Pliocene Arctic Climate Teleconnection (PACT) – A Joint Indo-Norwegian Endeavour

The Pliocene Arctic Climate Teleconnection (PACT) project aims to reconstruct the Arctic climate variability in high-resolution during the Mid-Pliocene Warm Period (MPWP) and explore its teleconnections with the South Asian and Australian Monsoon systems using sediment samples from the various IODP Expeditions in the Arctic Ocean, Eastern Arabian Sea (EAS), and North-Western shelf of Australia. MPWP was a warm period around 3.0 to 3.3 million years ago (Ma) when CO2 levels were similar to present or higher so it can provide an insight into the response of the climate system to the future global warming. Our results based on denitrification and productivity proxies from the EAS show that, during the MPWP, stronger summer monsoon occurred with less sea ice in the Arctic. New climate proxy data (Neodymium isotopes for past ocean circulation, highly-branched isoprenoid biomarkers for sea ice reconstruction, total organic carbon and nitrogen isotopes for productivity and nutrient utilization) shows enhanced Atlantic water inflow during MPWP into the Arctic Ocean and its effect on the sea ice retreat and productivity increase. These results have an enormous impact on analogous observations of ongoing melting of sea ice in the Arctic Ocean and predictions for future heat transport through increased Atlantic water inflow. The pollen abundance data suggest that overall vegetation was poor in the vicinity of the core site or the dispersal and deposition was restricted. The focus is now on the high-resolution response of the monsoon system during this phase of Atlantification of the Arctic Ocean during the MPWP. Further, data - model inter-comparison in PACT will improve model prediction of the Arctic climate and monsoon system in the future warming scenario.