Magnetic and geochemical constrains on alteration processes: An example from the Krudum granite body (KGB), western Bohemia

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The Krudum granite body (KGB) represents a reversely zoned pluton with the oldest, least fractionated biotite granite in the centre, surrounded to the NW by younger topaz-bearing, two-mica granite. The youngest, topaz–albite granite forms the outermost shell. From geochemical point of view, all these rock types are subaluminous to strongly peraluminous (leuco-) granites (A/CNK = 1.0–1.5), which form a compositional continuum.

The Vysoký Kámen Stock in the SE part of the KGB is formed by topaz–albite leucogranite and – together with alkali-feldspar syenite – it represents apical parts of a highly fractionated granite body, which crystallized from residual magmas oversaturated in respect to alkalis and fluorine (René, 1998; Breiter et al., 1999; Jarchovský, 2006).

The alteration of topaz-bearing granites was connected with a strong influx of volatile-rich fluids and opening of the geochemical system in general. In order to bring new insights into such a complex alteration process, we have conducted a detailed comparative study of rock physical properties on variously altered samples taken from the Vysoký Kámen Stock. The modelling included the evolution of rock physical properties (porosity, density), rock magnetic properties (magnetic susceptibility, magnetic minerals abundances, anisotropy of magnetic susceptibility) and whole-rock chemical composition (mobility of elements).

Two alteration processes related to chemically different fluids could be recognized at the Vysoký Kámen Stock, feldspathization and greisenization. The greisenization was caused by near-critical low-salinity aqueous fluids with low amounts of CO_2, CH_4, and N_2 (≤ 10 mol. % in total) at ~350–400 °C and 300–530 bar (Dolníček et al., 2012). The influx of these fluids led to enrichment in Sn, W, Al, Na, K, F, Rb, Cs, Sr, Nb and LREE. The other characteristic fluid--related feature is the occurrence of tetrad effect in chondrite--normalized REE patterns. Compared to leucogranite and alkali-feldspar syenite from the Vysoký Kámen Stock, the greisenized samples are also enriched in Fe, Mn, Co and Zn, i.e. elements triggering paramagnetism of minerals. During *feldspathization,* the fluid leached mainly Fe and Mn from the decomposed Li-micas (protolithionite and zinnwaldite) and produced muscovite in rock microstructure and quartz-hematite veins.

The magnetic susceptibility in the whole KGB is very low (median = 66.9^{-06} [SI]). The leucogranite and alkali-feldspar syenite from the Vysoký Kámen Stock shows even lower values of magnetic susceptibility (from -5^{-06} to 7^{-06} [SI]). Feldspathization did not change the magnetic susceptibility significantly, while the greisenization increased susceptibility up to 300^{-06} [SI]. The thermomagnetic curves have hyperbolic shapes characteristic of paramagnetic phases in paramagnetic samples including greisenized ones. With decreasing magnetic susceptibility, the thermomagnetic curves show mainly diamagnetic character. In contrast to evolution of the scalar magnitudes, the anisotropy of magnetic susceptibility keeps the consistent subhorizontal magnetic foliation with NE–SW trending horizontal lineations.

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