SCHMIDT FUTURES

Ocean Biogeochemistry Virtual Institute (OBVI)

Request for Expressions of Intent (EOI)

Topic Areas: Ocean Biogeochemistry, Ocean and Climate Science, Data Science

Background. The Ocean Biogeochemistry Virtual Institute (OBVI) is an initiative of Schmidt Futures to support transformational research that addresses grand challenges in the ocean sciences. OBVI is soliciting short expressions of intent (EOIs) targeting cross-cutting ocean biogeochemistry research. We seek scientific advances that improve the breadth and rigor of ocean biogeochemistry research, capacity to manage ocean resources, and environmental decision-making in order to better respond to the changing climate. To that end, **OBVI seeks to tackle some of the most challenging biogeochemical data and modeling problems across systems and scales by developing novel approaches for ocean data collection, integration, and synthesis.** These approaches may take advantage of innovations in engineering, computational science, and observing platforms. We aim to build a virtual institute with multiple integrated, interdisciplinary, and international teams of researchers or existing consortia by providing sustained funding and networking support to pursue cutting-edge research with revolutionary promise.

OBVI is purposefully focused on enhancing the speed and effectiveness of discovery and the translation of fundamental research to inform environmental decision-making (e.g., climate mitigation planning including marine carbon dioxide removal). As one of Schmidt Futures' Virtual Institutes of Science, OBVI will build an integrated network of carefully selected scientific and technical talent to solve hard and important problems of scientific knowledge by working across institutions and disciplines – taking high-risk bets that apply advanced computing and innovative technologies to STEM R&D for better results. **This network will confront grand challenges in ocean biogeochemistry by reimagining how we address some of the technical, logistical, and cultural reasons for why they are difficult to overcome.** For example, projects supported through OBVI might seek an integrated understanding of the physical and biological processes that maintain ocean carbon inventories and the mechanistic connections between biogeochemical cycles and higher trophic levels of marine ecosystems. The program may also develop an improved understanding of marine ecosystem structure, function, and resilience through improved synthesis of diverse ocean data and model representations of ocean biogeochemical processes.

OBVI strives to bridge gaps in collaboration, strengthen the ocean science research community, and support projects that facilitate the integration and synthesis of ocean data so that it can be used effectively in regional and global models and other decision-support tools. OBVI will also maximize opportunities to support ocean observing and data collection as part of these high-quality interdisciplinary research projects by collaborating with the Schmidt Ocean Institute (SOI), a 501(c)(3) private non-profit operating foundation established by Eric and Wendy Schmidt. SOI's mission is to catalyze the discoveries needed to understand our ocean, sustain life, and ensure the health of our planet through the pursuit of impactful scientific research and intelligent

observation, technological advancement, open sharing of information, and public engagement at the highest levels of international excellence.

Scope. We are first seeking brief EOIs, followed by invitation-only proposals, for research projects that **advance understanding and predictions of the ocean carbon cycle and resilience of marine ecosystems across systems and scales** by innovating in the following areas:

1. **Integrated Ocean Observation and Modeling:** Addressing critical gaps in data and theory at new study sites and/or study sites with pre-existing foundational knowledge that can be built on in novel directions through integrated observing and modeling efforts. Projects may focus on processes involved in ocean carbon cycling and/or marine ecosystems to move a capacity for state estimation and prediction forward across multiple systems and scales.

2. **Ocean Data Synthesis:** Synthesizing diverse datastreams in ocean biogeochemistry (e.g., microscopy, optical measurements, 'omics data, satellite data, tracers, model output). Projects may focus on building computational workflows, establishing collaborative, flexible frameworks for data synthesis, facilitating development of software platforms or tools in order to gain new insights, advancing sophisticated process representation or model frameworks, identifying/prioritizing data gaps and needs, or facilitating efficient and effective use of ocean data in regional and global models.

EOIs should come from teams of researchers or consortia interested in pursuing high impact, high risk ideas over a 5-year timeframe. Regarding the potential need for teams to collect new ocean observations to explore these ideas, the following types* of projects (or combination of types) can be included: (1) a site-focused project, (2) a project that studies a process across existing sites (which could be updated to include sites proposed by other OBVI teams after the Request for Proposals (RFP) stage), (3) a data-centric or modeling project with no explicit field effort, or (4) a project that leverages an existing field effort or historical data to study a particular biogeochemical process (or processes).

We desire projects that have the potential to deliver new foundational data and integrated data products, flexible strategies for organizing and synthesizing diverse datasets across scales and geographic locales, software and tools for the research community and other users of ocean data, and methods of collaboration. **Furthermore, OBVI encourages collaborations, particularly international and transdisciplinary collaborations, that are difficult to fund through existing mechanisms. Proposed project team members can be presented as preliminary suggestions in the EOI and can be changed at the RFP stage due to availability and/or fit.**

If selected for an award, we expect all teams to function together as one larger team, operating in an integrated manner to tackle technological, cultural, and logistical challenges that are pervasive in this field. Demographic, national, and disciplinary diversity within project teams is encouraged, as are opportunities for early career scientists and cross-disciplinary collaboration. We expect

project teams to make results and methods as transparent as possible across the virtual institute and publicly available as open source and open data in a timely manner.

EOI Submission:

Eligibility. Research teams in university, national laboratory, institute, or agency settings will all be considered. Multi-institute research consortiums are strongly encouraged. International collaborations (i.e. EOIs that involve scholars from different nations, such as ones within the global south) and collaborations between institutions are looked upon favorably.

Budget and Award Duration. Project budgets are intended to be approximately up to USD 10 million distributed over a 5-year period; however, compelling proposals with a total budget above or below USD 10 million may still be considered. Detailed budgets are not expected to be included at the EOI stage. In the event that projects require seagoing operations, shiptime may be provided through SOI at no additional cost provided that project timelines align with the research vessel *Falkor (too)* expedition plan for priority areas. Priority areas for R/V *Falkor (too)* over the next 10 years can be viewed on SOI's strategic framework website.

Information to Include. The EOI is expected to be short (2 pages). Please include any PI, team, and partner names and affiliations in the submission form linked below. Do not include this information in the 2-page EOI document, as we will set aside team information during the evaluation process. The EOI must address the following elements:

1) primary area of innovation and engagement with the virtual institute and key challenges being addressed in support of OBVI's mission;

2) why addressing this process or component is critical to advancing science and technology for society and how the proposed work may inform/support environmental decision-making, management, investment, and/or policy;

3) scientific ability, relevant expertise, scientific project management experience, and capacity of the PIs and partner institutions to run a large project;

4) project type(*) including observational and computational needs; and

5) collaborative teamwork approach, plan for coordination across research methods and disciplines within the team; ideas regarding how your team may interact with other research teams to ensure that you have effective cross-cutting collaborations as members of the VI community.

Deadline. Expressions of Intent due June 1, 2023, by 11:59 pm EDT

Submission and Questions. Please submit your EOI here. Should you have any questions, please reach out to obvi@schmidtfutures.com and state "OBVI EOI" in the email subject line. Responses to frequently asked questions about this request for EOIs can be found on the OBVI website.

Translation. If you would like to request the translation of this EOI call to your native language, please reach out to obvi@schmidtfutures.com and state "OBVI EOI Translation Request" in the email subject line.

Award Process:

The EOIs will be anonymized (removing names and references) for a blinded evaluation by a committee of peers, Schmidt Futures, and SOI staff. Some teams will be invited to submit full proposals for evaluation. We anticipate reaching out to EOI PI's who will advance to the RFP stage in July 2023. The invitation for full proposals will include more detailed requests for information regarding budgets, project operations, timelines, and team members, as well as information about relevant Schmidt Futures policies. Invited teams will have 60 days to submit a full proposal. We expect to award 2-4 proposals in the first year.

Additional Information to Note:

OBVI is one of several Schmidt Futures Virtual Institutes of Science working across institutions and disciplines. Other programs that OBVI might closely interact with include the Virtual Earth Systems Research Institute (VESRI) and the Virtual Institute for Scientific Software (VISS). Schmidt Futures' virtual institutes are designed to attract, excite, and retain the best researchers and students in the field from numerous institutions. We aim to assist the virtual institutes by leveraging our existing talent network, and maximize their impact through various community and knowledge sharing activities inside the virtual institute and outside of it, thus disseminating new knowledge worldwide, spurring new innovation, and further extending the Schmidt Futures talent network.

Additional Information on Schmidt Ocean Institute:

Schmidt Ocean Institute (SOI) operates the 110m global ocean class research vessel, *Falkor (too)*, and provides investigators and teams with free access to the full range of the capabilities of the vessel, its onboard scientific facilities, analytical tools, and lab equipment, as well as pertinent technical, operational, communications, and informational services. A requirement of this asset and support, in alignment with the goals of OBVI, is the timely sharing of data, research and development outcomes, and real-time sharing of expedition research. **The 10-year Expedition Areas map is provided on SOI's strategic framework website and may be used to guide the locations of data collection for the EOI if time is required on board R/V *Falkor (too)*.**

Schmidt Ocean Institute also has multiple nodes on a High-Performance Computing System, which may also be provided at no cost to the team if requested. Details of this system are provided here.