

Lidar Improves Geologic Maps

1. Look at "Enhancing Geologic Maps with Lidar" side of the 2023 GMD poster.




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.

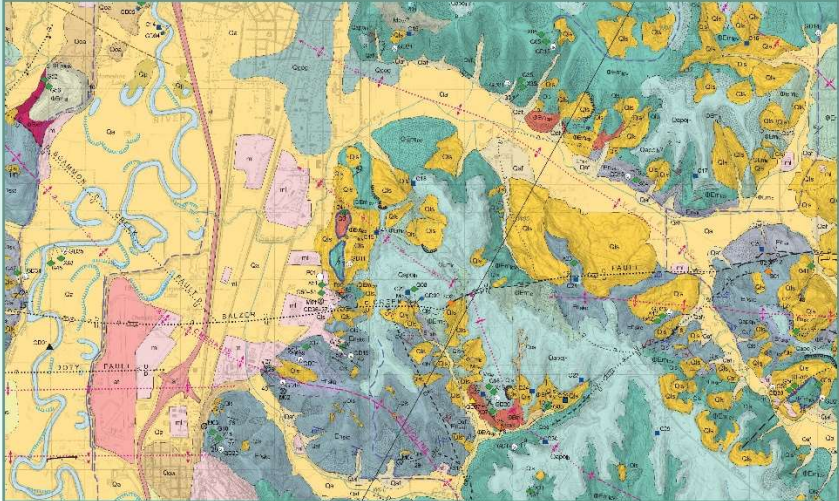
For example, examine the image on the far left which shows outlines of a geologic map from Centralia, Washington. These units were mapped in 1987 using data from aerial imagery and fieldwork. Since then, lidar was used in the same area which provided highly accurate elevation data for the Earth's surface (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.earthscienceweek.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.




GEOLOGIC MAP DAY:
FRIDAY, OCTOBER 13, 2023




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2. Examine the top three images on the poster. Make comparisons between the outdated geologic map on the left and the updated geologic map on the right. How has the map improved? Point out specific places where it has changed.



3. Examine the lidar map in the middle. How does this image differ from the geologic maps? How do you think the lidar data helped improve the geologic map?
3. Examine the detailed geologic map on the bottom of the poster. Can you find a steep incline? A body of water? A fault? What rock type is most common? What features of the map require the use of a key to be understood?
4. Notice the thin black line running diagonally across the large geologic map. Infer what the cross section through this line might look like. Draw your predictions, then examine and make comparisons to the published cross section found at [NGMDB Product Description Page](#)

NGSS

PE: [4-ESS2-2](#), [MS-ESS2-3](#)

DCI: The History of Planet Earth; Plate Tectonics and Large-Scale System Interactions

SEP: Analyzing and Interpreting Data

CCC: Patterns

Metadata

Tags: activity, geologic map, lidar

NGSS ESS Disciplinary Core Ideas (DCI's): Earth's Systems (ESS2)

NGSS ESS Topics: History of Earth

NGSS Performance Expectations: 4-ESS2-2, MS-ESS2-3



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