2023 BioGeoSCAPES National Meeting of Taiwan

Meeting overview

The first BioGeoSCAPES National Meeting of Taiwan took place online through Webex on August 22, 2023 and was moderated by the two national representatives, Chuan Ku and Tung-Yuan Ho. The meeting started with a general introduction to BioGeoSCAPES and to each of the 14 participants, who are affiliated to six institutions in Taiwan. Tung-Yuan Ho talked about his experience in participating in the international GEOTRACES program (https://www.geotraces.org/) and how it is related to and different from BioGeoSCAPES. We then moved on to discuss the four questions about BioGeoSCAPES (see below), how our expertise and research interests can fit in the scope of BioGeoSCAPES and how the scientists in Taiwan can potentially work together contribute to and benefit from the international community. Finally, we decided on a new national representative, Wen-Hsuan Liao, who succeeds Tung-Yuan Ho in this function.

Question 1

What are your thoughts on the preliminary BioGeoSCAPES mission statement ("To improve our understanding of the functioning and regulation of ocean metabolism and its interaction with nutrient cycling within the context of a hierarchical seascape perspective")? How could this be improved?

We much appreciate the goal of BioGeoSCAPES to link biological metabolism and biogeochemical cycling in the ocean. We also note that the scope might be too broadly defined that it could not be easily associated with focused aims and research plans. The term "hierarchical seascape perspective" also seems to be too vague. Compared with the original version of the mission statement (above), we feel that the revised one from the Canadian BioGeoSCAPES community better describes the actions to be taken in this international project and why this is more needed than ever ("changing planet"). In addition, we think it is important to point out in the mission statement that BioGeoSCAPES aims to achieve a global view of microbial metabolism with interoperable methods applicable to different oceanic regions.

Question 2

How would your nation best contribute to BioGeoSCAPES efforts? e.g. fieldwork, laboratory work, modelling, intercalibration efforts, project coordination, data management, bioinformatics

Taiwan has expertise in the different fields listed above, from experiments and sampling conducted in the lab and the field to omic profiling and data analyses. Intercalibration is a very complicated and general topic. Different strategies for intercalibration should be employed for different experimental and measurement methods, types of biological and geochemical information, microbes and their taxonomic resolution, and sampling locations. Given the unpredictable nature of microbial abundance and distribution, it might be particularly challenging to develop a sampling and experimental protocol that integrates geochemical measurements, biological experiments, and barcoding/omic analyses, and can be applied to different locations. We hope the collaboration in the BioGeoSCAPES community can better address this issue.

Labs in Taiwan have been carrying out regular survey and seawater sampling in the tropical and subtropical regions of Western Pacific. We have access to four research vessels and three tropical research stations (Green Island Marine Research Station, Dongsha Atoll Research Station, and Nansha Marine Station). In addition to regular sampling, Taiwan recently purchased a new trace metal clean water sampling system which will soon enable us to obtain trace metal clean samples for different types of marine research. Beyond collaboration in research, we would also be happy to contribute to BioGeoSCAPES by hosting international workshops and meetings, including the Scientific Steering Committee meetings.

Question 3

What science questions are most important to your nation within the broad scope of BioGeoSCAPES on a 10-year timeframe?

The geographic setting of Taiwan allows us to explore the influence of different physico-chemical processes and environments on microbial communities and ocean metabolism.

1. What are the impacts of typhoons (or tropical cyclones) on marine microbial communities, ecosystem dynamics, and elemental cycling?
2. What are the roles of Kuroshio Current (part of the North Pacific Gyre extending from the Philippines to Japan) in shaping the distribution of nutrients, microbes, and primary productivity?
3. How is nitrogen metabolism (incl. nitrogen fixation) regulated in marine microbes and how does it influence nitrogen cycling in oligotrophic environments?
4. What are the microbial communities in deep sea environments (which surrounds 2/3 of Taiwan's seashore) and how do they influence biogeochemical processes?
5. How does climate change affect coral reefs and their microbes, and what is its biogeochemical consequences?

Question 4

Are there any impediments that the international community could seek to mitigate via training or collaboration?

Besides interoperable protocols from BioGeoSCAPES, we hope to improve our expertise in biogeochemical modeling by participating in workshops or collaboration.
Around Taiwan in the Western Pacific, research cruises are often restricted by exclusive economic zones of neighboring countries (China, Japan, the Philippines, etc.). By collaborating with international BioGeoSCAPES community, we hope to gain more access to these regions.

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Meeting photo (August 22, 2023)

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