Geochemical and geological evidence for a Triassic transition from subduction- to rift-related volcanic activity in the Cycladic Blueschist Unit in Attica (Greece)

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Triassic geodynamic phenomena in the Aegean area are largely controlled by subduction of the Paleotethys ocean and opening of the Neotethys oceans. Triassic volcanosedimentary sequences have a complex composition in many cases, reflecting both subduction and rifting setting.

Detailed mapping of NE Attica (Penteli Mt., Marathonas, Varnavas) revealed the existence of a structurally lower meta-volcanosedimentary sequence, which, comprises quartzofeldspathic rocks, schists, quartzite, metabasite and acid meta-volcanics. This sequence is isoclinally folded in the macro-scale with marble layers and the axial plane foliation displays greenschist facies assemblages, whereas earlier HP minerals are mostly preserved as inclusions in albite porphyroblasts. The sequence of rocks has been investigated for their geochemical composition and their field relationships. Two assemblages of volcanic rocks are distinguished based on geochemical criteria: (a) a predominant subalkaline andesite-rhyolite series with a significant proportion of meta-tuffs in the stratigraphic sequence and (b) minor alkali basalts. Lenses of felsic meta-volcanic rocks alternate with siliciclastic layers showing sedimentary banding and allow for an interpretation of a volcano-sedimentary succession.

The geochemical characteristics of the alkali basalts are typical of rift settings (positive anomalies in Nb, Ta, Ti and P) and plot in the field of within plate basalts in the tectonic discrimination diagrams. The trace element and Rare Earth Element characteristics of the andesites and rhyolites in the subalkaline group show many characteristics of subduction zone melts e.g. negative Nb and Ta anomalies, positive Pb anomaly and LREE-enriched suggesting that a metasomatized mantle wedge source played an important role in the formation of the calcalkaline magmas. A geodynamic model of rift formation in the active continental margin of Pelagonia is proposed to explain the transition from a subduction- to an extension-related magmatic activity in the Late Permian/Triassic time in the broader NE Attica-central Evvia region.