

The Rannach Formation – A Permian Trough within the Austroalpine Seckau Nappe

Mandl Magdalena, (Universität Graz, Graz, AUT);

Kurz, Walter (Universität Graz, Graz, AUT);

Hauzenberger, Christoph (Universität Graz, Graz, AUT);

Fritz, Harald (Universität Graz, Graz, AUT);

Klötzli, Urs (Universität Wien, Wien, AUT)

Permian to early Mesozoic sedimentary units, known as Central Austroalpine Mesozoic (CAM), are widely dispersed within the Austroalpine basement nappes due to Eo-Alpine stacking and subsequent extension. Prominent examples for CAM are the Brenner Mesozoic west and the Stangalm, Thörl and Rannach Permo-Mesozoics to the east of the Tauern Window, respectively. Along the eastern margin of the Eastern Alps those units have been summarized to as “Semmering Quartzite” or “Alpine Verrucano”.

Most of the clastic Permian sequences have minor thicknesses between few meters (Brenner, Stangalm units) to at maximum 100 meters (Thörl unit). An exception is the Rannach Formation within the Seckau nappe with up to 1000 meters of clastic meta-sediments. Hence we consider this unit as possible Permian trough that developed within a Permian rift setting.

Several profiles across the Rannach Formation show a single general fining upwards sequence with 120-150 meters basal conglomerates followed by 600-700 meters sandstone and up to 300 meters of fine-grained clastics (phyllites) on top. Carbonate beds as developed elsewhere (e.g., Stangalm unit) are nearly absent. Provenience studies and relictic sedimentary structures suggest deposition of mature sediments eroded from an intra-continental source related to the basement underneath, possibly starting with alluvial fan deposits grading upwards into lower energy fluvial systems. Comparable Permian sedimentary troughs are absent in the Eastern Alps but are known from Southalpine domains (Orobic Basin, Collio Trough, Bolzano Basin).

The basement within the Seckau Nappe (SeckauComplex) was recently sub-divided into the following units (Mandl et al., 2018):

The Glaneck Metamorphic Suite comprises predominantly paragneisses with U-Pb zircon ages in the range between 572 ± 7 Ma and 559 ± 11 Ma and represents the oldest dated rocks within the Seckau Complex. Highly fractionated S-type granites of the Hochreichart Suite indicate a magmatic event between 572 ± 7 Ma and 559 ± 11 that may also have caused migmatization of distinct domains of the paragneisses. The Hintertal Plutonic Suite displays a second intrusion event ranging from 365 ± 11 Ma to 343 ± 7 Ma and comprises I-type granitoids (Pletzen Pluton) as well as S-type granitoids (Griessstein Pluton).

The detrital zircon age spectrum from the Rannach Formation reflects the geochronological ages from the suites described above, indicating a rather local provenance of the clastic sediments, in addition to zircons in age range of ca. 290 Ma. These latter ages are not documented in the aforementioned suites of the Seckau Complex, but might be derived either from late diabase dikes crosscutting several lithological units that were covered by the Rannach Formation, or from more regional sources of widely distributed Permian magmatic rocks being part of the Austroalpine basement nappe system. Anyhow, these 290 Ma detrital zircons provide a maximum age for onset of sedimentation within the Rannach Formation.

References:

Mandl, M., Kurz, W., Hauzenberger, C., Fritz, H., Klötzli, U., Schuster, R.: Pre-Alpine evolution of the Seckau Complex (Austroalpine basement/Eastern Alps): Constraints from in-situ LA-ICP-MS U-Pb single bond zircon geochronology, *Lithos* 296-299, 412-430. DOI: <https://doi.org/10.1016/j.lithos.2017.11.022>, 2018.