



CCAMLR

Commission for the Conservation of Antarctic Marine Living Resources
Commission pour la conservation de la faune et la flore marines de l'Antarctique
Комиссия по сохранению морских живых ресурсов Антарктики
Comisión para la Conservación de los Recursos Vivos Marinos Antárticos

SCIENTIFIC COMMITTEE

SC-CAMLR-43/BG/10

02 September 2024

Original: English

Establishing a Weddell Sea observatory: The WOBEC initiative for long-term monitoring of biodiversity and ecosystem change

Teschke, K., A. Van de Putte, F. Schaafsma, K. Campbell, C. Christian, H. Link, S. Moreau, S. Niiranen, C. Papetti, R. Roura, J. Stefels, J. Wiktor and H. Flores



This paper is presented for consideration by CCAMLR and may contain unpublished data, analyses, and/or conclusions subject to change. Data in this paper shall not be cited or used for purposes other than the work of the CAMLR Commission, Scientific Committee or their subsidiary bodies without the permission of the originators and/or owners of the data. This document was submitted to the meeting of the Scientific Committee and should be read in conjunction with relevant report paragraphs.

Establishing a Weddell Sea observatory: The WOBECE initiative for long-term monitoring of biodiversity and ecosystem change

Katharina Teschke^{1,2}, Anton Van de Putte^{3,4}, Fokje Schaafsma⁵, Karley Campbell⁶, Claire Christian⁷, Heike Link⁸, Sebastien Moreau⁹, Susa Niiranen¹⁰, Chiara Papetti¹¹, Ricardo Roura⁷, Jacqueline Stefels¹², Józef Wiktor¹³ and Hauke Flores¹

¹ Alfred Wegener Institute, Helmholtz-Centre for Polar and Marine Research, Bremerhaven, Germany; ² Helmholtz Institute for Functional Marine Biodiversity at the University Oldenburg, Oldenburg; Germany; ³ Institute of Natural Science, Brussels, Belgium; ⁴ Université Libre de Bruxelles, Brussels, Belgium; ⁵ Wageningen University & Research, Den Helder, Netherlands; ⁶ UiT The Arctic University of Norway, Tromsø, Norway; ⁷ Antarctic and Southern Ocean Coalition, Washington, D.C., USA; ⁸ University of Rostock, Rostock, Germany; ⁹ Norwegian Polar Institute, Tromsø, Norway; ¹⁰ Stockholm University, Stockholm, Sweden; ¹¹ University of Padua, Padua, Italy; ¹² University of Groningen, Groningen, Netherlands; ¹³ Institute of Oceanology Polish Academy of Sciences, Gdansk, Poland

Abstract

The purpose of this paper is to update CCAMLR about the Weddell Sea Observatory of the Biodiversity and Ecosystem Change (WOBECE) project. WOBECE aims to establish a systematic ecosystem monitoring framework in the eastern Weddell Sea that can be used to measure biodiversity and ecosystem change. The WOBECE study area covers parts of the proposed Weddell Sea Marine Protected Area (WSMPA) Phases 1 and 2, so an observatory established here in the future could be an integral part of the WSMPA Research and Monitoring Plans. WOBECE will be developed in close co-operation with CCAMLR and its various stakeholders, as well as with other monitoring initiatives in the Southern Ocean and beyond, to ensure the best possible integration of results based on broad acceptance.

1. Background

In recent years, the idea of establishing a long-term observatory in the Weddell Sea has gained traction. Three independent initiatives advanced this initiative in 2022:

- (1) A synthesis paper was published (Gutt et al. 2022), emphasising the need for long-term data and a better ecosystem understanding to address the impacts of climate change and support science-informed management in the East Antarctic Southern Ocean.
- (2) A multinational pilot study was conducted with RV *Polarstern* as a proof of concept to address the need for quantitative information on the Antarctic ecosystem in a well-defined and diverse region of the Weddell Sea. Further details on this pilot study can be found in WG-EMM-2022/43 (Jones et al. 2022).
- (3) Under the EU Biodiversa+ call "Improved transnational monitoring of biodiversity and ecosystem change for science and society (BiodivMon)" (<http://www.biodiversa.eu/2022/10/07/2022-2023-joint-call>), a project proposal entitled "WOBECE - Weddell Sea Observatory of Biodiversity and Ecosystem Change" was submitted and accepted (duration: 01/04/2024 - 31/03/2027).

2. WOBECE in a nutshell

The WOBECE project officially started in April 2024 for the next three years, and consists of a consortium of scientists from eleven institutes from eight countries (see <https://wobec.aq/team/>).

2.1. Study area

The WOBECE study area has its western boundary at 20°W, its eastern boundary at 10°E and its northern boundary at 60°S (see Fig. 1). This area encompasses near-pristine habitats from the coast to the deep sea, includes pack ice and seamount communities, and currently shows less pronounced climate-induced changes compared to other regions in the Southern Ocean (see more details in Gutt et al. 2022). It is logistically well located, simply because it is close to the Neumayer Station III, which is regularly supplied by RV Polarstern. And finally, it covers parts of the proposed MPAs in the Weddell Sea (WSMPA Phases 1 and 2).

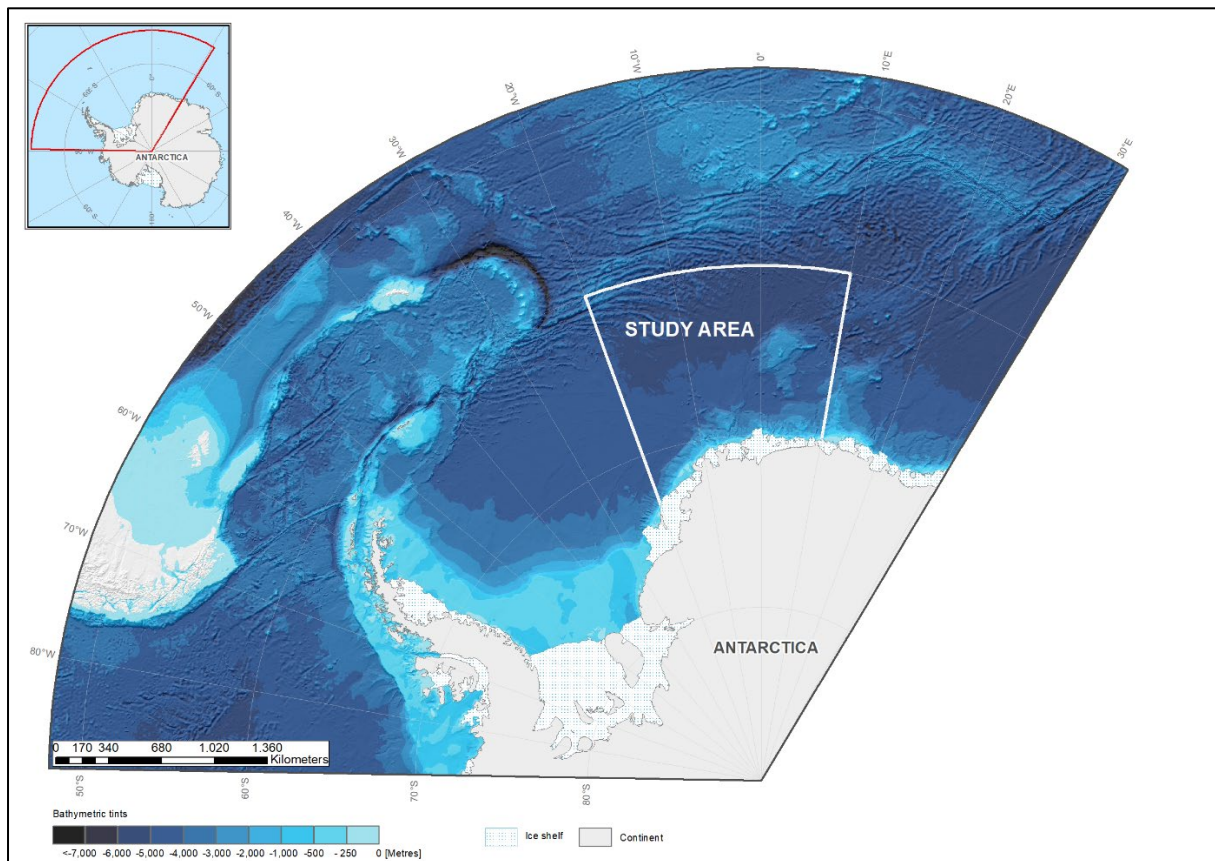


Figure 1: WOBECE study area in the eastern Weddell Sea. Sources: Quantarctica (Matsuoka et al. 2021) for base layers of Antarctic continent and ice shelf; IBCSO v2 (Dorschel et al. 2022) for bathymetric layer.

2.2. Main objectives & activities

WOBECE aims to establish the "DNA" for a systematic ecosystem monitoring framework in the eastern Weddell Sea that can be used to measure ecosystem change by achieving the following objectives:

- (1) Making the baseline biodiversity and ecosystem knowledge of the Eastern Weddell Sea globally accessible to the public;
- (2) Engaging stakeholders in a participatory process to develop a scientific monitoring framework with potential application in the WSMMPA Research and Monitoring Plans;
- (3) Crafting and implementing an innovative multiscale monitoring strategy that integrates traditional methods with cutting-edge technology.

WOBEC builds on a comprehensive co-design process with stakeholders to develop a monitoring framework that takes into account the latest scientific knowledge and societal needs, which will be developed in a series of stakeholder-science workshops. To provide the necessary knowledge base, we will add current and emerging ecosystem data to the existing databases compiled in the framework of WSMMPA P1 and P2 and make it available via publicly accessible data portals, e.g., OBIS and SOOSmap. In addition, we will assess and apply available technologies for their suitability for long-term monitoring at different spatial and temporal scales, including autonomous observatories, earth observation and traditional ship-based methods. Finally, we will analyse ecological data to generate scientific products such as statistical models and maps facilitating an iterative process to inform and refine the co-design process of the WOBEC monitoring framework. WOBEC will provide publicly available scientific data from the past five decades to the present and a socially relevant monitoring framework for future continuation, including a data management plan and standard operating procedures for sampling essential variables (EVs).

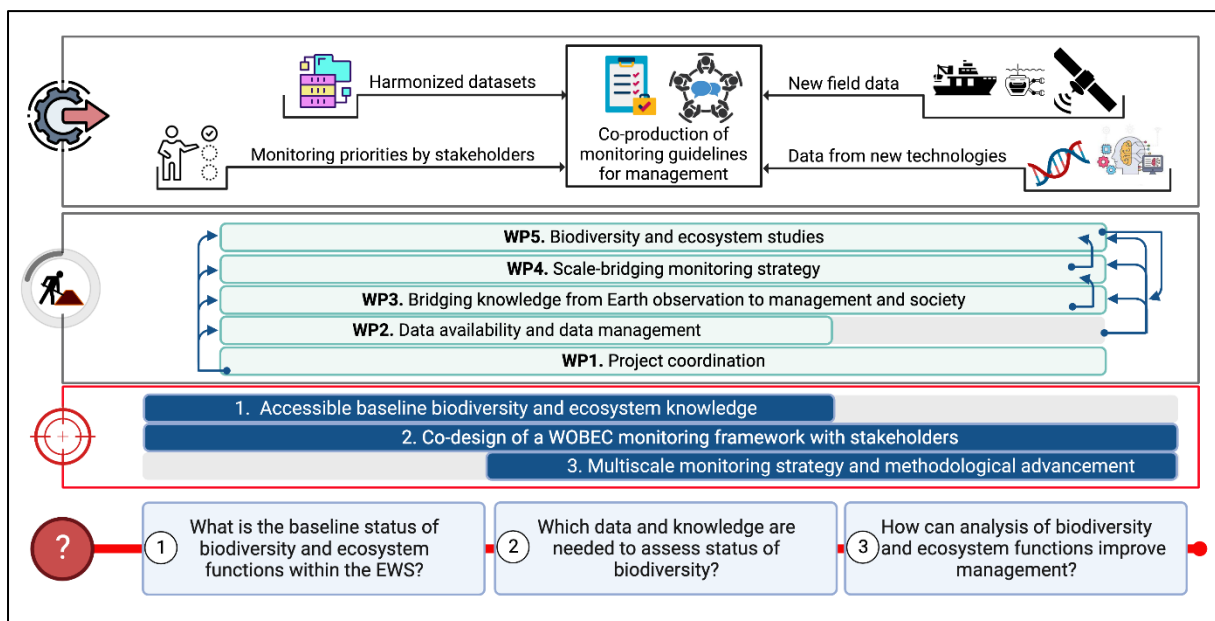


Figure 2: Relationships and coverage of research questions (bottom), and WOBEC work packages (WP1-5). Lateral arrows indicate main synergies among WPs, with final outcomes (top).

2.3. Previous activities & news

- 12 March 2024: Acceptance of *Polarstern* cruise application to the WOBEC study area in 2025/2026 (PS152; Project: WOBEC Heike Link (GPF 24_1_019) - Neumayer Support; <https://www.awi.de/en/about-us/logistics/schedules/polarstern-longterm-cruise-planning.html>)
- 17 April 2024: Participation in the kick-off meeting for the 33 research projects funded under the BiodivMon research call (Tallinn, Estonia) (www.biodiversa.eu/2024/04/24/biodivmon-kick-off-highlights/)
- 6-7 June 2024: Participation in the Biodiversa+ virtual workshop on data management plans and data standardisation (Darwin Core)
- 7 June 2024: Launch of the WOBEC website (<https://wobec.aq/>), which will provide information and products of the WOBEC project in the future
- 11-14 June 2024: WOBEC kick-off workshop in Bremerhaven, Germany
- 30 July 2024: Submission of the data management plan (vers. 1.0) to the Biodiversa+ team
- 1-12 July 2024: Presentation of WOBEC at WG-EMM-24
- 19-23 August 2024: Presentation of WOBEC at the SCAR Ocean Science Conference

3. References

- Dorschel, B., Hehemann, L., Viquerat, S., ... (+ 56 authors), Arndt, J.E. (2022): The International Bathymetric Chart of the Southern Ocean Version 2 (IBCSO v2) [dataset]. PANGAEA, <https://doi.org/10.1594/PANGAEA.937574>
- Gutt, J., Arndt, S., Barnes, D.K.A., ... (+ 25 authors), Piepenburg, D. (2022): A framework to observe, understand, and project ecosystem response to environmental change in the East Antarctic Southern Ocean. *Biogeosciences*, 19, 5313-5342, <https://doi.org/10.5194/bg-19-5313-2022>
- Jones, C., Bach, M., Barnes, D.K.A., ... (+ 24 authors), Vortkamp, M. (2022): The Eastern Weddell Sea Observation System (EWOS): A Multinational Initiative that Provides Coordinated and Systematic Observations of the Antarctic Marine Ecosystem, Meeting of CCAMLR Working Group on Ecosystem Monitoring and Management, virtual meeting, 04 to 11 Jul 2022, WG-EMM-22/43
- Matsuoka, K., Skoglund, A., Roth, G., ... (+ 18 authors), Melvær, Y. (2021): Quantarctica, an integrated mapping environment for Antarctica, the Southern Ocean, and sub-Antarctic islands, *Environmental Modelling & Software*, 140, 105015, <https://doi.org/10.1016/j.envsoft.2021.105015>