

## **GEOetc's Discover Hawaii Teacher Professional Develop Field Study Learning outcomes**

This field experience has been developed to provide you with multiple opportunities to learn about volcanic process and how they relate to Plate Tectonic on our dynamic planet. We will be examining different types of volcanic processes and products and you will have an opportunity to collect materials and data that you will be able to use with students in your classroom.

We will use both a mixture of mini-field lectures and inquiry based activities to enhance your learning and also provide you models to use back in your classrooms.

We will have group discussion topics that will allow us to discuss ways of linking scientific inquiry with history, math, geography and cultural issues.

We will also spend time talking through how you can maximize your experience through sharing your experience with your colleagues both in your own school and district.

### Summary of Daily teaching outcomes (field days may not occur in this same order)

**Day 1** – Overview/logistics, Kilauea Visitor Center, Steaming Bluffs, Sulphur Banks, Kilauea Overlook, HVO, Jaggar Museum, SW Rift, Halema'uma'u Overlook (if open), Keanakako'I overlook, Devastation Trail, Pu'u Pua'i Overlook.

#### Teaching Outcomes:

Scientific content: Overview of Plate Tectonics and how the Hawaiian volcanoes provide evidence for the theory. Discussion of volcanic products and broad processes. Talk by USGS staff from HVO on monitoring activities and human impacts of volcanic processes.

Data collecting/Observations : Observations of the differences between water table steam venting and magmatic gas venting. We will examine satellite images of the locations..

Group discussions: Building base level understanding of group. Using inquiry concepts in understanding volcanic processes.

**Day 2** – Chain of Craters Road including stops at Lua Manu Crater (hike), Pauahi Crater and others, Mauna Ulu trail to Pu'u Huluhulu, Kealakomo Overlook, Alanui Kahiko, P'u Loa Petro- glyphs, Holei Sea Arch, end of Chain of Craters Road.

Teaching Outcomes:

Scientific content: Understanding the rifting process and formation of volcanic craters. Understanding of the different forms of lava flows and their properties. Cultural enhancement through archeological site visits.

Data collecting : Measurement in altitudes and temperatures moving from the summit to the coastline.

Group discussions: Use of field sketching methods and geological history scenarios in a modern day geological setting.

**Day 3** – Drive north to Waipi'o Valley Overlook. Hike very steep road into valley and beach. Lapahoehoe Point Park.

Teaching Outcomes:

Scientific content: Understanding tsunamis. Visit to a tsunami damaged site and memorial. Overview of an eroded volcanic system.

Look at engineering solutions to protect small harbor.

Group discussions: What is the preparation process for tsunamis. How can we develop similar processes for natural disasters in our states. How should students be prepared for natural disasters while traveling.

**Day 4** – Drive to the Puna District to Lava Tree State Monument, Kumukahi Lighthouse, Ahalanui Hot Spring (lunch, swim), Kalapana, Kaimu black sand beach. Possible lava viewing. BL.

Teaching Outcomes:

Scientific content: Understanding the process of lava inflation and deflation through the use of secondary observations (lava trees). Understanding of geothermal processes and how they have affected cultural issues.

Data collecting : Measurement of lava trees and extrapolation of the data for lava inflation. Collection of black sand for laboratory examination (if possible)

Group discussions: How has recent lava flows affected society in this corner of the Big Island.

**Day 5** – Drive to South Point along the Hawaii Belt Road. Discussion at South Point. Hike to the Papakolea/Mahana Bay green sand beach (lunch, swim). Mauna Loa Road to Mauna Loa Lookout.

Teaching Outcomes:

Scientific content: Understanding the chemical composition of picrites and how they relate to deep Earth chemistry. Overview of massive shield volcanoes and their evolution..

Data collecting : Collection of green sand (olivine based) for laboratory examination..

Group discussions: Why is the most southern point of the USA a cultural icon for the native Hawaiians?

**Day 6** – Hike the Kilauea Iki Trail from Kilauea Iki Overlook, Thurston Lava Tube, Kau Desert Trail to Mauna Iki.

Teaching Outcomes:

Scientific content: Understanding of a recent eruption history - caldera creation and lava tubes.

Data collecting : Measurement of environmental factors (temp, humidity etc) from base of caldera to forest rim then into lava tube.

Group discussions: What classroom lessons can be brought home from a hour in a lava tube?

**Day 7** – Swimming, snorkeling (bring your own gear) at Ho'okena Beach Park (near Honounau) Bay, Pu'uuhonua o Honaunau National Historic Park.

Teaching Outcomes:

Scientific content: Understanding the biodiversity and evolution of life on the edge of an isolated environment. Cultural links between landforms and history.

Data collecting : Collection of white sands for examination in the laboratory.

Group discussions: The role of Captain cook in understanding the science of location.

**Day 8** – Kaumana Cave, Mauna Kea visits. Lunch on Hilo Bay. Afternoon open for helicopter tours or Hilo exploration.

Teaching Outcomes:

Scientific content: Examination of the weathering and erosion of volcanic landforms by water. How can we age lava flows. Examination by air (if option taken) of the active volcanic lava field. How can we map inside a cave.

Group discussions: How is the environment from the east side of the island compare to the west side of the island? How can this be used in the classroom to examine weather

and how it affects agriculture and tourism. How can you calculate the volume of a cave and work out lava flow volumes.

Please note that the schedule WILL change due to weather, eruption and other logistic considerations. We may modify the program to add some other activities or to drop others.

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