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Quantitative palynology in late and latest Famennian swamp environments, an accurate tool for Marine / Non-marine correlation

Coal seams do not become common until the Middle and Late Devonian. However these coals are either algal or only questionably of vascular plant origin. Coal-bearing sediments of the Late Famennian Hampshire Formation (West Virginia and Virginia, USA), dominated by the prefern *Rhacophyton*, are the first widespread occurrence of true swamp-adapted plant communities in the Paleozoic (Scheckler 1986). Miospore assemblages from these coals and associated sediments allow to distinguish **upstream** from **downstream** (coastal) **marginal swamp** environments (Streel & Scheckler 1990).

Coastal "coal" swamp development is known to depend mainly on the sea-level : higher the sea-level, higher the fresh-water table near the coast and therefore, wider the swamp. Upstream swamp environment development only depends on climate : more rainy the climate, higher the water table and wider the swamp environment, but also more important the river run-off and its discharge into the sea.

Miospores produced by their (often unknown) mother-plants are dispersed mainly in the corresponding environment but also in the neighbourhood. Their quantitative analysis in non-marine sediments gives a mean picture of the regional vegetation. But, in marine sediments, a distorted picture is obtained. Indeed, if the miospores from coastal environments are directly recorded, through the wind, in the neighbouring marine sediment, those from upstream environments are mainly transported to the sea through the rivers.

In the late Famennian marine facies of the Ourthe Valley in N-E Belgium, miospore quantitative analysis recognises a recurrence of high sea levels developing downstream "coal" swamps and a recurrence of wet climates developing upstream swamp margin plant communities.

Applied to a sequence around the latest Famennian Hangenberg Event in Sauerland, Germany, where the changes in sea level are known to have been severe, miospore analysis suggests short cycles involving climatic changes and sea-level changes probably of the 6th order i.e. of less than 100 ka by comparison with the researches conducted in the late Famennian in N-E Belgium.

Dreesen, R., Poty, E., Streel, M. & Thorez, J. - 1993: Late Famennian to Namurian in the eastern Ardenne, Belgium. I.U.G.S. Subcom. on Carb. Strat., guidebook : 60 p. Liège University.

Jarvis, D.E. - 1992: The stratigraphic palynology, palynofacies and sedimentology of the Devonian-Carboniferous Kiltorcan Formation of Southern Ireland. Ph. D. Thesis, Cork (Unpublished).

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Streel, M. & Scheckler, S.E. - 1990 : Miospore lateral distribution in upper Famennian alluvial, lagoonal to tidal facies from eastern United States and Belgium. Rev. Palaeobot. Palynol., 64: 315 - 324.

Miospores dominating a specific continental environment during the late Famennian (after Streel & Scheckler 1990, Jarvis 1992, Dreesen *et al.* 1993)

Well drained alluvial plains:

Aneurospora greggsii

(probably *Archaeopteris* microspores)

"Coal" swamps:

Diducites plicabilis-Auroraspora varia Complex

(*Rhacophyton* isospores)

Upstream swamp margins:

Grandispora gracilis

Apiculiretusispora coniferus

Downstream swamp margins:

Vallatisporites hystricosus

Auroraspora asperella

Retispora lepidophyta