2.4.11 Laboratory : Fisheries and Environmental Oceanography

Member :	Professor	Fujiwara, Tateki, Dr. Agric. Sci.
	Associate Professor	Kasai, Akihide, Dr. Agric. Sci.
	Assistant Professor	Kobayashi, Shiho, Dr. Agric. Sci.
	Doctor's program	1
	Master's Program	6
	Undergraduate	5

A. Research Activities (2009.4-2010.3)

A-1. Main Subjects

a) Analysis of the mechanism maintaining high productivity of coastal seas

Coastal seas are highly productive areas. To reveal mechanisms maintaining this high productivity and to find effective measures to sustain this productivity, we are studying nutrient dynamics in coastal areas. In recent years, shortage of nutrients has become prominent and economically damaged to the aquaculture of seaweed. We are trying to quantify the amount of nutrient input both from outer sea and rivers, elucidate nutrient dynamics in coastal seas, and develop a three-dimensional numerical model consisting of hydrographical and biological parts. Using this model, we aim to determine the adequate anthropogenic load which sustains both abundant biological production and preferable water quality. This year, study on dynamics of carbon, as well as those of nitrogen and phosphorous, has been developed.

b) Study on eutrophication and hypoxia in semi-enclosed coastal seas

Excess amount of loads of anthropogenic nitrogen and phosphorus flowing into Ise Bay, Tokyo Bay and Seto Inland Sea causes eutrophication and hypoxia in these seas. Basin-scale mechanisms generating hypoxic water mass have been studied. This year, we have studied on hypoxia in harbors which are important as water amenity zone.

c) Analysis of long term variability in coastal water qualities

To restore water qualities in semi-enclosed coastal seas (Ise Bay, Tokyo Bay and Seto Inland Sea), reduction of anthropogenic loads of organic matter (COD), phosphorus and nitrogen have been conducted for more than 30 years. Owing to these measures, near-shore water quality has been significantly improved. However, water qualities in basin-wide scale

(WQBS) are still deteriorated. We gathered data of water qualities, hydrographic parameters and meteorological parameters over 20 ~ 30 years to make data-base. It was revealed that WQBS is not correlated with the amount of pollutant loads, but varies in relation to hydrographic and meteorological conditions. In Seto Inland Sea, variations in WQBS are governed mainly by the through flow of SIS.

d) Modeling physical-biological interaction in coastal waters

The needs to understand the integrated physical-biological functioning of marine ecosystem are increasing in response to the concern about the depletion of living marine resources both in local and global scales. In coastal regions, horizontal flow systems such as density-driven circulations largely control water mass structure and hence biological productivity. Nutrient dynamics in the Seto Inland Sea in a large scale have been investigated, focusing on the mechanism of the variation of density-driven circulation and its impact. 30-year variation of nutrient transport has been simulated using coupled physical-biological and the model applied to predict the productivity of seaweeds.

A-2.Publications and presentations

a) Publications

Original Papers

- Taguchi, F., T. Fujiwara, Y. Yamada, K. Fujita:
Alkalinity in coastal sea, Japan. Bulletin of Coastal Oceanography 47; 71-75, 2009

- Fujiwara, T., Y. Yamada, M. Kuno and Y. Ueta:
Production and nutrients transport to the southern coast of Japan. Study on Kuroshio Resources 10; 1-7, 2009

- Kobayashi, S., T. Fujiwara and A. Harashima:
Seasonal and inter-annual variations of dissolved inorganic phosphorous and silica in the Seto Inland sea. Bulletin of Coastal Oceanography 47; 77-83, 2009

- Kobayashi, S., T. Fujiwara, K. Abo, Y. Hori and T. Fujisawa:
Seasonal variations in total nitrogen and nitrogen transformations in Harima Nada. Bulletin of Coastal Oceanography 47; 61-69, 2009

- Suzuki, K., R. Sugimoto, A. Kasai, J. Shoji, K. Nakayama and M. Tanaka:
Dynamics of particulate organic matter in the estuarine turbidity maximum of the Chikugo River estuary, Ariake Sea, in summer: Influence of the fluctuation of freshwater discharge. Bull. Jpn. Soc. Fish. Oceanogr. 73; 149-160, 2009

- Sugimoto, R., A. Kasai, T. Miyajima and K. Fujita: Transport of oceanic nitrate from the continental shelf to the coastal basin in relation to the path of the Kuroshio. Continental Shelf Research, 29; 1678-1688, 2009

- Sugimoto, R., A. Kasai, T. Miyajima and K. Fujita:
Controlling factors of seasonal variation in the nitrogen isotope ratio of nitrate in a eutrophic coastal environment. Estuarine, Coastal and Shelf Science, 85; 231-240, 2009

Reviews

- Fujiwara, T.:
Primary production and nutrient supply to the southern coast of Japan. Bulletin of the Japanese Society of Fisheries Science 73; 212-214, 2009

- Fujiwara, T.:
Variation in oceanographic condition observed from sattelite images - its implication on fisheries -. Bulletin of the Japanese Society of Fisheries Science 73; 278-280, 2009

- Fujiwara, T., Y. Watanabe and K. Tarutani:
Oligotrophication and nori-aquaculture in coastal seas, Japan. Aquabiology 30; 111, 2009

- Takagi, S., T. Fujisawa and T. Fujiwara:
Nori (Porphyra) culture in Bisan Seto and nutrient supply from the rivers. Aquabiology 30; 118-122, 2009

- Kakehi, S. and T. Fujiwara:
Numerical model study of nutrient dynamics. Aquabiology 30; 123-128, 2009

- Fujiwara, T. and Y. Komai:
Nutrient dynamics in coastal seas, Japan. Aquabiology 30; 134-140, 2009

- Harada, K., Y. Hori, T. Nishikawa and T. Fujiwara:
Relationship between cultured Porphyra and nutrients in Harima-Nada, eastern part of the Seto Inland Sea. Aquabiology 30; 146-149, 2009

- Kobayashi, S., T. Fujiwara, Y. Hori, M. Fujiwara and S. Takagi:
Distributions of carbon and nitrogen stable isotope ratios of nori (Porphyra) aqua-cultured in the eastern Seto Inland Sea. Scientific Forum of the Seto Inland Sea 57; 44-48, 2009

Reports

- Antonio, E., M. Ueno, A. Kasai, Y. Kurikawa, Y. Ishihi, H. Yokoyama, and Y. Yamashita:
Energy Flow Across Benthic Communities from Downstream to Offshore of Yura River. Proceedings of the WFC 2008, CD-ROM, 2009.

- Yamazaki, H., T. Hara, Y. Koyama, T. Hosokawa, A. Kasai, M. Wada, M. Nagasaki, T. Higashino, and N. Azuma:
Ecosystem and biological production in Lake Jusan; nutrient cycles and spatiotemporal variability. Proceedings of the WFC 2008, CD-ROM, 2009.

b) Conference and seminar papers presented

- 2009 Spring meeting of the Oceanographic Soc. Japan: 1 presentation
- 2009 Spring meeting of the Japan. Soc. Fish. Sci.: 4 presentations
- 2009 Autumn meeting of the Oceanographic Soc. Japan: 3 presentations
- The Crustacean Society Summer Meeting: 1 presentation
- 2009 Annual meeting of the Japan. Soc. Fish. Oceanogr.: 3 presentations
- 2009 Autumn meeting of Kinki Branch of the Fisheries Soc. Japan: 1 presentation
- International Symposium on Integrated Coastal Management for Marine Biodiversity in Asia: 1 presentation
- 4th Symposium of ecology in Iwaki River: 1 presentation

A-3.Off-campus activities

Membership in academic societies

- Fujiwara, Tateki : The Oceanographic Society of Japan (Councilor), Coastal Oceanography Division of the Oceanographic Society of Japan (Editor, Committeeman), The Marine Meteorological Society (Director, Editor), The Japanese Society of Fisheries Oceanography (Committeeman)
- Kasai, Akihide : Coastal Oceanography Division of the Oceanographic Society of Japan (Editor, Committeeman), The Japanese Society of Fisheries Oceanography (Councilor), The Japanese Society of Fisheries Science (Councilor of Kinki Branch)
- Kobayashi, Shiho : The Japanese Society of Fisheries Science (Secretary of Kinki Branch)

Research grants

1. Grants-in-aid for Scientific Research(KAKENHI)

- Scientific Research (B) : Kasai Akihide : Quantitative assessment of estuaries for nurseries of important fisheries resources
- Scientific Research (B) : Kasai Akihide : Molecular biochemistry on ecological functions of meiobenthos in coastal marsh
- Scientific Research (C) : Kobayashi Shiho : A study on variation mechanisms of particulate matter in coastal seas using long-term measurements of turbulent energy

dissipation

2.Other Research Grants

- Research and development projects for application in promoting new policy of Agriculture Forestry and Fisheries : Kasai Akihide : Increase and management of biomass of freshwater clam in estuaries

A-4.International cooperation and overseas activities

International meetings(country,roles)

- Kasai Akihide : International Symposium on Integrated Coastal Management for Marine Biodiversity in Asia (Japan, Poster presentations)

International joint research, overseas research surveys

- Cooperative research on the physics and high production in Menai Strait, Kasai Akihide, University of Wales (UK)

B.Educational Activities(2009.4-2010.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level : Marine Environment (Fujiwara), Marine Ecosystem (Kasai), Practical Course in Marine Bioscience and Technology (Fujiwara, Kasai), Laboratory Course in Bioresource Science (Kasai, Kobayashi), Outline of Bioresource Science (Fujiwara), Seminar in Marine Bioresources Science (Fujiwara, Kasai, Kobayashi)
- Graduate level : Fisheries and environmental Oceanography (Fujiwara), Seminar in Fisheries Physics (Fujiwara, Kasai), Laboratory Course in Fisheries Physics (Fujiwara, Kasai)

B-2.Off-campus teaching etc.

Part-time lecturer

- Kasai, A.: Faculty of Agriculture, Kinki University (Statistics), Faculty of applied biological science, Hiroshima University (Biosphere environment)

B-3.Overseas teaching

International students

- International students : Master 1 (China)

C.Other Remarks

- Fujiwara, Tateki : Disaster Prevention Research Institute (Researcher), International EMECS Center (Science and Policy Commissioner)
- Kasai, Akihide : Center for science and technology trends (Researcher), GLOBEC committee (Researcher), Tokyo Bay in Edo Era (Researcher), Environmental function in rivers and coastal areas (Researcher), Environmental assessment of Ohmura Bay (Researcher)