Reconstruction of paleoproductivity in the central equatorial Pacific Ocean during the Mid-Pleistocene using lipid biomarker approach

ADEGOKE OLUGBOYEGA BADEJO[1], INAH SEO[23], KISEONG HYEONG[2] AND SE-JONG JU[1*]

[1]Deep-sea and Seabed Mineral Resources Research Center, KIOST, Ansan, Korea: badejo@kiost.ac.kr

[1]Deep-sea and Seabed Mineral Resources Research Center, KIOST, Ansan, Korea: sjju@kiost.ac.kr

[2]Marine Geology and Geophysics Division, KIOST, Ansan, Korea: inahseo@kiost.ac.kr

[2]Marine Geology and Geophysics Division, KIOST, Ansan, Korea: ksheong@kiost.ac.kr

[3]School of Earth and Environmental Sciences, Seoul National University, Seoul, Korea: inahseo@kiost.ac.kr

The mid-Pleistocene climate transition (MPT), is a complex climatic change which brought about the Late Pleistocene ice age around 0.9Ma and shift in the dominant periodicity of glacial- interglacial oscillations from 41 to 100kyr. The MPT marks a change in the climate system in response to external forcing, bringing about changes in the deep water circulation, long term global cooling and decline in CO_2 in response to the Northern Hemisphere ice sheets and sea-ice development. Here we examine the changes in productivity in the central equatorial pacific during the MPT by applying the lipid biomarker approach. Sediment core from the central equatorial Pacific (5º 55' N, 177º 26' W, 557 cm long and 4136 m water depth) spanning a period of ~1Ma was studied. We focused on the time interval from 405,000 yrs to ~1Ma, largely coinciding with the MPT when the dominant period of the Earth's climate variability shifted from 41 to 100kyr. Down-core profile of marine lipid biomarkers (alkenone, brassicasterol and dinosterol) showed different profile, with an increase in concentration of brassicasterol and dinosterol in contrast to alkonone concentration during the MPT. The shift from the phytoplankton markers is said to be as a result of the oceanographic condition (physical properties of the water column). Sea surface temperatures (SSTs) reconstructed showed a fall in SSTs during the MPT (~ 2 ºC), indicating a history of intensified Walker Circulation. Our observation indicates that the changes in deep-water circulation, long-term global cooling and sea ice development could be a major factor controlling the productivity in the central equatorial Pacific Ocean during the MPT.