



CIC NEWSLETTER

*Center for International Collaboration
Atmosphere and Ocean Research Institute
The University of Tokyo*

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Participants of NRCT-JSPS Joint International Seminar, November 2013

Activities of JSPS-Asian CORE Program

Shuhe Nishida

Professor, Center for International Collaboration

1. NRCT-JSPS Joint International Seminar on Coastal Ecosystems in Southeast Asia



Oral session



Poster session

As a major activity of the Asian CORE Program (ACORE) of the Japan Society for the Promotion of Science (JSPS), “NRCT (National Research Council of Thailand) -JSPS Joint International Seminar on Coastal Ecosystems in Southeast Asia” was held on November 15-17, 2013 at Khum Phucome Hotel, Chiang Mai, Thailand, with a total of 134 participants and 113 presentations (71 oral presentations, 42 posters). The Seminar started with an opening address by Assoc. Prof. Thaithaworn Lirdwitayaprasit (Chairperson, Chulalongkorn University) and welcome addresses by Prof. Somsak Panha (Chulalongkorn University), Prof. Kuniaki Yamashita (Director, JSPS Bangkok Office), Prof. Shuhe Nishida (Coordinator, ACORE), and Ms. Pimpun Pongpidjayamaad (National Research Council

of Thailand: NRCT), followed by a keynote speech by Dr. Somkiat Khokiattiwong (Chairperson, IOC/WESTPAC). Several presentations in the scientific sessions were highly impressive and generated intense discussions among the participants, such as those on the flushing time scale of fresh water discharge from Chao Phraya River of Thailand, new records of octocorals in Malaysia, potentials of seaweeds and seagrasses for human use, molecular phylogeography of zooplankton in Southeast Asia, and advantages of rice-fishes as the bioindicators of environmental conditions. A special session was held on the third day on integrative research on seagrass ecosystems with constructive discussions on the results to date and future strategies.



Khum Phucome Hotel, Chiang Mai

2. Integrative Ecosystem Research on Seagrass Ecosystems in Malaysia

A field research was conducted in Marambong Shoal, Johor, Malaysia, during May 25–30, 2013, with the Fisheries Research Institute (FRI), Department of Fisheries (DoF), as the research base. This research is entitled “Integrative Ecosystem Research on Seagrass Habitats in Southeast Asia (IER),” and was conducted under the leadership and guidance of the Asian CORE Program of the JSPS in collaboration with the Malaysian research groups, led by Prof. Fatimah M.D. Yusoff (Universiti Putra Malaysia, UPM) and supported by the Ministry of Higher Education (MOHE), and the Japanese research groups, led by Prof. Shuhei Nishida (Atmosphere and Ocean Research Institute, University of Tokyo) and supported by JSPS. The IER aims at assessing the current status of the seagrass ecosystem in Southeast Asia, an ecosystem of considerable importance for its fisheries resources, biodiversity, economy, as well as the life of local people, but which appears to have suffered from serious impacts of human activities and climate change.

The research being conducted presently in Mearmbong Shoal, which is among the largest seagrass beds in Malaysia, aims at examining the biodiversity of seagrasses and the communities associated with seagrass-beds. Another specific topic this research investigates is the structure and function of the food

webs in the seagrass ecosystems of Merambong Shoal in relation to the dynamics of anthropogenic pollutants. To this end, research groups from different universities in Malaysia (UPM, U Sains M, U Kebangsaan M, U Teknologi M) and Japan (U Tokyo, Kiotasato U, Kobe College, Tokyo U Agr. Tech), specializing in different biotic groups (plankton, fish, benthos, macrophytes) and disciplines (satellite imagery, biodiversity, pollution, bioactive substances, social economy), worked together on this integrative research. Clear weather conditions during the sampling days allowed the research team to collect necessary samples, including those from fishes, benthos, sediments, seawater, and plankton, as well as environmental parameters (e.g. temperature, salinity, dissolved oxygen), for the analysis.

We sincerely thank the director and staff of FRI, DoF, for providing us with their excellent facilities and laboratory equipment, without which the present research would not have been possible.



Briefing at University Putra Malaysia



Sample processing in laboratory



Field sampling in a seagrass area of Merambong, Johor

3. BUU-JSPS Joint International Workshop “Classification and Culture of Marine Fauna, Jellyfish and Other Gelatinous Animals in Thailand”

The BUU-JSPS Joint International Workshop “Classification and Culture of Marine Fauna, Jellyfish and Other Gelatinous Animals in Thailand” was held at the Institute of Marine Science, Burapha University (BUU), Thailand, during July 1–4, 2013. This workshop was co-sponsored by BUU, Enoshima Aquarium, and Asian CORE Program (JSPS) and aimed at enhancing the outreach activities of the aquaria in Thailand and collaboration in research and education between Thailand and Japan. A total of 30 scientists, technical staffs and students from universities, aquaria, and research institutes of Thailand participated in the workshop.

The first day was devoted to field sampling of jellyfishes in nearby coastal waters. Following the opening ceremony at the Institute of Marine Science,



several lectures were given and laboratory practices were discussed on subsequent days: a lecture and the laboratory practices on “morphology and taxonomy of jellyfishes” on Day-2, a lecture on “biology of jellyfishes and symbiosis with other organisms” and the laboratory practices on jellyfish culture on Day-3, and a lecture on jellyfish exhibition in aquaria and the laboratory practices on jellyfish culture on Day-4.

In the closing session, it was emphasized that this workshop was highly efficient for the enhancement of jellyfish research and outreach activities of aquaria in Thailand and for future collaboration between Thailand and Japan.



Laboratory practice of culture technique



Scenery from lecture



Jellyfish sampling in the Gulf of Thailand

4. International Training Workshop on Marine Zooplankton Ecology and Identification



The “International Training Workshop on Marine Zooplankton Ecology and Identification” was held at the Department of Biological Sciences, Iligan Institute of Technology of the Mindanao State University, the Philippines, during August 26–28, 2013. As an outreach activity of the Asian CORE Program of the JSPS, this workshop aimed at enhancing the capacity of the Philippines in the identification of marine zooplankton and the aspects of their ecology. A total of 27 researchers, including university teachers, graduate students, and researchers of other institutions from different regions of the Philippines, participated in the workshop.

On the first day, following the opening session with welcome addresses and introduction to the workshop, lectures on the marine biodiversity in Southeast Asia, importance of zooplankton in marine ecosystems, ecology and taxonomy of major



zooplankton groups, and methodology of zooplankton sampling were presented. These lectures, open to everyone in the campus, attracted additional participation from 70 campus students and university staff members. In the afternoon, a field trip to a nearby coastal area was organized to practice zooplankton sampling.

The second and third days were devoted to laboratory practices of sorting and identification of zooplankton groups (copepods, mysids, and gelatinous plankton), which were conducted in parallel by three participating groups, each with a distinct zooplankton group in separate rooms.

In the closing session late afternoon on the third day, it was concluded that this workshop was highly successful in enhancing zooplankton research in the Philippines and a good starting point for our future collaboration, both in research and education.



Laboratory practice of zooplankton identification

AORI members visited WHOI as a MoU partner

Mitsuo Uematsu

Professor and Director, Center for International Collaboration

As one of the partners of Memorandum of Understanding with AORI, Prof. Mitsuo Uematsu and two staff members visited Woods Hole Oceanographic Institute (WHOI) in Woods Hole, located at the edge of the Cape Cod in Massachusetts, U.S.A on May 8-9, 2013. These two staff members were Ms. Naoko Hara, who is in charge of international collaborative activities and international students and scientists, and Ms. Kaoru Saeki, who manages editorial work for publishing AORI Newsletter “Ocean Breeze” along with other publications.

As a part of our cooperation with WHOI, Prof. Uematsu and Dr. Ken Bessler co-organized the Morss Colloquium “Fukushima and the Ocean” which was held at WHOI for the public on the evening of May 9. Prof. Jota Kanda, Tokyo University of Marine Science and Technology and Prof. Hiroyuki Matsuda, Yokohama National University were also the invited speakers from Japan. During the panel discussion, which was broadcasted live through Internet, audience had a lively question and answer session with the seven panelists. A special issue of the booklet OCEANUS, “Fukushima and the Ocean,” was distributed to each of over 200 participants.

The day before the colloquium, we met Dr. Susan K. Avery, President and Director of WHOI, and visited many facilities to learn WHOI’s expertise on administrative systems, international collaborations, public relations, outreaching activities, etc. in addition to the academic exchange of scientists. We congratulated the organizers for the success of the Colloquium in keeping the deep and vivid relationship between AORI and WHOI.



All speakers for the Morss Colloquium on the front of Redfield Auditorium at WHOI (courtesy of WHOI)



Panel discussion for the Morss Colloquium



Meeting with Dr. Susan K. Avery, President and Director of WHOI Prof. Uematsu(center)and Prof. Matsuda(right)

Transition from IGBP to Future Earth in Japan

Mitsuo Uematsu

Professor and Director, Center for International Collaboration

The 28th meeting of the Scientific Committee (SC) of the International Geosphere-Biosphere Programme (IGBP) was held in Bern, Switzerland from April 17-19, 2013. Dr. Mitsuo Uematsu, Director of Center for International Collaboration attended the meeting as an IGBP Science Committee member. The SC proposed that the activities of IGBP be synthesized in three parts through: (a) a high impact paper exploring the concept of Anthropocene in collaboration with IHDP, (b) an overview paper mapping the development of Earth System science throughout the IGBP, and (c) a series of core projects syntheses and future vision articles on the road map of evolution of science to address sustainability issues. The SC also decided to close IGBP and its secretariat at the end of 2015.

Dr. James Syvitski, Chair of IGBP, proposed working with the American Geophysical Union (AGU) to celebrate the success of IGBP in San Francisco at the 2015 AGU meeting in December through a number of sessions, Town Halls, prize, etc., although the 2015 European Geophysical Union meeting in April or May was also suggested as the venue for the celebration meet. Future Earth has been launched to establish a top-down “mega theme” working with a cross natural science, humanities and social sciences together as an integration of IGBP, DIVERSITAS, and IHDP.

“Living with the Sea: Oceans, Coasts and Blue societies” has been preparing in the Future Earth research framework. “Blue societies” that live in greater harmony with oceans and to include new protections for marine ecosystems within international treaties.

The Scientific Committee on Oceanic Research (SCOR), which co-sponsors IMBER and SOLAS, stressed its desire to continue supporting bottom-up research projects on current issues in ocean sciences. Although SCOR believes that Future Earth may be valid for global change synthesis, it will be a challenge to find common ground with SCOR, which is based on bottom-up principles. The core projects co-sponsored by SCOR will need to make a decision about joining Future Earth to which SCOR will respond.

In the ocean community of Japan, we are strongly requested to exchange information for transition of the core projects related to marine sciences, such as AIMES, IMBER, LOICZ, PAGES, and SOLAS, to Future Earth, which is focused on research on global sustainability (Fig. A). The committee for the promotion of Future Earth in Japan is chaired by Dr. Tetsuzo Yasunari and it was established under the Science Council of Japan in July 2013. Dr. Toshio Yamagata (JAMSTEC) and Dr. Uematsu were appointed as committee members from the ocean community. We believe experts from social sciences (e.g. marine policy, marine economics), and collaboration with IOC/WESTPAC community are needed for promotion of Future Ocean under Future Earth in Japan, in Asia-Pacific region and internationally. The 2nd Future Earth in Asia Workshop (FE WS) will be held in Kyoto on February 3-4, 2014.

Detailed activities of Global Environmental Change (GEC) and Future Earth in Japan are available at http://www.chikyu.ac.jp/gec-jp/jp/future_earth/index.html

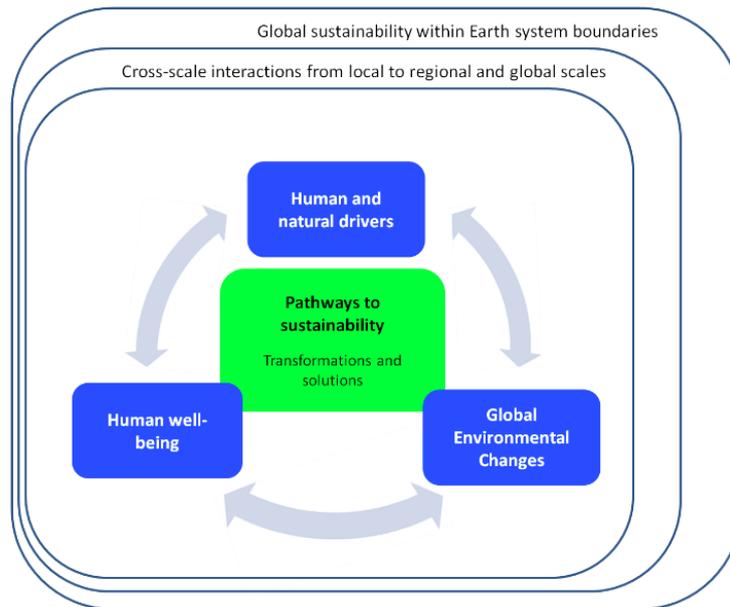


Fig.A The conceptual framework illustrates the fundamental interconnections between natural and human drivers of change, the resulting environmental changes, and their implications for human well-being. These interactions take place across a range of time and spatial scales, and are bounded by the limits of what the Earth system can provide. It emphasizes the challenge of understanding and exploring avenues for human development within the boundaries of the Earth system. This fundamental, holistic understanding is the basis for advancing transformative pathways and solutions for global sustainability.

The 27th Session of the IOC Assembly

Yutaka Michida

Professor, Center for International Collaboration

From June 26 through July 5, 2013, the 27th Assembly of the Intergovernmental Oceanographic Commission (IOC-XXVII) was held at the UNESCO headquarters in Paris. Prof. Mitsuo Uematsu, Director of the Center for International Collaboration of AORI (CIC), participated as the head of the Japanese delegation. Prof. Yutaka Michida and Associate Prof. Koji Inoue also participated in the meeting as members of the delegation.

The session adopted various resolutions and decisions to prioritize the programs even as a 22% cut in IOC’s budget has adversely affected implementation



Prof. Michida, leading the discussion under the agenda item “Tsunami” at the 27th IOC Assembly

of several of its programs. The decisions include those related to the medium-term strategy of the IOC and the future of the Commission, required actions for tsunami and coastal hazards warning systems, regional subsidiary bodies such as WESTPAC, and other important policy issues.

The Japanese delegation actively contributed to

discussions during the whole session. In particular, Prof. Michida, a member of the Japanese delegation and one of the vice-chairs of the IOC, led the discussion on the agenda of tsunami-related activities as the Chairperson of the Working Group on Tsunamis and Other Hazards related to Sea Level Warning and Mitigation Systems (TOWS-WG).

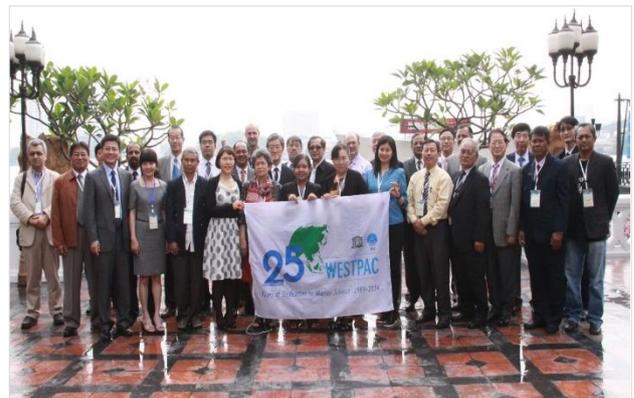
Indo-Pacific Ocean Forum on “Charting the Future of Sustained Ocean Observations and Services”

Yutaka Michida

Professor, Center for International Collaboration

From November 26 through 28, 2013, the Indo-Pacific Forum on “Charting the Future of Sustained Ocean Observations and Services” was held in Bangkok, Thailand, as one of the commemorative activities for the 25th anniversary of the IOC Sub-Commission for the Western Pacific (WESTPAC). The Forum was convened by Prof. Yutaka Michida, the vice-chair of the IOC for Asia-Pacific region, Dr. Somkiat Khokiattiwong, the Chairperson of WESTPAC, and Dr. Sang-Kyung Byun, the Chair of the IOC. The objectives of the forum included a) taking stock of major achievements of the IOC Sub-Commission for WESTPAC over the past 25 years in ocean observations and services, b) exchanging information on the current status of ocean observation systems among Member States in the Asia-Pacific Region (IOC Group IV), and c) identifying future opportunities for collaboration among Member States in the region to address challenges in ocean observations and services.

35 experts from 12 countries in the region and some invited experts from the IOC programs participated in the forum and engaged in an intensive discussion on the future direction of ocean observations and services. Dr. Masao Fukasawa of Japan Agency for



Participants of Indo-Pacific Forum on ocean observations and services

Marine-Earth Science and Technology (JAMSTEC), Prof. Mitsuo Uematsu, and Prof. Keisuke Taira also joined as the representatives from Japan. Prof. Taira, in particular, made invaluable contribution to the discussion based on his experience as the ex-Chair of WESTPAC and as the head of the Japanese delegation to the IOC.

The recommendations on the regional initiatives towards sustained ocean observations adopted at the Forum will be submitted to the next Session of IOC Executive Council in June 2014.

Prediction of the response of reef calcifiers to the future ocean acidification based on precisely-controlled culture experiments

Hodaka Kawahata

Professor, Department of Ocean Floor Geoscience

Recently, anthropogenic activities including emission of large amounts of CO₂ have significantly affected the Earth's surface environment and climate, attracting investigations of environmental and climatic change all over the world. Rising CO₂ concentrations in the atmosphere will cause acidification of the oceans. "Ocean acidification" describes the process of decreasing pH in the oceans, a process that has already started and will continue to decrease pH in surface ocean waters according to current studies and future projections. Incidentally, ocean acidification has become the biggest threat to calcifying marine organisms in recent years. In fact, Earth surface environment had experienced severe ocean acidification during the transition from Paleocene to Eocene (PE) epochs some 56 million years ago, which might have resulted in the most dramatic extinction episode of the past hundred million years, wiping of 35-50% species of cosmopolitan benthic foraminifera from the face of the earth. For the Intergovernmental Panel on Climate Change (IPCC) A2 scenario of increase in atmospheric pCO₂ to about 560–1000 ppm by the end of 21st century, seawater pH will decrease further from 8.08 to 7.93 (at 560 μatm of pCO₂) or 7.71 (at 1000 μatm of pCO₂).

Earlier studies have reported that the calcification rate of calcareous marine organisms (e.g., corals, foraminifers, coccolithophores, pteropods, mussels, and oysters) changes in response to lowering pH levels, even in waters oversaturated with respect to calcite. In general, negative responses to ocean acidification have been reported except for corals and coccolithophores, although knowledge about responses of reef calcifiers is quite limited. We conducted a culture experiment on these species using a high pCO₂ control system to

evaluate the effects of ocean acidification on foraminiferal calcification in possible near-future pCO₂ conditions (Experiment 1). Further, we cultured these foraminifers in seawater having varying bicarbonate ion concentration but a constant carbonate ion concentration in order to identify the most influential carbonate species involved in calcification of these species (Experiment 2).

A series of culture experiments on two groups of algal symbiont-bearing, reef-dwelling foraminifers, *Amphisorus kudakajimensis* and *A. hemprichii*, which are imperforate species, and *Calcarina gaudichaudii*, a perforate species, were conducted in acidified seawater. Two opposite responses were observed in Experiment 1 (Kuroyanagi et al., 2009; Fujita et al., 2011). *A. kudakajimensis* demonstrated that their growth rate, measured in shell diameter, shell weight, and the number of chambers added, decreased with decreasing pH. This negative response to ocean acidification is often observed in many calcifiers. In contrast, calcification of *Calcarina gaudichaudii* generally increased with increase in pCO₂. Experiment 2 showed that calcification in *A. hemprichii*, a species closely related to *A. kudakajimensis*, and *C. gaudichaudii* was not significantly different in presence of different bicarbonate concentrations. This led us to conclude that carbonate ion and CO₂ are the most important carbonate species controlling the growth of *Amphisorus* and *Calcarina*, respectively (Hikami et al., 2011). This difference may be attributed to different sensitivities of the calcifiers to these carbonate species, which could be due to their different symbiotic algae. This also suggests that ocean acidification will drastically modify the community of calcifiers in future.

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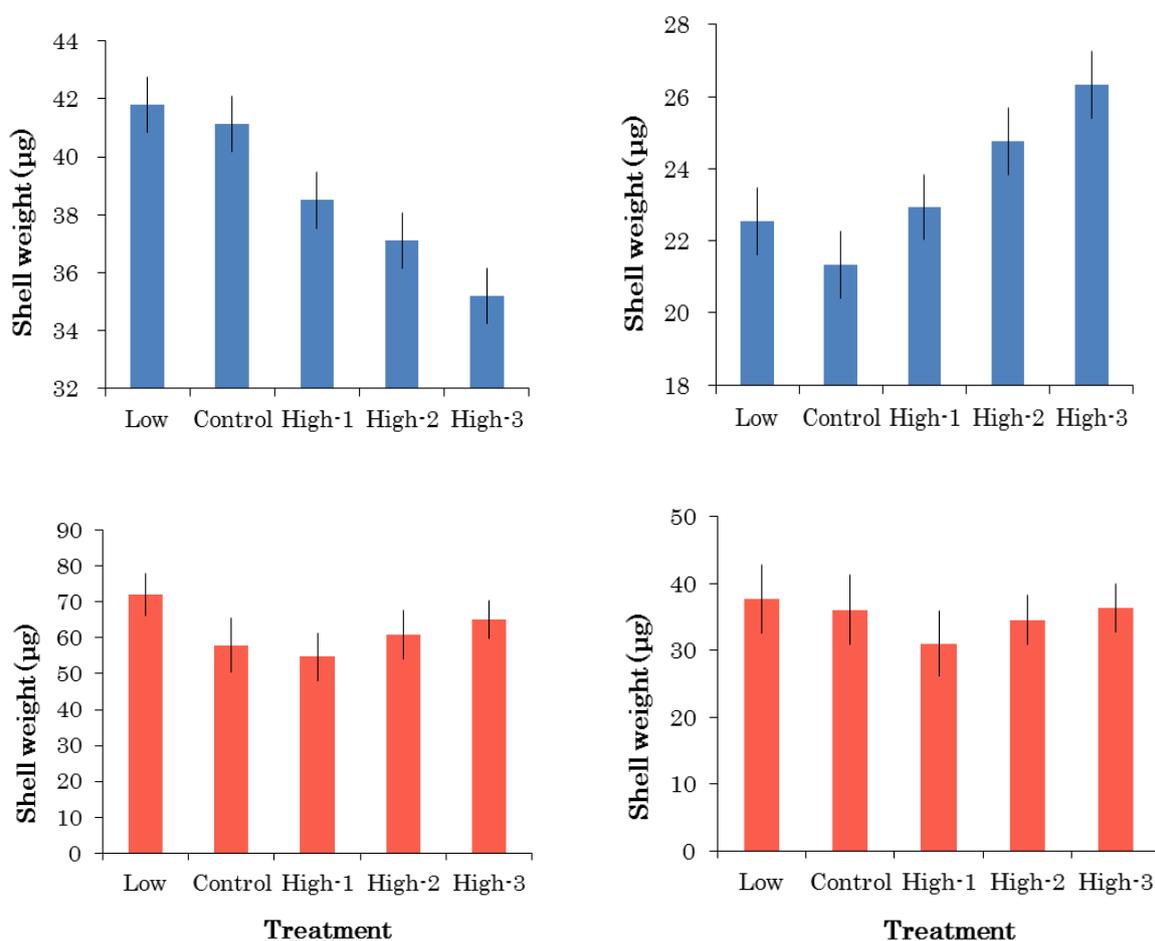


Fig.1 Averaged shell weights of a) *A. kudakajimensis* and b) *C. gaudichaudii* after Ocean Acidification experiment with five different $p\text{CO}_2$ conditions (Low, High 1, High 2 and High 3 = $p\text{CO}_2$ of 245, 375, 588, 763, 907 μatm and pH of 8.232, 8.085, 7.924, 7.826 and 7.761, respectively) and c) *A. hemprichii*, a species closely related to *A. kudakajimensis* and d) *C. gaudichaudii* after Constant Carbonate experiment (217 $\mu\text{mol/kg}$) (Low, High 1, High 2 and High 3 = $p\text{CO}_2$ of 354, 398, 448, 486 and 511 μatm and pH of 8.081, 8.057, 8.031, 8.014 and 8.003, respectively)

The 4th International Symposium on *Oryzias* Fish

Koji Inoue

Associate Professor,

Department of Marine Bioscience and Center for International Collaboration



The speakers and staff of the symposium



Lake Towuti, a habitat of some endemic *Oryzias* species

Medaka, *Oryzias latipes*, is a small fish that is familiar to the Japanese. However, it is not known well that it has more than 20 related species of the same genus and all of the related species are distributed in Asia. Especially, Sulawesi, one of the major islands of Indonesia, is the most famous place for scientists working on *Oryzias* fishes because almost one third of the *Oryzias* species are endemic to this island.

I have organized international symposia on *Oryzias* fishes in collaboration with scientists in Southeast Asia every two years since 2007 to offer the opportunity to exchange the scientific knowledge about these fishes and also to promote this science in Southeast Asia by utilizing the resources of *Oryzias* fishes in each country. During the last symposium at the Universiti Putra Malaysia in 2011, many participants suggested Sulawesi as the most desired venue for the next symposium. Fortunately, Professor Jamaluddin Jompa and Dr. Irma Andriani of Hasanuddin University kindly accepted to host the symposium and thus the 4th International Symposium “*Oryzias* Fish: Biodiversity and Environmental Sciences of Marine and Freshwater Fishes” was held in the university campus in Makassar on October 9-10th, 2013, with the support of Hasanuddin University and CIC, AORI.

The morning session of the first day consisted of the

opening ceremony and two plenary lectures. The first plenary lecture was on general characteristics of *Oryzias* fishes by me, and the other was on studies of karyotype evolution, osmoregulation and sex determination by Prof. Satoshi Hamaguchi, Vice President of Niigata University, Japan. Oral session was started from the afternoon of the first day and 18 papers were presented until closing ceremony in the afternoon of the second day. The topics of the presentations covered genetics, reproduction biology, ecology, and environmental sciences and I am confident that the session was quite informative for both experts of *Oryzias* fishes and local scientists and students, who were earlier not familiar with these fishes.

After the scientific session, the local organizing committee also offered an optional tour to the rivers and lakes in South Sulawesi. It was a great opportunity, especially for international participants, to visit the habitats of unique endemic species that are famous in literatures.

We would like to express our sincere thanks to local organizing committee for careful preparation for the symposium and the field trip. We expect new scientific insights and international collaboration to arise from this symposium.

Staff members of AORI contributed to the new IPCC assessment report

Masahide Kimoto

Professor, Division of Climate System Research



Participants in the Fourth Lead Author Meeting of IPCC WGI AR5 held at Hobart, Australia, January 2013

The Intergovernmental Panel on Climate Change (IPCC) is publishing its Fifth Assessment Report (AR5) in years 2013 and 2014. The Working Group I (WGI) Report of AR5, *Climate Change 2013: The Physical Science Basis*, was made available in late 2013, with 14 Chapters written by 259 lead authors, in full consideration of more than 50,000 comments from 1089 reviewers. The Summary for Policy Makers, released in September 2013, stated that “human influence on the climate system is clear,” and “limiting climate change will require substantial and sustained reductions of greenhouse gas emissions,” with more confidence than ever before based on careful reviews of more than 9,000 articles, most of which were published since the last report in 2007.

Japanese researchers have made considerable contribution to the AR5 of IPCC WGI. 10 Japanese scientists acted as lead and review authors of the report and participated in the long-series of meetings, writings, and reviews. Three staff members of AORI acted as lead authors (LAs); Associate Professor Ayako Abe-Ouchi for Chapter 5: *Information from*

Paleoclimate Archives, Professor Teruyuki Nakajima for Chapter 8: *Anthropogenic and Natural Radiative Forcing*, and Professor Masahide Kimoto for Chapter 11: *Near-term Climate Change: Projections and Predictability*.

Numerous research papers, published by AORI staffs and their collaborators, have been referenced in the report. The results of climate models, MIROC and NICAM developed by the AORI members and collaborators, have made a major contribution to enhance the credibility of the report; the MIROC series of models were among the most cited models in the international community which participated in the Coupled Model Intercomparison Project Phase 5 (CMIP5), an international project which played the central role in the attribution and projection of climate change reported in WGI AR5.

The LAs and other staff members are making efforts to help deliver the science messages of the IPCC report to the public, through media interviews, public lectures, etc.

List of Visiting Professors

Name	Country	Length of stay	Subject for study
Gang LIU	China	2012/4/14 - 2012/12/16	Research on parameterization of atmospheric boundary-layer in weather and climate models
Tezer M. ESAT	Australia	2012/8/2 - 2012/9/27	Trace element measurements and Uranium series dating on carbonate samples using HR-SF-ICPMS
Heinz BLATTER	Switzerland	2012/9/21 - 2013/2/20	Improvement of ice-sheel/ice-shelf model and the process studies on the interaction of climate and ice sheet/ice shelf
Michael DAGG	U.S.A.	2012/10/5 - 2012/12/5	Review of Calanus and Neocalanus biology
Mulyadi	Indonesia	2013/1/15 - 2013/2/14	Taxonomy and zoogeography of marine copepods in Southeast Asia
Ailsa Jane HALL	UK	2013/2/1 - 2013/2/28	Physiology of environmental adaptation in seals using biologging technology

* Visiting professors' reports of Division of Climate System Research are included in the CCSR NEWS.



New research vessel 'Shinsei-maru' in Otsuchi Bay

Visiting Professors' Reports

Michael DAGG

Professor (now retired)

*Louisiana Universities Marine Consortium
Chauvin, Louisiana, USA*



Over my career as a Biological Oceanographer, I have visited Japan many times. This last one was the crown for me. It was a great pleasure and honor for me to be a Visiting Professor at AORI for three months, from October 6 to December 5, 2012. I am greatly appreciative of the opportunities I had to work with my host Professor Atsushi Tsuda, for the support and warm appreciation I received from scientists of the International Affairs Section, and for my opportunities to visit colleagues at other marine laboratories in Japan.

The focus of my time at AORI was collaborating in the preparation of a review paper being authored by Hiroaki Saito, Atsushi Tsuda, and me, titled "Biology and Ecology of *Neocalanus* spp. in the Subarctic Pacific Ocean." Our careers as oceanographers have led us in many directions but each of us has always had a love for the *Neocalanus* copepods of the SPO. These three species of zooplankton are by far the largest

biomass in the SPO and play key roles in food webs and carbon cycling over the entire region. Our work on these important zooplankton has brought us together time and time again over many years.

However, in addition to working on the review paper, my activities in Japan were quite varied, and I will list some of them. I attended the annual meeting of the North Pacific Marine Science Organization (PICES) in Hiroshima. At the time, Professor Tsuda was the Chairman and I was the Vice Chairman of the Biological Oceanography Committee of PICES and we sponsored a special session that included many excellent papers from Japanese scientists, including two from Professor Tsuda's laboratory. I also gave a public lecture titled "The State of Marine Ecosystems in the North Pacific, with a Focus of the Ocean Regions near Japan", at a special meeting for the public sponsored by the Fisheries Agency of Japan. This was a new experience for me, and a new outreach activity for PICES. After the PICES meeting, I travelled further south to visit the laboratory of Dr. Toru Kobari at Kagoshima University where I enjoyed sightseeing on Yakushima Island and Sakurajima Island. At his laboratory, I gave a lecture on my research and discussed how Oceanography and Fisheries research is funded in the USA compared to Japan. Also, I had discussions with Dr. Kobari's graduate students. I then returned to AORI.

Next I visited the Plankton Lab of Dr. Atsushi Yamaguchi at Hokkaido University in Hakodate, where I gave a presentation on some of my work and I had some good discussions with the graduate students of Dr. Yamaguchi. I also enjoyed seeing a long-time colleague, Professor Tom Ikeda, now retired. Before returning to AORI, I travelled to the Tohoku National Fisheries Institute in Sendai to visit another long time colleague and friend, Dr. Hiroaki Saito. I gave a presentation on some of my work to a large audience of students and other scientists. Dr. Tsuda met us there and we discussed our review paper and also visited a

coastal sight that was heavily damaged from the Fukushima earthquake. It was interesting to me to compare the Japanese style of recovery to the New Orleans style (from Hurricane Katrina in 2005). After Sendai, I returned to AORI for some focused time and effort on the review paper. I also gave a presentation at AORI on some of my work, had many discussions with students in Professor Tsuda's lab, and generally enjoyed life in Kashiwanoha. My family joined me for some time during my stay: my son, about one month, my wife, about two weeks and my daughter, about one week. For all of them, it was the first time in Japan and they all had a wonderful experience, including several days in Kanazawa, and visits to Akihabara and Tokyo. We all enjoyed a dinner in Tokyo with Professor Satoru Taguchi, who I met in 1970 when I was a graduate student in the US and he was a graduate student in Japan and we sailed on a cruise from Hakodate to Seattle (I still remember it - 44 days with no sun!).

Now, the review paper is coming close to completion and it will be an excellent synthesis of the status of our knowledge of these important zooplankton. Japanese scientists have contributed most of the improved knowledge on these organisms in the past decade, and many of the scientists doing this valuable and interesting work have come from Professor Tsuda's laboratory. It is my great pleasure to have finished my active career with is visit to AORI and other parts of Japan, and to contribute to the preparation of a review article about "the most beautiful copepods."



Tezer M. ESAT

*Principal Research Scientist
Australian Nuclear Science and Technology
Organization (ANSTO) & The Australian National
University, Australia*



It has been a real pleasure and an honour to be at AORI for the last two months as a visiting researcher, at Dr. Yusuke Yokoyama's laboratory at the Department of Ocean Floor Geoscience, facilitated through the "Center for International Collaboration" and its director Prof. Mitsuo Uematsu. My collaboration with Yusuke on past climates, in particular, on sea level changes during the last ice age, has been going on for over a decade and a half and has been extremely fruitful. The latest venture we have been involved in, under the International Ocean Drilling Program's underwater fossil coral drilling expedition to the Australia's Great Barrier Reef, has produced a wealth of new and exciting results for the period as the Earth's climate was emerging from the last great ice age. Yusuke was responsible for many aspects of the expedition as the co-chief scientist. In preparation for publication, we have been going through the data which defines the timing of the 130 m, or so, of sea level rise that characterizes this period; some of it is episodic, but consist of very sharp sea level rises.

A highlight of my stay was a field trip to a limestone cave at Kyusendo in Kumamoto prefecture with a large group of students and staff. Here, we discussed the possibility of accessing calcite cave deposits of stalagmite and stalactites as they contain information on past monsoon patterns including on temperatures and precipitation. We also visited Mt. Unzen at Shimabara Peninsula which has a long history of eruptions, including Japan's largest eruption in 1792 in which about 1500 people perished and a huge tsunami raced across Ariake bay. The latest eruptions, during 1990-1995, were documented in detail and there are excellent museums and interactive displays to tell the story. Yosuke Miyairi, who knows the geology of the area, provided geochemical insights on various outcrops of volcanic rock types related to the recent and the historic eruptions. And, finally, at the annual meeting of the Japan Geochemical Society at the Hakozaki Campus of the Kyushu University at Fukuoka, I was able to meet with old acquaintances and listen to numerous presentations of current geochemical research in Japan. Among these, I was most impressed with the range of subjects and quality of the talks presented by the students.

Apart from the research activity, it has been very interesting for me to observe the structure and mode of operation of AORI of Tokyo University at Kashiwanoha. The institute that I spent most of my working time, The Australian National University (ANU), was established after the Second World War, at Australia's capital Canberra. It was made up of a number of research institutes for the express purpose of conducting advanced research in basic sciences and humanities and was originally mainly staffed by Australians returning home from the war effort in Europe and a large body of British researchers who were willing to relocate to Australia with expectations of a good working environment. There was no undergraduate teaching but research students were actively recruited by promises of very generous pay and conditions. The plan was extremely successful and ANU has produced excellent research outcomes

including several Nobel Prizes, the latest of which was awarded last year for the accelerating expansion of the universe. ANU remains to this day as the 1st ranking university in Australia. Along the way, the Research Institutes were amalgamated with a separately staffed undergraduate teaching university. However, over time, the Institute's funding has diminished with inflation and Government cuts. Currently, when many universities are adopting the "Research Institutes" approach, unfortunately ANU has decided to go in the opposite direction and remove the distinction between its research institutes and the teaching side. I believe that this is a mistake.

I do have a reason for going over this bit of Australian academic history that may relate to AORI. It concerns the model of the support services included in the original research institutes at ANU. Those of them that were based on experimental sciences and required technical equipment for their research were provided with additional service structures. Firstly each academic researcher had funding for several technical support staff. They included craftsman in electronics and instrument fabrication as well as higher qualified staff similar to research assistants. Each physical science based Institute had a "store" facility that kept frequently used materials such as metal, screws, nuts, resistors transistors etc. Or, those in the chemical sciences had a comprehensive chemical inventories including acids, bases etc. More importantly, each Institute had a well-staffed mechanical workshop with skilled craftsman in metal fabrication and instrument making and another workshop in "electronics" capable of designing and building or repairing advanced electronic equipment.

These structures still exist today. In many instances they have been instrumental in providing a significant advantage to the research work at ANU. Just to mention one that I am familiar with, the SHRIMP ion-probe which can be used to date zircons or analyse extra-terrestrial materials was designed and built at ANU and has been sold to more than a dozen overseas

universities including in Japan.

My first-hand observations here at AORI highlight the absence of such local facilities. Modern research instrumentation can be sophisticated and usually require high levels of maintenance to keep operating as well as to improve upon. If several laboratories possess the same instrument, then the ones who can adopt and improve upon the operation of theirs will have the advantage. Depending on the manufacturing company for service not only wastes time but usually does not provide satisfactory solutions.

I hope, that at some future time, the administration of AORI may be able to consider such proposals and devise a model suitable for local circumstances to bolster the already existing excellent research environment.

Ailsa Jane HALL

*Acting Director,
The Sea Mammal Research Unit,
The University of St Andrews in Scotland, UK*



It was a tremendous honour for me to be awarded a Visiting Professorship by AORI. I visited the Institute for the month of February, 2013 to continue my very fruitful collaborations with both Professor Yoshio Takei and his Physiology group in the

Department of Marine Bioscience and Associate Professor Katsufumi Sato and his Coastal Conservation group within the International Coastal Research Center.

My research at the Sea Mammal Research Unit involves understanding the physiological adaptations of various species of seal, whale and dolphin to their marine existence. This has included studies into their ability to survive in a seawater environment. This environment means they have essentially adapted terrestrial mammalian systems to thrive within an environment without freshwater, with some obvious similarities to the fish and desert mammals which Professor Takei and his group study. My visit enabled me to discuss the implications of various aspects of our research findings into the endocrine control of osmoregulation in seals with the researchers at AORI whose expertise in this field is far greater than my own.

In addition, I am interested in the physiology of fasting. Many species of seal and whale undergo extended periods of aphagia, to which they are exquisitely adapted, for example during the times in their life cycle when they migrate or moult their fur. One group of the hormones of particular interest are the glucocorticoids, particularly cortisol and cortisone, which are involved in regulating lipolysis within the adipocytes found in the extensive stores of fat in marine mammals known as blubber. They control fatty acid metabolism, adipocyte differentiation and are regulators of endocrine function within the adipose tissue. The concentrations of the glucocorticoids and their metabolites have not been measured in marine mammal blubber before so Professor Takei and his collaborator, Professor Kazuyoshi Tsutsui at Waseda University were able to assist me in extracting these steroids from some harbour seal blubber samples and to confirm the presence of cortisol, cortisone and additional corticosteroids using GC/MS during my visit.

However, because the release of these hormones is also controlled by the hypothalamic pituitary adrenal axis in response to environmental as well physiological stressors, handling the animals to collect blood samples can influence the concentration of the glucocorticoids in blood. In addition, the ability to collect blood samples from free swimming and diving seals opens up tremendous opportunities for studying both the stress hormones and the osmoregulatory hormones whilst animals are foraging or travelling. Collaboration between myself, Professor Takei, Professor Sato and the telemetry company 'Little Leonardo' has resulted in the development of a remote blood sampling device which can be deployed on a phocid seal for a short period of time and which collects a blood sample through an indwelling cannula at a predetermined time or depth, under microprocessor control. This is a very exciting development and initial samples collected from seals in the captive animal facility at the Sea Mammal Research Unit in St Andrews have been analysed for cortisol so we can compare levels in free swimming animals with those in blood samples collected when animals are restrained in nets. During my visit we were able to discuss the development of this project and potential future research objectives.

I very much enjoyed my time in Kashiwa and the opportunity the Fellowship gave me to interact with all the staff and students at the campus. I am very grateful indeed to Professors Takei and Sato and the University of Tokyo for affording me the privilege of being able to spend some time with them.



Mulyadi

*Professor, Research Center for Biology,
Indonesian Institute of Sciences (LIPI), Indonesia*



I stayed at AORI during 15 January–14 February, 2013, as a visiting researcher from the Research Center for Biology, Indonesian Institute of Sciences (LIPI). I started studying on copepod taxonomy in 1991 supervised by Profs Masaaki Murano and Takashi Ishimaru at the Tokyo University of Fisheries (now Tokyo University of Marine Science and Technology). I have specialized in the systematics and ecology of pelagic copepods, a major group of zooplankton, and have contributed to the field through researches in the Indonesian and adjacent waters. My main interest is in the order Calanoida, which has resulted in publication of two monographs and papers on re-description of previously known species and description of new species of copepods from the Indonesian waters. To my pleasure, these papers have been referred to by many workers for copepod identification. I am currently involved in revisions of the families Pontellidae, Tortanidae, and preparation of a taxonomy book on the Orders Cyclopoida, Poecillostomatoida and Harpacticoida collected in and around the Indonesian waters.

I was a project member of the Multilateral Cooperative Program of the Japan Society for the Promotion of Science (JSPS: 2001-2010) and worked

as a lecturer during a series of training courses on zooplankton diversity. In 2008-2010 we (Prof. S. Ohtsuka, Hiroshima U; Prof. S. Nishida and Dr. J. Nishikawa, AORI) had a joint research project (LIPI-JSPS) on “Biodiversity and Ecological Roles of Jellyfishes and Ctenophores in Indonesian Waters”. I am currently working as a member of an ongoing project of the Asian CORE Program of JSPS, “Establishment of Research and Education Network on Coastal Marine Science in Southeast Asia (2011-2015)”, aiming at accumulation and integration of the biodiversity information of marine zooplankton. Through our communications during the program we have realized the necessity of a particular research on

phylogeny of the genus *Tortanus* subgenus *Atortus* in the Sulawesi waters.

As a consequence, during my stay at AORI, I worked with Prof. Nishida on the species diversity of pelagic copepods in the Indonesian waters, and have illustrated and described about 25 species including 17 species that have hitherto been unknown.

I really enjoyed my stay at Kashiwa Campus and would like to thank Prof. H. Niino, the Director of AORI, and Prof. Nishida for granting me the opportunity to further my study and contribute to our collaborative researches.

CIC STAFF

Director of CIC

Prof. Mitsuo UEMATSU

International Scientific Planning

Prof. Yutaka MICHIDA

International Advanced Research

Prof. Mitsuo UEMATSU

International Research Cooperation

Prof. Shuhei NISHIDA

Assoc.Prof. Ryoichi IMASU

Assoc.Prof. Jin-Oh PARK

Assoc.Prof. Koji INOUE

**Center for International Collaboration
Atmosphere and Ocean Research Institute,
The University of Tokyo**

5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8564, Japan

Phone&Fax : +81-4-7136-6361

URL : <http://www.aori.u-tokyo.ac.jp/>