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THE SULZTAL SHEAR ZONE, A VARISCAN THRUST PLANE SEPARATES PERI-GONDWANA METAMORPHIC SEQUENCES FROM A GONDWANA NAPPE ON TOP OF THE ÖTZ-STUBAI CRYSTALLINE UNIT (AUSTRIA)

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The Sulztal shear zone (SSZ) is a long lasting lineament which crops out near Längenfeld (Ötz valley) and can be traced to the ESE over several kilometers up to the village of Ranalt in the Stubai valley. There it turns to the NW in acute angle and is cut off by the intrusion of the Alpeiner granodiorite-gneiss. The continuation of the shear zone in Längenfeld is not quite clear, it tends more to the north than to the west. The shear zone, dipping 60° to 80° NE is folded and faulted by younger Alpidic tectonic processes.

The SSZ separates two major sequences of the Ötz-Stubai crystalline unit which are totally different in origin, age and metamorphic history. (1) The lower sequence can be divided into supracrustal rocks of the so-called Ötztal Peri-Gondwana complex (ÖPC) and in rocks from an oceanic crustal regime, the so-called Ötztal ophiolithe complex (ÖOC). Both complexes originate from post Panafrican times, formed during Paleozoic opening of the Mid-European Sea. (2) The hanging sequence is a nappe, thrusted on the younger metamorphic rocks of ÖPC and ÖOC and composed solely of supra-crustal rocks of Panafrican age. It has to be regarded as part of the Gondwana continent (so-called Ötztal-Gondwana complex, ÖGC; SÖLLNER, this volume). Near Längenfeld at the Burgstein, tectonic microstructures clearly demonstrate the inverse layering of the hanging wall. The front of the nappe therefore is formed like an overturned fold.

In 1997 a geological project has been started to investigate the major rock units accompaning the Sulztal shear zone. As a result, a geological map from the surrounding area of the Amberger Hütte/Gries im Sulztal is presented here. The course of the Sulztal shear zone (SSZ) is often cut by younger traverse faults. The most significant is the SW-NE trending, sinistral Längental fault with a dislocation of about 4 km. Mylonites of the SSZ are dragged into the fault zone.

The rocks involved in the shear zone are strongly deformed and recrystallized. Transpressive deformation has not only concentrated on the thrust plane itself but tension has also relieved within the adjacent rocks. The rock, mainly deformed is a biotite-augengneis. Within this augengneiss mylonitic zones and distinct shear bands are developed. These zones of high prolate deformation ("Stengelgneise") are parallel to the foliation (direction of shear N/45°), several decimeter wide and sharply separated from lower deformed ranges. The subjacent layer of the shear zone, a coarse-grained metagabbro shows gneissic textures and lamination, as well.

To get an idea of the time of the tectonic activity along the Sulztal shear zone, age determinations were carried out on the deformed biotite-augengneiss. U-Pb zircon dating should mark the crystallization age of the rock and Rb-Sr investigations on thin slabs and minerals should be able to limit the time interval of the deformation.

U-Pb investigations on zircons of the biotite-augengneiss (SUL) provide a lower Concordia intersept age of 501 ± 4 Ma which can be interpreted as the crystallization of the precursor rock. Abraded zircon fractions trace back to an upper intersection of about 2.6 Ga. The inheritance of detrital zircon cores, the typological zircon classification as S6 and S11 types, as well as the $^{87}Sr/^{86}Sr$-initial ratio of 0.7095 point to an acid igneous rock of mainly crustal origin.

Thin slabs of a well deformed biotite-augengneiss (KB) characterizes alternating layers, dominant in biotite and quartz+feldspar, respectively. Rb-Sr isotopic analyses of these slabs do not yield the favoured results. Data points are wildly scattering in the isochron diagram and thus, demonstrate incomplete multiphase isotopic exchange. Dark biotite-rich layers may point to an Alpidic age (86 ± 8 Ma) which is identical with that, determined on the biotite itself (85.5 ± 2.1 Ma), as well as that on chlorite (85.3 ± 2.5). The oldest biotite age stems from the most deformed, but also the most dense and fine-grained biotite-augengneis (98.9 ± 2.2 Ma). Mucovite-whole rock ages vary between 292 and 299 Ma and denote cooling ages subsequent to the Variscan thermal event. Alpidic metamorphism in this area, therefore, didn't reach muscovite equilibration temperatures of about 500°C. The last fundamental thermal overprint has happened in Variscan times. Sm-Nd garnet-whole rock data on eclogite lenses, intercalated in basic metamorphic rocks of the ÖOC, which are integrated in the Sulztal shear zone yield ages of 350 to 360 Ma (MILLER & THÖNI 1995). This high grade eclogite facies metamorphism should has happened prior to the tectonic movements along the shear zone, because of the contact of quite different precursor rock types and the degree of metamorphism, not exceeding amphibolite facies conditions in the supra-crustal rocks of the overlying Ötztal Gondwana complex. Dynamic recrystallization of muscovite and amphibole in mylonitic and ultramylonitic biotite-augengneisses and metagabbros of the shear zone, respectively presume temperatures above 500°C (PASCHIER & TROUW 1996). Therefore, movements along the Sulztal shear zone are limited to the time interval of about 350 to 292 ± 8 Ma, trending more to the lower age.

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