

[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-P06]Long-term variation of phytoplankton chlorophyll *a* in the Indian sector of the Southern Ocean

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Long-term monitoring of phytoplankton biomass is valuable to detect climate change impact on surface ecosystems in the Southern Ocean. Chlorophyll *a* (chl-*a*) observations by Japanese Antarctic Research Expedition (JARE) started in the 1965/1966 during austral summer and continued for over 50 years in the Indian sector of the Southern Ocean. We analyzed long-term chl-*a* dataset along 110°E in December and January to investigate inter-annual and decadal variations of phytoplankton biomass. In the region between 40°S-60°S, chl-*a* values exceeded 0.5 mg m⁻³ were detected after the 1990s more frequently than before the 1980s. The similar long-term trend was also found in vertically integrated chl-*a* values. There was an increasing trend in the ten-year moving average of the mean surface chl-*a* value in the waters between 45°S-55°S over the past 50 years. Moreover, this increasing trend in chl-*a* was correlated with the Southern Annular Mode (SAM) index positively. The positive correlation between trends of chl-*a* and the SAM index could be associated with enhanced westerly winds, which can lead to the supply of cold, iron-rich waters by upwelling (e.g., Lovenduski and Gruber, 2005). Recent observation along 110°E by Umitaka-maru (TUMSAT) and satellite remote sensing dataset revealed that inter-annual variation of surface chl-*a* in seasonal sea ice zone in January, although relationships among chl-*a*, sea ice, and climate index such as the SAM are still obscure.