

[EJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-IS Intersection

[M-IS06]Global climate change driven by the Southern Ocean and the Antarctic Ice Sheet

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The Southern Ocean and Antarctic ice sheet, which are the giant reservoirs of heat, water, and materials, have a potential to play central roles in long-term global climate change. This system is composed of the following sub-systems; ice shelf which is a place of the interaction of ice sheet and ocean, flowing iceberg, seasonal sea ice zone, Antarctic bottom water which drives the thermohaline circulation, active biological production and Antarctic Circumpolar Current. These sub-systems are interacted with each other and have significant impact on changes in the global environmental system. This session aim to summarize recent observational and simulation studies from various fields relating to the past and present changes in the Antarctic Ice sheet and Southern Ocean, which are essential elements for unraveling the changes in the global climate system. Further, future science plans for understanding of the environmental changes of the Antarctic Cryosphere is also discussed.

[MIS06-P04]Orbital scale fluctuation of sea-ice covered area in the Southern Ocean during the mid-Pliocene warm period

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Sea-ice affects not only albedo but also carbon cycle and nutrient transportation in the ocean and thus reconstruction and clarification of its substantial role is needed to predict the future global climate change. Many paleoclimate researches have focused on the middle Pliocene warm period because CO₂ concentration in this interval showed similar to modern concentration therefore Pliocene climate change could contribute to prediction of global warming. It is possible that the Southern Ocean condition drives global climate system and relationship among sea-ice fluctuation, ice-sheet melting, and paleoceanographic condition played a crucial role in the climate changes. However, there are few consensuses about past sea-ice expansion and retreat in the Pliocene.

Investigating the ice rafted debris (IRD) and diatom assemblage related to sea-ice are known as useful indicators for reconstructing the sea-ice fluctuation. Investigating IRD is thought to be appropriate for discussing about the Pliocene long term trend, in the other hand studies using fossil diatoms are not progressed. Because of the species complicated evolutions, there are many interpretations for sea-ice reconstruction. However, diatoms have been changing assemblage sensitively responding to environmental condition, not only sea-ice but also sea surface temperature, stratification, and salinity.

In this research, for the purpose of sea-ice reconstruction with high precision and application to comparison with Pliocene climate change, fossil diatom assemblages from sediments of ODP Leg 119 Hole 745B and Leg 188 Hole 1165B in the Indian sector of the Southern Ocean are investigated. These sites are situated in modern summer and winter sea-ice zones respectively and possibly preserve diatom assemblage which is affected by sea-ice latitudinal dynamic change. As a result, the analysis suggest

that sea-ice covered area fluctuated in consistent with insolation change and sea-ice melting area possibly spread to northern area where previous research indicated. These results showed diatom assemblage analysis could contribute to detailed sea-ice reconstruction in the Pliocene period.