

Hydrochemical properties of thermal waters in the Eastern Black Sea section

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The Ilica (Artvin), Ayder and İkizdere (Rize) and Sarmaşık (Ordu) thermal waters are located Eastern Black Sea section. Thermal springs and thermal wells have temperatures ranging from 37 to 70°C. The pH values of the thermal waters change between 6.32 and 8.92. Thermal waters display various chemical compositions and high temperature waters have Na-SO₄, Na-HCO₃ and Na-Cl type. In the Ordu and Artvin area Late Cretaceous and Eocene aged volcanic rocks constitute reservoir and cap rocks. Late Cretaceous aged granite, granodiorite and monzonite rocks are reservoirs and cap rocks in the Rize geothermal system. The water-rock interaction has been investigated in this study. The thermal waters located rocks dominate region in the Gibbs Diagram. The chemistry of thermal water is controlled by weathering of minerals containing the rocks. According to chemical analysis basaltic rocks have higher Co, Sr, V, Cu, Pb, Zn, Ni and As content than granitic rocks. Especially Ilica, İkizdere and Sarmaşık thermal waters have high As, B, Ba, Br, Fe, Li, Rb, Cs and Zn concentration. Compare with Rare Earth Elements (REE) content rocks and thermal waters La, Ce, Nd and Pr are immobile elements for Ayder and Sarmaşık thermal waters. Ilica and İkizdere thermal waters are similar to REE content.

Duofuton mafic volcanic suite at northeastern margin of the Qing-Tibet plateau: Its age, geochemistry and tectonic implications

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Located at the northeastern margin of the Qinghai-Tibet Plateau, the Duofuton volcanics belong to a Na-rich and mafic volcanic suite. The suite has yielded an age of 96.21±2.10 Ma by the whole-rock ⁴⁰Ar/³⁹Ar method, indicating a magmatic product in early Late Cretaceous time.

The rocks are characterized by the (La/Yb)_N ratios of 6~11, ΣREE of 117, enrichment in incompatible elements. The Nb/U and Ce/Pb ratios are 30 and 17 on average, respectively.

The ⁸⁷Sr/⁸⁶Sr ratios of the samples are 0.7041~0.7069, ¹⁴³Nd/¹⁴⁴Nd = 0.5129 (ε_{Nd(t)} = 6) and Δ²⁰⁷Pb/²⁰⁴Pb and Δ²⁰⁸Pb/²⁰⁴Pb = 11 ~ 19 and 73~84. Coupled with high ⁸⁷Sr/⁸⁶Sr ratios, they show Dupal anomalies. The rocks are OIB-like in nature and their source region exhibits mixture between DM and EMII, while some samples are contaminated by continental crust. The complexity of the OIB-like rocks may have inherited from the proto- and paleo-Tethyan mantle in the region and is possibly not related to materials of eastward extrusion from the plateau. Compared with the contemporaneous volcanics in the area, it can be inferred that the mantle region below at the northeastern margin is heterogeneous. The development of the volcanic activity in the area could be triggered by the distance effect from the initial collision between the Eurasian Plate and a microcontinent in northwest Indian Plate.