

CONTINUOUS IN-SITU MEASUREMENTS OF GASES AT SOLFATARA AND TOR CALDARA (ITALY): A NEW EXPERIMENTAL APPROACH

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In late 2006, a new gas monitoring research initiative has started with two gas monitoring experiments carried out from November 29 - December 1 at the Solfatara volcano (Pozzuoli) and from December 19 - 20 at Tor Caldara (Lazio). Gas monitoring was repeated in Solfatara from May 13 - 18, again at the fumarole “Soffionissimo” very close to the “Bocca Grande”, furthermore at a fumarole field close to the Hotel Tennis. The primary goal of the experiments was to prove that monitoring is possible with the set-up described below, and to compare the new data obtained at Solfatara with those from a previous continuous gas monitoring experiment carried out in November 2001.

At Solfatara, a continuous gas flow was adjusted with a diaphragm pump and a needle valve, and the gas piped through a 10 m Teflon® tube. The temperature was measured in the fumarole with a K-type thermocouple. The released gas phase primary consists of water gas, which was gravimetrically determined in regular intervals after being trapped in a refrigerator. In contrast to the gas discharge at Solfatara, the gas at Tor Caldara is discharged at the bottom of a pool. Hence, the gas was not actively pumped and the gas flow not determined; furthermore the water content was not quantified. The gas bubbles were collected in a funnel, which was placed at the bottom of the pool, and let into a gas tube.

For all experiments, the remaining, almost water-free gas phase was continuously analysed with a quadrupole mass spectrometer for the following components: H₂, H₂S, CH₄, N₂, O₂, Ar, He, and CO₂. The gas line was also connected to a semiconductor laser spectrometer for CO₂ concentration measurements. Off-line gas samples were taken for laboratory gas-chromatographic and noble gas analysis. The residual (=water-free) average gas composition is dominated by CO₂ (>97 vol%), followed by H₂S, H₂, CH₄, and He. Due to the experimental set-up, the gas phase generally shows a varying contribution of atmospheric gases (O₂, N₂, Ar). Beside this, no significant variations over the time of investigation were observed within the analytical uncertainties of the experiment. There are, however, clear differences in the gas composition of the two investigated fumaroles at Solfatara.