RADIOACTIVITY AND GEOCHEMISTRY OF CALC-ALKALINE NEOVOLCANITES OF THE WEST CARPATHIANS

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Summary: The distribution of radioactive elements (Th, U, K) and selected trace elements (Rb, Sr, Ba, Y, Zr, V, Cr, Ni) in a set of 29 volcanic rocks of the West Carpathians was studied. The rock types follow the typical calc-alkaline sequence from basaltic andesites to rhyolites with average contents of SiO₂, K₂O, Th, U, Rb, Ba, and Zr increasing, and with average contents of TiO₂, Al₂O₃, FeO, MnO, MgO, CaO, P₂O₅, Sr, V, Cr and Ni decreasing from less to more acid rocks. Statistically significant differences in the contents of Th, U, Rb, Sr, Ba, Zr, K₂O, CaO and P₂O₅, found between the pyroxene andesites of Central and Eastern Slovakia, may indicate that the volcanism in both regions took place under different conditions. The andesites of Central Slovakia are characterized by relatively high contents of Th, U and Rb as opposed to the andesites from other volcanic areas, e.g., from the intraoceanic island arcs, the Andes or the Mexican volcanic belt.

INTRODUCTION

The volcanic rocks studied in the present paper come from Central and Eastern Slovakia, two areas, which are supposed to have a different tectonic history in the development of the Carpathian arc. Also the chemical composition of the volcanic rocks from both regions displays some differences in the distribution of radioactive and selected trace elements in rhyolites [1, 2], and in the distribution of selected trace elements in andesites [3]. In other volcanic areas of convergent plate margins, it was found that the chemical composition of volcanic rocks could be influenced by the specific tectonic conditions of the corresponding volcanic activity [4]. In order to start similar studies in the Carpathian region, a set of 29 samples of calc-alkaline volcanic rocks was selected and analyzed for radioactive and some trace elements using the same methods and laboratories as in [4]. The main attention was paid to the behaviour of the studied elements in the dominant rock type, i.e. in the andesites of both regions.

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Fig. 1. Schematic geological map showing the distribution of volcanic rocks under study. 1 — young alkaline basalts; 2 — calc-alkaline volcanic rocks; 3 — volcanic tuffs.