

MarineGEO Partnership Framework

Taking the pulse of coastal ocean life—together

v 1.0

Mission

*As a global partnership, we discover how coastal ecosystems work
—and how to keep them working—through science*

Vision

*Healthy and diverse coastal ecosystems,
revealed through networked science and safeguarded by an informed society*

Overview

The **Marine Global Earth Observatory (MarineGEO)** is a global collaborative network focused on understanding causal links between changes in environment, biodiversity, and ecosystem functioning in the coastal zone, where biodiversity and people are concentrated. We integrate a standard toolkit of long-term observations, coordinated experiments, and knowledge synthesis, and leverage the power of shared, open data.

To accomplish its mission, MarineGEO partners in a variety of ways with researchers and organizations worldwide. We capitalize on our broad range of collective expertise, ecological breadth, and collaborative spirit as the foundation of a dynamic system for long-term observation and research on Earth's coastal marine life and ecosystems. By working together, we can achieve understanding at scales none of us could accomplish alone.



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Why partner with MarineGEO?

Each partner achieves more and better science when we work together. This is MarineGEO's value proposition. The network is people. Our greatest strength is our globally distributed network of collaborating institutions and people, which grows stronger with each new partner. Membership in the network offers a range of benefits:

- **A network of colleagues:** Each partner increases our opportunities for ambitious research, locally and globally, and our collective capacity to lead the future of marine science.
- **Large-scale, collaborative science:** Working across the network generates new and bigger opportunities to pursue complex questions and competitive funding and produce more, higher-impact publications and products.
- **Complementary expertise and training:** Our individual and collective capabilities build across disciplines by introducing and sharing skills, approaches, and knowledge.
- **Complementary resources:** Each partner's access to specialized facilities, equipment, experts, analyses, and technologies increases across partner institutions and geography.

MarineGEO integrates place-based and global research. The network opens specific opportunities:

- **Global distribution:** The range of sites increases each partner's opportunities to address grand challenges in science and conservation answerable only through a global scope.
- **Greater value, visibility, and use of local site data:** Adopting the standard toolkit of protocols and data system adds value to all partners' research through interoperability and sharing.
- **Greater reach and efficiency:** Each partner can accomplish more at less cost in time and resources by coordinating to achieve research at broader spatial and temporal scales.
- **The Smithsonian's track-record:** Partnering with a world-class research and public education institution increases visibility and opportunity for each network partner's local activities.

How to partner with MarineGEO

MarineGEO aims to optimize mutual benefits to all colleagues in the network, offering different levels of partner commitment, influence within the network, and concomitant access to MarineGEO resources. **MarineGEO Observatories** are place-based partners committed to leading long-term research, including core observations and networked experiments, in one or more habitats at a particular site. Observatories form the backbone of MarineGEO's global research program and are essential to understanding long-term changes across geography and time. MarineGEO recognizes four general types of partnerships, in increasing order of commitment.

1. Project Partner

Organizations or individuals interested in particular MarineGEO research projects but not ready to join as a full observatory (described below) may participate in specific projects by mutual agreement. Such project partnerships are arranged on a case by case basis, dictated by the needs of the specific project. They may include, but are not limited to, conducting coordinated

experiments locally and/or collecting core MarineGEO data locally on a one-time or irregular basis in support of targeted campaigns. Project Partners play a key role in extending geographic reach beyond MarineGEO's long-term observatories and achieving rich, distributed datasets that capture a broader range of environments, conditions, and geographies. Project partnership may also provide an institution with opportunities to explore prospects for joining MarineGEO as an observatory.

Project partnership requirements (**Box 1**):

- Conduct a mutually agreed research project using specified MarineGEO protocols.
- Share data with MarineGEO Central using the approved system, in a timely fashion.
- Contribute to data analysis and co-authored manuscript (MS) preparation.

Project Partners receive the following support from MarineGEO Central:

- Certain supplies required for project research
- Instruction in protocols and best practices for the project
- Management and analysis of contributed data
- Co-authorship on project MSs based on level of contribution

2. Habitat Observatory

Partnership as a MarineGEO Observatory is formalized via a Memorandum of Understanding (MOU) for a 5-year period, renewable indefinitely. It is understood that this agreement requires institutional buy-in at both administrative and scientist levels and a commitment to local fundraising. In cases where an institution can make a long-term commitment to observations but has limited access to resources or habitats, it may join MarineGEO as a Habitat Observatory, focusing on only one or two habitats. Habitat Observatories collect the full suite of core observational data in the selected habitat(s). Although data from these partners make limited contributions to ecosystem-scale and cross-habitat science, they strengthen our understanding of community structure and function within the focal habitat(s).

Requirements of a Habitat Observatory (**Box 1**) include those for Project Partners, plus:

- Collect observational (monitoring) data in the agreed habitat type(s) annually using the standard MarineGEO toolkit.

Box 1. Types of MarineGEO partnerships. Summary of requirements and benefits.

| | Project partner | Habitat observatory | Ecosystem observatory | Hub |
|---|-----------------|---------------------|-----------------------|-----|
| Commitment | | | | |
| Specific project (one-time) | ✓ | | | |
| Extended (5 yr, renewable) | | ✓ | ✓ | ✓ |
| Habitats | | | | |
| single | ✓ | ✓ | | |
| multiple | | | ✓ | ✓ |
| Research | | | | |
| Specific research project | ✓ | ✓ | ✓ | ✓ |
| Annual monitoring | | ✓ | ✓ | ✓ |
| Annual network project | | ✓ | ✓ | ✓ |
| Co-authorship for participation | ✓ | ✓ | ✓ | ✓ |
| Support from MarineGEO Central | | | | |
| Project supplies | ✓ | ✓ | ✓ | ✓ |
| Site starter kit (sensors, supplies) | | ✓ | ✓ | ✓ |
| In-person training | | ✓ | ✓ | ✓ |
| Eligibility for network project grant | | | ✓ | ✓ |
| Eligibility for network project Postdoc | | | ✓ | ✓ |
| Travel support for annual workshop | | | ✓ | ✓ |
| Governance and influence | | | | |
| Seat on Executive Committee: Eligible | | | ✓ | |
| Seat on Executive Committee | | | | ✓ |

- Lead the annual coordinated experiment/project at the site, as applicable.
- Strengthen MarineGEO's community and research via active participation in Working Groups and annual workshops.

Support provided to Habitat Observatories includes that provided to Project Partners, plus:

- Basic equipment and supplies required for site launch.
- In-person training in MarineGEO methods.

3. Ecosystem Observatory

Ecosystem Observatories are the core of MarineGEO's network. Ecosystem Observatories commit to (1) collecting repeated measurements of environment and biology using the MarineGEO standard toolkit to produce a long-term record in multiple habitats; (2) participating in coordinated experiments and other project-based network research activities; (3) sharing the resulting data according to MarineGEO's data standards and policy; and (4) engaging fully in the network by participating in Working Groups, annual meetings and workshops, and regular communications. As nodes in the global network, ecosystem observatories gain comparative insights into their local ecosystem in a global context as well as contrasts and connections among local habitats.

Requirements of an Ecosystem Observatory (**Box 1**) include those for a Habitat Observatory, plus:

- Collect observational (monitoring) data across at least three habitat types annually using the standard MarineGEO toolkit.

Support for Ecosystem Observatories includes that provided to Habitat Observatories, plus:

- Training and personnel support from MarineGEO Central to launch the site.
- Eligibility to lead annual network project and compete for Postdoctoral Scholar funds.
- Eligibility to serve as an at-large member of MarineGEO Executive Committee (EC).

4. MarineGEO Hub

A MarineGEO Hub is an Ecosystem Observatory, with all the characteristics described above, that additionally commits to a larger leadership role within the network by helping MarineGEO Central strategize, recruit, train, and coordinate partners. Hubs may have a regional (e.g., East Asia) or a scientific (e.g., geospatial mapping) focus, or both. MarineGEO may approach institutions to explore Hub partnership based on the network's needs in a specific geographic or scientific area. Particular Hub partnerships are designed jointly by MarineGEO Central and partner institution(s) based on MarineGEO's Strategic Plan and Science Goals. Because each hub's role is unique, membership as a MarineGEO Hub is negotiated on a case by case basis.

Requirements of a MarineGEO Hub (**Box 1**) include those for an Ecosystem Observatory, plus:

- Commitment, capacity, and resources to help recruit and train other partners in the MarineGEO toolkit.
- Service as a standing member of the MarineGEO Executive Committee.

Support for MarineGEO Hubs includes that provided to Ecosystem Observatories, plus:

- Priority in joint fundraising efforts.

Becoming a MarineGEO partner

Exploration and application

MarineGEO welcomes universities, agencies, citizen groups, and other organizations to explore partnership in the network. The process for establishing a partnership is as follows:

1. **Exploration:** Prospective partner reviews MarineGEO background documents (<https://marinegeo.github.io>) to assess opportunities, mutual interests, and fit with partnership type. Materials to review include: MarineGEO Strategic Plan, Science Framework, Partnership Framework, and habitat protocol modules.
2. **Application:** Prospective partner submits an expression of interest in joining MarineGEO, describing the organization, areas of interest and expertise, desired partnership type, and partner capacity.
3. **Discussion:** MarineGEO and prospective partner discuss respective proposed roles (see **Boxes 1 and 2**).
4. **Review:** MarineGEO Central reviews prospective partnerships at least semi-annually, evaluating expressions of interest on several criteria:
 - Scientific value of the partnership to MarineGEO's goals on the basis of geography, ecological representation, and/or other scientific contributions
 - Capacity in terms of available resources (funding, infrastructure) and personnel
 - Soundness of local management plan to execute MarineGEO research
 - Commitment and support for long-term research by the partner organization's administration and scientists
 - Complementarity of expertise, geography, and habitats with other partners
 - Type of partnership desired
5. **Prioritization:** MarineGEO prioritizes proposed partnerships based on these criteria and on MarineGEO Central's capacity for onboarding in the coming year, then contacts prospective partners with the best fit to outline next steps toward a formal partnership.
6. **Formalization:** Smithsonian and prospective partner agree to formalize the partnership by signing a Memorandum of Understanding.

Box 2. Process and timeline of a MarineGEO observatory.

Planning (Smithsonian and Partner)

- Explore mutual interests
- Submit expression of interest
- Review and assess capacity and needs
- Formalize plan and responsibilities

Site launch (Smithsonian and Partner)

- Synthesize site data and literature
- Establish site infrastructure
- Delineate and map seascape and site
- Train local staff
- Conduct initial ecological surveys

Site management and time series (Partner)

- Environmental monitoring (continuous)
- Quantitative ecological surveys (annual)

Mature site (Smithsonian and Partner)

- ≥ Yr 3: Intensive biodiversity census
- ≥ Yr 3: Historical ecology analysis
- ≥ Yr 3: Blue carbon coring

Research cycle (Smithsonian and Partner)

- Network meetings: planning, synthesis
- Coordinated experiments across network
- Coordinated, short-term projects

Knowledge synthesis and planning

- Central data management (Smithsonian)
- Knowledge synthesis workshops

Research products

- Peer-reviewed publications
- Biodiversity database, resources
- Site status dashboard ("local ocean pulse")

Establishing a MarineGEO Observatory

A new Observatory partner lays the groundwork for long-term MarineGEO research through the following collaborative steps (**Box 2**):

1. **Synthesize site knowledge.** Partner synthesizes existing literature and data on the site, ideally including geography, history, environment, biodiversity, and ecology, to provide a foundation for long-term research at the new observatory¹.
2. **Inaugural field campaign.** With MarineGEO support, partner institution formally launches the new observatory by identifying and surveying the major ecosystems and establishing infrastructure for regular environmental and ecosystem observations. MarineGEO trains partner staff in standard field and data protocols.
3. **Establish time series.** New partner leads continuing MarineGEO core observations, experiments, and other activities at the site, at least annually, following the current MarineGEO Science Framework and protocol modules (<https://marinegeo.github.io>).
4. **Biodiversity census.** Smithsonian and new partner jointly build the biodiversity database for the site, potentially including an intensive biodiversity census as the new observatory matures. The census establishes a benchmark of local biodiversity and foundation for future research, based on rigorous scientific collections.

Roles and Responsibilities

MarineGEO aims to optimize mutual benefits to all network partners by balancing roles and responsibilities. By engaging in formal partnership, all MarineGEO partners commit to the network's shared principles, values, and long-term strategic goals (see MarineGEO website). That commitment protects both the Smithsonian's and the partners' investments in the network's continuing long-term research. The Memorandum of Understanding between Smithsonian and the partner organization(s) outlines these responsibilities (**Box 3**).

¹ A gold standard example, albeit dated, is: Rützler K, Macintyre IG (eds). 1982. The Atlantic barrier reef ecosystem at Carrie Bow Cay, Belize, 1: Structure and Communities. Smithsonian Contributions to the Marine Sciences. 539 (downloadable at: <https://repository.si.edu/handle/10088/1116>). Observatories are not expected to produce such a book for this purpose. At a minimum, we envision a list of key publications, ideally including taxonomic checklists or monographs, and available data sets.

Box 3. Responsibilities of Smithsonian and Partner Organizations in a MarineGEO Observatory partnership.

| | Observatory partner institution | Smithsonian MarineGEO Central |
|------------------------------------|--|--|
| Governance | Engages fully in network activities, working groups, committees appropriate to partnership type (Box 1). | Manages network operations and groups: Executive Committee, external Advisory Council, Working Groups. Solicits input from network. Leads strategic planning. |
| Collaboration | Adopts the community spirit of the MarineGEO network , sharing expertise and embracing opportunities for collaboration across disciplines and institutions. | Fosters development and engagement of MarineGEO community through regular communications, events, in-person meetings. Responds to initiatives and ideas from network members. |
| Research | Leads and identifies resources to support MarineGEO science locally. Proposes and reviews innovative research concepts for network adoption. | Coordinates research initiatives across the network. Provides consistent research direction and management. |
| Methods | Collects data and metadata according to established protocols. Provides feedback on methods to MarineGEO Central. | Provides vetted, standardized protocols , data templates, and guidance for conducting MarineGEO research through its open-access modules. |
| Training | Ensures all personnel are properly trained to conduct research and manage data accurately. | Trains network partners in MarineGEO methods in-person and via online service to build local capacity. |
| Data | Submits accurate data using approved templates and pipelines , after local QAQC. Shares data according to a mutual open data sharing agreement. | Centrally manages, archives, and serves network data. Conducts high-level QAQC on submitted data |
| Analysis & Synthesis | Collaborates across the network to synthesize research. Publishes rigorous research analyzing local and network data. Leads interpretation of local data. | Maintains open-source analytical toolbox and hosts workshops to support knowledge synthesis. |
| Publications & Products | Leads timely publication of rigorous research from local site, and from network as appropriate. | Helps coordinate partners toward timely publication of rigorous network research. Tracks network's scholarly achievements. |
| Collections | Leads local campaigns to collect biological materials and deposit them in appropriate repositories according to MarineGEO and accepted community standards. | Facilitates ethical collection and identifies proper deposition in central repositories for biological collections. Ensures proper documentation for long-term archiving. Coordinates collection efforts. |
| Education | Engages and trains local students in scientific foundations, practical skills involved in MarineGEO research, and network science. | Provides research and management opportunities for students and recent graduates through fellowships, internships, and exchanges. |
| Fundraising | Leads local fundraising. Engages MarineGEO Central as needed. | Leads fundraising for Central operations and network initiatives. Supports local fundraising as needed. |
| Infrastructure | Purchases and maintains local instrumentation and supplies. Maintains materials provided by Central. | Provides minimum set of standard materials. Ensures supply kits are provided for coordinated experiments. |

Other Engagement Opportunities

With a global-scale research program, MarineGEO provides a variety of additional opportunities for engagement. The strength of the MarineGEO network is its global, comparative approach to the science of coastal life and ecology. MarineGEO also recognizes the value of drawing on expertise that exists beyond the formal network. Where mutual interest exists, MarineGEO is open to collaborating with individuals and organizations in all sectors, from science, policy, and management to education, industry, and philanthropy. Working with leaders in these fields allows MarineGEO to extend the relevance, reach, and utility of our collaborative research. Reaching beyond the scientific research community is how MarineGEO realizes its vision for an informed society that fosters healthy and biodiverse coastal ecosystems.

The following are a few key areas, among many, ripe for collaboration with our research network:

- Complementary ecological networks, such as the Reef Life Survey
- Citizen science involving community members and students
- Machine learning to analyze still- and video images of organisms and habitats
- Data management
- Economics of ecosystem services
- Decision-making in conservation and management

MarineGEO welcomes inquiries from organizations doing work complementary to ours to discuss opportunities for mutually interesting projects on the above topics and beyond.

Please contact us at MarineGEO@si.edu.