

Cruise Summary

1. Cruise Information

- Cruise ID: MR14-05
 - Name of vessel: R/V Mirai
 - Title of the cruise: Predictability study of Arctic cyclones
 - Chief scientist [Affiliation]: Jun Inoue [JAMSTEC / National Institute of Polar Research]
- Main study on board
- Representative of the Science Party [Affiliation]: Jun Inoue [JAMSTEC / National Institute of Polar Research]
- Title of proposal: Predictability study of Arctic cyclones
- Studies on board
- Representative of the Science Party [Affiliation]: Michiyo Kawai [Tokyo University of Marine Science and Technology]
- Title of proposal: Nitrogen cycle in the Pacific Arctic
- Representative of the Science Party [Affiliation]: Yugo Kanaya [JAMSTEC]
- Title of proposal: Advanced continuous measurements of aerosols in the marine atmosphere: Elucidation of the roles in the earth system
- Representative of the Science Party [Affiliation]: Masaki Katsumata [JAMSTEC]
- Title of proposal: Applied research of MIRAI brand-new shipboard weather radar: Validation and utilization of dual-polarization information for global deployment
- Representative of the Science Party [Affiliation]: Masao Ishii [Meteorological Research Institute]
- Title of proposal: Studies on greenhouse gas cycles in the Arctic and their responses to climate change
- Representative of the Science Party [Affiliation]: Nobuyoshi Yamashita [National Institute of Advanced Industrial Science and Technology]
- Title of proposal: Estimation of hazardous chemicals discharge form the melting ice in the Arctic Ocean
- Studies not on board
- Representative of the Science Party [Affiliation]: Masao Nakanishi [Chiba University]
- Title of proposal: Tectonics history of the Pacific Plate during mid-Cretaceous
- Representative of the Science Party [Affiliation]: Masaki Katsumata [JAMSTEC]
- Title of proposal: Global distribution of drop size distribution of precipitating particles over

pure-oceanic background

- Representative of the Science Party [Affiliation]: Taro Shinoda [Nagoya University]
Title of proposal: Daily simulation using a cloud-resolving model over the Arctic Ocean
- Representative of the Science Party [Affiliation]: Kazuma Aoki [Toyama University]
Title of proposal: Aerosol optical characteristics measured by ship-borne sky radiometer
- Representative of the Science Party [Affiliation]: Takeshi Matsumoto [Ryukyu University]
Title of proposal: Standardization of marine geophysical data and its application to the geodynamics studies
- Cruise period:
31 August 2014 – 10 October 2014
- Ports of call:
31 August 2014, Dutch Harbor (leave port)
10 October 2014, Yokohama (arrival in port)
- Research area:
Arctic Ocean, Bearing Sea, North Pacific Ocean
Research map

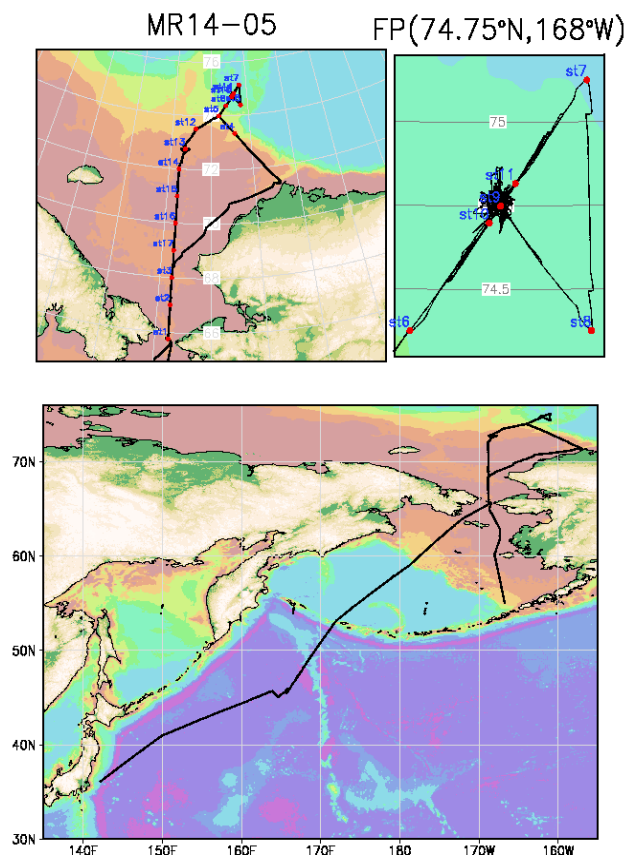


Figure 1: Research area and cruise track of MR14-05.

2. Overview of the Observation

Arctic cyclones are very influential phenomenon for weather forecasts, sea-ice decrease, and vertical and horizontal oceanic/biochemistry structure. To understand the role of Arctic cyclones for the Arctic climate system, this cruise focused on

- a) Obtaining the upper sounding data over ice-free ocean and their application for predictability studies
- b) Detection of a part of seasonal cycle of air-sea coupled system under diminished sea-ice condition
- c) The impact of atmospheric disturbances on the ocean structure and biochemical cycles

Here, we conducted a stationary point observation at 74.75N 162W with radiosonde, ozonesonde, HYVIS, Doppler radar, Lidar, atmospheric turbulent measurement, general meteorological equipment, CTD (Conductivity, temperature, and depth sensors), XCTD (expendable CTD), seawater samplers, current profilers, turbulence ocean microstructure acquisition profile, sea surface monitoring system, drifting buoys, core sampling, and so on.

Continuous observations were also done along the cruise track (sea bottom topography, gravity, and magnetic fields in addition to the meteorological and oceanographic observations by using general meteorological equipment and sea surface monitoring system, etc.)

This research cruise included the following publicly-offered studies:

- Studies on board

- Nitrogen cycle in the Pacific Arctic [Tokyo University of Marine Science and Technology]
- Advanced continuous measurements of aerosols in the marine atmosphere: Elucidation of the roles in the earth system [JAMSEC]
- Applied research of MIRAI brand-new shipboard weather radar: Validation and utilization of dual-polarization information for global deployment [JAMSTEC]
- Studies on greenhouse gas cycles in the Arctic and their responses to climate change [Meteorological Research Institute]
- Estimation of hazardous chemicals discharge from the melting ice in the Arctic Ocean [National Institute of Advanced Industrial Science and Technology]

- Studies not on board

- Tectonics history of the Pacific Plate during mid-Cretaceous [Chiba University]
- Global distribution of drop size distribution of precipitating particles over pure-oceanic background [JAMSTEC]
- Daily simulation using a cloud-resolving model over the Arctic Ocean [Nagoya University]
- Aerosol optical characteristics measured by ship-borne sky radiometer [Toyama University]
- Standardization of marine geophysical data and its application to the geodynamics studies [Ryukyu University]