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MEASUREMENTS OF METHANE CONCENTRATION IN THE AIR AND SURFACE SEAWATER ON BOARD THE ICEBREAKER SHIRASE (ABSTRACT)

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Methane concentrations in surface seawater and the lower troposphere were measured on board the icebreaker SHIRASE at almost every 5° latitude between Japan and Antarctica from November 1990 to April 1991. The atmospheric methane concentration measured in November and December 1990 was 1750–1770 ppbv in the mid-northern hemisphere, and decreased rapidly going southward until constant values of about 1670 ppbv were found in the southern hemisphere. A large discontinuity of the methane concentration was observed in the equatorial region due to suppression of interhemispheric air exchange by the Inter-Tropical Convergence Zone. The methane concentrations measured in the mid-southern hemisphere in March and April 1991 was lower by 15 ppbv than those in December 1990, reflecting the seasonal variation of the methane concentration.

The methane concentration in surface seawater, which was determined by analyzing air samples equilibrated with oceanic methane, showed 3000–10000 ppbv except in the Antarctic region where the concentration was about 2000 ppbv. These values were much higher than the those found in previous studies. Taking account of the fact that carbon dioxide concentrations of the air samples which were measured simultaneously agreed well with those of continuous measurements, such high concentrations cannot be ascribed to failure in sample collection. Therefore, the cause may be attributable to additional methane produced by organic decomposition in sample seawater tubing which was provided on SHIRASE.

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