



U-Pb of apatite from the western Tauern Window (Eastern Alps): tracing the onset of Eo-Oligocene exhumation in the European plate

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This study bases on U-Pb LA-ICP-MS analyses of apatite and zircon from 16 samples distributed along three sections crossing the western Tauern Window (Eastern Alps). While U-Pb zircon ages are interpreted as dating the late Variscan pluton emplacement of the Zentralgneis, U-Pb analyses of apatite yield also Paleogene ages. The latter are interpreted to date mid-range ($\sim 450\text{-}500\text{ }^{\circ}\text{C}$) cooling as response to the Europe-Adria collision. Zircon analyses for the different samples yield U-Pb ages between $294\pm 3\text{ Ma}$ and $305\pm 15\text{ Ma}$, which except for two samples overlap within their 2σ uncertainties. In case of apatite, for each sample up to 45 grains were analyzed scattering between ~ 300 and $\sim 20\text{ Ma}$. Data evaluation using the ISOPLOT algorithm “TuffZirc Age Extractor” enabled us to differentiate two age groups. A considerable number of apatite analyses for each sample reflect a relatively homogeneous cluster of Eocene to Miocene age values. The second cluster reflects Variscan and partly reset age values. We calculated the weighted mean age of the respective younger age cluster as cooling age and the asymmetric 2σ errors as its uncertainty, which is mostly in the range of $\sim 5\text{ Ma}$. These U-Pb apatite ages give a consistent age range of $\sim 31\text{-}29\text{ Ma}$ in the central part of the study area. U-Pb apatite ages of $\sim 36\text{-}34\text{ Ma}$ and of $\sim 26\text{-}25\text{ Ma}$ were obtained in the eastern and western part, respectively. In addition, in each section a slight N-S trend showing younger ages in its center and older ages at its margins was observed. These apatite ages indicate the inception of differential uplift in the western Tauern Window in Eo-Oligocene time. The age pattern in map view resembles those observed for chronometers with lower closure temperature (from $\sim 375\text{ }^{\circ}\text{C}$ for Ar-Ar biotite to apatite fission track, $\sim 110\text{ }^{\circ}\text{C}$), that are largely related to Dolomites indentation. Therefore, we will discuss whether doming of the Tauern Window due to Dolomites indentation may have started already in Eo-Oligocene time.