

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) has been defined as a non-flammable, non-explosive, colourless gas, having a pungent, irritating odour, and is one of the main gases emitted from volcanoes. Sulphur dioxide 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 exposures and alteration in lung and other physiological functions attributed to short-term exposures. 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 via its many fumaroles and bubbling pools, warranting concern by residents and visitors to the park regarding the effects of exposure to these gases. In this study, we introduce a novel SO₂ measurement system for the 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, as well as field examination in tandem with standard commercial samplers (SO₂ diffusion tubes). It also incorporates community involvement in the volcanic monitoring process as non-professional users of the instrument. We intend to present the preliminary monitoring results obtained from the low-cost samplers, to identify the areas in the Park exposed to high concentrations of ambient SO₂, and to assess the feasibility of the instrument for non-professional use and application in volcanic settings

Keywords : ambient SO₂, community-based monitoring, risk-reduction, sulphur springs, low-cost

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