MR01-K05 Leg1-2 Cruise Summary

1. Cruise name and code

Tropical Ocean Climate Study
MR01-K05 (Leg 1 - 2)

2. Introduction and observation summary

2.1. Introduction

This cruise has two major purposes. One is to observe physical oceanographic conditions in the western tropical Pacific Ocean for better understanding of air-sea interaction affecting on the ENSO (El Nino/Southern Oscillation) phenomena and its related climate change. The surface layer in the western tropical Pacific Ocean is characterized by high sea surface temperature, which plays major role in driving global atmospheric circulation. El Nino occurs when warm water migrates eastward, and causes short-term climate changes in the world dramatically. For example, the western Pacific area has very little rainfall when the "El Nino" occurred, as in 1997-98. This atmospheric and oceanic system is so complicated, and we still do not have enough knowledge about it.

The other purpose is to observe hydrographic conditions and its variability in the eastern tropical Indian Ocean associated with Asian Monsoon and Dipole Mode. Asian Monsoon may play an important role as a trigger of El Nino in the Pacific Ocean. Also the Indian Ocean has basin-scale interannual variability independent to ENSO mentioned as Dipole Mode variability. This climate system has various time scales. To investigate the mechanism, we need precise and detailed data for long period. Therefore, ocean and atmosphere observing mooring array is effective to obtain such data set. The major mission of this cruise is to deploy TRITON buoys developed at JAMSTEC for the long term measurements of ocean and atmosphere in the western tropical Pacific Ocean and the eastern Indian Ocean. We also deployed ADCP subsurface buoys in the Pacific and the Indian Oceans during this cruise.

The other purposes of this cruise are,

1. Temperature and salinity measurement using ARGO floats by Frontier Observational Research System for Global Change (FORSGC).
2. Optical measurement of properties of atmospheric aerosols by particle counter and sky radiometer by Hokkaido University.
3. Lidar backscatter measurements of lower atmosphere by National Institute for Environmental Studies (NIES) of Japan, Tohoku Institute of Technology and Communications Research Laboratory (CRI).
4. Cloud profiling radar measurements by CRI.
5. pCO2/PCO2 measurements by Okayama University of Science.

These measurements are also made successfully during this cruise.

2.2. Overview

During this cruise period, the SST in the western tropical Pacific Ocean is warm as 29.4 - 30.5 degree-C, and low sea surface salinity was observed near 8N and off Mindanao with the salinity of 33.6-33.8 psu. Eastward surface currents widely distributed from 0N - 5N along 137/138E section. The eastward currents indicated unusually strong as 1 m/s in the thermocline layer of

225 – 275 m depth centered at 2N, 138E. The surface currents at 2N, 138E are considered as a retroflexed flow toward the equator after that the New Guinea Coastal Current crossed the equator at the western boundary. However, the subsurface currents in the thermocline layer seem to be a continuous flow from off Mindanao and Halmahera because the New Guinea Coastal Undercurrent is weak along the equator from 138E to 135E and salinity in the 225 – 275 m layer at 2N, 138E is lower than 35 psu. Here, the New Guinea Coastal Undercurrent crossed the equator near 135E because the salinity maximum in the 130 – 200 m depth layer was observed at there in the salinity section along the equator. The observed currents may reflect basin scale ocean circulation changes associated with the developing warm episode.
November is in an inter-monsoon season in the Indian Ocean, climatology indicates that westerlies are prevailing in the equatorial zone and strong eastward current (equatorial jet) is generated along the equator usually. However, the observed hydrographic condition is different from climatological seasonal pattern. Although upper-ocean current was mainly eastward in the 5N – 5S equatorial band along 90E, equatorial jet was not well developed. Westerly winds were observed in this area, and stronger than 10m/sec near equator but not persistent. SST along 90E in the equatorial zone is mostly 28.4 – 28.8 degree-C, and is lower than normal and slightly lower than last year (MR00-K07).

2.3 Observation summary

TRITON buoy deployment:	7 sites
TRITON buoy recovery:	3 sites
ADCP subsurface buoy deployment:	4 sites
ADCP subsurface buoy recovery:	4 sites
CTD (Salinity, Temperature, Depth):	20 casts down to 1000 or 2000m
XCTD (Salinity, Temperature, Depth):	94 times down to 1000m
Surface meteorology:	continuous
Shipboard ADCP measurements:	continuous
Surface temperature, salinity measurements by intake method:	continuous
Atmospheric aerosols measurement by particle counter and sky radiometer:	continuous
Lidar backscatter measurement:	continuous
Cloud profiling radar measurement:	continuous
Profiling float (ARGO float) deployment:	5 launches
pCO2/PCO2 measurements:	continuous
Underway-geophysical measurements:	continuous

(*) We did not sample the continuous data from October 12 to October 15, 2001.

3. Period and port of call

September 20, 2001 – November 5, 2001
Port of call

Sekinehama, Japan	(Departure; September 20, 2001)
Hachinohe, Japan	(September 21, 2001)
Singapore	(October 16 – 18, 2001)
Koror, Palau	(Arrival; November 5, 2001)

4. Chief scientist

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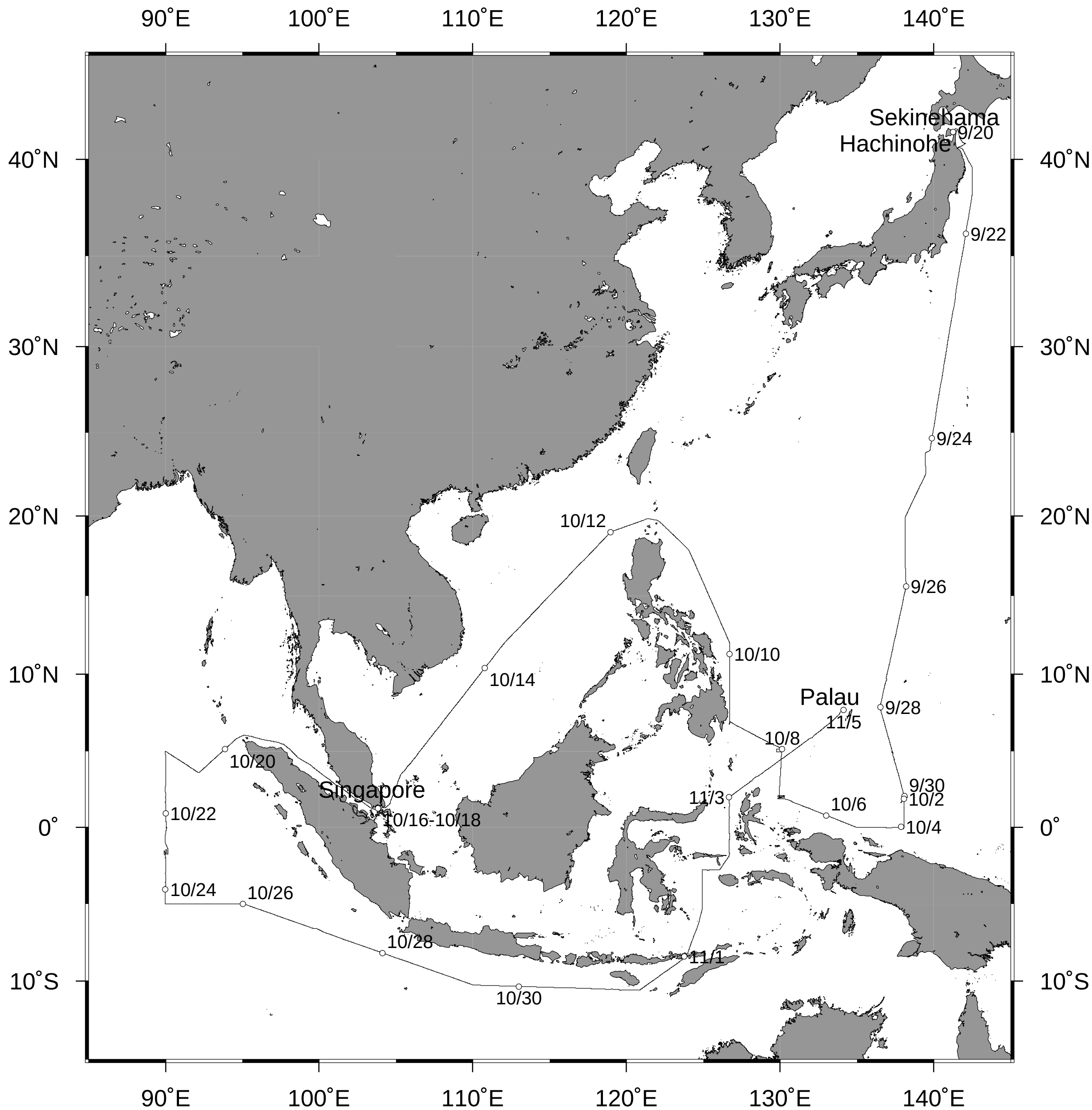

Ship Track (MR01K05)