ossimPlanet Users Manual

An accurate 3D Global Visualization System

Version 0.8 15 Aug 2007

Overview

ossimPlanet is an accurate 3D global geo-spatial viewer that is build on top of the OSSIM, OpenSceneGraph, and Trolltech QT open source software libraries. It provides native geo-spatial access to a wide range of commercial and government data formats with high the high performance visualization and collaboration capabilities. ossimPlanet is one of the key components of the Large Data Joint Capabilities and Technology Development project. This document describes the installation and use of ossimPlanet.

ossimPlanet provides accurate 3D global visualization and collaboration. Instances of ossimPlanet can be synchronized for distributed collaboration. Native file access, on the fly elevation tree topography, and online access to OGC WMS and Worldwind sites is provided.

Requirements

ossimPlanet currently requires a 3 button mouse for navigation.

Mac OS 10.4 or later is required. ossimPlanet is a universal binary that runs natively on both PowerPC and Intel-based Macs. The installer provides all of the required frameworks and dependencies. Installing ossimPlanet

Binary installers are available for various platform including MacOSX, Windows, and Linux. Double click on the Installer package and follow the instructions. The binary installer contains all of the dependencies need to run the program. It installs three double clickable applications in /Applications/ossim. Frameworks and supporting files are installed in appropriate system locations - /Library/Frameworks and /Library/Applications Support/ossim. Additionally, several command line utilities are installed in /usr/local/bin. Under Linux the root directory is .ossim instead of /Library/ Applications Support .

| Supported Data Sets |
| --- |
| OSSIM Geo-Spatial Formats |
| GDAL Geo-Spatial Formats |
| OGC WMS Interface |
| WorldWind Servers |
| Pixia NUI format |
| kml/kmz files |
| Precision Lightworks Urban Models |

Operating ossimPlanet

Running ossimPlanet

ossimPlanet is installed as a double clickable application in the Applications folder in an ossim subfolder. Navigate to /Applications/ossim/ossimPlanet and double click the ossimPlanet icon to start the program.
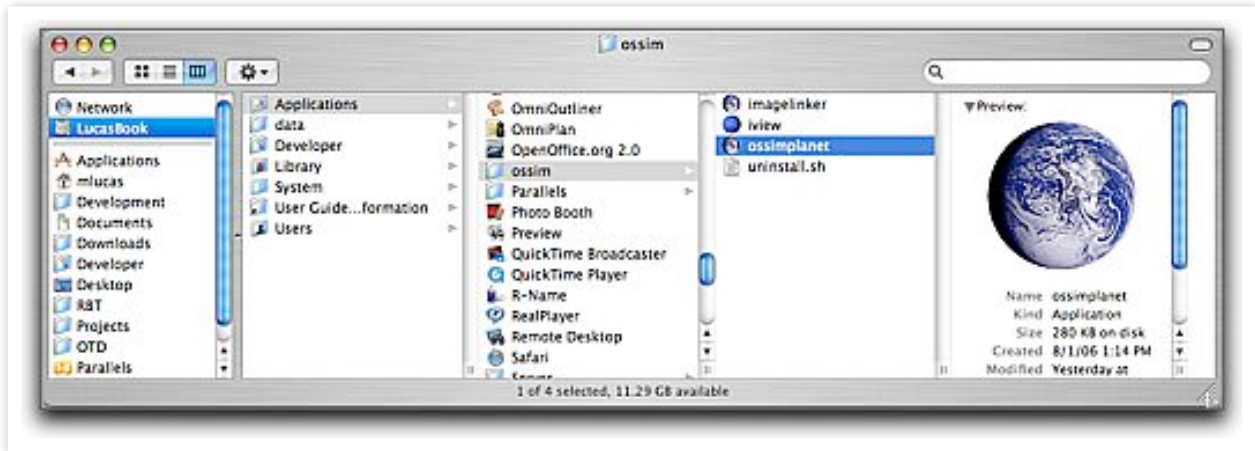
Starting ossimPlanet from the Finder
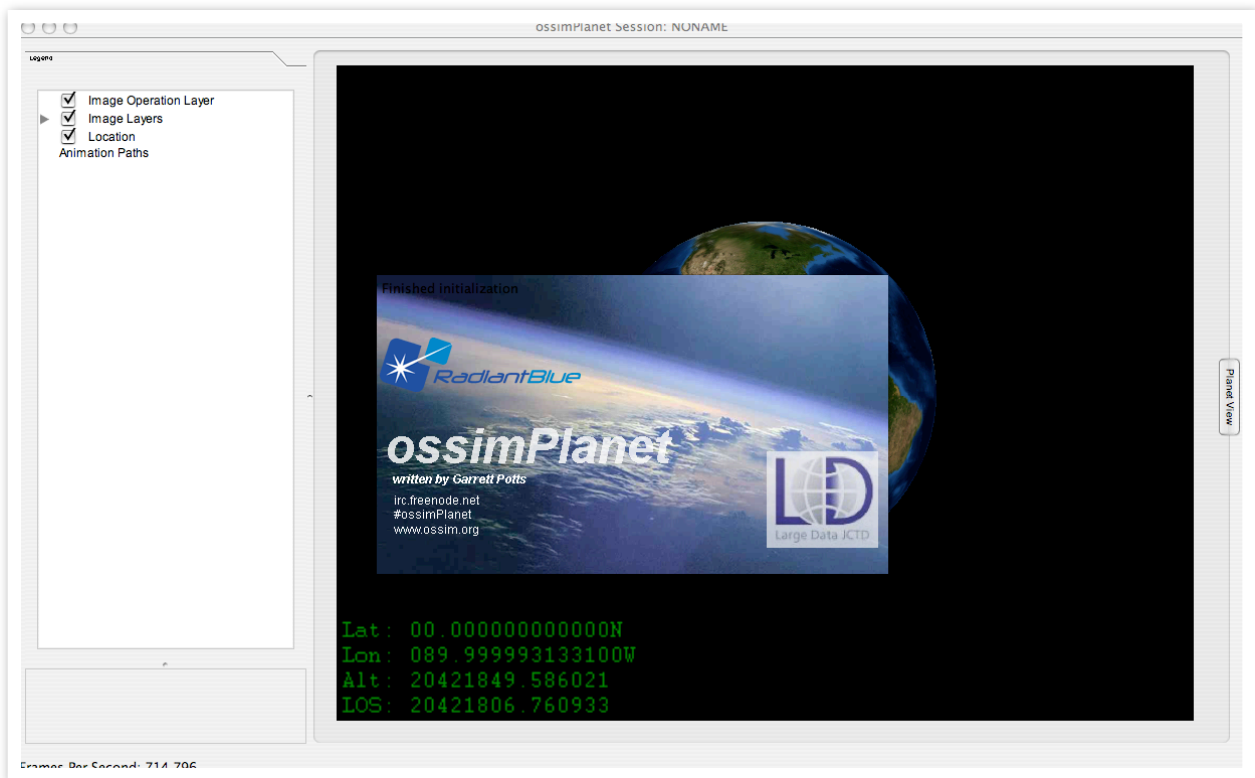
ossimPlanet startup

If the program is properly installed, a display similar to the one shown above will appear after double clicking the ossimPlanet icon in the Applications/ossim directory. The ossimPlanet splash screen is initially displayed. Click on the splash screen to dismiss it after the program has started up.

getting some data

Some sample data sets are available at http://ossim.telascience.org/ossimdata . ossimPlanet can also fetch data from OGC WMS servers or NASA Worldwind servers.   If you installed with the binary installer a copy of earth.xml has been installed in /Library/Applications Support/ossim/files/ WorldWind - alternatively you can download the same file from the link above and the Data direc-tory. Drag and drop this xml file into the legend area of the planet to trigger the setup for multiple WorldWind layers. By default all of the layers are enabled, you will want to deselect and view the layers one at a time to fetch and load various imagery and map layers from the remote server. You will need internet access for this to work.

Improved Blue Marble Next Generation backdrops are available at http://telascience.sdsc.edu/tela_data/BM/

These larger data sets can replace the earth backdrops in the ossim preferences folder. /Library/ Applications Support/ossim/images/reference/

Global elevation and bathymetry is available in the general raster format at http://ossim.telascience.org/ossimdata/Data/

download the srtmplus.tar.gz file, uncompress and install in /Library/Applications Support/ossim/ elevation/general_raster/

Lat: 22.706238108534N
Lon: 073.796721490578W
Alt: 34869.729219
LOS: 74613.909413
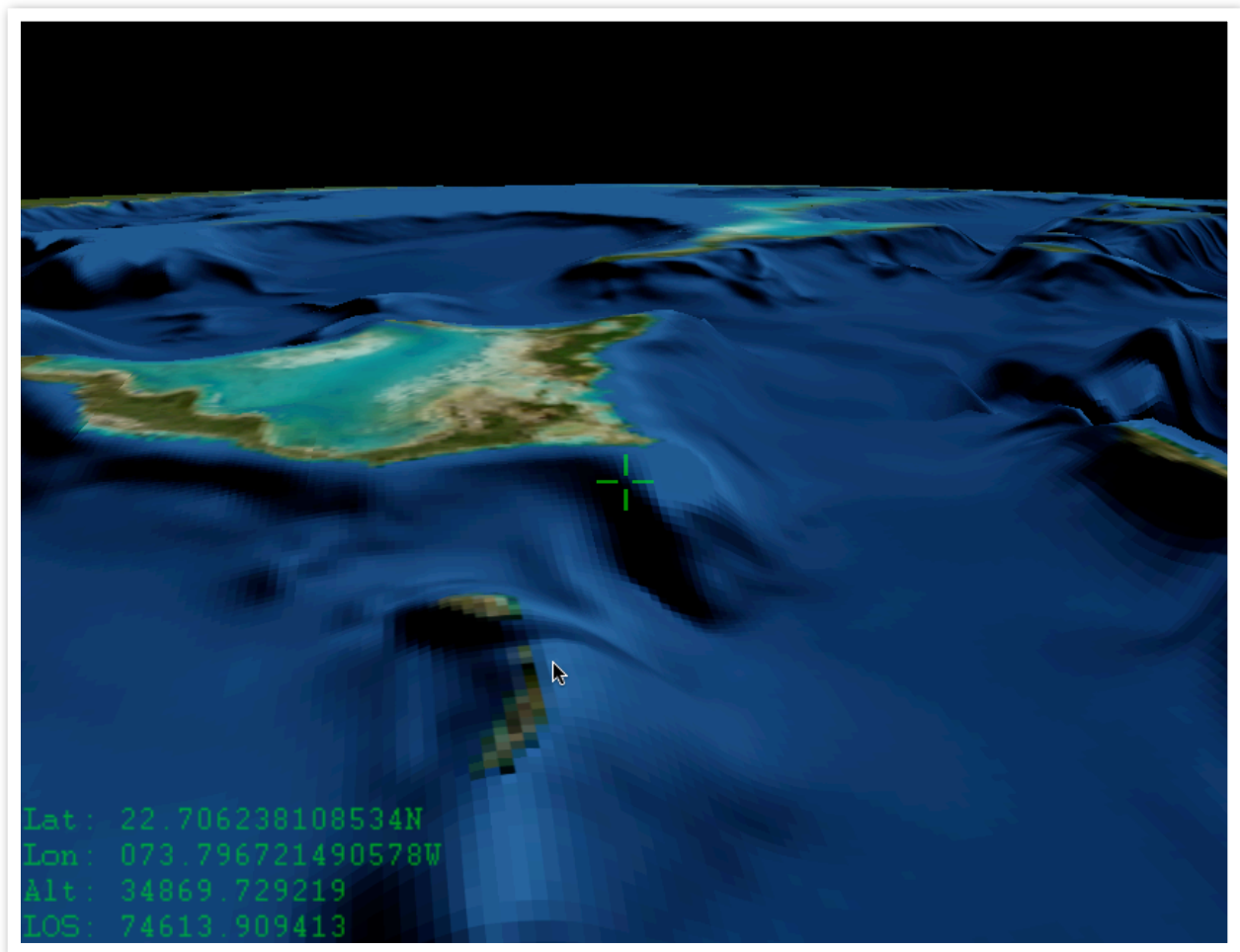
SRTMPlus general raster elevation with the enhanced Blue Marble Next Generation backdrops available for download. Elevation is exaggerated in this example.

Navigating

The current version requires an external 3 button mouse for three dimensional navigation of the planet.

Note: You will want to disable dashboard activation on mouse clicks from the Systems Preferences Dialog. Under the Apple menu, select the Dashboard and Expose dialog to change the default settings. Make sure the Dashboard isn't invoked on mouse clicks as it will intercept navigation controls to ossimPlanet. Also set the mousebutton mapping in the mouse control to a standard 3 mouse button configuration.

| Event	Action
Left mouse drag	rotates the globe
Middle mouse drag	Rotate around center of interest
Right mouse drag	Zoom in and out to center of interest
Shift Middle mouse drag	Moves up and down (elevator mode)
Shift Left mouse drag	Pivots around eye point
Space Bar	Resets view to default position
'w' key	Toggles between textured, wire frame, and point modes
'l' key (lower case L)	Toggles directed light source (currently disabled)
Apple f	Toggles full screen mode
Apple ,	Brings up preferences panel
Arrow keys	Starts constant rotation (accumulates with additional key presses)
Return Key	Freezes all motion

Menus and Menu Items

This section describes each of the menus and menu items in ossimPlanet.

ossimPlanet

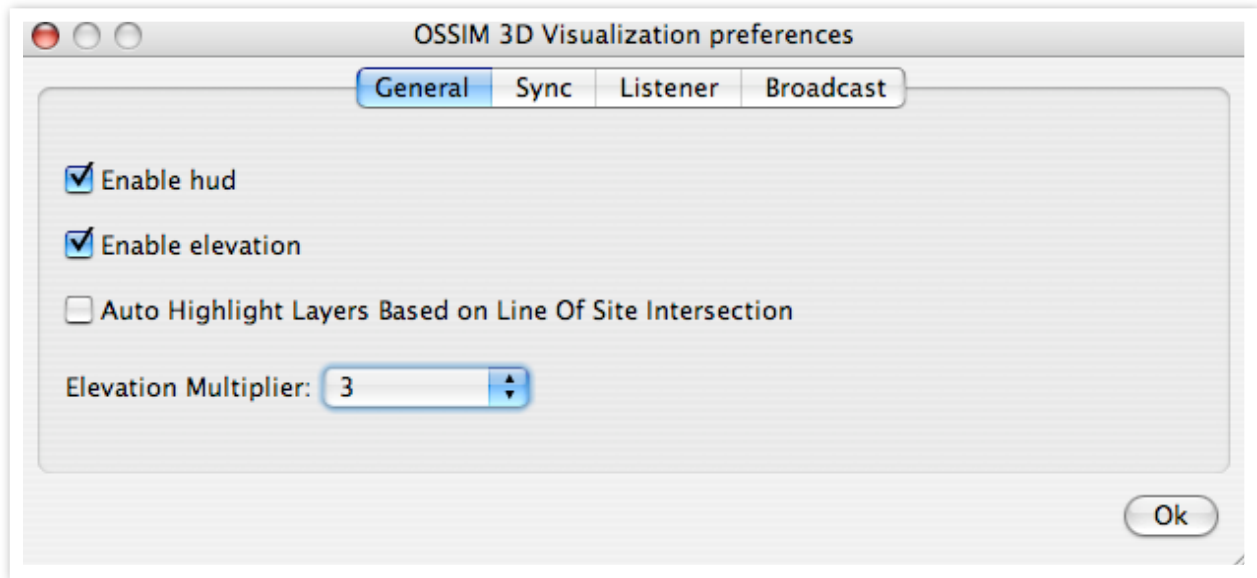Under the ossimplanet menu the following items are available:

About ossimplanet
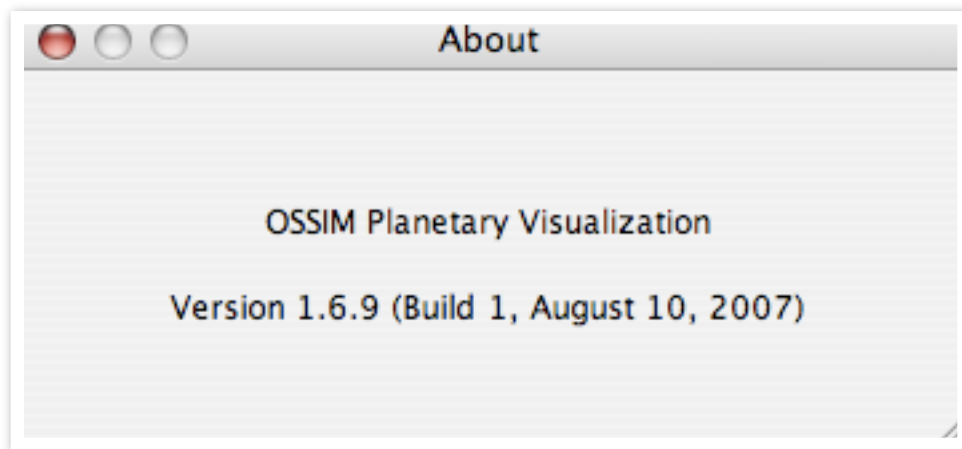
The About box will display the current version and build date.

Preferences

The preferences modal dialog allows the user to enable various features of ossimPlanet. The preferences has multiple tabs at the top to select the available views.

General tab displays the following options:

Enable HUD -
Enables the Heads Up Display (HUD) for ossimPlanet. The HUD includes the cross hairs at the center of the image and the latitude, longitude, elevation, and height readout at the bottom left hand corner of the display.

Enable elevation
Turns on or off elevation processing for topographic relief and visualization in ossimPlanet. Elevation processing requires that elevation data sets be staged through the Application Support directory for ossim. DTED and SRTM file structures for elevation can be automatically parsed and retrieved by the software. See the section on staging supporting data sets in this document for setup details.

Auto Highlight Layers Based on Line of Site Intersection
Enabling this option will show which data sets are intersecting with the cross hairs in the center of the screen. Intersected layers will be highlighted in the layer legend to the left of the globe.

Elevation Multiplier
A pull down menu applies an elevation scaling factor. The higher the number, the more exaggerated the topography. The value is persistent and will be automatically saved.

Sync Tab
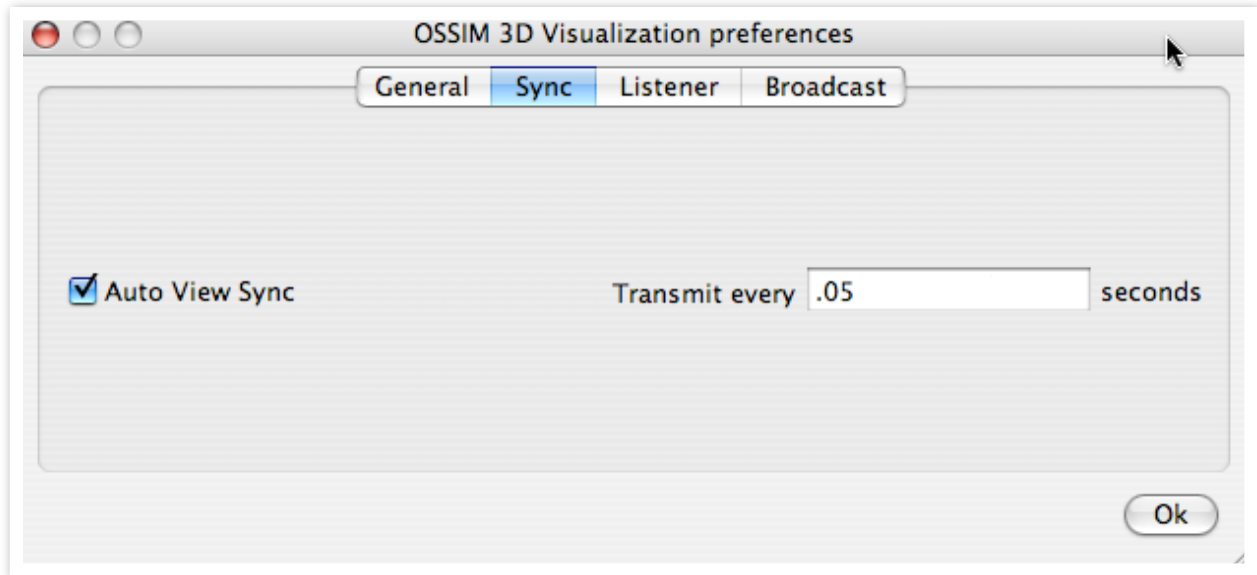
Auto View Sync - this checkbox enables automatic transmission of navigation commands. When selected the position of the view will be automatically transmitted when it changes through the navigation ports in the Broadcast panel. The frequency of this transmission can be adjusted in the field shown on the right. If Auto View Sync is deselected it will only transmit navigation if the user sends a specific go to command. This controls all Broadcast navigation channels that are enabled.

Listener Tab
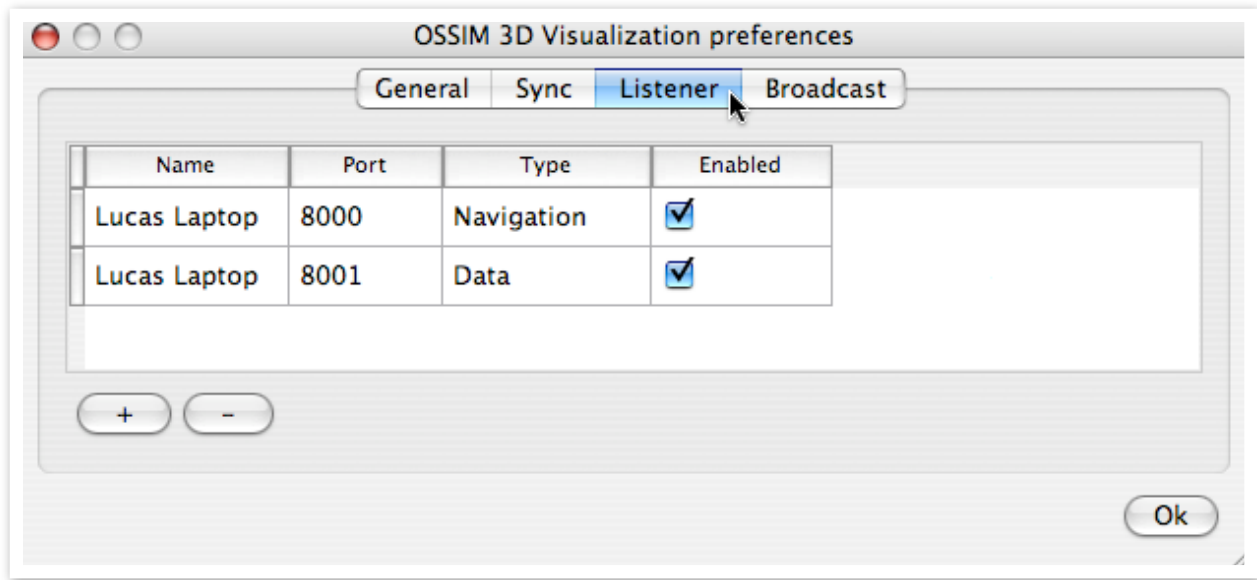
The Listener allows the user to open up ports for remote control and messages. ossimPlanet will listen on these channels for commands and respond accordingly. The plus and minus buttons at the bottom of the panel will add or remove channels. Data in this dialog is persistent - it will be automatically stored and retrieved in future ossimPlanet runs.

The simplest use is to sync up the navigation of multiple planets - the broadcast channel will transmit position information to the IP address ossimPlanet application listening on the same channel.

Name - a user defined name for the listening channel. Only used to help the user identify the channel.

Port - this is the communication port where the computer is listening for messages. It must be the same value as the port identified in the remote transmitting computer. It will be necessary for the port to be open (not blocked by a firewall) for communications to occur.

**Type** - A pull down menu to select the communication type:

        Navigation - listens for navigation commands (udp protocol)

        Data - listens for data transmissions (tcp protocol)

Enabled - this checkbox enables and disables listening on the communications channel

Broadcast Tab

The broadcast tab reveals the set up for ossimPlanet command broadcasting. Position and orientation commands are transmitted to all listening ossimPlanets through these open channels.
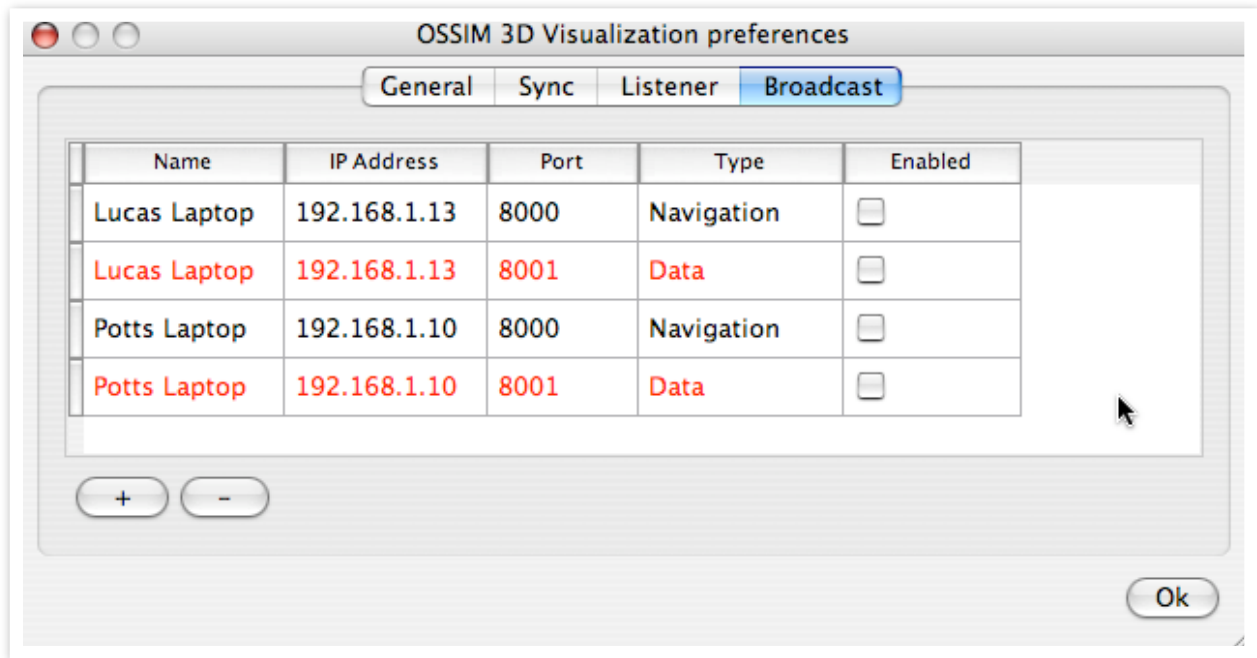
Channels can be added or removed in this dialog. The (+) and (-) buttons add and delete broadcast channels in the dialog. The state of this dialog is persistent and automatically saved for future use.

Name - a user defined name for the channel. It is used only to help the user identify what the channel is being used for.

IP Address - this is the IP address of dns name of the remote machine you are sending to.

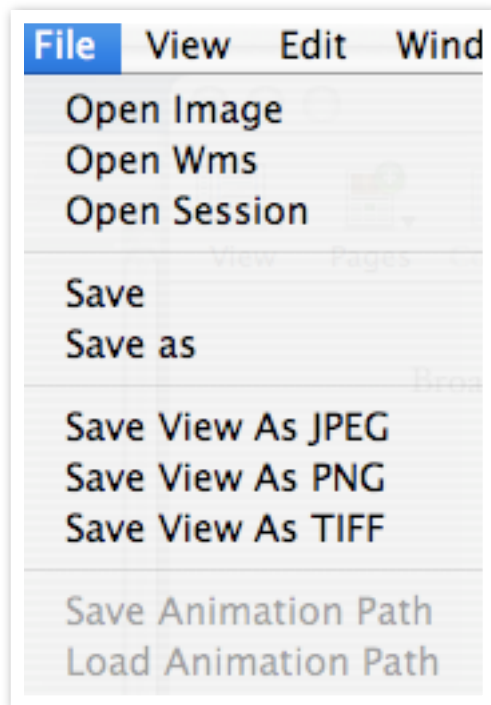*Port* - the port number to use for communications.

Type - pull down menu

>   Navigation - used for sending navigation commands (uses udp protocol)

>   Data - used for sending data transmissions (tcp protocol)

*Enabled* - Enables or disables the port

File Menu

The file menu contains the menu items for loading imagery into ossimPlanet.

Open Image

The Open Image menu item is used to access and load geo-spatial data files into the planet. Most commercial and government geo-spatial data formats are supported. ossimPlanet also supports drag and drop capabilities from the operating system onto the layer panel. For a complete list of supported files refer to the ossim and GDAL project documentation.
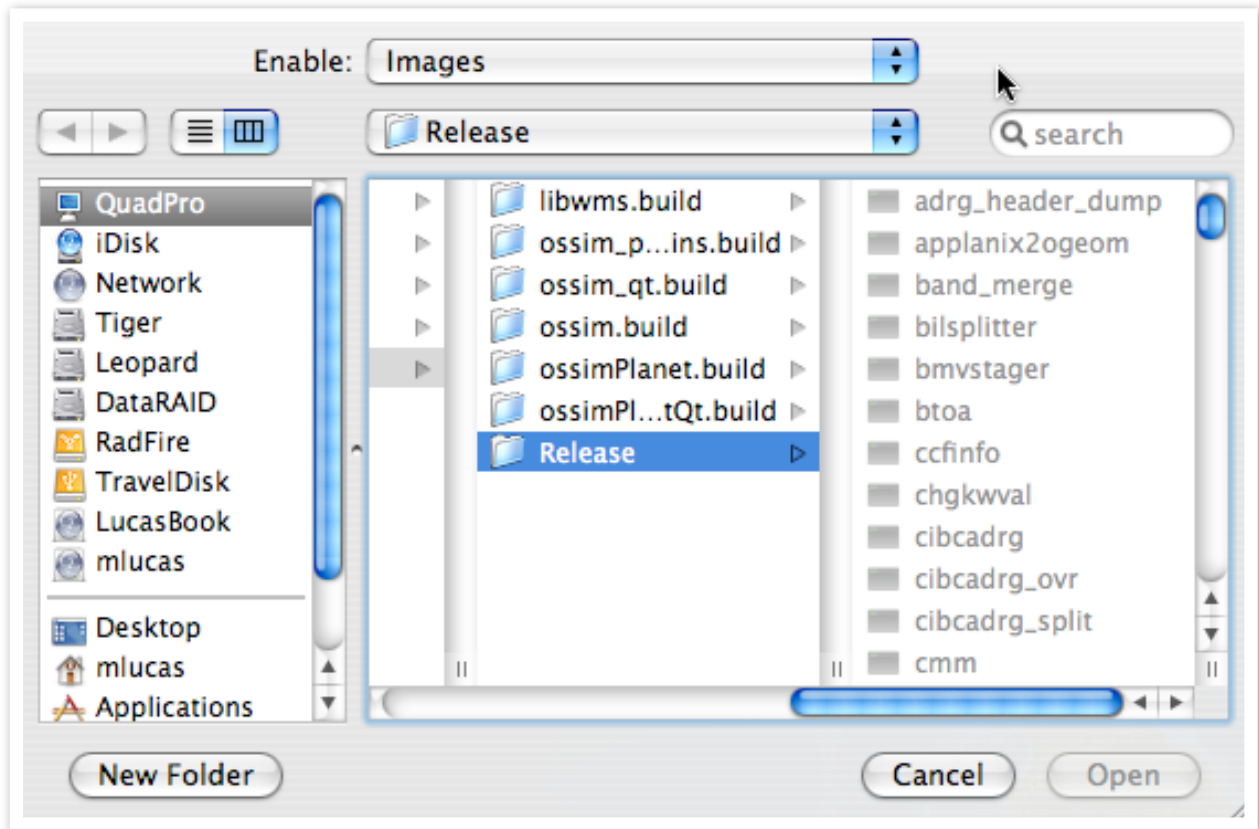
Open WMS

The OGC Web Mapping Services interface is supported in ossimPlanet. The menu item will open a dialog box for getting WMS access to online servers.
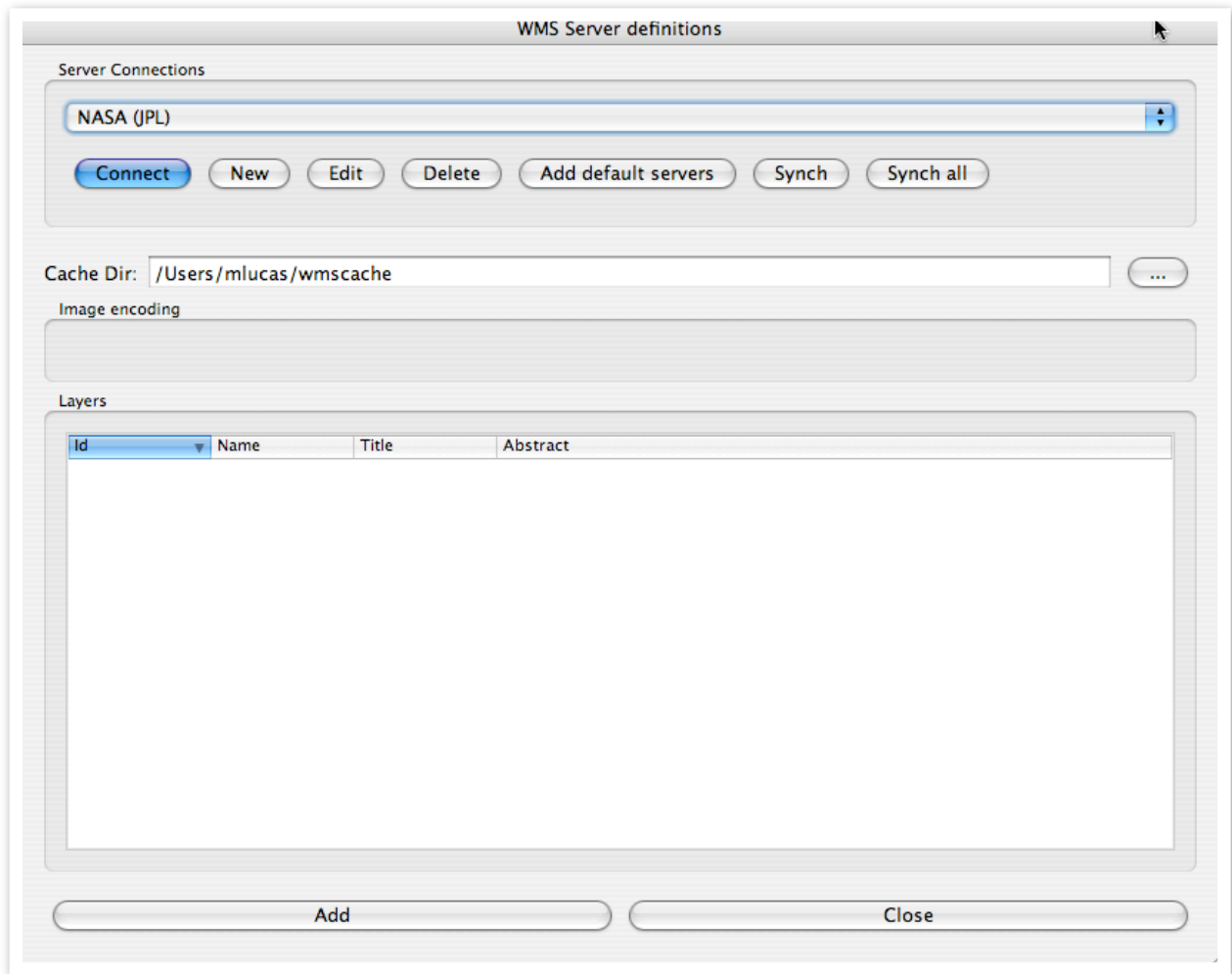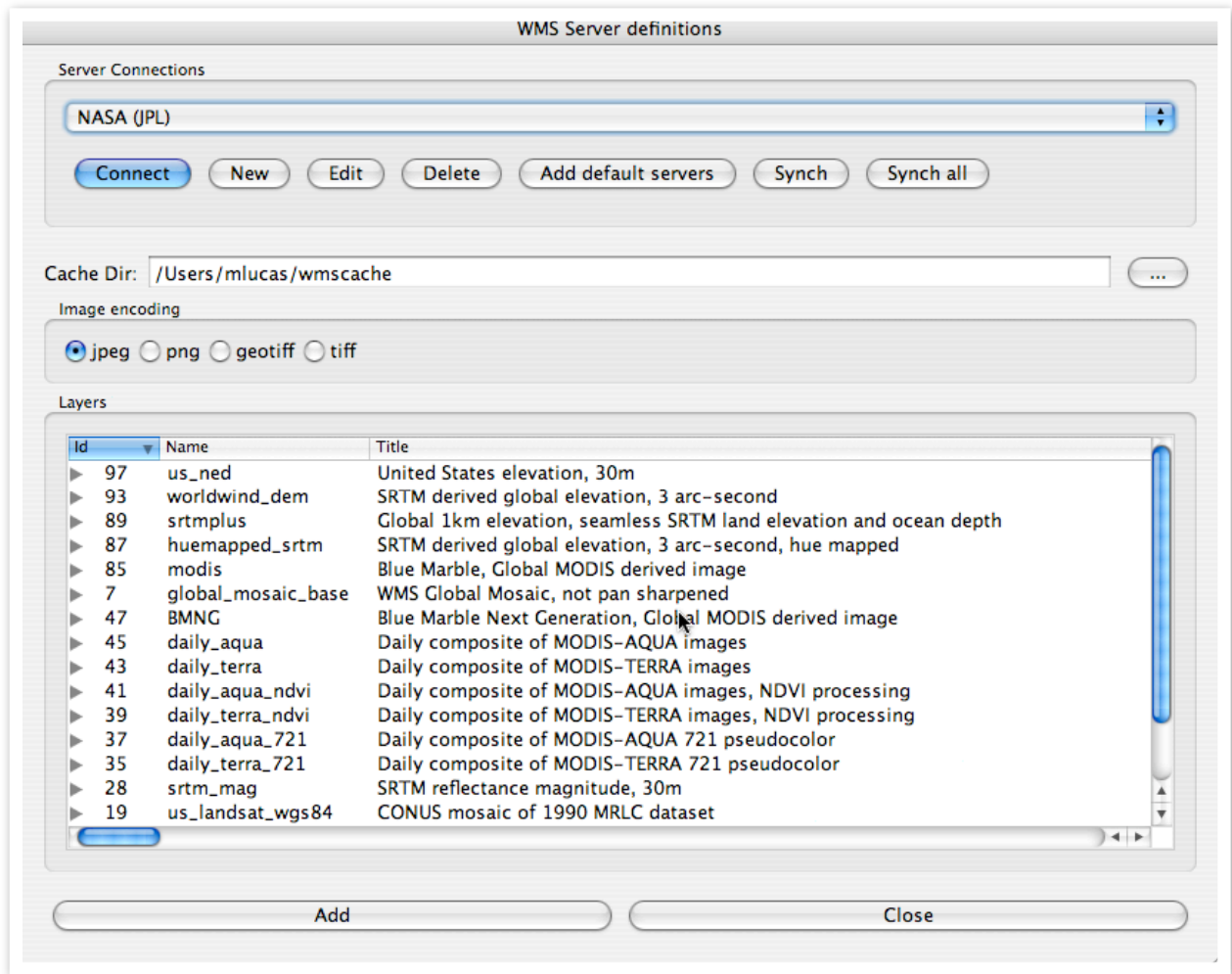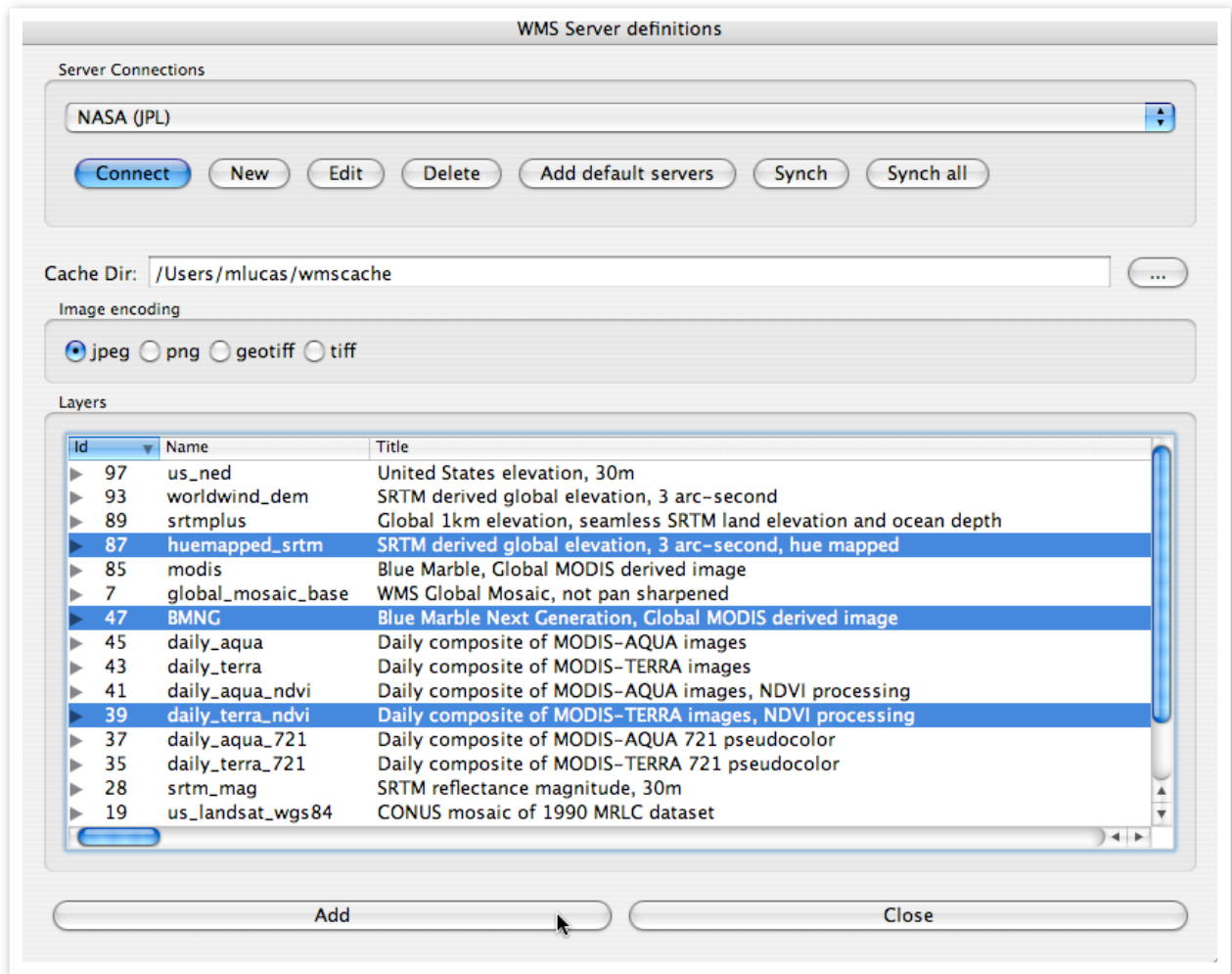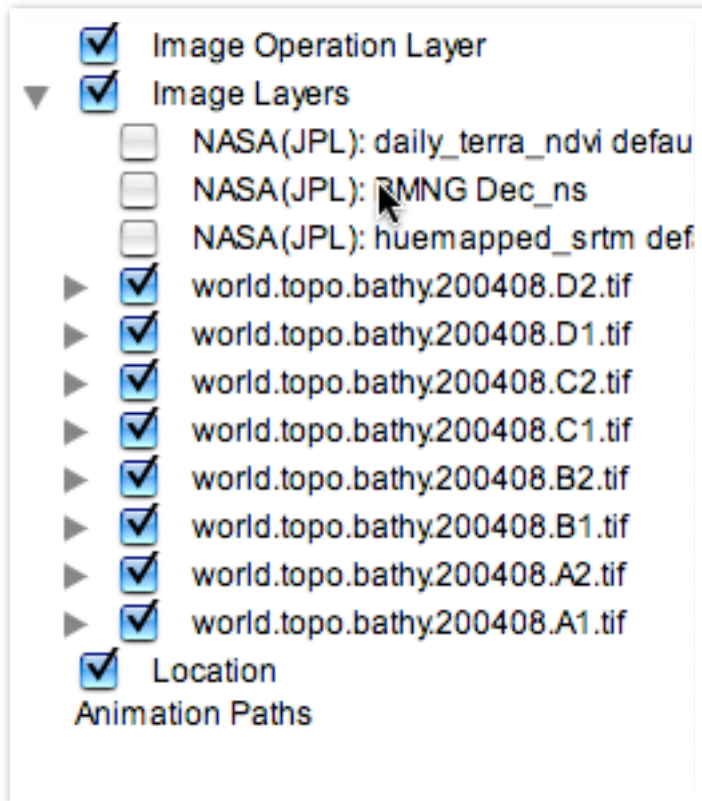
Dialog for setting up WMS servers and layers.

This dialog helps the user construct OGC WMS (Web Mapping Services) requests for online data retrieval. The default installation includes several WMS servers that can be selected from the pop up menu. New servers will be added to the pop up menu for future selection.

Connect

This button will make a WMS GetCapabilities request to the server selected in the pop up. A Get-Capabilities request determines what data layers and capabilities are available.

WMS Server definitions

Server Connections

NASA (JPL)

Connect New Edit Delete Add default servers Synch Synch all

Cache Dir: /Users/mlucas/wmscache

Image encoding

⦿ jpeg ○ png ○ geotiff ○ tiff

Layers

Id	Name	Title
97	us_ned	United States elevation, 30m
93	worldwind_dem	SRTM derived global elevation, 3 arc-second
89	srtmplus	Global 1km elevation, seamless SRTM land elevation and ocean depth
87	huemapped_srtm	SRTM derived global elevation, 3 arc-second, hue mapped
85	modis	Blue Marble, Global MODIS derived image
7	global_mosaic_base	WMS Global Mosaic, not pan sharpened
47	BMNG	Blue Marble Next Generation, Global MODIS derived image
45	daily_aqua	Daily composite of MODIS-AQUA images
43	daily_terra	Daily composite of MODIS-TERRA images
41	daily_aqua_ndvi	Daily composite of MODIS-AQUA images, NDVI processing
39	daily_terra_ndvi	Daily composite of MODIS-TERRA images, NDVI processing
37	daily_aqua_721	Daily composite of MODIS-AQUA 721 pseudocolor
35	daily_terra_721	Daily composite of MODIS-TERRA 721 pseudocolor
28	srtm_mag	SRTM reflectance magnitude, 30m
19	us_landsat_wgs84	CONUS mosaic of 1990 MRLC dataset

Add Close

New

The New button will allow the user to enter a URL for a new OGC Web Mapping Server. That URL and name will be added to the popup list.
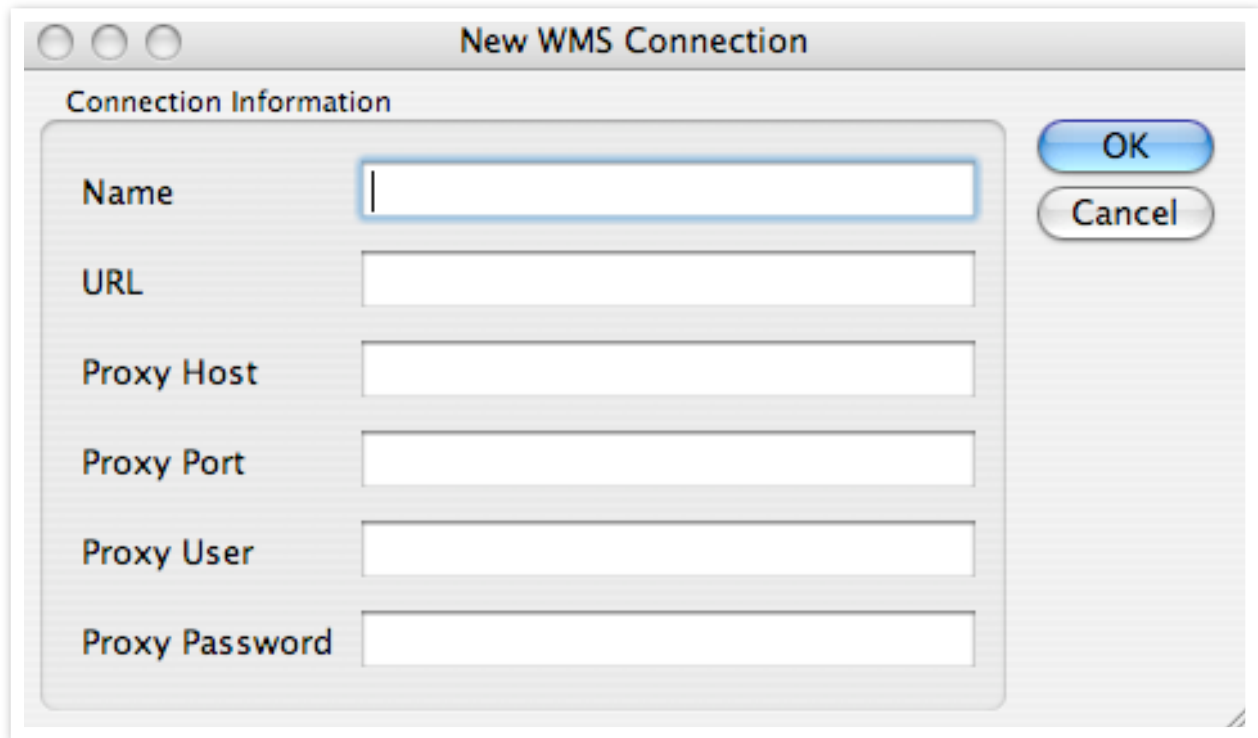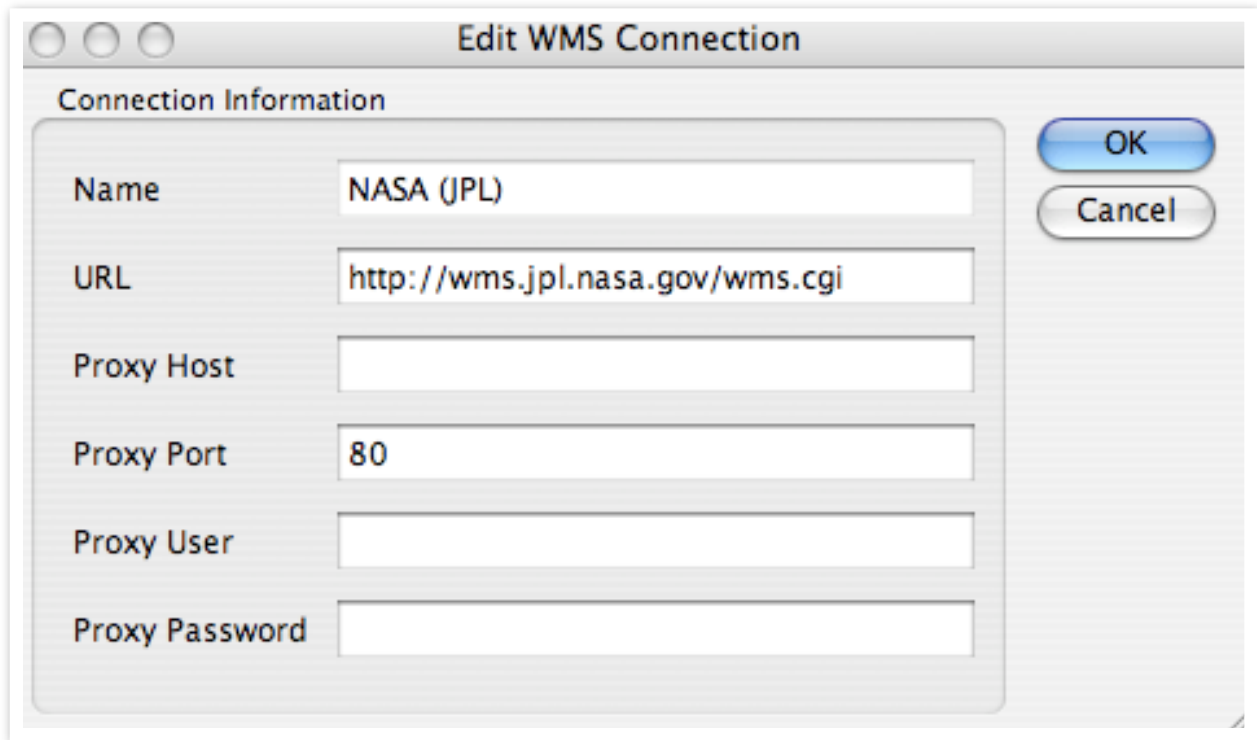
New or Edit buttons will provide this dialog for setting up WMS servers

This dialog is used for entering the parameters for a new OGC WMS web server. Support is is available for direct access or access through a proxy server.

Edit

Edits the currently selected WMS server in the pop up list.

Delete

Deletes the currently selected WMS server in the pop up list.

Add default servers

A list of default servers is distributed with the initial installation. Pressing the Add default servers button will add them to the pop up list.

Sync

Pressing the sync button will transmit the setup information for the currently selected WMS server through any enabled broadcast data channels.

Sync All

Pressing the Sync All button will transmit all of the available WMS server setups through any enabled broadcast data channels.

Cache Dir:

The Cache Dir: specifies the path where the retrieved data is to be stored on the local machine. Once image tiles are fetched from the internet they are stored locally in the cache directory. Before retrieving a new tile from the WMS server, ossimPlanet first checks to see if it is locally available in the cache.

Image encoding

Options for file format and image encoding will appear in this area after the server responds. For example, a server may provide pngs, jpgs, geotiffs as options.
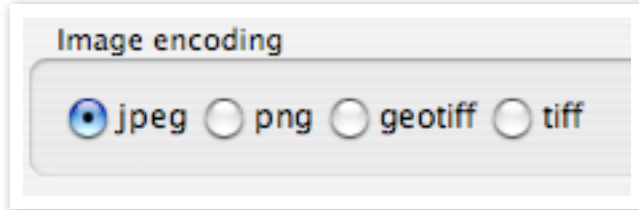
Layers

When the connect button is pressed a WMS GetCapabilities request is made to the remote server. It will answer back with the layers and capabilities that can be provided. The following examples shows the response from the NASA WMS server:

Id	Name	Title	Abstract
▶ 90	MODAL2_E_CLD_WP	Cloud Water Content (8 day – Terra/MODIS)	
▶ 88	MYDAL2_M_CLD_WP	Cloud Water Content (1 month – Aqua/MODIS)	
▶ 86	MODAL2_M_CLD_WP	Cloud Water Content (1 month – Terra/MODIS)	
▼ 84	MYDAL2_D_CLD_RD	Cloud Particle Radius (1 day – Aqua/MODIS)	
...	rgb	RGB Style	
▶ 82	MODAL2_D_CLD_RD	Cloud Particle Radius (1 day – Terra/MODIS)	
▶ 80	MYDAL2_E_CLD_RD	Cloud Particle Radius (8 day – Aqua/MODIS)	
▶ 8	MODAL2_D_AER_OD	Aerosol Optical Thickness (1 day – Terra/MODIS)	
▶ 78	MODAL2_E_CLD_RD	Cloud Particle Radius (8 day – Terra/MODIS)	
▶ 76	MYDAL2_M_CLD_RD	Cloud Particle Radius (1 month – Aqua/MODIS)	
▶ 74	MODAL2_M_CLD_RD	Cloud Particle Radius (1 month – Terra/MODIS)	
▶ 72	MYDAL2_D_CLD_OT	Cloud Optical Thickness (1 day – Aqua/MODIS)	
▶ 70	MODAL2_D_CLD_OT	Cloud Optical Thickness (1 day – Terra/MODIS)	
▶ 68	MYDAL2_E_CLD_OT	Cloud Optical Thickness (8 day – Aqua/MODIS)	
▶ 66	MODAL2_E_CLD_OT	Cloud Optical Thickness (8 day – Terra/MODIS)	
▶ 64	MYDAL2_M_CLD_OT	Cloud Optical Thickness (1 month – Aqua/MODIS)	

Select the layers that you wish to work with. The Add button will add those layers to ossimPlanet.

Add

After selecting the layers that you wish to work with, press the Add button to add them to the Layers Legend in the left panel of the main window.

Close

This button closes the dialog.

Returning to the main window the WMS layers will be displayed in their own category. Disclose triangles can be opened to drill down into the selected layers. By default, added layers are not enabled. Enable the check box to make them active.
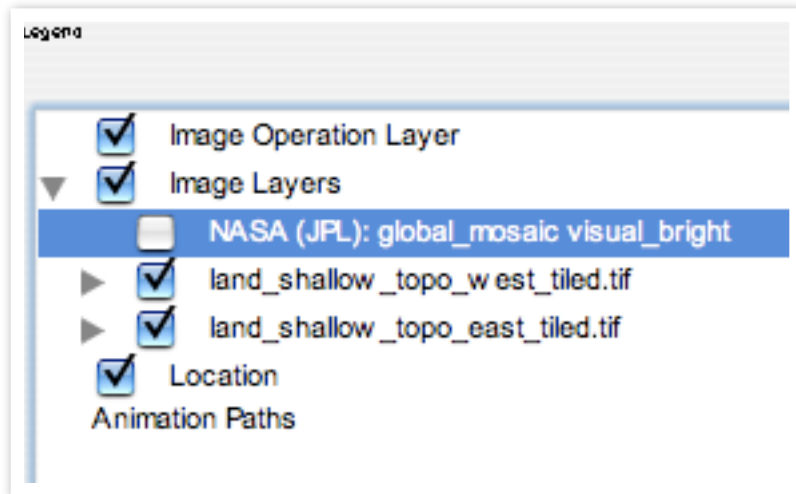
WMS Layers need to be enabled with the checkbox

Image layers are also used to display associated meta data. Meta data tags are automatically parsed and displayed with their associated values in the legend area. Simply open the reveal triangles next to the images to reveal the metadata.
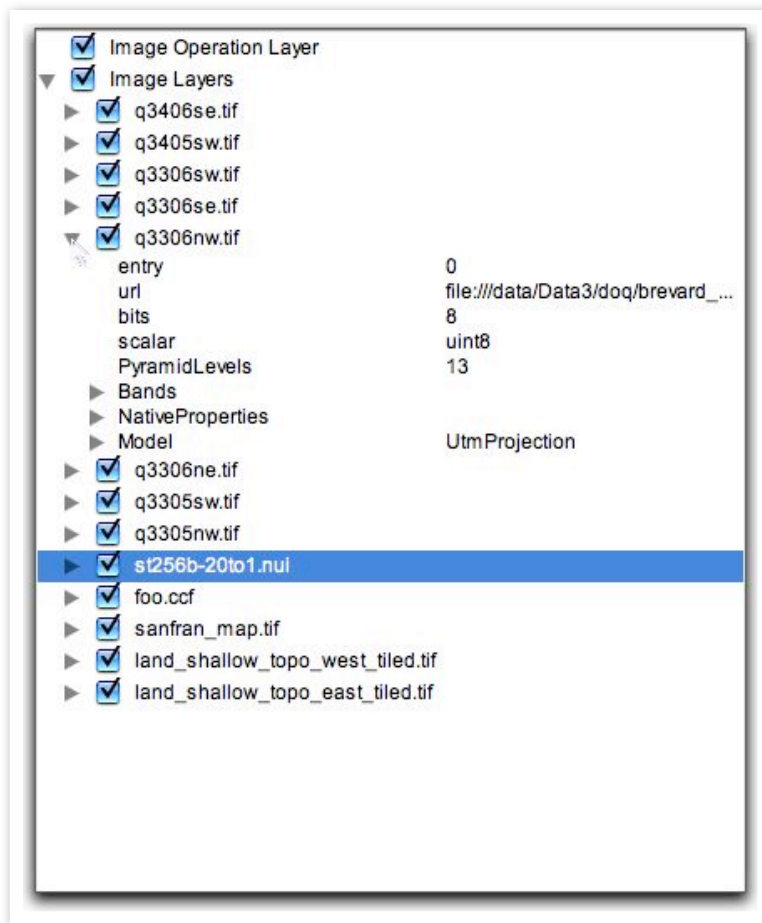
Drag and Drop support
ossimPlanet also supports drag and drop from the desktop into the Layer panel.

Loading WorldWind Servers
Direct downloading from WorldWind Servers is also supported. Included in the distribution is an earth.xml file. This file is located in /Library/Application Support/ossim/files/Worldwind/earth.xml. Opening this file or dragging it into the legend area will open download channels with several WorldWind servers and layers. These layers will be added under Image Layers in a sub-heading named ossimPlanetTextureLayerGroup as shown below. Expand the disclosure triangle to toggle on or off the display of these layers. As you navigate the globe data from these servers will be downloaded and displayed given your viewing area. Note, this also will work in the other included applications - imagelinker and iview.
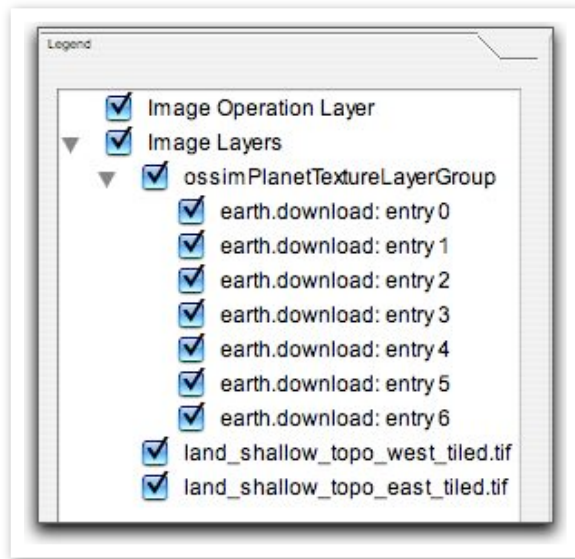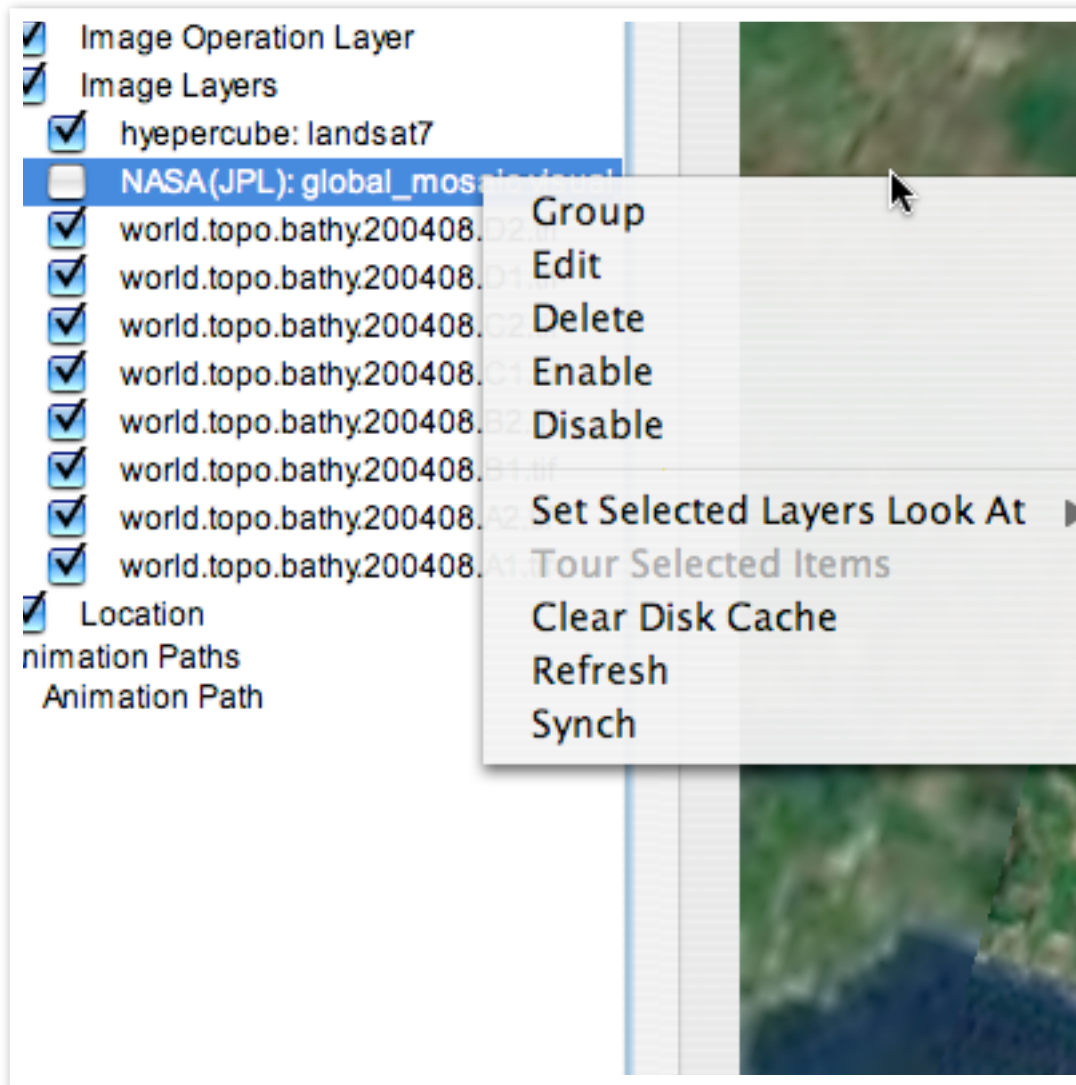
Items in the legend can display additional options. Select an item and press the right mouse key for a pop up menu of commands. Items can be grouped, renamed, deleted, enabled and disabled. Specific view parameters can be associated with each item or group. Forced refresh and sync commands are also available.

Open Session

A Session is an xml file that contains the state of the program including data that has been loaded and the currrent view. The Open Session command retrieves this file from disk, loads the data, and navigates to the saved view. The state of the program is preserved in the session file. In addition to loaded images and external server settings, the current position and any saved animation paths are also preserved.

KML and KMZ files

Placenames saved from Google Earth in either kml or kmz format can now be directly loaded into ossimPlanet. Simply drag and drop the kml or kmz file to the layers area and they will be loaded. Click the disclosure triangle to open the placenames - double click any placename to navigate to that location. Currently kml and kmz files are loaded, parsed, and stored internally within ossimPlanet. Development has just commenced on displaying the various attributes on the planet. Currently Placenames and descriptions with embedded links is functioning. Initial work on LineStyles has also commenced.
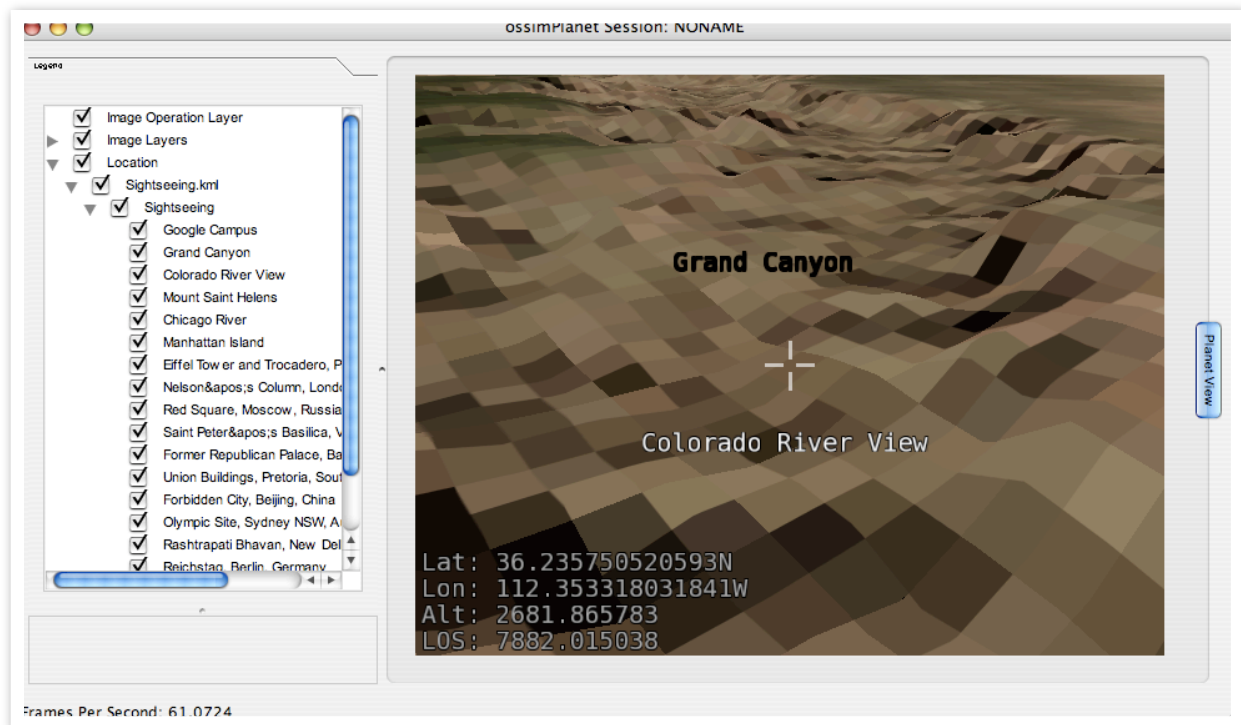
Simple placenames loaded from a kml file

Precision Lightworks Urban Models

Initial support for loading and viewing urban models is currently in this release.
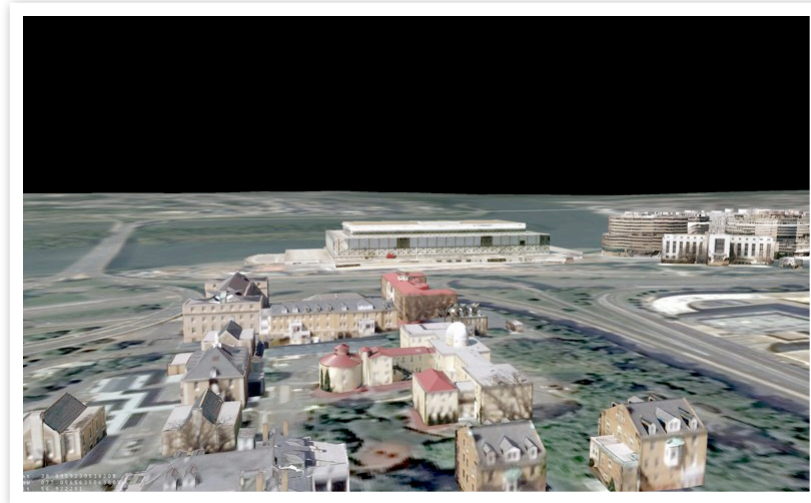
Example urban model courtesy of Precision Lightworks using the Pictometry imaging system.

Additional information about Precision Lightworks can be found at
http://www.precisionlightworks.com . The models are delivered in OpenFlight format with an
origins.txt file indicating the lat/lon origin of each building. Models are scaled and oriented north
up so they can be positioned using a geographic projection. Future plans include expanding model
support to include Collada formats. This will be included as part of the larger support for kml for-
mats. Much of this capability will be enabled with the upcoming OpenSceneGraph 2.0 release.

Additional work needs to be done to manage the complexity and size of the loaded models with a
level of detail strategy.

Testing instructions:

*Move the origins.txt and texture directory into the geom_flt directory. Drag and drop an
origins.txt file to ossimplanet to load. You will probably have to limit the number of models by
editing the origins.txt file.*

Save

The Save command saves a session given the current state and view of the program. The first time it
is run it will prompt the user for a name, subsequent saves will simply overwrite the file with the new
state. Sessions save the current state of the program including loaded data, servers, current view, and
loaded animation paths.

Save As...

The Save As.. command will open a dialog for saving a session and prompt for a new file name. Use
the Save As... command to save additional sessions.

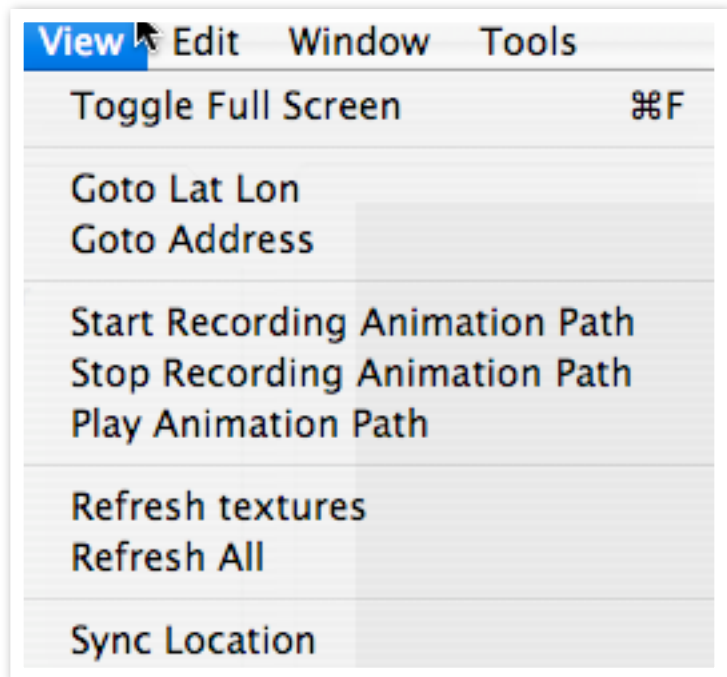### Save View as JPEG
Saves the current view as a jpeg file.

Save View as PNG
Saves the current view as a png file.

Save View as TIFF
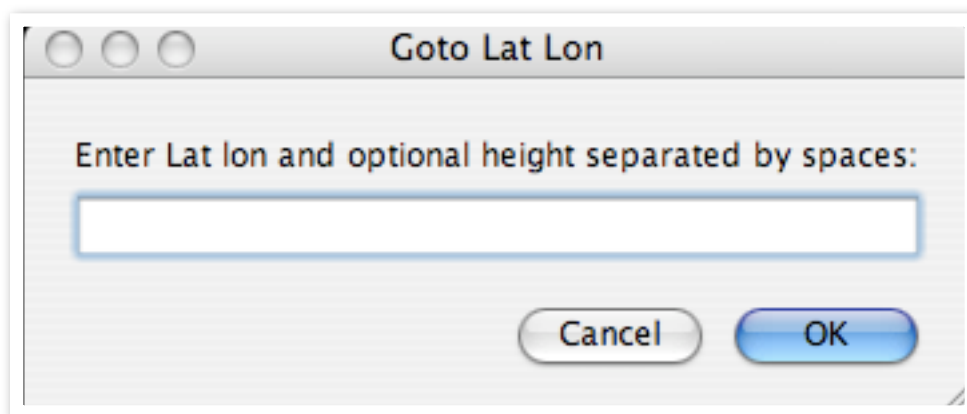Saves the current view as a tiff file.

View Menu

Toggle Full Screen

Selecting this menu item or pressing the Apple F key combination will toggle the display between full screen and windowed view.

Goto Lat Lon

Entering a Latitude, Longitude and optionally an altitude will navigate to that position.

Start Recording Animation Path

Selecting this item will start recording all navigation commands. Recording will continue until the Stop Recording Animation Path menu item is selected.

Stop Recording Animation Path

Stops recording the animation path an adds an animationpath to the animation path category in the left legend. Opening the disclose triangle in this category will expose all recorded animation paths. Note, when you save a session file the currently saved animation path will be written with the session file.

Play Animation Path

Will start looping through the last recorded animation path. Will continue until the user begins to navigate again.

Animation paths are now available in the legend. Their status is saved when session files are saved. A right click on a selected animation path will display a context menu for:
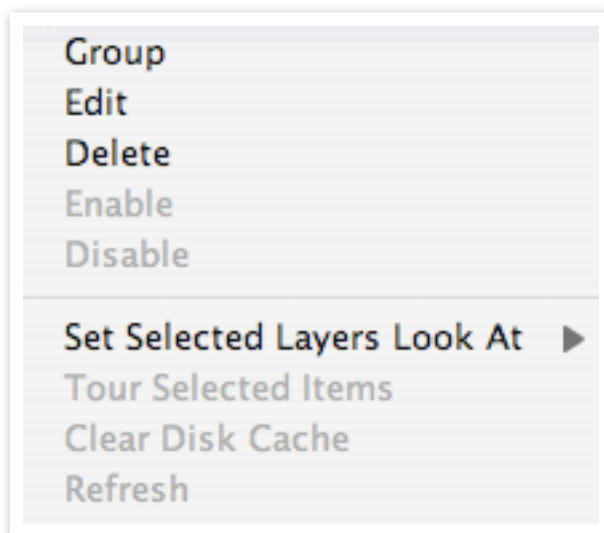
Use this menu to Edit or rename your animation paths and or layer items. Items can now be grouped. Double clicking on an animation path starts playback of the animation path. Double clicking on a image layer takes you to the default view for that layer. Initially the default view is an overview, but that can be changed to an arbitrary view with the Set Selected Layers Look At submenu.

ossimPlanet OSX documentation
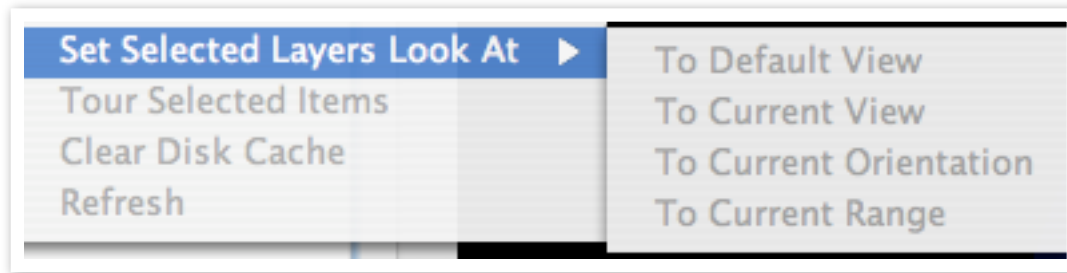
To Default View - bird's eye overview

To Current View - Range and orientation of the currently displayed view.

To Current Orientation - Saves roll, pitch, and yaw of the camera

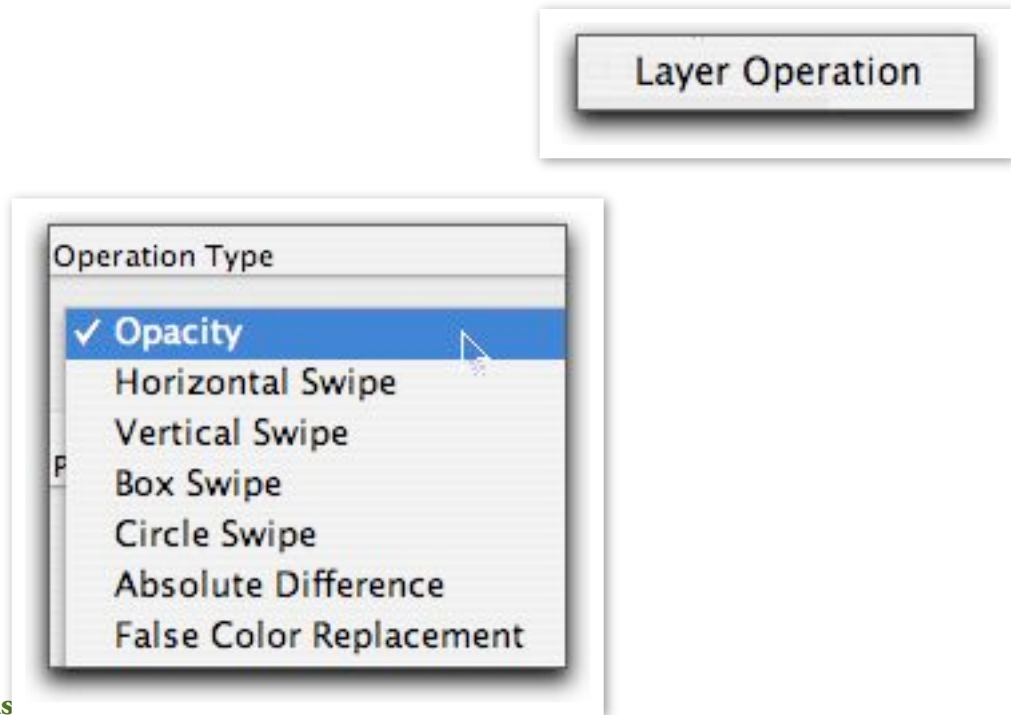To Current Range - Saves distance to target (eyepoint)

Refresh Textures

Refresh All

Sync Location

This sends a goto location command out any enabled broadcast navigation channels. The receiving ossimPlanet will then smoothly navigate to the location.

Edit menu

Layer Operations

This menu item implements various layering transitions in ossimPlanet.

These include the various swipes, blends, and change detection algorithms that are shown in the dialog pop up menu shown below. All of these operations are performed in the the Graphics Processing Unit (GPU) and operate on multiple OpenGL textures.

The Layers in the Legend panel are divided into two sub-categories - Reference and Layer. Individual image layers can be arbitrarily ordered and moved between these layer categories. ossimPlanet collapses each category into OpenGL textures for the operations.

Top

Selecting this option will display only those layers that have been positioned in the layers operations subfolder in the Legend panel.
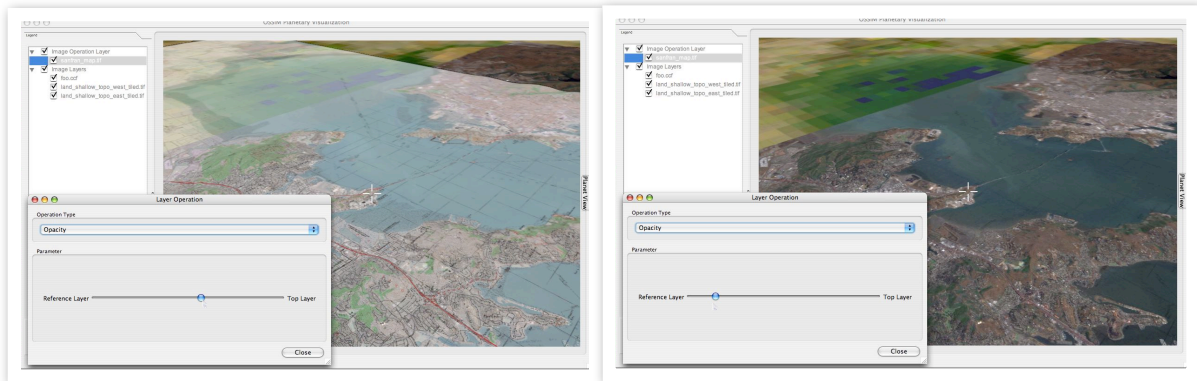
Reference

Selecting this option will display only those layers in the reference subfolder of the Legends panel.

Opacity

The Opacity of the operations layer is adjusted with the slider performing a blending operation with the reference texture.
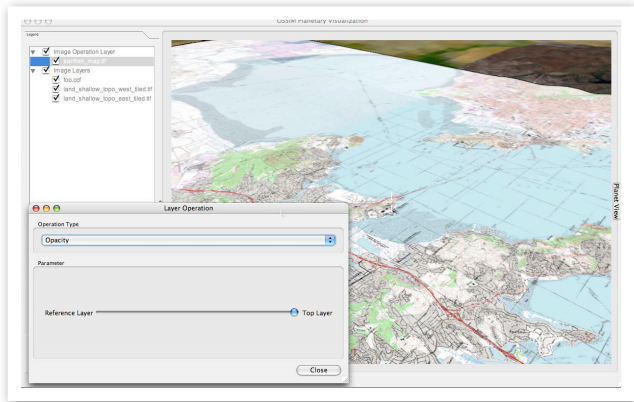
The map layer is totally opaque with the slider control on the right. Moving the slider back and forth will change the opacity of the top layer revealing the reference layer underneath.

Blending set so that the reference layer dominates the blend.

Horizontal Swipe

The application contains several swipe modes for revealing the reference layers under the operations layer. The Horizontal swipe mode moves a horizontal edge back and forth over the two textures as shown in the two examples below:
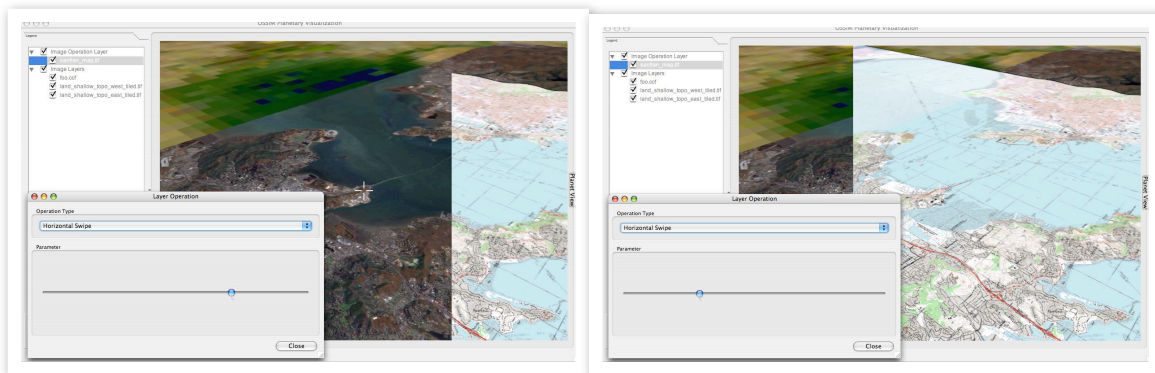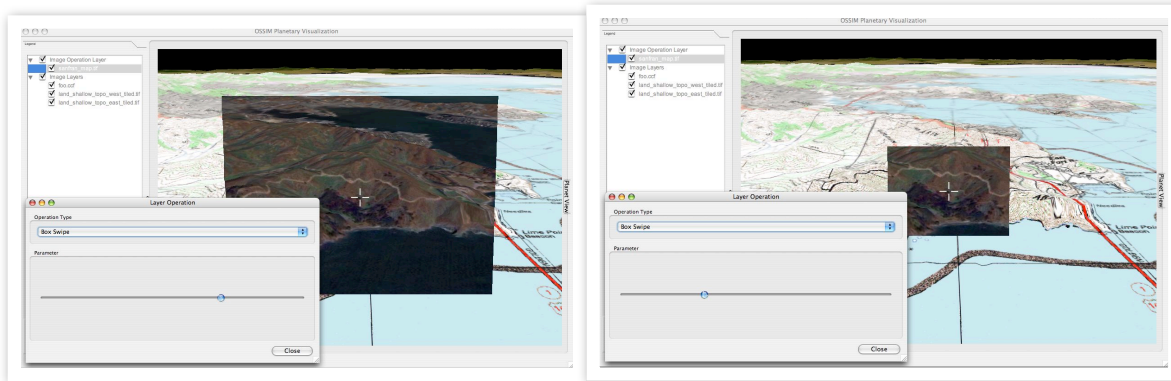

Vertical Swipe

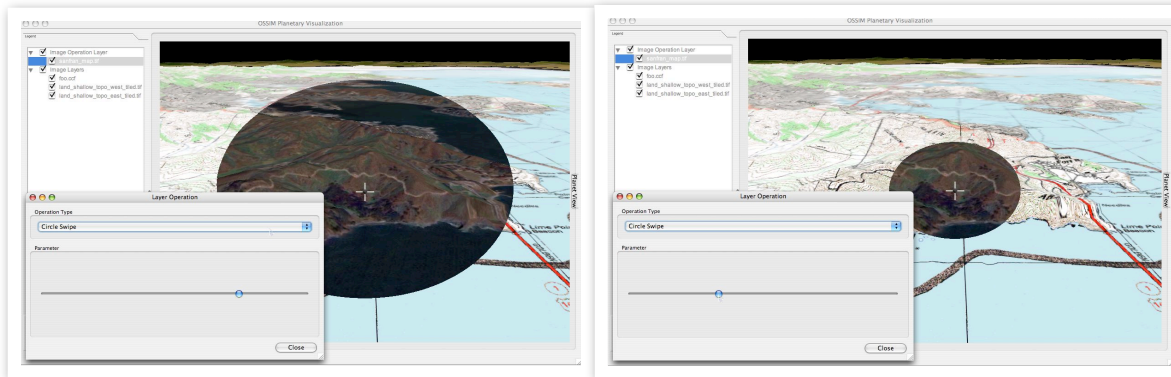The vertical swipe operates in a similar fashion with a vertical edge.
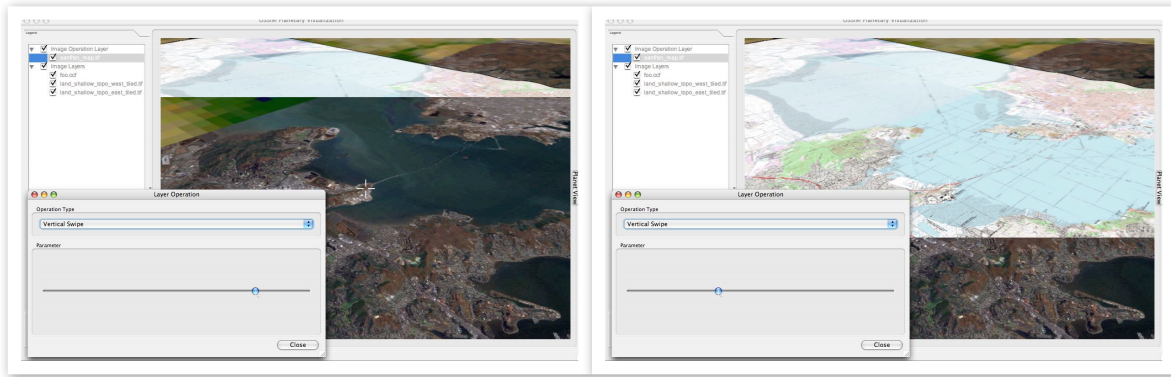
Box Swipe

The box swipe mode sets up a rectangular reveal area at the center of the view display. Moving the slider enlarges and collapses the rectangular reveal area.


Circle Swipe

The circular swipe mode sets up a circular reveal mask that expands and collapses as the slider is adjusted.

Absolute Difference

The absolute difference mode performs a simple pixel subtraction between the top and reference layers and displays the deltas between the channels. Therefore if the top and bottom images are equal the result would be a black image.
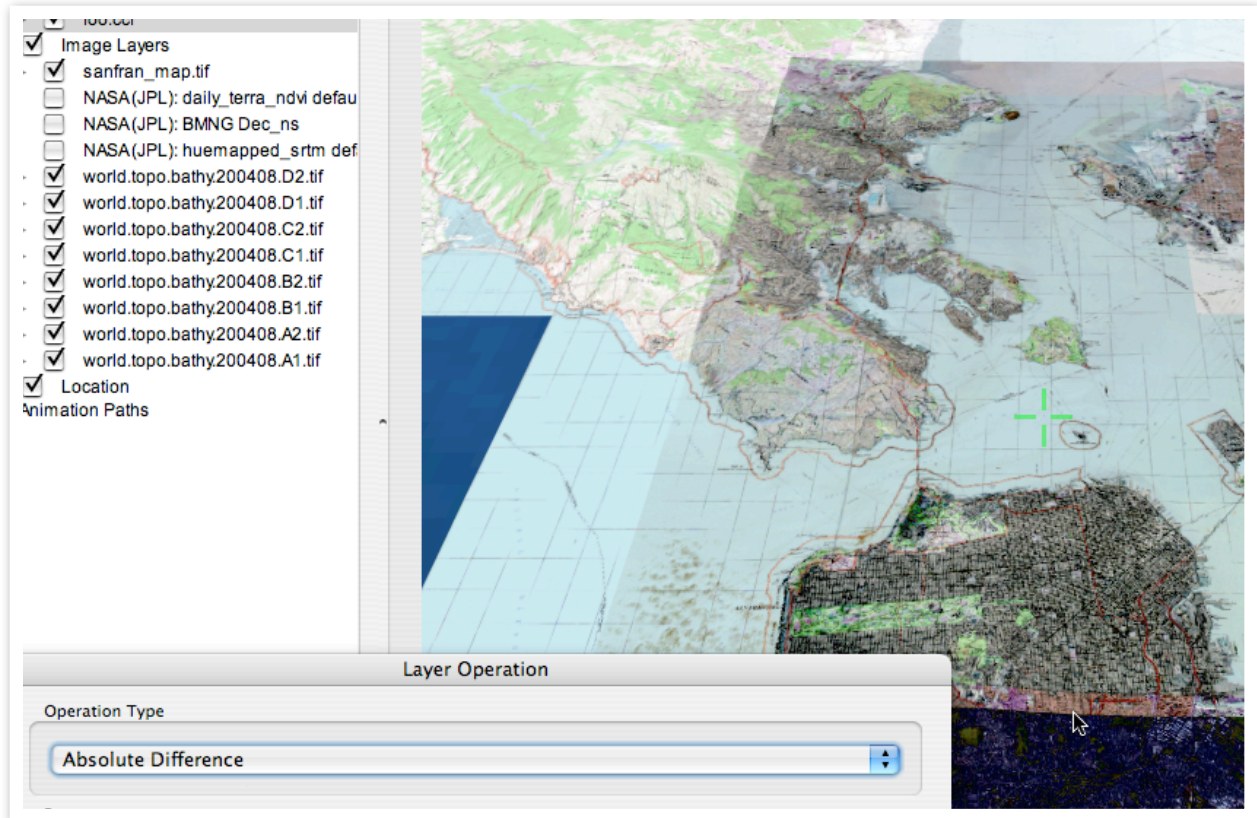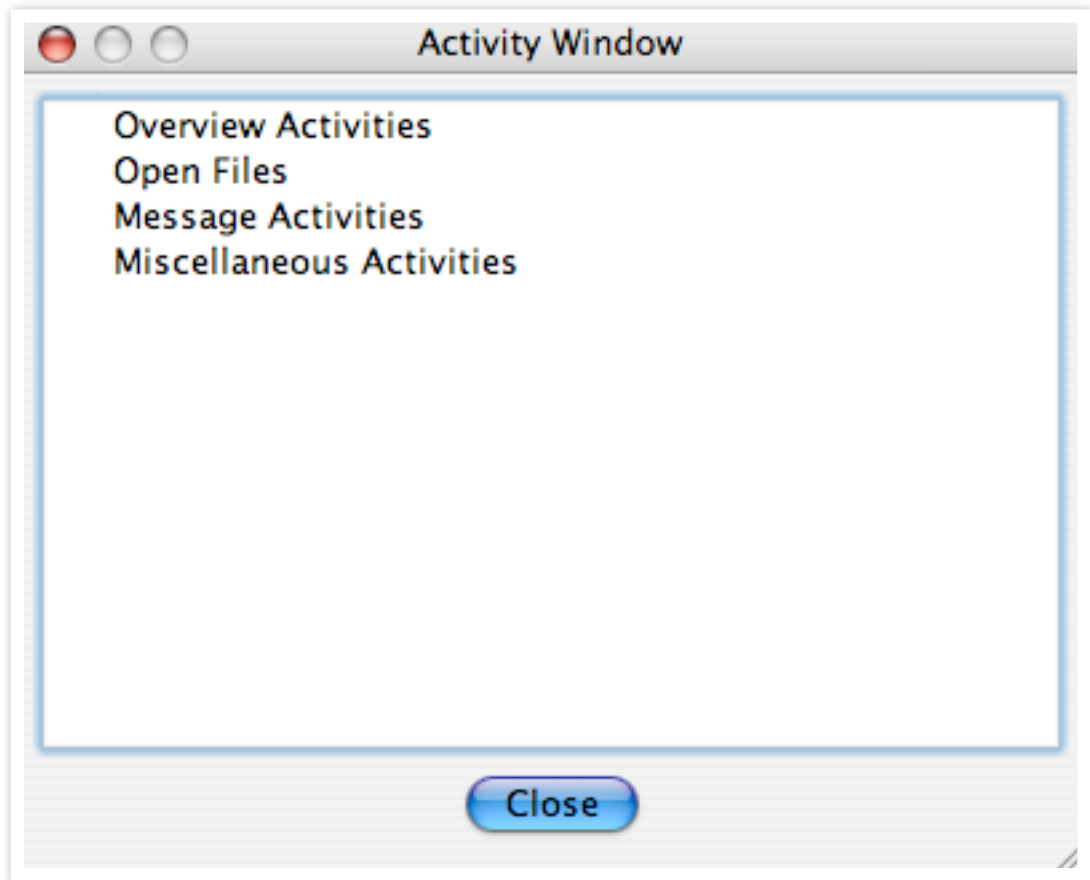

False Color

The false color mode is constructed by converting the reference and top layers into grey scale and mapping the takes the gray scale of the top layer and puts it into the green channel of the resulting image.

red - gray scale of bottom

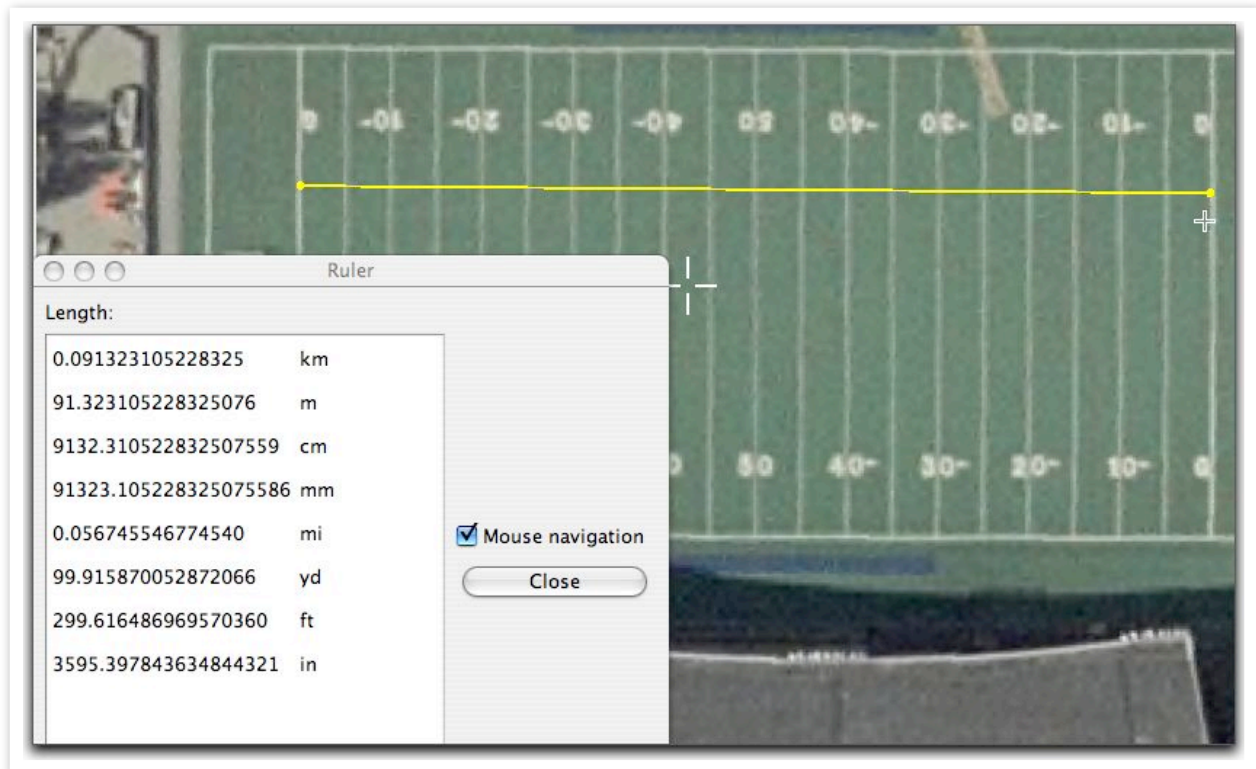green - gray scale of top

blue - gray scale of bottom

Activity

This window shows activity status of various background operations.

The Ruler menu item places ossimPlanet into mensuration mode. Two points can be selected and the geographic intersections with the planet will be used to calculate the distance in between.

In the above example two clicks were made on each goal line. The dialog displays the calculated distance in various units. When Mouse navigation is selected the user clicks at the desired end points. If Mouse navigation is not selected - drag and release between the two points to indicate the line. The close button will terminate the ruler mode and return to normal navigation.

System Locations - MacOSX

Default data sets for imagery and elevation, and dynamically loaded plugins are installed in standards system locations.   These locations should be used to add default elevation trees, background textures, and new loadable plugins.

/Library/Application Support/ossim

    geoids

        geoid1996

    elevation

        link to top of elevation tree

        general_raster

            strmplus

    images

        reference

            files or links

            bluemarble earth backdrop data

    plugins

        libossimgdal_plugin.dylib

        libossimnui_plugin.dylib

        libossimreg_plugin.dylib

        libossimworldwind_plugin.dylib

    files

        Worldwind

            earth.xml

    planet

        binds.act

~/Library/Application Support/ossim

    elevation

    images

ossimPlanet OSX documentation

        reference

    kml

    planet

        sessions

        wms

On Linux the same directory structure is located in a .ossim file in the user home.

About OSSIM

ossimPlanet is part of the OSSIM open source software project located at http://www.ossim.org .

About the Large Data JCTD

The Large Data JCTD is a three-year initiative that will demonstrate the integration of technologies and operational concepts to significantly improve the deployed joint warfighter's situational awareness by enabling rapid access, integration, and display of very large heterogeneous data with special emphasis on fusing geospatially and temporally referenced data. The effort will conduct spiral demonstrations leading to Joint Military Utility Assessments (JMUA) for this advanced "large data-to-the-warfighter" technology concept, and transition the technology to organizations and/or programs of record. To the extent possible, open technologies and open source software will be used in the development of this capability.

About RadiantBlue Technologies Inc

Founded in 2005, RadiantBlue Technologies is a small business headquartered in Colorado Springs with regional offices in Chantilly, VA and Melbourne, FL.

RadiantBlue develops and integrates intelligent information technology applications that support our customers' high priority needs and emerging capabilities in countering terrorism and protecting our country.

RadiantBlue provides development and support for the OSSIM baseline.

Additional information is available at http://www.radiantblue.com

Version	Date	Comments
0.1	18 oct 2006	Initial release coinciding with 1.6.6rc7 - mlucas
0.2	25 Jan 2007	Updating to the 1.6.6rc16 release - mlucas
0.3	8 Feb 2007	Added alerts and remote navigation
0.4	2 Mar 2007	tcp/udp communications, new manipulator modes, set path and loop (rc19)
0.5	14 Mar 2007	Shift modes, initial kml/kmz file support 1.6.6rc21 release
0.6	13 Apr 2007	PLW models, CADRG fixes, tuning, xcode rework rc22
0.7	2 Jul 2007	Animation paths, new WMS interface, legend grouping and editing, kml/kmz improvements
0.8	Aug 14, 2007	WMS proxy server, data and navigation sync, improved broadcast, listen dialogs. Elevation general raster support. Improved fade text for kml. (version 1.6.9)