MR99-K01 Cruise Summary

1. Introduction

The purpose of this cruise 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 inthe 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 few rainfall whenn the "El Nino" occurred, as in 1997-98. This atmospheric and oceanic systems is so complicated, and we still do not have enough knowledge about it. This climate system have 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 developped at JAMSTEC for the long term measurements of ocean and atmosphere in the western tropical Pacific Ocean. We have successfully deployed during this R/V Mirai cruise, although we must have recovered one TRITON buoy because of unexpected. It is the first step to establish long-term measurements for the TRITON program.

2. Summary

2.1 Ship

R/V Mirai
Captain Takaaki Hashimoto
Total 35 crew members

2.2 Cruise code

MR99-K01

2.3 Project Name

Tropical Ocean Climate Study

2.4 Undertaking institution

Japan Marine Science and Technology Center (JAMSTEC)
2-15, Natsushima, Yokosuka, 237 Japan

2.5 Chief scientist

Yoshifumi Kuroda (JAMSTEC)

2.6 Period

February 8, 1999 - March 31, 1999

2.7 Ports of call

Hachinohe, Japan
(Departure; February 8, 1999)
Guam, USA
(February 13-14, 1999)
Honiara, Solomon Islands
(March 10-12, 1999)
Chuuk, Federated States of Micronesia
(March 24-25, 1999)
Shimonoseki, Japan
(Arrival; March 31, 1999)

2.8 Research participants

Total 30 scientists and technical stuff participated from 8 different institutions and universities.

2.9 Observation summary

Triton buoy deployment:
9 sites (one at 0,156E was recovered because of adrift)
CTD/DO (Salinity, Temperature, Depth, Dissolved Oxygen):
35 casts down to 1000m (including 3 CTD casts in 24 hour at each TRITON buoy sites for data validation)
Surface meteorology:
continuous
Atmospheric sounding:
61 times
ADCP measurements:
continuous
Doppler radar measurements:
continuous
Surface temperature, salinity measurements by intake method:
continuous
Other specially designed observations have been carried out successfully.

2.10 Observed oceanic and atmospheric conditions

This MR99-K01 cruise has been carried out under a La Nina stage after the recovery from historical 1997-1998 El Nino event. Along the 147E section, 8-13m/s easterly trade wind was dominant. Swell was 2-3m high due to prevailed trade winds and developed northern north Pacific Low, which made rather difficult buoy deployment operation. Warm water was well accumulated in the western tropical Pacific as the 29 deg-C water covered surface 100m from the equator to 5N along 147E. The warm water was also observed 4N-5N and 3S-5S along 156E, but the equator of 2S-2N temperature was relatively cool as 28 deg-C which is caused by equatorial upwelling by prevailed easterly trace winds. The tendency was same at 165E, the trade wind was dominant and the surface water was quite low as 27 deg-C at the equator. Large scale cloud system frequently popped up over the tropical

ocean west of 150E, and Papua New Guinea to Solomon Islands. The former may be caused by the high sea surface temperature and latter is associated with the seasonally migrated Inter Tropical Convergence Zone. Along the equator, the freshened surface mixing layer of 34.2 psu was observed at 147E which was about 1 psu lower than those at 156E and 165E. This is evidence of heavy local precipitation in the west. As above, the warm water in the western tropical Pacific Ocean has been well accumulated and made convection system active in that region.