5.3.P08

Geochemical heterogeneity of south Alpine subcontinental lithosphere: Mantle xenoliths evidence

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The Tertiary Veneto Volcanic Province (VVP; SE Alps, northern Italy) includes Na-rich alkali basalts and basanites hosting many spl-peridotite xenoliths (mg#>88) among the ultramafic nodules which reflect a variably depleted mantle source [e.g. strong Cr/(Cr+Al) ratio increase at a slight $Mg/(Mg+Fe^{2+})$ ratio decrease in spinels] subsequently enriched by different metasomatic processes (e.g. presence of spongy clinopyroxenes; large range of enrichment in LREE, K, Rb, Sr, and P over HREE and HFSE). New geochemical and isotopic (Sr, Nd, Pb, O) data on VVP whole rock xenoliths help evaluating the nature of the geochemical enrichment recorded in the south Alpine subcontinental lithosphere. Compared to various representative world-wide ultramafic xenoliths, the VVP xenoliths show geochemical similarities to those carried by alkaline basalts in tectonic settings dominated by the presence of hot spot magmatism (e.g. Canary and Kerguelen Islands, French Massif Central, Rhon, Eifel). Moreover, most of the enriched xenoliths display significant positive Nb and Ta anomalies, incompatible element ratios, and Sr-Nd-Pb and -O isotopic compositions similar to the host VVP alkaline basalts, thus with a marked OIB-HIMU signature. By contrast, among different agents proposed so-far to explain trace element enrichment in the VVP xenoliths, carbonatite-induced metasomatism does not appear as significantly responsible.

Most of the depleted xenoliths are overall characterized by incompatible element patterns (e.g. troughs at Ba, Nb, and Ta) and ratios (e.g. high Rb/Nb, La/Nb, Th/Yb) likely related to a sedimentary component in their source, thus showing Sr-Nd-Pb-O isotopic compositions falling between the field of MORB and altered oceanic crust ± pelagic sediments. Similar features have been observed for ultramafic xenoliths collected in basalts from subduction-related environments (e.g. Marianas, Philippines, and Papua Nuova Guinea). Lack of significant presence of hydrous phases (phlogopite, amphibole) in the spl-peridotite xenoliths (mg#>88), but persisting geochemical and isotopic heterogeneities, suggests that the effects of any eventual metasomatism inferred by fluids released from a supposed subducted plate beneath the Veneto region, have been subsequently veiled and overlapped by modification induced by mantle diapirism related to alkaline volcanism in the southern Alps.

5.3.P09

Petrology of the peridotite xenoliths from East Asia region: Implications for the evolution of the sub-continental lithosphere

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There are a lot of mantle xenoliths localities in the East Asian continental margin [1]. This region had been the site of active the margin of the Asian continent in Mesozoic to Paleogene time. Therefore, the mantle xenoliths from this reagion give us useful information about the coplicated history of the Asian continent evolution. This paper discusses detailed petrologiccal characteristics of the spinel peridotite xenoliths from Cenozoic alkali basalts in Sikhote-Aline reagion, Far East Russia [2] and from Boun in South Korea [3] and combined with preveous studies, we summarize petrological characteristics of the upper mantle beneath the East Asian continental margin.

The peridotite xenoliths from these two regions are mostly composed of clinopyroxene-rich peridotite, rarely of harzburgite. In the most samples, the Cr# of spinel are lower than 0.2 and the Na2O content in clinopyroxene are higher than 1.0 wt%. The chondrite normalized rare earth element patterns of clinopyroxene are slightly LREE (light rare earth element)-depleted to enriched patterns. These mineral chemistries in the samples suggest that they are metasomatized by some agent correlated with some continental type magmatism rather than arc magmatsm.

It is noteworthy, however, that the peridotite xenoliths with arc or abyssal mantle signatures apparently have not been found from the eastern margin of the Asian continent, despite possible arc settings experienced through geologic time. It is highly speculative but is possible that the sub-arc type mantle material had not been accreted upon arc crust accretion. Alternatively the arc type mantle that had once been as supra-sudction zone was replaced later by the continental rift-zone type mantle in the East Asian continental margin.

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