phase of strongly reduced exhumation. Uplift accelerated again during Westphalian to Lower Permian times. Exhumation of the southern Rhenohercynian at average rates of 0.65 mm/a contrasted with decompression velocities of 0.2 mm/a in the adjacent Saxothuringian zone. This difference was probably related to reactivation of the suture as a major normal fault zone. Thermal modeling results help to constrain the tectonometamorphic history of the study area and allow evaluating the contributions of extensional strain and erosion to uplift. Additionally, they provide an estimate on the thermal state of the crust during late-orogenic exhumation.

## THE EASTERN MARGIN OF THE BOHEMIAN MASSIF IN AUSTRIA

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The eastern margin of the Variscan orogen called Moravian zone by F.E. SUESS 1903 is divided into two major domes (windows), the Svratka dome in the N and the Thaya dome in the S, the latter being largely situated on Austrian territory. At the E the Thaya dome is bordered by Tertiary sediments of the Molasse zone, which covers crystalline rocks of still disputed origin.

The core of the Thaya window is formed by a composite granitic batholite of Cadomian age (550 mA according to SCHARBERT and BATIK, 1980). It consists of granites, granodiorites and tonalites bordered in the W by the Therasburg formation, which consists of micaschists, quartzites, para- and orthogneisses as well as rare intermediate metavolcanics. Despite a common tectonic contact the intrusion relationships are locally preserved with migmatic textures and traces of a Cadomian metamorphism (old Moravian phase). The Stengel-gneiss of Weitersfeld separates the Therasburg formation from the overlying Pernegg formation which, in turn is built up by micaschists and marbles. The calcsilicate rocks of Fugnitz form the western horizon towards the Bittesch gneiss, a spectacular augen-gneiss body, which can be traced from the very southern end of the Moravian zone towards N of the Svratka dome. The age of the Bittesch gneiss is still debated with age figures ranging from Upper Proterozoic to Ordovician.

The Variscan orogeny formed an inverse metamorphism with a mineral zonation from the greenschist to the amphibolite facies oblique to the regional strike (middle Moravian phase). Temperatures calculated from coexisting garnet-biotite pairs revealed 590 °C to 620 °C for the high grade areas (garnet-biotite-staurolite zone). The overall pressure can be estimated based on the garnet-muscovite-plagioclase-biotite-geobarometer in the micaschists and on phengite-barometry in adjacent gneisses between 6 to 8 kbars.

The geometry of the mineral zones indicates that the zonation is compatible with an NNE directed movement of the Moldanubian over the Moravian unit, but the internal Moravian nappes should have formed prior to the maximum stage of the metamorphic evolution. The thickness of the overriding Moldanubian plate must have thinned considerably towards the south, the east and the north as suggested by the lower temperatures and pressures in the same direction.

## BASIN DEVELOPMENT AND SEDIMENTATION IN THE UPPER CARBONIFEROUS CULM BASIN, SW-ENGLAND

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Extension of the lithosphere in SW-England during the Upper Devonian and Dinantian strongly influenced the sedimentary processes and the subsequent thermal and tectonical behaviour of the crust during Variscan compression. Consequently, the Culm Basin geometry does not reflect the typical geometry of a foreland basin: The sediments were not derived from the Variscan Orogen to the south. Therefore the facies-symmetry from deep marine to litoral, to deltaic and thence fluviatile facies are reversed, so that the prograding onlap of the younging strata propagates southward and not onto the foreland plate to the north.

A comparison of differently constructed subsidence paths (1. decompacted sediment versus time, 2. tectonic subsidence) demonstrates a high sediment accumulation at the northern basin margin, but the gradient of the tectonic subsidence is a magnitude smaller than the gradient of decompacted sediment curve. This can be explained by a relative rise of sealevel, which enlarged the accomodation space for the sediments. Sedimentation in this part of the basin was controlled by the Bristol Channel Landmass (BCL), its sediments and facies–symmetries.

Only a speculative geometry for the southern basin margin can be reconstructed. Either the sediment masses were transported laterally in a drainage seaway in front of the Variscan thrust load, and/or the erosion– and transport–coefficients were very small and the south margin represents an underfilled foreland basin. This can be modeled with a thermally young (24 Ma) elastical lithosphere of ca. 30 km thickness yielding a deep and wide basin. The uplift of the BCL in the north can not be explained by the upwarp of a peripheral bulge, because sediment mass–balances demand an uplift of ca. 2km of the source area. This uplift is thought to have been a result either of inversed extensional faults, due to Variscan compression, or of the dextral Bristol Channel Fault System.

## RETROGRADE FLUID EVOLUTION IN THE BOHEMIAN MASSIF (LOWER AUSTRIA)

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The Lower Austrian part of the Bohemian Massif is represented by the Moldanubian Zone and the structurally underlying Moravian Zone. The Moldanubian Zone exibits a nappe–like structure. The various nappes can be distinguished by their distinct lithologies and metamorphic conditions. All of them experienced a retrograde overprinting, which was caused by the underthrusted Moravian Zone. Fluid inclusions are used to derive the fluid evolution during the retrogression. Four types of inclusions can be identified. Type 1 is most abundant and contains $CO_2$ with minor amounts of $CH_4$. Type 2 consists of $CO_2 + H_2O \pm CH_4$. The density of the carbon dioxide component in both types is generally low. Type 3 are moderate saline aqueous inclusions ($NaCl_{eq} < 10$ wt.%). $T_{H(L)}$–values range between < 100 and 375 °C. Type 4 is $N_2$– dominated. The homogenization of nitrogen is critical or into the vapour phase near the critical point.

All inclusions are hosted by quartz. They are arranged in trails or clusters, thus their origin is regarded as secondary. Apparently, there is no correlation between occurrence of the various types of fluid inclusions on one hand and the geological position and lithology of the host rocks on the other hand. Therefore the fluid composition seems to be triggered by external buffering. None of the inclusions represents the fluid of peak metamorphic conditions, but they record the cooling and uplift history of the rocks.

A model is proposed where fluids released from the Moravian Zone migrate into the overlying Moldanubian Zone to trigger retrograde hydration reactions. These reactions consume preferably water and cause a progressive $H_2O$–depletion of the fluid. This evolution leads finally to a $CO_2$–rich fluid. Inclusions of type 1–3 reflect the outlined development. $N_2$–rich inclusions are remnants of the youngest fluid that migrated through the rocks.

## ARENITES OF THE LOWER DEVONIAN RHENISH BASIN (RHEINISCHES SCHIEFERGEBIRGE, FRG)

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Depositional composition of arenites was studied from sediments of the Lower Devonian Rhenish Basin. Burial diagenesis up to very low grade metamorphic conditions were determined for these and for associated rocks. Modifying processes like alteration, cementation, pressure solution and dissolution of detrital material have to be taken into account for provenance interpretation.

Besides traditional petrographic methods like polarization microscopy, investigations using cathodoluminescense microscopy, electron microprobe analysis and SEM were included.

Cathodoluminescense allows a more detailed differentiation of monocrystal quartz grains. OWEN & CAROZZI (1986) used the ratio of brown– to blue–luminescing grains for their source area determinations. In this study, a ternary diagram with a more detailed subdivision of quartz luminescense (brown/blue/red colours) is very useful for more distinct provenance interpretation.