Exercise 1 – Introduction to Google Earth

**Created by:**

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**Purpose:**

The purpose of this exercise is for you to become familiar with Google Earth to explore and analyze the physical geography of a location.

**Essential Learning Outcomes:**

Navigate to a location using a variety of techniques

Analyze geographic and geomorphic properties of a location

Incorporate external data

**Equipment required:**

Computer with internet access

Google Earth computer program (available free at [www.earth.google.com](file:///G:\Teaching\GEOG%20221\Lab\Lab%20Manual\Online\www.earth.google.com))

**Instructor’s Notes:**

This exercise was developed for an online class and intended for students to work independently. There are several other similar introduction to Google Earth exercises available online, but none were comprehensive enough for my course. I developed this exercise to introduce students to the functions in Google Earth that they will be using to complete laboratory exercises throughout the semester.

**Background:**

Google Earth is a user-friendly, basic geographic information system (GIS) computer program that allows the user to view and interact with a seamless 3-dimensional virtual Earth (as well as the night sky, the moon, and Mars), maps, and a variety of data layers. Users can also create and distribute geographic data layers using Google Earth. Google Earth originated from a program called EarthViewer 3D, with funding from the Central Intelligence Agency. It was bought by Google in 2004 and became publicly available in 2005.

You will utilize Google Earth for this exercise and for several other laboratory exercises throughout the semester. Google Earth is available as a free download at www.earth.google.com. Google Earth apps are also available for smartphones and tablets. Many of the functions are not available in the app versions, however, so a computer will be necessary to complete this and future laboratory exercises.

The Google Earth interface consists of four panels: Search, Places, Layers, and the View panels. Navigation controls are in the upper right-hand corner of the View panel. The Search panel allows the user to navigate to a particular feature or location by entering location name or geographic coordinates. The Places panel includes locations you have added to your “My Places” folder or data you have loaded from an external source. The Layers panel consists of a series of thematic layers created by Google Earth and from external sources. **Before you begin this exercise, make sure all data layers in the Layers panel are unchecked.** The View panel is the primary panel where you can view and interact with the maps, images, and data presented in Google Earth.

Detailed directions on the several options available within Google Earth are available at: <https://www.google.com/earth/learn/>

A Google Earth user’s guide is also available at: <http://serc.carleton.edu/sp/library/google_earth/UserGuide.html>

**Exercises:**

**Part 1 – Navigating in Google Earth**

When you first open Google Earth, the default view should be a zoomed out view of North America. You can begin navigating in Google Earth in several different ways: using the search tool, by double-clicking “Placemarks”, using the mouse, using the on-screen navigation buttons, and using keyboard keys.

To begin, navigate to Mount Hood, Oregon by typing “Mt. Hood, OR” in the search panel and press the “Search” button. To adjust the eye altitude (i.e., the level of zoom), you can use the onscreen slider or “+” and “–“ buttons, you can hold the “Shift” + “Ctrl” keys and press the up/down arrow keys, you can hold the right mouse button and move the mouse up or down, or you can scroll the mouse wheel.

Zoom to an eye altitude of approximately 30,000 ft. Your eye altitude is listed in the bottom right-hand corner of Google Earth. Now tilt the image until the eye altitude is approximately 15,000 ft., so that you have an oblique/side view of the mountain. To tilt the image, hold the “Shift” key and press the up/down arrow keys or hold the “Shift” key and hold the left mouse button while moving the mouse up or down.

Now zoom in so that you can clearly see the mountain peak in detail. Hover the mouse pointer over the highest peak. Elevation of the location of the mouse pointer is listed near the bottom right-hand corner of Google Earth.

1. What is the approximate elevation of Mt. Hood?

You can “fly” around the mountain by rotating the viewing direction by holding the “Shift” key and pressing the left/right arrow keys, holding the “Ctrl” key and scrolling the mouse wheel, or by dragging the “N” icon on the onscreen compass wheel.

Add a “Placemark” to save this location by clicking on the yellow pushpin icon above the View panel. To adjust the location of the Placemark, press and hold the left mouse button while hovering the mouse pointer over the yellow pushpin and drag it to the proper location and release the mouse button. Move the Placemark to the peak of Mt. Hood and name it “Mt. Hood Peak”. You could add a description, change text and icon color, specify the default angle and eye altitude and more – for now you do not need to change anything but the name. It should appear under “My Places” in the Places panel. Right-click on the Placemark and select “Properties”.

1. What is the approximate latitude and longitude of the peak?

You can also use Google Earth to navigate between two locations using the “Get Directions” function in the “Search” panel. Get directions between your campus and Mt. Hood, OR.

1. Approximately how many miles would the trip be by car?

Return to Mt. Hood by double-clicking the Placemark and zoom to an eye altitude of ~20,000 ft.

Google Earth incorporates a variety of thematic layers, similar to more advanced Geographic Information System (GIS) software packages. In the Layers panel, expand the Borders and Labels layer, and then expand the Labels layers. Turn on the Geographic Features layer. You should now see a green icon on the peak of Mt. Hood – click on the icon to open an information box about Mt. Hood to answer the following questions.

1. What type of mountain is Mt. Hood?

1. How many glaciers are on the peak?

Close the information box and explore the other pre-loaded data layers and select the appropriate layers to answer the following questions:

1. When was the last eruptive period of the Mt. Hood volcano?

1. What magnitude earthquake was recorded near the peak on August 18, 1982?

Now you will import a data layer from the Google Earth Maps Gallery. Click on the “Earth Gallery” button in the top right-hand corner of the Layers panel. This will open a browser window with a series of Google Earth files. Search for “topographic maps”. Click on the “Historical Topographic Maps” icon, and then click on the “View in Google Earth” button below the right-hand corner of the map. You can save the file to your computer and open it with Google Earth, or you can select “Open with”, click on the browse button, and select Google Earth. Click Ok and the “Historical Topographic Maps” layer should appear at the bottom of the Layers list.

If it isn’t already, center the View panel on the peak of Mt. Hood at an eye altitude of ~20,000 ft.

1. What is the elevation of the peak of Mt. Hood on the topographic map?

1. What is the name of the glacier east/south-east of the peak?

You can adjust the opacity of the layer, so that you can also see the aerial image of the landscape through the topographic map. To do this, click on the square icon with a blue gradient immediately above the Layer panel and next to the magnifying glass icon. Use the slide bar to adjust the opacity of the image.

1. What is visible in the Google Earth image where the topographic map contour lines are brown rather than blue?

You will now construct a topographic profile of Mt. Hood running west to east across the landscape. If it isn’t already, center the View panel on the peak of Mt. Hood at an eye altitude of ~12 miles. Click the “Add Path” icon at the top of the View panel. Click on the west side of Mt. Hood at coordinates: 45.375 and -121.765 and on the east side at 45.370 and -121.600. Name the path “Mt. Hood transect” and click “Ok” to save the path to “My Places”. Right click on the path in “My Place” and select “Show Elevation Profile”.

1. What is the approximate difference between minimum and maximum elevations?

1. What is the approximate average positive slope of the entire topographic profile?

You can also focus the transect on a select portion of the topographic profile. Navigate the mouse so the thin vertical black line passes through the peak of the topographic profile. Click and hold the left mouse button and drag the cursor to the left edge of the topographic profile and release the button to select the western half of the profile. Repeat this process for the right side of the topographic profile.

1. Which side has a greater average slope?

1. What is the approximate length of the entire profile?

The length of the topographic profile is not the same as a straight-line distance measurement because the length takes into account changes in elevation and straight-line distance does not. To determine straight-line distance, click the “Show Ruler” icon above the View panel. Click at the same coordinates as you did to create the path.

1. What is the approximate straight-line distance between the two points?

**Part 2 – Incorporating external data into Google Earth**

Several organizations have created data or modified existing data for viewing and analysis in Google Earth. Incorporating this data into Google Earth is very easy. To demonstrate, we will utilize a Google Earth .kmz file created by the California Soil Resource Lab that is used to access detailed USDA soils data. Navigate to: <http://casoilresource.lawr.ucdavis.edu/soilweb/> and click on the “SoilWeb Earth” link. You can save the file to your computer and open it with Google Earth, or you can select “Open with”, click on the browse button, and select Google Earth. Click Ok and “SoilWeb” should appear in your “Temporary Places” in the Places panel.

Navigate to your house, and then zoom in on the area around it. Click in the View panel on the area/yard around your house and a soil information box should open (make sure “SoilWeb” is turned on in the Places panel).

1. What type of soil is your house built on?

Click on the soil name in the information box. This should open a website with detailed information about the soil.

1. What is the geomorphic position of this soil?

Under the “Component Name” column, click the “Soil Type 1” link to open a detailed description of the soil profile.

1. How deep is a typical profile?

1. What soil order does this soil belong to?

1. What is the soil’s limitation rating for local roads and streets?