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

Monitoring of volcanic SO2 using NOVAC stations at Ubinas volcano, 2014-2016

F Apaza [1], P Masias [1,4] , J Mamani [1], S Arellano [2], B Galle C. Kern

[1]OVI-INGEMMET, Arequipa, Peru

[2]Chalmers University of Technology, Göteborg, Sweden

[3]USGS Cascades Volcano Observatory Vancouver WA (United States)

[4]Research funded by the CRYOPERU CIENCIACTIVA 144-2015 project (https://cryoperu.pe/).

Keywords: Ubinas, SO2, NOVAC, DOAS, Peru

Peru lies on the ZVC and has 12 active volcanoes. Of these, Ubinas volcano is the most active with 26 eruptions recorded in the last 400 years. Since 2014, the SO2 emission rate from fumaroles on Ubinas volcano has been measured by the Volcanological Observatory of INGEMMET using mobile DOAS and scanning DOAS instruments as part of the NOVAC. Here we present the SO2 emissions data for the period from September 2013 to July 2016. During the evaluated time period, Ubinas volcano exhibited 146 eruptions and frequent episodes of high gas emissions and lava dome growth. Mobile DOAS measurements started in September 2013 and showed an increase in SO2 emissions associated with a magma body rising in the volcano's conduit. A lava dome appeared at the volcano's summit on March 1st, 2014. The SO2 emission rate continued to increase throughout the month of March and culminated in a large explosive eruption on April 17, 2014. Following this event, 230 inhabitants of Querapi, Tonohaya, Phara and Titi municipalities were evacuated. With support from the USGS-VDAP and Chalmers University of Technology, we began installing NOVAC scanning DOAS instruments at Ubinas in September, 2014. These now provide us with continuous SO2 emission rate data in real-time. Using these instruments, we have recently observed a change in the nature of degassing activity at Ubinas volcano. During 2014, peaks in SO2 emission rate exceeding 2,500 t/d were generally associated with explosive eruption columns and plume altitudes of more than 5000 m. Since 2015, however, high SO2 emission rates are no longer associated with explosive activity, but rather result from diffusive degassing at the summit vent. This observation is consistent with the existence of a relatively open pathway for gas to escape into the atmosphere without building the pressure necessary for a large explosion.