

Middle Jurassic. Microfacies of the samples represent radiolarian bearing filament limestone (resembling silicified *Bositra* limestone with radiolarians). In the upper part of the Meliata type section occur several grey limestones and dolomites in a late Middle Jurassic mélange. Beside Carnian limestones also Norian grey limestones occur, representing typical components which were derived from the grey Hallstatt facies (Pötschen sequence in the Eastern Alps).

The studied samples all contained Jurassic, or mixed Triassic-Jurassic fauna which is in accordance to the mélange character of the Meliata Unit with Triassic/Jurassic ophiolite and sediment cover blocks and a Middle to early Late Jurassic matrix. However, no new constraints concerning the time difference between the southern and northern occurrences of the Meliata Unit are possible.

MOCK, R., SYKORA, M., AUBRECHT, R., OZVOLDOVA, L., KRONOME, B., REICHWALDER, P. & JABLONSKY, J. (1998): Petrology and stratigraphy of the Meliaticum near the Meliata and Jaklovce Villages, Slovakia. - Slovak. Geol. Magazine, 4: 223-260.

#### **A structural-kinematic model for Mount Rettenstein near Filzmoos (Salzburg/central Northern Calcareous Alps)**

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A structural-kinematic model has been derived for Mount Rettenstein based on new stratigraphic, structural and thermal data. The most important findings about Mount Rettenstein's geological inventory are:

- There are three individual structural units to be distinguished. They are separated from each other by subhorizontal fault planes. Based on the stratigraphy these structural units were assigned to/described as: (I) the Werfen Imbricates Zone; (II) the Hallstatt Mélange (Sandlingalm Formation sensu GAWLICK et al. 2007) and (III) the Rettenstein Succession sensu stricto (AUER et al. 2009).
- The two higher structural units comprise Middle Jurassic series of different lithology, facies and thickness, originally deposited in far distance from each other. The chaotic, fault truncated Hallstatt Mélange of unit II is Bajocian to Bathonian/?Early Callovian in age, widespread more than 100 m thick and consists mainly of slide blocks of the Hallstatt Salzberg and ?Zlambach facies zones. In contrast the Middle Jurassic of unit III is represented by less than 2 m thick Klaus Formation overlain by a Late Oxfordian debris flow made up of shallow water carbonate platform detritus. Both Mount Rettenstein Jurassic series show peculiarities in age and/or characteristics and cannot unequivocally be correlated with other Northern Calcareous Alps successions.
- Conodont alteration and radiolarian preservation prove the upper two structural units to have experienced at

maximum low diagenetic conditions. In contrast, the Werfen Imbricates Zone rocks below (structural unit I) were overprinted at high diagenetic to low-grade metamorphic conditions allowing illite to crystallize and local cleavage to form. The sudden, substantial downward increase in the thermal state of the rocks implies a post-metamorphic juxtaposition of the upper two structural units onto the Werfen Imbricates Zone.

Based on these major findings and re-evaluations of some nearby key regions, conclusions on the structural-geodynamic evolution have been drawn. These contrast in some points significantly from existing models of both Mount Rettenstein and the central Northern Calcareous Alps. The present-day gross structural situation of Mount Rettenstein is thought to be the result of the following main tectonic events:

- Stacking in the Middle to early Late Jurassic, creating an imbricate wedge at the Neotethys margin, which constituted the supply area for the Hallstatt Mélange type redeposits.
- Long distance transport probably some time around the Jurassic-Cretaceous boundary, bringing the Hallstatt Mélange rocks into the Mount Rettenstein realm. They must have taken a frontal position within a regional-scale thrust sheet („Sandlingalm nappe“ of GAWLICK et al. 2007).
- Out-of-sequence thrusting due to deformation propagation is thought to have emplaced structural unit III from its original footwall position on top of the Hallstatt Mélange of structural unit II.
- Metamorphic overprint of the Werfen Imbricates Zone succession (structural unit I) of the Mount Rettenstein area as a result of this stacking event. The Werfen Imbricates Zone of the Mount Rettenstein area must have been in a position farther to the southeast at this stage, being covered by a substantial tectonic overburden.
- Right lateral movement of the Werfen Imbricates Zone in the order of about 20 km relative to the future overlying rocks of structural unit II and III. This is thought to have taken place along a NW-SE-oriented regional strike-slip fault some time within the late Early to early Late Cretaceous period.
- Achievement of the final position of the assembled structural units II and III on top of the Werfen Imbricates Zone rocks as part of the hangingwall of a prominent normal fault most likely in the Late Cretaceous.
- Late-stage S-directed thrusting at, and uplift of, the southern margin of the Northern Calcareous Alps, leading to rotation of the Mount Rettenstein stack. As a result, the main border faults ended up in their present-day subhorizontal position.
- Small-scale high angle faulting during the Neogene lateral extrusion stage whilst a major strike-slip rail was active along the Enns valley.

A seemingly consistent structural-geodynamic model is presented. However, there is quite some uncertainty about the palaeogeographic positions of the successions and the timing of events. There is still a large need of investigation to fill the substantial gaps in knowledge and to understand only the gross picture.

AUER, M., GAWLICK, H.-J., SCHLAGINTWEIT, F. & SUZUKI, H. (2009): Spatial and temporal development of siliceous basin and shallow-water carbonate sedimentation in Oxfordian Northern Calcareous Alps. - *Facies*, 55/1: 63-87, Erlangen.

GAWLICK, H.-J., SCHLAGINTWEIT, F. & SUZUKI, H. (2007): Die Ober-Jura bis Unter-Kreide Schichtfolge des Gebietes Sandling-Höherstein (Salzkammergut, Österreich) - Implikationen zur Rekonstruktion des Block-Puzzles der zentralen Nördlichen Kalkalpen, der Gliederung der karbonatklastischen Radiolarit-flyschbecken und der Entwicklung der Plassen-Karbonatplattform. - *Neues Jb. Geol. Paläont. Abh.*, 243/1: 1-70, Stuttgart.

**The Drei Brüder klippen structure - part of the major Trisselwand allochthonous unit (Salzkammergut/central Northern Calcareous Alps)**

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The Drei Brüder Kogel mountain range north of Lake Grundlsee is situated in the eastern part of the Trisselwand massif (Fig. 1). The latter extends over an area of about 3 times 10 km, constituting the largest relic of the Plassen Carbonate Platform of the Northern Calcareous Alps. New investigations have shown that the bipartite structural build with a fault at the base of the Plassen Formation, known

from the western carbonate massif (SCHÄFFER 1982, Geologische Bundesanstalt 2001), applies for the whole complex. In the east, however, this klippen-type geometry is found at higher altitude due to relative block uplift along a high-angle fault. In fact it is only preserved in the Drei Brüder structure with Plassen Formation on top of an Oberalm Formation + Barmstein Limestone succession. There is microfacial, biostratigraphical and structural evidence that these Late Jurassic to earliest Cretaceous carbonates do not form a primary depositional sequence but there was a post-depositional juxtaposition of the different Plassen Group formations.

The Drei Brüder Kogel constitutes the main summits of a N-S-oriented ridge on the eastern Trisselwand plateau. In contrast to the pelagic limestones of the Oberalm Formation with Barmstein Limestone carbonate breccia intercalations, forming the plateau, the Plassen Formation of the Drei Brüder Kogel mountain ridge is obviously more massive and less well bedded. The strata dip moderately towards north and are at an angle to the sub-horizontal to shallowly dipping basinal strata underneath. Thin section analysis proved the hidden contact surface to be of secondary origin, at the same time excluding a simple sequence boundary hiatus with a prograding depositional system on top. The occurrence of *Kilianina? rahonensis* FOURY & VINCENT in the Drei Brüder Plassen Formation sequence indicates a Kimmeridgian age. In contrast, Late Tithonian calpionellids (*Crassicollaria*) were found in the footwall Oberalm Formation. Thus we clearly face an older-younger situation. The depositional setting of the Drei

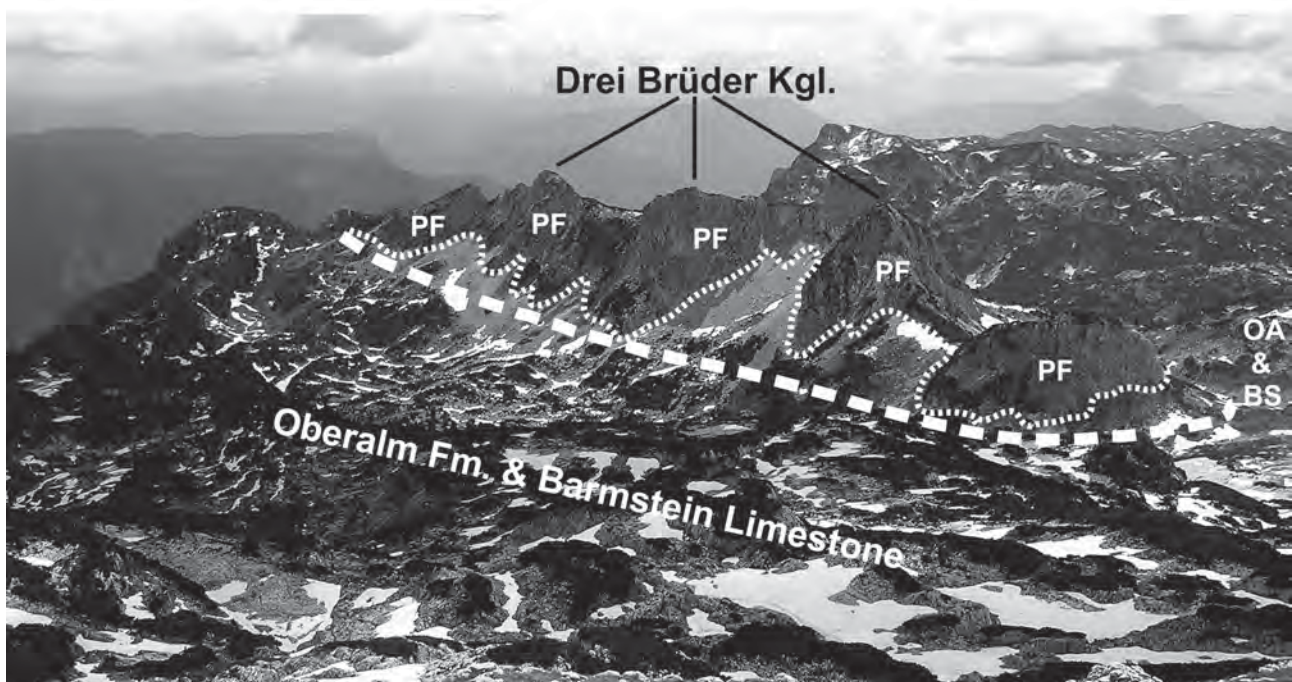


Fig. 1: View towards southwest on the Plassen Formation (PF) mountain ridge on top of the eastern Trisselwand plateau, with the Drei Brüder Kogel forming the main summits. The older stratigraphic age and the basal truncation of the beds clearly prove the allochthonous position of the Plassen Formation on top the Oberalm (OA) Formation + Barmstein (BS) Limestone sequence making up the eastern plateau. This general structural build applies for the complete Trisselwand Plassen Formation occurrence with the basal fault in topographically lower position and locally older strata in the hangingwall in the central and western part of the massif.