

**THE TIMING OF PRE-ALPINE HIGH-PRESSURE METAMORPHISM
IN THE EASTERN ALPS: CONSTRAINTS FROM U-PB SHRIMP DATING
OF ECLOGITE ZIRCONS FROM THE AUSTRALPINE SILVRETTA NAPPE**

by

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Partly retrogressed eclogites of gabbro-cumulate origin are present in the Austroalpine Silvretta Nappe as lenses and pods within amphibolite-facies orthogneisses. The eclogite assemblage comprises omphacite + garnet + phengite + kyanite + barroisite + rutile + quartz. Peak P-T conditions derived from multi-equilibrium methods range from 2.93 to 2.97 GPa at temperatures of 640–670°C for the zircon bearing sample.

Zircons were separated from a quartz-rich domain containing the typical eclogite assemblage. This eclogitic micaschist shows a very similar geochemical fingerprint compared to the mafic eclogites.

The zircons are euhedral in shape and may contain inclusions of quartz, rutile, omphacite and barroisite, indicating at least partial growth during the HP-event. All analysed zircons show complex cathodoluminescence (CL) patterns including irregularly shaped cores with low CL-intensity, oscillatory sector zoning and overgrowths with high CL-intensity. Zircon ages (Fig. 1) were determined using $^{206}\text{Pb}/^{238}\text{U}$ -ratios with a common-Pb correction according to TERA & WASSERBURG, 1972.

Three different age groups could be distinguished that also correlate with distinct ranges in zircon Th/U-ratios: A low-CL irregular core with a Th/U ratio of 0.72 and an age of 507 ± 11 (1 σ) Ma is interpreted as a relic core. The age is consistent with intrusion ages of gabbros, tonalites and granites from the Silvretta Nappe (SCHALTEGGER et al., 1997, POLLER et al., 1997) and the adjacent Ötztal Crystalline Basement (ÖCB) (MILLER & THÖNI, 1995). Broad sector-zoned zircon areas with Th/U-ratios in the range 0.35–0.58 yielded a weighted mean age of 437 ± 7 Ma (n=11). This age is thought to reflect magmatic growth of the zircons in the eclogite precursor, reflecting a Silurian/Ordovician magmatic event within the Eastern Alpine basement. The youngest event recorded led to the formation of narrow, irregular rims around zircons with very low Th/U-ratios in the range 0.01–0.29. The weighted mean age of these rims is 351 ± 22 Ma which is interpreted as the age of the HP-metamorphic overprint. This would be consistent with Sm/Nd-mineral isochron ages of eclogites from the adjacent ÖCB that are in the range 370–340 Ma (MILLER & THÖNI, 1995).

The U-Pb zircon SHRIMP ages presented here clearly supports the assumption of a widespread Variscian HP-event W of the Tauern Window.

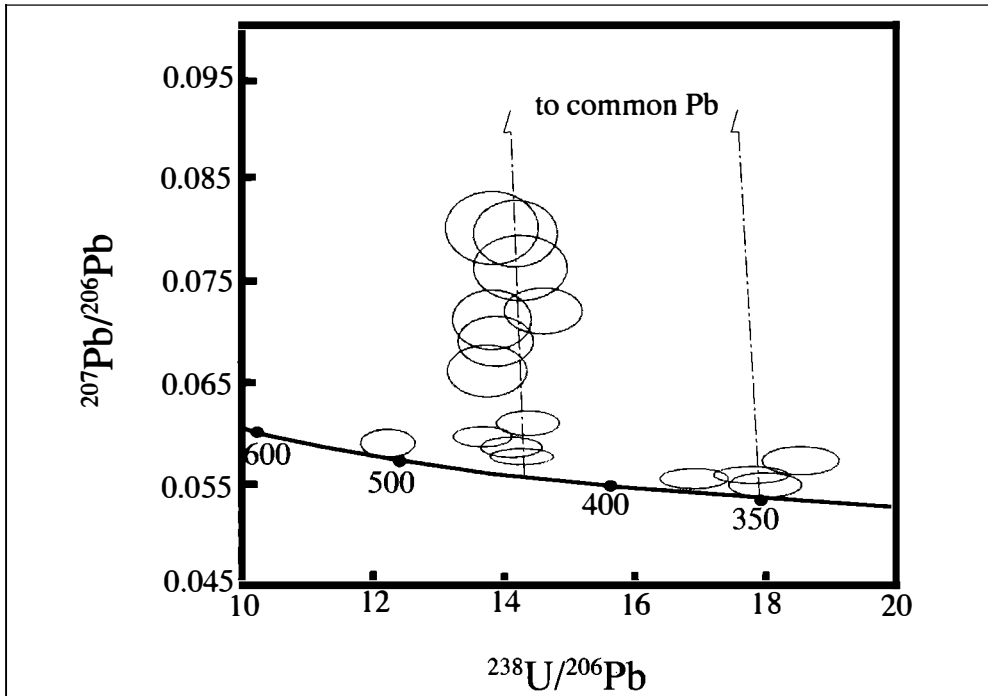


Fig 1

Tera-Wasserburg-diagram showing ($^{207}\text{Pb}/^{206}\text{Pb}$) corrected data for zircons from the eclogitic micaschist without any common Pb correction. This shows the fraction of common Pb for each analysis and gives the radiogenic $^{238}\text{U}/^{206}\text{Pb}$ age by regression of $^{207}\text{Pb}/^{206}\text{Pb}$ against $^{238}\text{U}/^{206}\text{Pb}$. The age is determined by drawing a regression line through the data-points and the common Pb composition.

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