



Volume estimates of selected prehistoric basaltic tephra layers from Katla, Iceland

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The Katla volcano, under the Mýrdalsjökull ice-cap, has probably erupted over 300 times during the last ~8400 years. The activity is characterized by explosive basaltic eruptions and occasional silicic eruptions. Its Holocene eruption frequency has been assessed from tephra stratigraphy and major element composition. Compositional variations of the basaltic magma with time suggest evolving magma system at depth, with or without high-level magma chambers. Volumes of ten historical tephra layers (younger than ~870 AD) have been estimated, all of them $\leq 1 \text{ km}^3$ of freshly fallen tephra. Eight selected prehistorical Katla tephra layers, younger than ~1860 BC (Hekla-S tephra) but older than ~870 AD (Settlement tephra, Veidivötn volcanic system) have been chosen for volume estimation. In this time period an active magma chamber appears to have been present, in contrast to a simple magma transfer system in historical time. About 40 soil sections, distributed around the volcano, most numerous to the east and northeast, have been measured to map the selected tephra layers. Tmax values similar to those applied in the volume estimates of the historical data were used in order to have comparable data between the historical and the prehistoric volumes, but they are probably underestimated. Isopach maps of the tephra layers are used for volume estimation using the program Surfer Golden Software. The freshly fallen tephra on land ranges from 0.27-2.69 km^3 , indicating that the production of Katla basalt per year in the prehistoric time period was higher than observed during historical time. These variable magma production rates most likely suggest higher magma flux through the magma plumbing system that may result in establishment of a high-level magma chamber and larger resulting erupted volumes per time unit.