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Two stage exhumation of subducted rocks in the Krkonoše-Jizera, NE Bohemian Massif, mark the transition from continental subduction to collision

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The Krkonoše-Jizera Massif in the northern part of the Variscan Bohemian Massif provides an insight into the mechanisms responsible for exhumation of deep subducted continental crust. The studied region exposes a relatively large portion of a flat-lying subduction-related complex that extends approximately 50 kilometres westward from the paleosuture in the east. The spatial extent of HP-LT metamorphism has been confirmed by P-T estimates indicating 400–450°C at 14–16 kbar and 450–520°C at 14–18 kbar for the easternmost and westernmost parts of the studied complex, respectively. Detailed study of metamorphic assemblages associated with individual deformation fabrics together with analysis of quartz deformation microstructures and textures allowed characterisation of the observed deformation structures in terms of their subduction-exhumation history. Timing of the prograde subduction-related metamorphism was constrained by Lu-Hf garnet and U-Pb monazite geochronology. The obtained ages point to diachronous peak metamorphism with older age of ∼364 Ma in the structurally higher blueschists and younger age of ∼342 Ma in the structurally lower metapelites. An integration of the lithostratigraphic, metamorphic, geochronological and structural data documents a subduction of distal and proximal parts of the Saxothuringian passive margin to high-pressure conditions and their subsequent exhumation during two distinct stages. The initial stage of exhumation has an adiabatic character interpreted as the buoyancy driven return of continental material from the subduction channel resulting in underplating and progressive nappe stacking at the base of the Teplá-Barrandian upper plate. Later, with the transition from continental subduction to continental collision, the underplated high-pressure rocks were further exhumed due to shortening of the wedge complex. This shortening was associated with the formation of large-scale recumbent forced folds extending across the entire studied area.