Volcanism on Methana (W Aegean arc): Magma mixing, crustal contamination & mantle sources

I. SMET[1]*, E. DE PELSMAEKER[1], M. ELBURG[1], F. VANHAECKE[2] AND T. ANDERSEN[3]

[1]Department of Geology and Soil Science, Ghent University, 9000, Belgium (*correspondence: ingrid.smet@ugent.be)
[2]Department of Analytical Chemistry, Ghent University, 9000, Belgium
[3]Department of Geosciences, University of Oslo, Norway

The peninsula of Methana represents the westernmost active centre of the (continental) South Aegean arc. Volcanism started about 1.1 Ma ago and the last eruptive phase is as young as 2200 years. Volcanic deposits are mostly andesitic to dacitic lava domes and flows with abundant mafic enclaves, but two volcanic centres also show volumetrically important pyroclastic deposits [1].

The many mafic enclaves in the lavas suggest that magma mingling has been important. Evidence for magma mixing includes a poor correlation between modal mineralogy and silica content, and the common occurrence of disequilibrium assemblages (such as biotite, zircon, quartz + olivine). Major and trace element concentrations of different lava flows and domes show a large variability, seemingly unrelated to silica content. $^{87}Sr/^{86}Sr$ ratios are variable (0.705-0.708), and the correlation with silica content is poor.

Enclosed xenoliths are mostly carbonates (and a few silicates) and are restricted to the two volcanic centres that also show pyroclastic activity. $^{87}Sr/^{86}Sr$ isotope ratios of these volcanics increase with increasing Sr concentration, suggesting carbonate assimilation. Interestingly, carbonate contamination is only observed in the pyroclast-bearing centres, and could therefore be responsible for their more explosive behaviour, as already suggested for Merapi volcano in Indonesia [2].

One lava flow displays a combination of the highest Sr concentrations (530 ppm, versus 200-350 ppm for the other volcanic deposits) and the lowest $^{87}Sr/^{86}Sr$ ratios (0.705). Similar volcanics have been found on the islands of Aegina and Nisyros, and point towards variations in mantle sources.

[1] V. Dietrich *et al*. (1995) Geological Map of Methana Peninsula (Greece) 1,25000, ETH, Zurich, Switzerland.
[2] J. Chadwick *et al*. (2007) *J. Petrol*. **48**, 1793–1812.

Uranium in tap and groundwater – Indications for anthropogenic origin

G. SMIDT[1]*, M. BIRKE[2], L. ERDINGER[3], M. SCHÄF[3], F. KNOLLE[4], A. KOSCHINSKY[1] AND E. SCHNUG[5]

[1]Intergrated Environmental Studies, Jacobs University Bremen, Campus Ring1, D-28759 Bremen, Germany (*correspondence: g.smidt@jacobs-university.de)
[2]Federal Institute for Geosciences and Natural Resources, Wilhelmstr. 25-30, D-13593 Berlin
[3]University Hospital Heidelberg, Dept. of Medical Microbiology and Hygiene, Im Neuenheimer Feld 324, D-69120 Heidelberg
[4]GeoPark Harz, Braunschweiger Land – Ostfalen, Grummetwiese 16, D-38640 Goslar
[5]Technical University - Faculty 2 Life Sciences, Pockelsstraße 14, D-38106 Braunschweig

Uranium (U) is a natural chemo- and radiotoxic heavy metal. The exposure of humans to U is mainly determined through uptake by drinking water. This paper reports on the U content in 4251 tap waters and 350 groundwaters from Germany collected by several research groups over the last 5 years and discusses the possible origin of U. This database is by far the largest available in the country and it represents data of drinking water to which 76% of the entire German population has access. The mean U concentration was 1.61 μg/L U, the median 0.50 μg/L U. 25.2% of all samples had U concentrations below the detection limits, which accounts for water to which 41.0% of the entire population has access. 24% of samples were above 2 μg/L U, 4.4 above 10 μg/L U, representing a population of 10.2 and 0.28%, respectively. The regional distribution of U concentrations follows the geological structures reported for mineral waters, however in contrasts to this clear evidences for anthropogenic influence through agricultural activities were found in drinking and groundwaters of areas with intense cropping productions in southern and northern Germany. Soil analyses show the high mobilisation capacity of fertilizer-derived U from arable soils in comparison to unfertilized control sites.