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Cooling and deformation history of Austroalpine crystalline units in the Schladminger Tauern (Eastern Alps/Austria)

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The Schladminger Tauern, located east of the Tauern window forms a 50 km long mountain-ridge built-up of crystalline nappes of the Upper Austroalpine unit. Investigations along its southern margin revealed a complex Alpine history, including low- to medium-grade metamorphism, folding and thrust and strike-slip faulting.
In the study area three nappes, each built up by a different complex are present: (i) The lowermost nappe consisting of the Schladming Complex is part of the Sivretta-Seckau nappe system. The (ii) overlying nappes belong to the Koralpe-Woelz nappe system and are formed by the Woelz Complex and (iii) Rappold Complex respectively.
The Silvretta-Seckau nappe system consists of migmatitic paragneisses, amphibolites and orthogneisses that formed from Neoproterozoic to Ordovician protoliths. The medium- to high-grade metamorphic imprint occurred during the Variscan event. An Eo-Alpine overprint reached greenschist facies conditions. Rb-Sr biotite cooling ages cluster around 80 Ma. Structures show a steep SW-dipping schistosity and W-plunging fold axes. A sub-vertical fault shows a dextral shear-sense with a minor normal movement. A Paleogene age of movement is presumed from cross-cutting relationships. On a microscopic scale, garnet represents relics of the Variscan medium- to high-grade metamorphic imprint. In the matrix, chlorite and epidote grew synkinematically with the Alpine schistosity and quartz-fabrics show bulging of grain boundaries.
The units of the Koralpe-Wölz nappe system comprise mica schists and paragneisses with intercalations of marbles, amphibolites and quartzites. They formed from Neoproterozoic to Devonian lithologies. The Wölz-Complex underwent low-grade metamorphism during a Permian event and shows a low- to medium-grade imprint during the Eo-Alpine event. Permian metamorphism in the Rappold-Complex reached medium- to high-grade conditions during subsequent intrusion of pegmatites. Greenschist to amphibolite facies conditions are indicated for the Eo-Alpine event. Rb-Sr biotite ages from the Koralpe-Wölz nappe system range from 60 to 78 Ma. Eo-Alpine N-S shorting at peak metamorphic conditions resulted in upright folding with W-plunging fold axes. Petrographical observations show two generations of mica in the mica schists together with postkinematic chloritization and low temperature bulging of the quartz-fabric. Furthermore, kink bands formed in the pegmatites.
The nappe boundary between the Silvretta-Seckau and Koralpe-Wölz nappe system is represented by a decametres wide phyllonite shear-zone, with a top to the NNW shear sense, indicated by S-C' shear bands. This shear zone formed at lower greenschist facies conditions, recorded by low temperature bulging of the quartz-fabric, and is Upper Cretaceous in age. In the Miocene, the southern margin of the Schladminger Tauern was dissected by E-W orientated, south-dipping normal faults and sinistral strike-slip faults.