

1. Objectives

The equatorial Pacific has distinguished characteristics, those are it occupies a large region of the world's ocean and the warmest water of the planet exists there. The western equatorial Pacific contains so-called warm water pool. Nitrate is depleted there and primary production is small. In the central and eastern equatorial Pacific, vertical flux of nutrients is enhanced due to Quasi-stationary upwelling caused by equatorial divergence and consequently chlorophyll a concentration and primary production rate increased along the equator. However, primary production and biomass are not as high as would be expected from the flux of nutrients could support. This is called high nutrient low chlorophyll situation. Since this east to west asymmetry is affected by ENSO event, there is a significant variability in physical characters on seasonal-interannual scale with impact to biogeochemistry, as well potentially with the similar scale of variability.

In order to investigate the mechanism of this biogeochemical variability, Japan Marine Science and Technology Center (JAMSTEC) conducted biogeochemical observation cruise in the equatorial Pacific. Participants are from ;

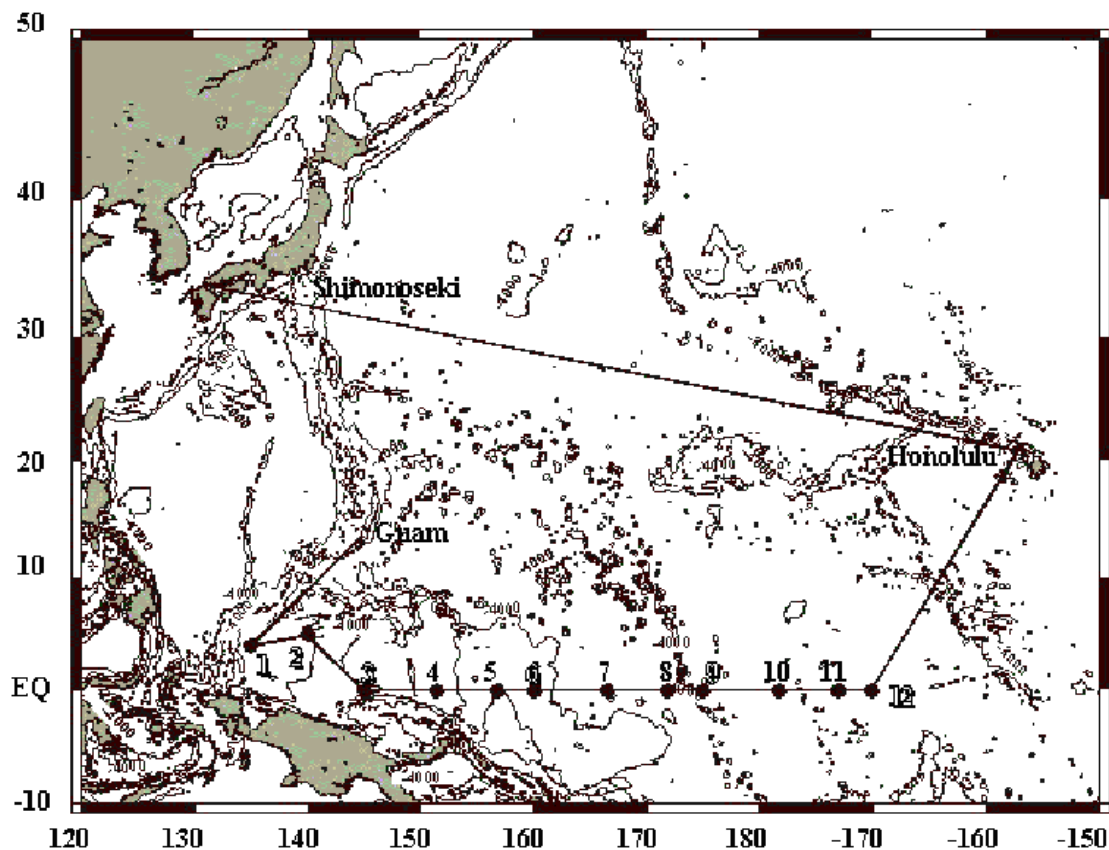
- Central Research Institution of Electric Power Industries
- Dalhousie University
- Geological Survey of Japan
- Global Ocean Development (Technicians)
- Hokkaido University
- Kansai Environmental Engineering Center
- Kumamoto University
- Kyushu University
- Marine Works Japan (Technicians)
- Meteorological Research Institute
- Nagoya University
- Nara University of Education
- National Institute of Radiological Sciences
- Seikai National Fisheries Research Institute
- Tokyo University

2. Cruise

Ship : MIRAI
Chief Scientist : Takeshi KAWANO, Ocean Research Department, JAMSTEC
Cruise Code : MR99–K07
Project title : Bio-optical research
Period : Nov. 21, 1999 – Dec. 27, 1999
Ports of call : 1) Guam, U.S.A.
2) Shimonoseki, Japan

3. Cruise Track

Cruise track is shown in Fig.1. Continuous measurements of surface seawater and meteorological measurements were made whole through the cruise. We made hydro-casts at 12 stations. Sediment Traps were recovered at Station 1, 2, 3, 6 and 9, and deployed at Stations 1, 3, 6, 9 and 12.



MR99-K07 Cruise Track

Fig.1

4. Observations

We made a comprehensive observation to investigate carbon cycle especially in a biological aspect. Our observation includes ;

- Hydrocast for physical, chemical and biological parameters such as salinity, nutrients, dissolved inorganic carbon, plant pigments and so on..
- Atmospheric and oceanic CO₂ measurements.
- In situ and simulated in situ incubation for primary productivity and new productivity.
- Sediment trap moorings to observe export production.
- Distribution of phytoplankton and zooplankton.
- Etc.

Figs.2 and 3 show vertical section of temperature and salinity, respectively, measured by XCTD. As same as the situation during the previous cruise (MR98-K02), cold and saline water proceeded to around 160 E. Figs.4 and 5 show vertical sections of nitrate and chlorophyll a. Nitrate concentration in the surface to ca. 100m depth was almost

undetectable and chlorophyll maximum layer was found at around 100m depth in the western part, that is, warm water pool. In the eastern part, from 160 E to 170W, nitrate concentration increased to the east. and chlorophyll maximum layer was lifted up to 60m depth around 170 W. We will conduct periodical and repeating observations to resolve a biogeochemical variation with a seasonal and inter-annual scale.

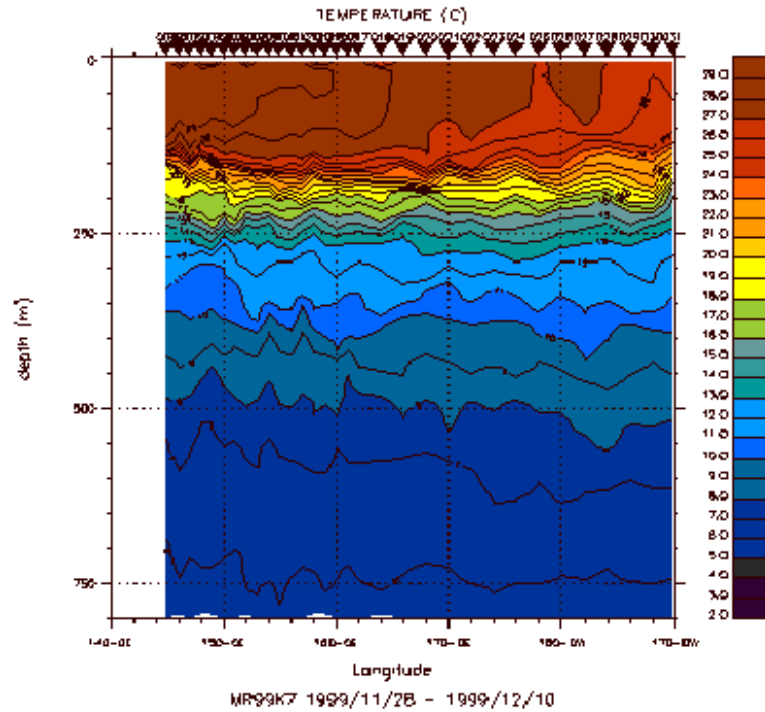


Fig.2 Vertical Section of Temperature (by XCTD)

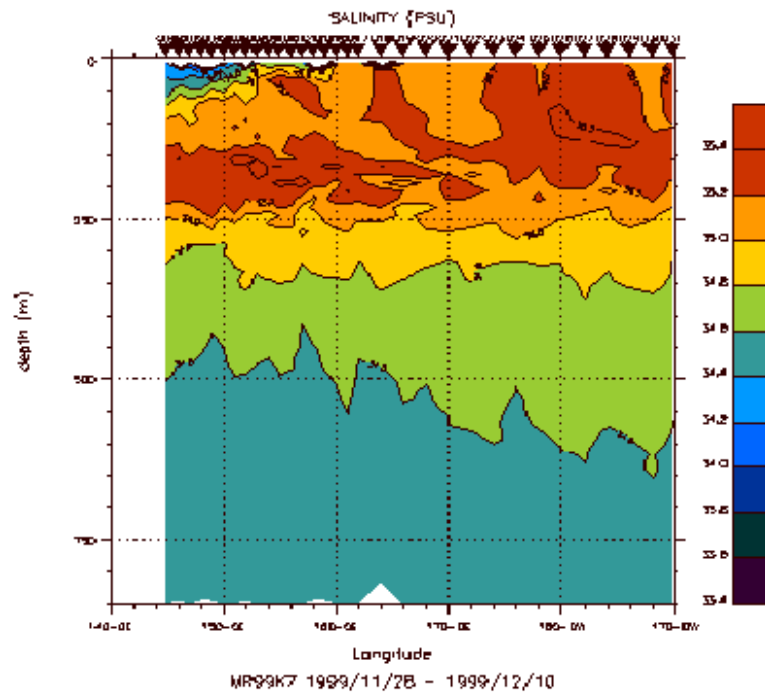


Fig.3 Vertical Section of Salinity (by XCTD)

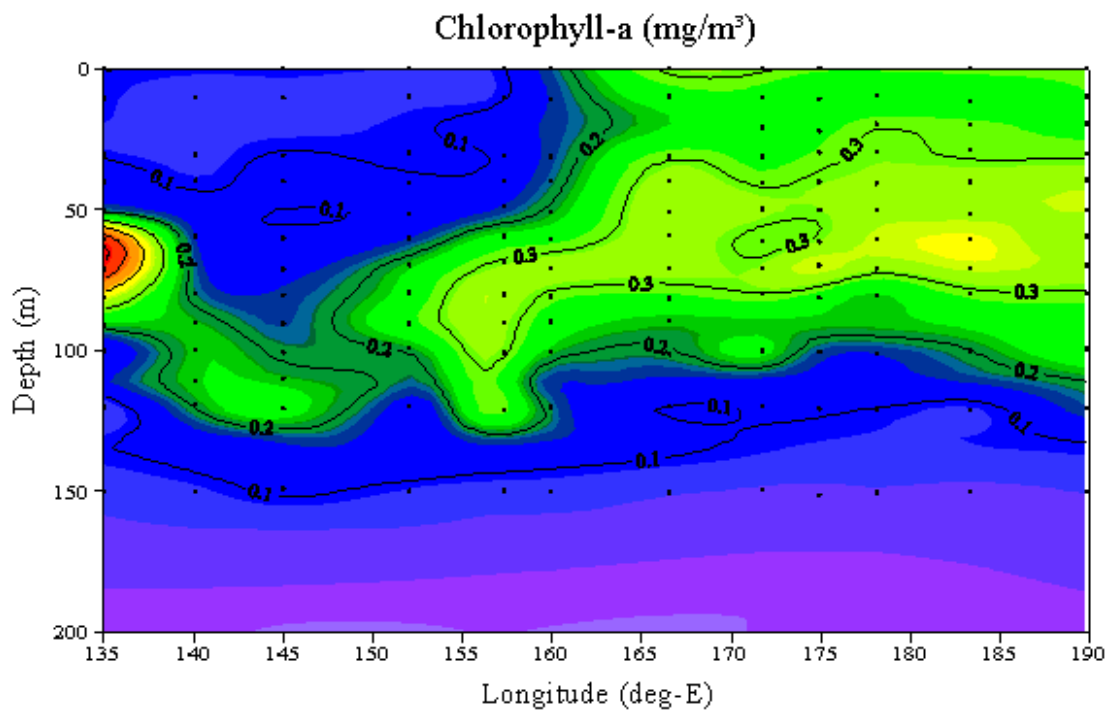


Fig.4 Vertical Section of Chlorophyll-a (by TURNER)

Vertical distribution of nitrate on the equator in MR99K07 cruise.

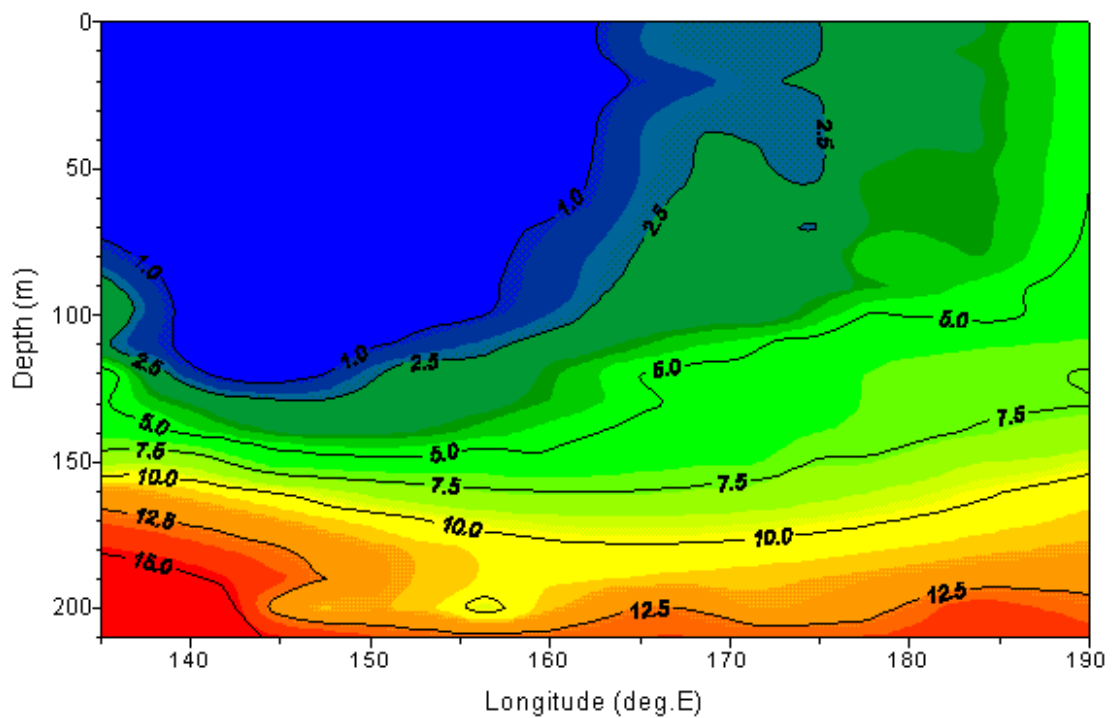


Fig.5 Vertical Section of Nitrate