Mineral and whole-rock chemical properties of pyroxenites in the peridotites of the Kop Ultramafics, NE Turkey

Ö. BILICI * AND H. KOLAYLI

Department of Geological Engineering, Karadeniz Technical University, 61080-Trabzon, Turkey
(*correspondence: ocubil@hotmail.com)

The Kop ultramafic unit in NE Turkey is one of the largest Alpine type peridotites. Petrographic and field studies in the ultramafic unit indicate that there are widespread two main rock types as harzburgites and dunites. In addition to these, pyroxenites are also locally observed and associated with peridotites.

Pyroxenites crop out as veins/dykes in varying size within peridotites [1]. Orthopyroxenites (>500 m^2) cover larger area than clinopyroxenites (between 10 to 100 m^2) and websterites (<1 m^2). Clinopyroxenites and orthopyroxenites exhibit dyke-like body in dunites and harzburgite, respectively. Websterites are only observed as veins in harzburgitic zone. Orthopyroxenites show coarse grained texture whereas clinopyroxenite and websterites have porphyritic texture. Clinopyroxenites and websterites contain variable amounts of olivine, spinel and magnetite.

Both whole-rock and pyroxene mineral chemistry data of the pyroxenites are characterized by low contents of Al, Na, K, Ta, Zr, Hf, Ti and REE, high Mg-numbers and LILE enrichment relative to less incompatible elements. The mineral and petrochemical data suggest that clinopyroxenites and websterites from the pyroxenites have not been directly crystallized from primary magma(s) derived by partial melting of depleted mantle. Whole-rock and pyroxene compositions of orthopyroxenites are similar to those of ultra-depleted mantle-derived pyroxenites, whereas cliopyroxenites and websterites have very close chemical features to those of pyroxenites in suprasubduction zone mantle.

[1] Bilici (2010) *Karadeniz Technical University, MSc thesis,* 76pp.

In situ dating and investigation of remarkably depleted –27.3‰ SMOW "Slushball" Earth zircons

I. BINDEMAN[1], J. VAZQUEZ[2], A. SCHMITT[3], J. EILER[4], N. SEREBRYAKOV[5] AND D. EVANS[6]

[1]Geol Sci, U. Oregon, Eugene OR; (bindeman@uoregon.edu)
[2]USGS, Menlo Park, Ca;
[3]ESS, UCLA, Los Angeles, Ca;
[4]GPS, Caltech, Pasadena, Ca;
[5]IGEM-RAS, Moscow, Russia;
[6]Geol & Geophys., Yale Univ., New Haven, CT

Paleoproterozoic amphibolites and gneisses - that are remarkably depleted in ^{18}O are found in the Belomorian Belt in Karelia, Russia [1,2]. We mapped their extent to exceed 200x20km and affect metamorphosed mafic intrusions (est. ~2.4 Ga intrusion age) and host 2.6Ga gneisses found in this 1.9 Ga collisional belt. $\delta^{18}O$ values of –7 to –27.3‰ characterize minerals and rocks from several of these localities; some of these rocks are also remarkably depleted with respect to δD (-212 to –235‰ amphiboles). All have typical terrestrial $\Delta^{17}O$ values of 0‰. Based on previous paleogeographic reconstructions, we attribute the origin of these exotic O and H isotope compositions to the hydrothermal alteration associated with subglacial rifting during the Paleoproterozoic panglobal ice ages, but discuss additional possibilities: extremely low-$\delta^{18}O$ Paleo- proterozoic sea water, and excursion of Karelia to polar latitudes. Given that at high-T hydrothermal exchange equilibrium $\Delta^{18}O$(rock-water) is close to zero, but water-rock interaction is rarely 100% efficient, the lowest measured $\delta^{18}O$ value in silicates likely gives the upper $\delta^{18}O$ bound for the altering meteoric fluid; we thus continues our quest to find the lowest $\delta^{18}O$ material such as a mineral assemblage or a tiny zircon fragment that would provide record of $\delta^{18}O$water.

Zircons in these rocks have survived metamorphism and record normal $\delta^{18}O$ cores and extremely low $\delta^{18}O$ rims (down to $\delta^{18}O_{SMOW}$ = 27.3 ‰). The rims are in oxygen isotope exchange equilibrium with host metamorphic assemblages at each locality. We present data from the ongoing investigation of these zircons using large radius ion microprobes for *in situ* U-Pb ages and $\delta^{18}O$ values, ion microprobe profiling using a ~1 μm gallium beam, and NanoSIMS isotope mapping of the zircon with 23 to 34‰ and sharp (~3-5 μm) isotope gradients.

[1] Bindeman *et al.* (2010) *Geology*, **38**, 631. [2] Bindeman, Serebryakov, (2011) EPSL, doi:10.1016/j.epsl.2011.03.031