

Geochemistry of hydrous peridotites above subducting slab a case study of Ti rich Cr spinel bearing peridotites from Happo Japan

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Twenty samples of tremolite-chlorite peridotites from Happo-One area, central Japan were analyzed for the bulk chemistry (major and trace elements) and mineral chemistry. These peridotites, being serpentinite Melange in high-P/low-T Renge metamorphism, vary from slightly depleted lherzolites (1.2- 1.9 wt% Al_2O_3 , 1.3-2.4 wt% CaO) to highly depleted harzburgites ($Al_2O_3=1.0$ wt% on average, CaO= 0.56 wt% on average) and dunites ($Al_2O_3=0.9$ wt% on average, CaO =0.44 wt% on average) which contain primary Cr-spinel, Cr# = 0.72. Systematic variations of major and trace elements of the bulk composition against MgO are related to degrees of partial melting, conforming a near fractional melting trend from 15% to 30%, (mainly between 15-25% fractional melting) in spinel stability field (e.g. Sc-MgO trend), showing refractory residues of their protoliths.

Some meta-peridotites in the tremolite zone, which are representative of a mantle peridotite facies transition from anhydrous peridotite to low-T tremolite-chlorite peridotites accompanied by Ti-rich Cr-spinel (up to 5.7 wt% TiO_2), show the same compositions with other Happo meta-peridotites except for slightly enrichment in Na_2O (up to 0.33 wt%), Ti (up to 152 ppm) and Ba (up to 25.31 ppm). The Happo meta-peridotites display U-shaped primitive mantle-normalized REE patterns (0.1-0.3 times PM), suggesting mantle metasomatism by metamorphic fluids derived from the subducted slab. Their high enrichment of Pb, Sr, Cs, Rb, Ba, similar to that in forearc peridotite, is due to derivation of these mobile elements from the slab. They have low values (less than 0.3) of LuN and YbN. They show low abundances for Zr, Hf, Nb and Ta, indicating no involvement of metasomatizing melts. The Happo meta-peridotites show abnormal enrichment in vanadium (up to 149 ppm, with an average=122 ppm) relative to forearc peridotites (up to 50 ppm), abyssal peridotites (up to 93 ppm) and PM (82 ppm).

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