GEOCHEMISTRY OF AMPHIBOLITES AND PARAGNEISSES FROM THE CONTACT OF THE KUTNÁ HORA CRYSTALLINE UNIT, MOLDANUBICUM AND BOHEMICUM (CENTRAL BOHEMIA, CZECH REPUBLIC)

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In the area of Sázava nad Sázavou, 50 km ESE of Prague, the contact between three regional geological units of the Bohemian Massif — Moldanubicum, the Kutná Hora Crystalline Unit (KHCU) and Bohemicum (represented by roof pendants of the Central Bohemian Pluton – CBP) — is exposed.

The following lithotectonic units differing in both lithology and P–T paths can be distinguished from the bottom to the top of the structural succession: Moldanubian Varied Unit (MVG), Mica Schist Zone (MSZ) Kouřim orthogneiss nappe (both usually assigned to KHCU), Gföhl Unit (GF) and strongly sheared granitoids of CBP with preserved relics of metasedimentary and metavolcanic rocks of the Bohemicum. Psammo–pelitic lithologies prevail in all units (except for the Kouřim nappe). Amphibolites and marbles are interlayered in MVG and MSZ, anatexites and mantle-derived rocks are typical of GF. Metasediments and metabasites were studied to provide constraints on tectomagmatic setting and original relations of these units.

Paragneisses of all units can be divided into three groups according to their mineralogy and geochemistry:

1. Paragneisses of MSZ and MVG show evolved REE patterns as well as enrichment in K_2O, P_2O_5, Rb, Ba, K, Th, and depletion in CaO, Na_2O and Sr, compared to the average upper continental crust composition. They were probably derived at an active continental margin or in an ensialic island arc.

2. Migmatites of GF are mostly geochemically more evolved than paragneisses of the first group, but are more variable in composition, due to their complex tectonometamorphic evolution as well as a primary variability of their source rocks. The former usually have higher contents of K_2O, P_2O_5, La, Ce, Cr and Ni as well as lower contents of CaO and Na_2O.

3. Upper Proterozoic graywackes and pelitic graywackes of the Bohemicum have a contrasting geochemical signature compared to the previous groups. They are enriched in Na_2O, CaO and Sr, and depleted in K_2O and Rb; typical are also different ratios of K_2O/Na_2O, Al_2O_3/Na_2O, SiO_2/Na_2O. Chemistry of graywackes was influenced by an influx of a less evolved material, derived probably in an island arc setting.

A similar subdivision can be applied to metabasic rocks. Banded amphibolites of MSZ and MVG, which were probably derived from identical magma source, can be distinguished from metabasites of GF and Bohemicum.

Banded plagioclase-bearing amphibolites of MSZ and MVG fall mostly in the field of tholeiitic basalts. The less evolved types can be compared with the recent MORB or transitional P-MORB basalts with a varied degree of crustal contamination. The more evolved types with steeper REE patterns, strongly enriched in K, Rb, Ba, Th, U, La and Ce and with a very slight Nb and Ta depletion, correspond to tholeiitic within-plate basalts.

Metabasites of GF are petrographically more variable. The most primitive MORB-like signature appears in coarse-grained pyroxene-bearing gabbroamphibolites. Banded amphibolites have usually higher contents of lithophile elements and steeper REE patterns. Coarse-grained metamonzogabbros and metamonzodiorites have features typical of more evolved Al-rich calc-alkaline rocks. Metabasites of the Bohemicum from the Stříbrná Skalice area differ, by both major-element (high SiO_2, Al_2O_3, Na_2O and K_2O) and REE chemistry, from both previous units. They probably originated in a convergent setting.

Protoliths of metabasites and paragneisses of MVG, MSZ suggest that rocks of these units originated in the same basin in contrast with GF, which represents a separate unit. The contact between MSZ and MVG probably does not represent an important terrane boundary. The nappe structure in this area originated before intrusion of granitoid masses of CBP (~ 340 Ma) which were thrust in a dextral ramp regime over the rocks of MVG, MSZ and GF.