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Karst Phenomena as Indicators of Tectonic Styles

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The three main tectonic styles: normal faults, reverse faults and strike-slip faults can be recognized in up-to-date seismic time- or depth sections. Main criteria of each one are well described by several authors. Seismic examples of the different styles will be presented. The question is, when no seismic section is available, and the geologist in the field can only observe small sections of a fault plane how can he apply the seismic criteria in identifying the tectonic style. I had the opportunity of walking inside a flower structure, which is the main indicator of strike-slip movements. It happened in the Massif Centrale of France, where the brook Bonheur, having its source in the granite massif of Mont Aigoual, reaching its contact with the Devonian limestone, disappears. Its underground passage is 800 m long and when it reaches the surface again in a 100 to 120 m deep gully, it is called the Bramabiau – meaning the sound of belling stags – as water rushes out from the cave. Several photos will be presented to prove that the features of this cave fulfil the criteria of strike-slip movement. As the route of water penetrating limestone surfaces and causing karst phenomena is controlled by tectonics, we can use the inverse route: deduce the style of tectonic movements from the characteristics of karst phenomena.

Cretaceous Structural Evolution of the Bakony Mts., Hungary

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The Bakony Mts. is the SW part of the Transdanubian Range, situating SE from the Danube Basin. According to its Cretaceous structural setting, the Bakony Mts. is part of the Alpine nappe system (Tari 1995, Fodor et al. 2003). In our poster we present new paleostress data and other observation focused for the Cretaceous deformational phases of the Bakony Mts. In addition to the systematic compilation of the measured paleostress phases of the Cretaceous outcrops, and the tectonic settings, our data sets can have implications for the Cretaceous structural evolution of the Bakony area.

The most important structural element within this upper nappe of the Alpine nappe system is a pre-Tertiary double-syncline with Jurassic-Cretaceous formations in its core. The axes of the synclines are NE-SW. It is covered by almost-horizontal Senonian formation on the NE wing of the structure, but folds and thrust are covered by gently dipping Albian formation at the southern part of the Bakony. It indicates at least two tectonic phases within the nappe-formation.

There was an important tilting event during the late Early Cretaceous, when the synformal structure of the Transdanubian Range formed (Tari 1995). We detected at several outcrop gently dipping reverse faults and associated folds belonging to this (W)NW-(E)SE compressional phase (Kiss et al. 2001, Albert 2000). We have indications for the upper age limit of this deformation from a cross section near Ajka (Fig. 1.), where the NE-SW striking folds and thrust in the Triassic and Liassic carbonates are covered by flat-lying Albian cherty limestone (Fig. 1) (Fodor 1998). We have a looser time constraint at the SW part of the TR, Sümeg, the steeply dipping Aptian limestone is covered by flat lying Senonian formation (Haas et al. 1984). The steeply dipping Aptian layers show small-scale duplexes, formed at sub-horizontal bed position, by NW-SE compression.

The beginning of this compression could be post-Barremian based on the section of a quarry nearby Zirc, where the tilted Barremian limestone is discordantly covered by late Aptian crinoidal limestone (Fülöp 1964). The age of this deformation can be early Aptian. Pre-late Aptian deformation is also suggested by variable pebble composition of the late Aptian basal layers (Lelkes 1990).

We detected a well-dated middle Albian ENE-WSW extensional event at a Bakony Mts. At two outcrops nearby Zirc the formation of Albian clay is controlled by NNW-EES to N-S striking normal faults, sometimes with syn-sedimentary features (Fig. 1).

We observed a (N)NW-(S)SE compressional type stress field in Albian limestone at several sites. The phase is characterised