【Grant - in - Aid for Scientific Research on Innovative Areas(Research in a proposed research area)】
Interdisciplinary Area

Title of Project : New Ocean Paradigm on Its Biogeochemistry, Ecosystem and Sustainable Use

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【Purpose of the Research Project】

With compelling evidence for global warming, ocean acidification and a host of other environmental threats, understanding and predicting how the ocean biogeochemistry and ecosystem responds to the environmental changes becomes one of the most urgent scientific pursuit. Since the ocean plays a critical role in sustaining human beings by providing a wide range of ecosystem services, ocean governance to maintain and manage these ecosystem services is crucial. However, our knowledge on biodiversity and material cycling in the ocean that form the foundation of the ecosystem services is extremely limited, particularly in the open oceans.

This research project aims to advance our understandings of ocean biogeochemistry and ecosystem dynamics in the Pacific Ocean for sustainable use of ecosystem services with particular attention to high seas. For this, the project sets three goals: 1) to establish a consistent set of pelagic biomes, 2) to evaluate ecosystem functions of each biome, and 3) to propose ocean governance for maintenance and management of ecosystem functions.

【Content of the Research Project】

The project consists of four research groups (Fig. 1). Group A01 will establish a consistent set of pelagic biomes in the Pacific Ocean based on physical oceanography, dynamics of bio-elements and molecular biogeography of plankton. Group A02 will investigate key processes of material cycling in selected biomes including primary production, dinitrogen fixation, and processes associated with microbial carbon pump. Group A03 will assess function and values of ecosystems in each biome by 1) examining population dynamics of migratory fish species based on ecosystem approach, 2) assessment of both market and non-market values of the ecosystem functions, and 3) establishing management objectives for sustainable use of the functions and values of biomes. Group A04 will design future social frame-works for sustainable use of the ocean.

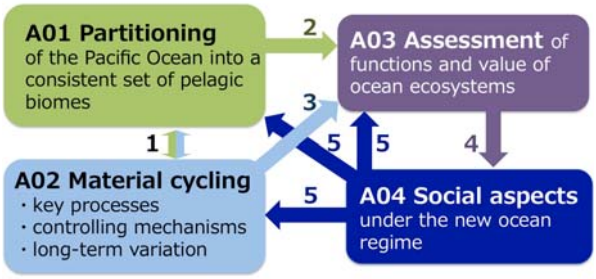

Fig. 1. Four research groups of the project. 1:joint oceanographic surveys, 2: pelagic biomes for regional units of analysis, 3: material cycling and biological productivity of each biome, 4: value of ecosystem functions of each biome, 5: key areas and items to be investigated.

【Expected Research Achievements and Scientific Significance】

Our knowledge on the biota and functions of pelagic ecosystems, particularly in the central and western parts of the Pacific Ocean, will advance significantly. A consistent set of pelagic biomes in the Pacific Ocean equipped with a comprehensive database on structures and function of ecosystems in each biome will be established. The database will stimulate model-based studies on ecological consequences of global climate change, and contribute to increasing the predictability by serving as a baseline for validation of model outputs. The biomes will improve ocean governance by providing conceptual and substantial frames for discussions. These activities will raise public awareness of the ocean.

【 Key Word 】 Ecosystem service: Life-supporting goods and services provided by natural ecosystems to human.

【Term of Project】 FY2012-2016

【Budget Allocation】 695,100 Thousand Yen

【Homepage Address and Other Contact Information】
http://ocean.a.u-tokyo.ac.jp