

## FE-CARPHOLITE-CHLORITOID ASSEMBLAGES IN METAPELITES-METASANDSTONES OF SKOPELOS ISLAND, N. SPORADES, GREECE

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In Skopelos island, Panormos area, metapelites-metasandstones which belong geologically to the Mesoautochthonous Complex of the Pelegonien Zone are characterised by the presence of Fe-carpholite-chloritoid assemblages. The common mineral assemblage in these rocks is: Fe-chloritoid  $\pm$  Fe-carpholite-sericite-chlorite-pyrophyllite-quartz  $\pm$  Cr-spinel  $\pm$  rutile) and in the adjacent metabauxites: chlorite-diaspore-hematite-rutile, chloritoid-diaspore-pyrophyllite-hematite-rutile, chlorite-diaspore-rutile. Microprobe analyses revealed that carpholite is characterised by  $X_{Mg}$  values between 0.15-0.20 and chloritoid by  $X_{Mg}$  values between 0.08-0.12, that is both minerals are Fe-rich. The coexistence of pyrophyllite + diaspore, the disappearance of kaolinite and the lack of kyanite suggest temperatures of metamorphism between 300°-380°C while the composition of carpholite indicates pressures in the order of 4-6 kbar. The presence of Fe-carpholite suggests metamorphic conditions of the low-blueschist facies while the parageneses: chlorite-pyrophyllite-quartz and chloritoid-pyrophyllite-quartz, which postdate Fe-carpholite growth, indicate an evolution to greenschist facies conditions.

## NOBLE GAS ISOTOPE GEOCHEMISTRY OF VOLCANIC GASES FROM THE AEGEAN ISLAND ARC

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Volcanic gas samples from three of the volcanic centres of the Aegean island arc were analyzed by mass spectrometry for He, Ne, Ar, Kr and Xe isotopes. The gas samples from Milos and Santorini show high  $^3\text{He}/^4\text{He}$  ratios indicating a large contribution of mantle-derived helium, while the low  $^3\text{He}/^4\text{He}$  ratio of the Susaki sample indicates crustal helium, enriched in radiogenic  $^4\text{He}$ . Combining the above ratios with the  $^4\text{He}/^{20}\text{Ne}$  ratios, it is shown

that the samples from Milos and Santorini lie on a common mixing line between atmospheric and mantle-derived helium, with a  $^3\text{He}/^4\text{He}$  ratio of  $5 \times 10^{-5}$ , suggesting common origin. The common helium ratios of Milos and Santorini may be produced by contamination with radiogenic  $^4\text{He}$  and by regional homogenization on the way from the mantle to the surface. Although  $^3\text{He}/^4\text{He}$  ratios of Milos and Santorini are high they are about one half of typical ratios of mantle helium found in volcanic gases and rocks from oceanic ridges and island arcs. Consequently, the relatively low  $^3\text{He}/^4\text{He}$  ratios can be considered as a characteristic feature of this volcanic area. Elemental abundance patterns of the analysed gas samples indicate that Ne, Ar, Kr and Xe are recycled atmospheric noble gases dissolved into ground water.

## THE GARNETITE FROM SERIFOS

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Recent investigations on the metasomatic aureole of Serifos island, resulted in the delineation of the lithological zoning as well as in the sequence of metasomatic parageneses:

Magnetite – Hedenbergite – Epidote – Garnet – Quartz

Garnet – Epidote  $\pm$  Hedenbergite ( $\pm$  Actinolite) – Quartz  $\pm$  Magnetite

Garnet – Epidote – Albite – Quartz  $\pm$  Hedenbergite

Hematite – Barite – Fluorite – Limonite – Siderite – Calcite

The observed thicknesses of the individual metasomatic zones range from 5 to 20 m.

In close proximity to the granodiorite (within 20-100 m from its margins), subzones with the parageneses Garnet (Andradite) – Epidote  $\pm$  Actinolite  $\pm$  Hedenbergite  $\pm$  Quartz  $\pm$  Albite were locally identified within the individual metasomatic zones. Segments of these subzones with thicknesses ranging from a few metres to a few tens of metres (Ag. Marina, Tsilipaki etc.) consist almost exclusively of Garnet (> 85%) with subordinate amounts of epidote, hedenbergite, feldspar and quartz. The size of such segments appears locally to be quite significant. For examples at the locality Ag. Marina an outcrop of dimensions 450  $\times$  120  $\times$  40 m has garnet contents in the order of 25 to 30% with a garnet content, in individual zones of 1 to 8 m wide, of more than 85%.

The garnets occur often as idiomorphic crystals up to 10 cm, but mainly as rough crystalline rock. The colour is mainly reddish-brownish often unfolding zoning.

The mineralogy of the garnetite was studied optically, by X-ray diffraction and microprobe analysis.

It is a typical skarn garnetite with andraditic garnet composition. According to microprobe analysis the garnet composition is: