

Development, Testing, and Application of a Low-Cost Technology Sulphur Dioxide Monitor as a Tool for Use in a Volcanic Emissions Monitoring Network

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Abstract

Sulphur Dioxide (SO₂) is a non-flammable, non-explosive, colourless gas with a pungent, irritating odour, and is one of the main gases emitted from volcanoes. It has been recorded in concentrations hazardous to humans (0.25 – 0.5 ppm (~650 – 1300 µg/m³) downwind of many volcanoes and hence warrants constant air-quality monitoring around these sites. It has been linked to an increase in chronic respiratory disease attributed to long term exposure and alteration in lung and other physiological functions attributed to short term exposure.

Sulphur Springs in Saint Lucia is a highly-active geothermal area, located within the Soufrière Volcanic Centre, and is a park widely visited by tourists and locals. It is also a current source of continuous volcanic emissions from its many fumaroles and bubbling pools, warranting concern by residents and visitors to the park regarding the effects of exposure to these gases. Here we introduce a novel SO₂ measurement system for monitoring and quantification of ambient levels of airborne volcanic SO₂ using low-cost technology. This work involves the extensive production of low-cost SO₂ monitors/samplers, and field examination in tandem with standard commercial samplers (SO₂ diffusion tubes). It incorporates community involvement in the volcanic monitoring process as non-professional users of the instrument. Here we present preliminary monitoring results obtained from the low-cost samplers, identify the areas in the Park exposed to high concentrations of ambient SO₂, and assess the feasibility of the instrument for non-professional use and application in volcanic settings.