

## **SULFUR GAS MONITORING IN VOLCANIC/GEOTHERMAL AREAS WITH PASSIVE SAMPLERS: HUMAN HEALTH IMPLICATIONS**

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Volcanic and geothermal areas are one of the major natural sources of sulphur gases to the atmosphere. Hydrogen sulphide (H<sub>2</sub>S) is a toxic gas mainly associated to geothermal systems while sulphur dioxide (SO<sub>2</sub>) is released in huge quantities from volcanoes characterized by open conduit activity. Apart from being one of the most impressive geodynamic expressions, volcanoes are also an important tourist attraction. During the summer season the number of tourists visiting the crateric areas each day is on average many tens at Stromboli, hundreds at Vulcano, Santorini and Nisyros and thousands at Etna. Touristic exploitation of active volcanic areas cannot exempt from warranting a reasonable security to the visiting persons. But while many risks in these areas have been since long time considered, gas hazard, a very subtle risk, is often disregarded. The atmospheric concentrations and dispersion pattern of naturally emitted SO<sub>2</sub> were measured at three volcanoes of southern Italy (Etna, Vulcano and Stromboli) while that of H<sub>2</sub>S at four volcanic/geothermal areas of Greece (Sousaki, Milos, Santorini and Nisyros). Measurements were made with a network of passive samplers positioned at about 1.5 m above the ground, which gave time-integrated values for periods from few days to 1 month. Samplers were placed in zones of the volcanoes with high tourist frequentation. Measured concentrations and dispersion pattern depend on the strength of the source (craters, fumaroles), meteorological conditions and geomorphology of the area. At Etna, Vulcano, Stromboli and Nisyros measured concentrations reach values that are absolutely dangerous to people affected by bronchial asthma or lung diseases. But considering that these are average values over periods from few days up to one month, concentrations could have reached much higher peak values dangerous also to healthy people. The present study evidences a peculiar volcanic risk connected to the touristic exploitation of volcanic areas. Such risk is particularly enhanced at Etna where elderly and not perfectly healthy people can easily reach, with cableway and off-road vehicles, areas with dangerous SO<sub>2</sub> concentrations.

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