Geophysical Research Abstracts
Vol. 20, EGU2018-8099-3, 2018
EGU General Assembly 2018

"The plume goes around like a snake": operational monitoring system for volcanic air pollution in Nicaragua

Evgenia Ilyinskaya (1), Sara Barsotti (2), Mark Richardson (3), James O'Neill (3), Wilfried Strauch (4), and the UNRESP project team

(1) School of Earth and Environment, University of Leeds, Leeds, United Kingdom (e.ilyinskaya@leeds.ac.uk), (2) Icelandic Meteorological Office, Reykjavik, Iceland, (3) CEMAC, University of Leeds, Leeds, United Kingdom, (4) INETER, Managua, Nicaragua

Masaya volcano in Nicaragua poses a low threat from ash or lava eruptions, but it is a significant source of air pollution due to its persistent emission of volcanic gas and aerosol. The project UNRESP (https://unresp.wordpress.com/) is working with Nicaragua's natural hazards observatory INETER on developing an operational monitoring system for volcanic air pollution (VAP). The VAP system will provide forecasts, real-time data, and public advisories and integrate with the pre-existing Nicaraguan systems of disaster risk prevention and mitigation. We present here the achieved advances and challenges of this ongoing work.

Masaya's VAP is estimated to impact on at least 50,000 people in the rural communities on a daily basis, and it is also periodically transported to the cities of Managua (population 2 million) and Masaya (population 150,000) where it mixes with anthropogenic air pollution. Exposure to VAP is known to be harmful to health, for example causing increased long-term respiratory problems [1] such as asthma. VAP also impacts health of animals and plants, water and soil quality [2], and property. While VAP tends to be a chronic hazard, it is not constant: monitoring VAP is vitally important as VAP burden varies over time and space based on weather and volcanic activity. Consequently, VAP can increase drastically and dangerously in certain areas at particular times and cause air pollution crisis events.

The new VAP monitoring system consists of a) instrumental monitoring by permanent and hand-held stations, b) plume dispersion forecasting, and c) citizen-science observations:

a) The direct monitoring provides real-time data on several key air pollutants (SO_2, NO, NO_2, O_3 and PM10, PM2.5 and PM1). In addition to the permanent stations, hand-held SO_2 monitors are provided to 'citizen observers' in communities exposed to VAP for regular recordings, especially during high-pollution crises. The hand-held sensors are useful for monitoring specific locations which have vulnerable populations, such as schools and clinics, and can be used indoors and outdoors with ease.

b) Forecasting of the plume dispersion is being developed by adapting CALPUFF model to yield daily forecast of SO_2 plume concentration at ground level originating from Masaya. The model has been running almost without interruptions since March 2017 producing 48 hour forecasts. The results show the movement and evolution of the SO_2 plume with a time resolution of one hour.

c) A two-way communication system is being developed so that communities can inform INETER when they experience high pollution levels - similar principle to "Did you feel it?" citizen observation system used in many seismically active zones. This will have the double benefit of providing ground-truthing for the plume forecasting, and raising the awareness and involvement within the communities.

Work is ongoing on creating public advisories which need to be tailored to the local setting and pre-existing practices in order to be able to intervene efficaciously.

References: [1] Longo et al Public Health 122 (2008); [2] Delmelle et al Bull. Volcanol. 64 (2002).