MR01-K01 Cruise Summary

1. Introduction

The purpose of this cruise 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 global 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 few rainfall when the "El Nino" occurred, as in 1997-98. This atmospheric and oceanic systems is so complicated and interacted each other, and we still do not have enough knowledge about it. 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 by JAMSTEC for the long term measurements of ocean and atmosphere in the western tropical Pacific Ocean. In this cruise, we could deploy 8 TRITON buoys and recover 6 TRITON buoys.

The other purposes of this cruise are,

1. CO2 measurements in the boundary layer by Meteorological Research Institute of Japan,
2. Lidar back scatter measurements of lower atmosphere by National Institute of Environment of Japan, Tohoku Institute of Technology and CRI,
3. ARGO floats launching, and evaluation experiment of ARGO sensors by free-rising profiler,
4. Surface meteorological measurement, underway geophysical measurements, and
5. Validation experinment for ocean lidar system. These measurements and experiments are also made successfully during this cruise.

2. Summary

2.1 Ship

R/V Mirai
Captain Akamine

2.2 Cruise code

MR01-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

Kentaro Ando (JAMSTEC)

2.6 Period

February 14 , 2001 - March 23, 2001

2.7 Ports of call

Sekinehama, Japan	(February 14, 2001)
Hachinohe, Japan	(February 15, 2001)
Guam, USA	(March 17-18, 2001)
Yokosuka, Japan	(March 23, 2001)

2.8 Research participants

Total 22 scientists and technical stuff participated from 7 different institutions, universities and companies.

2.9 Observation summary

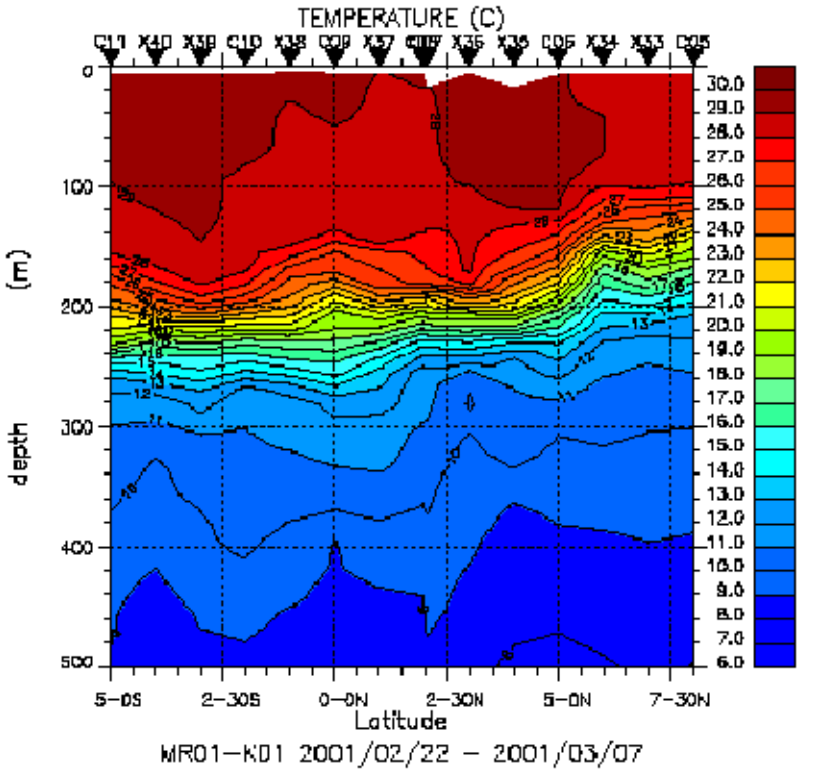
TRITON buoy deployment:	8 sites
TRITON buoy recovery:	6 sites
TRITON buoy repair:	1 sites
ADCP subsurface buoy deployment:	1 sites
ADCP subsurface buoy recovery:	1 sites
CTD(Salinity, Temperature, Depth):	13 casts down to 1000m
XCTD (Salinity, Temperature, Depth):	43 times down to 1000m
Surface meteorology:	continuous
ADCP measurements:	continuous
Surface temperature, salinity measurements by intake method:	continuous

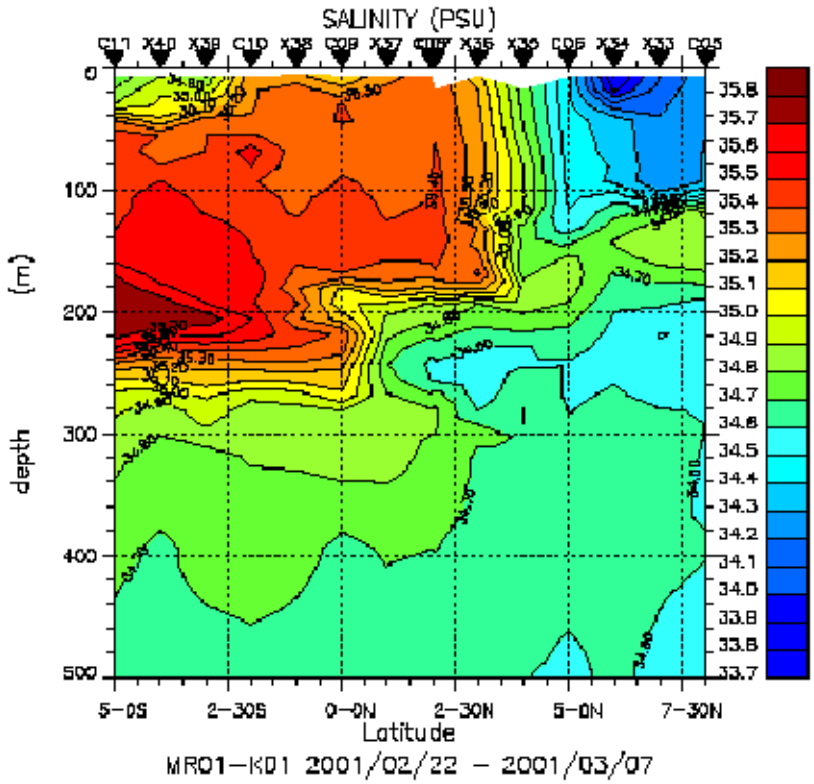
Other specially designed observations have been carried out successfully. All observations are described in details in the cruise report.

2.10 Observed oceanic and atmospheric conditions

This MR01-K01 cruise has been carried out after the historical 1997-1998 El Nino and followed 1998-2000 La Nina events. The vertical section of temperature along the 156E line by CTD and XCTD showed that the sea surface temperature (SST) was more than 29 degree-C in almost casts, and the depth of 20 degree-C was around 200 meters and deep between 5 N and 5 S. Compared with the same vertical section in MR00-K02, SST became little bit higher than in March 2000, especially between 2 N and 2S, suggesting the oceanic condition returned (or is returning) to the normal condition after the La Nina. Actually, the equatorial upwelling during this cruise suggested by temperature contour showed weaker upwelling than in MR00-K02. The vertical section of salinity showed the surface strong meridional front down to 100 meters between 2N and 5N, changing the salinity from 35.4 at 2N to 34.5 at 5N. On the equator, the strong meridional front was found, too. Compared with the same vertical section in MR00-K02, the surface salinity showed from 35.3 at 2N to 34.2 at 5N. The comparison of salinity section in two cruises

showed large changes which cannot be found in the temperature section, and maybe showing clearer signal of inter-annual phenomena in this area.





These figures show the temperature and salinity section along 156E from 5S to 8N in every one degree. The CTD and XCTD systems on board Mirai were used to measure these data.