

## ACTIVITIES OF BIOMASS/FIBEX CRUISE OF THE UMITAKA MARU

Masaaki MURANO and Kiyoshi INOUE

The Training Ship UMITAKA MARU III belonging to the Tokyo University of Fisheries participated in the FIBEX of BIOMASS plan. Scientists aboard this scientific cruise are 19 in total from five universities and two other research organizations.

We have two legs (third and fourth legs) of the vessel for research activities in the Antarctic Ocean. In the third leg, biological and oceanographical surveys were mainly conducted on the meridional line of 125°E from 45°S to 65°S and in the neighbouring area of pack ice, and in the fourth leg on 160°E line from 52°S to 65°S and in the neighbouring area of pack ice. In both legs the visual sighting was made for marine mammals and sea birds. In addition, throughout the voyage from Tokyo to Tokyo, pollutants, such as PCBs, DDT and so forth, were measured. (p. 1-11)

OCEANOGRAPHIC CONDITIONS OF THE SOUTHERN OCEAN ALONG  
125°E AND 160°E IN THE AUSTRAL SUMMER OF 1980-1981Noboru MATSUURA, Tsutomu MORINAGA, Juichi KATOH, Hiroh SATO,  
Yujiro SAOTOME, Isao KASUGA, Yuji MINE and Akira KITAZAWA

The oceanographic observations were carried out by the T/S UMITAKA MARU III in the Southern Ocean south of Australia during December 1980 to February 1981. In this paper, four meridional sections of the Australasian sector are inspected for the identifications of the watermass structures and the oceanic fronts. In addition, we present the geostrophic velocity fields, the thermohaline features, the zonation of the near-surface layer and the nutrient salts distributions along 125°E and 160°E. (p. 13-41)

VERTICAL FLUX OF PARTICULATE MATTER IN THE  
ANTARCTIC OCEAN IN SUMMER 1981

Naoji FUJITA and Satoshi NISHIZAWA

Direct measurements of vertical flux of particulate matter using *in situ* particle collectors were carried out at three stations in the Antarctic Ocean and adjacent water. The maximum fluxes of particulate organic carbon (POC) and pheopigments were 184 mg/m<sup>2</sup>/day at 50 m depth at Stn. 51 and 1.242 mg/m<sup>2</sup>/day at 200 m depth at Stn. 77, respectively. Distinct two maxima of flux of POC were observed at 50 and 200 m depths at Stns. 51 and 77. Similar phenomena have not been observed so far in other ocean areas. The results obtained are considered to be suffered from various sources of sampling variability, and the spatial scale of the collector used were discussed in comparison with the scale of particle falling phenomena in the sea. (p. 43-52)

DISTRIBUTION OF POC, DOC AND ATP IN THE PACIFIC SECTOR  
OF THE ANTARCTIC OCEAN IN SUMMER 1980-1981

Naoji FUJITA and Satoshi NISHIZAWA

The measurements of POC, DOC and ATP in seawater were carried out at 14 stations along the 125°E and 160°E lines in the Pacific sector of the Antarctic Ocean. The horizontal and vertical distributions of POC were influenced by the movements of seawater such as convergence and divergence. The developed discontinuity in concentrations of ATP was

observed at about 100 m depth, and below this the ATP concentration decreased rapidly. The ATP/POC ratios were high (0.10–0.25%) in the euphotic layers, decreasing with depth. The maximum ratio observed in this study was 0.25%. The two sections of ATP/POC ratio most clearly suggest the counter-clockwise helical circulation between the Antarctic Divergence and the Convergence. The DOC concentration was characteristically low throughout the water column over the studied area with only a few exceptions. (p. 53–63)

## HORIZONTAL AND VERTICAL DISTRIBUTIONS OF PARTICULATE ORGANIC MATTER IN THE PACIFIC SECTOR OF THE ANTARCTIC OCEAN

Eiichiro TANOUE, Nobuhiko HANDA and Mitsuo KATO

Particulate matter was collected from surface waters in the Pacific Ocean (64°57.8'S–27°36.0'N) and from various depths of 14 hydrographic stations in the Antarctic Ocean. The particulate matter was analyzed for organic carbon and nitrogen, amino acid, carbohydrate, lipid and chlorophyll *a* and *c*.

Particulate organic carbon (POC) in the surface waters was found to be higher in the areas to the south of 40°S than in the areas to the north of 40°S. However, POC in the former areas showed a great regional variability. Average concentrations of POC in the oceanic areas of the Antarctic Ocean were found in a range of 55.6–61.6  $\mu\text{gC/liter}$  in the surface and subsurface water layers (0–100 m), and tended to decrease with depth to a range of 26.1–33.1  $\mu\text{gC/liter}$  in the deep water layers (300–1500 m).

The ratios of amino acid, carbohydrate and lipid carbons to POC were determined. The ratio of amino acid carbon to POC was found in a range of 34.1–40.3% in the surface and subsurface water layers, and tended to decrease with depth to a range of 18.6–21.2% in the deep water layers at all of the hydrographic stations of the Antarctic Ocean. The ratio of carbohydrate carbon to POC was found in a range of 11.6–16.5% in all of the water layers at each of the stations. No significant trend in relation to the different watermasses and oceanic areas was found. The ratio of lipid carbon to POC was found in a range of 21.6–22.7% in the surface and subsurface water layers in the areas to the north of the Antarctic Divergence, while the values tended to increase with depth to a range of 25.5–28.4% in the deep water layers. Much higher values of the ratio (30.8–37.8%) were found in the areas to the south of the Antarctic Divergence in the surface through the deep water layers. Markedly high values of the ratio (larger than 40%) were found in the subsurface and intermediate water layers where the dichothermal water (below 0°C) was found to occur. (p. 65–83)

## VERTICAL AND HORIZONTAL CHANGES IN FATTY ACID COMPOSITION OF PARTICULATE MATTER IN THE PACIFIC SECTOR OF THE SOUTHERN OCEAN

Eiichiro TANOUE and Nobuhiko HANDA

A vertical distribution of the fatty acid composition was examined in the particulate matter collected from a station (64°35.0'S:124°57.1'E) located near the pack-ice area. It was found that unsaturated fatty acids tended to decrease toward deep, while saturated and branched fatty acids increased with depth.

A horizontal distribution of the fatty acid composition of the particulate matter collected from the surface waters of various oceanic areas (7°N–64°S) was also examined. A remarkable change in the fatty acid composition was observed in the areas between the