

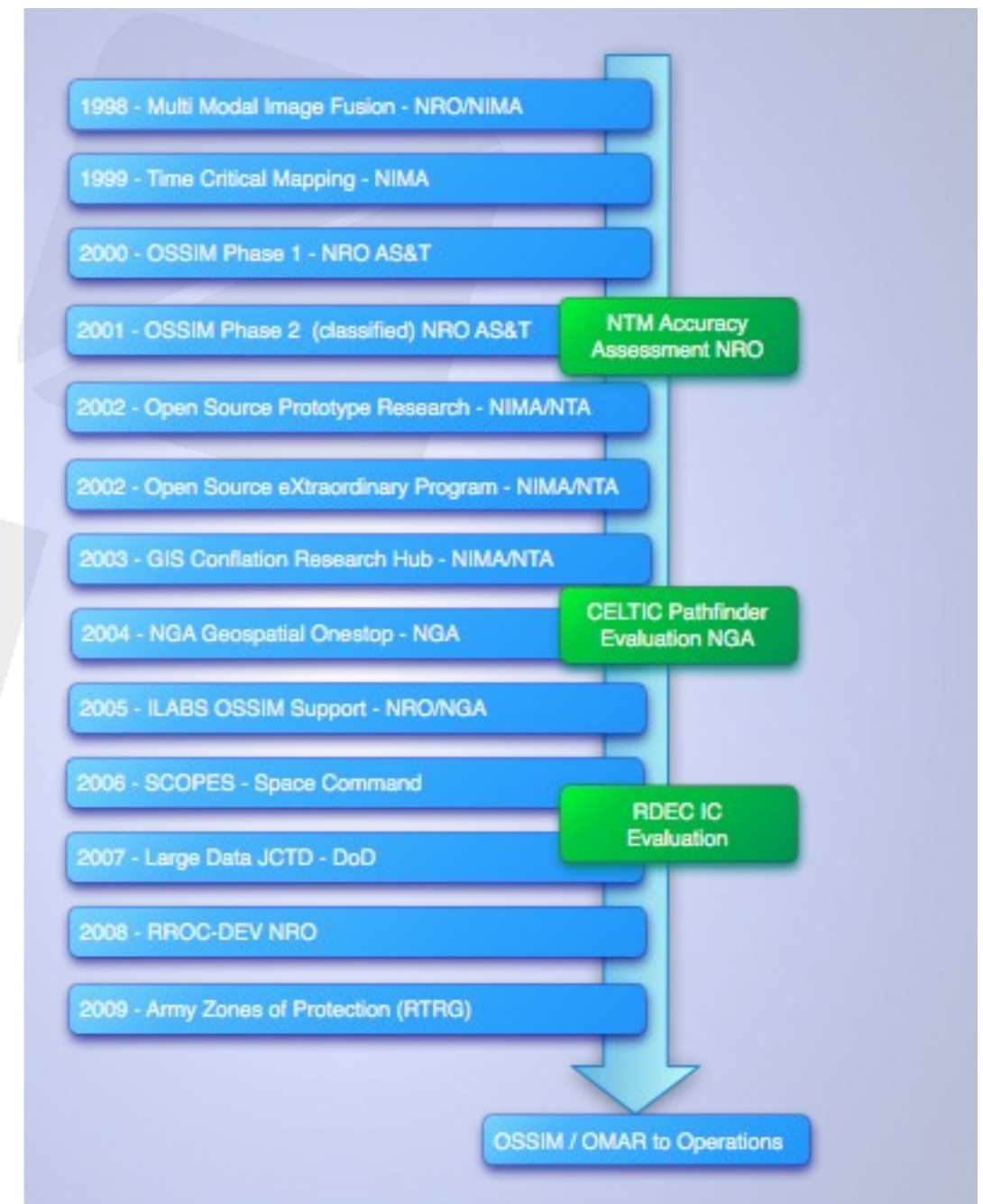
FOSS4G 2010
Barcelona
SEP 6th - 9th

Open Technology Division (OTD)

- Open Source Software
- Open Standards
- Professional Services for Integrated Solutions
- OTD Policy for US Government
- MIL-OSS conferences mil-oss.org



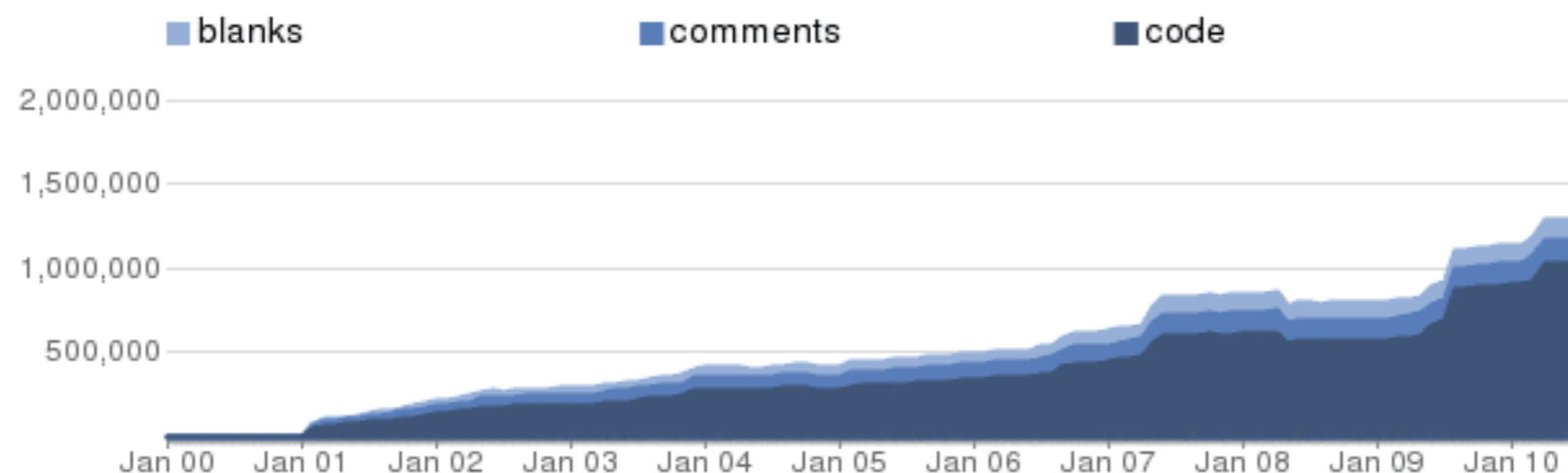
- US Government Sponsorship
- Classified Analysis
- CELTIC Pathfinder evaluation
- DoD Open Technology Development
- Large Data JCTD
- Operational Support



Open Source Business Model

- Projects fund Professional Services for support
- Inter project/agency collaboration by default
- No License fees for distribution
- Leverage from open standards and projects
- Open Source provides the best technical evolution path

- Advanced Open Source C++ Remote Sensing and Geo-spatial processing
- Started in 1998 hosted on remotesensing.org and ossim.org
- Used in numerous commercial and government solutions
- Cross Platform – Linux, Windows, Mac
- One of the founding projects for the Open Source Geo-spatial Foundation osgeo.org



- Photogrammetric Accuracy
- Non-Destructive, Parameter based image chain processing
- Radiometric preservation through the chain
- Automatic terrain correction, projection transformation, view synchronization
- External Plugin support

OSSIM Reviews

- Used in the Intelligence and Defense Communities
- NGA Certified Map Projections and Transformations
- RPC Universal Sensor Model validated
- Validated in NGA CELTIC Pathfinder 2003
- Classified Plugins and Services
- RDEC IC Evaluation 2008
- OSGeo Incubation Graduation 2009



OSSIM Sponsorship

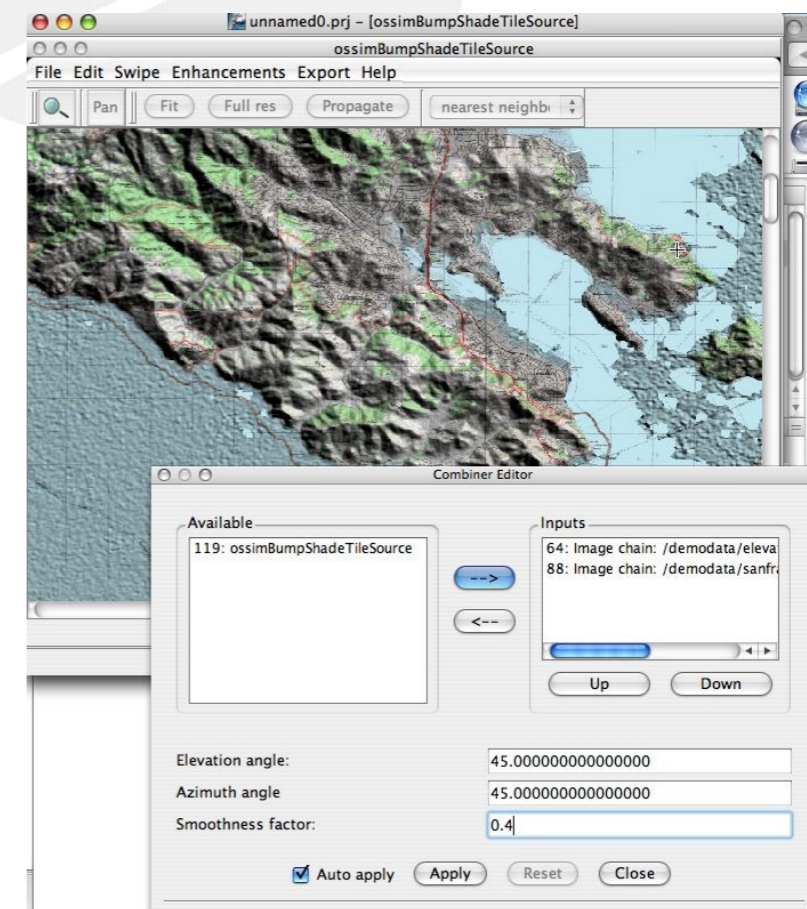
Commercial

- RadiantBlue Technologies
- ImageLinks
- SPADAC
- Intelligence Data Systems
- L3 Corporation
- Titan Corporation
- Observera
- SAIC
- ITT
- Hewlett Packard

Government

- National Reconnaissance Office
- Naval Research Laboratory
- National Geospatial-Intelligence Agency
- Army Topographic Engineering Center
- SPAWAR
- Department of Defense
- US Geological Survey
- Naval Expeditionary Forces
- British Ministry of Defence
- Other

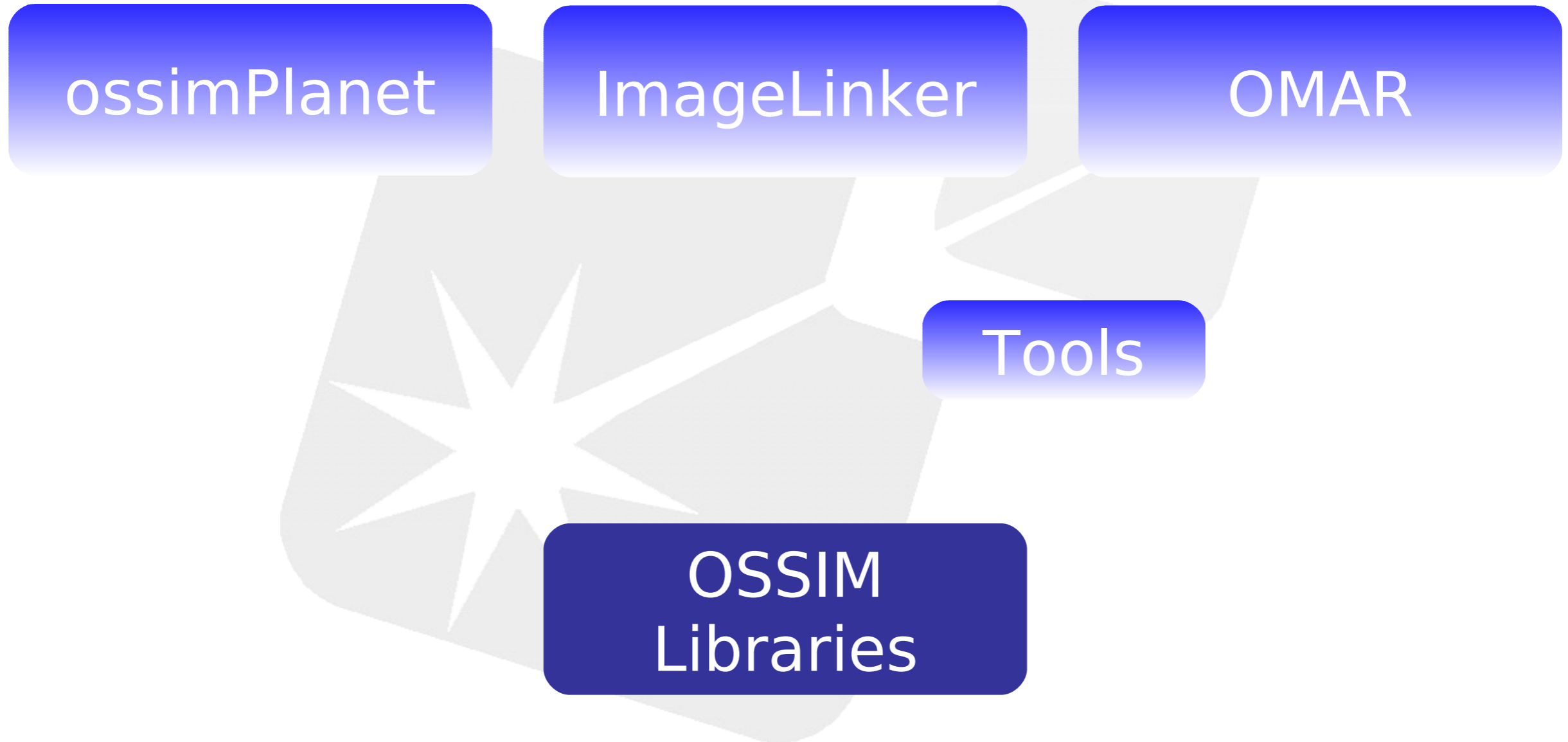
- NRO/NGA ILabs
- NASA
- DoD Large Data JCTD - ossimPlanet, OMAR
- Earthware (SPADAC)
- IED Detection (Observera)
- NASIC Comet/Optics (Ball Aerospace)
- NASIC (SAIC)
- Visibility Masks (L3-Communications)
- QinteQ
- Katrina Response (katrina.telascience.org)
- Satellite Ground Stations
- SPAWAR - Raven
- Aegis - Modeling and Simulation
- European Space Agency
- HP/EDS AMPA Program (British MOD)
- Telascience



Open Source Leverage

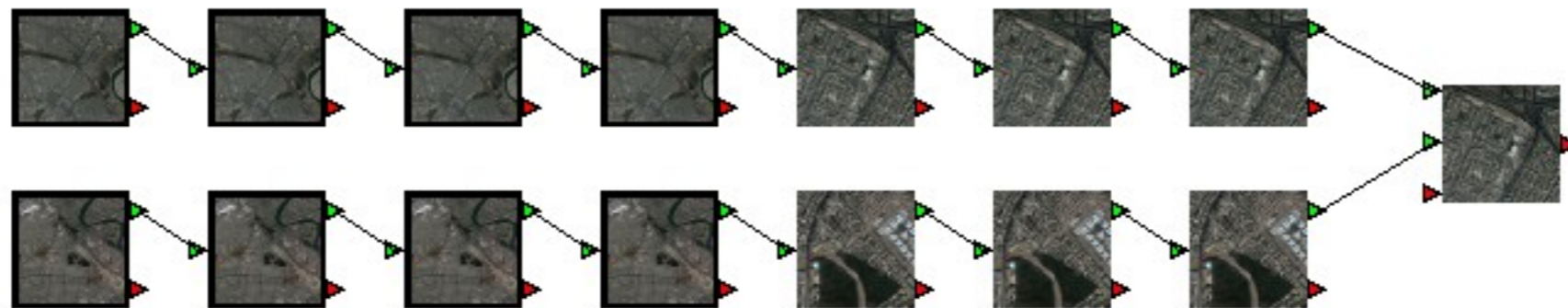
- Software Libraries
- Tools
- Systems
- Relational Databases
- Visualization





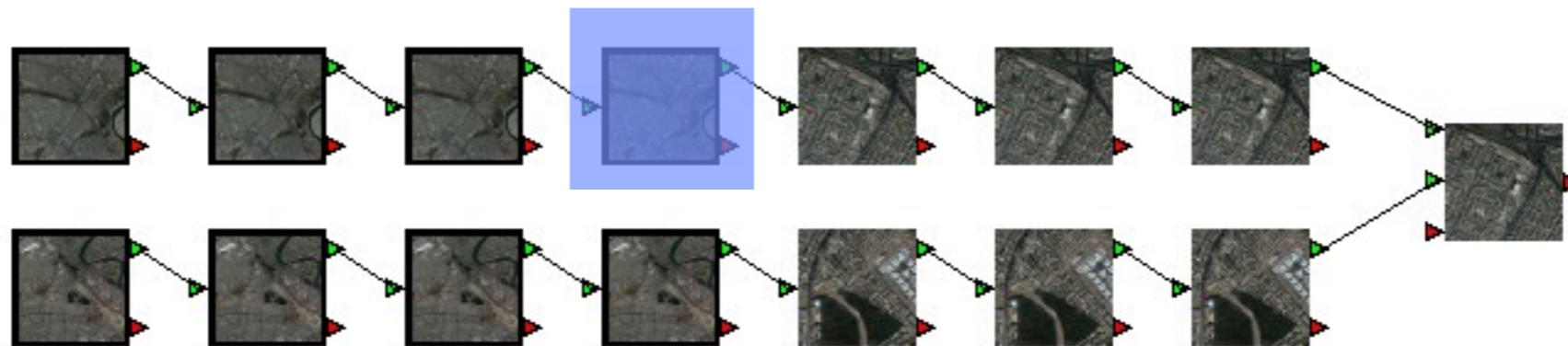
OSSIM Libraries

- Dynamically Connectable Image Chains
- Source > Models > Filters > Combiners > Output
- Parameter Based, Non-Destructive Processing



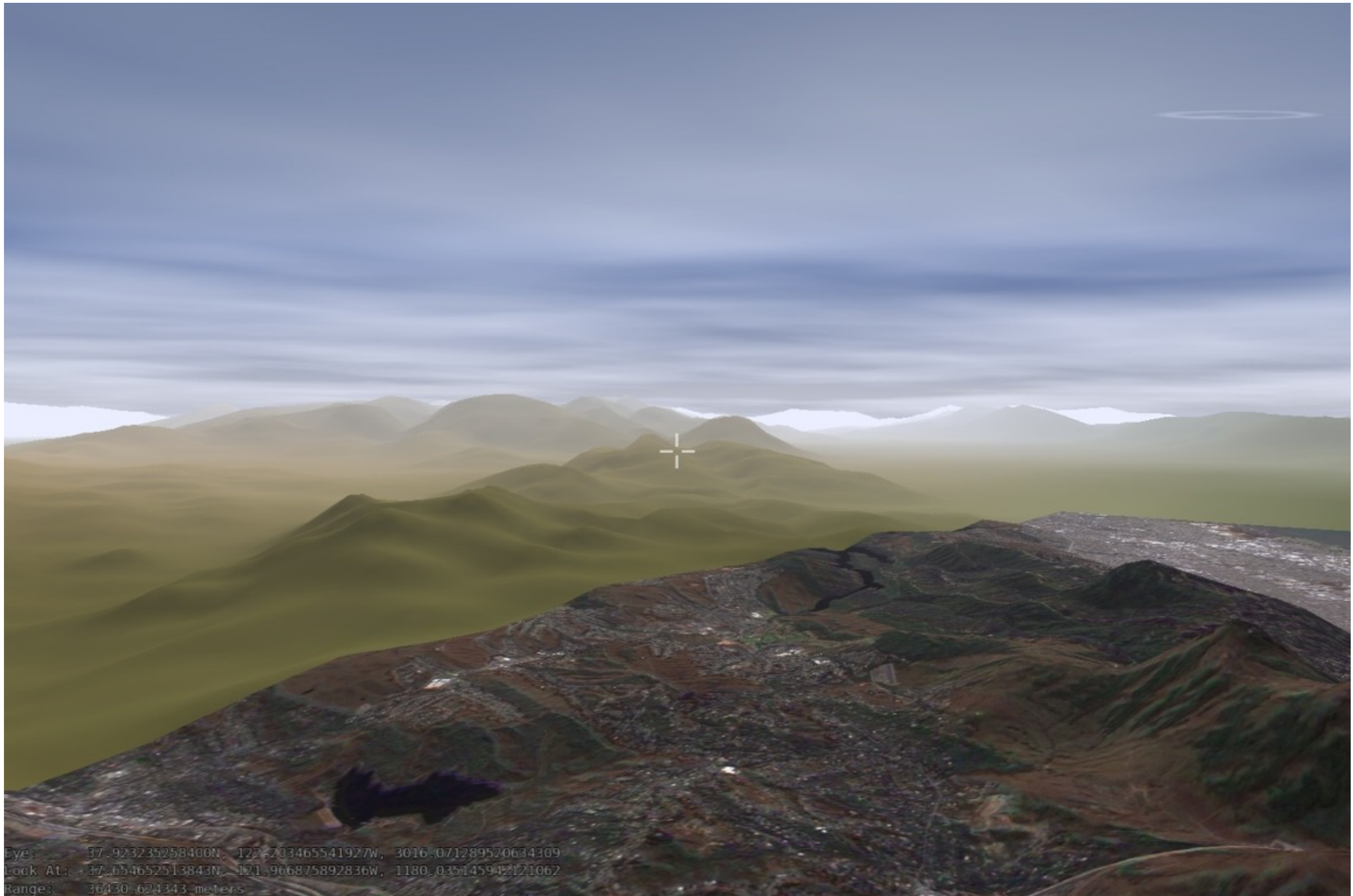
OSSIM Libraries

- Supports External Plugins
- Dynamically Loaded at Runtime
- Simple keyword based interface

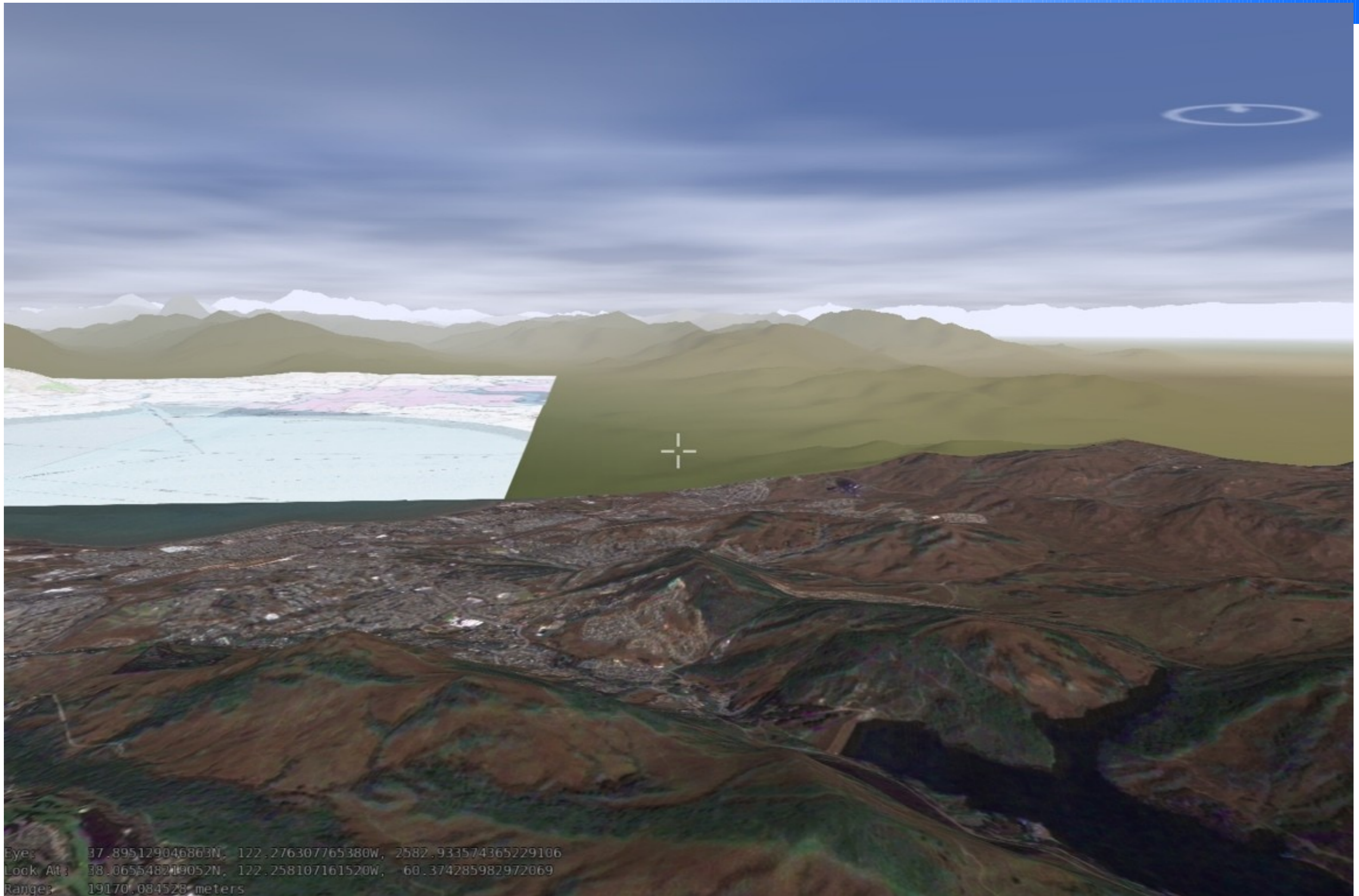


- Similar to Google Earth and NASA World Wind, except..
- Open Source Software runs on multiple platforms
- Photogrammetric Accuracy
- Native file access, does not require precooked layers
- OGC WMS compliance for Distributed access





Eye: 37.923235258400N, 122.703465541927W, 3016.071289520634309
Look At: 37.654652513843N, 121.966875892836W, 1180.035145947121062
Range: 36430.624343 meters



Eye: 37.895129046863N, 122.276307765380W, 2582.933574365229106
Look Alt: 38.065548219052N, 122.258107161520W, 60.374285982972069
Range: 19170.084528 meters



ossimPlanet Session: NONAME

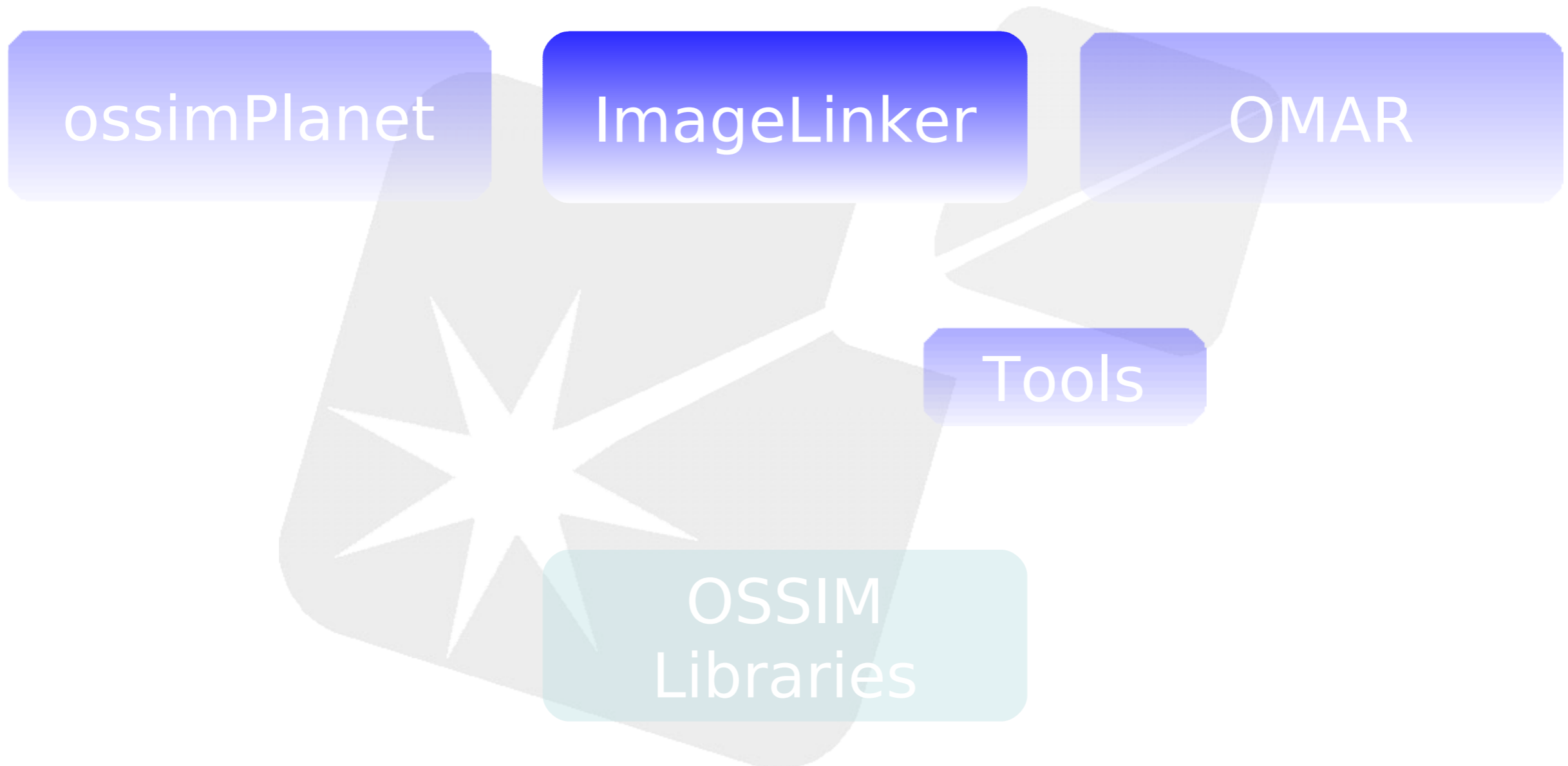
Legend

- Image Operation Layer
- Image Layers
 - korea_15_0006.tif
 - korea_15_0025.tif
 - korea_15_0001.tif
 - korea_15_0014.tif
 - korea_15_0020.tif
 - korea_15_0016.tif
 - korea_15_0011.tif
 - korea_15_0009.tif
 - korea_15_0023.tif
 - korea_15_0010.tif
 - korea_15_0015.tif
 - korea_15_0019.tif
 - korea_15_0002.tif
 - korea_15_0005.tif
 - korea_15_0004.tif
 - korea_15_0017.tif
 - korea_15_0008.tif
 - korea_15_0013.tif
 - korea_15_0018.tif
 - korea_15_0024.tif
 - korea_15_0021.tif
 - korea_15_0012.tif
 - korea_15_0022.tif
 - korea_15_0003.tif
 - korea_15_0007.tif
 - korea_16_0009.tif
 - korea_16_0005.tif
 - korea_16_0002.tif

Planet View

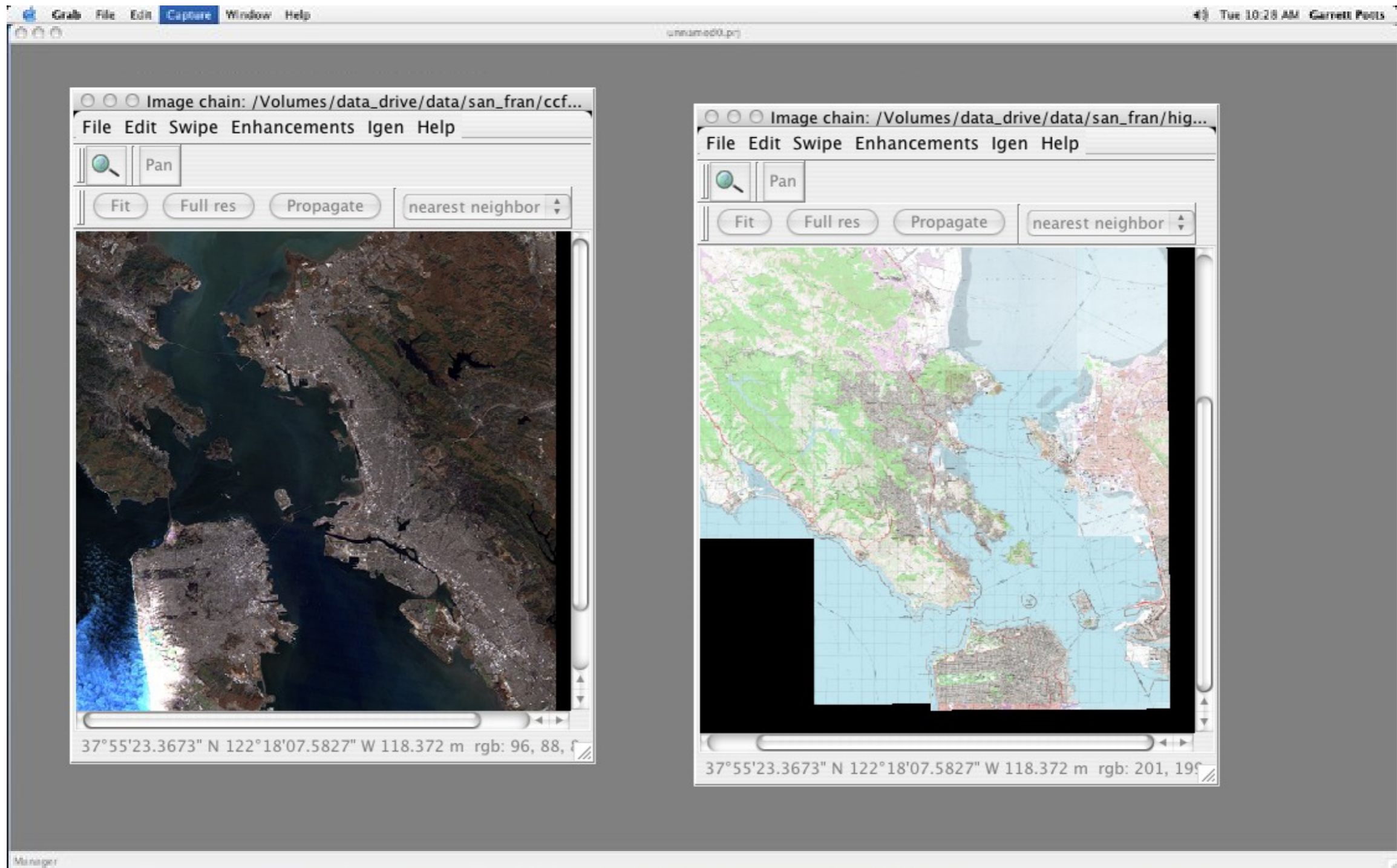
Lat : 36.3530220 N
 Lon : 128.2201498 E
 Alt : 670512.500595
 LOS : 863659.234380

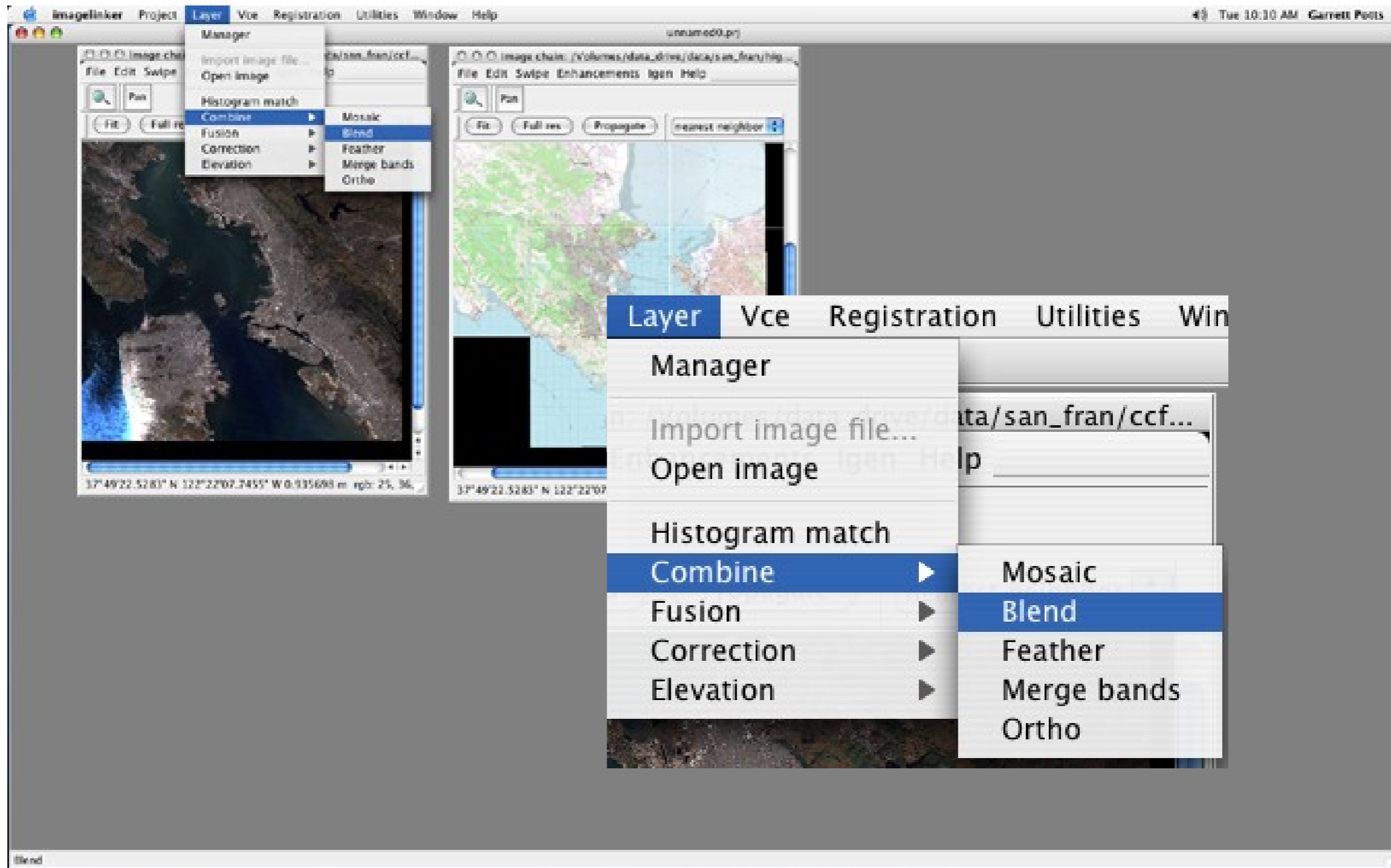
Frames Per Second: 60.2228 Total Texture Size = 76079.6 MB Total transferred = 2154.94 MB Percentage = 2.83248%



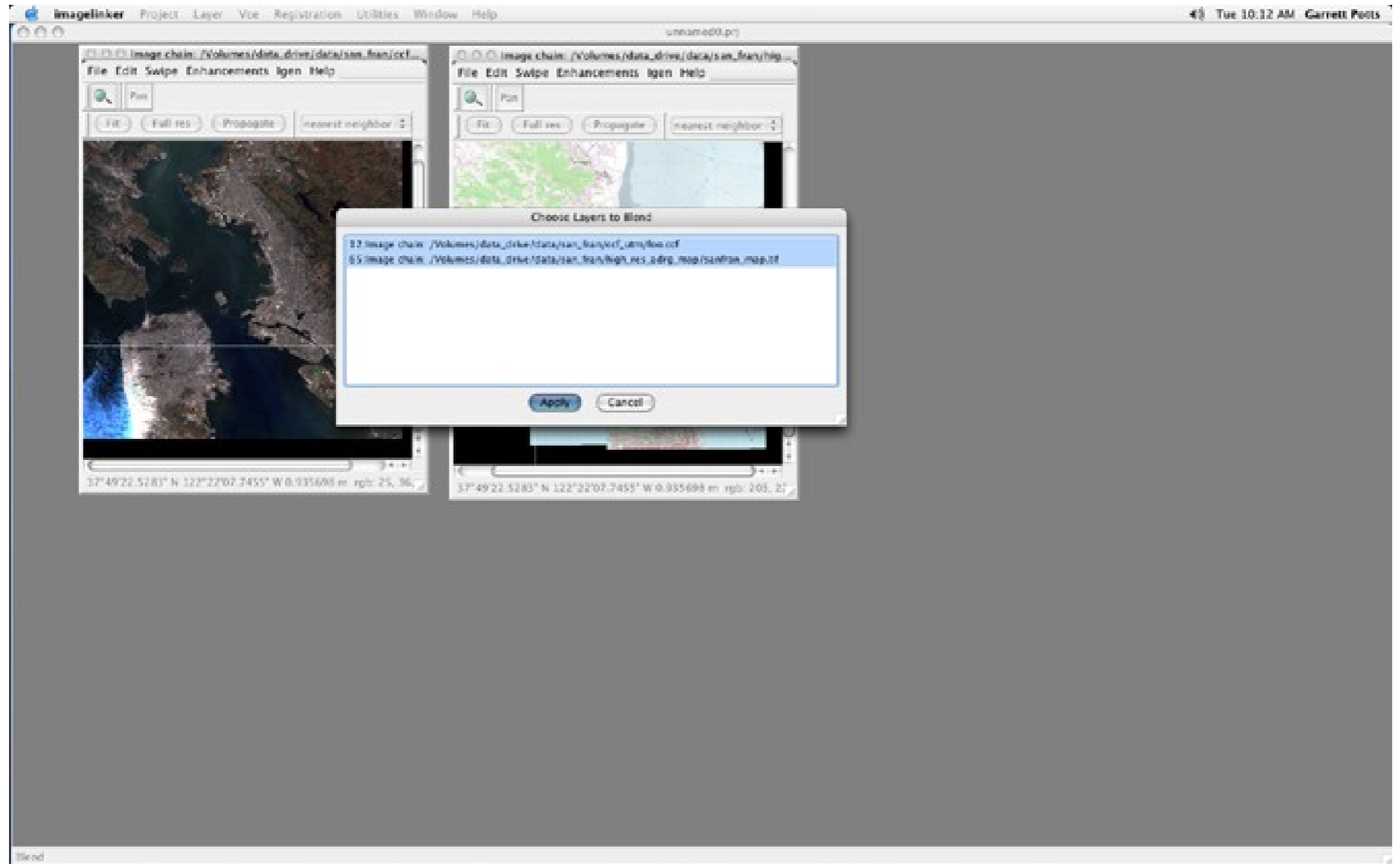
- Built on OSSIM Library (Open Source)
- Dynamically Connectable Objects and Functions
- Provides Rapid Prototyping of Custom Geo-Spatial Image Chains

Open Image Executed

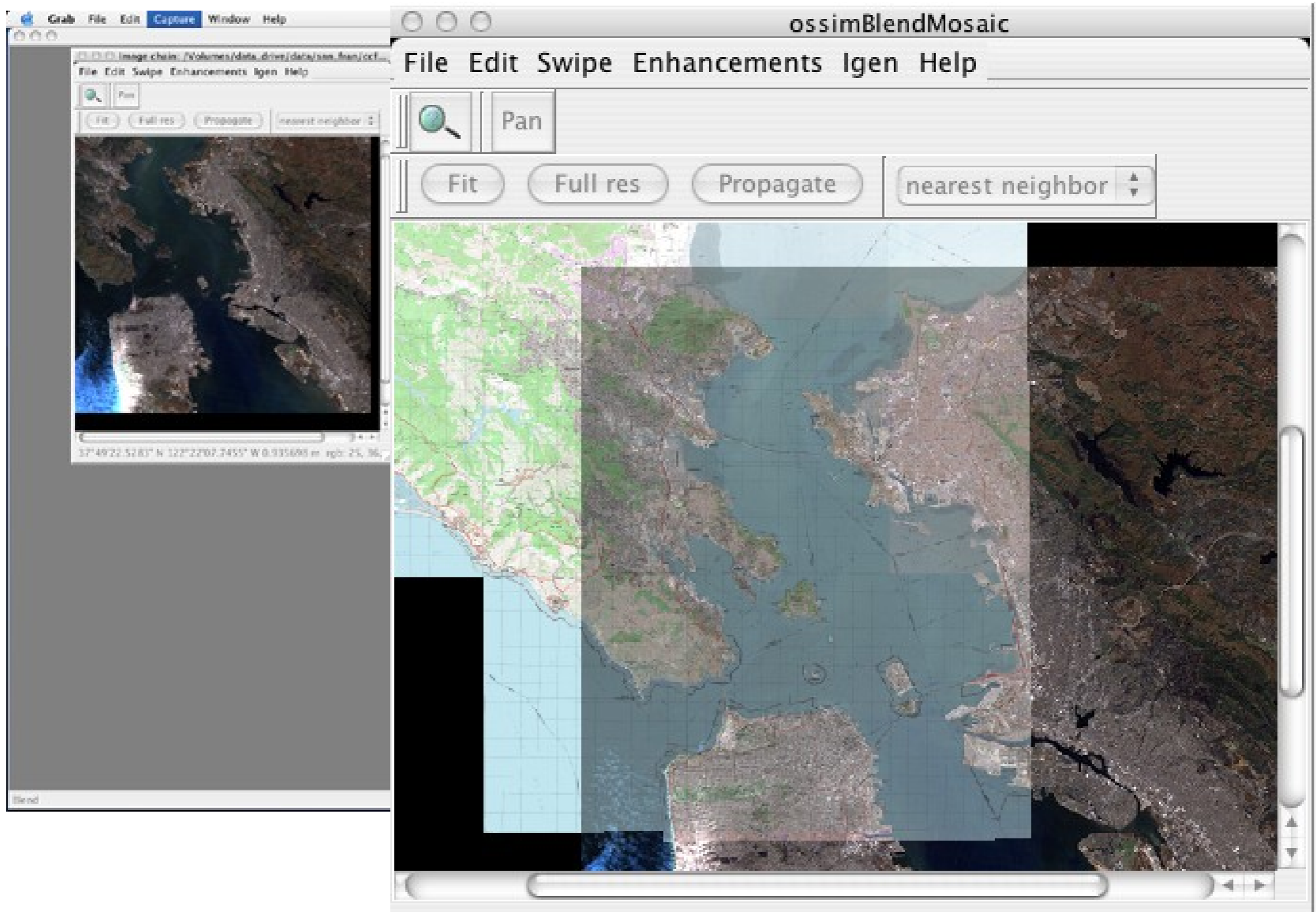




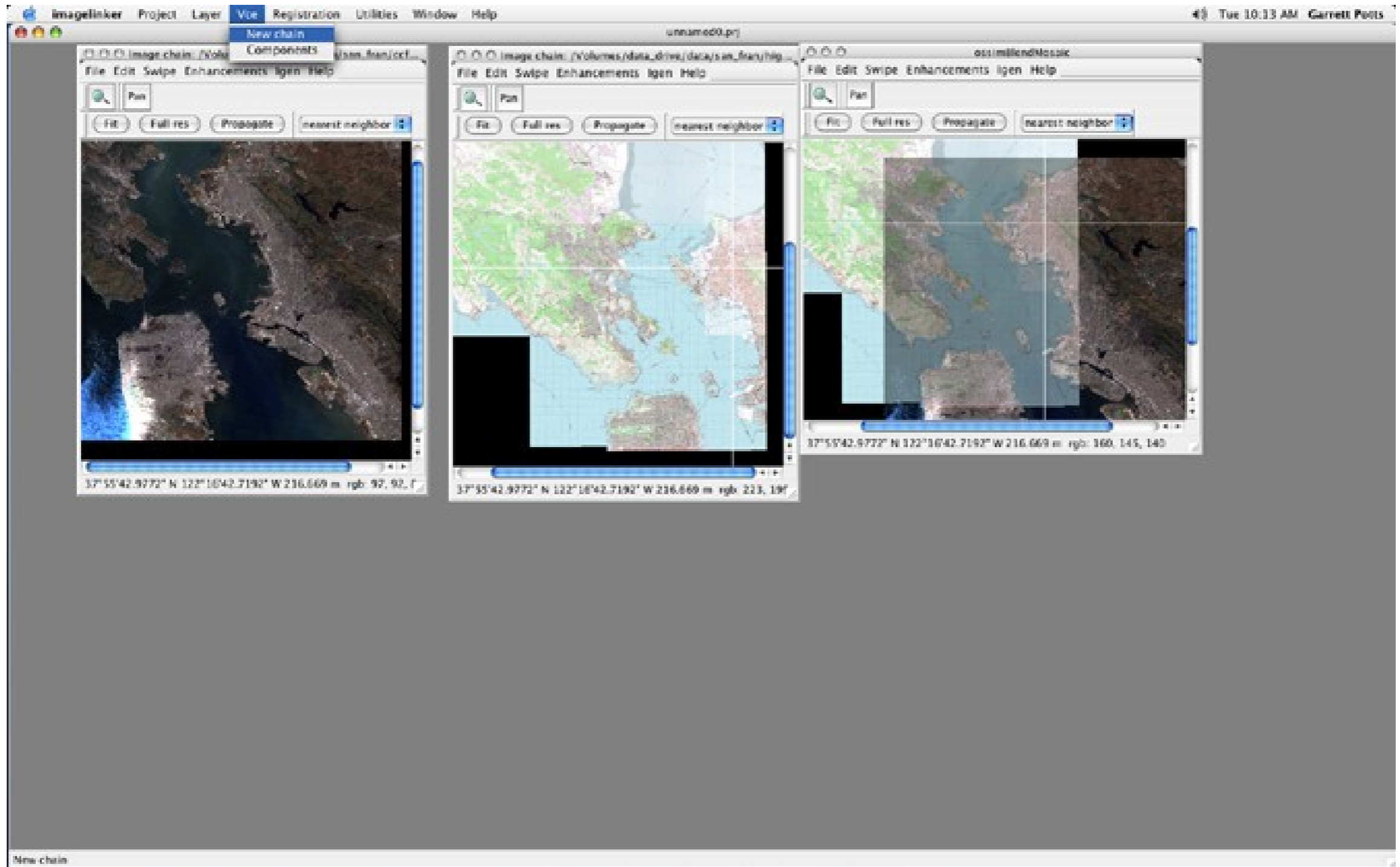
Blend Layer Selection



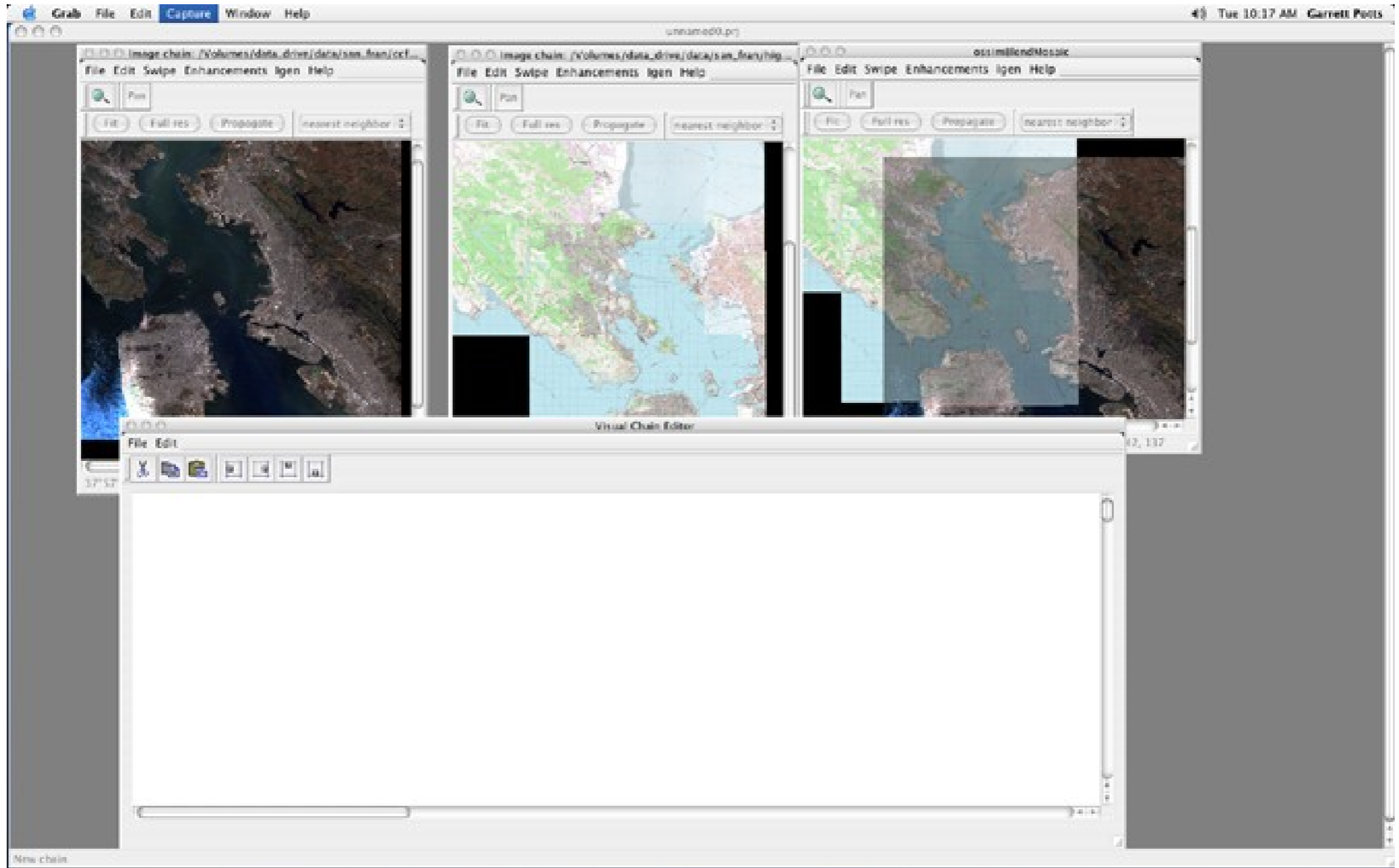
Blend Option Executed



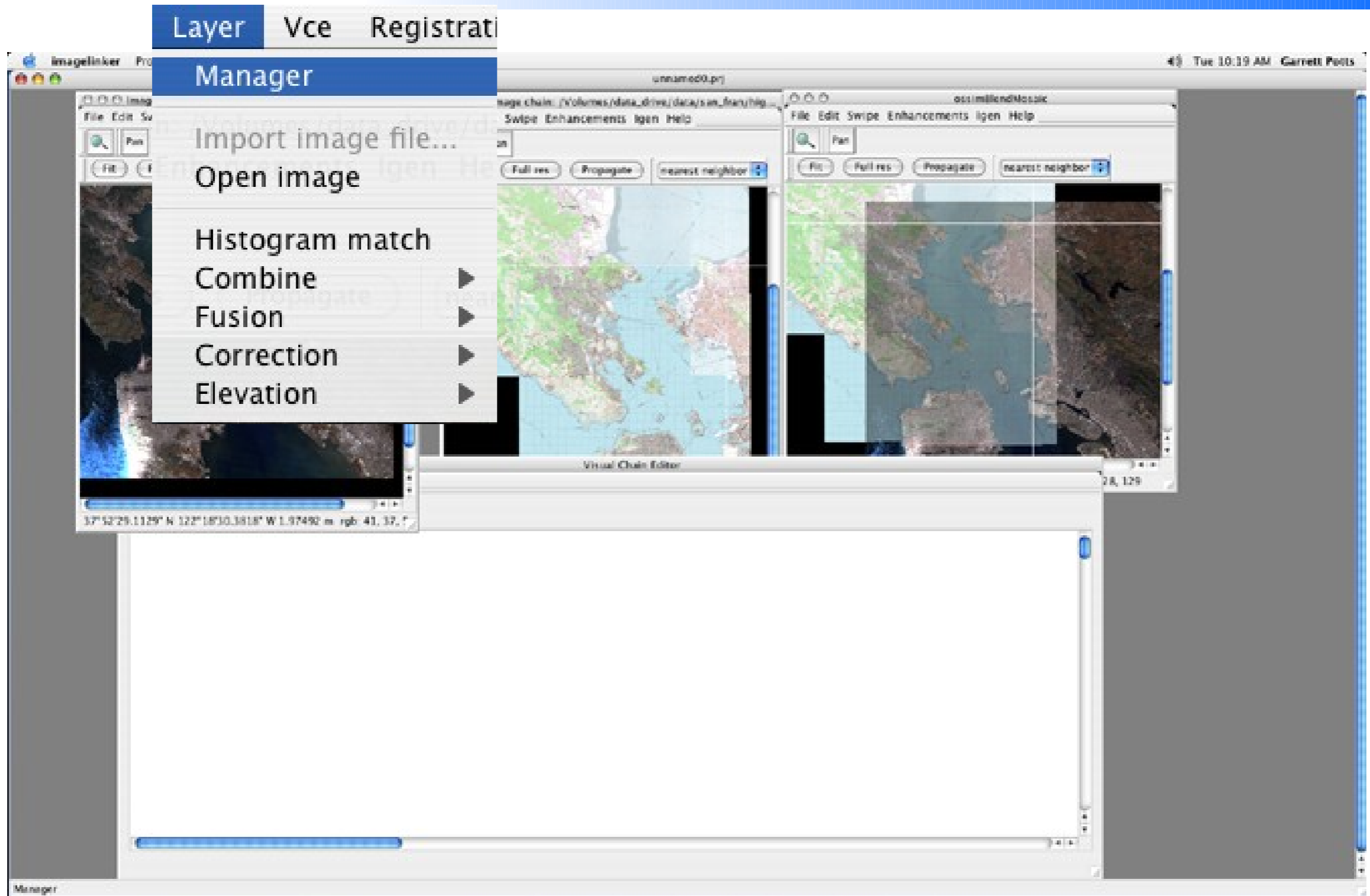
New Chain Menu



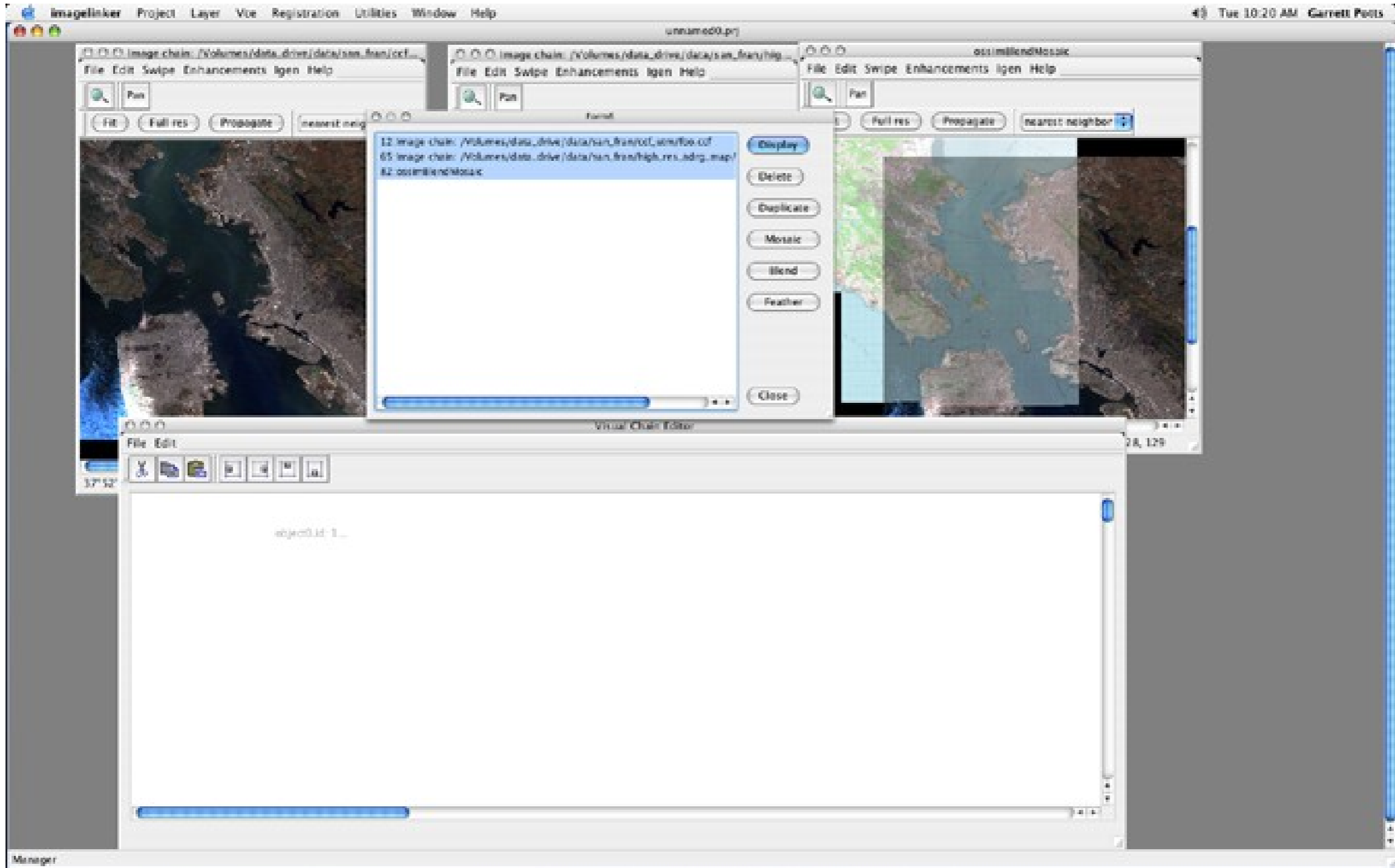
New Chain Executed



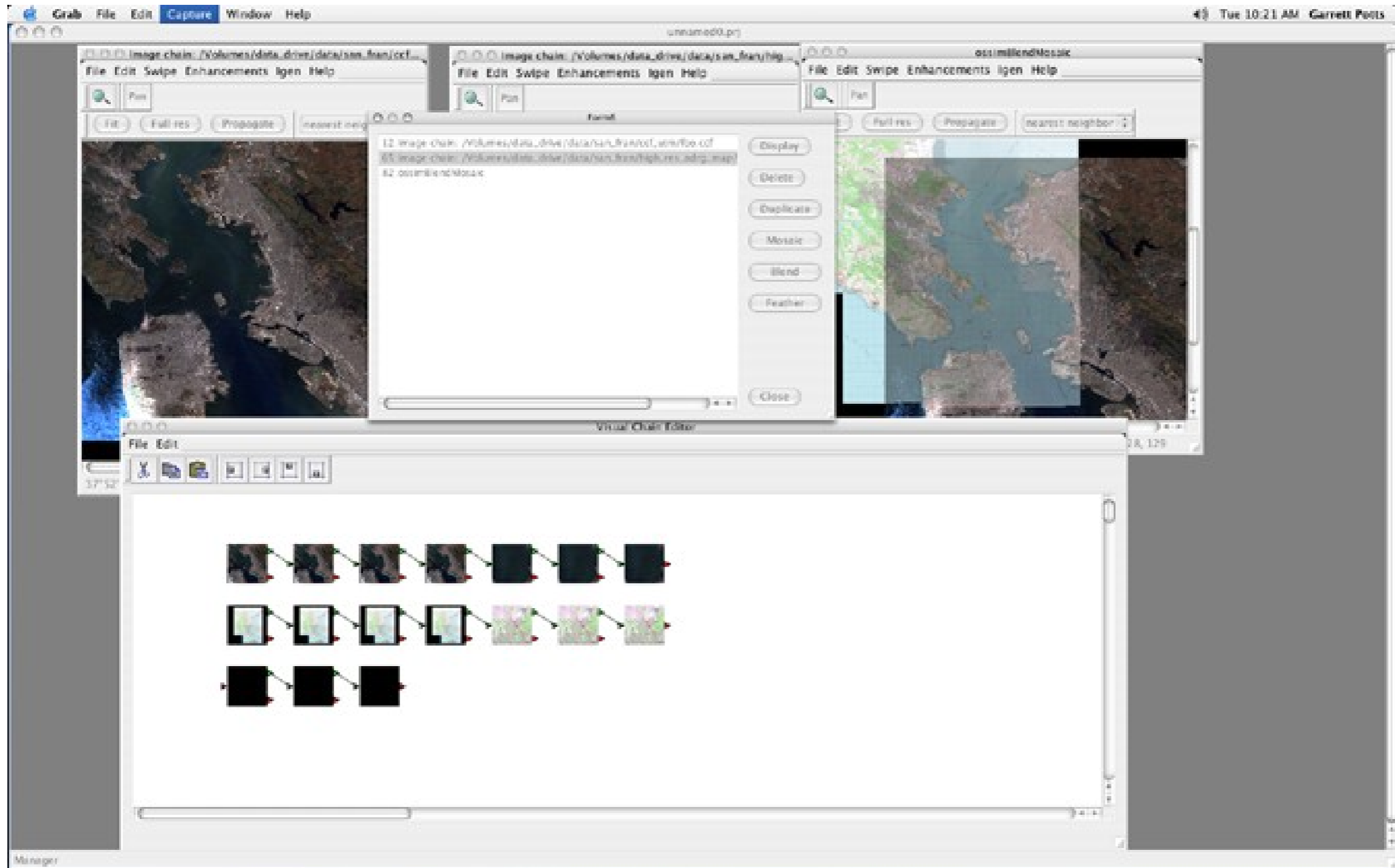
Layer Manager Menu



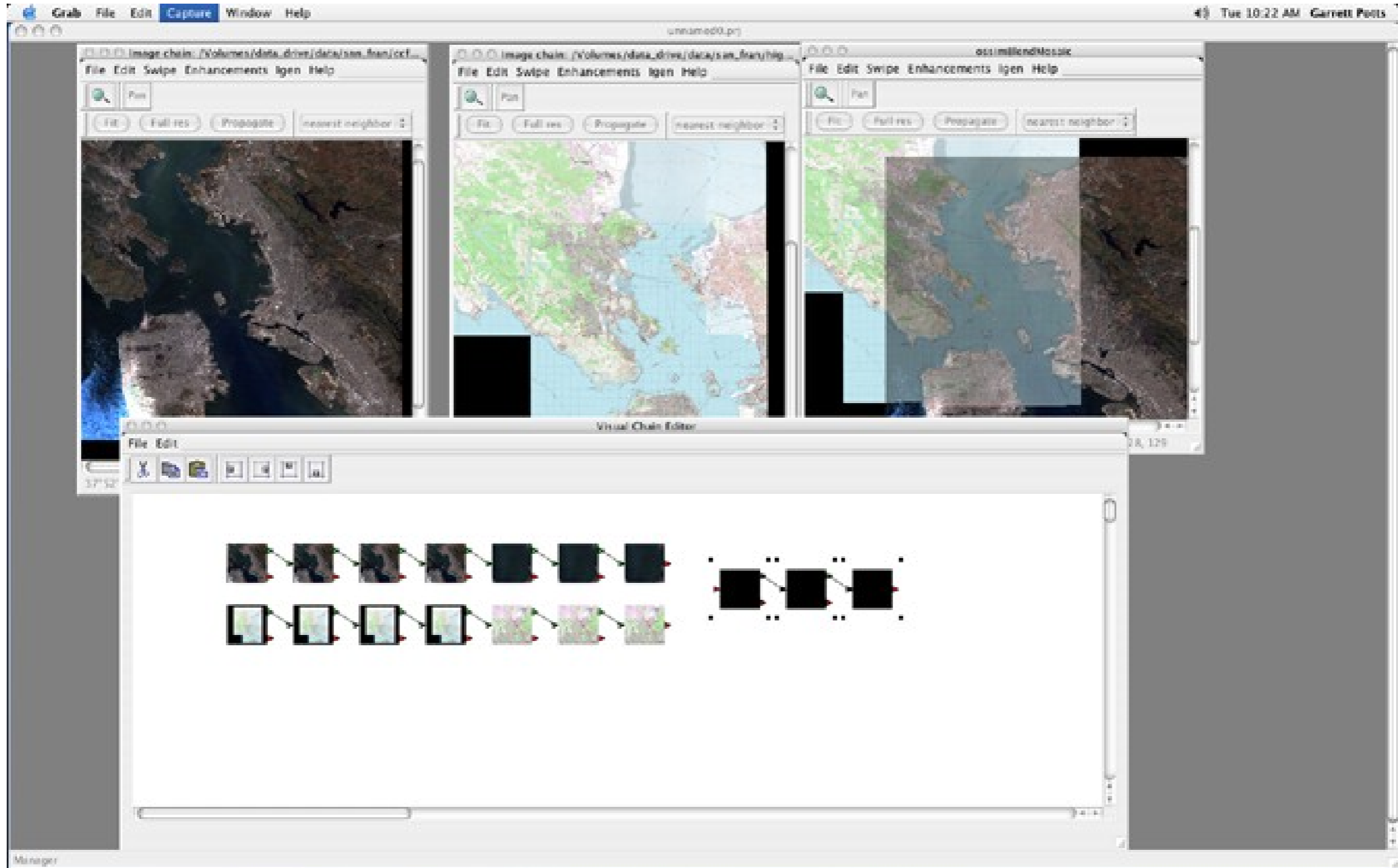
Layer Manager Dragging

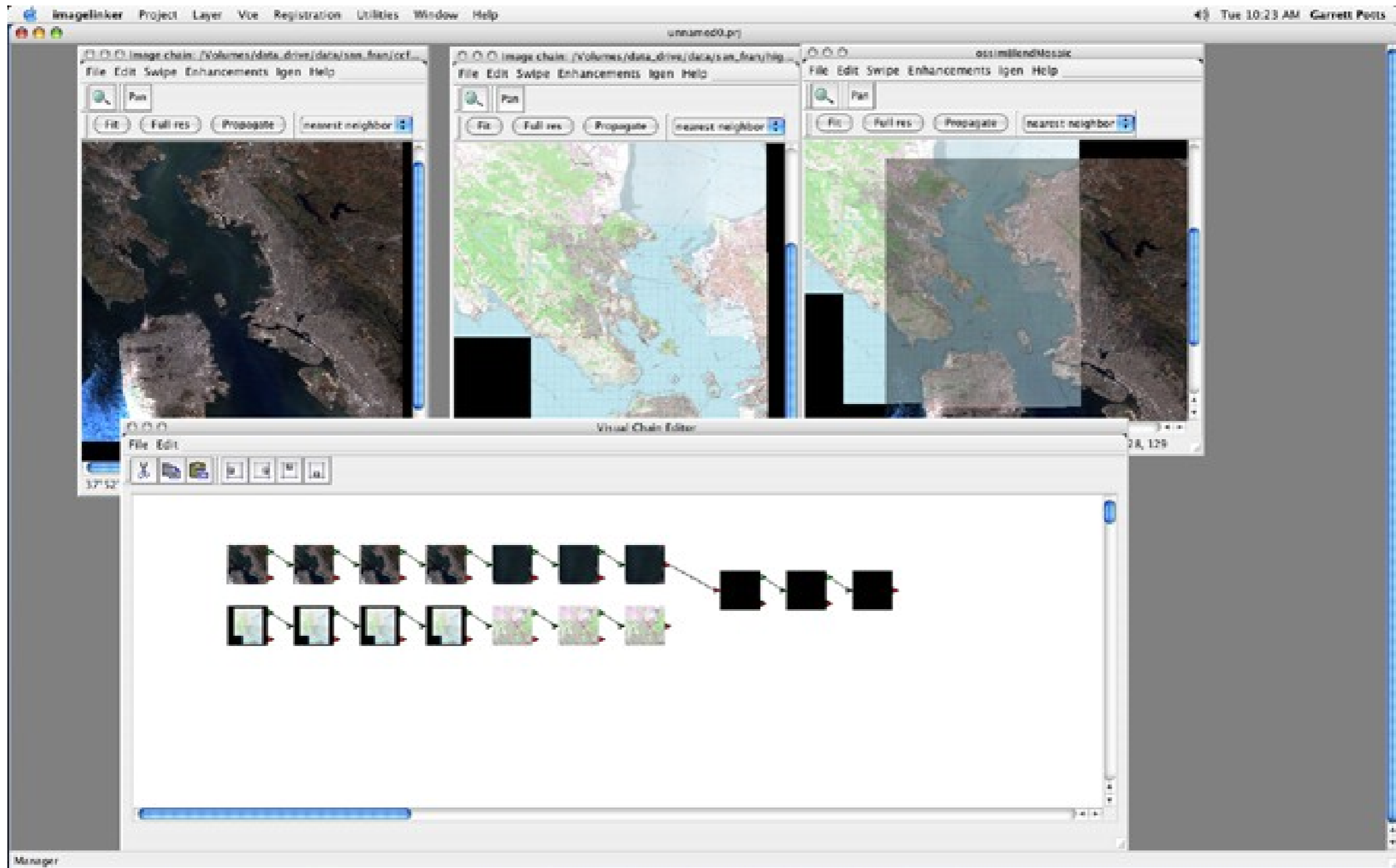


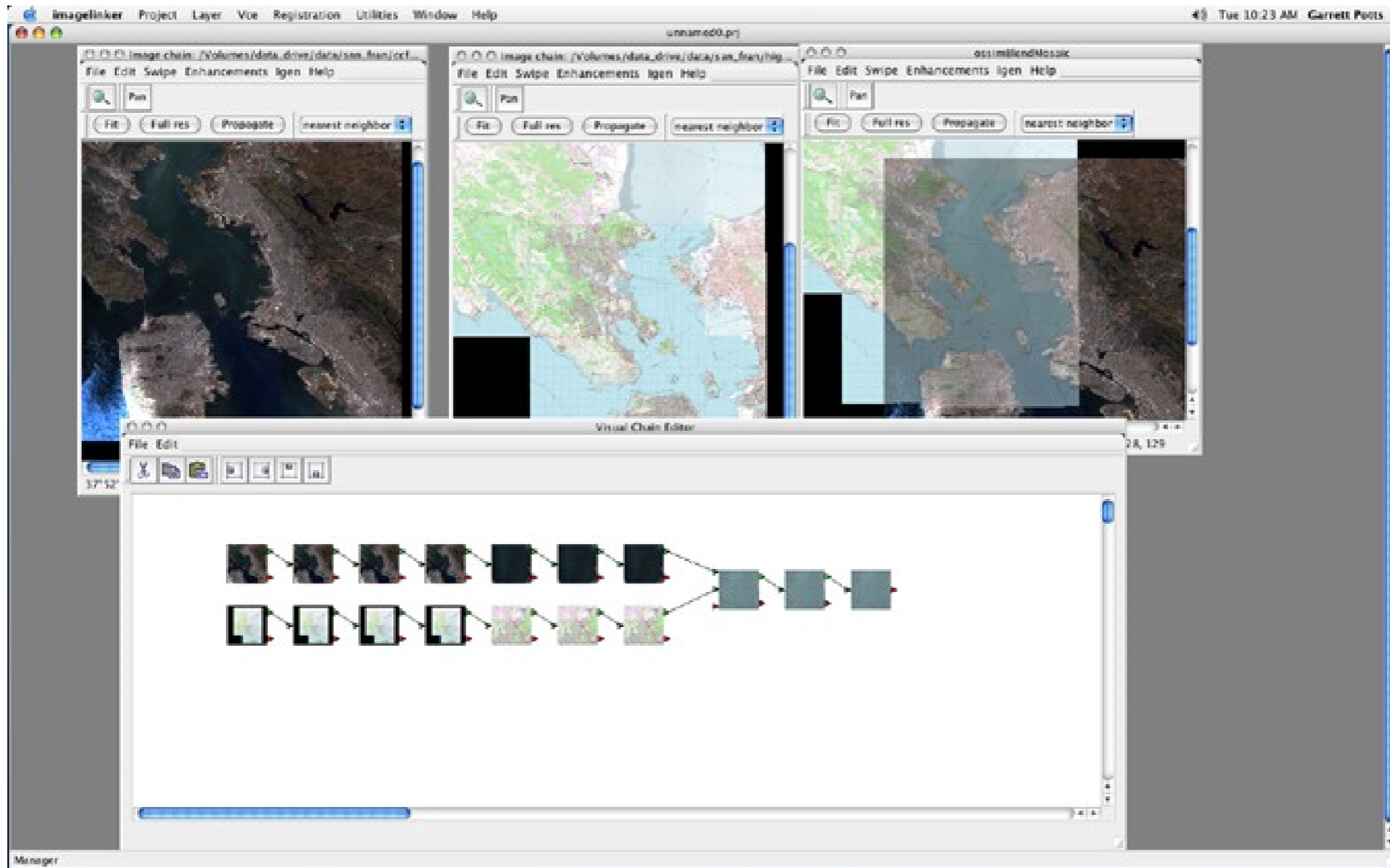
Layer Manager Dropping



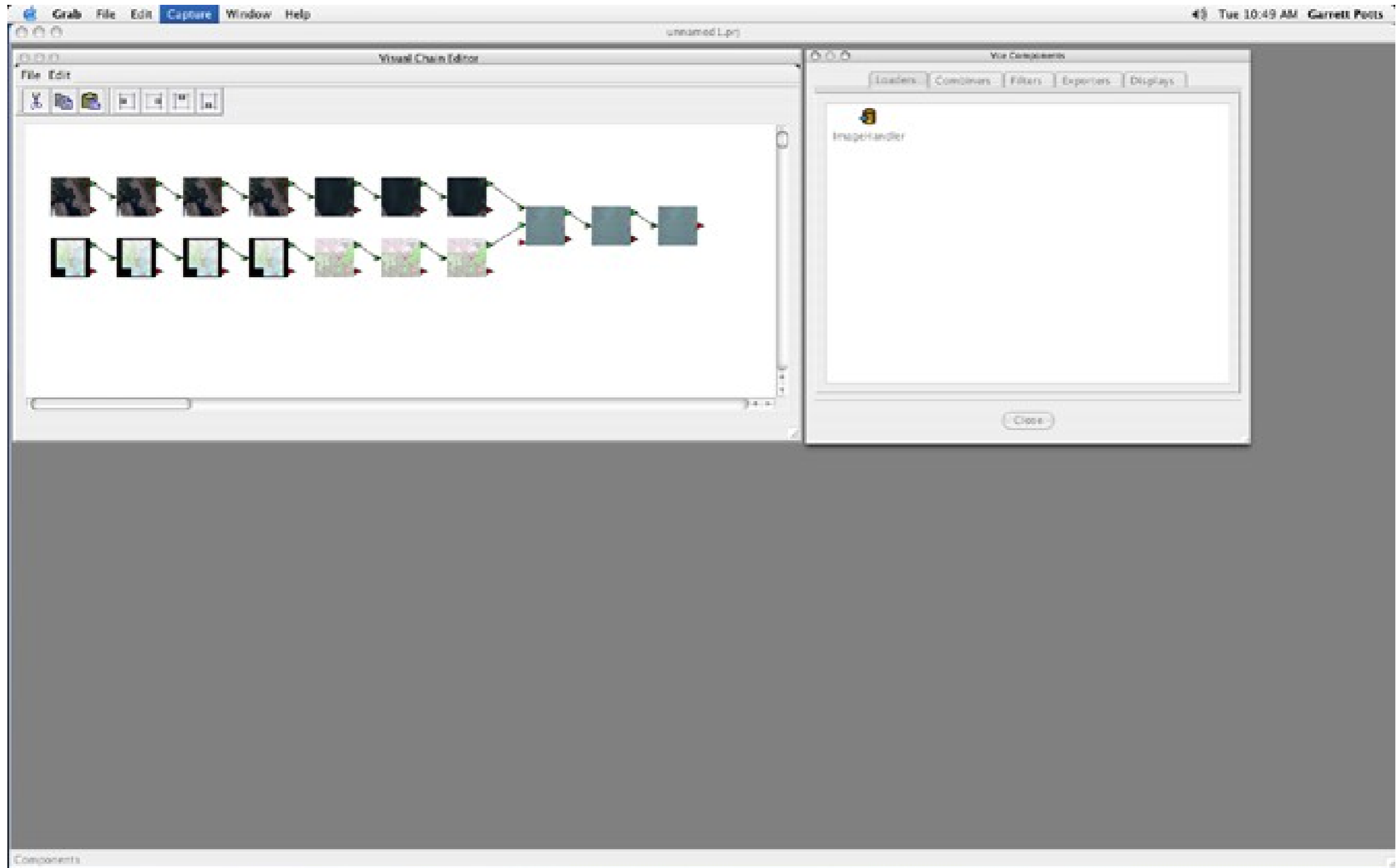
Blend Chain Moved



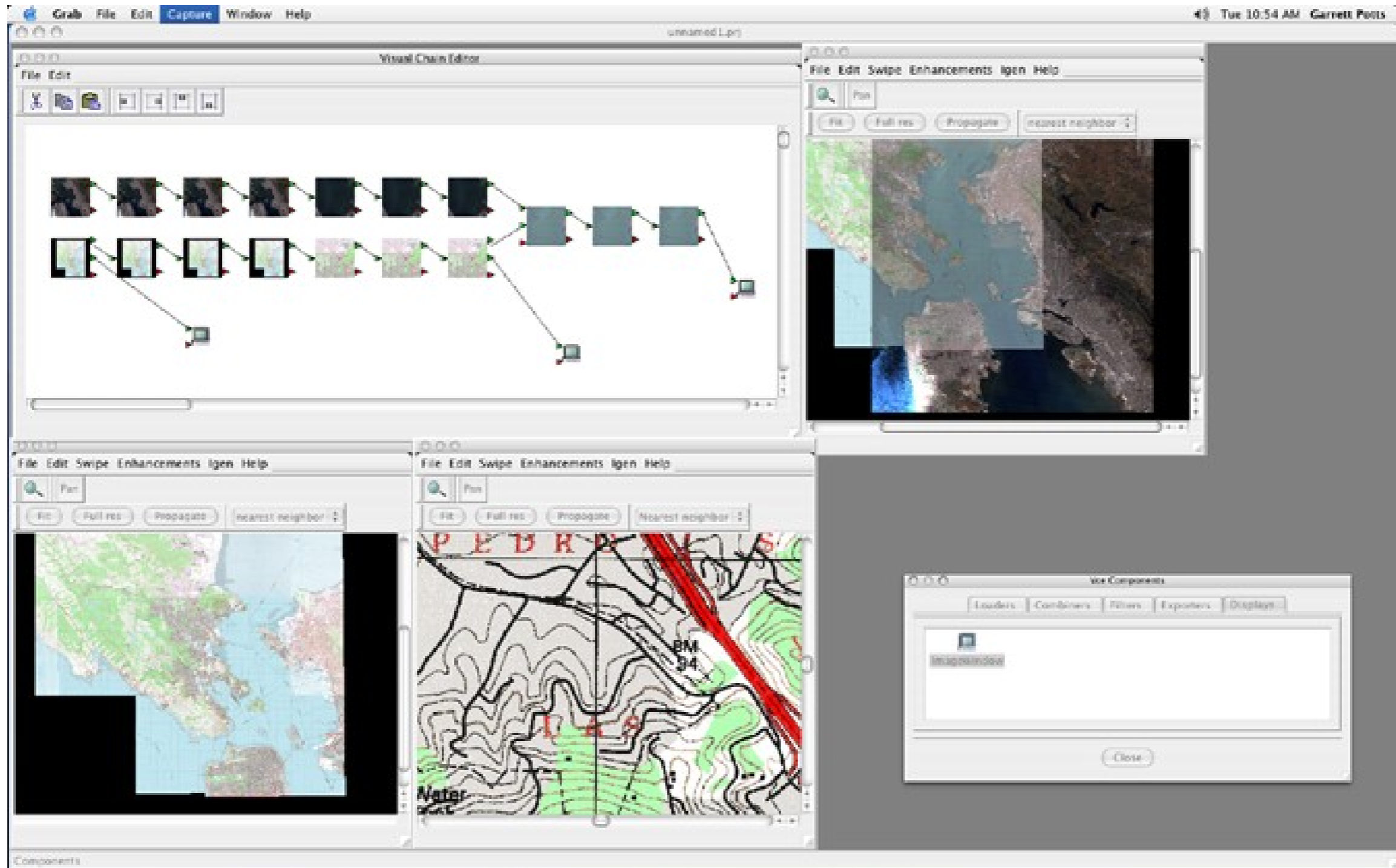




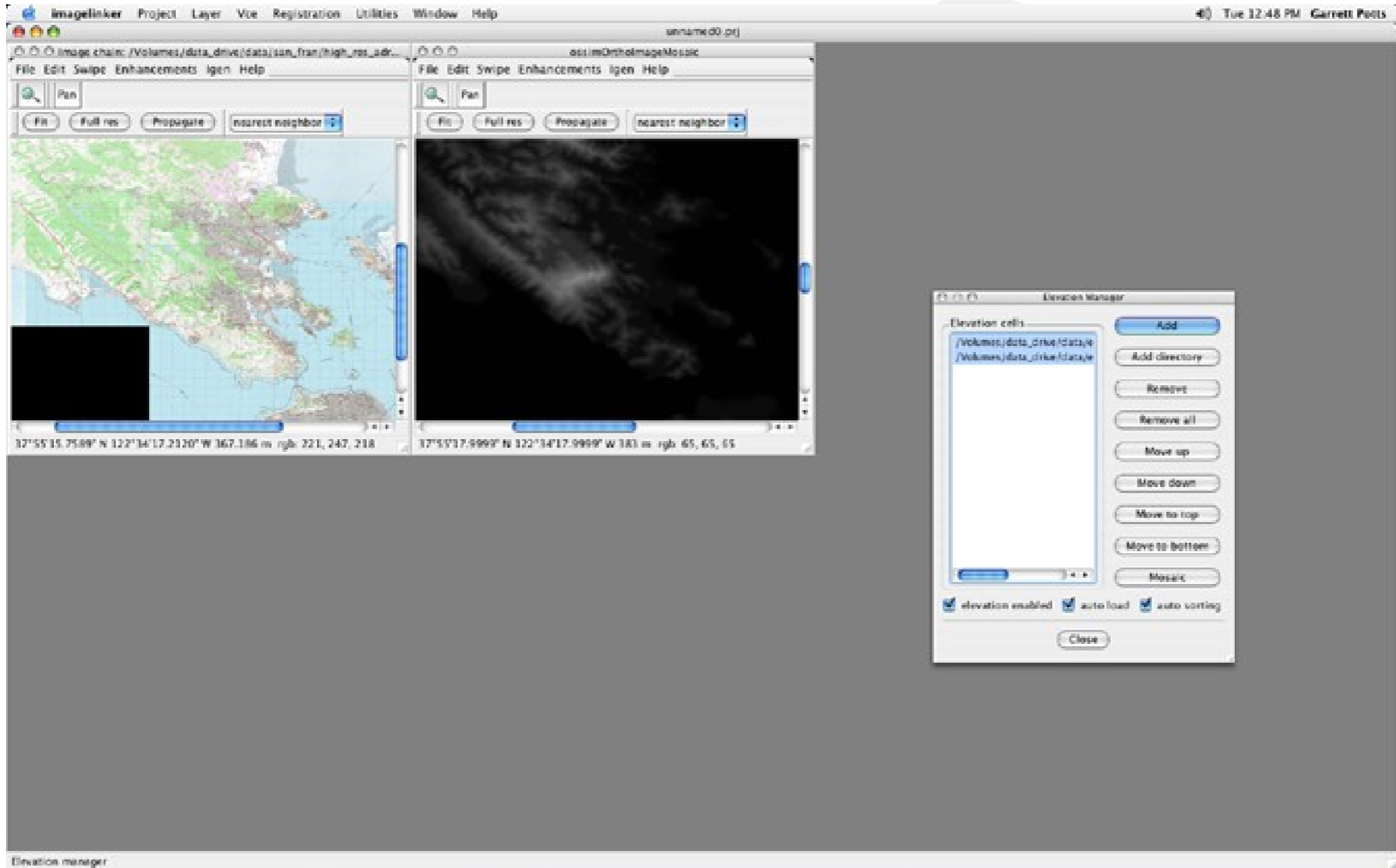
VCE Components Menu Executed



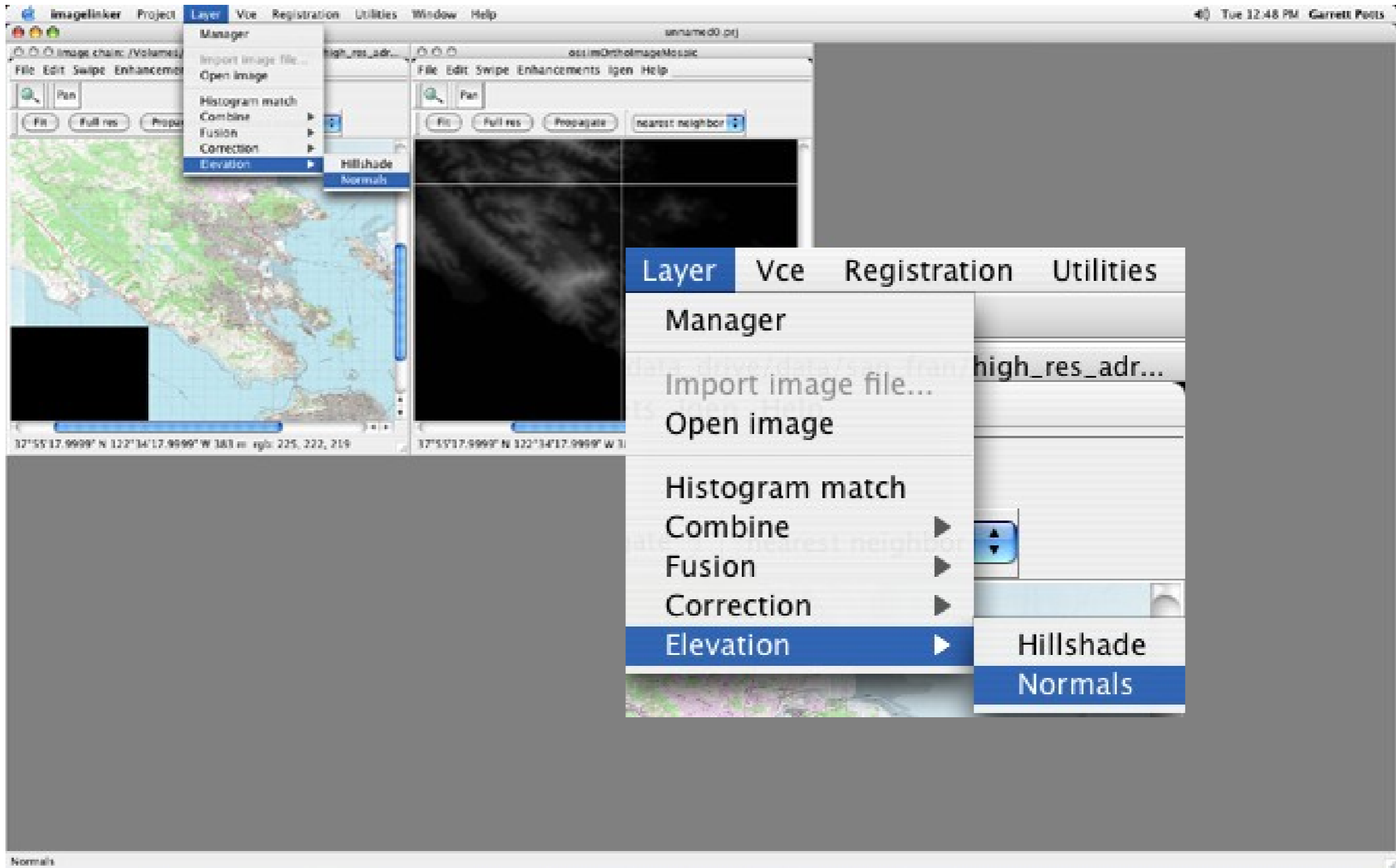
Displays at Different Points in Chain



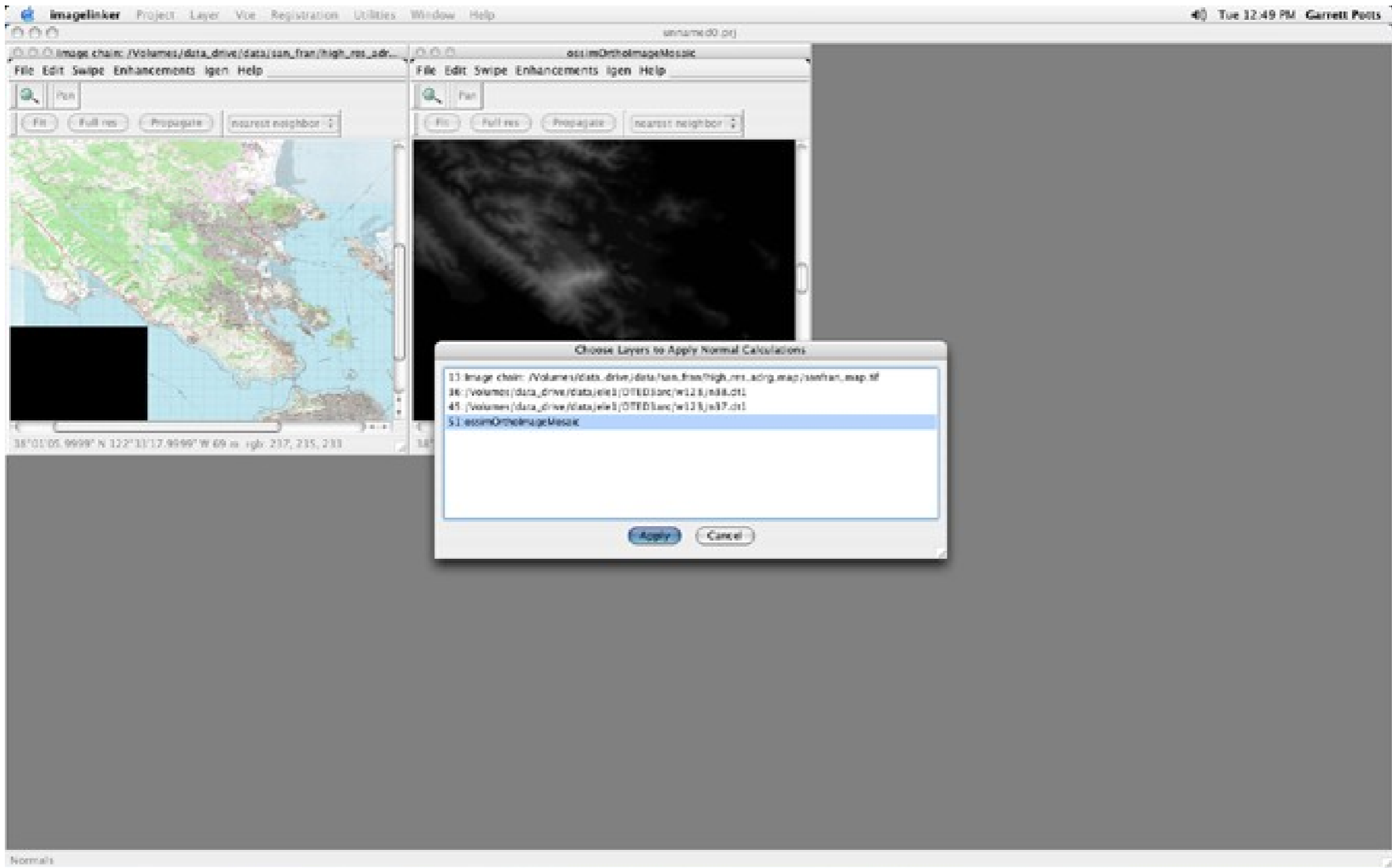
Elevation Manager Mosaic Final



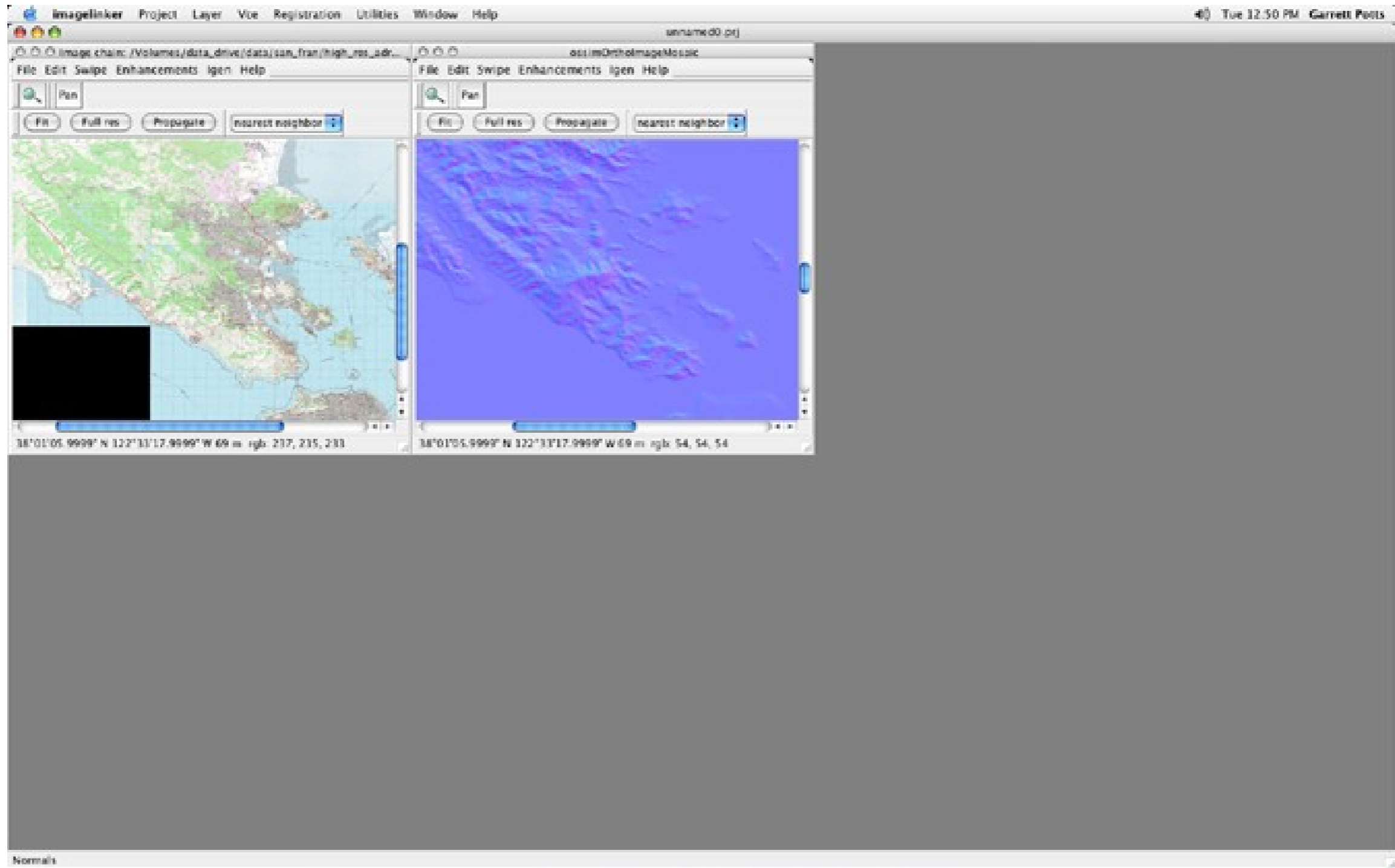
Elevation Normals Menu



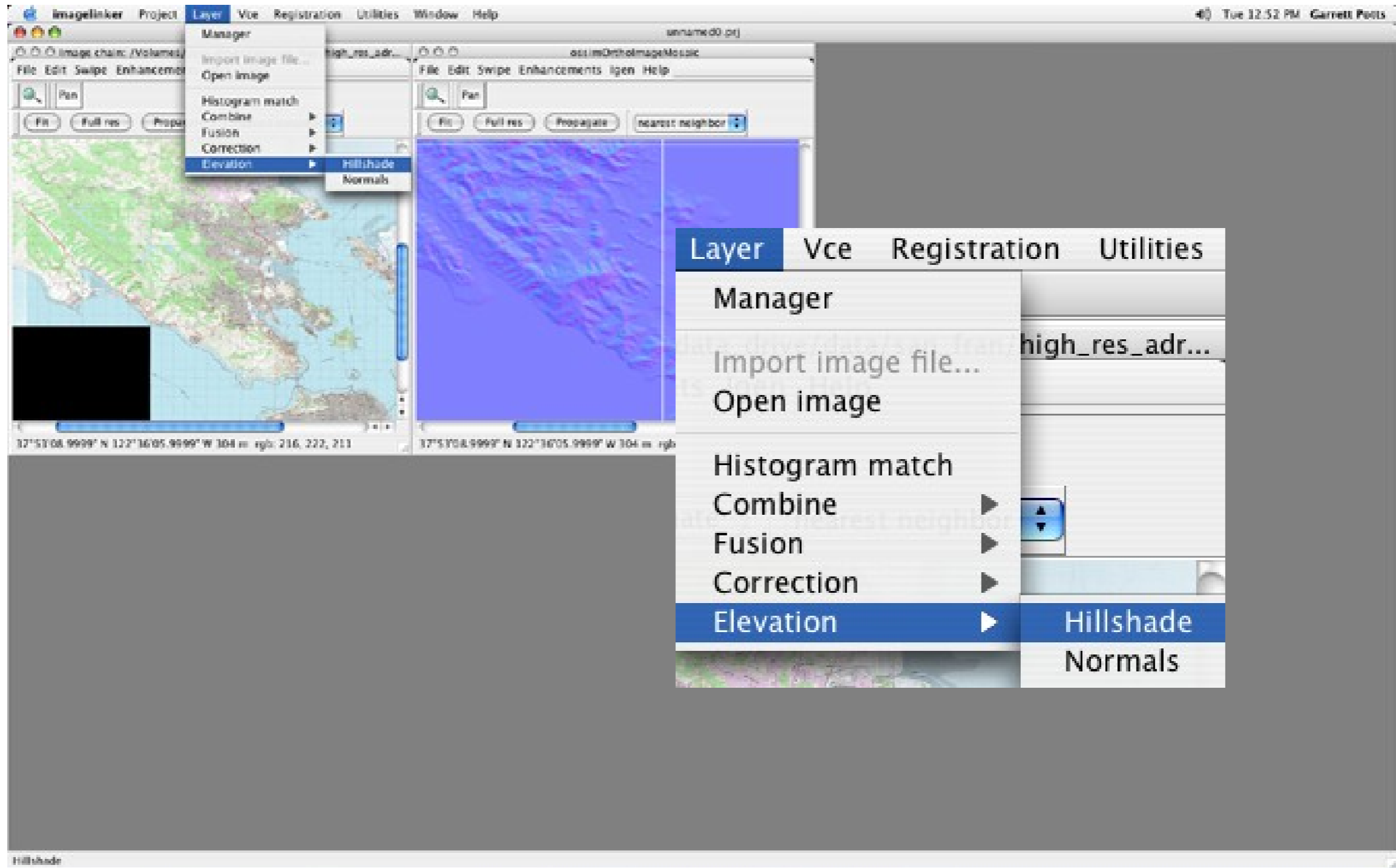
Elevation Normals Calculation Selection



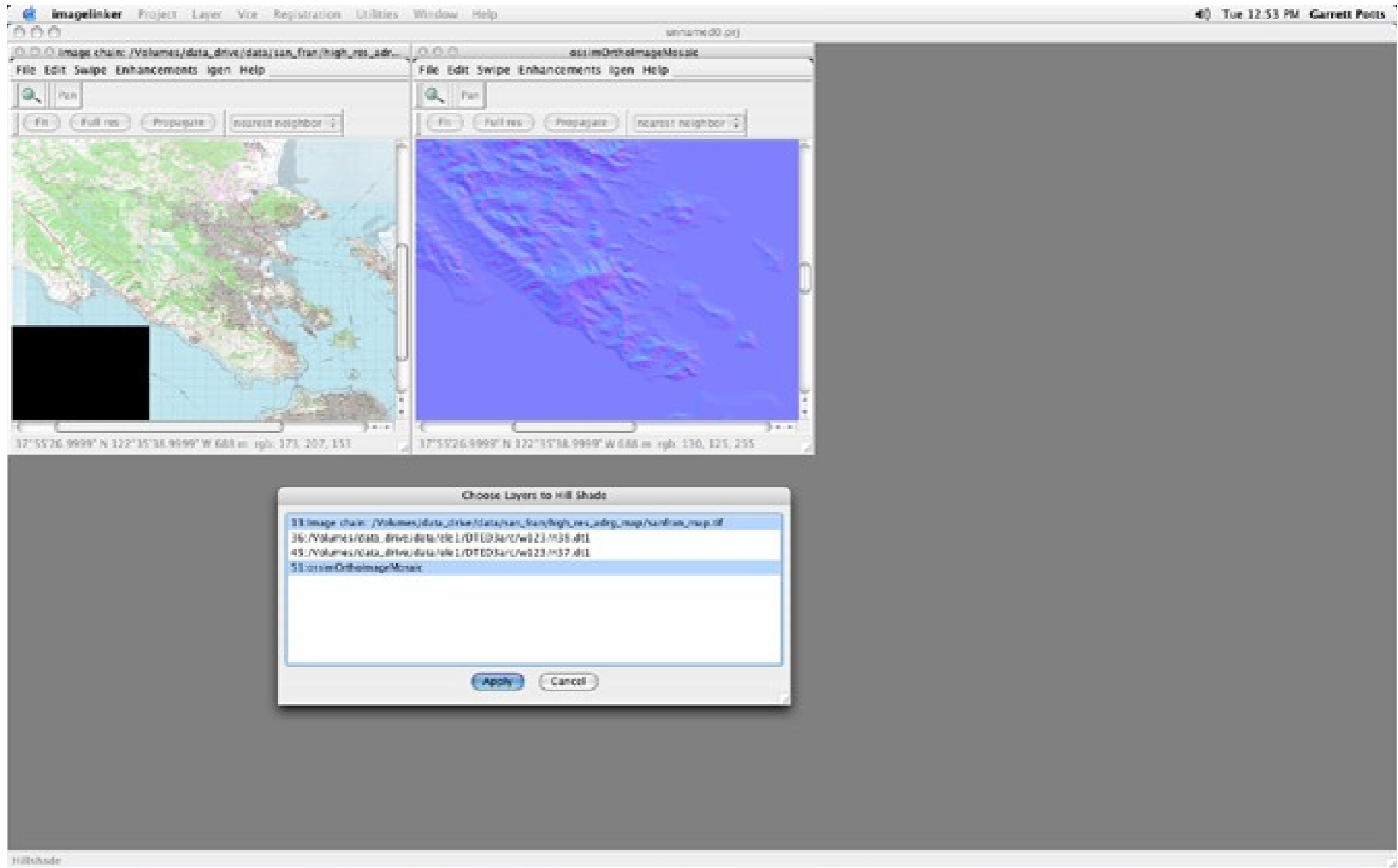
Elevation Normals Applied



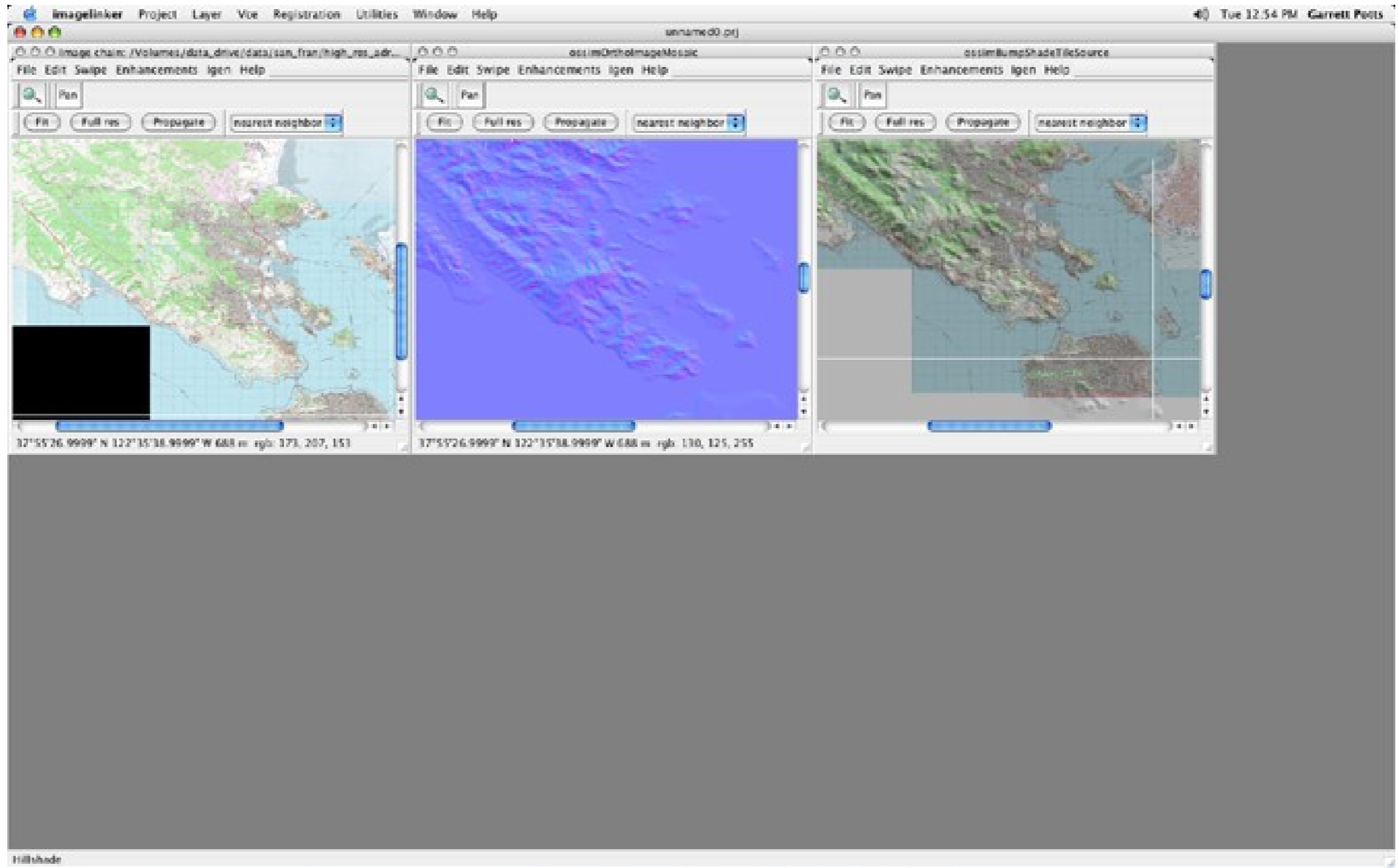
Elevation Hillshade Menu



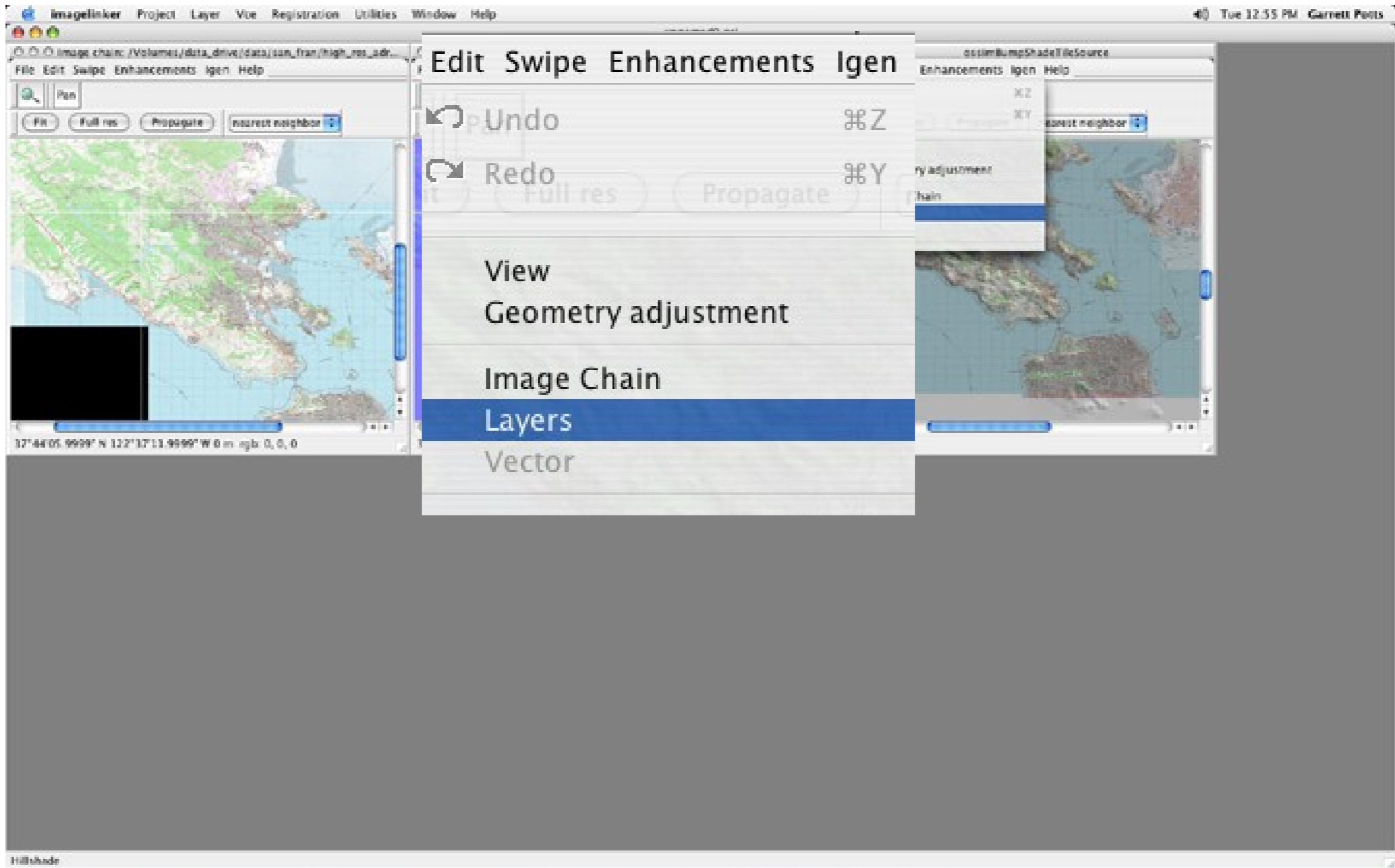
Elevation Hillshade Layer Selection



Elevation Hillside Executed



Elevation Hillshade Edit Layers Menu



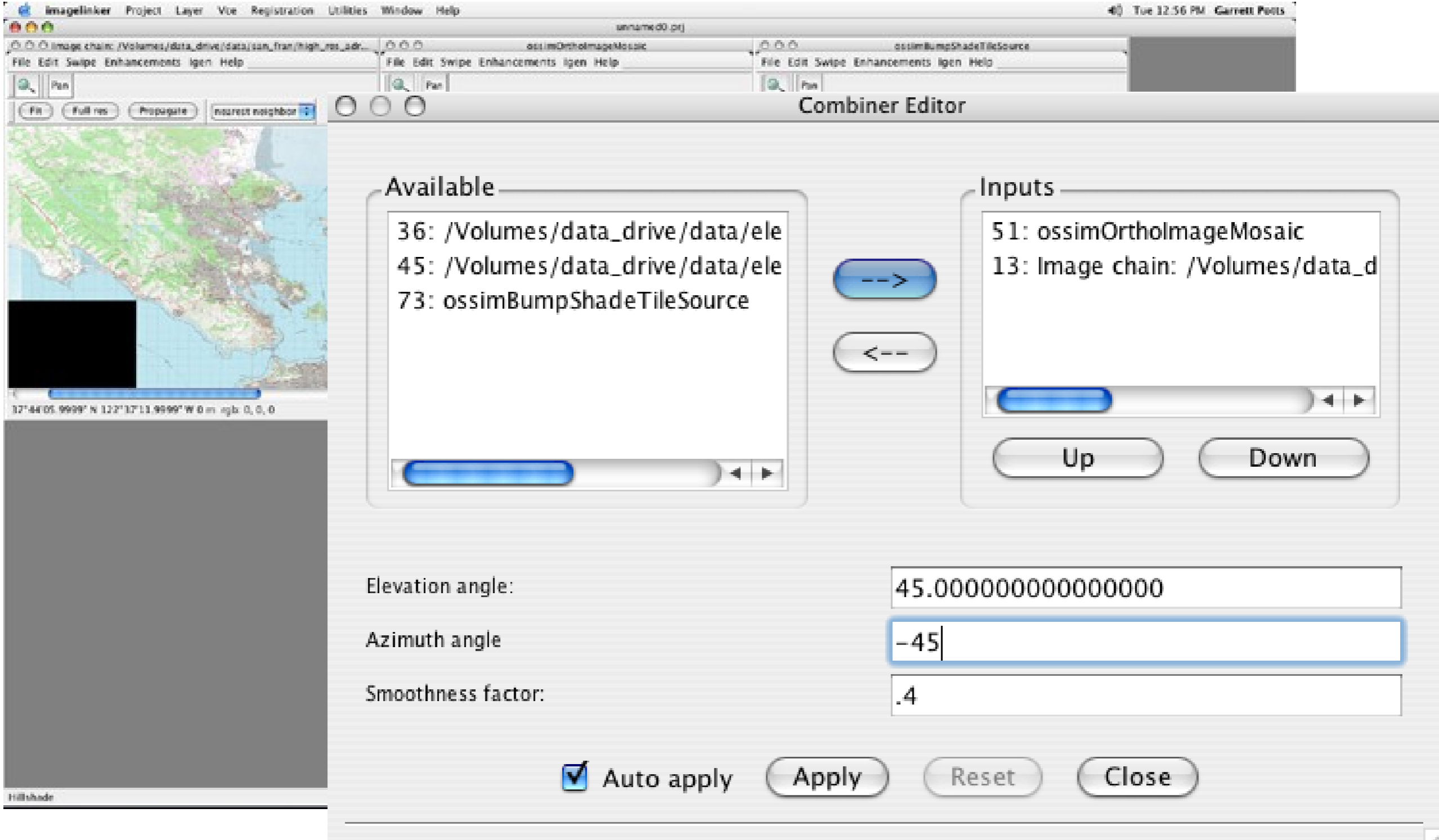


Elevation Hillshade Edit Layers Executed

The screenshot shows the 'Combiner Editor' window with the following elements:

- Available:** A list of three layers: 36: /Volumes/data_drive/data/elevation, 45: /Volumes/data_drive/data/elevation, and 73: ossimBumpShadeTileSource.
- Inputs:** A list of two layers: 51: ossimOrthoImageMosaic and 13: Image chain: /Volumes/data_drive/data/elevation.
- Parameters:** Three input fields for 'Elevation angle', 'Azimuth angle', and 'Smoothness factor', all containing the value 45.000000000000000000, 45.000000000000000000, and 1.0000000 respectively.
- Controls:** A checked 'Auto apply' checkbox, and 'Apply', 'Reset', and 'Close' buttons.

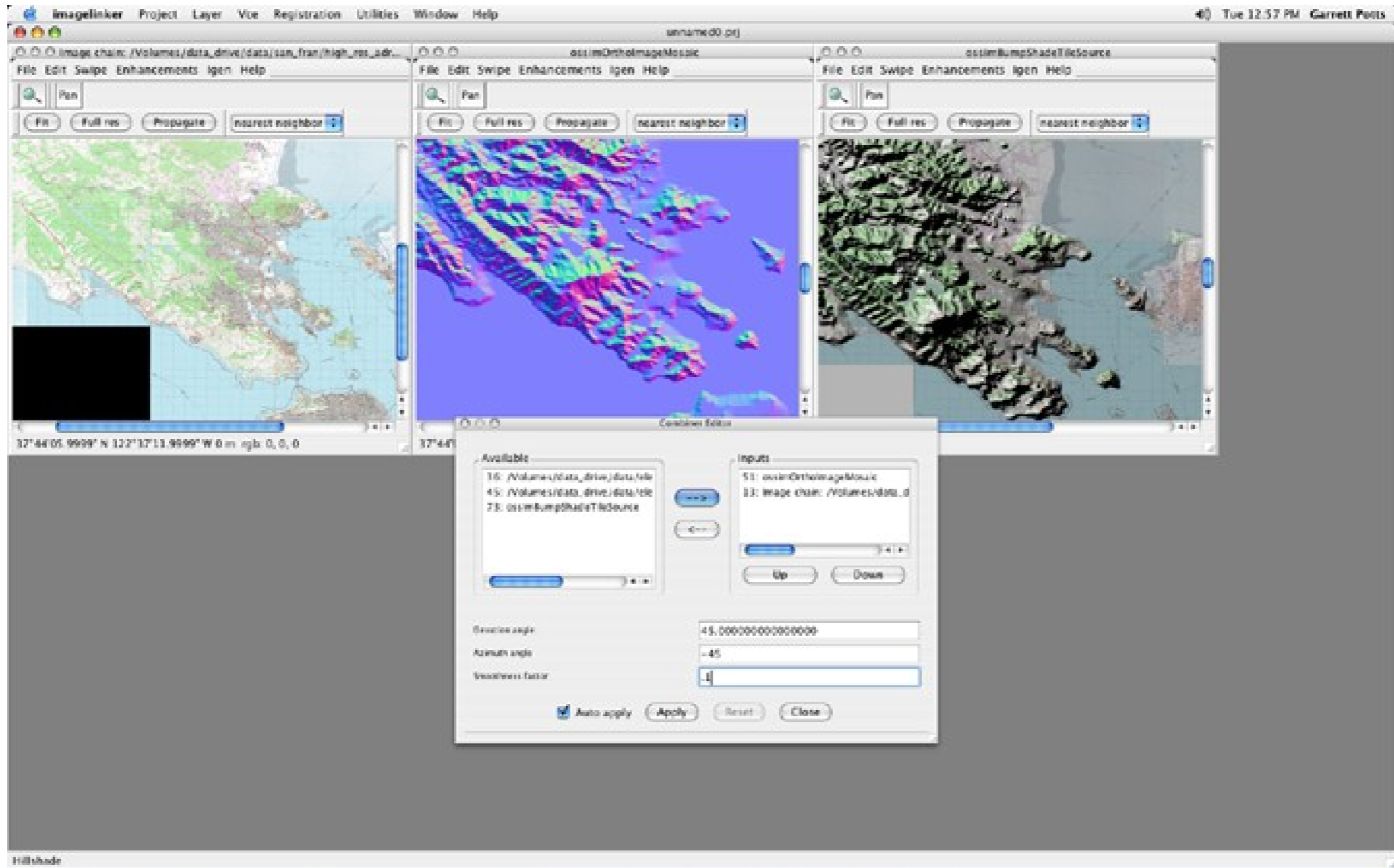
Elevation Hillshade Elevation, Azimuth and Smoothness



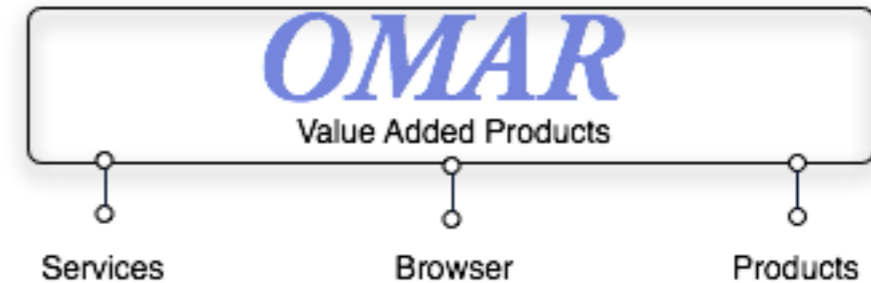
The screenshot shows the 'Combiner Editor' window. On the left is a map view with a black rectangle and coordinates: 37°44'05.9999" N 122°17'13.9999" W 0 m, 0, 0. Below the map is a 'Hillshade' label. The main control panel is titled 'Combiner Editor' and contains the following elements:

- Available:**
 - 36: /Volumes/data_drive/data/elevation/elevation.tif
 - 45: /Volumes/data_drive/data/elevation/elevation.tif
 - 73: ossimBumpShadeTileSource
- Inputs:**
 - 51: ossimOrthoImageMosaic
 - 13: Image chain: /Volumes/data_drive/data/elevation/elevation.tif
- Navigation buttons: --> and <--
- Slider: A horizontal slider with a blue bar and arrowheads.
- Buttons: Up and Down
- Input fields:
 - Elevation angle: 45.0000000000000000
 - Azimuth angle: -45
 - Smoothness factor: .4
- Bottom controls:
 - Auto apply
 - Apply
 - Reset
 - Close

Elevation Hillshade Edit Layers Very Rough

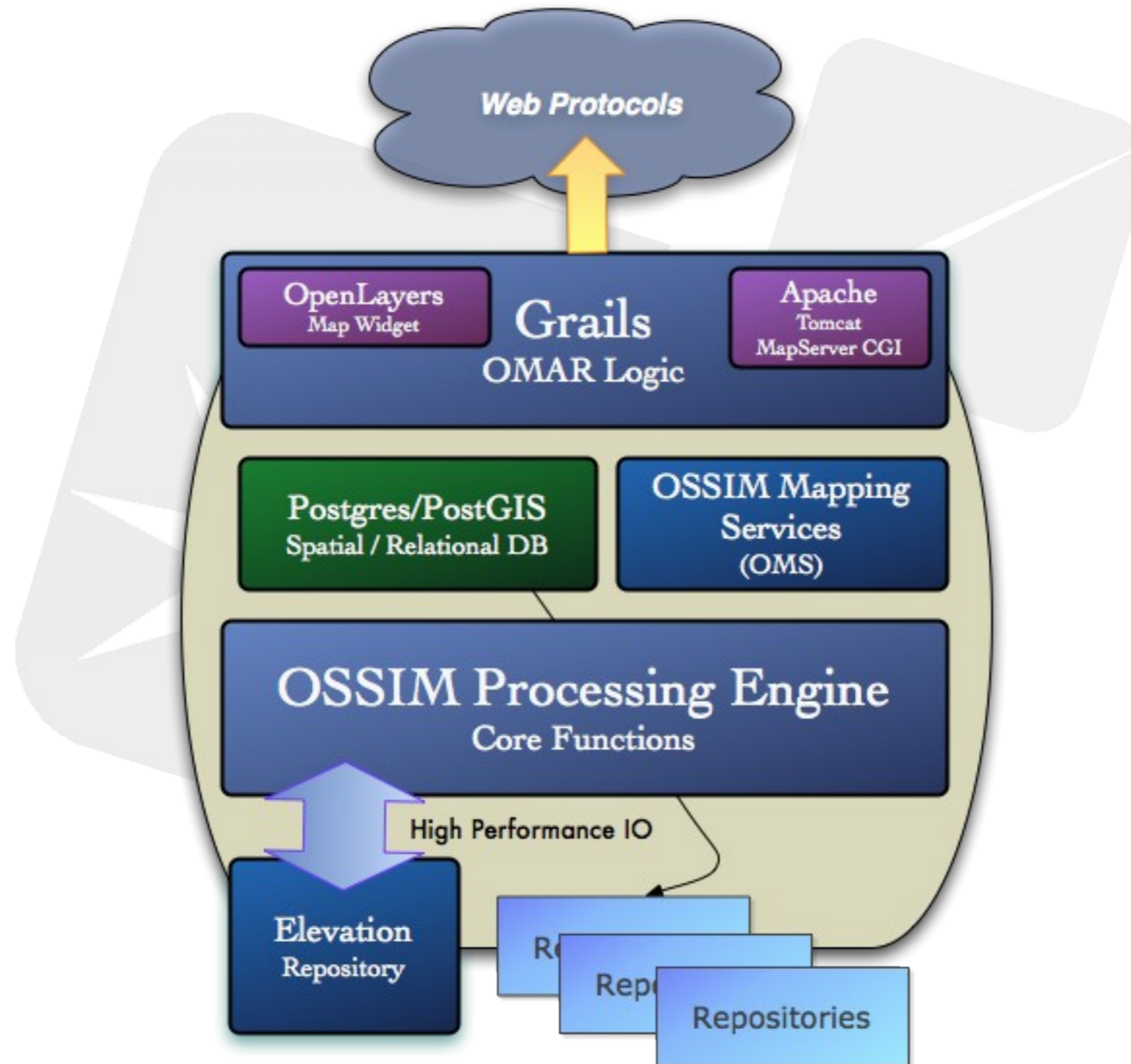


- Web Browser
 - Searching and Viewing
- OGC Standards
 - WMS
 - WFS
- SOA Services
 - OSSIM Services
- RSS Feeds



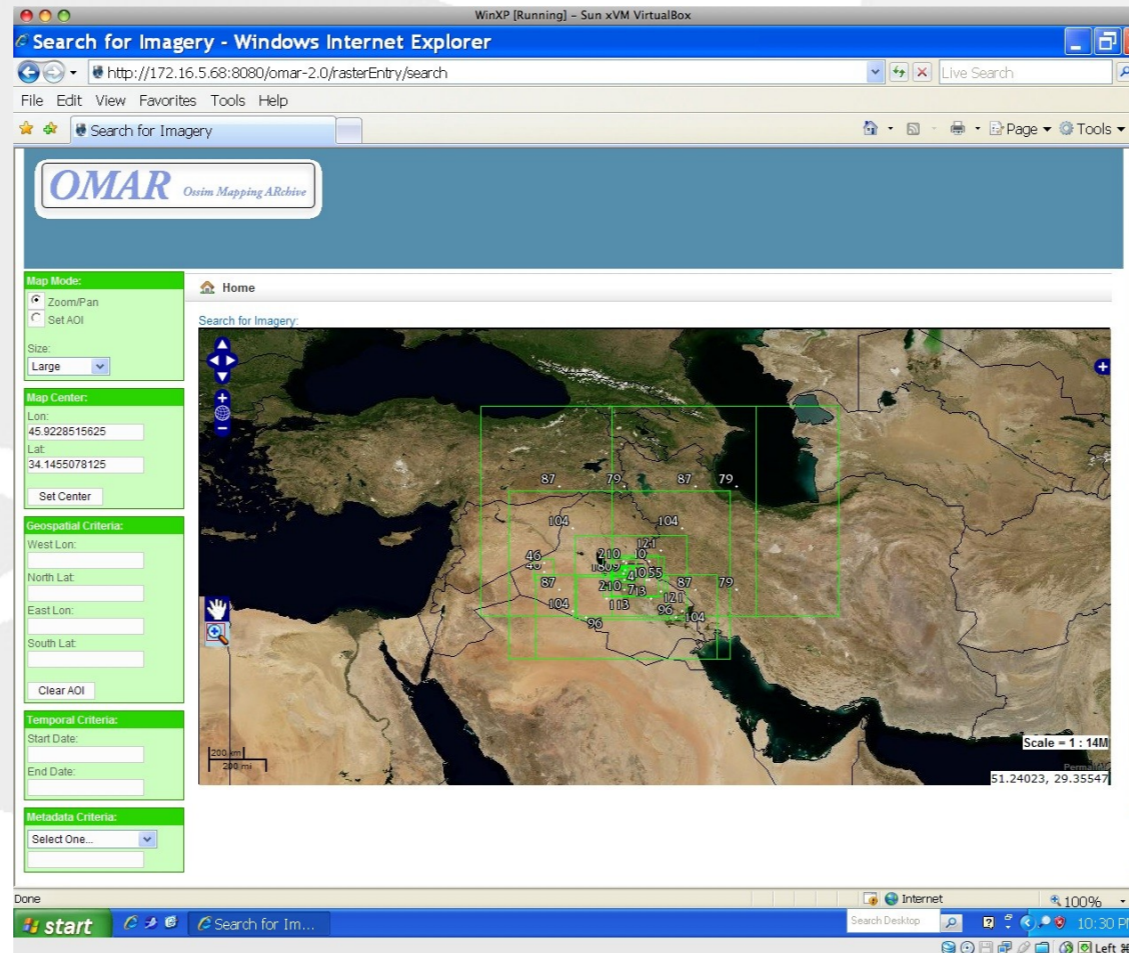

LD Web Services

- LD provides “point and click” access to globally distributed data
- Thin-client access with thumbnail previews
- Provides near real-time updates to planning and intelligence applications





- Web based geospatial archiving, production and delivery
- Open Source Software, Open Standards
- Supports National Imagery and Video Formats
- Most commercial formats supported
- Provides online geospatial processing



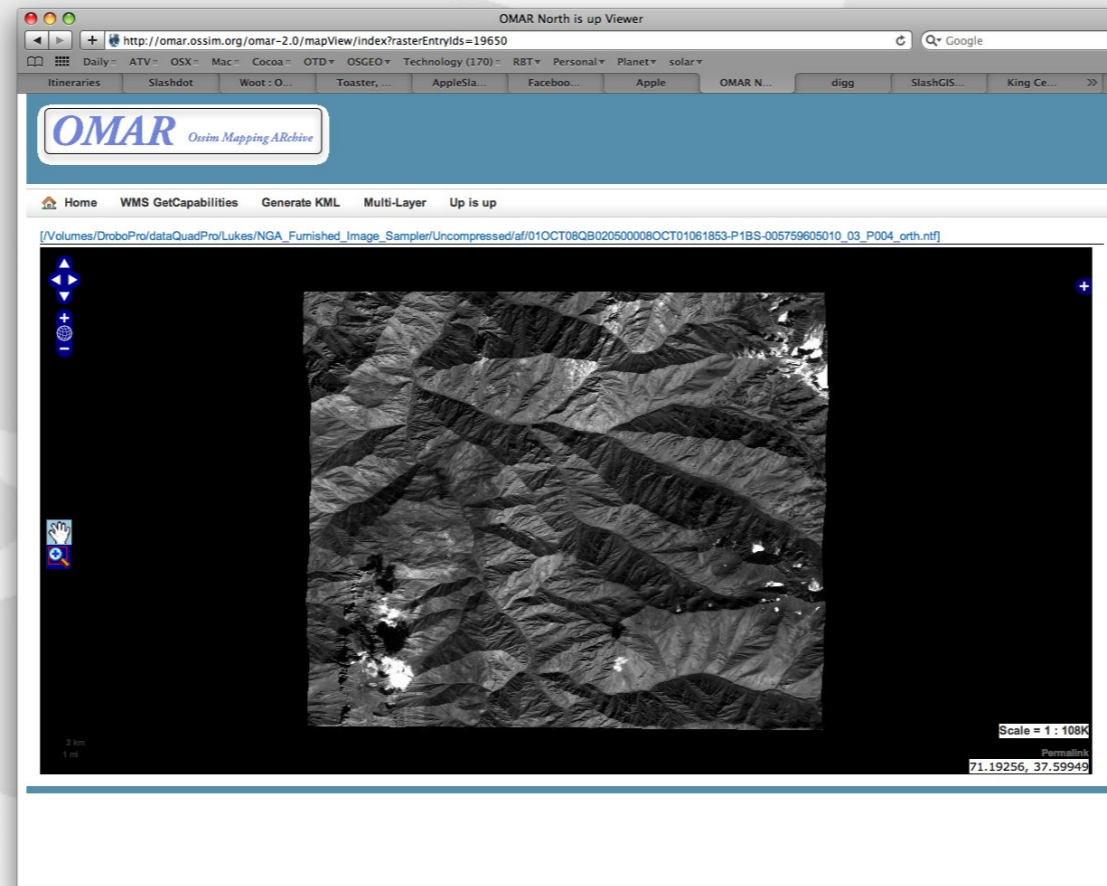


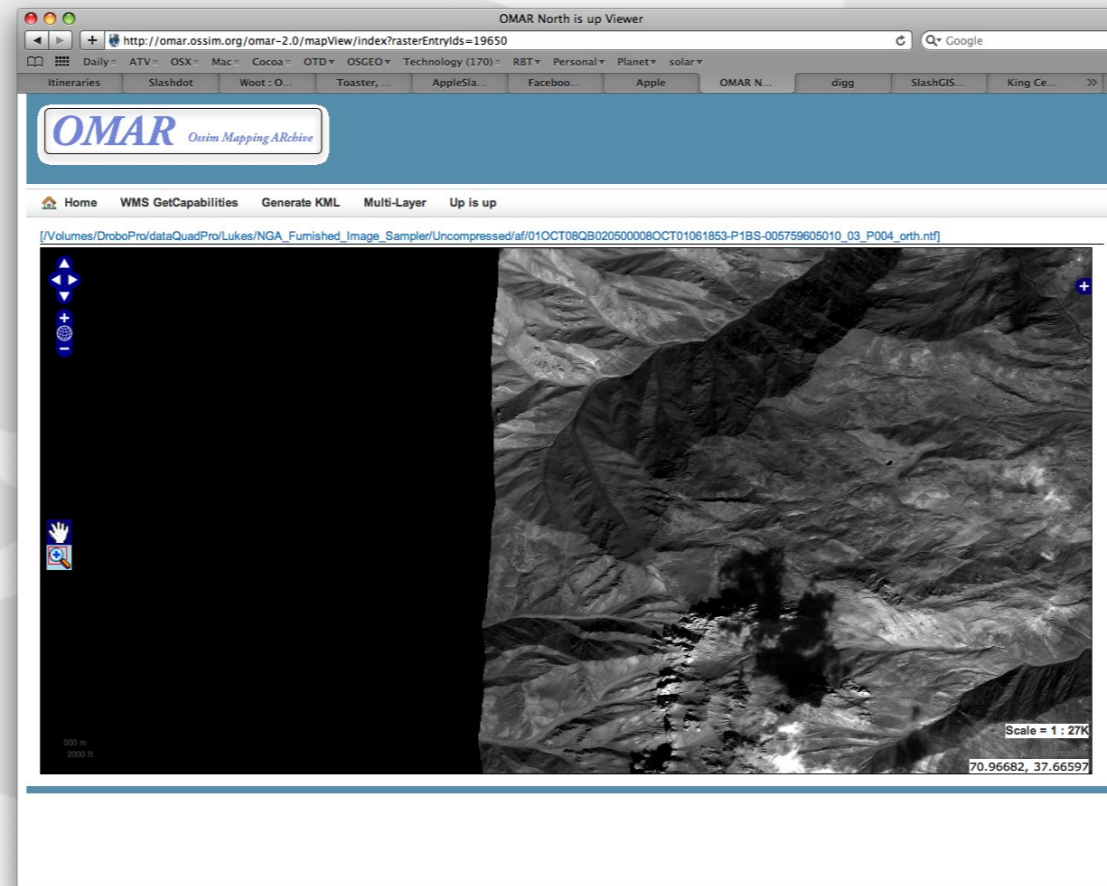
VideoDataSet List

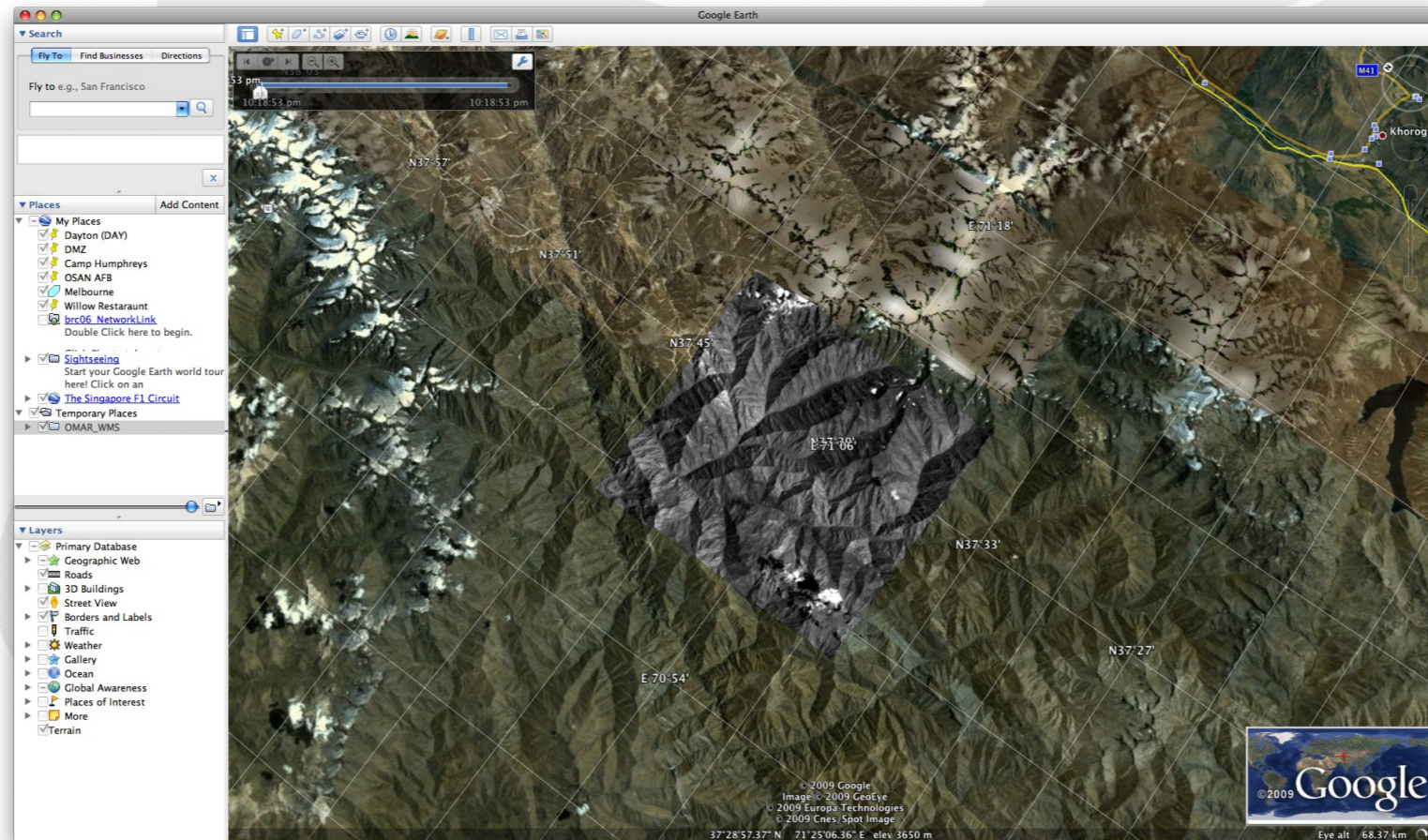
OMAR *Osim Mapping Archive*

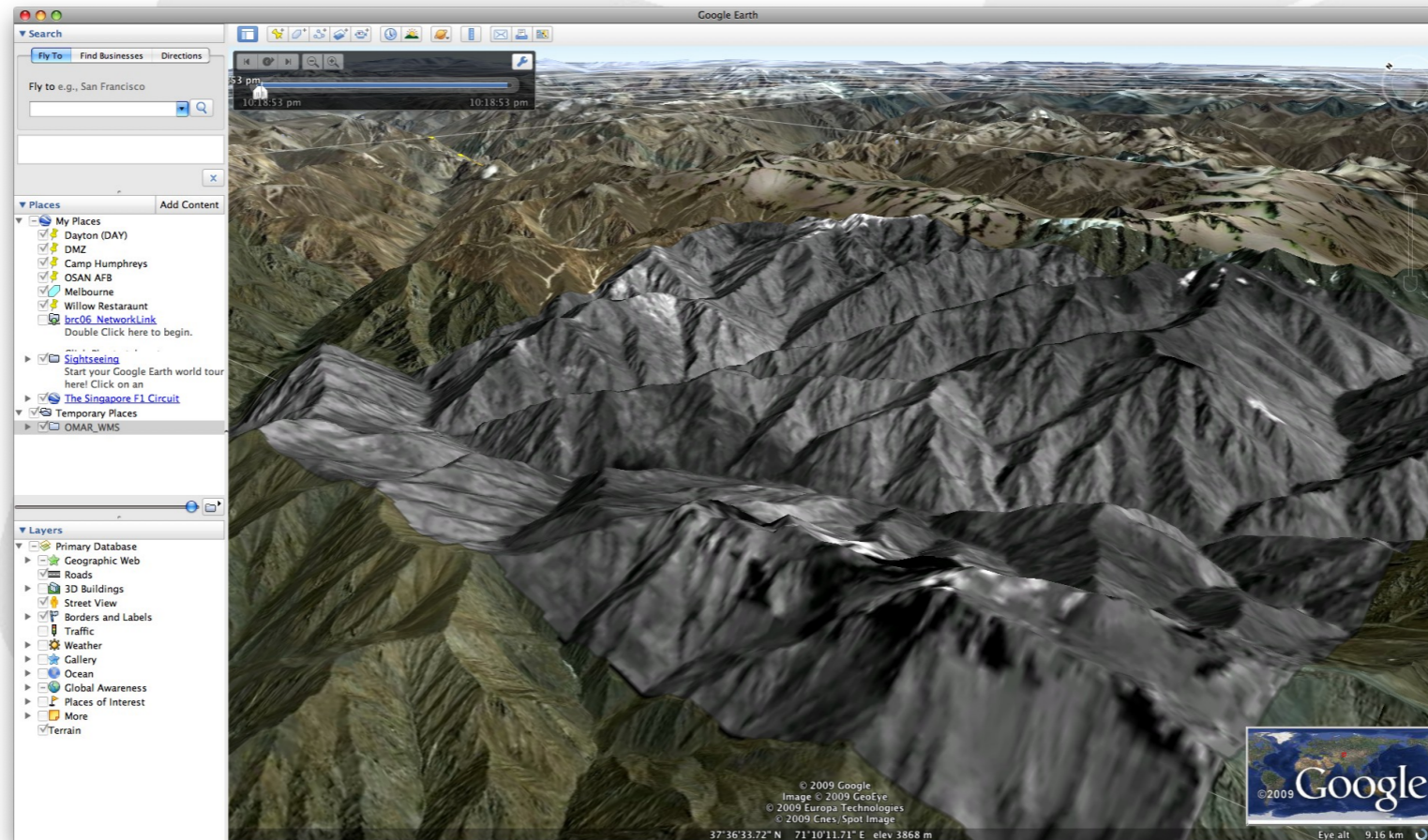
Home New VideoDataSet Search

Id	Width	Height	Start Date	End Date	Min Lon	Min Lat	Max Lon	Max Lat	Filename	Thumbnail
83795720	480	480	2003-02-21 14:54:19.0	2003-02-21 14:55:18.993	117.23182756648433	34.91801000150861	117.22360846845754	34.92391967133436	/data/uav/predator/MISP_42FB786B_21FEB03000019541saMISP-HD000999.mpg	
83797720	480	480	2003-02-21 13:05:24.0	2003-02-21 13:06:23.959	117.61262087338315	34.601703466840846	117.58493884234356	34.646900651982186	/data/uav/predator/MISP_42FB791F_21FEB03000018052saMISP-HD000999.mpg	
83799720	480	480	2003-02-21 13:06:23.0	2003-02-21 13:07:23.193	-117.6029118858867	34.379823064764665	117.57428057683518	34.434613613753534	/data/uav/predator/MISP_42FB795B_21FEB03000018062saMISP-HD000999.mpg	
83801720	480	480	2003-02-21 13:07:25.0	2003-02-21 13:08:25.126	117.68833333333333	34.697305555555556	117.68833333333333	34.697305555555556	/data/uav/predator/MISP_42FB7997_21FEB03000018072saMISP-HD000999.mpg	
83803720	480	480	2003-02-21 13:10:49.0	2003-02-21 13:11:48.993	-117.5191320121574	34.89271848332698	117.51243537418479	34.89683836867659	/data/uav/predator/MISP_42FB79D3_21FEB03000018104saMISP-HD000999.mpg	
83805720	480	480	2003-02-21 13:28:49.0	2003-02-21 13:29:48.993	-117.5093519957309	34.86520360333737	117.50413710431637	34.86815996990811	/data/uav/predator/PredtestUAV.mpg	


















CLOSE X

- ✦ Typically Optical and Infrared bands
- ✦ Land Classification
- ✦ Environmental and Resource Management
- ✦ Hyperspectral for material classification

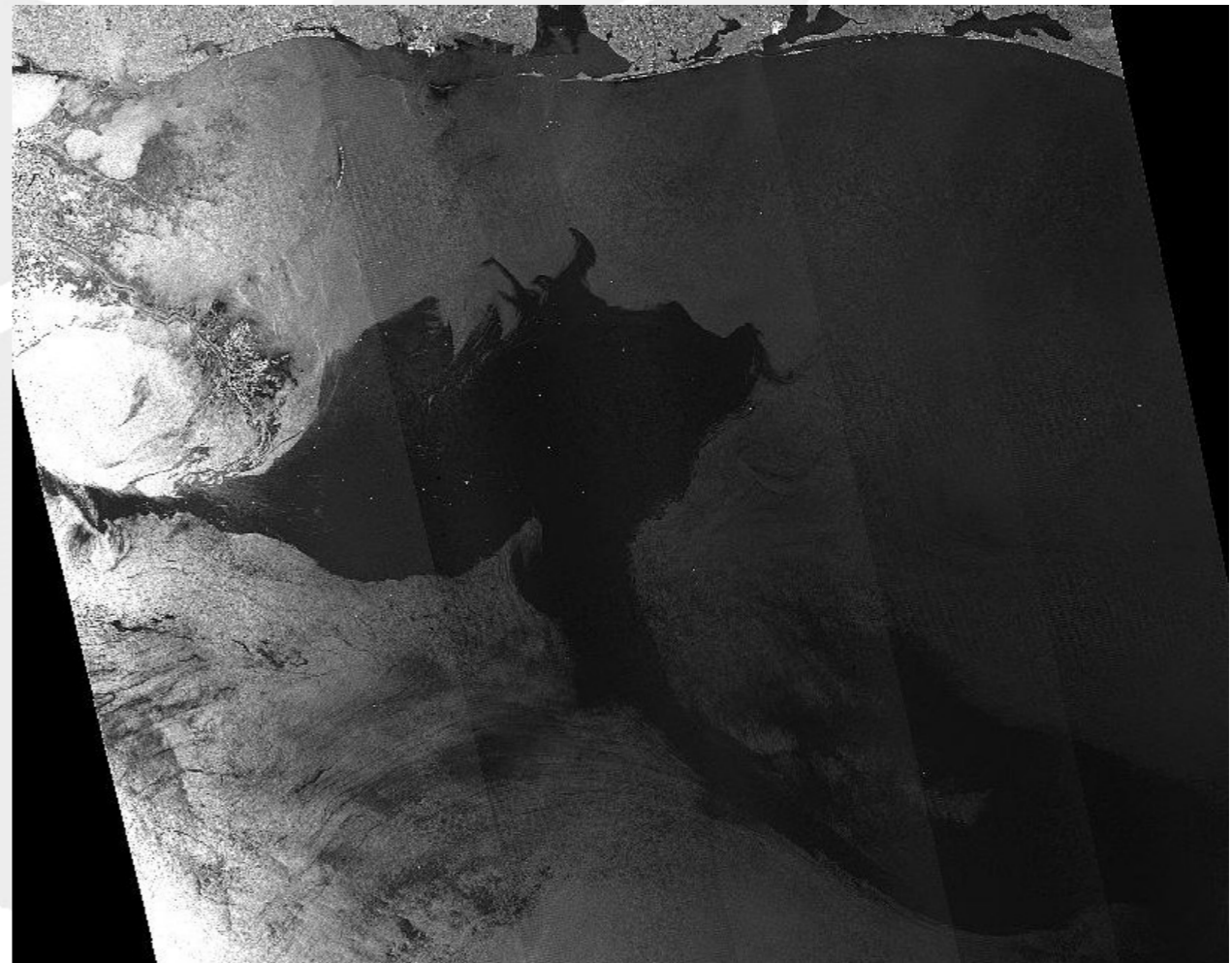
TM Band	Wavelength (um)		
6	10.4 - 12.5		Thermal Infrared
7	2.08 - 2.35		Shortwave Infrared
5	1.55 - 1.75		Shortwave Infrared
4	0.76 - 0.90		Near Infrared
3	0.63 - 0.69		Red
2	0.52 - 0.60		Green
1	0.45 - 0.52		Blue



Synthetic Aperture Radar



- ✦ All Weather, Day or Night
- ✦ Value added products with advanced signal processing



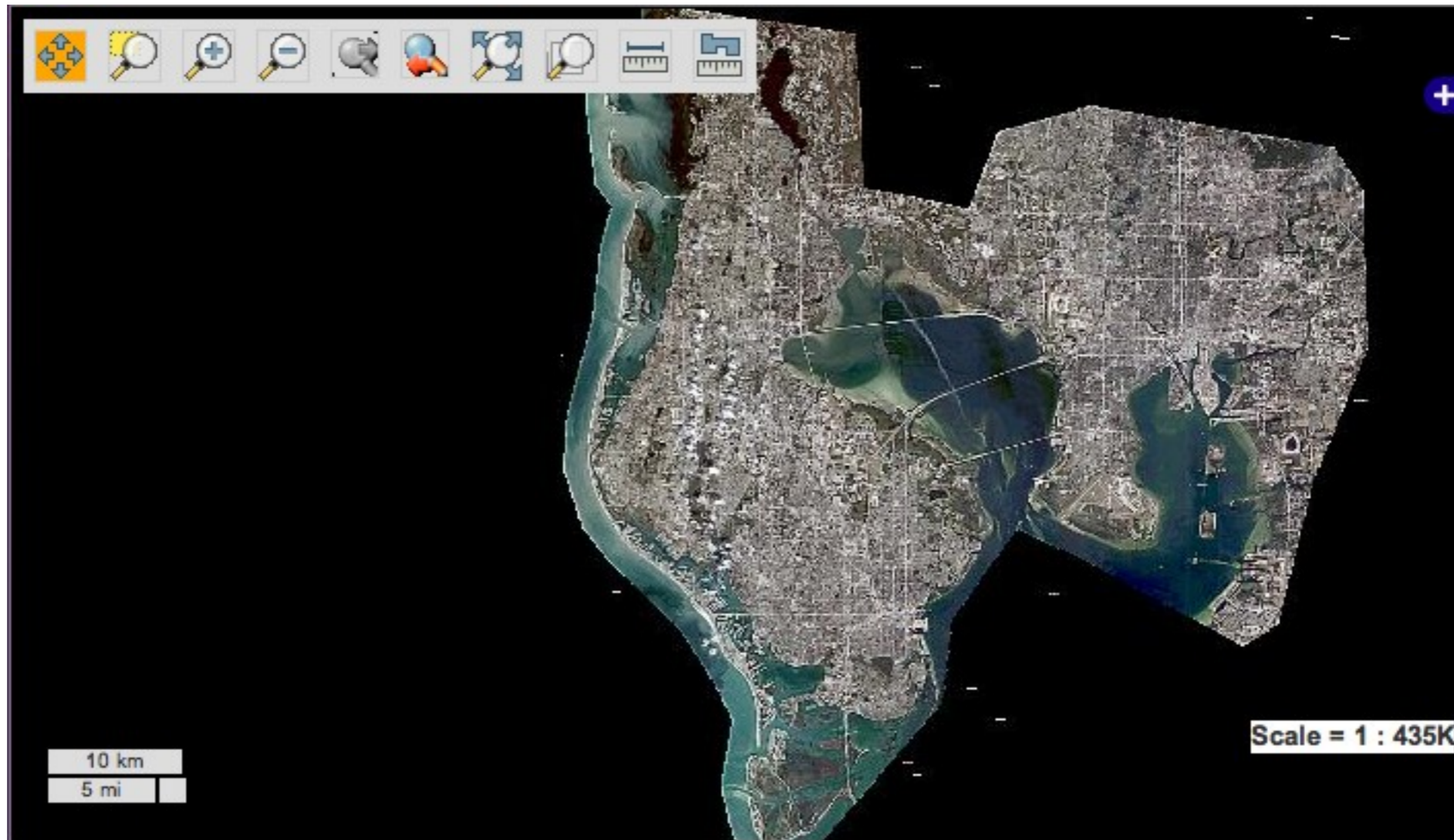
SAR Imagery of the Gulf Oil Spill

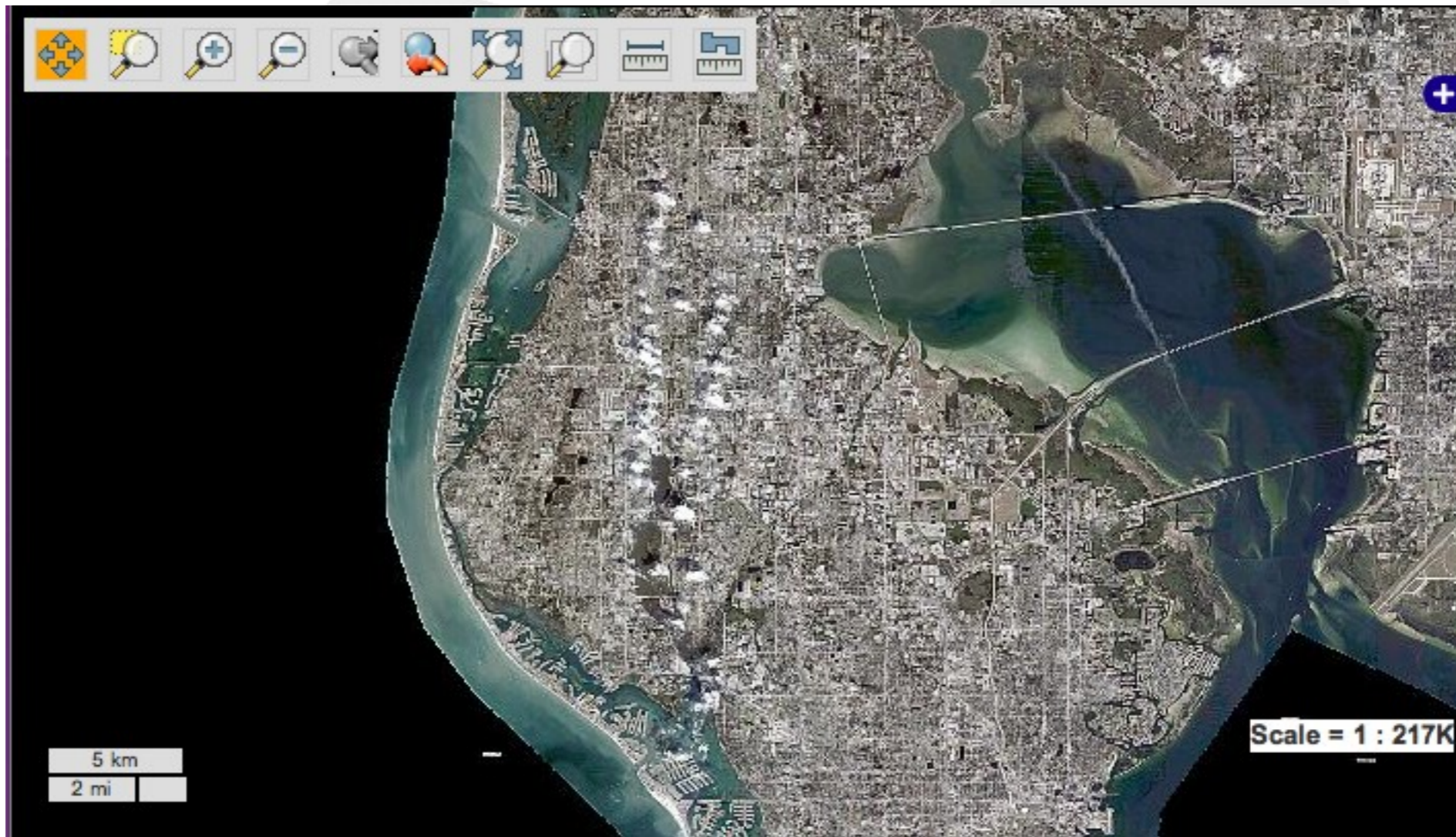
- ✦ Sub Meter Satellite
- ✦ Detailed Aerial, Oblique systems
- ✦ Ground based systems



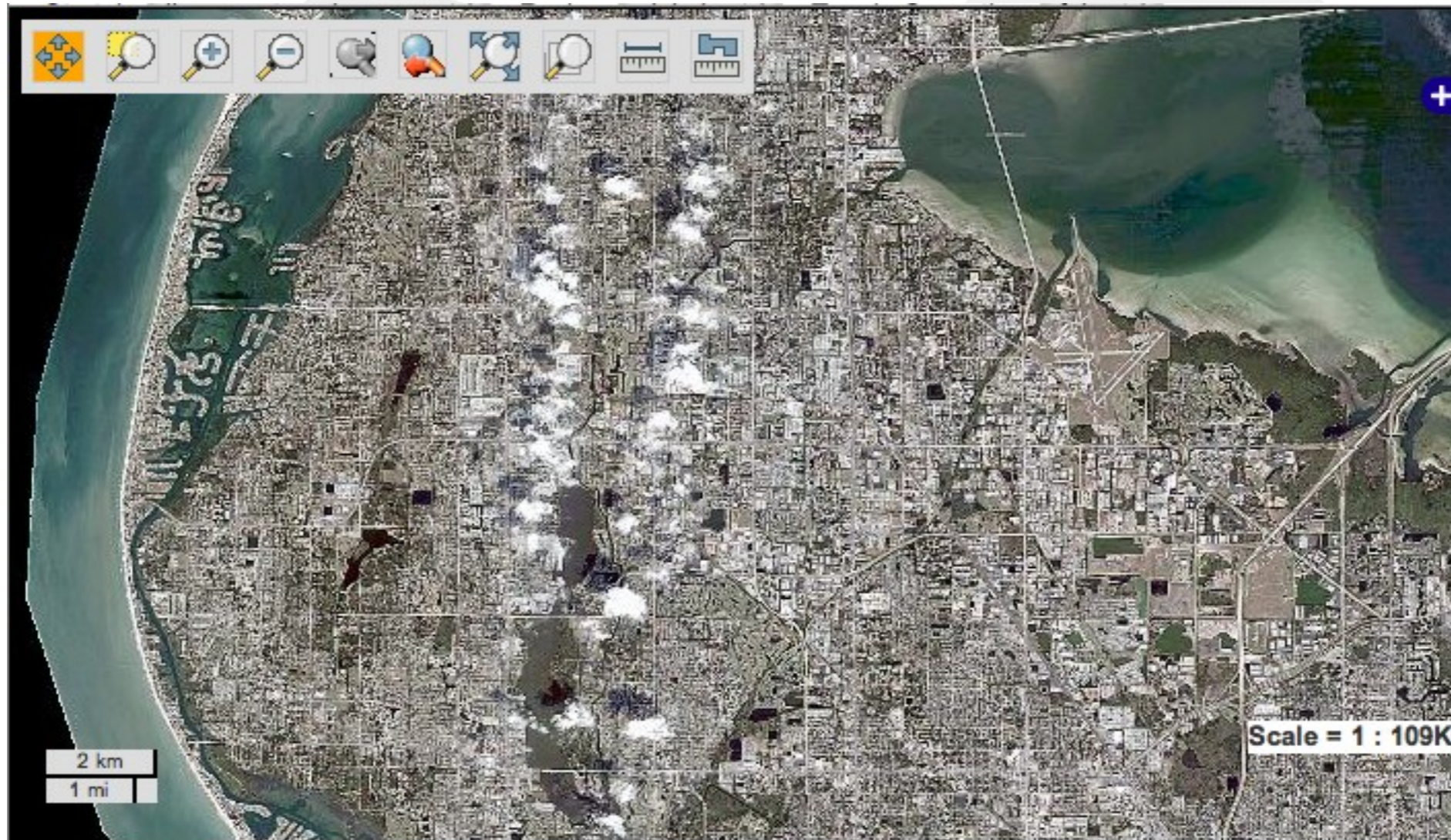
Aerial Imagery of Haiti refugee camps

Tampa, Florida

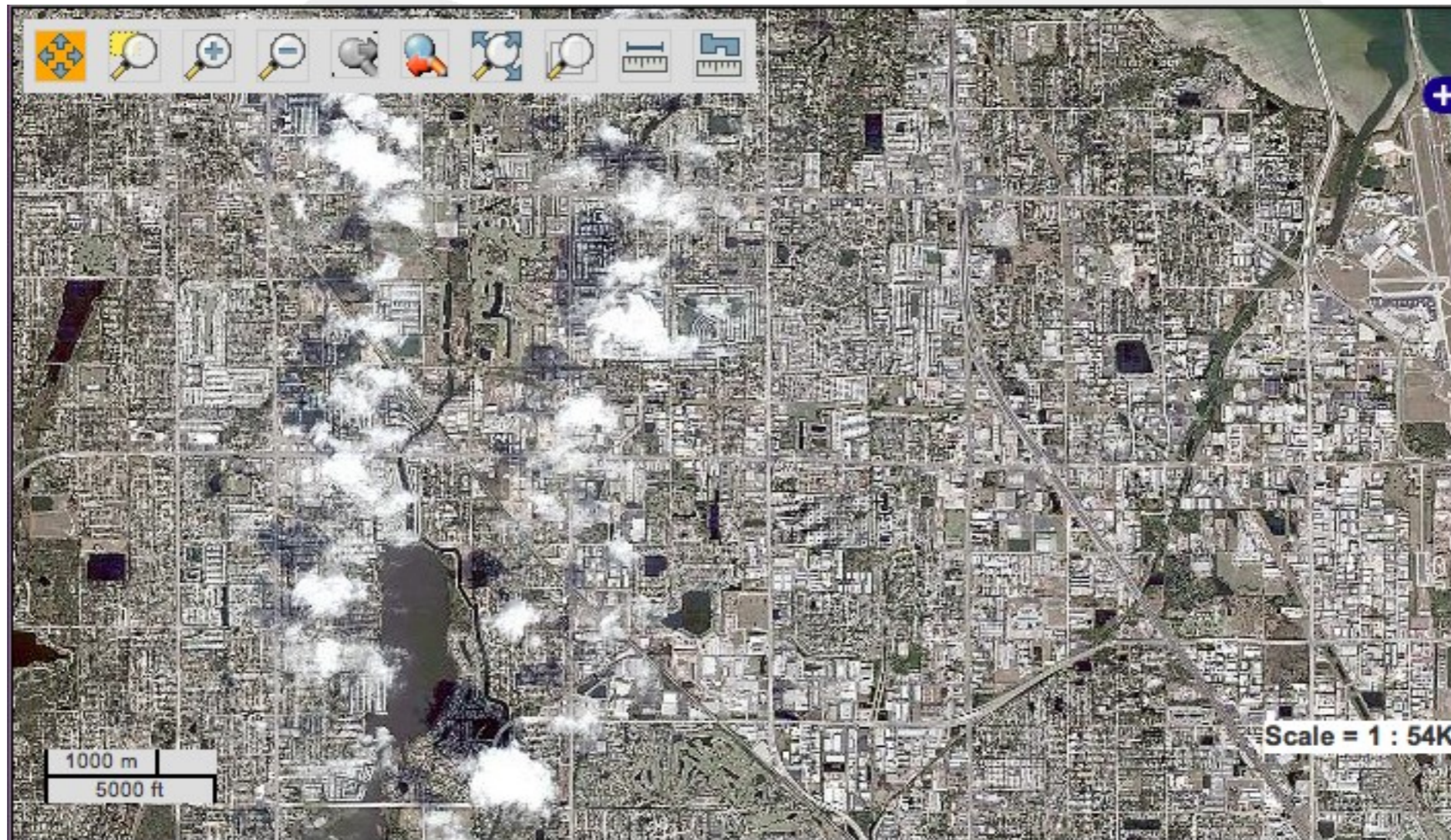




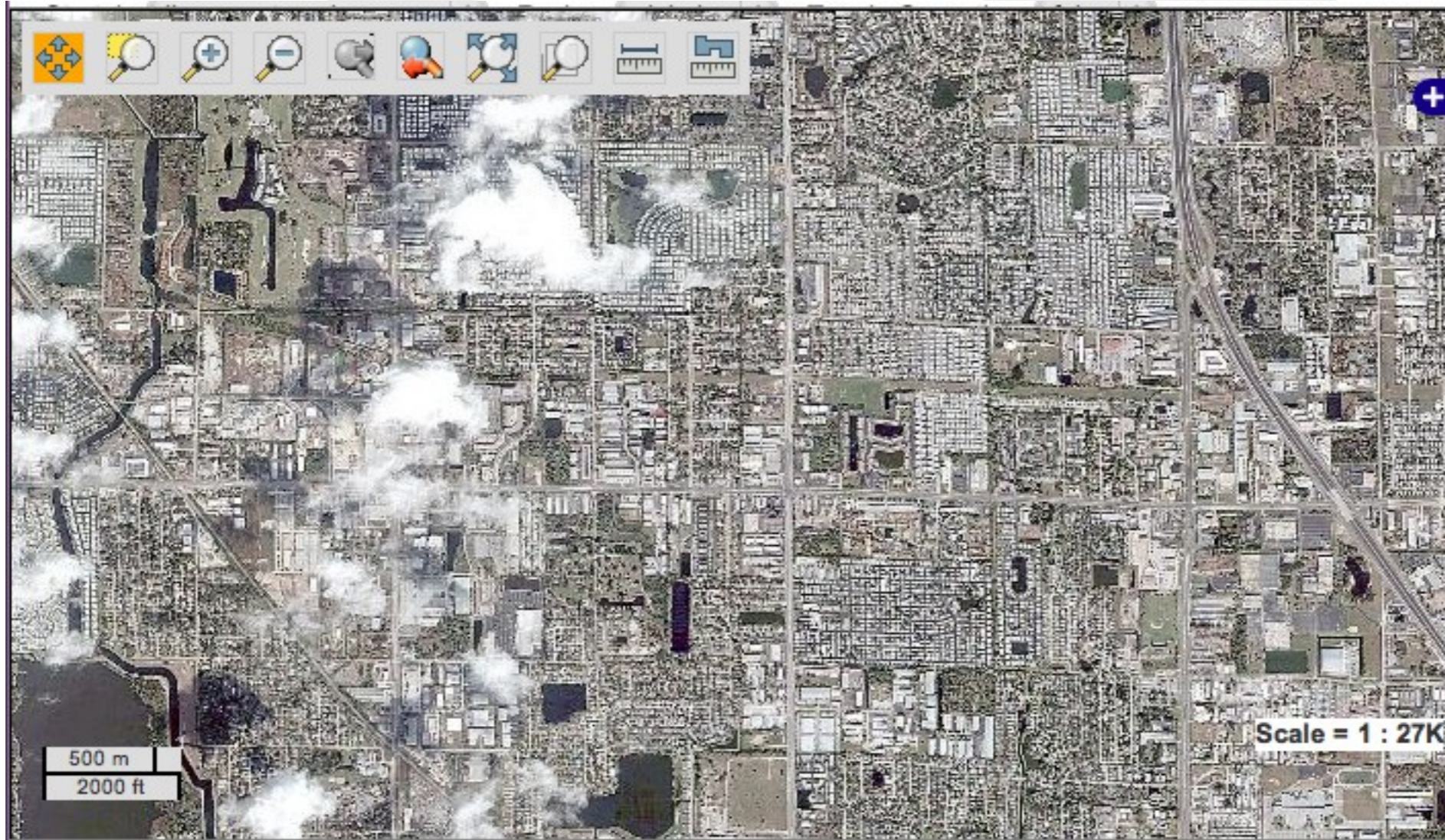
Urban Coverage

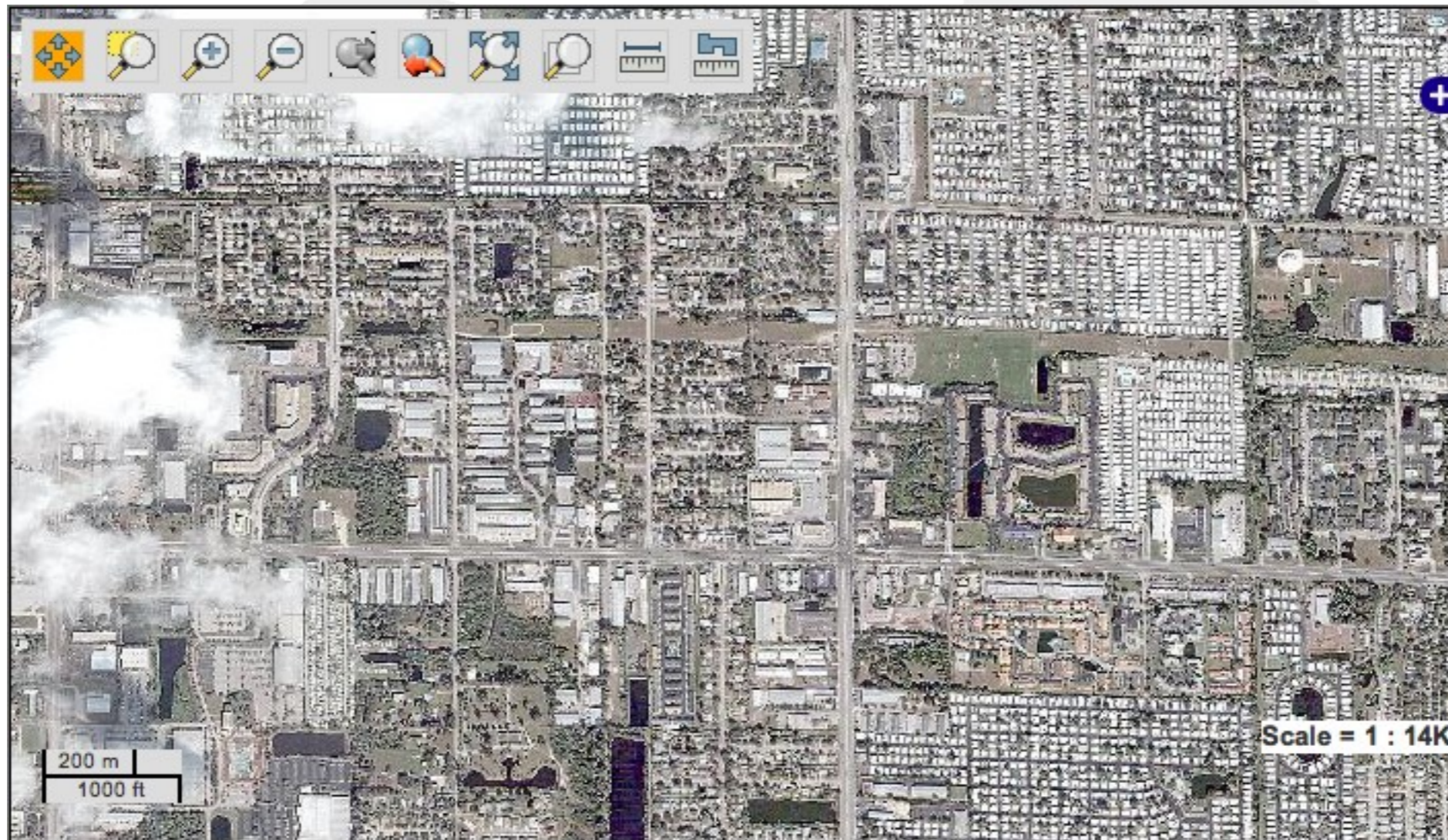


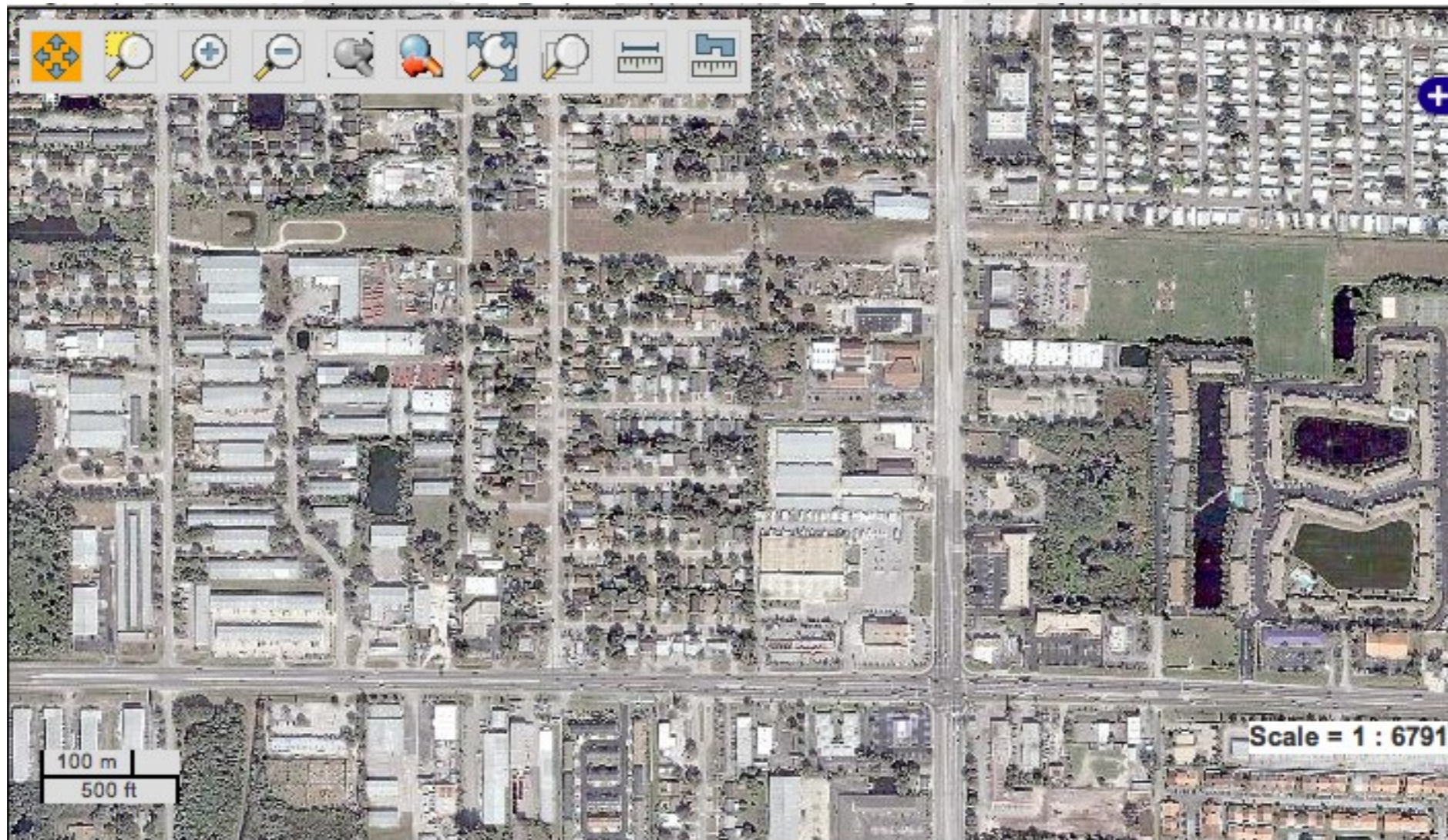
Sub meter resolution

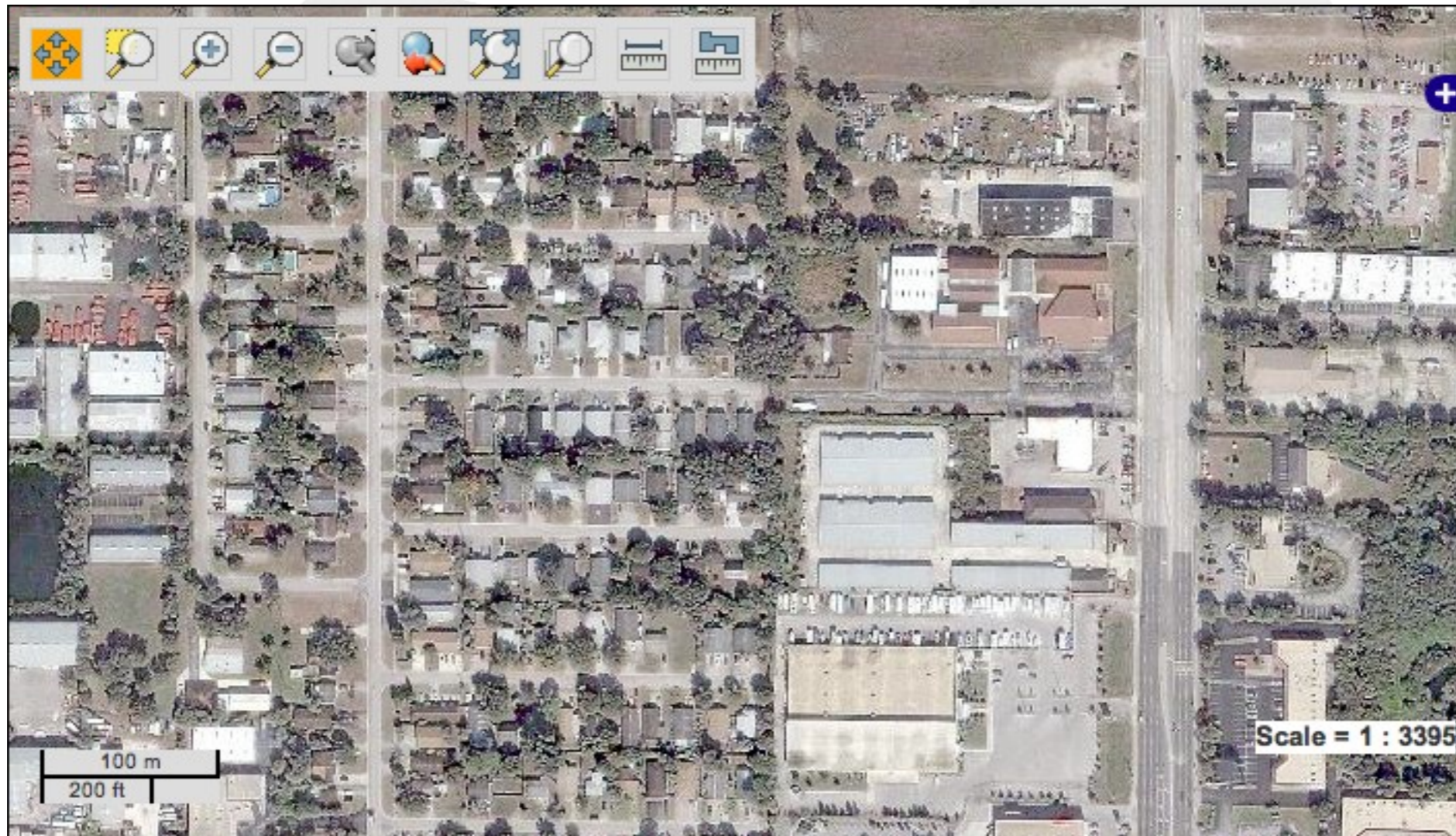


Optical and Near IR coverage

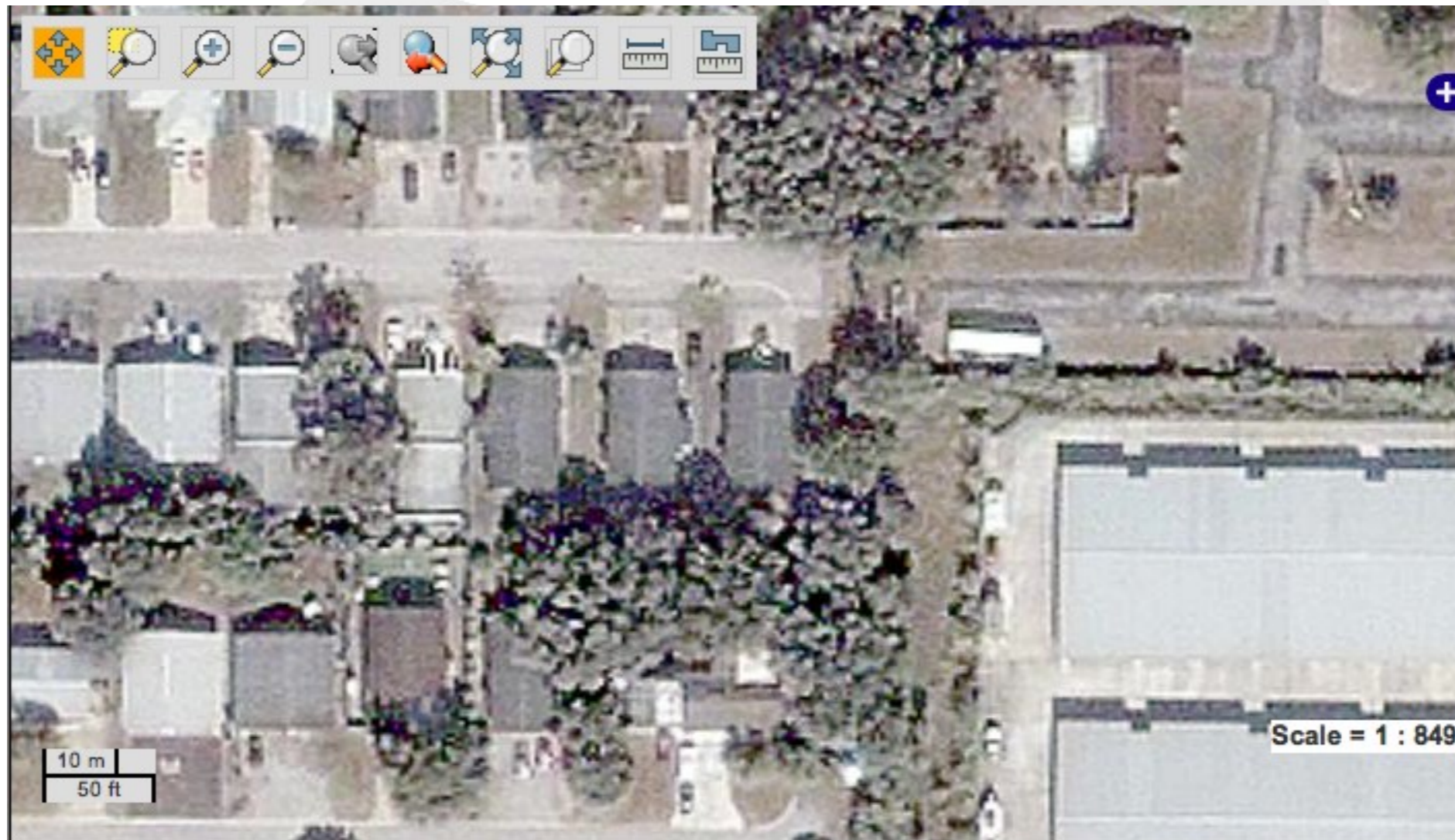




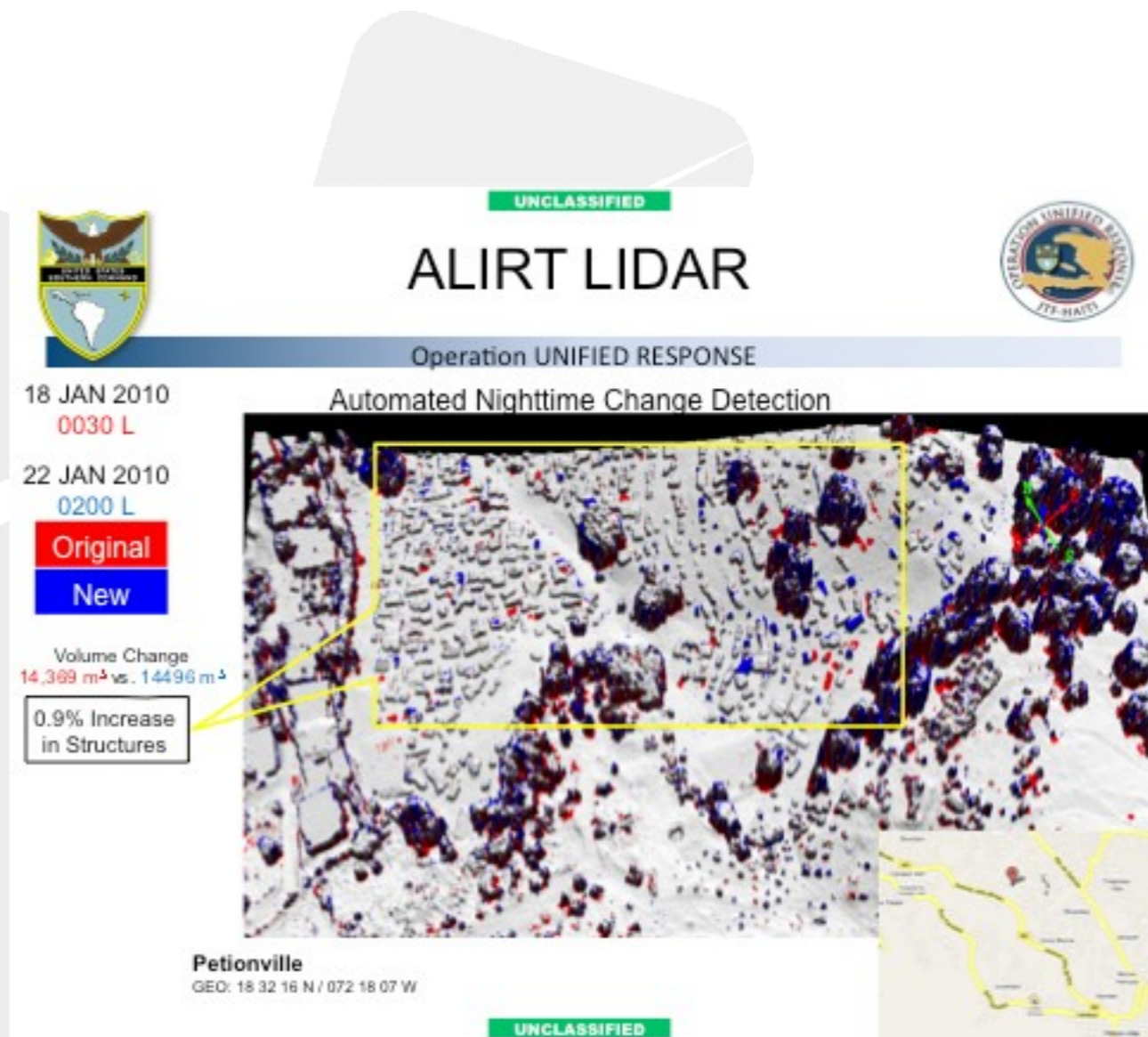




Resampling and Sharpening



- ✦ Direct Aerial measurement
- ✦ High resolution elevation surfaces
- ✦ Change Detection Products



Change detection in Haiti with LIDAR

Urban Feature Data

- ✦ Oblique Cameras
- ✦ Aerial
- ✦ Ground Based
- ✦ Rapid Model Generation



Precision Lightworks 3D Models with Pictometry Sensor



- ✦ High Resolution, Wide Area Systems
- ✦ 3D Virtual Environments
- ✦ Active Sensors (LIDAR, SAR, Interferometry)
- ✦ Persistent Surveillance
- ✦ Ubiquitous Remote Sensing
- ✦ Crowd Sourcing
- ✦ Automated Ground Station Processing





Mark Lucas

mlucas@radiantblue.com

www.ossim.org