Geochemical heterogeneity of ultrabasic and basic rocks from suture zones of the Altai-Sayan Folded Area, Central Siberia

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Stretched ultramafic belts are a typical feature of orogenic structures in the Altai-Sayan Folded Area (ASFA). The geodynamical interpretation of them proposes a development of suture zones composed from complexes of seamounts and island arcs and subcontinental crustal or the lithosphere mantle blocks. The isotopic geochemistry of rocks from these fragments of ancient oceanic crust are showed heterogeneity of matter sources and possibility of the spatial combination between different geodynamical units.

Our researches of ultrabasic and basic rock associations from greenstone and ophiolitic belts of ASFA allow demining a clearer interpretation for their forming models. For example, the Kingash massif located in the Eastern Sayan ridge is a multi-age intrusion. It is consist of chemically closed but strongly different in ages and isotopic parameters ultrabasic (1.41 ± 0.5 Ga; εNd +3) and basic (875 ± 40 Ma; εNd ~ 0) intrusion bodies. Spatially accompanied intrusion composed by magmatic harzburgites and gabbro has parameters of depleted mantle substrate (εNd +5).

Ophiolitic blocks of the Kuznetsk Alatau ridge including autonomous bodies of mantle and crustal ultramafites and intrusive gabbroides are present by two petrographic series of rocks. The first of them corresponds to olivine-bearing tholeiitic products of the dry melting of deplete lithosphere mantle (εNd +7…+8; εSr –7…–9). The second unit is correlated to the enstatite-bearing rock association with calc-alkaline features of chemistry (εNd –5; εSr +28) corresponding to the enriched lithosphere mantle of back arc oceanic basins.

Thus the geological mapping of the Siberian orogenic structures is a difficult geological task that proposes new methods of scintific investigations for natural geological objects. Now we must to define not only homogenous petrographical composition of rocks but some genetic features according to a total petrological model of real object.

This study was funded by the RFBR (grant 09-05-00526) and Ministry of Education and Science of the Russian Federation (project 2.1.1/208).

Experimental petrology, geochemistry and petrography of mantle xenoliths from Prahuaniyeu Volcano, Northern Patagonia, Argentine

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The Prahuaniyeu volcano, Northern Patagonia, Argentine, belongs to the North Patagonian Massif and is characterized by OIB-like alkali basalts that host ultramafic xenoliths from the lithospheric mantle, which possibly were stable in the garnet-spinel transition zone. The xenoliths are sp-lherzolites, harzburgites and sp-websterites. Simplectitic texture between the spinel and orthopyroxene indicates the destabilization of garnet (gr) due to decreasing of pressure, suggesting that the reaction ol1+opx1+cpx1+gr1 = ol1+opx1+sp1+opx2+cpx2 took place. Geochemical patterns, normalized to primitive mantle (Sun & McDonough,1989), suggest that the xenoliths come from a depleted mantle, with heavy rare earth elements (REE) fractionation compared to light REE (Ce_N/Yb_N = 16,14 - 26,87). They are enriched in calchophile (W,Pb, Sn, Sb) and in LILE (Ba and Sr) elements. The HFSE (Th, Zr, Hf and Y) are depleted, though Nb and Ta are enriched. These evidences indicate melting processes, followed by mantle metasomatic processes associated to liquids or melts related to the subduction plate, and liquids with primitive characteristics. The xenoliths were submitted to pressures of ~2GPa and temperature of ~1300°C. These experiments resulted in the growth of minerals such as ol, opx, cpx, sp, gr and a liquid phase, enriched in CaO, SiO_2, MgO, and FeO_{total}, indicating that these rocks were in equilibrium in the mantle, in the garnet stable zone.