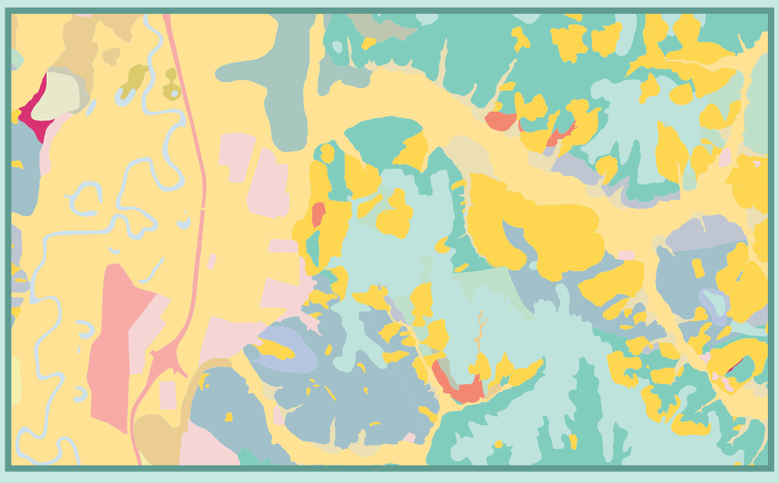
ENHANCING GEOLOGIC MAPS WITH LIDAR

A geologic map shows the nature of rocks and sediments at Earth's surface and, to some extent, in the shallow subsurface. Historically, geologic maps were created by taking ground-level observations and measurements in the field. As remote sensing technology has become available, such as satellites for taking aerial images and, more recently, lidar (which stands for Light Detecting and Ranging), the accuracy of geologic maps has greatly improved.

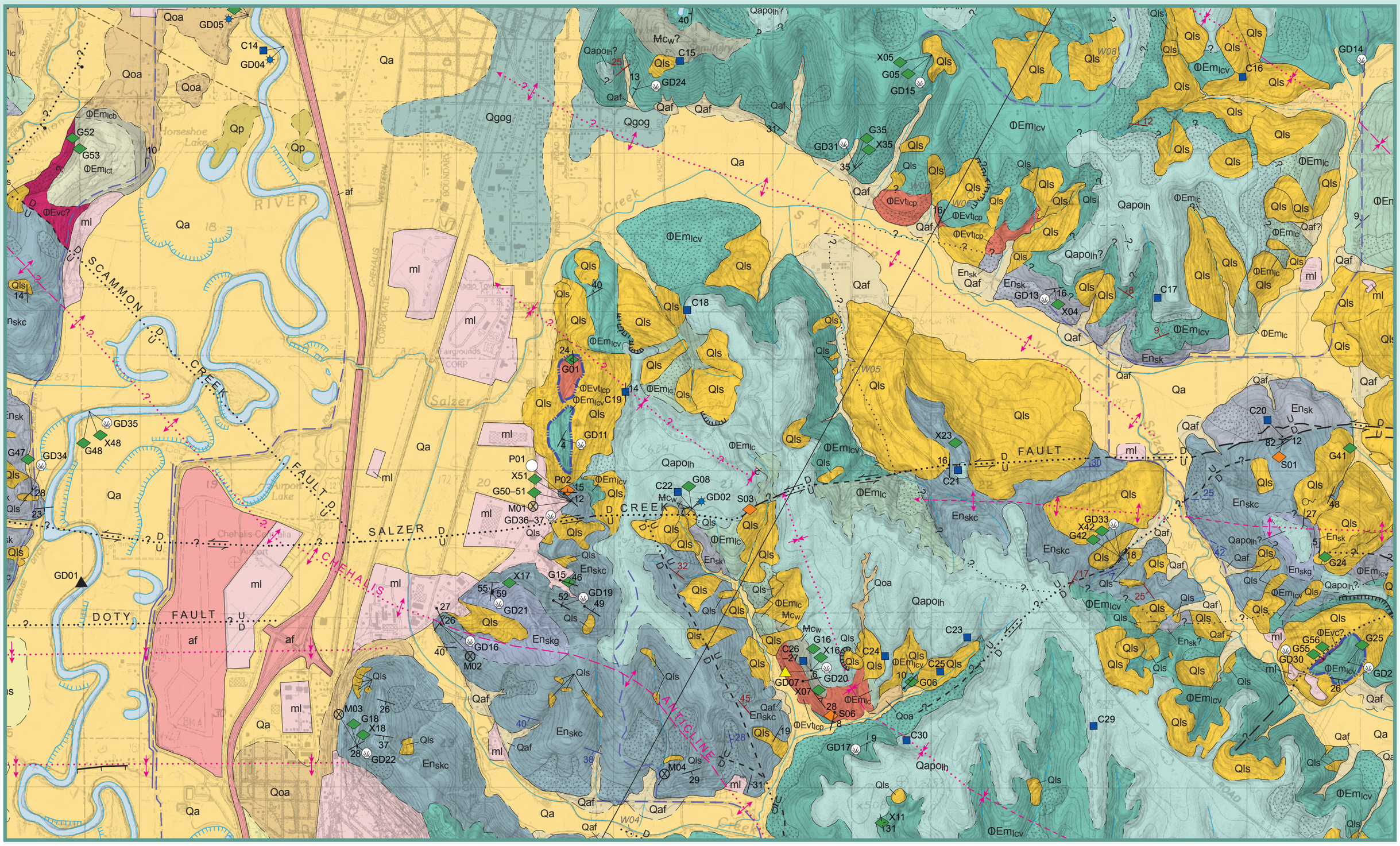
For example, examine the image on the far left which shows outlines of a geologic map from Centralia, Washington. These units were mapped in 1987 using data from aerial imagery and fieldwork. Since then, lidar was used in the same area which provided highly accurate elevation data for the Earth's surface (called the bare earth data) and objects above the ground (such as trees and buildings). The center image is a digital elevation model (DEM) that displays the lidar bare earth data. Notice the detail that lidar provides of the Earth's surface!

Bare earth data displays features such as faults, folds, and other landforms that are not always visible in aerial imagery, especially when hidden underneath vegetation. Using lidar data, geologists chose locations that were important to further investigate in the field. The updated observations and measurements helped refine the geologic map. The right image displays the Centralia geologic map that was updated in 2018. What differences do you see between the two maps? Where there are differences, look at the lidar model and see how it could have played a role in deciding to visit this area for further investigation.

See more details about lidar and many other applications to geoscience on the other side of this poster.



This year's Geologic Map Day poster features the Centralia quadrangle, which is an area of Washington about 30 miles south of Olympia, WA. It is a populated area that is affected by natural hazards; especially earthquakes, landslides, and floods. Explore this map and notice the details it shows. Can you find a steep incline? A body of water? What features of the map require a key to understand? Go to the 2023 ESW website (**https://www.earthsciweek.org/geoscience-innovating**) to see more details about this map, including the key. Also available to view is a cross section of the map which was derived mainly from surface observations, well data, and geophysical data.



Poster by the American Geosciences Institute, 2023. Maps and images from Daniel Coe, Washington State Department of Natural Resources.

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USGS science for a changing world

AGI american geosciences institute connecting earth, science, and people

AASG Association of American State Geologists

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