Washington State Department of Natural Resources
Division of Geology and Earth Resources

100k Geologic Units, Contact, and Faults
Google Earth Overlays

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OVERVIEW

The information and links below allow you to download an overlay for use in Google Earth. This overlay will allow you to view the 1:100,000-scale surficial geology of Washington State by county using the 3D tools and capabilities of Google Earth. Viewing the geologic data in this way helps the user to envision the interrelationships between the surficial geology and the terrain.

ABOUT THE LAYERS

Geologic Units: This layer contains geologic unit polygons showing the extent of each geologic unit. Geologic units may be broken out by age and lithology (rock description), formation, or terrane (fault-bounded body of rock with shared geologic history). Each unit is identified by a unit label. The unit labels are abbreviations that represent the age, lithology, and name of a geologic unit. Unit labels consist of uppercase letter(s) denoting age (youngest first if the age is compound), followed by lowercase letters showing first the general lithologic subdivision, then detailed lithologic information. For example, KJigb is the label for Cretaceous to Jurassic intrusive gabbro. If the age is "pre", as in pre-Cretaceous, the "p" representing "pre" is lowercase. Subscripts (indicated by parentheses) are used to represent formal or informal formation names. For example, the label for the Miocene (volcanic) Grande Ronde Basalt is Mv(g). The age of metamorphosed units is the protolith (original rock) age, not the age of metamorphism. Most of our age labels are based on standard U.S. Geological Survey (USGS) age symbols, but because of the prevalence of Tertiary rocks in Washington, each Tertiary epoch has been assigned a separate age symbol. These Tertiary symbols differ somewhat from those previously used by the USGS: E = Eocene, M = Miocene, O = Oligocene, PA = Paleocene, and PL = Pliocene. Symbols used for other geologic time units are: C = Cambrian, K = Cretaceous, J = Jurassic, MZ = Mesozoic, P = Pennsylvanian, PZ = Paleozoic, Q = Quaternary, and TR = Triassic.

Contacts: This layer contains unit contacts. Contacts are lines showing the boundaries of geologic units. Where the boundary between two geologic units is a fault, that boundary is shown in the Faults layer instead.

Faults: This layer contains faults. Faults are fracture surfaces along which two rock masses have moved relative to each other. A fault line on the map shows where the fracture has been recognized at the Earth's surface. A **normal fault** is a steeply dipping fault in which the hanging wall (the uppermost of the two rock masses) has moved downward relative to the footwall (the lowermost rock mass). The dip angle of the fault plane is usually between 45° and 90°. A **reverse fault** is a steeply dipping fault in which the hanging wall appears to have moved upward relative to the footwall. The dip is usually greater than 45°. A **thrust fault** is a low-angle fault (<45°), typically caused by horizontal compression, in which the hanging wall has moved upward relative to the footwall. A **strike-slip fault** is a fault in which displacement occurred parallel to the strike of the fault plane, that is, sideways instead of up-and-down.

HOW TO USE THESE FILES

Note: You must have Google Earth installed on your computer for these files to work. Note that these instructions are for the version of Google Earth (7.0.3.8542), updated versions or utilizing Google Earth Pro may change the user interface slightly. You can also learn about loading these files with a YouTube video.

1. You can download these data by either choosing a county of interest from the Subsurface Geology & 3D Visualization page or by clicking on a county link below.
2. Clicking a county link will open a file download window from fortress.wa.gov. Select either save or open to obtain the file; selecting save will download it to your user defined download folder. Unzip the folder by right-clicking on the folder and select the extract option (this may be slightly different depending on the version of windows you are running).
3. Once the folder is unzipped, you will see the kmz file for your selected county. Double click on this file name. Google Earth will launch and your 100k geology layer will be automatically loaded into your "temporary places" folder.
4. You may wish to adjust the transparency of the geologic unit polygons. This allows you to view the Google Earth terrain and aerial photography beneath the geologic units. To do this, click on the "+" sign next to the loaded .kmz to produce a dropdown menu folders. Click on the "Geologic Units" folder and move the slider at the base of the "Places" Table of Contents this will adjust the transparency of the geologic units (Figure 1).
5. To find more information about a geologic unit, fault, or contact simply click within the polygon or line of interest and a popup balloon will appear containing all the relevant information for the item of interest.
6. Be sure to enable terrain to view topography, to do this click "Tools"→"Options" and on the "3D" tab and ensure that the terrain section has a selection chosen for viewing 3D elements of Google Earth (your selection may vary depending on the capabilities of the user's system). To increase or decrease the apparent elevation to enhance visualizations of topographic features change "Elevation Exaggeration" as desired (Figure 2). Lower numbers will reduce the topography and high numbers will increase it.
7. Unit labels for geologic units will appear at Eye Altitude levels of <50,000 ft and appearance height may vary depending on viewing angle.
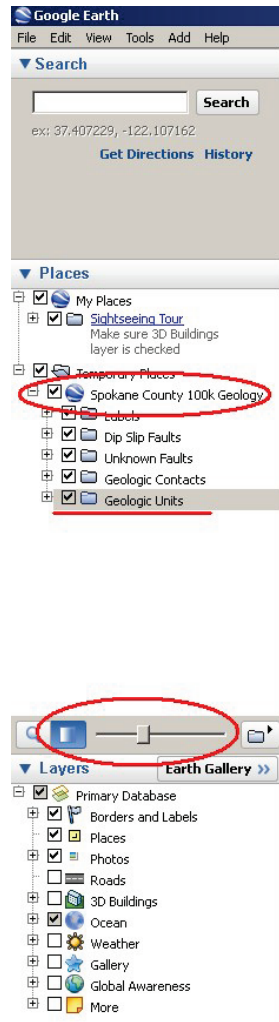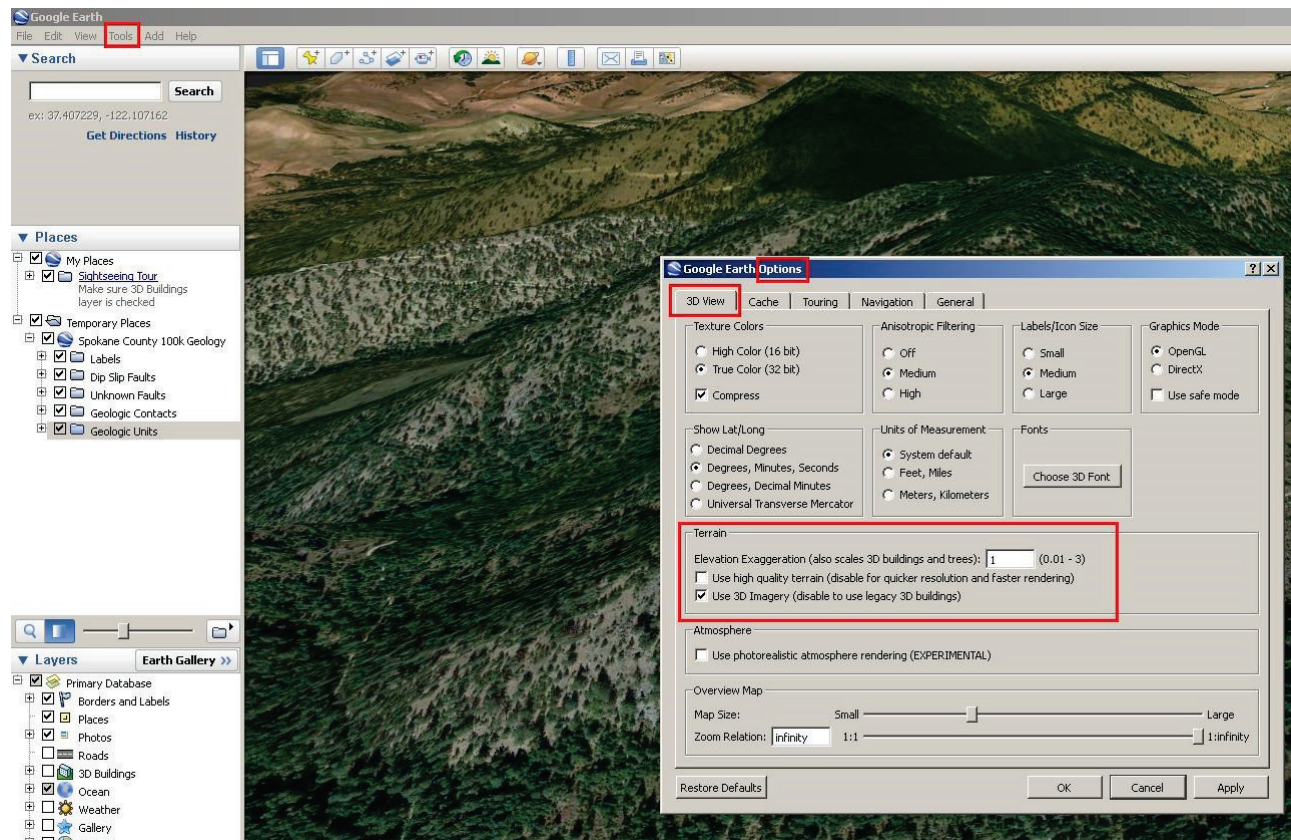
Figures

Figure 1

Figure 2

LINKS

Click on one of these links to download the 100k geology for your selected county:

Adams	Grays_Harbor	Pierce
Asotin	Island	San_Juan
Benton	Jefferson	Skagit
Chelan	King	Skamania
Clallam	Kitsap	Snohomish
Clark	Kittitas	Spokane
Columbia	Klickitat	Stevens
Cowlitz	Lewis	Thurston
Douglas	Lincoln	Wahkiakum
Ferry	Mason	Walla_Walla
Franklin	Okanogan	Whatcom
Garfield	Pacific	Whitman
Grant	Pend_Oreille	Yakima

GEOGRAPHIC PROJECTION

Google Earth reprojects these data from their original Lambert Conformal Conic projection (in Washington State Plane South (FIPS 4602), NAD83 HARN datum) to the Google Earth coordinate system (simple cylindrical projection, WGS84 datum). As with any data reprojection, coordinates on the Earth's surface can be slightly altered as a result of this process.

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