PALEOZOIC ENDOGENIC REGIMES AND METALLOGENIC FEATURES OF ORE-BEARING BLOCKS IN THE BOHEMIAN MASSIF

V.I. VELICHKIN, B.L. RYBALOV, B.M. SELTSOV, A.V. TIMOFEEV

Institute of Geology Ore Deposits, Petrography, Mineralogy and Geochemistry (IGEM), Russian Academy of Science (RAS), Staromonetny per., 35, 109017 Moscow, Russia

1. The inner structure of Bohemian Massif Variscan composed of folded metamorphic complexes is formed by tectonic blocks – synclinoria and anticlinoria – developed at Paleozoic subgeosyncline throughs and uplifts.

Synclinoria are characterized by a reduced ancient thickness of the crust and its sialic part, low-grade metamorphism of Prevariscan basement, and by limited spatial development of postkinematic (orogenic) granites. Anticlinoria in the Bohemian Massif marginal areas have much in common with synclinoria. However, anclinoria in the core of the Bohemian Massif have an increased thickness of the crust and of its sialic part, high-grade metamorphism of the Prevariscan basement and wide development of granites.

2. The differences in the structure of these tectonic blocks resulted from their evolution in different endogenic regimes. The anticlinoria which developed in the uplifted blocks in the core of the Bohemian massif are characterized by intense multistage deep-seated tectonic processes accompanied by the ascent of mantle fluids and of heat flow. In all other tectonic blocks deep-seated tectonic processes developed under relatively moderate thermal regime of the crust.

3. In the Upper Carboniferous endogenic processes caused an intense granite generation in the anticlinoria within the core of the Bohemian massif. During this process enormous geochemically specialized intrusive-anatectic systems were formed in the time interval of 50–70 Ma. In the blocks with homogenous sialic substrate like in the Krušné hory (Erzgebirge) - Smrčiny (Fichtelgebirge) anticlinorium there originated series of granite-leucogranite type. In the blocks with heterogenous structure of varigated composition (Moldanubian anticlinorium) there formed the series of a granodiorite-granite type.

4. Metallogenic specialization of tectonic blocks in the Bohemian Massif and intensity of their ore-forming processes are directly dependent on endogenic regimes. In synclinoria characterized by a weak manifestation of deep-seated petrogenetic processes (the Thuringian, Barrandian and other synclinoria) small-sized accumulations of pyrites-ores of stratiform type originated.

The anticlinoria with an intense spatial development of postkinematic specialized granitoids were the most ore-enriched of blocks of the Bohemian Massif. In spatial and temporal association with the granite series of various petrochemical types many hydrothermal deposits were formed in these blocks: Sn-W, Zn-Pb-Ag-(Cu-Au), Sb, F, U, associated with the granite-leucogranite series (the Krušné hory (Erzgebirge) - Smrčiny (Fichtelgebirge) anticlinorium), and Au, Zn-Pb-Ag-Cu, Sb, U, associated with the granodiorite-granite ones (Moldanubian anticlinorium). Composition variations in the indicated series correlate with geochemical specialization of postkinematic granites and with the specialization of their ore-bearing solutions in halogens: the chloride-fluoride type is characteristic of granite-leucogranite series and the chloride type the granodiorite-granite one.

STRUCTURE OF THE BOHEMIAN MASSIF

S. VRÁNA

Czech Geological Survey, Klárov 3, 118 21 Praha 1 Czech Republic

This contribution will examine and comment some aspects of this complex grouping of problems. A brief review of structural division of the Bohemian Massif will be presented with emphasy on alternatives receiving wider acceptance.

Disparity of the main geotectonic zones in the Hercynian fold belt, i.e. Rhenohercynian, Saxothuringian, and Moldanubian is noted. The Moldanubian zone will be discussed in some detail, as this least understood and controversial unit yielded much new information during the last decade. In methodology of large scale tectonic structure analysis there is continuing preference for the tectonostratigraphic approach. At present, the following main units are widely recognized:

1. Gföhl unit (granulite complex)
2. Variegated unit (in part Drosendorf unit)
3. Monotonous unit

The stratigraphic age of important members of these units is variably considered as Upper Proterozoic and Lower Paleozoic. At the same time, there is increasing evidence, coming mainly from U–Pb studies on zircon and Sm–Nd isotopic work, for a significantly heterogenous nature of the Moldanubian complex in terms of age. Examples include the following units:

1. Světlík orthogneiss and correlatives near Český Krumlov in southern Bohemia - U–Pb zircon age of the tonalitic to dioritic magmatic protolith 2 050 to 2 104 Ma, (Wendt et al., 1993).
2. Dobra orthogneiss, Lower Austria, U–Pb zircon age near 1 380 Ma (Gebauer–Friedl, this volume); Dobra gneiss was suggested as basement to the Variegated unit by Fuchs (1976) on geological grounds.
3. Winklarn unit carrying granulites, eclogites, and peridotites equilibrated/cooled at about 430 Ma, is thus distinct from the Variscan granulite–eclogite–peridotite assemblage as it is represented in Lower Austria, W Moravia and southern Bohemia.
4. The Sušice Variegated unit in SW Bohemia Moldanubian, occurring SW of the fossiliferous Lower Paleozoic in the roof pendants ("islets") on the Central Bohemian Pluton and showing a comparable lithology, can be interpreted as of Lower Paleozoic age (Chlupáč 1992).

Recognition of several older crustal segments in the Moldanubian Zone points to a limited validity of division of the Moldanubian to Gföhl, Variegated, and Monotonous units. The newly recognized Světlík eclogite belt, localized in the upper structural level of the Monotonous unit SW of Český Krumlov and just below the base of the Lower Proterozoic Světlík orthogneiss (overlain in turn by the Variegated unit) (Vrána 1989) represents a major suture sited several km below the so-called "Main Moldanubian Thrust" shown by Matte et al. (1990) at the base of the Blanský les granulite massif.

These relations and the above data indicate the scope of the newly emerging stratigraphic and tectonic complexity of the Moldanubian Zone and the need of further geochronological, tectonic, and petrological studies.

Some aspects of the polyphase nature of deformation and metamorphism, abundance of upper mantle segments intersliced in the crustal units, and the multitude of granulite P–T–t trajectories exhibited by various occurrences will also be discussed.

PROJECT 2100 - GEOLOGICAL MODEL OF WESTERN BOHEMIA IN RELATION TO THE DEEP BOREHOLE KTB IN THE FRG

S. VRÁNA, V. ŠTĚDRÁ, V. ŽÁČEK

Czech Geological Survey , Klárov 3, 11821 Praha 1, Czech Republic

The project has been formulated in 1990 for the period 1991–1994 and works commenced in January 1991 as a program financed through the Ministry for Environment of the Czech Republic. The project including cooperation of the institutions in the Czech Republic is aimed at formulating a model of the Earth crust in W Bohemia using also all relevant geological and geophysical data which issue from the program KTB in Northern Bavaria, FRG. As the KTB is located near the CR–FRG border, the aspect of exchange of information on all geological units around the KTB location is of a practical importance. The cooperation is formulated within the program of scientific and technical cooperation "Erkundung und Modellierung der mitteleuropäischen Erdkruste im Umfeld des Kontinentalen Tiefbohrprogramms der Bundesrepublik Deutschland (KTB)", supported by a bilateral agreement on the government level and signed by representatives of Niedersächsische Landesamt für Bodenforschung, Hannover and of Český geologický ústav, Praha.

Scientific and technical results of this project will be also significant for decisions with environmental impacts, affecting the Earth crust in W.Bohemia, including aspects of groundwater reserves and their protection, seismic stability and stress state of the crust, potential of geothermal energy and others.

Following cooperating organizations participate in the project : Czech Geological Survey – coordinating organization; Geofyzika Brno a.s.; Geophysical Institute, Czech Academy of Science; Geological Institute, Czech Academy of Science; Faculty of Science, Charles University; Aquatest a.s.;