**Introduction**

Shiveluch volcano has been active for the past 15 years, producing sub-plinian events, dome growth and collapse, debris flows from collapse. June 25-26, 2009 Shiveluch debris debris flow emplaced, onset recorded by seismic station over several hours, visual/infrared sensing confirmation of onset obscured by clouds.

**Methodology**

- **ASTER data:** ASTER thermal infrared image data acquired on 30 July 2009 at 10:35 UTC, and 2 August 2009 at 00:30 UTC. ASTER data acquired 6 September 2009 03:30 UTC.
- **AVHRR data:** AVHRR thermal IR temperature data of Shiveluch Volcano collected on: (A) 25 June 2009, 15:21 UTC, (B) 29 June 2009 20:15 UTC, (C) 2 July 2009 15:40 UTC, (D) 2 July 2009 09:28 UTC, (E) 4 July 2009 01:26 UTC and (F) 7 July 2009 16:45 UTC. All temperatures are in K.

**Results**

- **Equation:** The equation \( y = 29.486x - 0.555 \) is found the fit the cooling of the flow
- **Flow onset temperature determined from the hottest pixel at the summit:** 25.1 K, when \( y = 29.486 \times 10^{-1} \)
- **Time of emplacement:** June 25, 2009 12:18 UTC
- **Time for negligible thermal output:** August 13, 2009 20:14 UTC

**Conclusions**

- **ASTER produced information of the total surface area of the flow (2.85 km²) and four data points of the average surface temperature of the flow over time.** The high temporal resolution of ASTER allowed scenes of the pyroclastic flow to be captured shortly after emplacement. By utilizing the thermally integrated pixel equation along with the surface area of the flow determined from ASTER data, an accurate measurement of the temperature of the flow in the ASTER data could be calculated. With these data an equation can be matched to the cooling curve of the flow. From this equation the time of flow emplacement, the point at which the flow reaches a negligible temperature, and the total flow volume can be calculated.

**References**


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