

summer as a result of rainfall, runoff and the input of the nutrient rich Pearl River estuarine waters, but the high flushing rate restricted nutrient utilization and further accumulation of algal biomass. In other seasons, vertical mixing induced light limitation and horizontal dilution led to low Chl a ($2 \mu\text{g L}^{-1}$) and no spring bloom. Few hypoxic events ($\text{DO} < 2\text{mg L}^{-1}$) occurred due to reaeration and limited accumulation at depth due to flushing and vertical mixing. Therefore, Victoria is resilient to nutrient enrichment. In contrast, in the weakly-flushed Tolo Harbour (Tolo), yearlong stratification, long residence times and weak tidal currents favored algal growth, resulting in a spring diatom bloom and high Chl a ($10\text{--}30 \mu\text{g L}^{-1}$) all year and frequent hypoxic events in summer. Hence, Tolo is susceptible to nutrient enrichment and responded to nutrient reduction after sewage diversion in 1997. Sewage diversion from Tolo resulted in a 32–38% decrease in algal biomass in Tolo, but not in Victoria. There has been a significant increase (11–22%) in bottom DO in both harbours. Our findings demonstrate that an understanding of the role of physical processes is critical in order to predict the effectiveness of sewage management strategies in reducing eutrophication impacts.

Keywords: *Eutrophication; Nutrients; Phytoplankton biomass; Dissolved oxygen; Sewage; Stratification; Hydrodynamics; Light limitation; Tolo Harbour*

The application of qPCR methods to detect toxic Alexandrium blooms in the coastal waters of China

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The frequency and intensity of harmful algal blooms (HABs) increased significantly over the last four decades in the coastal waters of China, and led to intensive impacts on mariculture, tourism and the health of human-beings. Among those HABs, blooms formed by toxic *Alexandrium* spp. are particularly prominent due to their capabilities in producing neurotoxins named paralytic shellfish toxins (PSTs). Shellfish contamination by PSTs have been found in many areas along the coast of China, and the blooms of *Alexandrium* were recorded in the South China Sea, East China Sea and the Yellow Sea. To find out the distribution pattern of *Alexandrium* blooms, a set of qPCR methods were applied to analyze phytoplankton samples collected during the cruises organized in the Bohai Sea, Yellow Sea and East China Sea in spring of 2012. A qPCR method was targeted on *sxtA4*, a domain of the *sxt* gene cluster associated with biosynthesis of PSTs in toxic dinoflagellates and cyanobacteria. In addition, two TaqMan-based qPCR methods were employed to analyze toxic *Alexandrium fundyense* and *A. pacificum* previously reported in the coastal waters of China. The high performance liquid chromatography (HPLC) was used to analyze PSTs in parallel with those qPCR assays. It was found that the distribution pattern of *sxtA* gene coincided well with PSTs and toxic *A. fundyense*/*A. pacificum*, and the two toxic species *A. fundyense* and *A. pacificum* formed spatially separated populations in the

Yellow Sea and East China Sea during the sampling season. It's implied that toxic *A. fundyense* and *A. pacificum* were major PST producers during the sampling season, and the qPCR methods are promising to detect blooms of toxic *Alexandrium* spp. in the coastal waters of China.

Keywords: *qPCR, Alexandrium, Coastal water of China*

Transcriptomic analyses of *Scrippsiella trochoidea* revealed genes possibly relevant to encystment and dormancy of dinoflagellates

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We used the cosmopolitan, toxic, and resting cyst-producing dinoflagellate *Scrippsiella trochoidea* as a model organism to investigate its transcriptomes at different phases of life cycle with the aim of deciphering functional genes regulating the alteration of life cycle, particularly cyst formation and maintenance of dormancy, in dinoflagellates. We identified 3,874 DEGs (2.32% of the total unigenes) between resting cysts and vegetative cells, with 134 of which specifically expressed in resting cysts; a pause of photosynthesis; an active catabolism including β -oxidation of fatty acid, glycolysis, glyoxylate pathway, and TCA in resting cysts; 12 DEGs encoding meiotic recombination proteins and members of MEI2-like family potentially involved in sexual reproduction and encystment; elevated expressions of genes encoding enzymes responding to pathogens (chitin deacetylase) and

genes encoding ROS-scavenging enzymes in cysts. We paid particular attention to genes encoding essential components in phytohormone signaling and identified 4 key genes regulating abscisic acid (ABA) biosynthesis and catabolism, with further characterization based on their full-length cDNA sequences obtained via RACE-PCR. Further qRT-PCR results indicated an elevated biosynthesis and repressed catabolism of ABA during the courses of encystment and cyst dormancy, which was significantly enhanced by lower temperature and darkness. Direct measurements of ABA using ELISA in vegetative cells and cysts fully supported qRT-PCR results. All these results collectively suggest a possibly vital role of ABA in encystment and maintenance of dormancy, akin to its functions in seed dormancy modulation of higher plants. We believe this study provides a significant advancement toward understanding the molecular mechanisms in resting cyst formation and, more generally, life history of dinoflagellate.

Keywords: *Resting cyst; Harmful algal blooms (HABs); Dormancy; Life cycle; Transcriptomic analysis; Abscisic acid (ABA); Dinoflagellate; Scrippsiella trochoidea*

Mixotrophy in the dinoflagellate *Karlodinium veneficum* under variable nitrogen: phosphorus stoichiometry: feeding responses and effects on larvae of the eastern oyster (*Crassostrea virginica*)

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Mixotrophic feeding can be promoted by nutrient-enriched prey and this nutritional strategy can provide benefits to some toxic microalgae under nutrient imbalanced conditions. However, it is unclear how the nutritional condition of the predator or the prey affects mixotrophy and toxicity of toxin-producing mixotrophs. Laboratory experiments were conducted to measure growth and feeding rates of *Karlodinium veneficum* with addition of *Rhodomonas salina* as prey under varied nitrogen (N):phosphorus (P) stoichiometry (molar N:P of 4, 16 and 32) of both predator and prey, and with *K. veneficum* initially in different growth phases (exponential and stationary). Growth rates of initially exponential- and stationary-phase *K. veneficum* were enhanced in the presence of prey with reciprocal nutrient conditions. Feeding rates (measured as prey death rates) were highest for low-NP *K. veneficum* initially growing exponentially and mixed with N-rich prey. Maximum feeding rates of low-NP *K. veneficum* on N-rich prey during exponential growth were ~4-fold higher than the rates of high-NP *K. veneficum* on N-rich prey. The nutritionally different *K. veneficum* were tested with larvae of the eastern oyster (*Crassostrea virginica*) to compare putative toxicity. Larval mortality was significantly increased in 2-day exposures to high-NP *K. veneficum* monocultures in both growth phases. When mixed with N-rich prey, the presence of *K. veneficum* resulted in significantly enhanced larval mortality, but this was not the case for low-NP *K. veneficum* in exponential phase. Enhanced growth of *K. veneficum* and increased negative effects of *K.*

veneficum on larval survival appeared to be highest when fed prey with higher N:P content.

Keywords: *Mixotrophy, Dinoflagellate, Variable nitrogen phosphorus stoichiometry*

The Ecological Roles of Parasitic Dinoflagellates *Amoebophrya* spp. in The Coastal Waters of China

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The parasitic dinoflagellates in the genus of *Amoebophrya* can infect broad ranges of planktonic dinoflagellates, and transform algal biomass into organic matter that can be recycled within the planktonic community. The ecological significance of *Amoebophrya* spp. during harmful algal bloom (HAB) events was gradually recognized along with revelation of its host specificity and diversity. We carried out series of field surveys and laboratory studies to investigate the presence of *Amoebophrya* spp. in planktonic dinoflagellates in the coastal waters of China and explored its primary ecological roles. For the first time, we confirmed the presence of *Amoebophrya* infections in the planktonic community from coastal waters of China; twelve species of dinoflagellates (e.g. *Akashiwo sanguinea*, *Karenia mikimotoi*, *Scrippsiella trochoidea*, *Ceratium tripos*) were infected, with the highest prevalence of 5.8%. Molecular sequences retrieved from environmental water samples revealed high genetic diversity of *Amoebophryidae*-like organisms in the water column. The life span of *Amoebophrya* sp. ex. *A.*

sanguinea was approximately 58 hours. The infective dinospores can survive up to 78 hours in environment waters, but gradually lose their infectivity; *Amoebophrya* sp. ex. *A. sanguinea* cannot infect other dinoflagellate species, its infection rate reached as high as 91% when the dinospore: host cell was 20:1. In Changjiang estuary and the adjacent ECS, *Amoebophrya*-infected dinoflagellates were only observed in high salinity (>20) stations, suggesting that salinity may be a factor limiting the distribution of *Amoebophrya* infections in natural environment.

Keywords: *Harmful algal blooms; Dinoflagellate; Parasitic dinoflagellate*

Algae ground creation in Konoura fishing port offing breakwater mound

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Konoura fishing port is an important fishing port which located in South Akita Prefecture in Japan. After 1994, they carried out maintenance of the seawater exchange type breakwater. Because fishing port tranquility at the time of the high wave was not enough, after 2006, so Akita Prefecture expanded the fishing port and built the offing breakwater newly. The offing breakwater to install newly made a small step behind a breakwater to bring back the algae ground which decreased and opened mound width and made an epiphytism base of the algae. It was assumed to need long years for algae ground to be formed because the distance to the mound was away from the natural algae ground. So we supported it artificially to

promote formation of algae ground. Specifically, the core algae ground where "spore supply" and "mother alga transplantation" were combined targeted for the *Sargassum* spp. was developed for more than one years. And a development method was improved while confirming those effect.

The algae ground area expanded every year as a result of the above. The *Sargassum* spp. was admitted by 73% in a mound in 2011 when 5 years have passed from installation, and were 444 square meters when they converted it into an area. The useful benthos such as an abalone, the turban shell increased and 34 species of fish appeared. A seasonal visit was confirmed in particular mainly on the juvenile fish such as collections of a black rockfish and Japanese jack mackerel. Furthermore, the clustered eggs of the sandfish were confirmed in the algae ground in the winter season, and it was suggested to function as the feeding ground of the fisheries creature, habitation ground and spawning ground.

Keywords: *Algae ground creation; Breakwater mound, Fishing port*

Formation and purification of new metabolites of paralytic shellfish toxins in shellfish due to biotransformation

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Paralytic shellfish toxins (PST) accumulated by shellfish threaten seafood safety around the world. Field

mussel samples were collected from the coast of Qinhuangdao city, China, following a suspected PSP event in May 2016. High concentration of PST was discovered in the contaminated mussels using a hydrophilic interaction liquid chromatography (HILIC) coupled with tandem quadrupole mass spectrometry (MS-MS). New metabolites of PST including M2, M4, M6, M8, M10, as well as the common components (GTX1/4 and GTX2/3) were detected. The total toxicity calculated by GTXs was approximately 10,758 $\mu\text{g STX eq. kg}^{-1}$, significantly higher than the control value of 800 $\mu\text{g STX eq. kg}^{-1}$. In order to explain the toxin profile observed in the field mussels and further to know the formation of these PST metabolites, the uncontaminated mussels (*Mytilus galloprovincialis*) were fed on two different strains of *Alexandrium tamarense* (ATHK and TIO108) under laboratory conditions. Complex PST profile was observed in the mussels fed on ATHK for 33 days, including C1/2, C3/4, GTX5, GTX2/3, GTX1/4, NEO, STX, and metabolites M1, M2, M3, M5, M7, M8, M9 (total molar percent ~ 16%). However, only C1/2, GTX5 and metabolites M1 and M3 (total molar percent ~9.4%) were detected in mussels fed on another strain TIO108 for 7 days. Combined consideration of the simulative mussels fed on different strains of *A. tamarense*, we infer that the metabolites M1, M2, M3, M4, M5, M6 should be transformed from C1/2 and GTX2/3, meanwhile the metabolites M7, M8, M9, M10 should be related to C3/4 and GTX1/4 in mussels due to biotransformation. Toxins were extracted from the mussels fed on different strains of *A. tamarense* and mussels collected from the field, in order to understand the toxicity of these metabolites. The crude extracts were

purified by two steps of column chromatography packaged with Bio-gel P2 resin. Preliminarily the mixture mainly contained GTX1/4, M7, M3 was obtained in laboratory.

Keywords: *Paralytic shellfish toxins (PST); Metabolites; Biotransformation; Mytilus galloprovincialis; Alexandrium tamarense; Purification*

Rates of nitrogen uptake by cyanobacterially-dominated assemblages in Lake Taihu, China, during late summer

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Lake Taihu has suffered an increasing number of cyanobacteria harmful algal blooms (CyanoHABs) over the past three decades, bringing about formidable ecological and economical losses. Many efforts to control phosphate (P) and/or nitrogen (N) have been applied to mitigate these blooms; however, within the scope of management approaches to date, there has been considerably less attention paid to the role of nitrogen (N) and its different forms in the ecology of the blooms. Therefore, a series of kinetic and nutrient enrichment experiments were conducted to assess rates of N uptake under differing conditions, and to

examine the effect of changes in N forms (NH_4^+ , NO_3^- and urea) relative to the effect of changes in P on phytoplankton community physiology. In 2014 these experiments involved mesocosm enrichments; in 2015 these experiments were conducted over a diurnal period. Our results showed that the utilization of NH_4^+ , NO_3^- and urea was not efficient in natural communities of Microcystis-dominated assemblages in Taihu. Maximum uptake rates achieved by phytoplankton in Lake Taihu on NH_4^+ were significantly higher than those on NO_3^- and urea with or without nutrient pretreatment, indicating that the local phytoplankton preferred NH_4^+ to NO_3^- or urea and the interaction of NH_4^+ and PO_4^{3-} played important roles in regulating the uptake of NO_3^- or urea. High amounts of NH_4^+ and/or NH_3 did appear to inhibit or repress the uptake of NO_3^- in the diurnal study. Also, the dynamic variability of pH during the diurnal study suggests that dissolved inorganic carbon consumption by excessive bloom biomass and production alters N cycling pathways that help to sustain the bloom.

Keywords: *Lake Taihu; Eutrophication; Microcystis; nutrient enrichment; Ammonium; Nitrate; Urea; Phosphate*

Poster:

Prediction, prevention and mitigation of harmful algal blooms in the China Sea

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Ranging from microscopic, single-celled organisms to large seaweeds, harmful algal blooms (HABs) pose a serious threat to public health, aquatic organisms, commercial fisheries, and the quality of fresh water lakes, rivers and reservoirs, as well as marine coastal environments. Over the past few decades, the world's coastal waters have experienced an increase in the number and type of HAB events. In the China Sea, every coastal province frequently experienced HAB events and suffered from more and more serious economic losses and human illness and death in the last decade. A pressing need exists to understand, monitor, and predict the outbreak of HAB events and to propose the efficient emergent management methods. In this study, the several kinds of prediction methods are introduced, such as empirical prediction methods, statistical prediction methods, and numerical model prediction methods. Especially, the common prediction methods used in the national marine environmental operational forecasting systems for early warning red tide and green tide are proposed to understand the HABs occurrence mechanism and to promote HAB disaster prevention and mitigation in China. In order to improve the ability to respond to marine environmental disasters, operational HAB early warning and forecasting system and advanced emergent disaster mitigation system should be established in China as soon as possible.

Keywords: *Harmful algal blooms; Green blooms; prediction; Forecasting; Early warning*

Intercomparison of Five High Spatial and temporal resolution latent heat flux datasets over the Northwest Pacific Ocean

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Five latent heat flux (LHF) datasets with high spatial and temporal resolution are compared over the Northwest Pacific Ocean for the period 1998–2007. Overall the datasets show encouraging agreement in spatial and temporal characteristics. However, there are substantial discrepancies, especially in magnitude, both spatially and temporally. The ERA-Interim dataset gives the maximum LHF while the SeaFlux dataset gives the minimum. These consistencies and discrepancies of the LHF in the five datasets are mainly due to the differences in bulk variables, specifically the wind speed and sea–air specific humidity difference (Q_s-a). Generally speaking, large Q_s-a leads to large LHF. However, wind speed and Q_s-a play different roles in different regions. The maximum LHF in the western boundary current region of the Kuroshio arises from high wind coupling with large Q_s-a , and the minimum LHF at low latitude is mainly due to weak winds whilst at high latitude it is mainly due to the rapid poleward decrease of Q_s-a .

Keywords: Intercomparison; Latent heat flux; Bulk variables; Northwest Pacific Ocean

Effects of different temporal resolution of wind and thermal forcing on simulated global ocean temperature

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In this study, heat fluxes and wind stress with different temporal resolution are compared, and they are used as the upper boundary condition for a global oceanic general circulation model MOM4. Because of the time average, three experiments (CFSR_6h, CFSR_Day, CFSR_Mon) have the same climate characteristics, while differ in magnitude. The comparison between the simulations and observations reveals that the model SSTs have similar seasonal to interannual variability as the observed SST. But the magnitude of SSTs differ from observed SST within 1°C, the global mean SST in CFSR_6h is 0.74°C lower than in CFSR_Mon. In general, ocean temperature simulated with high frequency forcing is more similar with observation. The effect of high frequency forcing can cool the global ocean. In the mid-latitude and high-latitude area, high frequency forcing enhances vertical mixing to cool the ocean. But in the low-latitude area, the horizontal advection and heat flux may play more important roles to cool the ocean.

Keywords: MOM4; Temporal resolution; Forcing; Ocean temperature

The Effects of Environmental Factors on Dissolved Inorganic Carbon Absorption of Sargassum vachellianum

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This study was aimed to determine the photosynthetic carbon sequestration capability and pH-improving rate of Sargassum vachellianum under various temperature, light intensity, nitrogen(N) and phosphorus(P) enrichment. The results showed that: 1) Temperature and light intensity could dramatically influence the photosynthetic rate, assimilating seawater DIC and pH-enhancing capability of S.vachellianum ($P < 0.05$). When the light intensity was $60 \mu\text{mol} \cdot \text{m}^{-2} \cdot \text{s}^{-1}$ and the temperature was 20°C, the carbon sequestration rate was highest ($80.58 \mu\text{mol}(\text{C}) \cdot \text{g}^{-1}(\text{FW}) \cdot \text{h}^{-1}$) and the pH-improving rate was fastest ($0.138 \text{g}^{-1}(\text{FW}) \cdot \text{h}^{-1}$). 2) N and P enrichment could dramatically increase the photosynthetic rate, absorbing seawater DIC and pH-improving capability of S.vachellianum. The absorptive capacity of HNP group was strongest, and the DIC variation reached up to $0.68 \text{mmol} \cdot \text{L}^{-1}$, significantly higher than that of LNP group ($P < 0.05$). The pH reached up to 9.25 in HNP group, and the variation was 1.20, which was significantly higher than other groups ($P < 0.05$). And the addition of N and P showed strong complementary effects on improving the DIC absorption and pH-improving rate of S.vachellianum. The results could

provide theory basis for the marine eutrophication bioremediation and the ocean acidification mitigation.

Keywords: Photosynthetic carbon sequestration; pH; Sargassum vachellianum; Environmental factors

Predation and Reproduction Response of Mesozooplankton Assemblages during Noctiluca Scintillans Blooms in Daya Bay, South China Sea

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Noctiluca scintillans has frequently bloomed in Daya Bay recent years. This study is the first effort to investigate the effect of the bloom on local mesozooplankton populations. We compared grazing parameters and reproduction rate of mesozooplankton in the bloom and non-bloom periods to identify the interactions between mesozooplankton and Noctiluca scintillans blooms, and wish to gether more information for bloom control. By feeding experiment, dilution technique and reproduction experiment during 2015–2016, we found that biomass of both phytoplankton and mesozooplankton declined in bloom conditions. The clearance rate and ingestion rate decreased to negative, indicating a potential increase in phytoplankton and intermediate trophic level grazers (microzooplankton), which is among the factors that may shape the structure of a marine planktonic food web. Furthermore, significantly lower ($P < 0.05$) reproduction rate of mesozooplankton also contribute to the

community variation observed during bloom condition. Meanwhile, dilution technique revealed that grazing pressure from microzooplankton decreased during bloom, which means there may be a competition between *Noctiluca scintillans* and microzooplankton. Overall, the development of mesozooplankton populations might be inhibited by *Noctiluca scintillans* blooms. However, the mechanism needs further investigation.

Keywords: *Noctiluca scintillans* blooms, Mesozooplankton, predation, Reproduction

Countermeasures of Marine Biological Disaster Prevention and Control in Bohai Sea

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Bohai sea is a semi-enclosed shallow sea, originally with rich marine resources. With the rapid marine industry clusters and economic growth of Bohai sea, the ecological environment pollution, especially eutrophication of its coastal seawater became increasingly serious. Moreover, the frequent occurrence of marine biological disaster has posed a grave threat to the marine ecology, economic development, even the property and safety of the coastal people of Bohai sea. This study summarized the types and development trend of the marine biological disasters in Bohai sea, and then analyzed their outbreak causes. The operable prevention and control programmes and targeted management measures on

regulations, risk assessment and emergency treatment of biological disasters in Bohai sea were proposed concretely, to provide useful information for the ecological restoration of Bohai marine environment.

Keywords: *Bohai sea; Marine biological disaster; Prevention and control management; Emergency disposal; Ecological environment*

Research on Standardization Method of Preparation the Pectenotoxin-2

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Human intoxication with marine biotoxins can occur when shellfish that are contaminated with marine biotoxins are consumed. One of the most common types of intoxication, pectenotoxins (PTXs) are specific lipophilic toxins which have drawn a wide attention due to these displayed potent cytotoxic activities against human lung. However, the lack of PTXs toxin standards hampers the effective management and sanitation control of shellfish products. PTXs were first isolated from the digestive glands of the contaminated scallop *Patinopecten yessoensis* cultivated in Japan because of a poisoned incident, but the dinoflagellate *Dinophysis* was identified as the real producer of these toxins. Among these, PTX2 is the major toxin produced by the toxic *Dinophysis* spp., like *D. acuminata*. As to get more PTX2 products which are suitable to be used as a standard in analysis of shellfish samples and toxicological studies as well, the protocol for preparation of pectenotoxin-2 (PTX2) from large-scale culture of *Dinophysis* spp. was studied in current study. Toxins

were extracted from the cells of a toxic strain of *Dinophysis acuminata* (China) using both Liquid-liquid Extraction (LLE) and Solid Phase Extraction (SPE). The purification conditions by column chromatography was studied, then the preparative high performance liquid chromatography with a C18 column was employed at the final step to further purify the toxins. The separation conditions were optimized according to the recoveries. Samples collected analyzed with a high performance liquid chromatography-mass spectrometry (HPLC-MS) technique, based on which the toxin preparation protocol was optimized. Studies on optimization of the preparation and quality control protocols of PTX2 are still needed to be realised as the domestically production of PTX2 toxin standards, which will significantly promote the management of DSP contamination in seafoods in China.

Keyword: *Pectenotoxin-2 (PTX2); Dinophysis acuminata; Preparation*

Occurrence and variation of lipophilic shellfish toxins in phytoplankton, shellfish and seawater samples from the aquaculture zone in the Yellow Sea, China

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A comprehensive study has been carried out for lipophilic shellfish toxins (LSTs) in the aquaculture zone of Liuqing Bay located in the coast of Qingdao, Yellow

Sea, in 2014 and 2015. Components and concentrations of LSTs in the samples of phytoplankton, cultivated scallop and seawater samples were determined by the LC-MS/MS method. Meanwhile, the species of potential toxins-producing algae were also monitored in this study. Three species of *Dinophysis* and *Phalacrocoma* genera isolated from the investigation zone contained the predominant PTX2 and trace amounts of OA and DTX1. The highest quota of PTX2 occurred in *D. fortii* (0.28 pg cell⁻¹), followed by *D. acuminata* complex (0.08 pg cell⁻¹) and *P. rotundatum* (= *D. rotundata*) (0.02 pg cell⁻¹). PTX2, OA and DTX1 were also detected in cultivated scallops at low concentration, but in addition to the former, PTX2sa, 7-epi-PTX2sa and the isobaric DTX1 suspected as DTX1b were also found in the SPATT bags. The isobaric compound of DTX1 only appeared in the SPATT bags deployed in field samples. A significant higher quantity of OA was adsorbed by SPATT bags compared to DTX1, although similar concentrations of both toxins were enriched by SPE cartridges from the aquaculture zone. AZA2 was also detected in the concentrated phytoplankton samples, which demonstrated that AZA-producing microalgae were present in the investigation area. The variation of concentrations of PTX2 adsorbed by SPATT bags could reflect the change of *Dinophysis* density in seawater, but there is a time lag behind the density peaks of *Dinophysis*. Results did support that the SPATT technology as a useful forecasting tool for toxic algal blooms and shellfish contamination. Environmental behavior of LSTs should be explored further due to the prevalent contamination of LSTs in the coast of Qingdao.

Keywords: *Lipophilic shellfish toxins; Dinophysis spp.; SPATT; Chlamys farreri; LC-MS/MS*

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Local Ocean Dynamic Response to Typhoon in The Sea Area Adjacent to The Yangtze River Estuary

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Formation of near-inertial oscillation (NIO, at frequency near Coriolis parameter f) is one of important ocean local dynamic responses to typhoon. Strong vertical shear of horizontal current induced by NIO strengthens mixing and deepens mixed layer, and is one important reason for near-surface cooling. From buoys with ADCP in the sea area adjacent to the Yangtze River estuary, data during typhoon Muifa numbered 201109 (from 2011.08.03 to 08.13, passed the same latitude 30.4° N of Haijiao buoy on date of 08.07) is analyzed, and a winter cold air process (from 2012.01.17 to 01.27, wind speed peaked on dates of 01.21 and 01.22) is also studied for comparison. The results are as follows: Both in the typhoon and the cold air process, there is a sudden increase of current speed at Haijiao buoy and Yangtze estuary light ship, and current speed may reach triple of its previous value. Current velocity profile manifests significantly variation during Typhoon Muifa in summer. Taking Haijiao buoy (terrain depth of 52m) for instance, the daily averaged current velocity profile experiences four stages: peak profile – exponential

decay profile – uniform profile – peak profile again, and peak value of profile locates at about 10–20m under water. Depth of the peak value is deeper in the winter cold air process at about 16–26m under water. Stable stratification of sea water helps to generate stronger NIO (period of 23.9h at Yangtze estuary light ship and period of 23.7h at Haijiao buoy), and through weakening stratified shear flow instability, stable stratification is also conducive to sustain NIO. At the same time, energy of NIO is mainly concentrated in the thermocline layer (which is at the bottom of the mixed layer) with the strongest stratification stability. In the two process, already existing semi-diurnal tide (SDT, at frequency of $D/2$) can also be strengthened. The maximum energy of SDT and NIO happens to be in the same two depth ranges: one is the surface to subsurface and the second is middle and more lower layer. Through analysis above, the local ocean dynamic response to typhoon is furtherly understood, especially vertical distribution and strength variation of atmospheric energy input through the form of INO and the possible relationship between INO and the enhance of SDT. This study could pave the way for further research on the energy input during typhoons, ocean mixing, sea surface temperature and sea water heat capacity variation as well as feedback to typhoon.

Keywords: *Yangtze estuary; Typhoon, ocean dynamic response; Current profile; Near inertial oscillation; Semi-diurnal tide*

Study on The Characteristics of Earthquakes that Generate Tsunamis in Indonesia to Improve The Tsunami Early Warning System's Performance

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The Indonesian region is seismically active and prone to tsunami disasters. Most of the tsunamis that occurred in the region were generated by earthquakes. In order to mitigate the tsunami disasters, the government has established the Indonesia Tsunami Early Warning System (Ina TEWS). The Ina TEWS is designed to issue a tsunami warning within 5 minutes after the earthquake's occurrence. The decision of a tsunami warning issuance is mainly based on the examination of the earthquake parameters. Therefore, it is very important to explore the characteristics of earthquakes that generate tsunamis in Indonesia. In this paper we have studied earthquakes that generate tsunamis in Indonesia based on source parameter analysis to identify their characteristics. A total of 27 earthquakes that generate tsunamis in the period of 1991 to 2012 have been studied. The study has been done based on the analysis of (1) focal mechanism, (2) hypocenter, (3) ratio of energy and seismic moment, and (4) rupture duration of the earthquakes. The focal mechanism and hypocenter have been determined by applying the W phase method. Seismic moment were determined by analyzing P–PP phases recorded in displacement seismogram, while seismic energy and rupture duration have been determined by analyzing velocity seismogram.

Findings of this paper may give contribution to improve the performance of the Ina TEWS.

Keywords: *Earthquake; Tsunami; Disaster; Source parameter; Ina TEWS*

A Fundamental Study on The Drifting Countermeasure of Work Barge by Mooring System in Tsunami

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4. *Service Center of Port Engineering(SCOPE), Tokyo, Japan*

Work barge must operate the opening work of seaway after a tsunami. However, many work barges cannot perform to opening work. It is because countermeasures for work barge have not organized when tsunami comes into the harbor. However, tsunami countermeasure of work barge is not prepared. Thus, a recovering of port functions need to a lot of time because many work barges cannot perform to opening work. Hence, it is necessary to ensure safety of work barges when tsunami comes into the harbor. The purpose in this study is following items: 1) to understand characteristics of a behavior of work barge in a tsunami. 2) To approach mooring method which can prevents its disaster. Therefore the authors conducted a two-dimensional tsunami response calculation using the MPS method which is one of the particle methods. We propose the new method which is offshore mooring method and verify applicability of its method based on

numerical simulation. As results, we found that qualitatively applicability of the new mooring method and, appropriate mooring point of the new method which is approximately 20.0m from quay edge.

Keywords: *Tsunami countermeasure; Numerical simulation; The MPS method*

A Study on Applicability of The Numerical Simulation Using The Distinct Element Method

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When tsunami attacks in a harbor, vessels moored would start to drift because of breaking mooring tethers. In such a case, the vessels were drifting a shore and destroying buildings. Thus, it is necessary to comprehend behaviors of drifting vessels and the Tsunami Hazard Map should take into account of the behaviors. In the numerical analysis method using the Distinct Element Method, an analysis of two-dimensional horizontal plane is applied to tsunami flow and vessels were modeled as an aggregate of the disk elements. However, this method is limited to qualitative evaluation because of macroscopic approach. Therefore this paper verifies the applicability of the vessel response simulation using this method. In the verification, we compare results calculated by DEM with results analyzed by Moving Particle Semi-implicit Method. As a result, the applicability and issues to be improved of this method were clarified.

Keywords: *Distinct element method; MPS method; Tsunami; Vessel response; Numerical simulation*

An Experimental Study on Flow Characteristics of Tsunami Running Between Buildings

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In the Great East Japan Earthquake, buildings in coastal area suffered extreme damage by big tsunamis. The tsunamis into city areas caused a contraction flow. The flows of the tsunami were blocked by buildings, its water level increased and the flow velocity was accelerated. Thus, the flow was the contraction flow.

Guidelines for building design exclude the increase of flow velocity due to the contraction flow at present. Increase of flow velocity should enlarge tsunami loads acting on buildings. Therefore, we need to clarify the characteristics of the contraction flow and its behaviors.

The purpose of this study is to understand the characteristics of flow velocity and water level change caused by the contraction flow. This study carried out a model experiment in a wave channel.

Then, a solitary wave was applied as a tsunami, and the flow velocity and the water level of the tsunami running on to a land model were measured.

As a result, we found that the water level in the inflow part and the flow velocity of the outflow part is increased by this experiment.

Keywords: *Tsunami; Tank experiment; Contraction flow*

On Tropical Cyclone Intensity Forecast Using Different Sea Spray Scheme in Regional Atmosphere-Wave Coupled Model

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A sea-spray parameterization scheme in tropical cyclone (TC) model was used by combining the well performed functions at subdomains of diameter. The super Typhoon Rammasun in 2014 was simulated to analyze the impact of the improved scheme on TC development. The TC structure, intensity, momentum flux, sensible heat flux, and latent heat flux were analyzed. The simulation result in the improved sea spray scheme was closer to the TC track. In the seaspray scheme, air-sea momentum and heat exchanges varied by changing sea surface roughness and droplet evaporation, the TC intensity and structure in the simulation were also changed, and the roughness was smaller than that in the original scheme. In addition, the sea surface wind was enhanced as the friction was weakened. On the other hand, the reduced roughness resulted in smaller sensible and latent heat fluxes and less energy supply for TC. The sea surface wind speed was controlled by the balance between friction mechanism and heat intensifying mechanism.

Keywords: *Tropical Cyclone, Forecast, Sea Spray Scheme, Regional Atmosphere-Wave Coupled Model*

A Probabilistic Climatology-Based Analogue Intensity Forecast Scheme for Tropical Cyclones

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In this paper, we develop an objective probabilistic climatology-based intensity forecast (PCIF) scheme for tropical cyclones (TCs) over the northwestern Pacific region based on data from all TCs that occurred in the region between 1981 and 2010. The PCIF scheme has a forecast period of 120 h at 6-hourly intervals and was developed using eight persistence predictors: the latitude and longitude of the TC centre, the initial minimum central pressure (PMIN) and its change during the last 12 h, the TC movement direction within the last 24 h, the Julian day of the initial time, the lifespan of the TC between the initial time and its first recording in the observations, and the underlying surface conditions at the TC centre. The PCIF was independently tested for all TCs over the northwestern Pacific from 2011 to 2013. The nsity; Probabilistic forecast; Climatology mean absolute errors of its ensemble mean predictions for PMIN were 8.0, 12.5, 15.2, 17.0, and 17.2 hPa at 24, 48, 72, 96, and 120 h, respectively. Comparisons with the Tropical Cyclone Statistical Prediction, a climatological baseline approach used by the China Meteorological Administration to assess the skill of TC intensity forecasts, indicated the PCIF has significant prediction skill for lead times of 12–48 h. The PCIF probabilistic intensity predictions had

better performance for severe or dying TCs at most lead times, and for most categories at short lead times. The PCIF was also found to perform better than the output of the European Centre for Medium-Range Weather Forecasts Ensemble Prediction System in the probabilistic prediction of intensity at lead times shorter than 72 h.

Keywords: *Tropical cyclone; Intensity; Probabilistic forecast; Climatology*

A Preliminary Study of the Economic Benefit of Improving Track and Intensity Forecasts of Landfalling Tropical Cyclones

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In recent years, estimates of the damage caused by tropical cyclones (TCs) have gained wide attention, and much research has been done on evaluation indices and methods, whereas relatively little attention has been given to the accuracy of TC forecasts, improvements in which could greatly reduce TC damage. In this paper, we use typhoon real-time forecast data from the China Meteorological Administration to study the relationship between TC track and intensity forecast errors and the direct economic losses resulting from TCs making landfall in mainland China, and

we fit a predictive model for economic losses. Direct economic losses are positively correlated with both TC track and intensity forecast errors with a lead time of 24 hours. If the 24-hour track forecast error is reduced by 1 km, our model suggests that direct economic losses from a single TC would decrease by 97 million yuan (RMB) (adjusted to 2014 RMB values). If the 24-hour intensity forecast error is reduced by 1 m s^{-1} , a reduction in economic losses of 380 million yuan (adjusted to 2014 RMB values) is estimated. It is evident that there could be great economic benefit and reduced TC damage as a result of improvements to TC track and intensity forecast accuracy. In this regard, our results suggest that it will be more effective to target improvements in intensity forecast accuracy than in track forecast accuracy.

Keywords: *tropical cyclone, tropical cyclone track and intensity, forecast error, disaster mitigation*

Session 9:

Sustainable Economy and Policy Making

Under the adjustments of social brain—The new global and marine economy

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Intelligent revolution is the free civilized revolution of personality advocated. This is both the social reality created by all the nature person and the span-new order which is cross-bordered off-site global. It declares the finality of traditional globalization under the control of industrial revolution. The development of regional economy has encountered unprecedented challenge, even including marine economy.

This is both the freedom revolution of labor and the revolution of labor form and labor nature. At this time, the traditional labor is more and more not related to working hours people expend, but lies in workers' wisdom degree, originality and the participation degree of the wisdom sharing system. The labor by means of the wisdom sharing system enlarge its own function variables. The enlarged function variables and intelligent machine action together bring about new labor value variables. Human-machine harmonious coexistence and the new globalization of generalized preference and win together are coming now, and we start to seek the span-new value appeal of off-site marine economy.

Keywords: *Intelligent technology; The wisdom sharing system; Off-site economy; Labor value variables; New globalization; New marine economy*

Seize the Historic Opportunity, Participate Actively in International Cooperation about Development and Protection of Ocean, and Play a Distinctive Role of Private Enterprises

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Ocean is an important area of human living and developing. Since the 21st century, more and more countries in the world have attached importance to ocean development and protection and marine science technology develops rapidly. The international cooperation in ocean development is very important. At the right time, the government puts forward the strategy—"the Belt and Road" and actively develops ocean cooperation with other countries. "the Belt and Road" means the government provide a stage, then enterprises manage. By the strategy, private enterprise can use their own characteristics like flexible operation mode etc. to play a distinctive role. Tehe Ocean Technology Group Limited, with its headquarter in Shanghai, is a specialized group company engaged in R&D, manufacture and management of scientific research vessel, ocean engineering vessel ocean engineering service, ocean environment survey, ocean resource exploration and ocean engineering technology service of ocean high-tech service enterprise. Since 2011, Tehe has been cooperated with institute of marine research and

universities in China to invest and build the different types of ocean scientific investigation vessels. Zhejiang Tehe Shipping Co., Ltd. Cooperate with the 2nd Ocean Research Institute of the State Ocean Administration, the 4500 tons of ocean research vessel Xiang Yang Hong 10 is the first ocean research vessel cooperatively developed. Shanghai Rainbow Fish Research Vessel Technology Service Co., Ltd. Cooperated with Shanghai Ocean University and built the vessel named Zhang Jian. The 4800 tons of research mother ship for 11000m ROV MV Zhang Jian, along with its research equipment, is the first Chinese ocean research vessel solely invested by private company. There is another 2200t SWATH marine research ship which is building, the delivery time will be the beginning of 2018. Tehe Ocean Technology Group Limited hope that Tehe will establish cooperative relationship in oceanographic survey, oceanographic engineering and ocean high-end tourism with the marine scientific research units and enterprises. At present, we also have spoken to Thai Burapha University and both of us will establish cooperative relationship in oceanographic survey and ocean high-end tourism. The Cooperation in two sides about the high-end tourism and diving training projects will start in first half years of 2017.

Keywords: *Private enterprises; Development and protection of ocean international cooperation*

Thailand - Ratchaburi Smart Industrial City (RSIC)

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Ratchaburi Smart Industrial City ('RSIC'), a smart city development project, is strategically located in an area with superior physical advantages, a high-level of economic activity and excellent access to existing and planned infrastructure. Situated in Ratchaburi province, 140 km. west of Bangkok, on a single piece of land covering approximately 7.36 sq.km., RSIC is not at risk from floods. RSIC project has won the first round of national design & master plan contest, "Smart Cities Clean Energy" , organized by Ministry of Energy, Thailand.

Ratchaburi province is expected to become the flagship of Thailand' s western industrial gateway due to its ideal positioning on both east-west and north-south trade flows. Less than two hours drive from Bangkok, it has easy access to Thailand' s agricultural heartland to the north and to key transport infrastructure heading south towards the Malaysian border, and west towards Myanmar. This makes Ratchaburi the promising place to enhance the One Belt One Road policy across ASEAN.

RSIC comprises industrial, residential and commercial zones, all working sustainably in harmony with the local community. Its ultimate goal is to integrate modern industrial activities with advanced technologies, becomes sustainable smart city running on clean energy e.g. solar energy (roof top solar pv and floating solar farm) and biomass energy, foster the deep involvement of the local community, create comfort and well-being for the residents, as well as to create a key industrial center in the

western side of Thailand.

RSIC aims to attract industrial clusters to co-locate in the area. The key focus industries are 1) Bio-based products, 2) Smart Devices and 3) Mass/Track Transportation business with spare parts and maintenance services. It is also located near to one of the largest reserve of natural resources like Quartz (raw material of solar pv and electronic microchips productions) and Feldspar. Each player in the supply chain/ value chain of business will enjoy the benefit of by-product exchange, which can be traded in the form of energy, waste, water, design or even human resources.

Keywords: *Ratchaburi smart industrial city; RSIC, Smart city in Thailand; One Belt One Road in Thailand*

Thailand' s Investment Solution

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Over the past two decades, Thailand has been an attractive destination for foreign investment. Since 2000s, Thailand has achieved a remarkably high rate of robust economic growth accompanied by a nationwide explosion in export oriented and manufacturing industry, which contributed to a drastic decline in poverty threshold rate from about 50 percent in 1988 to only 8 percent in 2015. There is a huge opportunity to invest in Thailand. Our growing economy, world-class infrastructure, competitive human capital and strong government support, are responsible for our key position as one of the most attractive investment destinations for foreign investors. Prime Privilege (PP) is solution oriented investment consultant. We provide comprehensive investment advisory

services for private clients, solicited clients, and companies who are interesting to invest in Thailand.

Keywords: *Thailand; Investment; Incentive; Consultant*

The Role of Enterprises in Marine Information Economy

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Marine economy plays a dual role in driving and linking the world economic system. The overall output of the marine industry is very enormous. And in the worldwide: 80% of the GDP in the USA is driven by coastal and marine economy, within which 40% is provided by marine economy directly; 95% of trade supplies in the UK depend on international maritime transport; 99.8% of overseas trade and 40% of domestic trade volume is completed by maritime transport; In 2016, the overall output of Chinese marine production attains about 6.8 trillion yuan that is 9.6% of Chinese GDP. The economical gross of maritime transport, offshore oil and gas development, aquaculture, fishing and other marine-related industries in the world are huge, which support the survival and development of human, however, in the meantime, they are confronting the problems such as inadequate information security, low intelligent and so on. Thus, it' s high time to improve the progress of marine informatization which is the precondition-prerequisite for the development of marine economy, the important means to promote the scientific and modernization of marine production and the basic guarantee for the sustainable development of marine.

Marine informatization includes four aspects: digitization, networking, business-oriented progress on the decision-making management, socialization of information services. Drawing lessons from the experience of informatization in land, marine informatization has its own trouble, so its launch need to use commercial means by enterprises under the framework of policy system. Enterprises can use their own advantages in the field of science and technology to provide technical support for the digitization and network of marine information industries, who in meantime, also can use their own marketing capabilities to support the business-oriented progress and socialization of the marine informatization. China Electronic Technology Corporation (CETC) is the leading enterprise in domestic electronic information industry, and it owns deep and solid foundation in informatization construction and the field of electronic industry of China. In order to promote the development of marine information industry, CETC has carried out demonstration of major projects, constructed the multi-spatial information system of air, sky, shore and sea, which realizes the spatial perception and efficient information service capability of the ocean, and meanwhile carried out the research on large data comprehensive services project of the ocean which focuses on breaking through intelligent issues of marine information services in future to achieve a comprehensive analysis of massive ocean data, extract effective information and sever to the development of marine industry.

Keywords: *Marine information; Economy; Enterprise*

Black Tiger Shrimp Broodstock Domestication and Genetic Improvement Project in Thailand

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The major obstacle that formerly faced the black tiger shrimp (*Penaeus monodon*) industry was the heavy reliance on wild shrimp broodstock. The poor growth characteristics of fry produced from these wild shrimp broodstock constituted a serious threat to the industry.

Warning signs of the depletion of wild shrimp broodstock in Thailand first appeared in 1997. The broodstock were experiencing a decline in quality and quantity associated with lower survival rates and decreased sizes in farmed shrimp. The black tiger shrimp broodstock domestication and genetic improvement project was started to circumvent these problems in 2004. The objectives of this project are to carry out research on domesticated and genetically selected broodstock that are free of a specific list of major pathogens. The initial result of domestication and breeding program was considered to help overcome the problem arising from the inconsistent in quantity and quality of wild shrimp as a source of shrimp postlarvae (PL) to shrimp farm. From the results in 2012–2013, the broodstock multiplication center produced good quality of the black tiger shrimp broodstock and provided to shrimp hatchery to manipulate shrimp larvae. The performance test and evaluation of shrimp larvae showed that the post larval shrimp performed good growth performance as compared with shrimp postlarvae from the wild-caught broodstock. The evaluation of the

economic feasibility for the genetic improvement of domesticated black tiger shrimp broodstock production was studied in 2014–2016. The cultured shrimp from PL15 to 5–6 month-old of shrimp production were selected to culture for being the domesticated broodstock. The mature broodstock at an age of 12–16 months old were transferred to the shrimp private hatchery. The shrimp larvae from the broodstock produced by the hatchery and shrimp production from shrimp farms showed economic success of the black tiger shrimp broodstock domestication.

Keywords: *Black tiger shrimp; Penaeus monodon, Domestication; Genetic improvement*

Logistics Resource Sharing

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Sharing economy has become a new economic paradigm, and it has already been realized in many business models. The sharing economy refers to the creation of new value by sharing, exchanging, and lending to others the access rights or ownership, and is an economic form of cooperative consumption using social networks. The sharing economy is not a business model for making a profit for a specific participant who may be a platform provider, but rather for reducing costs or improving profitability for all participants. This presentation introduces how the sharing economy can contribute to the society as a whole by reducing resource wastes and solving environmental problems. Various classification

schemes for the sharing economy are suggested. This study introduces various business models in the field of logistics for sharing logistics resources among multiple participants. It is explained how SNS and IT technologies can contribute to the realization of logistics resource sharing. Various cases in logistics resource sharing and types of resource sharing in the logistics industry are introduced and classified. In addition, motivations and obstacles of logistics resource sharing, conflicting interests and opinions on various emerging business models, and policies related to resource sharing are discussed.

Keywords: *Economy sharing; Logistics resource; Survey*

Applicability of Special Area Management in Madu River ecosystem, Sri Lanka

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Integrated coastal zone management (ICZM), includes the laws, norms, institutions, and processes through which power and responsibility are exercised to make and implement decisions affecting the available social, cultural, natural, technical, and financial and other economic resources available for development in coastal ecosystems. With the intention of enhancing the integration among the involved departments to ICZM and satisfying the

need of more comprehensive and participatory management of the coastal resources “Special Area Management” (SAM) process was started.

The SAM process in Madu river was from 2002 to 2006. The stake holders of the SAM, in Madu river area were, people who have settled in the area, hotels and industry owners in the area, Coast conservation and coastal resource management department, various other departments and NGOs. SAM was comprised with several steps. As the initial step Madu River SAM area was demarcated. The main objectives of SAM process in Madu River were life

standard development with minimum resource usage, development of health standard and good social relations. Every single step such as issue identification, environmental profile compilation and management plan development were done with community involvement. Finally pilot project was implemented and it attested a considerable development in the ecosystem. Recommendations were given to overcome the loopholes.

Keywords: *Special area management; Integrated coastal zone management; Madu River; Community*

Session 10: Sustainable Biology

Identification Technology of Gene Recombinant Clostridium perfringens α -Toxin for Sensitive and Rapid Diagnosis using Mass Spectrometry

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Clostridium perfringens, a gram-positive anaerobic pathogen, is widely distributed in natural environments such as soil and the human gut. C. perfringens produces α -toxin, which causes food poisoning and gas gangrene in human. Gas gangrene can have a rapidly fatal outcome and requires prompt, often severe, treatment. Patients may be infected from various wounds in the

environment of dismal, paddy field, traffic injury, dust, and disaster may cause a contagion of decomposed food and feces in drainage. The aim of the study was to establish a method of rapid test for the acute and biological infection. The exiting cultural-method takes several days. The C. perfringens gene encoding the α -toxin protein was successfully cloned and expressed by E.coli. After then, the novel approach based on proteomics using anelectrospray ionization mass spectrometer (ESI/MS) was applied for the conclusive identification of a recombinant α -toxin. That shows the opportunity for the rapid diagnostics of diseases infected by C. perfringens. Hereafter, if a specific antibody against our recombinant C. perfringens α -toxin

and the detection method of higher sensitivity can be developed, an immunoassay technology of lateral-flow is expected to be applied for the point of care testing in varied medical scenes, especially in the field outside of the laboratory. As for other options, the method of TOF/MS (time of flight / mass spectrometry) with specific protein database is expected to be developed. All of those methods above are the method for protein identification. Further discussion, the genetic sequencing method for C. perfringens is expected to be developed as an ultra-high sensitivity method.

Keywords: *Clostridium perfringens; α -toxin; Mass spectrometry; Rapid test*

Recent Development in Diagnostics and Therapy in Alzheimer's disease

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The population in demographic are getting old and senior's longevity causes mental disorder like Alzheimer's disease. This means serious issue in the world particularly in the Pacific rim countries where the people are to encounter dramatic inexperienced demographic change. It is expected that in 2030, the senior generation up to 75 years old weighs 1/4 of the whole population in Japan. Faced to these issues, we researcher are seeking to the way to cope with serious phenomena in science and technology.

We are carrying the research programs to detect Alzheimer's disease as early as possible and take up effective therapy. The early detection and early therapy policy make these issues to solve in mild situation in most effectiveness in our disease control system in cost management. In this session, we would like to summarize our research activity for Alzheimer's disease. Our research has been begun from Tau protein phosphorylation. Based on the fact, the aggregation of A β ₁₋₄₂ protein is the cause of onset of Alzheimer's disease. We further searched the fact that aggregated A β ₁₋₄₂ protein is most toxic to neuron cells. And we have still in question, that the cross linkage of A β ₁₋₄₂ protein and phosphorylated tau protein. Very recently, the report said that the toxic A β ₁₋₄₂ oligomers are just on set the neuron disorder and these leads to enhance on mental disorder. In this session, we would like to our recent research on aggregation of A β ₁₋₄₂ protein. In the process of aggregation, our trial to detect the physiological aggregation to detect in immunological assay using our specific monoclonal antibodies in early stage of on set. The work is still on the way, we like to provide our paper as soon as possible. We consider the work to boost the development of therapeutic drug in Alzheimer's disease.

Keywords: *Alzheimer's disease, Phosphorylated Tau; Aggregated A β 1-42 immune detection; Therapeutic effect of some recent therapeutic agents*

Immunochromatographic Test for Rapidly and Simultaneously Detection of Norovirus and Rotavirus in Fecal Specimens

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1. *Immuno Probe;*

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3. *Nihon University School of Medicine*

Norovirus and rotavirus are major enteric viruses which cause acute gastroenteritis worldwide. The infection occurs through person to person, food-borne route and air-borne route. Because of infants, children and elderly are most susceptible to severe disease, a rapid diagnosis is needed to the treatment. There are several diagnosis kits commercially for norovirus and rotavirus. We developed IP Line Duo “Noro/Rota”, an immunochromatographic test which is able to detect rapidly and simultaneously both viruses from one test reaction.

This test was evaluated with fecal samples collected from patients with acute gastroenteritis in Japan. A total of 120 fecal specimens for norovirus and 142 fecal specimens for rotavirus were tested. These results were compared with other commercial immunochromatographic tests in each virus. The sensitivity, specificity and agreement of norovirus were 100%, 93.8% and 96.7%, respectively. Those of rotaviruses were 93.3%, 98.3% and 95.8%, respectively. In addition, detection limit of norovirus GII.3 and GII.4 were 106 and 105 copies/mL, respectively, by real time PCR. The rotavirus was 1.1×10^5 TCID₅₀/mL, by median tissue culture infectious dose assay.

The performance of IP Line Duo “Noro/Rota” doesn't need special

equipment and the result is obtained in 5–15mins. This rapid test may be useful in diagnosis of acute gastroenteritis caused by norovirus and rotavirus, as well as it would be a tool to monitor diarrhea outbreaks.

Keywords: *Norovirus; Rotavirus; immunochromatographic tests*

Fundamental Study on Spray Combustion of BDF/Water Fuel Emulsions in Electrostatic Atomization

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In the rest of 20th century, the environmental and global warming problems had been the most important worldwide issues that must be resolved with drain of fossil fuels. These problems motivate us to develop the alternative fuels for diesel engines which is produced from biomass or other renewal resources. Biodiesel fuels with high oxygen content would be having a potential to an improvement of the burning efficiency, reduction of particulate matter, carbon monoxide, and hydrocarbon pollutants. However, the biodiesel fuel would produce larger nitrogen oxides emissions. Avoiding the fault of biodiesel fuels, detail information of spray mode and characteristics of BDF and BDF with other component needs prior to the investigation of spray combustion. Experimental study has been carried out to reveal the spray characteristics of BDF and BDF/water emulsion. Electrostatic atomization technologies have been applied for controlling the spray mode and

characteristics. Results show that several spray modes were observed and be our target to control the processes of spray atomization. This has also resulted in increased interest in the study of the combustion of emulsions, especially secondary-atomization phenomena during spray combustion. These results suggested that the application of electrostatic atomization performed to obtain the detailed information to provide a deep understanding of the spray combustion process and the secondary atomization of BDF and BDF/water emulsions.

Keywords: *Renewable energy; Biodiesel fuel; Emulsion; Electrostatic atomization; Spray combustion; Secondary-Atomization*

Study on Disinfectant on Food Born Bacteria

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In food industries, we use varieties of detergent for hygienic purpose. In view of disinfectant, we focused dishwashers used in manufacturing cooking facilities. In food industries, it is widely use alkaline detergent. However, low concentration and sometimes because of poor cleaning care cause red slime in the inside, it tend to be a hotbed of bacteria in the process of manufacturing unit. This means a lot of hazardous bacteria grow and sometimes toxic

bacteria in dishwashers. In the study of systematic screening of growing bacteria. We chose 14 dishwashers of various type, swabbed in them, and cultivated at 35°C and 60°C. In the next steps, we counted the number of inhabitable bacteria, and the colony was isolated, and bacterial species were considered by DNA analysis. In clean dishwashers, only 102CFU/100cm² or less bacteria were detected, while poor operation dishwashers, 103–6CFU/100cm² bacteria were detected in red slime, and the species were identified. In result, we identified the total of 42 bacteria species. In the studies on, *B.subtilis*, spore-forming was detected from all industrial dishwashers at 35°C. The second in number is *Acinetobacter* spp., and third one is *Micrococcus* spp., which is followed by *Paracoccus* spp. with high frequency. These bacterial species that grow in environment, is not food poison species. Thermophilic bacteria such as *Anoxybacillus* spp. was detected at 60°C. These bacteria are found in the washing tank, and these results suggest that it can grow even under the high temperature (60°C) and high alkali condition (pH11–12). Furthermore, there are a lot of gram-positive bacteria even in high temperature and high humidity. Although toxic bacteria was not detected, we understand that it is not hygienic to many bacteria was detected. We will study the control of bacteria by disinfectant in the future.

Keywords: *food industry disinfectant, dishwasher, red slime, identify, spore-forming bacteria, alkaliphilic thermophilic bacteria*

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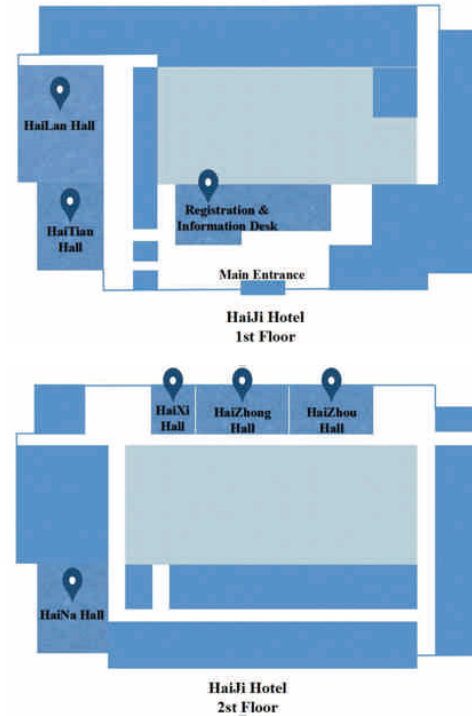


25th PACON-International
Maps & Weather

Campus Map



Haiji Hotel



MON						
MAR 27	Sunny	64° 40'	10%	NNW 4 mph	53%	
TUE						
MAR 28	PartlyCloudy	59° 42'	20%	SE 6 mph	59%	
WED						
MAR 29	MostlyCloudy	65° 46'	20%	SSW 5 mph	66%	
THU						
MAR 30	PartlyCloudy	66° 49'	20%	ENE 5 mph	72%	



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