and applied $^{40}Ar/^{39}Ar$ mineral dating on granitoid samples to reveal cooling histories of these intrusions in spite to detect distinct geodynamic events of Qinling Mountains. We used the following Ar retention temperatures: 525 °C for amphibole, 425 °C for white mica, 300 °C for biotite and 200 °C for K-feldspar (all errors are ca. ±25 °C) and work will be completed by determination of the depth of intrusion. The preliminary results are as follows.

(1) Early Palaeozoic granitoids are exposed to the north of the Shangdan suture, are partly foliated and incorporated in the Qinling metamorphic complex. Their cooling through white mica and biotite Ar retention temperatures occurred between 355 and 340 Ma implying rapid, homogeneous cooling within this time interval. In contrast, the K-feldspar ages scatter between ca. 340 and 162 Ma.

(2) Indosinian granitoids occur both N and S of the Shangdan suture zone excluding therefore the Triassic age of closure of this ocean basin. The cooling ages of amphibole, white mica and biotite are between ca. 233 Ma (amphibole) and ca. 200 Ma (biotite) with few much younger biotite ages of ca. 116 Ma. K-feldspar ages shows two groups including 208-198 Ma and ca. 115 Ma. The exception is the Taibai granite with cooling ages of amphibole of ca. 125 Ma 112 Ma (K-feldspar) implying rapid Yanshanian cooling.

(3) The third group of likely Yanshanian granitoids (exposed north of the Shangdan suture) exhibits exclusively Yanshanian-aged cooling between ca. 125 (amphibole) and 108 Ma (K-feldspar) and the contemporaneity with the Indosinian Taibai granite is remarkable. An exception is a ca. 63 Ma-age of K-feldspar.

In consequence, the regional cooling and exhumation histories are dominated by rapid post-collisional cooling between ca. 355 and 340 Ma north of the Shangdan suture. A subsequent major event is the Mid to Late Triassic cooling (ca. 233-200 Ma) after Indosinian intrusions monitoring likely the closure of the southern ocean and formation of the Mianlue suture. The most interesting event is the rapid Early Cretaceous cooling of various granitoids reflecting a hitherto undetected regional exhumation event covering major sectors of the Qiunling Mountains.

Middle Jurassic matrix radiolarians from the Meliata ophiolite mélange at the type Meliatic sites Meliata and Jaklovce (Western Carpathians): palaeogeographic evidence

AUBRECHT, R.[1,2], GAWLICK, H.-J.[3], MISSONI, S.[3], SUZUKI, H.[4], PLASIENKA, D.[1], KRONOME, K.[1] & KRONOME, B.[5]

[1] Department of Geology and Paleontology, Faculty of Natural Sciences, Comenius University, Mlynska dolina - G, 842 15 Bratislava, Slovakia; aubrecht@fns.uniba.sk; plasienka@fns.uniba.sk; kronomek@fns.uniba.sk;
[2] Geophysical Institute, Slovak Academy of Sciences, Dubravska cesta 9, 845 28 Bratislava, Slovakia;
[3] University of Leoben, Department of Applied Geosciences and Geophysics, Prospection and Applied Sedimentology, Peter-Tunner-Strasse 5, 8700 Leoben, Austria; hans-juergen.gawlick@mu-leoben.at; s.missoni@daad-alumni.de;
[4] Otani University, Koyama-Kamifusa-cho, Kita-ku, Kyoto 603-8143, Japan; hsuzuki@res.otani.ac.jp;
[5] State Geological Institute of Dionyz Stur, Mlynska dolina 1, 817 04 Bratislava, Slovakia

The Meliata Unit is crucial for understanding the West Carpathian geology. Its remnants mark an important suture zone which remained after the Meliata part of Neotethys Ocean which was open in the Middle Triassic and partly closed in the Late Jurassic time. The key areas, in which occurrences of this unit are concentrated are near Meliata village and in the wider surrounds of Margecany and Jaklovce villages. The first site lies south-west of the Gemeric Superunit, whereas the second occurs at its NE margin. Position of the Meliata Unit on the both sides of this crustal block (comparable with Greywacke Zone of the Eastern Alps) led some authors to opinions about two branches of the Meliata Ocean surrounding the Gemeric Superunit, whereas others inferred that the northern occurrences do not represent a true suture but they were transported to its recent position tectonically by thrusting (obduction). If the first opinion is true, there would be e.g., differences in geochemical signature or some time difference between the closure of the two branches. Therefore, the two principal sites, Meliata and Margecany were revisited and new micropaleontological data were obtained, the first report of which is given herein.

Margecany (the type outcrops of radiolarite-basalt succesion along the railway at the local cement factory were sampled): In a red cherty limestone intercalated in the basalts, Triassic radiolarians (together with some poorly preserved conodonts (similar conodont fauna was previously found here by KOZUR & MOCK) with a mixture of some Jurassic ones, were extracted by dissolution. Microfacies of most of the reddish cherty limestone to radiolarites is evidently Triassic. From a reddisch cherty limestone to radiolarite overlying the basalts, following radiolarian fauna was extracted: *Actinomma* cf. *siciliensis*, *Crucella squama*, *Crucella* spp., *Hagiastrum* sp., *Paronaella pygmaea*, *Praeconocaryomma* spp., *Spongotripus* sp., *Elodium cameroni* and *Hsuum parasolense*. The assemblage indicates Middle Jurassic age (Aalenian to Bajocian with two species; Callovian to Oxfordian indicated by one species). Estimation of the exact stratigraphic position is problematic due to the actual knowlegde of the age range of the species.

Meliata (the type locality of the Meliata Unit): Late Middle Jurassic matrix between the olistostromes and slide blocks of the upper part of the succession was investigated by MOCK et al. (1998). The Lower part of the section was interpreted as a continous Anisian to Carnian sequence. A sample from the basal part of the section below the Ladinian cherty limestones and radiolarites and above the Anisian limestones, yielded *Higumastra winteri*, *Dictyomitrella* cf. *kamoensis*, *Stichocapsa cicciona*, and *Zhamoidellum* cf. *ovum*. The assemblage indicates a Callovian to Early Oxfordian age. A sample taken higher, but still in the basal part contained *Sethocapsa* cf. *kodrai* indicating late

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)

Auer, M. & Gawlick, H.-J.

University of Leoben, Department of Applied Geosciences and Geophysics, Prospection and Applied Sedimentology, Peter-Tunner-Strasse 5, 8700 Leoben, Austria

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.