Eo-Alpine imbrication of Middle Austroalpine units in the Gurktal Alps, Carinthia — questioning the existence of the Upper Austroalpine Murau Nappe *Poster*

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Structural analysis of Paleozoic Middle and Upper Austroalpine (MAA, UAA) units of the Gurktal Nappe Complex (GNC) in combination with electron microprobe analyses of multiphase garnets reveal a complex Variscan and Alpidic tectonometamorphic evolution of the GNC. Our study is focussed on the UAA 'Murau Nappe' and its tectonic transition to the MAA respectively to the overlying UAA Stolzalpen Nappe. The 'Murau Nappe' may rather be interpreted as a major zone of imbricate thrust slices of the underlying and overlying units than a distinct nappe.
The tectonometamorphic evolution of the MAA and UAA units in the GNC comprises the following events:

1. D_1: pre-Alpine (Variscan), anchizonal to greenschist-facies metamorphism of the MAA ($^{40}Ar/^{39}Ar$-ages on micas of the western GNC about 315–310 Ma; Neubauer et al. 1999),

2. D_2: after subduction of the North-Penninic ocean thrusting of the Austroalpine units during Cretaceous times west- to northwestwards over the North-Penninic and Helvetic units,

3. D_3: Paleogene movement of thrusts to the north/northwest (v. Gosen 1989), and

4. syn- to post-D_3: transition of the N–S-compressional regime to E–W-extension, causing sliding of the extruding wedge of the Muralps from the Tauern Window eastwards towards the Pannonian Basin (Ratschbacher et al. 1991a,b) from Eocene/Oligocene to Middle Miocene times.

The 'Murau Nappe' (Stohwasser 1947/1956) was postulated because of two Mesozoic units (Stangalm respectively Pfannock unit) separating the nappe from the underlying MAA and overlying Stolzalpen Nappe. The occurrence of Mesozoic units, however, is locally restricted; therefore the 'Murau Nappe' as a distinct thrust unit is not confirmed yet.
The analyses on spessartine-rich garnets indicate upper greenschist-facies to epidote-amphibolite-facies in the phyllitic micaschists and epidote-amphibolite-facies in the phyllites, which are presumably related to the pre-Alpine peak-metamorphism. The carbonate dominated suite (Murau Limestones) displays conditions of higher greenschist-facies and has been tectonically imbricated between the overlying phyllitic micaschists and the overlying phyllites during D_2.
The Stolzalpen Nappe lacks Variscan ductile structures (v. Gosen 1989). During the Eo-Alpine orogeny the Stolzalpen Nappe overthrusted the MAA and the direction of movement changes from top-NW (syn-D_2) to top-E/NE (syn-D_3). A NW- to SW-dipping penetrative cleavage (S_3) is attributed to the late phase of the Eo-Alpine orogeny (D_3) and is a ubiquitous feature of all MAA- and UAA-units in the cen-

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tral Gurktal Alps. Linked to D_3 is a retrogressive overprint (diaphthoresis) of the MAA and 'Murau Nappe' under low to high greenschist-facies conditions. The Stolzalpen Nappe is not affected by this retrogression. The boundary 'Murau Nappe' and Stolzalpen Nappe appears to be transitional with respect to lithology and metamorphic grade. Locally a tectonic boundary is defined by chloritoid-bearing quartzitic mylonites (Angerer et al. 2000), indicating a thrust zone, with lower greenschist facies metamorphosis.

Except for the Murau Limestones a continuous metamorphic gradient from MAA to the Stolzalpen Nappe was established during the Eo-Alpine orogeny. The Murau Nappe appears as a continuous shear zone, incorporating less deformed imbricate slices of the Murau Limestones. No discrete tectonic boundary between MAA and 'Murau Nappe' has been observed in the central GNC.

The results of our study lead to a reinterpretation of the 'Murau Nappe' as a major shear zone generated during the Eo-Alpine thrusting of the Stolzalpen Nappe over the MAA. Concerning the central GNC we conclude, that the genetic term 'Murau Nappe' for the lower UAA unit between MAA and Stolzalpen Nappe is not valid. Instead, its reinterpretation as a major shear zone ('Murau shear zone'), genetically belonging to the MAA, generated during Eo-Alpine overthrusting of the Stolzalpen Nappe, is favoured. The Mesozoic Stangalm unit is interpreted as a local sequence imbricated during the northward movement of the MAA units.

References

Angerer T, Laukamp C & Leonhard A (2000) Strukturgeologische Untersuchungen in den Teileinheiten des Gurktaler Deckensystems (Ostalpen) und seines Kontaktes zum Mittelostalpin. Terra Nostra 2000/5: 4–5

v. Gosen W (1989) Gefügeentwicklungen, Metamorphosen und Bewegungen der ostalpinen Baueinheiten zwischen Nockgebiet und Karawanken (Österreich). Geotekt Forsch 72, pp 247

Neubauer F, Hoinkes G, Sassi FP, Handler R, Höck V, Koller F & Frank W (1999) Pre-Alpine metamorphism of the Eastern Alps. Schweiz Min Petr Mitt 79, 41–62

Ratschbacher L, Merle O, Davy Ph & Cobbold P (1991a) Lateral extrusions in the Eastern Alps, Part 1: Boundary conditions and experiments scaled for gravity. Tectonics 10, 245–256

Ratschbacher L, Frisch W, Linzer H-G & Merle O (1991b) Lateral extrusions in the Eastern Alps, Part 2: Structural analysis. Tectonics 10, 257–271

Stowasser H (1947/1956) Zur Schichtfolge, Verbreitung und Tektonik des Stangalm-Mesozoikums (Gurktaler Decke). Jb Geol B-A 99, 75–199