



Gas geochemistry and CO₂ output estimation of Milos Island (Greece)

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Several gas samples have been collected from natural gas manifestations in the island of Milos. Most of them are located underwater along its coasts, whereas three anomalous degassing fumarolic areas (Kalamos, Paleochori and Adamas) were identified on land. Almost all the gases have CO₂ as the prevailing gas species, with concentrations ranging from 88 to 99% for the samples taken underwater, while the on-land manifestations present a wider range (15-98%), being sometimes heavily contaminated by air. Methane reaches up to 1.0%, H₂ up to 3.2% and H₂S up to 3.5% indicating a hydrothermal origin of the gases.

The isotope composition of He shows values ranging from 2.55 to 3.39 R/R_A, highlighting a significant mantle contribution with the highest values measured at Adamas. C-isotope composition of CO₂ is in the range from -1.9 to +1.3‰ vs. V-PDB, with most of the values found around -0.5‰ indicating a prevailing limestones origin. Isotope composition of CH₄, ranging from -18.4 to -5.0‰ vs. V-PDB for C and from -295 to +7‰ vs. V-SMOW for H, points to a geothermal origin with sometimes evident secondary oxidation processes.

CO₂-flux measurements showed values up to 1100, 1500 and 8000 g/m²/day in the areas of Kalamos, Paleochori and Adamas respectively and up to about 23,000 g/m²/day in the marine area of Kanava. The south-western part of the island was covered with a lower density prospection, revealing only few anomalous CO₂ flux values (up to 650 g/m²/day). Preliminary CO₂ output estimations gave values of 1.1, 0.6 and 5.5 tons/day for the three fumarolic areas and of 1.1 tons/day for Kanava. The total output of the island (about 10 tons/day) is comparable to the other volcanic/geothermal systems of the south Aegean active volcanic arc (Nisyros, Kos, Nea Kameni, Methana and Sousaki).