The Miocene: an optimum of climate change?

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Recently a lot has been going on about global warming and climate changes. This can be seen in the huge amount of research that was done as well on land (by study of pollen, isotopic components,…) as in marine environment (current studies, dinoflagellata, biomarkers like TEX86,…).

The Miocene itself shows a spectacular climatic evolution with at the begin a glaciation that lasted for 4Ma followed by an explicit climatic optimum. From then on the global trend of climate would only go down to eventually end up in the glacial-interglacial period during the Quaternary. So what did happen at this optimum? Was it of major or minor importance in the trend to glacials-interglacials? Let's find out.

What we find back from it are worldwide changes in the geological record around this optimum. On land for instance we see that grasses become dominant and large mammalian herbivores radiate because of this evolution to modern terrestrial habitats. In the marine environments we notice the presence of bigger sea mammals, but the radiation is much less pronounced then on land. Next to changes in the paleontological record we also see some geological indications (like marine isotopes, hiata, changes in depositions…).

Hiata are also found in 3 DSDP sediment cores at Goban Spur, SW of Ireland. The 3 DSDP cores 548A-549A-550 are respectively taken on the shelf, the shelf edge and the abyssal plain and are in this way a representation of a large part of the marine environment. We would like to achieve to reconstruct this environment as a representative example for the Northern Atlantic, through the Miocene and especially around the hiatus (normally an equivalent of the Climatic optimum) by studying these cores. A sedimentological (sortable silt analysis) and paleontological study (dinoflagellata) will be applied in this thesis study. The sortable silt analyses of the 3 cores will give us some information on the lateral and vertical evolution of the ocean currents before and after the hiatus. If possible the change of water masses will be confirmed by the study of dinoflagellata abundances or assemblages. Dinoflagellata assemblages will offer us also an insight in the properties of these water masses like salinity, temperature, sedimentary influx from Ireland,… The dinoflagellata will also be used to date the hiatus more in detail and especially determining the difference in timing of the hiatus on different depths in the marine environment.

In the future we can expect a lot more studies like this one because there are still a lot of other DSDP-ODP-IODP cores that can be studied for the same hiatus or other periods and so in the future it might be possible to create an extensive mapping of the paleo currents and water masses over time. This will then eventually help to build up better climate understanding and climate models.