Anchizonal-hydrothermal growth and (U-Th)/He dating of rutile crystals in the sediments of Hawasina window, Oman

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Diagenetically overprinted and sub-greenschist facies metamorphosed Mesozoic sandstones of the Hawasina nappe complex of Oman Mountains contain euhedral rutile and quartz crystals in x 100 µm size. Ti was mobilized probably from the neighbouring nappes composed dominantly of mafic and ultramafic lithologies or from the decomposition and dissolution of mafic lithic fragments of the sandstones. The deformation and thermal overprint of the sediments is variable and related mainly to the inverse thermo-metamorphic effect of the overriding ophiolitic nappes. The climax of the obduction-related thermal history was probably in Late Cretaceous (ca. 75 Ma)

The well developed rutile crystals were analysed by electron microprobe, laser-ICP-MS and solution ICP-MS. The uranium, thorium and samarium concentrations are around 4, 35 and 2 ppm, respectively. We made experiments to extract the helium content and perform (U-Th)/He geochronology on the secondary rutile. The gas extraction was performed by IR laser heating and the gettered noble gases were measured by a Hiden triple-filter quadrupol mass spectrometer.

The uncorrected He-numbers range from 20 to 40 Ma, the He-ejection corrected ages are clustering around 35 Ma. For the geological interpretation of these results we have currently few data on the closure temperature of this secondary rutile. The preliminary degasing experiments indicate that the closure temperature is near the closure temperature of accessory zircon crystals or slightly higher than that. However, the intact character of the crystals and the consistency of the ages allows to suppose a mineralization and/or thermal event that postdates the Late Cretaceous thrusting of the ophiolitic nappes.

The Pb-Nd-Sr-Hf-isotopic mantle signature of the Kap Washington Group volcanics, North Greenland

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Volcanics and giant dyke complexes of the Kap Washington Group (KWG), North Greenland, are composed of bimodal alkaline rhyolites and basalts. Aeromagnetic data reveal a large lava plateau in the Polar ocean due north, indicating considerable magma production in this area. New Pb, Sr, Nd and Hf isotopic data from 14 dykes and three lavas with MgO > 4 wt% are presented.

We divide the KWG into two groups. KWG 1 has lower contents of LREE, MREE, Ta, Nb, Th and U, lower LREE/HREE and higher Zr/Nb relative to KWG 2. KWG 1 appears as scattered dykes throughout a wider area while KWG 2 is restricted to dykes and lavas within the outcrops of the volcanic succession at Kap Kane and Lockwood Ø.

Excluding crust contaminated dykes, the groups define the two ends of a single array in Pb,- Nd-, Sr-, and Hf isotopic diagrams. KWG 1 trends towards radiogenic Pb, with the sole two dykes from the Kap Washington peninsula, the most northerly location, at the extreme of this group. Two KWG 2 dykes define the other, unradiogenic end of the array.

The enriched character of the KWG 2 end member appears not to be related to melt fraction (e.g. no correlation of Zr/Nb with La/Yb, Th/Nb etc), but is more likely a source signature. Because of the proximate position to the lava plateau, the isotopically extreme KWG 1 dykes indicate a radiogenic signature of possibly the most important contributor to the KWG volcanism.