

WorldWind Exercise: Volcanic Landforms

In this exercise, we'll use an internet program produced for NASA called **World Wind** to explore volcanic landforms. You can either download the program to run it on your own computer – providing you have a reasonably fast computer – or use it in the Geographical Analysis Teaching Lab (HSS 290) or the GIS lab (HSS 272) during available lab times (check the schedule). World Wind is similar to Google Earth, but provides a more seamless access to imagery, and this imagery is better in non-urban areas.

To **download** World Wind, go to <http://worldwind.arc.nasa.gov/> to find the download site. It requires Windows 2000 or XP, Intel Pentium 3, 1 GHz, or AMD Athlon or higher, 256 MB of RAM, a compatible 3D Graphics Card (see a link on the above site to find a list), broadband internet access, and 2 GB of disk space. See the download site for more information.

- Start World Wind, and explore how to use it. The best way to start is to look at a "Walk-through" accessed via the **Help** menu. You should do two walk-throughs: (1) Default Image Layers, and (2) Basic Functions. You need to know what the various image types provide, and how to:
 - Navigate using the mouse. You need a mouse with a scroll wheel to zoom in and out, or use the keyboard shortcut with 1 and 7 on the numeric keypad. You need to be able to move around in different directions, change the tilt angle, and get back to vertical (space bar).
 - Use the **Place Finder** to go to a named location, or enter lat-long directly.
 - Set the vertical exaggeration (**View** menu) to an appropriate level for the area you're looking at. In most cases 2x is about right, though this may be too much for steep mountainous areas. For relatively flat terrain, you can experiment with greater vertical exaggeration to bring out fine details like river terraces.
 - Turn on and off different images and other layers. You'll find the following the most useful, though you won't want to have all of them on all the time:
 - NLT Landsat7 Visible Color
 - USGS Digital (1m) Ortho – but only in the US
 - Boundaries
 - Place Names – but it can get crowded sometimes
 - Position Information
 - Latitude and Longitude Lines
 - ... some of the other Landsat images are also good from time to time, especially the pseudo color images for volcanic flows.
- Your task in this exercise is to explore locations that include examples of landforms you've studied in class and in the readings. You'll use World Wind to see views of these features, and you should use the navigation tools to get different angles and visualize the topography – the *form* is obviously important to a *landform*. Your goal will be to complete a *Landform Scavenger Hunt*.
- We'll start by finding for named locations. Use the **Place Finder** to **Search** for the location. Select the best choice in the list, then click **Go** to zoom into the location you've selected. Turn on the imagery suggested in the table. [Google Earth : use Local Search. Ctrl-L for lat/long grid.]

Location	State/Country	Imagery/Layers	Instructions
New Orleans	Louisiana	NLT Landsat Visible	Navigate to see the birds-foot delta
Dinosaur	Colorado	NLT Landsat Visible	Then go due north along 109°W meridian to 40.54°N

- For the following locations, use Ctrl-C to copy the code from this document – I'll also put this part on the web page as a word document – then in World Wind, paste it with Ctrl-V (or if this doesn't work, use Paste Coordinates in the Edit menu). Make sure you get the entire text string that starts with "worldwind://" and ends with the number after "&tilt=". Unless indicated otherwise, **use a vertical exaggeration of 2.0** – this is an especially important setting since it is part of what determines where the central cross-hair target is located. **The feature we're looking for should be in the cross-hairs.** Unless otherwise indicated, use NLT Landsat7 Visible as the image to display (turn off other images). Zoom out and rotate around to see the regional context; paste again if you get lost.

Google Earth variation:

Google Earth is becoming in many ways a better alternative to World Wind for this exercise. It doesn't have the choice of imagery, but it works pretty reliably, is often at a finer resolution, and it works on a Mac as well as Windows. Instead of pasting strings, download the KML file, and select each feature from Places to get the perspective saved for it.

Volcanic/Tectonic/Structural:

Mt. St. Helens 46.13774, -122.20557 worldwind://goto/world=Earth&lat=46.13774&lon=-122.20557&alt=19178&dir=-170.6&tilt=62.6
Toutle River Valley 46.29320, -122.42087 worldwind://goto/world=Earth&lat=46.29320&lon=-122.42087&alt=35178&dir=-177.9&tilt=29.7
Mt. Shasta 41.49022, -122.21235 worldwind://goto/world=Earth&lat=41.49022&lon=-122.21235&alt=15477&dir=3.0&tilt=69.3
Kilauea & Mauna Loa, Hawai'i (also compare LandSat 7 Pseudo, Geocover 1990) 19.36413, -155.16223 worldwind://goto/world=Earth&lat=19.36413&lon=-155.16223&alt=17435&dir=-76.6&tilt=66.9
Great Crack, Puunhh, Hawai'i (also compare LandSat 7 Pseudo, Geocover 1990 or 2000) 19.24077, -155.41852 worldwind://goto/world=Earth&lat=19.24077&lon=-155.41852&alt=22684&dir=-5.8&tilt=59.2
Mt. Lassen – Cinder Cone (also compare USGS Ortho) 40.57793, -121.30254 worldwind://goto/world=Earth&lat=40.57793&lon=-121.30254&alt=7064&dir=16.2&tilt=49.7
Sonora Table Mountain, California (also compare USGS Ortho) 37.90245, -120.48913 worldwind://goto/world=Earth&lat=37.90245&lon=-120.48913&alt=2397&dir=-143.7&tilt=70.0
Crater Lake 43.02031, -122.08530 worldwind://goto/world=Earth&lat=43.02031&lon=-122.08530&alt=14224&dir=11.6&tilt=66.9
Miyakejima, Japan (also compare LandSat 7 Pseudo, Geocover 1990 and 2000) 34.09159, 139.53001 worldwind://goto/world=Earth&lat=34.09159&lon=139.53001&alt=7107&dir=11.6&tilt=66.9
Mt. Taranaki, New Zealand -39.2977, 174.063 worldwind://goto/lat=-39.2977&lon=174.063&altitude=23700
Mt. Mayon, Phillipines (exag = 1) (also compare LandSat 7 Pseudo, Geocover 2000) 13.30987, 123.67641 worldwind://goto/world=Earth&lat=13.30987&lon=123.67641&alt=6970&dir=-10.7&tilt=75.2
Licancabur, Chile (also compare LandSat 7 Pseudo, Geocover 2000) -22.73570, -67.87514 worldwind://goto/world=Earth&lat=-22.73570&lon=-67.87514&alt=29435&dir=118.1&tilt=57.7
Zavaritzki, Kuril Islands 46.91924, 151.95360 worldwind://goto/world=Earth&lat=46.91924&lon=151.95360&alt=7277&dir=124.9&tilt=58.3
Etna, Sicily (LandSat 7 Pseudo, Geocover 1990) 37.70623, 15.02194 worldwind://goto/world=Earth&lat=37.70623&lon=15.02194&alt=28789&dir=9.1&tilt=46.0
Mt. Hillers, Henry Mountains, UT 37.8813°-110.697°
Stone Mountain, Georgia (USGS 1-m ortho) 33.81389, -84.14716 worldwind://goto/world=Earth&lat=33.81389&lon=-84.14716&alt=3136&dir=-4.4&tilt=47.3
Shiprock, NM 36.6885°, -108.836°
adjacent to Shiprock, NM 36.6876°, -108.855°

Composite Cone Evidence:	Location: _____
Tephra Cone Evidence:	Location: _____
Shield Evidence:	Location: _____
Lava flow Evidence:	Location: _____
Caldera Evidence:	Location: _____
Lahar Evidence:	Location: _____
Explosive Volcanism Evidence:	Location: _____
Effusive Volcanism Evidence:	Location: _____
Topographic Inversion, Past Flood Basalt Evidence:	Location: _____
Flood Basalt Evidence:	Location: _____
Inselberg on Granitic Pluton Evidence:	Location: _____

Dike Evidence:	Location: _____
Volcanic Neck Evidence:	Location: _____
Laccolith Evidence:	Location: _____

- Now, select two of the sites you visited, and copy a screen shot to a word processor (we have MS Word in the lab), by using Alt-Print Screen (hold the Alt key down, then click the Print Screen button on your keyboard, near the upper right), then paste (Ctrl-V) into the document. Add text identifying the location, and then print each on a separate page. For each, interpret the landscape, labeling the relevant features. Identify at least four features on each printout. *Note that these features need not be from the list, but are just things you can see in the image that help you interpret them; for example, you might see ridges surrounding a laccolith that illustrate the country rock distorted by the intrusion. Some features might be on the list (like a lava flow or a lahar deposit extending away from a volcano) but you'll probably see minor features like fractured rock or a small crater, or steam from lava flowing into the ocean, that helps to interpret the image. Really anything visible that contributes to the interpretation might be good to label.*