Switch of kinematics in the Austroalpine basement between the Defereggen-Antholz-Vals (DAV) and the Pustertal-Gailtal fault

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Knowledge of the Oligocene–Miocene evolution of Austroalpine units in the Eastern Alps in the last two decades has been highly improved by numerous structural and geochronological investigations of major fault systems (e.g. Ratschbacher et al., 1991, Peresson & Decker, 1997, Mancktelow et al., 2001). Whereas the tectonic evolution of the Northern Calcareous Alps is well constrained, the data set from Austroalpine units S of the Tauern Window remained deficient. There, the transition from ductile to brittle deformation is controlled by two main fault systems, the Oligocene sinistral DAV fault (Borsi et al., 1978) and the dextral Pustertal-Gailtal fault as segment of the Periadriatic fault, which mainly accommodated the Miocene lateral extrusion of the Eastern Alps (Mancktelow et al., 2001).

In the current study, brittle/ductile structural data of the crystalline basement in the Isel valley at the eastern termination of the DAV fault, and in the Schober and Kreuzeck mountains have been evaluated. Sinistral kinematics related with activity of the DAV started with SW-directed thrusting, evolved towards transpressive strike-slip faulting along steep WSW-ENE striking fault planes (Drautal fault), and ceased with NW- and SE-directed normal faulting. During sinistral transpression Oligocene Periadriatic intrusions were emplaced (Müller et al., 2001).

A subsequent change in the stress-field is recorded by subvertical E-W striking faults with ultramylonitic and cataclastic rocks and subhorizontal thrust faults with top to S kinematics. These structural features are most prominent in the basement block between the main fault zones of the DAV and the Gailtal-Pustertal fault, and are interpreted to reflect the switch of major deformation from the DAV north, to the Gailtal-Pustertal fault south of the study area. Later, dextral WNW-ESE trending strike-slip faults formed the remarkable fault systems set up in the Isel, Drau and Möll Valleys. These were linked with dextral strike-slip movement along the Pustertal-Gailtal fault as part of Miocene lateral extrusion. The last stage of significant brittle deformation is characterized by a sinistral reactivation of the Iseltal fault due to E-W compression, which can be correlated with the Late Miocene stress inversion in the Alpine-Carpathian region (Peresson & Decker, 1997).

The described structural features characterize the deformational evolution from Oligocene sinistral kinematics of the DAV fault to Miocene dextral kinematics along the Pustertal-Gailtal fault, and may help to understand the processes related with the switch from Oligocene to Miocene kinematics in the Eastern Alps.

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