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Sedimentological results requiring a new tectonic framework for the NW Tauern Window

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Mapping in the NW Tauern Window (TW), with special emphasis on the sedimentology of the 'Bündnerschiefer' (BS) and the metasediments of the Subpenninic units, has resulted in a new tectonic and palaeogeographic framework.

Tectonic and geological setting:

The Subpenninic nappes are the deepest tectonic and highest metamorphic units of the NW TW. From footwall to hangingwall these are: (1) The Zentralgneiskerne and its old roof (2) autochthonous and parautochthonous Permotriassic (Keuper facies) and (3) Jurassic metasediments. N of the Pfitsch vally these units are overlain by the Wolfendorn nappe, with at its base slivers of crystalline basement as well as Triassic carbonate and quartzite slices. Jurassic layers (black quarzites, graphitic phyllites, brown quartz-mica-marbles and the upper Jurassic Hochstegen-marbles) and the lower cretaceous Kaserer Formation form the upper part of this nappe.

Sedimentological characteristics:

Subpenninic:

Within the Wolfendorn nappe, immediately south of the Wolfendorn, a clear sedimentological relationship between the upper Jurassic Hochstegen marbles and the lower cretaceous Kaserer formation has been observed. This boundary illustrates a change of sedimentary depositional environment from carbonate-dominated to clastic. From the carbonate-dominated base of the Kaserer formation upwards the proportion of quartz- and mica contents, and locally small breccia components, increases. Massive clast-supporting polymict breccias follow. Their components are dominantly light grey, dark grey and yellowish dolomites (Triassic dolomites) and grey marbles. Granite boulders (Zentralgneis) occur subordinately and arkoses and conglomeratic layers

are locally intercalated. These breccias are overlain by quartz-mica-marbles (reddish brown, gray) and well stratified arkoses (with granite boulders), quartzites, calcphyllites and black phyllites.

Bündnerschiefer of the NW Tauern Window:

The base of the BS is characterised by frequent calc-chlorite-phyllites, polymict breccias and olistolithes. These olistolithes of quartzite, dolomite, rauhwacke, marble and sericite phyllite, with sizes of up to tens of metres, occur predominantly in the calc-chlorite-phyllites. Granite boulders of up to 0,5 m have been found for the first time. In reconnaissance drillings for the Brenner Base Tunnel anhydrite has frequently been found. The majority of the overlying BS consists of carbonaceous quarzites, calcphyllites, dark phyllites, whilst fine- to medium grained dolomite breccias occur consistently. We interpret this range of clastic lithologies as resedimented Triassic in Keuper facies. The provenance of the well rounded granite boulders is probably from the European continent.

Modereck nappe (MN):

The crystalline basement at the base of the MN of the central part of the TW is characteristic. Permomesozoic metasediments, BS rich in clastics and with massive arkosic layers (granite boulders), carbonaceous quarzites and polymict dolomite breccias follow. Lithologically this clastic facies of the BS, with arkoses and breccias, is identical to the Kaserer of the western TW. Traditionally these sediments of the BS have been described as Jurassic Brennkogelfacies, with the exception of Thiele (1980), who held a lower cretaceous age for possible.

Palaeogeography and nappe framework based on facies relationships:

Based on above lithofacies characteristics a facies distribution from proximal to distal could be reconstructed. The pre-Alpine crystalline Subpenninic basement is covered with sediments of Permian-, Triassic- (in Keuperfacies) and Jurassic (Hochstegen facies) age. Cretaceous sediments are absent in the northernmost realm, which was the area of provenance of the clastic Cretaceous sediments (Kaserer Fm.) on the Subpenninic units further South (MN, Wolfendorn nappe and Zillertal-core). This is indicated by the lithological components. The change from carbonate platform sedimentation (Hochstegen marbles) to proximal clastic sedimentation (Kaserer Fm.) reflects sedimentation on a passive continental margin and initial rifting. This rifting is indicated in the basal BS of the NW TW by sediments rich in clastics and with olistoliths in Keuper facies. The absence of arkoses and conglomerates, similar to those in the Kaserer Fm., indicates a more distal depositional environment. Massive arkoses, quartzites and dolomite breccias, lithologically identical with those of the WN, occur in the MN of

the central TW. These were traditionally called ‘Brennkogeljura’.

Because of lithofacial similarity we now contribute these lithologies to the Kaserer Fm. Both, the BS in the NW TW and the MN have a continental basement, with massive Permotriassic series and very similar younger sediments. Based on its lithologies, with breccias, arkoses and quartzites, the MN is more proximal than the sediments of the NW TW. We propose to attribute the BS of the NW TW (except the Nordrahmenzone), inclusive its Permotriassic base, to the MN. This also enables a good regional correlation. In our view the Glockner nappe is mainly represented by metabasites, ultrabasites and calcschists. The metasediments have been deposited mainly on oceanic basement.

See also the abstract Feijth, J., Rockenschaub, M., Janda, C: From subduction to exhumation: interpretation of fold interference in the NW Tauern Window in this volume.

Thiele, O., 1980: Das Tauernfenster. In: Oberhauser, R. (Ed.): Der geologische Aufbau Österreichs, 300-314.