

1. Objective

It is well known that the oceans play a central role in determining global climate. However heat and material transports in the ocean and their temporal changes have not yet been sufficiently quantified. Therefore, global climate change is not understood satisfactorily. The purposes of this research are to evaluate heat and material transports such as carbon, nutrients, etc. in the North Pacific and to detect their long term changes and basin-scale biogeochemical changes since the 1990s. This cruise is a reoccupation of the hydrographic section called 'WHP-P1', which was observed by an ocean science group of USA in 1985 as a part of WOCE (World Ocean Circulation Experiment) and by a joint group of Canada and Japan in 1999. Both data-sets are included in the data base of CLIVAR (Climate Variability and Predictability) and Carbon Hydrographic Data Office (<http://whpo.ucsd.edu/>). We will compare physical and chemical properties along section WHP-P1 with those obtained in 1985 and 1999 to detect and evaluate long term changes of the marine environment in the North Pacific.

Reoccupations of the WOCE hydrographic sections are now in progress by international cooperation in ocean science community, within the framework of CLIVAR, which is as part of World Climate Research Programme (WCRP) and IOCCP (International Ocean Carbon Coordination Project). Our research is planned as a contribution to these international projects supported by WMO, ICSU/SCOR and UNESCO/IOC, and its results and data will be published by 2009 for worldwide use.

The other purposes of this cruise are as follows:

1. to observe surface meteorological and hydrological parameters as a basic data of meteorology and oceanography such as studies on flux exchange, air-sea interaction and so on,
2. to observe sea bottom topography, gravity and magnetic fields along the cruise track to understand the dynamics of ocean plate and accompanying geophysical activities,
3. to observe bio-geochemical parameters to study carbon cycle in the ocean,
4. to observe green house gasses in the atmosphere and the ocean to study their cycle from geochemical aspect.

Participants are from;

- Global Ocean Development (Technicians)
- Ocean Research Institute, the University of Tokyo
- Nagoya University
- Graduate School of Life and Environmental Sciences, University of Tsukuba
- Marine Works Japan (Technicians)
- Meteorological Research Institute
- National Institute for Environmental Studies
- Rakuno Gakuen University
- Tokyo Institute of Technology
- University of the Ryukyus
- Information and Multimedia Center, Gifu University

2. Cruise

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GHPO Section designation : P01
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Ship : R/V MIRAI
Ports of Call : Sekinehama – Hachinohe – Dutch Harbor
Cruise Date : July 24, 2007 – September 3, 2007

3. Cruise Track

Cruise Track and station locations are shown in Fig.1.

4. Observations

4.1 Number of Stations

A total of 88 stations were occupied using a Sea Bird Electronics 36 bottle carousel equipped with 12 liter Niskin X water sample bottles, a SBE911plus equipped with SBE35 deep ocean standards thermometer, SBE43 oxygen sensor, Seapoint sensors Inc. Chlorophyll Fluorometer and Benthos Inc. Altimeter and RDI Monitor ADCP. XCTD was deployed at 18 stations.

4.2 Sampling and measurements

1. Measurements of temperature, salinity, oxygen ,current profile, fluorescence using CTD/O2 with LADCP, fluorometer.
2. Water sampling and analysis of salinity, oxygen, nutrients, DMS, CFC11,12, 113, total alkalinity, DIC, and pH.
3. Water sampling of POC, PIM, CH₄, N₂O, ¹⁴C, ¹³C, Pu and ¹³⁷Cs
4. Surface water sampling for a bio-geochemical study.
5. Underway measurements of pCO₂, radon, temperature, salinity, nutrients, surface current, bathymetry and meteorological parameters including DMS, fog water.

4.3 Floats, Drifters, Drifter

5 ARGO floats were launched.

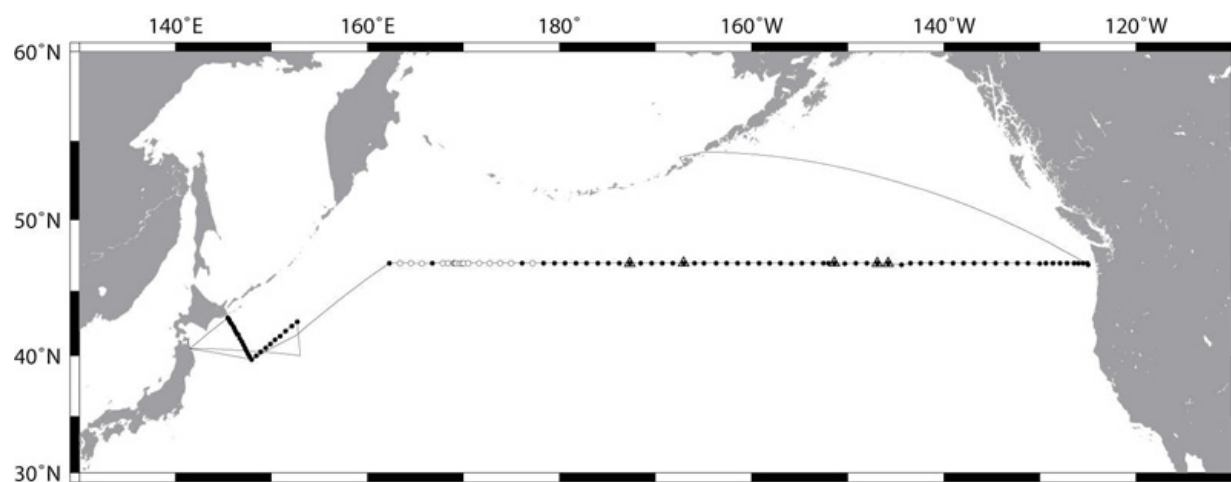


Fig.1.1 Cruise Track

Solid circle (●) and open circle (○) represents CTD station and XCTD station, respectively.
 Triangle (△) shows a position where ARGO floats were deployed.