COMET

Event Response

Area of Interest: Fentale Volcano, Ethiopia
Date Covered: 15 Feb – 2 Aug 2025

Plain language summary:
Sentinel-1 InSAR data shows that renewed uplift of about 4 cm/month around Fentale began in June 2025. Localised activity consisting of plumes and thermal anomalies continue to be observed from the southeastern section of the crater.

Purpose/Caveats: This event response report was produced to assist situational awareness and rapid response efforts. It represents best endeavours at the time of issue. Analysis and interpretation of the data is preliminary, which may not reflect the most up-to-date or complete information due to the evolving situation.

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Recent Activity:

Re-inflation at Fentale

Timeseries analysis of Sentinel-1 descending and ascending InSAR interferograms suggest there is displacement towards the satellite at Fentale of about 4 cm/month since June (Fig 1a). The broad region of uplift (measuring ~20 km across, Fig 1c, e) is consistent with an inflating Mogi source at ~6 km depth, with a total volume increase of approximately 0.015 km^3 ($\pm$ 0.0025 km^3) since June. The location is similar to that of the source that subsided during the dyke intrusion phase between December 2024 to March 2025 (Fig 1b, d – see Event Response Report 1.4-1.8).

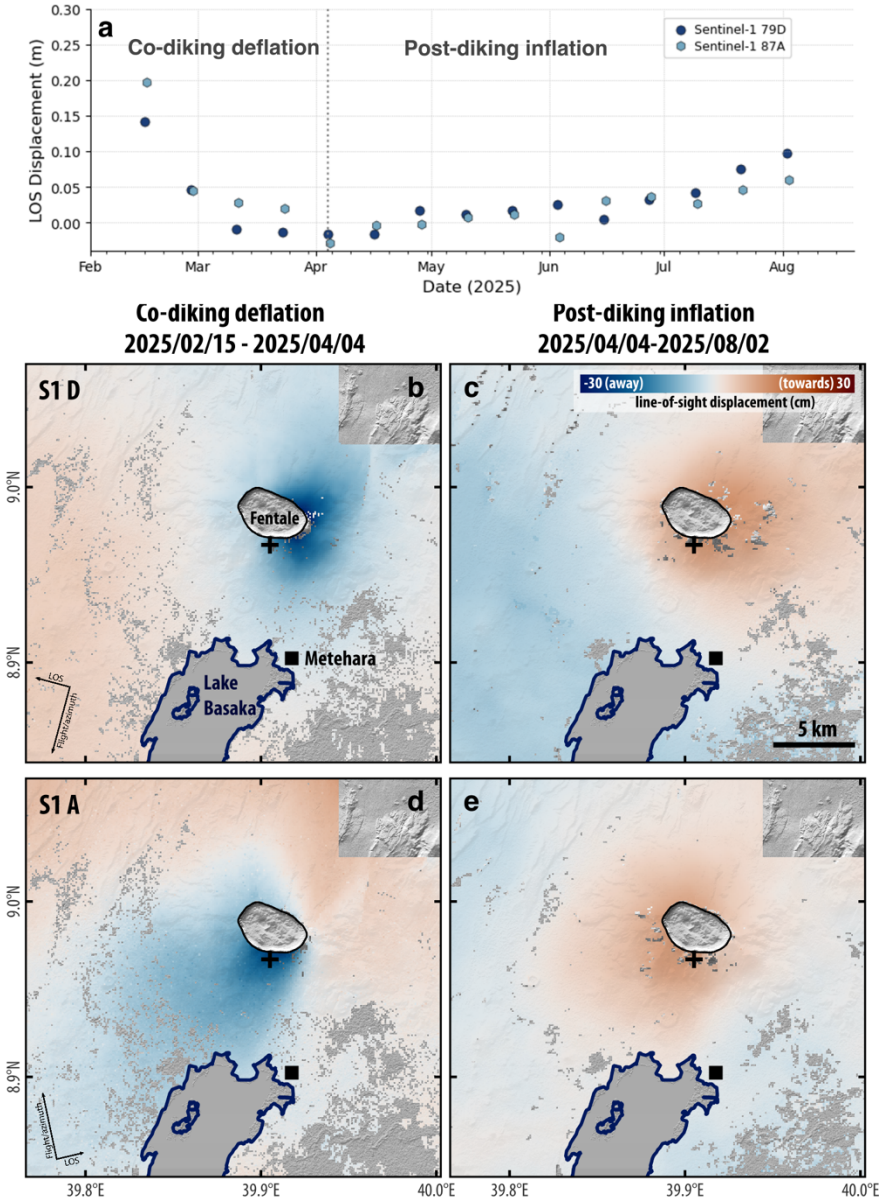

Fig 1. Changes in subsurface activity at Fentale illustrated by ascending and descending line-of-sight (LOS) displacement timeseries (a) of the point marked with a cross on the cumulative displacement maps (b-e). LOS displacement away from the satellite (subsidence) from February to April (b, d) is coeval with the dike intrusion towards Dofen volcano. From around June to the time of writing (August), broad uplift at Fentale is observed (c, e). Displacements within Fentale crater are masked out.

Crater activity

Optical imagery shows the disappearance of the low-lying white plume, last observed in Sentinel-2 imagery on 17 April 2025 (Fig 2a). Since then, there has been persistent steaming focused mainly on the eastern crater wall, varying in size over time (Fig. 2b-c). Local reports suggest that, on some occasions, these plumes are visible from the ground, rising above the crater rim (for example, 27 July). Thermal anomalies have remained

elevated within Fentale Crater (MIROVA VIIRS375), situated towards the eastern portion of the crater.

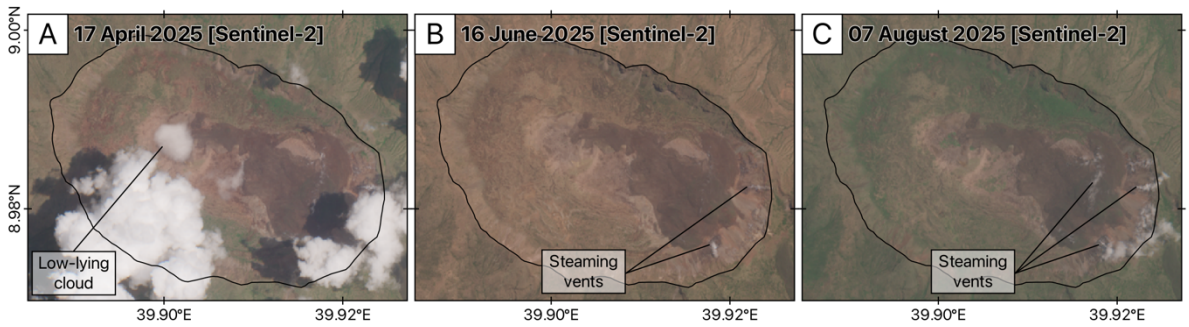

Fig 2. Sentinel-2 optical imagery over Fentale Crater between April and August 2025, showing (A) low-lying plume, (B-C) steaming vents in eastern portion of the crater and along crater wall. Diameter of crater is ~4 km.

Forward Look:

We will continue to monitor surface deformation with the upcoming InSAR and optical images. This, in combination with other data, observations and models, will provide evidence on which the potential evolution of the event can be considered. A scientific committee comprising scientists from Addis Ababa University (IGSSA and School of Earth Science), the Geological Institute of Ethiopia and other relevant institutions is monitoring the events and keeping the Ethiopian Disaster Risk Management Commission (EDRMC) and the public continuously informed. The government has reminded citizens to follow precautionary messages given by professionals.

Data Used:

- InSAR images collected by the European Sentinel-1 satellite and processed using the COMET LICSAR system (https://comet.nerc.ac.uk/comet-lics-portal/)
- Copernicus Sentinel-2 imagery (https://browser.dataspace.copernicus.eu/)
- MIROVA (Middle Infrared Observations of Volcanic Activity) provide detections of VIIRS thermal hotspots (https://www.mirovaweb.it/NRT/volcanoDetails_VIR.php?volcano_id=221080)