

## **Appendix A: Volcanic Events - Eruption Summaries**

<b>Kilauea</b>	<b>June 2023</b>
	<b>September 2023</b>
	<b>June 2024</b>

## June 2023

Wednesday June 7, 2023 – “Kilauea volcano erupts within Halemaumau crater before dawn”:

- At 4:44 a.m. on June 7, eruption at Halemaumau crater began after three-month break from the previous eruption.
- Scientists at HVO noticed a glow in Kilauea summit webcam images and later quoted that “The opening phases of eruptions are dramatic.”
- The lava from this volcanic activity was confined within the summit caldera.
- Kilauea’s volcano alert had been raised from “watch” to “warning” with “red” aviation advisory code.
- There was no volcanic threat to any community from this event.
- Several small earthquakes were recorded with the largest at magnitude 3.4.



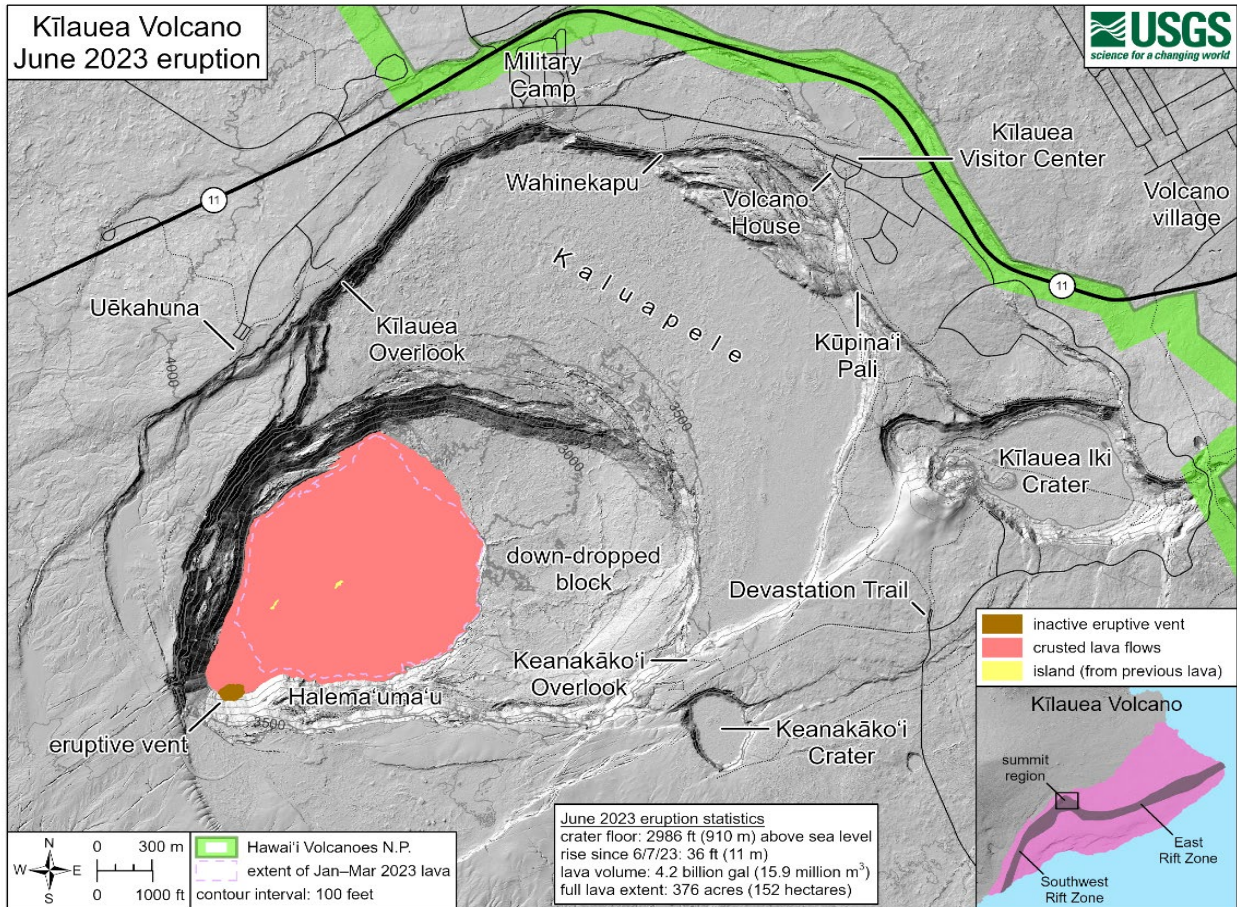
*At the instant of eruption within Halemaumau crater. Photo taken in the early morning of June 7, 2023 courtesy of USGS.*

Thursday June 8, 2023 – “Kilauea erupts and spurs an onslaught of visitors”:

- Late afternoon on June 7, multiple minor lava fountains on the crater floor were detected.
- The height of the fountains remained between 13 to 30 feet high.
- 30 feet wide of new lava was expanded to the crater floor.
- Ongoing volcanic activities brought a lot of visitors from all over the world.
- National Weather Service commented that “Communities in the Puna, Kau and South Kona District may be affected from volcanic gases and fine ash. “



*Kilauea volcano Halemaumau crater on the same day morning after eruption resumed. Photo taken on 6/7/2023 courtesy of USGS.*



USGS map of newly added lava flow from June 7<sup>th</sup> eruption on Kilauea Halemaumau Crater.

Thursday June 8, 2023 – “Kilauea advisories lowered as eruption resumes, wind vortex forms”:

- The advisory levels for Kilauea volcano had been lowered from “warning” to “watch” in the morning of June 8.
- Kilauea’s aviation advisory code was lowered from “red” to “orange” as well.
- The eruption plume stayed as high as 8,000-10,000 feet above sea level.
- Lower concentrations of sulfur dioxide and minor volcanic particles were measured from the plume.
- A wind vortex was formed from the extreme heat within the crater.



Wide webcam view from the west rim of Halemaumau crater in the morning of June 8, 2023. The photo shows the newly created lava flow mark since the morning of June 7. Photo courtesy of USGS.

Monday June 12, 2023 – “As tourists flock to eruption, agencies urge respect”:

- Some lava fountains lost its height before Sunday; however, some lava fountains kept its height up to 30 feet.
- Lava flow was continuously growing around the western side of the Halemaumau crater.
- Many minor lava fountains remained active on the southwestern floor and vent on the southwest wall of the caldera.
- More than 10,000 people visited the craters and Volcanoes National Park on the first day and the night of eruption.



*Eruptive activity overview in Halemaumau crater. Photo taken on June 14, 2023 courtesy of USGS.*

Tuesday June 20, 2023 – “USGS: Kilauea volcano eruption has paused”:

- After 4 p.m. on Monday June 19, volcano eruptive activity at Kilauea Halemaumau crater rapidly declined and came to stop.
- Scientists also observed circulation of the lava flow had been slowing down, and its surface dropped by several meters.
- Lava from previous activities continuously spread around the crater floor.
- The volcano alert level remained at “watch” with “orange” advisory code.



*Southwest side view of Halemaumau crater during the night. The lava fountain and channel emerging were recorded in this photo. Photo taken on June 17, 2023 courtesy of USGS.*

Friday June 30, 2023 – “Kilauea no longer erupting, alert level now at advisory”:

- Alert level was lowered to “advisory” with “yellow” aviation color code on Friday, June 30. (USGS Daily Volcano Newsletter)
- Amount of SO<sub>2</sub> emission was decreased to the level close to pre-eruption period.
- HVO alerted lower concentrations of SO<sub>2</sub> or hydrogen sulfide may stay around downwind residential areas including minor odors or gases.
- HVO reported a potential of Kilauea resuming eruptive activities near future with little or no warning.

Sunday August 13, 2023 – “Magnitude 4.2 earthquake shakes Kilauea volcano”:

- A magnitude 4.2 earthquake was measured at about 1:36 p.m. on August 13, 2023 near Halemaumau crater.
- It struck at a depth of nearly 2 miles of volcano centered at about 4 miles west-southwest of Kilauea volcano.

Sunday September 10, 2023 – HVO/USGS Volcanic Activity Notice (USGS Daily Newsletter)

- As of September 10, at 2:52 p.m., HVO recognized the increasement in the number of earthquake activities and detection of ground formation changes.
- HVO observed Kilauea’s eruptive activities in summit webcam images at about 3:15 p.m. on September 10 within Halemaumau crater.
- USGS elevated Kilauea’s alert level to “warning” and its aviation color code to “red”.
- As of 7 p.m., some minor fountains stayed active reaching up to 65-82 feet.

Sunday September 10, 2023 – “Volcano alerts lowered as Kilauea eruption continues but poses no serious threats” (Updated Monday, 8:30 a.m.):

- Eruption resumed at around 3:15 p.m. on Sunday, September 10, 2023.
- Eruption continued on Monday morning, but alert level was downgraded to “orange” from “red” and from “warning” to “watch”.
- The eruption plume with sulfur dioxide and minor volcanic particles remained in the height nearly 8,000 to 10,000 feet above sea level.
- Lava fountains from initial eruption reached 500 feet above ground.



*Active lava fountains in Eastern portion of the crater recorded in the morning of September 11, 2023. Photo courtesy of USGS.*

Monday September 11, 2023 – “Kilauea continues to erupt, vog returns to west side of Hawaii island”:

- As the eruption continued within the caldera crater, the air quality levels got higher.
- The height of lava fountains remained near 50 feet on the second day of eruption.
- The active lava fountains spread out to about one mile on the crater floor.
- Up to 100,000 tons of SO<sub>2</sub> was measured from this eruptive activity.



*The view of the summit around 12:30 p.m. on September 12, 2023. Newly created lava from this eruption had surrounded older fissures from 1982 eruption. Photo courtesy of USGS.*

Sunday September 17, 2023 – “USGS: Kilauea eruption ends as volcano alert lowered to advisory”, “Kilauea eruption brings brief boost to tourism”:

- Active lava flowing within Halemaumau crater ceased at around 11:15 a.m. and stopped by around noon on Saturday, September 16.
- HVO lowered the alert level to “advisory” as well as the aviation color code to “yellow” on Saturday.
- SO<sub>2</sub> emissions decreased to the level near pre-eruption period recording around 800 tonnes per day.
- At least 5,000 people visited Kilauea daily during this eruptive event.



*Multiple active lava fountains were recorded on September 14, 2023. Photo courtesy of USGS.*

Monday June 3, 2024 – USGS: “Kilauea Volcano began erupting in a remote location within Hawaii Volcanoes National Park.”

Wednesday June 5, 2024 – USGS: “The eruption that began southwest of Kilauea summit on June 3, 2024, has been paused for 48 hours and is unlikely to restart.”