

## Petrogeochemistry of Hornblende-Bearing Gabbro Intrusive, the Greater Caucasus

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**Abstract :** The Jalovchat gabbro intrusive is exposed on the northern and southern slopes of Main Range zone of the Greater Caucasus, on an area about 25km<sup>2</sup>. It is intruded in Precambrian crystalline schists and amphibolites intensively metamorphose them along the contact zone. The intrusive is represented by hornblende-bearing gabbro, gabbro-norites and norites including thin vein bodies of gabbro-pegmatites, anorthosites and micro-gabbros. Especially should be noted the veins of gabbro-pegmatites with the gigantic (up to 0.5m) hornblende crystals. From this point of view, the Jalovchat gabbroid intrusive is particularly interesting and by its unusual composition has no analog in the Caucasus overall. The comprehensive petrologic and geochemical study of the intrusive was carried out by the authors. The results of investigations are following. Amphiboles correspond to magnesiohastingsite and magnesiohornblende. In hastingsite and hornblende as a result of isovalent isomorphism of Fe<sup>2+</sup> by Mg, content of the latter has been increased. By AMF and Na<sub>2</sub>O+K diagrams the intrusive rocks correspond to tholeiitic basalts or to basalts close to it by composition. According to ACM-AMF double diagram the samples distributed in the fields of MORB and alkali cumulates. In TiO<sub>2</sub>/FeO+Fe<sub>2</sub>O<sub>3</sub>, Zr/Y-Zr and Ti-Cr/Ni diagrams and Ti-Cr-Y triangular diagram samples are arranged in the fields of island-arc and mid-oceanic basalts or along the trends reflecting mid-oceanic ridges or island arcs. K<sub>2</sub>O/TiO<sub>2</sub> diagram shows that these rocks belong to normal and enriched MORB type. According to Th/Nb/Y ratio, the Jalovchat intrusive composition corresponds to depleted mantle, but by Sm/Y-Ce/Sm - to the MORB area. Th/Y and Nb/Y ratios coincide with the MORB composition, Th/Yb-Ta/Yb and La/Nb-Ti ratios correspond to N MORB, and Rb/Y and N/Y - to the lower crust formations. Exceptional are Ce/Pb-Ce and Nb/Th-Nb diagrams, showing the area of primitive mantle. Spidergrams are characterized by almost horizontal trend, weakly expressed Eu minimums and by a slight depletion of light REE. Similar are characteristic of typical tholeiitic basalts. In comparison to MORB spidergrams, they are characterized by depletion of light REE. Their correlation to the spidergrams of Jalovchat intrusive proves that they are more depleted. The above cited points to the gradual depletion of mantle with the light REE in geological time. The RE and REE diagrams reveal unexpected regularity. In particular, petro-geochemical characteristics of Jalovchat gabbroid intrusive predominantly correspond to MORB, that usually is an anomalous phenomenon, since in 'ophiolitic' section magmatic formations represented mainly by gigantic prismatic hornblende-bearing gabbro and gabbro-pegmatite are not indicated. On the basis of petro-mineralogical and petro-geochemical data analysis, the authors consider that the Jalovchat intrusive belongs to the subduction geodynamic type. In the depleted mantle rich in water the MORB rock system has subducted, where the favorable conditions for crystallization of hornblende and especially for its gigantic crystals occurred. It is considered that the Jalovchat intrusive was formed in deep horizons of the Earth's crust as a result of crystallization of water-bearing Bajocian basalt magma.

**Keywords :** The Greater Caucasus, gabbro-pegmatite, hornblende-bearing gabbro, petrogenesis

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