# Rare Earth Elements in the surface Ocean under the Saharan dust belt

ED C. HATHORNE[1], MARTIN FRANK[1], MICHIEL RUTGERS VAN DE LOEFF[2], TOBIAS ROESKE[2], AND JOERG RICKLI [3]

[1]GEOMAR, Helmholtz Centre for Ocean Research Kiel, Germany (ehathorne@geomar.de)
[2]Alfred Wegener Institute for Polar and Marine Research (AWI), Bremerhaven, Germany
[3]ETH Zürich, Switzerland

The supply of trace metals to the surface ocean via dust deposition is important for primary productivity and the global biogeochemical cycle of many elements. Here we utilise the systematic variation of the chemical properties of yttrium and the rare earth elements (YREE) to investigate trace metal release from dust in the equatorial Atlantic Ocean. We present YREE data for the dissolved (<0.45 μm) and suspended particulate matter (SPM) collected from the mixed layer during Polarstern cruise ANT-XXIII/1 in Oct-Nov 2005.

Saharan dust can be traced with the Al content of the SPM revealing a broad maximum extending from 15° to 3°N. The PAAS normalised YREE patterns of the dust dominated SPM are relatively flat with a broad peak centred around Eu and Gd. This dust dominated SPM is also characterised by lower Y/Ho and Er/Nd ratios than the particulate material from outside the high Al zone.

The dissolved YREE distributions show normal seawater patterns with the relative enrichment of heavy REE over light REE. The samples with dust dominated SPM are enriched in the light and middle REE by a factor of approximately 2 compared to the other samples and a Sargasso Sea surface water. The dissolved Y/Ho and Er/Nd ratios obtained from the dust dominated SPM zone are also low compared to the samples outside the zone but display a fractionation between the SPM and the dissolved phase. This comparison indicates a consistent incongruent dissolution of the dust associated YREE which are probably mainly hosted by oxide coatings on the particles.

# Hydrogeochemical assesment of Pasinler (Erzurum- Turkey) geothermal fluids

E. HATIPOGLU[1]*, F. GULTEKIN[1] AND A. FIRAT ERSOY[1]

[1]Karadeniz Technical University, 61080 Trabzon, Turkey (*correspondence:hatipogluesra@gmail.com, fatma@ktu.edu.tr, arzufirat@gmail.com)

The Pasinler geothermal field is located to 37 km east of Erzurum Province. The basement of Pasinler Geothermal field consists of Upper Cretaceous ophiolitic melange, Eocene volcanic rocks, Oligocene volcanic rocks, Lower Miocene reef limestones, Upper Miocene pyroclastics, Plio-Quaternary (sandstone, marl, conglomerate) and Quaternary alluvium. The rhyolite is the reservoir for the geothermal fluid. The tuffs and marls are cap rocks of the system. The fault and related fractures around the Pasinler geothermal field provide pathways for the upward flow of geothermal fluid to the surface. The Alluvium around the Hasankale River is the most important unit as cold groundwater deposits in the study area. The thermal waters in the Pasinler geothermal fields have outlet temperatures 23 to 35°C in springs. But discharges in the wells vary between 38-52°C.

Geothermal well waters belong to the Na-Ca-Cl-$HCO_3$ type. The Pasinler geothermal water has discharge pH values of 6 to 7.5, electrical conductivity (EC) of 970 to 5800 μS/cm and TDS contents between 635 and 3700 mg/l. The Pasinler geothermal field is in class low enthalpy geothermal system, and its reservoir temperature was calculated as 46-169°C using silica geothermometer. The $\delta^{18}O$- $\delta^{2}H$ data clearly indicate a meteoric origin for the thermal waters.

According to analyses of heavy metal contents such as Cr, Pb, Zn, Ni, Al and Cu, the Pasinler geothermal water is suitable for the Turkish Thermal Standarts, on the other hand by the amount of Fe, Mn, As, B, Br is not suitable.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.8