ŽELEZNÁ HŮRKA (EISENBÜHL) — VOLCANOLOGY AND GEOCHEMISTRY OF A QUATERNARY SCORIA AND LAPILLI CONE IN THE OHŘE- (EGER-) RIFT

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Železná Hůrka is situated between the Czech town of Cheb and the German town of Neualbenreuth at the junction of the ENE–WSW striking Ohře rift and the NNW–SSE striking fault zone of Mariánské Lázně. Alhough volcanic activity in this area culminated in the Tertiary, it is still apparent in a regional mineral water province and seismic events like "Vogtländische Schwarmbeben" of 1985.

Samples were collected for classification and characterization of the rocks and the mechanisms of fragmentation and transport. Our interpretations are based on the investigation of 85 thin sections, 40 XRF whole-rock analyses and sieving of 28 samples for the determination of sedimentological parameters.

The volcano has the form of a shallow cone with a height of 25 m covering an area of 100 to 150 m. Additionally, volcanoclastic deposits have built eruption fans up to a distance of 1.5 km to the North and West of the volcano. The wall consists of a very well bedded succession of grey and red-brown layers. The colour reflects directly the content of xenoliths. The crater is filled with a breccia of bombs and their fragments. This pyroclastic breccia overlies the whole cone with a sharp discontinuity. The volcanoclastic rocks of Železná Hůrka consist of juvenile components and lithoclasts. Juvenile material is either compact to poorly vesicular or of high vesicularity. Lithic fragments are made of xenoliths of the crystalline basement, mantle-derived megacrysts and crystal accumulates of forsterite-rich olivine, phlogopite and kaersutite.

According to different porosities of juvenile clasts, layering, sorting, median diameter and contents of ash and xenoliths, Železná Hůrka has to be considered as a mixed scoria and lapilli cone. The succession building up the wall of the volcano reveals partly rhythmic series of hydroclastic and pyroclastic fragmented tephra, whereas the breccia is derived from a purely pyroclastic final stage. A predominantly hydroclastic initial stage formed the fan-shaped volcanoclastic deposits. The ratio of sorting and median diameter characterizes the volcanic successions as coarse fall deposits.

Morphology, absence of a soil horizon, freshness of volcanoclasts and little depletion in mobile elements are assumed to indicate a maximum age of 100 000 years.

Juvenile clasts are made of ore-rich mela-olivine-nephelinites. Olivine and titanian augite form macro- and microphenocrysts. The microcrystalline groundmass consists of clinopyroxene, magnetite, olivine, nepheline and basic glass. Low differentiation indices, mantle-derived megacrysts and nodules and high concentrations especially of Ni and Cr suggest a primitive magma. The ultrabasic rocks are enriched in mantle incompatible elements. Ratios of mantle incompatible elements like Nb, Ba, Zr and Y and high contents of Nb exclude an enrichment by crustal contamination. Thus, a mantle source enriched in LILE has to be envisaged.

The Rb/Nb ratio between 0.44 and 0.66, K/Nb ratio between 100 and 140, K_2O/Na_2O ratio of 0.48 to 0.75 and high contents of Ba indicate a mantle reservoir enriched by subducted oceanic crust.