Earth Observation

Observation of Kilauea volcano, Hawaii

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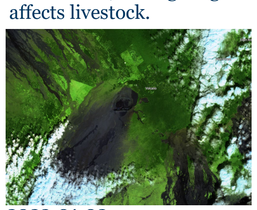
Summary

We wanted to analyse and track the possible eruption of Kilauea volcano, Hawaii. We collected data from the second of January 2023 to the eighth of March 2023. Using the sentinel hub EO browser, we could successfully track the volcanic action over the two-month period.

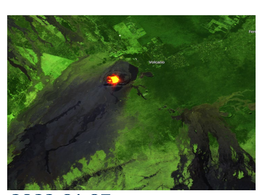
Kilauea volcano is not erupting. The summit eruption of Kilauea volcano, within Halemaumau crater, remains paused as of March 8th. Lava is no longer flowing on the crater floor. Resumption of eruptive activity may occur soon with little or no warning. No significant changes have been observed along either of the volcano's rift zones. Low rates of ground deformation and modest rates of seismicity continue across the volcano.
A reawaken may be possible but it would be detected first before any casualties.

Kilauea volcano, Hawaii
A photo taken by a passenger on a flight over the volcano on March 10th. The lava had subsided by this point so it would be safe to fly over

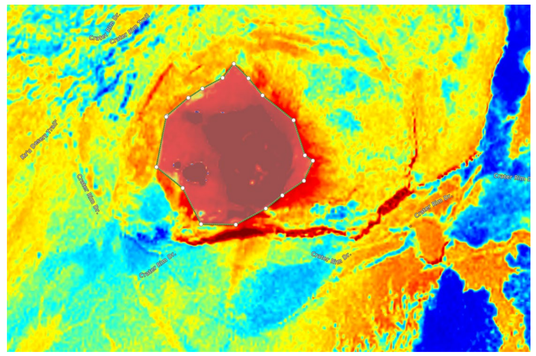
Recent eruptions at the summit of Kilauea Volcano have been occurring within a closed area of Hawaii Volcanoes National Park. High levels of volcanic gas are the primary hazard of concern, as this hazard can have far-reaching effects downwind. Large amounts of volcanic gas—primarily water vapor (H_2O), carbon dioxide (CO_2), and sulphur dioxide (SO_2)—are continuously released during eruptions of Kilauea. As SO_2 is released from the summit, it reacts in the atmosphere to create the visible haze known as vog (volcanic smog) that has been observed downwind of the volcano. Vog creates the potential for airborne health hazards to residents and visitors, damages agricultural crops and other plants, and affects livestock.



2023-01-02
No lava spotted on January second by satellite



2023-01-07
The same spot but 5 days later by same satellite



Research aims

Our research aims were to monitor the Kilauea volcano in Hawaii for a possible eruption.
But after monitoring it for two months during its most active period, the lava inside settled down and it was no longer active. The CO_2 levels around the volcano were also being monitored and whilst the volcano was at its most active point the CO_2 levels were also the highest. We watched its action through satellite. Also, we monitored the heat levels so when no more were visible, we knew that the volcano was now dormant.

Background information

Kilauea Volcano is an active shield volcano in the Hawaiian islands. Located along the south-eastern shore of the big island of Hawaii, the volcano is between 210,000 and 280,000 years old and emerged above sea level about 100,000 years ago. Historically, it is the most active of the five volcanoes that together form Hawaii island. Kilauea is also one of the most active volcanoes on Earth, and the most recent eruption began on September 29, 2021, when several vents began to erupt lava within Halemaumau a pit crater in the volcanoes summit caldera and ended March 7, 2023.

Kilauea is the second-youngest product of the Hawaiian hotspot and the current eruptive centre of the Hawaiian–Emperor seamount chain. Because it lacks topographic prominence and its activities historically coincided with those of Mauna Loa, Kilauea was once thought to be a satellite of its much larger neighbour. Structurally, Kilauea has a large, recently formed caldera at its summit and two active rift zones, one extending 125 km (78 mi) east and the other 35 km (22 mi) west, as an active fault of unknown depth moving vertically an average of 2 to 20 mm (0.1 to 0.8 in) per year.

Background information (continued)

Kilauea's eruptive history has been a long and active one; its name means "spewing" or "much spreading" in the Hawaiian language, referring to its frequent outpouring of lava. The earliest lavas from the volcano date back to its submarine presided stage, samples having been recovered by remotely operated underwater vehicles from its submerged slopes; samples of other flows have been recovered as core samples. Lavas younger than 1,000 years cover 90 percent of the volcano's surface. The oldest exposed lavas date back 2,800 years.
Kilauea's high state of activity has a major impact on its mountainside ecology, where plant growth is often interrupted by fresh tephra and drifting volcanic sulphur dioxide, producing acid rains particularly in a barren area south of its southwestern rift zone known as the Kau Desert. Nonetheless, wildlife flourishes where left undisturbed elsewhere on the volcano and is highly endemic thanks to Kilauea's (and the island of Hawai'i's) isolation from the nearest landmass. Historically, the five volcanoes on the island were considered sacred by the Hawaiian people, and in Hawaiian mythology Kilauea's Halemaumau served as the body and home of Pele, goddess of fire, lightning, wind, and volcanoes.

Kilauea
Stream of lava from Paulo's flowing through the forest in the Royal Gardens subdivision, February 28, 2008. The lava stream is about 3 m (10 ft) wide. Kilauea Volcano, Hawaii.

Experimental Method

To see these images, we used the sentinel hub Eo browser. We used two different settings:

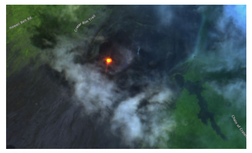
- False urban allowed us to see more defined images and more detail on the images
- Infared allowed us to watch the moisture levels change throughout

Results

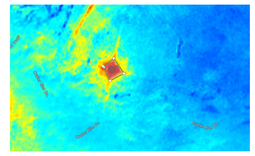
We tracked the action of the volcano for two months.

During this time, we witnessed a spike around the start of January. However nearer the end of the same month, it plateaued. Now it is inactive and no more larva is present at the top.

As it reached the end of February, we decided the volcano was no longer active and we finalised our data.



Under false urban
2023-02-26



Under infrared
2023-02-26
Larva area is 0.04km2

Analysis & conclusions

Going forward, we want to either watch Kilauea again or analyse a different volcano. We found this investigation so interesting; it was new for us however it was very easy to get used to the software and it was enjoyable to look through the different things you can do with the website.

In conclusion we wish we could've had longer with the software and done multiple locations of interest. We want to be able to look into different locations with more interesting volcanos
We would also like to look at the damage to greenery from inactive volcanos that have been inactive for a range of 5-10 years inactive
This would be a cool investigation.

KILAUEA (VNUM #332010)
19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)
Current Volcano Alert Level: WATCH
Current Aviation Colour Code: yellow