

Reconstructing surface water paleoproductivity variations across the Eocene-Oligocene Transition based on high-resolution, quantitative siliceous phytoplankton assemblage and biogenic silica records from low- and high-latitude Indian Ocean sites

Description for the general public

Contrary to what many of us think, the climate on Earth undergoes constant changes, as clearly shown by the rock record. One of the most important climate changes in the entire Earth history took place some 34 million years ago and is termed the Eocene-Oligocene Transition. At this point in time Antarctica became glaciated.

One of the likely causes for the global cooling at the EOT were large blooms of siliceous phytoplankton – tiny plants suspended in the surface ocean waters, that have skeletons composed of silica. Diatoms are a group of beautiful algae that are the best known representatives of the siliceous phytoplankton. The rock record, however, is rather incomplete, and thus it is also possible that the course of events took a different route: the global cooling may well have been the cause for diatom flourishing in the Oligocene.

In order to resolve what happened during the EOT, the proposed project will study late Eocene through early Oligocene sediments from five geological drillholes located in the Indian Ocean. This should give an answer to the following questions: how did siliceous phytoplankton abundance change during the EOT? What species first appeared, and which ones went extinct at that time? How did the nutrient levels change in the surface waters of the Indian Ocean?

All of this stems from an unlikely observation that tiny phytoplankton can make a huge impact on the Earth's climate. In favorable conditions, today's siliceous phytoplankton is responsible for carrying out a larger portion of total photosynthesis than all rainforests combined; and photosynthesis requires carbon dioxide. This way, by fixing organic matter that subsequently drops to the seabed and becomes buried in sediments, tiny plants are able to change the greenhouse gas concentrations in the atmosphere.

Is that what happened during the EOT? Was is the cause for the global cooling, or rather its effect? – these kinds of questions is what the proposed project aims to answer.