



Tectono-metamorphic evolution of the upper plate of the Eo-Alpine nappe-stack: constraints from the Oberhof Window (Carinthia, Austria)

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The Upper Austro-Alpine Unit in the Eastern Alps corresponds to a nappe-stack that formed during the Eo-Alpine Cretaceous event. It is dominated by crystalline rocks that show Variscan, Permo-Triassic, Eo-Alpine and Neo-Alpine metamorphic imprints. Understanding the tectono-metamorphic evolution of the Eo-Alpine nappe-stack is therefore hampered by a complex polyphase history. Most published studies focused on the subducted lower plate that contains the eclogite-bearing nappes (Koralpe-Wölz nappe system) but the upper plate (Ötztal-Bundschuh nappe system and Drauzug-Gurktal nappe system) is less understood.

Our contribution focuses on the tectono-metamorphic evolution of the Bundschuh nappe (Oberhof Window, Carinthia, Austria). This nappe contains metasediments intruded by granites of Ordovician age. Characteristically, these rocks underwent Variscan amphibolite-facies. They were later covered by Carboniferous to Mesozoic sediments and, all together, overprinted by greenschist to amphibolite-facies metamorphism in the upper plate of the Eo-Alpine wedge. During this event, the Bundschuh nappe was overthrust by the nappes of the Drauzug-Gurktal nappe system.

The core of the window is occupied by the middle-grained "Oberhof orthogneiss". LA-ICP-MS U/Pb zircon dating yielded a late Ordovician age for its protolith. The orthogneiss is overlain by the transgressive Carboniferous metasediments comprising meta-conglomerate, graphite schist and quartzite. The Bundschuh nappe is overthrust by garnet-micaschist, amphibolite, hornblende-garbenschist, calc-micaschist, quartzite and graphitic schist interpreted as parts of the basal Drauzug-Gurktal nappe system. Deformation is characterized by isoclinal folds with an E-W/SE-NW trending fold-axes and top-to-the-East/South-East shearing. This kinematics is related to normal faulting in the upper part of the Eo-Alpine orogenic wedge. The graphite schist contains an assemblage of isolated round garnet and abundant chloritoid in very fine-grained white mica, quartz, graphite and rutile matrix while chlorite is retrograde. The interlayered quartzite domains contain up to 4 mm fractured garnet without chloritoid and are surrounded by a chloritoid-free depletion halo in the graphite schist. This indicates a strong control of the sediment chemistry on the metamorphic assemblage as well as mass transfer between layers of different compositions. Raman spectroscopy of carbonaceous material performed both in the graphite schists of the Bundschuh nappe and in the garnet-micaschist of the hanging wall nappe(s) yielded peak temperatures of 500-530 °C. Biotite-cooling ages revealed that the Bundschuh nappe crossed the 300°C isotherm during the Late Cretaceous. These data together with constrains on pressure deduced from pseudosections are used to propose a tectono-metamorphic evolution for the Bundschuh nappe during the Eo-Alpine orogeny.