presence of clay/organic rich interlayers towards younger strata is present. The top (1256,65 m) is characterised by an erosive contact.
These strata reflect deposition in an open marine subtidal environment.

The upper megasequence starts with bioturbated bioclastic packstones/grainstones. Several porous and karstified horizons occur. Subsequently homogeneous, bioclastic grainstones are present, typically composed by a hash of open marine bioclasts and reworked crustose coralline algae fragments. At the top of the sequence algal bindstones occur; they are intercalated within pseudonodular crystalline chalk with bituminous interlayers and pore fillings. This succession reflects deposition in an open marine subtidal setting with a shallowing upward trend.
The two megasequences yield different cementation histories. These are much more complex than the diagenetic evolution affecting the paleocene-cretaceous sequence on the Brabant platform and Campine basin. Early cementation occurred in a marine setting, while late dissolution and cementation relates to a meteoric realm. An early dissolution stage affected most of the aragonitic components and created a network of small dissolution channels. However, these pores are occluded in a later stage by blocky calcite. According to the stable isotope data cementation by the blocky calcite occurred at shallow depth. The present porosity distribution relates mainly to a late dissolution stage and the creation of secondary porosity. Dissolution agents were meteoric water and carbocylic acids liberated near organic rich interlayers.
These results confirm the depositional basin model and the inversion tectonics structure developed by Martin Bless and his school (Bless, Felder & Meessen, 1987).

Wervik

The Upper Devonian traversed in the Wervik K12 borehole is mainly composed of Frasnian dolostones (interval 207-228m) and Famennian fine grained sandstones to siltstones (interval 178-207 m). The cementation and mineralisation history of these units is very complex but the most peculiar feature is the presence of exotic allochems and oolithes in the basal Famennian beds.

These isotropic pale brown spherical or irregularly corroded allochems with microlithic textures and similarly isotropic spastolithic or crushed «oolithes» are probably derived from a vesicular basic volcanic glass affected by submarine alteration (halmyrolysis).
Some vesicles are empty («spherical bubble shards»). They were compressed after transport and burial. Other vesicles are filled to form amygdales. These «oolithes» underwent a devitrification and chloritisation after transport. This discovery could shed a new light on the origin of the oolithic ironstones of the Famennian in Belgium. Indeed conodonts recovered from the 206,97 m level can be assigned to the Middle-Upper *Palmatolepis triangularis* Zone. This can be correlated to the first horizon of oolithic ironstones of Lower Famennian age in the Synclinoria of Namur, Verviers and Dinant (Dreesen, 1982). A transformation from volcanic «oolithes» into chloritic oolithes present in these ironstones seems plausible.

Petrographic analysis indicates a palagonitisation of strongly vesicular volcanic glass («gel-palagonite»), which implies a synsedimentary submarine volcanic activity with high gas pressure. This should have occurred on the Brabant Massif close to the Ashgill volcanic arch, and confirms the important epeirogenic movement and fracturation affecting the Brabant Massif during Middle and Upper Devonian times.

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SEAM DEVELOPMENT AND VITRINITE REFLECTANCE

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The degree of coalification of organic matter has since long been expressed in units of vitrinite reflectance (% Rm). It has been demonstrated that % Rm depends strongly on the thermal history of the organic matter. % Rm data from the Carboniferous in the Netherlands show that the observed coalification trends cannot be explained by geothermal modelling alone. Deviations from the expected downward coalification trends in boreholes have been observed in whole seam samples as well as in subsamples from coal seams.

The deviations can be explained either by postulating differences in the composition of the tanatacoenosis derived from the original peat-swamp environment, or by differences in the degree and process of biochemical degradation following the deposition of organic matter.

There is evidence that especially the postdepositional degradation - being responsible for the selective elimination of organic matter and the constitution of vitrinite precursors - may influence the ultimate vitrinite reflectance values.

It is suggested that the redox-potential of the ambient watermass, which in turn controls the microbiological activity after deposition, may influence the chemical composition of the organic matter and hence the optical properties, i.e. the vitrinite reflectance as well.

ZONED CALCITE CEMENTS : THEIR OCCURRENCE AND INFLUENCE ON THE Mn/Fe RATIO OF VISEAN LIMESTONES OF THE CAMPINE-BRABANT BASIN, BELGIUM

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The Visean limestones of the Campine-Brabant Basin, north of the London-Brabant Massif (Belgium) are characterized by zoned calcite cements which formed early in the diagenesis. Primary occlusion of the pores took place in an oxidizing marine environment and later in meteoric and/or marine pore waters under slightly reducing and shallow burial conditions.

Voluminous isopachous and radiaxial fibrous calcites and bladed cements precipitated in a marine oxidizing environment. Further growth of the bladed calcites occurred under more reducing conditions, as demonstrated by the higher

manganese content and the cathodoluminescence characteristics. The same evolution in the redox potential has been observed in spired syntaxial overgrowths. Intense zonations under cathodoluminescence are present in some syntaxial overgrowths, in rhombohedral calcites and in scalenohedral and blocky calcites.

The analyses of the bulk limestones containing the zoned calcite cements show a high Mn/Fe ratio. This is due to the presence of relatively voluminous zoned cements, which precipitated under slightly reducing (meteoric ?) conditions. The presence of clays and iron oxides in the carbonate rocks lowers the Mn/Fe ratio. Calcites in late diagenetic fractures have a low Mn/Fe ratio.

The Mn/Fe ratio of bulk samples can thus contribute to unravel the diagenetic history of limestones.

TERRESTRIAL SEDIMENTS AND PALEOSOILS FROM THE LOWER DEVONIAN (EMSIAN) IN THE RHENISH MASSIF (W. GERMANY)

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U. Jux (1983) mapped the Upper Bensberger sequence (Emsian) in the Oberbergisches Land (W. Germany) as composed of marginal marine sediments. The present work shows the development of a cyclic set of «fining upwards»-sequences with paleosoils which are overlaid by pyroclastics of the «Hauptkeratophyr (K4)».

The sedimentological parameters of current energy, sedimentation mode, water level, incomplete sedimentation, several paleosoils and the fossil record all point to terrestrial sedimentation.

Within the paleosoils, two types of soils could be distinguished :

1. Hydromorphic soils (sensu Remy, 1980). The groundwatertable remains longer almost at the same level as the soil surface. Increasing insolation forms mud cracks when the groundwatertable falls. According to Remy (1980), they are allochthonous soils, formed seasonally after floods.
   Typical plant communities are *Sciadophyton* sp., *Taeniocrada*-like plants, algae and rare Zosterophylaceae.
   A special root-system is found only in this soil-type.
2. Brown-yellow muddy-silty soil including many roots are rich in concretions of ironhydroxide and terrestrial invertebrate burrows.
   Typical fossils are roots, rhizoms, Zosterophylaceae *(Anisophyton gothani), Drepanophycus, Prototaxites,* algae and carbonised plant fragments (*Pachytheca* and *Prototaxites* fragments).

The Bensberger layers are overlaid by the «Hauptkeratophyr»-ignimbrites. Because of the sedimentological parameters and the laterally marine facies development (in the north and northwest), the depositional environment must have been a lowland at sea-level.

On the basis of the measurements of paleocurrents, it is apparent that the depositional environment lay to the south of the Old Red Continent.

RECENT INVESTIGATIONS OF Pb-Zn MINERALIZATIONS IN SOUTH LIMBURG (NL) AND THE NORTHERN EIFEL

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On the eastern border of the Brabant Massif vein-type Lead-Zinc mineralizations occur in lower carboniferous host rocks of South Limburg. They look very much like the mineralization type of Aachen/Stolberg. Investigations are carried out on drillcores from Valkenburg (Thermae 2002), which consists of paleozoic shales and silicified carbonate host rocks with several occurrences of pyrite, marcasite, sphalerite («Schalenblende»), wurzite, calcite and galena (Friedrich *et al.,* 1987). First microthermometric data show an average homogeneisation temperature (Th) of 125°C. Melting temperatures of last ice (Tm) are about -17°C and eutectic temperatures (Te) are ranging between -52 and -45°C. These data from cogenetic quartz indicate an ascendent transport of the H_2O, NaCl and $CaCl_2$ containing fluids.

In the Aachen/Stolberg Pb-Zn-district some fluid inclusions are measured on cogenetic calcites of drillcores from the Albertsgrube orebody near Stolberg. There are two clusters of homogenisation temperatures with an average of 72°C eg. 157°C. The average melting-temperature of last ice (Tm) amounts to -4°C in the first group and -20°C in the second group. These results point towards a mixing of warmer ascendent fluids with cooler descendent fluids.

Pb-isotopes from both occurrences show a similar distribution and plot into the field, for which Krahn (1988) proposed a postvariscan age. Remobilization from variscan mineralizations is rejected whereas a mobilization of the metals from underlying rocks is expected.

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GIVETIAN-FRASNIAN PHYTOGEOGRAPHY OF EURAMERICA AND WESTERN GONDWANA BASED ON MIOSPORE DISTRIBUTION

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The Givetian and Frasnian phytogeography of Western Gondwana and Southern Euramerica, as interpreted from miospore distribution, shows a rather uniform vegetation prevailing from palaeo-polar to palaeo-tropical regions. Similar climatic conditions are certainly required to explain this but it is concluded from a discussion on the dispersal of homosporous vegetation that a wide ocean separating these regions would have prevented it. Frasnian Northern Euramerica vegetation seems different and might correspond to an equatorial belt.

Heckel & Witzke's paleogeographical reconstruction fits much better with the miospore distribution than other maps.