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Dr. Hidetaka Takeoka is a coastal oceanographer investigating physical processes and related interdisciplinary subjects in coastal seas and oceans. His recent research topics are problems related to jellyfish bloom, environmental preservation of aquaculture farms, mechanisms of biological production in Seto Inland Sea, influence of climate change on coastal environments, etc. He has been the Director of the Center for Marine Environmental Studies, a core organization of the present GCOE, since its establishment in 1999. He received the Hidaka Prize from the Oceanographic Society of Japan and the awards from the governor of Ehime Prefecture and the Minister of the Environment, Japan. In the present GCOE, he leads the sub project 2, the theme of which is "evaluation of environmental behavior, fate and bioaccumulation through ecosystem and geographical modeling."

**Long-term Variations in Coastal Environments and Ecosystems—from the 21st Century COE to the Global COE**

One of the principal subjects in the recent coastal marine sciences would be to reveal mechanisms of long-term variations in coastal environments and ecosystems due to climate variations. In our 21st century COE program, we selected this subject as one of the core projects, and conducted research activities on long-term monitoring of them. One of the important findings is that the major part of nutrients in Seto Inland Sea, even though it is almost surrounded by lands, is of oceanic origin. This means that the climate variation such as global warming not only causes variations in sea level and water temperature but also has significant influence on nutrient concentrations in Seto Inland Sea through changes in ocean circulation. Actually, the analysis of the sediment core sampled from Bungo Channel revealed high correlation between PDO (Pacific Decadal Oscillation) index and the primary production during the past 100 years (Fig.1). Another important issue which may be a warning on future variation in coastal ecosystems is jellyfish blooms which are being reported from various places of the world in recent years. In Seto Inland Sea, they became noticeable since the 1990's; and especially in Uwa Sea, large scale jellyfish aggregations, visible even from the airplane, were observed almost every year (Photo 1). Our research revealed that jellyfish production was high if the water temperature in the preceding winter was high, suggesting that global warming is likely to accelerate occurrences of jellyfish blooms. We are now conducting various research activities including long-term monitoring to reveal the relation between jellyfish blooms and environmental variations including those due to anthropogenic impacts. Moreover, most of the research activities on environmental and ecosystem variations under the 21st Century COE are continued also under the "Research Project on Long-term variations in Seto Inland Sea" supported by the other governmental funds, in collaboration with many environmental scientists

in Ehime University, and are now at a new stage.

The research activities of the present Global COE Program include three sub projects, and the theme of the sub project 2 is "Evaluation of environmental behavior, fate and bioaccumulation of Persistent Toxic Substances (PTS) through ecosystem and geographical modeling." This project aims at revealing the transport processes of PTS in atmosphere and ocean and its bioaccumulation processes through food web. This comprises one of the major attempts of our GCOE to establish advanced interdisciplinary research on environmental occurrence of PTS with closer collaboration of research activities on chemical pollution and environmental changes which was built in the preceding 21st Century COE. The goal of the sub project 2 during the GCOE period is to establish a model representing the present situation of PTS pollution in East China Sea and Seto Inland Sea. We hope to expand our studies to predict possible future pollution status under influences of climate variation and human activities and to utilize the outcome for pollution abatement, ecosystem conservation and environmental health.

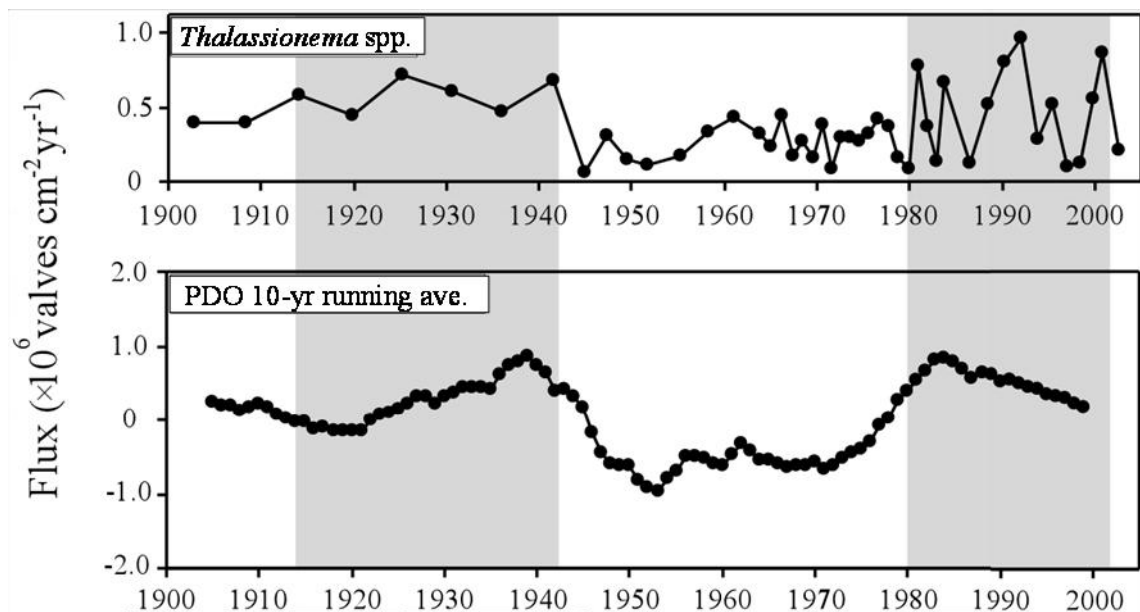


Fig.1. Sedimentation flux of diatom (*Thalassionema* spp.) in Uwa Sea and PDO index during the past 100 years.

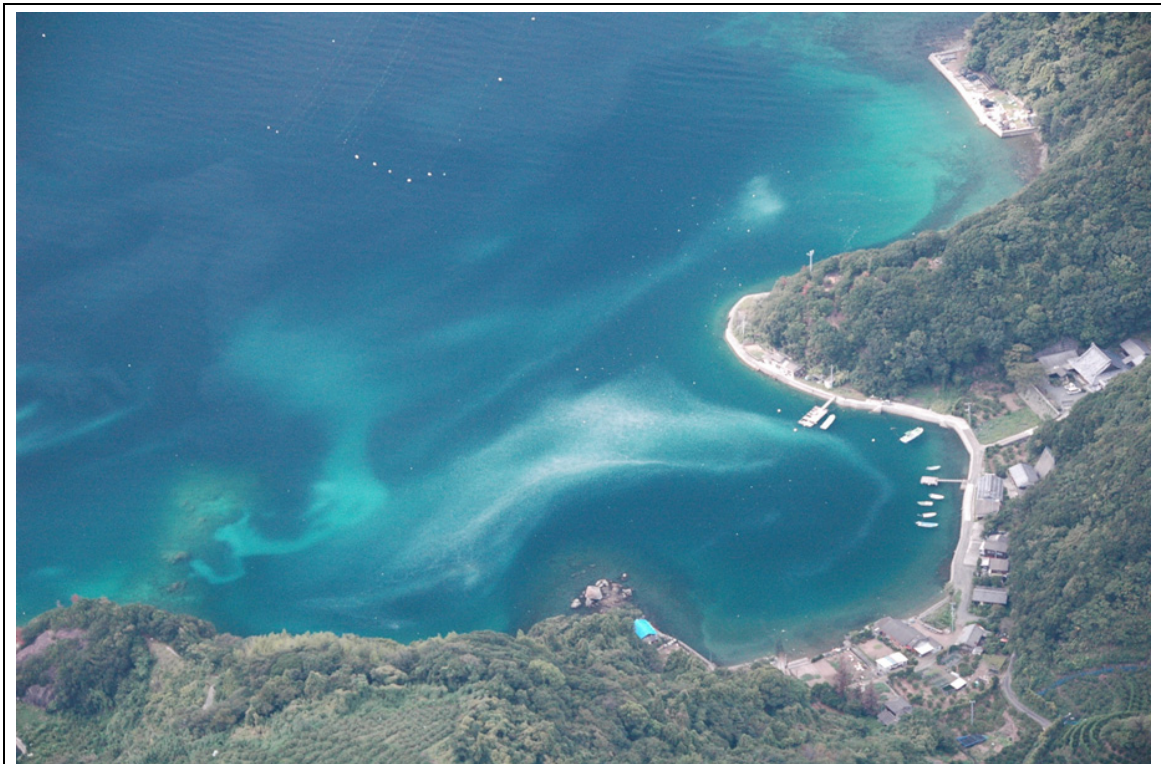


Photo.1. Aggregation of jellyfish in Uwa Sea.