

AGE AND STRUCTURE OF THE STOLZALPE NAPPE – EVIDENCE FOR VARISCAN METAMORPHISM, EOALPINE TOP-TO-THE-WNW THRUSTING AND TOP-TO-THE-ESE NORMAL FAULTING (GURKTAL ALPS, AUSTRIA)

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Stolzalpe Gurktal structure Variscan Eoalpine

In the Gurktal Alps (Austria,) the Drauzug-Gurktal nappe system represents the uppermost tectonic part of the Upper Austro-Alpine nappe stack. The Stolzalpe Nappe (s. str.) is its uppermost unit. It consists of interbedded metasedimentary rocks of the Spielriegel Complex, overlain by metavolcanic rocks of the Kaser-Eisenhut Complex. Both are covered by the Pennsylvanian clastic Stangnock Formation. In the investigated area, located at UTM-map sheet Radenthein (NL-33-04-06), the Stolzalpe Nappe tectonically overlays the Stangnock Formation belonging to the Königstuhl Subnappe, also part of the Stolzalpe Nappe.

In this contribution, we present new geochronological and structural data constraining the Variscan and Alpine evolution of the Stolzalpe Nappe. A LA-ICPMS U/Pb zircon age pins the volcanism of the Kaser-Eisenhut Complex to 448 ± 12 Ma (Upper-Ordovician to Llandoveryan). A Lower Pennsylvanian 316 ± 3 Ma $40\text{Ar}/39\text{Ar}$ white mica age in metasedimentary rocks of the Spielriegel Complex and Raman microspectroscopy thermometry on carbonaceous material indicates a peak-temperature of $\sim 350^\circ\text{C}$ during Variscan times.

The Variscan deformation produced the complex, large-scale, isoclinal fold pattern (D1, NW-SE trending axes), superimposed by ENE-verging asymmetric open folds (D2). These structures are discordantly covered by post-Variscan sedimentary rocks.

Asymmetric WNW-verging tight folds with NNE-SSW fold axis, indicating WNW-ESE shortening, overprint the Variscan structures. As indicated by S-C-C'-type fabrics (with striation and fibrous quartz) and asymmetric clast-geometries, this shortening event (D3) is associated to brittle-ductile top-to-the-WNW thrusting in the contact between the Stolzalpe Nappe (s. str.) and the Königstuhl Subnappe. The thrust likely runs in graphitic schist and anthracitic phyllite. Normal faulting, reactivation of former structures as normal faults, and C'-type shear planes crosscutting the older structures, indicate a change in tectonic regime to WNW-ESE extension, dominated by top-to-the-ESE shearing (D4). Combined with Upper Cretaceous $88-92 \pm 1$ Ma $40\text{Ar}/39\text{Ar}$ white mica ages in the footwall (Permo-Mesozoic cover of the Bundschuh Nappe) and Raman microspectroscopy thermometry peak values of $\sim 300^\circ\text{C}$, this deformation is attributed to the Eoalpine event. Neopalpine shortening is very limited to isolated open folds with E-W axes (D5).