Studies on the biological processes in the Antarctic Ocean and the global climate changes

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【Outline of survey】

In order to understand the global climate changes, the dynamic processes in the ocean has been pointed as one of the key areas to be fully understood. In particular, the importance of the biological process must be investigated to link to the physical and chemical processes in water and the interaction between air and ocean is also a key element to understand the global climate changes. CO2 is a target gas component to activate the positive warming, however, there is the other feedback gas component such as dimethysulfide (DMS), which is though to drive a cloud formation. Mechanism and process of DMS formation is closely related to the process of primary production in the ocean. Phytoplankton (primary producer) produces DMSP (dimethylsulfoniopropionate) within a cell, which is the precursor of DMS. DMSP will be released into water and it changes into DMS. However, the mechanism and process of DMS formation is less understood. Preliminary investigation indicates the grazing processes by zooplankton on phytoplankton have greatly influence on the degree of formation. This research project focuses on the accurate direct measurements of DMS formation through primary production of phytoplankotn and grazing by zooplankton. The measurements are carried out during the Antarctic research cruises and these data will be synthesized to evaluate the degree of importance of biological processes in the ocean to understand the global climate changes.

【Expected results】

The first expected production is the accurate measurement of DMS formation in the Antarctic ocean. These measurements are basis for the further evaluation of quantitative understanding. Concurrently, our understanding of the behaviour of phytoplankton and zooplankton species in cold water will be widened and deepened. The second expected production is a formation of new research system of the ocean. The global change could not be understand without the foundation of interdisciplinary and multi-disciplinary approaches. However, the previous research has been more or less carried out by the vertical grouping system and the marine biologists focuses species, communities and ecosystem. The present research is based on the close linkage among biologists and geochemists focusing on understanding the global changes. This sort of approach on land as well as at sea will promise to create a new research system which is necessary for global study. The third production is that the present research brings us new knowledge of biological processes with accurate quantitative evaluation which is a very fundamental knowledge for modeling and simulation of global climate changes.

【References by the principal researcher】

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【Term of project】 FY 2004 — 2008	【Budget allocation】 76,900,000 yen

【Homepage address】 Homepage on this research has not yet opened.