



FOSS4G 2018

Abstracts collection

About this document

This document contains the abstracts for the FOSS4G conference in Dar es Salaam. It is presented as a draft overview for those of you which would prefer to have a version available for print.

We would like to refer to our webpages and the Attendify app for the most up to date overviews of the presentations at the conference.

We, the program committee, expect several changes to this document before the conference starts in August. It is therefore presented as is.

Sincerely,

A handwritten signature in blue ink that reads "Ragnvald Larsen". The signature is written in a cursive style and is positioned above a horizontal blue line.

Ragnvald Larsen

Programme chair, FOSS4G 2018, Dar es Salaam

Categories

The following categories and sub-categories are used.

| Main categories | Number of presentations in category |
|------------------------|--|
| Academic | 23 |
| Big data | 11 |
| Bridging the gaps | 15 |
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| Catalogue systems | 7 |
| CGIAR/SIIL | 29 |
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| Drones | 6 |
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| Meeeting new projects | 15 |
| Open data | 6 |
| OSGEO community | 15 |
| Panel | 7 |
| PostGIS | 6 |
| QGIS | 11 |
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| SDG | 14 |
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Program overview

The numeric overview shows where the different presentations are placed by room, day and time.

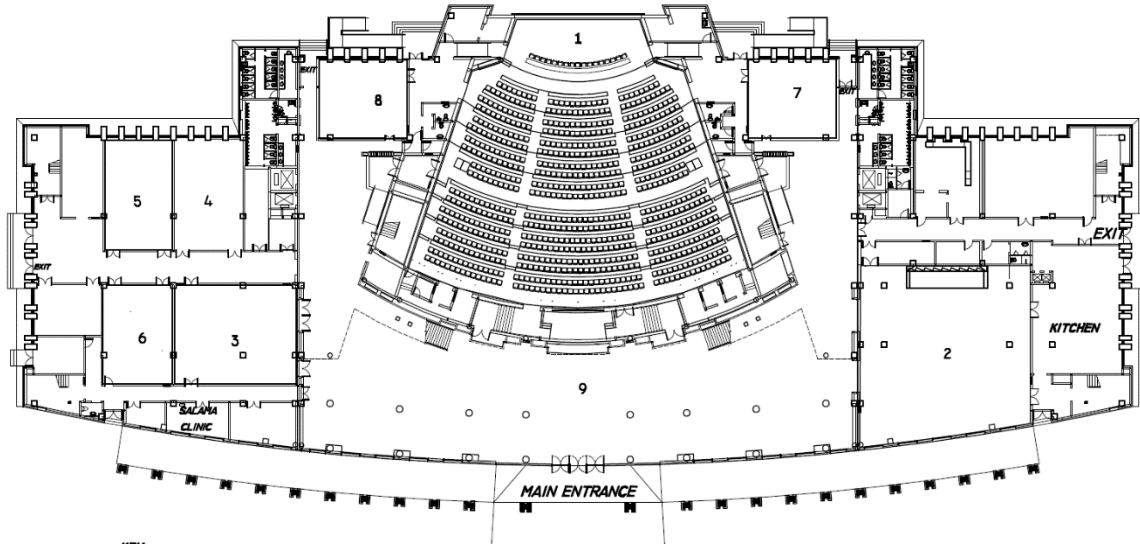
| Day | Date | Room | Selous | Ruaha | Mikumi | Mafia | Bagamoyo | Amboni | Saadani | Kitulo | Ngorongoro | Udzungwa | Gombe | Katavi | Main | Small | | |
|-----------|------------|---------------|--------|---------------------------------|--------|-------|----------|--------|---------|--------|------------|----------|-------|--------|------|-------|------|-----|
| Wednesday | 08/29/2018 | 11:00 – 11:30 | | 2001 TURP FY18 RECA | | 119 | 392 | 164 | 224 | 257 | 145 | 86 | 347 | 51 | 151 | 240 | 14 | |
| Wednesday | 08/29/2018 | 11:30 – 12:00 | | Kyoung-Soo Eom Panel Discussion | | 286 | 428 | 290 | 230 | 88 | 307 | 90 | 349 | 23 | 113 | 100 | 78 | |
| Wednesday | 08/29/2018 | 12:00 – 12:30 | Free | Exhibition Openi | | 150 | 393 | 189 | 246 | 299 | 312 | 133 | 140 | 54 | 117 | 272 | 123 | |
| Wednesday | 08/29/2018 | 13:30 – 14:00 | | 147 Innovations in Ri | | 255 | 395 | 262 | 332 | 335 | 91 | 203 | 175 | 19 | 207 | 93 | 139 | |
| Wednesday | 08/29/2018 | 14:00 – 14:30 | | 293 | | 366 | 397 | 239 | 344 | 112 | 201 | 238 | 223 | 16 | 243 | 327 | 144 | |
| Wednesday | 08/29/2018 | 14:30 – 15:00 | | 361 Community Enga | | 253 | 414 | 76 | 383 | 161 | 208 | 258 | 267 | 22 | 278 | 166 | 162 | |
| Wednesday | 08/29/2018 | 15:00 – 15:30 | | 365 | | 247 | 429 | 212 | 351 | | 287 | Free | 271 | 143 | 47 | 298 | 213 | 176 |
| Wednesday | 08/29/2018 | 15:30 – 16:00 | | 81 | | 380 | 408 | 270 | 264 | Free | Free | 279 | 137 | 18 | 310 | 353 | 179 | |
| Thursday | 08/30/2018 | 10:00 – 10:30 | | 2002 The Msimbazi Ex | | 249 | 396 | 336 | 125 | 387 | 305 | 337 | 416 | 49 | 182 | 330 | 115 | |
| Thursday | 08/30/2018 | 10:30 – 11:00 | | | | 313 | 405 | 146 | 205 | 187 | 231 | 341 | 415 | 35 | 206 | 350 | 157 | |
| Thursday | 08/30/2018 | 11:30 – 12:00 | | 2003 The Tanzania Aj | | 317 | 379 | 169 | 328 | 291 | 233 | 342 | 407 | 8 | 304 | 225 | 265 | |
| Thursday | 08/30/2018 | 12:30 – 13:00 | | | | 121 | 412 | 160 | 273 | 254 | 256 | 87 | 417 | 9 | 129 | 165 | 266 | |
| Thursday | 08/30/2018 | 13:00 – 13:30 | | | | 359 | 398 | 64 | 301 | 302 | 378 | 217 | 62 | 59 | 134 | 131 | 180 | |
| Thursday | 08/30/2018 | 14:30 – 15:00 | | 2004 Resilience Acade | | 364 | 409 | 236 | 94 | 388 | 89 | 357 | 402 | 92 | 234 | 130 | 320 | |
| Thursday | 08/30/2018 | 15:00 – 15:30 | | | | 248 | 403 | 114 | 191 | 389 | 211 | 13 | 434 | 15 | 343 | 128 | 345 | |
| Thursday | 08/30/2018 | 16:30 – 17:00 | | 2005 UR.TZ | | 96 | 399 | 360 | 170 | 98 | 260 | 73 | 417 | 103 | 352 | 122 | 232 | |
| Thursday | 08/30/2018 | 17:00 – 17:30 | | | | 295 | 700 | 311 | 171 | 102 | 268 | 368 | 281 | 36 | 375 | 107 | 252 | |
| Thursday | 08/30/2018 | 17:30 – 17:50 | | | | 356 | Free | | 334 | 172 | 277 | 219 | 370 | 56 | Free | Free | 261 | |
| Friday | 08/31/2018 | 09:45 – 10:05 | Free | | 183 | 115 | Free | | 202 | 226 | 184 | 156 | 159 | 340 | 4 | Free | 500 | 386 |
| Friday | 08/31/2018 | 10:05 – 10:30 | | | 141 | 254 | 344 | 325 | 333 | 155 | 374 | 306 | 373 | 42 | 450 | 500 | Free | |
| Friday | 08/31/2018 | 11:00 – 11:30 | | 2005 | 124 | 321 | 80 | 362 | 346 | 269 | 354 | 300 | 153 | 48 | 450 | 500 | Free | |
| Friday | 08/31/2018 | 11:30 – 12:00 | | | 190 | 322 | 105 | 235 | 10 | 244 | 309 | 126 | 193 | 24 | 450 | 500 | Free | |
| Friday | 08/31/2018 | 12:30 – 13:00 | | 2006 | 197 | 367 | 372 | 196 | 111 | 274 | 241 | 74 | 188 | 38 | 450 | 500 | Free | |
| Friday | 08/31/2018 | 13:00 – 13:30 | | | 222 | 283 | 127 | 250 | 289 | 276 | 419 | 280 | 218 | 338 | 450 | 500 | Free | |

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| Day | Date | Room | Selous | Ruaha | Mikumi | Mafia | Bagamoyo | Amboni | Saadani | Kitulo | Ngorongoro | Udzungwa | Gombe | Katavi | Main | Small |
|-----------|------------|-------------|-------------------|-------|----------------------|-----------------|-----------------|----------------------|-------------------|----------------|-----------------|-----------------|-------------|---------------|----------------------|-----------------|
| Wednesday | 08/29/2018 | 11:00-11:30 | Panel | | OGIS | CGIAR/SIIL | Geonode | Meeting new projects | Catalogue systems | Remote sensing | OSGEO community | Mapping systems | Academic | Big data | Meeting new projects | Mapping systems |
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| Wednesday | 08/29/2018 | 13:30-14:00 | Bridging the gaps | | OGIS | CGIAR/SIIL | Drones | Meeting new projects | Catalogue systems | Remote sensing | OSGEO community | Disaster | Academic | Big data | Open data | Mapping systems |
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| Thursday | 08/30/2018 | 10:00-10:30 | Panel | | Bridging the gaps | CGIAR/SIIL | PointGIS | Crowdsourcing | Environment | SDG | OSGEO community | CGIAR/SIIL | Academic | Crowdsourcing | Geoserver | Mapping systems |
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| Thursday | 08/30/2018 | 15:00-15:30 | | | Bridging the gaps | CGIAR/SIIL | OGIS | Crowdsourcing | Environment | SDG | OSGEO community | CGIAR/SIIL | Academic | Government | Geoserver | The library |
| Thursday | 08/30/2018 | 16:30-17:00 | | | Bridging the gaps | CGIAR/SIIL | OGIS | Mapping systems | Environment | SDG | Cartography | CGIAR/SIIL | Academic | Government | Geoserver | The library |
| Thursday | 08/30/2018 | 17:00-17:30 | | | Bridging the gaps | CGIAR/SIIL | Big data | Mapping systems | Environment | SDG | Cartography | Crowdsourcing | Academic | Government | Geoserver | The library |
| Thursday | 08/30/2018 | 17:30-17:50 | | | Bridging the gaps | CGIAR/SIIL | Big data | Mapping systems | Environment | SDG | Cartography | Crowdsourcing | Academic | Government | Geoserver | The library |
| Friday | 08/31/2018 | 09:45-10:05 | | | Meeting new projects | Mapping systems | Mapping systems | Crowdsourcing | Environment | SDG | Remote sensing | The library | Academic | | HOTOSM | CGIAR/SIIL |
| Friday | 08/31/2018 | 10:05-10:30 | | | Meeting new projects | Mapping systems | Mapping systems | Crowdsourcing | Environment | SDG | Remote sensing | Government | Academic | CGIAR/SIIL | HOTOSM | |
| Friday | 08/31/2018 | 11:00-11:30 | Panel | | Meeting new projects | Mapping systems | Mapping systems | Government | Big data | SDG | Remote sensing | Government | Academic | CGIAR/SIIL | HOTOSM | |
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| Friday | 08/31/2018 | 13:00-13:30 | | | Meeting new projects | Mapping systems | OGIS | Government | Education | Disaster | Remote sensing | Government | The library | CGIAR/SIIL | HOTOSM | |

Venue maps

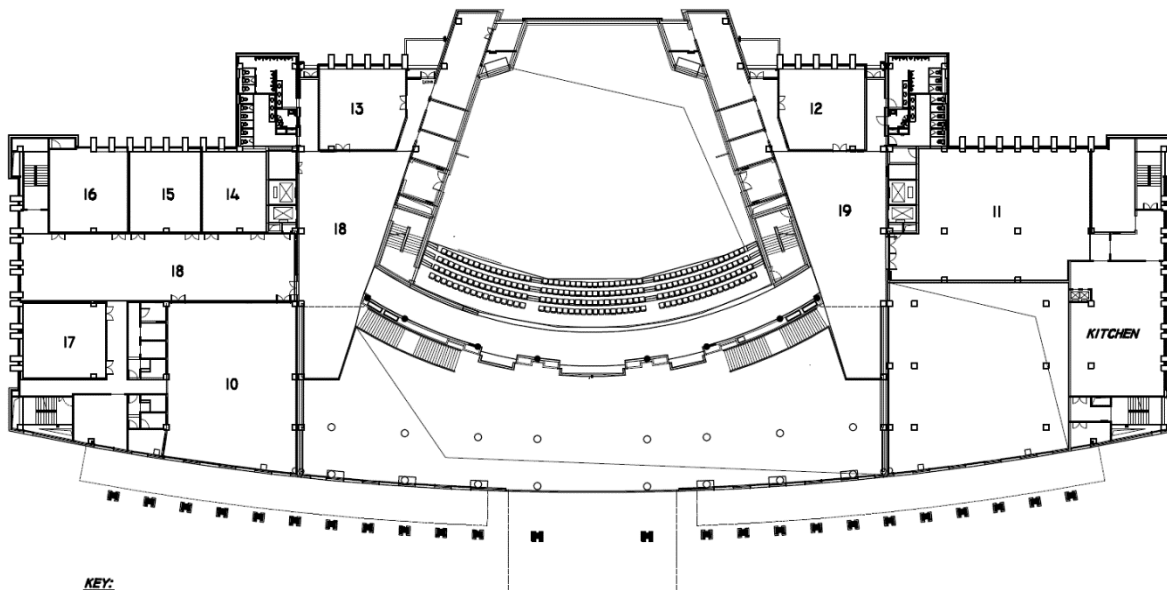
JNICC GROUND FLOOR PLAN



KEY:

- | | | |
|--|--|--|
| 1. SELOUS HALL, AREA: 1138.50 M ² | 4. SAADANI ROOM, AREA: 98.43 M ² | 7. BUTIAMA VIP ROOM, AREA: 90 M ² |
| 2. RUAHA HALL, AREA: 380.20 M ² | 5. UDZUNGWA ROOM, AREA: 97.31 M ² | 8. MSASANI VIP ROOM, AREA: 90 M ² |
| 3. MKOMAZI HALL, AREA: 145.90 M ² | 6. MAFIA ROOM, AREA: 90.23 M ² | 9. VICTORIA LOBBY, AREA: 885 M ² |

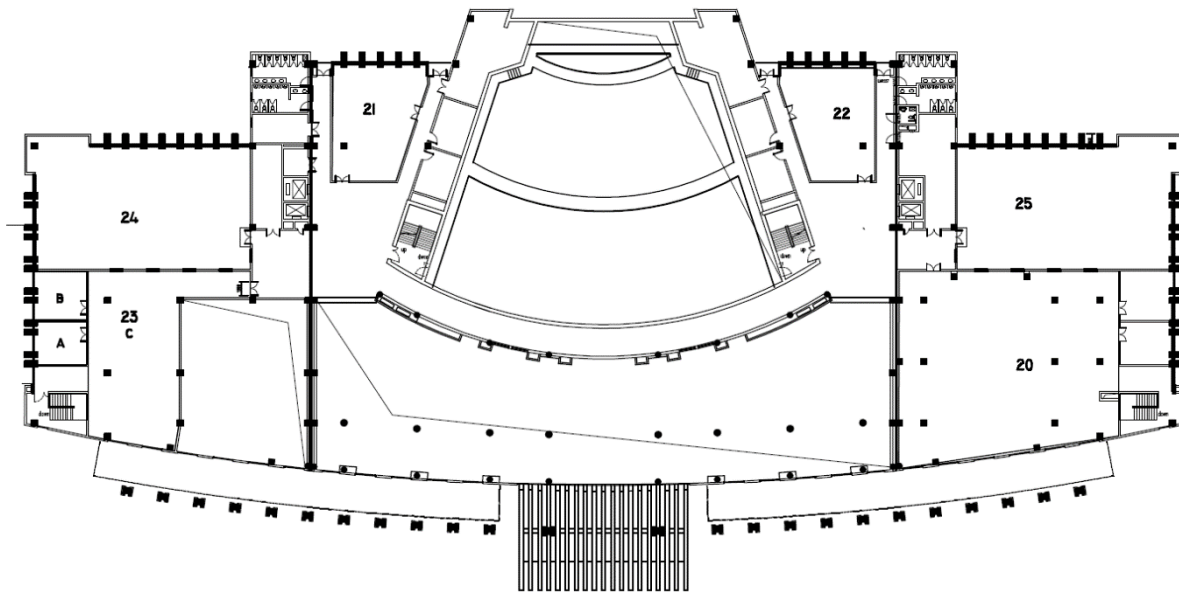
JNICC FIRST FLOOR PLAN



KEY:

- | | | |
|--|---|---|
| 10. MIKUMI HALL, AREA: 224.60M ² | 13. OLDUVAI GORGE HALL, AREA: 81.53M ² | 16. BAGAMOYO ROOM, AREA: 75.44 M ² |
| 11. MOUNT MERU HALL, AREA: 262.30 M ² | 14. KATAVI ROOM, AREA: 67.70 M ² | 17. AMBONI ROOM, AREA: 72.26 M ² |
| 12. KITULO HALL, AREA: 81.73 M ² | 15. GOMBE ROOM, AREA: 67.90 M ² | 18. TANGANYIKA LOBBY, AREA: 422.64 M ² |
| | | 19. NYASA LOBBY, AREA: 109.70 M ² |

JNICC SECOND FLOOR PLAN



KEY:

20. MOUNT KILIMANJARO HALL, AREA: 490.35M²

21. NGORONGORO HALL, AREA: 117.20 M²

22. LAITOLI HALL, AREA: 117.20 M²

23. JNICC OFFICES

A. MANAGERS OFFICE, AREA: 26.45M²

B. BOARD ROOM, AREA: 30.83M²

C. POOL OFFICE, AREA: 211.32M²

24. STONE TOWN TERRACE, AREA: 330.60M²

25. PEMBA TERRACE, AREA: 330.60M²



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Presentations overview

In the following sub-chapters you will find all currently registered abstracts.

Open Network for Local Self Sustainability, boosting bioregional development through an open data sharing system. (#4)

| | |
|-------------|--|
| Authors: | Matteo Clementi, Carlotta Fontana, Alessandro Rogora |
| Categories: | Academic |
| Date: | 08/31/2018 |
| Time: | 09:45 - 10:05 |
| Room: | Gombe |

The paper presents an online geodatabase currently under development. Its name is Open NETWORK for Local Self Sustainability and the website address is www.oloss.net. The goal of this platform is to publish and share information about production and consumption chain oriented towards the use of locally available resources. To this end, it provides an open standard of supply chains georeferenced representation, and the ability to georefer data generally used in the context of life cycle analysis of products and services.

This standard has the purpose of representing production and consumption chains in the form of Impact Geographies (IGs). This database may provide public administration centers, research centers, NGOs, planners and designers with information useful to develop projects geared towards the optimal use of local resources, consistent with the bioregional development paradigm (Sale, 1985) (Scudo, 2016). The bioregional approach promotes trans-scalar regional supply and demand chains where food and energy are grown, produced, sold and consumed within a certain territorial unit.

Linked Data Viewing as part of the Spatial Data Platform of the Future (#8)

| | |
|-------------|---|
| Authors: | Erwin Folmer, Wouter Beek, Laurens Rietveld |
| Categories: | Academic |
| Date: | 08/30/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Gombe |

The Land Registry and Mapping Agency of the Netherlands ('Kadaster' in Dutch) is developing an online publication platform for sharing its geospatial data assets called KDP ('Kadaster Data Platform' in Dutch). One of the main goals of this platform is to better share geospatial data with the wider, web-oriented world, including its developers, approaches, and standards. Linked Open Data (W3C),

GeoSPARQL (OGC), and Open APIs (OpenAPI Specification) are the predominant standardized approaches for this purpose. As a result, the most important spatial datasets of the Netherlands – including several key registries – are now being published as Linked Open Data that can be accessed through a SPARQL endpoint and a collection of REST APIs.

In addition to providing raw access to the data, Kadaster Data Platform also offers developers functionalities that allow them to gain a better understanding about the contents of its datasets. These functionalities include various ways for viewing Linked Data.

This paper focuses on two of the main components the Kadaster Data Platform is using for this purpose: FacetCheck and Data Stories.

Projects based on the Web Processing Service framework Birdhouse (#9)

| | |
|-------------|--|
| Authors: | Carsten Ehbrecht, Tom Landry, Nils Hempelmann, David Huard, Stephan Kindermann |
| Categories: | Academic |
| Date: | 08/30/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Gombe |

Birdhouse is a collaborative project open for the community to participate. It is a software framework containing a collection of Web Processing Services (WPS). The deployed algorithms are focusing on Earth Systems and environmental data processing with the philosophy of streamlining the software development and deployment. By supporting climate, earth observation and biodiversity data and processes, Birdhouse can be used in a wide array of Earth sciences projects and workflows.

The core benefit of this project is to allow the seamless use of climate services developed by a diverse network of national meteorological offices, regional climate service providers, academics, not-for-profit research centers and private industry. As governments move toward open-data policies, there will be a need for analytical services that extract value out of the deluge of information. Using an interoperable software architecture, institutions can provide both data and services allowing users to process the data remotely from a laptop, instead of having to acquire and maintain large storage infrastructures.

Geographic Technological Solution for web map viewers. Application case Sistema de Información Predial Urbano de Pitalito "SIPUP" (#10)

| | |
|-------------|--|
| Authors: | Katheryn Zulay Peraza Hernandez, Javier Andres Tamayo Peña |
| Categories: | Government B - Land ownership |
| Date: | 08/31/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Amboni |

Geographic Technological Solution for web map viewers. Application case "SIPUP" - Pitalito's Urban Property Information System of Pitalito.

Currently in local governments or Mayor's offices of Colombia, budgets are insufficient to implement technological tools that allow to share, to view and to consult the geographic and cartographic information of their territories. The lack of Geographic Information Systems tools to manipulate information and maps through web map viewers, limit an accurate decisions making in the local territory planning.

It is fragmented with the information and communications technology of Colombia's Digital Government strategy and delaying the effective provision of information services to the citizens. The governmental entities could have these tools by the free software platforms which enable economic solutions and stable implementations that allow managing geographic data, design and set up maps and display them in a web map application, easily to access and use.

El Sistema de Información Predial de Pitalito SIPUP (The Urban Property Information System of Pitalito) is the postgraduate Geographic Information Systems Project. it provides a geographic technological solution using free software and allows to obtain a web map viewer with functionalities that improve the geographic information consults and visualization processes for entities with low resources in the technology acquisition such as Mayor's offices.

Pitalito is located in the Huila's department, where the project was developed. Pitalito has a strategic location and is the largest Colombia's coffee producer, that is why it has had a great urban growth in recent decades. Because of that the need of supporting the Mayor's Office with a map tool development was created. It supports the territory management and improves the response time to information requests by citizens due to the urban building documental processing.

The SIPUP map viewer is easy to access, use and it allows to do quickly queries on the map about property basic information to know its environment variables and contextualize its geographic location with the purposes of Use Land Planning. Previously, this task was done with several days because the related information was decentralized and it was in different formats (analog and digital). Nowadays, using the web map viewer this task is done in minutes. According to it, SIPUP is considered a technological solution made with free software that strengthens the Pitalito's municipally planning and Territorial Development. Therefore, the Pitalito's task force and the community can query maps and the information related with their properties.

Storing and managing geographic information was made using PostgreSQL database management system and its PostGIS complement. SIPUP map viewer was set up with QGIS software as geographic platform. The Desktop software component was used for the map design and manager connections to the database. Server software component allowed geographic web services publication and finally, Web Client software component kept the deployment for web map application.

Digital mapping as a help to local development (#13)

| | |
|-------------|-------------------------------|
| Authors: | Hoavonon Agbessi-Anake |
| Categories: | OSGEO community C - Solutions |
| Date: | 08/30/2018 |
| Time: | 15:00 - 15:30 |
| Room: | NgoroNgoro |

OpenStreetMap Togo (OSM Togo) is an association who is consisted of people convinced of the importance of digital mapping in the development of our country. It is in this sense that the association OSM Togo with the help of its partners decided to train annually, the agents of development of cities and localities in OpenStreetMap digital cartography and in Free Geomatics.

The objective of these trainings is to discover, to provide tools of decision support to the agents of development of the local communities (representatives of the public power, the associations, the NGOs and even the private individuals).

Moving an application on drought monitoring from Oracle Spatial to PostGIS, An attempt to develop webgis in developing countries (#14)

| | |
|-------------|-------------------------------------|
| Authors: | Alfred de Jager |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/29/2018 |
| Time: | 11:00 - 11:30 |

Room: Small

In 2017 we created an Open-source software based web-server for the South and Central American Drought Observatory. The original server was based on Oracle Spatial, R, PHP and Mapserver in a Linux Apache environment and built in Italy.

A research organization in Ecuador adapted the software to function with PostgreSQL and PostGIS and managed to restore all functionalities inside the new platform. Functionalities include complex statistical computations using R up to refined web-mapping using a set of high resolution gridded data which can be analyzed by users using various web interfaces.

The challenge proved more to be in the creation of a user base that is both knowledgeable on Web GIS as well as on drought disaster research. The technical challenges were solvable but the institutional challenges, how can research agencies retain access to skilled programmers, proved more difficult.

We attempt to do similar transfers of knowledge and software to other South American countries such as Brazil and Argentina. The next challenge is to start diffusing similar platforms in Africa in order to create a vibrant WebGIS community and better access for the citizen to understand the extent of environmental problems.

The use of the UAV images for the building 3D model generation (#15)

Authors: Giuseppina Vacca, Aldo Banni, Andrea Dessi, Giuseppe Furfaro

Categories: Academic

Date: 08/30/2018

Time: 15:00 - 15:30

Room: Gombe

The growing interest in recent years in Unmanned Aerial Vehicles (UAVs) by the scientific community, software developers, and geomatics professionals, has led these systems to be used more and more widely, in different fields of engineering and architecture. This is thanks, above all, to their flexibility of use and low cost compared to traditional photogrammetric flights using expensive metric digital cameras or LiDAR sensors.

In recent years, UAVs have also been used in the field of monitoring and inspection of public or private buildings that are remarkable in terms of size and architecture. This is mainly due to the focus on sustainability and resource efficiency in the building and infrastructure sector, which aims to extend their lifetimes. Through the use of remote checking using UAVs, the monitoring and inspection of buildings can be brought to a new level of quality and saving.

Fostering pre-university student participation in OSGeo through the Google Code-in competition (#16)

| | |
|-------------|--|
| Authors: | Victoria Rautenbach, Margherita Di Leo, Verónica Andreo, Luca Delucchi, Helmut Kudrnovsky, Jeff McKenna, Sergio Acosta Y Lar |
| Categories: | Academic |
| Date: | 08/29/2018 |
| Time: | 14:00 - 14:30 |
| Room: | Gombe |

The Open Source Geospatial Foundation's (OSGeo) vision is to empower everyone, from pre-university students to professionals, with open source geospatial applications, tools and resources. In 2017, OSGeo decided to participate for the first time in the Code-in competition. Google Code-in (GCI) is an annual online competition aimed at introducing pre-university students (13-17 years) to open source projects, development and communities, through short 3-5 hour tasks. This is a unique opportunity to interact with pre-university students and to encourage them to become part of OSGeo.

In this paper, we present OSGeo's involvement in GCI with the purpose of establishing lessons learned to improve our approach in the next editions of GCI. Over the 51 days of the competition, 279 students completed 649 OSGeo tasks. Students consistently communicated with the mentors to discuss submission and receive inputs from the wide community of developers too. During the GCI, the mentors reviewed the students' work and provided suggestions and feedback. Generally, the submissions were good and some of them are now part of the projects. As this was our first time participating in GCI these issues are seen as lessons learned and strategies to improve the process will be implemented based on the mentors' experience. It is key to encourage these students to continue contributing to the OSGeo community, as they will bring new energy and ideas into the organisation; for many of these young students, this competition is a way to introduce them to the geospatial industry.

A semi-automatic procedure for a demographic analysis of the FOSS4G developers' community (#18)

| | |
|-------------|--|
| Authors: | Daniele Oxoli, Haekyong Kang, Maria Antonia Brovelli |
| Categories: | Academic |

Date: 08/29/2018
Time: 15:30 - 16:00
Room: Gombe

The open and direct collaboration at the creation, improvement, and documentation of source code and software applications - enabled by the web - is recognized as a peculiarity of the Free and Open Source Software for Geospatial (FOSS4G) projects representing, at the same time, one of their main strengths. With this in mind, it turns out to be interesting to perform an extensive monitoring of both the evolution and the geographical arrangement of the developers' communities in order to investigate their actual extension, evolution and degree of activity. In this work, a semi-automatic procedure to perform this particular analysis is described.

The procedure is mainly based on the use of the GitHub Search Application Programming Interface by means of JavaScript custom modules to perform a census of the users registered with a collaborator role to the repositories of the most popular FOSS4G projects, hosted on the GitHub platform. The collected data is processed and analysed using Python and QGIS. The results - presented through tables, charts, and thematic maps - allow describing both dimensions as well as the geographical heterogeneity of the contributing community of each individual project, while enabling to identify the most active countries - in terms of the number of contributors - in the development of the most popular FOSS4G. The limits of the analysis, including technical constraints and considerations on the significance of the developers' census, are finally highlighted and discussed.

[Towards understanding the impact of mapathons – Reflecting on YouthMappers experiences \(#19\)](#)

Authors: Serena Coetzee, Marco Minghini, Patricia Solis, Victoria Rautenbach, Cameron Green
Categories: Academic
Date: 08/29/2018
Time: 13:30 - 14:00
Room: Gombe

YouthMappers is a global network of student chapters actively engaged in collaborative mapping efforts, such as OpenStreetMap mapathons. Many questions have been raised about the impact of mapathons on open map data and on the participating mappers. For example, how can the social gathering and event format encourage productivity and quality, while also contributing to community building? Because YouthMappers chapters regularly host mapathons, there are frequent

opportunities to investigate the impact of mapathons. In this paper, three universities involved in the YouthMappers network, located in Europe, North America and Africa, describe how mapathons are conducted at their respective universities. Incorporating mapathons into the curriculum encourages students to contribute much-needed open geospatial data for humanitarian projects. At the same time, students get practical experience in data capturing with open source tools and awareness is raised of humanitarian challenges in other parts of the world, thus nurturing socially engaged citizens for the future. The experiences at the three universities are diverse and richly contextual to the specific character of the campus and its students. These differences underscore the challenge of a common means to formally assess the impact of such events in general. Based on this exploratory research, three themes for assessing the impact of mapathons are proposed: the volume and quality of open geographic data produced during mapathons; the social and personal growth of the students attending the mapathons; and the changes in university programs and curricula introduced as a result of the mapathons.

Capacity Building for High-Resolution Land Cover Intercomparison and Validation: what is available and what is needed (#22)

| | |
|-------------|--|
| Authors: | Maria Antonia Brovelli, Hao Wu, Marco Minghini, Xinyan Zheng, Monia Elisa Molinari, Jun Chen |
| Categories: | Academic |
| Date: | 08/29/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Gombe |

Land Cover (LC) maps are fundamental products for a wide variety of applications. The workflow for their production is composed of classification of satellite imagery and validation against a reference dataset. Different LC maps as well as multiple versions in time of the same LC map can be also compared with one another to assess LC changes. Since the current richness of both space and in-situ observations makes it quite easy to produce LC maps, it is fundamental to assess their accuracy before using them for real applications. This paper focuses on education and capacity building on the intercomparison and validation of global (i.e. covering the whole world) and high-resolution (i.e. with a spatial resolution of at least 30 m) LC maps. The availability of Free and Open Source for Geospatial (FOSS4G) technology capable to process LC maps, as well as the existence of ad hoc educational material, is carefully assessed. In parallel, an ad hoc survey has showed that users, especially in developing countries, often lack awareness about the need to validate them and are not aware about the existence of training material. With this premise, a new project presented in the paper aims to

produce new, openly licensed and FOSS4G-based training material on the intercomparison and validation of global high-resolution LC maps.

Mapping Spatial Distribution of Mangrove Forest in Mafia Island in Tanzania Using Landsat-8 OLI Imagery and in situ data (#23)

Authors: Joseph Stephen Mayunga, Guido A. UHINGA

Categories: Academic

Date: 08/29/2018

Time: 11:30 - 12:00

Room: Gombe

Mangroves are important for survival of coastal communities as they provide ecosystem services that support coastal population and their livelihoods. Most coastal communities largely depend on ecosystem services provided by mangroves such as fuel wood, building poles, charcoal, and also mangroves provide spawning ground for coastal fishes. Most importantly mangroves act as a buffer that protects coastal communities from natural hazards such as tropical storms, strong winds, beach erosion, and even tsunamis. Despite the important role that mangroves play, yet mangroves are under serious threat to extinction worldwide. Many mangrove-rich developing countries, including Tanzania, are facing challenges in establishing effective management plans to protect increasingly threatened mangrove ecosystems. Most of these challenges are associated with inadequate or nonexistent of up-to-date and accurate geospatial information. Knowledge on extent and spatial distribution of mangroves is critical in planning and effective management of mangroves. The aim of this study was to assess the spatial and temporal distribution of mangroves in Mafia Island using remotely sensed data for three decades (1985-2013). Results revealed a decrease of mangroves from 3,708.36 ha in 1985 to 3,187.25 ha in 2013. From the spatiotemporal dimension point of view, the results show that overall mangroves in Mafia Island have been gradually decreasing over time. This trend suggests a decline rate of about 14% for the period of 28 years, which is an average rate of 0.5% per year. This rate of mangrove loss should not be underestimated; effective protection measures and sustainable utilization of mangrove resources are needed.

Developing a Land Cover Classification of Salt Marshes using UAS Time-Series Imagery and FOSS4G (#24)

Authors: Daniel Myers, Ryan Wicks, Forrest Bowlick, Charlie Schweik
Categories: Academic
Date: 08/31/2018
Time: 11:30 - 12:00
Room: Gombe

Salt marsh ecology classification is difficult using traditional coarse resolution remote sensing techniques. Salt marshes exhibit a spatial pattern of vegetation zonation that are visually identifiable using imagery that has an improved 0.04 meter per pixel resolution. This project applies high resolution unmanned aerial system (UAS) imagery to aid in multi-temporal classification of our study area (Horseneck Beach) in Westport, Massachusetts, USA. We flew a DJI Phantom Pro 3 at low- and high-tide to capture effects the changing tide has on vegetation in an effort to predict effects of the rising sea level on saline plant species. We implement an open source software workflow using OpenDroneMap and the Semi-Automatic Classification Plugin for QGIS to create the necessary orthomosaics and to conduct vegetation classification required of this project. We compare land cover classifications using one-time-point RGB imagery to a multi-time-point (low tide, high tide) RGB image stack to investigate whether the multi-time point stack improves land cover classification accuracy. We find it does. More generally, this paper provides a model for others wishing to use low-cost UAS equipment carrying a simple low-cost RGB camera, and free and open source for geospatial (FOSS4G) tools, to develop multi-band image stacks to improve land cover classification accuracy. Further, we provide some reflections and technical notes on our experience. The approach we present here could be extended to include other image layers that UAS can provide when equipped with other sensors, such as multi-spectral (e.g., NIR, thermal), or by adding another band with photogrammetry-produced digital elevation data.

[Electricity infrastructure planning: Evaluating solar potential assessments for informal settlements using GRASS and freely available data \(#35\)](#)

Authors: Luqmaan Hassim, Serena Coetzee, Victoria Rautenbach
Categories: Academic
Date: 08/30/2018
Time: 10:30 - 11:00
Room: Gombe

Informal settlements, also known as slums or shanty towns, are characterised by rapid and unstructured expansion, poorly constructed buildings, and in some cases, they are on disputed land. Such settlements often lack basic services, such as electricity. As a result, informal settlement dwellers turn to hazardous alternative sources of energy, such as illegal electricity connections and paraffin. Solar power is a clean and safe alternative. However, informal settlements are often located on undesirable land on the urban fringe where the topography may hinder the use of solar energy. The high density of dwellings could also be a hindrance. Therefore, the solar potential needs to be assessed before any implementations are planned. Solar potential assessment functionality is generally available in geographic information system (GIS) products. The nature, cost and accessibility of datasets required for the assessment vary significantly. In this paper, we evaluate the results of solar potential assessments using GRASS (Geographic Resources Analysis Support System) for a number of different datasets. The assessments were done for two informal settlements in the City of Tshwane (South Africa): Alaska, which is nestled on a hill; and Phomolong, a densely populated settlement with a rather flat topography. The results show that solar potential assessments with open source GIS software and freely available data are feasible. This eliminates the need for lengthy and bureaucratic procurement processes and reduces the financial costs of assessing solar potential for informal settlements.

Improving Path Query Performance In pgRouting using A Map Generalization Approach (#36)

Authors: Rohith Reddy Sankepally, K.S Rajan

Categories: Academic

Date: 08/30/2018

Time: 17:00 - 17:30

Room: Gombe

pgRouting library provides functions to compute shortest path between any two points of a road network which is of great demand and also a topic of interest in the field of GIS, graph theory and transportation. To compute path in a road network, pgRouting functions process the entire road network which is a major bottleneck when it comes to routing in large road networks leading to the requirement of large server resources. A reduction/compression in the input network that is to be processed for path computation would improve the performance of pgRouting. In this study a map generalization based network model is proposed which extracts a significantly smaller subset of the road network aka skeleton which further used to divide the network into zones, that shall be selectively used in path computation. This results in processing a much smaller part of the network to compute path between any two points leading to an overall improvement in query performance of pgRouting when computing path, especially on large road networks. As part of assessment of this

approach and its applicability to large road networks, the paper presents an in-depth analysis of the trade-offs between deviation in computed path and the performance gain in terms of space and time on road networks of varying sizes and topology to get a better understanding for both providing a sound proof of the utility of the proposed method and also to show its implementability within the current model of pgRouting or any other routing platforms.

Redeployable, Open Standards, Open Source and Open Data Stack for building a Federated Marine Data Management and Decision Support System for South Africa (#38)

Authors: Graeme Mcferren, Raymond Molapo, Bryan McAlister

Categories: Academic

Date: 08/31/2018

Time: 12:30 - 13:00

Room: Gombe

The National Oceans and Coastal Information Management System (OCIMS) of South Africa is a large, integrated IT system for enhancing oceans, coastal and maritime governance, and supporting sustainable economic utilisation of ocean and coastal resources. This article is a case study, describing how a range of Free and Open Source Software are deployed to generate the Open Standards based core of this federated system for providing decision support applications in addition to data and information management, access and dissemination services. This article demonstrates the importance of modern software development and deployment approaches in constructing the OCIMS core and easing the integration process with other systems in the federation. Finally, this article discusses some lessons learned and reflects on the lineage of OCIMS architectural choices and how these approaches may need to adapt to changing computing environments

Coastal mapping and Kitesurfing (#42)

Authors: Julien Barde, Sylvain Bonhommeau, Emmanuel Chassot, Beenesh Motah

Categories: Academic

Date: 08/31/2018
Time: 10:05 - 10:30
Room: Gombe

Collecting data on aquatic biodiversity is very challenging because of the difficulty to access underwater ecosystems. Over the years, field surveys have become easier and cheaper with the development of low cost electronics. Commercial and recreational vessels, including sailboats, can now substantially complement expensive scientific surveys and arrays of observation buoys deployed across the world oceans (Pesant et al., 2015, Karsenti et al., 2011). Meanwhile, a large variety of marine animals such as birds, mammals, and fish have become data collection platforms for both biological and environmental parameters through the advent of archival tags. It becomes obvious that data collection in coastal and high seas will become more popular and that citizen will play a growing role in acquiring information on ocean dynamics (physical, chemical and biological parameters). However, currently, very few attempts have been made to use Human beings as observation platforms. In this paper we describe large datasets (more than 200,000 pictures) that have been recently collected along the coast of Mauritius by using popular and cheap platforms such as kite surf and Stand Up Paddle. We describe the characteristics of the data collected and showcase how they can be geolocated and used to complement remote sensing and mapping in order to drastically extend the current scope of "old school" fieldwork. We point out some of the main limitations encountered which need to be addressed to foster this citizen science approach such as data storage and transmission, deep learning to automate image recognition. The methods are all based on open source softwares.

[Building geospatial competences in Tanzanian Universities with open source solutions \(#47\)](#)

Authors: Niina Kayhko, Christopher William, Joseph Mayunga, Makame Omar Makame, Ernest Mauya, Antero Jarvi
Categories: Academic
Date: 08/29/2018
Time: 15:00 - 15:30
Room: Gombe

The GEO-ICT is an institutional cooperation project aiming at improving the quality and societal relevance of geospatial and ICT research and education at the Universities of Dar es Salaam (UDSM), Ardhi University (ARU), State University of Zanzibar (SUZA) and Sokoine University of Agriculture (SUA). Jointly with the University of Turku (UTU) Finland, the institutions focus on strengthening geospatial and ICT skills of the staff, establishing new curricula, upgrading supportive infrastructures

and creating synergetic cooperation modalities with different stakeholders in the society. In this paper we share how our practical experiences of the cooperation, including what is the background for the establishment of institutional cooperation between these universities, how is the project operating in practice, what type of activities and cooperation modalities we do together and how do we think institutional cooperation contributes to the advancement of geospatial expertise in Tanzania and what is the role of open source solutions in this development.

[An open source approach for the intrinsic assessment of the temporal accuracy, up-to-dateness, lineage and thematic accuracy of OpenStreetMap \(#48\)](#)

| | |
|-------------|---|
| Authors: | Marco Minghini, Maria Antonia Brovelli, Francesco Frassinelli |
| Categories: | Academic |
| Date: | 08/31/2018 |
| Time: | 11:00 - 11:30 |
| Room: | Gombe |

OpenStreetMap (OSM) is the most popular crowdsourced geographic information project. The main factor that still limits the practical use of OSM is the lack of quality assurance. OSM quality assessment is thus a well-studied topic in literature, with most of the studies evaluating the quality by comparison against reference datasets. In contrast to these extrinsic approaches, OSM intrinsic assessment evaluates the quality by only analysing OSM itself. This study contributes to OSM intrinsic assessment by introducing an open source procedure to evaluate the temporal accuracy, up-to-dateness and lineage of OSM. Two workflows are presented: the first allows accessing the historical evolution of single OSM objects through an interactive web application, while the second aggregates and stores results on a user-defined grid to enable further GIS processing. The methodology is applied on the OSM nodes in the city of Dar es Salaam, Tanzania, by computing the following measures on the cells of an hexagonal grid: total number of nodes, average date of creation and last edit of nodes, average update frequency of nodes, average number of versions of nodes, average and total number of different contributors on nodes. Results highlight the mapping dynamics driven by the Dar Ramani Huria project, focused on increasing flood preparedness and resilience. When moving from the peripheral areas to the city centre, OSM is characterized by a progressively higher density of nodes, created earlier in time and updated by a higher number of contributors, which are all indexes of a general higher data quality.

Overcoming data scarcity for energy access planning with open data – The example of Tanzania (#49)

Authors: Catherina Cader, Setu Pelz, Alin Radu, Philipp Blechinger

Categories: Academic

Date: 08/30/2018

Time: 10:00 - 10:30

Room: Gombe

The achievement of the United Nations Sustainable Development Goals (SDGs) is heavily influenced by access to data: Data is necessary to assess the current status quo as well as to measure progress and to find opportune contextualized solutions for development challenges. Specifically, the lack of energy access (as defined in SDG7) is an immense bottleneck for development in Tanzania and considering spatial planning plays a crucial role in locating the most appropriate electrification solution for each site; taking into account not only its inherent characteristics, such as local demand for electricity and economic activities, but also external factors such as the distance to existing energy transmission and distribution infrastructure.

Adoption of geospatial governance in the context of e-government in Tanzania: Addressing Bottlenecks in Spatial Data Infrastructure Development (#51)

Authors: Zakaria Ngereja, Evaristo Liwa, Francis Buberwa

Categories: Academic

Date: 08/29/2018

Time: 11:00 - 11:30

Room: Gombe

This study has developed a framework for adoption of geospatial governance in the context of e-government in Tanzania. After examining the governance of geospatial data, identify factors affecting governance of geospatial data, and proposed a framework that integrates e-governance and e-government. The research was undertaken to examine the understandings of geospatial governance, its challenges and to develop an institutional framework to guide the management of geospatial resources. Using documentary analysis, strategically designed interviews and questionnaire, and Focus Group Discussions, data was collected from a range of spatial data user community. Upon simple analysis of the data the following were the findings: First, the findings

revealed that spatial data is not well managed, reused and shared. Second, geospatial data it is not easily and readily available and accessible. Third, there is lack of coordination and collaboration among spatial data users and custodian. The study revealed that coordination and collaboration is very important if a nation wants to utilize effectively the massive amount of data scattered in various organizations. There is an urgent need of having common gateway for spatial data discovery and sharing, and to have a mechanism that ensures spatial data is collected, processed and analyzed with acceptable standards and having metadata. In view of the findings, the study recommends that geospatial governance integration with e-Government is indispensable. The study has come out with the SPOTES framework for geospatial governance in the context of e-government; the Government should adopt the framework and establish the National Spatial Data Infrastructure. This will ensure the institutional set-up for the governance of geospatial data in the country and key players, i.e. the private sector, government institutions, and NGOs should collaborate in data sharing to benefit the country's sustainable development.

Open Foris and Google Earth Engine linking expert participation with natural resource mapping and remote sensing training in Tanzania (#54)

| | |
|-------------|---|
| Authors: | Ulpu Leinonen, Joni Koskinen, Harun Makandi, Ernest Mauya, Niina Käyhkö |
| Categories: | Academic |
| Date: | 08/29/2018 |
| Time: | 12:00 - 12:30 |
| Room: | Gombe |

There is an increasing amount of open Earth observation (EO) data available, offering solutions to map, assess and monitor natural resources and to obtain answers to global and local societal challenges. With the help of free and open source software (FOSS) and open access cloud computing resources, the remote sensing community can take the full advantage of these vast geospatial data repositories. To empower developing societies, support should be given to higher education institutions (HEIs) to train professionals in using the open data, software and tools. In this paper, we describe a participatory mapping methodology, which utilizes open source software Open Foris and QGIS, various open Earth observation data catalogues, and computing capacity of the free Google Earth Engine cloud platform. Using this methodology, we arranged a collaborative data collection event, Mapathon, in Tanzania, followed by a training of the related FOSS tools for HEIs' teaching staff. We collected feedback from the Mapathon participants about their learning experiences and from teachers about the usability of the methodology in remote sensing training in Tanzania. Based on our experiences and the received feedback, using a participatory mapping campaign as a training

method can offer effective learning about environmental remote sensing through a real-world example, as well as networking and knowledge sharing possibilities for the participating group.

Hierarchical path planning for walking (almost) anywhere (#56)

Authors: Knut Landmark, Espen Messel

Categories: Academic

Date: 08/30/2018

Time: 17:30 - 17:50

Room: Gombe

Computerized path planning, not constrained to transportation networks, may be useful in a range of settings, from search and rescue to archaeology. This paper develops a method for general path planning intended to work across arbitrary distances and at the level of terrain detail afforded by aerial LiDAR scanning. Relevant information about terrain, trails, roads, and other infrastructure is encoded in a large directed graph. This basal graph is partitioned into strongly connected subgraphs such that the generalized diameter of each subgraphs is constrained by a set value, and with nominally as few subgraphs as possible. This is accomplished using the k-center algorithm adapted with heuristics suitable for large spatial graphs. A simplified graph results, with reduced (but known) position accuracy and complexity. Using a hierarchy of simplified graphs adapted to different length scales, and with careful selection of levels in the hierarchy based on geodesic distance, a shortest path search can be restricted to a small subset of the basal graph. The method is formulated using matrix-graph duality, suitable for linear algebra-oriented software. Extensive use is also made of public data, including LiDAR, as well as free and open software for geospatial data processing.

Implementation of a comprehensive and effective geoprocessing workflow environment (#59)

Authors: Rob Lemmens, Martin Schouwenburg, Bas Retsios, Chris Mannaerts

Categories: Academic

Date: 08/30/2018

Time: 13:00 - 13:30

Room: Gombe

Many projects and research efforts implement geo-information (GI) workflows, ranging from very basic ones to complicated software processing chains. The creation of these workflows normally needs considerable expertise and sharing them is often hampered by undocumented and non-interoperable geoprocessing implementations. We believe that the visual representation of workflows can help in the creation, sharing and understanding of software processing of geodata. In our efforts we aim at bridging abstract and concrete workflow representations for the sake of easing the creation and sharing of simple geoprocessing logic within and across projects.

Landcover classification with R and Google Earth Engine to predict Human-elephant conflict (#62)

Authors: Kate Tiedeman, Aniruddha Ghosh

Categories: CGIAR/SIIL

Date: 08/30/2018

Time: 13:00 - 13:30

Room: Udzungwa

Protected areas are a commonly used conservation measure, the success of which depends upon their relationship with the surrounding landscapes and human communities. Land use change, particularly conversion of wildlands to cropland, outside boundaries has potential negative consequences for protected areas. Conversion of wildlands to agriculture can indirectly lead to biodiversity loss by influencing landscape connectivity-- the degree that landscape facilitates or impedes species movement (Taylor et al. 1993, Luoto et al. 2003, Roschewitz et al. 2005). As reserves will likely never cover more than a fraction of the globe, landscape connectivity between reserves is essential to reserve function and conservation success.

Modeling a Spatial Data Base with PgModeler/PostgreSQL/PostGIS and Developing a Geoportal with MapBender (#64)

Authors: Baovola Marie Anna
Categories: PostGIS
Date: 08/30/2018
Time: 13:00 - 13:30
Room: Bagamoyo

To handle a functioning spatial database, I presume that knowing how to draw models is not only necessary but also an interesting way to start with. During my talk, I will firstly try to share with my audience the best way to begin creating a spatial database and then, will end by developing a Geoportal. Thus, we will principally focus on how to manipulate PgModeler an Open Source tool which is a PostgreSQL database Modeler that enables to create and edit database models. This tool is interesting because it can generate a SQL script. Afterward, I will show my audience a simplistic way of customizing their Geoportal without having any software development skills. Consequently, I will demonstrate the power of MapBender by exploring it.

At the end of my talk, my audience shall have a much better idea on how to create their personal or professional Spatial Database as well as their Geoportal. Some practical Geoportals by MapBender which are already available on line will be viewed. Obviously, the audience will learn that Spatial databases need models to be efficient. My audience will be the University students at licence level.

A love letter to cartography. (#73)

Authors: Kenneth Field
Categories: Cartography
Date: 08/30/2018
Time: 16:30 - 17:00
Room: NgoroNgoro

Dear cartography,

Where to even begin? I am writing to you today to remind you of how much I love you.

Yes, I know it's not a special occasion but I want to tell my friends and colleagues at the FOSS4G conference how much you mean to me. I've tried to express my love by writing you a book, and also sharing what you are, freely, through an online course. I'd like to explain a little of how I've poured my heart into these two special love letters to you.

You walked into my life nearly 30 years ago and even when life gets in the way and you make me so frustrated, I still love you more than marks on a map can describe. You are constantly on my mind as I go about my everyday business, either directly or subconsciously in the back of my head. You are with me in every single thing I do, and everywhere I go. You are my soul mate. You make my soul happy. You are my love, companion, and above all, my best friend. But others don't necessarily see you like that and so my efforts, recently, have been to explain the passion for you that awaits them all.

I want you to know that our relationship means everything to me, and that I simply could not survive in this crazy world without you. 'Cartographer' was recently identified as the number 1 job by U.S. News. And I hit the jackpot when I knew I wanted to spend my life with you. Making maps is also now a key requirement in UK schools. And yet cartographic education is in limbo. University courses have closed, professionally trained cartographers are dwindling in numbers and mapping is often not much more than a self-service activity. How could people fail to see what excitement you bring when you truly get to know how you are? There's a massive increase in map use, and democratization of mapping, of huge steps forward in proprietary, FOSS and cloud computing, and a reservoir of materials to aid the novice map-maker as they develop their crush into a fully-fledged relationship. Wither cartographic expertise? In a world that now showers affection on Google and Wikipedia, how do people learn of your tradecraft? How do I make people fall in love with you, like I did all those years ago?

I've written you a love letter in the form of a book but more than that, I want you to know why. By sharing my deepest thoughts; the trials and tribulations of how I started with a blank page over 10 years ago and the often fraught on-off relationship I've had with it ever since, I express my feelings to you in every page, every word and every map. I negotiated the anxiety of deciding what to include and what to leave out and precisely how many times I nearly gave up on you. I emphasize the importance of friends and colleagues who helped me when I felt you were undeserving.

I want to thank you for your continued support and faith in me as I journey through my endeavors. You have never once doubted me, told me I should give up, or told me that I could not do something. Your positivity and confidence in me continues to baffle me each day. I know that if I ever need a pick-me-up or someone to tell me, "Keep trying," or "Don't give up," I know I can turn to you. You are my support system and my fan club; my motivation to push myself and always reach for bigger and higher goals. You have taught me to believe in myself and to appreciate my own worth, a task that is not always easy. I have often sought your forgiveness when I make mistakes and hurt you with my daggering words and actions; yet your unwavering faithfulness in our relationship kept me returning.

If you ever feel like I am taking you for granted, please open up my book or the online course. Let them be a reminder of how I feel about our relationship and its worth to me and how sharing our love with the world hopefully shines a light on what it means to be a cartographer. Please remember how much I love you. I loved you the minute our scribe coat first met. I love you deeply, and I always will.

Ken x

PS – you’re pretty good between the map sheets too

PPS – this talk is about the backstory to writing a book and developing an online course. It’s not a sales pitch. It’s a collection of stories that explores the hidden work, challenges and often brutal reality of negotiating a path to get the jobs done.

Copernicus Emergency Mapping, the new phase with FOSS (#74)

| | |
|-------------|-----------------------------|
| Authors: | Simone Dalmaso |
| Categories: | Remote sensing B - Products |
| Date: | 08/31/2018 |
| Time: | 12:30 - 13:00 |
| Room: | NgoroNgoro |

The Copernicus EMS Mapping is the European Commission global service for Emergency Response. It is composed by two modules, Rapid Mapping and Risk & Recovery Mapping. Both components create free and open data derived from satellite imagery acquired during or right after an emergency. The Rapid Mapping component started testing the dissemination of data through FOSS systems, in particular with GeoNode, back in 2014 and now that both RM and RRM enter in a new phase, the FOSS software is going to be used heavily to build a system and a web portal where to find the data. Web services, APIs, web mapping, are all going to be created using innovative solutions, following the European Commission Open Source strategy.

Community Mapped elevation through “Differential Barometry” (#76)

| | |
|-------------|--|
| Authors: | Hessel Winsemius, Ivan Gayton, Kristen Tonga, Ka-Ping Yee, Frank Annor, Nick Van de Giesen |
| Categories: | Drones |
| Date: | 08/29/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Bagamoyo |

Detailed and accurate geospatial information on dimensions, connectivity and elevation of the drainage network is a prerequisite for understanding flood hazard and risk in complex urban water systems. Urban planning and disaster resilience can only be developed once this information is available. As part of the community mapping project “Ramani Huria”, a data collection protocol and data model have been developed for collection of this information. However, one variable remains highly problematic to collect accurately: the elevation of drainage elements. Elevation information is very necessary for urban flood modelling and risk evaluations. This holds true for tertiary drainage elements, where the relative elevation of each drainage element with respect to each other should be known, and primary drainage from natural streams. For primary drains, Structure from Motion photogrammetry may be used, but to relate the 3D point cloud to real elevation requires very accurate Ground Control Point (GCP) observations. Elevation points may be collected through differential GPS or RTK, but these techniques are too expensive and complicated to use within a community mapping context and are usually deployed by experts or specialised firms.

In this contribution, we demonstrate a prototype low-cost sensor and software solution to accurately estimate elevation through “differential barometry”. The principle of differential barometry is as follows. We measure the difference in pressure between a known base station with known elevation, and a point of interest, and solve the unknown elevation difference through the barometric formula. Literature review suggests that within a distance of 10 km, an accuracy of 80 cm can be achieved. The sensor is prototyped using a setup with Arduino Uno Rev3, and Bosch BMP280 pressure sensors, and a new set of meteorological stations that observe air pressure and are part of the Trans-African Hydro-Meteorological Observatory (TAHMO). The pressure differences and elevation computations are made using a prototype open-source Android app. The technology will contribute to Sustainable Development Goal 11 "Make cities and human settlements inclusive, safe, resilient and sustainable" by allowing local communities to map and understand their own city.

Beyond Pretty Pictures: Topographic Labels in 3D Maps of High Terrain (#78)

| | |
|-------------|-------------------------------------|
| Authors: | David Levínský |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/29/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Small |

Three-dimensional maps of high terrain often lack in ability to represent a visual hierarchy of features, thus failing one of the basic tests of good cartography. This talk demonstrates how OSM data and VTS 3D Geospatial Software Stack can be used to enhance an interactive 3D map with informative and visually appealing topographic labels while avoiding the pitfalls of information overload and clutter. We will show how to setup VTS backend to enrich OSM-driven geodata with external topographic prominence data, and how to write an appropriate style for the geodata layer within the VTS JavaScript client.

Map of water pipes to reduce water loss in the cities (#80)

Authors: Jose Maria Villac Pinheiro
Categories: Mapping systems A - Generic systems
Date: 08/31/2018
Time: 11:00 - 11:30
Room: Mafia

The main way to improve network efficiency, a major source of resource conservation, is to reduce leaks. In many of the world's cities, more than 20% of water produced is lost in the distribution network. In Brazil according to SNIS - National System of Sanitary Information 42% is the loss estimated. This represents US\$ 4,2 billion loss every year.

This presentation is about a Geographic Information System whose objective is to allow the realization of a technical register of water pipe networks integrated with the commercial information for the export of networks and consumption demands associated with the nodes of the networks, for hydraulic simulation systems, such as case of EPANET. The main objective is to make feasible the actions of reduction of water losses in the municipality, allowing the accomplishment of de facto engineering actions.

New participatory spaces: The role of locating in resistance (#81)

Authors: Doug Specht
Categories: Bridging the gaps A - Strategic
Date: 08/29/2018

Time: 15:30 - 16:00

Room: Selous

Maps have been shown to be an incredibly important resource, especially in the environmental sector, but the costs are often prohibitive to their creation. This research is examining how publicly created online maps, rather than social media, are able to support human rights and environmental justice. It questions how we open up mapping products to enable the world's poor and grassroots movements to be able to create maps that support their causes, and thus giving them a bigger voice.

Using document and theoretical analysis, interviews, surveys, GIS and content analysis from social media, this study examines the role of social media and Volunteered Geographic Information (VGI) in protest movements and to what extent increased digital connectivity can help spread knowledge about human rights and environmental issues. Results show that the use of both social media and online mapping is still embryonic and hindered by strong hierarchical power structures within social movements, meaning its effect on political mobilisation is often limited, or negative. Furthermore it is suggested that social media does not spontaneously produce non-hierarchical knowledge structures, and that social movement organisations need to further develop their knowledge dissemination strategies. The study goes on to ask whether it is then publically created online maps rather than the much lauded social media that will help legitimize knowledge around human rights and environmental abuses in a way that moves beyond documenting abuses and towards holding those responsible to account.

[Inclusion and Diversity in OSGeo \(#86\)](#)

Authors: María Arias de Reyna, Malena Libman

Categories: OSGEO community A - Community health

Date: 08/29/2018

Time: 11:00 - 11:30

Room: NgoroNgoro

We work on an unbalanced environment where diversity is hard to find. Both in the working environment and in conferences, most of the participants are white cis males.

The situation poses many questions, we ask ourselves: Why is our sector so unbalanced? Is this a chicken-egg problem? What are the real statistics and how is it evolving? What are the dangers of

having a uniform environment? Is it a cultural problem? How does it varies from country to country, or even continent?

We are living a moment where a ray of hope is starting to glow, very dimly, where diversity and equal opportunity are being discussed, not for the first time, but with more intensity every day. We are more and more aware of the repeat discriminatory conduct we perpetuate even as a minority.

Although it seems there is always a presentation about this topic in every conference, we want to address the issue from a more active perspective, taking matters into our own hands and analysing that what we can change.

Based on the experience of two female leaders of the community, we are going to explore what is exactly the situation, why it is a bigger problem than what we think and how can we work together to improve the situation.

[An enterprise version of OSGeo stack to overcome customer challenges \(#87\)](#)

Authors: María Arias de Reyna, Jeroen Ticheler

Categories: OSGEO community C - Solutions

Date: 08/30/2018

Time: 12:30 - 13:00

Room: NgoroNgoro

In the past we've run into various organisations that want to use open source software, but have challenges with it's agile character. We've experienced that these organisations gladly delegate the interaction with the community, do not expect to have the latest new features at a monthly basis and most of all expect a stable well-tested and documented product. Under the 'enterprise' label GeoCat is intentional to sell such an experience for OSGEO stack products to that group of customers. In this presentation we're highlighting our experiences in the initial steps on this road. The benefit for the company and the benefits for the OSGEO stack products in general.

[GeoNetwork State of the Art: what's New and Upcoming \(#88\)](#)

Authors: María Arias de Reyna, Jeroen Ticheler

Categories: Catalogue systems A - Core systems

Date: 08/29/2018

Time: 11:30 - 12:00

Room: Saadani

GeoNetwork OpenSource is the chosen Spatial Data Catalog in many countries all over the world. INSPIRE ready, it covers both Linked Open Data and ISO formats that are exposed through OGC and RDF services.

It has been a dynamic year for GeoNetwork, we've released the 3.4 version which had some interesting new features like the new INSPIRE external validation tool for the metadata editor.

Currently we are in major discussion if we should migrate the catalog to use ElasticSearch as a base search index for the 3.6 version. Another big work item is metadata workflow, ability to change a record without modifying its published version. Also implementation of the new INSPIRE metadata guidelines 2.0 is up for discussion for the 3.6 version.

Sh*thole Geography - the global geo pub quiz (#89)

Authors: Steven Feldman, Kenneth Field

Categories: SDG

Date: 08/30/2018

Time: 14:30 - 15:00

Room: Kitulo

This presentation will explore the mapping of the United Nations Sustainable Development Goals through the means of a pub quiz.

There are many ways to represent data when making global comparisons of socio-economic statistics.

While questioning delegates knowledge of the highs and lows of current achievement of the UN SDG's we will explore different techniques for mapping global statistics and introduce some guidelines for of good (if not best) practice.

Delegates will discover that the Sh*tholes are not always in the least developed parts of the world despite the prejudices of some geographically uninformed leaders.

We hope that delegates will laugh and learn with us and we promise some unique maps (and stickers)

Open Communities - we love to hate ... (#90)

| | |
|-------------|--------------------------------------|
| Authors: | Steven Feldman |
| Categories: | OSGEO community A - Community health |
| Date: | 08/29/2018 |
| Time: | 11:30 - 12:00 |
| Room: | NgoroNgoro |

OSGeo describes itself as a community, we seek to "promote interaction between users, developers, and community participants" How successful are we?

- Who are the tribes?
- Do we co-exist harmoniously?
- Are we on the side of the angels?
- Has religious fundamentalism reached OSGeo or OSM?
- Have social media and online communications changed the way we view each other within open communities?
- Do the ends justify the means?
- Does any of this matter and if so why?

This talk will explore the dynamics of open communities, drawing examples from both OSGeo and OSM. It will map the main community groups and consider how they interact, whether these interactions promote or hinder the mission of open communities.

Maybe harmony is not and should not be a goal for open communities.

Actinia Open Source – geoprocessing in the cloud (#91)

Authors: Till Adams, Till Adams
Categories: Remote sensing A - Processing
Date: 08/29/2018
Time: 13:30 - 14:00
Room: Kitulo

Especially in countries with unstable internet connections processing large amounts of geo-data for your own purposes is a challenge. The alternative is often to process on your desktop, but what if data amounts are too large and can't be handled on a desktop? This applies in particular to Earth Observaiton data.

On the other side, Earth Observation data is often the only source for up-to-date geo-information.

The solution is to process the data where it is stored. There are several offers such as Google Earth Engine ad others, but these solutions are often black boxes, processing alghorithms are fixed and it is often not possible for the user, to download the results.

Actinia is the Open Source answer on this. Actinia also offers to integrate your own processing-chains and to specify the output format.

The actinia computing platform processes big data quickly, reliably and with high quality. Thanks to it's API data processing can be integrated into your own business processes. The fields of application are not defined, could be agriculture, desertification or urban planning or many others.

The talk presents a cloud-based processing API as well as the open source project, which is based on top of GRASS GIs, the famous Open Source GIS.

Adding 3D GIS visualization and navigation to the SPARQL query loop (#92)

Authors: Wouter Beek, Erwin Folmer, Laurens Rietveld, Tony Baving, Vincent van Altena
Categories: Academic
Date: 08/30/2018
Time: 14:30 - 15:00
Room: Gombe

3D environments allow advanced spatial navigation and visualization, but have traditionally provided limited support for performing non-spatial data analysis operations like filtering, joining, and integrating data on-the-fly. Linked Open Data provides advanced support for performing filters and joins over datasets that can be dynamically combined through SPARQL federation. Unfortunately, Linked Data results often lack intuitive visualization capabilities, making it relatively difficult to interpret the data for a data analyst. In this paper we present our integration of 3D visualization into the read-evaluate-print-loop of SPARQL query execution. We show how the inclusion of 3D visualization has concrete benefits for the SPARQL query writing process, and how our integrated solution is used to answer specific use cases that could not be answered before.

3D Linked Geospatial Data – The potential of combining different worlds (#93)

Authors: Erwin Folmer, Wouter Beek

Categories: Open data

Date: 08/29/2018

Time: 13:30 - 14:00

Room: Main

Within the GIS domain, a vibrant community exists that focuses on the use of 3D geospatial data. Unfortunately, traditional 3D environments make little use of Linked Data, which makes it relatively difficult to put 3D geospatial assets into context. In fact, data from a different source often has to be downloaded, preprocessed, and integrated explicitly.

At the same time, the Linked Open Data (LOD) community makes it easy to share and interlink data from multiple sources over the web. Unfortunately, the LOD community has published very little 3D data. However, querying data in 3D unlocks novel use cases, and 3D visualization allows a more realistic view of the data to be presented to the user.

Within the Dutch Cadastre an experiment was conducted to combine 3D Cadastre geospatial data with multiple Linked Open Datasets that are published by the Dutch government. The experiment was conducted by a joint team of 3D GIS experts and Linked Open Data experts. The results of this experiment are twofold: firstly, 3D was added to the world of Linked Open Data, and secondly, Linked Data was added to the world of 3D.

The first result (3D in Linked Data) was achieved by representing existing 3D data in RDF, by using the GeoSPARQL vocabulary standardized by OGC. The 3D data in RDF was loaded into a triple store, allowing the 3D data to be queried. In order to make the iterative process of writing a correct GeoSPARQL query of 3D data more seamless, the popular YASGUI query editor was extended with a 3D view that displays (intermediate) SPARQL query results. This allows Linked Data

The second result (Linked Data in 3D) is a bit more exploratory, but does show promising results. Several commonly used 3D environments (Cesium, Unity, and arcGIS) are able to formulate HTTP requests. This means that they are also able to send GeoSPARQL queries and receive SPARQL result sets. The current challenge is to properly process the received SPARQL result sets, and use them in order to provide context for the respective 3D objects.

We will present our results of combining 3D GIS and Linked Open Data, and will show how these distinct domains can benefit from one another with relatively little effort.

Real time air quality mapping on a shoestring (#94)

| | |
|-------------|-----------------------------------|
| Authors: | Christopher Eykamp |
| Categories: | Crowdsourcing B - Collecting data |
| Date: | 08/30/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Amboni |

Particulate emissions (PM) from diesel and wood smoke are an important cause of pollution-related illness in urban environments. This presentation will describe how Sensorbot built a network of real-time air quality sensors to monitor PM levels using open source software and readily available hardware on a very limited budget. This project could be fully replicated in almost any city in the world, and demonstrates how community groups can collect environmental data at much higher spatial/temporal resolutions than most governments.

Approaches to WebGIS in times of unstable or weak internet connections (#96)

| | |
|-------------|----------------------------------|
| Authors: | Till Adams |
| Categories: | Bridging the gaps C - Technology |
| Date: | 08/30/2018 |
| Time: | 16:30 - 17:00 |

Room: Mikumi

Surprisingly, Germany takes on one of the backmost places in Europe regarding fast Internet connections, fast fibre connections are often only available in the larger cities.

Nevertheless, web-based geoinformation systems are widespread and well-accepted. In times where regular GIS functionality is outsourced to the web and use of mobile phones is widely demanded, this challenges the developers of open source components with the task to keep the amount of data transferred between server and end device as small as possible.

On top of this, there are a lot of offline technologies. So the question nowadays is more, how much GIS functionality can be taken offline using paradigms & technologies such as progressive enhancement, graceful degradation, browser caches, application caches (deprecated as of today), service workers, local storage and many more?

The talk presents thoughts on the above and gives examples with the open source WebGIS suite "SHOGun Harmony". SHOGun offers a thin client based on react-JS and OpenLayers. Project examples from Mongolia and other countries will also be shown.

Open & Low-cost Monitoring System: evaluation of the 4onse “non-conventional” solution (#98)

Authors: Massimiliano Cannata, Daniele Strigaro, Milan P. Antonovic, Mirko Cardoso, Marcus Hoffmann

Categories: Environment

Date: 08/30/2018

Time: 16:30 - 17:00

Room: Saadani

An Environmental Monitoring System (EMS) is composed by the integration of sensing devices, communication technology, data warehouse and distribution services. EMS are essential for the implementation of mitigation actions aimed at reducing natural hazards such as droughts, flooding and landslides and in the management of the natural resources like water. Unfortunately, the high costs related to conventional systems drastically reduce the possibilities of adopting such technologies in low-income and developing countries. The 4onse project (analysis of Open, Non-conventional, Sustainable and Effective monitoring systems), funded by the Swiss National Science Foundation (SNSF), aims at evaluating “non-conventional” EMS based on open technologies both hardware and software.

To this end, the solution proposed offers a low-cost, collaborative, accessible, modifiable system from the hardware to the software level composed by nodes which transmit environmental data using GPRS wireless technology to the data warehouse. Each node is a weather station based on Arduino (Open Hardware) as core component to collect the air temperature, air pressure, air humidity, rain and other environmental parameters thanks to low-cost sensors. As main software of the data warehouse, istSOS (www.istsos.org), released under the GNU GPL V2 license (Open Software), was selected to enable environmental data sharing (Open Data) through the SOS standard service (Open Standard).

With this contribution, besides the presentation of the 4onse system's architecture, the results of the analysis performed to evaluate the quality of data collected from the system will be discussed. During the testing period the weather station was installed near an official and authoritative weather station of the hydro-meteorological network of the Canton Ticino (Switzerland) to permit the statistical comparison between the environmental data time series produced by the two stations.

On the wave of the Internet of Things and the ubiquitous of Internet, the solution proposed, if scientifically fully validated, can potentially increase the capacity of these countries to adopt monitoring systems to fast react against hazardous events and better understand natural phenomena.

For more information please refer to the 4onse project website: www.4onse.ch

QGIS & the 240 Wine Regions: A Tale of Large Scale Collaborative Digitizing (#100)

Authors: Michele Tobias

Categories: Open data

Date: 08/29/2018

Time: 11:30 - 12:00

Room: Main

Once upon a time, researchers in need of spatial boundary data for the American Viticultural Areas (AVAs) paid high prices for data with little methods documentation. Researchers were sad and often avoided asking research questions that would require them to use this data. An intrepid team of librarians and data experts at the University of California Davis sought to make United States (US) wine region data freely available, embarking on a massive digitizing effort using US Federal records and maps, QGIS, geojson, and GitHub, to make polygons for more than 200 AVAs. Along their journey, they joined forces with University of California Santa Barbara and members of the mapping community battling software updates, long distance communications, and learning new software.

For their efforts, they were richly rewarded with a well-documented open data set, a work flow that can (and has been!) applied to manage similar projects, and offers of more digitizing help from other universities! This talk will tell their story and explain how you can join them on the rest of their journey.

The project's GitHub repository is available online here: <https://github.com/UCDavisLibrary/ava>

The rise of istSOS3 (#102)

| | |
|-------------|--|
| Authors: | Massimiliano Cannata, Milan P. Antonovic, Daniele Strigaro |
| Categories: | Environment |
| Date: | 08/30/2018 |
| Time: | 17:00 - 17:30 |
| Room: | Saadani |

istSOS is a a simple and open source implementation of the Sensor Observation Service standard from the OGC. It includes a Web based administration interface that permits access to all the service configurations and operations without need of explicitly writing XML requests, making the usage of SOS more user-friendly. Several istSOS "special features" makes it a complete sensor data management system supporting time-zones, on-the-fly data aggregation, data quality, multiple output formats, restful Web API, security & authentication and others.

Despite its proven high maturity level demonstrated in several applications and different environmental fields where it has been appreciated for its stability, robustness and features, after ten years of development for istSOS its time to move into the future.

In fact, recent researches have shown that istSOS2 (version 2) is not adequate to meet the high demanding Quality Of Service required for IoT and Big Data applications in terms of high concurrency, massive datasets and performance. For this reason, the istSOS Development Team started a complete redesign of the software, based on latest technologies and approaches like Python3, asynchronous programming, real time caching, React and ECMAScript2016. Thanks to the followed Chain of Responsibility Pattern, processes are atomized in Actions (the elaborations) that acts on Entities (the data) to produce complex operations. This introduces a great flexibility of code reuse enabling istSOS expansibility with plug-in.

Based on the requirements of supporting different databases, being INSPIRE compliant and container independent, istSOS3 (version 3) has proven its high-level Quality of Service, proved by Load testing, that makes of it the new flagship application for scientific sensor data management with Open Standard.

New Source of Geospatial Data: Crowdsensing by Assisted and Autonomous Vehicle Technologies (#103)

| | |
|-------------|---|
| Authors: | Charles Toth, Zoltan Koppanyi, Maria Gabriela Lenzano |
| Categories: | Academic |
| Date: | 08/30/2018 |
| Time: | 16:30 - 17:00 |
| Room: | Gombe |

The ongoing proliferation of remote sensing technologies in the consumer market has been rapidly reshaping the geospatial data acquisition world, and subsequently, the data processing as well as information dissemination processes. Smartphones have clearly established themselves as the primary crowdsourced data generators recently, and provide an incredible volume of remote sensed data with fairly good georeferencing. Besides the potential to map the environment of the smartphone users, they provide information to monitor the dynamic content of the object space. For example, real-time traffic monitoring is one of the most known and widely used real-time crowdsensed application, where the smartphones in vehicles jointly contribute to an unprecedentedly accurate traffic flow estimation. Now we are witnessing another milestone to happen, as driverless vehicle technologies will become another major source of crowdsensed data. Due to safety concerns, the requirements for sensing are higher, as the vehicles should sense other vehicles and the road infrastructure under any condition, not just daylight in favorable weather conditions, and at very fast speed. Furthermore, the sensing is based on using redundant and complementary sensor streams to achieve a robust object space reconstruction, needed to avoid collisions and maintain normal travel patterns. At this point, the remote sensed data in assisted and autonomous vehicles are discarded, or partially recorded for R&D purposes. However, in the long run, as vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication technologies mature, recording data will become a common place, and will provide an excellent source of geospatial information for road mapping, traffic monitoring, etc. This paper reviews the key characteristics of crowdsourced vehicle data based on experimental data, and then the processing aspects, including the Data Science and Deep Learning components.

The story of an error (#105)

| | |
|-------------|-------------------------------------|
| Authors: | Ramiro Aznar |
| Categories: | Mapping systems A - Generic systems |

Date: 08/31/2018
Time: 11:30 - 12:00
Room: Mafia

CARTO leads the Location Intelligence revolution, empowering any organization and individual to uncover insights through location data and then makes them available to their organization or the general public in the form of location intelligence applications. Those applications help optimize processes, predict situations, and overall improve performance by leveraging location data.

CARTO, as a technological startup, is having an accelerated growth. Every month, more and more diverse clients are using our platform, new team members join, and new protocols and departments are being established. In this context, this talk is about two parallel stories. On the one hand, it tells the amazing voyage of an error (or bug). From its earliest childhood when the bug is found and reported by a user, going through its first iterations with CARTO's support team, until he reaches its own solution by the hands of our product engineers. On the other, the story of how CARTO has evolved and adapted to create a workflow and specialized team to help in the prioritization and fixing of these problems.

Do you need a cluster? Load testing Web Map Servers (#107)

Authors: Ian Turton
Categories: Geoserver
Date: 08/30/2018
Time: 17:00 - 17:30
Room: Main

When deploying a Web Map Server (WMS) or Tile Cache (WMTS/TMS) system for your organization the question you most want to know is how many users can it support at once. It is best to be able to answer this question before the critical incident that it will be used to support is upon you.

Many sites move directly to costly cloud based clustering solutions before carrying out basic checks and improvements to single machine speeds. The talk will start with the ways you can easily test various configurations to give you a feel for how many users you can support in day to day and emergency usage.

This talk will then outline some of the possible configurations of WMS and WMTS servers and caches that can be used to meet possible peaks in demand for map tiles.

Mapping efforts in an unsurveyed land - Koorachundu Village Panchayat experience. (#111)

| | |
|-------------|-------------------------------|
| Authors: | Jaisen Nedumpala Devi Nilayam |
| Categories: | Government B - Land ownership |
| Date: | 08/31/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Amboni |

In Kerala (A southern state in India), local governments are the custodians of asset registers which contain the details of basic infrastructure including road networks and other public facilities they maintain. Central govt. guidelines to formulate projects requires GIS to be applied for the sake of accuracy and precision. But the state of affairs at the Koorachundu Village Panchayat (local government) is that they had no cadastral map, no GIS. So, There is a need of baseline GeoData for Developmental Planning and Implementation, administration purposes, and in case of emergencies without hassle.

There is an ongoing work to build an #OpenGeoData repository. First phase of the work was an OpenStreetMap mapping party. After data collection with android mobile apps, and uploading and editing all the data in OpenStreetMap, it was processed using QGIS. The Village Panchayat got a more accurate map by this activity.

The second phase of this work also is over, involving the representative of village panchayat, surveyors from the Dept. of Survey & Land Records and the authorities at the revenue village offices of the area. It was conducted a joint field verification involving these three parties and reported the results, with a detailed cadastral map to the state government to issue a correction notification. The state government looked in to the matter in detail and issued a notification in its official gazette, correcting its earlier notification to re-organise the Koorachundu revenue village, including all the wards of the Koorachundu village Panchayat and excluding all the areas out side of it.

Now it is going on the third phase, which is to enforce the new correction notification, by transferring all the land records, and related activities to the corresponding re-organised village offices. The fourth phase is under planning, which is to accurately geo-reference the latest cadastral map prepared during the second phase activities, with the help of field level volunteers. Baed on this it is planned to conduct a detailed field survey to develop a more detailed geodatabase and information system of the village panchayat.

Multiple metadata catalogues the easy way. (#112)

Authors: Brent Wood
Categories: Catalogue systems B - Applications
Date: 08/29/2018
Time: 14:00 - 14:30
Room: Saadani

The National Institute for Water And Atmospheric Research in New Zealand (NIWA) manages several internal metadata catalogues an several external catalogues for clients and other research programmes. We use the OSGEO application Geonetwork for these. This presentation discusses two open source tools developed by NIWA: a CSW proxy/filter and a CSW browser/search tool for Dublin core catalogues. CSW is a web service API used to remotely interact with such catalogues. Using these tools, it is possible for a single catalogue instance to support several virtual catalogues, each with a simple customisable search/browse facility which can be embedded in any appropriate web site. This enables NIWA to provide a working instance of a metadata catalogue for any research programme or institution that wishes to use one using an existing underlying physical catalogue. This has encouraged, and made possible, catalogues for various programmes which would otherwise had difficulty implementing and supporting their own new catalogue.

Uncovering patterns in high dimensional spatial data (#113)

Authors: Stuart Lynn
Categories: Big data
Date: 08/29/2018
Time: 11:30 - 12:00
Room: Katavi

One of the best things about spatial data is that it allows us to join a universe of data through a common index of space and time. Tell me the location and time of an event and I can tell you a host of other information that occurred there. How do we start to uncover patterns in this vast array of data? What variables in the strata of spatial datasets are actually relevant for the question we are interested in? We can't visualize more than 2 or 3 variables on a map so we need to rely more on analytical methods to uncover patterns.

In this talk I will describe different methods in automatically uncovering patterns in high dimensional datasets including traditional methods like PCA but also more recent methods like t-sne, variational auto-encoders and topological data analysis. I will cover how each works, the trade-offs between

them and go in to some case studies and use cases, including segmenting movement data across a city to describe different behaviors (Weekend hangouts, commuting areas, etc) in a large scale GPS dataset, uncovering communities in the census and looking at political patterns in the UK.

Participants will come away with an understanding of the challenges involved in high dimensional spatial data, the methods that can be used to tame it and how to start to interpenetrate the results of those methods. I will also introduce some tools we have developed at CARTO to apply these methods to geospatial datasets and quickly explore the results.

Sensor Observation data and QGIS (#114)

| | |
|-------------|-------------------|
| Authors: | Brent Wood |
| Categories: | QGIS A - Using it |
| Date: | 08/30/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Bagamoyo |

The National Institute for Water and Atmospheric Research in New Zealand (NIWA) has implemented a public Sensor Observation Service (OGC SOS) on its national climate and hydrometric databases serving monthly aggregated data. The server software used is the 52North SOS server system. This communicates with the legacy NIWA databases using custom NIWA middleware. Regional councils in New Zealand are also implementing OGC SOS services on their sensor (time series) databases.

NIWA worked with councils and Sourcepole (Switzerland) to develop an open QGIS plugin as a client to access these services and visualise or download the provided data. This presentation discusses the implementation of the Open Souce SOS services and the collaborative development of the Open QGIS client.

The NIWA Marine data web portal (#115)

| | |
|----------|------------|
| Authors: | Brent Wood |
|----------|------------|

Categories: Mapping systems B - Specific systems

Date: 08/31/2018

Time: 09:45 - 10:05

Room: Mikumi

In 2008, the National Institute of Water and Atmospheric Research (NIWA) developed a web portal providing access to data, reports and information collected during a four year research programme on the north east coast of New Zealand. This was based on the open source Silverstripe CMS, and used Postgis, Mapserver, Openlayers and Geonetwork as part of the portal framework, for mapping and metadata capabilities. Subsequently, the need for a web portal providing similar capabilities for other research programmes was recognised and the web portal was generalised. The framework, rebranded as the NIWA Coastal and Marine Data Portal, provides a flexible home for a growing number of research projects, each using the components it needs.

The system has not only been expanded to support multiple, independent research projects, but has also been redeployed to implement the New Zealand Marine Biosecurity portal. The framework has a map administration tool which allows a map page to be set up for a project, with layers accessed as WMS or WFS services, which are implemented separately from the portal, and can be (for example) served by Mapserver, Geoserver or Arc Server. This presentation discusses the framework, and how it is deployed and used.

[Using Passively-collected Geospatial Data to Compare Patterns of Residential Location Choice in Two North American Cities \(#117\)](#)

Authors: Max Gardner, Alexei Pozdnukhov

Categories: Big data

Date: 08/29/2018

Time: 12:00 - 12:30

Room: Katavi

Deep into the era of Big Data, urban planners and transportation engineers are still heavily reliant on expensive cross-sectional surveys for gathering data on the travel habits of their denizens. In addition to their expense, travel surveys commonly suffer from small sample sizes as well as other inaccuracies associated with self-reported data collection. This presentation will explore the as-yet-unlocked potential of large-scale observational data to supplement, or even replace, travel surveys for studying the behavioral dynamics that drive urban growth and development. Using data sourced

from a combination of location-based service providers, federal agencies, and local property records, we will investigate the character of intra-urban residential relocations in two cities: San Francisco, USA, and Toronto, Canada.

Selective improvements in QGIS 3.x (#119)

| | |
|-------------|---------------------|
| Authors: | Andreas Neumann |
| Categories: | QGIS B - The system |
| Date: | 08/29/2018 |
| Time: | 11:00 - 11:30 |
| Room: | Mikumi |

The QGIS 3.x series was officially released starting in late February 2018. It is the result of many under-the-hood API improvements, library upgrades, Python upgrade and many new feature developments as well as bug fixes.

This presentation would summarize some of the major new improvements of QGIS 3.0 and 3.2, in coordination with other submitted QGIS presentations to avoid overlaps.

Possible areas that would be covered are:

- * improvements in rendering methods and labeling
- * improvements in the expression system
- * improvements in forms and widgets
- * digitising improvements (node tool)
- * map composer improvements (layouts and reports)
- * processing improvements and task manager
- * user profiles
- * Geopackage improvements
- * QGIS 3D (if not covered in other presentations)
- * QGIS server rewrite/improvements

Note if there is another presentation that covers the above areas in depth, I would probably not cover it but refer to that other presentation.

Crowd2Map Tanzania - crowdmapping rural Tanzania to help end FGM and aid community development (#121)

| | |
|-------------|---|
| Authors: | Janet Chapman, Benedicto Hosea, Neema Meremo, Ngailla Alpha |
| Categories: | Bridging the gaps B - Practical approaches |
| Date: | 08/30/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Mikumi |

Crowd2Map Tanzania is a crowdsourced mapping project putting rural Tanzania on the map. Since 2015, we have been adding schools, clinics, roads, buildings and villages to OpenStreetMap, with the help of over 5000 remote volunteers worldwide and 600 on the ground in Tanzania. With minimal budget and no staff we have so far added over 2.1 million buildings and trained community mappers in 26 areas of Tanzania, We have been featured on Al Jazeera, The Guardian and Missing Maps, as well as 2 TV stations and 2 newspapers in Tanzania.

We have also set up Youthmappers Chapters at the Institute of Rural Development and Planning in Mwanza and Dodoma and conducted mapathons in over 20 universities around the world.

Our mapping is in two phases – firstly online volunteers trace roads and buildings from satellite images via the HOT tasking manager, then volunteers on the ground add names of villages, offices, churches, shops and other points of interest using a free smartphone app Maps.Me and printed fieldpapers. Community groups discuss the annotated fieldpapers with village leaders and then take a picture of them with their phone and email it to their paired volunteer - an advanced remote mapper from anywhere in the world. They then input this information into OpenStreetMap and produce a printable map of the village which they email back.

We helped organise the first State of the Map Tanzania, a 3 day mapping training event in Dar es Salaam in December 2017, and a 3 day training event in Mwanza for Open Data Day in March 2018.

Our talk will feature an overview of how we have mobilised such a large community of global mappers, the difficulties we have faced and the advice we have for other countries seeking to replicate this crowdsourced mapping model. We will also talk about the challenges faced by field mappers in remote Tanzania and what they can gain by working together with remote mappers from all around the globe to help map their communities and develop their GIS skills

We will also talk about 3 examples of the impact that maps are having on the remote rural communities where are groups are based, namely;

How maps can help protect girls at risk from FGM (presented by Neema Mereemo, an FGM activist from Hope for Girls and Women in Mara)

How maps can help villages acquire Village Land Use Plans and mitigate local land disputes (presented by Benedicto Hosea, community activist from Mboni ya Vijana in Zeze, Kasulu)

And how maps can show the extreme distances that students have to walk to school and thereby convince potential donors on the need for school hostels (presented by Ngaila Alpha, a secondary school teacher in Ikondo, Muleba)

Serving earth observation data with GeoServer: addressing real world requirements (#122)

Authors: Simone Giannecchini, Andrea Aime

Categories: Geoserver

Date: 08/30/2018

Time: 16:30 - 17:00

Room: Main

Never before we have had such a rich collection of satellite imagery available to both companies and the general public. Between the launch of new satellites like Landsat 8 and Sentinels, the explosion of cubesats, as well as the free availability of worldwide data from the European Copernicus program, a veritable flood of data is made available for everyday usage. Locating satellite images of interest in such a diverse, spatial and temporal deep data set can be challenging. OpenSearch for EO is the latest response to the problem, providing protocol for locating satellite data with the desired attributes using a simple URL based search returning ATOM documents, with some early implementations such as ESA FEDEO providing a good example of such system.

The presentation will cover GeoSolutions experience in setting up GeoServer based production systems providing access to earth observation products for organizations like DLR, EUMETSAT with indications of technical challenges, solutions, and deployment suggestion. It will cover topics such as setting up a single unified mosaic from all the available data sources, tailoring access to it to different users, determining the most appropriate stacking order, dealing with multiresolution, different coordinate systems, multiband data, SAR integration, searching for the most appropriate products using a mix of WFS, CSW and so on, serving imagery with high performance WMS and WMTS,

performing small and large data extractions with WCS and WPS, closing up with deployment examples and suggestions.

We will also introduce latest developments like the development of the OpenSearch for EO extension that allows to expose EO Collection and products via OpenSearch, the enhancements to ImageMosaic for improved management of EO Time Series as well as the improved REST Interface for administering EO collections and products. The presentation will cover the protocol, the two step search, how to locate data by keywords, time, space and imagery specific attributes (e.g. cloud cover, resolution, SAR acquisition mode). It will then show how the results can be simple to view, and link to external sources to provide authoritative metadata (ISO, O&M for EO) and cross link to OGC protocols for data visualization and download. Finally, the presentation will cover how the system works by profiling the OGC services and giving the user access to specialized sub-services focusing on a single satellite/sensor, a significant grouping of them, or a single satellite acquisition.

Eventually, challenges for preprocessing EO data like Sentinel and Landsat will also be introduced as well as the usage of Apache Airflow for the task.

MapStore, modern mashups with OpenLayers, Leaflet and React (#123)

Authors: Mauro Bartolomeoli, Simone Giannecchini

Categories: Mapping systems A - Generic systems

Date: 08/29/2018

Time: 12:00 - 12:30

Room: Small

MapStore is the Open Source product for creating, saving and sharing in a simple and intuitive way maps and mashups created selecting contents from public services like Google Maps and OpenStreetMap or other servers implementing OGC and ISO protocols. Thanks to MapStore the user can mix her own data with data available on the web to create comprehensive maps and share them with anyone (also via social networks). MapStore2 is cross-browser, and mobile ready.

MapStore allows the user to:

Manage maps (share, delete, search, create) and users through a front-end Manager.

Create and navigate maps using a powerful and intuitive front end as map Viewer.

Manage the embed-link, marker's injection, routes injection, time series Google Earth like, spatial queries and more.

Interact with one or more Catalog Service for the Web (CSW).

You can also use MapStore as a framework to develop your custom WebGis application composing MapStore ReactJS components and components from other libraries (like React Bootstrap), choosing the best mapping library for your purposes.

The presentation will give the audience an extensive overview of the MapStore functionalities for the creation of mapping portals. Eventually, a range of GeoSolutions case studies of MapStore will be presented to demonstrate what our clients (like City of Genova, City of Florence, Halliburton, Austro Control and more) and partners are achieving with it.

Dether - geospatial & blockchain research (#124)

| | |
|-------------|----------------------|
| Authors: | Alexandre Kurth |
| Categories: | Meeting new projects |
| Date: | 08/31/2018 |
| Time: | 11:00 - 11:30 |
| Room: | Ruaha |

Dether is a map-based progressive webapp. It provides a platform on which you can buy and sell cryptocurrency for cash, and spend it at physical stores, located by geographic coordinates.

It is mostly dedicated to the 2 billion people who are excluded of the banking system.

Dether uses the Ethereum technology, a blockchain platform which provide the possibility to write decentralized applications thanks to smart contracts (applications are not controlled by a company, and which can be executed by people without any kind of censorship)

Dealing with geo-data within the blockchain technology is quiet complicated. The tech is really new, and Ethereum apps are written in 'solidity' language. There are no existing geo-libraries, or any tools yet.

Plus, there are also challenges and limitations inherent to the blockchain technology itself that you have to take into account when you develop some stuff on top of it.

On top of the Dether app, a geo-reputation zoning system will be built. This system will be controlled by users only, and Dether team won't be able to cheat on it. A dedicated geo-blockchain team in charge of research and development is currently working on this system. All the source code resulting of Dether geospatial research will be open source.

All these kind of tools could be profitable to everyone who want to develop a spatial blockchain application on top of the Ethereum protocol. We can imagine for example spatial climate

autonomous insurance, self service drone pool, pokemon-go like tourism application and many others which has not been yet imagined.

The presentation will cover the state of Dether geospatial research, and the state of the existing geospatial tools developed by other teams for blockchain developers.

website: <https://dether.io/>

github: <https://github.com/dethertech>

white paper: <https://dether.io/static/media/whitepaper.fb660120.pdf>

Closing the divide: Data visualisations, organisational structures and representation in humanitarian mapping (#125)

Authors: Amelia Hunt, Doug Specht

Categories: Crowdsourcing A - Society

Date: 08/30/2018

Time: 10:00 - 10:30

Room: Amboni

As the classic digital divide, around access, becomes ever smaller two significant barriers persist in opening up geospatial and mapping technologies for new users and for implementation in humanitarian and development projects. These are questions over translation of graphical representation, and organizational barriers to data flows. This session aims to address both these issues. Firstly by exploring the 'untruths' of digital mapping tools, borrowing lessons from data visualization techniques and the work of the post-impressionist art movement, to suggest that the gaps in our maps are where the majority of the richest data for humanitarianism lies. Secondly, we seek to address the organizational barriers to sharing this information between lay users and organizations.

Exploring the role of centralized, decentralized and distributed networks we develop a management concept of research, regionalize, prepare, humanize. The session aims show that the dual process of understanding the data collected, how it is translated, and the networks through which it is distributed, can add more value, and create better representations and maps, than adding additional data.

Identifying deforestation over time using change detection (#126)

| | |
|-------------|-----------------------------|
| Authors: | Damon Rand, Ryan Elfman |
| Categories: | Remote sensing B - Products |
| Date: | 08/31/2018 |
| Time: | 11:30 - 12:00 |
| Room: | NgoroNgoro |

In 2017, Ecometrica Ltd. was tasked with identifying deforestation that occurred over the course of one cultivation year on sites spread across South America. This required the analysis of more than 15 Terabytes of satellite imagery, and was equivalent to processing a total area of approximately 25 million km² for the entire time sequence. Given the vast area and dense time series data required, we developed an approach that uses freely available data from Sentinel 1 (radar) and 2 (optical) satellites, and processes the imagery using an open source toolchain of data preparation software (SNAP toolbox), a change detection analysis algorithm, and Python. All of the data processing is run in the cloud on Amazon Web Services EC2 instances, but the toolchain and data can readily be executed and processed locally at a smaller scale.

The resulting output was a 14m² resolution classified change map, with each pixel value representing the index position of change (from within the stack). The results successfully identified forest loss events within the bounds of the areas of interest, but also included error of omission if there were gaps in the time-series, and commission error over steep terrain or rapidly changing landscapes (e.g. flooding). In order to validate our automation processes and the change detection algorithm, the results were all manually verified to exclude omission and commission as automated segmentation is still under development.

We believe this approach has a low barrier to access, and, being a cloud solution, is also achievable in areas with low internet connection speeds. In this presentation we will focus on the digital infrastructure required to run the change detection method. By going through each of the steps taken and the lessons learned, we hope to show you how it can be done with nothing but a laptop, some skill in python/GIS, and lots of perseverance.

A Unified Map Service (UMS) that integrates all the capabilities of WMS, WMTS, WFS, WCS, CSW in a single service (#127)

| | |
|----------|-----------------|
| Authors: | Jerome St-Louis |
|----------|-----------------|

Categories: Mapping systems A - Generic systems

Date: 08/31/2018

Time: 13:00 - 13:30

Room: Mafia

A presentation of a Unified Map Service (UMS), a single service offering capabilities equivalent to OGC WMS, WMTS, WFS, WCS and CSW. UMS addresses gaps between these services by supporting requests for imagery, coverage or vector data; either as tiles or as entire features; and either as raw data or images rendered server-side.

It also greatly simplifies the implementation of services and clients wishing to support all these capabilities by making it possible to handle them all at once in a single service, through shared semantics for shared concepts.

UMS proposes a simpler and more efficient interface based on JSON as well as ECON (a super-set of ECON with additional advantages, <http://ec-lang.org/econ>), rather than XML, for both requests and responses. UMS is agnostic of both data formats and tiling scheme. However, an open compact representation for tiled imagery, coverage or vector data is proposed along with it, which has the benefit of improving usability in low bandwidth situations and provide an improved responsiveness. Additionally a tiling grid suitable for the entire globe based on WGS84, with special considerations for polar regions and ideal for on-the-fly re-projection to a 3D globe or an arbitrary cartographic projection is also described. This approach solves a number of challenges with providing data for anywhere on the globe in a variety of projections or tiling schemes while minimizing data storage requirements.

The UMS is being proposed to the Open Geospatial Consortium (OGC) in the hope of it informing or becoming a future standard.

Through its simplicity and wide capabilities support, UMS hopes to overtake the barriers in adoption to the current feature and coverage based services, and make advanced capabilities and an optimal user experience ubiquitous in web mapping.

Creating Stunning Maps in GeoServer, with SLD, CSS, YSLD and MBStyles (#128)

Authors: Andrea Aime, Mauro Bartolomeoli, Simone Giannecchini

Categories: Geoserver

Date: 08/30/2018

Time: 15:00 - 15:30

Room: Main

Various software can style maps and generate a proper SLD document for OGC compliant WMS like GeoServer to use. However, in most occasions, the styling allowed by the graphical tools is pretty limited and not good enough to achieve good looking, readable and efficient cartographic output. For those that like to write their own styles GeoServer provides a few alternatives with varying degrees of compactness and readability.

Several topics will be covered, providing examples in the various GeoServer styling languages, including: mastering multi-scale styling, using GeoServer extensions to build common hatch patterns, line styling beyond the basics, such as cased lines, controlling symbols along a line and the way they repeat, leveraging TTF symbol fonts and SVGs to generate good looking point thematic maps, using the full power of GeoServer label lay-outing tools to build pleasant, informative maps on both point, polygon and line layers, including adding road plates around labels, leverage the labelling subsystem conflict resolution engine to avoid overlaps in stand alone point symbology, dynamically transform data during rendering to get more explicative maps without the need to pre-process a large amount of views.

Summarising, the presentation aims to provide the attendees with enough information to master GeoServer styling documents and most of GeoServer extensions to generate appealing, informative, readable maps that can be quickly rendered on screen.

How we can make Spatial Data Infrastructure in Argentina with the help of Free and Open Source Software (#129)

| | |
|-------------|--------------------|
| Authors: | Malena Libman |
| Categories: | Government C - SDI |
| Date: | 08/30/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Katavi |

Let's talk about how the development of an SDI (Spatial Data Infrastructure) can promote the use of Free and Open Source Software (FOSS). In Argentina, a middle-income country with an extensive territory (approximately 2.791.810 km² just in the continent, roughly five times the size of France, eight times Germany, eleven! times Great Britain), a SDI is being developed at a national level, despite the usual problems linked to its scale, such as the lack of high speed internet which is not available in all the national territory. There are also some political obstacles, due to the diversity of

actors involved and the federal government structure, thus proprietary software companies take advantage of these flaws.

Since 2007, when IDERA's (Infraestructura de Datos Espaciales de la República Argentina - Spatial Data Infrastructure of the Argentine Republic) first meeting took place, work is being done towards strengthening networks between actors and interoperability between geospatial information producers in the country. The main objective is the democratization of the access to geospatial information, in order to improve decision making in public, private, academic and civil society spheres.

The evaluation and certification of SDI's is created and within this framework it arises as an experience that consolidates more develop initiatives and offers as a guide for the more incipient ones. Every work protocol, recommendation, agreement and standard, emerges from this methodology of interaction between actors and initiatives, and seeks to encourage institutions towards the use of FOSS, and therefore to obtain maximum advantage from their meager budgets, as well as spreading the word and exploit the fact that free and open source proposals tend to be more flexible and interoperable, generating, at the same time, a process of mutual improvement for everyone, given that every development or personalization that isn't made, every thing we learn, if it's shared in IDERA, benefits all participating institutions.

Mapping the world beyond web mercator with GeoServer (#130)

Authors: Andrea Aime, Simone Gianecchini

Categories: Geoserver

Date: 08/30/2018

Time: 14:30 - 15:00

Room: Main

Most popular mapping presentations today, ranging from clients to servers, show and discuss only maps in web mercator, the popular Mercator derived projection used by OSM as well as most commercial tiles providers.

There is however an interesting, exciting world of map projections out there, that are still being used in a variety of context. This presentation will introduce the advancement made in GeoTools and GeoServer to handle those use cases, where users have a worldwide data set, and need to view all or part of it in multiple projections, some of which valid in a limited area, and requiring the software to perform a proper display of it on the fly, without any preparation.

We'll discuss GeoTools/GeoServer "advanced projection handling" manages to deal with these cases, wrapping data, dealing with the poles and the dateline, cutting on the fly excess data, densifying on

the fly long lines as needed to ensure a smooth reprojection, for a variety of cases, ranging from seemingly innocuous datum shifts, maps having the prime meridian over the pacific, and the various tricks to properly handle stereographic, transverse mercator, Lambert conic and other limited area projections against world wide source data sets.

Crunching Data In GeoServer: Mastering Rendering Transformations, WPS And SQL Views (#131)

| | |
|-------------|--|
| Authors: | Mauro Bartolomeoli, Andrea Aime, Simone Giannecchini |
| Categories: | Geoserver |
| Date: | 08/30/2018 |
| Time: | 13:00 - 13:30 |
| Room: | Main |

This presentation will provide the attendee with an introduction to data processing in GeoServer by means of WPS, rendering transformations and SQL views, describing real applications and how these facilities were used in them. We'll start with the basic WPS capabilities, showing how to build processing request based on existing processes and how to build new processes leveraging scripting languages, and introducing unique GeoServer integration features, showing how processing can seamlessly integrate directly in the GeoServer data sources and complement existing services.

Moreover, we will show how to integrate on the fly processing in WMS requests, achieving high performance data displays without having to pre-process the data in advance, and allowing the caller to interactively choose processing parameters.

While the above shows how to make GeoServer perform the work, the processing abilities of spatial databases should not be forgotten, so we will show how certain classes of processing can be achieved directly in the database.

At the end the attendee will be able to easily issue WPS requests both for Vectors and Rasters to GeoServer through the WPS Demo Builder, enrich SLDs with on-the-fly rendering transformations and play with SQL views in order to create dynamic layers.

OSGeo wants you! (#133)

| | |
|-------------|--------------------------------------|
| Authors: | María Arias de Reyna |
| Categories: | OSGEO community A - Community health |
| Date: | 08/29/2018 |
| Time: | 12:00 - 12:30 |
| Room: | NgoroNgoro |

OSGeo is a matured community full of good friendly people contributing for a greater good. We are all familiar with the open source concept and we all understand why the community is important.

But also, good communities are chaotic. Volunteers suffer from imposter's syndrome and disorientation. Leaders suffer from lack of time. The community is a delicate environment where balance doesn't look easy to achieve and still, we keep growing and evolving. How can we all help in improving the community? Is there something the community can do for me? Is there something I can do for the community?

Administrative Units as Linked Open Data – A casestudy from the Norwegian Mapping Authority (#134)

| | |
|-------------|---------------------------------|
| Authors: | Joan Olive Lopez, Thomas Ellett |
| Categories: | Government C - SDI |
| Date: | 08/30/2018 |
| Time: | 13:00 - 13:30 |
| Room: | Katavi |

In 2017, the Norwegian Mapping Authority started work on a Linked Open Data project to distribute Administrative Units data through the RDF framework. The specific use case was to store administrative unit values in DCAT metadata as URI's, thus enabling better consistency of data, better handling of versioning and additional information made available to the end user through dereferenceable URI's. The whole project has been completed using open source software and libraries, from Protégé with an Ontop plugin for ontology development and data transformation, to Virtuoso for RDF data storage and OpenApi and the Linked Data Theatre for data access endpoints.

We planned to tackle four key areas during the project and these were; development of a URI pattern, creation of an Ontology, transforming data to RDF and delivery of that RDF data through

multiple endpoints. We had some crucial elements already in place when we began; persistent local ID's at the object level, a stable UML model and data stored in a PostgreSQL database.

We began with development of the URI pattern, which was developed and agreed upon by the product owner, standardization unit and geodata development section. Next came the ontology, which was developed in Protégé through an iterative process considering additional user requirements. The data stored in PostgreSQL was then transformed to RDF/XML using the Ontop plugin for Protégé according to the ontology into RDF/XML, before being stored in the graph database Virtuoso. The first endpoint required was a Rest API that could deliver URI's based on a fuzzy text search, so that the D-CAT metadata could begin to be updated. Once that had been developed in OpenApi, we moved on to creating an html representation for human consumption. This has been accomplished reusing an open source software called the Linked Data Theatre.

This presentation will cover some basic theory on Linked Open Data and RDF, before delivering information about the technical elements of the project, both successes and challenges, and present information on how the general infrastructure has been setup and give a live demonstration of the different endpoints available.

Simple is Better: An Intro to Event-Driven Serverless Architectures for Faster Disaster Response (#137)

| | |
|-------------|--------------------|
| Authors: | Joe Flasher |
| Categories: | Disaster B - After |
| Date: | 08/29/2018 |
| Time: | 15:30 - 16:00 |
| Room: | Udzungwa |

In a disaster or humanitarian relief context, time obviously matters. Working with large geospatial datasets has often been a bottleneck, both in terms of data transfer and processing times. However, the shift to democratized access of large processing resources alongside valuable data allows innovative solutions to traditional problems. This talk will show how, without concern for the details of servers and storage, you can use small amounts of code to quickly build powerful solutions, using a prototype disaster response pipeline as an example.

The talk will walk through an end to end process including 1) creating highly-queryable indexes in real-time from satellite imagery source updates, 2) deploying tooling to monitoring <https://earthquake.usgs.gov/> for earthquakes, 3) responding to high-magnitude earthquakes by querying and collecting the most recent, relevant satellite imagery as well as hospital information

from OpenStreetMap, and 4) responding to new imagery of high-magnitude earthquakes by utilizing machine learning algorithms over affected areas and determining potential population estimates. And finally, the talk will look at what happens if external connectivity is affected and how to do all this locally, still taking advantage of the cloud.

Geopaparazzi and gvSIG mobile: state of the art (#139)

| | |
|-------------|-------------------------------------|
| Authors: | Andrea Antonello, Silvia Franceschi |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/29/2018 |
| Time: | 13:30 - 14:00 |
| Room: | Small |

Geopaparazzi is an application for field surveys and digital field mapping for Android devices. Its simplicity and the possibility to use on as good as any Android device makes it a trusty field companion for engineers and geologists, but also for tourists who wish to keep a geodiary and any user that needs to be aware of his position even in offline mode.

In Geopaparazzi it is possible to take notes with text, pictures and sketches and place them on the map. Notes can also be complex and form based in order to standardize surveys in which many people need to be coordinated.

In the past years Geopaparazzi has started to feel like a good option to be the new gvSIG Mobile, given its interaction with gvSIG Desktop and gvSIG Online. The plugin for Geopaparazzi in gvSIG desktop supplies an userfriendly GUI with GIS functionalities to:

- prepare the base raster data for the map view in Geopaparazzi
- prepare the overlay vector layers as Spatialite DB with the support of the styling (original SLD)
- export as shapefiles of all the data collected in the field (GPS tracks, text notes, pictures and form based notes).

The presentation will show the main features of Geopaparazzi, the tools available in gvSIG and some examples of customization of the application for different use cases.

Modelling natural hazards in gvSIG with the HortonMachine plugins (#140)

Authors: Silvia Franceschi, Andrea Antonello

Categories: Disaster A - Before

Date: 08/29/2018

Time: 12:00 - 12:30

Room: Udzungwa

The climate change and the recent extreme events occurred all over the world draw again the attention to the natural hazards both for prevention and for management aspects. In this context, environmental modelling can help in mapping hazards and risks zones and to support decision makers in building functional infrastructures with low environment impact and for a safe urban planning.

In the context of modelling natural hazards hydro-geomorphology analysis is a key aspect. In the last decades many researchers tried to extract useful information from digital data and in particular from Digital Terrain Models (DTM) with the development of ad-hoc algorithms and tools. In the meanwhile the data availability increased and high precision DTM are available almost all over the world.

There are many possibilities to analyze natural hazards and to define hazard and risks zones as required by the national and international directives. The algorithms contained in the HortonMachine library are the result of more than 10 years of research, development and real application of people from different research institutes and professionals working in the field of natural hazards. The HortonMachine library contains tools for data management (raster, vector and point cloud), data collection in the field, and environmental modelling in particular related to hillslope stability, floods, debris flow, forestry management and large wood transportation during floods.

Envision Scenario Planner – a geospatial tool for socio-economic and environmental assessment & modelling for urban regeneration of neighbourhoods (#141)

Authors: Ines Falcao, Rita Dionisio, Mirjam Schindler, Simon Kingham

Categories: Meeting new projects

Date: 08/31/2018

Time: 10:05 - 10:30

Room: Ruaha

This presentation covers the tool Envision Scenario Planner (ESP), which is one of the tools developed as part of CRC for Spatial Information's Greening the Greyfields project and the New Zealand's National Science Challenge 11 Building Better Homes, Towns and Cities: Ko ngā wā kāinga hei papakainga project that has the vision "Built environments that build communities".

ESP is a web-based tool for the assessment and modelling of regeneration scenarios designed to support decision-making in urban planning for experts and non-experts. It is a publicly funded geospatial tool that aims to support local authorities and other stakeholders in planning and regeneration processes, to provide evidence for decision-making through the creation of business cases and to help with community engagement since it is spatially explicit and very visual and easy to use.

From a spatial dataset of land lots, users can easily rezone, subdivide and amalgamate land parcels, create new lots, allocate various types of residential, commercial, institutional and mixed-use buildings, open spaces and pathways, create new typologies, assess a scenario through a simple report line and compare scenarios' results as to their environmental and socio-economic impacts. The main goal of ESP is to enable the assessment of sustainability and liveability aspects raising awareness of the potential impacts and benefits across different regeneration scenarios.

Given the public nature of the project, the rationale for using open source technology is primarily to ensure free ongoing access and use of the application by the general public since the project seeks innovative, affordable and flexible solutions that support decision-makers and communities to embrace change and to understand what sustainable land use means. The use of open source also makes it easier to integrate different software, rather than reinventing the wheel, having the freedom to adapt it according to the needs and to contribute with fixes and improvements to upstream sources.

ESP was developed using MapboxGL JS, MapboxGL Draw, VueJS, Turf.js, Chart.js, Bootstrap, Django/DRF, PostgreSQL, PostGIS and Docker. The user-friendly interface and a 2D-extruded visualisation of the scenarios make ESP attractive and simple providing users with a straightforward way of modelling and analysing use-cases through the interactive geospatial functionalities and the technical but explicit assessment reports. ESP is a free tool to support the opportunity to rebuild smarter and empower the community in the process of decision-making.

Development of Data Linkage, Sharing and Display System for Disaster Management of Typhoon (#143)

Authors: Ahlong Son, Hyoungseong Park, Jungtak Lim, Jinyi Park

Categories: Disaster B - After

Date: 08/29/2018

Time: 15:00 - 15:30

Room: Udzungwa

National Disaster Management Research Institute(NDMI) has developed Smart Disaster Situation Management System based on a digital map in order to situation management monitoring and support rapid and correct decision making by collecting, sharing and storing associated data when disaster strikes Korea. This study suggested disaster monitoring management scenario on the typhoon, analyze the stored data related to typhoon disaster and issue layers through Geoserver for providing customized thematic map based on the scenario. And also issued layers are displayed in web browser applying open source OpenLayers. In case of a typhoon which would cause damage, the scenario was composed of four steps according to typhoon track from creation to extinction of typhoon. Additionally, Necessary Information, as well as analyzed data, was collected on each step and solution for providing the information was established.

The first step is when a new typhoon is developing; this step includes predicted path of typhoon information from five countries(Korea, Japan, United States, Taiwan, China) and find past typhoon similar to forecast information.

The second step is when typhoon enters the watching zone(longitude135 degree, latitude25 degree); there are storm surge forecast, real-time observation data of tidal level.

The third step is when typhoon enters the warning zone(longitude132 degree, latitude28 degree); statistical analysis of past damage record within the area which will be under the influence of typhoon, real-time observation data from automatic weather system, frequency analysis of rainfall, inundation forecast, CCTV, water level of dam and river.

Last is when the typhoon dissipates; accumulated damage data and so on. The layers such as rainfall frequency and inundation forecast are issued using Geoserver after analyzing collected data.

The geospatial information is categorized according to map function; utilizing GeoServer, dynamically making and using vector layer, changing layer style, layer order and transparency, basic map control and the other's map function. And then migration of OpenLayers was applied to the system by function group. Accordingly, the study results that disaster information which is provided in form of text automatically was displayed on the digital map. Besides easily recognizing at a glance, the system is able to flexibly extend and transfer technology to local governments.

[Introduction to mago3D - a web based GeoBIM platform on top of FOSS4G \(#144\)](#)

Authors: Sanghee Shin, Hakjoon Kim, Seongdo Son, Jeongdae Cheon

Categories: Mapping systems A - Generic systems

Date: 08/29/2018
Time: 14:00 - 14:30
Room: Small

Do you want to display and manage tons of your BIM(Building Information Modelling) data in your web browser with your existing geospatial data? That's exactly what mago3D does! This talk will introduce mago3D project, a web based GeoBIM platform on top of many FOSS4G projects. mago3D enables the integration of BIM(Building information Modelling) and GIS in a single web platform regardless of size and complexity of 3D objects.

Although there have been numerous attempts to integrate BIM and 3D GIS in a single web platform, the outcome of those attempts are not so satisfactory to date. The difference of data models, the massive number of objects to be displayed, the big volume of data files, and proprietary technologies are among the major barriers that hindered seamless integration of BIM and 3D GIS on a web environment. In order to overcome these kinds of hurdles, a new 3D web service format called F4D has been devised to optimize the network traffic, to reduce the file size, and to increase the rendering speed. Industry standard formats such as 3DS, OBJ, DAE, IFC, and JT can be converted to F4D format using the newly developed format converter. A new JavaScript plugin called mago3d.js also has been developed to increase rendering quality and to visualize F4D format. mago3D.js has been developed on top of well-known open sources such as Cesium or NASA World Wind to make the best of the existing features and to expand the functionalities to BIM and AEC areas. As a result, the mago3D now can service successfully millions of 3D objects in a web browser on any kinds of devices such as smart phones, tablets, laptops and PCs. This talk also will introduce some of real successful cases that are using mago3D in their business.

In short, mago3D can manage, handle, and visualize massive 3D data from BIM and 3D GIS simultaneously on a web browser without headache!

OpenDataCube in a Box (#145)

Authors: Alex Leith, Felix Lipkin
Categories: Remote sensing A - Processing
Date: 08/29/2018
Time: 11:00 - 11:30
Room: Kitulo

The OpenDataCube (ODC) is a collaborative effort to develop software and a community of users around a common goal of making it easier to access and analyse earth observation satellite data. Due

to a 50% increase in the number of earth observing satellites over the past 12 months, coupled with new storage formats, like Cloud Optimised GeoTIFF and associated tools, there is a need for a standard way to 'plug in' to this data and enable analysis processes. The ODC was developed in the Australian Federal Government as a means to access and analyse satellite data and has rapidly expanded across the world. ODC has been adopted by many organisations, including USGS and NASA in the US, the Satellite Applications Catapult in the UK and CSIRO and Geoscience Australia in Australia. There are now serious discussions to deploy ODC in over 20 countries around the world, with 7 production or demonstration installations already in use, and that number grows each year.

One of the hurdles to ODC adoption is in the first step, getting the application installed and loading data. While it is open source, and freely available on GitHub, it is a complex application. Learning how to set it up with the required database (Postgres) and data indexing (in place data discovery) or ingestion (importing data and optimising it) can take a significant investment of time. OpenDataCube in a Box has been developed to lower the barriers to entry for newcomers, to flatten the learning curve. ODC in a Box utilises Docker, Docker Compose and cloud infrastructure templates to enable a local test environment or cloud deployment to be configured over an area of interest as simply as possible. In this way, a new user to ODC can get up and running in hours instead of days. This means that more people can work with earth observation data than ever before.

This presentation will briefly introduce the ODC project and will then discuss the ODC in a Box methodology and technology, before demonstrating a number of examples of use of the ODC in a Box. Finally, we'll discuss what's next for the ODC project.

[Livewire: postgis, Postgres & pgrouting for power delivery modeling \(#146\)](#)

| | |
|-------------|---------------|
| Authors: | Rhys Stewart |
| Categories: | PostGIS |
| Date: | 08/30/2018 |
| Time: | 10:30 - 11:00 |
| Room: | Bagamoyo |

The typical power delivery company is the perfect fit for the use of GIS technologies: lots of assets, normally a large geographic region is involved and many questions to be answered based on location. However, due to the linear nature of power delivery networks, the most pertinent questions can not be answered using simple spatial predicates, instead a deeper understanding of the power delivery model must be applied to the data at hand.

Livewire is a postgresql extension that relies on postgis and pgrouting to answer the most pressing questions in the power delivery space. This talk is about The questions that need to be answered and how the software stack that was used to answer them.

Championing SDGs with Disenfranchised Groups: Indonesian Case Study Mapping with Youth, Women, and Disabled Communities (#147)

| | |
|-------------|---------------------------------|
| Authors: | Biondi Sima |
| Categories: | Bridging the gaps A - Strategic |
| Date: | 08/29/2018 |
| Time: | 13:30 - 14:00 |
| Room: | Selous |

IT advancement is at the forefront of development. However, such advancement has to ensure socio-economic equity and environmental sustainability are kept in check. Innovation has always been dubbed as a creative destruction, meaning there are larger socio-economic aspects that come at the expense of greater use of automation and artificial intelligence. Open source communities in spatial data collection and analysis are no exception.

HOT Indonesia started operation since 2011 and only beginning to approach inclusive mapping by inspecting female mappers participation in 2013. The method is as simple as noting down the gender of training participants on a database. For three consecutive years, we note that female participations remained constant at 30-31%. Only in 2017, when HOT proactively advocate for inclusivity in mapping—hosting #WomenMap during the International Women’s Day, among others—that female participation increased significantly to over 50%, on par to its male contributors. This shows how championing social progress can not always depend on organic change, and that mapping communities need to approach this issue more vigorously.

There are numerous reasons why charting spatial data is a relevant tool for advocacy for disenfranchised groups whose needs and interests are often time neglected in decision making process. I propose to talk about best practices from HOT Indonesia to involve more women, youth, and persons with disabilities at among the centerpieces of our mapping and data collection trainings. And as such, incorporating human aspects to tech innovation. I will talk about the following questions:

- Why inclusion is of fundamental matters in an open tech community, such as HOT and OpenStreetMap?
- How do we encourage inclusion in a systemic manner?
- What tangible benefits can we expect by championing inclusion in a community?

- What would be the constraints?

- What are some of the potential uses of OSM as tools for advocacy for women, youth, and persons with disabilities?

Implement and deploy OGC services with QGIS 3.0 (#150)

| | |
|-------------|---------------------|
| Authors: | David Marteau |
| Categories: | QGIS B - The system |
| Date: | 08/29/2018 |
| Time: | 12:00 - 12:30 |
| Room: | Mikumi |

We present feedback from our experience on OGC services integration using the new Qgis server API. We will focus

on our WPS implementation using the QGIS 3.0 processing toolbox.

With the rewriting of Qgis 3.0, it is now possible to embed and customize easily OGC services in the desired framework:

to illustrate this, we will show the way of embedding Qgis server in a python framework with the new exposed features for interfacing requests and responses between the framework and the Qgis API.

Then we will discuss the implementation of a full featured WPS service built upon the Qgis processing toolbox. From this,

we will show how we can use the algorithms managed from the desktop Qgis directly on a server backend.

By combining these tools, we have a solution that enables the whole configuration of maps and the analytic processing prototyping on the desktop that can be deployed as OGC services without modification to the server.

We will elaborate on Docker based deployment and orchestration of these services, providing a simple way to deploy a full

service stack on any platform.

Will we show use case from the context of a deforestation study that uses processing models to make projection of future deforestation

states. The results of the model are then used from server side to expose maps and indicators to decision makers.

I have Tera-Bytes of Point Cloud data. What do I do now? (#151)

Authors: Éric Lemoine

Categories: Big data

Date: 08/29/2018

Time: 11:00 - 11:30

Room: Katavi

This talk is about storing, manipulating and visualizing point clouds. Point clouds are key to modeling our environment in 3D, and they now play a major role in GIS. Their sizes in number of points (billions!) and number of bytes (tera-bytes!) present unique challenges.

After a general introduction to point clouds and LIDAR systems I will present Pointcloud (<https://github.com/pgpointcloud/pointcloud>), a PostgreSQL extension for storing and manipulating point clouds in PostgreSQL databases. Pointcloud was created by Paul Ramsey, one of the PostGIS creators and developers. It is now developed and maintained by several individuals and organizations, including Oslandia. I will show how to use Pointcloud efficiently, in combination with PostGIS. And I will discuss Pointcloud's latest features, that we contributed recently.

In a second part I will talk about LOPoCS (<https://github.com/Oslandia/lopocs>), the open-source point cloud streaming server developed by Oslandia. LOPoCS allows streaming point clouds stored in PostgreSQL databases. LOPoCS supports multiple client/server protocols. Greyhound and 3D Tiles are currently supported. We will review the functioning of Greyhound and 3D Tiles, and discuss their implementations in LOPoCS. I will also do a few demos using the WebGL-based iTowns 3D visualization

tool (<http://www.itowns-project.org/>).

Come to this talk if you want to know more point clouds, from the storing of point clouds in PostgreSQL to the streaming of point clouds onto the web using LOPoCS.

Enhancing Korean Resilience with Public Safety Map (#153)

| | |
|-------------|--|
| Authors: | Sohee Lee, Youngwoo Chun, Misong Kim, Kyungsoo Pyo |
| Categories: | Government A - Services |
| Date: | 08/31/2018 |
| Time: | 11:00 - 11:30 |
| Room: | Udzungwa |

To build up a safe and secure society, the Korean government has announced the frame of 'government 3.0' which is a new paradigm for government operation that is based on three concepts: openness, sharing, communication and collaboration. Within this framework, a project of constructing safety information integrated management system has begun at 2013 as 5 years project, and that has been funded by the ministry of interior and safety in Korea as a part of e-government support project. The Public Safety Map is a part of the project named on the construction of safety information integrated management system.

There are two goals in this 5 years project. The first goal is to provide the public with safety map services that are accessible through the internet (www.safemap.go.kr) and mobile devices and help individual citizens better cope with disasters and stay safe in their everyday lives. The second goal is to offer local governments regional safety index services by integrating the disaster safety information of each government department. The thematic maps of Public Safety Map service divided into eight categories: crime, traffic, natural disasters, the safety for vulnerable groups, facilities, industries, public health and man-made disasters. For doing the service, 154 types of data is collected from 229 local governments and 26 public organizations. Moreover, the safety levels of each local government are assessed in seven categories: crime, traffic accidents, natural disasters, fire, suicide, epidemics and man-made disasters, aiming to ensure the objective evaluation of each local government's safety level and comparing local governments as a means of encouraging them to take greater responsibility for local safety. This comprehensive, citizen-centered disaster prevention system will eventually enhance the country's environmental sustainability by allowing the public to develop the capability to cope with and manage disasters effectively.

Since opening the Public Safety Map service in Sep. 2014, over 2.94 million people have visited the website, and about 49,000 people downloaded the mobile application. This demonstrates that the Public Safety Map is now being established as a tool with which the government can satisfy the public demand for safety and wellbeing in everyday life. Also Open API (Application Programming Interface) platform is established to share our service data. Since May 2015, the Open API is used over 3.24 million times to members of local governments, private sector and also academic circles. Sharing data is caused to innovate and create new services, and doing so amazing virtuous circle effect will be expected. Moreover, by co-managing and utilizing the disaster-related information collected and managed individually by relevant organizations, the Korean government has been able to increase its capacity to manage disasters and establish a foundation for the promotion of sustainable industrialization and innovation in relation to safety in people's daily life.

SPATIAL DISTRIBUTION ANALYSIS OF WILD DUMPS IN THE DISTRICT OF DABARAKONDJI IN LOME (TOGO) : GIS APPROACH (#155)

Authors: Ata Franck Akouete

Categories: Environment

Date: 08/31/2018

Time: 10:05 - 10:30

Room: Saadani

My session talk about how the OpenStreetMap data and Free and Opensource Software for geospatial was used to analyze spatial distribution of wild dumpsites in the Dabarakondji district of Togo. After data collect with fieldpapers and GPS, we created heatmaps to identify the concentrated areas of permanent and temporary wild dumpsites. The nearest neighbor analysis realized with QGIS software allowed to estimate the average distance between the types of wild dumpsites. Finally, a buffer zone of 3m radius was built around the streets of this area using OpenStreetMap data has confirmed the proximity of wild dumpsites to the residential streets.

Validating OpenStreetMap in Botswana to support and improve National Malaria Programme intervention planning and monitoring (#156)

Authors: Katelyn Woolheater, Ayokunle Abogan

Categories: SDG

Date: 08/31/2018

Time: 09:45 - 10:05

Room: Kitulo

In November 2016 and February 2017, the Botswana National Malaria Programme (NMP), with support from CHAI, conducted activities to remotely enumerate buildings in six malaria endemic districts in Botswana (Chobe, Bobirwa, Boteti, Tutume, Okavango, and Ngami) using the Humanitarian OpenStreetMap Team (HOT) Tasking Manager.

These data were used to estimate settled areas to sample for surveys, and numbers of sprayable structures to inform insecticide campaigns; however, it was determined that [1] validation of completeness and accuracy of mapping, and [2] additional information on structure type and

household composition were required to improve the usefulness of the OSM data for malaria elimination programmes.

In advance of the 2018 insecticide spray campaign (IRS), the NMP will conduct a field-mapping project with the HOT team and support from CHAI to validate all buildings in Chobe district, and buildings in one village in the 5 remaining malaria endemic district.

These data will be used to improve microplanning for IRS, and inform other malaria interventions to accelerate Botswana to elimination by their 2020 goal.

Open source elements in the MAPIRE service: georeferenced historical maps of Europe (#157)

| | |
|-------------|--------------------------------------|
| Authors: | Előd Biszak, Gábor Timár |
| Categories: | Mapping systems B - Specific systems |
| Date: | 08/30/2018 |
| Time: | 10:30 - 11:00 |
| Room: | Small |

The leading European georeferenced historical map portal, MAPIRE is introduced. Its company/university background, its historical evolution and data sources are described as well as the outline of the georeferencing methods.

The technical background is shown with special respect of the open-source technologies applied in georeferencing, processing and web publishing, to maintain the largest such provider of Europe with sustainable costs.

Planet: Global Daily Imagery (#159)

| | |
|-------------|-----------------------------|
| Authors: | Benjamin Trigona-Harany |
| Categories: | Remote sensing B - Products |
| Date: | 08/31/2018 |

Time: 09:45 - 10:05

Room: NgoroNgoro

Planet, a young San Francisco-based company, has put over 150 satellites into space with the goal of imaging the entirety of the earth's surface once a day. This goal was achieved with the completion of Mission 1 in 2017, and Planet's unique data set is now transforming how we are able to monitor our world and see changes as they occur.

In order to make this imagery accessible, Planet has built a powerful end-to-end system to process data as it arrives on earth and disseminate it to users through the Internet.

This talk will walk through the development of Planet's satellite constellations and how they have been used to detect change, monitor disasters and gain insights into parts of the world, including Africa, that usually receive less attention from commercial satellite operators. Planet makes its entire archive of California imagery freely available to everyone under an open CC-BY-SA 4.0 license. and this talk will show how to get access to this dataset today.

Extending PostGIS with Python (#160)

Authors: Benjamin Trigona-Harany

Categories: PostGIS

Date: 08/30/2018

Time: 12:30 - 13:00

Room: Bagamoyo

PL/Python can be used to write procedural functions for use with PostgreSQL, but what is less common is using Python to add geospatial functionality to a PostGIS database.

This talk will introduce `pipygis`, an free and open-source project that enables the integration of Python and PostGIS inside a running database. This makes it easy to write easy extensions to PostGIS's amazing functionality. `pipygis` can also serve as a bridge between PostGIS and other Python geospatial libraries that are in common use.

IPFS: A Sneakernet for your geodata (#161)

| | |
|-------------|------------------------------------|
| Authors: | Volker Mische |
| Categories: | Catalogue systems B - Applications |
| Date: | 08/29/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Saadani |

Often geodata workflows are centered around data residing on the Internet. Being it direct downloads from cloud providers or APIs from portals. But sometimes there might only be limited connectivity or no Internet at all. The problem is that the data is location-addressed to some place on the Internet. The solution is to use content-addressing instead. So it doesn't matter where the data is served from, but which data is stored. This allows to transfer the data through other channels like hard-dives or USB sticks, the so called Sneakernet.

The InterPlanetary File system (IPFS) is an example of such a content-addressable system. The data is stored in a distributed peer-to-peer network and hence can also be served locally in Sneakernet fashion. This enables creating workflows around the data itself, independent of the location. There's an implementation of IPFS in Go and in JavaScript, which even works in the Browser.

In this talk you'll get an idea how IPFS could bring data to remote locations and enable people there to process data with limited to no Internet connectivity at all. You'll also learn about the distributed web and why it is important to build such safer and more reliable systems.

IPFS is open source licensed under the MIT License.

Cartoframes - spatial tools for data science (#162)

| | |
|-------------|-------------------------------------|
| Authors: | Andy Eschbacher |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/29/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Small |

As more data is collected with a spatial component, data scientists need tools familiar to them and their workflows that allow them to get the most out of spatial data. At the same time, data science techniques are increasingly being adopted by the wider GIS community with tools like Jupyter notebooks, Python, and R becoming commonplace. At CARTO, we internally needed a tool that allowed us to interact with CARTO in our normal workflows using Jupyter, pandas, and matplotlib without having to export our files and manually import them into CARTO.

What we built is now `cartoframes` (<https://github.com/cartodb/cartoframes/>), an open source Python package for creating CARTO maps (interactive and static), data input / output operations, spatial processing using CARTO's PostGIS in the cloud, and data augmentation using our open source Data Observatory (<https://github.com/cartodb/bigmetadata/>).

In this talk, I will discuss the wider map and spatial analysis in Python ecosystem, where `cartoframes` sits, what open source technologies from our community it relies upon, and where we are going with planning and integration.

One Geonode, many Geonode (#164)

| | |
|-------------|--|
| Authors: | Alessio Fabiani, Giovanni Allegri, Simone Giannecchini |
| Categories: | Geonode Geonode |
| Date: | 08/29/2018 |
| Time: | 11:00 - 11:30 |
| Room: | Bagamoyo |

GeoNode is a Web Spatial Content Management System based entirely on Open Source tools whose purpose is to promote the sharing of data and their management in a simple environment where even non-expert users of GIS technologies can view, edit, manage, and share spatial data, maps, prints and documents attached.

GeoNode was initiated in 2010 by the World Bank and OpenGeo but from 2011 is entirely run by the developer community that the project has been able to attract. It claims some large organizations among its contributors such as the United Nations, the World Bank and the European Commission as well as many NGOs and private companies.

GeoNode is based on a set of robust and widespread open source components as Django as a basic framework, GeoServer for geospatial data management and OGC services and OpenLayers/Leaflet as mapping application. It can also communicate with PostgreSQL for vector data management.

GeoSolutions has been involved into a number of projects, ranging from local administrations to global institutions, involving GeoNode deployments, customizations and enhancements. A gallery of projects and use cases will showcase the versatility and effectiveness of GeoNode, both as a

standalone application and as a service component, for building secured geodata catalogs and web mapping services. Lastly, ongoing and future developments will be presented ranging from the upcoming integration with MapStore to the monitoring and analytics dashboard or the support for time series data.

GeoServer in Production: we do it, here is how! (#165)

| | |
|-------------|--|
| Authors: | Simone Giannecchini, Andrea Aime, Mauro Bartolomeoli |
| Categories: | Geoserver |
| Date: | 08/30/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Main |

The presentation will describe how to setup a production system based on GeoServer from the points of view of performance, availability and security.

The suggestions will start covering how a single node GeoServer should be prepared for internet usage, tuning logging, connection pools, security, data and JVM preparation, keeping disk, memory and CPU usage in check within the limits of the available resources. We will then move to tools used to monitor the production instances, ranging from probes to request auditing and watch-dogs.

Finally the presentation will cover setting up a cluster of server and the strategies for keeping them in synch, from the traditional multi-tier setup (testing vs production) to the systems that need to keep an ever evolving catalog of layers constantly on-line and in synch.

Location, Location, Location! (#166)

| | |
|-------------|-------------|
| Authors: | Michelle Ho |
| Categories: | Open data |
| Date: | 08/29/2018 |

Time: 14:30 - 15:00

Room: Main

This presentation shares lessons learned while building a real estate development site-selection tool using zoning and land use data from NYC Open Data. The suitability of a specific property depends not only on its intrinsic characteristics but also its relation and proximity to points of interest and the environment of the surrounding area. In other words, location is everything!

This presentation covers the evolution of this project from initial design concept to writing and running spatial queries and finally to developing the interactive tool. We used CARTO Engine's SQL API for running PostGIS spatial queries and CARTO GL for rendering the data in the final browser dashboard tool.

[Path Planning in your Database and more with pgRouting \(#169\)](#)

Authors: Rohith Reddy Sankepally, Celia Virginia Vergara Castillo

Categories: PostGIS

Date: 08/30/2018

Time: 11:30 - 12:00

Room: Bagamoyo

pgRouting is an extendible open source library extending the PostGIS / PostgreSQL geospatial database to provide geospatial routing and other network analysis functionality. This presentation will explain how pgRouting has grown over the years as an open source library with the help of valuable contributions. It will also showcase the current state of pgRouting development with its wide range of shortest path search algorithms, driving distance calculation or "Traveling Sales Person" (TSP) optimization.

We will also explain the challenges faced in shortest path routing in real world road networks and the importance of structure and storage of the network data in generating better routing results. Furthermore, the presentation will cover topics such as how the quality of search can be improved with dynamic costs using pgRouting and make the result look closer to reality. In addition to this we will give a brief overview of the upcoming features along with a plan for future releases.

VTS: Getting Started with 3D Map Application Development (#170)

Authors: Tomas Kavan
Categories: Mapping systems C - 3 dimensions
Date: 08/30/2018
Time: 16:30 - 17:00
Room: Amboni

VTS is an alternative, cross-platform approach to 3D mapping and virtual landscape streaming, relying heavily on backend capabilities and tight client-server integration. VTS server-centric design makes its client libraries lightweight and efficient. This talk explains the basic concepts behind the VTS JavaScript library and takes you through the process of writing your first 3D map application.

Server-side Data Fusion in 3D Mapping with VTS (#171)

Authors: Ladislav Horký
Categories: Mapping systems C - 3 dimensions
Date: 08/30/2018
Time: 17:00 - 17:30
Room: Amboni

Sometimes you need to combine diverse collections of orthoimagery, True3D data, DSMs and various types of vector data into a single seamless globe, yet you need to access all these resources independently from the client. VTS 3D geospatial software stack has been designed specifically for these workflows. This talk will tell you how server-side heterogeneous data fusion works in VTS, what is the role of the metadata, and how you can leverage these capabilities in your 3D mapping project.

Large-scale, Country-wide VHR Photogrammetric 3D Mapping (#172)

| | |
|-------------|----------------------------------|
| Authors: | Ladislav Horký |
| Categories: | Mapping systems C - 3 dimensions |
| Date: | 08/30/2018 |
| Time: | 17:30 - 17:50 |
| Room: | Amboni |

A country-wide VHR photogrammetric map is a cornerstone of urban and infrastructure planning, and effective land administration. In this talk we will discuss the challenges involved in large-scale photogrammetric mapping: data acquisition, processing, data-fusion and distribution to users, with special focus on the open-source VTS 3D Geospatial Software Stack. VTS is a modern, full-stack open source platform for 3D geospatial application development on the Web, on the desktop or on mobile. Integrating both backend streaming servers and frontend rendering libraries, VTS is also well suited for intranet deployment with limited or no internet access.

Catchment Hydrology Explorer for Water Stewards (CatchX Platform) (#173)

| | |
|-------------|---|
| Authors: | Luis Felipe Patino Velasquez, Susana Almeida, Wym Clymans, Mark Trigg |
| Categories: | Environment |
| Date: | 08/30/2018 |
| Time: | 17:30 - 17:50 |
| Room: | Saadani |

There is increasing recognition of the importance of sustainable management of water resources and associated freshwater ecosystems for economic stability. This, in addition to their high importance for the conservation and protection of wildlife, has generated a pressing need to understand the influence of catchment changes in demography, climate and land use. Whilst the use of hydrological monitoring data for the management of water resources has been the focus of much hydrological and conservation research, the insufficiency and rarity of objective datasets particularly in developing countries presents a significant challenge in the application of good water stewardship. Recent advances in technology paired with an increase in the availability of remotely sensed data have resulted in the development of global hydrological datasets and digital catchment observatories focused on sustainable management of water resources. However, the potential opportunities these new developments present are compromised by an incomplete application to the full range of

potential end-user. Overcoming this challenge will lead to the creation of new scientific knowledge and a greater level of engagement by water stewards, particularly in developing areas of the world.

To address these issues, we introduce CatchX a new global web-based catchment hydrological information platform that allows scientists, water stewards and non-expert users to easily access and visualise hydrological information for local-level water management and stewardship. A key feature of CatchX is the ability to synthesize and pre-process remotely sensed and modelled hydrological datasets at catchment scales using a globally consistent set of catchment boundaries – HydroSHEDS. In turn CatchX provides the end user with tools such as time series visualisation, catchment comparison and hydrological catchment reports. The platform was developed based on the stated needs of more than 100 prospective end users including research organisations, government agencies, private industry and NGO's worldwide, and with the aim of assisting decision makers and water stewards of communities in the assessment and management of water resources. CatchX takes advantage of the GEOSS vision 'to realise a future wherein decision and actions for the benefit of humankind are informed via coordinated, comprehensive and sustained Earth observations and information'. Further, CatchX seeks to contribute to the achievement of Sustainable Development Goal 6, by ensuring the availability and sustainable management of water for all by using and providing objective datasets that depict water availability at a catchment scale across the world.

From Static to Dynamic: Using Cell Phone Application Data to Measure 24hr Population Dynamics (#175)

| | |
|-------------|---------------------|
| Authors: | Wenfei Xu |
| Categories: | Disaster A - Before |
| Date: | 08/29/2018 |
| Time: | 13:30 - 14:00 |
| Room: | Udzungwa |

Mobile and smart phone penetration rates have been steadily increasing, with smart phone penetration at 33.3% of global populations currently and projected to increase to 37% by 2020. Importantly, the rise of smart phone usage has increased globally. Better technological coverage and rapid advances in positioning technology has had important implications in the study of the human population: The task of mapping and understanding human populations and mobility patterns is becoming less and less dependent solely on costly census surveys and restricted to administrative boundaries. With data from global positioning systems, we are not only able to work towards a remote-sensing method of creating a population count, but these counts be used to create a spatiotemporally dynamic, real-time representation of mobility. These have implications on our

ability to better understand and represent a range of populations or scenarios that are difficult to count, such as regions in the midst of crisis, resource-poor developing countries, or rural regions.

We demonstrate the process of creating a population count using mobile application data through two scenarios: Measuring rural populations in the United States and comparisons with the American Community Survey in terms of accuracy of representation, as well as using measuring population movement after Hurricane Maria in Puerto Rico to understand the post-hurricane migration patterns. As well, we will discuss best practices of accounting for biases in demographic representation as well as variation in coverage.

XYZ - from none to node to client as simple as ABC (#176)

| | |
|-------------|-------------------------------------|
| Authors: | Dennis Bauszus |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/29/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Small |

XYZ is GEOLYTIX' open source web mapping framework. We have had a soft launch at this years' FOSS4G-UK event (http://bit.ly/xyz_foss4guk) and work now on documentation, feature completion, bug fixes and a move towards a serverless architecture.

XYZ is meant to be a light weight framework which serves API endpoints and/or interactive Leaflet apps with the data coming straight from PostGIS 2.4+. The setup can be as microservice or serverless.

This talk will give an overview of the project's status and current development work. Some of the more exciting features involving a simple vector tile service, clustering, dynamic bi-variate hex grids, puppeteer reports and web hooks will be highlighted.

We also plan to run a workshop prior to the conference which will allow participants to setup their own web mapping instance within 2 hours.

<https://github.com/GEOLYTIX/xyz>

Useful hints when working with Leaflet (#179)

Authors: Numa Gremling
Categories: Mapping systems A - Generic systems
Date: 08/29/2018
Time: 15:30 - 16:00
Room: Small

Whether you are new to Leaflet or an experienced user, there is a chance that you are not aware of all of Leaflet's functionalities. Or perhaps you have been doing things one way and never realized there is another, much simpler, way.

From seemingly obvious basics to more advanced topics, this presentation will provide you with useful advice when working with one of the world's most popular open-source webmapping libraries.

Have you heard of map panes? Do you know how to easily style datasets? Do you know how to remove a marker by clicking it? Have you calculated the distance between two markers? Have you wondered whether the global variable L can be renamed?

If you do not have definite answers to all of these questions, there is a chance that you might have missed other things as well. Let this presentation enlighten you!

Browser-based geoprocessing with Turf.js (#180)

Authors: Numa Gremling
Categories: Mapping systems A - Generic systems
Date: 08/30/2018
Time: 13:00 - 13:30
Room: Small

Turf.js is an open source JavaScript library to perform browser-based geospatial analysis and queries. Turf.js offers a multitude of geoprocessing tools, covering all the classics that are used in every desktop GIS software (e.g. buffer, erase, intersect, merge) and many advanced features. Because it is a pure JavaScript library, anyone with a basic knowledge of JavaScript can get started quickly. Turf.js is also very well documented, flexible, and user-friendly.

Unlike many of the powerful geoprocessing libraries, such as PyQGIS, Turf.js does not require the connection to a GIS software. Analyses can be run in any browser. As opposed to Web Processing Services (WPS), which require a complex server-side infrastructure and which take longer to return results, even for trivial tasks, Turf.js works client-side with GeoJSON data, which not only results in a better performance but also works offline. Although the visualization of results is completely optional Turf.js can be used with about any webmapping library, such as Leaflet or OpenLayers.

This presentation will include how to get started with Turf.js, as well as various use cases that clarify the benefits of using Turf.js and that make it a viable, easy-to-implement, alternative to complex geoprocessing solutions. The presentation is ideal if you want to extend your web maps with geoprocessing functionality, or if you are thinking about replacing a WPS infrastructure.

[A Million Walks in the Park: How to use GPS data to Scale Up and Refine Land Use \(#182\)](#)

| | |
|-------------|----------------------------|
| Authors: | Wenfei Xu |
| Categories: | Crowdsourcing C - Analysis |
| Date: | 08/30/2018 |
| Time: | 10:00 - 10:30 |
| Room: | Katavi |

The widespread use of mobile applications and the geospatial data it produces has many potentially interesting applications within urban planning. In this talk, we focus on using human mobility patterns to better understand land use in the context of public spaces and to measure qualitative aspects of public space usage such as the potential social interaction.

Looking at public parks usage across New York City using global position systems data from a wide mixture of mobile applications, we analyze land use on a variety of different scales, within and across parks. We combine these observations with contextual analysis to better understand regions of high activity, different dominant transportation modes (walking, running, stay), as well as regions of high likelihood for social interaction, in order to demonstrate methods that would allow urban planners and policy-makers to both increase both the scale and granularity of their land-use studies.

[Mobile project monitoring in development cooperation projects \(#183\)](#)

Authors: Martin Dresen
Categories: Meeting new projects
Date: 08/31/2018
Time: 09:45 - 10:05
Room: Ruaha

Monitoring progress and assuring quality is a crucial part of many mobile projects.

Development cooperation is one of the areas where monitoring has been complicated in the past due to long-term projects and diverse project partners. This has to do especially with the fact that communication between companies and non-profit or donor organizations is often limited or non-existent. Luggage poses another complication: binders, with hundreds of sheets of paper, can not only be difficult to carry, but they are also prone to adverse weather conditions. So why not use technology to fix some of these issues? This talk suggests some ways to monitor progress using mobile GIS/GPS applications for smartphones.

Crucial aspects of progress monitoring will be presented: from storage of collected data (spatial data, attributes, images), to availability and generation of offline basemaps, uploading collected data to a secure server, and ultimately managing data in an online dashboard, accessible by anyone not on-site. Two case studies and the technologies used will be presented: one multi-year project which has recently been concluded in Ethiopia and another project which has recently started in Madagascar.

[Building large scale environmental models from pointcloud data with PDAL and postgis \(#184\)](#)

Authors: Tom van Tilburg
Categories: Environment
Date: 08/31/2018
Time: 09:45 - 10:05
Room: Saadani

Environmental models that calculate the impact of infrastructural projects usually involve a lot of data that is 3-dimensional, like buildings, elevated highways and embankments. The process of transforming and creating this data can be time-consuming and is usually done manually and only on

a local scale (like the buildings close to a highway). On top of that the detail of the data is not very high causing oversimplification and sometimes results that are too far off reality.

The availability of large scale airborne pointcloud data makes it possible to automate the creation of sets of 3-dimensional terrain and buildup data for very large regions with less effort and higher quality than previously spent on much smaller areas.

In this talk we will show how we created a 3D topographical dataset for the whole country of the Netherlands with the help of PDAL and Postgis and what it looks like. Buildings are split into blocks with the same height and terrain is modelled with breaklines and enhanced with known topological features. It involves the processing of terabytes of LIDAR data, development of extensive queries with the help of plv8 and pgpointcloud and the use of webviewers to inspect and distribute the data. We will also focus on some of the difficulties we encountered and what parts of the software we would like to improve.

Remote Control Operation (#187)

| | |
|-------------|---|
| Authors: | Luiz Motta, Marcelo Aguiar, George Ferreira, Jailton Dias, Jair Schmitt |
| Categories: | Environment |
| Date: | 08/30/2018 |
| Time: | 10:30 - 11:00 |
| Room: | Saadani |

The fiscalization operations of IBAMA(Brazilian Institute of Environment and Renewable Natural Resources) for combat of deforestation in Amazon region have a high cost, because its need to transfer the inspectors from your cities to operative base of IBAMA in Amazon. From operative bases, the inspectors go to the places where are happening the deforestation, by boats, pickup truck and helicopters.

The inspectors identify in the field the environment crime and issue the notice of infraction to those responsible.

The Remote Control Operation consist is to analyze the rural properties that have deforestation identify by PRODES(Project to Monitor Deforestation in the Legal Amazon), where, these properties are selected and made a ranking with deforestation area of PRODES that have intersection with them. The selected properties are analyzed, checking the official records, for example if properties had old notices of infringement, and with historical series of satellite images for identify the moment of deforestations in properties.

The Remote Control Operation in its initial phase in 2016, in Mato Grosso State, was register 601 deforestation fines, resulting the area of embargoes of 197.7 thousands hectares, totalizing US\$ 260

millions of fines. The cost inside Remote Control Operation for make a notice of infringement was less than a operation in field, where, in Remote Control Operation the cost was US\$ 183 and in the operation in field was US\$ 854. In addition to cost reduction, the fine made by Remote Control Operation has more materiality, reducing the legal remedies to cancel the fines by properties owners.

The Remote Control Operation database is composite by a set of satellite images in Amazon region, having public images, e.g Landsat(total of 9.219), and private images, how RapidEye(total of 57.168), vectorial layers of CAR(Rural Environmental Registry), SIGEF(Land Management System), license of Amazon States for deforestation, old fines, embargoed areas, PRODES and others cartographic bases(E.g: limit of municipalities, village, ...).

The analysis performed on the Remote Control operation are made using QGIS, where the vectorial layers are inside PostgresQL/PostGis and satellites images are delivered by TMS format.

The analysis of rural properties are default, and their informations are populate in Target layer inside database. The Target layer was created inside Postgres/PostGis doing the intersections of PRODES layer with properties layer from CAR and SIGEF. For populate Target layer is made using the custom form in QGIS, where, are identifies the responsible of analysis.

In the Remote Control Operation, the satellite images in TMS format are add for QGIS using the "Catalog On The Fly" plugin, where, the user view the property polygon and run the plugin, with this, all images(different dates) that intersects the view of map are added automatic. In this way, the user have focus only in their analysis, don't losing time for find the images.

After the analysis and finding the deforestation in rural properties, the inspectors of Remote Control Operation issue the fine, and this is send by mail to owners of properties.

At the moment, the Remote Control Operation is being extended to other types of Brazilian biomes, and too is being added the use of daily images of Planet Labs in QGIS by "Catalog Planet Labs" plugin.

Participatory Mapping for Open Counties in Kenya (#188)

Authors: Erica Hagen, Zacharia Wambua

Categories: Government A - Services

Date: 08/31/2018

Time: 12:30 - 13:00

Room: Udzungwa

Map Kibera has been a leader in participatory mapping and open data, by collecting data using OpenStreetMap and making it publicly available to the community and other interested NGOs working within Kibera, an informal settlement in Nairobi.

Most recently, Map Kibera has embarked on a new effort to engage lower level government in using OpenStreetMap within its participatory budgeting programs.

In 2010 Kenya passed its new constitution and with it came a devolved government. With 47 new counties came the birth of the Participatory Budgeting Process which is supported by the World Bank. Participatory Budgeting has been piloted in five counties and as such there has been tremendous participation from the citizens building transparency and accountability within the counties. This is evident in one of the counties where during a forum, some of the citizens sketched maps on a piece of paper and indicated on the maps where they would want the projects to be implemented. This brought out the potential for citizen generated maps as a key component of the exercise.

In early 2018, Map Kibera along with partner GroundTruth Initiative came on board to initiate Community Participatory Mapping by training the local citizens on how to map their county projects using OpenStreetMap. They also enabled citizens to track the progress of these projects, allowing them to hold government accountable for delivering what has been promised during the budgeting sessions.

This shows that this data in form of maps will help to:

1. Visualize existing government-funded development projects which will enable the counties to know which projects have been completed or are pending.
2. Perform a needs assessment analysis through the Participatory Budget meetings where the counties engage the citizens and together determine the distributions of the projects as required by the community.
3. Aid in better comprehensive financial planning within the counties as the focus will be a 'bottom-up' approach towards community development.
4. Help citizens to monitor project progress and hold the government accountable for delivering the promised results.

Using OpenStreetMap and sharing the data with the counties is a huge milestone for OSM Kenya as this will drive up usage of OpenStreetMap within both communities and county government. We hope this awareness will penetrate into the national government. This session will share the process and tools being used in the project and early outcomes.

[From images to commons: fast sharing to OpenAerialMap using WebODM. \(#189\)](#)

Authors: Piero Toffanin, Stephen Mather, Dakota Benjamin

Categories: Drones

Date: 08/29/2018
Time: 12:00 - 12:30
Room: Bagamoyo

OpenAerialMap is an open service to provide access to a commons of openly licensed imagery. WebODM is an interface to OpenDroneMap which allows users to quickly go from aerial images to georeferenced orthomosaics.

A typical workflow for contributing to OpenAerialMap involves the following steps:

1. Image acquisition
2. Data processing
3. Orthomosaic export
4. Upload to OpenAerialMap

In an effort to make it even easier for users to contribute to OpenAerialMap, in this talk we will introduce an integration plugin for WebODM that considerably reduces the efforts required for steps 3 and 4 by adding a "Share to OAM" button directly within WebODM's interface. We will discuss user experience (UX) choices that went into the design of the plugin as well as a brief high level overview of WebODM's plugin system.

These are exciting times. The adoption of open geospatial tools for aerial images continues to increase. We will provide a roadmap for WebODM and explain how people can get involved with the project.

Building a WebVR environment to bring historical shipping data alive (#190)

Authors: Luis Calisto, Ieva Dobraja, Yuhang Gu, Andreas Weber, Jelle Van Lottum, Marti Huetink, Menno-Jan Kraak
Categories: Meeting new projects
Date: 08/31/2018
Time: 11:30 - 12:00
Room: Ruaha

The main objective of this presentation is to show techniques and technology that enable the proper display, exploration and analysis of spatio-temporal data using the WebVR environment. Which techniques and technology can we use to create Virtual Reality (VR) environments? What is the added value of VR for spatio-temporal data exploration compared with the traditional Web? How can we create a FOSS based WebVR geo environment? These are some questions we would like to answer.

For this case study we used A-Frame framework with several customized A-Frame components and a data set about ships and crew members from Prize Paper archive. The digitized interrogations of the Prize Papers are a vast and valuable collection of judicial documents, private and official letters, shipping lists and ledgers covering the period between 1652 and 1815. They provide an insight on trade routes, about what commodities were shipped, migration patterns of maritime personnel, the scope of merchant networks and about labour relations on board. The display of all this data quickly leads to visual clutter. Data representation in VR might partly overcome this problem and help us to see and explore spatio-temporal patterns of the movements.

One advantage of VR environment is the unlimited space which can be used for data representation during the interaction process with data. Therefore, in VR we can combine several dashboards in a single environment. In addition to this, the user may create additional dashboard views representing information of interest in more detail.

Although WebVR is a recent technology and not many frameworks/libraries exist at the moment, we can see the power of it in displaying and analyzing spatio-temporal data. With some limitations it's possible to create spatio-temporal WebVR environments using current FOSS technology. The possibility of having the user surrounded by data representations can give a better and faster experience compared with normal Web. Usability research of the new environment is foreseen in a follow up study.

Hospitals worldwide: Data Modelling, Volunteered Data Collection, Geocoding, and Service Implementation (#191)

| | |
|-------------|--|
| Authors: | Thilo Pfalzgraf, Mwai Makoka, Franz-Josef Behr |
| Categories: | Crowdsourcing B - Collecting data |
| Date: | 08/30/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Amboni |

Since its establishment, the World Council of Churches (WCC) has supported health work of the churches globally, by supporting establishing and strengthening of Christian health associations at

national and regional levels, global advocacy, and other initiatives. Various development actors like UN and WHO aim to collaborate more closely with faith communities, especially towards the 2030 Sustainable Development Agenda where SDG 3 can be efficiently supported by an enhanced engagement of the church health structures and programmes.

Knowledge about health facilities can contribute significantly to this process. The aim of this process is to develop a framework for the mapping of health facilities like hospitals and dispensaries. In a first step the data in the OpenStreetMap database are analyzed regarding their structure, completeness and coverage. Additional approaches for the collection, storage and update of the data will be analyzed to enable a farreaching collection and provision of data. A stepwise approach regarding the completeness of attribute data will be developed.

The Tanzania Food and Land Productivity Information System (#193)

Authors: Karsten Vennemann, Ludger Herrmann, Siza Tumbo

Categories: Government A - Services

Date: 08/31/2018

Time: 11:30 - 12:00

Room: Udzungwa

This information system has been created to speed up the exchange of data and information in and about Tanzania and to support faster development, particularly in the agricultural sector. It is part of a cooperative effort of several German and Tanzanian research institutes (Trans-SEC project). The system has been implemented as a suite of web maps and spatial tools covering the whole of Tanzania. It is based on PostGIS, MapServer, OpenLayers, and GDAL/OGR using SQL, PHP, JavaScript, and Python to put the implementation together. The system has four main components: two spatial tools (1) the "Tanzania Food Security Monitor" and (2) the "Land Evaluation Tool", a suite of "Map Viewers", and a collection of "Natural Resource Data". The map viewers are interactive maps covering natural resources information including soil, climate, and crop performance on a national scale, and in addition, providing selected soil maps at the village scale. The Land Evaluation Tool is an interactive web-based tool targeted at non-GIS experts.

The tool is based on the FAO framework for land evaluation and applies the Storie index in order to derive crop suitability classes. Many natural resource data layers are available for use in the tool calculations by default. Following a guided step by step approach users can interactively select their desired area of interest, set a variety of parameterizations in order to evaluate crop suitability for maize (the default) or for selected other crops. In addition, users can optionally include their own

spatial data in the evaluation calculation and finally download results as raster files (in a resolution of 250m) for further processing.

The Tanzania Food Security Monitor delivers dekadal (10 days) rhythm information on the current and past potential biomass productivity. The algorithm behind the monitor is the "Water Requirement Satisfaction Index" (WRSI, FAO). Based on regularly updated NOAA data on rainfall and potential evapotranspiration (PET) the WRSI is calculated for 12km by 12km tiles and presented as six categorical food security indicator classes. Recent and historical dekadal spatial patterns can be downloaded. A version of the full information system is also available as a virtual machine (for Virtual Box) that can be run locally on most operating systems without the need for an internet connection. The later provides a significant advantage in educational settings and allows to use the tool for work in remote locations without internet connectivity.

A data visualisation platform using D3, leaflet, Geoserver, PostGres and php (#196)

| | |
|-------------|-------------------------------------|
| Authors: | Santosh Seshadri, Vanessa O'Brien |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/31/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Bagamoyo |

Introduction:

Open data and open source software play a pivotal role in bringing communities and governments together to surface achievements and problems faced by different parts of the community. Currently, most open data platforms are catered towards a technical audience for analysis purposes. While these platforms are very powerful and filled with great analytical tools for gaining insights, they are not designed to communicate a cohesive story to the community. Orbica has developed a data visualisation tool utilising open-source technology to engage and inform the community about how their government projects are funded.

Implementation of this tool has allowed for widening the access of open data and open source technologies to governments and citizens. The maturity and robustness of this application has increased confidence in open source technologies, resulting in local governments investing and adopting these technologies to tell their stories to their citizens and stakeholders.

Detailed overview

In today's world of rapid development, big data and globalisation, transparency amongst local, regional and central governments is essential for well-adjusted and transforming communities.

Open data and open source software play a pivotal role in bringing communities and governments together to surface achievements and problems faced by different parts of the community.

Currently, most open data platforms are catered towards a technical audience for analysis purposes. While these platforms are very powerful and filled with great analytical tools for gaining insights, they are not designed to communicate a cohesive story to the community. Orbica has developed a data visualisation tool utilising open-source technology to engage and inform the community about how their government projects are funded. This allows for an open conversation between the government and citizens.

This data visualisation tool is a web application along with a content management system designed using Geoserver, Postgres/PostGIS, pHP, jQuery, python, leaflet, apache, tomcat and D3. The application allows administrators to input government funding data along with narratives to illustrate expenditures. The application is split into three distinct views- Bubbles, Map and User views. The bubbles view breaks down the funding into various categories and sub categories. The map view breaks down the same data in a geographical context. The user view is targeted at the user level and shows the data relevant to a citizen. All three views seamlessly interact with each other giving the citizen a complete picture of collected taxes will potentially be allocated. The narrative section of the application provides the expenditure information.

Implementation of this tool has allowed for widening the access of open data and open source technologies to governments and citizens. The maturity and robustness of this application has increased confidence in open source technologies, resulting in other local governments investing and adopting these technologies to tell their stories to their citizens and stakeholders. The low cost and high value approach of free and open source technology has had a great impact in the New Zealand community and continues to get adopted across various organisations.

CityCycler - lowering the barrier to cycling by matching up inexperienced and experienced cyclists to cycle together (#197)

| | |
|-------------|----------------------|
| Authors: | Max Stephan |
| Categories: | Meeting new projects |
| Date: | 08/31/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Ruaha |

Problem:

Many cities today suffer under too much motorised traffic and as a result congestion and dramatic air pollution. This not only has an effect on the quality of living but a direct impact on the citizens' health. One solution to this problem is to encourage more people to cycle, both for leisure and for their commute. Oftentimes an appropriate and safe infrastructure enabling this is missing, though. This poses a significant barrier for citizens who would like to pick up cycling as they oftentimes do not know safe routes and lack the confidence to deal with motor traffic.

Solution:

CityCycler is a mobile app that aims at lowering the initial barrier to cycling by matching up inexperienced and experienced cyclists. Experienced cyclists enter their commute route along with times when they take this route. An inexperienced cyclist on the other hand provides start and end point as well as when he would like to cycle. The app then finds the most suitable experienced cyclist that could join them on their route, and the inexperienced cyclist can send a request to cycle together.

Execution:

The core functionality of the app is provided through a Swagger documented REST API, running on google app engine and therefore scalable and easily distributable. User data as well as route data is stored in PostGIS running on google CloudSQL. PostGIS also does the heavy lifting of finding appropriate matches.

The app itself was created using the cross-platform hybrid framework React Native. All maps within the app are based on react-native-mapbox-gl with self-made vector tiles hosted in google cloud storage as base map.

In the talk I will go through the general idea of the project and explain the technical implementation in depth as well as pitfalls and lessons learned.

A feature extraction tool set using Tensor Flow and Keras to identify features using RGB imagery (#201)

| | |
|-------------|-------------------------------|
| Authors: | Vanessa O'Brien, Peter Rose |
| Categories: | Remote sensing A - Processing |
| Date: | 08/29/2018 |
| Time: | 14:00 - 14:30 |
| Room: | Kitulo |

Introduction

The amount of earth observation imagery available has multiplied exponentially in the age of satellites and drones. But how can we take advantage of this vast data source and turn it into valuable insights in near real time?

Traditional methodologies of extracting and classifying features of the earth's surface are time consuming and labour intensive. Orbica's solution to this problem is to automate this using artificial intelligence deep learning algorithms and geospatial processes. We've invested in research and development to build our solution and have applied it to waterbodies, roads, vegetation, build progress reporting and building outlines. This tool has many uses, from identifying informal settlements to providing valuable datasets for urban planning, environmental management, disaster response and humanitarian mapping. The tool is a very cost-effective solution completely developed using open source technologies and has no proprietary licensing costs.

Details

Artificial intelligence (AI) technologies have rapidly grown and become an essential part of the core technologies used to identify patterns and features in our environment in recent years.

Though AI has been used by the geospatial community for a long time in the form of remote sensing, supervised/unsupervised classification, feature extraction etc. it had a limited scope and required resource expensive multispectral/hyperspectral imagery. Now, with proliferation of AI in almost all sectors of our economy such as autonomous cars, healthcare, finance, agriculture, asset management etc. it has grown the number of players exponentially. This has opened the flood gates for ideas to pour in mainly in the open source space. Lot of AI tools, models and technologies are being developed using open source frameworks allowing for usage of these tools in unimaginable ways. For example, it is now possible to use tools developed to identify faces in a picture to identify potential pests and diseases in crops, or tools used to assist doctors during diagnosis to predict stock markets.

The GeoAI feature extraction tool is one such tool: it uses Keras with Tensorflow and Theano as the back-end technologies to identify environmental features using only RGB imagery. This tool uses the power of machine learning and deep learning, such as convolutional neural networks (CNN), to identify building footprints, water bodies and land use, and classify them based on core geographic principles. The tool then uses libraries from GDAL, SAGA, GRASS, Shapley and QGIS to apply geoprocessing techniques to further classify and improve these features. The features are then served up using Geoserver for consumption into mapping applications and other geospatial workflows.

This tool has many uses, from identifying informal settlements to providing valuable datasets for urban planning, environmental management, disaster response and humanitarian mapping. The tool is a very cost-effective solution completely developed using open source technologies and has no proprietary licensing costs. Also, RGB imagery datasets are much cheaper to capture and issues such as cloud cover artefacts can be eliminated as RGB images are cost effective to capture using drones or planes allowing for much richer datasets when satellites do not make sense. In addition, all the results from the tool feedback to the AI model to increase accuracy and precision of the datasets, which results in an ever-improving dataset.

CorpsMap - A plugin-based web mapping platform (#202)

| | |
|-------------|-------------------------------------|
| Authors: | Will Breitzkreutz |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/31/2018 |
| Time: | 09:45 - 10:05 |
| Room: | Bagamoyo |

Rather than building a web map to fit all of the needs of our organization and each of the sub-organizations within, we decided to build a mapping platform that allows each instance of the map to be configured to use any number of stock and / or custom plugins. Plugins provide all of the functionality of the application, from map interactions to integration with our authentication API. By separating the application out into plugins we are able to create a composable architecture that is easily extended or refined for specific uses.

Map authors may enable or disable any of the “core” plugins that provide basic functionality, build their own plugins that are compiled into an instance of the application, or even publish plugins to a central repository so that users across the CorpsMap ecosystem may import and use their custom plugin and its functionality.

We built our platform using React.js and the awesome ol-cesium integration library that marries OpenLayers for a 2D canvas with Cesium for 3D. The presentation will cover the high level plugin architecture, explore some examples of plugins and walk-through the process of publishing and importing external plugins.

Diversity within mapping and FOSS communities (#203)

| | |
|-------------|--------------------------------------|
| Authors: | Selene Yang |
| Categories: | OSGEO community A - Community health |
| Date: | 08/29/2018 |
| Time: | 13:30 - 14:00 |
| Room: | NgoroNgoro |

I will present the initial results for the International Gender Survey from Geochicas that seeks to understand gender balance and hostile situations within the mapping communities. This talk is about the need to create more initiatives that encourage participation of women in OSM and FOSS

communities, their active role in decision making spaces and more projects and activities led by women. From Geochicas, we believe in mapping as a sociopolitical practice, thus maps are a result of collective subjectivities that give personal meanings to the open geospatial data. As Hanna and Del Casino argue, maps are 'mediated by the multiplicity of knowledges we bring to and take from them through our everyday interactions and discursive practices' We believe there is a crucial opportunity to understand and make visible the minorities needs in OSM

The challenge for new communities that create open geospatial data is to produce symbolic and real territories that are diverse, politically and culturally inclusive. By generating inclusive cartographies, with a gender approach towards territorial issues, one can make visible and understand the societal organisation in terms of historical discrimination against women and other marginalized groups. Maps are not subject to their moment of initial production, rather they are modified according to the new meanings that can emerge from the territories and from those who create and use them.

How communities can leverage location during emergencies, disasters and humanitarian efforts. (#205)

| | |
|-------------|---------------------------|
| Authors: | Kenn Burnet, Joe Larson |
| Categories: | Crowdsourcing A - Society |
| Date: | 08/30/2018 |
| Time: | 10:30 - 11:00 |
| Room: | Amboni |

Social media has been used many times to share information in an emergency. Users will send a tweet about their situation and ask for help. Oft times these social media posts are not geospatially enabled and lack the specific information needed to affect the situation in a positive way. If we could leverage a geospatially enabled method to collect and collate relevant information in a free and open manner, many emergencies could be prevented. The method of collection should also be easily shared in a cloud environment.

Fulcrum Community is a cloud-based mobile phone field data collection platform based on the successful Software as a Service (SaaS) Fulcrum. Many companies use Fulcrum to collect and manage their data. Custom forms and secure data are critical for those companies. In a natural disaster, humanitarian emergency or environmental preservation project, leverage of location, customization of forms and rapid deployment at no costs to the widest audience regardless of their geospatial awareness is critical. We should enable the community to leverage their location without complication. Fulcrum Community allows organizers to set up forms for critical data collection and

sharing with all members of the community. The community can be contacted through most popular social media venues. The forms can be as simple as necessary to collect the critical information. Video and photo are fully enabled and geospatially tagged. The users in the community can contribute necessary and relevant information in near real time with little to no training. Multiple languages can also be supported. The best part is the data are free and open for everyone.

Improving Transit Safety with Open Data and OSM in São Paulo (#206)

Authors: Tiago Fassoni, Flávio Soares
Categories: Crowdsourcing C - Analysis
Date: 08/30/2018
Time: 10:30 - 11:00
Room: Katavi

São Paulo's transit is atrociously violent, with over 880 deaths only in 2017.

In this talk we share all the steps we took, as a Cycling Activism NGO and a Tech Cooperative, to make the first data-driven study on how to decrease that number and whether the steps taken so far are being efficient.

We geocoded 14 million transit fines over a 4 year period. Got all the data available about the deaths via FOIA requests (to be more exact, its equivalent in Brazilian Law), used OpenStreetMap a lot as a source of geocoding and/or to fix faulty data.

One of the findings was: to decrease the number of deaths, we need more people to be fined. Educational campaigns are ****not**** enough.

We did all this analysis using Python, Pandas, PostGIS and the venerable QGIS. We want to share it to the world so more analysis like this can be made.

You got a huge dataset via FOIA Request. Now what? (#207)

Authors: Tiago Fassoni, Laury Bueno, Flávio Soares
Categories: Big data

Date: 08/29/2018
Time: 13:30 - 14:00
Room: Katavi

Fear not, for we are going to explain all the (well, some of) witchery of Python Data Analysis so you can make sense of the data, check if the data is correct and even make some cool interactive visualizations.

This talk will involve Python, Pandas, Jupyter Notebooks and Bokeh. Pretty much the entire python data stack. It is based on the pyviz.github.io tutorial, but we will use a dataset of 13 million transit fines in São Paulo instead of the NYC taxi dataset.

Wave Good-Bye to Buttonology: Satellite Imagery Analysis Made Easy with GeoTIFF.io (#208)

Authors: Daniel Dufour, Stephen Peyton
Categories: Remote sensing A - Processing
Date: 08/29/2018
Time: 14:30 - 15:00
Room: Kitulo

GeoTIFF.io is an open source website that makes analyzing satellite imagery easier than ever before in three ways: removing the installation step, working offline, and providing a simple interface.

No installation is required because GeoTIFF.io is just a website, that's it. It's just a collection of your standard HTML, CSS and JavaScript files. Just point your web browser to <https://geotiff.io> and go.

No internet connection is required to load rasters and analyze them because all of the calculations are run inside of the web browser on the user's physical device.

No longer must you learn buttonology, what every icon stands for and where to find it. GeoTIFF.io has a simple search interface where you can find everything you need.

GeoTIFF.io is powered by geoblaze (geoblaze.io), an open-source engine for in-browser processing of satellite imagery and other rasters.

GeoTIFF.io is democratizing access to satellite imagery analysis and empowering people to answer questions about their own communities. Because GeoTIFF.io works with almost any data in GeoTIFF

format, Africans and anyone around the globe can quickly answer many questions important to them using raster data.

We will live demo how GeoTIFF.io can answer real questions with blazing fast speed. We'll show how anyone can calculate the acreage of croplands in Tanzania using MapSpam data. Anyone can quickly compute the suitability of pastureland using Action Against Hunger's dry matter raster data. Anyone can quickly compute the median access to ante-natal care for each province in Rwanda using data from WorldPop.

GeoTIFF.io is on a mission to make GIS, especially satellite imagery analysis, accessible to everyone.

Resource Watch: Monitoring the Planet's Pulse (#211)

Authors: Francis Gassert

Categories: SDG

Date: 08/30/2018

Time: 15:00 - 15:30

Room: Kitulo

Creating a healthy planet where people and ecosystems can thrive requires trustworthy, accessible, and actionable information. Data has never been more plentiful, but few sources are open and curated to meet our needs.

Resource Watch is the world's monitoring system: an open-source, collaborative data platform that makes it possible to track and manage precious natural resources. Hundreds of open datasets offer unprecedented insight into some of our planet's most urgent issues, including climate change, air pollution, and water insecurity.

Access data and integrate datasets to meet your interests, easily create custom visuals, and share insights on your findings to help address the world's most pressing natural resource challenges. Resource Watch is curated by World Resources Institute (WRI), built together with over 40 partner organizations.

This presentation will focus on how this tool can be used for to conduct or share geospatial analysis, and how to access and use its open APIs. Learn more about the initiative and how to get involved at <http://resourcewatch.org>.

Overcoming data access and acquisitions limitations through opensource solutions to increase GIS efficiency (#212)

Authors: Sylvain Poulain
 Categories: Drones
 Date: 08/29/2018
 Time: 15:00 - 15:30
 Room: Bagamoyo

Having access to the right data at the right time in GIS is key for effective results in a project. Data acquisition can be a great challenge when faced with limited or no access to information due to lack of means. The tedious exercise of processing data can also be a constraint and cause delay in achieving objectives on time.

In this project, we have tried to show that alternatives to traditional data acquisition and processing methods exist and that opensource can be a real solution to overcome time constraint and be cost effective. Indeed, a project can be geared 100 % opensource with spectacular results. Affordable and more accessible, opensource techniques are more and more requested by users. Solution driven, with a comprehensive approach, open source solutions provide huge possibilities to counter effectively, limitations with regards to access fast and accurate data, and also to increase the fair value of information acquired. Flexible, these opensource solutions can leverage and enhance traditional softwares and hardwares to improve quality of results.

Overcoming data access and acquisitions limitationsthrough opensource solutions to increase GIS efficiency

How it all started?

Data acquisition as a key factor in Geographical Information Systems (GIS) proved to be a great challenge while undertaking projects in the Western Indian Ocean and Africa. Indeed, encountering limited or no access to information can be a real issue, before even starting a project. Proven traditional data acquisition methods and means have often been questioned because of local characteristics and needs (related to time, availability of materials locally, resources...). These two issues (poor access to data and limitations of “traditional” data acquisition methods) were major constraints in project planning and budgeting.

Approach

While in some countries data acquisition is just a simple formality, limitations of the same methods can be experienced in other countries, Adaptability is a must for a project’s success. Facing these

challenges, the technical team reviewed the current modus operandi to adapt to new realities, meet time and budget constraints. Open source solutions were then explored.

The challenges faced by the technical team were mainly:

- Poor knowledge of project sites and neighborhood
- Geomorphological and meteorological characteristics of each country
- Poor or no access to data
- Low reactivity and not solution driven

Example:

Road development – new motorway in a steep and morphologically difficult site in a tropical environment can be costly (in terms of material and human resources) and time consuming.

Our company intervened at the evaluation stage to assess the terrain before construction.

In this context, a 3D model of the road with opensource softwares (QGIS, GRASS GIS, Paraview, Blender and Ogre 3D) were used.

A videoclip illustrating the implementation of the road project through real time 3D visualization rendering under Ogre 3D (game engine) made in 2011 will be showed during the workshop

This clearly depicts the fact that quality results depend largely on the quality of data. Being a prerequisite for information acquisition and analysis, short and medium terms solutions were requested to improve current methodologies.

How we proceeded?

The reviewed acquisition process included the:

- Manufacturing of opensource/openhardware drones
- Mastering measurement and processing
- Handling incoming data or reviewing steps for incoming data

Results

The “fully” opensource solutions were implemented in other projects in Europe and Indian Ocean namely:

- Flood simulation on Patiras Island in France (processed with Grass GIS)
- Volume calculation in GIS, dike modeling, analysis the evolution with sentinel 2 data (Grass GIS)
- Management (evaluation and optimization) of a natural reserve through semi-automated classification of plants (Etang du Cousseau, France)
- High accuracy implementation of solar panels with data acquired by drones (Mauritius, r.sun with GRASS GIS)
- Precision crop management (postgis and postgres for fast data processing)
- Marine drones – semi-automated detection of acanthaster (test phase)

Our conclusions

- New usages and applications could be tested. Academicians and technicians should work together to alleviate data access and acquisitions issues. However, it is interesting to note that:
- A project can be geared 100 % opensource,
- Possibility of tackling complex techniques: opensource techniques more and more user friendly and accessible - 3D, Postgis
- Mixing softwares for better result
- Associating softwares and hardwares can provide fast and accurate results
- Open source solutions are more and more requested by users. Solution driven with a comprehensive approach, it provides huge possibilities to counter effectively these limitations. Until now, there has not been a full-fledged opensource data/open hardware solutions (A to Z), but these aspects are evolving rapidly.

-

Keywords: OGRE 3D, QGIS, PostGIS, GRASS GIS, UAV, Drone, DIY, opensource, openhardware, data, ardupilot.

Mexico Earthquake mapping: An example of how Humanitarian Mapping supports in Disaster Response (#213)

Authors: Miriam Gonzalez

Categories: Open data

Date: 08/29/2018

Time: 15:00 - 15:30

Room: Main

Every day we are witnesses of how places that usually not appear in commercial maps are affected by different disasters. Commercial maps are focused in areas in the ones there is a business model in return but what happen with all the places with economies with limitations or poverty. In OpenStreetMap we do the opposite we try to see which areas of the world need to appear in a map and become part of the largest Geographic database in the world. This has helped different locations to react faster and in a more efficient way to help people in need after a disaster.

In this session we will understand how we can get the benefits of Open mapping and how we can work together pre disaster and the ways to coordinate rapid mapping for disaster response helping to see how many people was affected, how to find ways to receive basic assistance and help the injured and even to plan reconstruction based in the map data. I will share examples of different projects and shared the latest events in the Mexico earthquakes.

Using Community User Experience Research to Improve Open Source Tools: A Case Study of OSMCha (#217)

Authors: Jinal Foflia

Categories: OSGEO community C - Solutions

Date: 08/30/2018

Time: 13:00 - 13:30

Room: NgoroNgoro

OSMCha is an open source tool that — is a web tool to help visualise and analyse edits made by mappers on OpenStreetMap (OSM). When developing OSMCha, Mapbox started with the goal of creating a tool that would be useful for the OSM and open mapping community and decided to take a user-driven approach to the design of this community tool. We will use the learnings from the user interviews and explain our user experience research methodology including

- Justifying the need to conduct the interviews — setting up goals, action plan to accomplish them
- Selecting the users for the interviews — having a diverse mix of users
- Framing the interview questions — asking right questions to make the most of the process
- Conducting the interviews — reaching out to the users, making the users comfortable and making a conversation happen
- Analysing the findings from the interview — drawing conclusions, deriving patterns
- Using these findings to improve the tool — translating the analysis into actionable items

We become what we behold. We shape our tools and then our tools shape us ~ Marshall MacLuhan. As developers, designers, and everyone involved in building open source tools, it's important for our tools to be useful and meet community's needs. The user interviews not only help us reach out to the community, understand their needs but also brings us closer and makes them a part of that tool.

What and how OSM data can help in strengthening the Disaster Resilience, and what is still missing? (#218)

Authors: Kuo-Yu Chuang
Categories: Government A - Services
Date: 08/31/2018
Time: 13:00 - 13:30
Room: Udzungwa

With the previous experience with Asian Development Bank in Armenia, Bangladesh, Philippines, and Fiji on ICT for disaster resilience, we see how local community can response to disaster with the proper designed ICT tool. Usually, the environmental survey, called Town Watching, was done by paper and pen, not that easy to be re-used. We would like to talk about the methodology and ICT tool we used, the pilot deployment in those countries, how community mapped on OSM, what was planned for evacuation and response, what is still missing to the methodology and tool, and what is the follow up after this pilot project.

Beyond Latin Glyphs: Advanced System for Rendering Texts in 3D Maps (#219)

Authors: David Levínský
Categories: Cartography
Date: 08/30/2018
Time: 17:30 - 17:50
Room: NgoroNgoro

Labels in digital cartography have been dominated by Latin glyphs for a very long time, and only recently are we seeing a gradual change towards support of non-Latin characters. The main challenge in handling non-Latin writing systems is the sheer number of glyphs and the complex rules that apply to character composition and text layout. In a 3D presentation such as the VTS WebGL based 3D map browser, efficient high-quality GPU font rendering is of interest. In this talk we will present a solution which is fully client-side based and compact enough for dynamic web-based presentations.

Bringing complex features from extendable GML application schemas into a compact database representation (Is it really as hard as the title reads?) (#222)

Authors: Felix Kunde
Categories: Meeting new projects
Date: 08/31/2018
Time: 13:00 - 13:30
Room: Ruaha

So this is one is on standards, namely GML application schemas (GMLAS). GMLAS are the OGC way to engage different domains and communities to talk with each other about the data they have (or want to have) and come up with a common understanding about the things and properties they are dealing with. The GMLAS can be seen as the contract between them and with software companies who produce, process or analyze the data. GMLAS have laid the foundation for important national and international standards such as INSPIRE, CityGML, GeoSciML or SensorML.

For anyone who is new to GMLASs they look like a huge mess. If you present the topic at a FOSS4G conference you **rarely** see storms of enthusiasm in the audience. Might be sad, but also understandable as software support hasn't been that great for a long time. But, things changed to the better. Many of our favourite tools have started to support it by now: GDAL, QGIS, Geoserver, deegree (since a little longer) and we got nice schema alignment tools like HALE or steti.

What about the database? The GMLAS data needs to be stored somewhere. And this is when things get tricky again. Most often PostGIS is used as the backend. Mapping complex UML models into the relational world has been an annoying task ever since. This talk will show how different FOSS4G projects are dealing with this problem. I will also present a new approach of optimizing derived database schemas by using graph transformation rules. This method has been successfully applied for the upcoming version of the 3D City Database, which had to deal with user-defined extensions to CityGML standard documents. And yes, this is when GMLASs get even weirder.

Application of GIS and OpenStreet mapping in earthquake mitigation: A case study of Karonga Area (#223)

Authors: Rachel Kumwenda, Dr. Blackwell Manda
Categories: Disaster B - After
Date: 08/29/2018
Time: 14:00 - 14:30

Room: Udzungwa

Earthquakes vary in magnitude ranging from weak to destructive. Earthquakes manifest themselves by shaking and sometimes displacement of the ground. Earthquakes occur when energy from the lithosphere releases seismic waves and is associated with rapid movements on active faults. Faults result from the action of plate tectonics. Malawi, Uganda, Kenya Rwanda, Congo are some of the countries that lie along the East African rift system and due to divergent plate movements there are a number of faults that have led to a number of earthquake. Studies have been carried out in Karonga to understand the risk posed by earthquakes based on roles and perception of stakeholders. Information was collected from several stakeholders who were responding to earthquakes impacts in Karonga town.

A Geographic Information System (GIS) portal site, crucial and critical in disaster management does not exist for Karonga, rendering it very difficult to quickly share disaster-related GIS data and make and implement quick policy decisions. This research will analyze the location of both population and infrastructure with respect to areas prone to strongest earthquakes and will reduce the impact of potential hazards. It will also assist in improving policies with respect to infrastructural development in implementing strategies for vulnerability reduction as the population increases. Expanding urban development and construction works are moving toward areas susceptible to earthquakes. This research will help to maintain a database to track community vulnerability to earthquake risk.

3D Geospatial Application Development with no Internet Access (#224)

Authors: Vaclav Blazek
Categories: Meeting new projects
Date: 08/29/2018
Time: 11:00 - 11:30
Room: Amboni

Modern geospatial application development is largely cloud-based. Yet in many scenarios, geospatial data may not be legally uploaded into the cloud, the application runs off the grid or with limited connectivity. VTS 3D Geospatial Software Stack is an integrated open-source platform well suited for off grid deployment since both the backend streaming servers and the frontend libraries may be deployed in a local network, completely cut off of the Internet. This talk will give a short overview of VTS components and will walk you through VTS backend setup.

Access Geoserver Rest-api using Python (#225)

Authors: Jakob Lagerstedt

Categories: Geoserver

Date: 08/30/2018

Time: 11:30 - 12:00

Room: Main

The geoserver rest-api is very useful for automating Geoserver deployments. A person using a Geoservers Rest-api can set up anything otherwise available through the web-ui. Thus a person using a programming language, such as, python can automate this setup; this proves particularly useful when deploying instances of Geoservers in throw-away environments such as containers (docker, rocket and so on) since it quickly becomes tedious to setup Geoserver through its web-ui especially when you would need to do this many times every week.

The geoserver rest-api can be tricky to get to grips with as a developer not well versed in geoserver specifics (or at-least it was for us). However, there is a trick or two that once understood makes development much easier. We think by exposing our learnings, a new developer can within 20 minutes be given the framework needed to develop their own functions that use Geoservers rest-api in whatever way they choose.

Linear Referencing with Floating Car Data (#226)

Authors: Felix Kunde

Categories: Crowdsourcing C - Analysis

Date: 08/31/2018

Time: 09:45 - 10:05

Room: Amboni

Within a research project I got the chance to analyze a greater dataset of very precise (5 sec frequency) floating car data collected by 500 taxis over one year. Usually, you don't find such datasets free for download for driver privacy reasons. I used the map matching algorithm by Graphhopper to align the tracks with OpenStreetMap roads and imported them to PostGIS. From there on one can do space-time cluster analysis or calculate the average speed of single roads.

I also came across the linear referencing functions of PostGIS and found out, that one can answer pretty interesting questions with them like:

- Cut out subsets between two points in order to compare different driving statistics (length, duration, road types, specific roads)
- Create a spatial weight matrix between static traffic sensors as an input for traffic forecasting
- Cut out subsets by time of the day or speed parameter (misused the Z value for it) to see where and when cars are going slow

I've also created a way to anonymize data by combining tracks, instead of simply cutting out parts. Although the dataset will not be made available, I would like to present my findings to help developers that have the chance to play with similar sample files.

Monitoring postgis model CRUD actions with prometheus. (#230)

| | |
|-------------|----------------------|
| Authors: | Alison Mukoma |
| Categories: | Meeting new projects |
| Date: | 08/29/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Amboni |

Prometheus is a monitoring solution that gathers time-series based numerical data. It is an open-source project started at SoundCloud by ex-Googlers that wanted to monitor a highly dynamical container environment.

Real Time Monitoring is a web application in the cloud that allows you (or your IT department) to monitor any glitches or problems that may arise with your site. Obviously, in real time.

It enables you to respond to the problems right away. The reason why real time monitoring is so important today is because you can easily adjust your resources if needed based on traffic and it is one of the most effective ways of protecting a company's digital assets and utilities.

A few benefits.

Sales

If you are managing a rich map website, it is crucial that your server runs fast and is optimized at all times. During issues like downtime, real time monitoring comes into play as it helps you identify and rectify the problem as it unfolds.

Feedback

If your site is in its infancy or beta testing stage, real time feedback is a treasure.

Therefore, monitoring your database models (tables) activities would be so beneficial to your design pattern enhancement as when you can see the counts of how many creations, read requests, update or deletions are occurring in a particular incremental timestamp then you can choose what to focus your optimization on much.

This is where Prometheus comes in as a good option for model monitoring.

We could hook up our django-postgis (which has to be a postgres database) database to be monitored by Prometheus easily.

You may want to monitor the creation/deletion/update rate for your model. This can be done by adding a mixin to the postgis database models. This is safe to do on existing models as it does not require a migration.

The exported metrics are counters of creations, modifications and deletions done in the current process. Hence we end up having rich internal workings of our geospatial enabled database .

Map the Philippines: Building Local Resilience Networks To Address New 21st Century Realities (#231)

Authors: Celina Agaton

Categories: SDG

Date: 08/30/2018

Time: 10:30 - 11:00

Room: Kitulo

The Philippines has limited access to current, free and low-cost maps for the public and private sector, creating barriers to effective urban, social and economic development planning - especially for the most vulnerable communities. The monitoring and evaluation of programs and sharing of best practices is difficult due to closed communication channels within and across local and international sectors. The Philippines' geography and cultural diversity amplify the challenges of poverty, corruption, disaster risk and climate change. The country is effectively high risk for all the UN Sustainable Development Goals (SDGs) even as it maintains its status as the 10th fastest growing economy in the world and the 1st in Asia.

Map the Philippines (MapPH Inc.) is an open data cross sector mapping program that tracks public and private programs and services, layered against resilience data and real-time community risks and opportunities within the framework of the SDGs. The combination of risk data, citizen reporting and community engagement rapidly identifies priority areas, gaps and overlaps to mobilize better planning, coordination and monitoring of efforts across the sectors. The goal is to map the Philippines' 81 provinces to help grow more local and more inclusive social and economic development. MapPH was the local community mapping partner for the World Bank OpenRoads project.

MapPH teaches business, government, NGOs, schools, community groups and citizens how to map their local assets, identify needs, risks and opportunities to create the foundation for more effective planning, coordination and monitoring. This engagement process helps strengthen community resilience by empowering local community leaders regardless of their sector. The first meeting is often the first time NGOs, business, government, academe and community groups are meeting in person and can help create a stronger support network to share resources and efforts when unexpected challenges arise.

As a third party platform, MapPH is able to steward data and help maintain the momentum of cross sector efforts from the local, regional and national community level on an ongoing basis amidst organizational leadership changes, the realities of politics and personalities, and disaster and climate change risks. These challenges are not unique to the Philippines and reflect a new model for addressing the new realities of the 21st Century.

A traffic management system based on Graphhopper and OpenStreetMap (#232)

| | |
|-------------|---------------|
| Authors: | Felix Kunde |
| Categories: | The library |
| Date: | 08/30/2018 |
| Time: | 16:30 - 17:00 |
| Room: | Small |

Graphhopper is a powerful Open Source routing engine based on OpenStreetMap data providing different routing profiles and ways to customize routing behaviour. The project also provides endpoints for route optimization (travelling salesman), map matching, geocoding and travel time isochrones. It received a wider attention in the data viz scene with the roads to rome project by moovellab (<http://roadstorome.moovellab.com/>) which has seen many copies since then.

In our research project ExCELL, started in 2015, one goal was to built up a mobility service platform for small companies where data is gathered by crowdsourcing. Graphhopper provided most of tools we were looking for out-of-the box, except for routing on real traffic data. As our project partners, the Techninal University of Dresden, maintains the intelligent transportation system (ITS) of Dresden (called VAMOS), they used their sensor data (detectors and floating car data) to calculate travel times and level of services against the Graphhopper network in order to do routing under real circumstances. Corresponding Swagger APIs got integrated in the plattform and can be used for free after registration. As a data backend everything is stored in PostGIS database and we use GeoServer and Openlayers to provide maps and WMS/WFS to visualize the different traffic parameters.

In this talk I will give a short overview on the ExCELL plattform and Graphhopper and will explain what has to be done in order to setup a similar traffic management system in your city.

Missing Maps Year 4! (#233)

| | |
|-------------|---------------|
| Authors: | Rachel Levine |
| Categories: | SDG |
| Date: | 08/30/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Kitulo |

Millions of people are vulnerable to disaster and disease because of rapid urbanization, climate change, and insufficient infrastructure. The Missing Maps project aims to put these communities on the map.

The MM Project is a global collaboration between NGO's (including HOT), data partners, universities, and the private sector. Launched in 2014, we have had over 50,000 volunteers and hosted over 2,000 mapathons in 60+ countries. As a community, we've accomplished amazing things over the last three years and we are excited to share what we have planned for Year Four!

The American Red Cross, as a founding member of the MM Project, is actively working to map 200 million of the world's vulnerable people in OpenStreetMap by 2021; creating open map data for anyone to access, use, and update. This talk will focus on our recent work with UAV's, our increased attention to validation, and the use of OSM to help with our programming in Puerto Rico following Hurricane Maria. We are proud members of the HOT community and are excited to engage more with the community as we continue to introduce and scale OSM activities.

ZanSDI – Spatial data infrastructure for Zanzibar (#234)

| | |
|-------------|---|
| Authors: | Mohammed Zahran, Ibrahim Khalid, Riitta Teiniranta, Minna Kallio, Kaisu Harju, Niina Käyhkö |
| Categories: | Government C - SDI |
| Date: | 08/30/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Katavi |

Spatial data infrastructure for Zanzibar (ZanSDI) is about sharing spatial data nationally in Zanzibar. It is about putting together the necessary institutions, legal framework, technologies and people to enable the shared use of geospatial information. It facilitates the connections between the sources of information and provides access to the shared datasets. As such, the Zanzibar SDI is a strategy of a visionary idea to build a hub of spatial information in Zanzibar, as a tool for inclusive economic development, and a step toward implementation of sustainable development goals in communication technology, promoting sustainable use of life and partnerships. ZanSDI with its components; data, metadata, coordination structures, technical environment and human resources will form an efficient tool for data sharing. The core data with proper metadata, data policies and agreements, collaboration network and practices together with the technical framework will constitute comprehensive SDI.

ZanSDI will provide a technical framework for storing, managing and distributing geographic information. The design for the infrastructure is created and it's based on a centralized platform that enables efficient data sharing even if all data providers do not have resources required available. Cloud services are tested by using GeoNode and Geoserver in Azure clouds. These services enable the development of the SDI services and can be used for learning practices for SDI data sharing. The practices and services can be transferred to operational use in e-government services in later phase. The low maintenance costs of systems are essential but as important is the usability. The current development of ZanSDI is enabled in the project the National Spatial Data Infrastructure for Integrated Coastal and Marine Spatial Planning (ZAN-SDI) Institutional Cooperation Project funded by the Ministry for Foreign Affairs of Finland. The solutions are compatible with the work done in prev!

ious projects like Sustainable Management of Land and Environment Programme (SMOLE) Smole and Zanzibar Social Environmental Atlas for Coastal and Marine Areas (ZanSea). The SDI partners are currently departments of Commission of Land and Zanzibar State University. Finnish Environment Institute, National Land Survey of Finland and University of Turku have supported the development.

Interactive mobile maps with the Mapbox Maps SDK (#235)

| | |
|-------------|-------------------------------------|
| Authors: | Konstantin Käfer |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/31/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Bagamoyo |

In many parts of the world, maps on mobile are far more in demand than maps in browsers or on desktop. Are you looking for inspiration of what's possible with mobile maps? Are you looking to expand your toolkit for making beautiful, high-performance maps for mobile that work well in low-bandwidth environments? Come to this session to learn about how Mapbox tools can help.

The Mapbox Maps SDK is an open source map rendering ecosystem that uses vector tiles to draw interactive maps in Android and iOS apps. This has many advantages over raster maps: vector data can be compressed more efficiently than pixel data, which leads to smaller file sizes. Having the data available locally instead of a pixel representation enables users to change the rendering style on the fly without downloading new tiles. It also enables querying information in the tiles without a roundtrip to the server. All of this makes dynamic on-device rendering appealing to low-bandwidth use cases.

In this talk, we'll explore how dynamic map rendering works, how you can use the Mapbox Maps SDK in your iOS and Android apps, how to benefit from its offline caching behavior, and walk through all of the powerful visualization features of the SDK — from heatmaps and clustering to multiple language support and dynamic hillshading.

This presentation will be of interest to developers and anyone working with open source tools for making maps for mobile apps. It will also be of interest to practitioners interested in learning more about how maps for mobile work and what is possible with cutting-edge tools.

Postgres migrations using Python (#236)

| | |
|-------------|-----------------|
| Authors: | Mario Baranzini |
| Categories: | PostGIS |
| Date: | 08/30/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Bagamoyo |

Good practices regarding database versioning and migration are not so easy to handle in a CVS code management system. Initial development is easy, using pure git, and sometimes some meta SQL generation scripts. But when it comes to maintaining databases already in production, good practices differ a lot since SQL patches cannot be handled the same way as git diffs.

PUM (<https://github.com/opengisch/pum>) is a python program that can be used via command line or directly from another python program. Similarly to other database migration management tools like Flyway-db or Liquibase, PUM is based on metadata tables. It permits to manage the upgrade of a PostgreSQL database using delta files. Before upgrading the production database, PUM allows to easily duplicate the database on the fly to test if the application of the delta files generates the desired result. Only for an affirmative answer, the migration is performed on the production database. PUM has been developed to solve issues encountered in the QWAT and QGEP projects, which are open source Geographic Information System for network management based on QGIS. QWAT already had a dedicated migration tool, allowing to both work on the data model using git and use delta file for migrations. QGEP needed something similar so it was decided to make a more generic, yet simple tool, to handle both. The tool is completely independent to QWAT and QGEP and is easy to extend and integrate it into other projects.

An interactive understanding of the free and open source geospatial ecosystem (#238)

| | |
|-------------|--|
| Authors: | Codrina Maria Ilie, Vasile Crăciunescu |
| Categories: | OSGEO community B - Our place in the world |
| Date: | 08/29/2018 |
| Time: | 14:00 - 14:30 |
| Room: | NgoroNgoro |

The Free and Open Source paradigm is no longer a novelty in the geospatial world. There are numerous, stable and powerful solutions, services, libraries built and maintained in the spirit of FOSS. The movement has long overcome the status of a garage hobby, infiltrating all sectors. There are hundreds of relevant events around the world each year, from conferences to hackathons, workshops and seminars, studies and reports analysing open source business models, funding schemas and explicit request for projects that built software to make it open source. In this agile context, it is difficult, if not impossible to keep up to the speedy developments, to make use of what is already out there and investing resources in improving and not building from scratch.

This talk presents the ongoing endeavor to create a dynamic and interactive visualization of the free and open source software for the geospatial ecosystem. Using a directed graph build with D3.js, the authors attempted to sketch the connections between existing solutions. The 300+ identified solutions have been divided into 5 categories: core-libraries, server-side, desktop, web tools and mobile, and linked to the specific type of Open Source license and programming languages. Although still in an incipient shape, the graph offers an intriguing glimpse of this intricate ecosystem.

This research started in the context of an exercise of the European Association of the Remote Sensing Companies and has been continued by the authors. The higher scope is to find the best way to open this tool for the community so that developments that spring all over the world can be illustrated in a near-real time framework.

Aerial Drone building (#239)

| | |
|-------------|----------------------|
| Authors: | Henrik Lund Pedersen |
| Categories: | Drones |
| Date: | 08/29/2018 |
| Time: | 14:00 - 14:30 |
| Room: | Bagamoyo |

This session takes you through the steps of building inexpensive durable Drones capable of carrying equipment for collection of geospatial data and aerial photos.

Building drones today is easier than it was just a few years back, since building parts have become standardized and lots of useful information is available on the internet. Still, deciding the right components, control board and software in order to achieve the specifications, quality and flight performance that you will need for your specific purpose can be a puzzle. Also, you probably wish to ensure that your valuable geo collecting equipment does not get damaged or lost.

During this session You will be introduced to the following topics:

Deciding the right construction parts to use, including frames, motors, multicopter control boards, electronic speed controllers, receiver, transmitter, antenna, wiring systems, navigation lights, etc.

Brief introduction to how it is all assembled in order to become a ready to fly drone.

Calculate the theoretical weight of equipment that the drone can carry in addition to its own weight.

How to setup the onboard equipment and how to obtain balance and good flight performance.

What Geospatial software and equipment is available and useful for aerial geospatial data collection.

Finally, you will get some tips and tricks regarding how to teach yourself to fly the drone safely.

This session is meant to inspire you and give you enough information to get a head start in the exciting “hands-on” field of Geospatial data collection.

What is Open Source Google Earth Enterprise (GEE)? (#240)

Authors: Michael Turner
Categories: Meeting new projects
Date: 08/29/2018
Time: 11:00 - 11:30
Room: Main

Just prior to the FOSS4G Boston 2018 Conference, Google made the decision to Open Source the Google Earth Enterprise (GEE) software. This presentation will describe the Open Source GEE project including such topics as: What is GEE used for? Who is involved in the project and maintaining and expanding the project? How do you access the Open Source GEE and get involved with the project? The presentation will also describe some of the use cases that Open Source GEE supports, such as off-line and/or private network access to Google Earth.

Mapping of fishing communities and coastal wetlands in the Urabá Gulf - Colombia (#241)

Authors: Natalia Da Silveira Arruda, Juan Felipe Blanco Libreros, Nixon Arley Arsitizabal Niño
Categories: Disaster A - Before
Date: 08/31/2018
Time: 12:30 - 13:00
Room: Kitulo

The talk aims to present the results, conclusions and lessons learned from the Project developed by Universidad de Antioquia, “Mapping of coastal wetlands in the Urabá Gulf to help planners and the local fishing community to respond to flooding hazards in the area - COASTMAP-URABA”, selected in the HOT OSM Microgrants 2017. The project was the result of the collaboration of the GeoSIG group (Youthmappers Chapter) –Faculty of Engineering – and ELICE group –Faculty of Biology, and was supported in the work of more than ten years the latter has been developed in the Urabá Gulf with the study of ecosystem services in the region. As a contribution to the existing knowledge, the project addressed the problem of mapping the settlements inserted in this territory, with the generation of the cartography of two specific settlements, the city of Turbo, and the peripheral fishing community Bahia El Uno. In addition, a field work was carried out in the local community for the development of a participatory work, integrating humanitarian cartography, perception of the services provided by the ecosystem, and climate change.

It was an interdisciplinary project, which used tools and methodology of humanitarian and participatory mapping to incorporate themes of ecology, environment and resilience. The aim was create awareness among inhabitants about the importance that the ecosystem represents for them in the face of climate variability and climate change, especially addressing the problem of flood. In addition to quantitative results, we also have qualitative results, and we would like to share with all the participants the conclusions drawn from the project and mainly the lessons learned with the community. Although each community is unique, there are many that share the characteristic of being located in coastal zones, and that present similar vulnerabilities.

Links:

https://www.hotosm.org/updates/2017-04-20_hot_microgrants_2017_results

https://www.flickr.com/photos/mangle_blanco/sets/72157686235139356/

<https://mangleblanco.com/2017/04/25/20170424-mapping-the-southern-caribbean-uraba-antioquia-colombia-time-to-go-open-and-humanitarian/>

Data aggregation for efficient geospatial services (#243)

Authors: Javier Goizueta

Categories: Big data

Date: 08/29/2018

Time: 14:00 - 14:30

Room: Katavi

Data aggregation has a long history as a means to analyze large amounts of data, from basic statistics to data cubes and cartographic generalization. Even within our young company, CARTO, it has a

pretty long history as a means to break the limits of how much data can be visualized and analyzed. It has been used over time in a number of different ways. Now it's increasingly becoming an integral part of the way spatial services operate.

Some of the areas in which we've found the need for aggregation are:

- i) As a means to reduce amount of data to process, transfer and render to create maps.
- ii) As a means to enable access to external big-data sources.
- iii) As a means to make sense of vast amounts of data when visualized as maps

We'd like to present an overview of how it's being applied to solve various problems with scalable geospatial services, with an emphasis about it's value in a Maps API. We'll explain some of the problems we found when trying to summarize measures along discrete dimensions (including space and time), how to specialize it for specific user or problem needs, how to do it efficiently, how to visualize it in a sensible way, etc.

We'll discuss also some technical details about our implementation:

- i) Dynamic vs static aggregation.
- ii) Spatial, temporal and multidimensional aggregation
- iii) Sensible defaults for the unsuspecting user

University Battle Mapping: an Approach to engage youth mappers (#244)

| | |
|-------------|-------------------|
| Authors: | Adityo Dwijananto |
| Categories: | Education |
| Date: | 08/31/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Saadani |

University Battle Mapping is a competition held by Humanitarian OpenStreetMap Team in Indonesia with its aim to build awareness within universities about OpenStreetMap. This project also to find which university that can do mapping with more objects without leaving the quality of the data. This talk will discuss about the concept, results and challenges occurred during the project.

FOSS4G Software in practice (#246)

Authors: Birgit Blaabjerg Bisgaard, Martin Høgh

Categories: Meeting new projects

Date: 08/29/2018

Time: 12:00 - 12:30

Room: Amboni

In Denmark there has been a chance during the last 5 years where GIS users has started using FOSS4G software as QGIS, PostGIS and others.

In my company we started using QGIS in 2013. We liked the idea of being able to write small python scripts our selves or being able to ask consultant to do it for us. In all cases we would own the code and decide what to develop and how. We did not need to wait for Pitney Bowes or ESRI do develop, what we thought was needed.

By 2015 we also started using PostGresql with PostGIS. Again a FOSS4G software free downloadable and very useful together with QGIS – much better performance than between QGIS and MS SQL.

Then in 2017 we started working with GeoCloud. A small Danish company delivers a very easy useable GeoCloud platform – GC2, which includes PostGresql with PostGIS, database management, facilities to edit and style maps online, WMS and WFS services etc.

We use the software for distributing data to users in house and external. Users can see, edit, upload and download (if they have access).

We have always used webmaps in distributing data to colleagues and external users. But our former webmap software was proprietary and owned by a company (Danish) that also delivered to a lot of other types of companies with other interest. So the development did not always point in the direction we wanted/needed. Also the management software is not as easy to use as the GC2 platform.

I would like to demonstrate the process in publishing and editing data through GC2 – live if possible. Otherwise I will have screenshots of all processes.

The process is like this:

1. Login to GC2
2. Open the administration
3. Switch to database
4. Click on new layer
5. Choose all vector files (shx, shp, dbf, qbj, prj, cpg ...) and upload
6. Open layer as WFS in QGIS 2.18.x (LTR version)
7. Edit style and/or data

8. Save as project file
9. Upload project file – now the styles are as edited in QGIS

Simple and easy

Integrating and Scaling QGIS Server Backend with Docker and Rancher (#247)

| | |
|-------------|-----------------------|
| Authors: | Rizky Maulana Nugraha |
| Categories: | QGIS A - Using it |
| Date: | 08/29/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Mikumi |

This paper describes implementation details, challenges and its solutions of using QGIS Server Backend as an alternatives Map Server Backend. The background of the topic is specific to how QGIS Server is integrated with GeoNode to provides an alternative map rendering services from the default option (GeoServer). The work mainly focused to address the problem of integrating map service to another service using a dockerized QGIS Server image. This will help similar map service integration problem faced by other developers and provides suggestions on how to create a better architecture to solve the problem using Docker and Rancher. The solution is to implement certain attributes needed by a QGIS Server dockerized image. The key characteristics are the docker image needs to be: stateless, atomic, and scalable.

After QGIS Server backend were dockerized following the previous guideline, Rancher is used to abstract the orchestration for high level integration. This allows an easy setup to provide a server side map rendering service and integration over various possible existing software such as GeoNode. The possibilities can range from using the image as a dedicated map rendering service, tools for preseeded or caching tile map, or even map-based report generation tools. The end goals are to provide a generalized way of using QGIS Server Backend and open up possibilities for the community to integrate FOSS4G easier and simpler as a foundation to solve more complex problems.

Using maps to advance the SDGs and humanitarian goals: A showcase from Mapbox (#248)

| | |
|-------------|----------------------------------|
| Authors: | Marena Brinkhurst |
| Categories: | Bridging the gaps C - Technology |
| Date: | 08/30/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Mikumi |

Spatial data infrastructure for Zanzibar (ZanSDI) is about sharing spatial data nationally in Zanzibar. It is about putting together the necessary institutions, legal framework, technologies and people to enable the shared use of geospatial information. It facilitates the connections between the sources of information and provides access to the shared datasets. As such, the Zanzibar SDI is a strategy of a visionary idea to build a hub of spatial information in Zanzibar, as a tool for inclusive economic development, and a step toward implementation of sustainable development goals in communication technology, promoting sustainable use of life and partnerships. ZanSDI with its components; data, metadata, coordination structures, technical environment and human resources will form an efficient tool for data sharing. The core data with proper metadata, data policies and agreements, collaboration network and practices together with the technical framework will constitute comprehensive!

nsive SDI.

ZanSDI will provide a technical framework for storing, managing and distributing geographic information. The design for the infrastructure is created and it's based on a centralized platform that enables efficient data sharing even if all data providers do not have resources required available. Cloud services are tested by using GeoNode and Geoserver in Azure clouds. These services enable the development of the SDI services and can be used for learning practices for SDI data sharing. The practices and services can be transferred to operational use in e-government services in later phase. The low maintenance costs of systems are essential but as important is the usability. The current development of ZanSDI is enabled in the project the National Spatial Data Infrastructure for Integrated Coastal and Marine Spatial Planning (ZAN-SDI) Institutional Cooperation Project funded by the Ministry for Foreign Affairs of Finland. The solutions are compatible with the work done in previous projects like Sustainable Management of Land and Environment Programme (SMOLE) Smole and Zanzibar Social Environmental Atlas for Coastal and Marine Areas (ZanSea). The SDI partners are currently departments of Commission of Land and Zanzibar State University. Finnish Environment Institute, National Land Survey of Finland and University of Turku have supported the development.

Mapping Media+Radio Reach for Better Project Outcomes (#249)

Authors: Thad Kerosky, Kassim Sheghembe
Categories: Bridging the gaps B - Practical approaches
Date: 08/30/2018
Time: 10:00 - 10:30
Room: Mikumi

Since 2014, Farm Radio International's country staff, Canada staff and I have collaborated to accurately map the partner radio stations across the continent. We believe pieces of the process would be useful to anybody managing people+machine data pipelines or projects involving media or rural populations in hard to reach places. What we've learned allows us to communicate results in clear and interactive ways that listeners and funders find engaging.

We experimented with various free and/or open source tools and web services including Splat, RadioMobile and CloudRF to map FM radio broadcasters all over East/West Africa using basic tower data from partners. Ultimately we settled on a single Makefile-based process around RadioMobile/Nautel to produce clean polygons showing how far and how many rural people that radio stations reach. The final data pipeline utilizes many open tools including QGIS, GRASS and GDAL.

The pipeline takes KML/PNG image overlay outputs from the radio modeling tools and converts them to polygons. QGIS's zonal/spatial statistics was automated in Docker to use the latest WorldPop population and calculate the rural farming population potentially reachable by stations in East and West African contexts.

We have now used the process to make maps and to supplement Monitoring and Evaluation (M&E) data in 15 countries. We are excited to share this approach with others interested in the area at the conference. It is easier to tell the story of the results from radio media projects when you can see and count the potential audience.

[Dockerizing QGIS Plugin for Headless Service - Case Study: InaSAFE Headless \(#250\)](#)

Authors: Ismail Sunni, Rizky Maulana Nugraha
Categories: QGIS B - The system
Date: 08/31/2018
Time: 13:00 - 13:30

Room: Bagamoyo

QGIS has hundreds of plugins that enhance the functionality of QGIS. Since QGIS is running in a desktop environment, we can only use the plugin in the desktop environment. We will need to install QGIS first before we can use it. In the current internet era, it would be great if we can make the QGIS plugin's functionality available in the server environment. If we run the plugin on the server, we can use a much better resource to run heavy processing, run it periodically / automatically, or integrate it into another system/web apps.

We can create a plugin for QGIS server to handle it, but unfortunately, we can not use the same code base as in the QGIS plugin. This means more headache in the development and maintenance process.

In this paper, we want to show an alternative way to use Docker to create a headless service from a QGIS plugin and keep using the same code base. By doing this, we can use the same plugin not only in the desktop environment but also in the server environment.

We use InaSAFE-headless, a headless version of InaSAFE QGIS Plugin as a case study to how the dockerizing works. InaSAFE itself is a QGIS plugin that produces realistic natural hazard impact scenarios for better planning, preparedness and response activities. We also use celery task to support asynchronous task for heavy processing in InaSAFE-headless

[A Simple Introduction to Scalable Geospatial Microservices using gRPC, Kubernetes and Istio \(#252\)](#)

Authors: David Raleigh

Categories: The library

Date: 08/30/2018

Time: 17:00 - 17:30

Room: Small

With gRPC it has never been more simple to quickly turn a library written in one programming language—say Python—into a library you can call remotely from another language—like Go, JavaScript, C++, R, etc. In 2016 Google open sourced gRPC, the RPC (Remote Procedure Call) framework that they use internally for handling billions of requests per second. By creating a simple “.proto” file to describe the data you want to transfer and whether your services should be unary (think GET and POST) or streaming (think websockets), you can auto-generate your service and serialization code for the language of your choice using the Protocol Compiler.

In this talk we'll go over the basics of gRPC and protocol buffers and what are the performance benefits, the cross-language support and the time saving benefits of autogenerated code. We'll go over the different streaming patterns available to you and why it's such a huge improvement over websockets or long-polling. Next we will go over the basics of how to get started with writing a service in Python, and how to auto-generate your gRPC client code in Go, C++, JavaScript and R. Seeing the service and client code should give you an idea of why gRPC protocol buffers might be preferable to using JSON to serialize your data. We'll talk about testing services by running locally on our desktop and we'll also demonstrate how to place the service in a Dockerfile. All this leads up to the holy grail of running a distributed geospatial service in Kubernetes that in turn uses Istio for our authentication and load-balancing. If time permits we can talk about how Echo Park Labs used gRPC and Kubernetes to write a distributed geometry service for Elastic Search.

[An integrated approach to automatically configure a QGIS project from a database model \(#253\)](#)

Authors: Denis Rouzaud, Matthias Kuhn

Categories: QGIS B - The system

Date: 08/29/2018

Time: 14:30 - 15:00

Room: Mikumi

We present Projectgenerator, a QGIS 3 [1] plugin which generates QGIS project files using information of existing database models.

The core of every complex GIS application lies in the data model. Its data is then accessed through a user interface which allows visualizing, querying and editing the data. As a standard graphical GIS frontend tool, QGIS is highly configurable to reflect data model structures. From representation and validation of attributes to relations between different layers and more, there are almost infinite possibilities to fine tune QGIS to the needs of a user. It is however required to first configure the QGIS project to benefit from such features. This is a tedious task and much of this information is already available in the database structures.

Projectgenerator examines an existing PostGIS datamodel and configures a QGIS project with all available information. This operation drastically decreases initial project configuration efforts thanks to a semi automatic procedure.

Projectgenerator also benefits from the Interlis [2] modeling language. Models defined in Interlis provide additional meta information such as domains, units or an object oriented definition of tables.

This can be used to fine tune the project configuration even further. Without additional effort on the user side, this offers extensive support for the entire Swiss geodata catalogue already available in Interlis format. Furthermore, it has proven to be a great tool for any other project. For example, the colombian implementation of the land administration domain model (LADM) [3] has successful use of Interlis in combination with Projectgenerator.

Implementing such a tool requires to develop many QGIS core features. While former approaches tended to provide custom Python code as part of a plugin, OpenGIS chose to bring these features to QGIS core. This approach proved to be a great opportunity to raise funds for both plugin and QGIS core development at the same time. Hence making this functionality available to the whole community even those not using the Projectgenerator.

This talk offers a journey through the configuration possibilities of data models and how to represent these in a QGIS project, with real use-cases. We also present an outlook on integration of this functionality within custom plugins and how this can leverage the preconfiguration of layers and project to rapidly develop custom business logic and workflows.

[1] <http://qgis.org/>

[2] <http://interlis.ch>

[3] <https://www.proadmintierra.info/>

Vector Tiles focused rendering optimisations in Openlayers (#254)

| | |
|-------------|------------------------------|
| Authors: | Florent Gravin |
| Categories: | Mapping systems D - Services |
| Date: | 08/31/2018 |
| Time: | 10:05 - 10:30 |
| Room: | Mikumi |

Geospatial applications are now being build to be able to use Vector Tiles. This file format has spread out these past years and has become one of the geospatial standards.

With its implementation, Openlayers tries to provide smooth and performant rendering. It also aims to keep its look close to the Mapbox Style specification. Obviously, there is still room for improvement and optimisation.

This presentation will show the huge amount of research and work that has been done around optimizing vector tiles rendering. That has lead to the refining of core rendering concepts of Openlayers.

Indeed, Openlayers mostly supports 2D Canvas rendering using a hybrid format for Vector Tiles. A first concept has been to introduce mixed renderers that will enable both webgl and canvas renderers, depending on layer specificities.

The combination of an Openlayers map with a Mapbox-gl-js layer through the usage of plugins has also been an interesting concept. This feature enables you to take benefits of both libraries.

This will also open the door to further webgl improvements in Openlayers, such as allowing the usage of specific renderers for only one layer to display millions of points.

Obviously, webgl vector tiles rendering has been considered and partially implemented, and is now ready for further development.

Our current focus is optimizing the usage of Web Workers for tile preparation. This could be extended to many process tasks concerning vector rendering.

For communications between threads and the main process, we will need to refine the whole feature, geometry and styling concepts. These concepts will have to be based on plain objects, delegating specific process to external libraries.

These are just a few examples and focuses that we have been working on, in order to improve Openlayers performances.

We will try to cover technical aspects of the improvements of the library. This will, I hope, enable you to stay up to date with the Openlayers rendering core.

QField and the future of QGIS on mobile devices (#255)

Authors: Matthias Kuhn, David Signer

Categories: QGIS B - The system

Date: 08/29/2018

Time: 13:30 - 14:00

Room: Mikumi

QGIS is efficient and comfortable in everyday office life. However, data collection often begins on the field. Whether in shiver or sunshine, working outdoors requires a solution that is optimized for mobile devices.

QField [1] is the perfect companion of QGIS. The off-the-shelf application allows intuitive viewing and editing of data. With a slick user interface, QField allows using QGIS projects on tablets. QField's map

display is powered by the QGIS rendering engine, so the results are identical and come with the full range of styling possibilities available on the desktop. Editing forms on QField respect the QGIS configuration and are adapted for touch interaction. . For situations where network access is unavailable, a QGIS plugin downloads all the data to the device and allows integrating the changes back when returning to the office.

Features such as satellite positioning or camera integration make QField a powerful tool for those who need to edit on the go and would like to avoid standing in the swamp with a laptop or paper charts.

For cases where an off-the-shelf solution is not enough, the core components of QField have been extracted into a new framework called QgisQuick. While QField covers the majority of use cases as an off-the-shelf solution, this framework can be used for custom development to meet specific customer requirements and workflows.

QField, like QGIS, is an open source project [2]. Everyone is welcome to contribute to make the product even better - whether it is with financial support, enthusiastic programming or visionary ideas.

[1] <http://www.qfield.org>

[2] <https://github.com/opengisch/QField>

Humanitarian High Resolution Mapping (#256)

Authors: Jean-Baptiste Pasquier, Lorenzo Riches

Categories: SDG

Date: 08/30/2018

Time: 12:30 - 13:00

Room: Kitulo

Problem, Relevance and Context

To understand the food security situation of vulnerable populations, the World Food Programme is continuously conducting household surveys. The difficulties of collecting face-to-face data in remote or unsafe areas mean that the estimates are only representative at a low resolution - usually regional or district level aggregation - for a reasonable cost. However, WFP and other humanitarian actors need more detailed maps in order to allocate resources more efficiently. At the same time, geographic coordinates are increasingly being recorded in household surveys thanks to digital data collection tools.

The main aim of our initiative is to leverage the high-resolution mapping techniques developed in academia for use in WFP and the humanitarian sector, and to make it accessible for a broad range of users. Another objective is to get the most accurate fine-scale maps on food security indicators. Our work was mostly inspired by the WorldPop/Flowminder “bottom-up” approach to population mapping and by transferring learning techniques developed by Stanford University to map poverty.

User-friendly Mapping Application

To date, we have deployed a first version of a simple web application that is able to automatically downscale geo-referenced survey data. This application enables users to easily produce predictions for their area of interest. It produces a raster that can then be re-aggregated to a given administrative level. This version is using optimized k-Nearest Neighbour or Gaussian Process Regression (also known as Kriging) to make predictions for areas where no survey data is available. To avoid biasing results by including inhabited areas, a common problem for high resolution mapping, the final raster is masked with an urban land cover layer. A cross-validated evaluation metric is also displayed.

The prototype is built in python and open-source libraries. The code is publicly available on GitHub and more complex algorithms can easily be integrated.

Mapping Food Security at High Resolution

The currently deployed app uses only spatial covariates (the GPS coordinates of the survey clusters) to make predictions. However, the core aim of the project is to ultimately incorporate remote sensing information to improve the accuracy of predictions. While the research community has made significant recent progress in mapping poverty, we are focusing on mapping food security indicators.

We process Sentinel-2, Google Maps and Bing Maps satellite images through well-documented APIs. Real colour and false colour images containing maximum NDVI band are computed to extract vegetation features.

We extract features out of the images through pre-trained neural networks that are then used as covariates in a regression model. We are currently using the last layer of pre-trained Neural Networks that are fine-tuned on nightlights raster (Xie, Michael, et al.), but we are also experimenting with re-training the network on more correlated proxies to our survey indicator (such as Open Street Map labelled images). Defining explicitly remote sensing covariates (vegetation, infrastructure, etc.) is likely to lead to better accuracy, but the automatic extraction of features will be key for automating the process at scale.

Results on a variety of indicators are very promising. On Food Consumption Score (FCS), the cross-validated coefficient of determination (R^2) achieved at survey cluster level is 37% in Senegal and 19% in Uganda.

Publish Geospatial Metadata in a Semi-Compliant OGC Standard System with Pycsw (#257)

| | |
|-------------|------------------------------------|
| Authors: | Boney Bun |
| Categories: | Catalogue systems A - Core systems |
| Date: | 08/29/2018 |
| Time: | 11:00 - 11:30 |
| Room: | Saadani |

Catalogue service implementing OGC standards bridge specific interoperability challenge between different independent system. But, often developers deal the fact that they have to publish a not-fully OGC standard compliant catalogue system. This paper aims to address the publishing issue with an example from the SANSA's catalogue. We hope that it can be useful for such developers.

SANSA's catalogue, accessible via catalogue.sansa.org.za, showcases the landscape of South Africa from the earth observations' eye. A lot of satellite images are in store. We are upgrading the system so that it can also be accessible outside the main website. The imagery archives shown on the site are a result of some earth observations from different systems, being processed into different output and format. Engineers at SANSA work to process the images before being ingested into the existing catalogue system. The existing catalogue system preserves the origin satellite metadata as much as possible. As a result, we have various metadata format on the system.

The challenge of upgrading the site is that we need to compromise and adjust different metadata into a unified model for easy publishing. Another requirement is the upgrade should have minimal impact on the existing catalogue system. At this point, pycsw server comes to the rescue. The existing catalogue system has been dockerized. Adding a stand-alone pycsw container and connecting it to the existing catalogue system can be done easily. The non-trivial task is mapping different metadata format from various satellite images into a single pycsw metadata format. Pycsw offers a flexible mechanism to map the existing catalogue. Addressing the mapping problem, we now can have the SANSA's catalogue searchable through QGIS desktop and possibly other means of the future system.

Location-based Task Management (#258)

| | |
|-------------|--|
| Authors: | Thibault Mutabazi, Daniel Kastl |
| Categories: | OSGEO community B - Our place in the world |
| Date: | 08/29/2018 |
| Time: | 14:30 - 15:00 |

Room: NgoroNgoro

Almost every task has a location and a time component. However most businesses manage on-site work inefficiently with simplistic, barely integrated tools such as checklist, calendar and route planner. Salesmen need to visit their customers, city officers need to check public assets, outpatient care staff needs to visit patients, ... and there are lot of other examples where tasks have a location reference.

To manage such work with information technology implies more than just dropping a marker on a map: location-based tasks usually pass through various states, have varying importance, get assigned to different people and follow a predefined workflow.

With optimization of work processes and tour scheduling in mind we developed a task management software based on available open source software and open standards. In this presentation you will learn about our concepts, and how FOSS4G can be extended to become a location-based task management software for non-software developers, how it can facilitate on-site customer services and improve service quality and efficiency.

Supporting community engagement with open source geo-tools: a conceptual framework. (#260)

Authors: Rosa Aguilar, Johannes Flacke, Karin Pfeffer

Categories: SDG

Date: 08/30/2018

Time: 16:30 - 17:00

Room: Kitulo

Despite the benefits of local stakeholders and communities' participation in spatial planning processes, which is mainly to impact positively policies, plans or projects on their social and economic lives, a major involvement of communities in planning activities remains a challenge.

Over the years, there has been an increased interest to involve local stakeholders and communities in spatial planning processes to influence policies, plans and projects with regard to the urban living environment. However, a major involvement of communities in planning activities remains a challenge. Possible reasons for this are, among others, the perception that their voices may not have any impact on the issue at stake, the cost of participation (i.e., transportation cost or time), lack of

means for participating (i.e., internet connection), absence of or unsystematic procedures for participation, or deficient communication support to make the content understandable for all the participants. Our study is addressing the deficient communication support by providing a conceptual framework of a planning support tool to be implemented as a free open source software that enables the interaction and communication between stakeholders employing a so-called mactable (a large horizontal touch device). Studies have shown that a mactable encourages collaboration between participants leading to more informed planning processes and social learning among participants. However, software tools for mactables have remained relegated or underdeveloped usually keeping single user roots. Besides, to date, there is hardly any open source software tool available that allows for collaborative development of extendable applications.

Our framework integrates a spatial visualization interface, touch capabilities and quantitative modelling methods in a touch-based open source solution to support the analysis of and discussion about alternatives. With this approach we aim to engage local stakeholders, and in particular communities, in the planning process. Requirements for the envisaged development are derived from a literature review which has shown quantitative analysis, communication and geovisual capabilities to be predominant demands of the planning community. Our geo-tool aims to contribute to the following policy goals: inclusive participatory planning processes (SDG: 11, target 11.3), by fostering the adoption of spatial planning tools, and providing a conceptual framework to enhance participatory planning processes (SDG: 17, target 17.5). Besides, the tool to be developed aims to address problems where the involvement of local communities is necessary, for example, in climate-change related planning (SDG: 13, target 13.b) or water and sanitation management (SDG: 6, target 6.b). Finally, by choosing open source software we offer a flexible and extendable tool to be adapted for a respective planning purpose.

Exploring OSRM (#261)

| | |
|-------------|---------------|
| Authors: | Kajari Ghosh |
| Categories: | The library |
| Date: | 08/30/2018 |
| Time: | 17:30 - 17:50 |
| Room: | Small |

The Open Source Routing Machine (OSRM) - <http://project-osrm.org/> - is a high performance, open source routing engine designed to work with OpenStreetMap data. It can calculate shortest-path routes across continents in milliseconds, and provide turn by turn guidance to then make that trip - by car, bicycle, or on foot. It can be combined with traffic data to provide even more accurate ETAs.

But what else can OSRM be used for? And how does it work? This session will explore how OSRM solves intriguing theoretical problems like the Traveling Salesperson and how that solution can be

applied in the real world use-cases of Rural Accessibility Analysis (<http://staging.ruralaccess.info/#/en/projects/25/scenarios/33>) or logistics planning. It will then do a deeper dive into how the routing engine works and will end with a discussion of challenges when working with OSRM and strategies for addressing them.

This session will be of interest to attendees working on projects that involve routing, navigation, or measurements of travel time or accessibility. The target audience is people who would be working with OSRM directly, but it will also be of interest to those who want to know more about what's possible with open source routing tools.

Free and Open Source Unmanned Vehicles (#262)

Authors: Luca Delucchi, Luca Bezzi, Peter King

Categories: Drones

Date: 08/29/2018

Time: 13:30 - 14:00

Room: Bagamoyo

Unmanned Vehicles (UV) are used daily for different applications around the world. However, most of the software and technologies on which they are based are closed and proprietary systems.

The presentation will start by introducing the history of Unmanned Vehicle technologies, with some unknown historical info, and the different types of Unmanned Vehicles that exist.

The aim of the presentation is to demonstrate the integration of free and open source systems starting from the hardware, specially the autopilot component, through some payloads and finishing with the software solutions. Different software solutions for diverse aims will be showed and compared, i.e., first the different software used to configure the UV and manage the mission and later the possible software used to manage the outputs from the mission.

iTowns, web framework for 3D immersive visualization (#264)

Authors: Vincent Picavet
Categories: Meeting new projects
Date: 08/29/2018
Time: 15:30 - 16:00
Room: Amboni

We present iTowns, a web framework written in Javascript / WebGL for heterogeneous 3D geospatial data visualization, with a focus on immersive-type user experience.

The first use case of iTowns is Street-view data type visualization with immersive images, but also terrestrial LIDAR Point Cloud data.

Currently at version 2.3, iTowns has evolved from its original version to support more data types :

- Panoramic images
- Point Clouds (with Potree data support)
- WMTS raster data
- WFS vector data
- 3D Tiles
- 3D textured models

New fancy features have recently been added to provide stereo effects (anaglyph, parallax or stereo), multiple globe, post-processing and more.

We are currently working on adding more data types like oriented images for projective texturing and vector tiles, as well as new features like smart measurements, better mobile support, and additional high-level features for data analysis.

In this presentation, we detail iTowns features with videos. We demonstrate basic features of the framework as well as advanced examples.

Then, we showcase some real-world applications based on iTowns : who ever dreamed of walking in Paris wastewater system - virtually ?

Links to project: <https://www.itowns-project.org>

Client-Side Map Reporting on Web Based Applications using OpenLayers and jsPDF (#265)

Authors: Anita Hapsari

Categories: Mapping systems B - Specific systems

Date: 08/30/2018

Time: 11:30 - 12:00

Room: Small

Map allows us to visualise data accurately yet attractively. As humans are visual being, people can get a better idea about data interpretation in an easier way using maps. For example, using global population density heat map, people can understand which area has higher population density and which has less in an instant. Interactive maps, another example, let people to play with the data and they can get instantaneous visual feedback based on the data through the maps. However, in some cases we need to export these maps into printable format, such as for documentation, reports, etc. Therefore, having map presented in a printer friendly format will be beneficial for people who need to deliver it in papers.

OpenLayers help us to put maps in web based application in an easy way. It can display vector data, map tiles and markers that are loaded from any given source. So, we can display spatial data in maps beautifully and accurately. A map reporting, a process where we can export the map we see into printer friendly format, needs to be able to capture what people see, such as when people interact with it (pan and zoom). It is also important that the exported map can capture any data that is displayed on it as people need it. Hence, client-side map reporting on web based applications is one option to deliver the map as people see in their screen into printable format.

In this paper, we will explore how to export the displayed map into printable pdf. The process of converting the displayed map into pdf is done in the client side using javascript library, jsPDF and html2canvas, while the map is using OpenLayers. We will also present the benefit of using client-side map reporting over server-side reporting and how to maintain the quality of the results.

GRASS GIS 7.4: What's new in a nutshell? (#266)

Authors: Markus Neteler, Veronica Andreo, Luca Delucchi, Martin Landa, Moritz Lennert, Vaclav Petras, Anna Petrasova, Helena Mitasova

Categories: Mapping systems B - Specific systems

Date: 08/30/2018

Time: 12:30 - 13:00

Room: Small

Even after more than 30 years since the first release, GRASS GIS keeps offering a lot of modern features. The new stable GRASS GIS 7.4 version series is available since February 2018. It comes with several new features, enhancements and fixes.

The international development team has further improved the usability, migrated selected add-ons into the core package and revised the orthorectification of aerial images.

Raster data storage has also been further optimized for processing of massive data sets in the cloud and new algorithms for vector data analysis have been integrated. GRASS GIS is also available on the Docker Hub.

The presentation shows the most important innovations in GRASS GIS 7.4 in an easy to understand way with many screenshots and examples.

Supporting Humanitarian Logistics with the OpenRouteService for Disaster Management (#267)

| | |
|-------------|--|
| Authors: | Sabrina Marx, Melanie Eckle, Timothy Ellersiek, Benjamin Herfort, Alexander Zipf |
| Categories: | Disaster B - After |
| Date: | 08/29/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Udzungwa |

Since its official launch in 2008, the OpenRouteService (ORS, openrouteservice.org) has been applied to support disaster relief efforts numerous times already, e.g., during the earthquake response in Haiti 2008 and 2010, Nepal 2015, and Ecuador 2016. However, the open source route planner showed limitations for supporting humanitarian logistics such as low update frequencies of the routing graph. In order to provide the ORS for humanitarian organizations, SAR units and affected people in a more stable, reliable and automated way, HeiGIT @ GIScience Heidelberg developed an adapted version of the ORS.

The ORS for disaster management (disaster.openrouteservice.org) computes routes and navigation information considering information about impassable ways from OpenStreetMap (OSM), which are tagged in scope of disaster activations coordinated by the Humanitarian OpenStreetMap team (HOT). Thereby, the service relies on the latest OSM data available. Up-to-date OSM extracts, on which basis the routing graphs are recalculated, are accessed using the recently introduced real-time OSM service (github.com/GIScience/OSM-realtime-update). This allows us to provide hourly update intervals for the entire African continent, South America and South Asia. Accounting the highly dynamic nature of the OSM dataset during disaster response activations, on regional level even higher update intervals of a few minutes are possible.

Moreover, the ORS for disaster management provides an accessibility analysis service (calculating fast isochrones) for a given location, the possibility to export GPS tracks for offline use on mobile devices, and the interactive avoid area tool. The latter allows interactively drawing polygons into the map to mark severely affected, not accessible or impassable regions or road sections, which should be avoided. In addition to the usage via the web application, the API endpoint (openrouteservice.org/documentation) can be integrated in dedicated applications (e.g., QGIS plugins such as the OSM Route plugin).

One major concern when relying on crowd-sourced geodata such as OSM is the data quality. Missing or inaccurately represented streets in OSM directly affect the routing. Analyzing the history of OSM data facilitates intrinsic OSM data quality assessments, i.e., without comparing to other data sets, and provides crucial insights regarding the evolution of the OSM street network and its fitness for routing. We are presenting the potential of this approach based on the mapping activities in the aftermath of the Nepal earthquake. Integrating intrinsic quality measures in the ORS for disaster management will facilitate better assessments of routing quality and support post-disaster humanitarian logistics on the ground more effectively.

Community Education Mapping in OSM in Kenya (#268)

| | |
|-------------|--|
| Authors: | Erica Hagen, Zacharia Wambua, Joshua Ogure |
| Categories: | SDG |
| Date: | 08/30/2018 |
| Time: | 17:00 - 17:30 |
| Room: | Kitulo |

After producing the first free and open digital map of Kibera Slum, one of the largest informal settlements in Africa, Map Kibera began to work on a number of projects of interest to the community. One was to develop an open education data portal called Open School Kenya. Supported by the Gates Foundation, we mapped all 350+ Kibera schools put them on OpenStreetMap, then developed a schools website where each and every school had a profile page. All this open data is stored in OSM. The school profile shows details of the school ranging from the number of teachers, number of students, how much school fees they charge, contact information, details on facilities, toilets, programming, etc. We later printed and distributed the maps to each and every school we had mapped, and for the first time teachers appreciated that they got a result of the data collected from their school, unlike before where researchers would collect data never to be seen again.

Started in 2014, the project aimed to make education information easily available, accessible, and useful to everyone.

The Kenyan government officials have been able to use it to reach out to informal schools, and provide them with access to resources. Schools now know what other schools are doing and have a way to direct people to their school. And, parents can also make more informed choices of which schools to send their kids. Map Kibera made it easier for schools to update their own information, since schools information changes quite often. The open format using OSM allows for others to update the data in the long term. More than just a repository of data, OSK is a way for schools to connect with each other and local government, and for education advocates to work with the community to advocate for better access to quality, affordable education.

This year, Map Kibera has been working to expand and scale up OSK to other informal settlements across Nairobi. Eventually we intend to cover the entire country.

Dotloom - Next Generation Point-cloud Platform (#269)

Authors: Thibault Mutabazi, Kyoung-Sook Kim, Martin Heidegger, Daniel Kastl

Categories: Big data

Date: 08/31/2018

Time: 11:00 - 11:30

Room: Saadani

Sharing data securely and reliably is tedious, transferring big spatial data is a real challenge! Data portals, web services and platforms often struggle already with uploading and downloading the data, requiring large investments in IT infrastructure and fast and stable internet connection, and still it requires patience by the user. Dotloom wants to change this and make the sharing of data easy, enjoyable, secure and efficient.

Dotloom is a distributed system for synchronizing, replicating, indexing and processing of terabytes of point-cloud data with peer-to-peer technologies. The distributed nature allows instant exchange between data producers and data consumers.

Processing pipelines have the power to stream data from multiple peers, and the generated output can be shared again instantly. Remote indexing can be implemented using partial data, reducing transfer costs

Building on the existing “DAT Project” infrastructure, Dotloom adds functionality needed to manage, query, and visualize point-cloud data. These new concepts of Dotloom have the potential to transform not just how we deal with point-clouds, but may lead to a transformation of the big-data community.

OpenDroneMap In The Cloud - An Architecture for On-Demand Photogrammetric Processing (#270)

Authors: Tomas Holderness, Matthew Berryman, Stephen Mather

Categories: Drones

Date: 08/29/2018

Time: 15:30 - 16:00

Room: Bagamoyo

OpenDroneMap provides Docker images as the new core-architecture for OpenDroneMap deployments. This approach both helps improve the accessibility of the software (which now runs independent of the user's operating system) and provides the ability to create scalable workflows, capable of distributing multiple tasks across clusters of OpenDroneMap instances simultaneously. Critically, managed Docker services from leading cloud providers extend this paradigm further, enabling compute instances to be dynamically created or destroyed depending on demand. These technologies represent a fundamental shift for photogrammetric processing workflows which often require bursts of large compute resources once imagery capture has been completed. Specifically, on-demand processing represents significant improvements in processing efficiency and cost reduction where resources are only allocated as and when they are needed.

In this talk we present the results of the recent Humanitarian Innovation Fund award to build a scalable on-demand OpenDroneMap processing flowline. This approach complements existing efforts in the open source community as part of the WebODM project, and offers an alternative to in-house enterprise solutions via a Software as a Service (SASS) model. Using Amazon Web Services' Elastic Compute Service we demonstrate the ability to scale compute resources to match OpenDroneMap processing requests on-demand and in real-time. Supported by web-facing API user's are able to submit imagery for processing and receive a notification when the process is complete, without having to provision their own compute resources. This open source project provides an invaluable contribution to OpenDroneMap and the wider geospatial community seeking to harness modern web technologies to improve their photogrammetric processes.

Helping open source projects thrive: a guide for users and occasional contributors (#271)

Authors: Andrea Aime, Jeff McKenna

Categories: OSGEO community B - Our place in the world

Date: 08/29/2018
Time: 15:00 - 15:30
Room: NgoroNgoro

Using open source software is for many still a new concept, and this often shows up in how people approach the project and its usage.

This presentation provides a honest introduction to what one actually get when downloading an open source project, how to interact with its community, and help it stay strong and grow, both for users, and occasional contributors.

We will discuss basic misconceptions based on parallels with proprietary software usage, what expectations you should have, how to get involved in a positive, constructive way, as well as approaches for making sure the community is a nice place to live in.

Finally, we'll cover how to best sponsor the project, choose the counterparts that will perform implementation of fixes and new features, and discuss effective code donation approaches.

[A practical approach to cartography in QGIS 3. Case study - Making 1:50 k topographic map in South Africa. \(#272\)](#)

Authors: Admire Nyakudya
Categories: Open data
Date: 08/29/2018
Time: 12:00 - 12:30
Room: Main

Access to open source data in developing world is very much restricted. Over the last couple of years, there has been a great effort to provide these datasets. Whilst there is an effort on the data site there still is a lack of initiative in migrating the software that these big organisations/government departments use. In South Africa, Chief Directorate of National Geo-Spatial Information(NGI) is responsible mapping services. One of the flagship products they produce is the 1:50 k topographic map series using proprietary technologies.

Access to the data used to produce the topographical maps is freely available. This talk aims to explore the mapping exercise we did to emulate the 1:50k topographical maps using Open Source tools mainly (QGIS3, PostgreSQL, Gimp and Inkscape).

The talk will also look at how cartography has improved in QGIS since QGIS 1.8 when we initially did start the mapping exercise to emulate the 1:50k topographic map series and look at the best practices for web map cartography.

Collaborative Imagery and Data Collection in Your Community with Mapillary (#273)

| | |
|-------------|-----------------------------------|
| Authors: | Christopher Beddow |
| Categories: | Crowdsourcing B - Collecting data |
| Date: | 08/30/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Amboni |

Mapillary is a platform that enables users to collaborate in capturing and sharing street-level imagery, using accessible devices such as mobile phones. Mapillary uses computer vision to derive geospatial data from user images, which enhances monitoring and mapping of infrastructure, assets, and points of interest on OpenStreetMap. Mapillary technology is accessible to anyone with a smart phone camera, empowering users to pursue their own projects in areas ranging from rural to urban, connected to remote.

Street-level imagery has previously required professional capture of images, while storing and deriving data from images is a costly process. This has limited the opportunity and availability of imagery to areas where there is a strong commercial incentive for an outside party to map on the ground. As a result, many developing regions lack readily available information about infrastructure, transportation, and land cover. While satellite imagery gives a distant and limited view of such areas, street-level imagery provides deeper context and useful data source to create rich, detailed maps. With Mapillary, imagery can be independently captured by diverse local stakeholders including students, local mappers, and NGOs.

Highlighting Mapillary's community-driven approach, we will introduce a range of compatible devices, as well as software tools we developed to organize capture. We will also share stories from Brazil, Canada, Ghana and Lesotho, locations where communities have come together to create a base layer of imagery in their areas. We will conclude the presentation by demonstrating how both humans and computer vision are being used to create more detailed maps of local areas, with enhanced detail on such features as road networks, schools, healthcare clinics, and SIM card vendors.

Building a Tangible Landscape with GRASS GIS for a school near you (#274)

Authors: Gavin Fleming
Categories: Education
Date: 08/31/2018
Time: 12:30 - 13:00
Room: Saadani

A Tangible Landscape is bound to attract attention of passersby and to engage anyone interacting with it. It consists of a sandbox, a 3D sensor, a PC running GRASS GIS and a projector and runs offline. The 3D sensor produces a point cloud model of the 'landscape' you create in the sand and the PC runs it through GRASS, generating a DEM (digital elevation model) and then any number of other analysis results you specify. Contours, ponds, erosion-deposition, aspect, slope, flow accumulation, the list is as long as the number of GRASS functions. The results are projected back onto the sand, which brings it to life and makes it an excellent geography teaching tool.

We have assisted with the set-up of two Tangible Landscapes at secondary schools in South Africa, including the first Tangible Landscape in Africa. We'll share how you can put the physical components together, set up the software and calibrate the system at minimal cost. You'll also see some examples of it in action.

The Tangible Landscape is a great application of FOSS GIS that is fun and challenging to build from the perspective of a GIS specialist and that really helps cement spatial concepts from the perspective of a learner.

Teaching the Geography curriculum (Grade 8 to 12) in South Africa with QGIS (#276)

Authors: Bridget Fleming
Categories: Education
Date: 08/31/2018
Time: 13:00 - 13:30
Room: Saadani

GIS was introduced into the Geography curriculum in 2008 in South Africa. This bold move was met with much resistance from teachers, mainly because no training was given. Various teacher

interventions were introduced and these will be discussed in the paper. The successes and pitfalls over a ten year period (2008 to 2018) will be illustrated.

The focus on how versatile QGIS is in the South African school context will be how geographic concepts in the curriculum can be taught with GIS, from basic map skills to bifurcation ratios in fluvial geomorphology. The most exciting intervention has been empowering school children to map their own data for their research projects. The fact that QGIS is so accessible, free and easy to use has been an enabler to higher order thinking. Educational case studies will be demonstrated.

QWAT - an open source project for drinkable water management based on QGIS and PostgreSQL (#277)

Authors: Régis Haubourg

Categories: SDG

Date: 08/30/2018

Time: 17:30 - 17:50

Room: Kitulo

QWAT is a GIS application for drinkable water network management based on PostgreSQL, PostGIS and QGIS.

Initiated and supported by a Swiss group of local authorities, this application allows mapping and designing of all necessary objects of a water network (pipes, pumps, installations, covers, pressure and protection zones, districts, subscribers, valves, leaks, Survey Points, PrintMaps. It allows to handle z dimension and different precisions level for schematic or high resolution features. The data model can be extended using extensions or local customizations.

Currently in production in Romania and Switzerland, it supports different languages, can be extended using extensions or local customizations.

The infrastructure part is designed to handle data model migrations. We developed for this need the « PostgreSQL Update Manager » (aka PUM) – a pure python database migration tool similar to Flyway. The continuous integration system relies on a workflow that checks if migrations delta files always lead to the very same state as the last source code state. This is a guarantee for data integrity and a long term support of QWAT.

Moreover, QWAT is a major driving force for QGIS, since it pushes the use of relations and forms, advanced digitizing options, new node tool and more CAD enhancement for edit tools and snapping options.

At last, together with QGEP - a wastewater management application - based on the same architecture, a community of interest is starting to grow quickly. It focuses on all underground networks, electricity, gaz distribution and is bringing CAD community to embrass QGIS.

Conceived as a full Open Source project, it includes a governance model and community management. Oslandia acts as the favoured integrator, a support provider and also as a hub with the QGIS developer's community.

Geo in the Elastic Stack (#278)

| | |
|-------------|------------------|
| Authors: | Thomas Neiryndck |
| Categories: | Big data |
| Date: | 08/29/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Katavi |

You may have heard of Elasticsearch, that it is a distributed full-text search engine built on top of Lucene. You may even have used Elasticsearch, perhaps to store large amounts of application performance metrics or to hunt for security breaches in your server logs. What you may not know is that is that Lucene/Elasticsearch fully supports the storage of simple feature vector geometries. Elasticsearch also provides programming interfaces for the efficient retrieval, aggregation, and ranking of this data based on spatial parameters, as well as implementations for a core set of topological operations. Combined with its ability to deal with massive amounts of data in real time and its first-class support for time-based data sources, Elasticsearch thus has become a viable platform for the kinds of solutions that deal with spatial-temporal data like IoT, sensor networks, or GPS track feeds.

This session will introduce the geo capabilities of the entire open source Elastic Stack. We will demonstrate how you can efficiently ingest spatial data into Elasticsearch, and use its aggregation-framework to roll-up this data spatially and temporally. We will also show how you can use Kibana, the stack's data visualization platform, and the Elastic Maps Service, a centrally hosted map data service, to create dashboards and mashups of various data sources into a single view. We will conclude by lifting the veil on some of the ongoing future work, which includes the addition of GIS-like data analytics to Kibana and the arrival of more advanced spatial clustering techniques to Lucene.

Towards an Open Source Geospatial Certification Model (#279)

| | |
|-------------|--|
| Authors: | Franz-Josef Behr, Tanzeel U. R. Khan |
| Categories: | OSGEO community B - Our place in the world |
| Date: | 08/29/2018 |
| Time: | 15:30 - 16:00 |
| Room: | NgoroNgoro |

As the recent announcement of the gvSIG Association about “Geographic Information Systems applied to municipality management” indicates ongoing education and training play an important role in the professional life, also in the FOSS field.

Based on the Memorandum of Understanding between International Cartographic Association, OSGeo Foundation, and ISPRS this development led to the implementation of the ICA-OSGeo-Lab initiative. Its mission "Making geospatial education and opportunities accessible to all" initiated already a few years ago the idea for a framework for a worldwide applicable Open Source certification approach.

The development of the framework is based on the analysis of diverse bodies of knowledge concepts, i.e., the Geospatial Technology Competency Model (GTCM) which provides a US American oriented list of the knowledge, skills, and abilities. In addition to this analysis the geospatial community was integrated by an online survey and interviews with experts in different countries about Open Source usage and certification.

In the developed certification framework each certificate is described by pre-conditions, scope and objectives, course content, recommended software packages, target group, expected benefits, and the methods of examination. The implementation of examinations has to be based on (open source) tools to automate tests. These automatisms have to be supported by proofs of professional career paths and achievements which need a peer qualification evaluation. Recertification will be required after a couple of years.

The concept seeks the accreditation by the OSGeo Foundation and international support by a group of geospatial scientific institutions to achieve wide and international acceptance.

Keeping Up With Urban Change (#280)

Authors: Derek Lieu, Anna Scalamogna

Categories: Remote sensing B - Products

Date: 08/31/2018

Time: 13:00 - 13:30

Room: NgoroNgoro

Urban centers change fast; faster than maps can keep up. We're building Urchn, a tool that tracks how cities change, and aims to provide valuable public insight to city planners and development officials. It allows planner to analyze how their city is changing and allows mappers to know where the map is out of date.

Case in point: thanks to volunteer mappers and flood preparedness efforts, Dar es Salaam has great OSM coverage. But in a city constantly changing, how do officials reliant on OSM know where the map is out of date, due to redevelopment, demolition, or other causes? How do you know that at scale? And how do you mobilize volunteers to improve the map?

Urchn combines data derived from open and commercial satellite imagery, OpenStreetMap, and other public datasets. We've teamed with Azavea, Radiant Solutions, and the World Bank to deploy remote sensing algorithms designed to tell when persistent change has occurred across satellite images, and overlaid this data over a high-resolution base layer and minutely-updating OSM data, powered by our own OSM replication infrastructure.

With Urchn, you can immediately tell what parts of the city are changing the fastest, and whether those areas are out of date in OSM. Once you've identified these areas, you can export and assign these as tasks to volunteers. As those volunteers map, you can see updates in Urchn's interface in near real-time.

[Opening up the potential of the OSM Full History Data to the HOT community, project managers and data users \(#281\)](#)

Authors: Melanie Eckle, Michael Auer, Sascha Fendrich, Benjamin Herfort, Fabian Kowatsch, Sabrina Marx, Martin Raifer, Moritz Schott, Rafael Troilo, Alexander Zipf

Categories: Crowdsourcing C - Analysis

Date: 08/30/2018

Time: 17:00 - 17:30

Room: Udzungwa

The growing OpenStreetMap (OSM) database repeatedly proved its potential for disaster management and humanitarian activities. This also led to increasing contributions by the Humanitarian OpenStreetMap (HOT) community and a growing number of partnerships with humanitarian organizations and data users, e.g., in the Missing Maps project. The increasing use of the data for disaster response activations and humanitarian activities however also oftentimes raises questions related to the impact and quality of the provided Volunteered Geographic Information, on the side of HOT contributors, project managers and data users.

What kind of data was contributed over time? How to monitor the data evolution? How to assess the semantic, positional and overall accuracy and the usability of the data?

In order to address these and other questions, the HeiGIT/GIScience Research Group at Heidelberg University developed a software platform that applies big data technology to OSM full history data.

The framework, including openly accessible APIs, will allow interested community members, partnering organizations and other potential beneficiaries of varying levels of experience and GIS or programming skills to conduct analysis tasks with different levels of complexity. Queries on the OSM full history data allow detailed analyses of the OSM data evolution and the detection of remarkable patterns over time: what changes have been applied, where, when and by whom. As all changes are considered, spatio-temporal patterns can be detected as well as changes due to individual users' activity.

The talk will provide an introduction into the framework and show how the framework can be applied for different use cases by project managers, data users and contributors. Furthermore, the talk will provide insights on how to access and how to make use of the framework for own analyses.

Alien Worlds: 3D Maps of Celestial Bodies with VTS (#283)

| | |
|-------------|----------------------------------|
| Authors: | Ondrej Prochazka |
| Categories: | Mapping systems C - 3 dimensions |
| Date: | 08/31/2018 |
| Time: | 13:00 - 13:30 |
| Room: | Mikumi |

A wealth of public-domain extraterrestrial remote-sensing data may be turned into stunningly beautiful, interactive and geospatially accurate 3D maps with open-source software. This talk will provide a hands-on demonstration. We will cover topics of reference-frame definition, dynamic TIN generation, planetary nomenclature and definition of atmosphere for visual realism. Special

attention will be given to fusion of orthomosaics and DEMs of varying resolutions. Data from USGS Astrogeology Science Center, ESA Mars Express, and VHR data from the UoA HiRISE project will be used in the process.

QGIS 3.0: More Powerful in the Cloud (AWS). (#286)

Authors: Mark Korver
Categories: QGIS B - The system
Date: 08/29/2018
Time: 11:30 - 12:00
Room: Mikumi

This talk/demo will focus on what you need to know to successfully use QGIS and other FOSS4G tools on AWS. The value proposition of using open source tools in the Cloud vs on-prem will be showcased by running QGIS 3.0 on GPU enabled Amazon Workspaces and Appstream 2.0. I will show how you can instantiate and connect to Amazon RDS running PostgreSQL/PostGIS in minutes for vector data, and directly access Cloud Optimized GeoTIFF(COG) mosaic's on Amazon S3 by using VRT files embedded with /vsis3/ type references to manage large raster collections.

Towards a More Inclusive Definition of Geocoding (#287)

Authors: Julian Simioni
Categories: Catalogue systems C - Theory
Date: 08/29/2018
Time: 15:00 - 15:30
Room: Saadani

Open any GIS textbook, look up geocoding, and you'll see something like this:

“Geocoding is the process of turning a postal address into a location on the Earth’s surface”

This definition is broken. It was written mostly by academics of the western world who, while meaning well, were able to take things for granted that only apply to a tiny subset of the world.

In this talk we'll strive to create a more inclusive definition of geocoding. We'll explore what technology we'll need to get there, and what the open source geocoders our communities have built have already done to move us in that direction.

Improving public land management in Burundi with OpenSource software (#289)

Authors: Pierre-André Le Ny, Florent Lasry

Categories: Government B - Land ownership

Date: 08/31/2018

Time: 13:00 - 13:30

Room: Amboni

The PAGGF project aims at limiting conflict risks in Burundi, which are often linked to land management.

Approved in 2014, the project is funded by the EU, the German cooperation, and managed by GIZ. It concerns the whole country, in order to improve the governance and management of public land. Another goal is also to improve conditions needed for private land management.

The expected results of the project are the following :

1. Establish a full register of all state land, taking into account conflict solving. Only non-conflictual land are registered into the cadaster and the land management office
2. Provide juridical support for all conflict resolution and mediation
3. Establish a roadmap for a durable national land management system

So as to fullfill goal 1, a full land management IT system was required : the SIF-TD platform has been developed to manage the full process of land management.

This platform is based entirely on OpenSource software.

A PostGIS database has been setup, with a specific data model for parcel management, adapted to Burundi's context. This database uses a topological model, so as to keep a maximum amount of information coming from field surveys. The database follows the "thick database" approach, implementing specific rules as close as possible from the data.

On top of the PostGIS data model, end-user interfaces have been developed using QGIS as a development platform. In this interface, the user can find :

- map layers for visualization and analysis
- specific widgets for land object management
- import and export features
- search capabilities
- specific forms and composer following strict models

The SIF-TD platform also includes a web application for map visualization.

This presentations offers a full overview of the SIF-TP platform from the PAGGF project, and details its capabilities and potential for more features and mutualization as an opensource land management platform. We also present the difficulties and issues we faced during the development of the project.

Introducing GeoNode with QGIS Server (#290)

| | |
|-------------|-----------------|
| Authors: | Gavin Fleming |
| Categories: | Geonode Geonode |
| Date: | 08/29/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Bagamoyo |

GeoNode is a Spatial Data Infrastructure or Catalogue that has been around for about ten years and been deployed around the world on sites like <https://worldmap.harvard.edu>, <https://mapstory.org> and <http://haitidata.org>. It is built on the Django web application framework and is thus highly customisable. Other core components of GeoNode are a web map server that defaults to Geoserver and a metadata server that defaults to pyCSW.

QGIS as an alternative map server back-end to GeoNode has been an official option since GeoNode 2.6 although it was only with 2.8 that the whole QGIS server development fork was merged upstream to GeoNode. Kartoza led the development of the QGIS server back-end, initially to enable the QGIS desktop plugin, InaSAFE, to be controlled through the GeoNode web application and run as a headless service. This work was funded largely by the World Bank.

We will share the functionality that QGIS server brings to GeoNode, such as the ability to style layers with QGIS styles and download GeoNode maps as QGIS projects. We will also share orchestration tips

for setting up GeoNode QGIS server easily and introduce the functionality provided by the new GeoNode provider in QGIS 3.

Solving geology use cases with OpenSource GIS: Albion and CtrlCraft (#291)

Authors: Vincent Mora, Emmanuel Duguey

Categories: Environment

Date: 08/30/2018

Time: 11:30 - 12:00

Room: Saadani

We present various advances and new software in the use of OpenSource GIS to solve geological problems and use cases. The first tool is Albion, for 3D models reconstruction of the underground. The second is CtrlCraft, for on the field truck loading optimization.

This talk begins with a new solution to build geological volumes from boreholes data. The geometric model of the ore will be used to estimate the volume of ore (money in the bank) and plan its extraction (if possible and economically sound).

The former workflow involves drawing polygons on terrain sections passing through boreholes and using 3D modeler to try and create volumes from those sections. A major shortcoming is the lack of relation between sections for different levels of ore concentration: lower the ore concentration threshold and you have to reconstruct your model from scratch.

The underlying idea behind Albion is to use a graph to represent the mental interpolation that the geologist makes when looking at terrain sections. The Albion approach is to connect the dots, no more. The graph for various ore concentrations have topological similarities that are used to speed up construction. You may find it orders of magnitude faster than former approach.

We present an overview of going from borehole information to ore volume in minutes with Albion.

The second tool we present also solve a geological issue for mine exploitation : how to optimize truck loading, and assess mineral quality directly on the field. As the name suggests, you could picture it as a GIS-enabled clone of MineCraft.

Albion and CtrlCraft use QGIS has the user interface and PostGIS to store ****and process**** data.

Last but not least, we discuss our plans to extend Geological use cases managed by this toolbox:

- boreholes visualization in 2D and 3D

- visualizing imagery information from boreholes, as well as mineral informations
- mineral facies editing and visualization for field survey in underground mines
- automatic recognition of mineral types from boreholes data with AI algorithms
- better data information with RTK positioning system on the field

This work is aimed at providing a full geological toolbox in QGIS and PostGIS, as an OpenSource and collaborative project.

Ramani Huria: improving urban planning with local tools & communities (#293)

Authors: Ivan Gayton, Innocent Maholi, Paul Uithol, Nuru Kalulunga

Categories: Bridging the gaps A - Strategic

Date: 08/29/2018

Time: 14:00 - 14:30

Room: Selous

Ramani Huria is a large scale community mapping project in Dar es Salaam. Over the past years, we have continued innovating and experimenting with a large array of locally developed, low cost and highly effective technology to increase accessibility to technology and knowledge for communities throughout Dar es Salaam. This includes, for example, styrofoam drones, deriving very accurate elevation models using basic barometers, and improvements existing tools such as OpenDataKit to allow better tracing of on the ground features.

These are among the tools and technologies we are using to teach students and communities, living informal settlements throughtout the city, new methods of working with maps and open data. These maps are part of the city's effort to improve flood resilience, urban planning, and identify and improving access to services for it's residents, making Dar es Salaam a better place to live.

Socio-ecological models of aquaculture in 4-dimensions (SEMA4D) (#294)

Authors: Nicholas Keeney, Damian Brady

Categories: Environment

Date: 08/30/2018
Time: 12:30 - 13:00
Room: Saadani

Our work within the Sustainable Ecological Aquaculture Network (SEANET) evaluates how rural, resource-dependent Maine (USA) can encourage responsible shellfish aquaculture development within the context of federal growth benchmarks. We identified a need for a data management and modeling framework, which would be capable of addressing questions about feedback in management and culturing choices. Existing enterprise solutions were not legally interoperable, so we use FOSS for computation/scripting. The project has evolved into a modular architecture running in Docker, with persistence handled by Neo4j graph databases. Satellite data introduced the need for efficient access using RASDAMAN. The internal data representation is a quantized mesh, built on unstructured triangular grids by transfer of raster data using statistical methods. This allows us to adaptively refine subregions as new observations from buoy and citizen monitoring become available. The process accomplishes compression and interpolation, and enables extrapolation to future scenarios. The final component is OpenGL shaders with FFMPEG to render, encode and live stream interactive video to a web client. The interface and API require minimal data transfer—and negligible JavaScript.

The system can run locally on modest hardware, or hosted on a dedicated hybrid cluster. The first application is predictive siting of aquaculture leases and licenses in the Damariscotta River Estuary—Maine’s traditional aquaculture growing area. There have abuses of the application process leading to farm saturation. Stakeholder concerns are about exclusion of other uses, and water quality degradation. Based on existing sites, and the application rates, we train a kernel density estimator and inter-arrival model to predict new sites.

Under current conditions, some municipal jurisdictions are already out of ocean space, while others will remain vacant due to suitability limitations. Investment and adversarial activity can be overlaid as incentives or risk, to modulate siting. Based on predictions, we estimate the oyster production capacity of the growing area. The shellfish model is not FOSS, but we share methods for running .NET using MONO, and creating look-up tables based on parallelized simulation of the parameter space. The take away is, FOSS technology enables complex interoperable data systems for marine spatial planning, which would be clumsy or impossible otherwise—and, you don’t need much GIS to do it.

[Using FOSS4G to empower communities: Mobile Applications to Secure Tenure \(MAST\) \(#295\)](#)

Authors: Ioana Bouvier, Jeffrey Euwema, Leland Smith, Silvia Petrova, Jeanne Choquehuanca, Caleb Stevens, Stephen Brooks

Categories: Bridging the gaps C - Technology

Date: 08/30/2018

Time: 17:00 - 17:30

Room: Mikumi

Globally, over 70 percent of people lack documentation for their land. Land documentation can improve rural livelihoods by increasing access to credit and encouraging long-term sustainable investments in the land. Obtaining land documentation, however, can be difficult due to the high costs of surveying land, stringent accuracy requirements, and outdated land registries. To overcome these constraints, the United States Agency for International Development (USAID) supported the development of Mobile Applications to Secure Tenure (MAST). MAST supports systematic mapping and documentation of community land resources in an efficient, sustainable, and participatory manner.

The suite of applications developed to support MAST are built on:

- 1) Postgres/PostGIS database to manage land data collected in the field;
- 2) Geoserver for serving geospatial data;
- 3) Android application for field data collection; and
- 4) a web application built on open source libraries for managing data, workflows and reporting.

Both local community members and land resource managers receive training in MAST tools, land rights, resources governance, and participatory approaches to mapping boundaries and collecting information on land use and individual land holdings. After community consultations and participatory mapping, land managers have access to simple tools to validate the information and issue land documentation. MAST has been tested in Tanzania, Zambia, and Burkina-Faso, where it facilitated the documentation of over 36,000 parcels. Results show that MAST significantly reduced claim processing times and enabled local land managers to inventory land and issue certificates more efficiently. Additionally, it led to increased awareness of land rights by community members and resulted in unprecedented parity in women's claims to land ownership. MAST tools are public and have been adopted by several local and international organizations working to address access to land and reduce poverty.

Geo-diversity in Machine Learning (#298)

Authors: Andrew Bollinger

Categories: Big data

Date: 08/29/2018

Time: 15:00 - 15:30

Room: Katavi

New machine learning techniques hold tremendous potential to revolutionize our ability to solve complex social and environmental problems. However, there is increasing recognition that these tools can return incorrect and even biased results. This results in automated irrigation equipment that works well for certain crops or areas but which overwaters in others. Or self-driving trucks which can navigate over asphalt roads but fail to reach their destination over dirt or gravel. Ultimately these tools are as good as the data that they learn from. To build algorithms that work for the whole world, we must use training data that better represents the world's diversity.

Now we're building tools to help address this gap:

- Using the open source library Label Maker, we can take images and labels from multiple locations when training a supervised machine learning model for satellite imagery. Label Maker downloads OpenStreetMap QA Tile information and satellite imagery tiles and saves them into a single training data file.

- We're working on an API and webtool to better identify training locations. This can help us determine if the data is representative of our prediction area, which satellite imagery products have good coverage in the area, and if OpenStreetMap has good data coverage in the area.

- Our Data Team is making machine learning specific open data sets. These will be open licensed and help machine learning engineers develop new algorithms for satellite imagery. Spacenet, Functional Map of the World and xView are great existing resources in this space and we'd like to continue scaling this effort.

We're sharing this work with other developers and advocates to ensure that the whole world benefits from advances in machine learning.

[STAC, Sat-utils and publicly available satellite imagery datasets \(#299\)](#)

Authors: Matthew Hanson

Categories: Catalogue systems B - Applications

Date: 08/29/2018

Time: 12:00 - 12:30

Room: Saadani

The Spatio-Temporal Asset Catalog (STAC) is an emerging standard based on WFS 3.0 that allows for standardization across different geospatial imagery providers. By deploying a STAC API or making a STAC catalog available, providers can give users a standard way in which to access their data. In addition, efforts are underway to make STAC APIs for several publicly available datasets on AWS (Earth on AWS). Now it is possible to build client applications that are usable across multiple datasets.

Sat-utils is a collection of libraries and utilities for searching, fetching, and processing satellite imagery that is made available via a STAC API. We will present an overview of what metadata the STAC spec provides about imagery, and an overview of the sat-utils libraries. Sat-api is a library that is an easily deployable stack to run your own elasticsearch-backed STAC API. Sat-search and sat-fetch are utilities for searching and downloading imagery efficiently by reading just the areas of interest. Sat-select is a tool for quickly identifying scenes of interest using their thumbnails, and sat-process is used for processing imagery into useful products.

The sat-utils libraries are designed to be used by both the developer and non-developer. Command line tools are built in to provide an easy interface to sat-util functionality and be able to batch fetch and process data. They are also Python libraries that can be incorporated into other tools to create targeted applications that can be easily scaled.

Creating Land Use and Land Change Maps with Public datasets (#300)

| | |
|-------------|-----------------------------|
| Authors: | Matthew Hanson |
| Categories: | Remote sensing B - Products |
| Date: | 08/31/2018 |
| Time: | 11:00 - 11:30 |
| Room: | NgoroNgoro |

Looking at Land Use and Land Change (LULC) maps made from satellite imagery can give us important insights into the development of a region. While there are high quality LULC products available for many regions, they are always for a specific set of categories (e.g., earth, built, crops, forest) and cover a specific time period. Users who want to explore LULC for a specific time or for certain changes over an arbitrary time period are left to create their own LULC maps for multiple points in time.

Creating your own land-use maps can be difficult and time consuming, especially for large areas that contain varied landscapes. This talk will cover methods and open-source Python tools for creating Land Use maps from Landsat and Sentinel data. We will show how to identify scenes to use in

creating a Land Use map, using clustering to identify similar categories in the scenes, and a technique for auto labeling those categories, and how to identify change across time.

In addition, we will present results for several regions in Keyna, Uganda, and Malawi where we generated Land Use maps for two points in time and used those to create Land Change maps, showing where there were categorical shifts in Land Use.

Rapid mobile mapping, and less-rapid development of relationships between refugees and local communities (#301)

| | |
|-------------|-----------------------------------|
| Authors: | Paul Uithol, Rupert Allan |
| Categories: | Crowdsourcing B - Collecting data |
| Date: | 08/30/2018 |
| Time: | 13:00 - 13:30 |
| Room: | Amboni |

Or, using open data & OSM to improve operational data, coordination, transparency and accountability for refugees and host communities around the Uganda refugee crisis.

In Uganda, HOT's objective is split between capacity building and map creation. The combination of how HOT engages and trains participants from both refugee and host communities as community surveyors, collecting data under HOT and UNHCR's established standard data Indicators and collaborative inter-agency data sharing and embedded trainings in partner organisations and government agencies, GIS tooling and data sharing through OpenStreetMap leads to a comprehensive, community-verified maps for operational precision, monitoring, and accountability.

This data cuts across traditional divides between emergency response and development, sectors and working groups.

This is an account of the pitfalls and successes of training and sustaining a mobile community in mobile tools with which to map their needs. We will talk about how to engage communities on the ground and multiple agencies in the sharing, reporting, and use of map data, and the potential impacts of this on how humanitarian intervention may change for the better through the use of OpenStreetMap worldwide.

Hydra, OpenSource hydrology simulation platform (#302)

| | |
|-------------|--|
| Authors: | Vincent Mora, Thierry Lepelletier, Camille Duran |
| Categories: | Environment |
| Date: | 08/30/2018 |
| Time: | 13:00 - 13:30 |
| Room: | Saadani |

We present Hydra, an OpenSource platform for hydrology and hydraulics modelling.

Hydra is the first OpenSource tool allowing to simulate the full water cycle, directly integrated into a GIS software.

Hydra is based on QGIS and PostGIS, and provides a full platform for water management :

- hydrology
- fluvial modelling
- wastewater
- water quality
- solid transportation
- water network / river coupling

We chose to bring the water simulation part of the software into QGIS/PostGIS, for various obvious reasons :

- QGIS is a great GIS application development platform
- Simulation involves GIS data preparation before computation
- .. and visualization of the results after computation
- PostGIS is the best place to store data and complex models
- The dynamism of OpenSource community and the QGIS project directly benefits to Hydra
- ... and Hydra is made available to the OpenSource ecosystem at large

We want Hydra to become the de-facto OpenSource water management platform, and look forward to enlarge the community around it.

The platform is already used for large-scale projects, to assess its efficiency and confirm its adaptation to real-world use cases.

After the presentation of the platform itself and its features, we showcase some use cases it has been applied to.

The Hydra platform was born from a collaboration between Hydratec, a hydraulics engineering firm, and Oslandia for its OpenSource GIS knowledge. We also present the organisational part of the creation of this platform, as an example of efficient collaboration and mutualization of resources and competences to create OpenSource software.

Pilot land Information Management System (#304)

Authors: Elijah Kingori, Peterson Muchiri
Categories: Government B - Land ownership
Date: 08/30/2018
Time: 11:30 - 12:00
Room: Katavi

Land is one of the vital assets in Kenya. However, over the years, the Ministry of Lands has relied on Paper-based manual System to administer, manage and discharge land records. In return this has posed a great challenge, and unbearable to effectively refer to records and retrieve them timely while serving citizens, institutions and other key stake-holders. As a result, the entire process has become inefficient, time consuming, unreliable, restrictive, occasioned repetitiveness, unaccountable and costly, undermining efficiency and effectiveness in service delivery.

The goal of this project was to explore the role of new and emerging technologies, Specifically GIS and Internet technologies, for land administration and management. A web based GIS LAND INFORMATION MANAGEMENT SYSTEM was developed to streamline and enhance effective and efficient management of the land resource.

The role of Open Data and Free and Open Source(FOSS) in achieving Sustainable Development. (#305)

Authors: Laura Mugeha
Categories: SDG

Date: 08/30/2018
Time: 10:00 - 10:30
Room: Kitulo

In November 2017, OpenStreetMap's statistics indicated that there are 4.3 million users with over 3 million changesets per day on OpenStreetMap. This positive impact can be attributed to crowdsourcing through various OpenStreetMap communities, YouthMappers chapters and volunteers around the world.

This, therefore, leads to the greater availability of open spatial data with great uses in academic research, navigation, emergency response and in various real-world applications such as PEPFAR projects.

However, there is limited use of this data to create solutions to real-world problems faced in third world problems. Spatial data is important in developing such solutions since all problems are location-based hence all solutions should be location-specific.

With improvements in technology, there are various software applications for processing spatial data with the provision of toolsets for the same. This allows for the production of customized outputs that are dependent on the intended solution and purpose.

This talk will highlight how Free and Open Source (FOSS) Software and various Open spatial datasets can be integrated and used in creating solutions to problems through analysis, visualization and development. The developed solutions would further lead to achieving the 2030 Sustainable Development Goals(SDGs) in Africa and other Third world countries. This will be facilitated by using existing cases and applications.

Open-source coastline mapping with publicly available imagery (#306)

Authors: Matthew Hanson, Mark Dion
Categories: Remote sensing B - Products
Date: 08/31/2018
Time: 10:05 - 10:30
Room: NgoroNgoro

Because of their changing nature, mapping coastlines with satellite imagery can be very difficult. Images are taken at a specific point in time, and the coastline will not only vary daily due to tides, but coastlines can shift over time, or even seasonally. Using a variation of the NDWI algorithm we have

extracted coastlines from a large number of Landsat and Sentinel scenes, but how can a single coastline be generated from all of these snapshots of coastlines over time? This talk will cover the algorithm details for extracting a coastline from a single image, as well as combining multiple coastlines over time in order to provide an estimate of the coastline at low tide, high tide, or mean tide.

The coastline extraction algorithm uses a buffered version of an existing coastline (such as OpenStreetMap data) to create computation AOI's (to avoid misdetections that are on land or at sea), generates the NDWI and uses automatic threshold to determine the ideal cutoff between land and water pixels. The resulting raster mask is turned into a series of linestring vectors with associated metadata such as date and time. The date and time, along with the location can be used to estimate an expected tide height. Coastlines within a range of tide heights (e.g., 80%-100% of high tide) are then conflated to create a single coastline representing the middle of the range (e.g., 90% of high tide) over the time period of collected images.

This talk will give an overview of the algorithm, which is all available via open-source repositories on GitHub, as well as present low and high tide coastlines from Landsat and Sentinel imagery along eastern Africa.

The eStation 2.0, an Earth Observation processing system (#307)

| | |
|-------------|---|
| Authors: | Marco Clerici, Antoine Royer, Jurriaan Van'T Klooster, Vijay Charan Venkatachalam |
| Categories: | Remote sensing A - Processing |
| Date: | 08/29/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Kitulo |

The recent development of many web processing services of Earth Observation data have been facilitated by the advent of the free and open geospatial technologies and data. Though there are many such processing services, the use of user-friendly and automated one is vital. The eStation 2.0 is one such web processing server for automating the acquisition, processing, analysis and visualization of key environmental parameters derived from remotely sensed data. It was designed and developed by the Joint Research Centre (JRC) of the European Commission and fully built on open-source technologies, including apache web server with PostgreSQL database, python in the backend, OpenLayers & Ext JS in the front end. The measurements are obtained mainly from the SPOT/PROBAV, SEVIRI/MSG, TERRA-AQUA/MODIS, and the Sentinel Earth Observation systems. In addition to the processing services, the eStation offers a highly customized web client, made

available to different end-users for computing ad-hoc thematic products and environmental indicators.

All processing steps are easily configurable allowing the user to modify the generated environmental indicators and to implement new ones. The eStation has been distributed to more than 130 Institutions in all sub-Saharan African countries involved in the MESA project (Monitoring of Environment and Security in Africa, 2013-2017), implemented by the African Union Commission in partnership with the ACP Secretariat, CEMAC, ECOWAS, IGAD, IOC and SADC, the five Regional Economic Groups that are supported by the European Development Fund. Its open source configuration encourages the community of end-users to further adapt the tools to their needs. It is worthwhile to stress that capacity building activities are an essential component of the projects supporting the distribution and use of the eStation in Africa, and will be continued in the transition to the GMES&Africa support programme (2017-2020), that builds on MESA achievements and aims at extending the Copernicus services to the African Institutions.

[An automated workflow to extract irrigated area land use from time series of satellite data \(#309\)](#)

| | |
|-------------|---|
| Authors: | Sajid Pareeth, Poolad Karimi, Charlotte De Fraiture |
| Categories: | SDG |
| Date: | 08/31/2018 |
| Time: | 11:30 - 12:00 |
| Room: | Kitulo |

An estimated forty percent of the global population are experiencing water scarcity at different magnitudes. In the Asia and Middle East region, water scarcity is mainly driven by changing climate, improper water use and increasing population. Many studies reported rapid decrease in the level of ground water table in the semi-arid regions of Asia and Middle East. One of the target of Sustainable Development Goal (SDG6) is to substantially reduce the number of people suffering from water scarcity by improving water use efficiency. To improve water use efficiency it is very critical to monitor the water use at different scales, most importantly at a basin scale where water allocation to different sectors takes place. The biggest share of water (around 70 %) is often allocated for irrigation. Hence monitoring the spatial and temporal dynamics of water availability, irrigated area and water use at basin level will play a big role in ensuring proper allocation of water in a sustainable way.

In this study, we developed a remote sensing based irrigated landuse monitoring workflow using time series of Landsat 8 (L8) optical for Mashhad basin in Iran. The entire workflow is implemented using open source softwares and in bash scripts. The workflow is implemented using GRASS GIS and Orfeo Toolbox libraries. All the data pre-processing is implemented using GRASS GIS functionalities

and the land use detection is based on machine learning algorithms in Orfeo Toolbox. Given a training sample and bounding box as input, the scripts will automatically download, pre-process and classify the Landsat 8 or Sentinel 2 data. The workflow can be applied to any other similar geographical location. The future work include converting the bash scripts to python to make it workable across platforms.

State of GeoTrellis (#310)

| | |
|-------------|-----------------|
| Authors: | Eugene Cheipesh |
| Categories: | Big data |
| Date: | 08/29/2018 |
| Time: | 15:30 - 16:00 |
| Room: | Katavi |

The GeoTrellis project is a leader in distributed raster processing. Powered by Apache Spark it is integrated with the Big Data ecosystem. GeoTrellis enables the creation of scalable GIS systems and workflows using the elegant concepts from Map Algebra.

The GeoTrellis team is excited to share the state of our project and its vibrant community at FOSS4G 2018. We introduce our project, our team and what we have been working on in the last year.

You will learn about GeoTrellis through a walkthrough use-case and insight into the project roadmap.

We will also share stories from our community:

* Astrea has developed tools focused on enabling data scientists to build statistical and machine learning models from on remote sensing data

* Azavea has been focused on brining the power of GeoTrellis workflows to python GIS community through Jupyter workbook.

Attend this talk if you're curious about what GeoTrellis could do for your use case or for a snapshot of the exciting developments in the Big Data GIS space.

FOSS4G based satellite exploitation platform (#311)

| | |
|-------------|---|
| Authors: | Vasile Craciunescu, Marian Neagul, Marcin Gil, Rok Mocnik, Bartosz Buszke, Przemysław Turowski, Igor Kratochvil |
| Categories: | Big data |
| Date: | 08/30/2018 |
| Time: | 17:00 - 17:30 |
| Room: | Bagamoyo |

For decades now, Earth Observation (EO) satellites have provided a wealth of data. The existing missions, along with the future ones, will provide routine monitoring of our environment at the global scale, thereby delivering an unprecedented amount of data. While the availability of the growing volume of environmental data from space represents a unique opportunity for science and applications, it also poses a major challenge to achieve its full potential in terms of data exploitation. The talk presents the technologies used to develop an online platform that can use high satellite data volume to perform operations like information mining, data extraction, time-series analytics and fusion.

The fundamental principle of this exploitation platform, called EO4SEE, is to move the user to the data and tools. Users access a platform work environment providing the data, tools, and resources required, as opposed to downloading, replicating, and exploiting data 'at home'. The platform, created by an international consortium led by TERRASIGNA with financial support from the European Space Agency, offers services based on Open Geospatial Consortium standards for data retrieval (WMS, WCS, WFS) and server-side processing (WPS). The services were built using open source solutions such as GeoServer, OpenLayers, PostGIS, GDAL, OTB, Apache Mesos, Marathon.

Quickly integrate machine learning segmentation to the geo-workflow (#312)

| | |
|-------------|-------------------------------|
| Authors: | Zhuangfang Yi |
| Categories: | Remote sensing A - Processing |
| Date: | 08/29/2018 |
| Time: | 12:00 - 12:30 |
| Room: | Kitulo |

At Development Seed, we built a tool, Pixel Decoder, to help quickly train machine learning algorithms and run those algorithms over a large area. It's a model zoo that contains multiple ready-to-go algorithms for semantic segmentation. Semantic segmentation is an area of machine learning focused on partitioning an image into semantically meaningful parts and then classifying each part into a pre-determined class. For example, land use classification, mapping roads, and creating building footprints at the pixel level from satellite imagery all belong to semantic segmentation in the geo-workflow. All the algorithms that live in Pixel Decoder are neural networks built with Keras and Tensorflow.

It will take three steps to incorporate Pixel Decoder into your machine learning geo-workflow:

- prepare a training dataset
- train the selected algorithms with pixel decoder
- predict on a larger geospatial scale from the trained model

In this talk, I will demonstrate detecting pixel-wise building footprints and how to locate the changes by comparing the model prediction result with OSM mapped buildings.

[Paving the way for increased sustainable energy solutions in rural Tanzania \(#313\)](#)

Authors: Dorica Mugusi, Tonny John, Barnabas Caro, Paul Uithol

Categories: Bridging the gaps B - Practical approaches

Date: 08/30/2018

Time: 10:30 - 11:00

Room: Mikumi

HOT is working in Tanzania with IFC, the Rural Electrification Agency (REA) and Distributed Energy Services Companies (DESCOs) to produce better estimates and indicators of the access to and demand for energy in rural communities throughout the country, and the potential for various forms of sustainable, small scale generation and distribution systems (so-called minigrids). This is achieved through a combination of large scale digitization of buildings, field mapping and combining a variety of existing datasets. This will allow providers of minigrid solutions to better respond to market demand, and increase the rate at which (rural) Tanzania achieves access to sustainable energy. In this presentation, we'll discuss the impact and implications of our approach and methods and the potential impacts on access to energy and services for rural communities.

From "Data Zetu" to action: Shina boundaries offer unprecedented hyperlocal data for decisionmakers (#317)

Authors: Ivan Gayton, Paul Uithol, Sara Amadi, Asha Mustapha

Categories: Bridging the gaps B - Practical approaches

Date: 08/30/2018

Time: 11:30 - 12:00

Room: Mikumi

Community mapping efforts in wards across Dar Es Salaam have surfaced data about hyperlocal "shina" boundaries, which offer local communities and leaders unprecedented information about the most granular level of community administration that exists in Tanzania. This is the first time Dar es Salaam has been mapped to such detailed level, and the data collected has far reaching implications for public health planning, local administration, economic evaluation and disaster prevention.

Many informal communities remain relatively unmapped — with little knowledge about, for instance, how many people live in households, where buildings like shops and houses are and how many people are within safe walking distance to health clinics. This makes it hard for health workers, emergency responders and planners to make informed decisions about where to prioritize investments, advocacy and outreach.

The lack of spatial information around these amenities has far reaching implications for access to basic services, such as healthcare and maternity services. In detail, some of our surveys reveal unexpectedly large gaps in access between neighbouring shina's. In this talk, we'll be taking a closer look at some highly interesting insights revealed by this data and other data collected as part of the Data Zetu project, and how we can make this data accessible and actionable to local communities and decision makers.

Our talk will be delivered by a combination of team members in an engaging presentation with rich media, including vibrant photos and maps of never-before-seen data and the people who are using them.

Detailed 3D Elements in geographic context with MapboxGL and Three.js - A Cultural Heritage approach (#320)

Authors: Lucia Marsicano, Marco Montanari

Categories: Mapping systems C - 3 dimensions

Date: 08/30/2018

Time: 14:30 - 15:00

Room: Small

The integration of detailed 3D models into a well structured map is complicated and has been only partially touched by very limited projects. Yet, it is becoming once again important considering the recent evolution of Google Maps API aiming towards a more entertainment-driven approach. For this reason, the approach we organized for this experiment was more structured and defined as an element in an infrastructure, trying to build a process more than a tool per se. The first step was the definition of the tools to expose the models in a web usable and geographically aware manner. In our case, using the blender toolchain, we relied on two add-ons. The first is Basemaps, through which it was possible to import data directly from OpenStreetMap. Through the options it is possible to download enough data to manage all aspects of the context and geographical location of the elements to be modeled. To keep the relevant GIS information available in the final project, it is central to use the georendering functionality, that generates an additional text descriptor containing the geographic information to correctly position our model on a map. This, applied to a big architectonic model generates a great set of data, yet it is basically unusable, considering the size in MB.

To make the models really usable, it is necessary to describe the models as low-polygon situations. To do that, it is necessary to operate a retopology, using both shrinkwrap and decimate operators. The models will be available, this way, in several levels of detail, enabling the replacement of the model with different version based on the zoom level.

Once the size level is solved, the new problem becomes, more infrastructural. The models need to be stored somewhere in an easy to fetch and easy to manage way usable on the web. Here comes the second add-on for blender, the “ThreeJS Blender Exporter”. With this tool it is possible to export the models as json files. With the various zoom levels and quality levels and this format, it is possible to store the data within a normal json document database.

Relying on a mongodb database with a simple REST interface, we created a simple treejs-json model repository, available at <https://3dmodelcommons.com>, and its additional geographic datasets and APIs at <https://geo.3dmodelcommons.com>. With these elements in mind we were able to expand the mapboxgl layer and starting from the amazing work made by Peter Liu on ThreeBox we were able to automate the visualization of complex Cultural heritage models by relying on a simple RESTful API exposed by <https://geo.3dmodelcommons.com>.

We will present the process, the tools and the platforms created as well as the results of our analysis and approach.

ZOO-Project 1.8.0: What is new about Open WPS Platform (#321)

Authors: Gérald Fenoy, Venkatesh Raghavan, Nicolas Bozon
Categories: Mapping systems D - Services
Date: 08/31/2018
Time: 11:00 - 11:30
Room: Mikumi

ZOO-Project is a powerful WPS (Web Processing Service) platform which is implemented as an Open Source project and following the OGC standards, it was released under an MIT/X-11 style license and is currently in incubation at OSGeo. It provides a WPS compliant developer-friendly framework to easily create and chain WPS Web services.

This presentation gives a brief overview of the platform and summarizes new capabilities and enhancement available in the 1.8.0 release. Moreover, a brief introduction to WPS and a summary of the Open Source project history with its direct link with FOSS4G will be presented. The new 1.8.0 release come up with a brand new R support and more other new features. The new functionalities and concepts available in the 1.8.0 release will be presented and described, also highlight their interests for applications developers and users. Apart from that, various use of OSGeo software, such as GDAL, GEOS, PostGIS, pgRouting, GRASS, OTB, SAGA, as WPS services through the ZOO-Project will be presented. Furthermore, the ongoing developments and future innovations will be explored.

MapMint: The 100% service-oriented GIS platform (#322)

Authors: Gérald Fenoy, Venkatesh Raghavan, Nicolas Bozon
Categories: Mapping systems D - Services
Date: 08/31/2018
Time: 11:30 - 12:00
Room: Mikumi

MapMint is a comprehensive task manager for publishing web mapping applications. It is a robust open source geospatial platform allowing the user to organize, edit, process and publish spatial data to the Internet. MapMint includes a complete administration tool for MapServer and simple user interfaces to create mapfiles visually. Its use does not require any coding and most of the mapfile parameters are supported, so the user can fully focus on the map features and not on its source code. The latter is generated using various WPS requests which are using the user's data and his settings as input.

MapMint is based on the extensive use of OGC standards and automates WMS, WFS, WMT-S, and WPS. Most of the MapMint core functions are run through WPS requests which are calling general or geospatial web services (vector and raster operations, mapfiles creation, spatial analysis and queries and much more). MapMint server-side is built on top of ZOO-Project, MapServer and GDAL and its numerous WPS services are written in Python and JavaScript. MapMint client-side is based on OpenLayers and JQuery and provides user-friendly to create, publish and view maps.

MapMint architecture and main features will be introduced in this presentation, and its modules (dashboard, data, maps, and apps) will be described with an emphasis on the OGC standards and OSGeo software they are using. Some short but relevant case studies and examples will finally illustrate some of the key MapMint functionalities.

Building an open source mapping system for forest monitoring (#325)

| | |
|-------------|-------------------------------------|
| Authors: | Kristofor Carle, Leo Bottrill |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/31/2018 |
| Time: | 10:05 - 10:30 |
| Room: | Bagamoyo |

Open-source tools are helping us support companies and NGOs that need easy to use mapping tools with built in forest monitoring analysis and satellite imagery. MapHubs is a full featured online map publishing platform where you can upload GIS data, choose a color and design, then combine data layers into contextual interactive maps. MapHubs Forest adds analysis/intelligence dashboards with weekly forest alert data, historical deforestation data, landcover/landuse and a range of other datasets.

We have a strong focus on low bandwidth environments, and building full featured multilingual support in all our map data and interfaces, and are interested in building a broader open-source community around our software.

We will present some of the unique use cases of MapHubs: it used to monitor palm oil concessions in the Democratic Republic of the Congo (<https://feronia.maphubs.com/>), cocoa deforestation in Côte d'Ivoire (<https://mighty.maphubs.com/map/share/Hk36zQP9Z>) and powers the open data portal Map for Environment (<https://mapforenvironment.org/>)

We will also geek out a bit on our use of AWS Lambda for real-time cloud GIS analysis, vector-tile based polygon intersection analysis, use of vector tiles for multilingual maps, and more.

Community mapping to improve health and governance (#327)

Authors: Gertrude Namitala

Categories: Open data

Date: 08/29/2018

Time: 14:00 - 14:30

Room: Main

OpenStreetMap Zambia advocates for an open data environment in all sectors such as health, WASH, decentralization, education especially geospatial data in Zambia.

We train community members on how to use OpenStreetMap and its tools to collect baseline data on schools, health, WASH, transport and business data which has been used for informed decision making. A case in point the data has been used in the fight against cholera, pit emptying, real time data monitoring and improved revenue collection in the councils as there is proper documentation of features on ground.

Such data is very important as it has helped track illegal development and also monitor development in areas making a clear plan for enforcement for various sectors.

Crowdsourced damage assessment using FOSS and OpenStreetMap (#328)

Authors: Cristiano Giovando, Keiko Saito

Categories: Crowdsourcing A - Society

Date: 08/30/2018

Time: 11:30 - 12:00

Room: Amboni

In the aftermath of a disaster, knowing the condition of buildings, infrastructure, and utilities is critical to both immediate response and long-term recovery efforts. Web and mobile applications are now being developed to engage online volunteers in the interpretation of post-disaster aerial imagery and rapidly assess damage over large areas.

In this presentation we review three such crowdsourced damage assessment prototype projects, illustrating methods and tools used in each. We then discuss options for operationalizing them within

existing platforms such as OpenStreetMap and by integrating functionalities from free and open source geospatial software.

State of GeoServer 2018 (#330)

Authors: Jody Garnett, Andrea Aime, Ian Turton

Categories: Geoserver

Date: 08/30/2018

Time: 10:00 - 10:30

Room: Main

State of GeoServer provides an update on our community and reviews the new and noteworthy features for 2018. GeoServer is a web service for publishing your geospatial data. using industry standards for vector, raster and mapping.

We have an active community and a lot to cover for 2.12 and 2.13 release, as well what is cooking in September's 2.14 release.

Each release provides exciting new features, this talk covers diverse improvements across GeoServer:

- * OGC compliance work for WFS 2.0 and WMTS 1.0, WFS 3.0 support
- * improvements for cloud deployments
- * cascade WMTS services
- * progress in NetCDF support
- * getting ready for the Java 18.9 roadmap
- * And much more...

Attend this talk for a cheerful update on what is happening with this popular OSGeo project. Whether you are an expert user, a developer, or simply curious what GeoServer can do for you.

The success of the Social Tenure Domain Model (STDM) Open Source Project (#332)

| | |
|-------------|----------------------|
| Authors: | Arnulf Christl |
| Categories: | Meeting new projects |
| Date: | 08/29/2018 |
| Time: | 13:30 - 14:00 |
| Room: | Amboni |

UN-HABITAT through the Global Land Tool Network (GLTN) is working in partnership with international partners in the promotion of secure land and property rights for all, through the development of pro-poor and gender appropriate land tools.

The conventional land administration approaches based on land registration have not been successful, especially in developing countries where there shortage of resources, capacity and there prevails land governance challenges.

GLTN advocate for inclusive approaches where land rights are not restricted solely to registered rights and not only to individual property rights. The concept identifies a continuum of land rights from informal to formal and the categories of tenure in the continuum range from squatter tenant, customary rights and to legal owners.

In order to actualise the Continuum concept GTLN, in partnership with ITC, FIG, UN-Habitat, World Bank, OSGeo and Metaspatial developed the Social Tenure Domain Model (STDM). STDM is designed to model the relationships between people and land as a basis for land administration and/or land management.

The software tool is based on professional OSGeo software with a Postgres and PostGIS database, QGIS desktop GIS and a range of web mapping tools. The presentations will highlight the current achievements, give an outlook and finishes with a call to action for local communities who are ready to take control, if not of their fate then at least of their spaces.

OpenStreetMap Analytics for Health (#333)

| | |
|-------------|--|
| Authors: | Alyssa Wright, Anna Scalamogna, Marc Farra |
| Categories: | Crowdsourcing C - Analysis |
| Date: | 08/31/2018 |
| Time: | 10:05 - 10:30 |
| Room: | Amboni |

Malaria prevention experts rely on OpenStreetMap (OSM) data to plan spraying campaigns, distribute supplies, and prioritize tasks. To improve this crucial data infrastructure, we're working on OpenStreetMap Analytics for Health, a tool to assess the quality and accuracy of local OpenStreetMap using population data and machine learning.

Development Seed, the Humanitarian OpenStreetMap Team, and Azavea have partnered to build OSM Analytics for Health. This tool helps field-based, academic, and governmental organizations improve their prevention strategies by tracking where the map is complete and incomplete. By combining the WorldPop dataset - a high resolution estimate of world population in an area - and completely mapped areas in OpenStreetMap, we have trained a computer model to estimate gaps in building density.

Following, we overlay these with metrics over additional information such as recency of edits, percentage of missing metadata, and population density in order to provide a multi-modal report of a coverage area. Once regions are identified for improvement, a mapper can export areas to work on in their editor of choice. The system then uses these edits to periodically update the quality assessment for an area.

OpenStreetMap Analytics for Health allows mappers to target where to map next. With some of the latest work on OpenStreetMap machine learning this analytics module allows us to make sense of OSM data for real decision-making in order to save, real lives.

Really Big Geospatial Data Analytics (#334)

Authors: Marc Vloemans, Rob Azavea

Categories: Big data

Date: 08/30/2018

Time: 17:30 - 17:50

Room: Bagamoyo

Most data has a location component that, once enabled, opens previously unseen avenues of analysis and understanding. This is especially relevant for Big Data analysis purposes.

Looking at Big Data from a geographical perspective provides new insights and explanations often unrecognized without a spatial eye, but vital to understanding and managing activities and resources: to see the unseen!

Thus improving situational understanding, real time monitoring, better decision-making and actionable intelligence. From tracking your assets to remote sensors in a smart city environment, from LiDAR, Earth Observation to IoT, a host of new use cases have emerged.

The LocationTech working group at Eclipse Foundation is the home for open source Big Geospatial Data technologies based on special geospatial attributes for the Cloud.

Meet its innovative Cloud based geospatial technologies, such as GeoGig (versioning/data history), GeoMesa (database), GeoWave (distributed storage) and others. Building upon Hadoop, Spark and Cassandra you are able to integrate the latest open technology for robust and affordable geospatial analysis, to deploy Big Spatial Data answers to Big Data challenges.

How NASA is Building a Petabyte Scale Geospatial Archive in the Cloud (#335)

Authors: Aimee Barciauskas, Alireza Jazayeri

Categories: Catalogue systems B - Applications

Date: 08/29/2018

Time: 13:30 - 14:00

Room: Saadani

NASA's Earth Observing System Data and Information System (EOSDIS) is working towards a vision of a cloud-based, highly-flexible system to meet it's ever-growing and evolving data demands.

Cumulus, a free and open source framework, supports this vision via configurable workflows to ingest, process, archive, manage and distribute NASA's Earth imagery. The Cumulus infrastructure is designed for scalability and reliability, using much of the AWS "Serverless" Platform. These services enable Cumulus to scale in real time in order to be performant under the largest expected workloads.

Cumulus is poised to make a huge impact on how NASA manages and disseminates its Earth science imagery. In one notable case, the NISAR mission, Cumulus will be used to collect more data in a year than exists in NASA's current archive. The NISAR mission will collect 45PB a year and process that data at a rate of 1GB per second.

The need for Cumulus is proven through its application to NASA missions, but it's application has extended beyond NASA's Distributed Active Archive Centers (DAACs). Cumulus is being used to monitor agriculture in Tanzania, apply machine learning models to estimate hurricane intensity, and generate air quality predictions using near-realtime forecast data.

This talk outlines the motivation for Cumulus, presents the achievements and hurdles of the past 2 years, and summarize its varied applications. We will share with FOSS4G attendees information on

the availability of the open sourced software and how NASA intends on making its Earth Observing Geospatial data available for free to the public in the cloud.

There are many opportunities to use Cumulus and we're excited to see what comes next!

PostGIS Release Features since v2.0 (#336)

Authors: Felix Kunde

Categories: PostGIS

Date: 08/30/2018

Time: 10:00 - 10:30

Room: Bagamoyo

Every PostGIS user has his/her favourite spatial SQL features and new stuff is added with each release. Also PostgreSQL, the DBMS behind PostGIS, has evolved greatly within the last years. Some important features are remembered but maybe some are soon forgotten. The talk shall be a refreshment of what has happened in PostGIS since the release of version 2.0 in 2012 incl. rasters, vector tiles, 3D, 4D, indexing etc.

Open source is hard, we are here to help! (#337)

Authors: Jody Garnett, Thea Aldrich

Categories: OSGEO community B - Our place in the world

Date: 08/30/2018

Time: 10:00 - 10:30

Room: NgoroNgoro

Open source is responsible for so much good in the world, but it can be difficult to figure out how to start.

- * Choosing an open source license, and what it says about your dreams and ambitions
- * Trusting your code? Vaccination is important for herd resistance
- * Building together with friends
- * Success with open source, save the world, get paid

This is a joint presentation from the OSGeo and LocationTech who are here to offer you help, and hope, on your open source journey! Thea is a developer advocate with LocationTech will introduce the services of the Eclipse Foundation and the facilities available to help your project. Jody Garnett from the Open Source Software Foundation incubation committee will introduce how OSGeo supports open source.

If your organizations is migrating to using open source this talk provides insight into how projects are established, governed and developed. We will also look at the responsibilities taken on by software developers, along with the legal support and risk mitigation provided by a software foundation.

Development teams considering taking their projects to the next level, or seeking reassurance, should attend this talk to review what goes into making open source safe, responsible and successful.

State of JTS 2018 (#338)

| | |
|-------------|----------------------------|
| Authors: | Jody Garnett, Rob Emanuele |
| Categories: | The library |
| Date: | 08/31/2018 |
| Time: | 13:00 - 13:30 |
| Room: | Gombe |

JTS is a geometry library providing a Java implementation of the OGC Simple Features Specification. The code has been translated into a half-dozen languages including C++ (GEOS), .NET (NTS), and Javascript (JSTS).

As a Geometry library the foundation of JTS is the familiar point, line and polygon data structures. The true power of the library is the algorithms that drive our open source GIS industry. These JTS algorithms have been battle hardened with 18 years of real world use offering a balance between performance, computational stability that spells trust.

This talk covers new developments in the JTS library, focusing on performance improvements, and new features. We will also get an update from the development team, their experience at LocationTech, and efforts towards Java 18.9 compatibility.

We also look at what is next for JTS with plans for the future and a few wild ideas that inspire us to continue.

State of JAI Advanced Image Processing (#340)

Authors: Jody Garnett, Eugene Cheipesh

Categories: The library

Date: 08/31/2018

Time: 09:45 - 10:05

Room: Udzungwa

The Java Advanced Imaging is a powerful Java image processing engine underlines our popular OSGeo open source projects - including GeoTools, GeoServer, GeoNetwork, and GeoNode, and more! Tragically there has been one problem with this, the JAI library is not open source!

The library originated at Sun Microsystem as a core component of the Java Runtime Environment, but was not included as part of OpenJDK collaboration.

This talk explores:

- * Capabilities that make JAI attractive for GeoSpatial work
- * How JAI has been used in our community
- * The exciting JAI-EXT project by GeoSolutions

One of the reasons our community has been so addicted to this library is its power. It explored concepts like parallel processing, and distributed parallel processing in 1999, well ahead of the curve. It is an excellent example of engineering and software design.

Importantly we will cover the search for an open source alternative, and are the exciting progress in producing an open source alternative.

Come see how our this foundational library is being propelled into an open source future by our community.

Open Source Practice and Passion at OSGeo (#341)

| | |
|-------------|--|
| Authors: | Jody Garnett |
| Categories: | OSGEO community B - Our place in the world |
| Date: | 08/30/2018 |
| Time: | 10:30 - 11:00 |
| Room: | NgoroNgoro |

Open Source is more than just a license - join us at FOSS4G to dig into the “best practices” that can help your project succeed with open source. This talk builds on the lessons learned by the Open Source Geospatial Foundation in twelve years helping project teams and building the foss4g community.

This presentations looks at the core values that OSGeo as an organization ask projects to adopt. We will discuss why we consider these factors critical to success, and practical ways they can be applied to your project.

* To introduce these principles we will look at what is required to list an open source project on our website.

* Then the new “OSGeo Community” program is used to explore how these principles are applied in practice.

* Finally we will unpack how each principles is realized in the OSGeo incubation program, using examples of “OSGeo Projects” to explore different ways of achieving success.

We invite project teams interested in succeeding with open source to attend this talk (and list your project on the OSGeo project directory after the presentation).

If you are new to open source, or cautious, consider this talk an introduction to some of the risk factors associated with open source and community work - and mitigation steps to consider.

We look forward to seeing you in Dar es Salaam!

Working With the OSGeo Community (#342)

| | |
|-------------|--|
| Authors: | Jody Garnett |
| Categories: | OSGEO community B - Our place in the world |
| Date: | 08/30/2018 |
| Time: | 11:30 - 12:00 |

Room: NgoroNgoro

Welcome to the Open Source Geospatial Foundation, this presentation is on how we actually get work done as volunteers.

This presentation covers the “lay of the land” introducing our committees, local chapters and projects and describes how each one is organized. More importantly we will look at how each group makes decisions, from the scruffy friendly system administration team who handle your infrastructure requests, to the OSGeo board making final calls on budgets and funding.

We will introduce your guides (by name with pictures) the foundation officers and committee chairs who facilitate all that we do.

OSGeo is best done close to home - setting up a local chapter allows regions (or languages) to support each other grow. We will look at how a local chapter is set up, and several successful local chapters.

Please keep in mind that we are all in this together, attend this talk to see how you can get started (or be more effective) in the OSGeo community.

Geospatial Continuous Integration using Geogig (#343)

Authors: Felipe de Carvalho Diniz, Diogo Oliveira Nascimento, Phillipe Borba, Jossan Costa, Cesar Soares

Categories: Government C - SDI

Date: 08/30/2018

Time: 15:00 - 15:30

Room: Katavi

The Board of Geographic Service (Diretoria de Serviço Geográfico - DSG) is an organization of the Brazilian Army and is responsible for the standardization and production of topographic mapping of scales 1:25.000 and smaller. In 2014 the DSG started using QGIS in small projects of mapping, and now, 4 years after, fully changed the mapping production from ArcGIS platform to FOSS4G, namely QGIS and PostGIS. Not only the institution was able to reduce costs (reducing more than 200 ArcMap licenses) but also improve the speed and the quality of the generated geospatial products.

DSG also created the plugin DSGTools (available for QGIS 2.18 and soon 3.0), that helps users to create products that follow the Brazilian NSDI specification, creating databases according to the specification, and proving tools for data quality check.

Using QGIS and PostGIS, DSG has created seamless databases of 100000 km², showing the capabilities of the FOSS4G in topographic mapping even in very large areas. In order to keep a central seamless database even during field data collection, DSG started in 2017 to use the software Geogig to manage cloning and merging of the seamless database. In a typical project, we usually have 8 military personnel doing data collection, each one with a clone of the main database, and the experience showed that the best practice is to perform the merge of those clones in a daily basis.

This process of merging frequently resembles the Continuous integration methodology for software development, and in that way was called Geospatial Continuous Integration. Also like Git, Geogig allows the creation of hooks, commands that can be executed before and after an operation. We can use those hooks to perform data validation, not allowing bad that to be merged to the main database.

Digital Matatu 2.0 : Leveraging Open Street Maps to Develop Data on Semi-Formal Transit (#344)

Authors: Carmelo Ignaccol, Sarah Williams, Jacqueline Klopp, Daniel Orwa, Peter Waiganjo, Steave Osoro, Derick Lung'Aho

Categories: Meeeting new projects

Date: 08/31/2018

Time: 10:05 - 10:30

Room: Mafia

Mapping of public transport networks from the bottom up in cities that previously had little to no digital data is growing. This raises the critical problem of how to keep this data, which is often distributed in the GTFS data format updated for passenger information systems and planning. Maintaining data is especially challenging in cities where data has been collected by civic activists rather than the government, which was the case for the Digital Matatus project in Nairobi. Therefore, the Digital Matatus team created a GTFS editing tool that uses the Open Street Map Valhalla routing engine to make edits to the routes.

The tool allowed our us to redraw the routes on using an online map, once redrawn, the tool automatically re-sequences the GTFS data. This process would have taken hours performed manually, and there would be great potential for human error. Automating the generation of GTFS was possible because of access to open source mapping tools such as Valhalla and the presentation will provide a summary of how others might build tools using these open source tools. Perhaps most

importantly, with over 50 cities who have copied the work of Digital Matatus, the tool helps these cities and others develop data on mobility in many rapidly developing cities which is essential for making safe mobility plans - fulfilling one of the most recent Sustainable Development Goals. The presentation will show how anyone can build and edit essential transport data for their cities.

Raster Vision: Deep Learning for Aerial and Satellite Imagery (#345)

| | |
|-------------|----------------|
| Authors: | Lewis Fishgold |
| Categories: | The library |
| Date: | 08/30/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Small |

Increasingly, deep learning is being used to make sense of the vast quantity of satellite and aerial imagery being generated each day. Although there are many open source libraries for deep learning, they are unable to handle geospatial datasets without the addition of a non-trivial amount of extra data processing glue code. Over the past year, we have prototyped workflows for the computer vision tasks of classification, object detection, and semantic segmentation. After reflecting on these early prototypes, we have assembled a set of objectives and architectural principles for a generic library for doing deep learning on geospatial imagery.

We are currently developing an open source library based on these principles called Raster Vision. The overall goal of the library is to make it easy to prepare training data, train models, make predictions, and evaluate models for the three computer vision tasks listed above. In addition, the library is designed to be easy to extend for new computer vision tasks and implementations, and new data sources. In this talk, we will discuss the general problem of doing deep learning on geospatial imagery, the objectives, roadmap, and architecture of the library, and a demo of how to use Raster Vision.

Mapping and Hacking for better Public Transport in African metropolis - the case of Maputo (#346)

Authors: Remígio Chilaule, Joaquin Tejada, Idelson Mindo
Categories: Government A - Services
Date: 08/31/2018
Time: 11:00 - 11:30
Room: Amboni

Maputo's metropolitan region has about 2.5 million people. Although growing rapidly it is not yet extremely big, and this presents an enormous opportunity to not make the same mistakes other African (and world) metropolitan regions have made. The risk is real: public transport is not prioritized, it is mostly informal, uncomfortable and unsafe. This brings a rush to the private car, widening of streets and other non-solutions that we have seen fail badly in many cities.

In general terms, our work aims at raising immediate awareness about the need to leverage this incredible opportunity to put Maputo on the forefront of public transport management in big African cities, much like Curitiba and Bogotá did with their BRT and other innovations in South America during the second half of last century.

So far we have collected extensive data covering half the metropolitan region (more than 350 bus stops, 80 routes). This data collection/production was conducted in close collaboration with bus operators and with municipal government, and has in itself been a process of micro-decision making and raising awareness.

Despite commercial interest from various for-profit corporations, we have decided to open up part of this data for free, by putting it on OpenStreetMap through a series on-going of Mapathons. These serve not only to map the data, but to train a group of young Mozambicans in geo tools and software. We hope this group can grow and become a social movement that insures sustainable action in public transport management, emerging from the very base of public transport users, rather than other more distant stakeholders.

Following up on the Mapathons, we are now preparing a series of Hackatons, in which we hope to use the data to generate apps that are useful for either passengers, operators or managers, or a combination of all of them. In longer term we hope this leads to the creation of a comprehensive database, mostly open, intersecting the needs of all stakeholders.

Along the way, we have been producing maps and visuals of various stages of our work, using open software (QGIS, Inkscape). We have received little training and most of what we have done has been through self-learning. Additionally most of it is also done on a totally volunteer basis.

Our main challenge moving forward is acquiring the know-how needed to navigate the increasingly complex geodata tools. Using a GPS device to locate a bus stop is one thing, learning how to use GTFS and create a large dynamic database is another.

Bringing our project to FOSS4G 2018 would for us represent an opportunity to learn from experts and/or other communities how to overcome this challenge. And maybe our work done so far and our high aspirations for the future can also inspire others in the conference.

Next generation activities and technologies in the OGC (#347)

Authors: Athina Trakas, Luis Bermudez, Gobe Hobona
Categories: Mapping systems E - Strategy
Date: 08/29/2018
Time: 11:00 - 11:30
Room: Udzungwa

This presentation looks into technology trends and openness in the geospatial world

Open standards have been an underpinning principle in the geospatial community for many years. At times characterized by disruptive technologies, the need and ability to access, fuse and apply diverse data sources is more important to decision making than ever before.

The Open Geospatial Consortium (OGC) is an international industry consortium of over 525 companies, government agencies and universities participating in a consensus process to develop publicly available interface standards. OGC provides working groups that discuss requirements and advances technologies in domain areas (e.g. Big Data, Unmanned Vehicles, etc.). Working Groups help identify future trends and challenges.

OGC has undertaken a process to identify, analyse and summarize technology trends. The presentation will look into the most important trends that have been identified by OGC members and staff and the role of existing and new open standards. Some of the trend areas include citizen science, blockchain, sensors, autonomous vehicles, and big data. The presentation will also provide an update on the current activities advancing these technology trends, within the OGC's Innovation Program and OGC's standard Program.

Open Standards in support of global challenges - opportunities for African countries (#349)

Authors: Athina Trakas, Luis Bermudez, Gobe Hobona
Categories: Mapping systems E - Strategy
Date: 08/29/2018
Time: 11:30 - 12:00
Room: Udzungwa

Geospatial information has been proven an effective and critical component in supporting both immediate, maintenance and recovery action in our social environment, climate change and natural disasters.

The ability and need to share, use and re-use geospatial information among different organisations on local, national and international scales in support of societal, environmental and economic challenges and resilience depends on various factors like partnerships, policies, standards and technology already in place, when necessary.

The Open Geospatial Consortium (OGC) is an international industry consortium of over 525 companies, government agencies and universities participating in a consensus process to develop publicly available interface standards. OGC provides working groups that discusses requirements and advances technologies in domain areas (e.g. Emergency Disaster Management and Earth Systems Science Domain Working Groups).

This presentation will identify OGC activities and standards that can assist African countries in addressing challenges related to social environment, climate change and natural disasters. It will discuss how open standards can be used in supporting Geographic Information Systems (GIS) and tools for geospatial sharing. This presentation will also address best practices for using open standards in Citizen Science and Crowdsourcing projects.

GeoServer Ecosystem (#350)

Authors: Jody Garnett, Andrea Aime, Ian Turton

Categories: Geoserver

Date: 08/30/2018

Time: 10:30 - 11:00

Room: Main

GeoServer is the start of a great open source success story. This talk introduces the core GeoServer application and explores the ecosystem that has developed around this beloved OSGeo application.

This talks draws on the GeoServer ecosystem for use-cases and examples of how the application has been used successfully by a wide range of organizations.

* Andrea Amie from GeoSolutions is on hand to share success stories highlighting GeoServer use in managing satellite data, agriculture information management, and marine data management, as well as development of customer specific builds of GeoServer.

* Jody Garnett will look at how GeoServer enables Boundless products including Boundless Server and Boundless Server Enterprise.

* We will look at GeoServer use at OSGeo with both GeoNetwork and GeoNode making use of the technology.

* LocationTech is not ignored with the “big data” players in the form of GeoMesa and GeoWave bridging to cloud data sources of epic proportion

We use each use-case to highlights a capability of GeoServer providing an overview of the application drawn from practical examples.

Attend this talk for inspiration on what is possible with GeoServer and open source.

Geo-enabling AI Assistants & Concierge Services (#351)

| | |
|-------------|----------------------|
| Authors: | Patrick Dufour |
| Categories: | Meeting new projects |
| Date: | 08/29/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Amboni |

The field of AI assistants and concierge services is growing rapidly. Whether it's planning a big family vacation, managing a business, or running a humanitarian operation, traditional decision making processes will be disrupted by new interfaces. VOICE is quickly becoming a primary method for interacting with the world around you, rather than staid desktop interfaces or frustrating mobile websites. Voice will make GIS data accessible to a wider audience than ever before.

This presentation covers a platform built on open source components that utilizes graph-search algorithms to process user natural language queries into geospatial dashboards (<https://github.com/spatialcurrent/>). Patrick will present on technical lessons learned from developing Spatial Current, with a focus on graph databases. Spatial Current (<https://spatialcurrent.io>) ingests data from OpenStreetMap, Eventbrite, and more. Spatial Current "computes" a map using machine learning (ML) and other techniques, based on past user conversations, current location, etc. On the server side, the platform uses a distributed graph database. The platform uses First Draft GIS to parse locations from natural language text.

This presentation will empower attendees with useful information for incorporating emergent technologies into their systems and workflows.

Enterprise Spatial Data Infrastructure using FOSS4G (#352)

Authors: Junyoung Choi, Jongseok Won
Categories: Government C - SDI
Date: 08/30/2018
Time: 16:30 - 17:00
Room: Katavi

Korea has been building and operating Spatial Data Infrastructures (SDI) based on commercial solutions in central and municipal government. Recently, in Korea, FOSS4G technology development, FOSS4G industry ecosystem creation, and so on, shows the case of converting commercial solution based SDI to FOSS based SDI.

Korea Land & Housing Corporation is a state owned enterprise for land and residential housing, and has transformed the entire GIS enterprise architecture into FOSS4G base. The presentation introduces the architecture that has been transformed into FOSS4G-based architecture, and describes the reaction before and after the transition and the expected effect for Korean geospatial industry.

Serverless Vector Tiles on AWS (#353)

Authors: Mark Varley
Categories: Mapping systems D - Services
Date: 08/29/2018
Time: 15:30 - 16:00
Room: Main

Vector tiles are becoming the new normal for web mapping. Maps are now faster, richer, lighter and more customisable thanks to this new standard. But getting started with vector maps can be a steep learning curve and hosting these in production and being able to scale to deal with large spikes in demand can be complex and expensive.

In this talk we will explore how we can use open source tools from Mapbox together with AWS services to be able to generate vector tiles from PostGIS and Shapefiles and host these at very low or even no cost. We will cover important concerns such as generating the config files, caching and securing our vector tiles and automating the process from beginning to end.

Implementing "open" - pushing the "free" and "open" agenda in global-rural project (#354)

Authors: Anthonia Ijeoma Onyehialam

Categories: SDG

Date: 08/31/2018

Time: 11:00 - 11:30

Room: Kitulo

Here we share our experience implementing free and open in the Global-Rural project, an ERC funded research, examining globalisation at a global scale, and in over 35 rural communities in 13 countries. The project uses mixed methods in its research, with focused fieldwork at case study sites and spatial analysis at global scales. Some of the outcomes of the research being data and story geonarratives that rely on mixed methods approach and hosted on the project's open access resource platform.

However, researching globalisation at a global and micro rural scale means defining what globalisation is, "as a process by which the world, societies, and cultures have an interrelationship through the global network and movement of trade, communication, migration, health and environment issues, transportation", defining themes, defining and deciding relevant variables, its geographic details and sourcing its relevant data.

Thus, as the project investigates themes and sub themes such as migration – forced, labour, retirement, linked and life style migration and remittances; trade and economy – global economy, trade areas and agreement, trade in food and agricultural products such as dairy, wool, sugar, paper and pulp, manufacturing, biofuels and agribusiness; land and capital – land grabs and investments, global finance; tourism; global infrastructure and communication – transport, internet and social media; and global challenges – water, energy and food security, climate change and biosecurity, it relies on data from multiples sources - global data portals that have mixed data access and use conditions – free and/or paid, project derived (field work, literature reviews, documentary analysis and desktop research). Open data portals include OECD, World Bank and UN datasets from FAO, UNHCR, WHO, UNPD, ITU, UNIDO, UNWTO etc.

Here we share our experience of opening up our project and outputs to public, from sourcing data mainly from UN Data portals and fieldwork, analysis, software choices and platforms for communicating findings to the public, how we navigate the spaces of global data platforms, and how the experiences define our choice of globalisation variables, data opened up for public use as well as choice of softwares and GIS story mapping platforms –Geonode based mapstory to communicate our geonarratives to the public.

Applying Big Data tools to OpenStreetMap for humanitarian mapping analysis (#356)

| | |
|-------------|----------------------------------|
| Authors: | Robert Emanuele |
| Categories: | Bridging the gaps C - Technology |
| Date: | 08/30/2018 |
| Time: | 17:30 - 17:50 |
| Room: | Mikumi |

Azavea, in collaboration with others in the OpenStreetMap community, have been developing a set of tools that utilize big data frameworks such as Apache Spark and GeoTrellis to perform analytics on OSM data. These tools, collectively called OSMesa, are being used for jobs such as computing statistics for every user and campaign in OSM's history, baking worldwide vector tiles, rasterizing road networks for terrain calculations, and matching buildings between OSM and other large vector data sources.

OSMesa is also being used successfully in two humanitarian mapping projects: Pacific Atlas used OSMesa to compute historical changeset statistics for the Missing Maps dashboard, ensuring that the data used to measure user and campaign activity is historically accurate and complete. Azavea is working with DevelopmentSeed and HOT to use construct vector tiles containing building counts to be used in conjunction with WorldPop density and demographic data and machine learning techniques to evaluate the completeness of OpenStreetMap in African countries.

In this talk, I will discuss the underlying technology behind OSMesa and walk through how it is being used in humanitarian contexts. I will also share the project's vision and describe how this new approach to working with OSM data will drastically expand our ability as a community to ask and answer questions with OSM data. I hope attendees will feel invited to participate in the project by becoming a user, a developer, or influencing its direction by joining conversations about potential applications of OSMesa.

The Little Beginning of a UniqueMappersTeam Born in a Citadel of Learning on the Green Lowlands and Swampy Plains of The New Calabar River, Nigeria (#357)

| | |
|-------------|--|
| Authors: | Victor N. Sunday, Blessing Oshoma, Chukwudubem Nzewi |
| Categories: | OSGEO community C - Solutions |
| Date: | 08/30/2018 |
| Time: | 14:30 - 15:00 |
| Room: | NgoroNgoro |

The University of Port Harcourt, geographically situated on the green low lands and swampy plains of the New Calabar Rivers, is a citadel of learning and excellence that is UNIQUE in all ramifications. This is the transcending entrepreneur university where the UniqueMappersTeam (UMT) Port Harcourt emerged into a global presence of YouthMappers, showcasing their unique and enthusiastic action about crowdsourced Mapping and Citizen Science. Precisely, the vision became realistic and then came the birth of UniqueMappersTeam on 12th June, 2017, right in the Cartography and GIS Laboratory office of our Team Coordinator and Mentor, Mr. Victor N.Sunday, who also is the founder of this Unique Team of Mappers and other emerging MappersTeam in Nigeria affiliated to YouthMappers Network.

The UniqueMappersTeam-University of Port Harcourt Chapter is a team of map enthusiasts comprising of over 60 registered current UNIPORT students from a wide variety of disciplines, with a majority from the Department of Geography and Environmental Management, all united for the common goal of collaborative online crowdsourced mapping of our local environment, campus community and resilient communities in Nigeria and beyond. The team is known for training and equipping of members with a frontline practical mapping and geospatial skills that enables them compete favorably in mapping activities at local and global levels with other chapters and organization. It is a forum for professional mentoring and training of team members for various applications of mapping skills and knowledge. UniqueMappersTeam leverages on the availability of Open Geospatial software and data for virtually all mapping activities and projects.

This paper drives to conclusion experiences worth sharing about the activities, mapping projects and mapathon carried out by UniqueMappersTeam using OpenStreetMap in the last one year from inception. It provides a highlight of the team's impact, prospects and challenges of OpenStreetMap Community anchored by the YouthMappers Network in Nigeria.

FEMALE GENDER INVOLVEMENT IN HUMANITARIAN CROWDSOURCED MAPPING USING OPENSTREETMAP GLOBAL WEB ATLAS IN AFRICA (#359)

Authors: Victor N. Sunday, Mercy Nnaji, Romanus .U Ayadiuno, Nathalie Sidibe Astou

Categories: Bridging the gaps B - Practical approaches

Date: 08/30/2018

Time: 13:00 - 13:30

Room: Mikumi

This paper provides an overview of the female gender participation in crowdsourced Geographic Information and mapping as a humanitarian service for rapid response to disaster and vulnerable communities in Africa and the world at large. The need for critical geospatial data and Geoinformation that is time and location-specific is unavoidable for a proactive rapid response to resilient communities during crises and disaster management. Obviously, these critical geospatial data and information can only be acquired with urgency using humanitarian efforts being widely accessible through open geospatial data platforms like OpenStreetMap (OSM) to ensure geospatial data sustainability. The OpenStreetMap is a globally Volunteered Geographic Information-driven humanitarian community, whose members work to create a common digital street level Web Atlas Map of the world. OSM embraces ideals of open data, and to that end innovates but socially and technically to develop practices and processes for coordinated operations and response to humanitarian events. As a community of participatory crowdsourced mapping, the level of awareness motivation, participation and empowerment to the female gender is crucial to the state of the map in developing countries of Africa. Conclusively, we advocate that “LetGirlsMap” is the sure way forward for sustainable mapping and female gender participation in African countries. All stakeholders, therefore, must provide an enabling platform for a favourable female gender involvement in humanitarian crowdsourced mapping of the OpenStreetMap and Africa in Particular.

Serverless GIS in Precision Farming (#360)

Authors: Christian Christelis

Categories: QGIS A - Using it

Date: 08/30/2018

Time: 16:30 - 17:00

Room: Bagamoyo

The increasing demand for food globally is pushing farmers to be more productive. Achieving higher yields is only possible by applying precision to farming.

MyFarmWeb is a South African precision farming application developed in Django with many FOSSGIS tools, notably, these include QGIS Server, PostgreSQL with PostGIS extensions and Open Layers 3.

In an effort to respond to fluctuating demands on server resources the application has been re-architected as a serverless solution in a low bandwidth environment. This paper discusses the process of migrating a production system to a serverless solution using AWS infrastructure.

Engaging the Female Gender in Active Humanitarian Mapping for Sustainable National Development in Africa Using OpenStreetMap (#361)

| | |
|-------------|---|
| Authors: | Victor N. Sunday, Peace Bairidapsi Nyiaghan, Faith Umuokoro, Rebecca Firth, Janet Chapman |
| Categories: | Bridging the gaps A - Strategic |
| Date: | 08/29/2018 |
| Time: | 14:30 - 15:00 |
| Room: | Selous |

Mapping refers to the production of maps – a graphical representation of a whole or part of the earth’s surface. Mapping has grown widely, being applied in engineering, health care, recreation, urban and rural planning, government, environmental sciences, real estate and the internet. The inputs of LetGirlsMap under YouthMappers network have recorded notable increase on OpenStreetMap edits. These inputs ranging from disaster, agriculture, health and planning has been more beneficial to the female gender. With increase in natural disasters, climate change and other community crises, the need for humanitarian mapping is crucial. Also adequate geographic data should be available in the case of any incidence, thus the need for Volunteered Geographic Information (VGI).

Most of the world’s influential charitable organizations are owned and run by women. The women figure represents compassion, voluntary and humanitarian service which is exactly the goal of openstreetmap – making spatial data available through volunteer crowdsourced mapping for community development and quick response during disasters. Deploying women specially in these mapping activity does not only empower them economically but it is also taking advantage of their areas of competencies. This paper therefore advocates for active participation of the female gender in humanitarian mapping and highlights ways of engaging them for sustainable national development using openstreetmap in African countries.

Oskari - Your Geospatial Friend (#362)

| | |
|-------------|-------------------------------------|
| Authors: | Timo Aarnio |
| Categories: | Mapping systems A - Generic systems |
| Date: | 08/31/2018 |

Time: 11:00 - 11:30

Room: Bagamoyo

Oskari is a multipurpose web map application platform that can serve your geospatial needs whether they are related to monitoring development, visualising phenomena with thematic maps or time series, performing spatial analysis or publishing web maps including any of the aforementioned. The modular architecture makes it easy to extend Oskari with new features and the active community will be happy to help you get started.

Built utilising open standards from day one Oskari can be the platform to take full advantage of your SDI. Also local data is supported if there is no SDI readily available. The specialty of Oskari is its support for statistical data and services. The thematic maps functionality supports several APIs providing statistical data and it can be used to visually analyse statistical information with thematic maps, bar charts and in tabular form. This comes in handy for example when analysing and visualising Sustainable Development Goals indicator data with a spatial extent.

If you already have an online service and would like to spatially enable it by adding a map component Oskari is just the tool for you. With Oskari you can create embedded maps without any programming expertise by using the easy-to-use WYSIWYG-tool. After creating the map the embedding is done by copy-pasting a little HTML-snippet to the target web page and that's it!

In addition, if further integrations with the web page is needed, Oskari offers a simple RPC API that can be used to communicate between the map and the web page so that both can react to user interaction on the other (i.e. moving the map can be connected to updating the web page content and vice-versa).

In the presentation a short demonstration of publishing an embedded map will be showcased.

Promoting Science-Based Environmental Reporting in the Nile Basin through Interactive Maps and Drone Video Journalism (#364)

Authors: Annika McGinnis, Fredrick Mugira

Categories: Bridging the gaps B - Practical approaches

Date: 08/30/2018

Time: 14:30 - 15:00

Room: Mikumi

InfoNile is a geojournalism platform mapping data on water issues in the Nile River basin of Africa with journalism stories to promote transboundary peace. Our website uses the "JEO" Wordpress

theme initiated by Internews' Earth Journalism Network to create interactive maps on issues of environment and water in the Nile Basin, pairing such maps with journalism stories from local outlets in the region reporting on the economic, environmental, and sociopolitical impacts of large-scale trends such as climate change and hydroelectric power projects. With the combination of interactive maps and journalistic storytelling, we seek to communicate scientific research in an understandable way, promote data journalism by local journalists, and increase fact-based reporting while reducing transboundary water conflicts that are often spurred by inflammatory, rumor-based reports.

We have utilized QGIS, Mapbox and CartoDB to create interactive maps mapping all dams in the Nile Basin, visualizing the drought index across basin countries, and mapping all wetlands in the Nile Basin. We also utilize such maps in original multimedia journalism features that incorporate drone journalism, innovative data visualizations and satellite imagery to provide new perspectives on often difficult-to-communicate issues such as water scarcity, environment degradation and climate change. Recently, our "Swamp City" multimedia feature project told the story of the challenges of urban planning and wetland destruction in Kampala city, utilizing interactive maps, drone video reporting and satellite imagery showcasing change in the wetland over the years.

With grants from Code for Africa and the Earth Journalism Network, we have also commissioned 10 similar in-depth data journalism features in Egypt, Ethiopia, Sudan, Uganda, Rwanda, Kenya, and Tanzania. We further focus on solutions journalism as a driver of sustainable development by telling the stories of initiatives that are working to solve environmental issues. Currently, we are working on a project mapping solutions shown to be conserving wetlands in the Lake Victoria basin in Uganda, Rwanda, Kenya and Tanzania. In this presentation, you will learn of our approach to environmental journalism in the Nile basin through interactive maps and drone journalism. InfoNile is a project of Water Journalists Africa, a network of over 700 water journalists on the continent, and is supported by the Institute of Water Education in Delft.

Open Source Geospatial Technology; the Solution for African Women Empowerment (#365)

| | |
|-------------|--|
| Authors: | Maureen Nkiruka Ezebube, Victor N. Sunday, Chukwunonyelum Okpala-Okaka |
| Categories: | Bridging the gaps A - Strategic |
| Date: | 08/29/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Selous |

Geospatial Technology is a term used to describe range of modern tools contributing to the geographic mapping and analysis of the earth and human societies. These tools include;

* Remote Sensing - Imagery and data collected from space, airborne cameras and sensors are appropriate for monitoring humanitarian needs and human rights abuses.

* QGIS - A set of software tools for mapping and analysing data which has a location on the earth surface, this can be used to detect trends, concentration and occurrence of violation of women's rights.

* OpenStreetMap - Another inevitable tool in mapping the location of vulnerable women, degree of violence and rescue network. The development in the user interface of this made this technology available to a wide range of audience to access easily.

* GPS - This tool gives precise coordinate locations of a place in the case of an abuse.

All these geospatial technologies go a long way to help women in the case of violations of their human rights because they provide accurate positional location, pattern, degree of occurrence and abuse, concentration and even evacuation route. This paper therefore advocates for women empowerment using these geospatial technologies and highlights strategic ways to bridge the digital divide among the female folk especially, in developing African countries and Nigeria in particular.

QGIS Web Client 2 Update (#366)

| | |
|-------------|---------------------|
| Authors: | Pirmin Kalberer |
| Categories: | QGIS B - The system |
| Date: | 08/29/2018 |
| Time: | 14:00 - 14:30 |
| Room: | Mikumi |

QGIS Web Client 2 (QWC2) is the second generation of the widely used Web GIS client optimized for QGIS Server. It supports the QGIS server extensions for PDF printing, search, data export, legends, etc.

A responsive UI optimizes usage on desktop browsers, tablets and other mobile devices.

QWC2 is using OpenLayers 4 as mapping library and ReactJS/Redux as Javascript framework. It's a collection of components, adding QGIS server specific functionality to MapStore2, which was initially written for GeoServer.

Thanks to an active community, QWC2 is already translated into seven languages.

During the last year many important features have been implemented:

- * New digitizing tools

- * Layer reordering
- * Editing
- * User specific viewer settings
- * WMS / WFS import
- * KML import
- * Height profiles
- * Map comparison tool

The combined search input field can be configured to use QWC 1 compatible services, QWC 2 REST services and is easy to adapt for other search providers. It also recognizes coordinate pairs and can be used to search for available layers.

On the server side, a modular collection of Python 3 Flask components ensures flexibility and extensibility. The REST API's are documented with Swagger and the components are ready to deploy with Docker in a Microservice

-oriented architecture. Classical deployments using a WSGI-capable server like Apache are supported as well.

Links:

- * <https://github.com/qgis/qwc2-demo-app>
- * <https://github.com/qgis/qwc2>
- * <https://github.com/sourcepole/qwc2-server>

Using GeoPackage as work and exchange format (#367)

| | |
|-------------|------------------------------|
| Authors: | Pirmin Kalberer |
| Categories: | Mapping systems D - Services |
| Date: | 08/31/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Mikumi |

GeoPackage is an OGC standard combining vector data and raster tiles in a single database file. Since its official publication in February 2014 adoption has grown very quickly and the new format got support by all major Open Source and proprietary software products.

Its combination of easy distribution and efficient use thanks to an SQL interface makes it interesting in a wide range of usage scenarios from embedded devices up to Open Data portals.

This presentations shows the current state of support in Open Source applications like GDAL and QGIS and gives tips for using GeoPackages in practice.

Its older relative „Spatialite“ will also get a mention and a short comparison with GeoPackage. And as a reminiscence to the slogan „GeoPackage is the Shapefile of the future“ , even older formats will be mentionend as well.

The GeoPackage website now also lists available extensions like „Related Table“, „Feature Tile Link“ and „Tiled Gridded Elevation Data“. This talk also presents the current state of an extension to store map styling information right in the GeoPackage file, allowing to distribute a dataset together with map views and print layouts in one file. The qgpkg extension combines storing QGIS project information and generic OWS context information with SLD styling.

Links:

<http://www.geopackage.org/>

<https://github.com/pka/qgpkg>

Styling and publication of vector tiles (#368)

Authors: Pirmin Kalberer

Categories: Cartography

Date: 08/30/2018

Time: 17:00 - 17:30

Room: NgoroNgoro

Styling and publication of vector tiles

Vector tiles are competing and complementing the well established raster maps in many areas. For styling, Mapbox GL JS sets the bar with its JSON format and the WebGL implementation. Apart from the Javascript viewer, Mapbox also maintains a native SDK for Android, iOS, macOS, Node.js and Qt. Other viewers like OpenLayers have adapted Mapbox GL JS styling and there is also a library for

converting SLD styles into Mapbox GL JS. A visual editor for editing these styles is available as an Open Source implementation.

This talk gives an overview of the current state in vector tile technology on the web and serves as an introduction into the Mapbox GL JS styling format. Additional data sources like GeoJSON, TMS, WMS are listed, image sprites for patterns and icons and font glyphs are explained. Examples are given for resolution based styling, zoom and property functions and the new expressions. Special rendering types of Mapbox GL JS like heatmap and fill-extrusion are mentioned as well.

The current state of the Mapbox Vector Tile 3.0 specification will be covered as well.

Serving vector tiles is similar to serving raster tiles. A few special considerations for serving MVT tiles are given in this talk.

Links:

- * <https://github.com/mapbox/mapbox-gl-js>
- * <https://github.com/mapbox/mapbox-gl-native>
- * <https://github.com/boundlessgeo/ol-mapbox-style>
- * <https://github.com/maputnik/editor>

Mapillary for QGIS 3 plugin (#370)

| | |
|-------------|---------------------------------------|
| Authors: | Alexandre Duclaux, Christopher Beddow |
| Categories: | Crowdsourcing B - Collecting data |
| Date: | 08/30/2018 |
| Time: | 17:30 - 17:50 |
| Room: | Udzungwa |

Mapillary and Sige developed the official Mapillary plugin for QGIS 3 in partnership. This open source plugin is available in two versions : Lite and pro. The lite version allows the user two overlay Mapillary pictures and sequences location as a QGIS layer and display Mapillary pictures in a viewer. The pro version allows to map objects from the pictures by retrieving their coordinates and edit the attributes directly into the GIS layer. The pro version is linked to a web service provided by Sige andMapillary.

Get to know Mapbender - create web applications without writing a single line of code. (#372)

Authors: Astrid Emde
Categories: Mapping systems A - Generic systems
Date: 08/31/2018
Time: 12:30 - 13:00
Room: Mafia

Mapbender is a content management system for geospatial data services and map applications. With Mapbender you can create applications without writing a single line of code. Based on state-of-the-art technologies Mapbender is a flexible client for OGC services. Mapbender is based on the frameworks Symfony, JQuery and OpenLayers.

Mapbender has an administration web interface to do all the work. Mapbender helps you to set up a repository for your OWS Services and to create individual applications for different user needs. An application can provide search modules, digitizer functionality, print & more.

You have access control and can provide applications for defined users and groups.

This presentation will give an introduction on Mapbender and the possibilities.

Helping governments improve service delivery through OSM (#373)

Authors: Jess Beutler, David Luswata
Categories: Government A - Services
Date: 08/31/2018
Time: 10:05 - 10:30
Room: Udzungwa

In 2017 and 2018, HOT worked with government ministries in Liberia and Botswana to improve government service delivery in areas such as solid waste management and malaria control. This talk will look at how OSM is being adopted and integrated into future government service delivery in these countries to improve the lives of their citizens and meet Sustainable Development Goals.

Clean Streets Kampala (#374)

Authors: Samson Ngumenawe
Categories: SDG
Date: 08/31/2018
Time: 10:05 - 10:30
Room: Kitulo

This is a Survey that was done to map garbage disposal in Kampala City. The survey focused on the use of open source mobile tools and community engagement to generate open data for decision making and general public sanitation of the people living in and around Kampala.

Distributed download with National SDIs (#375)

Authors: Bjørn Grøtan
Categories: Government C - SDI
Date: 08/30/2018
Time: 17:00 - 17:30
Room: Katavi

The norwegian national geoportal is evolving to become a one-stop shop for geodata. To accomplish this, a download API was designed for hosted data as well as for distributed orders.

This talk will briefly go into the history of downloading geology in Norway since 2010 and then dive into the REST API and the 2 official implementations (C# and JAVA). The API is open and both current implementations are Open Source.

The API supports prefabricated files as well as an external API for custom orders with delivery by email. One such external API implemented is for FMEServer by Safe Software.

Leveraging FOSS4G for Strengthening Health Systems in Nigeria (#378)

Authors: Ayodele Adeyemo, Dami Sonoiki

Categories: SDG

Date: 08/30/2018

Time: 13:00 - 13:30

Room: Kitulo

Every year, hundreds of communities in Nigeria reports various disease outbreaks affecting thousands of people in these communities. Besides the outbreaks, a lot of attention is paid to strengthening the existing health systems which include laboratory systems, health facility registry, and health delivery systems. In providing these supports either for the strengthening of the existing system or disease outbreaks, there is a vital need for proper data management and processing. Through proper data management and processing, stakeholders in the health sector which include the government across various national levels and partners to make informed decisions in the response to the situations.

eHealth Africa leverages data and technology to build stronger health systems through the design and implementation of data-driven solutions that respond to local needs and provide underserved communities with tools to lead healthier lives. We have demonstrated our expertise and experience by working in various capacities such as data collection, vaccination tracking systems, data management, health delivery systems, and disease outbreak response. Through these activities, we are able to reach and improve hundreds of thousand lives across various communities especially the ones in the hard to reach communities. Also, leveraging on FOSS4G to support disease outbreak management.

Our presentation will focus on how we have leveraged on the Free and Open Source Geospatial tools (FOSS4G) such as QGIS, Leaflet, OpenStreetMap Routing Machine (OSRM) etc, OGC interoperability protocols, and custom built open source geospatial solutions to support various health systems in Nigeria, Chad, DRC, Liberia and Niger. Through this presentation, we hope to demonstrate how organizations, governments and individuals can deploy cost-effective and sustainable health systems as well as providing opportunities for them to adapt existing tools and processes in their works.

Mapping paddy rice cropping pattern and phenology in Cambodia (#379)

Authors: Hongfei Wang, Aniruddha Ghosh

Categories: CGIAR/SIIL

Date: 08/30/2018

Time: 11:30 - 12:00

Room: Mafia

Rice is the major source of caloric energy in Cambodian diets. Over 85 percent of cultivated area in Cambodia grows rice and dominated by smallholder farmers. All major rice producing ecosystems (Rainfed Upland, Rainfed Lowland, Deepwater or Floating Rice, and Irrigated Dry Season or Recession Rice) in Cambodia are susceptible to rainfall variability. Both wet and dry season rice production primarily depend on the monsoon rainfall. Spatially explicit information on rice growing fields and cropping practices can be helpful for optimizing the water resources for rice production and increasing production by introducing improved rice varieties.

Remote sensing is an effective tool for monitoring croplands and collect useful information on total cropped area and cropping patterns. Here, we present an end-to-end framework implemented in R software environment to map paddy rice fields, cropping intensity and phenological stages in Cambodia. For this purpose, we use time-series Enhanced Vegetation Index (EVI) and Normalized Difference Flood Index (NDFI) derived from the MODIS-Terra sensor (8-day surface reflectance product: MOD09A1 at 500-m spatial resolution). The framework is based on PhenoRice, an algorithm for detecting intensity, seasonality and phenology of rice using satellite data time series, which has been tested in various rice growing regions across the world. We modified the PhenoRice algorithm to i) estimate additional phenology metrics (e.g. emergence and end-of-season dates), ii) include arbitrary number of cropping seasons per-pixel, and iii) remove the dependency on any proprietary software (e.g. IDL).

The estimated paddy rice area was compared with national agricultural statistical data at national and sub-national levels for the year 2013. Additional accuracy assessment was conducted using high resolution satellite data and Google Street View app. Rice phenology was compared to the ground data collected and verified by the local experts. The proposed framework requires minimum user interaction as different R-packages allow automated downloading and processing of MODIS products and can be adapted for other areas. The output of the results directly contributes to the UN Sustainable Development Goal (SDG) on achieving food security and promoting sustainable agriculture.

[Implementing OpenSource Gis in Israel \(#380\)](#)

Authors: Anat Marcovitch

Categories: QGIS A - Using it

Date: 08/29/2018

Time: 15:30 - 16:00

Room: Mikumi

As heavy ESRI users, we decided to find other solutions for: DESKTOP, SERVERS.

As the main point of planning in Israel, we created 2 main apps:

DT: developing ADDINS for QGIS in hebrew, that will ease the use for new users. SERVER: converting ESRI symbology. Automatically, including complexed polygons.

That includes massive training scheme for all users in local authorities and government offices.

These two solutions, coming from us, will dramatically increase the attitude towards Open Source solutions in Israel.

Validation of geospatial information in web environment - GeoDT Online (#383)

Authors: Yijun So, Dayeon Oh, Seulgi Lee, Jonghun Lee, Hochul Kim

Categories: Meeting new projects

Date: 08/29/2018

Time: 14:30 - 15:00

Room: Amboni

Describes GeoDT Online, which can be used to validate SHP and DXF formats in Web-based systems. It can detect about 30 types of spatial information errors and is based on open source. All you have to do is select the files and settings you want to check.

The validation result is written as a point SHP layer, and the point has the attribute information as the error location and error name. This allows users to correct errors through editing software such as QGIS.

It is also possible to define custom settings so that users can perform only the checks that they want. Users can create their own inspection settings by stepping through the layer names, the geometry type, and the items to be inspected in this layer. This makes it possible to check geospatial information for various purposes.

New global weather and climate data for spatial modeling (#386)

Authors: Robert Hijmans, Steve Fick
Categories: CGIAR/SIIL
Date: 08/31/2018
Time: 09:45 - 10:05
Room: Small

We will describe new global and continental level spatio-temporal data sets of weather and climate, including new WorldClim time series data. We will contrast methods and quality, and approaches to improve quality using satellite data. We will discuss usability for modeling purposes in ecology and agriculture, as well as approaches to deal with the trade-offs between data size, and spatial and temporal resolution.

Using QGIS and PostGIS for aerial surveys of Tanzanian large mammals (#387)

Authors: Howard Frederick, Edward Kohi, Machoke Mwita
Categories: Environment
Date: 08/30/2018
Time: 10:00 - 10:30
Room: Saadani

Every few years the Tanzania Wildlife Research Institute conducts aerial surveys (using light aircraft and human observers) of around 300,000 km² of savannah and woodland environments around the country to establish the status of large mammals from elephants down to the size of impala; TAWIRI also maintains a database of 50+ years of wildlife data, much of it spatially referenced, to provide management with data for trends in wildlife over time.

Planning and flying these missions is a serious challenge, and managing and analysing decades of data adds another layer of complexity. Field teams use QGIS and PostGIS to set up survey flight plans, and validate and manage data in the field, including GPX data and field forms with observational data. Data are analysed and derived density information added to the database, and are available in-house for more advanced spatial analyses.

New challenges include adapting the database system to accept new forms of data from other types of surveys, to manage and georeference terabytes of image data, and develop systems for readily present distribution and trend data.

Electricity mode in Israel Electricity and the connection to our pocket (#388)

Authors: Dr. Asnat Mangell

Categories: Environment

Date: 08/30/2018

Time: 14:30 - 15:00

Room: Saadani

The subject I am interested in talking about is the ability to use geographic information systems to reduce the use of electricity. Can a geographic system touch our pocket?

The transition to smart meters in the electricity grid brings to the computer world lots of data. To this day, human workers would walk around every month or two and manually read the meter. This decade brings us to a new era in which the meter reading is continuous and gives continuous information every fifteen minutes. So what can we do with all this information? And what is the connection to the customer's pocket, and what do geographic information systems and geographic data contribute to analyzing such data? For comparison, we take an example of a regular customer. Planning the electricity system is satisfied with a simple model of peak consumption of the ordinary customer, usually according to the number of rooms in the house. The same customer uses the washing machine and dryer only from midnight, while his neighbor who works from home runs the same machines only in the morning hours. So here we have two customers who consume electricity at different times. So if we connect the two consumers then it turns out that the electricity company could already use the other parameters during the planning to save electricity and then the operation of electricity and hence can be a new economic model for electricity use that will ultimately affect the customer's pocket. And if we use geographic information and can query the system by street, neighborhood or group of houses and perhaps connect data such as climate then we built a new electric model based on geography.

The lecture will be accompanied by examples from the world of Bigdata and the geographical tools for their analysis.

Analysis of environmental sensitive areas using open source software (#389)

Authors: Ragnvald Larsen, Yves Barthelemy

Categories: Environment

Date: 08/30/2018

Time: 15:00 - 15:30

Room: Saadani

This presentation shows how open source software like QGIS and Geonode are used to analyse and present environmental information for the purpose of sensitivity atlases. The workflow from data collection to presentation presented.

An understanding of the sensitivity of the environment to petroleum related pollution is an important part of pollution preparedness, response and cooperation efforts. Analysis of multiple environmental factors will give us a basis for analysis. Spatial representations through maps are crucial tool to assist responders during an incident as well as for the purpose of land use planning.

National level infrastructure for dissemination of such information is discussed and presented. We will use case studies from African countries we have been working with.

Use of FOSS4G for spurring innovation in agricultural research (#392)

Authors: Jawoo Koo, Francis Muthoni, Lisa-Maria Rebelo

Categories: CGIAR/SIIL

Date: 08/29/2018

Time: 11:00 - 11:30

Room: Mafia

A wide range of advances in FOSS4G is driving progress in spatial analysis across many economic and social enterprise sectors – and agriculture is no exception. Recognizing the need to spur agricultural transformation and smallholder livelihoods through better access to its research, CGIAR, the world's foremost global research partnership for accelerating sustainable agricultural productivity growth

and food-secure future, is taking a number of steps to significantly improve the curation, exploitation and dissemination of its research data, findings, and products.

During the first half of the workshop, CGIAR's geospatial scientists will showcase their new research using FOSS4G tools/open data, share lessons learned, and demo CGIAR's geospatial data cataloging and visualization platform. In the second half of the workshop program, a series of the panel discussion will be organized to brainstorm on the topics most relevant to the agricultural research and development agenda in Africa, including 1) What would be the most effective geospatial data platform for the agricultural science community in the region, 2) What would be the opportunity of precision agriculture in smallholder farming systems in Africa, 3) How can the geospatial technology support the monitoring and mapping of agriculture and rural welfare, better, faster, and cheaper?

Mapping inequality in access to resources in R (#393)

Authors: Andy Nelson, Jacob van Etten, Daniel Weiss

Categories: CGIAR/SIIL

Date: 08/29/2018

Time: 12:00 - 12:30

Room: Mafia

More equal access to the resources that sustain human well-being, such as education, employment and health services, underpins the equality agenda of 'leaving no one behind' established by the Sustainable Development Goals of the United Nations. Accessibility can be defined as the ability to interact with locations that offer economic and social opportunities; better access usually means better opportunities and better livelihood outcomes. The accessibility of a particular location can be quantified in several ways: equity (i.e. proximity based on distance or travel time); coverage (i.e. the number of reachable resources per person), or; integration (i.e. the likelihood of interactions or the cost of transactions).

Spatial modelling of accessibility uses the geographic location of the population in relation to target locations and the transport means and infrastructure to access those locations. This presentation discusses (i) recent work on mapping equity in access in R using the `gdistance` package, (ii) options for mapping other access indicators in R and (iii) the importance of good, up to date and easy to use transport network data for accessibility mapping.

Pre-harvest loss estimation using satellite data calibrated with drone data in Tanzania (#394)

| | |
|-------------|---|
| Authors: | Soonho Kim, Summer Allen, Michael Laurence Humber, Ritvik Sahajpal, Sonja Betschart, Rose Funja |
| Categories: | CGIAR/SIIL |
| Date: | #N/A |
| Time: | #N/A - #N/A |
| Room: | #N/A |

Reducing crop loss could greatly support global food security. In this light, Food Security Portal team in the International Food Policy Research Institute (IFPRI), University of Maryland, WeRobotics and Agrinfo have joined the NASA-funded food security and agriculture consortium which has a goal of using satellite data to better understand crop production and loss. The pre-harvest loss assessment using satellite data requires the collection of detailed ground-truthed data over the growing season. This project investigates a new method to validate satellite data using Unmanned Aerial Vehicles (UAV), GPS-based measure of area, and a self-reported survey of farmers in Tanzania with target of 300 farmers and around 2,000 hectare area. Machine learning based yield estimation model will calculate yields of each plot based on NDVIs from satellite calibrated with NDVIs from drones. The calculated yield from the model will be verified with self-reported yields from local farmers. The set of pre-harvest loss questions in the survey will identify the reasons of pre-harvest loss and crop stages when the loss was determined.

The first round of data collection after sprouting in 2018 Masika season was conducted and we are processing data from the first round. After the first round of data collection, we found that exact measurement of plot area using GPS at the smallholders in the rural area of Tanzania is essential to calculate correct yield, which may affect several farming activities with government support such as seeds purchase or fertilizers subsidies. We will share more finding after harvesting crops in this Masika season and disseminate the underlying data and results via IFPRI Food Security Portal. We plan to expand the use and knowledge of satellite information combining with drone data for food security.

A FOSS-based remote sensing data analytics tool for smallholder crops in sub-Saharan Africa and South Asia (#395)

Authors: Luis Calisto, Rolf A. de By

Categories: CGIAR/SIIL
Date: 08/29/2018
Time: 13:30 - 14:00
Room: Mafia

The STARS project (2014-2017) aimed to develop methods and techniques to allow the use of very high spatial resolution remote sensing images in improving the quantification of smallholder farming food production systems. Such quantification includes farmland acreage, per-crop acreage, productivity and yield estimations, amongst others. Underpinning these ambitions is the need for farm plot delineation and crop identification. To this end, the project developed a rich data container based on FOSS technology namely PostgreSQL/PostGIS, known as the Crop Spectrotemporal Signature Library, or CSSL. This container aims to absorb farm plot characteristics that are obtained from an advanced satellite image workflow, which labels characteristics with timestamps, crop type, and possibly also with farm management activities. We subsequently built a data exploration tool to allow visual inspection through dedicated graphs showing characteristics and their change over time.

The data exploration tool is a web-based platform. Both the data and the platform are free and open products; in this way, we expect the tool to be used by the scientific community and users working on smallholder farming projects. The selected architecture is based on different FOSS frameworks namely OpenLayers, Angular, D3 and many others. We choose this technology suite to allow full development control and to create various kinds of visual analysis. Having in mind the complexity of the CSSL store and the fact that possible users can have different scientific backgrounds, the exploration tool client interface needs to be simple and have a powerful backend engine that performs most of the analytic processing. To support the back-end engine in simple tasks such as histogram classifications, we decided to include a statistical module in the web client interface.

Farm Management Units (FMUs) are (usually small) farm plots with a fixed cropping system, ownership and agricultural management practice. Through the web platform, a user can filter and group FMUs according to location, timestamp and crop type. Then it is possible to use one of the several visualization tools to initially probe for patterns between variables chosen amongst field and image characteristics timeseries on selected FMUs. Field constants are measured constants that do not change over time, such as slope or elevation. Field constants can be used to classify and group FMUs. Such classification may help understand and explore possible patterns in different characteristics time series associated with each group. For example, by using a histogram it is possible to classify FMUs in terms of elevation and perform visual analytics over different characteristics time series.

Using this data exploration tool, we expect to apply different data aggregation techniques and use different map, reduce and filter mechanisms to categorize, group and extract patterns out of the CSSL. We require this tool to be visual, interactive and useful to all kinds of end-users. After testing we realized that new workflows and visualization techniques can be added to explore characteristics

timeseries. The same is true for aggregation techniques, and more aggregation methods can be used in future developments to explore the data.

FOSS can be used for very different purposes. Creating data analytics with FOSS tools was definitely a good choice because it gave us power and freedom to experiment. Power of combining several different powerful frameworks for data visualization, mapping and statistics such as D3, OpenLayers, geostats, jStat and others. And freedom to explore new techniques and create one's own exploration methods.

Time to Sow: Mapping the Adoption of Cropping Practices from space (#396)

Authors: Zhe Guo, Simrin Makhija, Jawoo Koo, David Spielman

Categories: CGIAR/SIIL

Date: 08/30/2018

Time: 10:00 - 10:30

Room: Mafia

During the past five years, the Government of Ethiopia has invested heavily in the promotion of improved management practices to increase cereal production. A key element of its strategy has been the promotion of wheat and teff row planting - a practice that lowers seeding rates and increases yields. Efforts led by the government have heightened awareness and knowledge about the practice, in part through engagement with partners such as Digital Green, which helps to promote row planting through a community-centric video-based approach integrated into agricultural extension provision. However, data on both adoption rates and yield impacts remain unclear, with wide variability in reported achievements at different agroecological and administrative levels.

This study aims to map and validate row planting practices across different agro-ecological zones using machine learning algorithm with high resolution spatiotemporal remotely sensed datasets of the growing season. The study builds on a randomized controlled trial (RCT) being conducted by the International Food Policy Research Institute (IFPRI) of Digital Green's video-based extension approach. The trial covers approximately 350 villages in 30 districts - and collects data from a sample of 2,500 households and plots—to explore various outcomes associated with the Digital Green approach.

Application of Free and Open source software and data for spatial targeting of agricultural technologies (#397)

Authors: Francis Muthoni, Tunrayo Alabi

Categories: CGIAR/SIIL

Date: 08/29/2018

Time: 14:00 - 14:30

Room: Mafia

Targeting sustainable agricultural intensification (SAI) technologies to locations with similar biophysical and socio-economic characteristics significantly increases the probability of adoption and adaptation. This study utilizes free and open source software and geospatial data to delineate spatial indices for guide evidence-based targeting of SAI technologies. The indices are:

(1) Sustainable recommendation domains (SRDs) that are derived from biophysical and socio-economic grid layers to identify non-contiguous zones with relatively similar agricultural potential for targeting suitable SAI technologies. SRDs are designed to avoid agricultural development in critical ecosystems to maintain provision of ecosystem services,

(2) the Impact Based Spatial Targeting Index (IBSTI) that is an ex-ante tool for identifying areas where the highest potential impacts can be realised if particular SAI technology is scaled out. IBSTI is designed to rationalize investment of limited resources to achieve maximum impacts,

(3) the Extrapolation Suitability Index (ESI) is a simple and easy geospatial tool for visualizing risk associated with scaling-out technologies beyond the environmental conditions in their trial sites. ESI also generates maps on spatial distribution of limiting factors for any technology option to guide targeting of remedial measures. The ESI tool is useful to seed companies and agro-dealers to target appropriate products to areas that they are most suited and to estimate demand of farm inputs before onset of cropping season, and

(4) the Climtrend tool for visualizing long-term spatial-temporal trends in rainfall and temeperature. Climtrend identify locations experiencing downward or upward trends in rainfall and temperature to guide targeting of appropriate climate smart agricultural technologies. Results demonstrate the potential of FOSS and remote sensing data in transforming agriculture investment decisions.

Accuracy of maizeland classification in smallholder farming systems using sentinel-2A satellite imagery (#398)

Authors: Julius Adewopo, Helen Peter, Alpha Kamara

Categories: CGIAR/SIIL
Date: 08/30/2018
Time: 13:00 - 13:30
Room: Mafia

Maize is an important cereal crop, and 80% of its production in Africa accrue to smallholder farmers. Mapping the area planted with maize is important to generate national estimates of yield and evolve interventions for sustainable production. However, classification of croplands with satellite images within the humid tropical region of sub-Saharan Africa (SSA) is limited by cloud interference and data availability at compatible resolution. In this study, we assessed the accuracy of classifying maize-sown lands in Nigeria's major maize production region, using open-source Sentinel 2a (S2A; 10m resolution) images.

Georeferenced data on maize presence and other crop types (n=2100) were sourced from various research activities (on-farm trials and agronomic surveys) which were conducted in 2017 under the auspices of a large maize agronomy project in Nigeria (TAMASA - www.tamasa.cimmyt.org). The dataset was split into training (70%) and validation (30%) samples and imported into google earth engine computing platform. We sourced and composited S2A imageries within the growing season, filtered and masked out clouds, and conducted supervised binary (presence-absence) classification based on three machine learning methods – Classification and Regression Tree (CART), Support Vector Machines (SVM), and RandomForest (RF). Results show that highest training classification accuracy was achieved with CART training (91%), followed by RF (82%), and SVM (68%). However, validation assessment showed that SVM provided best classification accuracy (71%), compared to CART (68%), and RF (66%).

These results demonstrate that freely-available S2A imagery can be used for rapid classification of maizelands in SSA, and increased availability of georeferenced cropland data can support wider application for broader cropland mapping.

MULTI-SOURCE SATELLITE DATA FUSION FOR AGRICULTURAL MONITORING (#399)

Authors: Raj Kumar Singh, Chandrashekhar Biradar, Ashutosh Sarker
Categories: CGIAR/SIIL
Date: 08/30/2018
Time: 16:30 - 17:00
Room: Mafia

Updated farm typologies and agricultural production systems dynamics are key requisite for successful agricultural diversification and intensification. There are several methods and approaches have been in application for mapping land use and land cover dynamics, however, often challenged with the monsoon climatic conditions, especially cloud cover, granularity, and complex cropping systems. In order to overcome of these limitations, we use data fusion algorithms to combine cloud penetrating microwave data from Sentinel-1 with optical data from Sentinel-2 satellites. The fused data with spatial resolution at 10m has been generated for mapping crop land and crop fallows.

Scenarios have been tested to investigate the best options for classification: i) Sentinel-2 and ii) Fused Sentinel-1 and Sentinel-2. The Preprocessing and digital classifications have been performed using Random forest algorithms in Sentinel Application Platform (SNAP) for six LULC classes. The results have shown that high classification accuracies were achieved using fused data. Overall accuracy of the classification was 84.6% and 89.5%, respectively. The proposed approach has main advantages of combining all-weather capability of the radar sensor, plus rich information in the visible-near infrared spectrum of the optical sensors, with the short revisit period of both satellites.

The high spatial and temporal resolution of the Sentinel data in the same constellation and processing chain has open tremendous opportunities in quantification of crop land, crop fallows at near-real time for agricultural diversification and intensification with appropriate crops/varieties for sustainable cropping systems while using food and nutritional security.

Bush encroachment mapping in Otjozondjupa region, Namibia (#402)

Authors: John Mutua, Ravic Nijbroek

Categories: CGIAR/SIIL

Date: 08/30/2018

Time: 14:30 - 15:00

Room: Udzungwa

The concept of 'zero net land degradation' was first proposed at the 2012 UN Conference on Sustainable Development (Rio+20), and Land Degradation Neutrality (LDN) was adopted by the UN General Assembly as part of the Sustainable Development Goals (SDGs), specifically SDG Target 15.3 which aims to "combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world" by 2030. In 2015, the Republic of Namibia was one of 14 countries to test the concept of LDN. Some of the worst degradation in Namibia is in the form of bush encroachment.

This paper aims to present an implementation of Random Forest model in R, a free and open source software and the use of open datasets for mapping bush encroachment in Otjozondjupa region,

Namibia. The methodology involves the collection of bush data and links the data with climatic, vegetative, soil properties and topographic variables to map shrubs less and more than 1.5 meters. The results pinpoint areas with high densities of bushes and also show areas with the biggest losses of critical grasslands.

Assessing the impact of national food security policies on irrigated rice production in Senegal using advanced remote sensing and modelling technologies (#403)

| | |
|-------------|---|
| Authors: | Sander Zwart, Lorenzo Busetto, Mirco Boschetti, Mandiaye Diagne |
| Categories: | CGIAR/SIIL |
| Date: | 08/30/2018 |
| Time: | 15:00 - 15:30 |
| Room: | Mafia |

In the aftermath of the rice crisis in 2008 the Government of Senegal launched the program The Great Offensive for Food and Abundance running from 2008 to 2015. The goal was to achieve self-sufficiency for the major crops that are imported by making large investments in the agricultural sector aiming self-sufficiency by 2018 through intensification and area expansion incentives. The goal of this study was to analyze policy-induced trends in rice area, cultivation patterns and choice of varieties in the Senegal River Valley using advanced remote sensing and modelling techniques. We deployed the PhenoRice algorithm and time-series of 250 by 250 meter resolution MODIS satellite imagery between 2003 and 2016 to analyse cultivated areas in the dry and wet seasons, start and end of the rice season and length of the growing season. The results were validated with long term observations of farmer cultivation practices in two regions and with official statistics of rice cultivated areas.

PhenoRice rice areas are reasonably correlated with the reported statistics ($r^2 = 0.71$) and it was concluded that the algorithm is able to detected trends. However, the actual detected rice area is consistently lower than the reported areas. This was attributed to the mismatch between field size and pixel size as well as the fact that the schemes are relatively small and located in dry, desert-like environments. Before 2008 cropped areas during the dry season were minor (<1,000 ha). However from 2008 onwards dry-season rice cultivation was promoted and by 2015 the dry season area (28,000 ha) had become more important than the wet season (17,000 ha). This occurred mainly in the delta region where also rice double-cropping has become a common practice (approximately 6,000 ha). Yield potentials in the dry season are higher while in the current state river flows are sufficient to meet the demands. Finally we analyzed the start, end and length of the rice seasons. We found a significant reduction in average length of the wet season by 0.53 days y^{-1} ; this is explained

from the choice for short-duration variation to cater for rice double-cropping within the current climate limits.

Targeting spatio-temporal dynamics in floodplain agro-ecosystems with GIS-based analysis of multi-temporal MODIS imagery (#404)

Authors: Martin van Brakel

Categories: CGIAR/SIIL

Date: #N/A

Time: #N/A - #N/A

Room: #N/A

Seasonality and inter-annual variability of inundation increase vulnerability of communities that heavily depend on floodplain ecosystem services. Local contingency is a characteristic inherent to these systems. Despite their importance, the contribution of floodplain ecosystem services to food security and the local economy, their vulnerability to climate-related impacts as well as their importance in terms of disaster risk reduction are generally neglected in development planning due to difficulties in their valuation.

This study offers a robust application based on long time series of free and open-access MODIS 16-day Vegetation Index composites that can serve as a basis for estimating seasonal and inter-annual variations in floodplain ecosystem services. Areas prone to high variations in flood extent and duration are identified using time series of enhanced vegetation index (EVI) data. Processed in a GIS environment the results demonstrate distinct seasonality of irrigated floodplain agro-ecosystems in the densely populated and fertile “rice baskets” of Bangladesh and the Mekong Delta. The capability of analyzing the seasonal dynamics of floodplain ecosystems in near-real time provides a basis for better estimation and valuation of ecosystem services in seasonal floodplains and can inform decisions to reduce risk by improving the adaptive capacity of communities dependent on these highly unpredictable systems. The application can also be used in assessing the productivity of other agro-ecosystems and will become more widely applicable with contemporary access to free and open source software, complemented with high-resolution geospatial data that enable more detailed and localized analysis.

Tracking the adoption of pigeonpea in Malawi using time series satellite imagery and spectral matching technique (#405)

| | |
|-------------|--|
| Authors: | Murali Krishna Gumma, Takuji Tsusaka, Ismail Rafi, Mohammed Irshad |
| Categories: | CGIAR/SIIL |
| Date: | 08/30/2018 |
| Time: | 10:30 - 11:00 |
| Room: | Mafia |

The dryland eco-system is perhaps one of the most vulnerable to adverse weather events such as drought and heat stress. It is important to determine the spatial extent of the stress-prone areas to effectively and efficiently promote proper technologies (e.g., stress tolerant crops, varieties, and agronomic practices) to achieve the goal of sustainable food production. Malawi is one of the poorest countries, located in southeastern Africa, with a predominantly rainfed ecosystem, where maize, sorghum, groundnut, pigeonpea, and other legumes are the major staple crops for consumption.

The present study analyzed the temporal cropping patterns in various dryland ecosystems and identified pigeonpea expansion in southern Malawi. The spatial distribution of cropland areas was mapped using MODIS (MOD13Q1) 250-m 16-day time-series data for the year 2010-11 and 2016-17 with spectral matching techniques. MODIS derived areas were compared with national statistics and ground survey data, and areas were well correlated. Resultant cropland extent maps were validated with intensive ground survey data. The result indicates that the area planted to pigeonpea increased by 29 % from 2010-11 to 2016-17. By mapping near real time information using satellite imagery on major crops at the country level, suitable locations can be identified for demonstrating and scaling up best-bet management practices and intensification. The use of remote-sensing techniques proved rapid, cost-effective, and reliable to monitor changes in pigeonpea cultivated areas over a long period of time and estimate the expansion of area planted to pigeonpea. This approach can be utilized for monitoring cropland areas and identifying their periodic changes, which will inform decision makers in promoting sustainable food production and supporting smallholder farmers.

Economics of land degradation in Niger (#406)

| | |
|-------------|--|
| Authors: | Ephraim Nkonya, Yating Ru, Edward Kato |
| Categories: | CGIAR/SIIL |

Date: #N/A
Time: #N/A - #N/A
Room: #N/A

The study delves into the economics of land degradation in Niger over the years 1992 - 2015, based on an analysis of land use and land cover change (LUCC) using the newly released 300-meter-resolution Climate Change Initiative (CCI) Land Cover data. Results present that that Niger experienced high costs of land degradation in the past 24 years (1992 to 2015). The annual total economic value (TEV) of degradation was 2015 US\$3.535 billion or 19% of the 2015 PPP GDP. Land degradation in the grasslands and woodlands accounts for more than 95% of total cost of land degradation due to LUCC. Spatially, the loss of TEV occurs in the northern and southern regions of the country, while the central hyper-arid region actually receives gain of TEV thanks to its extraordinary efforts in rehabilitation.

The Open Source Web Mapping Solution: an Experience from the BOBLME Marine Protected Area (MPA) Atlas (#407)

Authors: Shwu Jiau Teoh, See Lay Stanley Tan, Nurulhuda Ahmad Fatan
Categories: CGIAR/SIIL
Date: 08/30/2018
Time: 11:30 - 12:00
Room: Udzungwa

The Bay of Bengal is one of the world's Large Marine Ecosystems (LMEs), covers the coastal waters of the Maldives, Sri Lanka, India, Bangladesh, Myanmar, Thailand, Malaysia and Indonesia. Approximately 400 million people in this region depend on this 6.2 million km² marine ecosystem for their food and livelihoods. The marine protected areas (MPAs) plays a vital role to enhance and sustain its fisheries productivity and maintain marine biodiversity. WorldFish has created the "Bay of Bengal Large Marine Ecosystem (BOBLME) Marine Protected Area (MPA) Atlas" website (<http://boblme.reefbase.org>), as part of the UN Food and Agriculture Organization's Bay of Bengal Large Marine Ecosystem (BOBLME) Programme, to provide access to the latest information on MPAs and fish refugia relevant to the Bay of Bengal. The BOBLME Programme is a regional initiative to build support for coordinated and inter-government management of the coastal and marine resources in the Bay of Bengal.

The BOBLME MPA Atlas has incorporated the online interactive maps with multiple data layers including MPAs, important habitats such as coral reefs, the BOBLME boundaries, and bathymetry.

The MPA data is open access and can be downloaded directly without any authentication. A sustainable website requires ongoing maintenance and hosting. The development team believe that it is essential to make certain that the portal is functioning, and accessible to the public, although beyond the project duration. To reduce the cost of development and maintenance, the website was built on OpenGeo Suite, instead of traditionally proprietary GIS software. OpenGeo Suite is a web mapping solution by Boundless, which include a bundle of open source software consist of PostGIS, GeoServer, GeoWebCache, OpenLayers, GeoExt and QGIS. The main outcome will be an improvement in knowledge management for the governance of MPAs in the Bay of Bengal, and knowledge transfer to the national partners if any BOBLME countries interested in continuing to maintain the website without concern of enterprise software licenses.

ILCYM's index interpolator tool for regional pest risk assessments in mountainous regions (#408)

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|-------------|--|
| Authors: | Henry Juarez, Pablo Carhuapoma, Henri Tonnang, Jurgen Kroschel |
| Categories: | CGIAR/SIIL |
| Date: | 08/29/2018 |
| Time: | 15:30 - 16:00 |
| Room: | Mafia |

The use of global coarse and monthly sources of climate surfaces is limiting the precision of predictions of the potential distribution and abundance of insect pests in mountainous regions along altitude gradients (e.g., Andean region). To improve the Insect Life Cycle Modeling (ILCYM) software capacity to capture the small-scale distribution of pests, a new module called “The Index interpolator tool” was developed for analyzing pest risk indices at finer spatial and temporal resolution. The Index interpolator tool inputs daily minimum and maximum temperature data and calculates three risk indices (establishment index, ERI, generation index, GI, and activity index, AI) location by location. We used the thin-plate smoothing spline algorithm implemented in R. For the indices interpolation we used latitude, longitude, and elevation as independent variables. The application of the Index interpolator tool was tested in the Mantaro valley of Peru. As input daily data temperatures collected from 23 weather stations homogenously distributed across the valley at altitudes ranging from 3,300 to 4,200 masl were used.

The analyses of the indices at high spatial (pixel size of 90 m) and temporal resolution (daily data) enables capturing the potential establishment, distribution and abundance of insects at small regional scales particularly in mountainous areas with steep climate gradients and provided detailed index variability that can be partly lost at lower resolutions.

The “Index Interpolator” simulated with high precision ($R^2=0.993$) when comparing with commercial tools as Anusplin ($R^2=0.962$).

Synthetic Aperture Radar (SAR) Based Rice Monitoring and Crop Insurance System: Institutional Achievement and Challenges (#409)

Authors: Nasreen Khan, Francesco Holecz

Categories: CGIAR/SIIL

Date: 08/30/2018

Time: 14:30 - 15:00

Room: Mafia

Remote sensing based rice monitoring system technology developed by IRRI and sarmap is capable of generating near real time accurate information on rice area, start of season, yield and damaged due to flood and/ or drought over the entire rice season. This satellite-based rice monitoring system is implemented and operational in number of South East countries (Cambodia, Vietnam, Thailand, and Philippines) and in number of states in India (Tamil Nadu, Odisha, and Andhra Pradesh). The system can be adapted to new geographies with dedicated activities involving in-situ ground data collection and remote-sensing data analysis and processing. Through this monitoring system, rapid and near real time, rice area mapping and abiotic stresses (flood and drought) assessment and monitoring are achievable. The remote-sensing based rice monitoring system will also deploy rice yield estimation system based on assimilation of remote-sensing data with ORYZA crop growth model while capturing weather, soil, and agronomic management practices information for the provision of mid-season yield forecast and end of season yield estimates.

The information generated through this system has already been used to provide area-yield-index based crop insurance solution in Tamil Nadu, India and pilot insurance scheme been developed to implement in An Giang province in Vietnam. During 2016-17 Samba Season in Tamil Nadu a total of >300,000 farmers received timely crop insurance payout under the Central Government insurance program (PMBYF) where 47, 513 and 256190 farmers received payout for preventive sowing and yield loss claim respectively.

Application of unmanned aerial vehicle (UAV) and object-based approach for satellite-based rice area validation (#412)

Authors: Aileen Maunahan

Categories: CGIAR/SIIL

Date:

Time: -

Room:

Coming

Digital diffusion and geodesigning for ecological intensification (#414)

Authors: Chandrashekhar Biradar

Categories: CGIAR/SIIL

Date: 08/29/2018

Time: 14:30 - 15:00

Room: Mafia

The agriculture is becoming the prominent sector for reaching out to the sustainable development goals and stability of the farming livelihoods. The digitization of the agroecosystems become most essential entry point for any sustainable developmental entities whether it is plant genetics for breeding better varieties, crop diversification and intensification, efficient use of farm inputs, agronomic practices, stable economic return to ecosystem services. The valuing the ecosystem functions is more important than production alone.

Recent advances in Earth Observation System (EOS), Open-Access (AO), Artificial Intelligence (AI), Machine Learning (ML), Information, and Communication Technologies (ICTs) along with smartphone enabled Citizen Science (CS) making Big-Data analytics much smarter, interoperable and much useful ever before. This has opened tremendous opportunity to address the gaps at multiple levels (e.g., data, yield, ecology, economy, resilience) for demand-driven ecological interventions across the scale (e.g., space, time and package). The digital diffusion in agriculture will help enabling infusion of ecological functions to achieve desired return (production follows functions). Ongoing efforts in big-

data analytics aims at quantifying production dynamics, functions and drivers to target site specific developmental interventions and scaling the ecological intensification such as name here few; intensification of food legumes in rice fallows, adoption of conservation agriculture, quantification of yield gaps, understanding land potential and yield gaps, geo-options for increased water productivity and transboundary cooperation. Ongoing efforts is to use make use of big-data innovations coupled with sound ecological functions and citizen science to incorporate and design an functional agroecosystems and better land use choices for green livelihoods in the dry areas.

Mapping livestock keepers and their herds across Africa based on households' survey (#415)

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|-------------|--|
| Authors: | Stephen Oloo, Catherine Pfeifer, Jawoo Koo |
| Categories: | CGIAR/SIIL |
| Date: | 08/30/2018 |
| Time: | 10:30 - 11:00 |
| Room: | Udzungwa |

Livestock plays a key role in African economy and contributes between 30-80 % of the agricultural GDP. Yet, the information about who is keeping how much livestock across the African continent remains up until today quite limited.

Over the last year more and more microdata have been made available to the scientific communities across many different fields. Among those are the DHS (Demographic Health Surveys) that has a representative sample of the country's population to assess health levels and contain unexpectedly some minimal livestock information for a whole range African country some of which even have several rounds of data. Data continue being collected, enhancing almost yearly the overall database that we can rely on. Most DHS households can be located within a 10 km radius, which opens the door to understand patterns of livestock keepers across space and time on the African continent.

The objective of this paper is to present the process that we have set up in R to query, analyze, document and visualize DHS data as well as the automatization we set up to adjust all our information as soon as new DHS is released.

We will illustrate this process with our project of mapping livestock keepers and their herds across Africa. For this project, we enhance DHS data with open access geographical data to explore patterns of ownership. Identified patterns are then used to extrapolate the livestock information to those countries that do not have any DHS survey.

Preliminary results show that the patterns of cattle keeper based on DHS reflect the general patterns observed in the FAO-ILRI livestock distribution maps. Those suggest that most cattle are kept at the fringe between a dry mixed crop-livestock production systems and livestock only pastoral system.

This is also where the biggest transformation of the livestock sector is expected over the up-coming years. Up-coming work will, therefore, investigate the spatiotemporal changes in those areas.

Live spatial simulation to develop a shared vision for a sustainable livestock value chain transformation (#416)

| | |
|-------------|---|
| Authors: | Catherine Pheifer, Joanne Morris, Jawoo Koo |
| Categories: | CGIAR/SIIL |
| Date: | 08/30/2018 |
| Time: | 10:00 - 10:30 |
| Room: | Udzungwa |

Demand for animal sourced food is predicted to double over the next 10 years in most African countries as a result of both population growth and increased incomes. Livestock value chains need to be transformed today, so that animal sourced food can and will remain to be provided in sufficient quantities without at the same time doubling the negative impact on the environment and particularly on natural resources.

Different transformation options, such as the improvement of genetics or the planting of high-protein fodder have different consequences on economic, social and environmental dimensions and often come with trade-offs that are difficult to assess and measure, especially in the African context, where generally education levels and availability of accurate data is low.

The ResLeSS approach is a participatory approach in three steps that aims to identify locally relevant trade-offs along economic social and environmental dimensions in livestock value chain transformation. At the core of the process is the CLEANED-R tool, a spatially -explicit relevant environmental simulation tool developed in R, with a R-shiny interface that can be run live during the final workshop. Thanks to integration of the most recent open access data it is locally customizable and rapidly implementable in any African location. It can compute water use, greenhouse gas emissions, biodiversity loss and soil nitrogen loss based on user scenarios. Fine tuning of the tool parametrization is done with an expert reconnaissance tour (step 1) and a participatory GIS exercise (step 2). In the final workshop (step 3) the CLEANED R tool becomes a “boundary object” or the neutral actor in the room that computes productivity and environmental indicators. Homogenous stakeholder groups can explore the impacts of their vision. Discussions with heterogenous stakeholder groups allow to identify trade-offs beyond the environmental dimension and principles that will enable a shared vision for development in the study area.

The objective of this paper is to illustrate the ResLeSS approach with its application to Bama, a town in the peri-urban fringe of Bobo-Dialassou in Burkina Faso. This study area is characterized by a conflict between sedentary farmers who wish to intensify as quickly as possible and agro-pastoralist who wish to remain mobile. This lifestyle is becoming more difficult as sedentary farmers start using land that was traditionally used by agro-pastoralist for grazing. In addition, mobility limits the options for transformation, and there is little room to improve productivity and income.

Preliminary results show that improved income will come at an environmental cost that can only be partially off-set by improved genetics or improved forages. However, there may be no need to ask pastoralist to sedentarize : if sedentary farmers intensify quickly with improved breeds that consume mainly planted and commercial feed, and a genuine effort is made in better management of communal grazing areas, more grass will remain for agro-pastoralists, who can maintain their mobile herds, yet without increasing their numbers.

Mapping fertilizer prices in Africa: Where to start? (#417)

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|-------------|--|
| Authors: | Camila Bonilla Cedrez, Jordan Chamberlin, Robert Hijmans |
| Categories: | CGIAR/SIIL |
| Date: | 08/30/2018 |
| Time: | 12:30 - 13:00 |
| Room: | Udzungwa |

Agricultural productivity in sub-Saharan Africa (SSA) has been improving in some areas, it remains very low, with persistently large yield gaps for major staples. The low levels of agricultural productivity in the region are often cited as a major factor underlying high levels of rural poverty and food insecurity in the region. Increased use of mineral fertilizers by the regions smallholder farmers is arguable the single most important way to improve productivity and is a central policy objective throughout the region. However, the use of inorganic fertilizer remains very low amongst African smallholder farmers. Although, there is a great variability in fertilizer application across SSA, on average farmers in Africa apply 13 kg/ha of fertilizer compared to 86 kg/ha in Latin America, 104 kg/ha in South Asia and 142 kg/ha in Southeast Asia.

A central hypothesis about why this is the case, is that fertilizer use is simply not profitable, given the effective price of fertilizer at the farm gate, as well as the farm gate price of farm outputs. Relying on national or regional average prices of fertilizer could obscure important local variation, the analysis of which may help us to better understand the profitability of fertilizer usage in different areas. The trouble is defining exactly how and why prices are changing over space: spatially explicit data on prices are difficult to get, particularly in the data sparse environments of rural Africa. Furthermore, there are important data quality issues with existing data sources.

The goal of this paper is to describe the current situation with fertilizer price data for different countries in Africa, with a particular emphasis on their spatial variability and how we may use such spatial variation to produce fertilizer price maps for rural areas. To do so, we created a database made of georeferenced price fertilizer data and spatial covariates of theoretical importance. Price data (21617 observations) were collected from fifteen countries in west and east Africa from two open data sources: (1) LSMS-ISA (Living Standards Measurement Study-Integrated Surveys on Agriculture) with 19543 observations for four countries (Ethiopia, Nigeria, Uganda, and Tanzania) and different years between 2009 to 2015 depending on the country; (2) Africa Fertilizer with 2074 observations for 14 countries (Burundi, Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mali, Malawi, Mozambique, Nigeria, Senegal, Togo, Tanzania, Uganda, and Zambia) from 2010-2018. The LSMS-ISA data contain prices reported by farm households, while Africa Fertilizer is a database of retailer prices. As spatial covariates we use a stack of layers as proxies for market access and demand for product such as travel time to market, population density, and crop production. All the covariates used are from free data sources available online.

Data analysis was made using the free-open software R. This software is a powerful tool that allows to create a reproducible and high-quality analysis and at the same time it incorporates all the statistical test and models needed for this study (basic statistics, machine learning, spatial analysis, and mapping).

The application of FOSS4G in the emergency, preparedness and response operations of the World Food Programme (WFP). (#419)

Authors: Dimitris Karakostis

Categories: Disaster A - Before

Date: 08/31/2018

Time: 13:00 - 13:30

Room: Kitulo

The GIS Unit of Emergency, Preparedness and Response division of WFP has been using FOSS4G in order to develop and customize a series of tools and applications, which increase the organization's efficient planning of activities in times of emergencies. This presentation will cover a set of in-house developed tools and processes implemented for automatic production of earthquake dashboards (geonode.wfp.org/adam.html) and collection of OSM data, which are used for creation of topographic maps. We will also present our work done in WFP GeoNode platform; the corporate platform for sharing and distributing data (geonode.wfp.org)

Where and how well do crops grow around the world – SPAM2010 tells you! (#428)

Authors: Ulrike Wood-Sichra, Liangzhi You, Zhe Guo

Categories: CGIAR/SIIL

Date: 08/29/2018

Time: 11:30 - 12:00

Room: Mafia

The distribution of crops (measured in yield, area, and production) is an important parameter for the assessment of food security, rural development planning, emergency aid, etc. The closer this distribution can be related to a specific geographical location, the more successful assessments or planning exercises will be.

Despite the advancement in remote sensing and the ever increasing resolution of satellite imagery it is not yet possible to identify on a global basis “exactly” which crop grows where (area) and how successfully (yield). Crops statistics at sub-national level and household surveys are the closest we can get to specific locations.

Here is where the Spatial Production Allocation Model (SPAM) fills the gap, by combining statistics (at rather coarse resolutions) with cropland imagery, irrigated area maps, crop suitability surfaces and population grids (all at 10 x 10 km resolution) and through a data fusion process generate crop areas, yields and production for all crops, at global level. The results are also at 10 x 10 km resolution.

Advanced Data Exploration Tools to Enhance Data Analysis and Knowledge Management in Africa (#429)

Authors: Abd Salam El Vilaly

Categories: CGIAR/SIIL

Date: 08/29/2018

Time: 15:00 - 15:30

Room: Mafia

The Regional Strategic Analysis and Knowledge Support System (ReSAKSS) has developed a Web-based mapping tool, called “The ReSAKSS Country eAtlases(RCeA)”, that brings high quality and highly disaggregated data on agricultural, socio-economic, and bio-physical indicators from different sources into a centralized, user-friendly, and highly interactive system.

The eAtlases, <http://eatlas.resakss.org>, can be viewed as a GIS-based mapping tool to help policy analysts and policymakers access and use highly disaggregated data at subnational levels to guide agricultural policy and investment decisions. The eAtlases serve as an important tool for policymakers, analysts, and other stakeholders by (i) providing an online, highly interactive and dynamic data environment rich with standard pre-processing and essential data analysis tools, (ii) assembling in one resource data from a variety of domains necessary for effective policy design and targeting, and (iii) ensuring broad access to high quality data to facilitate inclusive review and dialogue processes.

Geospatial Analysis to Spur Technology Adoption for Increasing Bean Productivity in Tanzania (#434)

Authors: Jovin Lwehabura, Zachary Stewart, Jean-Claude Rubyogo, P.V. Vara Prasad, Nicky Mason, Aniruddha Ghosh

Categories: CGIAR/SIIL

Date: 08/30/2018

Time: 15:00 - 15:30

Room:

Common bean (*Phaseolus vulgaris* L.) is widely cultivated by smallholder farmers in Tanzania as both a source of food and income. Due to low soil fertility, unreliable rainfall, inadequate access to agronomic inputs, markets, and low adoption rates of technology, the current farm yield (~741 kg ha⁻¹) is far below the potential yield (~1,235 kg ha⁻¹). Improved bean varieties, inorganic fertilizers, and fungicide (Apron Star) have the potential to enhance the productivity and close the current yield gap. Mother-baby trial is an effective method to train farmers about the benefits of new technologies and varieties in comparison to conventional practices on their farms. The learning from the 'baby' sites in farmers' fields can catalyze farmer adoption of appropriate, location specific technologies.

In this study, we designed 57 mother demos consisting of trials with replicated experiments. This study uses a geospatial approach to (1) map the locations (fields and farmers) of successful technology adoptions, (2) determine the most important biophysical and socioeconomic factors behind the production increase, and (3) identify potential areas to target expansion of the bean technology adoption. Preliminary analysis indicate increased yield of improved bean varieties. Further analysis based on freely available geospatial indicators of biophysical and socioeconomic factors (for example climatic variables, soil properties, access to markets) shows potential areas for technology adoption/expansion across the country. A web-based interface based on Carto platform

is created to show different spatial layers relevant for this project. The interface can be used by organizations such as agro-dealers, extension workers, and developmental agencies working towards scaling different adoption technologies. Other users such as seed producers and fertilizer and fungicide companies can utilize this interface to locate potential farmer/customers and improve the supply network for various agronomic inputs.

FOSS4G for developing agriculture insurance products: experience from Eastern Africa (#700)

Authors: Amos N. Tabalia

Categories: CGIAR/SIIL

Date:

Time: -

Room:

Coming

