

## WG170: Physiology and Rates in Microbial Oceanography (PRIMO)

### 1. Brief summary with the main highlights (200-300 words)

WG170 was informed of its selection for funding by SCOR on 8 Nov. 2023. This news was announced to the participants of the [International BioGeoSCAPES science planning workshop](#) (6-9 November 2023, Woods Hole Oceanographic Institute), which resulted in expressions of interest from several participants to contribute to our working group activities (via our extended network, PRIMONet). A presentation was given by E. Bertrand at the Ocean Science Meeting 2024 Town Hall: Accelerating Toward an International BioGeoSCAPES Program on 20 February 2024 to disseminate information on the aims of the PRIMO working group and build community engagement.

Following the guidance of the SCOR national committees review of our proposal, we recruited two additional members to the working group from South America (Cecilia Alonso, Microbial Ecology of Aquatic Systems Research Group, Centro Universitario Regional del Este, Universidad de la República, Rocha, Uruguay, and Peter von Dassow, Departamento de Ecología, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Santiago, Chile).

The PRIMO working group has met regularly since February 2024 (the leadership team has met regularly online since November 2023), including a one-day hybrid meeting of PRIMO and PRIMONet members (15 members online and 8 members in person) in Les Diablerets, Switzerland following the Marine Microbes Gordon Research Conference on 14 June 2024. A key outcome of these meetings was the assignment and division of tasks to achieve our first Term of Reference (ToR): the review, gap analysis, and ranking of current physiological metrics.

In July 2024 we launched the PRIMO website (<https://www.primoscorwg.org>) and the mentorship program (<https://www.primoscorwg.org/mentorship-program>).

### 2. Activities since previous report to SCOR (e.g., virtual or in-person meetings, email discussions, special sessions). Limit 1000 words

A brief presentation was made to the participants of the International BioGeoSCAPES science planning workshop (E. Bertrand, 6-9 November 2023, Woods Hole Oceanographic Institute) to articulate the aims of the working group.

A presentation was given by E. Bertrand at the Ocean Science Meeting 2024 Town Hall: Accelerating Toward an International BioGeoSCAPES Program on 20 February 2024 to disseminate information on the aims of the PRIMO working group and build community engagement.

Cecilia Alonso (Uruguay) and Peter von Dassow (Chile) became members of the working group.

The PRIMO leadership team (M. Maldonado, K. Ziervogel, E. Bertrand, R. Strzepek) have met regularly online since November 2023 and typically correspond weekly via email. The full working group has met 3 times online since February 2023. A well-attended (23 members and affiliates) one-day hybrid

meeting was held in Les Diablerets, Switzerland following the Marine Microbes Gordon Research Conference on 14 June 2024.

The working group has divided into 4 subgroups to tackle the ToR 1 deliverable: the review, gap analysis, and ranking of current physiological metrics. We have set a deadline of 15 September 2024 to complete the preliminary version of a database that will summarize our findings.

In July 2024 we launched the PRIMO website (<https://www.primoscorwg.org>). This website will be the platform for the ToR 1 deliverable of an online database of current and desired physiological metrics, highlighting metabolic processes revealed by 'omics that are critical for quantifying marine microbial metabolism, but that we do not currently have assays for. We aim to launch this online database in Sept-Oct 2024. The website will also be home to the ToR 3&4 deliverable of a web-based marine microbial assay workflow optimization tool.

In July 2024 we launched the PRIMO mentorship program (<https://www.primoscorwg.org/mentorship-program>). We will select 10 applicants after the call for applications closes on 16 September 2024.

We have been invited to submit a *Nature Microbiology* comment piece (Editor: Kyle Frischkorn) that we will use to articulate our working group's aims and set the stage for our more substantive Perspective piece (ToR 2 deliverable). We are currently discussing the next steps and forming a plan.

3. Documents published since previous report to SCOR (e.g., peer-reviewed journal articles, reports, Web pages) and should be limited to publications that resulted directly from WG activities and which acknowledge SCOR support

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We have been invited to submit a *Nature Microbiology* comment piece (Editor: Kyle Frischkorn) which will set the stage for our more substantive Perspective piece (ToR 2 deliverable).

4. Progress toward achieving group's terms of reference. List each term of reference separately and describe progress on each one. Limit 1000 words

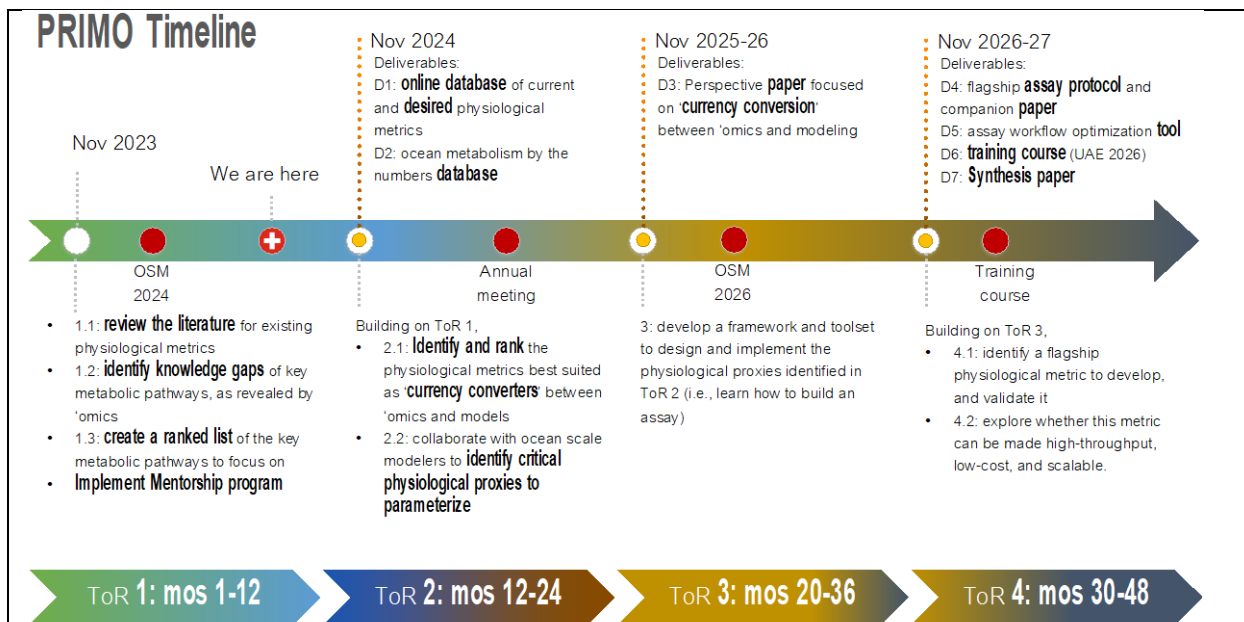


Figure 1. Primo Working Group Timeline showing the ToRs and deliverables.

**Term of Reference (ToR) 1.** Review current physiological metrics, identify the key gaps in our understanding of marine microbial metabolism as revealed by 'omics that are candidates for the co-design of new physiological assays, and rank these candidate assays according to their likely success for development and their biogeochemical importance.

**Progress:** the review, gap analysis, and ranking of current physiological metrics is currently under way. Working group members have broken into 4 subgroups to construct a 'table of metrics'. We have set a deadline of 15 September 2024 to complete the first version of this database, which we will then share on our website and update on a regular basis.

We have implemented our Mentorship program, which aims to connect postdocs and senior graduate students from any nation with PRIMO scientists (full, associate and network members) to develop an international community of early career scientists interested in the goals of our working group. In addition to interacting with their PRIMO mentors, the fellows will participate in monthly PRIMO all-hands meetings (virtual) for at least 12 months. Once in the mentorship program, we will work with the mentees to access funds, from SCOR and elsewhere, for possible laboratory exchanges and participation in scientific meetings. We intend to select 10 applicants in September 2024.

### ToR2

Identify the physiological metrics of marine microbial metabolism best suited to convert between the currencies of 'omics datasets and models, from cellular (fine scale) to BGC (coarse scale) models, using the WGs combined expertise in 'omics, physiology and modeling, and the knowledge gained from ToR 1.

**Progress:** ToR 2 will build on the work done for ToR 1 and will start in November 2024.

**ToR3**

Determine the pathways to implementation with respect to assay development (learning the design process from systems biology, ecotoxicology, and biomedical sciences), and in doing so develop a framework and toolset for discovering proxies of marine microbial physiological processes that can bridge 'omics and models.

**Progress:** ToR 3 will build on the work done for ToR 2 and will start in November 2025.

**ToR4**

As a proof of concept, identify a flagship physiological metric to develop, using the roadmap designed in ToR 3, and assess whether this can be made high throughput and integrated with new observational platforms to stimulate the co-measurement of marine microbe 'omics, physiology, and the BGC processes.

**Progress:** ToR 4 will start in November 2026.

5. WG activities planned for the coming year. Limit 500 words

PRIMO will continue its work on ToR 1. We anticipate that the preliminary database will be online by around September 2024, but it is a living document that will continually be improved upon over the lifetime of the working group. In addition, we will advocate for community participation in BioNumbers for our 'ocean metabolism by the numbers' database. We will discuss paths to implementation of the BioNumbers database in our Sept 2024 meeting.

We will continue to hold (bi-)monthly online meetings of full, associate and affiliated members of PRIMO as we complete ToR 1 and transition to ToR 2. We have begun planning for a larger meeting (~30 people) for May 2025 to bring many disciplines together to discuss ToR 2/3. We are discussing location (possibly Amsterdam) and ways to raise funds to support the attendance of invitees from disciplines that can inform ocean microbial metabolism.

We will submit an invited comment piece to *Nature Microbiology* (Editor: Kyle Frischkorn) in which we will articulate our working group's aims (revitalizing physiological studies in environmental microbiology) and set the stage for our more substantive Perspective piece (ToR 2 deliverable).

6. Is the group having difficulties expected in achieving terms of reference or meeting original time schedule? If so, why, and what is being done to address the difficulties Limit 200 words

PRIMO is currently on track to achieve its terms of reference on the original time schedule.

7. Any special comments or requests to SCOR. Limit 100 words.

None at this time. Thank you for your support.

Additional information can be submitted and may be posted at the SCOR Annual Meeting webpage at the discretion of the SCOR Executive Committee Reporter for the WG and the SCOR Secretariat.