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Subduction Initiation for the Formation of High-Cr Chromitites in the Kop Ophiolite, NE Turkey

ZHANG Pengfei, Ibrahim UYSAL, ZHOU Meifu, SU Benxun and Erdi AVCI

1 Department of Earth Sciences, the University of Hong Kong, Hong Kong, China
2 Department of Geological Engineering, Karadeniz Technical University, 61080 Trabzon, Turkey
3 State Key Laboratory of Lithospheric Evolution, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, 100029, China

The Kop ophiolite in NE Turkey, representing a forearc fragment of Neo-Tethys ocean, mainly consists of a paleo-Moho transition zone (MTZ) and a harzburgitic upper mantle unit. The Kop MTZ locally contains cumulate dunite and high-Cr chromitites ($Cr^{\#}$ up to ca. 79), which are cut by pyroxenites. Dunites and chromitites in the MTZ have lower REE concentrations than the primitive mantle by 1-2 orders of magnitudes; their REE patterns vary from depleted to concave shapes. These features probably reflect that the cumulate rocks were produced by magmas derived from depleted mantle, and their concave REE patterns were the modification products of LREE-enriched fluids. Clinopyroxenes from pyroxenites are diopsidic and featured by high $Mg^{\#}$s (ca. 92-96) and CaO contents (ca. 24%-25%); their Al_2O_3 contents (1.0-3.0 wt.%) fall between those of clinopyroxenes in N-MORB and komatiite/boninite, suggesting the parental melts originated from more refractory mantle than abyssal lherzolite. However, these clinopyroxenes display depleted REE patterns highly consistent with those of clinopyroxenes in abyssal lherzolites, indicating their genetic connection with decompression melting of asthenosphere. The cross-cutting relationship between pyroxenite veins and chromitiferous rocks suggests depleted mantle still remained beneath the proto-forearc after chromitite formation; they had not been remarkably modified by slab-derived components and continued interacting with asthenosphere before pyroxenites were generated. This study offers a temporal constraint on the formation of high-Cr chromitites in the Kop ophiolite; they were possibly formed around the transition period between early and late proto-forearc spreading, during which subduction dehydration had not well developed.

* Corresponding author. E-mail: zhangpengfei073061@163.com