Geol. Paläont. Mitt. Innsbruck, ISSN 0378–6870, Band 25, S. 1–242, 2001

TECTONOMETAMORPHIC EVOLUTION OF THE AUSTROALPINE NAPPES IN THE NORTHERN ZILLERTAL AREA, EASTERN ALPS

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This project is closely related to the international geophysical TRANSALP project which provides a continuous seismic reflection profile through the Eastern Alps along the transect Bad Tölz (D) – Venice (I). In the frame of the TRANSALP project, this investigation addresses the problem of the tectonometamorphic evolution of the Austroalpine nappes in the northern Zillertal Area. The three units to be studied in the course of this project are the Innsbrucker quarzphyllite, the Kellerjochgneiss, an acidic orthogneiss body, and the Wildschönauer Schiefer. These units are separated by shear zones, from less than a meter in diameter up to several meters diameter. The Innsbrucker quartzphyllite is part of the lower Austroalpine units and the Wildschönauer Schiefer is part of the upper Austroalpine Grauwacken Zone. The Kellerjochgneiss is still of debated origin, since it has been attributed over the years to either the lower- or the middle Austroalpine units.

Most importantly, these units lack modern petrological investigations, to determine the P-T conditions of the pervasive metamorphic overprint and relate them to the structural history. The detailed tectonometamorphic investigation of these units and their tectonic contacts provides an important key to the understanding of the paleogeographic reconstructions of this part of the Eastern Alps.

During this project, detailed field mapping of an area of ca. 60 km^2 between the Finsinggrund in the south and the Inntal in the north was performed. Combining the structural observations of the three units with previous structural data by SCHMIDEGG (1943), WEZEL (1981), ROTH (1984), STEYRER et al. (1996), KOLENPRAT et al. (1999) and REITER (2000) yields the following tectonic successions:

Four stages of deformation could be distinguished in all three units. The first three stages are ductile, whereas the last stage is brittle. The earliest stage, D_1, is associated with a NW-SE oriented transpression and structures indicating a transport top NW could be discerned. D_2 is the result of a NE-SW oriented transpression and indicates transport top NE. D_3 is manifested by the formation of semi-ductile kink bands. The subsequent brittle deformation D_4 can also be divided into two stages. The earlier stage is due to NE-SW directed extension and the later stage is due to movements along the Inntal and Zillertal faults.

Correlation of these data with other structural- and geochronological investigations from this area (ANGELMAIER et al. 2000; GENSER et al. 2000), suggest that the observed stages of deformation are thought to be associated with the Alpine orogenic cycle.

Thermobarometric investigations in the Kellerjochgneiss, by using multi-equilibrium methods yield temperatures of 350–430°C and pressures of 8.5–10.5 kbar whereas in the Innsbrucker quartzphyllites pressures are significantly lower and yield 3.5–6 kbar for the same temperature range. These data suggest that both units were probably separated during the early

stages of Eo-Alpine metamorphism (e.g. situated in different crustal levels), and the Kellerjochgneiss and Wildschönauer Schiefer were subsequently juxtaposed onto the Innsbrucker quartzphyllite during Eo-Alpine nappe transport to the NW.

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