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A hot exhumation makes "cool" textures: Implications for the exhumation history of orogenic crust based on mineral reaction textures and monazite geochronology

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Mineral reaction textures such as coronae or symplectites can provide valuable insights in the exhumation history of high-grade metamorphic rocks as the formation of these textures is commonly attributed to post metamorphic peak processes. In this study we use a twofold approach to extract maximum information from mineral reaction textures observed in an aluminous paragneisses from the Loosdorf complex (southern Bohemian Massif, Austria): (i) chemical potential diagrams are used to qualitatively describe texture formation and (ii) phase equilibrium diagrams using local bulk compositions obtained directly from mineral reaction textures in thin section are used to quantitatively constrain the P–T conditions of texture formation. The observed reaction textures consist of a monomineralic cordierite moat around garnet, which formed in a first step. A second step of texture formation was observed only at former garnet-sillimanite interfaces. There, cordierite-spinel and cordierite-quartz symplectites formed on the sillimanite and garnet sides of the texture, respectively.

Our results suggest that texture formation occurred during near-isothermal decompression to ~0.3 GPa and ~750 °C following inferred peak metamorphic conditions of ~0.9-1.1 GPa and ~780-820 °C. This relatively hot exhumation path can be explained by the contemporaneous exhumation of a large HP-UHT granulite body that now underlies the Loosdorf complex. The timing of regional metamorphism in the granulite is well constrained and has its peak at ~340 Ma. Monazite from Loosdorf paragneiss samples indicates a slightly younger age of ~335 Ma. Although the ages overlap within error, they are interpreted to reflect isothermal decompression and exhumation resulting in the formation of the observed reaction textures.