Phase diagrams for the eclogites from Koralpe

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In the Kor- and Saualpe of the Eastern Alps several eclogite bodies occur within metapelitic gneisses. The bodies are between 1 meter and several hundreds of meters in size and some of them were defined by Haüy (1822) as the type locality for the rock type „eclogite". A growing body of petrological work has documented the metamorphic evolution of the metapelites surrounding the eclogites, including studies of the *PT* paths, studies of the evolution of water content and geochronological work documenting the cooling and heating rates. Moreover, there are many petrological, geochemical and geochronological studies on eclogites, but very little work has been done on phase diagrams for the eclogite bodies themselves. Here we use recently available activity models for amphiboles to present new thermodynamic pseudosections for the Koralpe eclogites that can be used to constrain their *P-T* path and general metamorphic evolution.
We study eclogites with both basaltic and gabbroic precursors. Specifically we have selected samples from (i) the Bärofen Gabbro (a type-2 eclogite as defined in earlier studies), (ii) the Gressenberg (a type-1 eclogite) exposure and (iii) the metabasalt at Hohl (a type-3 eclogite). From the Hohl occurrence, we have investigated the sample with different states of hydration, in order to maximize the P-T-aH_2O information.
Modelling these rocks using with THERMOCALC, results in estimates for the conditions of metamorphism that are consistent with earlier studies which used conventional thermobarometers. Interpretation of the metamorphic evolution using *PT* and P-M_{H2O} pseudosections indicates that the *PT* path of the eclogites provides additional information on the prograde and high pressure evolution. The comparison between eclogite and the gneissic host can permit to integrate these to the tectonic evolution of the Eastern Alps.

Crustal structure and its relation to active tectonics in the Eastern Alps and surrounding tectonic provinces

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We consider the Alps east of the Brenner fault and their surrounding major tectonic units (Molasse, Bohemian Massif, Vienna and Pannonian basins, Dinarides, and Adriatic foreland). Processes still imprinting active tectonics have been the collision between the European plate and the Adriatic micro-plate, and the lateral extrusion of Eastern Alpine crust to the Pannonian basin. The Moho structure revealed by 3-D interpretations of the CELEBRATION 2000 and ALP 2002 seismic wide-angle data by the application of stacking techniques and tomographic methods indicates a fragmentation of crust and upper mantle into the European plate, the Adriatic micro-plate, and the newly interpreted Pannonian fragment. 2-D modelling using interactive ray-tracing techniques along main profiles of the ALP 2002 experiment and steep angle reflection profiles (TRANSALP, NE-Styria) supply additional support. Elastic plate modelling was applied to locate and characterize the boundaries between the crustal blocks.
The boundary of European and Adriatic Moho is located south of the TW, near the PAL. Crustal structure indicates that NS convergence has been compensated mainly by thrusting and up-folding of the TW over the Subtauern Ramp (SR), by thickening of the Adriatic middle or lower crust, and by backthrusting of the South Alpine sedimentary layers. East of the TW the Moho boundary divides into two branches. One extends first to NE and then to E, near the Mur-Mürz fault. The other branch follows the strike of the Dinarides in the vicinity of the Idria fault. These two branches separate the Pannonian fragment from the EU and AD plates. Gravimetric data supports the general pattern of plate boundaries and the assumption that the Subtauern Ramp exists under the whole TW. At its northern and south-eastern boundary the Pannonian fragment belongs to the Alpine and Dinaric orogens. A distinct transition zone represents the continuation to the much shallower Moho in the Pannonian basin. Tectonic escape and gravitational collapse find their expression in this structure. To the south the Pannonian fragment meets the Tisza unit.
Seismic activity correlates well with thrust and strike-slip faults in our investigation area. However, also the deep crustal structure and the inferred fragmentation of the Moho are in excellent correlation with the spatial distribution of foci. This pattern, displacement vectors derived from GPS campaigns, and results from levelling may be well explained by a continuing NS convergence between EU and AD and an ENE movement of the Pannonian fragment. In this model the Pannonian fragment has been merged with the Tisza unit to one „soft" micro-plate, and the PAL lost its significance as a dominant active strike-slip fault.

The geodetic-seismological field-laboratory at the mass movement Gradenbach

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The mass movement Gradenbach (GB) is a typical example of deep-seated gravitational creep affecting the slope of an alpine valley. It is located in the crystalline nappes of the Schober mountain range near the confluence of the Graden creek and the Möll river, Carinthia, and covers an area of about 1.7 km^2. GB accelerated in 1965 and 1966 and triggered catastrophic debris flows. Since this time GB attracted the interest of scientists and practitioners. However, the reliable short and long time prediction of creep rates and hazard estimates is still an unsolved problem. Our combined geodetic-seismological research at GB is dedicated to a deeper understanding of the processes at work and to improve prediction.
Geodetic observations of displacement rates by GPS started in 1999 (Brunner et al. 2003). The depth to the basal sliding surface