

**VARISCAN, LATE VARISCAN OR EARLY ALPINE TECTONOTHERMAL
EVOLUTION OF THE CENTRAL GRAYWACKE ZONE, AUSTRIA: NEW
INSIGHTS FROM $^{40}\text{Ar}/^{39}\text{Ar}$ MICA DATING**

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Based on K-Ar and Rb-Sr dating of fine-grained white mica, central sectors of the Graywacke Zone exposing mainly Lower Palaeozoic rocks are considered to have been overprinted by pervasive Early Alpine, Cretaceous-aged metamorphism reaching greenschist facies metamorphic conditions. The metamorphic overprint is intimately associated with NW-directed ductile shear due nappe stacking. On the other hand, structural studies and scarce geochronological data demonstrate the pre-Late Permian age of Variscan orogenesis, particularly of ductile deformation within greenschist metamorphic conditions. The exact age and extent of pre-Alpine and Early Alpine metamorphic overprint remained uncertain. Furthermore, some models claimed even Late Alpine metamorphic overprint close to the Tauern Window.

To resolve these questions, we performed $^{40}\text{Ar}/^{39}\text{Ar}$ dating of white mica from pervasively foliated phyllites with relatively simple, single-stage fabrics exposed along a N-S section of central sectors of the Graywacke Zone south of Salzburg city. The results are as follows. (1) Phyllites close to the Tauern Window, distant to overlying Permian-Triassic successions of the Tauern window, yield an age of ca. 240 Ma, i.e. earliest Triassic. (2) Phyllites close to upper, northern margins of the Graywacke Zone give ages between ca. 98 and 116.0 ± 0.6 Ma.

In a preliminary model and consistent with structural results, particularly Permian to Early Triassic graben formation at the structural base of the overlying Northern Calcareous Alps, we interpret the 240 Ma age to record ductile shear during Late Permian to Early Triassic extension of the of Graywacke Zone basement, which overprints an earlier stage of Variscan (ca. 300 Ma) metamorphism. This succession of the combined Graywacke Zone and structural base of the Northern Calcareous Alps underwent Early Cretaceous, ca. WNW-/NW-directed ductile shear during nappe stacking. These new Early Cretaceous $^{40}\text{Ar}/^{39}\text{Ar}$ ages are slightly older than elsewhere in the Graywacke Zone and also significantly younger than $^{40}\text{Ar}/^{39}\text{Ar}$ feldspar ages (ca. 143 Ma) reported from Juvavic units of the Northern Calcareous Alps. Together with other existing data, the new $^{40}\text{Ar}/^{39}\text{Ar}$ ages demonstrate the polyphase nature of metamorphic overprint on the Graywacke Zone basement and the need to combine geochronological dating with detailed structural work.