Normal faulting in a rigid and anisotropic basin boundary block – field evidence from the Koralm Complex (Eastern Alps)

Gerald Pischinger[1], Franz-Josef Brosch[1], Walter Kurz[1] and Gerd Rantitsch[2]

[1]Institut für Angewandte Geowissenschaften, TU Graz, Rechbauerstrasse 12 8010 Graz, Austria (gerald.pischinger@tugraz.at)
2 Department Angewandte Geowissenschaften und Geophysik, Montanuniversität Leoben, Peter-Tunner-Straße 5, 8700 Leoben, Austria

Miocene lateral extrusion of the Eastern Alps resulted in the development of a prominent fault pattern which strongly mould the present-day morphology of the Eastern Alps (Frisch et al., 2000; Ratschbacher et al., 1991). The formation of several sedimentary basins from the early Miocene onwards (Sachsenhofer, 1996) and the associated volcanism are linked to this tectonic period. Bordered by the Lavant and the Styrian basin the Koralm complex forms a relative brittle and rigid block in this extrusion corridor.
The brittle tectonics of this block has only sparsely been worked on in geological research (Brosch, 1983; Buchroithner, 1984; Kieslinger, 1928; Riedmüller and Schwaighofer, 1978; Tollmann, 1976) and is hence insufficiently documented in the regional geological maps (Beck-Mannagetta, 1980; Beck-Mannagetta, 1991) . The begin of the site investigations for the Koralm tunnel from 1996 onwards mark an increased interest for the brittle tectonics of this region of the Eastern Alps (Brosch et al., 2001; Peresson and Decker, 1998; Vanek et al., 2001).
In our contribution we want to present field evidence from the region near Stainz (Styria) for pronounced normal faulting within this block from the eastern realm of the Koralpe. The investigated area is predominately situated in a mylonitic shearzone (“Plattengneis”) of Cretaceous age which may be interpreted as an extensional detachment zone resulting from the exhumation of the Middle Austroalpine basement complexes in the central part of the Eastern Alps (Kurz et al., 2002).
Normal faulting from the Neogene onwards resulted in the formation of listric cataclastic shear zones which tend to follow the given anisotropy, the generally flat dipping, often nearly horizontal metamorphic foliation in their lower parts. In several large scale outcrops these foliation parallel structures seem to form detachment-like master faults in which the steeper listric splays seem to terminate. The latter show intense bifurcation and dip either towards east or west. The east dipping faults represent the more continous faults at which the west dipping elements end.
Paleostress analysis with the P/T method (Turner, 1953) shows clear extension in W-E to WNW-ESE direction. Field evidence additionally shows strike slip faulting on N-S trending slickensides and on foliation planes. The latter striations form an acute angle with the prominent metamorphic stretching lineation which allows a clear distinction of the two. The age relation of these kinematic events could not reliably be resolved up to now.
Natural mineral springs obviously are linked to the fault activity in this area (Beck-Mannagetta, 1991).

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