Introduction to Google Earth™

Using Google Earth™ with the Field Guides in the *Second California Edition* of *McKnight's Physical Geography, 10th ed.*

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January 2011

The *Field Guides* for the *Second California Edition* of *McKnight's Physical Geography*, 10th edition, by Darrel Hess, include the latitude and longitude of all road log stops, enabling readers to navigate to these locations using GPS (the Global Positioning System) as well as to study these sites remotely using Internet mapping programs such as *Google Earth™* and the U.S. Geological Survey's *National Map*. In addition, a series of Google Earth™ "tours" has been created for each of the routes described in the *Second California Edition Field Guides*.

This document introduces the basics of using Google Earth™ with the *Field Guides*, including how to locate features in Google Earth™, how to change your view of the landscape, and how to use KMZ files from the *Second California Edition* Web site in order to take "virtual" field trips to these locations.

A more detailed introduction to *Google Earth™* (as well as *The National Map*) is found in the *Physical Geography Laboratory Manual* for *McKnight's Physical Geography*, 10th edition, by Darrel Hess (available through **http://www.mypearsonstore.com**). With further exploration you will uncover many capabilities of this application not discussed in this brief introduction. *Note: Google Earth™ is a constantly evolving application—over time the functions and procedures may vary slightly from that described below.*

Getting Started with Google Earth™: In order to use Google Earth™ (GE), you must download and install free software on your computer (**http://earth.google.com**). GE allows you to move easily to different parts of the world, viewing roads, topography, and detailed aerial imagery. Google Earth™ contains an ever-growing amount of location information that is easily accessed, placemarked, and shared by individuals and businesses. With GE you can zoom in, rotate and tilt your view of the surface below (aerial imagery "draped over" a three-dimensional digital elevation model of the terrain) and virtually "fly" over the landscape—a remarkable tool for the study of physical geography. *Note: Google Earth™ base map and imagery content is strictly protected by copyright and should not be reproduced without permission.*
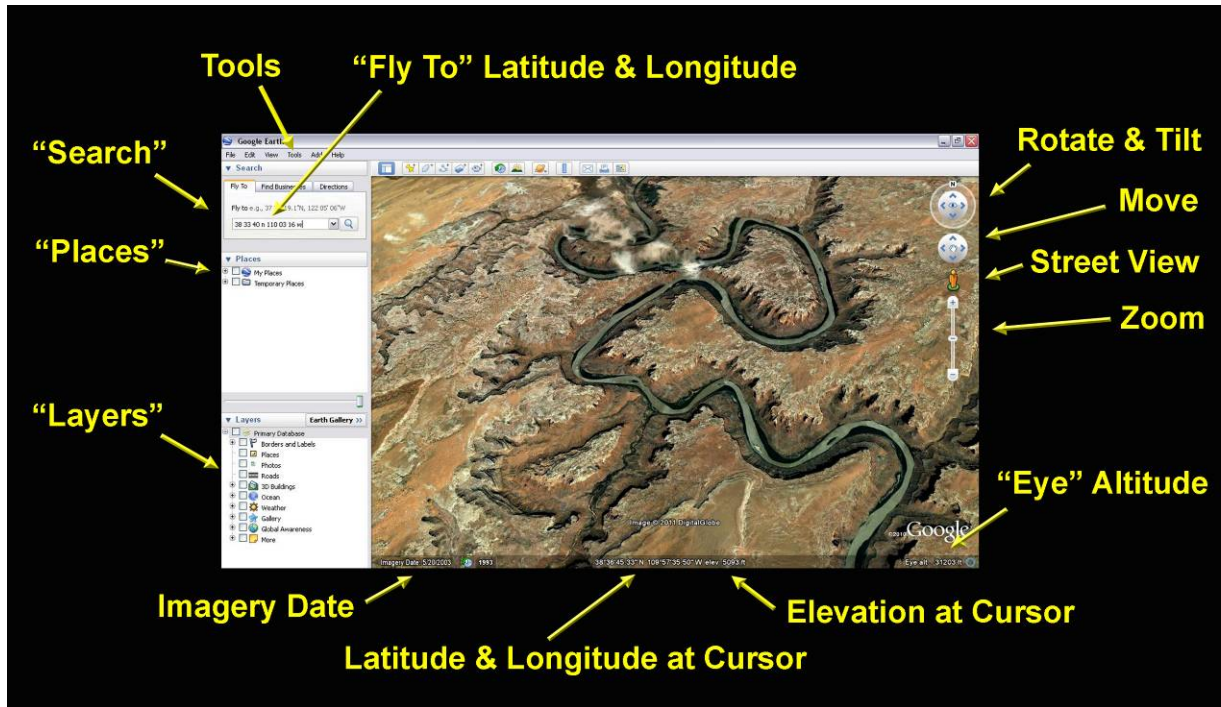
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Figure 1: Google Earth™ screen showing panels and navigation controls. (Google Earth™ is a trademark of Google, Inc.)

After installing the latest version of the free Google Earth™ software on your computer, you may want to go through some of the introductory tutorials (click "Help" along the top of the screen).

Google Earth™ opens with a map of the world on the right and a sidebar with three menu panels on the left: *Search*, *Places*, and *Layers* (Figure 1). Any of these panels may be hidden from view by clicking the triangle next to the panel name.

Search Panel: The "Fly To" feature lets you search for locations by entering a place name or address. You may also type in latitude and longitude coordinates and instantly "fly to" a specific location—this is one of the ways you can navigate to locations mentioned in the *Field Guides*. Enter latitude and longitude values in the same order as coordinates are given in the *Field Guides*, but you needn't enter the symbols for degrees (°), minutes (′), or seconds (″)—just leave a blank space between each number and N or S for latitude, and E or W for longitude. So, the location of the Lassen Peak trailhead in northern California (40°28′27″ North, 121°30′20″ West) would be entered in the "Fly To" box as: 40 28 27 n 121 30 20 w. As soon as you click the search button, you'll fly to and zoom in on that location.

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When you type in a place name in the Search panel, a list of locations (often commercial establishments) linked to your search terms will appear. When searching for locations by street address, you may only need to enter the street address and zip code. For example, to find City College of San Francisco with an address of 50 Phelan Avenue, San Francisco, California 94112, you can simply enter "50 Phelan 94112" (this won't work for all addresses).

Places Panel: The "Places" panel lets you keep track of locations you've "placemarked," as well as files opened from other sources (such as the *Second California Edition* Web site) which lets you view special content in GE. (The procedures for creating placemarks and opening files are discussed below.)

Layers Panel: The "Layers" panel lets you click on and off the many map layers of information available in GE. In the *Field Guides* we're mostly interested in the terrain, so you may want to start off by "unchecking" most of the layers (although you may find it helpful to keep a few of the place-name layers showing). You may then hide the Layers panel.

Navigating in Google Earth™: Once you have arrived at your map destination, use the controls along the right side of the screen to move around and change your perspective. The *Zoom* control changes the scale of the map—and so the apparent altitude of your "eye." The *Rotate and Tilt* control (the "Look Joystick") lets you rotate your vantage point and tilt your view up or down. The *Move* control (the "Move Joystick") moves you over the landscape in the direction you choose; if you've set the tilt control to a low angle, you'll have the sensation of flying over the virtual landscape below. You may also change location by clicking and dragging on the map with your mouse. (If the navigation controls do not appear, click "View" on the top toolbar and then "Show Navigation.")

As you navigate in GE or change the location of your cursor on the screen, notice that the latitude, longitude, and elevation values (shown along the bottom of the screen) also change. (If you don't see the latitude and longitude at the bottom of the screen, click "View" on the top toolbar and select "Status Bar.")

You can keep track of the direction you're viewing in GE by looking at the position of the "N" on the ring around the Rotate and Tilt control—when the N is in the "12:00 position" (top of the circle), the view is facing north; if the N is in the 6:00 position, you're facing south, and so on. To quickly reorient the map with north at the top of the screen, just click on the N.

Although the default settings of GE generally work well, you can adjust characteristics such as the measurement units shown, the format of latitude and longitude, and the amount of "vertical exaggeration" in the landscape. To change these settings, select "Tools" from the top toolbar, then "Options," and "3D View."

Street View: To see the street-level images that are available in many locations, drag and hold the *Street View* icon over an area of interest. After a few seconds, blue lines will appear over the roads indicating where street view images are available. Release the icon and the screen will show ground-level photography. From the Street View screen, you can "drive" along a road and see

the surrounding landscape (the quality and usefulness of the street view imagery varies somewhat from place to place).

Placemarks: You can mark locations in GE by adding "placemarks." Click the Placemark button near the top of the screen and an icon will appear on the map. Drag the icon to the location you desire and give it a name (and an additional text description if you wish) in the dialogue box that appears. Your placemark then becomes an entry in the "My Places" folder on the Places panel (you may also add additional folders to organize your placemarks). You can fly back to the location of any placemark on your list by double clicking on the placemark name or icon.

Opening Field Guide KMZ Files in Google Earth™: To access the special Google Earth™ content created for the *Field Guides*, go to the *Second California Edition* for *McKnight's Physical Geography*, 10th edition, Web site at **http://www.mygeoscienceplace.com**. For each of the *Field Guides* that offer road logs (all of them except FG7, FG10, FG11) you'll find a KMZ file (compressed "Keyhole Markup Language" file). When you select one of these files, Google Earth™ will open and the file will appear in your "Temporary Places" folder on the Places panel (Figure 2).
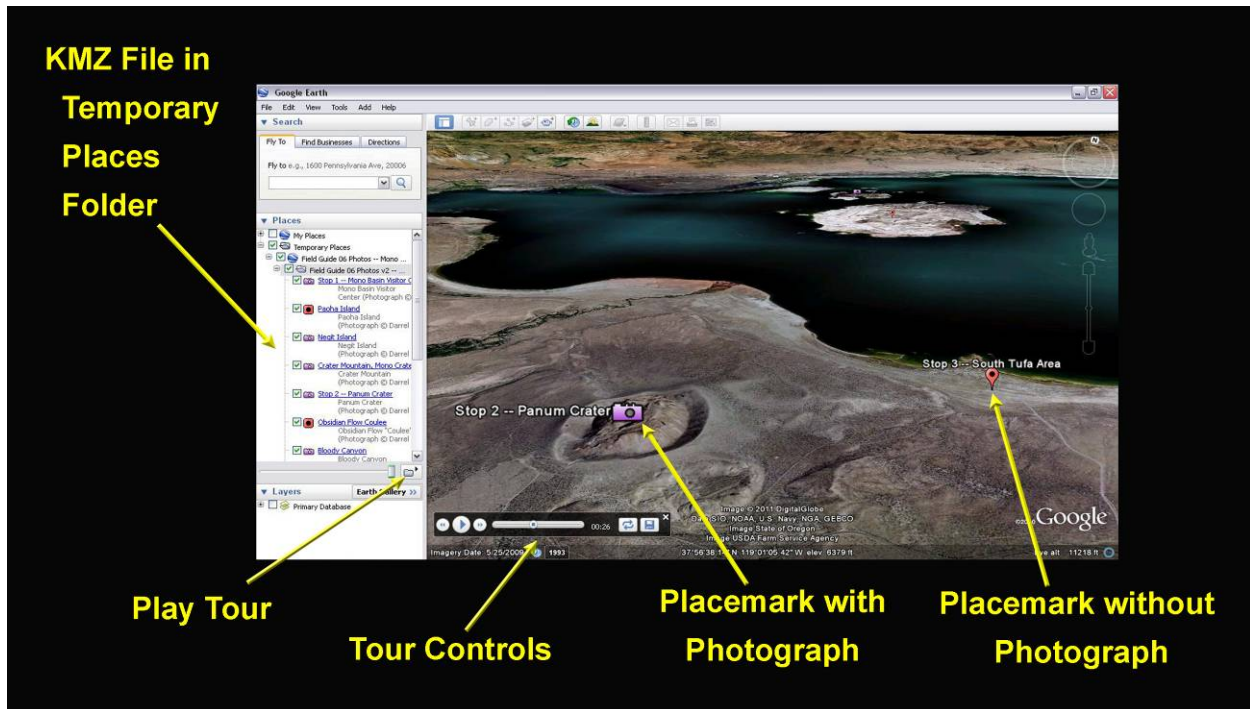
Figure 2: Google Earth™ screen showing "Tour" controls and a KMZ file in the Temporary Places folder. (Google Earth™ is a trademark of Google, Inc.)

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These KMZ files contain preselected views of all *Field Guide* stops, along with other useful intermediate locations. You may need to click on the "+" icon next to the folder to expose all of the stops, and be sure that the tiny box next to each placemark name is checked so that the placemark icons appear on the map. Simply double click on a stop icon on the Places panel and GE will fly you to the correct location. Once there, you can further zoom in or change your view in GE; to return to the original view, just double click again on the location icon on the Places panel.

If you play the file as a "tour," GE flies you to all of the stops in an automatic sequence, pausing for a few seconds at each location (if the "Play Tour" icon does not appear at the bottom of the Places panel, just click on a folder). To pause or replay a tour, click the appropriate button on the "Tour Controls" toolbar that appears in the lower left side of the screen. To change the timing characteristics of a tour, click "Tools" on the top toolbar, then "Options" and "Touring."

Most of the *Field Guides* include two KMZ files. If two files are given, the first KMZ file (for example, the one titled *Field Guide 03 -- San Andreas Fault*) contains stop locations indicated with a red placemark "balloon" icon (see Figure 2); the second KMZ file (for example, the one titled *Field Guide 03 Photos -- San Andreas Fault*) includes photographs taken at most placemark locations. Where photographs are available, a "camera" icon is used instead of the balloon icon (see Figure 2). To view the photographs, either double click on the blue photograph description line in the Places panel, or double click on the camera icon on the map. To close a photograph, click the "x" button next to the photo. (If the photographs don't appear when you double click on the camera icon or photograph description line, you may need to clear your GE cache: Go to "Tools," then "Options," and "Cache," where you can click the "Clear Memory Cache" button.)

The Three-Dimensional Landscape in Google Earth™: It is important to keep in mind that the landscape you're viewing in Google Earth™ is a virtual one. In most cases, vertical (or near vertical) aerial imagery is "draped" over a digital elevation model (DEM) of the landscape by the GE software. In order to view such an image-over-DEM landscape from a low angle, the vertical aerial imagery must necessarily be "stretched" down over the topography. While such views can be extremely useful when studying landforms, keep in mind that this computer-generated image does not provide the exact same view you would have were you *actually* flying over the landscape— interpret what you see with a critical eye.

Keep in mind also that the quality of aerial images shown in Google Earth™—as well as the time of day or even the time of year of the imagery—varies from place to place. This means that as you travel from one location to the next in GE, you may notice abrupt differences in color, brightness, and even detail shown on the ground.