15-PP-35

MEASUREMENTS OF Hg^0 (AND H_2S) AT THE SOLFATARA CRATER (SOUTHERN ITALY): ESTIMATING THE ATMOSPHERIC DISTRIBUTION WITH A REAL-TIME APPROACH

Jacopo CABASSI[1] , Franco TASSI[2] , Stefania VENTURI[3] , Sergio CALABRESE[4] , Orlando VASELLI[5] , Francesco CAPECCHIACCI[6] , Walter D'ALESSANDRO[7]

(1)University of Florence, jacopo.cabassi@unifi.it, (2)University of Florence, (3)University of Florence, (4)University of Palermo, (5)University of Florence, (6)University of Florence, (7)Istituto Nazionale di Geofisica e Vulcanologia

Volcanic and geothermal areas are important emitters of natural gas compounds into the atmosphere, which can be of concern when discharging close to densely, populated sites. Mercury has a strong environmental impact, its organic and inorganic complexes being toxic. The dominant form of Hg in the atmosphere is gaseous elemental mercury (GEM), which has high volatility and residence time of 1-2 years. Volcanic degassing accounts for a significant part of the natural mercury emissions. No mercury limits or target values in ambient air are present in the EU legislations, whereas US-EPA and ATSDR impose 300 and 200 ng/m^3, respectively, as a limit for chronic exposure. WHO has proposed the annual average value of 1,000 ng/m^3 as a guideline for Hg^0 in ambient air. The determination of Hg^0 concentrations is often performed via passive/diffusive samplers, which provide time-integrated gas concentrations, but not able to assess the highly variable distributions of GEM. Different weather factors and photochemical reactions indeed affect the Hg^0 dispersion. In volcanic/geothermal sites, GEM measurements can be associated with H_2S, an irritating and suffocating substance and detectable at very low concentrations (7 µg/m^3, ~5 ppb) due to its typical rotten eggs odor. WHO recommends a guideline value of 150 µg/m^3 (~107 ppb) with a 24h averaging time. In April 2014 real-time Hg^0 and H_2S measurements in air were conducted at the Solfatara Crater, which is nested in the town of Pozzuoli (Southern Italy). The main aims were to (1) test this new methodological approach and (2) investigate the Hg^0 the H_2S concentrations and their spatial distribution. GEM and H_2S continuous measurements were determined with a portable Zeeman atomic absorption spectrometer with high frequency modulation of light polarization (Lumex RA-915M, DL: 2ng/m^3) and a pulsed fluorescence gas analyzer (Thermo 450i, DL: 1 ppb), respectively. The GEM and H_2S and meteorological data were acquired along previously planned pathways at an average speed <5 km/h. The Hg^0 and H_2S concentrations were between 12 and 77 ng/m^3 and 0.2 and 2400 ppb, respectively. The highest measured concentrations corresponded to the main gas discharging areas, whereas the lowest values were measured outside the crater and in the vegetated areas. The results of this study indicate that this technique approach is highly efficient and effective and provides reliable and reproducible Hg^0 and H_2S concentrations, which can be used to define the exposure that tourists and inhabitants, living close to volcanic and geothermal areas, may suffer.