

Strengthening episode in Kilauea's marathon eruption

Sentinel-2 MSI acquired on 24 December 2017 at 20:59:29 UTC

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Sentinel-1 CSAR IW acquired on 23 April 2018 at 16:15:25 UTC

Sentinel-1 CSAR IW acquired on 02 May 2018 from 04:30:28 to 04:30:53 UTC

Sentinel-1 CSAR IW acquired on 08 May 2018 at 04:29:48 UTC

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[2D Layerstack](#)

Fig. 1 - S2 (07 & 24.12.2017 & 13.01.2018) - 12,8,2 colour composite - Usual activity near Kilauea cones (lava shows in pink-red). [2D view](#) [3D view](#)

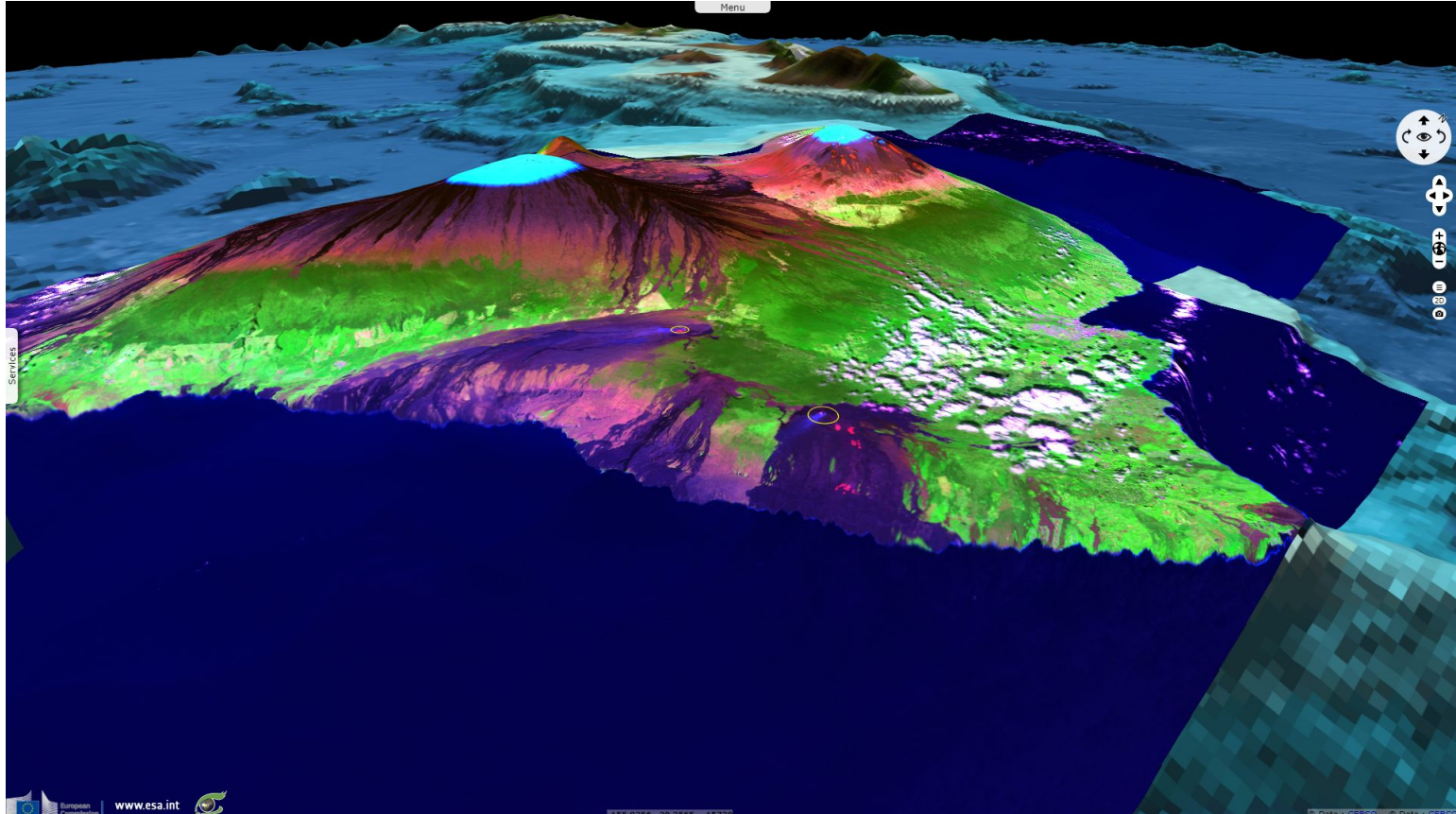
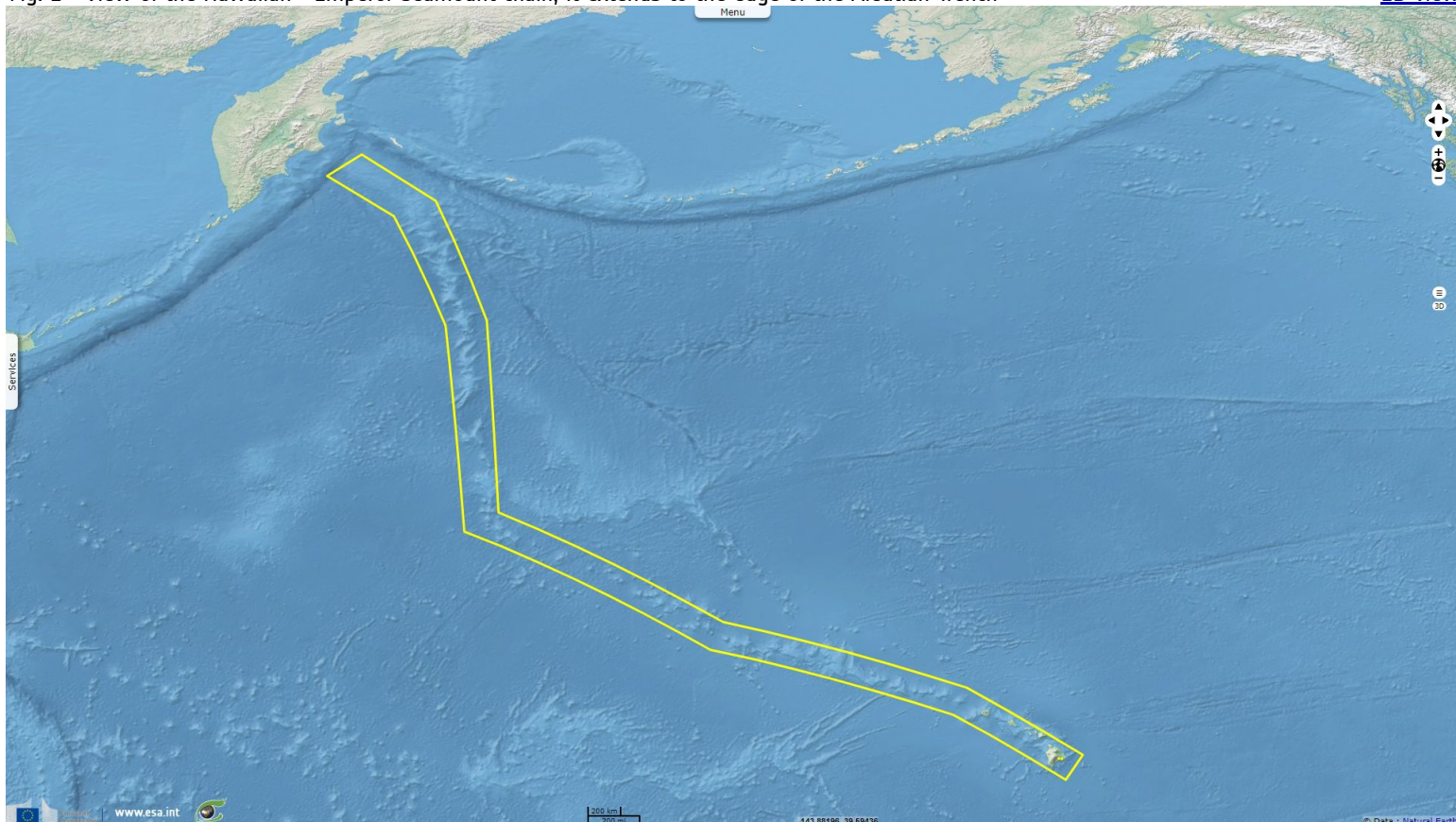


Fig. 2 - View of the Hawaiian - Emperor seamount chain, it extends to the edge of the Aleutian Trench [2D view](#)

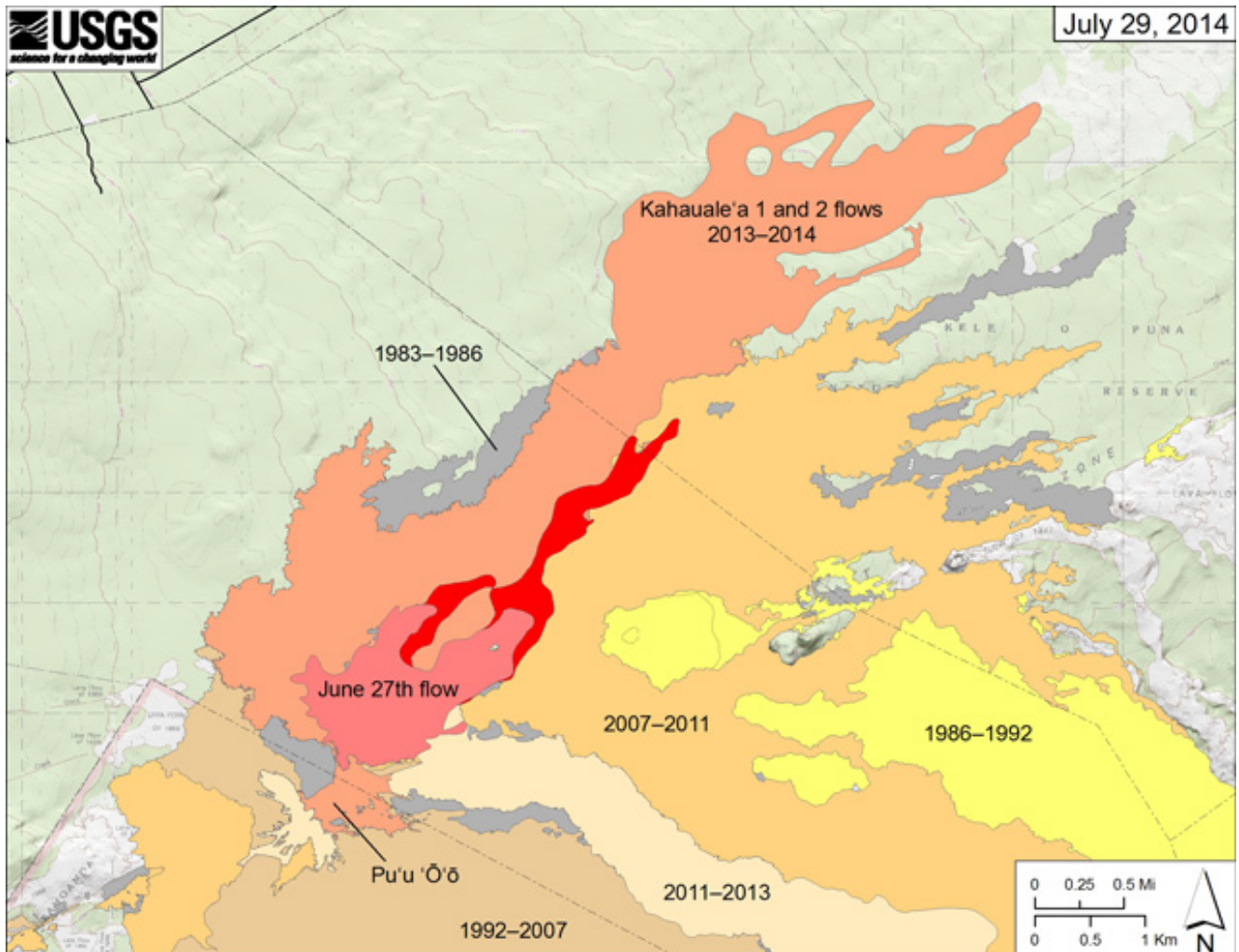
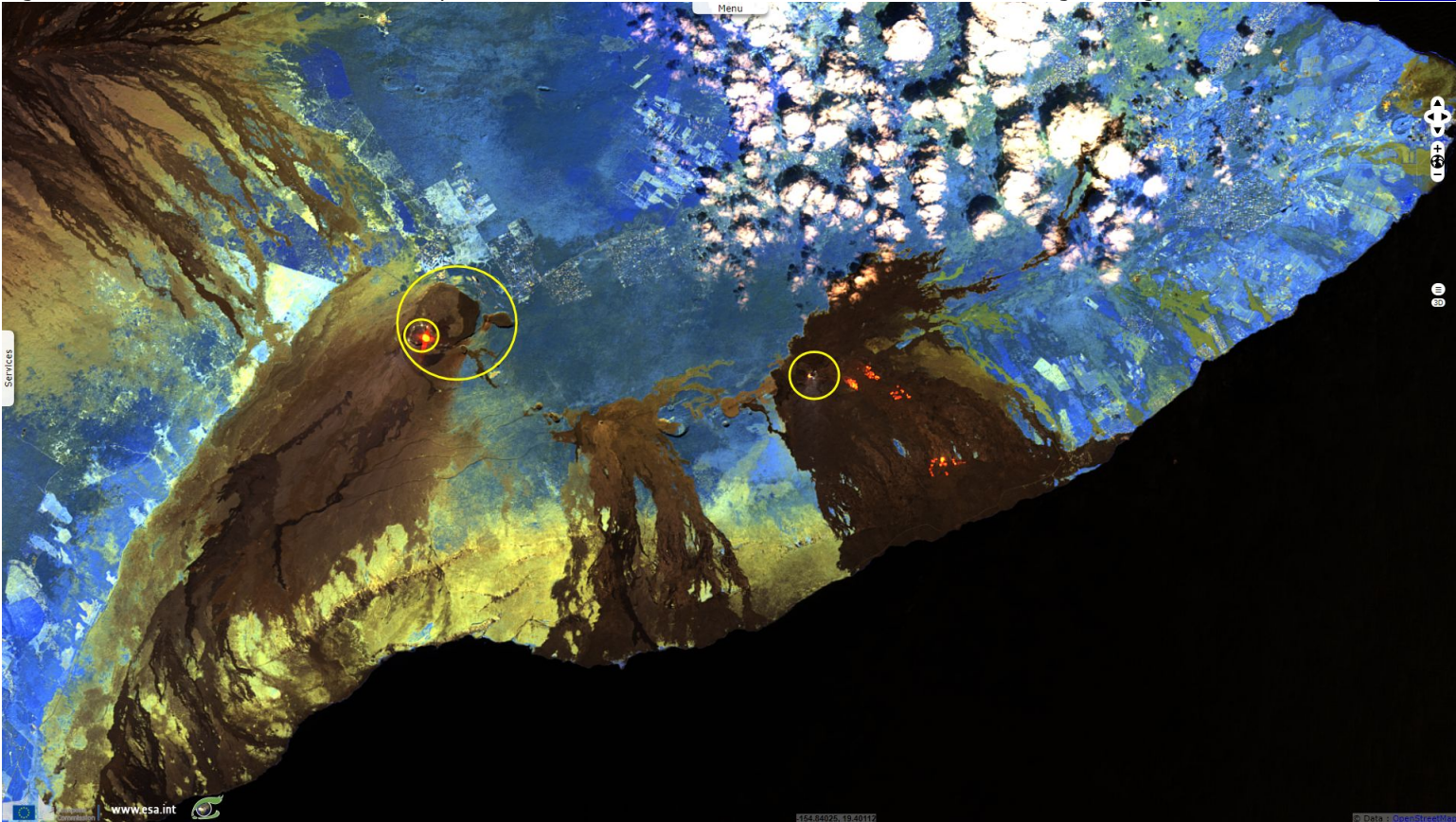


Hawaii plume is responsible for the creation of the Hawaiian – Emperor seamount chain, a 5800km-long chain of over 80 identified undersea volcanoes. Four of these volcanoes are active, two are dormant, and more than 123 are extinct, many having since been ground beneath the waves by erosion as seamounts and atolls. The chain extends from the Aleutian Trench in the far northwest Pacific to the Lo'ihi seamount, the youngest volcano in the chain, which lies about 35km southeast of the Island of Hawai'i. Closest to the Aleutian Trench, the oldest and most heavily eroded part of the chain are the Emperor seamounts, which are 39 to 85 million years old.

Kilauea has been erupting continuously since 1983, it is the current eruptive center of the Hawaiian–Emperor seamount chain. It is still dwarfed by its neighbour Mauna Loa which rises 9170m from base to summit, hiding most of its volume under sea.

Fig. 3 - S2 (24.12.2017) - 12,11,8 colour composite - The "colour" of a lava flow is indicative of its weathering & its age.

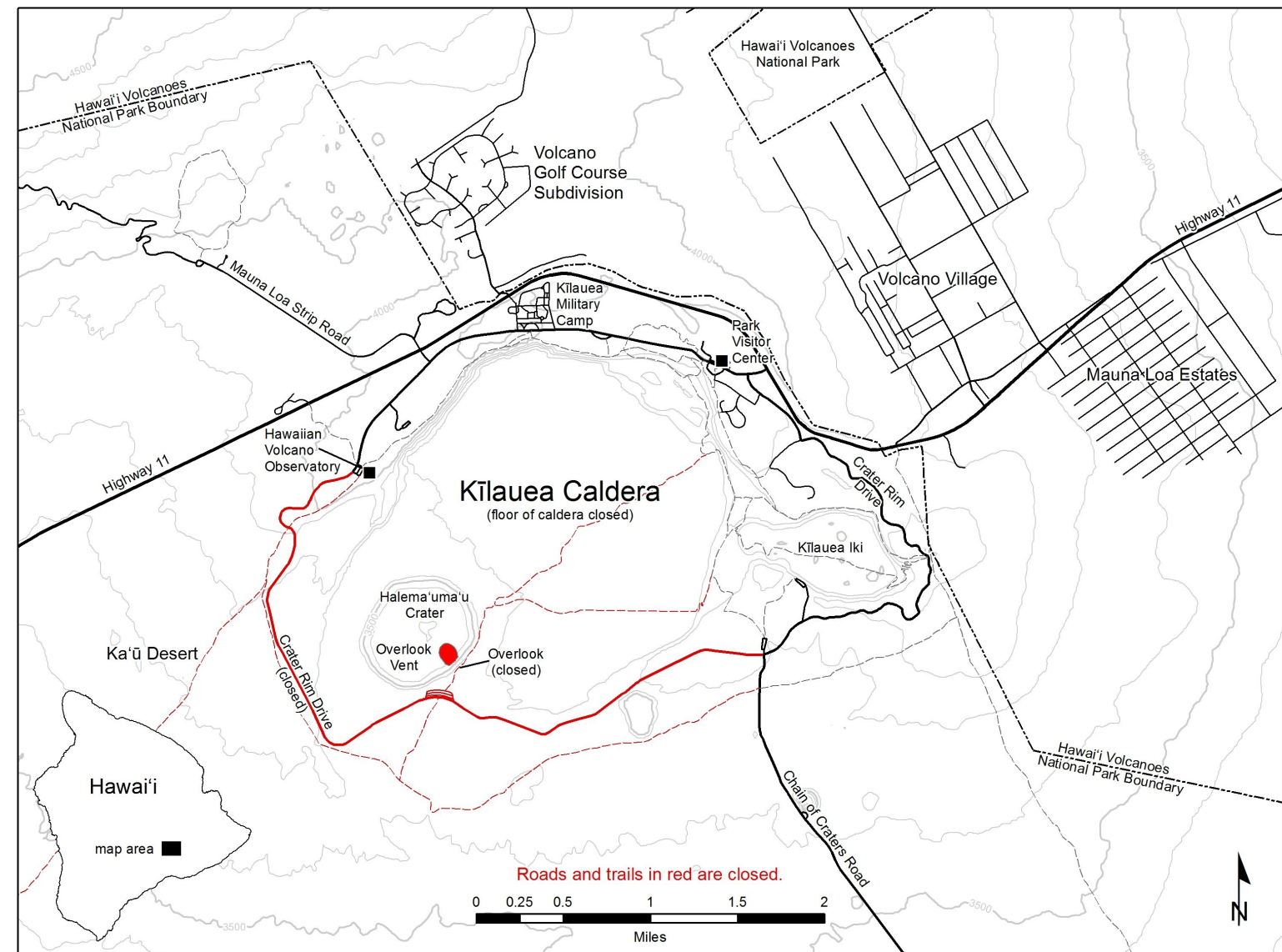
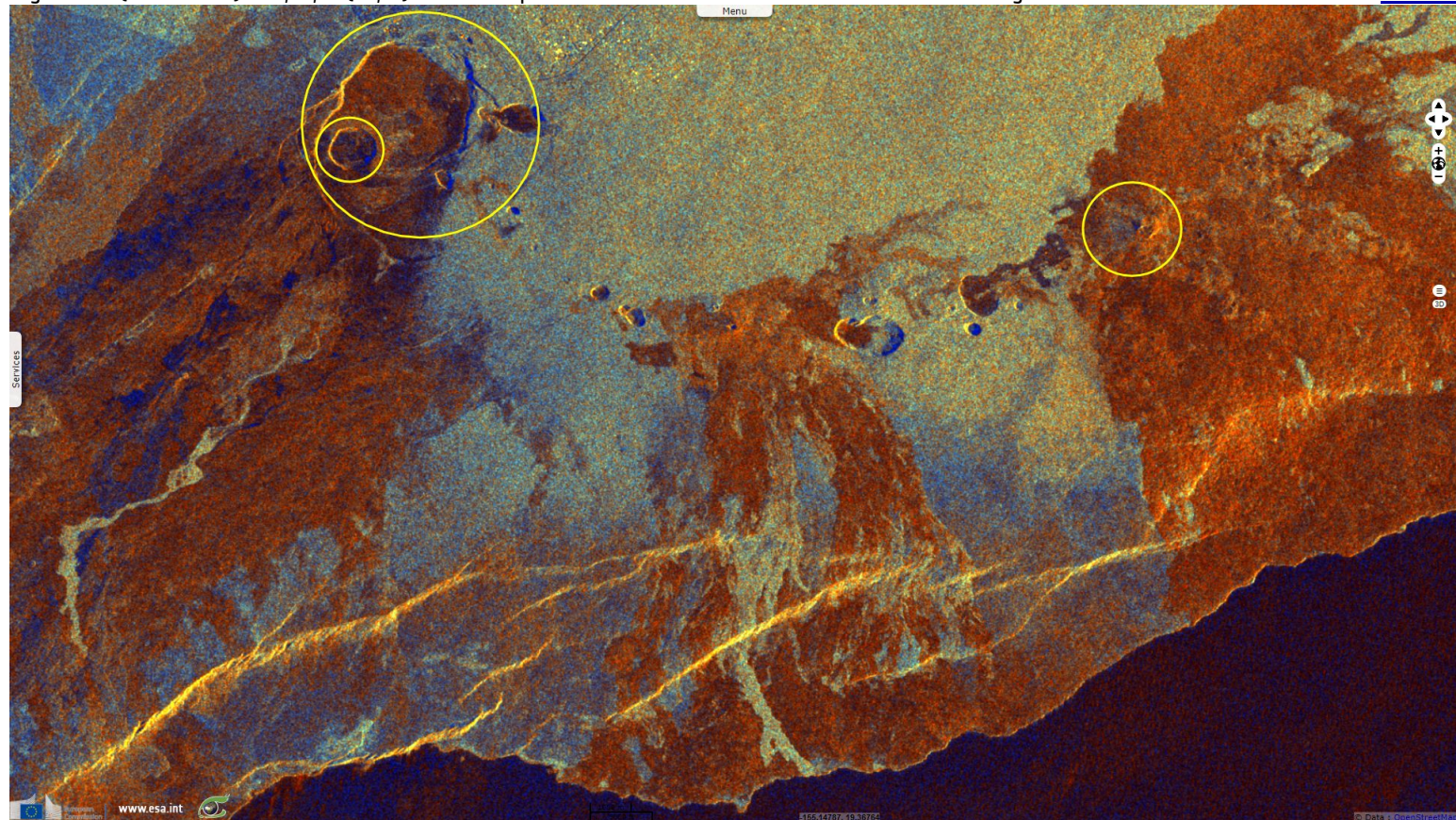
[2D view](#)



2014 map showing the age of the top lava flow since Kilauea's continual eruption in 1983 - source: USGS, archived by [Smithsonian Institution](#).

Fig. 4 - S1 (23.04.2018) - vv,vh,ndi(vh,vv) colour composite - Kilauea shown with its lava lakes at the highest level.

[2D view](#)



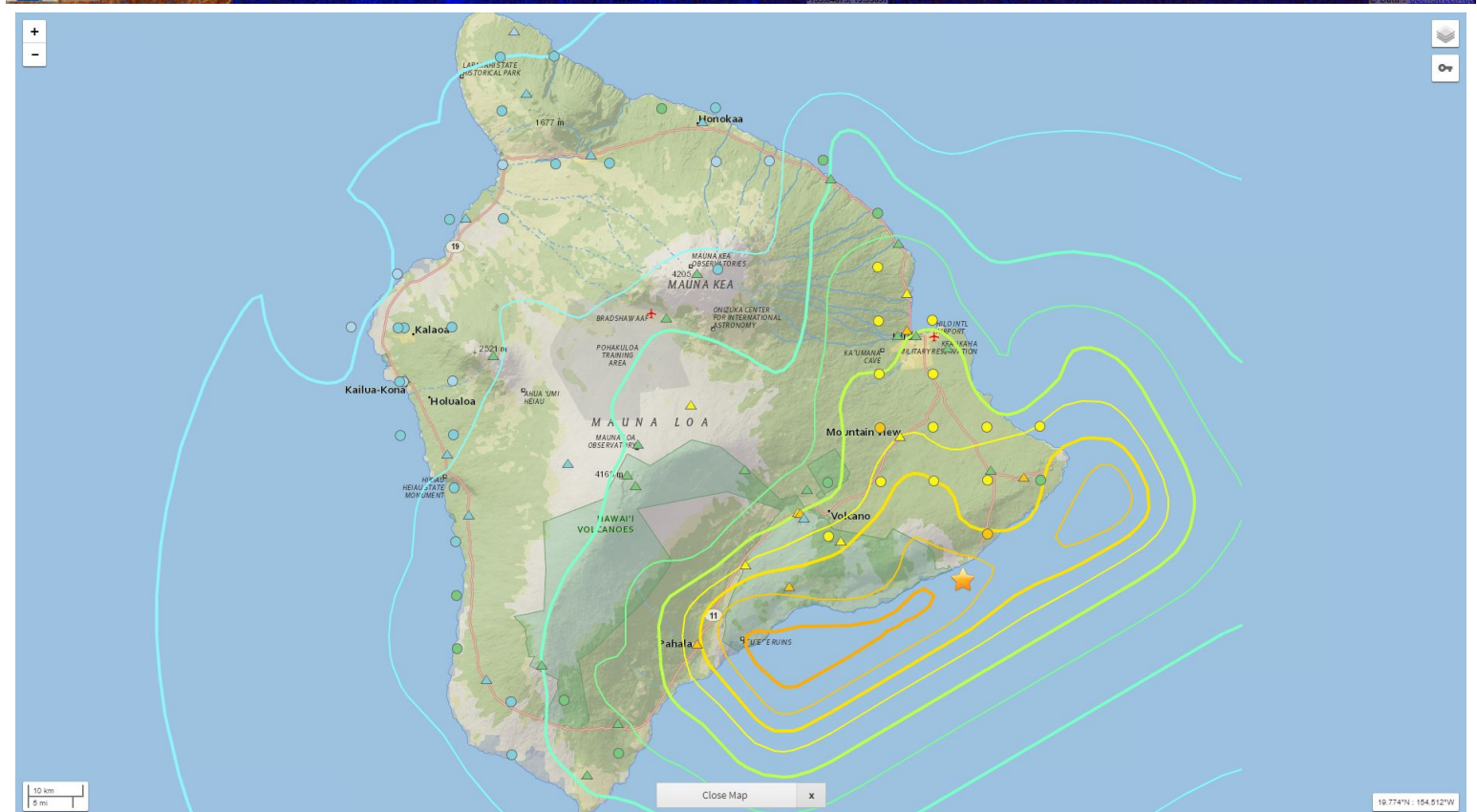
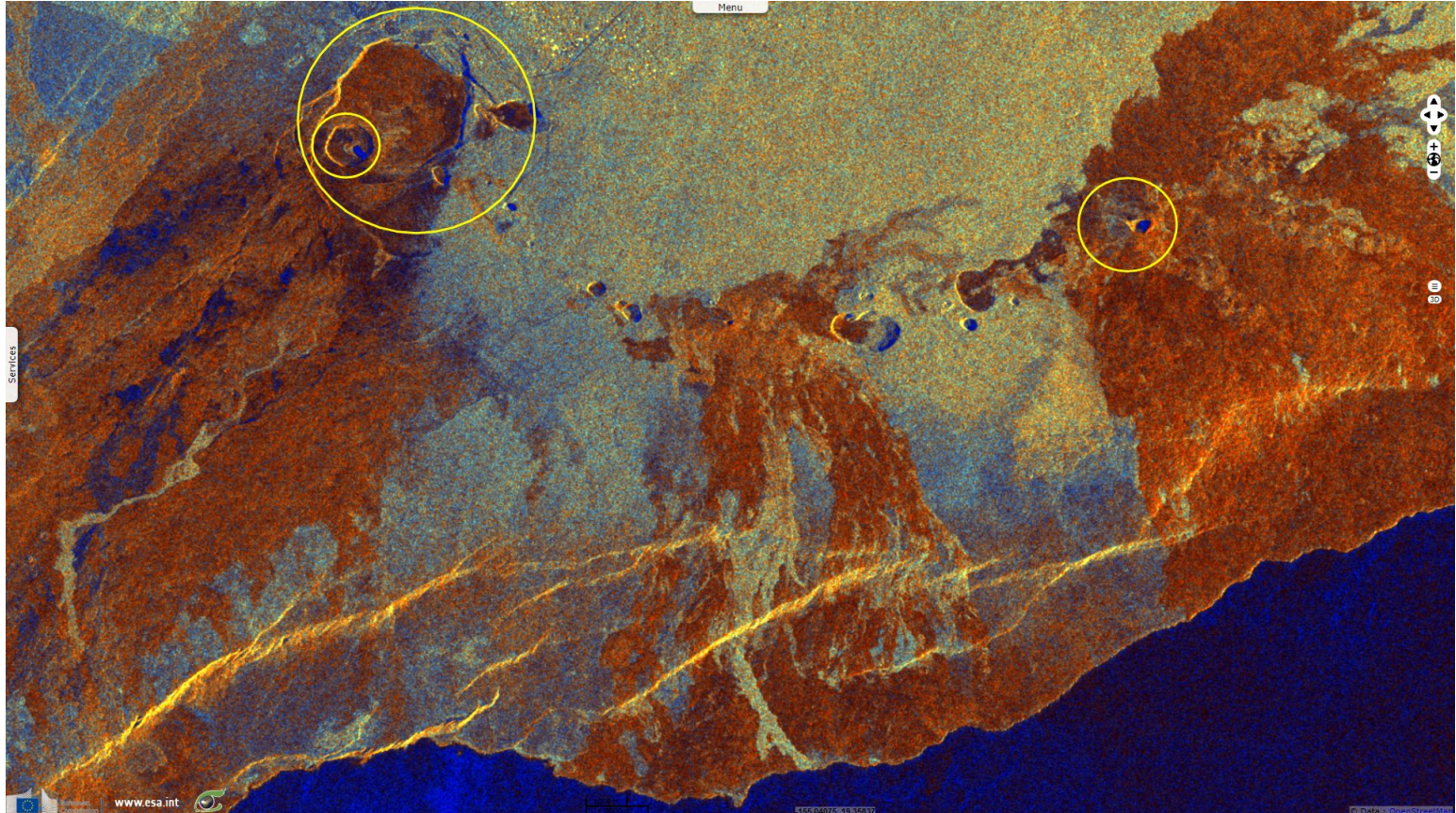
Map of the Kilauea's main caldera - source: [USGS - Hawaiian Volcano Observatory \(HVO\)](#).

HVO [listed](#) several event that can be observed or derived from Sentinel-1 data:

- "May 1, 2018, 14:54 UTC: Between about 2:00 and 4:30 pm on Monday, April 30, following weeks of uplift and increasing lava levels within the cone, the crater floor at Pu'u 'Ō'ō on Kīlauea Volcano's East Rift Zone collapsed. A collapse of the Pu'u 'Ō'ō crater floor Monday afternoon on Kīlauea Volcano's East Rift Zone has prompted increases in seismicity and deformation along a large section of the rift zone.
- May 2, 2018, 05:56 UTC: The increase in seismicity and deformation recorded since Monday afternoon at Kīlauea Volcano's East Rift Zone east of the Pu'u 'Ō'ō vent is continuing this evening. The activity is associated with the intrusion of magma eastward from the Pu'u 'Ō'ō magma system. Since this morning, seismicity rates in the lower East Rift Zone east of Highway 130 have increased. An outbreak of lava in a new location remains a possible outcome of the continued unrest. At this time it is not possible to say with certainty if or where such an outbreak may occur, but the area along the East Rift Zone downrift (east) of Pu'u 'Ō'ō remains the most likely location.
- May 3, 2018, 18:48 UTC: Earthquakes and deformation of the ground related to intrusion of magma into the lower East Rift Zone of Kīlauea continue. Deflationary tilt at the summit of the volcano has been accompanied by a drop in the level of the lava lake in Halema'uma'u."

Fig. 5 - S1 (05.05.2018) - After the eruption strengthening, the level of lava lakes quickly decreased.

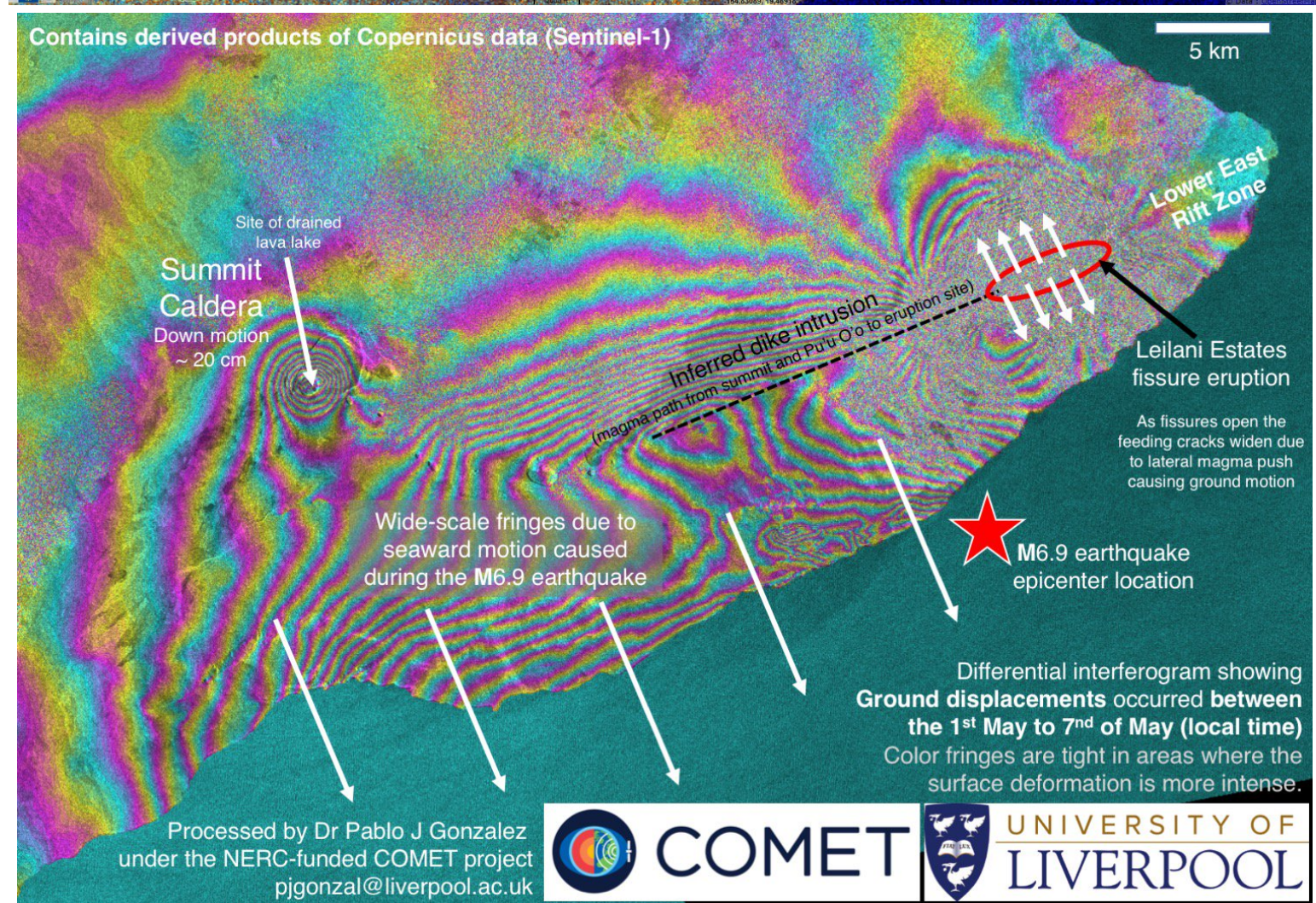
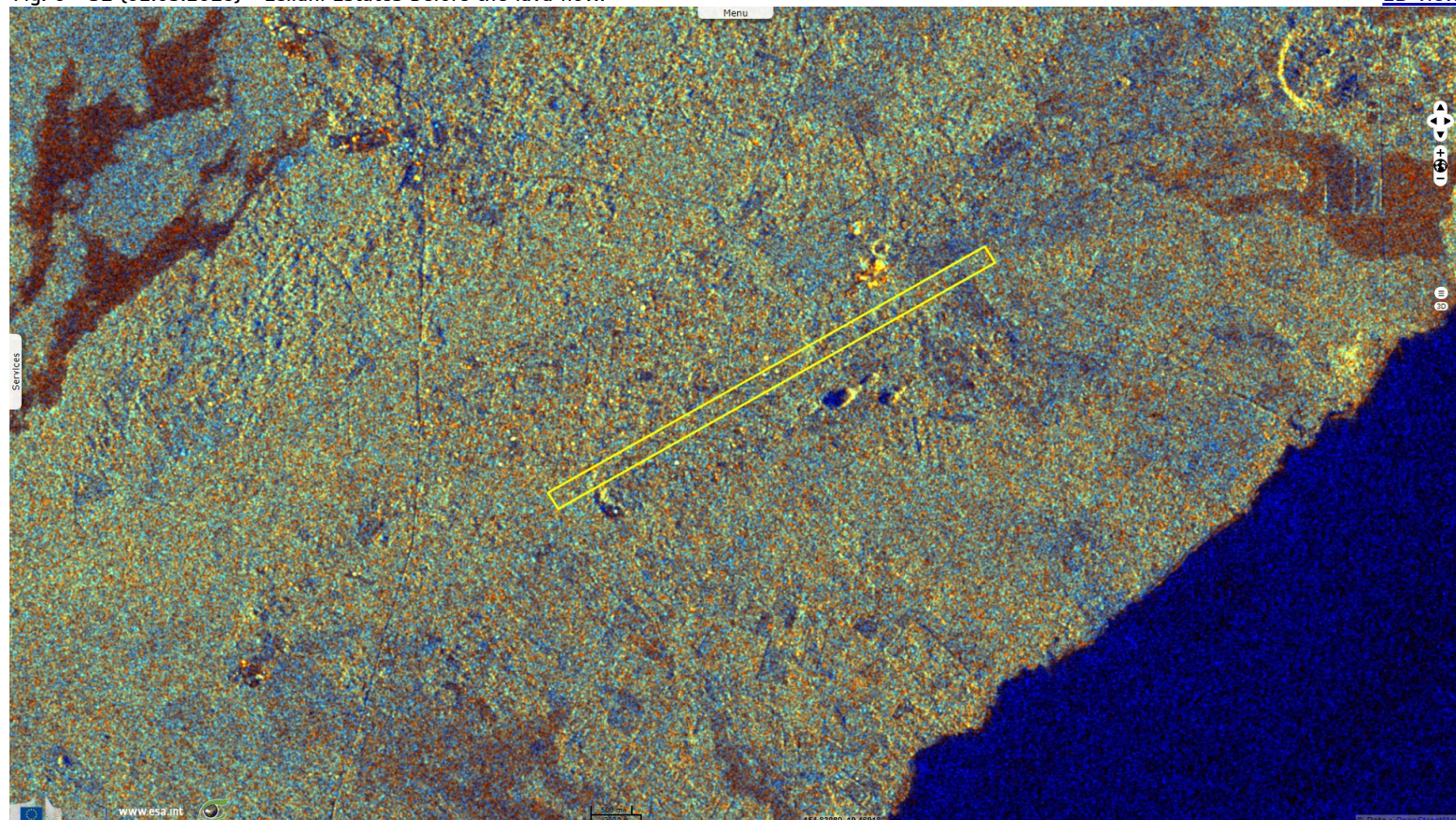
[2D view](#)



Left: Map of the M6.9 earthquake - source: [USGS](#).

Fig. 6 - S1 (02.05.2018) - Leilani Estates before the lava flow.

2D view



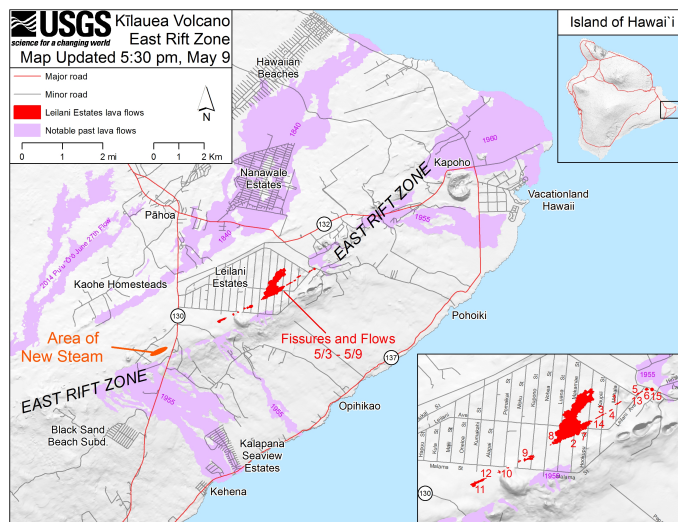
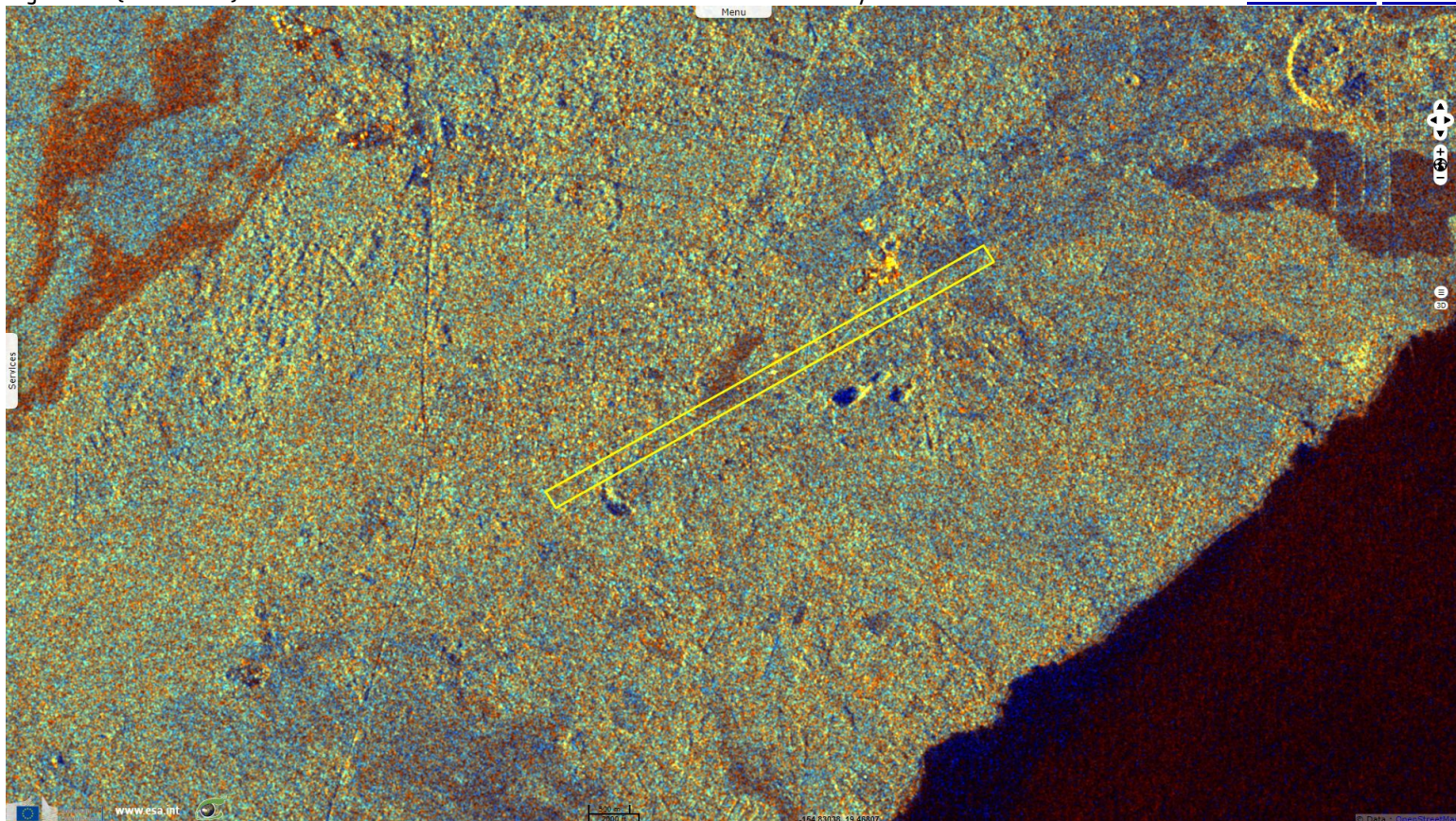
Sentinel-1 interferogram of this earthquake between 01 & 07.05.2018 - source: [Pablo J. González](#).

Regarding the level of the lava Lake in Overlook crater, within the main caldera, HVO noted:

- "On 3 May the intensity of the ERZ seismicity decreased slightly, and the eastward migration of hypocenters slowed or ceased; deformation continued. The lava level in Overlook crater dropped over 30m, though spattering in the lake continued."
- "Based on satellite InSAR data, the summit caldera floor subsided about 10cm during 23 April-5 May. Corresponding to this deflationary trend, the summit lava lake in Overlook crater had dropped to about 128m below the crater rim since 30 April."
- "The level of the summit lava lake continued to drop, and by 7 May was 220m below the crater rim."

Fig. 7 - S1 (08.05.2018) - A lava flow caused the evacuation of 1700 residents & destroyed ~30 houses in Leilani Estates.

[2D animation](#) [2D view](#)



Left: 60m high fountains fed massive flows that consumed homes and covered property in Leilani Estates - source: [Paradise Helicopters](#)

Right: Map of fissures & flows as of 09.05.2018 - source: [USGS - HVO](#).

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