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Structure and cooling ages in the Upper Austro-Alpine nappes in the Bundschuh area (Austria)

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The investigated area is located between the villages of Ramingstein–Predlitz in the north and Innerkrems-Turrach in the south. Tectonically it is built by Upper Austro-Alpine nappes. The lowermost Gstoder nappe is characterized by rocks of the Radenthein Complex (Koralpe-Wölz nappe system) forming the Ramingstein window, overlain by the Bundschuh nappe containing rocks of the Bundschuh-Priedröf Complex transgressively covered by Permo-Mesozoic meta-sediments (Ötztal-Bundschuh nappe system). On top meta-volcanic and meta-sedimentary rocks of the Murau and Stolzalpe nappes (Drauzug-Gurktal nappe system) are present.

Older, E-W-striking (Variscan) fold axes, in the Bundschuh nappe are overprinted by Eoalpine (Cretaceous) thrust and normal faults. The earlier, are observable in out of sequence thrusts with top W/NW sense of shear in the Stolzalpen nappe. Later features, during exhumation of the Gstoder nappe, are represented by E-W-striking structures with top E sense of shear and perpendicular N-S-striking structures in distinct shear zones indicating a N-S transpressional regime with a high plain strain component.

In the Gstoder nappe Ar/Ar white mica ages are around 86-83 Ma whereas Rb/Sr biotite ages are in the range of 78-74 Ma. In contrast in the overlying Bundschuh nappe Ar/Ar white mica ages are about 100 Ma and Rb/Sr biotite of 86-84 Ma have been determined. The Ar/Ar white mica and Rb/Sr biotite ages reflect cooling below ~400°C and ~300°C respectively and therefore indicate a cooling rate of ~10°C/Ma for both units. The data fit to a model with north directed exhumation of the Koralpe-Wölz nappe system and subsequent cooling of the welded units in the late Upper Cretaceous.