Nd and Sr isotopic characteristics of NE Aegean Ophiolites, Greece

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In this study we report on the isotopic characteristics of ophiolitic complexes located in the northeastern Aegean region. These complexes are, from north to south, the Evros and Samothraki ophiolites, commonly considered as part of the Circum-Rhodope Belt (e.g. Kauffmann *et al*. 1976) and the Lesvos ophiolite, which forms the western continuation of the Karakaya Complex (W Turkey) (e.g. Koglin *et al.* 2007).

The Evros ophiolite comprises all the typical characteristics of an ophiolite suite, namely mantle peridotites, gabbros, sheeted dykes and basaltic extrusives. The ophiolite of Samothraki is built up of gabbros intruded by dolerite dykes, diorites, sheeted dykes, and massive and pillow lavas. The Lesvos ophiolite consists of mafic extrusives, ultramafic rocks with an amphibolitic sole at their base and an ophiolitic mélange. This mélange consists of gabbros, massive basaltic flows, pillow basalts, marbles, phyllites and greenschists.

The Middle to Late Jurassic Evros and Samothraki ophiolites (SHRIMP zircon ages, Koglin *et al.* 2007) show supra-subduction zone geochemical characteristics. The latest Permian ophiolitic rocks of the mélange indicate an OIB source influence, while the basalts of Vatera, S Lesvos, display a geochemical signature of mid-ocean ridge affinity (Koglin *et al*. 2007).

The basalts and most of the gabbros of the Evros ophiolite have εNd_{169} values between +2.9 and +7.7 with a mean of +5. Their $^{87/86}Sr_{169}$ ratios range from 0.7037 to 0.7052. The Samothraki mafic rocks have εNd_{160} from +3.8 to +7.2, mostly clustering around +5. Their $^{87/86}Sr_{160}$ ratios range between 0.7034 and 0.7058. The εNd_{253} of the Lesvos ophiolite mafic rocks vary from +3.8 to +6.4 with a mean of +5.5. Their $^{87/86}Sr_{253}$ is between 0.7043 and 0.7051.

For the Evros and Samothraki ophiolites the isotopic data indicate a depleted mantle source with a subduction-zone influence. This is concordant with the observed enrichment in Th and other LILE compared to MORB. The isotopic data for the Lesvos ophiolite are similar to those of Evros and Samothraki. However, the subduction-zone input is less pronounced and an additional OIB component has to be considered.

References:

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Characteristics of trace elements in groundwater from basaltic aquifers with natural land uses in Jeju Island

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Introduction

Jeju Island consists of basaltic rocks which is more susceptible to weathering and likely to have higher trace elements related to mafic composition of the rocks. To evaluate the effect of basaltic rocks on trace elements in groundwater, 40 groundwater samples from wells and springs located in mountaionus area which are mainly forest and grassland were investigated for 29 trace elements including major elements.

Results

Previous studies show that basaltic rocks of Jeju Island are enriched in Ni, Co, Cr, and V and depleted in Cs, Pb, U, and Rb compared to average contents in grantes and have similar composition to average contents in basalts. Concentrations of trace elements was compared to those in basaltic rocks to estimate relative mobility in groundwater systems in Jeju Island. Mo, Rb, Sn, and Zn had higher mobility whereas Ni, Cr, and Ba have much lower mobility in comparison of concentraions in groundwater to those in local basaltic rocks. B and As had much higher mobility compared to average basalts because the element data are not available for local rocks. Slightly alkaline condition of groundwater possibly caused enhanced adsorption of some transition metals such as Ni and Cr on mineral surfaces, which can accout for the low mobility in groundwater. Groundwater appears to be in mainly aerobic conditions considering high level of dissolved oxygen. The redox conditions are related to the very low level of Fe and Mn. Effects of water-rock interaction on concentrations of trace elements was assessed by comparison to alkalinity. Alkali and alkaline elements are well correlated with alkalinity whereas transition metals are in poor correlation with alkalinity. U concentrations were distinctively higher in two highly mineralized water though concentration levels are low (<2 ppb).