Where the Action Is

Activity Description & Estimated Class Time

During this 2-class-period activity, students explore global patterns of earthquakes and volcanoes to better understand Earth's dynamic crust. Using latitude and longitude coordinates, students plot real-world seismic and volcanic activity on a world map and analyze emerging patterns. Through collaborative mapping and visual data analysis, students discover that these geologic events are not random, but often occur along tectonic plate boundaries. This activity builds spatial reasoning, data interpretation skills, and a foundational understanding of Earth's structure.

Correlations to NC Science Standards

ESS.6.2.2 Construct an explanation to illustrate how the movement of lithospheric plates can create geologic landforms and cause major geologic events such as earthquakes and volcanic eruptions.

Learning Target

Students will demonstrate knowledge and understanding of:

- locations of volcanic eruptions and earthquakes.
- patterns of these locations and infer their causes.

Brief Science Background

When scientists map where earthquakes and volcanoes occur around the world, clear patterns emerge. Most of these events are found along the edges of tectonic plates, with a few occurring in areas called "hot spots." These patterns provided important evidence for the theory of plate tectonics, which explains how Earth's crust moves and how continents change position over time. By studying where earthquakes and volcanoes happen, scientists can also identify many of the boundaries between Earth's plates.

Where the Action Is

Materials

Materials for the whole class

- Ability to project Earthquakes and Volcanoes PowerPoint located at www.ciblearning.org
- Ability to project YouTube videos located at www.ciblearning.org
- Earthquakes picture collection located at www.ciblearning.org

Materials for groups of 4 students

- World maps with latitude/longitude markings, SD 1, 1 per student
- A group set (1-8) from earthquake and volcano coordinates, SD 2.
- Where the Action Is Student Activity Sheet, SD 3, 1 per student
- Scissors

Preparation

1. Preview the volcanic eruption YouTube videos and select 1-2 videos to show. Also preview the earthquake picture collection and select several pictures to show to represent the damage that can be caused by earthquakes.
2. Copy world map with longitude and latitude lines, SD 1, and Where the Action Is Student Activity Sheet, SD 3. One per student.
3. Copy earthquake and volcano coordinates, SD 2, and cut along the dotted lines to make 8 half sheets labeled by group. Be ready to hand out to the 8 groups of 4 students.

Procedure

1. Tell students that they are going to continue their investigation of Earth's crust by exploring 2 different events, earthquakes and volcanoes. Ask students to complete question 1 on their Where the Action Is Student Activity Sheet, SD 3, and then discuss their responses as a class.
2. Show the videos and pictures of volcanoes and earthquakes and ask students to respond to question 2 on SD 3. Again, discuss their responses as a class. Accept students' ideas and questions at this point, but avoid teaching content at this time. If students don't mention it, let students know that these events are happening every day around the world.
3. Give each student a world map sheet, SD 1 and project PowerPoint Slide #3, the world map with latitude and longitude lines. Slide #'s are at the bottom right of each slide. Slide #'s 1 and 2 are for the teacher only. The PowerPoint for students begins at Slide #3.
4. Briefly discuss latitude and longitude lines, similar to the coordinate grid used in graphing. Use the slide to point out the Equator and North and South latitudes. Point out the Prime Meridian and East and West longitudes. Explain that we use latitude and longitude lines to locate places on earth.
5. Project Slide #4. At the bottom of the slide are coordinates: latitude 33°N, longitude 104°E. Explain that there has been an **earthquake** at this place. Ask students to find this spot on their map and mark it with a pencil. Ask students to check with each other to be sure they have the right place. When everyone has it, project Slide #5 showing a blue squiggle in China, the location of the earthquake. The blue squiggle represents an earthquake. Allow for a little error in placement by the students.
6. Repeat the previous step by projecting Slide #6: showing latitude 12°N, longitude 41°E at the bottom. Explain that there is a **volcano** at this place. Ask students to mark this spot on their maps and check with team members to be sure they have the right place. When everyone has it, project Slide #7 showing a red triangle for the volcano. The slide also has the blue squiggle earthquake from the previous step.
7. Ask the class to share how they found the right spot for the volcano. Use this opportunity to teach how to use the map. Repeat steps 5 and 6 using Slides 8-11.
8. Project slide #12 showing a star for Washington, DC, and blanks for latitude and longitude at the bottom. Ask students to write down the numbers that should go in the blanks on SD 3. When everyone has them, project slide #13 to show the answer. Students' numbers may not be exactly the same as the numbers on slide #13. Numbers within a few degrees are acceptable. However, it is important that the students are correct in the 'N' and 'W' aspects of the latitude and longitude.
9. Form 8 groups of 4 and give each group a number. Give each group an earthquake/ volcano sheet from SD 2 and a pair of scissors. Ask the groups to note their group number because later, they will see their work shown by that number. Have them cut the sheet horizontally along the thin lines to make strips and distribute the strips, one to each group member. **Each strip has latitude/longitude coordinates for one numbered volcano and one numbered earthquake.** Ask each student to note the #

Procedure cont.

of their volcano and earthquake— for example, "Earthquake – 6." They will use that number to determine whether they have found the right spot.

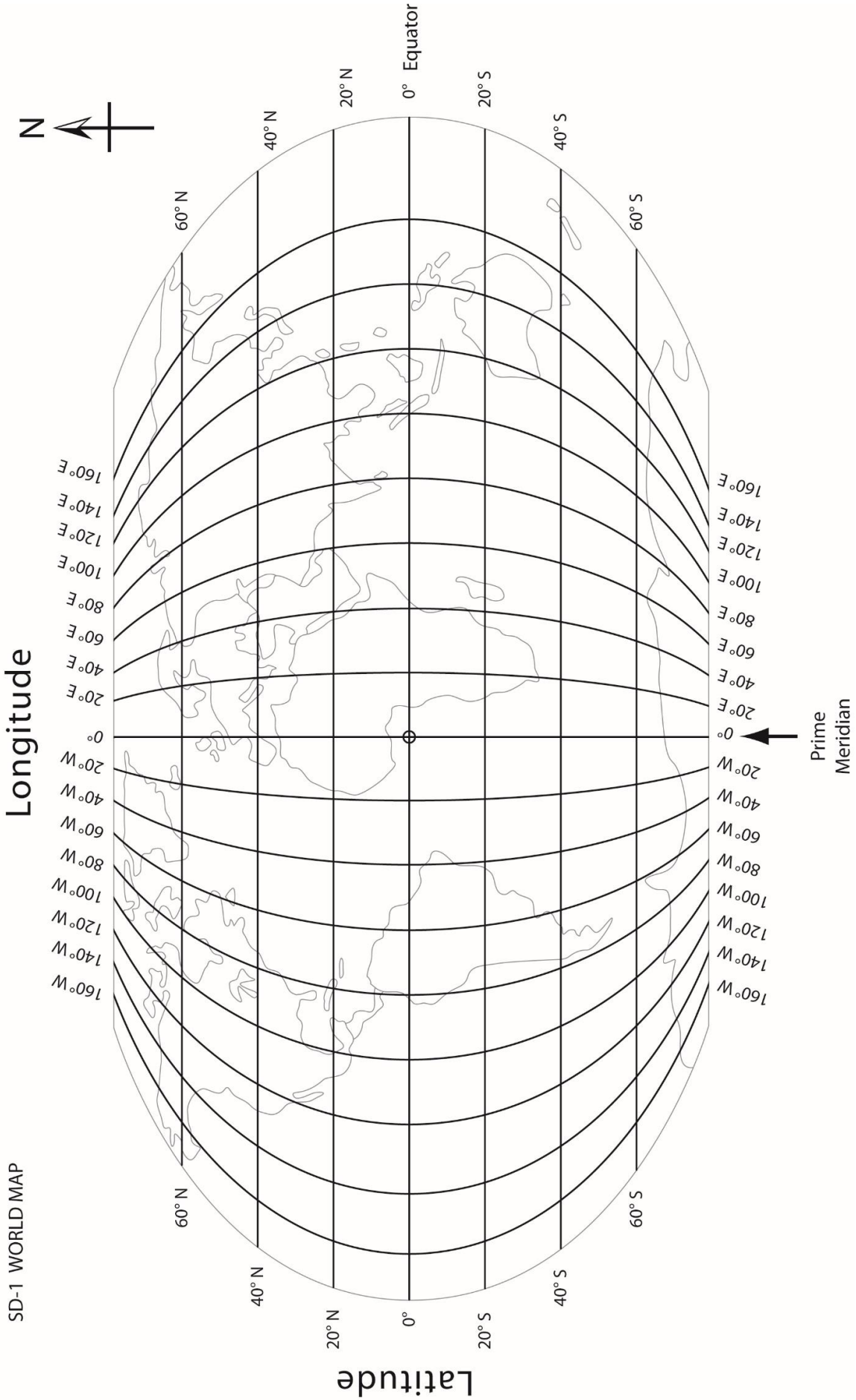
10. Ask each student to use their coordinates to place a volcano (as a triangle) and an earthquake (as a squiggle) on their own map. Altogether, the students in each group will locate 4 volcanoes and 4 earthquakes. Ask them to check each other's work and complete question 4 on SD 3.
11. When all 8 groups have located their volcanoes and earthquakes, project Slide #14 showing the 8 earthquake and volcano locations for Group 1. Ask each individual student in group 1 to check their locations with the slide.
12. Repeat for groups 2-8, slides #'s 15-21.
13. Explain that you will show the earthquakes and volcanoes that the class has found in North and South America. Project Slide #22. Ask the class what they notice. What pattern do they see? Students should record their answer on SD 3, #5.
14. Explain that you will again show earthquakes and volcanoes in North and South America, this time also showing tectonic plates. Project Slide #23. Ask the class what pattern they see. Students should record their thoughts on SD 3, #6. Discuss their ideas as a class.
15. Project Slide #24 and repeat the previous step, viewing the whole world including Europe and Asia. Again, ask students what pattern of earthquakes and volcanoes they see. Ask students to answer question 7 on SD 3. Students might notice some volcanoes and earthquakes that are not near plate boundaries. Let them know that we will address these later.
16. Have students complete question 8 and discuss as a class. At this time, students should speculate about possible explanations for what they see. They only need to understand that Earth's surface is made up of plates, and that some geologic activity happens around the edges of these plates. Movement of the plates will be addressed in the next activity.

Formative Assessment/ Guided Practice

Assign question 9 on SD 3 as formative assessment. Students should note a relationship between the plates and continents and that earthquakes and volcanoes often happen (but not always) in these areas. Students should speculate that something at these edges is causing these events.

SD 1

World Map



SD 2
pg. 1 of 4

Earthquake and Volcano Coordinates

GROUP 1

	Earthquake—1			Volcano—1		
1.	Latitude 15°N	Longitude 94°W	Magnitude 8.1	Latitude 1°S	Longitude 78°W	Name Cotopaxi
	Earthquake—2			**Volcano—2**		
2.	Latitude 37°N	Longitude 27°E	Magnitude 6.6	Latitude 46°N	Longitude 122°W	Name St. Helens
	Earthquake—3			**Volcano—3**		
3.	Latitude 11°N	Longitude 125°E	Magnitude 5.0	Latitude 1°S	Longitude 37°E	Name Kenya
	Earthquake—4			**Volcano—4**		
4.	Latitude 33°S	Longitude 71°W	Magnitude 5.5	Latitude 16°S	Longitude 72°W	Name Sabancaya

GROUP 2

	Earthquake—5			Volcano—5		
1.	Latitude 6°S	Longitude 155°E	Magnitude 7.9	Latitude 38°N	Longitude 15°E	Name Etna
	Earthquake—6			**Volcano—6**		
2.	Latitude 15°N	Longitude 92°W	Magnitude 6.9	Latitude 40°N	Longitude 121°W	Name Lassen
	Earthquake—7			**Volcano —7**		
3.	Latitude 3°S	Longitude 33°E	Magnitude 4.4	Latitude 19°N	Longitude 99°W	Name Popocatepetl
	Earthquake—8			**Volcano—8**		
4.	Latitude 43°S	Longitude 74°W	Magnitude 7.6	Latitude 36°N	Longitude 25°E	Name Santorini

SD 2
pg. 2 of 4

Earthquake and Volcano Coordinates

GROUP 3

	Earthquake—9			Volcano—9		
1.	Latitude 11°S	Longitude 161°E	Magnitude 7.8	Latitude 36°N	Longitude 80°E	Name Kunlun
	Earthquake—10			**Volcano—10**		
2.	Latitude 14°N	Longitude 89°W	Magnitude 4.8	Latitude 10°N	Longitude 85°W	Name Arenal
	Earthquake—11			**Volcano—11**		
3.	Latitude 5°N	Longitude 96°E	Magnitude 6.5	Latitude 21°N	Longitude 110°E	Name Tianyang
	Earthquake—12			**Volcano—12**		
4.	Latitude 28°N	Longitude 87°E	Magnitude 5.4	Latitude 6°S	Longitude 105°E	Name Krakatau

GROUP 4

	Earthquake—13			Volcano—13		
1.	Latitude 4°N	Longitude 123°E	Magnitude 7.3	Latitude 41°N	Longitude 14°E	Name Vesuvius
	Earthquake—14			**Volcano—14**		
2.	Latitude 53°N	Longitude 132°W	Magnitude 7.7	Latitude 12°N	Longitude 87°W	Name Momotombo
	Earthquake—15			**Volcano —15**		
3.	Latitude 26°N	Longitude 68°E	Magnitude 4.6	Latitude 35°N	Longitude 139°E	Name Fuji
	Earthquake—16			**Volcano—16**		
4.	Latitude 36°N	Longitude 4°W	Magnitude 6.3	Latitude 40°N	Longitude 44°E	Name Ararat

SD 2
pg. 3 of 4

Earthquake and Volcano Coordinates

GROUP 5

	Earthquake—17			Volcano—17		
1.	Latitude 27°S	Longitude 27°E	Magnitude 5.4	Latitude 59°N	Longitude 153°W	Name Augustine
	Earthquake—18			**Volcano—18**		
2.	Latitude 39°N	Longitude 74°E	Magnitude 6.6	Latitude 8°S	Longitude 118°E	Name Tambora
	Earthquake—19			**Volcano—19**		
3.	Latitude 37°N	Longitude14 145°E	Magnitude 7.1	Latitude 17°N	Longitude 93°W	Name El Chichon
	Earthquake—20			**Volcano—20**		
4.	Latitude 32°N	Longitude 115°W	Magnitude 7.2	Latitude 17°N	Longitude 43°E	Name Jabal Yar

GROUP 6

	Earthquake—21			Volcano—21		
1.	Latitude 2°S	Longitude 101°E	Magnitude 6.6	Latitude 42°N	Longitude 141°E	Name Hokkaido
	Earthquake—22			**Volcano—22**		
2.	Latitude 33°N	Longitude 95°E	Magnitude 5.9	Latitude 0°	Longitude 122°E	Name Colo
	Earthquake—23			**Volcano—23**		
3.	Latitude 3°S	Longitude 29°E	Magnitude 4.8	Latitude 15°N	Longitude 120°E	Name Pinatubo
	Earthquake—24			**Volcano—24**		
4.	Latitude 16°S	Longitude 72°W	Magnitude 5.5	Latitude 42°N	Longitude 128°E	Name Changbai

SD 2
pg. 4 of 4

Earthquake and Volcano Coordinates

GROUP 7

	Earthquake—25			Volcano—25		
1.	Latitude 23°N	Longitude 121°E	Magnitude 6.4	Latitude 9°S	Longitude 158°E	Name Kavachi
	Earthquake—26			**Volcano—26**		
2.	Latitude 33°N	Longitude 131°E	Magnitude 7.0	Latitude 9°S	Longitude 148°E	Name Lamington
	Earthquake—27			**Volcano—27**		
3.	Latitude 54°N	Longitude 159°E	Magnitude 7.2	Latitude 51°N	Longitude 157°E	Name Kambalny
	Earthquake—28			**Volcano—28**		
4.	Latitude 38°N	Longitude 122°W	Magnitude 6.0	Latitude 10°N	Longitude 109°E	Name Ile de Cendres

GROUP 8

	Earthquake—29			Volcano—29		
1.	Latitude 55°N	Longitude 135°W	Magnitude 7.5	Latitude 41°S	Longitude 73°W	Name Calbuco
	Earthquake—30			**Volcano—30**		
2.	Latitude 41°N	Longitude 14°E	Magnitude 4.2	Latitude 3°S	Longitude 37°E	Name Kilimanjaro
	Earthquake—31			**Volcano—31**		
3.	Latitude 39°N	Longitude 26°E	Magnitude 6.3	Latitude 60°N	Longitude 123°W	Name Ruby
	Earthquake—32			**Volcano—32**		
4.	Latitude 28°N	Longitude 140°E	Magnitude 7.8	Latitude 28°N	Longitude 60°E	Name Bazman

SD 3

Where the Action Is Student Activity Sheet

Name:

1. What do you already know about earthquakes and volcanoes?

2. As you watch the videos and look at the pictures, what do you notice? What questions do you have?

3. Washington DC Latitude: Longitude:

4. Where were your group's volcanoes and earthquakes located? Did you notice any pattern? What do you think causes these events to happen in these areas?

5. What pattern do you see in the earthquakes and volcanoes in North America and South America? Why do you think this is happening?

6. What pattern do you see in Slide 23?

7. How is the pattern similar or different in Slide 24? Is there anything that doesn't fit the pattern?

8. What is an important relationship you see here?

9. What might explain the patterns you've noticed in the slides? What else do we need to know?