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ORIGIN OF ECLOGITE AND GARNET PYROXENITE FROM THE MOLDANUBIAN ZONE OF THE BOHEMIAN MASSIF, CZECH REPUBLIC AND ITS IMPLICATION TO OTHER MAFIC LAYERS EMBEDDED IN OROGENIC PERIDOTITES IN THE WORLD

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Eclogite and related mafic rocks occur as layers or lenses in many mantle derived peridotite masses in orogenic zones in the world. A popular hypothesis for the origin of such mafic layers is that they represent crystal precipitates from mafic magmas flowing in the upper mantle at various depths (SUEN & FREY, 1987). However, some mafic rocks have been suggested to be of gabbroic origin from their geochemical and mineralogical signature such as positive Eu anomaly and the presence of corundum (e.g., KORNPROBST et al, 1990). The primary igneous mineralogy of these mafic rocks has typically been obliterated through subsolidus recrystallization at various metamorphic conditions and, therefore, their igneous origin must be sought through whole rock geochemical signature. I examined a large data base collected from literature on the eclogites and garnet pyroxenites embedded in garnet and spinel peridotites enclosed in the Gfoehl gneiss and granulites, Bohemian massif (MEDARIS et al, 1995; and others). These rocks may be divided into two sub-groups: the magnesian group (Mg# > 70) and the less magnesian group (Mg# < 62). It was found out that the whole rock compositions of the magnesian group lie on a single straight line with a positive slope on the oxide ratio plot – CaO / MgO vs SiO_2 / MgO. It may be shown that the straight line represents a projection of a mixing plane of olivine, An-rich plagioclase and clinopyroxene – the gabbroic assemblage. The well-defined linear relationship led the author to conclude that the magnesian group of eclogite and garnet pyroxenite, some of which contain kyanite, represents metamorphosed gabbros that had precipitated from basaltic magmas at shallower levels in the Earth. To test this hypothesis, this method of oxide ratio plot was applied to mafic rocks from other well-characterized orogenic peridotites such as Ronda (Spain), Beni Bousera (Morocco), and Horoman peridotites (Japan). It was found out that the magnesian group mafic rocks (Type II), including garnet pyroxenites and olivine-gabbroic granulites, all lie on straight lines on the CaO / MgO - SiO_2 / MgO oxide ratio plot. The linear relationship suggest that the observed compositional variation of these mafic rocks is ascribed to modal variations of original gabbroic minerals whose compositions were rather constant for each locality, which in turn suggests that a dominated process in the formation of original gabbros was *not* likely the fractional crystallization of magmas but some other mechanical processes of differentiation such as crystal sorting in magma chambers.

References

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