The granulites of the Dunkelsteiner Waldes, Gföhl Unit, Bohemian massiv

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The Dunkelsteiner Wald belongs to one of four granulite complexes of the Bohemian massive in Austria. The granulite complexes are the top of the Moldanubian Zone. Together with the Raabs Serie and the Gföhl Gneis the granulites forms the Gföhl Unit. Gföhl Gneis and the granulites are standing in a close contact to each other and there are indications that the Gföhl Gneis is a retrograde product of the granulites. The granulites attain higher granulite facies with 950- 1050 °C and 15-20 kbar.
The granulites of the Dunkelsteiner Wald are mainly investigated at the Quarry Wanko and its survey. They are grouped in two different types, one with pyroxene and one without. A special type is the biotitfree Weißstein, which achieves only minor thickness. The investigation deals mainly with the geochemistry of the granulites. They are comparable to other granulites from the Moldanubian Zone. Based on the A/NK and A/CNK ratio and the negative Eu- Anomaly the protolith of the granulites is an S-type Granite. Geotectonically the protolith was situated in a convergent margin.
At the margins of the granulite complexes there are serpentinized peridotites with a harzburgite to lhearzolithe character. LREE are anomaly enriched. The geochemistry of serpentinized bodies within the Dunkelsteiner Wald is equal to others in Moldanubian Zone of Austria, but is significantly different to similar peridotite bodies of the Czech Republic.

Microstructures and mineralogy of deformation bands in drill cores from the Matzen hydrocarbon reservoir, Austria

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In porous sedimentary rocks, fault zones are frequently accompanied by deformation bands. These structures are tabular zones of displacement, where grain rotation and in some cases grain fracturing result in a significant reduction porosity. However, as deformation bands usually only show displacements of some few millimeters to centimeters, and similar thickness, they are not captured by seismic measurements.
We analyzed drill core samples close to large normal faults from the most productive hydrocarbon reservoir in the Vienna Basin (Austria), the Matzen oil field. The terrigeneous sandstones contain predominately quartz, feldspar and dolomite as sub-rounded, detrital grains and are weakly cemented by dolomite and kaolinite. Deformation bands occur as single bands of ca. 1-3 mm thickness and negligible displacement, as well as strands of several bands with up to 2 cm thickness and displacement of 1-2 cm. A dramatic porosity reduction can already be recognized macroscopically. In some samples, the corresponding reduction in permeability is highlighted by different degree of oil staining on either side of the bands.
The mineralogical composition of the deformation bands differs from the host rock exclusively by a dramatic increase in dolomite cement, which reduces the porosity within the bands to a minimum. Additionally, cataclastic grain size reduction is observed within the bands.
Identification of the mechanical and diagenetic processes of porosity and permeability reduction, in combination with the analysis of the spatial distribution and orientation of the deformation bands may provide valuable information on the reservoir properties and fluid migration paths.

High-resolution studies comparing magnetic susceptibility and paleoenvironmental change with focus on small scale cyclicity in Lake Pannon

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The evolution of Lake Pannon and its associated environments have been studied for a long time. Drillings and geophysical data within the whole Pannonian Basin complex document a quickly reacting system. More precisely, the observed variations in sedimentology and facies revealed a clear linkage to the influence of orbital forcing and therefore to climatic change.
The main focus of our project now is to identify such shifts on a much smaller scale (decadal to centennial) within a relatively well-constrained age model. Based on this key concept we preformed high-resolution studies on sediment cores from Hennersdorf (south of Vienna, 10.4 Ma) with a sampling distance of 1 cm, considering pollen, dinoflagellates, the total number of ostracods and molluscs. In addition, gamma ray and magnetic susceptibility measurements were taken corresponding to the other samples.
The magnetic susceptibility (MS) record shows a fairly regular pattern between high and low MS values, but with a significant power at 33 cm, 40 cm and a third peak at 123 cm passing the 95 % interval in the spectral analysis. Within the current age model, this points to a cyclicity of c. 500, 625, and 2000 years. Gamma ray measurements, however, lack such rhythm. The decoupling of the MS signal from the gamma ray signal, which is also depending on detrital input, suggests a quite complex system.
The mechanism causing the different signals can only be