

# Major and trace element geochemistry of Mesozoic igneous formations of the Ukrainian Carpathians as an indicator of paleotectonic settings

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Mesozoic igneous rocks are widespread on the south slope of the Ukrainian Carpathians (Chivchin mountains, Rahiv zone, Ugolka river, Trostianets and Vulhovchik stre-

ams) and in the basement of the Transcarpathian depression. At the first stage of investigation we subdivided them, according to territorial principle, into five complexes: Transcarpathian (basalts, diabases, picritic tuffs), Uglia (diabases), Rahiv–Chivchin (basalts, diabases), Trostianets (basalts, basaltic andesites and trachytes) and Vulhovchik (tra-

chydolerites). Later we discovered, that they have distinctive major and trace element characteristics, as the result of their different origin.

Basalts and diabases of the Transcarpathian, Uglia and Rahiv-Chivchin complexes are similar to each other in their major element compositions, with 49–51 wt.% SiO<sub>2</sub>, 1.5–2.5 wt.% TiO<sub>2</sub>, 18.2–18.8 wt.% Al<sub>2</sub>O<sub>3</sub>, 12 wt.% FeO (total Fe expressed as FeO), 4–6 wt.% MgO, 8–11 wt.% CaO, 3–4 wt.% Na<sub>2</sub>O, 0.4–1.35 wt.% K<sub>2</sub>O, 0.4–0.6 wt.% P<sub>2</sub>O<sub>5</sub>. They correspond to sub-alkaline tholeiitic rocks of oceanic floor. The majority of rocks normalised to MORB show low concentrations of Cr, Sc, Co, Ni and are slightly enriched in V, Zn, Pb, U and lithophile elements — Rb, Sr, Zr, Th, Ba, Nb. We consider them to be fragments of dismembered Mesozoic ophiolitic sequences. However, the distribution of trace elements (enrichment in lithophile and depletion in ferric elements) indicates that these rocks are not directly related to mid-ocean ridge, and were formed from non-evolved mantle in the narrow trough with oceanic crust.

Picritic tuffs of the Transcarpathian complex correspond to sub-alkaline melanocratic rocks. In terms of trace elements they characterised by normal distribution

of Sc, Co, I (in comparison with picritic standard), low concentrations of Cr and Ni, and are strongly enriched in Pb and lithophile elements — Sr, Ba, Rb, Zr, Nb, Th. Geochemical features suggest the interplate origin of picritic tuffs. From our point of view they mark the initial stage of continental crust destruction in this region.

Magmatic rocks of Trostianets complex, in comparison with the basaltic rocks described above, have decreased FeO (10 wt.%), MgO (3.1 wt.%), increased Na<sub>2</sub>O (4.6 wt.%) and K<sub>2</sub>O (2 wt.%) content and correspond to magmatic formations of continental crust. These rocks much more depleted in Fe-group elements, especially V and Cr, and enriched in lithophile elements (Ba, Rb, Nb). High content of U is characteristic. Probably, they were formed in conditions of intracontinental rifting.

Trachydolerites of Vulhovchik complex correspond to alkaline rocks. They are characterised by high potassium content (3–6%) and belong to continental formations. With respect to other magmatic complexes they are strongly depleted in Cr, Ni, Sc and enriched in Sr, Zr Nb and Ba. The origin of trachydolerites is closely connected with the pre-existing continental block, which separated two oceanic troughs.