CHARACTER OF PALAEOFLUIDS IN THE WESTERN PART OF THE BOHEMIAN MASSIF: A FLUID INCLUSION RECORD

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New data on palaeofluids from mineral associations of several geological units of the Western Bohemian Massif were obtained within the framework of the project "Geological model of Western Bohemia in relation to the deep borehole KTB in the FRG". A combination of optical microthermometry and micro-Raman spectrometry (carried out in CREGU, Nancy) was applied on fluid inclusions from rocks of several units: HP–HT granulites of the Southern Bohemian Moldanubicum (the Blanský les, Prachatice, Křišťanov and Lišov granulite massifs), quartz veins (partly Au-bearing) along the boundary of the Varied and Monotonous Group of the Šumava Moldanubicum (the Kašperské Hory deposit), LP–LT Barrandian Upper Proterozoic volcano–sedimentary rocks (Mítov) and Pb–Zn vein epithermal mineralization in the Bohemicum (the Stříbro ore district).

Several types of fluid inclusions can be distinguished with respect to their composition from all the associations studied: H_2O-rich, H_2O–CO_2 (+CH_4, N_2), CO_2-rich, H_2O–CH_4 (+CO_2, N_2), N_2 (+CO_2, +CH_4). All types of fluid inclusions (C–O–H–N composition) mentioned so far were found in minerals from metamorphic mineral associations, whereas in the post-metamorphic associations only water-rich fluid inclusions were observed.

The content of H_2O, CO_2 and $CH_4 + N_2$ phases is very variable in metamorphic minerals. The amount of CO_2 in fluids increased with the metamorphic grade. The inclusions of water-free liquid CO_2 are typical of minerals from granulites. The fluids with predominance of CH_4 and/or N_2 belong to relatively late generations of inclusions, which originated under lower temperatures (< 350 ^oC) and pressures (< 100 MPa). The presence of CH_4-rich fluid in minerals from the inter-pillow matrix from the Upper Proterozoic metavolcanic rocks (Mítov) is connected with the basalt–sediment–seawater interaction.

The Late Variscan palaeofluids of the Pb–Zn mineralizations (the Stříbro type) are characterized by mixing of chloride solutions of variable Na–K–Mg–Ca composition. Ion chromatographic technique (carried out in USGS, Denver) also revealed elevated bromide and ammonium concentrations suggesting that the fluids reacted with organic-rich lithologies.

Fluid inclusions in granulites formed during their retrograde development under the amphibolite-grade and lower metamorphic conditions (down from about 650 ^oC and 400–450 MPa) connected with deformation processes and thrusting that brought granulite massifs to the higher crustal position.

The origin of the Kašperské Hory vein system during uplift of the Moldanubian rocks — under the conditions of retrograde metamorphism — started already under pressures close to 450 MPa and 500 ^oC and continued during the successive uplift up to pressures of about 160 MPa.

The study of fluid inclusions in the products of basalt–sediment–seawater interaction from the Mítov volcano–sedimentary complex showed that H_2O-rich inclusions (Th to 315 ^oC) probably represent an initial stage of interaction, whereas later H_2O–CH_4 inclusions were trapped during the subsequent fluid circulation under lower temperatures of about 200 ^oC and pressures not exceeding 100 MPa.

Temperatures of homogenization of inclusions in minerals from the Stříbro ore district vary from 130 ^oC to about 100 ^oC for quartz, fluorite, dolomite–ankerite and sulphidic minerals. For late barite and calcite, these were less than 100 ^oC. The hydrothermal veins represent low-temperature fluid circulation through open tensional fault zones in the consolidated and relatively cold crust.