

Assembling UHP-metamorphic units in the Alps and Rhodopes

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HP- and UHP-metamorphic relicts in the Adula Nappe (Central Alps, Switzerland), in the Pohorje Complex (Eastern Alps, Slovenia), and in the Rhodope Terrane (Rhodopes, Greece) are preserved in mixed units assembled from dominantly continental material (orthogneisses, paragneisses, marbles, and mica schists) and a relatively small portion of mafic and ultramafic rocks which are often not derived from Mesozoic protoliths. Rocks recording peak-pressure conditions are eclogites, garnet peridotites and garnet-mica schists. In all three cases, peak pressure conditions were followed by regional amphibolite facies conditions. Such continental mélanges appear to be typical for UHP-metamorphic provinces and are often interpreted as having formed in a subduction channel. Models of exhumation from UHP-metamorphic conditions hinge on whether mélange formation occurred before peak pressures were reached or during exhumation. Models of continuous return-flow in a weak subduction channel predict intense mixing during exhumation and thus a record of different PT-paths and metamorphic ages in HP-mélanges (e.g. Gerya and Stöckert, 2006). In contrast, models assuming exhumation events usually predict units with coherent PT-conditions and metamorphic ages (e.g. Chemenda et al. 1995, Froitzheim et al. 2003). We use structural, petrological and geochemical data to infer that the three discussed units were strongly deformed during exhumation from UHP-metamorphic conditions but probably remained coherent. Where known, post-peak-pressure strain and metamorphic gradients are continuous and metamorphic ages are consistent, though in all cases more data is desirable. We propose that UHP-metamorphic mélanges are assembled before peak-pressure conditions are reached and that exhumation of rocks from such depth occurs in distinct events.

References:

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