



The Hekla eruption of 1845 – Volume and characteristics of the tephra layer.

Jonas Gudnason (1), Thor Thordarson (1,2), and Bruce Houghton (2)

(1) University of Iceland, Department of Earth Sciences, (2) University of Hawaii, Department of Geology and Geophysics

The eruption of Hekla in 1845 started on the 2nd of September around 9 am, activity lasted until the 13-16th of August 1846 with minor activity in August the same year (Thorarinsson, 1968). Written accounts describe precursor earthquakes followed by a shadow casted over the Land district by the ~10-20km high eruption plume that drifted to the east-southeast and eruption induced flash floods in the river Rangá (Erlendsson, 1847). Contemporary description at sites some 80 km downwind indicate first sighting of the eruption plume at ~10 am and tephra falling on the ground at ~11 am. Around noon the tephra fall began to dissipate and was over by 3 pm. Reports of ash fall beyond the shores of Iceland are preserved in records from 3 ships of the southeast coast of Iceland as well as from the Faeroe and the Shetland Islands.

The 1845 eruption is divided into three phases based on style of activity, phase 1 (the focus of this study) is the initial explosive phase that produced bulk of the tephra fall, phase 2, which is a transitional phase where explosive intensity of the eruption declines abruptly and shifts towards effusive activity, which is phase 3.

The 1845 tephra layer is a marker layer in the soils of South Central Iceland, a well sorted homogeneous brownish tephra. Its distribution has been re-mapped via thicknesses and mass-per-area measurements at ~120 locations. In addition, grain size samples were collected at each measuring site. Our preliminary mapping results indicate that tephra fall on land was approximately 16000 km², the thickness half distance is approximately 17 km with principal axis passing over Torfajökull and to Kirkjubæjarklaustur. In the proximal sector, straight east of Hekla, the maximum measured thickness of the tephra layer is 37 cm. Density analyzes of three 100 clast sets of juveniles range in mean from 560-690 kg/m³ and exhibit a tight unimodal and log-normal distribution with measured a mean vesicularity of 74% to 79% for the magma erupted during the initial phase. there is observed a subtle decrease in maximum vesicularity from onset to cessation of phase 1 from 88% to 82% vesicularity, which coincides with decrease in grainsize (and thus intensity) upwards in proximal sections. The phase 1 in the 1845 eruption was intensive and short lived, the course of events typifies the activity in Hekla in historic times (since AD 874). The well documented event thus aids in evaluation of fragmentation mechanisms at Mt. Hekla and give new insight into the most common style/size of activity in Mt. Hekla the last ~1000yrs.

Erlendsson, O., Dagskrá um Heklugosið 1845-6 og afleiðingar þess., 1986. Fjölrit Náttúrufræðistofnunar, Reykjavík.

Schythe, J.C., 1847. Hekla og dens sidste Udbrud, Kjöbenhavn 1847.

Thorarinsson, S., 1968. Heklueldar. Rangæingafélagið, Reykjavík.