MR00-K07 Leg1-2 Cruise Summary

1. Cruise name and code

Tropical Ocean Climate Study
MR00-K07 (Leg-1/2)
R/V Mirai
Captain Takaaki Hashimoto
Total 35 crewmembers

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 to achieve a 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. Especially, 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 in order to understand the ocean response to Asia Monsoon and the nature of Dipole Mode variability. Asia 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 the long time scale. To investigate the mechanism, we need precise and detailed data for the long period continuously. 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, following a long-term measurements plan of the TRITON program. We also deployed an ADCP mooring buoy in the Pacific and two in the Indian Ocean during this cruise.
The other purposes of this cruise are,

1. Particulate carbon dioxide flux and primary productivity measurements in the warm water pool using sediment trap by Kyushu University and Geological Survey of Japan.
2. Temperature and salinity measurement using ARGO floats by FORSGC.
3. Surface current measurement using drifters by FORSGC.
4. Optical measurement of properties of atmospheric aerosols by particle counter and sky radiometer by Hokkaido University.
5. Cloud and rainfall measurement by Doppler radar for comparison with TRMM satellite by Meteorological Institute of Japan.

2.2. Overview

During this cruise period, SST in the tropical Pacific was generally normal. However, observed SST in the western tropical Pacific Ocean is 30C, which is warmer than normal, and at the upper layer thickness (depth of 20C) is deeper than normal by 30m or so at the sites of TRITON buoy deployment. Although, sea surface salinity is lower along a zonal band of 3-10N with a salinity of 34.0psu or so, observed salinity in this band is lower than normal with 33.5-7psu especially in the vicinity of 3-6N. Along 147E, eastward surface current larger than 1kt was observed between 3- (i.e. North equatorial current), and South Equatorial Current and Equatorial Under Current were observed in the vicinity of equator. Trades were prevailing in a zone of 10-20N with 5-10m/sec wind speed, and westerlies (5-10m/sec) were prevailing in the vicinity of the equator.
Three TRITON buoys were deployed and one ADCP mooring system was recovered and re-deployed on the equatorial sites successfully. Since low transmission power problem was found for a satellite telecommunication unit of TRITON buoy shortly after deployment, we changed the unit at sea and solve the problem eventually.
November is in an inter-monsoon season in the Indian Ocean, 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 quite different from the normal seasonal pattern. No equatorial jet was found and northeasterly winds were prevailing east of equator and westerlies were prevailing south of equator and SST in the equatorial zone is cooler than normal, although the upper layer thickness is near normal. We suspended scheduled two TRITON buoy deployments in the Indian Ocean in order to take more careful measures to meet the strong current situation, but two ADCP mooring system were newly deployed in the vicinity of TRITON mooring sites.
During the cruise, other recovery/deployment operations (sediment trap and surface/ subsurface drifters) and observation equipments (CTD, ship-board ADCP etc.) were mostly worked without significant problem.

2.3. Observation summary

TRITON buoy deployment:	3 sites
TRITON buoy repair:	1 sites
ADCP subsurface buoy deployment:	3 sites
ADCP subsurface buoy recovery:	1 sites
Sediment trap buoy recovery:	1 sites
CTD (Salinity, Temperature, Depth):	20 casts down to 1000 or 2000m
XCTD (Salinity, Temperature, Depth):	97 times down to 1000m (includes 7 re-launches)
Surface meteorology:	continuous
Atmospheric sounding:	44 times
Shipboard ADCP measurements:	continuous
Doppler radar measurements:	continuous
Surface temperature, salinity measurements by intake method:	continuous
Atmospheric aerosols measurement by particle counter and sky radiometer:	continuous
Profiling float (ARGO float) deployment:	2 launches
Surface drifter deployment:	7 launches

Underway-geophysical measurements: continuous

3. Period and port of call

October 18, 2000 – November 22, 2000
Port of call

Sekinehama, Japan	(Departure; October 18, 2000)
Hachinohe, Japan	(October 19, 2000)
Singapore	(November 8-9, 2000)
Jakarta, Indonesia	(November 20-22, 2000)

4. Chief scientist

Keisuke Mizuno
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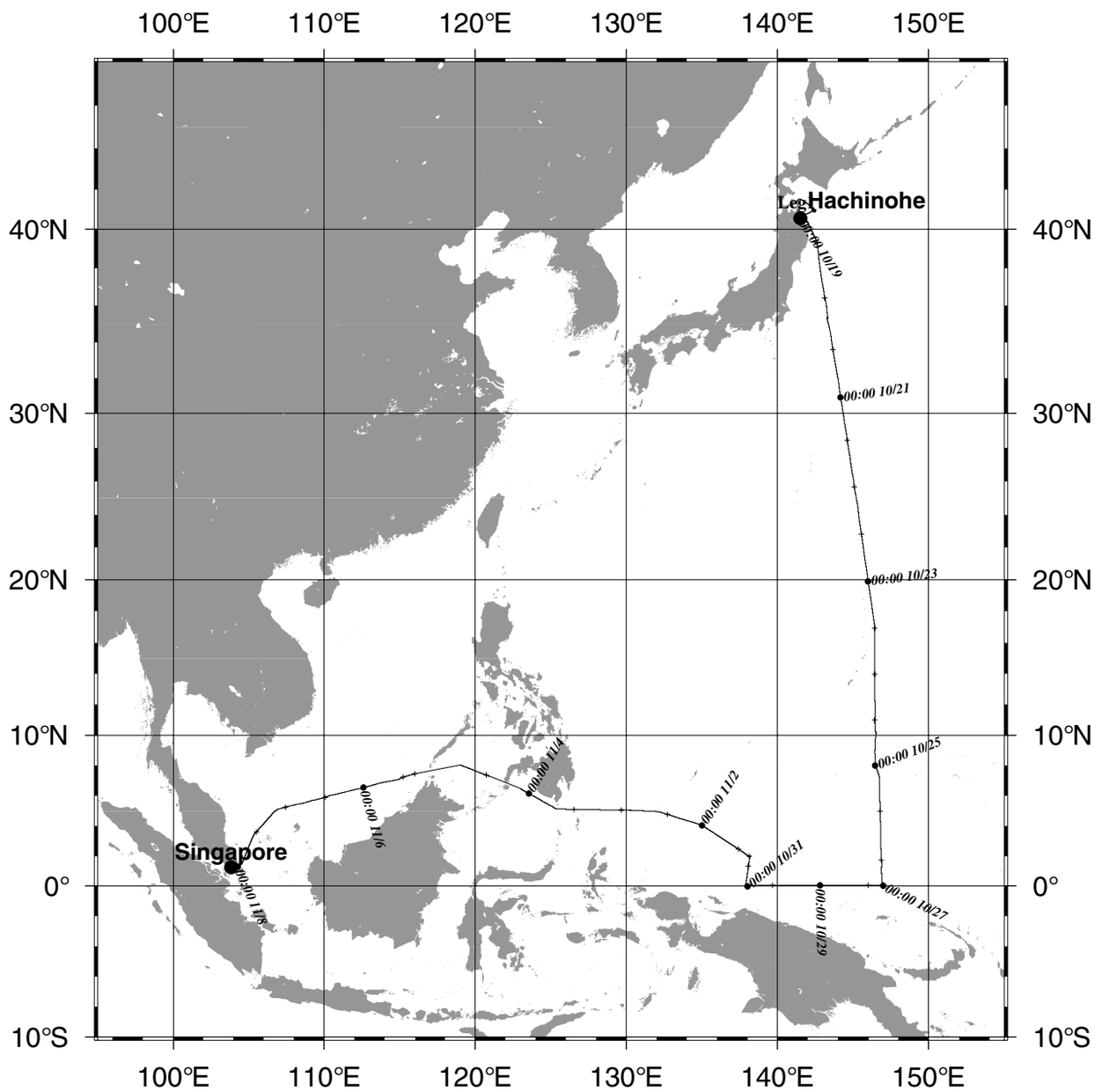
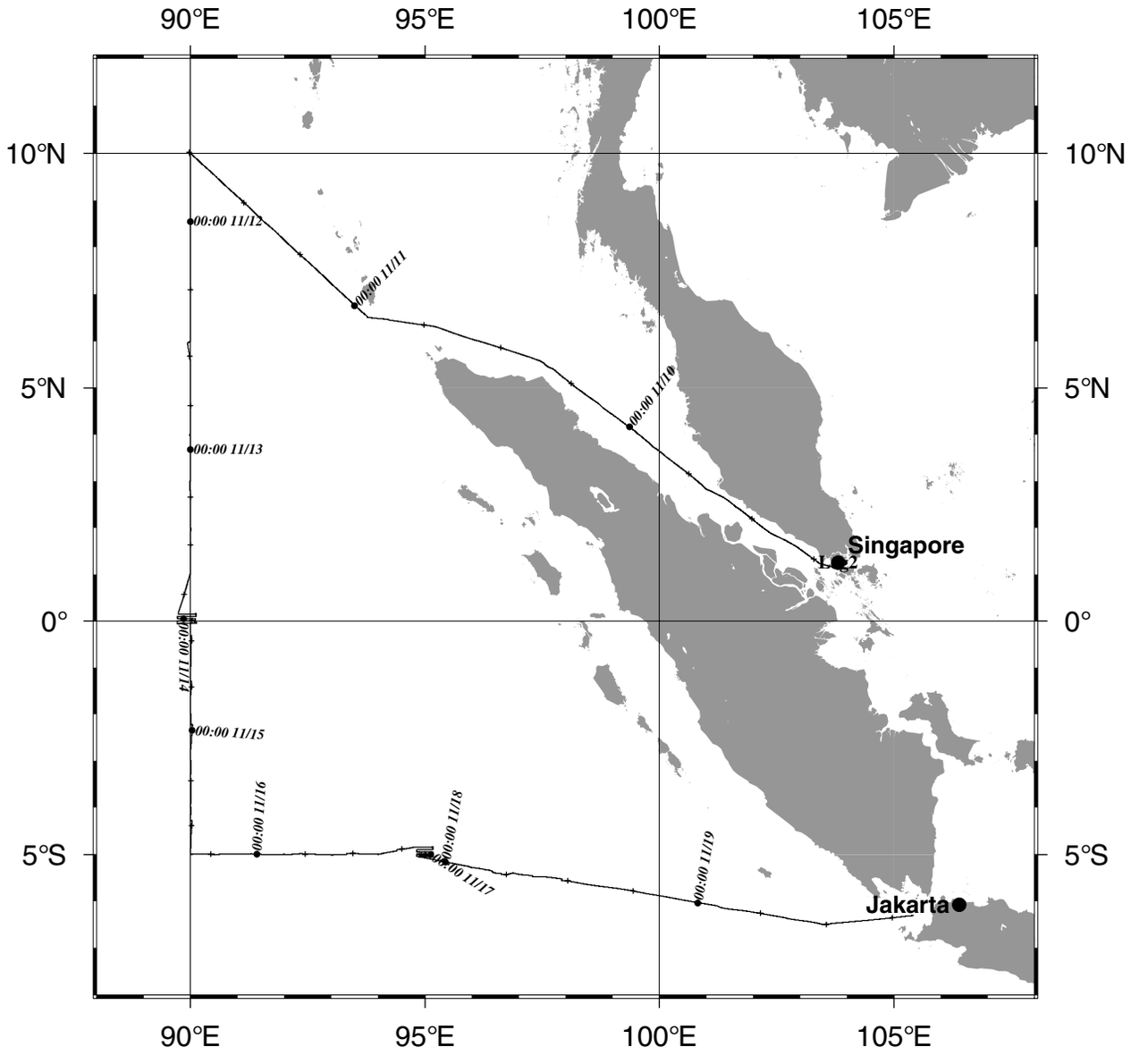
5. Research participants

Total 29 scientists and technical stuff participated from 8 different institutions, universities and companies including 6 foreign scientists and officers form Indonesia and Malaysia.

JAMSTEC	K. Mizuno, N. Ushijima, M Katsumata and H. Hase
FORSGC	Y. Masumoto, E. Oka and H. Matsuura
Kyushu Univ.	H. Asahi
Indonesian Navy	Sunar Widiyanto
BPPT	Djoko Hartoyo, Bayu Sutejo, Handoko Manoto and Sidik Mulyono
Malaysian Navy	Mohd Khalis bin Haji Jaafar
MWJ	A. Ito, M. Fujisaki, T. Matsumoto, H. Matsunaga, K. Sagishima, A. Yasuda, Y. Matsuura, K. Shiraishi, K. Suminaga, M. Furuhata, S. Narita and N. Nishikawa
GODI	F. Yoshiuara, W. Tokunaga and S. Okumura



Cruise Track (MR00-K07 Leg.1)



Cruise Track (MR00-K07 Leg.2)