Mineralogical and geochemical characteristics of Emet borate basin, Kütahya, Western Anatolia, Turkey

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The volcanosedimentary borate deposites in Emet, Kütahya have been studied to investigate the mineralogy and geochemistry of neoformation minerals (carbonate, clay, sulphate, borate minerals). For this purpose, 193 samples collected from 4 different locations (Espey, Hisarcık open pits and two drill holes) in Emet.

XRD whole rock analyses made on all samples show that, clay, feldspar, realgar, mica, carbonate (dolomite, calcite), sulphate (glauberite, gypsum, anhydrite), opal-CT and borate (colemanite, ulexite, probertite, hydroboracite, P-veachite) are the minerals detected. XRD clay fraction analyses made on 69 samples revealed that there are illite, smectite, kaolinite and chlorite minerals. ICP major element analyses applied on smectite minerals show that the trioctaedric smectites are saponite and stevensite in composition.

At the investigation area, an increase at the amount of smectite has been discovered from northern parts (Espey) to southern parts (Hisarcık). As the dolomite minerals are absent at Espey open pit and present at two drill holes and Hisarcık open pit, the Espey area can probably be the edge of the basin. Ca-borate→ Ca-borate + Na-borate→ Na-Ca-borate + Mg-Ca-borate mineralogical zoning show that the drilling area of two drill holes which are located between Espey and Hisarcık open pits, can be the center of the basin. Especially at the borate bearing zones Sr reaches high concentrations. Samples that have higher clay contents also have higher REE contents.

Chemical heterogeneities along the South Atlantic Mid-Ocean-Ridge (5-11°S): Shallow or deep recycling of ocean crust?

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Between 5° and 11°S, the Mid-Atlantic Ridge displays anomalous crustal thickness and geochemical compositions, thought to be related to either small scale upper mantle heterogeneities or a weak, diffuse mantle plume. We report new high precision trace element and Sr, Nd and Pb (DS) isotope data for 72 ridge axis samples and 9 off-axis seamount samples along with U–Th–Ra disequilibria data for off axis seamounts at c. 9.7°S. At least four distinct components are needed to explain the geochemical variations along the ridge: 1) a common depleted (D-MORB-like) component near and north of 4.8–7.6°S, 2) an enriched component upwelling beneath Ascension Island and the northern A1 ridge segment (segment numbers ascend from north to south), 3) an enriched component upwelling beneath the A2 ridge segment, and 4) an enriched component upwelling beneath the line of seamounts east of the A3 segment and the A3 and A4 segments. The A1 and the A3+A4 segment lavas form well-defined mixing arrays from Ascension Island and the A3 seamounts respectively to the depleted D-MORB component. We propose that the enriched components represent different packages of subducted ocean crust and/or ocean island basalt (OIB) type volcanic islands and seamounts that have either been recycled through 1) the shallow mantle, upwelling passively beneath the ridge system or 2) the deep mantle via an actively upwelling heterogeneous mantle plume that interacts with the ridge system.