



Rocky Mountain Mapping Center

Map Mysteries Activities

**74,796 Ready-To-Go Lesson Plans
Teaching Earth Science and Geography
with USGS Topographic and Thematic Maps**

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The concept of "Map Mysteries" means to use topographic and thematic maps as starting points to uncover mysteries about the cultural and physical geography of the Earth.

The USGS has published 74,796 of these maps.

Each one can be thought of as a lesson about the Earth's surface and the forces affecting it.

I-2206 Digital Landforms Map of the Conterminous USA



How many geomorphic regions would you divide the USA into?

Identify effects of:

- Glaciation, particularly Coteau de Prairies in SD and driftless are in southwest Wisconsin and northeast Iowa.
- Extent of Mississippi floodplain and Nebraska sandhills
- Is the Great Plains a uniformly flat landscape? Where is the flattest landscape?
(Mississippi floodplain and Llano Estacado).
- Crustal deformation near plate boundary in California
- NW-trending lineaments in Oklahoma and Texas
- ENE-trending lineament from Los Angeles to Grand Canyon
- Extent of basin-and-range province: from TX to OR

Bay Area Earthquakes 1972-1989

Why does the vegetation on this map appear red? (Infrared Landsat image)

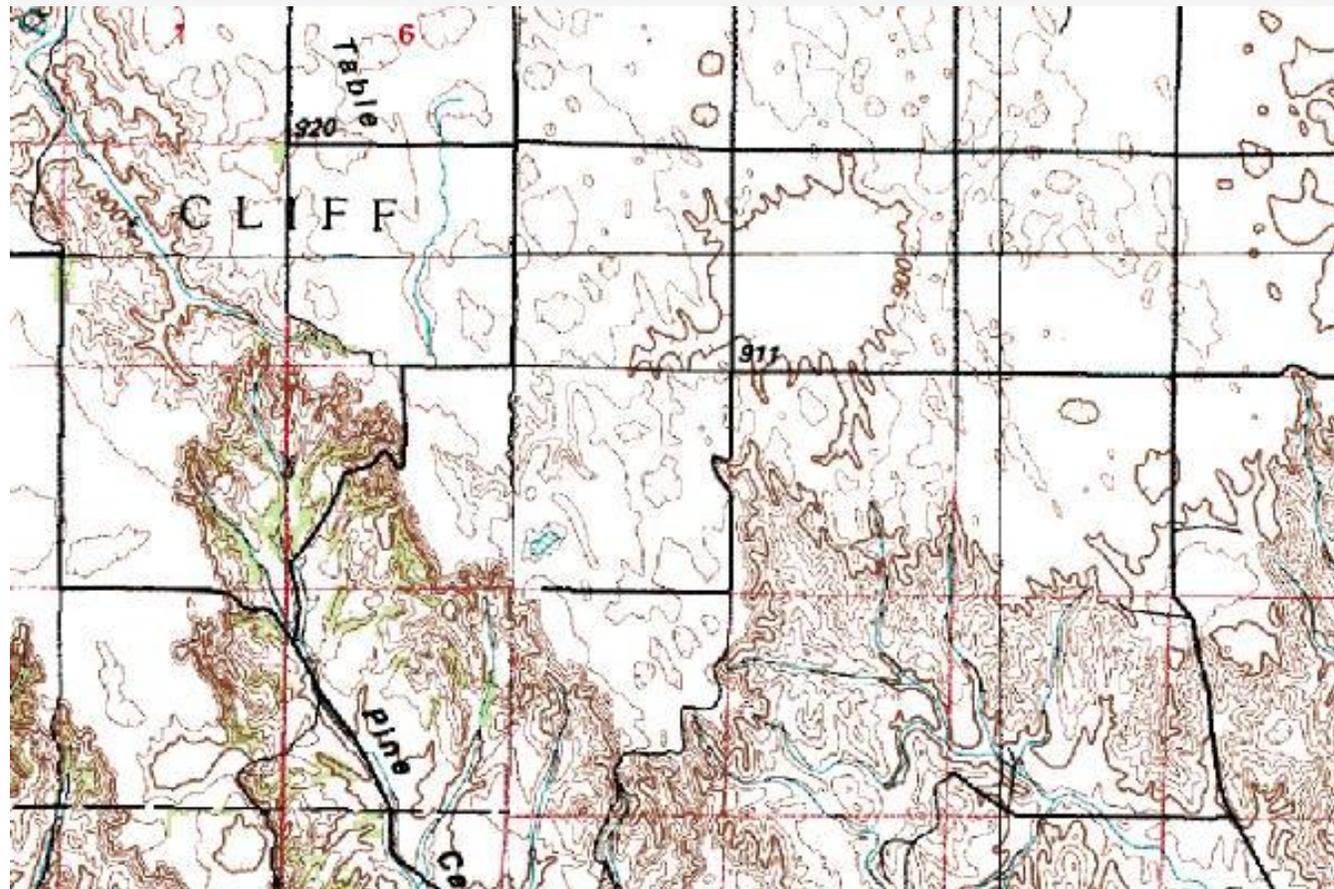
Analogy: What kind of film does the dentist use to see through your cheek?

Identify rainfall patterns (mountains receive more) and infer climate of this region.

Why do earthquake epicenters form linear features?

Why does the lack of activity on San Andreas Fault vs the Hayward Fault mean potentially more danger for the San Andreas?

Callaway NW, NE 1:24,000-scale



What do you think the white spot is on the map?

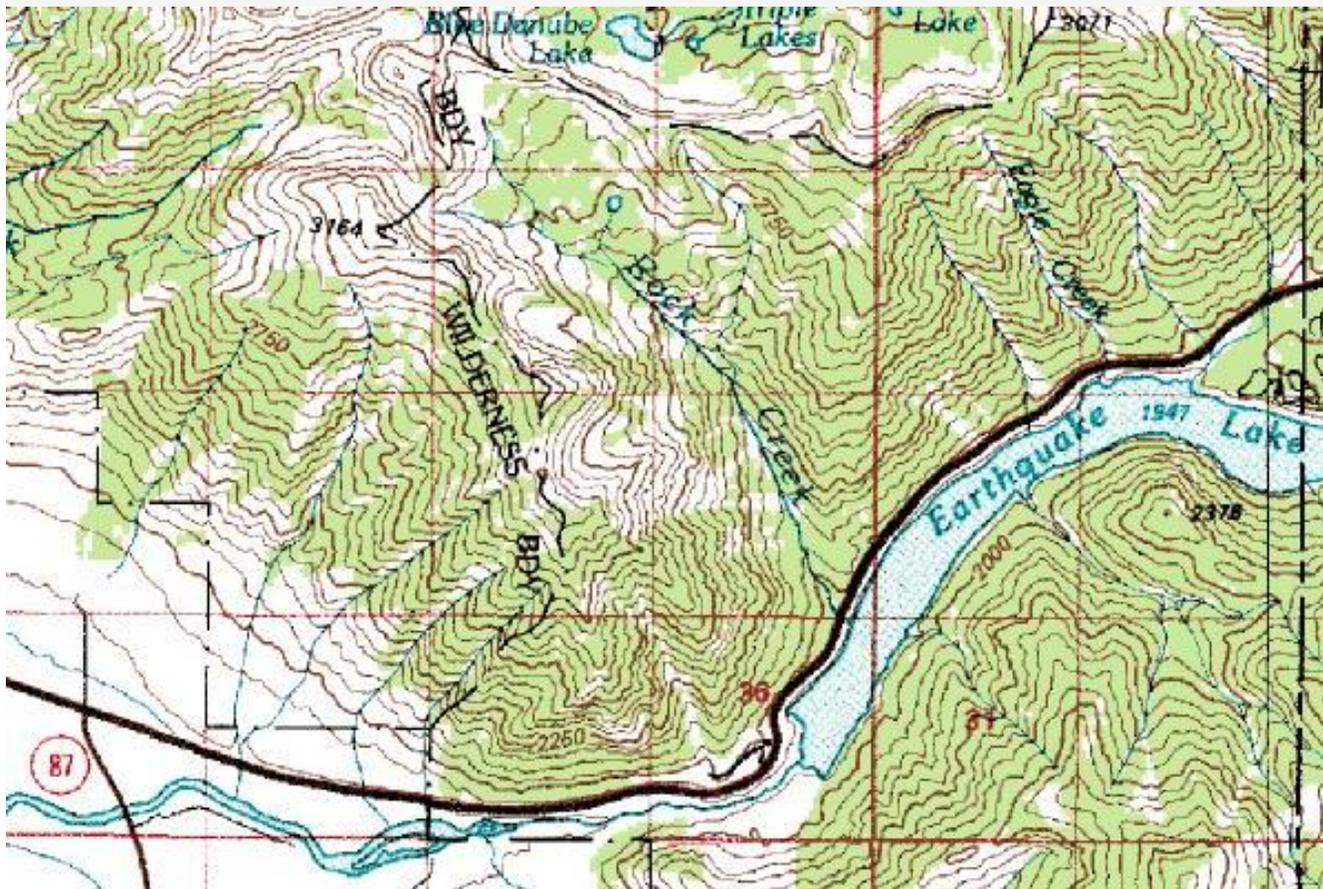
If you thought the spot was a crater, what would you do next?-->Investigate! Map inquiry fosters field work.

Impact crater, undiscovered from 1951, when map was published, until 1991.-->There are still undiscovered mysteries about our planet that can be discovered with the study of maps!

Does the amount of relief of this landscape challenge your stereotype of Nebraska landscape?

Do you think much has changed since 1951 in this area? -->Yes! There was a great deal more tree cover found during Joseph Kerski's July 1997 trip there. Why? Shows that even an area with decreasing population is changing physically.

Earthquake Lake, MT-ID 1:24,000-scale



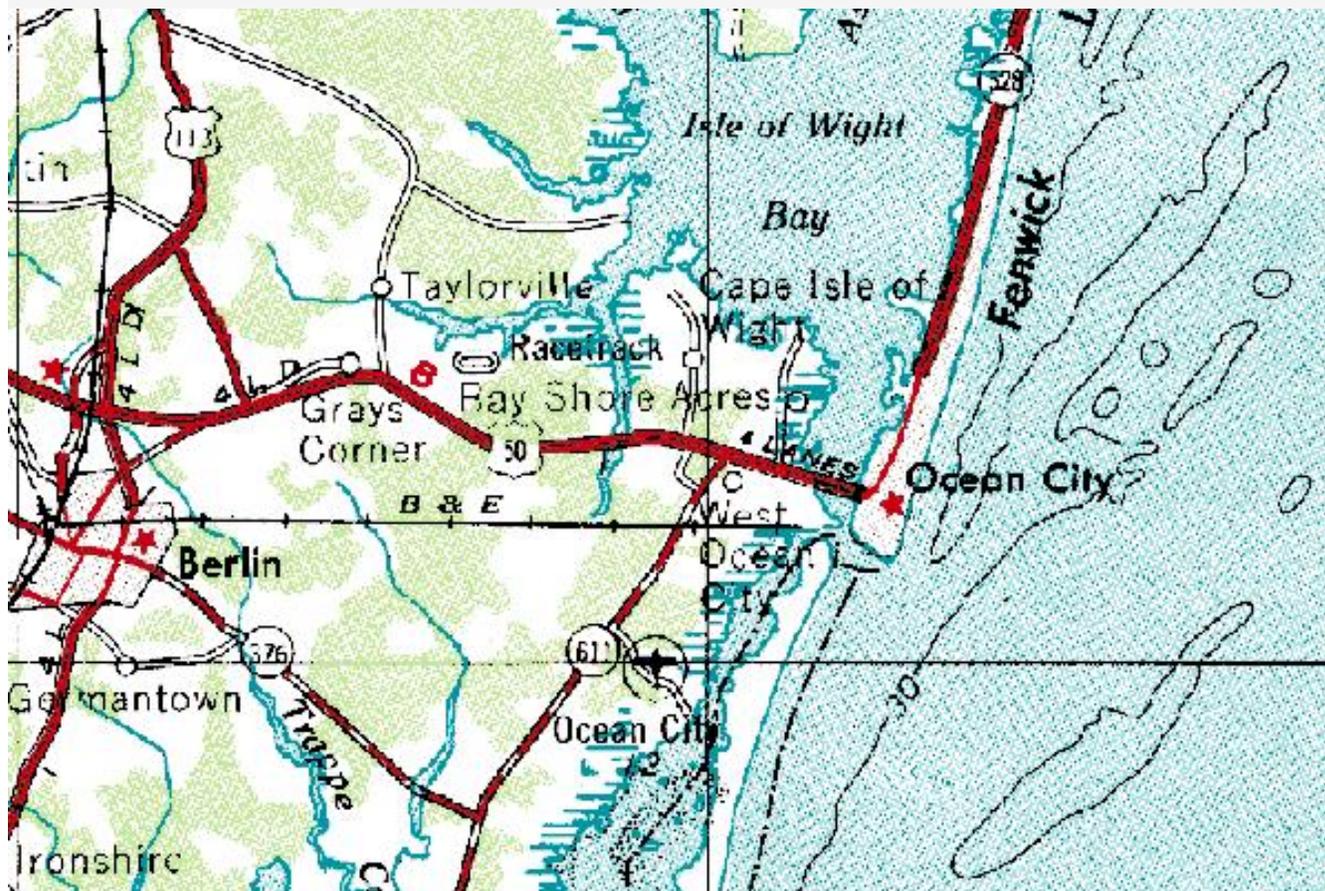
Clues as to how an earthquake caused Earthquake Lake and the date of this event are shown by the cultural and physical features on the map.

How did Earthquake Lake form? Cultural names reveal much about the physical and cultural history and characteristics of an area. Discuss Geographic Names Information System. For example, if you found a Disappointment Hill, investigate who was disappointed, why, and when. Here, refer to USGS natural hazards posters to illustrate that a crack in the earth is never as wide as the lake.

Discuss what happens when water running (in a gutter, for example) is dammed. What could have dammed Madison River to form the lake? Refer to "slide area." What kind of slide could it be? Why not a snowslide? Describe the slopes of earthquake lake.

What are the clues as to when the slide took place? Clues are existence of memorial, and lack of vegetation on the south slope. Who would likely be at the bottom of the canyon? Who lives and travels to this area, and why? Refer to Hebgen Lake earthquake professional paper for photographs and eyewitness accounts.

Ocean City, MD 1:24,000-scale



Why is Assateague Island offset from Fenwick Island? Calculate the rate of offset per year since the mid 1840s. Discuss the cultural and natural pressures on seacoasts, including longshore current, sand migration, jetties, land use, and tourism. Refer to Circular "Coasts in Crisis."

South Pass, LA 1:24,000-scale Orthophotomap

Discuss differences between looking at the Mississippi Delta at small and large scales. How can people access this area? (by helicopter only) What are the economic activities here (on map: oil field)? What else? (fishing, boat tours). What sediment type is here? Why are there no rocks in this area? Discuss sediment transport by rivers. Compare this map to Lake Itasca, Minnesota (Mississippi headwaters), and map of Dubuque, Iowa. What are the differences in landforms between each region? What is the gradient of the river in each map, and why do the differences exist?

New Orleans W, LA 1:24,000-scale

Why is most of New Orleans below sea level? Discuss human impacts on the environment. Why were the artificial levees constructed? Discuss differences between natural and artificial levees. Why is New Orleans located where it is?--use smaller scale maps in conjunction with this one to discuss both site and situation. What would be the most common natural hazard posed to this area. What would be the effect of a hurricane in this area? After a flood, how much of the area would be under water if all

the levees were ruptured?

Isolation Peak, CO 1:24,000-scale

How can weather and weather-related effects on the landscape be understood from topographic maps? Discuss location and size of glaciers on the Continental Divide. Why are they all on the northeast side of the divide? Discuss angle of sun and direction of wind. What influence does snowpack have on vegetation? What is orographic precipitation? What kind of precipitation is most common here?

Discuss the effects of glaciers in the past, evident on valley sizes, valley shapes, moraines, marshes, and drainage.

Florida Satellite Image Map

Discuss the threats that exist to the Everglades, and how evident agriculture and urbanization pressures are in this map. Discuss terrain, vegetation, settlement patterns. What can be inferred about Florida's climate from this map?

Integrating the Geography Standards in Teaching With Topographic Maps

The World in Spatial Terms (Location)

Spatial information tells about where things are -- and about where things are in relation to each other. Different scales of USGS maps can be used to illustrate these concepts.

Places and Regions (Physical and Human Characteristics)

The description of a place includes its physical and human characteristics. Illustrate with topographic maps and compare across regions of the United States. Obtain defense maps from the USGS and compare across the world.

Physical Systems (Land, Air, Water, and Living Things)

Physical processes constantly change Earth's surface. Physical processes also interact with living things, creating and modifying Earth's ecosystems. Weather systems, ocean currents, volcanic activity, and tectonic plate movement affect the landscape and the organisms within it. At the same time, living things release and absorb gases, build and use soil, break down rocks, dam streams, and fill in lakes. These and many more activities make up the systems that shape Earth's geography. USGS geologic, hydrologic, natural hazards, coal, oil, gravity, geomagnetic, historical, and topographic maps can be used to illustrate these physical systems. Digital USGS data can be loaded in a GIS to illustrate these concepts, with the use of digital vector and raster files.

Human Systems (Population, Culture, and Interdependence)

Human activities shape Earth's surface. Human settlements and structures are also part of Earth's surface. When people move from one place to another they often change the landscape as they go. In addition, people in different cultures interact with their environment in different ways. USGS geologic, hydrologic, natural hazards, coal, oil, gravity, geomagnetic, historical, and topographic maps can be used to illustrate human systems. What are the dominant economic activities for the people who live in this area?

Environment and Society (Human-Environmental Interactions)

Human activities change the physical environment and ecosystems. In addition, human activities are influenced by the environment and by Earth's physical processes. Thus the interactions between people and the environment occur whenever physical systems and human systems meet -- which is all of the time! USGS maps can be used to illustrate the affect of humans on their environment, and the affect of the environment on human settlement.

The Uses of Geography (Changes Over Time)

Knowing about geography helps people understand the relationships between people, places, and environments over time. Thinking geographically allows us to interpret the past, understand the present, and plan for the future. Geography gives us a "big picture" of humans' place on Earth. Illustrate with historical editions of USGS maps, compared to the latest topographic edition, and discuss the extent to which the area has changed, why the area has changed, and if the changes are increasing or decreasing in their rate.

General Questions To Pose While Exploring Topographic Maps

In what part of the USA is the area depicted on the map located?

West South North East Central

In which state is this map located?

In what part of the state is this map located?

What is the latitude and longitude of the southeast corner of the map?

Latitude _____

Longitude _____

What is the distance, in kilometers and miles, from east to west across the map?

Kilometers _____

Miles _____

What is the distance, in kilometers and miles, from east to west across the map?

Kilometers _____

Miles _____

What is the largest town on the map? Estimate its population.

Town name _____

Population _____

Describe the reasons behind your population estimate.

What is the nature of the topography in this area? Circle your answer.

Flat Rolling Sharp Mixed Other

Given what you know about the state, is the topography of this area what you expected? Why or why not?

What is the range of elevation in this area?

Highest _____ Lowest _____

Is the elevation in feet or meters?

What is the average elevation in this area?

Does the highest point on the map have a name? What is it?

Which direction(s) do the rivers flow in this area? Why?

Describe the climate of this area. Include a description of the winds, sunshine, rainfall, and snowfall.

What physical and cultural (human-made) map features give clues about the climate?

Is this area subject to a natural hazard? If so, what would be the most likely natural hazards to pose a threat to this area?

Is the threat of these natural hazards high, moderate, or low? Take into account the location of the area and the physical features found there.

What is the nature of the settlement pattern in this area--is it concentrated, linear, or diffuse?

What topographic, climatic, hazard-related, or other constraints affect the settlement pattern?

What are the things that people do in this area for work? What kind of jobs do they have?

What is the most common occupation found here?

What is the predominant economic activity in this area, and what map features give clues about this activity?

What physical and cultural (human-made) map features give clues about what people do in this area for work?

What are the things that people do in this area for recreation?

What is the most common recreational activity in this area?

What physical and cultural (human-made) map features give clues about what people do in this area for fun and recreation?

How did the maps we examined today challenge your stereotype about these areas?

[U.S. Department of the Interior](#)

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URL: <http://rockyweb.cr.usgs.gov/public/outreach/mapmys.html>

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