Lycospora pusilla, *Knoxisporites stephanephorus* and *Raistrickia nigra* Biozone of Visean age. The TMC and the Cabrela Complex appear so to be coeval.

The constant presence reworked early and mid Palaeozoic palynomorphs indicates uplift and erosion of crustal blocks of the Ossa Morena Zone during the volcanic activity, but the source area is still a matter of conjecture.

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Palynofloristic changes used to reconstruct palaeoecological conditions of the main groups of megafloras along the Malimán formation (Lower Carboniferous) at the Cortaderas Creek, San Juan province, Argentina

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Malimán Formation outcrops at the northwestern of the Precordillera in San Juan province, around 30° S and 69° W, Argentina. This unit belongs to the Río Blanco Basin, which is characterized by Upper Paleozoic rocks with glacially-influenced continental, transitional and marine deposits. Erosional unconformities separate the Malimán Formation (probably Viséan) from the underlying Chigua Formation (Middle Devonian) and the overlying Cortaderas Formation (late Lower Carboniferous) (RODRÍGUEZ AMENÁBAR et al., 2003). The present contribution focuses on the analysis of the palynofloristic changes obtained from 10 samples of this unit collected at Cortaderas creek. Additionally, previous paleontological and sedimentological data were considered. This unit, with a thickness of 1300 m, is made up of shales and fine-grained sandstones intercalated with subordinated thick conglomerates that are referred to fluvial, deltaic and coastal plain palaeoenvironments; minor marine mudstones mainly with brachiopods are registered in the lower section. Quantitative variations of each palynological association allow recognizing different habitats for the major palaeobotanic groups of taxa (considered at generic level), such as lycopsids, sphenopsids, ferns and pteridosperms, which are developed around depocenters containing mostly transported microspores. Three groups of assemblages are identified: one recovered from shales where lycopsids and ferns spores show quite similar percentages (type I); a second group also obtained from shales is characterized by the dominance of herbaceous lycopsids spores (45%-60%) such as *Cristatisporites* and *Densosporites* (type II), and a third one yielded by a very fine-grained sandstone level, is a monospecific assemblage dominated almost exclusively by only one species of fern spore (56% of *Anapiculatisporites hystricosus*; type III). Sphenopsids (*Calamospora*) and pteridosperms (*Cyclogranisporites*) spores are rare (less than 2.5%). A significant percentage of *incertae sedis* spores have been registered, too (5-17%). All the levels yielded reworked material comprising Siluro-Devonian taxa ranging between 12% and 55%. Type I assemblages are representative for a wide range of wetter lowland as well as dryer more upland environments (wetlands and small lakes and related better drained areas on the alluvial plain). In contrast, type II assemblages represent local vegetation of swamps and ponds while the type III level could have preserved a quite *in situ* deposit of the dryer floodplain under an abiotic stress. The almost complete absence of the sphenopsids both in the micro- and the megaflora along the outcrop points out to unfavorable conditions for its development or perhaps to a taphonomic bias, since this flora is characteristic of the margins of rivers where relative high energy conditions added to long transport, could have prevented its preservation. Plant fossil remains include herbaceous lycopsids and small pteridosperms and other plants with uncertain taxonomic position (CARRIZO, 1998). Differences in composition between macro- and palynofloras reflect a subrepresentation of pteridosperms of the

local flora in the microfloras due to its miospores are typically trilete spores similar to other fern spores while the megascopic ferns remains are not registered even though they are apparently overrepresented in the microfloristic associations. The presence of reworked Silurian and Devonian palynomorphs into Carboniferous strata is consistent with a mountain range uplifted occurred during the Late Devonian orogenic movements (Chanic phase). Therefore, during the Early Carboniferous, this region placed at a high palaeolatitud of around 60° S, would have had a temperate-cool and humid paleoclimate. The relative wetness would have been maintained at least more or less stable along the Malimán Formation.

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Lower Carboniferous Palynostratigraphy of NE-Germany (Rügen) – A Revision

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Only few palynostratigraphic investigations have been completed in the Lower Carboniferous of Germany. The most data are available from the carbonate shelf sequences in NE-Germany, especially Rügen. The first study by BURMANN (1975) was based on samples from one borehole leading to a spore zonal scheme for the Tournaisian of Rügen. It is closely linked to the scheme from the Pripjat Depression (Russia) with spore zones defined by a combination of first occurence and frequency of key species. Therefore detailed correlation with schemes from W-Europe and E-Europe (Poland) are difficult.

A second study was done by CARSON & CLAYTON (1997) based on two other boreholes from Rügen Island. The Lower Carboniferous strata were studied completely, but because of a hiatus at the bottom and on the top of both sections the published spore zonal scheme ranges from the middle Tournaisian to Upper Visean. It showed, that spore assemblages from Rügen are good to compare to those from W-Europe. Nevertheless differences are seen in the uppermost Tournaisian and in the Upper Visean leading to different spore zones for these intervals.

Palynological investigations of all boreholes from Rügen Island bearing Lower Carboniferous strata done by the author during the last few years, led to a revision of the spore zonal schemes mentioned above. There is no complete section throughout the Lower Carboniferous in any borehole. But by combination of boreholes a continuous section can be put together, reaching from Mid-Tournaisian BP-Zone to Upper Visean VF-Zone. Spore assemblages showing a mix of in-situ and redeposited older taxa are very common in Visean strata, which are dominated in most sections by redeposited sediments. Redeposition seems to effect both, spore assemblage diversity and preservation (JÄGER in press).

Beside partially poor preservation spore assemblages from Rügen are less diverse than those from the British Isles, especially from the Mid-Visean TS/TC-Zone onwards. Clearly triangular taxa like *Tripartites*, *Triquitrites*, *Waltzispora*, *Ahrensisporites* etc. - common and stratigraphical important in Upper Visean assemblages from W-Europe - are rare and partially absent in Rügen. Also middle Visean key species like *Knoxisporites stephanophorus*, *K. triradiatus* and *Schulzospora campyloptera* can be quite rare or - in case of *Perotriletes tesselatus* - mostly absent. Furthermore, the first appearences and stratigraphical ranges of some Visean taxa such as *Densosporites* and *Leiotriletes tumidus* differ between these regions. Similarities are observed also between spore assemblages from Rügen and Poland, e.g. rare appearence of *Lycospora pusilla* in the Lower to Middle Visean and the presence of *Tripartites incisotrilobus* in the Lower Visean of both regions.

Despite the differences described above the spore assemblages from Rügen are even more comparable to those from W-Europe as shown by CARSON & CLAYTON (1997). The differences in the zonal schemes can not be confirmed by the present investigations. The upper Tournaisian MC-Zone (CARSON & CLAYTON 1997) can be identified in one more borehole from Rügen only. Therefore it is not useful even for local correlations. Also upper Visean palynostratigraphy shows no major differences between Rügen and the British Isles. Mid-Visean spore assemblages from Rügen are followed by assemblages typical for the NM-Zone in Western Europe. The diverging VP-Zone introduced by CARSON & CLAYTON (1997) for the upper Visean from Rügen is produced by a hiatus in