

Utah's Geological History

Summary

This activity is designed to familiarize the students with the vocabulary, investigate the geological changes that Utah has gone through over time, and develop an understanding that uplift creates the mountains and valley areas on Earth's surface and that fault lines are often in earthquake zones.

Group Size

Small Groups

Materials

- [Blank Utah Map](#)
- [Vocabulary Match Answers](#)
- [Vocabulary Match](#)
- [Vocabulary Whip](#)
- Poster -- Utah: A Geologic History
- [Utah Cutout Descriptions](#)
- [Fault Blocks](#)
- [Fault Blocks Continued](#)
- [ABC Fault Blocks](#)
- [Wasatch Fault Figure](#)

Utah Relief Map

3D Stereo Topographic Map of Utah

3D Glasses

Additional Resources

Booklet

The Wasatch Fault, Utah Geological Survey Public Information Series 40, 1996; ISBN 1-55791-387-0
available PDF <http://ugs.utah.gov/online/pdf/pi-40.pdf>

Earthquake hazards and safety in Utah (pdf), Public Information Series #6
<http://ugs.utah.gov/online/pdf/pi-6.pdf>

Photo essay of four Utah earthquakes, 1921-1972 (pdf) Public Information Series #72
<http://ugs.utah.gov/online/pdf/pi-72.pdf>

Media

Vocabulary PowerPoint, by Gennie Kirch developed using Microsoft Office, 2008

Utah: A Geologic History, Utah Geological Survey; Public Information Series #54

Wasatch Front poster and Fault Blocks, Utah Geological Survey, UGS office at the Department of Natural Resources (DNR) Building at 1594 West North Temple, Suite 3110, Salt Lake City.
801.537.3300;

Organizations

Utah Geological Survey, UGS office at the Department of Natural Resources (DNR) Building at 1594 West North Temple, Suite 3110, Salt Lake City. 801.537.3300; <http://geology.utah.gov/>

Local Earth-Science Resources for Utah Teachers

http://geology.utah.gov/teacher/teacher_resources.htm

Teaching Kits

Rock, mineral, and fossil; grade 4 (can also be used for grades 2 [rocks], and 8 and 9 [extinction]).

Landforms; grade 5

Dinosaurs; grades K-6.

Ice Age; grades 4, 8, and 9 (includes extinction and climate change).

All kits are available at the UGS for a refundable deposit. Call 801-537-3300 or

<http://geology.utah.gov/teacher/teachkits.htm> for more information about these kits.

Classroom Materials

Hands-on Activities

5th-grade landforms and geologic processes (volcanoes, earthquakes, uplift, weathering, erosion, deposition): contact Sandy Eldredge (UGS) at 801-537-3325.

Slide Sets

5th-grade landforms and geologic processes: contact Sandy Eldredge (UGS) at 801-537- 3325.

Background for Teachers

Earth's surface is constantly changing. Some changes happen very slowly over long periods of time, such as weathering, erosion, and uplift. Other changes happen abruptly, such as landslides, volcanic eruptions, and earthquakes. All around us, we see the visible effects of the building up and breaking down of Earth's surface.

Most students grasp an understanding of weathering and erosion, but they do not understand geological forces and process that have occurred on Earth over long periods of time. Common misconceptions are that Lake Bonneville was the only lake that existed in Utah; volcanoes are the only things causing Earth's surface to uplift; and Earth is not changing. While it is true that Earth will not change very much in their lifetime, Earth is changing all the time. These activities are designed to help students understand that erosion and uplift are forces that are active right now and they have and will continue to change Earth's geological face.

This activity is designed to familiarize the students with the vocabulary, investigate the geological changes that Utah has gone through over time, and develop an understanding that uplift creates the mountains and valley areas on Earth's surface and that fault lines are often in earthquake zones.

Intended Learning Outcomes

1. Use science process and thinking skills.
2. Manifest scientific attitudes and interests.
4. Communicate effectively using science language and reasoning.

Instructional Procedures

Invitation to Learn

Invite students to hypothesize: What geological change has Utah has gone through over time? Ask what they might know about Utah's geological past. Ask if anyone has heard that the Great Salt Lake area was once filled with water (Lake Bonneville). At this time if students are unable to use correct terminology, review vocabulary. Two ways are provided: Vocabulary Match and Vocabulary Whip. Directions for Vocabulary Whip - Ask one person to start; he/she reads their card exactly as written. The next person to read has the card that has the vocabulary word for the definition read. Students continue to read their cards until it returns to the first person that read. (It does not matter which definition is read to start the game.)

Instructional Procedure

Ask the Big idea question: "What geological processes has the Utah area gone through over time?" What made the mountains? What made the valleys? How long did it take?

Group Activity: Use the cutouts from the Utah: A Geologic History poster. In this activity students will look at cutout pictures of Utah's geological past. Pass out the cutouts. Ask each group to hypothesize what is going on in their cutout pictures. Then using the Utah: A Geologic History poster, have each group try to determine where the cutout fits into the poster. It should be very

difficult for them to determine where to place their cutout. Have all the students be seated and invite several students to read the Utah Cutouts information card set. Start at #1. As the card is being read, the group that has that cutout will come and put it on the poster. Discuss what geological forces are apparent in the cutout and what happened at that stage of Utah's development. Focus on what processes would have been working on the Utah area at that particular time. (Volcanoes, uplift, erosion) Encourage open discussion about the geological processes that would have caused the changes the picture represents and how Earth's surface has been built up (uplift) and eroded away (erosion). Close this part of the activity by asking, "How do scientists know this information?" "What evidences do they use to determine what Utah used to look like?"

Show the Utah Relief Map. Invite students to come up and point out geological features they can see.

Develop understanding by using the cardstock *Fault Blocks*. Use the blocks to show how mountains and valleys are formed. Point out that mountain uplift is occurring on one or both sides of the fault blocks and a valley is being made in the middle. Discuss, "What if only one side of the fault is uplifted?" Handout *ABC Fault Block* page to students. Have them cut out the blocks and use them as you demonstrate what the questions are asking on the handout.

Develop the idea that A and C moving away from each other create mountains (A, C) and the B area would become a valley. Then move A and C together. Help students understand that uplift would occur (B area). Show Wasatch Front figure. Ask questions to correlate how the figure and the fault blocks are similar. (Students should discover that where the mountains and valley meet there is a fault line.)

Hypothesize -- What if there were no uplift forces or erosion, what would happen to Earth? Have a few students respond to this. Direct the discussion until students understand that Earth would be flat and unchanging without these acting upon it.

Use the 3D Stereo Topographic Map of Utah and 3D glasses. Allow students to view the map with the glasses so they can see how topographic map lines show physical features of Earth. Invite several students to find areas where uplift has occurred. Find areas where drainage and erosion has had an effect. Have students locate rivers and have them trace or hypothesize how water flows down mountains into rivers and finally into drainage areas.

Introduce the idea that Utah has a fault line. This is an area where forces from plate tectonics have compressed Earth. Use a long sleeve of someone in the group. Push up the sleeve and see how the material wrinkles, and then as the force is released it spreads out more, but still has lines in it. Use the Utah Relief Map to analyze areas where Earth has been compressed, uplifted, eroded, etc. Direct students to look at the area west of the Great Salt Lake and into Nevada. Have them find the lines that show where uplift has occurred because of compression and how it has spread out as the compression has released.

The final step in the lesson is to locate fault lines in Utah. Use *Blank Utah Map* and have students draw a faint line where they think the fault line might be located. Draw the shape of Utah on a whiteboard or chalkboard. (Teacher refer to Wasatch Fault booklet for information on fault line.) Have an open discussion to develop the idea that this is why Utah is in an earthquake zone and has frequent earthquakes. Discuss that there are many faults all over Earth's surface and help students understand that fault zones are one reason for frequent earthquakes throughout the world.

Extensions

Curriculum Extensions/Adaptations/ Integration

- *Utah Geological Survey Activity 21*

- which is a lesson about locating geological features on United States Shaded Relief Map

Invite students to learn about the hazards of earthquakes in Utah, e.g., liquefaction.
Invite students to learn about seismographs and how they are used with earthquakes.
Allow students to draw pictures of vocabulary words in a journal so they can make associations with vocabulary words.

Make a Social Studies connection by having students predict what physical features of Utah helped it become a part of the United States. (e.g. migration trails, Great Salt Lake, desert, mineral deposits -- mines in Utah).

Use a World Map and draw the major plates of plate tectonics.

Research natural resources that are unique to Utah and how those resources are used in everyday life.

In a newspaper or travel magazine find articles about Utah's geology.

To reinforce vocabulary, use *Capitol Reef* web page handout. Students (group or individual) highlight any vocabulary words that can be found in the document. Have several volunteers share the vocabulary words they found in the document.

Family Connections

For extending learning at home invite families to identify geologic features in their own area.

Collect rocks near students' homes and determine what geological forces have created that rock.

Identify earthquake hazards in their own town.

Learn what to do during an earthquake at home and other places.

Invite families to find rocks or other formations that show changes that Utah has gone through.

Look through a Utah Travel guide and find places in Utah that have unique geology.

Plan a visit to a geological museum in their area.

Find what geological features Utah is famous for and try to locate and collect postcards of that area.

Provide a set of *Vocabulary Match* for practice at home.

Assessment Plan

Participation in vocabulary activities and Utah Geological timeline.

Use *ABC Fault Blocks* to show how a valley and mountains are made. Journal activity, draw ABC Fault Blocks in book and label with arrows uplift, valley, mountain.

Correctly identify the Utah fault line on the blank map.

Journaling activity -- either written or pictorially, list several answers to the big idea question of "What geological processes has the Utah area gone through over time?" (Some things that should be in the journal would be fault blocks, uplift, mountains, valleys, other changes, fault lines and earthquakes.)

Bibliography

Research Basis

Sutton, J., & Krueger, A. (Eds.). (2002). *EDThoughts: What we know about science teaching and learning*. How does teacher pedagogical knowledge impact instruction? Aurora, How does teacher pedagogical knowledge impact instruction CO: Mid-continent Research for Education and Learning. 28-29

This article stresses that different teaching methods accomplish different goals. High-quality science teaching should include a deep knowledge of subject matter, incorporates inquiry, and focuses on skills of observation, information getting, predicting, and testing. It should be carefully aligned to curriculum, assessment, and high standards. Building on real-life situations that apply concepts (hands-on) deepens understanding. Varied opportunities for discussion and reflection are incorporated in science teaching.

TAN, Kok Siang (June, 2007) Using "What if" questions to teach science. *Asia-Pacific Forum on*

Science Learning and Teaching, Volume 8, Issue 1, Article 16. Accessed January 5, 2008

http://www.ied.edu.hk/apfslt/v8_issue1/tanks/tanks5.htm

Using "what if" questions are a reflective learning strategy that can be effective in classroom situations. Students are actively engaged in thinking up possibilities, talking about ideas and developing deeper insights. Through "what if" questions social interaction occurs and real life problem solving skills are employed.

Authors

[Utah LessonPlans](#)