Geophysical Research Abstracts
Vol. 15, EGU2013-7895, 2013
EGU General Assembly 2013

Mercury and Halogen Chemistry from Passively Degassing Volcanoes

Deanna Donohoue, Luke Surl, and Roland von Glasow
Department of Environmental Science, University of East Anglia

Passively degassing volcanoes are natural sources of trace gas species, such as halogens and mercury. Recent field and modelling studies have suggested that these emissions have significant impacts on the regional atmospheric chemistry resulting in O_3 depletion, a reduction in the OH radical lifetime, and mercury oxidation. Atmospheric processes influence the transport, deposition, and cycling of mercury species and an understanding of these processes is essential to evaluate the effects of volcanic mercury emissions on human health and the environment on both a global and regional scale. In an effort to better understand the effects of volcanic mercury, a 1-D model was used to evaluate a detailed set of gas-phase and aqueous-phase reactions. The model output was compared to measured BrO/SO_2 ratios from various volcanoes. While the 1-D model resolves the vertical dilution of the plume explicitly, it includes a parameterisation for the horizontal entrainment of background air. To better resolve the meteorological parameters, particularly the entrainment of background air into the plume; we employed a 3-D regional chemical transport model (WRF-Chem). The WRF-Chem model is a fully coupled online Weather Research and Forecasting/Chemistry model which includes both a detailed treatment of meteorological and chemical processes. A reduced halogen and mercury mechanism was incorporated into WRF-Chem. We will present our model results which demonstrate that near source chemical processing of volcanic plumes have important impacts on both the halogen chemistry and the resulting speciation of mercury; which influences the environmental and health impacts of volcanic plumes on regional and global scales.