



Geochemical monitoring and noble gas characterization of the eastern segment of the Büyük Menderes Graben (Turkey)

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From November 2007 until October 2008, a geochemical monitoring experiment was performed in Tekke Hamam (Büyük Menderes Graben, Turkey). Gas, discharged on the ground of a pool and collected in a funnel, continuously travelled to a nearby monitoring station for real-time analysis. The gas composition (Ar, CO₂, CH₄, O₂, N₂, H₂, He, H₂S) was determined minutely with a quadrupole mass spectrometer, together with gas flow rate and gas temperature. Additionally, the gas composition and noble gas isotopes were investigated in gas samples from four other pools at Tekke Hamam and from seven wells of the Kizildere geothermal field, situated 4 km northeast of Tekke Hamam on the opposite side of the Menderes River.

All gas samples mainly consist of CO₂ (>95 vol.-%), followed by N₂, CH₄, O₂, H₂S, Ar, H₂ and He. O₂ (<0.3 vol.-%) can be attributed to atmospheric contamination during sampling/monitoring. Samples from Tekke Hamam show generally higher concentrations of H₂S, He and CH₄ than those from Kizildere. ³He/⁴He ratios are higher at Tekke Hamam (2.6-2.9 R_a) compared with Kizildere to (1.1-2.1 R_a). In the Kizildere geothermal field, a SW-NE reaching trend to lower R_a values could be observed. Furthermore, the R_a values roughly correlate with the well depths, showing higher R_a values in deeper wells. A possible explanation could be mixing between a shallow fluid reservoir with lower ³He/⁴He ratio and a deeper reservoir with higher one.

Different types of variation in the gas flow and gas composition could be observed during gas monitoring: long-term changes in the gas composition, daily variation and short-term fluctuation. From these, the daily variation seems to correlate with the temperature. Data evaluation is ongoing to understand whether the changes in the gas composition can be attributed to seismic events or to meteorological factors.