## MR01-K04 Leg2 Cruise Summary



Akihiko MURATA and Mario HONDA (JAMSTEC) Leg. 2 of MR01-K04 cruise had mainly following two objectives

## (1) Observation in the eastern Bering Sea shelf

Recent reports on ecosystem in the eastern Bering Sea warn that since 1997, oceanic ecosystem has been anomalous (Vance et al., 1998; Hunt et al., 1999). This anomalous condition gives an impact also on carbonate system in the eastern Bering Sea shelf through blooms of E. huxleyi coccolithophorid. According to Murata and Takizawa (2001), surface water partial pressures of CO2 (pCO2) was in excess of 400  $\mu$  atm, acting as a source for atmospheric CO2 in the bloom area, although it is known that the eastern Bering Sea shelf is usually a sink for atmospheric CO2. They related the high surface water pCO2 found in the bloom area to weak activity of diatoms.

With a purpose of surveying the coccolithophorid blooms, we conducted biogeochemical observations in the eastern Bering Sea shelf, subsequent to the last year's observation. We re-occupied the observation line at 166oW from 55oN to 58oN. However, the bloom was not so conspicuous as found (distinct aquamarine waters) in the last year, but existed in the northern end of the observation line. We made water sampling at 9 stations along the observation line, and measured various biogeochemical properties. The results will be open to public through academic journals.

## (2) North Pacific Time-Series Observational Study

The importance of time-series observation has been recognized for the better understanding of ocean's role in the uptake of the atmospheric carbon dioxide. Some scientific program such as U.S.JGOFS, BATS, HOT and Canadian P have been successfully conducting time series observation. However repeatable observation by ordinary research vessels are tough work economically and physically. Time-series sediment trap experiment is one of useful tactics for time-series observation. As a center of ocean flux study, this experiment has been carried out all over the world oceans. However, time-series observation in the shallow and intermediate water is strongly requested in order to clarify the "biological pump" more precisely.

Under this situation, the North Pacific Time-Series Observational Study initiated in 2000 as a one of research programs at Must Institute for Oceanography (MIO) of JAMSTEC. This program is also a joint program with Joint Pacific Research Center (J-PAC) of Woods Hole Oceanographic Institution (WHOI). For this study, the new mooring systems were designed. Mooring system for physical oceanography has self-descending / ascending CTD with ADCP (MMP). In addition to the ordinary sediment trap, mooring system for biogeochemistry has water / plankton auto-sampler and autonomous incubation system for the measurement of productivity (SID). The remarkable characteristic is that these new mooring systems stand up from deep-sea floor to the surface euphotic zone. In order to sustain mooring system against the surface strong current, mooring tension is loaded to be approximately 1,500 kg. Therefore wire and nylon ropes used were pre-stretched and measured its length precisely to keep the shallow time-series instruments within the euphotic layer.

Before deployment, sea floor topography and bathymetry was carefully surveyed by Sea-Beam and an altimater. Two mooring points (K1: 50N, 161E, K2 47N, 160E) were selected taking into account for topography and stability in oceanography in the Western Pacific Sub-arctic Gyre.

John Kemp from WHOI was a parson in charge for mooring work. Owing to his enthusiastic work, exact operation of MIRAI by Captain Akamine, devoted work by chief officer Dowaki, boat swain Ishikawa and ship crews. The above mooring systems were installed on the planned points. The above mooring system will be recovered in October 2002

At stations K1 and K2, seawater and particulate materials were also collected by Carousel Water Sampler with CTD and in situ large volume pump, respectively. Hydrographic data shows that cold water exists around 100 m depth, nutrients were not exhausted and both points are located in the NPSG. The future analysis of radiochemistry (thorium and protactinium) on these samples will reveal the behavior of settling particulate materials.