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Volcanic emissions of mercury to the atmosphere

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Mercury is a toxic metal which has a long lifetime in the atmosphere of around one year. This long life time enables it to be carried vast distances and the metal is found in elevated concentrations in remote regions of the world. There is some debate at present regarding the quantity of mercury naturally released by volcanoes and its relative significance to the natural Hg budget. In order to better assess this value, a number of field campaigns have been carried out to measure the gaseous mercury flux from Masaya in Nicaragua and Vulcano and Etna, Italy. A Lumex 915+ portable mercury vapour spectrometer was tested to record real-time gaseous mercury concentrations in the volcanic emissions. These measurements were carried out in parallel with the collection of gaseous elemental mercury on gold coated sand traps. While there is some uncertainty regarding the absolute values recorded by the Lumex the peaks in the Hg data correlate well with those of CO2 and SO2 enabling variations in the Hg/SO2 ratios to be observed in volcanic gases. Speciation was also investigated with the collection of reactive gaseous and particulate mercury for subsequent analysis. A portable sensor box was developed to simultaneously record SO2, H2S, CO2, humidity, temperature and pressure. The Hg/SO2 ratio was used in combination with the known SO2 flux of the volcanoes to determine the Hg emissions at each location.