

## Minutes

### 4<sup>th</sup> Meeting of the Baltic Earth Working Group “Marginal Seas – Humans and Environment”

online (Zoom), June 2, 2026, 3-5 pm CEST

#### Participants:

Helge Arz, Germany (HA); Sonja Ehlers, Germany (SE); Junjie Deng, China (JD); Cátia Milene Ehler von Ahn, Germany (CvA); Peter Clift, UK (PC); Joanna Dudzińska-Nowak, Poland (JDN); Gary Greene, USA (GG), Mayya Gogina, Germany (MGo); Matthias Gröger, Germany (MG); Jan Harff, Poland (JH) (protocol); Kari Hyytiäinen, Finland (KH); Chris Jenkins, USA (CJ), Katarzyna Kozirowska-Makuch, Poland (KKM); Karol Kuliński, Poland (KK); Susanne Kratzer (SK); Markus Meier, Germany (MM); Lev Naumov, Germany (LN); Janika Reineccius, Germany (JR); Tarmo Soomere, Estonia (TS); Juliana Ivar do Sul, Germany (JIS); Detlef Schulz-Bull, Germany (DSB); Joanna Waniek, Germany, (JW); Kehui Xu, USA (KX)

#### Preface (aim of the meeting):

The fourth meeting of the Baltic Earth Working Group “Marginal Seas – Humans and Environment” was held online following the 6th Baltic Earth Conference and served to evaluate the results of the Marginal Seas Topical Session of the 6<sup>th</sup> Baltic Earth Conference (<https://baltic.earth/events/details/heringsdorf2026>) organized by the MargSeas Group. The meeting aimed to prepare for the conclusion of Phase I of the working group's activities—specifically, the elaboration of a joint White Paper on the significance of marginal seas in terms of UN Sustainable Development Goal 14 (SDG 14).

#### Agenda

1. Welcome JH
2. Agenda, JH
3. WG activities, Phase I (2024-2026), JH
4. Publication (“White Paper”)
  - 4.1. General Goal, JH
  - 4.2. Outline (draft attached)
    - Discussion
  - 4.3. Time lines
    - Discussion
  - 4.4. Journal
    - Discussion

5. Further planning: Work phase I
  - Discussion
6. To Do
7. Summary and conclusion, JH

## **Results:**

### **Ad 3.) WG activities**

JH referred to the outcomes of preceding three Working Group meetings:

1<sup>st</sup> meeting, Oct 24, 2024,

[https://baltic.earth/files/assets/WG%20Marginal%20Seas/1st%20BE\\_MargSeas\\_Kick\\_Off\\_24\\_10\\_2024%28final%29.pdf](https://baltic.earth/files/assets/WG%20Marginal%20Seas/1st%20BE_MargSeas_Kick_Off_24_10_2024%28final%29.pdf)

2<sup>nd</sup> meeting, Jan 29, 2025,

[https://baltic.earth/files/assets/WG%20Marginal%20Seas/2nd%20BE\\_MargSeas\\_WG\\_Meeting\\_29\\_01\\_2025\\_final.pdf](https://baltic.earth/files/assets/WG%20Marginal%20Seas/2nd%20BE_MargSeas_WG_Meeting_29_01_2025_final.pdf)

3<sup>rd</sup> meeting, May 28, 2025,

[https://baltic.earth/files/assets/WG%20Marginal%20Seas/3rd\\_BE\\_MargSeas\\_WG\\_Meeting\\_28\\_05\\_2025\\_final.pdf](https://baltic.earth/files/assets/WG%20Marginal%20Seas/3rd_BE_MargSeas_WG_Meeting_28_05_2025_final.pdf)

plus the results of the 6<sup>th</sup> BE Conference 2026, Heringsdorf, Germany, April 13-17, 2026, Topical Session “Marginal Seas – Humans and Environment”,

<https://baltic.earth/events/details/heringsdorf2026>

### **Ad 4.) Publication (White Paper)**

**Ad 4.1.)** One of the main deliverable of WG’s Phase I (2024-2026) will be a **White Paper** with the **main goal** to describe the environmental status of Marginal Seas and to recommend strategies for marginal seas’ sustainable development.

**Ad 4.2.)** JH introduced a first draft of the **White Paper’s Outline structured into three topics** (enclosure):

- (1) Classification of Marginal Seas’ diversity (natural drivers)
- (2) Assigning weighted key messages for sustainable development of the IOC 2024 Ocean Status Report’s to analogue classes of marginal seas (anthropogenic drivers)
- (3) Recommendation of generalized strategies to meet Sustainable Development Goals for analogue classes of marginal seas with respect to key messages of the State of the Ocean Report (IOC-UNESCO. 2024).

## **Discussion**

MGo supports in a written contribution to the discussion the White Paper’s aim to synthesize the current interdisciplinary knowledge on marginal seas and their environmental management to establish an integrated perspective on sustainable development referring to Dasgupta (2021) and United Nations (2015).

Participants of the online discussion expressed concerns regarding the scope of the planned publication in relation to journals’ limited page count. It was recommended to

**streamline the outline** with respect to the previously mentioned main topic (1). In this regard, thematic overlaps of topic (2) with the BEAR report manuscripts should be minimized (MM, MG, HA, JW).

KX recommended to structure the ms into **sections** and nominate corresponding **lead authors** in an early stage of work.

The question of **parameters (variables) to be included** into the study was raised by SK. In a retrospectively written contribution to the discussion, she pleaded in particular for using **proxy variables (indicators)** that integrate multiple physical, chemical, and biological processes and can provide valuable information on ecosystem state, riverine influence, sediment dynamics, underwater light climate, habitat suitability, and long-term environmental change. Even if Chlorophyll-a is an important indicator of **eutrophication and ecosystem productivity**, considerably more insight would be gained by also considering other key optical variables, including water transparency (Secchi depth), turbidity, light attenuation, colored dissolved organic matter (CDOM), suspended particulate matter, and optical water types. Therefore, SK sees an opportunity to explore whether optical properties could be incorporated as additional state variables for classifying and comparing marginal seas, and for identifying common “ecosystem trajectories” and responses across regions. Such an approach could strengthen the **link between in situ observations, ecosystem functioning, and satellite-based monitoring**, while providing an additional framework for ecosystem synthesis across different marginal sea environments.

CJ supported the discussion about the inclusion of the **sea floor substrate** as a key classification key parameter for marginal seas, in particular because of the value of habitats for the benthic biodiversity. He also mentioned the value of the development of quantitative **metric functions** for the comparison of marginal seas.

DSB addressed the question of the definition of marginal seas and whether the **drainage areas** are to be included. KK replied mentioned that the drainage areas in marginal seas play an important role for the biogeochemical environment as for instance the weathering products from drainage areas have remarkable influence on the alkalinity of the respective marginal sea’s water body.

A special topic devoted to **hydrology** is proposed by JD and CvA. The latter particularly pleaded for the integration of **groundwater inflow** to the characterization of marginal seas as an important classification parameter.

The relation between **pristine background and the onset of anthropogenic drivers’ impact** was discussed under the headline “**pollution**” (microplastic) by JW, HA, JIS. It was recommended to clarify this question along with the debate about the role of the “**Anthropocene**” in the intended paper.

#### **Ad 4.3.) Time line**

JW mentioned that the Leibniz Institute for Baltic Seas Research Warnemünde has to focus on the evaluation of the institute at the end of the Summer Semester 2026. This evaluation has highest priority for all members of the institute. That means that

the work for the ms cannot realistically begin before the WS 2026/2027. As many of the co-authors of the planned White Paper come from the IOW, for ms-planning this fact has to be considered.

JH proposed to prepare a drafted ms by the end of the winter semester 2026/2027.

#### **Ad 4.4.) Journal**

JH favored *Earth Science Reviews* (<https://www.sciencedirect.com/journal/earth-science-reviews>) as an appropriate journal to be approached for a publication. The reasons for this suggestion are: the scientific scope of the journal and the interest of the publishers in papers that **support and advance the UN's sustainable development goals, in particular SDG 14.**

#### **Discussion**

PC supported the suggested outline and proposed to get in touch with the Editor-in-Chief and the Review Papers Coordinator / Managing Editor to explore the interest of the editors and the technical limits before starting the work on the manuscript. This contact is needed in any case if the manuscript is supposed to exceed 20.000 words.

#### **Ad 5.) Further planning: Work phase I**

JH pointed out that the group had agreed in previous meetings to build on the results of Phase I when planning Phase II. Planning for Phase II should therefore begin in the winter semester of 2026/2027 and proceed in parallel to the development of the white paper.

#### **Ad 6.) To Do**

JH to complete the 4<sup>th</sup> WG minutes considering the comments of the WG members by June 19, 2026

JH to elaborate an updated outline for the second round of discussion by June 30, 2026

JH to check with the editors of *Earth Sciences Reviews* the interest of the journal in a marginal-seas-paper and technical preconditions.

#### **Ad 7.) Conclusion**

Support is given to the goal of jointly producing a white paper at the conclusion of the first phase of the WG (2024-2026).

This paper will describe the role of marginal seas in the global effort to achieve sustainable development of the global marine environment.

Regional studies and research previously conducted in the Baltic Sea play a key role in this process. Comparisons with similar marginal seas are intended to facilitate the generalization of solutions for sustainable development planning strategies.

Options for publication in an international peer reviewed journal are being explored, with priority given to “Earth-Science Reviews”.

The aim is to finalize a definitive outline of the manuscript before the summer break 2026.

The manuscript should be drafted by the end of the winter semester 2025–2027.

This manuscript will serve as the base for future work, with the ultimate aim of developing a proposal for a fundable project.

protocol: J. Harff, June 11, 2026

## References

Dasgupta, P. (2021). The economics of biodiversity: The Dasgupta review. HM Treasury. <https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review>

IOC-UNESCO. 2024. State of the Ocean Report. Paris, IOC-UNESCO. (IOC Technical Series, 190), <https://doi.org/10.25607/4wbq-d349>

United Nations. (2015). Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development. Sustainable Development Goals. <https://sdgs.un.org/goals/goal14>

## Joint review paper „Marginal seas‘ sustainable development – a global challenge“

### Outline (1<sup>st</sup> draft)

#### 1. Introduction

- Motivation: Key tasks of sustainable development of the ocean to be specified to marginal seas

Reference: IOC Ocean Status Report 2024

- Feasibility study, selection of key areas

Study areas selected along the diversity of marginal seas.

#### 2. Marginal seas as standalone parts of the ocean

some definitions

#### 3. **STATUS parameter scaling marginal seas‘ diversity**

(to be demonstrated by at least two of the selected key areas)

##### 3.1. Geosystem and climate

Oceanographic dynamics and taxonomy based on temperature, mixed layer depth and salinity (MG)

based on Cluster analysis after Gröger et al. (2025)

geological provinces (JH, GG)

key areas across geological provinces

Hydrologic system

River discharge (PC, JD, KX), Groundwater (CvA); Glacier Ice (DK)

key areas across geological provinces

Surface sediment facies (CJ, AK, MGo, GG, JH, DK, KX, HA, FF, PC, ...)

application of dbSeaBed to key areas

##### 3.2. Ecosystem

Benthic biodiversity (MGo, ... )

Functional biodiversity model applied to selected key areas

Productivity (SG)

review based on authors‘ scientific competence

##### 3.3. Socio-economic system

Asynchronous onsets of anthropogenic effects readable from sediment records of key areas: PRE, Adriatic Sea, Mississippi Delta, .... (PC, JZ, FF, KX, HC?, EF?)

Anthropocene as global phenomenon (HA ?)

review based on authors' scientific competence

4. **TRENDED-parameters as indicators for key demands for sustainable development**

4.1. Healthy and Resilient Ocean:

Acidification (KK, ...),

review based on authors' scientific competence

deoxygenation (MM, LN, ...),

review based on authors' scientific competence

losses of functional biodiversity (MGo, TR)

to be elaborated

4.2. Predicted Ocean: Sea-level change (JH, RW), ocean warming (MG)

review based on authors' scientific competence

4.3. Safe Ocean: Storms and waves (RW, TS)

review based on authors' scientific competence

4.4. Clean Ocean: Eutrophication (SK), contamination (JW, DSB, ...)

review based on authors' scientific competence

5. **Generalized consequences to hit Sustainable Development Goals (SDG**

**14.1) for Marginal Seas** (base for tailored measures against eutrophication, deoxygenation, acidification, loss of biodiversity, contamination and coastal erosion)

(KH, SK, MM, MG, LN, KK, MGo, RW, TS, RW, DSB, KP, JH, ...)

still to be jointly elaborated

6. Summary and Conclusion (all authors)