

Observations from the Erta Ale eruption 21st Nov – 23rd Nov 2010
Lorraine Field and Derek Keir



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Figure 1a (above). Locations of the crater pits, camp and sampled new lavas at the Erta Ale caldera.

Figure 1b (below). View of new lava and eruptive cone, 22nd Nov 2010. Red circle shows Mulugeta and Abdulah (police) for scale (Photo L. Field)



Sequence of events from the eruption in the southern pit

At 16:45 the team commenced ascent of Erta Ale by foot starting from the base camp. No smoke from the lava lake was initially visible on the 8 km hike. However, as darkness fell, pinkish smoke was intermittently visible as we approached the summit. We arrived at the camp on the main crater rim in darkness (~7.45 pm). The lava lake was visible from the crater rim, and bursts of magma and fire fountaining could be seen above the lake level. We descended into the main crater and approached the lava lake which is now above eye level when standing on the western rim of the south sink (*fig. 2*). A few minutes after arriving (~7.50 pm), the first lava flow breached the boundaries of the south sink into the main crater (*fig 2*). Viscosity was extremely low (video clip to be sent round separately). During the night of the 21st-22nd Nov, and during the day of 22nd Nov, overspill flows were observed roughly every two hours (*fig 3*). A scoria ring around the lake began to build up with each overspill. The expected 19.30 overspill of the 22nd Nov did not happen – the lava lake level rose up but did not overspill. From this point onwards the lake was contained within the scoria ring which by 6 am on the 23rd Nov was around 4 m high on the southern side. The lava lake level rose and fell on a roughly 20 minute cycle, with agitated Strombolian activity at the peak level indicating the magma was volatile rich.

At ~7 pm on 22nd Nov, a small cone immediately adjacent to the main scoria ring was observed on the northern side. This emitted an ignited gas flame (greenish-blue, with an orange glow reflected from the erupting lava) until ~5 am the following morning. Other intermittent ignited gas flames were observed within the main scoria ring throughout the night of the 22nd. On the morning of the 23rd, the northern side of the scoria ring appeared unstable, and from what could be made out in the dark, suffered some collapse.

Observations from the northern pit

A little incandescence was observed on the night of the 21st Nov. In daylight, a new cone (approximately 1 m high) and lava flows of limited extent were visible, but no further activity was seen (*fig. 4*).

Emplaced lava

Two main flows have now been emplaced into the main crater (*fig. 5*), both of which have been sampled. The flows are inflated when emplaced and are hollow when broken open. Hydrogen sulphide gas was released when the flows were sampled. Extensive suffocating clouds of hydrogen sulphide gas were released from the southern sink throughout the observation period. Pele's hair was also extensive (*fig 6*). The basalts are glassy, porphoritic (plagioclase rich) with rare olivine.



Figure 2. The first lava to breach the rim of the south sink and enter the main crater, ~7.30 pm 21/11/10. (Photo L. Field)



Figure 3. Daytime overflow 22/11/10. (Photo L. Field)



Figure 4. The new cone and lava flows within the northern pit (Photo L Field). Cones approx 1 m high.

Seismic team

A Guralp ESP seismometer has been installed at 13.60449 40.65789 and will remain until Feb 2011. The guard is the environmental officer at Erta Ale (Amudin Saleh). He is to be paid 800 birr per month. It is not possible to leave the station during the rainy season, as the guard will depart for his village once the tourist season is over. Derek has already downloaded approximately 3 hours of data between ~13:00 and ~16:00 local time 22nd November 2010.

Comparison to previous levels

A comparison of photographs from previous trips show the level of the lava lake in the southern pit had risen, filled and begun to overflow by Feb 2010. By Nov 2010, the southern sink had filled to the level of the western rim and begun to overflow into the main crater, suggesting activity has been ongoing since Feb 2010 (figs 7 & 8).



Figure 5. Lava flows which breached the southern sink into the main crater. A-D the main flow, A- being emplaced 21st Nov, flow length ~90 m. B-D the following morning. E and F, 2nd flow sampled at <1hr old, flow length ~20 m. The flows are inflated and release H₂S when sampled. (Photos L. Field)



Figure 6. Pele's hair. (L.Field)

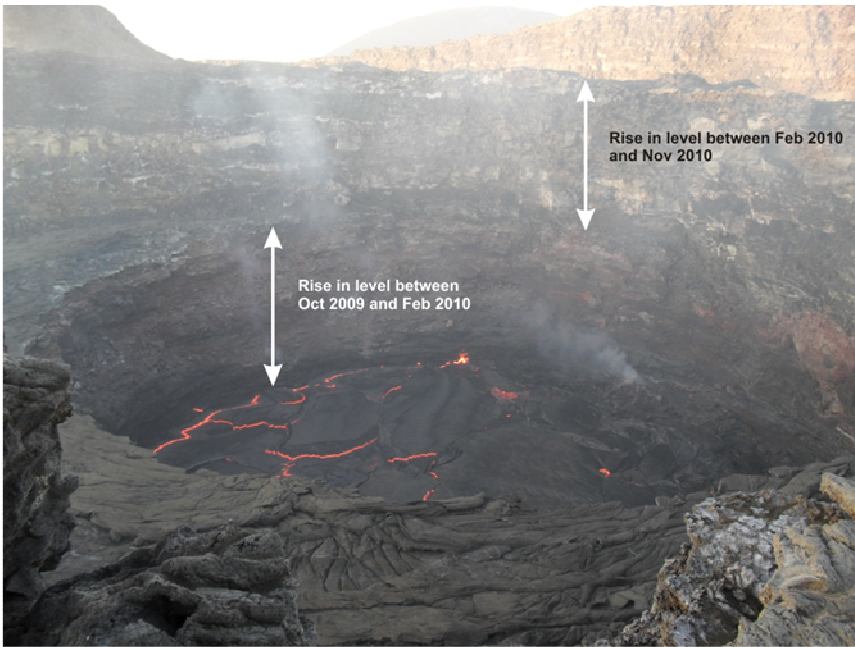


Figure 7. Photo from Oct 2009 showing rise in observed lava levels. (Photo D. Keir)

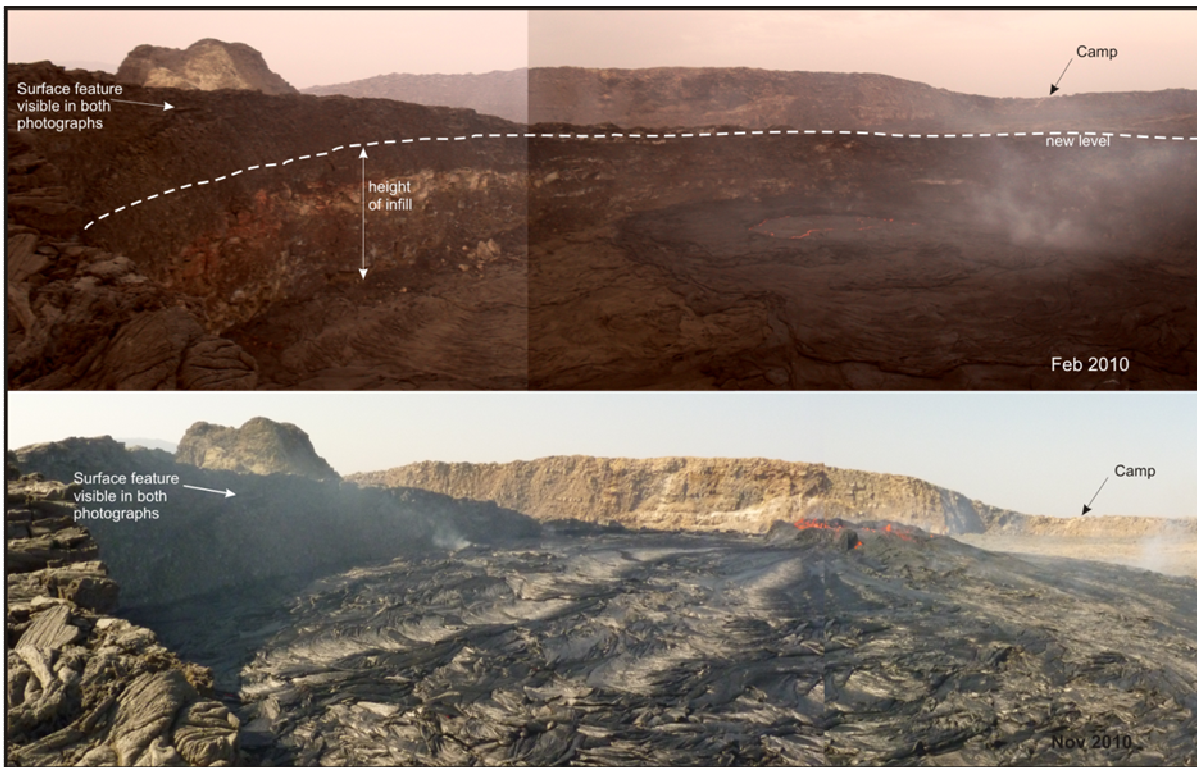


Figure 8. Comparison of photos from Feb 2010 (D. Keir) and Nov 2010 (L. Field) from the same viewpoint. The height of infill is indicated.