

From where the tectonic slices of the Cretaceous age could have been transported into the Magura Group of nappes?

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The Magura Group of nappes is the significant regional unit of the Outer Western Carpathians in which flysch sediments from the Lower Cretaceous up to the Oligocene are proved. In the front of the partial Raèa and Bílé Karpaty units tectonic slices of Cretaceous rocks occur that are from lithological and biofacial point of view distinctly different:

Raèa unit, Klippe of Kurovice: Kurovice Limestones are formed by grey micritic limestone of the Oxfordian-Tithonian up to Early Berriasian age. Nannofossils with dominant specimens of genera *Cyclagelosphaera* and *Watznaueria* give evidence of the Tethyan bioprovince.

Tlumačov Marls (Berriasian-Valanginian) overlying Kurovice Limestones are characteristic by grey marl and clayey limestone. Nannofossil assemblages with nannoconids and *Conusphaera mexicana* are of the Tethyan character. In the Valanginian (CC3 Zone) was observed rare *Micrantholithus speetonensis* that could indicate a minor influence from the Boreal bioprovince.

The Jurassic and Lower Cretaceous of the Klippe of Kurovice can be lithologically comparable to a degree with northern edge of the Alpine Flysch Zone (Eliáš et al., 1990).

Bílé Karpaty unit, Hluk development: Púchov Marls (Campanian-Maastrichtian) consist of red, highly calcareous claystone and marl. In the Late Campanian and Early Maastrichtian, nannofossils of genera *Ceratolithoides* and *Quadrum* support Tethyan bioprovince by evidence but in the Late Maastrichtian common occurrences of high- and low-latitude species document also some influence from the Boreal area. Sediments correspond to the Púchov Marls of the Pieniny Klippen Belt (Stránik et al., 1995). They could also represent slope sediments comparable with those of the Hauptklippen Zone of the Wienerwald (Bubík, 1995).

Antonín Formation (Campanian-Maastrichtian) is characterised by turbidite rhythms formed by grey sandy-silty limestone and highly calcareous claystone and marlstone. Unlike Púchov Marls, the Early Maastrichtian nannofossil assemblages are rather of Boreal character documented by *Biscutum coronum* and *Prediscosphaera stoveri*. Equivalent of these sediments are unknown.

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Deformational sequence of a flysch sandstone: examples from Outer Carpathians (Poland)

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Deformation bands are widespread in Lower Eocene flysch sandstone of the Magura nappe (the innermost nappe in the Outer Carpathians in Poland). These structures were studied in detail at Gruszowiec and at Tylmanowa. Microscopic observations were combined with stress analysis. To our knowledge, this is the first attempt to trace and date a process of folding by studying the deformation bands.

At Gruszowiec, steeply dipping beds of the sandstone are cut by water escape sheets, deformation bands and minor brittle faults. The water escape sheets are oriented subperpendicular to bedding and to the regional fold axis. Some of the water escape sheets pass laterally into the deformation bands. The latter present whole spectrum between the bands with no feldspar cataclasis occurring as (i) a single cross-fold set and (ii) several fold-parallel sets (the latter inclined under shallow angles to the bedding); and the bands with strong feldspar cataclasis forming several fold-parallel sets oriented under high angles to the bedding. The minor brittle faults form several fold-parallel and fold-oblique sets. These faults display cataclasis of feldspar and quartz and cataclasis of calcite cement. Orientation of the water escape sheets and deformation bands was controlled by regional stress field and these structures occurred progressively during regional folding. First, water escape sheets and deformation bands with no feldspar cataclasis were formed. The intensity of cataclasis increased during the folding, and the most recent deformation bands, which were formed close to the completing of the folding, display strong feldspar cataclasis. However, deformation bands display neither quartz cataclasis nor cataclasis of calcite cement. It appears therefore that all deformation bands pre-dated calcite cementation of the host sandstone. Brittle faulting, which involved quartz cataclasis and cataclasis of