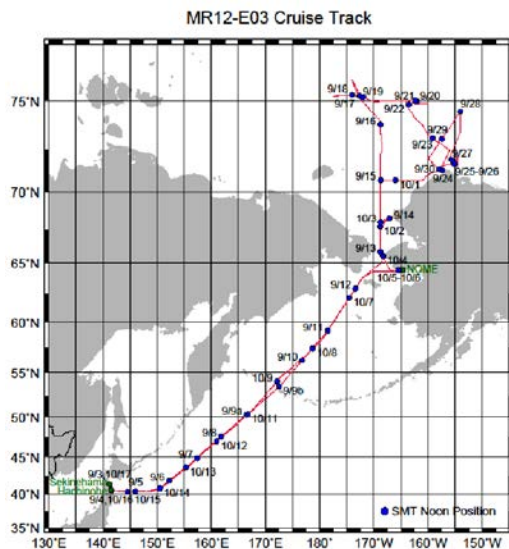


## Cruise Summary

- : must be included
- : may be included as necessary

### 1. Cruise Information

- Cruise ID: MR12-E03
- Name of vessel: R/V Mirai
- Title of the cruise: GRENE Arctic Ocean Cruise 2012
- Chief scientist [Affiliation]: Takashi Kikuchi [JAMSTEC]
- Representative of the Science Party [Affiliation]: Takashi Kikuchi [JAMSTEC]
- Title of proposal: Ecosystem studies on the Arctic Ocean declining sea ice
- Representative of the Science Party [Affiliation]: Shuji Aoki [Tohoku University]
- Title of proposal: Studies on greenhouse gas cycles in the Arctic and their response to climate change
- Representative of the Science Party [Affiliation]: Jinro Ukita [Niigata University]
- Title of proposal: Atmospheric studies on Arctic change and its global impacts
- Cruise period: 3 September 2012 – 17 October 2012
- Ports of call:
  - Sekinehama (3 Sep) – Hachinohe (4 Sep) – Arctic Ocean –
  - Nome (5-6 Oct) – Hachinohe (16 Oct) – Sekinehama (17 Oct)
- Research area: Arctic Ocean, Bering Sea, and North Pacific Ocean
- Research map



## 2. Overview of the Observation

The Arctic climate and environmental changes substantially occur due to global warming, attracting public attentions as well as scientists'. In addition, the Arctic changes influence back to global climate, so-called polar amplification. Sea ice extent of the Arctic Ocean recorded its minimum value,  $3.48 \times 10^6$  km<sup>2</sup>, in the satellite observation on September 15th, 2012, which is a half of summer sea ice extent in the late 20th century. Arctic sea ice is shrinking faster than predictions by global climate models. Still, there are lots of open questions regarding Arctic climate and environmental changes.

In the framework of the GRENE (Green Network of Excellence) Program funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), "Arctic Climate Change Research Project" was initiated in 2011. The Project is funded for 5 years. Four strategic research targets of this project are;

- 1) Understanding the mechanism of warming amplification in the Arctic,
- 2) Understanding the Arctic system for global climate and future change,
- 3) Evaluation of the impacts of Arctic change on weather/climate in Japan and marine ecosystem and fisheries, and
- 4) Projection of sea ice distribution and Arctic sea routes.

To achieve the strategic research targets, seven research projects were initiated in the GRENE Arctic Climate Change Research Project with close collaborations among them.

R/V Mirai was operated under GRENE Arctic Climate Change Research Project in September-October 2012 (MR12-E03). MR12-E03 was totally 45 days cruise, including 22 days for the field observation in the Arctic Ocean. 20 scientists and 25 technical staffs were onboard. The cruise mainly focused in the Chukchi Sea and the Canada Basin of the Arctic Ocean, where was almost completely ice-free ocean this year. On September 13th, the field observation in the Arctic Ocean started at the Bering Strait. During the cruise in the Arctic Ocean, lots of unique and important data could be collected. For instance, CTD/water sampling was conducted at 95 stations in the Arctic Ocean during the cruise.

### MR12-E03 activities

CTD/water samplings	95 stns/101 casts
XCTDs	63 stns
Mooring recoveries	9 stns
Mooring deployments	10 stns

Primary production	10 stns
Spectroradiometer (PRR)	19 stns
Spectral backscattering sensor (HydroScat)	19 stns
Particle meter (LISST-100)	26 stns
NORPAC nets (with other nets)	49 casts (65 casts)
Multiple cores	8 stns
ADCP continuous observation	
Sea surface water monitoring system	
Total carbonate monitoring system	
Green house gases monitoring system (CRDS)	
Meteorological observation system	
Seabeam	
Geophysical continuous observation (Magnetometer, Gravity meter)	