Geophysical Research Abstracts
Vol. 15, EGU2013-10478, 2013
EGU General Assembly 2013
© Author(s) 2013. CC Attribution 3.0 License.

Recent SO_2 camera and OP-FTIR field measurements in Mexico and Guatemala

Alessandro La Spina (1), Giuseppe Salerno (1), and Michael Burton (2)
(1) Isituto Nazionale di Geofisica e Vulcanologia, Catania, Italy , (2) Isituto Nazionale di Geofisica e Vulcanologia, Pisa, Italy

Between 22 and 30 November 2012 a field campaign was carried out at Mexico and Guatemala with the objectives of state the volcanic gas composition and flux fingerprints of Popocatepetl, Santiaguito, Fuego and Pacaya by exploiting simultaneously UV-camera and FTIR measurements. Gases were measured remotely using instruments sensitive to ultraviolet and infrared radiation (UV spectrometer, SO_2-camera and OP-FTIR). Data collection depended on the requirements of the methodology, weather condition and eruptive stage of the volcanoes.

OP-FTIR measurements were carried out using the MIDAC interferometer with 0.5 cm-1 resolution. Spectra were collected in solar occultation mode in which the Sun acts as an infrared source and the volcanic plume is interposed between the Sun and the spectrometer. At Santiaguito spectra were also collected in passive mode using the lava flow as a radiation source. The SO_2-camera used for this study was a dual camera system consisting of two QS Imaging 640s cameras. Each of the two cameras was outfitted with two quartz 25mm lens, coupled with two band-pass filters centred at 310nm and at 330nm. The imaging system was managed by a custom-made software developed in LabView. The UV-camera system was coupled with a USB2000+ spectrometer connected to a QP1000-2-SR 1000 micron optical fiber with a 74-UV collimating lens. For calibration of plume imagery, images of five quartz cells containing known concentration path-lengths of SO_2 were taken at the end of each sampling.

Between 22 and 23 November 2012 UV-camera and FTIR observations were carried out at Popocatepetl. During the time of our observation, the volcano was characterised by pulsing degassing from the summit crater forming a whitish plume that dispersed rapidly in the atmosphere according to wind direction and speed. Data were collected from the Observatorio Atmosférico Altzomoni (Universidad Nacional Autónoma de México) at 4000 metre a.s.l. and at a distance of $\sim$12 km from the volcano summit. SO_2 camera observations were made for $\sim$30 and 130 minutes on the 22 and 23 November, respectively, with a sampling rate of $\sim$7 seconds. FTIR measurements were carried out for 20 and 15 minutes on 22 and 23 November.

At Santiaguito volcano, we carried out volcanic gas measurements on 27 and 28 November 2012. During the period of our observations the volcano activity was characterised by lava flow extrusion on the S flank of dome edifice. Occasionally, incandescent blocks detached from the lava flow front rolling onto the dome flanks. During the time of our survey the explosive activity was low frequency (every $\sim$5 - 6 hours). We observed a persistent and sustained degassing plume was observed occasionally polluted by ash. However, on 28 November at 5:25 local time, a violent pyroclastic flow occurred generating an ash-plume that rose $\sim$5 km passing Santa Maria's summit and spreading $\sim$30 km south. SO_2 camera and FTIR data were simultaneously collected on 27 November from El Mirador at a distance of $\sim$2 Km from the lava-dome. Data were collected for $\sim$75 and $\sim$90 minutes for SO_2-camera and FTIR, respectively. On 28 November, due to the pyroclastic flow event, only distal solar occultation FTIR measurements and open-path UV spectra (using a USB spectrometer) were collected from the west flank of Santa Maria volcano. Both UV and IR spectra were recorded for $\sim$60 minutes Ash released by the pyroclastic flow was sampled from a distance of 6.5 km from the volcano collecting the fallout products along a 60 minute time interval

Data from the volcanic plumes of Pacaya and Fuego were collected on 29 and 30 November 2012. During our survey the eruptive activity of Pacaya consisted of weak puffing from the summit crater, while Fuego showed a weak outgassing occasionally interrupted by explosion from its summit crater. In both days, we carried out only SO_2 camera measurements due to the poor weather conditions which prevented solar FTIR measurments. At both volcanoes, UV images were taken for a period of $\sim$45 minutes from a distance of $\sim$ 3 km and $\sim$ 10 km, respectively.

In this paper we summarise the results from the field campaign and interpret the gas observations in light of the current activity of each volcanic source.