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

Turrialba volcano: Monitoring volcanic sulphur dioxide and aerosols in the ambient air at the Central Valley of Costa Rica

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Keywords: Turrialba volcano, sulphur dioxide, aerosols, volcanic eruptions, air quality

Sulphur dioxide and aerosols injected by Turrialba volcano into the ambient air of the Central Valley of Costa Rica are currently monitored in a daily basis since June 2016, using a newly developed instrumental mobile platform which central instruments are a fluorescence SO_2 analyzer and an aerosol analyzer (PM_{10} and $PM_{2.5}$) capable to measure real time from its location at Universidad Nacional in Heredia.

An examination of the time series of SO_2, PM_{10} and $PM_{2.5}$ values measured from 16 June to 15 August indicates that in general they have been relatively low: Normal daily amounts of SO_2 ranged from a low of 0 to a high of 40 ppb, whereas PM_{10} ranged between 0 and 60 µg/m^3, and $PM_{2.5}$ between 0 and 25 µg/m^3. Furthermore, the daily diurnal (daytime vs night time) of PM_{10} and $PM_{2.5}$ profiles over the entire monitoring period show that the majority of the higher PMs concentrations tended to increase daily over the time period between 6:00 AM and 7:00 PM, which is consistent with that a majority of anthropogenic activities occur during these hours.

Two moderate volcanic events at Turrialba volcano were detected by the instruments of the station on the 24-25 July and the 12 August, 2016. On the 25 July, between 9:10 and 11:50 AM, the concentrations of PM_{10} increased one order of magnitude reaching between 100 and 250 µg/m^3, whereas the $PM_{2.5}$ increased slightly reaching up between 14 to 38 µg/m^3. These peak values were observed around 2 hours after the eruption that took place at 7:22 AM and that produced an ash plume that rose 3000 m above the volcano´s summit. On the 12 of August, between 12:00 PM and 6:00 PM, SO_2 was exceeded reaching between 40 and 150 ppb. Between 9:00 AM of the 12 of August and 6:30 AM of the 13th August, PM_{10} and $PM_{2.5}$ reached peak values up to 120 and 80 ug/m^3, respectively. The excess of SO_2 detected was attributed to a passive release of sulphur-rich gases, as suggested by particular seismic and infrasound patterns. The daily average concentrations of SO_2 so far registered were well below of the 1-hour primary standard guideline of 75 ppb, however on the 12 of August during half an hour the concentration of SO_2 was between 75 and 150 ppb. PM_{10} and $PM_{2.5}$ have not exceeded the norm of 150 and 25 µg/m^3 for a 24-hour guideline of exposition, respectively.

The information provided by this station is being used for volcano surveillance purposes, and also to alert and recommend the authorities and the communities to promote development of strategies and good practices to protect human and animal health and production activities of the country.

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Con formato: Fuente: (Predeterminada) Times New Roman, 14 pto, Negrita
Bajado [1]: Keywords: Turrialba volcano, sulphur dioxide, aerosols, volcanic eruptions, air quality ¶
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Eliminado: Authors:¶
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