SCOR Working Group Proposal

Title: Data **SY**nthesis and **M**ethod Harmonization for Global **Benthic** Modeling

Acronym: SYM-Benthic

Summary/Abstract

Marine sediments are a primary site of carbon burial and chemical transformation on Earth and play an outsize role in regulating carbon, oxygen, and nutrient cycling. Despite their importance in global elemental cycles, marine sediments are largely undersampled compared to the water column. This lack of data and systematic knowledge constrains our ability to include sediments in Earth System models. In turn, we know less about the current state of our planet and have a limited ability to forecast how it will change with natural processes and human activities. Additionally, our understanding of the mechanisms driving spatiotemporal variations in benthic systems, and their influence on ecosystem function, remains unclear. We have identified several challenges that prevent the scientific community from fully realizing the potential of the benthic data already available. These include 1) a lack of method standardization and clear descriptions of methodological strengths and limitations; 2) inadequate recording and reporting of metadata, including information needed by diverse end users (e.g., modelers, stakeholders); and 3) a lack of consensus on what parameters to prioritize. With this working group, we aim to leverage a growing international community of ocean benthic observationalists, method developers, and modelers to address these issues. We will assess regional priorities and establish recommendations for data harmonization for modeling, benthic observations, and data archiving with the aim to increase coordinated data collection globally, expand the community of benthic data users, and improve the inclusion of the benthos in global budgets and modeling efforts.

Scientific Background and Rationale

The seafloor plays an outsized role in influencing atmospheric CO_2 and O_2 and ocean acidity over long timescales, all key factors in the evolution of life and climate on Earth. This is because marine sediments on the seafloor serve as a primary site for organic matter burial and respiration. For example, ~ 90% of carbon released to the atmosphere through long-term sources, such as volcanism and the oxidation of sedimentary bedrock, is ultimately buried in the ocean (Regnier et al., 2022). Around 25% of the downward flux of organic carbon at the base of the euphotic zone reaches the seafloor, where much of it is respired, regulating the partitioning between CO_2 and O_2 (Muller-Karger et al., 2005, Dunne et al., 2007). Furthermore, chemical processes in sediments influence ocean alkalinity, which affects ocean acidification and calcium carbonate precipitation/dissolution and burial, ultimately impacting atmospheric CO_2 (Middelburg et al., 2020). Finally, sediments host biologically mediated reactions involving nitrate, phosphate, and trace metals that can serve as a source or a sink of these nutrients in the marine system. Nutrient availability controls rates of photosynthesis in the surface ocean, so the impact of sediment processes on nutrient fluxes provides a secondary control on the drawdown of atmospheric carbon through biological fixation carbon dioxide into organic matter. For all these reasons, accurately modeling carbon cycling in seafloor sediments is critical to

understanding Earth's carbon cycle as a whole and predicting the trajectory of climate change. Benthic systems, though important to global biogeochemistry, are challenging to sample due to high degrees of temporal and spatial variability (Figure 1). For example, benthic ecosystems can be deeply impacted by extreme events such as marine heatwaves and storms (Tesi et al., 2013; Gomes et al., 2024), and these disturbances can in turn alter rates of biogeochemical transformations. Added to the increasing frequency of extreme events, benthic ecosystems and diagenetic processes are also altered by anthropogenic perturbations such as trawling (Epstein et al., 2022; Hilborn and Kaiser, 2022) and offshore infrastructure development (De Borger et al., 2021; Coates et al., 2014). Increasingly, marine carbon dioxide removal (mCDR) strategies such as iron fertilization and biomass burial that rely on the seafloor to sequester organic carbon are also being considered, and these could further alter the benthic system (NASEM, 2022).

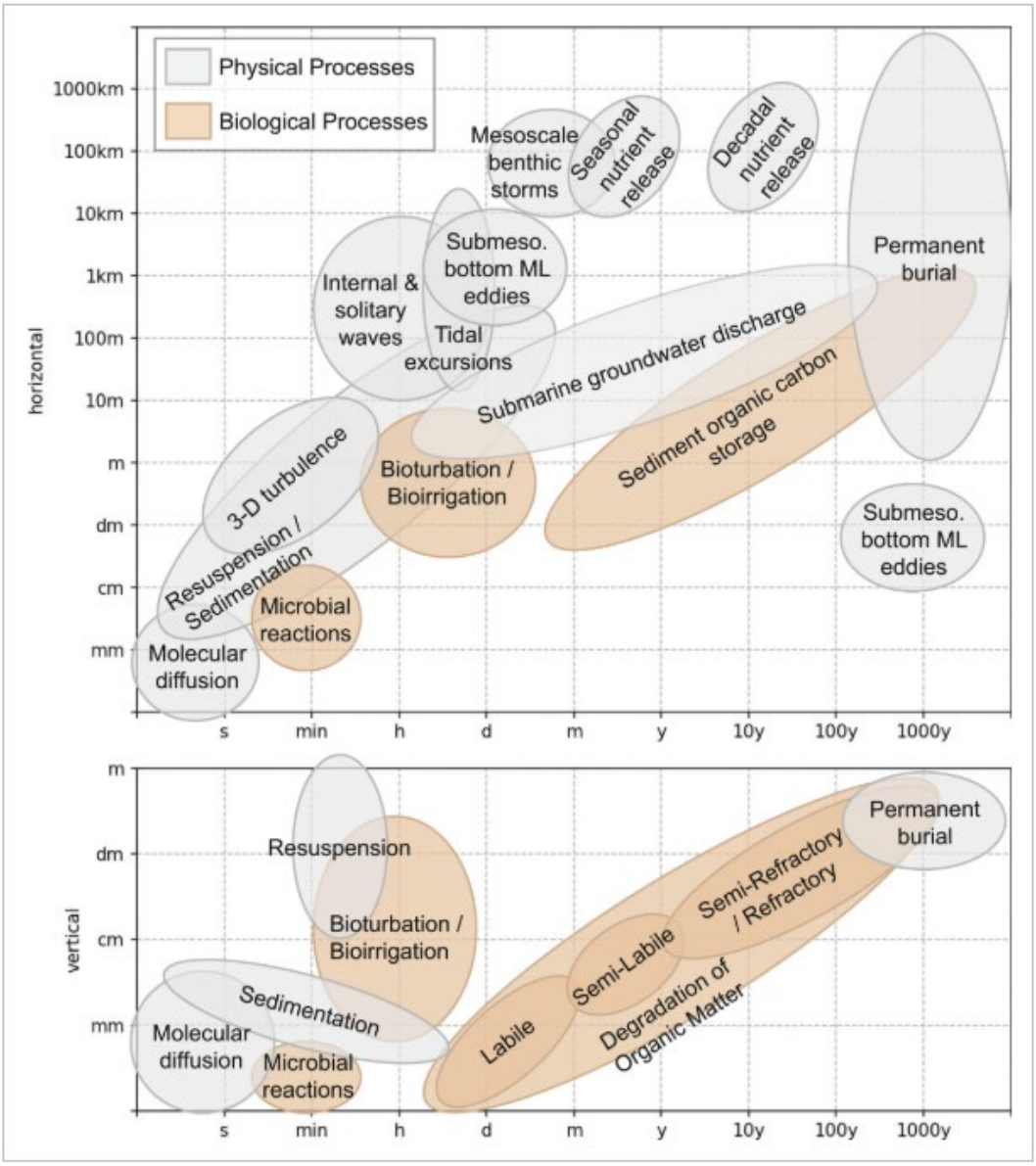

Figure 1. Stommel diagram demonstrating the range of spatial and temporal scales over which sediment processes operate. From Schultz et al., 2025.

Despite the importance of marine sediments in ocean ecosystem health and carbon cycling, the seafloor and benthic ecosystems remain undersampled compared to the pelagic environment. While several data synthesis products have been developed over the years for individual variables (e.g., Jørgensen et al., 2024; Dunne et al., 2007), critical regional gaps remain in existing datasets. The South Atlantic Ocean, for example, is severely underrepresented; although it represents a large proportion of the global seafloor, it accounts for just 2.3% of a global synthesis of sediment bioturbation, mixing depth and ventilation rates (Solan et al., 2019), and only 6.8% of a dataset synthesizing bottom water oxygen concentration (Jørgensen et al., 2024), with no transects crossing this basin at any latitude in the latter. In the BenbioDen database (Stratmann et al., 2020), the South Atlantic represents only 1.5% of macrobenthos records, 3.7% of meiobenthos, and 4.3% of megabenthos. In addition to these spatial gaps, global datasets are also limited in their depth coverage. For example, Jørgensen et al., (2024) indicate that water depth is a key control for oxygen consumption, but note that this relationship does not hold to shallow regions (<10 m). This is a significant gap because coastal areas are hotspots of benthic carbon oxidation and burial. Further, benthic nutrient fluxes are especially important in shallow coastal areas where primary productivity can rely on benthic nutrient sources (Boynton et al., 2018). Before the benthos can be effectively integrated into large-scale models, these regional gaps in data must be filled.

This lack of consistent and systematic data, difficulty locating and accessing existing datasets, and challenges in integrating datasets generated using different methods has limited the inclusion of benthic systems in regional and global models used for global biogeochemical models, emission projections, mCDR modeling, and other applications. We also still lack a full assessment of the role of the benthos in global carbon and oxygen cycles (Schultz et al., 2025). While the biogeochemical processes at the seafloor have traditionally been thought to operate at long timescales, recent studies have shown that these processes could be accelerating in a fast-changing world (e.g., continental shelf alkalinity fluxes changing annual to decadal scales; Van de Velde et al., 2025). It is urgent, therefore, to accelerate our understanding of the mechanisms and drivers of the ocean sediment and ecosystems, understand natural variability in important ocean floor variables, and include these processes in ocean and climate models to study regional and global feedbacks.

As a first step toward this goal, the OCB (Ocean Carbon and Biogeochemistry Program) funded the BECS (Benthic Ecosystem and Carbon Synthesis) working group in 2023 to discuss paths and priorities to advance benthic research. Through a series of webinars, conference activities, and in-person workshops with scientists from different regions, the BECS working group developed a multi-pronged approach to this challenge, including recommendations for benthic model intercomparison, new experimental designs, data synthesis, and expanded observations (Schultz et al., 2025; Figure 2). The BECS working group also reached a key additional outcome: consensus on the necessity of building a truly global community to accelerate progress in understanding the role of the seafloor in regulating global biogeochemical cycles, which is the goal of the proposed SCOR working group. Such a community would enable more holistic accounting of challenges and priorities of different countries and ecosystems, build a common language between benthic observationalists and modelers, and advance our understanding of marine benthic processes more efficiently.

Figure 2. Conceptual diagram illustrating the open questions and recommendations resulting from the BECS Working Group. From Schultz et al., 2025.

Given the scope of the challenge and the community interest during sessions and Town Halls organized by BECS working group members during the 2024 and 2026 Ocean Sciences Meetings, we propose a SCOR working group ("SymBenthic") to further the discussions related to filling gaps in data and making use of existing data sets in benthic modeling. We have included global representation of observationalists and modelers, who are in many instances the creators or end-users of benthic datasets. The proposed working group also includes members who overlap with the recently created OCB-funded SedMIP working group, aimed at developing a protocol for benthic model intercomparison. The goal of SymBenthic is to create a framework to increase coordinated data collection and reuse globally and expand the community of benthic data users through model-informed priorities.

To address these gaps, the proposed working group will evaluate and synthesize available benthic datasets and develop methodological recommendations. The working group aims to 1) synthesize existing data by gathering it into one accessible location, 2) harmonize the synthesized datasets by evaluating the compatibility of disparate datasets for comparison, and 3) facilitate effective sampling of the seafloor and accessible archiving of observational data in the future. We plan to create community-supported resources and tools to directly support both modelers and observationalists, and facilitate open communication and collaboration between both groups of researchers. These efforts will support diagenetic model development and validation, while also identifying critical gaps to guide future data collection. In the long term,

improving our understanding and modeling of processes occurring in seafloor sediments will advance our understanding of Earth's carbon cycle and strengthen our predictions of future climate and environmental changes.

Terms of Reference

SymBenthic will build a community of modelers and observationalists who collaborate towards shared goals of synthesizing and harmonizing existing benthic data, while also establishing priorities and recommendations for future sampling and data sharing to ease this process in the future.

Specifically, the Terms of Reference of this working group are as follows:

- ToR1 (*Existing datasets*): Synthesize existing global benthic datasets required for improved systematic understanding and effective carbon cycle modeling, and assess gaps in coverage and limitations of these datasets.
- ToR2 (*Modeling guidelines*): Define priority research questions in sediment carbon modeling and provide recommendations for harmonizing data from different sources, including a framework for evaluating observational data quality and executing models to identify critical variables.
- ToR3 (*Sampling guidelines*): Identify priority sampling data needs and locations/environments for future sediment-water carbon cycle measurements, and compile accessible and community-backed protocols for measurements of interest.
- ToR4 (*Data sharing guidelines*): Develop a common reporting framework for sediment-water carbon and oxygen fluxes and guidelines for sharing data to support reuse in modeling applications, following FAIR data principles (Wilkinson et al., 2016).
- ToR5 (*Community engagement*): Engage the broader community in development, refinement, and implementation of the frameworks and tools developed in this project.
- ToR6 (*Momentum building*): Connect modelers and observationalists to work together on a shared goal and build community beyond the end of the working group.

Deliverables

- D1: A compilation of existing datasets useful for modeling sediment carbon and oxygen cycling. (**ToR1: Existing datasets**)
- D2a: A report defining priority benthic modeling questions and an order of operations for harmonizing data and validating data selection. (**ToR2: Modeling guidelines**)
- D2b: A framework for comparing data collected using different methods, including assessments of data quality. (**ToR2: Modeling guidelines**)
- D3a. A paper published in a peer-reviewed journal identifying benthic priorities for sampling. (**ToR3: Sampling guidelines, ToR6: Momentum building**)
- D3b. A compiled handbook for best practices in measuring parameters of interest in carbon cycle modeling. (**ToR3: Sampling guidelines**)
- D4a. A downloadable metadata table template to facilitate consistent archiving of sediment data, including recommendations for following FAIR data principles. (**ToR4: Data sharing guidelines**)
- D4b. A document outlining recommendations for sharing unpublished data in an

accessible and citable format to enable wide reuse. (**ToR4: Data sharing guidelines**)

- D5a: Recordings of 5-minute research lightning talks by members of the SymBenthic community. (**ToR5: Community engagement**)
- D5b: A town hall session at Ocean Sciences 2028 to share the draft tools created by the working group and invite feedback from the broader community. (**ToR5: Community engagement**)
- D5c: A webpage sharing expertise and contact information for any SymBenthic participants who wish to be included. This space will spark collaboration among the growing community. (**ToR5: Community engagement**)
- D6: A time-bound plan for future efforts, building on the SymBenthic efforts, and a list of existing challenges (**ToR6: Momentum building**)

Working plan

At the end of the SymBenthic working group period, the tangible outcomes will include **a website** for sharing information and tools publicly (hosted and maintained by the chairs of the working group), **an email listserv** for connecting the community, and **a paper** published in an open access journal. During the working period, we will **host regular community research discussions** and **organize a town hall** at Ocean Sciences 2028 to engage the broader community and seek feedback on our work. The website will also have capabilities for collecting suggestions from the community to improve the tools we create.

The organizing team will schedule ~3 virtual meetings per year to build and maintain the website, plan the in-person meetings and virtual discussions, and ensure the Terms of Reference are being met in a timely manner. In these meetings, we will assign sub-groups to focus on ToR 1-4 (Existing datasets, Modeling guidelines, sampling guidelines, and Data sharing guidelines) deliverables. The Modeling guidelines sub-group (ToR 2) will specifically lead the definition of priority research questions to be tested against available datasets. Additional sub-groups will be established for 1) building and maintaining the website and managing the listserv, 2) organizing the lightning talks and research discussions, and 3) planning the town hall. Each full member will be in 2-3 of the sub-groups, with 2-3 people. Each sub-group can work independently on their goals, and meet monthly to discuss progress and resolve challenges. The associate members will be invited to attend the quarterly meetings and contribute wherever they wish.

To address ToR5 and ToR6 (Community engagement and Momentum building), we will invite members of the research community (spanning as wide a range of career stages, locations, and personal identities as possible) to **record 5 minute lightning talks** sharing their research. These talks will be uploaded to our YouTube Channel and linked on the website. Each lightning talk will have a Google form attached for viewers to submit comments and questions for the presenter. The working group will **plan quarterly or biannual (depending on other concurrent activities) virtual discussion sessions** for the SymBenthic community. In each of these sessions, 5-6 lightning talks will be selected that share similar research topics. The session will then allow the participants to discuss each lightning talk with the speaker and with each other. This differs from the typical webinar format, which often does not foster strong engagement, and instead provides space for researchers from all levels to spotlight their research and build connections with others working in benthic observation and modeling.

We plan to host two in-person meetings during the working period. The **first meeting will be hosted in one of the full members' institutions in Year 1.** The goal of the first meeting will be to create outlined drafts of the deliverables to ToR 1-4 (Existing datasets, Modeling guidelines, sampling guidelines, and Data sharing guidelines). Each sub-group will present their thinking and plans to the broader group and invite discussion. The in-person environment is critical for group visioning and relationship-building that will allow us to meet our goals as a group. The in-person meeting will also be used to agree on a structure for the website and a strategy for maintaining it, and to draft a proposal for the OSM town hall.

In Year 2, we will **host a Town Hall at the 2028 Ocean Sciences Meeting** in Vancouver to engage the broader community and get feedback on the tools created in Year 1. Prior to the Town Hall, the draft toolkit (ToR 1-4 deliverables) will be distributed to the SymBenthic listserv and other interested researchers within the network of the working group members. Feedback will be invited via a Google Form, and summarized during the Town Hall. This event will increase awareness of the working group's activities and expand the community even further, as contact information will be collected from the attendees, who will then be added to the listserv with their permission.

Immediately following Ocean Sciences in Year 2, **the second in-person meeting will be held in Vancouver**. Tying the second meeting to a large, international conference will maximize attendance and minimize travel costs for participants. In this meeting, the feedback received during the Town Hall will be incorporated and the deliverables revised accordingly. This meeting will also include a discussion session focused on planning the next steps for the community after the end of the SCOR working period. This conversation will result in a document outlining open questions and remaining activities, ideas for how to approach them, and assignments for people who will lead these endeavors (ToR6, Momentum building).

In Year 3, **three more virtual working group meetings will be held** to finalize the deliverables, with the sub-groups working independently outside of the meetings. a paper outlining the results of the data synthesis and future priorities for model-informed benthic sampling will be drafted (ToR4 and ToR6) and submitted for publication. Given the length of time required to move through the peer review process, it is likely that the final publication of the paper may occur after the end of the working group period.

We request **a start date of November 1, 2026**, to provide enough time for developing deliverables in advance of the OSM Town Hall in February 2028. Below is a brief timeline highlighting the major events planned for this working group.

Year 1	Q1: Nov 2026-Jan 2027	Q2: Feb-April 2027	Q3: May-July 2027	Q4: Aug-Oct 2027
Virtual WG meetings	x	x	x	X
1st in-person meeting			x	
Community research discussions		x		x

Submit OSM town hall proposal			x	

Year 2- 2028	Q1: Nov 2027-Jan 2028	Q2: Feb-April 2028	Q3: May-July 2028	Q4: Aug-Oct 2028
Virtual WG meetings	x	x	x	x
OSM Town Hall		x		
2nd in-person meeting		x		
Community research discussions	x		x	x

Year 3	Q1: Nov 2028-Jan 2029	Q2: Feb-April 2029	Q3: May-July 2029	Q4: Aug-Oct 2029
Virtual WG meetings	x	x	x	x
Paper preparation	x	x	x	
Paper submission				x
Community research discussions	x	x	x	

Capacity Building

This working group will create capacity for continued work and improved outcomes in benthic modeling by *building community* and *sharing tools*, as well as training students and early career scientists in collaborative benthic research with the tools needed for sample and model intercomparability. This initiative was begun by the BECS working group, which successfully connected an international group of highly engaged modelers and observationalists and refined the key challenges to be addressed in benthic modeling, ultimately leading to the conception of this SCOR working group by a subset of the BECS participants focused on data synthesis and observations. The SCOR working group will provide an opportunity to engage participants from an even wider range of countries and regions, and produce concrete deliverables that were recommended in BECS but not accomplished. The publication resulting from BECS provides structure by outlining the current gaps in benthic sampling and modeling and presents clear recommendations for next steps. We will build on the success of BECS and use the structure and wider reach of a SCOR working group to take a series of critical next

steps to advance our goal of integrating benthic observations to improve accurate modeling of the marine carbon cycle.

The efforts of the working group will create capacity for future work through several key structures, which the full members are committed to maintaining past the end of the working period: an email listserv, a website, and a YouTube channel. The tools and ideas generated by the working group will be disseminated and the community developed through the meetings will be connected through these means (more details below). Additionally, the work proposed here is critical for solving the problem of gaps in benthic datasets, which can only be truly achieved through international effort and ability.

Email list serv:

We have already begun building an engaged community interested in the proposed work, evidenced by >50 members who asked to be registered to a “SymBenthic” listserv that was created following the “Creating Truly Global Benthic Datasets” Town Hall event hosted at OSM 2026. These members come from >15 countries and 5 continents, span career stages, and include scientists working in academia, NGOs, and governmental agencies. The listserv will be used to recruit participants in the recorded lighting talk series, advertise the virtual research discussions and Town Hall at Ocean Sciences 2028, and invite feedback on the modeling and sampling guidelines and workflows created by the working group members. This listserv broadens participation beyond the working group members, and will be maintained by Full Members throughout the working group period and beyond.

Website:

A SymBenthic website created by the working group will be the primary hub for interactions and resource sharing with the broader research community. The website, created in the first year and fully populated by the end of the working period, will contain materials and tools that are free and accessible, to empower independent work by people who might not already be in the SymBenthic community. These will include tools for both modelers and observationalists, including many of the deliverables of the working group. The site will have a “Resources” tab that will contain the results of our synthesis of benthic datasets as well as additional linked repositories (D1), a document with recommendations for harmonizing data and comparing different data sources (D2), a PDF handbook with implementable protocols for common sediment measurements (D3), and a downloadable metadata template for effectively sharing the resulting data in a citable and accessible format following FAIR Data Principles to support reuse (D4). Importantly, the website will include an embedded form for providing feedback on the materials, allowing these resources to continue to grow and improve even after the end of the working group.

The website will also contain a repository of researcher profiles and contact information. The full and associate members of the working group will add their profiles, and we will invite others to contribute profiles as well during the OSM Town Hall and the virtual research discussions. These profiles will allow new connections to be made in the community to facilitate model-observation collaborations for years to come. For example, if a benthic biogeochemist would like to incorporate diagenetic modeling into their next project but does not have any modelers in their existing network, they can reach out to members of the SymBenthic

community to initiate a new collaboration with an expert in modeling. We will also maintain a list of research publications in benthic modeling and observations to provide easy access to relevant citations and information.

Finally, the website will provide a means to unify and identify SymBenthic-associated efforts. We will design a logo that will be distributed to the community for inclusion in conference presentations or to otherwise signify efforts connected to the working group. We will provide recommended citations for the handbook and other tools, so their use in future publications can be recognized. These steps will build identity for the broader community and make the results of the working group more visible in research.

YouTube channel:

We will create a YouTube channel to host recorded lightning talks and link the channel on the SymBenthic website. In this way, science being discussed will be made broadly available and digitally preserved. This will also provide an avenue for researchers to share their research more broadly, and gain experience in science communication as they create their own lightning talks and learn from others.

Momentum:

While the proposed working group will provide support for key discussions that will facilitate the development of much needed protocols and recommendations, we are aware that coordinated observational campaigns will require larger proposals. A key purpose of SymBenthic is to build the momentum and community required to identify opportunities and advance to this next stage. This period of strategizing, community growth, and momentum-building is critical for solving the large-scale problem of gaps in our benthic datasets.

Geographically Diverse Leadership:

The full and associate members of this working group represent a broad range of countries and regions. In addition to organizing Town Halls at large international meetings, Full and Associate members will present at local conferences in their own countries and continents, and serve as a local contact point for other scientists seeking guidance on sampling and reporting protocols, wanting to contribute data to global datasets, and disseminating products generated during the working group period. This is particularly important to ensure access and enhanced capacity in countries where English is not the main language used in daily scientific activity and where data may be stored in repositories that require knowledge of local language (e.g. National Bank for Oceanographic Data - BNDO in Brazil) We will strengthen connection with other international groups with whom we have been interacting, including the Coastal Carbon Network, which curates and archives data for the Coastal Carbon Atlas, to keep learning from their experience and coordinating standards for metadata.

Working Group composition

Full Members

Name	Gender	Years since degree*	Country and institution of affiliation(s)	Expertise relevant to proposal
1 Lisa Herbert (Chair)	F	6	Florida State University, USA	Benthic trace metal biogeochemistry
2 Nicholas Ray (Chair)	M	6	University of Delaware, USA	Observational and experimental measures of carbon burial and sediment-water gas exchange
3 Natalya Evans	F	4	Dalhousie University, Canada	Trace redox chemistry across the sediment-water interface
4 Volker Brüchert	M		Stockholm University, Sweden	Sediment-seawater exchange and turbulent benthic boundary layer
5 Dominik Hülse	M	8	University Bremen, Germany	Diagenetic modeling
6 Nadine Lehmann	F	6	University of Tasmania, Australia	Marine biogeochemistry, nutrient and carbon cycling
7 Anna Lichtschlag	F		National Oceanography Centre Southampton, UK	Benthic biogeochemistry
8 Christophe Rabouille	M		Laboratoire des Sciences du Climat et de l'Environnement, CEA-CNRS-UVSQ, France	Benthic biogeochemistry
9 Julio Cesar de Faria Alvim Wasserman	M		University Federal Fluminense - Brazil	Sediment geochemistry

Associate Member

Name	Gender	Years since degree*	Country and institution of affiliation(s)	Expertise relevant to proposal
1 Cristina Schultz	F	7	Northeastern University, USA	Coastal/benthic biogeochemical modeler
2 Robinson Fulweiler	F		Boston University, USA	Coastal/benthic biogeochemical observationalist
3 William Landing	M		Florida State University, USA	Marine biogeochemistry, trace element sources and cycling
4 Gustavo Fonseca	M		Federal University of São Paulo, Brazil	Marine ecology/ Machine learning modeling
5 Janine Felden	M		Alfred Wegener Institute for Polar and Marine Research - AWI, Germany	Data management, Data publication, Marine Biogeochemistry
6 Karima Khalil	F		ESTE, University Cadi Ayyad, Morocco	Benthic biogeochemistry, modelling, carbon cycle
7 Sebastiaan van de Velde	M	8	University of Otago, New Zealand	Marine carbonate chemistry and coastal carbon cycling

Note: The chairs and members are committed to maximizing the geographical representation of SymBenthic working group. We are in the process of building new connections with colleagues in other regions not already represented, especially Asia (e.g., China, Taiwan, and India). Following these efforts, we aim to include new members from these regions in our group should the proposal be funded.

Working Group contributions

Lisa Herbert is a chemical oceanographer studying the cycling of trace metals in marine sediments and investigating the role of benthic-sourced micronutrient trace metals in fertilizing primary productivity in metal-limited regions of the ocean. This understanding of benthic metal processes contributes to the Working Group goals because metals play key roles in marine carbon cycling, both as critical nutrients for carbon fixation and as electron acceptors in

anaerobic carbon respiration.

Nicholas Ray is an aquatic biogeochemist and ecosystem ecologist whose research program investigates carbon and nitrogen cycling processes across the land-ocean continuum with a focus on the role of sediments in regulating water column processes and air-water gas exchange. He employs field observations and experiments, laboratory experiments, and data synthesis in his work, and was a member of the BECS working group.

Natalya Evans is a chemical oceanographer specializing in high-precision measurements of carbon, nitrogen, sulfur, iron, trace metals, and iodine across sediments and the water column. Her expertise covers complex, dynamic shelf systems with multiple redox gradients, deconvolving transport and chemical processes, and linking sedimentary processes to basin-wide observations. She has successfully conducted small-scale benthic mCDR test deployments and recoveries and is at the forefront of MRV using benthic mCDR techniques involving biomass burial.

Volker Brüchert is a marine biogeochemist with 30 years of experience in benthic biogeochemical processes, specializing in coupled carbon, nitrogen, phosphorus, iron, and sulfur cycles through porewater chemical analysis and isotope tracing in coastal marine sediments. He deploys autonomous benthic landers for non-invasive investigation of processes and fluxes in the turbulent benthic boundary layer. His recent work focuses on Arctic coastal benthic biogeochemistry and the effects of benthic trawling disturbance on carbon storage.

With over a decade of experience in developing and applying diagenetic models, ***Dominik Hülse*** will represent the modelling perspective within the Working Group, ensuring that data harmonization efforts are aligned with the needs of process-based sediment models. As the only diagenetic modeller and a representative of the SedMIP initiative, he will provide a unique link between observational data synthesis and model intercomparison efforts, helping to ensure that compiled datasets are suitable for robust model development, evaluation, and benchmarking.

Nadine Lehmann is an observational biogeochemist with over 10 years of experience in water column carbon and nitrogen cycling, spanning large-scale physical transport, microbially-mediated transformations, and feedback mechanisms between natural biogeochemical fluxes and marine CDR approaches in coastal and open-ocean settings. She brings a critical water column perspective to the Working Group, bridging pelagic and benthic research communities to support coordinated observation strategies and broaden benthic dataset applications, including marine CDR monitoring and verification.

Anna Lichtschlag is a benthic biogeochemist with more than 20 years of experience in sediment geochemistry and sediment-water exchange processes. She is working interdisciplinary with modellers and marine engineers for novel benthic flux method developments and can provide expert guidance on designing, implementing, and interpreting sediment biogeochemistry studies. Her expertise includes evaluating the impact of natural and anthropogenic drivers on early diagenetic processes, using observational data to support regulatory site assessments, environmental impact evaluations, and sustainable marine management.

Christophe Rabouille is a marine geochemist with 35 years in the French oceanographic community. His research focuses on organic matter and nutrient recycling in marine and continental sediments, biogeochemical dynamics, and oxygen control in marine

waters. Since 1991, he has contributed to major national (JGOFS-France) and European biogeochemistry projects, linking fieldwork to mathematical modelling of diagenetic reactions. From the mid-2000s, he has focused on Mediterranean sediments, particularly Rhone River inputs, and coordinated ANR-Congolobe, a multidisciplinary project studying deep-sea fluxes and chemo-autotrophic ecosystems in the Congo Canyon.

Julio Wasserman is a chemical oceanographer with 36 years of experience in sediment geochemistry. Primarily an observationalist with extensive field experience, he has also developed simplified compartment models over the past 15 years to anticipate mitigation procedures for anthropogenic impacts. To support these models, he created innovative microcosms and mesocosms replicating sediment-water interface behavior under controlled conditions. His work covers elemental and organic compound mobility in sediments and porewaters, their relationship with overlying waters, and interdisciplinary approaches to environmental contaminants and coastal tropical remediation.

The **associate members** of the working group will provide expert guidance to the working group by participating in virtual and in-person meetings and giving feedback on materials. They provide connections to other groups that align with the mission of the SymBenthic working group (e.g., BECS, PANGAEA, GEOTRACES).

Relationship to other international programs and SCOR Working Groups

The idea for the proposed SymBenthic working group emerged as a result of discussions during the OCB-funded BECS working group, which in its first workshop gathered ~40 scientists from 8 countries and 4 continents, and hosted webinars featuring the work of scientists in a variety of regions (Taiwan, England, Netherlands, Germany, and USA). Several scientists involved with SymBenthic also participated in the OCB-SedMIP Town Hall at Ocean Sciences Meeting 2026 and remain involved in their activities, either participating in email lists, volunteering for webinars, or being on the leadership team. We believe coordination and constant interaction between observationalists and modelers is of primary importance to advance benthic research, and feedback between SymBenthic and SedMIP researchers aims to provide that bridge.

We have also taken advice on building an international community from the Coastal Carbon Network, and aim to keep in touch to ensure that metadata, quality control protocols, and archival of data for variables that are of interest for both groups are coordinated. SymBenthic also has ongoing conversations with members of GEOTRACES to discuss inclusion of protocols for benthic variables of interest and paths forward to implement a coordinated global effort for benthic observation. Lastly, we will initiate conversations with Biogeoscapes to discuss an accessible framework for including sediment sampling in Biogeoscapes cruises.

Key References

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