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Tectonics of an exhumation zone in the Erzgebirge, N-Bohemian Massif: constraints from microstructures and EBSD data

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The overthrusting of isothermally exhumed (U)HP units onto medium pressure gneiss complexes is a striking feature of the variscan Erzgebirge (N-Bohemian Massif). Because of a complex deformation history the exhumation mechanism of the deeply subducted rocks is controversially discussed. Here we present first results from detailed studies of the (U)HP / MP shear zone contact in the roof of the Catherine-Reitzenhain gneiss dome including field work, microscopic observation and EBSD texture analysis. Generally, the entire zone is characterized by a flat lying main foliation partly overprinting preexisting steeper inclined fabrics. The complex particle path in the shear zone is indicated by a large scatter of the x axis of the finite strain ellipsoid. In the medium-pressure units an initially NE-SW oriented stretching lineation is obliterated by a second elongation with WNW-ESE azimuth. In contrast, the (ultra)high-pressure units preserve a WSW-ENE oriented stretching lineation. Additionally, different exhumation paths are revealed by microkinematic indicators with top to the NE, (W)SW and (W)NW shearing. EBSD data from mica generally reveal plane to flattening strain with [001] point maxima near z and point maxima of [100] and [010] near x and y respectively as well as a girdle distribution of [100] and [010] in the xy plane of the finite strain ellipsoid. Textures of samples with an apparent constrictional strain geometry additionally contain a second [001] maxima deviating from the first one up to 90°. We explain this feature by stepwise deformation with different plane strain geometries rather than by a single constrictional process. Quartz shows all features of dynamic recrystallization by pervasive grain boundary migration. The texture is characterized by pronounced point [0001] maxima in y. However, in samples with multiple fabrics the finite quartz texture probably reflects incomplete overprinting of preexisting Crystal Preffered Orientations. In conclusion, our observations corroborates tectonic models proposing different strain geometries during initial NE-SW directed crustal stacking and the subsequent WSW to WNW directed exhumation of deeply subducted continental crust.