Land sea signals in three different marine settings: the strength and weakness of a combined pollen-dinoflagellate cyst research

GB 2012 Contestant for Best Poster Presentation

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A palynological study was carried out on three different marine settings with a Pliocene-Pleistocene age situated in the northern Atlantic. Pollen and spores, derived from the land, together with dinoflagellate cysts, derived from the photic zone of the ocean, are preserved in the sediments. The wall of the resting cysts of the marine algae as well as from the pollen and spores consists of a very resistant organic material. This allows an extraction with acids out of the sediments from both proxies with a same treatment. While dinoflagellate cysts are an important biostratigraphical tool (Verhoeven *et al.*, 2011), pollen and spores give especially information about the response of the vegetation to climate changes. In this study, we studied the limitations of the scientific significance of the two proxies according to the specific sedimentation environment.

The three localities are 1) the shallow marine sediments of the Tjörnes peninsula, 2) the 5km further seawards situated shelf sediments of the Flatey island and the 3) sediments of the Ocean Drilling Program core 985A, situated north of the Icelandic plateau with a water depth of 2787.6m.

The Tjörnes beds consist of an alternation of terrestrial swamp sediments and marine tidal flat to sublittoral shallow water and estuarine sediments. Dinoflagellate cysts are mostly moderate to scares present, but still give a significant representation of the marine assemblage. Pollen is in this kind of sediments abundantly present and the variation in the assemblages is closely linked to the gain and loss of habitats caused by sea level changes (Verhoeven *et al.*, submitted).

The dinoflagellate concentration in the Flatey sediments is higher and more constant compared to the Tjörnes sediments. The pollen concentration in Flatey is substantial lower, but still represent the vegetation of the island. The conservation of both proxies is good.

The more oceanic position of ODP 985 is clearly visible as can be seen by the dominance of *Impagidinium* species and *Nemathosphaeropsis labyrinthus*. Biostratigraphical species like *Operculodinium tegillatum*, *Reticulatosphaera actinocoronata* and *Batiacasphaera minuta* are present as well in ODP 985 as in Tjörnes. Heterotrophic species however like *Lejeunecysta* sp. and *Selenopemphix* sp. which forms a major part of the shallow marine assemblage of the Tjörnes beds, are not present in ODP 985. The pollen concentration is extremely low and no real signal can be obtained from this proxy in this oceanic environment.

It seems that best results for the combination of both proxies can be achieved in shallow marine sediments with a restricted distance to the coast like in Flatey.

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Verhoeven K., Louwye S., Eiríksson J. (2012). *Plio-Pleistocene landscape and vegetation reconstruction of the coastal area of the Tjörnes peninsula, northern Iceland, based on a pollen analytical study.* Boreas, Volume 42, Issue 1, pp 108-122.