

The drainage development of the Tauern window (Eastern Alps): a strike-slip dominated metamorphic core complex overprinted by indentation

Georg Trost¹, Franz Neubauer², Jörg Robl²

¹ University of Salzburg, Dept. of Geoinformatics, Salzburg, Austria; e-mail: georg.trost@sbg.ac.at

² University of Salzburg, Dept. Geography and Geology, Salzburg, Austria

The Tauern window has formed as a metamorphic core complex since the late Oligocene. The major fault systems correlate with the main river systems of the Eastern Alps. The drainage pattern hence documents the complex updoming history of the Tauern window. In this study, we have investigated the morphological expression of the drainage pattern and compiled it with sedimentary depositional ages and geomorphic markers to constrain the fault activities during the updoming phase.

The drainage morphology of the Tauern window area describes an arc-like bending by 30-degrees to each side of the dome center. The maximum deflection is located between the two highest peaks of the Tauern window and leads to the development of a radial drainage system oriented to the dome center. In contrast, the drainage system at the northern boundary is linearly draining to the upper Salzach Valley, as part of the Salzach-Enns-Mariazell-Puchberg-Fault (SEMP), and is highly asymmetric along the course of the fault system. Besides the SEMP, the Katschberg normal fault (KNF) shows also dominant drainage asymmetries along the eastern edge of the Tauern window. In contrast to the SEMP, where the drainage asymmetry is explained by the dome-like shape of the Tauern window, the asymmetry at the KNF is explained by the predominant activity of the fault system. Overall, we are able to distinguish four different stages of fault activity with a rejuvenation trend from north to south. The first step is dominated by a left-lateral overstep along the SEMP and the Defreggen-Antholz-Valles fault during the early Miocene. Contemporaneously, an eastward directed extrusion generated fault related sedimentary basins during the second stage. During the middle Miocene, the fault activity migrated to the south and generated sedimentary basins along the Mur-Mürz fault system, until the activation of the Möll valley fault during the Pliocene, leading to the indentation of a crustal block into the Tauern window. The observed arc-shaped deflection of the drainage pattern is explained by such an indentation of a crustal fragment.

A fifth fault period addresses recent tectonic activities of the Tauern window and is found predominantly at the upper Salzach Valley, where geomorphological features, *e.g.*, a tectonic overstep, partly dextral doglegs and asymmetries in the deposition of alluvial fans are observed.