Cities on Volcanoes 9
November 20-25, 2016
Puerto Varas, Chile
'Understanding volcanoes and society: the key for risk mitigation'

From plume to public: tracing the path from gas measurements to air quality forecasts in Hawai`i

Elias, T.1, Sutton, A.J.1, Businger, S.2, Horton, K. 3, Garbeil, H.2

[1]USGS Hawaiian Volcano Observatory, Hawaii, USA

[2]University Of Hawai`i at Manoa, Hawaii, USA

[3]FLYSPEC Inc., Hawaii, USA

Keywords: gas emissions, SO2, Kilauea, vog, VMAP, dashboard

Kilauea Volcano, now in its 34th year of nearly continuous eruption, currently hosts lava lakes at both its summit and East Rift Zone. The volcano releases between ~1,000 and 8,000 metric tons of SO2 each day, depending on eruptive status and local vent activity. The copious gas emissions continue to challenge Hawai`i communities, causing impacts to health, agriculture, and infrastructure. Over the duration of the eruption, novel tools to measure and evaluate the persistent degassing of Kilauea have been developed. Ten stationary upward-looking UV spectrometers (FLYSPECs) span the plume, at an average spacing of ~ 430 m. The prevailing trade winds in Hawai`i result in a relatively consistent plume direction, and the ~3.4 km long array records column path measurements, nominally every second, at each station as the plume passes overhead. The data are telemetered to the Hawaiian Volcano Observatory for near-real-time access. SO2 emission rates are calculated every 20 seconds from the array, reflecting short- and long- term volcanic processes. The average daily emission rates from the array are used to initialize a forecast model that provides comprehensive statewide forecasts of the concentration and dispersion of volcanic emissions. The Vog Monitoring and Prediction (VMAP) model, operated by the University of Hawaii at Manoa Meteorology Department, uses the HYSPLIT atmospheric transport and dispersion, and WRF wind field models to provide an animated 2-day projection of SO2 and sulfate aerosol concentrations. People on the island use the model to plan their activities and minimize their exposure to high concentrations of volcanic pollution, also known as vog.