IMBeR West Pacific Symposium 2021

Session 5: Towards the Sustainable Indo-Pacific Region (IPR): Marine Biogeochemistry and Biodiversity

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The IPR is the linkage between the West Pacific Ocean (WPO) and the East Indian Ocean (EIO), covering complex ocean channels and numerous tropical islands. As an important node for global ocean conveyor belt, the IPR hosts active interactions among atmosphere, water and soil/sediments. The high-level biodiversity in the IRP is also well known, likely supported by the diverse biogeochemical processes and warm environment. This session focuses on the biogeochemistry studies from the view of climate change, e.g., solute dispersion, chemical transformation and biological assimilation, as well as biodiversity research across temporal scales, e.g., species diversity, evolutionary origins and biodiversity drivers. Furthermore, as a region deeply influenced by anthropogenic activities, topics regarding marine economics and management are also contained in this session.

The session was headlined by a keynote address from Prof. Fan Wang, the Chair of the Centre for Ocean Mega-Science, Chinese Academy of Sciences (CAS) and Yantai Institute of Coastal Zone Research, CAS (YICCAS). Prof. Wang introduced the importance of IPR as the centre for matter and energy transport on a global scale and highlighted the complex biogeochemical transformations and high-level biodiversity driven by the multi-sphere interactions. According to the database established from cruises organized by CAS and predicted climate change scenarios, Prof. Wang also highlighted the possible variations of biodiversity in the IRP in the future, which received great attention from session attendees.

The first two speakers, Erika Grace Gernato and Prof. Aida Sartimbul are marine biologist. Erika offered a presentation on community structuring of bacteria/archaea in a mariculture-impacted area, located at the Philippine coast. The correlation between microbial distribution pattern and environment settings highlighted the influence of anthropogenic activities on marine environment stability and resilience. The presentation from Prof. Sartimbul detailed the variability of Sardine community at fishing ground Prigi-Trenggalek via the mtDNA information. The annual changes in species and population from the present research benefit the local fishery

community and offers a reference for investing the pressure of climate changes on marine culture. The third speaker, Prof. Yan Du, gave attendees an excellent summarization on ocean currents in the IRP. He highlighted the complexity of deep-water circulation and importance of monsoons as a water circulation driver. Afterwards, Man Ying Mok, another marine biologist, shared her latest finding on sea urchin community distribution in Peninsular Malaysia. The environmental factors, e.g., water temperature and primary production, as previously outlined by Prof. Du, would be key drivers for sea urchin distribution in the IRP.

The fifth presentation, from Prof. Masao Ishii, attracted our attention from coastal zone to open ocean. He detailed ocean acidification in the tropical Pacific, typically in the region of the warm pool. The solid observation data and historical review on CO2 accumulation in the equatorial ocean received great interests from oceanographers. Followed with the thread of carbon, Prof. Patrick Martin, showed a comprehensive study on the terrestrial carbon transport and transformation in tropical peat systems and displayed the significant increases in land-derived carbon loading during the past 20 years due to the land-use changes. Afterwards, Dr. Punyasloke Bhadury and Maria Anna Michaela De La Cruz also offered presentations related with carbon cycling, focusing on marine planktonic cyanobacterial communities and pico-eukaryotic microbial communities, respectively. The dynamic of plankton in tropical oceans, frequently driven by monsoons, triggers the variation of dissolved organic carbon concentration in the photic zone. Yixue Zhang, a speaker from East China Normal University, highlighted such variations in the South China Sea and linked the composition of pelagic organic matter to biological province in her presentation. Apart from phytoplankton, mangrove forests are also key primary producers in tropical ocean systems. Prof. S.M. Mustafizur Rahman and Prof. Ashraful Azam Khan demonstrated health status and nutrient dynamics in mangrove ecosystems, respectively, according to their long-term survey in Bangladesh mangroves. At the end, Dr. Haiyan Sun illustrated publishing details in Elsevier Oceanography journals and warmly invited research submissions to the symposium special issue. Beside oral presentations, several researchers showed their important outcomes via posters (online).

As aforementioned, the IRP is an important node on ocean conveyor belt and supports the livelihood for millions of people. A scientific understanding on marine biogeochemistry and related biodiversity in the IRP is critical, especially for reaching a sustainable economy development for coastal citizens. This research challenge calls for continuous efforts from the scientific community, managers and stakeholders.