

Preliminary Field report June 29, 2009 Karbahi II eruption (Afar rift, Ethiopia)

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On 29/06/09 Simon Carn reported the presence of a large SO₂ cloud in southern Afar, Ethiopia, as detected by the OMI instrument aboard NASA's EOS-AURA satellite (Fig 1). The cloud was reported to be similar in size to that observed during the basaltic fissure eruption in August 2007 in the Manda Hararo rift segment in central Afar.

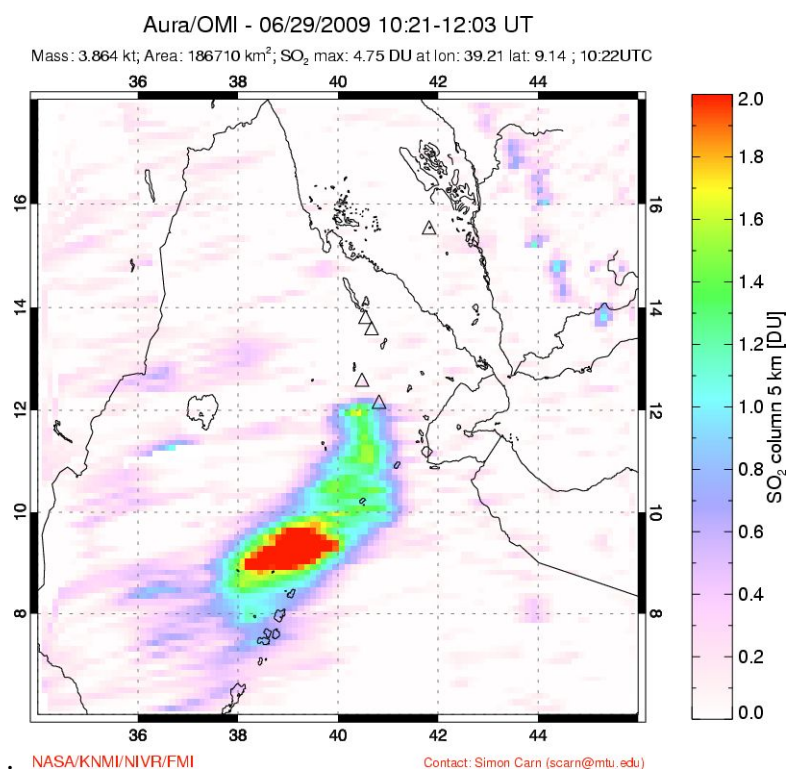


Fig 1. SO₂ cloud over southern Afar detected by the OMI instrument.

MODIS hotspots provided by the Fire Information for Resource Management System (FIRMS, <http://maps.geog.umd.edu/firms>) from MODIS acquisitions at 23:20 UTM on 28/06/09 and the morning of 29/06/09 confirmed that the SO₂ cloud was associated with thermal anomalies in the immediate vicinity of the August 2007 basaltic fissure eruption in the Manda Hararo rift in central Afar, indicating a volcanic eruption was most likely in progress. METEOSAT real time Active Fire Monitoring

data derived from METEOSAT imagery (<http://oiswww.eumetsat.org>) allowed the onset of the thermal anomaly to be constrained to within 15 minutes to 17:15UTC 28/06/09. A small earthquake associated with the onset of the thermal anomaly was subsequently identified by the Addis Ababa Geophysical Observatory.

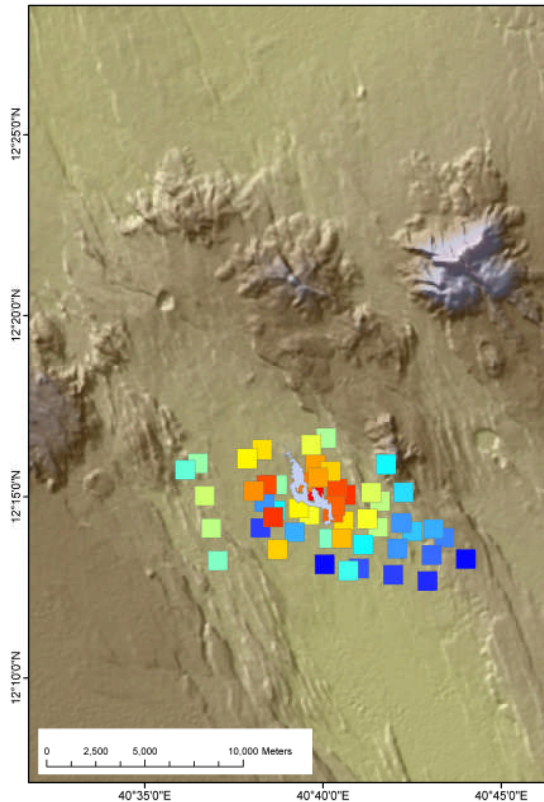


Fig 2. MODIS hotspots from FIRMS data, colour scaled by brightness temperature from blue (coldest) to red (hottest) overlaid on a hillshaded SRTM DEM. Blue polygon delineates extent of August 2007 eruption.

A field team reached the site of the thermal anomalies by helicopter on 04/07/09, and had approximately 2 hours on the ground. We found predominantly aa basalt flows approximately 2 to 3m thick sourced from fissures approximately 4-5km long, lined by scoria ramparts approximately 30-50m high. Rock samples and gas samples were collected and the erupted material was surveyed using visible and FLIR cameras both from the air and the ground. Inspection of hand specimens indicated that the erupted lava was feldspar porphyritic basalt. No lava effusion was observed although some steam was seen at the fissure (Fig 3). The lava flow appeared to have cooled significantly with the FLIR recording typical temperatures of between 30 and 120 degrees Celsius for the flow surface, with a maximum temperature of 238 degrees observed at the fissure from the air (Fig 4). Only a small part of the margins of the flow were visited on the ground due to limited time, rough terrain and high temperature and humidity making strenuous exertion difficult. The fissure itself was inaccessible as it was surrounded by hot rock, and could only be observed from a distance. Gas measurements were made at hot cracks in the flow front where volcanic gases could be smelt and the FLIR registered temperature in excess of 100 degrees.

As previously mentioned, this eruption occurred near the August 2007 eruption and appears to be of similar magnitude, perhaps slightly bigger, and appears to be associated with the ongoing rifting event in the Manda Hararo rift segment that began in 2005.



Fig 3. Oblique aerial photograph showing the fissure, scoria ramparts and gas plume.

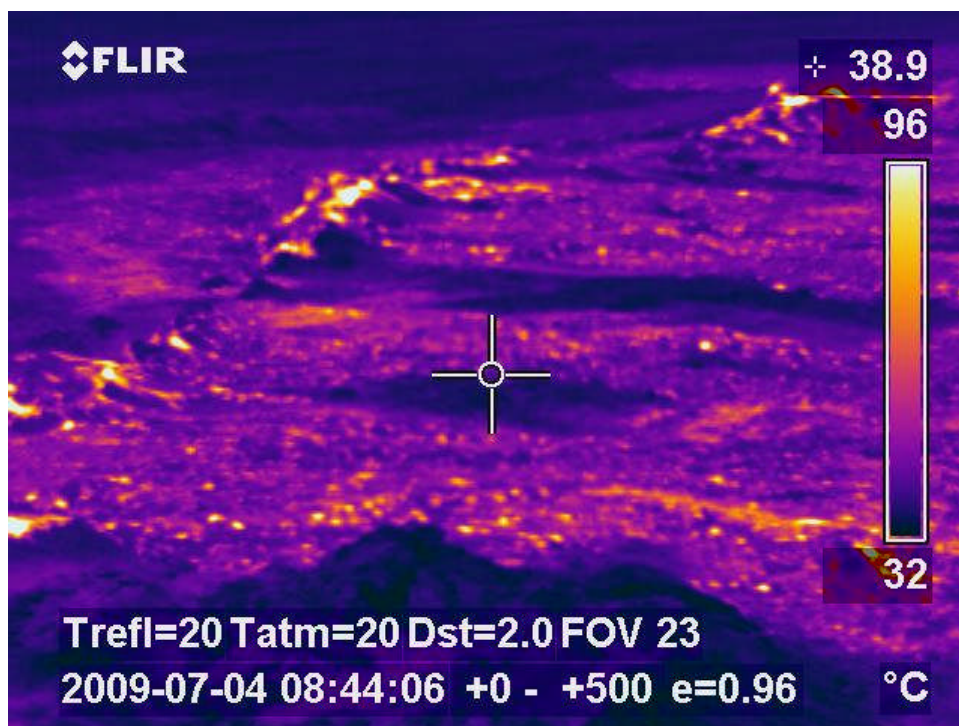


Fig 4. FLIR image taken from roughly the same look direction as Fig3, showing temperature distribution in and around the fissure.