COMPOSITION AND STRUCTURE OF LITHOSPHERIC MANTLE IN THE PACIFIC MARGIN OF ASIA

Prikhod'ko, V.S.

Institute of Tectonics and Geophysics, Far Eastern Branch of Russian Academy of Sciences, Khabarovsk 680063, Russia

A big collection of samples of spinel peridotite xenoliths (over 350 samples) from the Cenozoic alkali basalt located in all major tectonic structures of the Russian Far East was studied. The information on the composition and structure of the upper mantle under the Khankaisky median massif (Sviyaginsky and Medvezhy volcanoes), Sikhote Alin nappe-fold system (Podchelbanochny, Vostretsovsky, Alchansky, Barkhatny, Anyuisky, Innokent'yevsky, Bolon'sky, and Mukhensky volcanoes), the East Sikhote Alin volcanic belt (Koppinsky volcano) was obtained. 25-35 samples of xenoliths of deep rocks were at random collected from each volcano, so it allows speaking about representative sampling from each location.

Spinel peridotite xenoliths from the region under consideration are characterized by a stable mineral association of olivine, orthoclinopyroxene and chrome-spinel. Water containing minerals such as amphibole or mica do not occur. The modal composition of this group of xenoliths considerably ranges. Spinel lherzolite dominates, harzburgite and olivine websterite are rare. Each volcano is characterized by a dominant shape of xenoliths, certain dimensions of nodules and component minerals, and the rock structure. Practically all spinel peridotite samples studied have some traces of plastic deformations.

The petrochemical structures of individual groups of xenoliths from a greater part of localities demonstrate no main component discreteness. The rock compositions are characterized by the maximum contents of CaO and Al2O3 at the interval of 3-4 weight% and the absence of low values of these oxides. The intermediate compositions of spinel peridotite xenoliths from these volcanoes are most close to the numerous estimations of the primitive mantle composition.

For some locations of deep rocks (Podchelbanochny, Medvezhy, Bolon'sky and Innokent'yevsky) the chemical analyses of spinel peridotite xenoliths are heterogeneous, especially as regards the contents of such easily fusible components as CaO and Al2O3.

To our mind, such discreteness is not connected with the heterogeneous distribution of monoclinic pyroxene but has a genetic nature. This is confirmed by the chemical composition data on the component minerals. In these volcanoes, no less than two independent petrochemical groups of xenoliths have been determined. As a rule, the main group, has the composition similar to the described above, and the second one has lower CaO and Al2O3, and higher MgO contents. The latter one is similar to the depleted oceanic mantle.

Petrochemically homogeneous samples of spinel peridotite xenoliths characterize the undepleted mantle of the Sikhote Alin area, volcanic belt and one of the Khankaisky massif terranes. As for the lateral compositional variations of the upper mantle, the

average contents of CaO and Al2O3 in the nodules from the localities most close to the continental margin are somewhat enriched compared to the other representatives of this group. Petrochemically depleted peridotites were discovered in the mantle blocks under the Khankaisky massif and the Sikhote Alin fold system.

The rare earth elements (REE), high - field - strength (HFSE) and other incoherent elements in the spinel peridotite xenoliths characterizing the upper mantle of various tectonic structures of the region were examined. The rare element composition has specific features in each mantle site, the samples of xenoliths from the East Sikhote Alin volcanic belt being geochemically most similar to the primitive mantle composition.

Spinel peridotite minerals have no significant compositional variations. Significant differences in some elements were noted in spinel and pyroxene from depleted and undepleted spinel peridotite.

Thus, petrochemical, geochemical and mineralogical data on deep xenoliths testify to highly heterogeneous mantle material in the territory considered. The primitive mantle localities were determined at the oceanic boundary under the East Sikhote Alin volcanic belt, and deep in the continent, the mantle rock composition deviates from the primitive mantle composition and becomes more heterogeneous. It is suggested that the blocks of oceanic mantle from accreted terranes participate in the formation of the modern continental mantle in the Asian margin.