The reconstruction of Miocene coal-bearing palaeo-habitats of the Hausruck – a multidisciplinary approach

A. Bechtel[1], W. Gruber[1], Ch.-Ch. Hofmann[2], T. Masselter[3], B. Meller[2] & R.F. Sachsenhofer[1]

[1] Institut f. Geowissenschaften, Montanuniversität Leoben, [2] Paläontologisches Institut Wien, Austria, [3] Botanisches Institut Freiburg, Germany

Outcrops and two exploration drill cores of the Hausruck coal-mining district (N Ampflwang, Kalletsberg and Lukasberg, respectively) of Late Miocene age have been analyzed: the coals by coal-petrology and organic geochemistry and the intercalated clays and carbonaceous clays by sedimentology, organic facies analysis, carpology and palynology.

Coal petrology and organic geochemistry indicate major differences between the depositional environments of the Kalletsberg and Lukasberg sites. The results point to drier, more acidic conditions in the part of the mire sampled at Lukasberg, whereas the lignites from Kalletsberg formed under near neutral conditions due to a raised (ground) water table. These differences agree with the palaeogeographic positions of the drillholes: Lukasberg is located within a relatively dry palaeo-valley, whereas the Kalletsberg core lies at the wet margin of a basin located south and southwest of the Hausruck area.

The fruit and seed flora from the small drill cores are poorer in species than the bulk samples from the Ampflwang outcrop, which yielded over 60 taxa of mainly aquatic plants indicating a lacustrine facies. The carpoflora of the Kalletsberg drill core also indicates wetland forests and swamps, whilst the flora of the Lukasberg drill core can be compared with the flora of the Amplwang outcrop. In the small open cast mine at Lukasberg, several remains of Ericaceae were found at the upper part of the section.

The sedimentological and organic facies analysis revealed roughly three depositional facies, which occurred in all localities investigated: lacustrine facies, coal swamp facies and clastic swamp facies. These depositional facies are strongly supported by palaeobotanical data (aquatic vegetation, wetland forests and swamps by the carpoflora) and the palynological results indicate well mixed vegetation types (clastic swamps, riparian vegetation, herbaceous swamps). There is also no over-domination of, for example, *Glypto-strobus* or *Pinus* spp. pollen, as in other Miocene palyno-morph assemblages. This is in marked contrast with the Lukasberg outcrop, where numerous charred *Pinus* spp. logs with bark and cones have been found. Ombrotrophic conditions are indirectly indicated by the occurrences of Ericaceae fruits (see above) and Ericaceae pollen (lower part of Lukasberg and middle part of Kalletsberg). Remarkable are the unusually high percentages of the Pinaceae *Cathaya* (up to 13%) and the Cornales *Mastixia* (2%), probably reflecting locally warmer and more humid climatic conditions, as also recorded in the Lower Miocene. Therefore the Hausruck can be interpreted as a palaeo-relict area.

The results of the analysis of the coals and the clastic/palaeobotanical analysis should be interpreted in terms of the lateral and vertical cooccurrence of different facies and vegetation types in a mosaic-like pattern, thus giving evidence for a dynamic ecosystem.

Fault kinematics on the Achentaler Schubmasse and western Salzach Fault

E. Beer and H. Miller

Department für Geo- und Umweltwissenschaften der Ludwig Maximilians Universität München

Fault-slip data were collected, analyzed, and palaeo-stress tensors computed from 93 stations along the northern margin of the Achentaler Schubmasse between Hochplatte (W-Achenkirch) and Landl (Thiersee), and from 33 stations along the Salzach fault between Ronach and Gerlosberg. Most fault sets resulted from more than one deformation. Heterogeneous sets were divided into homogeneous subsets by cross-cutting relationships observed in the field and graphical separation. For each subset stress tensors were calculated.

Along the Achentaler Schubmasse the stress tensors can be divided into five distinct groups that are regionally consistent in orientation, stress ratio and relative age.
From oldest to youngest the tensor groups are as follows:
σ1 subhorizontal E-W to WNW-ESE, σ3 subvertical
σ1 subhorizontal N-S, σ3 subvertical
σ1 subhorizontal N-S, σ3 subhorizontal E-W
σ1 subvertical, σ3 subhorizontal E-W
σ1 subhorizontal E-W, σ3 subhorizontal N-S