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Center for International Cooperation
Ocean Research Institute
The University of Tokyo



**ORI MOVING FROM NAKANO
TO KASHIWA**

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Ready for the New Era of International Academic Exchange Activity at ORI in FY2009

Mitsuo UEMATSU

Professor and Director, Center for International Cooperation

In April 2010, the Ocean Research Institute (ORI) at the University of Tokyo (established 1962) was reorganized and moved to a new building on the Kashiwa campus. Along with the Center for Climate System Research (established in 1991), we have established the Atmosphere and Ocean Research Institute (AORI) as a new institute to cover the interdisciplinary ocean and atmospheric sciences. At the same time, we have established a new center for further strengthening the activities of international academic exchange in this scientific field. The Center for International Collaboration is the successor to the Center for International Cooperation (CIC), which had been operating for over 15 years.

As the last director of CIC, I would like to report on the summary of our accomplishments in the fiscal year of 2009 and project our capabilities for developing future international activities in ocean and atmospheric sciences.

In 2009, several important activities were organized and supported by CIC members. The 45th Session of the Assembly of IOC of UNESCO was held in Paris during the period of June 16–25. Prof. Yutaka Michida and I attended from the ORI. The agenda included discussions about the Commemoration of the 50th Anniversary of the IOC in 2010, the Ocean Biogeographic Information System (OBIS) and the election of the chairperson of the Commission. During the assembly, the 42nd Executive Council was also held and argued for the recruitment of a new executive secretary for the commission. One candidate from Japan* remained in the final list of six members drawn from over eighty candidates. Dr. Wendy Watson-Wright from Canada was appointed as the successor to Dr. Patricio Bernal, who had served over a decade for IOC, and had contributed enthusiastically to its work.

The 4th JSPS/VAST Seminar on “Coastal Marine Science,” part of the Multilateral Core University Program, which was supported by the Japan Society for the Promotion of Science (JSPS), was held at Hai Phong in Vietnam from October 26–28. Over 140 participants attended the seminar, including a number of young scientists from Vietnam. The seminar was followed by 2009’s second ocean research workshop - looking at the issue of how to encourage collaboration in the future beyond the JSPS “Coastal Marine Science” program. This was held at the Institute of Marine Environment and Resources in Hai Phong on October 29 and attracted over 40 participants. We agreed to hold an international conference in Tokyo in October 2010 and to discuss the possibility of establishing a future projects upgrade of the JSPS network.

The joint fourth workshop of the Asian Dust and Ocean EcoSystem (ADOES), along with Asian SOLAS and the eighteenth meeting of the North Pacific Marine



Professor Uematsu at the JSPS Seminar in Vietnam

Science Organization (PICES), was held in Jeju, South Korea in October. Several faculty members from ORI contributed to these meetings by taking part in many sessions and workshops. It is quite important to maintain stable relationships between East Asian countries, not only in terms of inter-governmental relations but also for bottom-up research projects.

The project known as “Marine Ecosystem Transit From Marginal Seas to the Open Pacific” was funded under the Strategic Japanese-Chinese Cooperative Program on Climate Change for three years after careful preparation had been carried out in collaboration with Ocean University of China. This was a great opportunity to share and standardize experimental techniques to be carried out on board ships and in labs in order to make seamless data utilization for future research possible and to recruit graduate students and scientists for the Japanese cruises.

The Medaka project, which is a unique application for evaluating the coastal environment, in collaboration with the present member countries and new countries in Southeast Asia (i.e., Myanmar, Laos, and Cambodia) has begun under the leadership of Dr. Koji Inoue of ORI. The CIC supported the establishment of an international symposium in Thailand in November after the establishment of the MoU between ORI and Universiti Putra Malaysia.

ORI has developed formal agreements on scientific cooperation with more than ten research and educational institutions around the world. Further agreements and renewals have been established with the Australian National University, Muséum National d’Histoire Naturelle (France), Universiti Putra Malaysia, Lamont Doherty Earth Observatory, the Earth Institute at Columbia University, the University of Southampton and the University of Hawaii, and Université Pierre et Marie Curie. These agreements are based on intimate relationships and strong scientific cooperative programs

between the faculty members of ORI and its counterpart organizations.

Delegations from the VAST, Vietnam, Ocean University of China, and other countries visited ORI and held discussions with ORI faculty members regarding the collaboration.

In 2009, the CIC invited three distinguished scientists from Australia, Canada, and India. It is critical to invite active scientists to ORI in order to stimulate interactions with faculty members and graduate students. As a domestic visiting associate professor at the CIC, Dr. So Kawaguchi from the Australian Antarctic Division conducted scientific activities and stimulating discussions with us for a year. We were grateful to him for his contributions and his many constructive suggestions to ORI.

Scientists representing a wide spectrum of marine sciences have worked together in the CIC, and the center leads international research endeavors through planning, coordinating, and promoting international cooperative studies and research programs. The CIC has strived to play a unique role in enhancing the quality of ocean science disseminating from ORI to Asia and the world beyond.

At the end of March 2010, Prof. Nobuyuki Miyazaki retired from the Ocean Research Institute. He had served tirelessly as the coordinator for JSPS Coastal Marine Science and had conducted an extensive international Bio-Logging Science program for nine years at CIC during his seventeen years at ORI. We all deeply acknowledged his accomplishments and expressed the hope that his activities for science and

society would continue successfully. A new Center for International Collaboration (CIC) will make the following proposals for a long term plan to promote the internationalization of the Atmosphere and Ocean Research Institute, and to help it continue to be a leader and create ties with other institutions as an international center for atmosphere and ocean research:

1. To plan, promote, and support international activities based on inter-governmental agreements.
2. To promote and support large joint international research projects.
3. To promote academic exchanges and personnel development with Asian and other countries.
4. To strengthen the role of the institute as an international center for research on coastal oceanography.
5. To develop the next generation of researchers by supporting the overseas dispatch of young researchers and promote their involvement in interdisciplinary joint research.
6. To invite non-Japanese visiting professors and actively hire non-Japanese professors, researchers, and exchange students.
7. To expand and strengthen the international dissemination of research results (including using academic journals and academic databases).

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**Editorial Note: The Candidate from Japan was Professor Mitsuo Uematsu himself.*

The 4th VAST-JSPS Joint Seminar on Coastal Marine Science

Nobuyuki MIYAZAKI

Professor, Center for International Cooperation

The multilateral core university program “Coastal Marine Science (CMS),” supported by the Japan Society for the Promotion of Science (JSPS), is an international program in six countries: Indonesia, Malaysia, Philippines, Thailand, Vietnam, and Japan. Under this program, scientific activities regarding (1) material transport; (2) harmful algal bloom; (3) biodiversity of benthos, zooplankton, seagrass and seaweed, and fish; and (4) marine pollution, have been carried out since 2001.

As a major activity of the program, The 4th VAST-JSPS Joint Seminar on Coastal Marine Science was held on October 26–28, 2009 in Hai Phong, Vietnam, under the leadership of Dr. Tran Duc Thanh, director of the Institute of the Marine Environment and Resources (IMER), part of the Vietnamese Academy of Science and Technology (VAST). At the venue—the beautiful new building of Hai Phong Convention Center—140 participants (64 JSPS program members and 76 scientists from Vietnam) got together and presented their achievements in 58 oral and 21 poster presentations. In



Hai Phong Convention Center

the opening ceremony, Dr. Chau Van Minh, the President of VAST, Dr. Nguyen Van Thanh, First Vice-chairman, People’s Committee of Hai Phong City, and I, on behalf of the JSPS program, gave the opening addresses.

During the seminar, we discussed plans, with an emphasis on the collaboration, among the four projects. Two subjects also attracted the attention of participants. One was the balance of environmental conservation and economic development, reflecting Hai Phong as an important international trading port. The other was the

issue of biodiversity, with the interest in COP10 in Nagoya, in October 2010. Both subjects were within the scope of the CMS program and we had fruitful discussions, which were also continued by the three parties, each of which were hosted by the JSPS, the Mayor of Hai Phong City, and IMER, respectively. These parties offered good opportunities for communication between program members and young local scientists.

I would like to express sincere thanks to the local organizing committee, the staff of VAST, and the many other Vietnamese people involved in the seminar. It

seems to me that the seminar was rather successful because of their support and hospitality. I also felt that the enthusiasm of the Vietnamese government for the promotion of international cooperation in coastal marine science and for the education of young scientists who will perform research in the coastal regions of Vietnam was particularly helpful. In fact, many young scientists participated in the seminar with the support of the government. I would also like to thank Prof. Mitsuo Uematsu, the director of CIC, and the staff of ORI including Dr. Jin-Oh Park, Dr. Koji Inoue, Ms. Yuko Fukuda, and Ms. Risa Sekine.

Ocean Research Workshops to Establish New Collaboration after CMS

Koji INOUE
Associate Professor, Center for International Cooperation

With the support of the Japan Society for the Promotion of Science (JSPS), we have carried on a cooperative research program by focusing on the marine sciences in the coastal regions of Southeast Asian countries. This began as a bilateral program with Indonesia, Thailand, and Malaysia. In 2001, it was expanded to the multilateral core university cooperative program “Coastal Marine Science (CMS)” with the Philippines, Vietnam, and the three countries above. As the CMS program will end by the end of March 2011, it was necessary to have an opportunity to start discussions about our future collaboration. Thus, we held a workshop, named “The First Ocean Research Workshop,” at Ocean Research Institute, the University of Tokyo, on February 12–14, 2009, under the support of the JSPS program, “Flexible International Exchanges.” We invited more than forty participants, including the national coordinators of the CMS program and a distinguished administrator from each participating country, as well as scientists from Cambodia. In the plenary sessions, we discussed various themes, including climate-related changes in sea levels, the monitoring of seagrass beds by satellite imaging, marine pollution monitoring through multiple approaches, the construction of a database, and so on. Ms. Ayako Maesawa, Head of the Asian/African Program Division of JSPS, also participated in the workshop and explained the “principle” of the international program of JSPS, i.e., the bottom-up approach, accountability to society, and equal partnership. In addition, time for specific discussion between Japan and each country was included in the program. Utilizing this period, many participants could obtain new ideas for collaboration, in addition to making the already-existing collaboration tighter. In the final plenary discussion, new assignments were proposed by the convener, Prof. Mitsuo Uematsu, to confirm what each country should do until the next workshop. After the final session, the participants visited RV Hakuho Maru at Harumi Port.

The second workshop was held at the Institute of



The 1st Ocean Research Workshop in ORI, Nakano, Tokyo



Participants visited R/V Hakuho Maru at Harumi Wharf after the 1st Ocean Research Workshop



The 2nd Ocean Research Workshop in Haiphong

Marine Environment and Resources (IMER) of the Viet Nam Academy of Science and Technology (VAST) on October 29, 2009. The workshop started with an opening address by Prof. Uematsu. Subsequently, the national coordinators of the five CMS member countries presented the status of each country by answering the questionnaires sent by the convener prior to the workshop. Other participants also introduced specific research projects, which are expected to become cores of future collaboration. We also discussed about the

establishment of a scientific society to maintain the network that has been established through the CMS program.

On the basis of the outcome of the two workshops, we hope that we can propose new collaborative researches at the symposium, which will be held in October 2010, at the new building of ORI, which will be reorganized to be the Atmosphere and Ocean Research Institute (AORI), in Kashiwa, Japan.

International Symposium on Ocean Science, Technology and Policy in Manado, Indonesia

Koji INOUE

Associate Professor, Center for International Cooperation

“The International Symposium on Ocean Science, Technology and Policy” was held in Manado Convention Center, Manado, Sulawesi, Indonesia as a major side event of the World Ocean Conference on May 12–15, 2009. The objectives of this symposium were: “to provide a venue for sharing the latest information and cutting edge technologies on all aspects and function of the ocean that would enhance the current understanding of the marine ecosystem” and “to forge strong commitments from the global community, governments, development agencies, international organizations and other stakeholders to improve marine ecosystem management and policies in consideration of the impact of climate change on the ocean.” The symposium covered a wide variety of topics under eight themes: (1) Aquaculture, (2) Ecosystem and Coastal Management, (3) Marine Resources Management and Conservation, (4) Marine Trade, Industry, and Technology, (5) Maritime Hazards and Pollution, (6) Oceanography and Climate Change, (7) Policy, Governance, and Capacity Building, and (8) Marine Spatial Planning and Cadastre. Professor Nobuyuki Miyazaki of CIC organized the session on marine pollution, under Theme 5, with Dr. Markus T. Lasut of Sam Ratulangi University (SRU), and the members of the Pollution of Marine Environment (POME) project of the JSPS Multilateral Core University Program “Coastal Marine Science (CMS),” including



WOC in Manado, Indonesia

Professor Miyazaki and myself, gave oral presentations. The POME members also held a meeting to discuss the nature of research activity in the future. After the symposium, I visited Drs. Inneke Rumengan of the SRU with Dr. Kinoshita of Kyoto University and gave a lecture, in front of more than a hundred students, on our project of pollution monitoring using rice fishes of the genus *Oryzias*. I also had the opportunity to visit Professor Bambang Soeroto, who was studying *Oryzias* fishes in Sulawesi, and to visit the mangrove area around Manado to look for wild fishes. We would like to thank Drs. Inneke Rumengan, Daniel Limbong, and their staff for their kind arrangement of our visit and their hospitality during our stay.

Agreement on Scientific Cooperation between ORI and Universiti Putra Malaysia

Koji INOUE

Associate Professor, Center for International Cooperation

Through the JSPS Multilateral Core University Program “Coastal Marine Science (CMS),” a number of collaborative studies have been started with SE-Asian countries. Among them, some promising research has emerged from the collaboration with Universiti Putra Malaysia (UPM), one of the top universities in Malaysia.



Signing ceremony at UPM, Malaysia

For example, I have studied the mechanisms of environmental adaptation and environmental monitoring, using salinity-tolerant rice fishes in Malaysia, with Professor Ahmad Ismail of UPM. To further enhance the collaborative research activities, ORI and UPM agreed to sign a Memorandum of Understanding (MoU)

and the signing ceremony was held at the Faculty of Science, UPM on May 25, 2009. There are a variety of resources for marine sciences, including mangrove areas, coral reefs, seagrass beds, and tidal-flats, around UPM. It is expected that the MoU will strengthen the research activities between the two institutions in the future.

Conference on Marine Ecosystem (INCOMES) 2009

Koji INOUE

Associate Professor, Center for International Cooperation

The 2009 conference on the marine ecosystem (INCOMES 2009) was held at the Awana Porto Malai Hotel, Langkawi, Malaysia on May 26–28, 2009. The chairman of this conference was Prof. Che Abd. Rahim Mohamed of Universiti Kebangsaan Malaysia, who is also a member of the Pollution of Marine Environment (POME) project of the JSPS Multilateral Core University Program “Coastal Marine Science (CMS).” The main theme of the conference was the “Transboundary approach to sustainable and integrated marine resource management,” and more than two hundred oral and poster presentations were presented on such subjects as marine biodiversity, marine fisheries, marine pollution, marine ecotourism, oceanography, marine geology, climate change, marine technology, and marine biotechnology. Professor Nobuyuki Miyazaki from CIC participated in this conference as an international scientific advisor and gave a keynote lecture, entitled “Sustainable development of marine resources and conservation of the marine environment.” I also introduced our researches on *Oryzias* fishes in an oral



INCOMES 2009, Langkawi, Malaysia

session and was able to conduct valuable discussions with local and international participants. I enjoyed this well-organized conference on an island with a full diversity of nature.

International Symposium of *Oryzias* Fish

Koji INOUE

Associate Professor, Center for International Cooperation

An international symposium on *Oryzias* fish, “*Oryzias*: Small Fish with Big Potentials” was held at the Faculty of Science, Srinakharinwirot University (SWU), Bangkok, Thailand on November 12–14, 2009. Dr. Wichian Magtoon, Dean of Faculty of Science, SWU, coordinated the symposium as chairman, and I served as co-chairman. Scientists from Thailand, Malaysia, Hong Kong, Cambodia, Laos, and Japan participated and presented their scientific results. The CIC supported scientists from Cambodia and Laos by sponsoring their travel fees. *Oryzias* fishes, i.e., medaka and related species, are important models for both laboratory and field studies, and it is expected that these small fishes can promote the establishment of an international research network in Asia. We agreed to hold the next symposium in 2011 in Malaysia.



Registration of International Symposium of *Oryzias* fish

Visiting Professors' Reports

Daniele L. PINTI

Visiting Professor

Full Professor, Department of Earth and Atmospheric Sciences, Université du Québec à Montréal, Canada

I was invited for 3 months at the Ocean Research Institute of the University of Tokyo, during summer 2009. I planned to visit the Center for Advanced Marine Research and work together Prof. Yuji Sano and his team on paleoceanography and paleoclimatic research topics. At the same occasion, one of my PhD students, Emilie Roulleau, came at the laboratory with a JSPS Summer Fellowship. She worked with Prof. Sano and myself on nitrogen isotopes and rare gases as tracers of magmatic processes. I spent most of my time doing difficult experiments at the ORI facilities, but thanks to Prof. Sano, Dr. Takahata and their students I could enjoy Tokyo's life and fieldwork in the region of Nagano (Ontake volcano) and at the International Coastal Research Center at Otsuchi (Iwate Prefecture). This is not my first visit in Japan. Indeed, I lived mostly 4 years in Osaka as a JSPS post-doctoral fellow long time ago and my spouse is a "Tokyo-jin" but those 3 months at ORI were my longest stay in Tokyo. During my visit I had occasion to give a talk at ORI on noble gas geochemistry applied to deep-sea sediment pore water. Two other seminars were held at the Hongo-Sanchoe UT campus and at Tohoku University.

My research at ORI was on determining REE geochemistry of North Pacific deep-sea corals to check whether variations with growing time of 1700 years old

specimen could be related to changes in marine paleocurrents. This work was carried out together with Dr. Sano and Dr. K Shirai of UT, doing some nice experiments using the ICP-MS at the ICRC in Otsuchi (and enjoying fresh sushi, too!). The other promising research was an attempt to date one of the high-latitude ever found stalagmites from Devon Island (Canadian Arctic Sea) by using (U-Th)-⁴He dating techniques. This stalagmite is older than 500,000 years and it may reveal paleoclimate conditions of Early Quaternary.

I had a very rich intense summer, scientifically and culturally and I am very grateful to Prof. Sano, and all ORI people to welcome me among them... and invite me to the final Japanese experience, bring a Mikoshi (see photo).



Professor Pinti, the second from the right.

Nagappa RAMAIAH

Visiting Professor

Professor, National Institute of Oceanography, India



At the very outset, I express my gratitude to Professor Kazuhiro Kogure and the Ocean Research Institute (ORI) for the offer of visiting professorship to me during January 1- March 31, 2010. Being a marine microbial ecologist at National Institute of

Oceanography (NIO) in India, it was my fervent interest to interact and, learn from the proficient expertise in marine microbiology at the ORI. I am deeply glad to state that I learnt a great deal of newer approaches in this ever expanding research area. For instance, under the advice of Professor Kogure, we conducted experiments to determine the buoyant density of different archaeal and bacterial isolates in the culture collections of Professor Kogure's laboratory. The enthusiastic team of microbiologists in the lab selected different bacterial and archaeal strains and facilitated determining the

buoyant density. Evaluating buoyant density of different microbial types is of interest to microbial ecologists to infer as to why and how certain types of bacteria ought to remain in the pelagic zone and, what is the fate of those that have lower buoyant density. We have come up with interesting observations that we believe are of relevance in microbial oceanography. When we consider the light-energy dependent physiological functions of some tested strains, it appears that being buoyant is very vital to them.

I also learnt on a non-radioactive tracer technique, the bromodeoxyuridine incorporation assay that reliably detects actively growing bacterial cells. I am allured by its ease of use and, data-accuracy. I will collaterally use it back in India to compare its usefulness in our seas. I have had the joy of interacting everyone in this very busy and highly committed team pursuing an array of the interesting facets of marine microbiology.

It is my hope that the ORI and NIO carry out joint researches not only in marine microbiology but also in many other disciplines common to both of our great institutions.

I have always admired the Japanese culture. This nation's picturesque natural beauty, the aesthetic norms of its citizens, its warm and friendly people -and their

ever-active life-style- are among the cynosures of my recollections. The many meetings and interactions I enjoyed within the ORI campus will remain the

cherished memory to me. ARIGATOO GOZAIMASHITA. Yorooshuku onegai tashimasu.

John A. DONALD

Visiting Associate Professor

Professor, Deakin University, Geelong, Australia



I was very honoured to come to the University of Tokyo as a Visiting Associate Professor in 2009. I spent two and a half months from mid-April to mid-June in the laboratory of Professor Yoshio Takei, arriving just in time to see the last of the cherry blossom. I am deeply appreciative of the

help provided to me by all the laboratory members, who ensured I had a very enjoyable and productive time. This was my eighth visit to Japan and the Shinjuku area, which is becoming like a second home; things will be very different next time I visit ORI [or AORI as I believe it will now be known] in Kashiwa in coming years. I will miss the Sun Terrace weekly mansion and “my” local neighbourhood around Nakano-Shimbashi metro station.

Scientifically, I had a very productive time. I had just completed a very busy period at my home institution and it was very rewarding to be able to focus on research for an extended period. During my visit I was able to establish the platform for future studies on the evolution of vasodilation in fish and amphibians, which I hope will lead to interesting discoveries in the future and joint publications. The Monday morning laboratory meetings provided a great opportunity to learn of the breadth of research in the laboratory and to discuss it with the postgraduate students and postdocs. I hope I was able to make a valuable contribution in assisting graduate students preparing manuscripts and conference

presentations. I particularly enjoyed preparing for my lecture to the graduate students on the circulation in fish as it meant re-connecting with research I did as a PhD student at the University of Melbourne. As with past visits, the most rewarding part of coming to ORI is the interactions with all the staff, postdocs, and students, which are always informative and entertaining. I am always impressed by how up to date the laboratory is in many techniques and I learnt a great deal during my stay that I have applied to my own laboratory at Deakin University.

My spouse, Dr. Tes Toop, was able to make two visits to Japan during my stay. On her first visit we took the shinkansen [Nozomi] to Hiroshima, where we visited the Atomic Bomb Dome and the Peace Memorial Museum in the Peace Park; we both found it deeply moving. A colleague of Ando-sensei, Mukuda-san, was a fabulous host and took us to Miyajima to see the famous Torii gate and the Itsukushima shrine. We were incredibly lucky as there was a traditional Japanese wedding at the shrine. From Miyajima we went to Kure along the coast. This was of great interest to me as my father spent two years working as a doctor at the British Hospital in Kure during the Korean War. On Tes’ second visit we visited Kyoto and the many shrines and temples throughout the city. We particularly enjoyed a side-trip to Arashiyama and the bamboo groves.

I am sincerely grateful to Professor Yoshio Takei and Centre for International Cooperation in providing me the opportunity to visit ORI and I look forward to hosting Japanese scientists in Australia.



Lukas RÜBER

Visiting Associate Professor (FY2009)

Researcher Ichthyology, Department of Zoology, The Natural History Museum, London, UK



I joined the Ocean Research Institute in mid June 2008 to work for five weeks in the laboratory of Professor Mutsumi Nishida. The aim was to initiate collaborative research with Prof. Nishida and Dr. Masaki Miya (Natural History Museum & Institute, Chiba University) on the molecular

phylogeny of gobioid fishes. We use complete

mitochondrial genome sequences in order to study global patterns of diversification in the evolutionary history of this group.

Gobioids are small fishes normally between 4 to 10 cm inhabiting most freshwaters, brackish, and marine habitats with the exception of the Antarctic and Arctic Ocean and the deep sea. They show a spectacular variety in morphology, behaviour, and ecology. Gobioids are known for their associations with various marine invertebrates (e.g. sea urchins, corals, sponges), or their cleaning behaviour (some species of the genus *Elacatinus* remove ectoparasites from other fishes). Major ecological shifts associated with evolutionary novelties in morphology or physiology characterize many gobioid families and subfamilies, as for example the amphibious mudskippers (Gobiidae, Oxudercinae) and the amphidromous freshwater rock-climbing gobies (Gobiidae, Sicydiinae). While gobioids belong to one of

the most species rich fish groups (roughly 10% of all ray-fined fishes are gobioids) they are at the same time one of the least studied. However, a robust phylogenetic framework is needed to tackle their evolutionary history.

Upon my arrival to Japan Dr. Miya picked me up at the airport and I first spend two days in his laboratory at the Natural History Museum & Institute in Chiba, discussing our joint project. After this short stay in Chiba I moved to Tokyo to settle in at the ORI and get started with my lab work. During my stay at ORI I presented two seminars on my current research on gobioid fishes and miniature cyprinids. It is always interesting to learn new approaches and techniques, and in this case I was particularly impressed by how well organised and productive the lab of Prof. Nishida is. The results we obtained from my visit will contribute significantly to our understanding of gobioid evolution. However, the most rewarding aspect of my visit was the interaction with the people in Prof. Nishida's group. Professors, students and technicians were all very welcoming, kind and enthusiastic. We had engaging discussions about science but also about life in Japan, and more than once my hosts took me to sample the delicacies of Japan cuisine and the exciting Tokyo nightlife.

At the end of my stay at ORI I spent two weeks indulging in one of my passions: Japanese food. My girlfriend Soraya joined me then and after a few days in Tokyo we travelled to Kyoto and the surroundings. For both of us this was an incredibly enriching experience. The temples and gardens were splendid, and one of our nicest memories is the sight of the vast lotus fields in bloom at lake Biwa. Another of our fondest memories is the wonderful goodbye party that my hosts organised on the roof of the ORI building on the last day of our visit. We barely touched the surface of Japan's diverse geography and culture so we very much hope to have the opportunity to go back for a longer visit in the near future.

It is a great pleasure for me to thank the University of Tokyo for providing this unique opportunity for collaborative research at ORI. I am very grateful to Dr. Masaki Miya for all his help throughout my stay in Japan and for inviting me to his home on several occasions. I particularly would like to thank my host Professor Mutsumi Nishida and his students and people working in his research group for their kindness and hospitality. They all made my visit very enjoyable and fruitful.

Special Essay by Guest Professor

So KAWAGUCHI

*Visiting Associate Professor
Principal Research Scientist
Australian Antarctic Division,
Australia*



“From Krill Study to Australian-Japanese Antarctic Link”

In this short essay, by covering quite a range of topics starting with krill biology, I will try to convey the feel for the sorts of issues and topics surrounding Antarctica. Further, I will explain why collaborations between Australian and Japanese are so important in the Antarctic research community.

Krill study is important

Antarctic krill is a shrimp-like animal growing up to 6.5cm, with life span of 5-7 years (Fig.1). There are total of 85 pelagic krill species in the world's ocean, and Antarctic krill is one of the largest in size. Its' biomass is thought to be at least several hundred million tonnes, playing a key role in the structure and function of the Southern Ocean ecosystems serving as both an important grazer and a critical prey item for the reproductive success of major marine predators.

The survival of young krill and reproductive success of mature krill has been linked to winter sea-ice conditions; more ice leads to more food resulting in high survival of young krill (Fig. 2 & 3). In fact, there have

been suggestions that the krill population in the South Atlantic has already declined significantly as a result of productivity changes caused by the decline in sea ice.

There are more reasons for krill to be significant. Recent studies indicate aggregations of krill generate large turbulence patches, potentially increasing the nutrient exchange across the stratified ocean (layered – with warmer water at the surface), which means that krill could be fertilising the surface waters, boosting the production of phytoplankton.

And finally krill is the target of the biggest fishery in the Southern Ocean.

Therefore, any perturbations in the krill populations will have ramifications not only throughout the Southern Ocean ecosystem but also to human activities.



Fig. 1. Antarctic Krill

Overview of Antarctic krill fishery

An exploratory fishery targeting Antarctic krill first started in the 1962 fishing season, and full scale commercial operations were underway by the mid 1970s. The annual total catch peaked in early 1980s (over half million tonnes) and rapidly declined thereafter down to around 120,000 tonnes due to problems with krill processing. The catch from the 1986 to 1992 fishing season was between approximately 300,000 to 400,000 tonnes. A marked drop in catch occurred in the 1993 fishing season after the USSR ceased fishing operations. Since the 1992/93 season the annual total catch remained close to 100,000 tonnes, although there appeared to be a small but consistent recent increase in catches (Fig. 4).

Management of the harvest of all marine living resources (other than whales and seals) in Antarctic waters is regulated by the Convention on the Conservation of Antarctic Marine Living Resources. Current level of annual total catch is well below the precautionary catch limit set by CCAMLR, but the fishery is showing the sign of increase. The krill fisheries tend to concentrate in small number of locations where the land based predators such as seals and penguins forage as well. There is a concern about depleting local krill populations from these predators' feeding ground if the fishery further grows without fishing effort being distributed to wider area.

Nations involved in Antarctic krill fishery have



Fig. 2 Dr. Kawaguchi on ice with an underwater camera

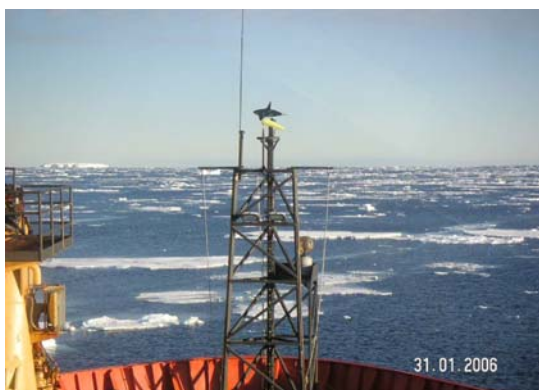


Fig. 3 Sea-ice in Southern Ocean

changed dramatically. Until 1992 fishing season, the major fishing nation was the USSR but Japan had also been continuously operating from early 1980s. From 1993 fishing season onwards, Japan became the major nation taking more than 50% of the total catch of 100,000 tonnes. Other countries (Poland, Ukraine, Korea) were also regularly operating during this period. The USA and Vanuatu also operated for a while. More recently, Norway has entered the krill fishery and is now becoming the major fishing nation.

A wide variety of products have been produced from krill and these have been aimed at aquaculture, animal feed, human consumption and the production of pharmaceuticals and chemicals (Table 1). The recent growing demand for marine oils and for aquaculture feed, and the decline in traditional supplies of fishmeal is increasingly attracting commercial interests.

Antarctica as a window for the future global environment

Parts of Antarctica are some of the most rapidly warming places on the globe, and as a consequence the extent of winter sea ice is decreasing around the Antarctic Peninsula. Drastic change in UV radiation has been observed as a result of stratospheric ozone depletion. Atmospheric CO₂ levels are rising globally, and due to the greater solubility of CO₂ in cooler water, the Southern Ocean is thought to be one of the first ecosystems on the globe to be affected by ocean acidification. Additionally, there is a history of exploitation of a range of species (seals, whales, fish,

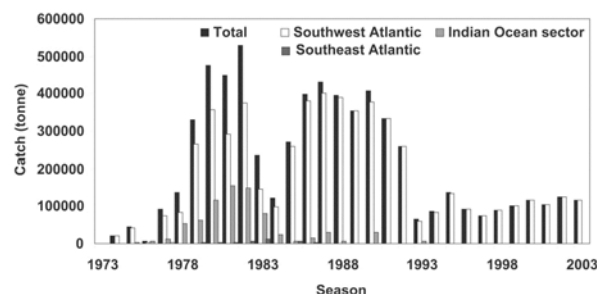


Fig. 4 Total and regional catch of Antarctic Krill

Table I. A list of krill products.

Usage	Products
Feed and baits	frozen krill
	krill meal
	krill oil
	krill protein solubles
Human consumption	frozen krill tail meat
	krill protein concentrate
	krill hydrolysed solubles
	krill flavours
Chemicals	krill pharma oil
	astaxanthine
	dried krill shell
	chitin
	chitosan
	krill enzymes

krill) since 18th century. Further, the number of tourists visiting the Antarctic continent has increased by more than ten fold in the recent 15 years. The Antarctic is often described as the window for the future global environment. Monitoring this environment is important, not only for the need to detect early signs of change, but also to improve our understanding of the system and to allow predictions for the future. Consequently, Japan and Australia are leading a program to monitor plankton as early warning indicators of the health of the Southern Ocean

Nobu Shirase to Kevin Rudd: Australia and Japan, the Antarctic link

As early as 1911 a hand of friendship and support was held out to Lt Nobu Shirase, the first Antarctic explorer in Japan, by the professor of geology at Sydney University, Sir Tennant William Edgeworth David at a time when Japanese were regarded with suspicion in Australia. Lt Shirase had failed to reach Antarctica on a previous voyage south and had not met with much support from Australia or New Zealand, or indeed from Japan, for his endeavours. Sir Edgeworth David provided moral and intellectual support for the scientific objectives of Shirase's, a matter which Lt Shirase recalled in a letter written to him on his departure for Antarctica and currently held in the Mitchell Library, Sydney.

In 1985, when Nella Dan (Australian research and resupply vessel at that time) was locked in heavy ice and failed to be freed by Icebird, it was Japanese icebreaker JMSDF Shirase which finally rescued her out of ice on 15 Dec 1985. Later in 1998, JMSDF Shirase rescued the RSV Aurora Australis in Prydz Bay.

In June 2008, the Prime Ministers of both Australia (Kevin Rudd) and Japan (Yasuo Fukuda) met in Tokyo and released a joint communique on Japan-Australian collaboration

(http://www.pm.gov.au/media/release/2008/media_release_0309.cfm; Japanese translation http://www.mofa.go.jp/mofaj/area/australia/vsit/0806_ks.html). Paragraph 34 states:

"The two Prime Ministers recognised the important role of continued cooperation in scientific research in the Antarctic to support the understanding of the global impacts of climate change and confirmed their commitment to further enhanced cooperation in this area."

Significance of Australian-Japanese collaboration in Antarctic Science

Currently long-term monitoring sites conducting comprehensive marine ecosystem observations are all located in the Southwest Atlantic. Similar ecosystem monitoring sites are lacking in other areas of the Antarctic. Environmental trends and rates of changes differ between areas around the Antarctic continent. To view Antarctica as an entire system, we desperately need to have such information from all regions of Antarctica.

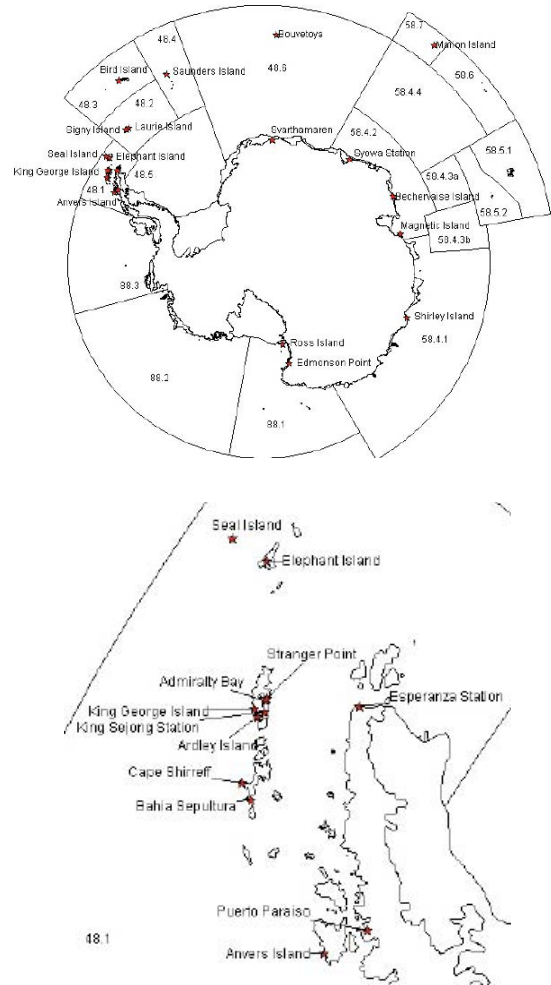


Fig. 5 Locations of long-term monitoring site in the Antarctica

In that sense, Australia and Japan share a unique and important position within the Antarctic research community. We both have permanent stations in the East Antarctica, continuously observing an incredible amount of data, as well as the execution of successful large scale snapshot ecosystem surveys in a region, which encompass more than a quarter of the coast line (Fig. 5). There is a proud history of successful research collaborations between Australia and Japan in Antarctic ecosystem studies.

In September 2009 Australia-Japan Joint Workshop on Antarctic Science was held at National Institute of Polar Research. The workshop was attended by both countries' key scientists from a wide range of Antarctic disciplines to discuss, prioritize future collaborations.

Further strengthening Japanese-Australian cooperation/collaboration, I believe, will provide a wealth of information for the whole Antarctic research community.

Data related to CIC

The Center for International Cooperation (CIC) was established in 1994 in Ocean Research Institute (ORI). Since then, CIC has promoted international activities of ORI and also has played a central role as a national center for various international cooperation projects. Followings are data related to international activities of CIC and ORI.

Director of CIC

Keisuke TAIRA	FY1994-1997
Makoto TERAZAKI	FY1998-2001
Katsumi TSUKAMOTO	FY2002-2005
Mitsuo UEMATSU	FY2006-2009

Faculty Members of CIC

Asahiko TAIRA	1994-2002 (Prof.)
Makoto TERAZAKI	1994-2003 (Prof.)
Noriyuki HIBIYA	1996-1998 (Assoc. Prof.)
Mitsuo UEMATSU	1997-2004 (Assoc. Prof.) 2004-2010 (Prof.)
Toyoji KANEKO	1997-2003 (Assoc. Prof.)
Yutaka MICHIDA	2000-2007 (Assoc. Prof.)
Nobuyuki MIYAZAKI	2003-2010 (Prof.)
Hiroshi HASUMOTO	2005-2006 (Lecturer)
Jin-Oh Park	2006-2010 (Assoc. Prof.)
Koji INOUE	2006-2010 (Assoc. Prof.)

Guest Professors (International)

Xavier Le PICHON	Collège de France, France	1994
John R. PAXTON	National Museum of Australia, Australia	1996
Neil HAZON	University of St Andrews, UK	1997
Ian F. JONES	University of Sydney, Australia	1997
Roger LARSON	University of Rhode Island, USA	1998
Vijayalakshmi R. NAIR	National Institute of Oceanography, India	1999
Gregory F. MOORE	University of Hawaii, USA	2000
Sergey M. VARLAMOV	Far Eastern Hydrometeorological Research Institute, Russia	2001
Yuli D. CHASHECHKIN	Institute for Problems in Mechanics, Russia	2002 2003

Guest Professors (International) (Continued)

Shuo-zeng DOU	Institute of Oceanography, Chinese Academy of Sciences, China	2003
Labib WAGDY	Ministry Scientific Research, National Institute of Oceanography & Fisheries, Egypt	2003 2004
Robert Jr L. BROWNELL	Southwest Fisheries Science Center, National Marine Fisheries Service, USA	2004
Jorge M.O. FERNANDES	University of St Andrews, UK	2005
Myung-Soo HAN	Hanyang University, Korea	2006
Shiu-Mei LIU	National Taiwan Ocean University, Taiwan	2007
Randall W. DAVIS	Texas A&M University, USA	2007
Richard ARIMOTO	New Mexico State University, USA	2007
Richard J. BALMENT	University of Manchester, UK	2008
Manmohan SARIN	Physical Research Laboratory, India	2008
Sourendra Kumar BHATTACHARYA	Physical Research Laboratory, India	2008
Lukas RUBER	The Natural History Museum, UK	2008
Nagappa RAMAIAH	National Institute of Oceanography, India	2009
Daniele L. PINTI	Université du Québec à Montréal, Canada	2009
John Alexander DONALD	Deakin University, Australia	2009

Guest Professors (Japanese)

Yasuhiko NAITO	National Institute of Polar Research	1994 1995
Kunio RIKIISHI	Hirosaki University	1996 1999 2000
Itaru KOIZUMI	Hokkaido University	1997
Masao MINAMIGAWA	Hokkaido University	1998
Shinsuke TANABE	Ehime University	2001 2002
Masaji MATSUYAMA	Tokyo University of Marine Science and Technology	2003
Saneatsu SAITO	Japan Agency for Marine-Earth Science and Technology	2004
Naokazu AHAGON	Hokkaido University	2005
Mitsuhiro TORATANI	Tokai University	2006
Hiroaki SAITO	Tohoku National Fisheries Research Institute, Fisheries Research Agency	2007
Michio KAWAMIYA	Japan Agency for Marine-Earth Science and Technology	2008
So KAWAGUCHI	Australian Antarctic Division	2009

Examples of international projects and organizations in which CIC/ORI has been involved

- Integrated Ocean Drilling Program (IODP)
- Global Ocean Observing System (GOOS)
- International Study of the Marine Biogeochemical Cycles of Trace Elements and Their Isotopes (GEOTRACES)
- Census of Marine Zooplankton (CMarZ)
- Integrated Geosphere-Biosphere Programme (IGBP)
 - Surface Ocean-Lower Atmosphere Study (SOLAS)
 - Integrated Marine Geochemistry and Ecosystem Research (IMBER)
 - Global Ocean Ecosystem Dynamics (GLOBEC)
- Intergovernmental Oceanographic Commission (IOC)/UNESCO
 - IOC West Pacific (WESTPAC)
- International Oceanographic Data and Information Exchange (IODE)
- Ocean Observations Panel for Climate (OOPC)
- JSPS Multilateral Core University Program "Coastal Marine Science" (CMS)

Academic Exchange Agreements

University/Institution	Country	Year of Conclusion
Korea Inter-University Institute of Ocean Science, Pukyong National University	Republic of Korea	August 23, 2000
National Institute of Oceanography	India	October 5, 2006
School of Biology at University of St. Andrews	UK	March 12, 2007
Lamont-Doherty Observatory, Earth Institute, Columbia University	USA	May 6, 2009
Muséum national d' Histoire naturelle	France	May 16, 2009
Universiti Putra Malaysia	Malaysia	May 25, 2009
National Oceanographic Centre	UK	August 11, 2009

Number of JSPS postdoctoral fellows

	Year 2005	Year 2006	Year 2007	Year 2008	Year 2009	Total
Asia	2	3	2	3	3	13
North America	1	1	1	1	1	5
South America	0	0	0	0	0	0
Europe	2	2	1	2	1	8
Oceania	0	0	0	1	1	2
Middle East	0	0	0	0	0	0
Africa	0	0	0	0	0	0
Total	5	6	4	7	6	28

Number of international students

	Year 2005	Year 2006	Year 2007	Year 2008	Year 2009	Total
Asia	10	9	5	8	9	41
North America	0	0	0	1	1	2
South America	0	0	1	1	1	3
Europe	2	2	2	2	1	9
Oceania	0	0	0	0	0	0
Middle East	0	1	0	0	1	2
Africa	1	1	2	2	3	9
Total	13	13	10	14	16	66

Number of ORI staff who went abroad

		Year 2005	Year 2006	Year 2007	Year 2008	Year 2009	Total
Types of Fund	Total	143	143	133	142	151	712
	MEXT	47	52	37	47	68	251
	JSPS	5	26	30	23	27	111
	ORI	34	34	30	29	23	150
	Other	57	31	36	43	33	200
Destination	Asia	39	70	46	52	66	273
	North America	53	25	51	46	33	208
	South America	2	6	2	3	2	15
	Europe	37	28	23	29	37	154
	Oceania	8	10	8	10	12	48
	Middle East	0	0	0	1	0	1
	Africa	4	4	3	1	1	13

Number of invited foreign researchers

		Year 2005	Year 2006	Year 2007	Year 2008	Year 2009	Total
Types of Fund	Total	122	59	28	55	32	296
	MEXT	6	3	3	3	6	21
	JSPS	90	28	17	24	11	170
	ORI	8	7	3	10	7	35
	Other	18	21	5	18	8	70
Destination	Asia	87	33	21	34	22	197
	North America	22	4	7	4	4	41
	South America	0	1	0	0	0	1
	Europe	9	20	0	15	4	48
	Oceania	3	0	0	2	2	7
	Middle East	1	0	0	0	0	1
	Africa	0	1	0	0	0	1

--- **CIC STAFF** ---

Director of CIC	Mitsuo UEMATSU
Research Cooperation Division	Mitsuo UEMATSU
	Jin-Oh PARK
Research Planning Division	Nobuyuki MIYAZAKI
	Koji INOUE

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