

氷床・海水縁辺域の総合観測から迫る大気 - 氷床 - 海洋の相互作用

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Research of Ocean-ice BOUNDARY INteraction and Change around Antarctica (ROBOTICA)

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The Antarctic and surrounding Southern Ocean are changing. Acceleration of ice mass loss and warming of the coastal ocean in the West Antarctica are the problems of substantial impacts on the global climate system. In the East Antarctica, which has been considered to be stable and attracted relatively less attention, regional characteristics of interactions among climate subsystems have been recently revealed and evidences of variations on various time scales from decades to millennium have been accumulating. Off Wilks Land underneath the Totten Glacier Ice Shelf, whose ice discharge is accelerating, a potential pathway of warm water access has been discovered (Greenbaum et al., 2015). Along the East Antarctic coast, sea ice formation and subsequent brine rejection in polynyas, including Cape Darnley Polynya as the head of the list, result in production of Dense Shelf Water and lead to the export of bottom water (Ohshima et al., 2013; Kitade et al., 2014). In the Lutzow-holm Bay off Enderby Land, decadal or longer-term variabilities have been observed. A significant portion of landfast ice was disintegrated in April 2016 (Fig.1), which has proven the quasi-periodicity of one to two decades. In August, offshore Cosmonaut Polynya recurred, after the previous large opening in 1999. Despite the global impact of the coastal variability through the bottom water export and long-term ocean-ice variabilities, investigations of the mechanisms and variabilities in the East Antarctica are insufficient.

Recent rapid progress in the techniques of remote autonomous observation and satellite communication are beginning to change this situation. Hence, under the project called ROBOTICA for the coming 9th six-year plan (2016-2023), we plan to utilize state-of-the-art unmanned observations such as under-ice oceanographic, seafloor and cryospheric observations using ROV/AUVs, geodetic network observations of ice/ocean motion and deformation using GPS/ GNSS, and oceanographic observations using tethered and moored profiling observation systems. Combinations with the conventional and robust observational techniques will enable us to acquire the detailed environmental information both in time and space. Implementation of this project can provide us a big step forward for realization of the dream of the sustained observation system around Antarctica. For JARE58, we will target for the ice-ocean interaction in Lutzow-holm Bay in front of Shirase Glacier, using satellite communicating profiling buoy and shipboard hydrography. Deployment of a state-of-the-art tethered profiler off Cape Darnley region is another challenge for sustained observation

Efforts for remote automation in the oceanographic and cryospheric observations are rapidly emerging world-wide. In cooperation with the frameworks such as Antarctic Gateway, SOOS, and FRISP, development for the future sustained observational network is now underway.

References

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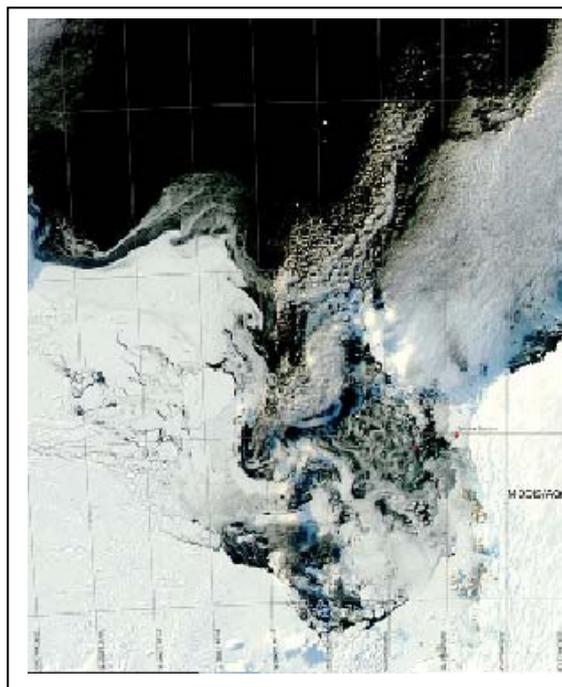


Fig.1 Land fast sea ice disintegration in April 2016.