Geophysical Research Abstracts
Vol. 17, EGU2015-9969-1, 2015
EGU General Assembly 2015
© Author(s) 2015. CC Attribution 3.0 License.

The effect of the 2014 Holuhraun eruption (Bárdarbunga, Iceland) on precipitation chemistry and associated environmental impact

Gerður Stefánsdóttir (1), Nicole S. Keller (2), Elín Björk Jónasdottir (1), Árni Sigurðsson (1), Svava Björk Þorláksdóttir (1), Melissa Anne Pfeffer (1), Andri Stefánsson (2), Sibylle von Löwis (1), Sigurður Reynir Gíslason (2), and Sara Barsotti (1)

(1) Icelandic Meteorological Office (IMO), Reykjavík, Iceland, (2) University of Iceland, Institute of Earth Science, Reykjavík, Iceland

The Holuhraun eruption that started at the end of August 2014 in Central Iceland has resulted in large quantities of gases emitted to the atmosphere, where the preliminary SO_2 emission rates have been estimated to be $\sim$400 kg/s with some days greater than 1000 kg/s in the beginning of the eruption.
The major gases include H_2O, SO_2, CO_2, HCl and HF. Sulfur dioxide in the atmosphere hydrates and oxidizes to form sulfuric acid (H2SO4) which, together with the other acid gases HCl and HF, results in acid rain. As part of the ongoing monitoring effort, precipitation samples have been collected regularly since shortly after the start of the eruption to assess whether the volcanic gas emission is causing significant changes in precipitation chemistry. Samples (rain and snow) from 21 locations around Iceland were analyzed for the acid gases, including the determination of pH, SO4, Cl and F concentrations. Unpolluted precipitation in Iceland has an average pH value of 5.77. The pH values of precipitation since the start of the eruption range from 3.18 to 7.48. Considerable SO4, Cl and F chemical loads have also been observed. Based on the comparison of the chemical composition of precipitation before and after the onset of the eruption, about 40% of precipitation samples show characteristics of volcanic gas input, with $\sim$5% showing major effects.
Gas polluted precipitation, especially when having low pH and high HF load, can have severe environmental effects, notably on the chemical composition of groundwater, water ponds, lakes and rivers. It can influence human health conditions and affect ecosystems e.g. vegetation and aquatic life. These effects can be especially severe in a long term eruption and with a high emission rate as is the case for the Holuhraun eruption. To assess the environmental impact of the chemical composition of gas-polluted precipitation, the chemical data have been integrated with meteorological data in order to estimate the locations of potential impact and possible cumulative effects of prolong volcanically polluted precipitation on water and ecosystems.