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 μgC/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 μgC/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

oceanic areas south and north of the Antarctic Convergence. High proportions of unsaturated fatty acids were characteristic of the south area of the Antarctic Convergence and the particulate matter from this area gave fatty acid composition almost identical to that of diatom. Unsaturated fatty acids, however, were found to be much less abundant in the particulate matter from the north area of the Antarctic Convergence and the particulate matter was very different from marine unicellular algae living in this oceanic area in terms of the fatty acid composition. Low nutrient concentration, high water temperature, or a combination of the two in this area was supposed to be the most important environmental factor producing the characteristic fatty acid composition observed in the present study. (p. 85–95)

CHLORINATED HYDROCARBONS IN THE ANTARCTIC, WESTERN PACIFIC AND EASTERN INDIAN OCEANS

Shinsuke TANABE, Masahide KAWANO and Ryo TATSUKAWA

Polychlorinated biphenyls (PCBs) and chlorinated hydrocarbon pesticides such as DDT compounds and HCH isomers were measured in air and surface water samples taken from the Antarctic, western Pacific and eastern Indian Oceans.

All of chlorinated hydrocarbons were detected in every location surveyed. The most interesting finding was their presence in the Antarctic Ocean with measurable concentrations, which indicates their long-distance transport in the global extent.

Both in air and water samples, ΣHCH (sum of α, β and γ isomers) concentrations were higher in the northern hemisphere rather than in the southern hemisphere. On the other hand, higher concentrations of ΣDDT (sum of *p, p'*-DDT, *p, p'*-DDE and *o, p'*-DDT) were found in the tropical regions and its levels between both hemispheres were not so different. These results appear to be the strong proof that the consuming areas of HCH are still concentrated in the northern hemisphere, especially in the Asian Continent, while those of DDT have been shifting from northward to southward for the last decade.

The significantly high concentrations of PCBs were observed in the coastal regions of the tropical and subtropical zones, and PCB components found in these regions were composed of higher chlorinated biphenyls both in air and water samples. In contrast, the lower chlorinated biphenyls were dominant in the oceans far from the terrestrial environment.

The data presented here will be useful for the estimation of persistent chlorinated hydrocarbon fluxes into the marine environment and for the construction of more sophisticated mathematical models of their global atmospheric transport. (p. 97–109)

STANDING STOCK AND DISTRIBUTION OF PHYTOPLANKTON CHLOROPHYLL IN THE SOUTHERN OCEAN, SOUTH OF AUSTRALIA

Yukuya YAMAGUCHI and Yoshiaki SHIBATA

During BIOMASS Cruise of the T/S UMITAKA MARU III to the Southern Ocean, the standing stock and the distribution of phytoplankton chlorophyll were determined in the areas between Australia and Antarctica. Mean surface chlorophyll *a* concentrations in five different water masses, measured continuously by the *in vivo* fluorescence, ranged from 0.118 to 0.385 mg/m^3. Clear diurnal fluctuations of *in vivo* fluorescence, higher in the nighttime and low in the daytime, were observed. Except in the Subantarctic zone in early February, marked subsurface chlorophyll maxima were observed. The amounts of chlorophyll *a* in the subsurface maximum layers were 1.30 to 5.37 times greater than those observed in the surface waters. In the Antarctic zone, most of the subsurface chlorophyll maximum was found in the subsurface temperature minimum layer. The total amount of chlorophyll *a* within the upper 200 m of the water column varied from 12.48 to 50.96 mg/