

**SINGLE ZIRCON U-Pb GEOCHRONOLOGY OF PRE-VARISCAN AND VARISCAN  
BASEMENT UNITS OF THE CENTRAL TAUERN WINDOW, EASTERN ALPS (AUSTRIA)**

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Variscan and pre-Variscan basement units of the Tauern Window (TW) were strongly overprinted by Alpine orogeny; and, hence, delimiting the basement assemblages into their respective components remains to be challenging. In the last decade several geochronological investigations have been conducted on the TW basement units, however, distinction between the pre-Variscan and Variscan components of the basement rocks of the TW was not done unambiguously. Thus, here we present new single zircon U-Pb ages (all calculated at  $2\sigma$ ) derived from selected lithotectonic units (Basisamphibolit, Biotitporphyroblastenschiefer and equivalent lithologies, Zwölferzug, Habach Phyllite, and Zentralgneis) of the central TW basement sequence. These and published previous age data are combined to resolve outstanding problems such as the relation of Basisamphibolit to Zwölferzug, stratigraphic position and maximum sedimentation age of the Biotitporphyroblastenschiefer, and distinction of the lower and the upper magmatic sequences [UMS & LMS; 1, 2] of the Habach Formation.

Conventional U-Pb zircon geochronology of the different varieties of the Basisamphibolit, namely the coarse-grained garnetiferous metagabbro, banded amphibolite, and medium-grained amphibolite yielded  $343 \pm 1$  Ma,  $349 \pm 1$  Ma, and  $352 \pm 2$  Ma concordia ages, respectively, which are considered as protolith formation ages distinct from that of the Zwölferzug garnet amphibolite ( $486 +5/-4$  Ma; [3]). The Basisamphibolit and the Zwölferzug were equated together for several years [4]; however, apart from their different  $\epsilon_{Nd}(t)$  values [3], which suggest distinct evolutionary history; the magmatic protolith ages of these rocks provide additional evidence that they are unrelated. Unlike the Basisamphibolit, which formed during Variscan tectonics (Lower Carboniferous), the Zwölferzug garnet amphibolite may have formed coeval with the LMS of the Habach Formation at the margin of Gondwana [cf. 5], and thus need to be disengaged and treated separately in reevaluation of the lithotectonic setup of the TW basement units.

Moreover, laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) and conventional U-Pb detrital zircon dating of samples from the banded porphyroblastic biotite schist (Wager Alm, Amertal), porphyroblastic biotite schist (Lemperbach) and two-mica plagioclase gneiss (Brentling and Lemperbach) from the Biotitporphyroblastenschiefer yielded maximum sedimentation ages at  $362 \pm 5.7$  Ma,  $368 \pm 17$  Ma, and  $368 \pm 16$  Ma, respectively. In addition, a banded garnetiferous leucocratic gneiss sample (Zwölferzug) also produced a maximum sedimentation age at  $357.9 \pm 9.7$  Ma.

The banded garnetiferous leucocratic gneiss was believed to be a granitic orthogneiss emplaced into the Zwölferzug garnet amphibolite. However, the presence of abundant detrital zircon grains of which some produced older ages ( $496 \pm 13$  Ma,  $550 \pm 6$  Ma,  $587 \pm 13$  Ma) than that of the garnet amphibolite ( $486 \pm 5/-4$  Ma; [3]) strongly suggest a sedimentary origin of the unit. Furthermore, conventional U-Pb dating of a pinkish euhedral magmatic zircon population (derived from the abundant gabbroic clasts) and rounded detrital zircon grains from the meta-agglomerate (Habach Phyllite, Felberberg) yielded an upper intercept age at  $536 \pm 8$  Ma and nearly concordant age at  $506 \pm 8.5$  Ma, respectively. The  $536 \pm 8$  Ma age is interpreted as a magmatic protolith age of a gabbroic source rock that is comparable to LMS of the Habach formation [e.g., 7]. Even though, the detrital zircons were well screened the  $506 \pm 8.5$  Ma age can be tentatively considered as maximum sedimentation age for the meta-agglomerate of the Habach Phyllite, which was considered to be part of the sedimentary cover of the UMS [2].

Overall, the Upper Devonian maximum sedimentation ages obtained from the detrital zircons derived from samples of the Biotitporphyroblastenschiefer and Zwölferzug coupled with protolith ages of the Basisamphibolit, which has unconformable contact with the Biotitporphyroblastenschiefer [6], further constrain the maximum sedimentation age of these sediments to be Upper Devonian to Lower Carboniferous. Hence, the Basisamphibolit and the Biotitporphyroblastenschiefer form parts of the Variscan basement sequence of the central TW; but not Upper Proterozoic to Lower Paleozoic pre-Variscan basement as formerly contemplated. The LMS of the Habach Formation [488–547 Ma; 3, 7] and the Zwölferzug garnet amphibolite predate the opening of the Paleo-Tethys in the Early Silurian [e.g., 8], may constitute parts of the European Hun Terranes and also represent part of the pre-Variscan basement rocks in the TW. Conversely, the UMS of the Habach Formation constitutes part of the Variscan basements. Thus, distinction must also be made between the LMS and the UMS of the Habach Formation, which represent parts of the pre-Variscan and Variscan basements, respectively. The lithotectonic positions of the central TW basement units require reevaluation and reinterpretation in view of the new age data, which may have significant contribution to the geological history of the eastern Alps in general.

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