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A Cordilleran-type metamorphic core complex: Rechnitz window, Eastern Alps

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The Rechnitz window group represents a Cordilleran-style metamorphic core complex, which is almost entirely located within nearly contemporaneous Neogene sediments of the Pannonian basin at the transition zone between the Eastern Alps and the Neogene Pannonian basin. The western boundary of the South Burgenland High is a high-angle normal fault dipping to the west, whereas the eastern boundary is rather a low-angle normal fault operative during exhumation of the Penninic units exposed within the Rechnitz window. Two tectonic units separated by a ductile thrust fault can be distinguished within the Rechnitz metamorphic core complex (RMCC): (1) a lower unit mainly composed of Mesozoic metasediments, and (2) an upper unit mainly composed of ophiolite remnants. Both units are metamorphosed within greenschist facies conditions during earliest Miocene followed by exhumation and cooling. The internal structure of the RMCC is characterized by the following succession of structure-forming events: (1) blueschist relics formed as a result of subduction (D1), (2) ductile nappe stacking (D2) greenschist facies-grade metamorphism of an ophiolite nappe over a distant passive margin succession (ca. E–W to WNW–ESE oriented stretching lineation), (3) greenschist facies-grade metamorphism annealing dominant in the lower unit, and (4) ductile low-angle normal faulting (D3) (with mainly NE–SW oriented stretching lineation), and (5) ca. E to NE-vergent folding (D4). The microfabrics are related to mostly ductile nappe stacking respectively to ductile low-angle normal faulting. Palaeopiezometry of recrystallized quartz and calcite in conjunction with P-T estimates yield high strain rates of 10-11 to 10-13 s-1, depending on the temperature (400–350 ºC) and choice of piezometer and flow law calibration. Progressive microstructures, strain analysis of the recrystallized quartz and calcite, texture analysis and thermobarometric calculations indicate an overprint of the greenschist facies grade fabrics (D2) by the sub-greenschist facies grain plane strain deformation (D3), resulting in subvertical thinning in an extensional deformation regime. Phengitic mica from the Eocene high-pressure metamorphism, which remained stable during D2 ductile shearing, is still well preserved within late stages of final sub-greenschist facies shearing. The interesting point is now that the rocks of both Penninic units underwent a previous high-pressure metamorphism and subsequent lower greenschist facies conditions. Chlorite geothermometry yields two main temperature groups, 376–328 °C, and 306–132 °C. The lower temperature group is interpreted to result from late-stage hydrothermal overprint, which affected older microfabrics. Chlorite is seemingly accessible to late-stage resetting. The spatial distribution of specific microfabrics indicates that the RMCC underwent an earlier large-scale coaxial pure shear deformation accommodated by a late non-coaxial shear (simple shear) with ductile low-angle normal faulting during the main stage of exhumation between ca. 23–18 Ma.