Major and incompatible trace elements in clinopyroxenes from different magmas

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We have compared a lot of compositions of clinopyroxene from different types of basaltic lavas.

We have studied tholeiites, traps and alkaline magmas that are common in Antarctica and nearby region of Southern Atlantic. Grains of clinopyroxene were picked from basaltic magmas of different ages: from Mesozoic basaltic flows related with traps in the region of Dronning Maud Land Province (DMLP) to Cenozoic alkaline lavas erupted in the segment of Hobbs Coast (Western Antarctic) and to contemporaneous tholeiites formed in the region of Western End of South-West Indian Ridge (SWIR). All magmas are of olivine-bearing type.

The variations of most litophile elements in clinopyroxenes determined by ion microprobe were analogous to all studying regions and had well correlation on the graphs Mg# - element. At the same time clinopyroxene from the alkaline magmas from Hobbs Coast Province had visible enrichment in Ti. The clinopyroxene from traps of DMLP had enrichment in Cr. During the process of differentiation of magmas the maintenances of incompatible elements increased as well as increased the ratios of the most incompatible elements to less incompatible.

The petrogenetic compare of clinopyroxene from basalts from the Spiess Ridge and from the segment of Southwest Indian Ridge in the Bouvet region showed that paragenesis of minerals is similar and consists of olivine, plagioclase and clinopyroxene.

Using several methods for determent the pressures of origin of the basaltic rocks: Nimis, 1998; Yang et al., 1996, based on the abundances of major elements in basaltic glasses, we had estimated that pressures of liquid crystallization under the Spiess Ridge and in the Bouvet segment are similar and their values were from 2 to 5 kbar. And the analogous estimates fo r Hobbs Coast and Dronning Maud Land were 3-12 km and 1-6 km respectively.

Geochemical map of the Tohoku region, northern Honshu, Japan

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Geochemical characteristics of river sediments from the Tohoku region, northern Honshu, are studied, as a part of full-land geochemical mapping project of Japan, for environmental purposes and for understanding of a large-scale elemental distribution in an island arc.

The mapped region belongs to Northeast Japan Arc. This region consists of mountain areas, small basins and coastal plains. The Ou Mountains extends north to south through the region and correspond to the Quaternary volcanic front. Paleozoic to Mesozoic basement rocks are mainly exposed in the eastern part (Kitakami Mountains) and in the southwest part (Asahi Mountains). Other areas are widely covered by Neogene-Quaternary mafic-felsic volcanic rocks, sedimentary rocks and sediments.

About 390 river sediments were collected. They were analyzed for more than 50 elements by ICP-AES, ICP-MS and AAS.

The concentration patterns of Mg, Sc and Co in the geochemical maps accord with the distribution of mafic and felsic rocks in the whole area.

The areas showing high concentrations in light rare earth elements (LREEs), Th and U coincide with the distribution of pre-Neogene basement rocks, in many cases. The highest concentrations are obtained in the areas where the Cretaceous granitic rocks are exposed, especially in the Asahi Mountains. The area of the Jurassic accretionary complex in the Kitakami Mountains still shows higher concentrations than the area of the Neogene-Quaternary rocks. The relatively low concentrations in these elements are common characteristics for the whole area where the Neogene-Quaternary rocks are exposed, including sedimentary rocks and felsic volcanic rockst. The variations of the LREEs, Th and U in the geochemical maps are concordant with chemical variation of dominant rocks, and they possibly indcate the change of geological setting of the Tohoku region from continental margin to island arc in Cenozoic. The concentrations of K and Rb are low in the Ou Mountains, especially at the northern part, reflecting the chemical characteristics of the rocks at the volcanic front.

The areas especially rich in Cu, Zn, As and Pb coincide with the distribution of mineral deposits. The high concentrations related to Neogene Kuroko deposits, hydrothermal-vein deposits, and Cretaceous skarn-type deposits are recognized.