

REPORTING FORM 2024

Please return completed form to imber@ecnu.edu.cn by **26th July**

REPORTING PERIOD: WHAT YOU HAVE DONE since the annual report submitted for the SSC meeting held in Paris in April 2023 ([Link to past annual reports](#))

and **PLANNED ACTIVITIES** over the next year (and beyond if details available)

N.B. The form focuses reporting on the research objectives (2022-2025) of the Grand Challenges (in order to align with how we are addressing IMBeR's commitments defined in the 5-year review process to SCOR and Future Earth).

Thank you.

Insert name of Grand Challenge

List authors

1. Ongoing activities, in line with the IMBeR Grand and Innovation Challenges

(Among other uses, information will be used to update the [IMBeR Annual Report to SCOR](#))

1.a. Grand Challenge I

Understanding and quantifying the state and variability of marine ecosystems - with focus on Research Objectives 1 to 3:

Research Objective 1. *Evaluate and predict the cumulative effect of multiple stressors*

Research Objective 2. *Integration of climate change and climate variability*

Research Objective 3. *Impacts on society – preparation for a changed future*

The ocean is the largest active carbon reservoir on the planet, absorbing approximately 25-30% of the carbon dioxide emitted by human activities. Consequently, ocean-based carbon removal technology is considered one of the most cost-effective ways to achieve “net zero emissions.” However, significant uncertainties remain in estimating carbon fluxes within the ocean's interior, primarily due to a lack of understanding of how biological processes affect carbon flow and how carbon fluxes vary throughout the water column and across coastal and open ocean boundaries. In response to this challenge, the National Science and Technology Council of Taiwan has launched a four-year project (2023-2026) entitled “Integrated Blue Carbon Research in the Northwest Pacific.” This project aims to depict the carbon cycle in a three-dimensional fashion through investigative and observational goals. The integrated project consists of three subprojects: (1) the study of the structure of the plankton food web and carbon and energy flow in the euphotic zone; (2) the study of carbon fluxes throughout the water column; and (3) the study of coastal blue carbon. To date, we have quantified the natural carbon sinks in and around Taiwan, finding that forests, sediments, and oceans account for approximately 21.5, 42.1, and 96.8 Mt-CO₂ per year, respectively. This is significantly less than Taiwan's CO₂ emissions, which total 280 Mt-CO₂ per year. Therefore, novel carbon dioxide removal (CDR) strategies such as bioenergy with carbon capture and storage,

afforestation, reforestation, biochar, seaweed cultivation, and ocean alkalinity enhancement are imperative to reach carbon neutrality by 2050 (Hung et al., 2024).

1.b. Grand Challenge II

Improving scenarios, predictions and projections of future ocean-human systems at multiple scales - with focus on Research Objectives 4 to 6:

Research Objective 4. *Development of integrated data systems and approaches for predictions and projections*

Research Objective 5. *Development of predictive models and projections for use at regional scales*

Research Objective 6. *Development of alternative scenarios to bridge the gap between physical climate sciences and humanities*

Add text...

1.c. Grand Challenge III

Improving and achieving sustainable ocean governance - with focus on Research Objectives 7 to 9:

Research Objective 7. *Develop knowledge on best practices for multilevel governance approaches to ocean climate adaptation and mitigation*

Research Objective 8. *Develop understanding on key ingredients for transformation towards more sustainable, equitable and inclusive governance approaches to fisheries and aquaculture*

Research Objective 9. *Support implementation of post-2020 biodiversity targets for marine spatial planning and marine protected areas*

Add text...

1.d. Innovation Challenge 3

To advance understanding of ecological feedbacks in the Earth System

Add text...

1.e. Innovation Challenge 4

To advance and improve the use of social science data for ocean management, decision making and policy development

Add text...

1.f. Innovation Challenge 5

Interventions to change the course of climate impacts

[Add more rows if needed]		

**If appropriate, please list the IMBeR activity through / by / from / during which the publication arose*

**** **Notes on publications** ****

Publications are logged in the IMBeR Zotero library which is publicly accessible online –

[Publications since 2016](#) | [Publications prior to 2016](#)

Publications are categorised by “Class” and linked to “Activities”:

Class 1 publications are specifically generated through/by/from/during ***IMBeR activities*** - for example, arising from IMBIZOs and IMBeR conferences such as the IMBeR open science meeting and the IMBeR West Pacific symposia and from the activities of the working groups, regional programmes and the SPIS scoping teams.

Class 2 publications are on topics relevant to the IMBeR Science Plan that benefitted from some interaction with IMBeR or ***IMBeR activities***, for example by IMBeR symposium attendees, past and present SSC members, working group, regional programme and endorsed project members, or national contacts.

Class 3 publications are on topics relevant to the IMBeR Science Plan but for which there is no direct link to or benefit from an IMBeR activity. These might include publications by SSC members, working group, regional programme or endorsed project members or members of the IMBeR international community that were written as part of the normal scientific activity of the authors and would have occurred irrespective of IMBeR’s existence. You can report Class 3 publications, but they will no longer be logged in the IMBeR database.

[See “[What is an IMBeR publication?](#)” for further information]

Why list ‘Class’ and ‘Activity’? This helps us to declare authentically which publications IMBeR has helped to generate, and it makes it easier for us to demonstrate the value of the Regional Programmes, the Working Groups, and IMBeR in general, and it helps us to justify support for IMBeR activities when we can list tangible outputs.

2.c. Events, Meetings, and Workshops

List all international and national events, meetings and workshops. Describe the level of participation: e.g. chairing session/workshop, organising meeting. Include Endorsed Projects committee meetings and workshops.

Format: Title of event. Date. Location. Description of participation. Any other pertinent details.

Add text...

"Oceanic and Coastal Blue Carbon: Charting New Frontiers in Climate Mitigation and Approaching Net Zero Emissions" session at the 21st Annual Meeting of the Asia-Oceania Geoscience Society

(AOGS) in Pyeongchang, South Korea, held from June 23-28, 2024. Dr. Wen-Chen Chou served as the convener and chair for this event.

3. International collaboration and links

Add text...

4. Input to management, policy and SOCIETY* over the last year

Add anything that is not covered under "1.c. Grand Challenge III"

**As previous reporting forms requested 'input to management and policy' only, please add any 'input to society' not captured in previous reports*

Add text...

5. Education, outreach and Capacity Development

Add text...

6. Planned activities

6.a. Activities and Outreach and how they link to the Challenges (including, but not limited to convening sessions, meetings, summer schools, workshops, etc)

Add text...

6.b. Upcoming papers (Community-Position-Review-etc)

Add text...

7. Funding

7.a. Funding from external sources

National Science and Technology Council of Taiwan (#112-2119-M-019 -008)

7.b. Funding proposals in progress or planned

7.c. Funding requested from IMBeR for 2024-2025

Include a brief budget and justify requests

8. Changes to Organisational Structure

Add text...

9. Images / Figures

*****It is always good to have some recent photos / figures / infographics to create more exposure for the Regional Programmes, Working Groups, etc. These can range from those suitable for a very scientific audience, to those that would engage the general public. IMBeR would use these, on the website (e.g. <http://www.imber.info/> and <http://www.imber.info/en/news>), in tweets (@imber_ipo), in presentations, etc. In addition, Future Earth (one of our sponsors) regularly asks us to provide high quality images for their glossy reports. These can highlight the activities of IMBeR and their other Global Research Projects (see pdfs of past Future Earth reports here <https://futureearth.org/publications/annual-reports/>)*

*So, please provide any images that you might think are useful. These can be pasted in this document or emailed as an attachment to imber@ecnu.edu.cn.*****



Photo: in situ photosynthetic performance measurement in a seagrass bed at the southern tip of Taiwan.

10. Anything not covered above

Add text...

11. How to improve this form

Please give suggestions on how to improve this form and make it better next time.

Add text...

12. Appendices

Add appropriate meeting / workshop reports and include URLs (this helps to track where online content is missing)

Add text...