

# Ecological Effect of Lava in Marine Environments



Photo Credit: USGS

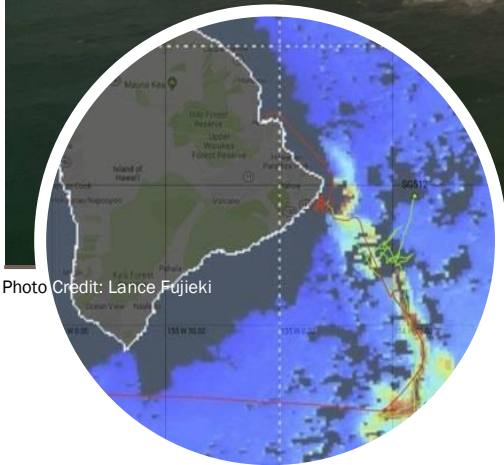


Photo Credit: Lance Fujieki

## Overview

Researchers at the University of Hawaii (UH) are studying how lava flowing into the ocean from Kīlauea affects the marine environment. When Kīlauea erupted in 1986 and lava flowed into Kalapana, UH researchers at Mānoa began a rare multi-year study of the geochemical interaction between lava and seawater [1]. They found that lava erupts under water [2], and emits sulfur dioxide and hydrochloride acid, making the ocean water more acidic and creating brown hydrothermal plumes containing small glassy particles [3][4][5][6].

When lava from Kīlauea began flowing into the ocean at Kapoho in 2018, UH Hilo scientists collaborated with the Monterey Bay Aquarium Research Institute and the Hawaii Volcano Observatory to deploy a Wave Glider sea-faring drone to gather nearshore data on ocean temperature, salinity, turbidity and oxygen level in the hydrothermal plumes [7, 8]. They measured temperatures up to 120 ° Fahrenheit in the plume. Within the hot water plume near the coast, all phytoplankton and algae seemed to have disappeared; no chlorophyll was detected in water from the surface down to 15 feet [9].

A team of UH Mānoa researchers studied the plume farther offshore. Satellite images revealed an area about 100 miles long and 1 mile wide where elevated chlorophyll levels indicated a bloom of phytoplankton/algae [10] [11], in contrast to the nearshore waters. Initial findings indicate that phytoplankton in the plume area offshore were producing chlorophyll and other plant pigments at concentrations nearly 10 times higher than normal in July 2018. The researchers suspect that iron and phosphorus in the lava and ash act as a fertilizer to increase algal growth in offshore plumes [12].

As lava erupts from a volcano and flows into the ocean, it makes the water more acidic and warmer. The hydrothermal plume can raise water temperature up to 120° Fahrenheit. As the plume moves offshore, iron and phosphorous in the plume can act as fertilizer to fuel large algal blooms.

# Ecological Risk Assessment

The UH Mānoa team has submitted samples of water and ash to laboratories around the world to analyze concentrations of chemicals that may affect marine organisms. They plan to conduct studies to investigate how the ash samples affect the growth and metabolism of marine microbes that form the basis of the food web [10].

Similar plumes of algae in offshore waters of Hawaii are thought to be supported by nutrients in dust storms from China. Although scientists have only begun to study how these broad expanses of marine algae occur, fish, birds, and sea turtles have been observed following the plumes [12].

Lava feeds the marine phytoplankton at the base of the offshore food web.



Photo Credit: USGS

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