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

The dynamics of degassing at Popocatepetl volcano investigated with an SO2 camera.

Robin Campion[1], **Hugo Delgado-Granados**[1], **Salvador Pedraza-Espitia**[1]

[1]Instituto de Geofísica, Universidad Nacional Autónoma de México

Keywords: volcanic degassing, SO2 camera, Popocatépetl, conduit processes, explosions

Since its wake in 1994, Popocatepetl volcano has been consistently among the three strongest permanent emitters of volcanic gases. Previous measurements with COSPEC (Delgado et al., 2001; Delgado et al., 2008) have documented average emission rates of 4000 T/d of sulfur dioxide (SO2) with peaks over 50,000 T/d coinciding with the phases of more intense volcanic activity. One particularly intriguing aspect of the current eruptive cycle is the extreme disproportion between gas emissions and extruded lava, which means that most of degassed magma has accumulated at depth. Although the gas exits passively most of the time, thousands of explosive events of weak to moderate magnitude have been registered, sending eruptive column to height of 100 to 7000m above the crater. In this work, we used an SO2 camera, to better characterize the passive and explosive degassing at a high temporal resolution, and achieve a better understanding of the conduit processes. We show that passive degassing is not constant but shows short time scale variations ranging +/- 60% of their average value, and very often exhibit a periodic or almost periodic behavior. Based on the evolution of the SO2 flux before and after the explosions, we could divide them into two types: The first type (E1) occurs suddenly in the middle of the normal passive degassing and is followed by a rapid return of the degassing at its preexplosive level. The second type (E2) occurs when the passive degassing is abnormally low and is followed by a return of the SO2 flux to more similar to normal levels. We suggest that explosions E1 are probably caused by gas bubbles rising in the conduit, similar to what happens in Stromboli volcano, while the E2s, which are less common but more powerful, are likely caused by a partial temporary blockage of the conduit.