

Using Satellite Images

Overview:

In this activity, students trace lava flows from a satellite image, then transfer the lava flow to a topographic map. Students then determine distances the lava traveled and how close the lava came to towns and roads.

Objectives:

The student will:

- transfer lava flow information from a satellite image to a topographic map;
- use a scale to determine distances on a map; and
- interpret a topographic map.

Materials:

- Mylar, 8 1/2" X 11" with matte finish (optional)
- Colored pencils
- Ruler
- Tape
- Student Information Sheet: "Enhanced Satellite Image of Hawai'i"
- Student Information Sheet: "Topographic Map of Hawai'i"
- Student Worksheet: "Using Satellite Images"

Answers to Student Worksheets:

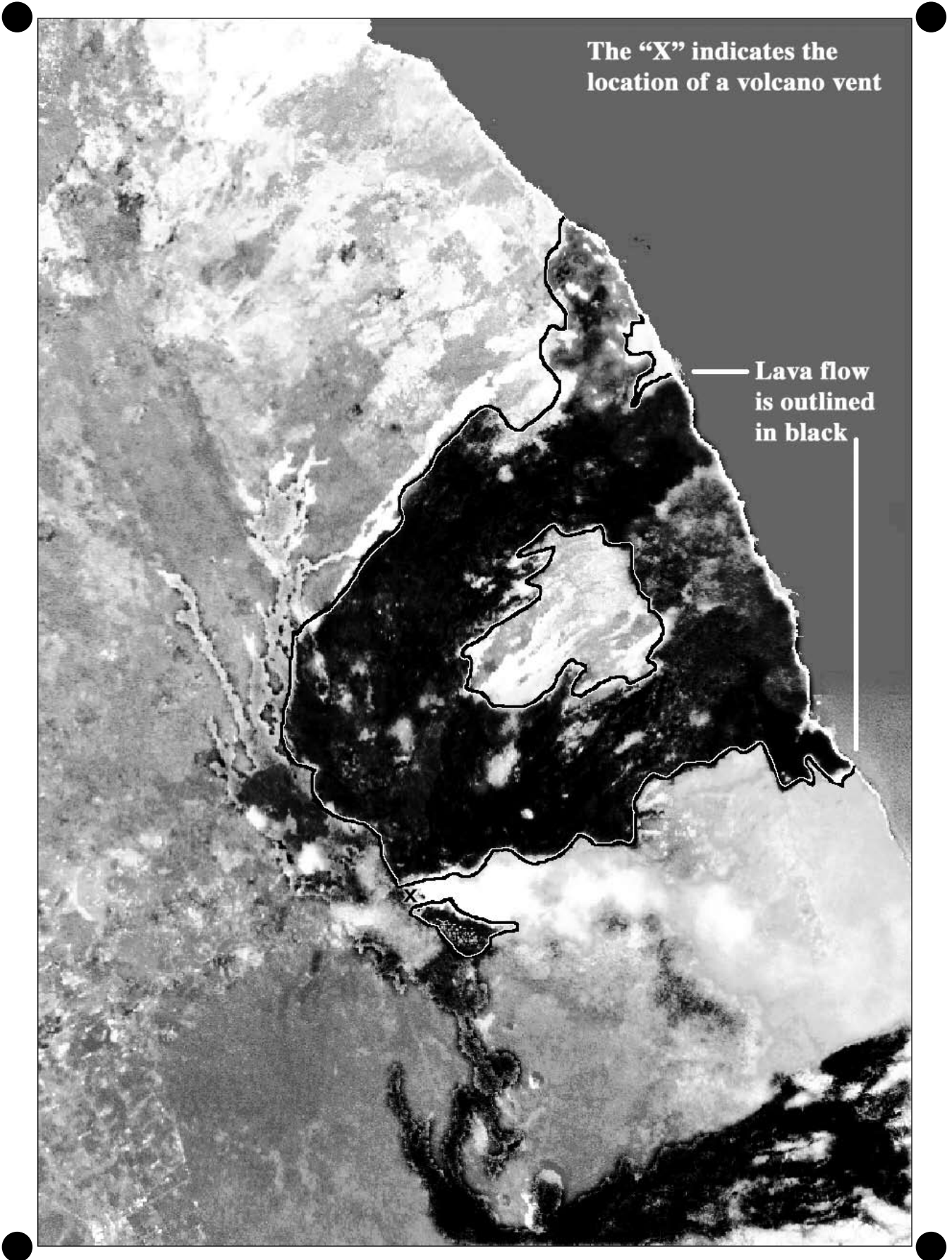
1. Kalapana and Kapa'ahu
2. Pu'u 'Ō'ō
3. 9.5 km (acceptable answers: any number between 8 and 10 km)
4. GIS (Geographic Information Systems)
5. True
6. False
7. Answers will vary
8. Answers will vary

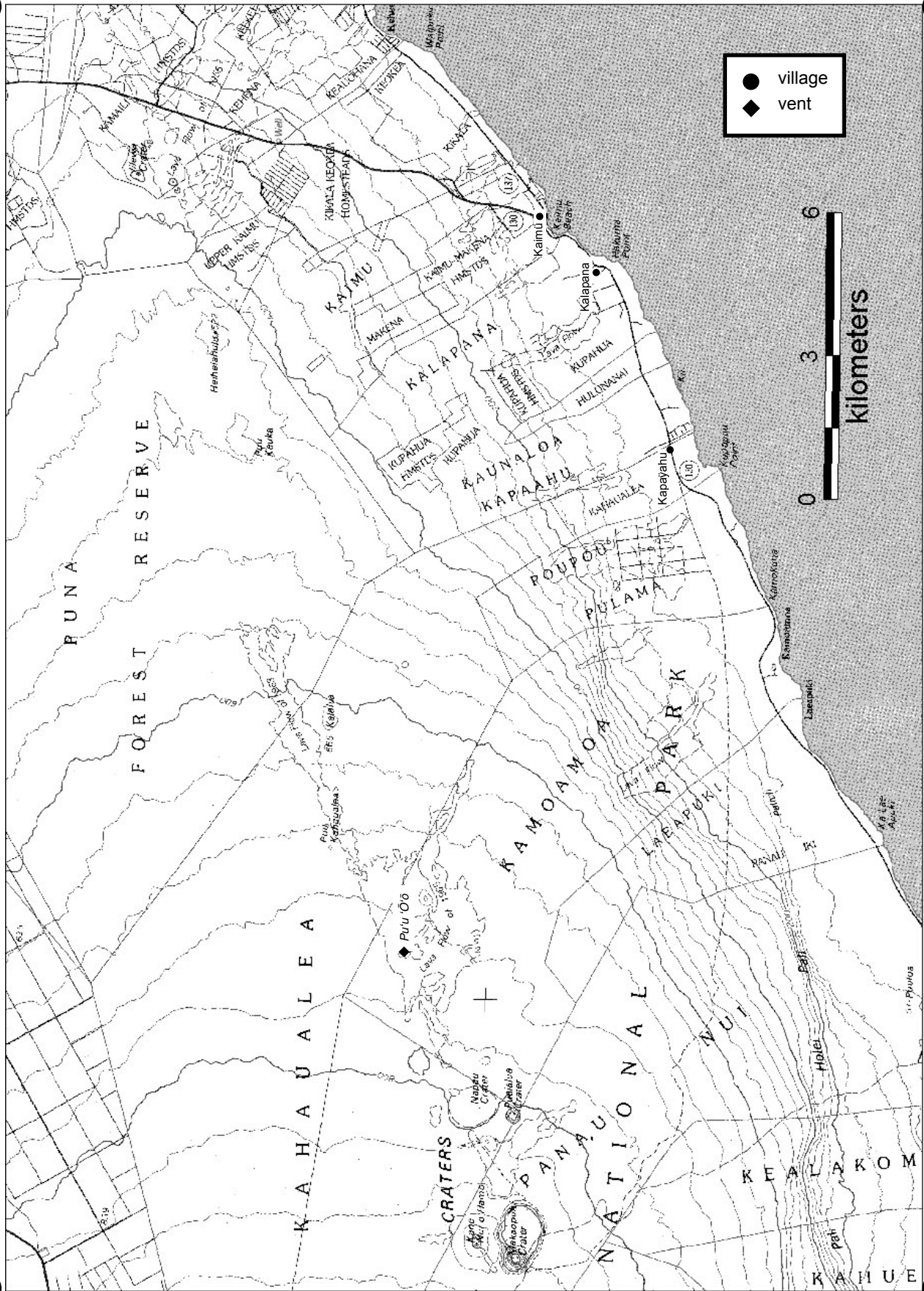
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Activity Procedure:

1. Explain that scientists use satellite images, aerial photographs and topographic maps to study lava flows. During this activity, students will trace a lava flow from a satellite image, then transfer the lava flow tracing to a topographic map to determine how close the lava came to towns and roads.
2. Scientists use a similar method to view layers of information using the Geographic Information System (GIS) program.
3. The progress of an eruption can be monitored by mapping lava flows. Each flow boundary can be mapped with a handheld Global Positioning System (GPS) receiver. This information is compiled by GIS software into a digital map. These maps can help forecast the path of the lava flow.
4. Distribute all materials.
5. Ask students to look at the Student Information Sheet: “Enhanced Satellite Image of Hawai‘i” and identify the land and water in the image.
 - a) The water is the solid gray area in the upper right corner.
 - b) Ask students to locate the recent lava flows on the image. Recent lava flows appear as black patches. The edge of the lava flow has been enhanced with a black line.
 - c) Ask students to locate the volcano vent on the image. The vent is indicated by a black “X” issuing a plume of gas that appears white in the image.
 - d) Notice how roads and towns are difficult to identify.
6. Ask students to place a piece of mylar on top of the Student Information Sheet: “Enhanced Satellite Image of Hawai‘i.” Ask students to draw a small dot on the mylar at each corner of the image. The dots will be used to line up the mylar with the Student Information Sheet: “Topographic Map of Hawai‘i.” If mylar is unavailable, place satellite image behind topographic map and hold up to a window to trace directly on to the map.
7. Ask students to use a colored pencil to trace around the lava flows. They may want to lightly color in the area of lava flows.
8. Ask students to use their colored pencil to make an “X” at the location of the volcano vent.
9. Ask students to overlay the mylar on the Student Information Sheet: “Topographic Map of Hawai‘i.” They need to line up the small dots on the mylar with the topographic map. Students may want to tape the mylar to keep it in place.
10. Remind students of how to use a map scale to help them find distances on a map. Then, using the mylar and topographic map, ask students to answer the questions on the Student Worksheet: “Using Satellite Images.”

Cultural Extension Idea: Ask students to research why the lava may have skirted the white area on the image. The reason may be geologic or cultural.





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Directions: Place the mylar outline of the lava flow and vent on the topographic map to help you answer the following questions. You may need a ruler.

1. What villages have been buried by lava?

2. What is the name of the vent that is active? _____

3. How far is the vent from the ocean? _____

4. What type of computer software program uses GPS data to create maps?

5. True or False: Satellite images can be used to identify the boundaries of recent lava flows.

6. True or False: Volcanic vents are not visible on satellite images. _____

7. How is the surface of the Big Island changing and why? What can we predict about future changes?

8. How can we use what we know about volcanoes to make decisions about where and how we live? (Use the back of this page for more space).

