International Symposium on the Sustainability and Productivity of Coastal Resources

19 January (Wed)- 21 January (Fri)
Nagasaki University Medical School
Matsumoto Ryojun Auditorium
Bauduin Hall

Sponsored by

Nagasaki University

Nagasaki University Strategy for Fostering Young Scientists
Japan Science and Technology Agency (JST)

January 19 (Wednesday)

10:00 – 13:00 Registration

13:00 – 13:05 Welcome Address
Prof. Shigeru Katamine
(President, Nagasaki University)

13:05 – 13:30 Introduction
Yu Umezawa (Nagasaki University)

Introduction of the coastal areas (field excursion sites) & the studies on nutrient dynamics around Nagasaki

Session 1:
Nutrient Dynamics and their effects on coastal ecosystems

13:30 – 14:10 Keynote Address
Prof. Kon-Kee Liu
(National Central University /UC Davis)

Nutrient dynamics and anthropogenic forcing in the western North Pacific marginal seas

14:10 – 14:35 **Eko Siswanto** (HyARC, Nagoya University)

Remote sensing applications to elucidate environmental changes in the marginal seas and coastal regions

14:35 – 15:00 **Chin-Chang Hung** (National Taiwan Ocean University)

Biogeochemical impacts of atmospheric extreme events in the ocean

15:00 – 15:25 **Atsushi Watanabe** (Tokyo Institute of Technology)

pCO_2 distributions in the East China Sea-Japan Sea shelf estimated from climatological sea surface temperature, chlorophyll a and salinity

Coffee Break

15:45 – 16:10 **Young Baek Son**
(Korea Ocean Satellite Center, KORDI)

Marine Carbon Observation from Satellite Data

16:10 – 16:35 **Benoit Thibodeau** (AORI, the University of Tokyo)

Sedimentary nitrogen elimination in coastal environments

16:35 – 17:00 **Hannelore Waska**
(Max Planck Research Group, University of Oldenburg)

Submarine groundwater discharge: Impacts on intertidal nutrient budgets and benthic communities

Coffee Break

17:15 – 17:40 **Ryo Sugimoto** (Research Center for Marine Bioresources, Fukui Prefectural University)

Application of stable isotope analysis to the nitrogen dynamics study in a eutrophic coastal environment

17:40 – 18:05 **Anukul Buranapratheprat** (Burapha University)

Roles of Turbulence on Chlorophyll-a distribution in the Upper Gulf of Thailand

18:05 – 18:30 **Naoki Yoshie**
(Center for Marine Environmental Studies, Ehime University)

Ecosystem and nutrient dynamics in the western Seto Inland Sea, Japan

19:30 – 21:30 Dinner at restaurant

January 20 (Thursday)

8:30 – 9:00 Registration

9:00 – 9:05 Opening Address
Prof. Katsuyasu Tachibana
(Dean of Faculty of Fisheries, Nagasaki University)

Session 2:
Dynamics of biological resources in the coastal and neashore regions

9:05 – 9:45 Keynote Address **Prof. Masahiro Nakaoka**
(Field Science Center for Northern Biosphere, Hokkaido University)

Scaling up our (your?) research for better understandings of coastal ecosystem dynamics

9:45 – 10:10 **Piyalap Tuntiprapas** (Prince of Songkla University)

Spatial and Temporal Variations of Seagrasses Coverage on Swimming Crabs (Portunidae) at Koh Tha Rai khanom-Mu Ko Tha Lae Tai national park, Thailand.

10:10 – 10:35 **Greg Nishihara** (Nagasaki University)

Placing a perspective on effects of physical variables on the primary productivity of rocky shores

Coffee Break

10:50 – 11:15 **Chris Cornwell** (University of Otago)

Predicting the effects of ocean acidification on New Zealand near-shore rocky reef macroalgal communities

11:15 – 11:40 **Juntian Xu** (Xiamen University)

Positive and negative effects of CO_2-induced seawater acidification on photosynthetic performance of Ulva prolifra (chlorophyta)

11:40 – 12:05 **Awantha Dissanayake** (Nagasaki University)

Climate change impacts (ocean acidification and increased temperature) in Antarctic Krill Euphausia superba

Lunch & Picture

13:30 – 13:55 **Wei Li** (Xiamen University)

Effects of CO_2-induced seawater acidification on copepods from the coastal water of the Southern China Sea

13:55 – 14:20 **Haruko Kurihara** (University of the Ryukyus)

Ocean acidification and global warming climate change impacts on the coastal ecosystem

14:20 – 14:45 **Sung-yin Yang** (University of the Ryukyus)

Diversity and distribution of scleractinian associated Symbiodinium in the Chagos Archipelago, central Indian Ocean

Coffee Break

15:00 – 15:25 **Gen Kume** (Nagasaki University)

Spatial distribution and feeding habits of three species of larval fishes in Ariake Bay.

15:25 – 15:50 **Kristine White** (University of the Ryukyus)

Amphipods (Crustacea: Amphipoda) as bioindicators: the key to monitoring and preserving the sustainability of coastal resources?

Coffee Break

16:00 – 18:00 Workshop, Discussion, Conclusion

19:00 – 21:00 Dinner at restaurant

January 21 (Friday)

8:00 – 18:00 Excursion & Free discussion

Abstracts

Kon-Kee Liu

Institute of Hydrological and Oceanic Sciences, National Central University, Taiwan

Nutrient dynamics and anthropogenic forcing in the western North Pacific marginal seas

Commonly known as KK, I trained at UCLA as an isotope geochemist specializing in stable isotopes of nitrogen. My current research interest is in biogeochemical cycles in continental margins and their numerical modeling. After returning to Taiwan in 1981, I had opportunities to organize the Kuroshio Edge Exchange Processes (KEEP) project exploring biogeochemistry in the East China Sea and to help develop the South-East Asian Time-series Study (SEATS) in the South China Sea. Basing on my professional experiences, I advocated the significance of continental margins in global biogeochemical cycles, while serving on the Scientific Steering Committee of JGOFS and the Scientific Committee of IGBP. I am currently co-chairing the Continental Margins Task Team sponsored jointly by IMBER and LOICZ.

Abstract: The global human population has increased by 1-2% annually during the last few decades reaching a current population of about 7 billion. The marginal seas in the western North Pacific Ocean (WNPO) are bordered by some of the most densely populated coastal zones in the world. Biogeochemical cycles in these marginal seas are strongly influenced by input of anthropogenic nutrients via river runoffs, aerosol outflows and, probably, submarine ground water discharges. The biogeochemical cycles perturbed by human activities include those of the major nutrient elements, namely, N, P and Si and also the micro-nutrient elements, such as iron. The chemical speciation of nutrient elements is complicated, but we usually focus on the most common forms. Here we briefly review the macro-nutrient fluxes discharged to the East China Sea and a few other marginal seas in the WNPO from the Global NEWS estimates and provide a simple comparative assessment of the potential impacts. We then examine the issue of limiting nutrients, namely, which of the nutrient elements is the limiting one in view of the Redfield paradigm and some of the more recent observations. It will become apparent how little we understand the intricacy of nutrient dynamics in continental margins. Yet we are able to demonstrate, using numerical models based on a simple ecosystem structure, the importance of anthropogenic nutrient loading in affecting the biogeochemical system in the marginal seas. It is hopeful that the future changes in continental margins ecosystem and biogeochemistry may be predicted reliably with advanced modeling approaches based on more intricate pathways in nutrient dynamics.

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Yu Umezawa

Faculty of Fisheries, Nagasaki University

Introduction of the coastal areas (field excursion sites) & the studies on nutrient dynamics around Nagasaki

When I was undergrad student, I visited a coral reef in southwest of Japan, and I was very surprised by degradation of reef system, which suffered from bleaching and algal bloom. Then, I was engaged in clarifying nutrient dynamics at coral reefs and their effects on reef ecosystems mainly using stable isotopes techniques. I finished my PhD at Earth & Planetary Science, the University of Tokyo (in Prof. Isao Koike Lab), and continued my study at Botany department, University of Hawaii (in Prof. Celia Smith Lab). After one and a half year, I got position at Hydrology laboratory (in Prof. Makoto Taniguchi Lab) in Research Institute for Humanity and Nature (Kyoto, Japan) to learn about groundwater dynamics, which transport terrestrial materials to coastal areas, as well as river water. Two years ago, I moved to Nagasaki, and started the studies on nutrient dynamics at eutrophicated coastal areas and marginal sea (East China Sea), collaborating with many colleagues in Faculty of Fisheries, Joji Ishizaka (Nagoya University), Daoji Li (East China Normal University) and Adina Paytan (UC Santa Cruz).

Abstract: Nagasaki is located in western area in Japan, and surrounded by East China Sea (ECS), Omura Bay and Ariake Bay. Therefore, many people here rely their livelihood on fisheries, but coastal environments have been deteriorated and the catches are getting lower. It is very important to better understand nutrient dynamics, which support primary production in ocean at the bottom of marine food web structure. Today, I'd like to introduce several studies on nutrient dynamics conducted at Nagasaki University, mainly focusing my laboratory. Two research vessels (Nagasaki-maru & Kakuyo-maru) are effectively used for chemical and physical monitoring along the regular transect lines at ECS and coastal zones. At inner bay where red tide and hypoxic water mass frequently occur, several trial remediation (e.g., aeration at bottom water, withdrawal and reuse of macroalgae) have been conducted, or planned in near future. The impact of atmospheric depositions (i.e., yellow sand and anthropogenic aerosols) on marine ecosystem is another concern in Nagasaki, which is located near Asian continent, China and South Korea. Intensive monitoring and chemical analyses of aerosols and sinking particles at inner bay has recently started. We hope to develop our studies at coastal areas and ECS collaborating with active researches from Japan and Asian countries. And we hope that the participants from different field areas (i.e., marine chemist, marine physicist, marine ecologist, marine biologist, hydrologist etc.) will share and exchange the ideas for future collaboration.

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Eko Siswanto

Hydrospheric Atmospheric Research Center (HyARC), Nagoya University

Remote sensing applications to elucidate environmental changes in the marginal seas and coastal regions

After completing Doctoral degree in Nagasaki University in 2006, I was involved in the giant jellyfish monitoring project in the Seikai National Fisheries Research Institute (SNFRI) and collaborated with scientists from SNFRI and Nagasaki University, long-term surface salinity and nutrients in the northern East China Sea (ECS) has been elucidated. In 2007, in collaboration with Prof. Toshiro Saino (now at JAMSTEC) and Dr. Akihiko Morimoto, I have been awarded JSPS fellowship in Hydrospheric and Atmospheric Research Center (HyARC), Nagoya University to elucidate the ocean physical and biogeochemical responses to tropical cyclone passage using satellite, ship-base, and Argo float observations. Currently as postdoctoral fellow in HyARC (in Prof. Joji Ishizaka's Lab.), I have been involved in the research collaboration between China, Korea and Japan to develop ocean color algorithms for the Yellow and East China Seas (YECS) and also with Oita Prefectural Agriculture, Forestry and Fisheries Research Center (OAFFRC) to develop red tide detection method based on satellite ocean color data. In this symposium, to stimulate a wide discussion and possible research collaborations, I will not only emphasize the recent research activities but also introduce the past researches as well as future research activities have been planned.

Abstract: Remote sensing is an effective tool to elucidate ocean biogeochemical changes due to its high temporal and spatial observation capability. But its applicability in the coastal regions is often hampered by non-trivial amount of total suspended matter (TSM) and gelbstoff that in turn leads to difficulties on the studies such as red tide detection and spatial and temporal variations in biological production. Recent studies on the ocean biogeochemical responses to tropical cyclone passages in the ECS, for example, are also limited in the offshore region to avoid unreliable ocean color data retrieval in the shallower region due to high TSM.

Through international research collaboration (China-Korea-Japan), bio-optical and radiometric data collected over a wide region of the YECS have been shared to develop ocean color algorithms to retrieve chlorophyll-a (Chl-a), TSM, and gelbstoff absorption coefficient in the YECS region. Studies dealing with spatial and temporal biogeochemical changes (e.g., primary production, air-sea CO_2 flux, etc.) in the ECS will hopefully benefit from this research results as Chl-a, the essential biogeochemical variable can be retrieved more reliably.

Research collaboration with OAFFRC on the red tide detection in the western part of Seto Inland Sea has currently being conducted as one of the strategies to minimize fisheries damage due to algal blooms. Based on the discrimination of satellite normalized water leaving radiance retrieved during diatom bloom, dinoflagellate bloom, and other water types, a new practical method to discriminate red tide (diatom or dinoflagellate) from non-red tide waters (TSM- and/or gelbstoff-dominated waters) has been developed. This method has advantages over the previously published methods in terms of reducing red tide false detection caused by TSM and/or gelbstoff, and at once differentiating them from algal blooms.

In the near future, with the possible research collaborations, by applying aforementioned ocean color algorithms, it is challenging to elucidate the long-term biogeochemical changes in the ECS probably associated with the climatic and anthropogenic perturbations. It is also challenging to apply the above mentioned red tide detection approach in the other regions (e.g., Ariake Sea) frequently suffer from red tide outbreaks. In the near future, studies on the marginal sea/coastal environmental changes will seem likely benefit from the recently launched Korean Geostationary Ocean Color Imager (GOCI) providing high spatial (500-m) and temporal (1-hour) resolutions sufficient for coastal monitoring.

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Chin-Chang Hung

Institute of Marine Environmental Chemistry and Ecology National Taiwan Ocean University

Biogeochemical impacts of atmospheric extreme events in the ocean

I studied effects of light and nitrate levels on nitrate uptake and nitrate reductase activity in marginal seas at Old Dominion University in USA and earned my Ph.D. degree in 1999. I got my postdoctoral position at Texas A&M Univ. in 1999 and worked on particulate organic carbon (POC) flux, carbohydrates dynamic and $^{234}Th/^{238}U$ disequilibrium in the Gulf of Mexico with Peter Santschi until 2006.

I was hired as an associate professor at National Taiwan Ocean University in 2006. Currently, I am working on the effects of extreme atmospheric events such as Asian dust storms and typhoons in the East China Sea and the oligotrophic northwest Pacific Ocean. My talk will be focused on the biogeochemical impacts of atmospheric extreme events in the ocean.

Abstract: The impact of Asian dust storm on the export of POC in the low nutrient low chlorophyll (LNLC) northwest Pacific Ocean was examined between March 2007 and April 2008. Several strong northeast monsoon events (sustained wind speeds ~ 16.7 m s^{-1}, and gusts up to 19.0 m s^{-1}) accompanied by dust storms occurred during a 1-month period. The cold stormy events decreased sea surface temperature (SST) and induced strong wind-driven vertical mixing of the water column, resulting in nutrient entrainment into the mixed layer from subsurface waters. As a result, the export flux of POC ranged from 49 to 98 mg m^{-2} d^{-1}, approximately 2–3 times greater than average values in other seasons. As dry and wet deposition of nitrogen attributable to Asian dust storm events does not account for the associated increases in POC stocks in this N-limited oligotrophic oceanic region, the enhancement of POC flux must have been caused by nutrient entrainment from subsurface waters because of the high winds accompanying the dust storm events.

Besides dust storms, in 2008, typhoon Fengwong provided a unique opportunity to study the *in situ* biological responses associated with a severe storm in the southern East China Sea (SECS). After passage of the typhoon, the SST in the SECS was markedly cooler (~25.5 ^{o}C) than before typhoon passage (~28.5 ^{o}C). The POC flux 5 days after passage of the typhoon was 265±14 mg C m^{-2} d^{-1}, which was ~1.7-fold that (~160 mg C m^{-2} d^{-1}) recorded during non-typhoon conditions suggesting that typhoon events can increase biogenic carbon flux efficiency in the SECS. It is likely that phytoplankton population growth was constrained by a combination of light limitation and grazing pressure.

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Atsushi Watanabe

Graduate School of Information Science and Engineering, Tokyo Institute of Technology

pCO_2 distributions in the East China Sea-Japan Sea shelf estimated from climatological sea surface temperature, chlorophyll a and salinity

I studied carbon dynamics in coral reefs and estuaries at the University of Tokyo, and after graduating from UT in 2004, I moved to Nagoya University as a post-doc fellow under COE program and started carbon dynamics study in marginal seas such as Japan Sea, East China Sea, and Sagami Bay with Prof. Toshiro Saino, Dr. Akihiko Morimoto, and other collaborators from multiple disciplines such as physical oceanography and biology.

After 4 years in Nagoya, I moved to Tokyo Institute of Technology as an assistant professor from 2008 and have started coral reef studies again. Currently, I am concentrating my efforts in elucidating the relation between coral reef productivity (photosynthesis and calcification) and environmental variables such as water temperature, light intensity, turbidity, and nutrients concentration, hoping that with such information we can setup a reliable material cycle model to predict future status of coral reefs under various scenarios.

Abstract: Today my presentation will focus on my past study in marginal seas in which I studied seasonal changes in air-sea CO_2 exchanges and origins of water masses in the northern tip of the East China Sea. We made up an empirical algorithm between carbonate parameters (alkalinity and dissolved inorganic carbon) and environmental variables (Sea Surface Temperature (SST), Sea Surface Salinity (SSS), Chl-*a*). With the algorithm, we made surface pCO_2 climatology in the East China Sea using satellite-based Chl-a concentration and SST and ship-based SSS. Using this algorithm, climatology of monthly pCO_2 distribution was produced. I will discuss seasonal variation of air-sea exchange of CO_2 in East China Sea in my presentation.

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Young Baek Son

Korea Ocean Satellite Center (KOSC), Korea Ocean Research & Development Institute (KORDI)

Marine Carbon Observation from Satellite Data

I began Ph.D program in the department of Oceanography at Texas A&M University, USA in September, 2001 and graduated in June, 2006. I was to develop better algorithms to estimate concentrations of particulate organic carbon (POC) from ocean color obtained from SeaWiFS. During Post-Doc at NOAA (National Oceanographic and Atmospheric Administration) in Washington D.C. (Jan., 2006 - Dec., 2007), and as researcher at Nagasaki (Jan., 2008 – Mar., 2009) and Nagoya University (Apr., 2009 – Mar., 2010), I have continued to develop innovate approaches using satellite data to understand environmental conditions that affect the health of both human and the ocean. Now I worked at KOSC (Korea Ocean Satellite Center), KORDI (Apr. 2010 – present) to test Cal/Val for GOCI (Geostationary Ocean Color Imager), improve the GOCI product algorithms and develop the GOCI applications. For today's presentation, I will provide "Marine Carbon Observation from Satellite Data".

Abstract: Particulate Organic Carbon (POC) plays an important role in removing carbon from surface to deeper waters. In ocean carbon models, POC mass in surface waters is only about 10% of the dissolved organic carbon (DOC), whereas downward POC flux is 500% greater than the DOC flux. For >3 decades biomass has been estimated from chlorophyll a content, using remote sensing algorithms. Visual band remote sensing of ocean phytoplankton has been focused from the early days of the Coastal Zone Color Sensor (CZCS) on the detection of chlorophyll biomass. This was possible due to the strong absorption properties of chlorophyll. While this approach has been very fruitful form many uses, we and others have suggested that carbon biomass could be estimated more accurately by developing remote sensing proxies for POC, since POC comprise a much larger percent of total biomass (roughly 50%) than does chlorophyll (0.1-0.2%). The currency of ocean carbon models, however, is carbon and chlorophyll represents a minute fraction of the total carbon biomass of phytoplankton. Therefore, recent advances in phytoplankton remote sensing have been directly toward quantification of carbon pools such as POC, particulate organic carbon (PIC) and DOC.

Given the limited color bands available aboard satellite remote sensing platforms, there are relatively few degrees of freedom in a statistical sense, for the derivation of phytoplankton products. This limitation leads to a restriction to the amount of information which can be derived from ocean color bands (as well as strong co-variation between the derived properties). An approach using a normalized different ratio of bandwidths using five band widths rather than simple bandwidth ratios has been for POC estimates in complex waters.

To use satellite data in the study of carbon pools and fluxes, there should be a focus on : 1) use of ocean biogeochemical models to test internal consistencies which incorporate broad scale simplifications/assumptions (e.g. vertical processes, physics, climatologies of nutrients, oxygen or mixed layer depth) along with satellite data and 2) assess product accuracy, particularly in deriving integrated properties for comparison to vertical water column processes. Again, combining satellite remote sensing data with in-water observation assets like drifters and gliders holds considerable promise for producing accurate integrated water column estimates. Combining remote sensing "snapshots" of standing stocks with climatologies can be useful for obtaining flux information as well as interpreting inter-annual variability.

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Benoît Thibodeau

Atmosphere and Ocean Research Institute – The University of Tokyo

Sedimentary nitrogen elimination in coastal environments

I completed a Ph.D in environmental sciences in 2010 at the Geochemistry and Geodynamic Research Center (GEOTOP), Université du Québec à Montréal in Canada. During my graduate studies, I investigated the causes of the development of a large hypoxic zone in the St. Lawrence Estuary. One part of my research consisted in paleo- reconstruction of different parameters of the water masses, as temperature and surface productivity, in order to better understand their respective role in the recent decline of the dissolved oxygen concentration. The second part of my research aimed at quantifying the nitrogen elimination rate from the sediment to tentatively estimate the N-budget of the St. Lawrence.

I am now a JSPS postdoctoral Fellow at AORI and I work toward evaluating potential impacts of atmospheric nitrogen deposition on coral reef ecosystems located in Yaeyama Islands, Southwest, Japan, where the atmospheric inputs of reactive nitrogen are projected to increase substantially (by 30 – 50%) within the next two decades.

Today I will focus on the role of benthic N-elimination in estuary and what can be learned from our measurements in the St. Lawrence.

Abstract: Sedimentary nitrogen elimination is difficult to estimate precisely and plays a major role on nitrogen budget in coastal environmental. In the St. Lawrence estuary, we used two different approaches in order to estimate sedimentary N-elimination. The first approach was based on ultra-high precision porewater measurements carried on sediment cores. The second one used water column data, which integrate biogeochemical processes over a large spatial and temporal scale. I will present results from both approach and discuss the differences between them and what it imply for the N-budget of the St. Lawrence marine system.

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Hannelore Waska
Max Planck Research Group for Marine Geochemistry, University of Oldenburg

Submarine groundwater discharge: Impacts on intertidal nutrient budgets and benthic communities

In 2009, I completed my PhD degree at the Environmental & Marine Biogeochemistry Laboratory at the School of Earth & Environmental Sciences, Seoul National University. During my PhD studies, I investigated the effects of submarine groundwater discharge (SGD) on the nutrient budget and ecosystem of a large tidal flat along the West Coast of South Korea, on a seasonal scale. The outcomes of this project will be presented here.

Abstract: The biogeochemical and ecological impact of submarine groundwater discharge (SGD) on a large, mesotidal embayment along the Korean Yellow Sea Coast was evaluated via (1) a bay-wide radiotracer-based mass balance of SGD volumes and associated nutrient fluxes, and (2) a mesoscale comparative study of benthic microalgal and macrofaunal communities in and outside of intertidal groundwater seeps. Results show that the SGD is generally enriched with nutrients compared to seawater, therefore acting as a nutrient source to the coastal ocean. The composition of SGD strongly depends on relative contributions of tidally driven recirculated seawater and terrestrial fresh groundwater inputs, and the biogeochemical signal of SGD was evident in all seasons throughout the bay water column. Nutrient mass balances indicated a dependence of the bay primary producers on SGD-driven nutrient inputs. In intertidal groundwater seeps, microphytobenthos biomass was elevated compared to nearby dry areas, and macrofaunal distribution patterns were influenced by the seepage areas as well, indicating that SGD may create microenvironments beneficial for benthic communities of the tidal flat.

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Ryo Sugimoto
Research Center for Marine Bioresources, Fukui Prefectural University

Application of stable isotope analysis to the nitrogen dynamics study in a eutrophic coastal environment

During the PhD student at Graduate School of Agriculture, Kyoto University as a JSPS Fellow from 2005 to 2007, I focused on nutrient dynamics in a eutrophic coastal environment. After I had spent eight months as a Postdoctoral researcher at Field Science Education and Research Center, Kyoto University, I transferred to Fukui Prefectural University as an Assistant Professor (2009 - present). Recent works are to understand the mechanism of eutrophication in coastal seas and lakes and to evaluate the human impact on their ecosystems.

Today, I would like to present an application of stable isotope analysis to the nitrogen dynamics study in a eutrophic coastal environment.

Abstract: An important aspect of the nitrogen cycle in coastal environments concerns the source of the nitrogen used in primary production. The continual input of external nitrogen can determine the total capacity of a bay to produce a sustainable fish harvest within the system. Phytoplankton production in Ise Bay, which is one of the most eutrophic coastal areas in Japan, is supported by external nitrogen derived from rivers and ocean, and nitrogen regenerated within the bay. The objectives of this study are to clarify the characteristics of DIN in each source including riverine, oceanic and regenerated nitrogen, and to evaluate the contribution of each DIN source to primary production in time and space. In this study, therefore, the 3D ecosystem model including nitrogen isotopes was developed based on the precise observations as follows. First, seasonal observations for identifying endmenber values of riverine DIN were conducted in the lower part of the Kiso Rivers, which empty into the head of the bay. Second, the oceanic DIN endmenbers were determined by the seasonal observations at the bay mouth. Third, the magnitudes of isotope effects by nitrification and denitrification on $\delta^{15}N$ dynamics were estimated at the central part of Ise Bay to clarify the seasonal changes in regenerated DIN inside the bay. Finally, nitrogen dynamics in Ise Bay were elucidated by the ecosystem model. The model results indicated that phytoplankton production is mainly supported by the internal DIN cycle rather than the external DIN supply.

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Anukul Buranapratheprat

Department of Aquatic Science, Faculty of Science, Burapha University, Thailand

Roles of Turbulence on Chlorophyll-a distribution in the Upper Gulf of Thailand

Numerical modeling on water circulation and red tide dynamics has long been my interested. I have been working on such oceanographic researches with Prof. Tetsuo Yanagi at Kyushu University for about 10 years under the support of the Japan Society for the Promotion of Science (JSPS). This research persuasion drives me to achieve two doctoral degrees – one from Kyushu University in 2005 and the other from University of Victoria, Canada in 2007. The thesises regard using a numerical model name POM (Princeton Ocean Model) to investigate oceanographic phenomena. The first thesis was for the study of a conservative material transport in the Bangpakong estuary, Thailand while the second one was for phytoplankton dynamics in the upper Gulf of Thailand (UGoT).

As a lecturer and a researcher at Burapha University, I am still working on collaborative studies with Prof. Tetsuo Yanagi with regard to red tide dynamics in UGoT. Recently we found the relationship between water turbulence and chlorophyll concentration whose, in UGoT area, have not been pointed out before. What I present today focuses on roles of turbulence on chlorophyll concentration in UGoT from both modeling and field observation results.

Abstract: Although plankton bloom incidents in UGoT have been reported, no dynamic investigation of the phenomenon has been conducted. To address this need, a simple pelagic ecosystem model coupled with POM was employed to investigate seasonal variations in surface chlorophyll-a (chl-a) distributions to clarify phytoplankton dynamics in this area. Sensitivity analyses of simulated chl-a demonstrate that water stability, including wind-induced vertical currents and mixing, plays significant roles in controlling phytoplankton growth. Nutrients in the water column will not stimulate strong blooms unless upwelling develops or vertical diffusivity is low. This finding suggests an alternative aspect of the mechanism of phytoplankton bloom in this region.

Field observation in UGoT in March and August 2009 were conducted to investigate the relationship between water turbulence (K_z) and Chl-a suggested by the ecosystem model. Other water properties, including salinity, temperature, density, dissolved oxygen (DO), dissolved inorganic nitrogen (DIN) and phosphorous (DIP), and dissolved silicate (DSi), were also investigated. Proportional relationships seem to happen for Chl-a and DIP, and Chl-a and Dsi in March 2009, while reverse relationships for Chl-a and K_z resulted for both periods. Further investigations are required to clarify the occurrence mechanism of red tide in UGoT.

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Naoki Yoshie
Center for Marine Environmental Studies, Ehime University

Ecosystem and nutrient dynamics in the western Seto Inland Sea, Japan

I obtained my degrees of BSc and MSc in marine biogeochemistry using techniques of analytical instrumentation and field observation in the subarctic western North Pacific, and then went on to study mechanisms of biogeochemical cycles using ecosystem modeling technique in the PhD course of Hokkaido University. After postdoctoral position, I have developed and applied an ecosystem model to reproduce various lower trophic level marine ecosystems around Japan by collaborating with field monitoring groups of Fisheries Research Agency, Japan. From 2009, I have studied coastal ecosystem and biogeochemical cycles in the Seto Inland Sea, Japan at Ehime University as an assistant professor.

Abstract: We studied the ecosystem and nutrient dynamics in the western part of the Seto Inland Sea from the both field observation and numerical modeling. We investigated spatiotemporal variations in the group composition of phytoplankton and the nutrient concentrations in the Iyo-Nada, Hoyo strait and Bungo channel (parts of the Seto Inland Sea) with monthly field observations in 2009. From the spring to early summer, nano- and pico-phytoplankton dominated in all the three regions. From the late summer to autumn, micro-phytoplankton (diatom) was blooming in the Iyo-Nada and Hoyo strait, while distinguished bloom was not observed in the Bungo channel. This autumn diatom bloom was probably caused by nutrient supply associated with breakdown of the cold water dome. For understanding the mechanisms of the nutrient cycle and plankton dynamics, we developed a plankton functional types model eNEMURO (4Nutrient, 4Phytoplankton, 4Zooplankton, 4Detritous), which was an extend version of NEMURO [a standard lower-trophic-level marine ecosystem model of PICES (The North Pacific Science Organization)] by introducing the microbial food web and the phosphorous cycles and dividing diatoms to two compartments according to temperature dependency. eNEMURO was coupled with 5box physical models (2boxes in the Iyo-Nada, 1box in the Hoyo strait, and 2boxes in the Bungo channel). Model successfully reproduced the nutrients and phytoplankton dynamics observed in the both Iyo-Nada and Bungo channel. Difference between the ecosystems in the Iyo-Nada and Bungo channel was mainly caused by nutrient supply mechanism. Nutrients supply in the Iyo-Nada might be dominated by the horizontal transport from the Hoyo strait, on the other hands, those in the Bungo channel might be dominated by the vertical transport from the deep layer.

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Masahiro Nakaoka

Akkeshi Marine Station, Field Science Center for Northern Biosphere, Hokkaido University

Scaling up our (your?) research for better understandings of coastal ecosystem dynamics

When I was a graduate student in Ocean Research Institute, University of Tokyo, I was interested in evolutionary ecology of marine organisms, and got Ph. D by studying population dynamics and life history of marine bivalves. Since I became a research assistant in ORI, my research interest has shifted more to the dynamics of marine population and community themselves. I started studying seagrass community, which have been one of my main research objectives. Since I moved to Chiba University in 2001, I also started studying rocky intertidal community to elucidate scale-dependency in community organization. My research interests have been getting wider as I have become a director of Akkeshi Marine Station, Hokkaido University in 2008. Currently, I participate several different research projects, ranging from biodiversity at various levels, ecosystem processes and functions, and ecosystem services of coastal waters in relation to human activities. I am currently a member of steering board of Monitoring Sites 1000, a nationwide monitoring program of natural ecosystems in Japan. I am also working as a secretary-general of JaLTER (Japan Long-term Ecological Research Network), which was established in 2006 to promote broad-scale, long-term research under international, interdisciplinary cooperation for both in terrestrial and marine ecosystems.

Abstract: Biodiversity and functions of coastal ecosystems of the world are declining due to various types of human-induced stresses and disturbances such as overexploitation, eutrophication, land reclamation, introduced species expansion and global climate changes. These threats operate simultaneously over multiple spatial and temporal scales. Traditional studies that were conducted at small spatial and temporal scales revealed that processes and mechanisms governing population and community dynamics are highly context-dependent, making it very difficult to answer how marine communities and ecosystems changes in response to multiple stressors written above. To answer these questions, we need to scale up our research, i.e., conducting observation, experiments and analyses over broader and longer scales. In this presentation, I would like to discuss with audience how we can scale up our research by showing some of our case studies conducted for benthic communities in Japan and in the world. I also would like to discuss how we can collaborate toward establishment of global network for broad-scale, long-term ecological research.

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Piyalap Tuntiprapas

Spatial and Temporal Variations of Seagrasses Coverage on Swimming Crabs (Portunidae) at Koh Tha Rai khanom-Mu Ko Tha Lae Tai national park, Thailand.

Piyalap Tuntiprapas[1]+, Ekkalak Rattanachot[2], Supattra Pongparadon[2], Pemika Apichnangkool[2] and Anchana Prathep[2] *

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I graduated Msc. In Ecology (International Programme) at Prince of Songkla University, Thailand in 2010, where I have been working on the effect of seasonal variation on growth and sexual reproduction of Thalassia hemprichii (Ehrenb.) Asch. in Haad Chao Mai National Park, Trang Province, Thailand for my thesis. Currently, I am a research scientist at the Prince of Songkla University working together with Seaweed and Seagrass Research Unit. I am interested in the population dynamics of seagrass in both the Gulf of Thailand and the Andaman sea, which would provide us a great understanding on productivity and seagrass ecosystem for local livelihood and further management.

For today’s presentation, I would like to focus on the role of seagrass habitat on the swimming crabs.

Abstract: Roles of seagrass coverage on economic species, crabs, were investigated between 2 seasons (Summer VS Rainy) and 3 coverages of seagrasses (High, low and bare sand) between 2006-2010. This is a part of a study to increase the awareness of seagrass ecosystem to local community and students for conservation and sustainable uses. Crabs were collected using the collapsible baited traps for three consecutive days from three sites with differences in seagrass coverage: High seagrass coverage (50 %), Low seagrass coverage (25 %) and No seagrass coverage (0%) in May 2006 and September, 2010; 6 replications each. There were four species of crabs found namely: Thalamita crenata (Latreille, 1829), Charybdis hellerii (A. Milne-Edwards, 1867), Scylla sp., Portunus pelagicus (Linnaeus, 1758) in the high seagrass coverage in May 2006; but only 2 species were found in September 2010, T. crenata and P. pelgicus. Thalamita crenata was found in all sites, but mostly in the high seagrass coverage area (69.49 % of total crabs). In addition, there were the female crabs with eggs and small crabs found in high coverage seagrass area than in the lower seagrass coverage and bare sand ($p<0.05$), suggesting an important role of seagrass as a nursery ground. During the seagrass monitoring study, we have also noticed a new recruit of seagrasses on the nearby area once there was no disturbance occurred and local community has increased their awareness on seagrass community and ecosystem. This study emphasized the important role of seagrass in the marine ecosystem and raised awareness about seagrasses among local community and students.

~~~~ Note ~~~~

Gregory N. Nishihara
Institute for East China Sea Research, Nagasaki University

Placing a perspective on effects of physical variables on the primary productivity of rocky shores

After graduating from Kagoshima University in 2004, I left to work in the laboratory of Dr. Josef Ackerman at the University of Guelph, Canada. There we elucidated the effects of water velocity on the development of the oxygen boundary layer around photosynthesizing aquatic macrophytes. Following this work, I returned to Kagoshima University in 2007 as a JSPS fellow to examine the effects of water motion on nutrient supply to economically important species of marine algae, such as *Eucheumaserra*. Currently, I am an Assistant Professor at the Institute for East China Sea Research (Nagasaki University), where I am exploring the effects of physical variables, such as water motion and photosynthetic active radiation, on the distribution and productivity of submarine forest forming large macrophytes. These macrophytes include the *Sargassum*, *Ecklonia*, and the seagrass*Enhalusacoroides*.

Abstract: Marine algae and plants are found throughout the worlds coasts, in wide variety of hydrodynamic environments. I am using a combination of field, laboratory, and computer simulation studies to unravel the complex interactions between the three main physical environmental variables (water motion, light, and temperature) on the distribution and productivity of bed-forming large macrophytes. I hope to provide details and spur discussion regarding the importance of these variables on macrophyte ecophysiology. In particular, I hope to insight and build evidence of the importance of water motion on the ecophysiological processes. First I will discuss the effects of water motion on the photosynthesis rates of aquatic macrophytes, and how these processes affect the boundary layer. Second, I will provide details on the current state-of-knowledge regarding these processes. Finally, I will provide some details of my most recent findings on how water flow affects the transport and motion within macrophyte canopies and how they may affect their productivity.

~~~~ Note ~~~~

Chris Cornwall

Predicting the effects of ocean acidification on New Zealand near-shore rocky reef macroalgal communities

Cornwall, C.E1., Hepburn, C.D2., McGraw3, C.M., Pilditch4, C.A., Hunter, K.A3., Hurd1, C.L.

1Department of Botany, University of Otago, Dunedin, New Zealand

2Department of Marine Sciences, University of Otago, Dunedin, New Zealand

3Department of Chemistry, University of Otago, Dunedin, New Zealand

4School of Biological Sciences, Waikato University, Hamilton, New Zealand

My research focuses on processes that influence macroalgal community dynamics by focusing on specific species interactions and by examining how macroalgae respond to environmental conditions, particularly water motion and dissolved inorganic carbon concentrations (DIC). I completed an MSc in Marine Biology at Victoria University of Wellington, New Zealand in 2007. My MSc focused on how abalone interact with attached versus detrital macroalgae, and how their feeding modes were influenced by competition with other herbivore species and by water motion. I then worked as a research assistant from 2008-2010 for Ass. Prof. Catriona Hurd at the Botany Department at the University of Otago, New Zealand. This work focused on how macroalgae may respond to the effects of ocean acidification (OA), investigating how macroalgae may be able to change their use of DIC in elevated CO_2, the physiological responses of coralline algae to OA, and by examining how calcifying macroalgae and benthic invertebrates may be able to buffer the pH changes due to OA surrounding themselves. I am currently a PhD student at Otago University, examining how macroalgae may act as ecosystem engineers to modify their physical and chemical environment, both in the laboratory and in the field. Aspects of my PhD also address how the ability of macroalgae to modify their environment may influence how OA affects these communities.

Abstract: Ocean acidification (OA) is the elevation of seawater CO_2 concentrations due to increased oceanic absorption of anthropogenically produced CO_2. Temperate near-shore rocky reefs dominated by macroalgae are highly susceptible to change due to OA, because species of macroalgae differentially use dissolved inorganic carbon for both photosynthesis (CO_2 and HCO_3^-) and (for calcifiers) calcification (CO_3^{2-}). Using a series of laboratory experiments we found that OA may negatively influence coralline algae through reduced growth, abnormal calcification, and reduced photosynthetic capacity. Macroalgae that utilize HCO_3^- during photosynthesis could benefit from OA, due to increased use of energetically cheaper CO_2 under conditions simulating OA. However, macroalgae are able to influence their own pH environment, both on a small scale (0-50 mm) in the laboratory and a larger scale (1-10 m) in the field. The ability of macroalgae to alter pH through photosynthesis is largely controlled by the environmental conditions (light and water velocity) and their ability to attenuate water flow. Future research will determine how various environmental parameters interact with OA to influence coralline algal growth, physiology and chemical composition in the laboratory and the field.

~~~~ Note ~~~~

Juntian Xu

Positive and negative effects of CO_2-induced seawater acidification on photosynthetic performance of Ulva prolifra (chlorophyta)

Juntian Xu and Kunshan Gao
State Key Laboratory of Marine Environmental Science, Xiamen University, Xiamen, China

I completed my PHD degree at Marine biology Lab, Shantou University in 2008. I focused on the positive and negative effects of UV on the photosynthetic performance of macroalgae during my PHD studies. Now being a postdoctoral researcher at state key laboratory of marine environmental science, Xiamen University, I am interested in the co-effect of ocean acidification and UV radiation on the photosynthetic physiology of macroaglae.

Abstract: We carried out the CO_2/pH perturbation experiments under two different CO_2 levels (390 ppmv, LC; 1000 ppmv, HC). The high CO_2 level was obtained with a CO_2 plant incubator which automatically control the CO_2 concentration with the variation of less than 5%. Spores of *Ulva prolifra* were collected on glass slides, and grown under the CO_2 concentrations at 100 μmol photon m^{-2} s^{-1} and 20°C. Over 50 days after the germination of the spores, relative growth rate, photosynthetic O_2 evolution and photochemical and nonphotochemical quenching were measured during the growth period. Our result showed that the relative growth rate of the young sporophytes was enhanced by 18% under the HC conditions. The HC-grown individuals showed higher electron transfer rate (ETR), but lower non-photochemical quenching performance (NPQ and qN), compared to the LC-grown ones. The features of photosynthetic response to light were altered under the two CO_2 treatments. Light-saturated net photosynthesis (Pmax) and photosynthetic light use efficiency (α) were lower in the HC-grown than in the LC-grown thalli. Nevertheless, the HC-grown thalli showed higher NPQ when exposed stressful high light levels, reflecting that HC-related acidity change imposed negative impacts on the heat dissipation process. On the other hand, the HC-grown thalli showed higher photorespiration rate than the LC-grown ones, though the ratio of CO_2 to O_2 in the culture medium was higher for the former than the latter. The contents of Chl a and Chl b were down regulated, while that of carotenoid increased in the HC-grown thalli. These changes in pigmentation imply that the alga decreased its antenna size but increased its protective strategy under CO_2–induced seawater acidification. In terms of the photosynthetic inorganic carbon utilization, the HC-grown sporophytes showed higher $K_{1/2DIC}$ for photosynthesis, refecting its reduced photosynthetic affinity for HCO_3^- or/and CO_2 and down-regulated carbon concentrating mechanism (CCM).

~~~~ Note ~~~~

Awantha Dissanayake

Climate change impacts (ocean acidification and increased temperature) in Antarctic Krill Euphausia superb

Awantha Dissanayake[1], So Kawaguchi[2], Atsushi Ishimatsu[1].

1Institute for East China Sea Research, Nagasaki University, Taira-machi 1551-7, Nagasaki, Japan, 851-2213.

2Australian Antarctic Division, 203 Channel Highway, Kingston, Tasmania 7050, Australia.

Abstract: Direct consequences of climate change include increased warming of the earth's oceans, elevated oceanic CO_2 concentrations (hypercapnia) and rising acidity (ocean acidification); hypothesized to occur primarily in the Southern Ocean, as colder water absorbs CO_2 at a greater rate than warmer water. Physiological implications of ocean acidification-associated climate change (OA-CC) were evaluated in adult Antarctic krill (*Euphausia superba*) during their main growth period, as the long-term consequences to these both ecologically- and economically-important species are currently unknown. Krill conditioned to both summer and winter conditions (i.e. summer photoperiod/ food or 'dark adapted'/no food, respectively) were exposed for 21 days to hypercapnic and increased temperature regimes (1900 µatm CO_2; 4.5 ºC) relative to normocapnic controls (380 µatm CO_2; 0.5 ºC). Physiological effects included a significant deviation in acid-base balance (alkalosis), increased routine metabolic rates and ammonia excretion rates (i.e. protein catabolism) in hypercapnia-exposed krill compared to normocapnic krill, acclimated to both summer and winter conditions. Growth rates, however, demonstrated a dichotomy of effects in OA-CC exposed krill; elevated and negative daily growth rates (DGR; mm d-1) in both summer and winter-conditioned krill, respectively. Although, summer krill displayed higher growth rates, it maybe unsustainable as confirmed by a lower 'scope for growth' (energy available for growth). Present results suggest that the internal physiology of adult krill is negatively-impacted by climate change at both summer and winter stages of the seasonal cycle; the long-term direct consequences of which maybe increased energy utilisation for maintenance functions at the expense of growth.

~~~~ Note ~~~~

Wei Li

Effects of CO_2-induced seawater acidification on copepods from the coastal water of the Southern China Sea

Wei Li and Kunshan Gao

State Key Laboratory of Marine Environmental Science, Xiamen University, 361005, Xiamen, China

As a PhD student major in environment science, my studies focus on effects of ocean acidification and UV-radiation on marine planktons. I have done some works about effects of UV-radiation and ocean acidification on zooplankton from the view of behavioral, physiology and changes. In this presentation I will introduce these work I have done.

Abstract: To investigate the impacts of ongoing ocean acidification on copepods, the behavioral responses and metabolisms of *Centropages tenuiremis* collected from Xiamen Bay were studied in laboratory. It was found that it could perceive the pH change and made an advantageous selection to some extent. Furthermore, the high CO_2 (1,000 ppmv CO_2, HC) induced acidification (pH 7.83) affected it's grazing and respiration compared with those cultured with seawater aerated with air (390 ppmv CO_2, LC, pH 8.18).

To investigate effects of ocean acidification on offspring production and larval development, a benthic and easy cultured copepod *Tigriopus japonicus*, was studied under high CO_2 (1000 ppmv)-induced seawater acidification. However, the seawater acidification did not suppress the offspring production and larval development of *T. japonicus*. These preliminary results showed that *T. japonicus* could adapt to the change in seawater acidity induced by the enriched CO_2 within the tested period of weeks.

It seemed that CO_2-induced seawater acidification can stimulate the respiration of the copepod *C. tenuiremis*. This implies that the zooplankton requires additional energy to cope with the chemical stress induced by the acidification. Such additional energy cost under acidified conditions coincides with the behavioral response that the individuals tended to avoid the acidified current and to choose to stay in the normal seawater. Offspring production and development was not affected by the seawater acidification in *T. japonicus* during the period of 8 and 14 days. Further experiments are needed to examine its grazing and physiological response to increased seawater acidity over longer time span.

~~~~ Note ~~~~

Haruko Kurihara

Transdisciplinary Research Oragnization for Subtropical Island Studies,

University of the Ryukyus

Ocean acidification and global warming climate change impacts on the coastal ecosystem

Autobiography

2004 Kyoto Universty, Seto Marine Biological Laboratory

2004 assistant researcher in RITE

[Trophic structure determination of deep-sea copepods by stable isotope analysis]

2005-2008 post-doc in Nagasaki University, Institute for East China Sea Research

[Impacts of ocean acidification on marine organisms]

2009~ assistant professor in University of the Ryukyus, Transdisciplinary Research Organization for Subtropical Island Studies

[Climate change impact on the coral reef ecosystem]

Abstract: Coastal ecosystems are among the most ecologically and economically valuable place in the ocean. However, profound ramification is expected by recent global climate change on the coastal ecosystems. Impacts by the global warming have been well studied for decades, and increase of temperature is known to change the physiological performance of marine organisms, which is suggested to induce distributional shifts of population. Additionally, the increase of atmospheric CO_2 has been recognized that is acidifying the sea surface and its potential impacts to the marine is becoming one of the most imperative issues to be studied. In this presentation, I will review the observed biotic responses to the ocean acidification, and assess the potential climate change impacts on the coastal ecosystems including the East China Sea.

~~~~ Note ~~~~

Sung-Yin Yang

Scleractinian associated Symbiodinium diversity in the central Indian Ocean, with implications for the East China Sea

Sung-Yin Yang[1#], Shashank Keshavmurthy[1#], David Obura[2,3], Charles R C Sheppard[3], Shakil Visram[1,2,] Chaolun Allen Chen[1,4*]

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3School of Life Sciences, University of Warwick, Coventry CV4 7AL, UK

4ARC Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, 4810, Australia

#: co-first author *Corresponding Author

Abstract: The Chagos Archipelago, lying about 500 km south of the Maldives in the Indian Ocean, has a deservedly high conservation priority, particularly because of its fast recovery from the ocean-wide massive coral mortality following the 1998 coral bleaching event. The aims of this study were to examine *Symbiodinium* diversity and distribution associated with scleractinian corals in five atolls of the Chagos Archipelago, spread over 10,000 km ^{2}. *Symbiodinium* clade diversity in 262 samples of seven common coral species, *Acropora muricata, Isopora palifera, Pocillopora damicornis, Pocillopora verrucosa, Pocillopora eydouxi, Seriatopora hystrix,* and *Stylophora pistillata* were determined using PCR-RFLP of the large subunit ribosomal DNA (lsurDNA) and PCR-SSCP of the ribosomal internal transcribed space 1 (ITS1), PCR-DDGE of ITS2, and phylogenetic analyses. The results indicated that *Symbiodinium* clade C was the dominant symbiont in the seven coral species, with the presence of clade A in *A. muricata* and *I. palifera* in the Salomon Islands, Chagos Bank and Diego Garcia. Clade A is associated with higher tolerance to strong light. *A. muricata* and *I. palifera* had a substantial percentage (20%) of corals containing clade A or a mixture of clade A and C, suggesting a stable association between the two Acroporids and *Symbiodinium* clade A. This study reports the presence of high incidence of clade A together with clade C in the Indian Ocean that is in contrast to the previous reports from other regions of the Indian Ocean. This may be attributed to the clear waters, strong solar radiation, and seawater temperatures that average about 28 ^{o}C in Chagos. The results from this study can be applied for the baseline information of the coral-*Symbiodinium* relationship under different environmental factors in the East China Sea.

Keywords: *Symbiodinium* clade A, Chagos Archipelago, PCR-RFLP, SSCP, lsurDNA, Indian Ocean

~~~~ Note ~~~~

Gen Kume

Faculty of Fisheries, Nagasaki University

Spatial distribution and feeding habits of three species of larval fishes in Ariake Bay.

My research background is in marine and estuarine fish biology. I am keenly interested in investigating the factors that contribute to the population dynamics of fish. For my doctoral thesis, I had examined the life history and reproductive strategy of the paternal mouthbrooding cardinalfish *Apogon lineatus*. I obtained my doctoral degree from the University of Tokyo in 2002. Since then I have been working as a postdoctoral researcher at Nagasaki University, National Institute for Environmental Studies and University of Canterbury (NZ). In my postdoctoral research, I focused on the adverse effects of anthropogenic stressors on the reproduction of fish. Today, I would like to talk about the results of recent studies on the early life history of some commercially important fish species in Ariake Bay.

Abstract: In Ariake Bay, the fish belonging to the Sciaenidae and Cynoglossidae families are commercially important. However, their catches have been drastically decreasing since the 1980s. The innermost areas of Ariake Bay are the nursery grounds of my subject species—*Nibea albiflora* and *Pennahia argentata* (belonging to Sciaenidae family) and *Cynoglossus lighti* (belonging to Cynoglossidae family). Degradation of the physical and biological conditions in those areas could be the reason for reduced recruitment. My research goal was to elucidate the different aspects of their early life history, such as distribution, growth, and feeding habits and identify the causal oceanographic factors for reduced recruitment. In my presentation, I have focused on larval distribution and feeding habits.

From May to September of years 2009 and 2010, larvae were collected with a larva net (mouth diameter, 80.0 cm; mesh size, 1.0 mm) at 11 stations in the innermost areas of Ariake Bay. The gear was towed for 15 min horizontally in the middle or the bottom layers. Zooplankton samples were collected by a vertical tow of NORPAC net (mouth diameter, 45.0 cm; mesh size, 0.1 mm) from the bottom to the surface at all stations. Vertical profiles of temperature, salinity, and dissolved oxygen were recorded at each station.

The patterns of larval horizontal distribution were different between species. *P. argentata* and *C. lighti* were distributed widely in the offshore areas, whereas *N. albiflora* was found to be limited to the shallow areas, adjacent to the Rokkaku River. In July and August, the water in the study areas turned hypoxic, and this severely limited larval distribution. The gut contents of the fish were examined and compared with the composition of local zooplanktons. All 3 species were fed exclusively on copepods. Larval feeding differed in a number of aspects; differences in the taxonomic composition of the preferred prey, in particular, were apparent. During ontogeny, *N. albiflora* and *P. argentata* preferred large, but less common preys (*Pseudodiaptomus marinus* and *Temora turbinata*), whereas *C. lighti* preferred a small-sized prey (*Microsetella norvegic*a). The diet spectrums of all 3 species were relatively narrow. The expansion of hypoxic areas and changes in the zooplankton fauna of their nursery grounds over several decades may be the possible causal factors for the reduced catch of the subject species.

~~~~ Note ~~~~

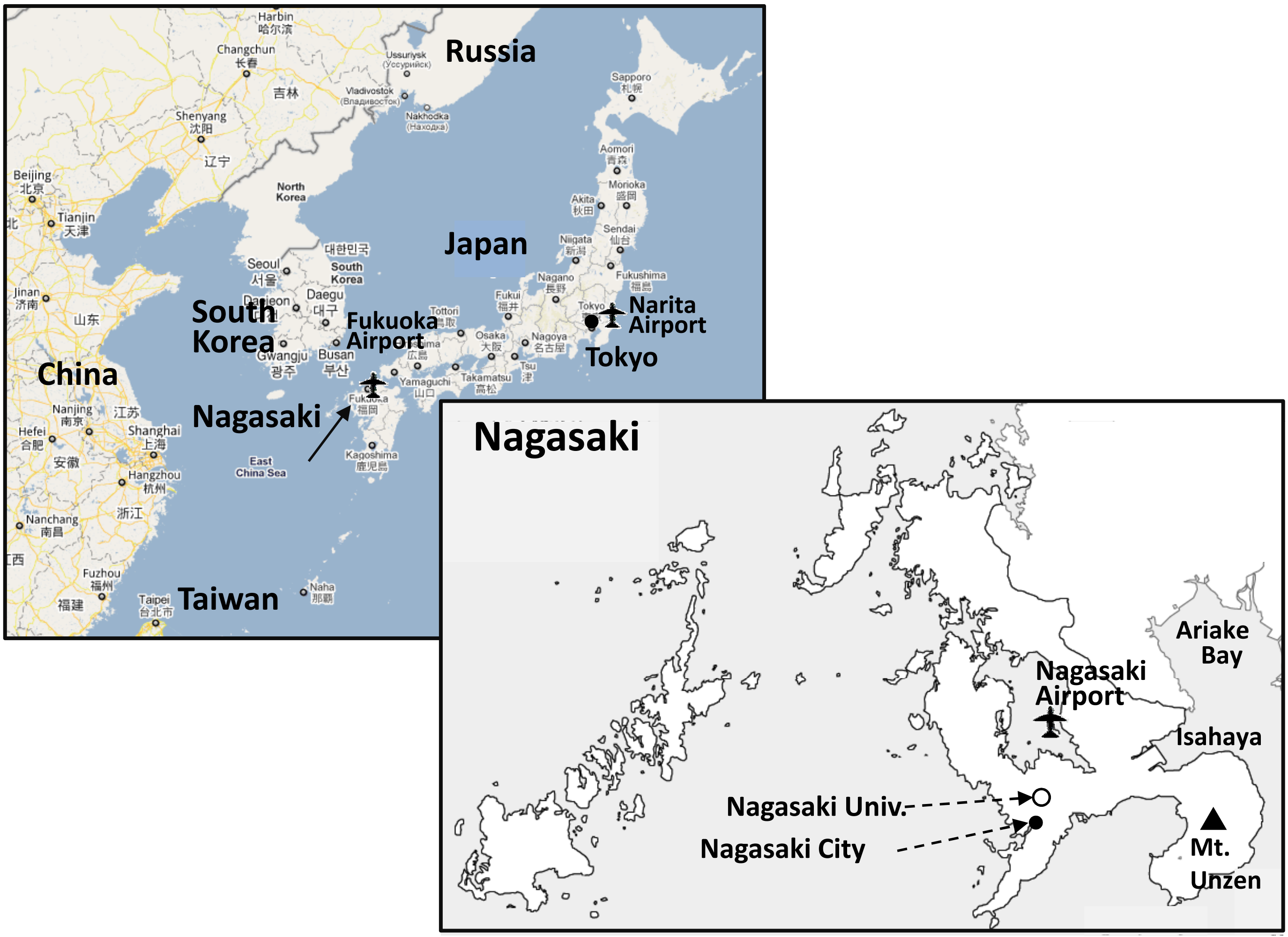
Kristine N. White
University of the Ryukyus

Amphipods (Crustacea: Amphipoda) as bioindicators: the key to monitoring

Abstract: Increased anthropogenic effects threaten marine ecosystems and their component species. Small, cryptic crustaceans that exhibit direct development, limited dispersal, and high levels of endemism are especially sensitive to these stressors. Amphipods have long been considered sensitive environmental indicators due to their ecological importance, abundance, and sensitivity to toxicants and pollutants. To date, the use of amphipods as bioindicators is constrained to regions where comprehensive taxonomic and natural history studies have been undertaken. Documentation of the natural variability and biodiversity of marine systems, including extensive taxonomic and ecological studies is imperative for the monitoring and preservation of coastal resources. Once baseline studies are conducted, amphipods may provide the key to monitoring the sustainability of complex marine systems. Amphipod ecology and examples of their current use as bioindicators around the world are presented. The role of taxonomic studies focusing on commensal amphipods and their hosts in sustaining coastal resources is discussed.

~~~~ Note ~~~~

Location of Nagasaki



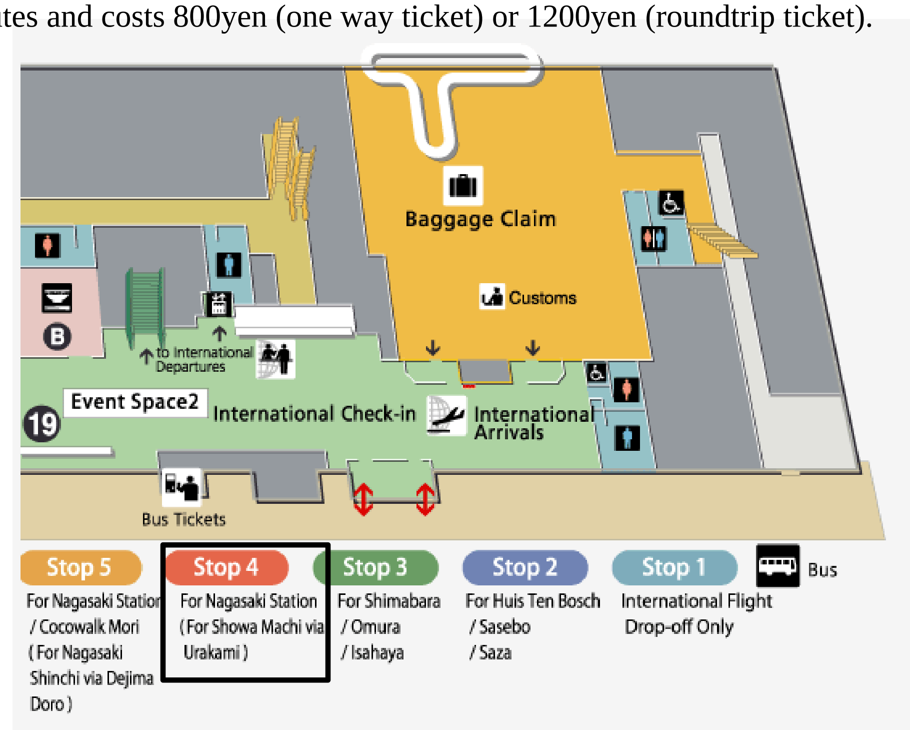
Venue

Ryojyun Hall in the Nagasaki University School of Medicine Campus
(Location ***F*** in the access map)
5 minutes walk from Alpha Inn Nagasaki Hotel

Access to School of Medicine Campus

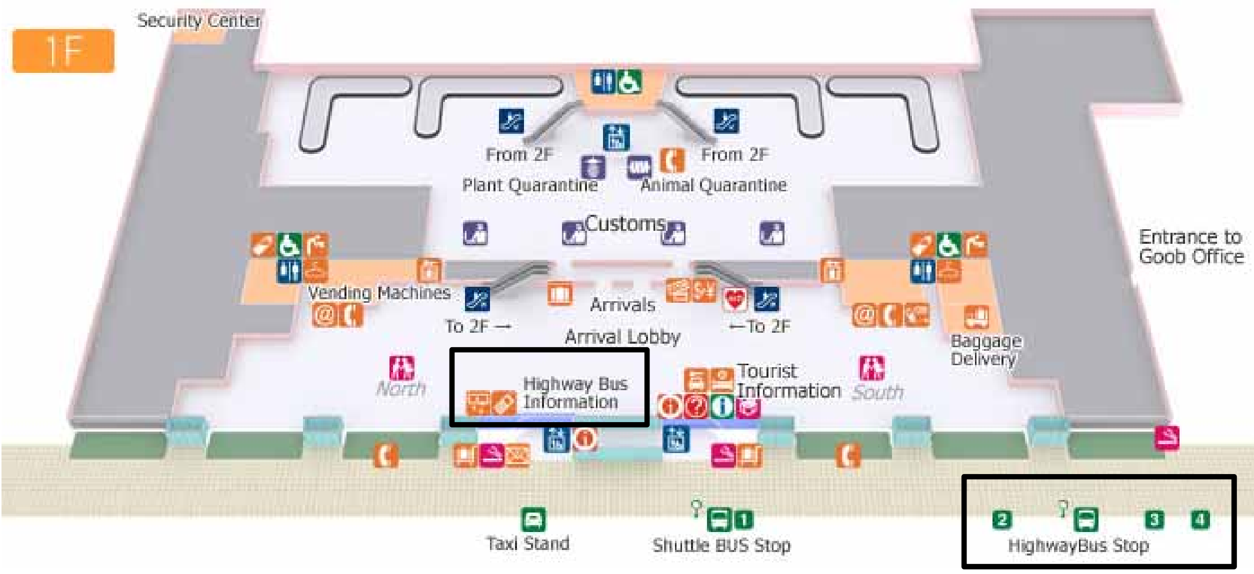
From Nagasaki Airport (http://www.nabic.co.jp/english/map/index.html)

Take a Limousine Bus to Nagasaki City (No. 4) and get off at URAKAMI EKIMAE (see Access map). Then change to a local bus or walk (15 min). The ticket for the airport limousine bus is available at a vending machine in front of the NO. 4 bus stop at Nagasaki Airport. The one way journey from the airport to Urakami Ekimae takes about 45 minutes and costs 800yen (one way ticket) or 1200yen (roundtrip ticket).



From Fukuoka Airport (http://www.fuk-ab.co.jp/english/frame_index.html)

Please visit the Highway Bus Information desk to make a reservation. Take a Limousine Bus to Nagasaki City and get off at MATSUYAMA-MACHI (see Access map). Then change to a local bus or walk (15 min). The one way journey from the airport to Matsuyama-machi takes about 120 or 150 minutes and costs 2500yen (one way ticket). As for a reservation for a ticket to the airport, please consult with symposium secretariat during the symposium.



Trams

Nagasaki is served by four tram lines. Operated by Nagasaki Electric Tramway, the tram lines provide easy access to most of the city's main attractions and runs approximately every 5-8 minutes from 6:00 to 23:00. HAMAGUCHI-MACHI stop is located near the School of Medicine Campus. Enter the tram through the rear door and exit through the front door. Pay the driver when exiting. We're sorry that there is no announcement in English. One ride costs 120 yen regardless of how far you travel. A 1-day pass for unlimited use of trams on one calendar day is available for 500 yen. Route map will be available at registration desk at Ryojyun Hall.

Hotel

Alpha Inn Nagasaki
(Location ***J*** in the access map)
Tel: 095-844-0533
Hamaguchi-machi 10-18
(w/ Internet Access and light breakfast)

Hotel New Top Nagasaki
(Location ***K*** in the access map)
Tel: 095-848-8111
Hamaguchi-machi 13-18
(w/ Internet Access and light breakfast)

Banquet

Banquet will be held at a Japanese restaurant on January 19 and 20. Banquet fee (5000 yen) will be collected at the registration desk in advance. Dinner tours on the other days (18 and 21 January) may be also arranged by symposium staffs. Please ask at registration desk, or give a call to Yu Umezawa (cell: 090-4068-5824, umezawa@nagasaki-u.ac.jp) or Greg Nishihara (cell: 080-6430-2585, greg@nagasaki-u.ac.jp).

Excursion

1 day field trip is scheduled on the last day, January 21. Please see the next page for details. 27 seats of the bus will be allocated preferentially for the speakers. There are still a few seats left for the other participants. If there are others that are interested in this excursion, please ask at registration desk, or Yu Umezawa.

Excursion

Unzen volcanic area is 1st Japanese “Geopark” in the Global UNESCO Network of Geoparks. Geoparks are field museums where visitors can learn about Earth’s history.

Time Schedule	Location & Information
8:00	Meeting around main gate of School of Medicine campus
9:00	**Isahaya Bay Reclaimed Land, and Isahaya Dike Gate**
10:45	**Unzen Jigoku** : 30 or more hot springs enriched with Fe, Al and S.
11:30	**Nita Ridge Observatory**: Lava dome extruded in the latest eruption (1990) can be observed. This area may be restricted depending on the weather.
13:00	Lunch at Japanese restaurant, Himematsuya: Guzoni, a specialty of this area
	Stroll around Shimabara castle and **spring water canal** areas.
14:30	**Mt. Unzen Disaster Memorial Hall**
15:30	Load Station and souvenir shops : The houses suffered from pyroclastic flows and debris flows are preserved.
16:30	Departure for Nagasaki
18:00	Arrival at School of Medicine campus (Bus will stop at some locations, Nagasaki Station and Nagasaki city areas)

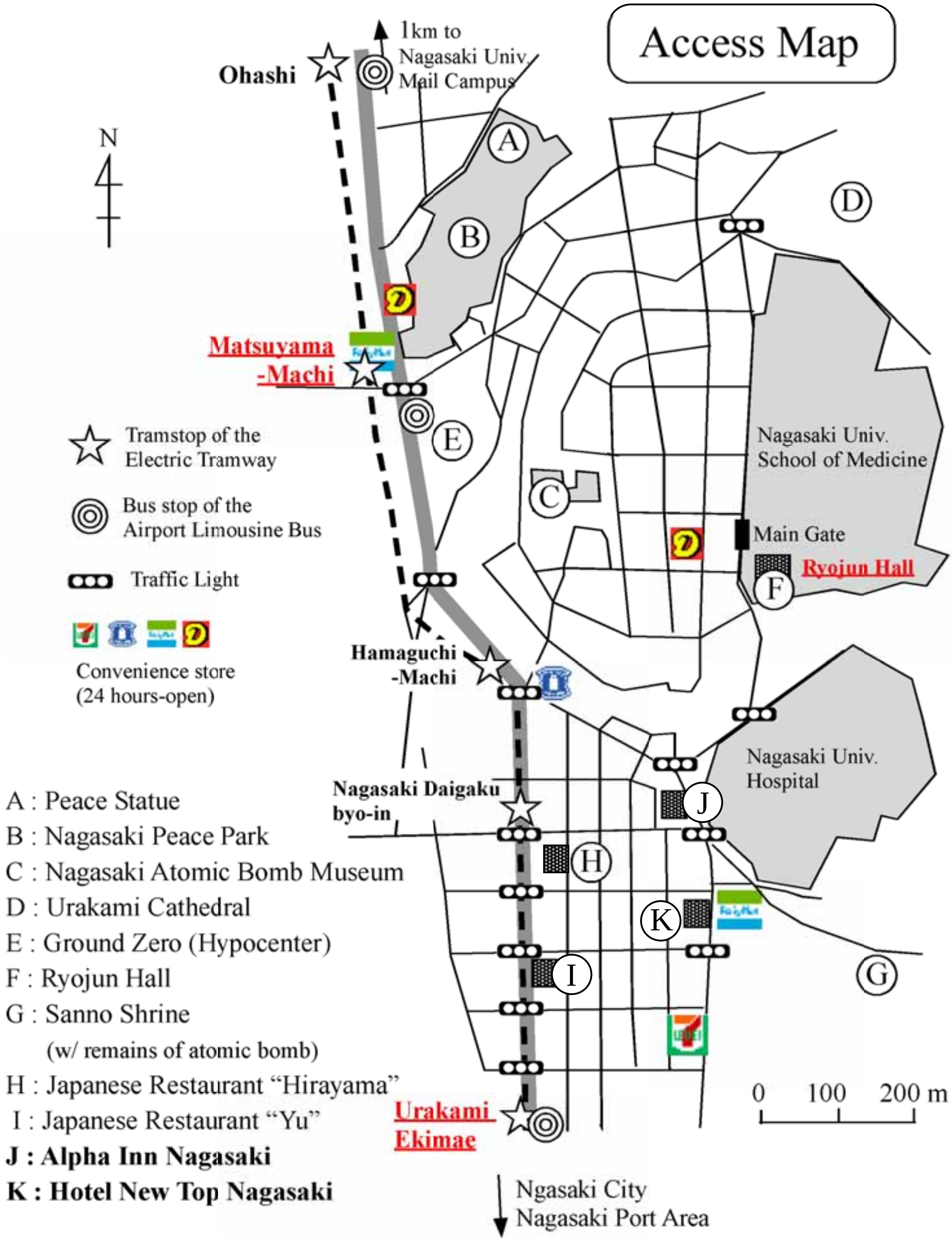
Unzen Jigoku

Mt. Unzen

Spring water

Shimabara Castle

Isahaya Dike constructed in 1997



Bus stop from Nagasaki Airport

Nagasaki Airport --- ~ 3 bus stops in the local town ~ --- Koba --- Bypass Tarami --- Showa Machi ---
--- Ohashi --- Matsuyama Machi --- **Urakami Ekimae** --- Takara Machi --- Nagasaki Station

Bus stop from Fukuoka Airport

Fukuoka Airport --- Tsukushino --- Kosoku Kiyama --- Ureshino Inter --- (Ureshino Bus Center) ---
--- Omura Inter --- Isahaya Inter --- Showa Machi --- **Matsuyama Machi** --- Nagasaki Station

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