

Gas geochemistry and preliminary CO₂ output estimation from the island of Kos (Greece)

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Several gas samples have been collected from natural gas manifestations at the island of Kos. Most of them are found underwater along the southern coast of the island. On land two anomalous degassing areas have been recognized. These are characterised by lack of vegetation and after long dry periods by the presence of sulfate salts efflorescences. Almost all the gases are CO₂-dominated (CO₂ ranging from 88 to 99%) with minor amounts of N₂ (up to 7%) and CH₄ (up to 2.6%). Only the on-land manifestations have also significant contents of H₂ (up to 0.2%) and H₂S (up to 0.3%). Only one underwater manifestation is N₂-dominated (61-99%) with CH₄ (0.6-11%) and low CO₂ (0.1-26%).

The isotopic composition of He shows values ranging from 0.84 to 6.72 R/RA indicating a sometimes strong mantle contribution with the highest values measured in two of the most strongly degassing areas (Paradise Beach and Volcania). C-isotopic composition of CO₂ is in the range from -3.6 to 0.6 ‰ vs V-PDB with most of the values around -1‰ indicating a mixed mantle – limestones origin. Isotopic composition of CH₄, ranging from -21.5 to 2.8‰ for C and from -143 to 36‰ for H, points to a geothermal origin with sometimes evident secondary oxidation processes.

CO₂-flux measurements showed values up to about 10,000 g/m²/day in the areas of Volcania and Kokkino Nero and up to about 50,000 g/m²/day at Paradise beach. Preliminary CO₂ output estimations gave values of 8.8 and 4 tons/day for the first two areas respectively and of 2.7 tons/day for the latter. The total output of the island (15.5 tons/day) should be considered a minimum estimation because of the incomplete coverage of the area and is comparable to the other active volcanic/geothermal systems of Greece (Nisyros, Nea Kameni and Methana).