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Zircon SHRIMP ages and the origin of ophiolitic rocks from the NE Aegean region, Greece.

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In this study we report on the geochemistry and geochronology of ophiolitic complexes located in the north-eastern Aegean region. These complexes, from north to south, are the Evros, Samothraki and Lesvos ophiolites.

The Evros and Samothraki ophiolites are regarded as parts of the Circum-Rhodope Belt (Kauffmann et al. 1976), while the continuation of the Levos ophiolite is less obvious. We aim to provide insight into the origin and timing of these complexes in order to better understand the evolution of the Tethyan system in this region.

The Evros ophiolite comprises all the typical characteristics of a complete ophiolite suite, namely serpentinised peridotites, gabbros, sheeted dykes and basaltic extrusives. The basaltic rocks show a typical island-arc signature with depletion in HFSE, negative Nb anomaly, enrichment in Th and LREE and flat HREE patterns. The Samothraki ophiolite is built up of gabbros intruded by dolerite dykes, basaltic dykes, massive basalts, pillow lavas and more fractionated rock types like diorites. The basaltic rocks of this dismembered ophiolite are flat to slightly enriched in HFSE, show flat REE patterns with some slight enrichments in LREE and a slight enrichment in Th arguing in favour of a MORB to E-MORB character. The results from both ophiolites above are concordant with those of previous studies on these complexes (e.g. Pe-Piper & Piper 2002 and references therein). The Lesvos ophiolite consists of extrusives, ultramafic rocks with an amphibolite sole at their base and an ophiolitic mélange. This mélange consists of gabbros, massive basaltic flows, pillow basalts, marbles, phyllites and greenschists. The basaltic rocks can be subdivided into two groups:

1) Basalts within the ophiolitic mélange which show enriched LREE and flat HREE patterns as well as an enrichment in HFSE and Th, suggesting an island-arc environment.

2) Basalts around the Vatera area, which exhibit slightly depleted LREE and flat HFSE patterns similar to those of MOR basalts.

For the purpose of the age determination of these ophiolites, zircons have been separated from gabbroic rocks and analysed by SHRIMP II. These zircons have a prismatic shape and their size varies between 100-200 μm. Cathodoluminescence imaging revealed homogeneous growth and poorly developed oscillatory zoning. The Th/U ratio of the zircons ranges between 0.4 and 1.6 suggesting a clear magmatic origin. The concordia age obtained from the zircons of the Evros gabbro is 169 $\pm$ 2 Ma (Middle Jurassic). The zircons separated from the Samothraki gabbro have a ^{238}U/^{206}Pb weighted mean age of 160 $\pm$ 5 Ma (Upper Jurassic), making it slightly younger than the Evros ophiolite. Zircons from a gabbro within the ophiolitic mélange of Lesvos yielded a ^{238}U/^{206}Pb weighted mean age of 248 $\pm$ 5 Ma (Lower Triassic). All ages measured are interpreted as intrusion ages of the ophiolites.

We propose that the Evros ophiolite was generated in an island arc while the Samothraki ophiolite was generated in a back-arc basin. Both ophiolites can be correlated with ophiolites from the eastern Vardar zone based on their similarities in age and geochemical characteristics (Zachariadis et al. 2006).

The Lesvos ophiolite has a dual geochemical signature comprising both island-arc and mid-ocean ridge characteristics. The geochemistry, in conjunction with the Triassic age obtained in this study, suggests that the Lesvos ophiolite is genetically linked to the Karakaya Complex (Pickett & Robertson 2004) rather than to the Vardar Zone.

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