Geologic Mapping in Eastern Oregon

Providing foundational data for natural resource management and geologic hazard mitigation

Are there any mineral resources where I live?

Is my house built in an area susceptible to landslides?

What rocks in my area may host groundwater?

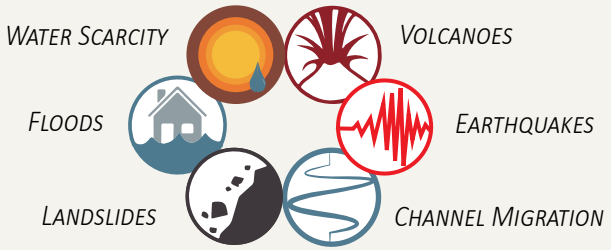
Could earthquakes possibly occur in my area in the future?

When concerns, needs, or questions like these arise, community members, interested parties, and policy makers may reach out to relevant agencies or organizations for information. For example...

If you have a question about **hazards** like landslides or earthquakes or about **resources** like minerals and water, they may contact the Oregon Department of Geology and Mineral Industries (DOGAMI) or the United States Geologic Survey (USGS).

If you are concerned about **groundwater** rights and resources, they may reach out to the Oregon Water Resources Department (OWRD) or a local watershed council.

Did you know that most natural hazards in eastern Oregon are geologic hazards?

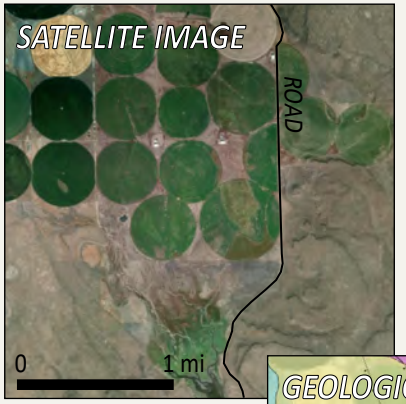


In order for policy makers, interested parties, and specialized agencies to provide answers, protect the public, and make informed decisions, **they must understand the regional geology.**

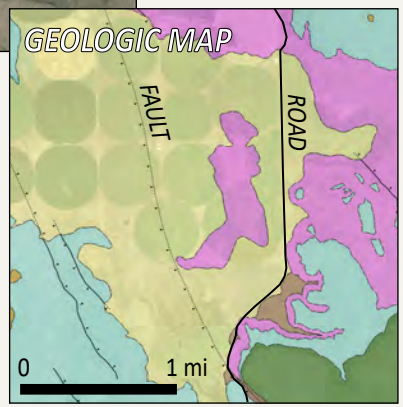
Geologists at DOGAMI work with partners like OWRD, USGS, and local governments to develop plans that address the current needs or issues. With funding from agencies like the Federal Emergency Management Agency (FEMA) and the USGS, geologists are able to conduct fieldwork and study the regional geology.

What do mapping geologists do?

Interpreting the regional geology requires constructing a detailed geologic map, and that is the job of the mapping geologists at DOGAMI.



Geologists gather various types of data in order to make a map and project what the rocks look like in the subsurface (underground).



A **geologic map** shows the different types and ages of rocks exposed at Earth's surface, with each rock type assigned a unique color.

How do they do it?

Fieldwork

▲ **Recording outcrop-scale observations** of stratigraphic relationships, and structures.

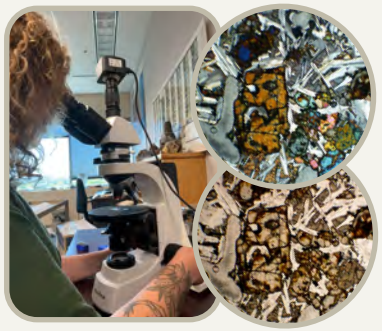
▲ **Describing hand samples** to note different minerals and textures.

▲ **Collecting rock samples** to find their chemical composition and age.

◂ **Digging trenches** across known faults to get direct observations of when, where, and how the earth has moved.

Laboratory Work & Analysis

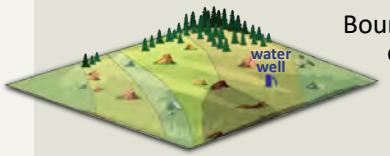
◂ **Aquiring whole rock chemical compositions** through X-ray fluorescence analysis.



▸ **Identifying minerals** by observing how light passes through a thin slice of the rock under a microscope.

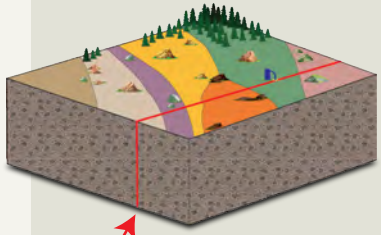
Putting it all together

Synthesizing the various types of data together allows geologists to assemble a regional geologic map.



Boundaries of rock units, or **contacts**, are drawn as they would be exposed at the surface, under the vegetation.

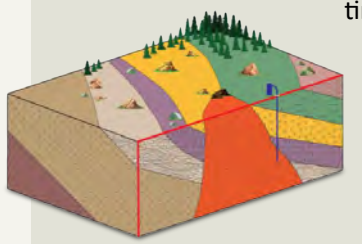
A **geologic map** includes these contacts, faults, geologic formations, well locations, and other data.



Each rock unit is assigned a different color. Geologists use all data, including well data, to project how the rocks are arranged underground.

These underground projections along any chosen line are called **cross sections.**

With a comprehensive understanding of the geology on the surface and at depth, geologists understand how rocks formed over time, where **faults** project below the surface, potential areas for **geologic carbon storage**, and where **groundwater**, **critical minerals**, and **energy resources** may exist.



Imagine the Earth is a cake. A cross section shows what the layers of a slice would look like.

Why do geologists do it?

DOGAMI shares these data with the public, policy makers, and interested parties to help them make informed decisions. Geologic mapping helps communities evaluate resources and improves hazard preparedness and mitigation. For example...

Locating groundwater in Prineville, Oregon

The Prineville community needed more water. New wells were coming up dry.

Geologic mapping revealed subsurface lava flows that control how groundwater flows and resides in the rocks today.

Planners use geologic maps to determine where to access groundwater, allowing agencies like OWRD to manage resources effectively.

DOGAMI has already mapped and is currently mapping several areas of Eastern Oregon. Mapping priorities are based on the needs of local communities and the state as a whole, taking into account the concerns and hazards associated with each region.

DOGAMI's mission is to provide earth science information and regulation to make Oregon safe and prosperous.

Want to learn more?

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Oregon geologic hazard map:
www.oregon.gov/dogami/hazvu