Geophysical Research Abstracts
Vol. 21, EGU2019-17144, 2019
EGU General Assembly 2019


# The Surtsey 1963 eruption plume, characteristics and tephra dispersal

Einar Sindri Ólafsson (1), Magnus T Guðmundsson (2), and Esther R. Guðmundsdóttir (3)

(1) Institute of Earth Sciences, University of Iceland, Reykjavik, Iceland (eolafs@gmail.com), (2) Institute of Earth Sciences, University of Iceland, Reykjavik, Iceland (mtg@hi.is), (3) Institute of Earth Sciences, University of Iceland, Reykjavik, Iceland (estherrg@hi.is)

Surtsey is a basaltic island in the south-western end of Vestmannaeyjar archipelago off the south coast of Iceland and is a part of the Vestmannaeyjar volcanic system. It is built from the ocean floor at about 130 m depth in a series of eruptions during 1963-1967, one of the longest eruption in Iceland in historical times. The eruptions can be split into four phases. The first phase of the eruptions was explosive and phreatomagmatic in character. The aim of this study is to put constraints on the mass of tephra transported with the plume. This is done in two ways: (1) Study soil profiles on Heimaey and on the mainland to look for tephra deposits from Surtsey as well as note contemporary descriptions of tephra fallout; and (2) by compiling existing contemporary records of plume height and use plume height – mass transport systematics to estimate the transport. Finally, we compare the outcomes of (1) and (2). Eruption started on 14 November 1963. It was explosive and fed an eruption plume rising typically to 5-9 km in November and December 1963. The plume was usually bent over or straight, steam-rich and the activity alternated between frequent explosions forming a continuous plume and periods of continuous uprush. Fallout according to weather records from the time was primarily towards north and south. Tephra fallout was mostly into the ocean around the island, but did occur on several occasions on the inhabited Heimaey, 20 km to the northeast of Surtsey. Some fallout was also detected on the mainland of Iceland about 40 km away from Surtsey. Preliminary results indicate that minor amounts of tephra are preserved in Heimaey and that only traces of tephra may be present on the mainland while a discernible tephra layer is not preserved in soil. Data on fallout into the ocean is scarce or non-existent. However, the data indicate that the fraction of airborne tephra relative to the submarine and near-vent deposition is volumetrically minor.