Partial melting of a fertile peridotite: Application of the microcrack extraction technique

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The partial melting of peridotite at very low degrees is an important process for the generation of basaltic magma at midocean ridges. We will present the results of anhydrous lowdegree partial melting experiments on a fertile peridotite composition at pressures of 1.0 GPa and 1.5 GPa and temperatures ranging from near the solidus to about 100 °C above the solidus.

We used a fine-grained mix of minerals from a natural spinel lherzolite as starting material for the piston-cylinder experiments and we applied the recently developed microcrack extraction technique [1]: the partial melt in equilibrium with the peridotite powder intrudes at run conditions into microcracks in the surrounding graphite container. In these cracks, the glasses remain unaffected by quench crystallization and can be analyzed by electron probe microanalysis.

The crystalline phase assemblage comprises olivine, orthopyroxene, clinopyroxene, and spinel; the runs at nearsolidus temperatures at 1.0 GPa also contain plagioclase. Melt and solid phase fractions were calculated by mass balance. The melt fractions within the temperature interval studied range from 0.7 to 16 wt.% at 1.0 GPa and from 0.4 to 8 wt.% at 1.5 GPa. With decreasing temperature, i.e. lower melt fractions, the magnesium, calcium, and iron contents decrease continuously with a concomitant increase of the silica and alkali contents in the melt. Close to the solidus, at 1.0 and 1.5 GPa respectively, the silica content reaches 55 and 52 wt.%; the potassium content approaches 300 times that of the starting material.

We will discuss compositional trends of the melt and the co-existing crystalline phase assemblages as a function of pressure and temperature and we will compare our data with those from literature obtained by applying different melt extraction techniques.

Reference

 [1] Laporte D., Toplis M., Seyler M., and Devidal J.L., (2004), *Contrib. Mineral. Petrol.* 146, 463-484. DOI: 10.1007/s00410-003-0509-3.

Zircons from the arenite of Early Mesozoic continental redbeds of the western and central mediterranean area: A case of typological study

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Triassic to early Liassic continental redbeds along the internal domains of the Mediterranean chains from the Gibraltar Arc (Spain and Morocco) to the Calabrian Arc (Italy) have been analyzed for their source-area provenance. The identification of source-areas of sedimentary basin is based on zircons typological study. Zircons were separated from arenites of the Triassic to Early Jurassic continental redbeds of the Calabrian-Peloritani Arc, Rif and Betic Cordillera stratigraphic sections. The zircons of both the Calabrian-Peloritani Arc and the Rif samples are mostly euhedral and contain inclusions of apatite prisms and opaque minerals. These inclusions are typical of magmatic zircons. The features of these zircon populations are compatible with a provenance from granitoids. The Betic Cordillera zircon crystals are rounded or subrounded. In these samples euhedral, elongated zircons are minor. The studied zircons display vellow turbidity, corrosion, zoning and overgrowth. Some zircons contain inclusions of apatite prisms and opaque minerals, and these inclusions are typical of magmatic zircons. The characteristics of the Betic Cordillera zircon populations are probably compatible with a provenance from granitoids. The typologic study of zircon population from arenites of the Triassic to Early Jurassic continental redbeds of the Calabrian-Peloritani Arc, Rif and Betic Cordillera stratigraphic sections, has revealed the existence of two distinct arenite groups. The first group includes the arenites from the Calabrian-Peloritani Arc and the Rif area. The zircon typologies suggest a probably provenance from an igneous protoliths. The second group includes the arenites from the Betic Cordillera area. The zircon typologies suggest a detrital origin.