

Briefing Note # 7

Ocean20: Accessible Ocean Observing Technologies

Key Recommendations:

1. Leverage financing mechanisms by mobilising blended finance and innovation funds to scale affordable ocean technologies for climate resilience and blue economy growth.
2. Support a global framework for affordable and open ocean technologies and promote co-design with developing countries.
3. Strengthen data equity by encouraging G20 member states to expand open-access data policies, leveraging accessible software and shared digital infrastructure.
4. Invest in capacity building by enhancing technical training, establishing regional innovation and sensor calibration / validation hubs, and promote citizen science programmes using internet-enabled mobile devices to empower equitable participation.

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Ocean20: Accessible Ocean Observing Technologies

The ocean is foundational to the global climate stability, economic prosperity and human well-being. While there have been many advancements in ocean observing technologies, access and data collection remains biased to the Global North. The tools required to observe, monitor and sustainably manage the ocean remain largely inaccessible to many regions around the world, due to funding constraints, tariffs and sustained and impactful knowledge transfer, leaving many developing and small island states unable to monitor and manage their ocean systems. The high cost, proprietary software and centralised research and development investments, compounded by the lack of data sharing have left many regions unable to contribute or benefit from ocean knowledge and innovation.

The G20 nations have previously recognised the importance of digital inclusion, innovation and climate actions in their objectives and recommendations. Supporting accessible ocean technologies aligns directly with these priorities and will further enhance:

- Climate resilience: Improved monitoring supports early warning systems for extreme weather and climate driven changes.
- Blue Economies: Broader access to technology enables responsible fisheries, aquaculture and marine resource management.
- Scientific Innovation: Inclusive research and development networks accelerate technological development and knowledge transfer across regions.

Recent initiatives demonstrate that accessible ocean technologies and open data policies can transform participation in ocean observation. Some examples include:

- Argo floats: This is an international program of autonomous instruments that measure the open ocean's temperature and salinity down to 2000m¹. This data has become the backbone of scientific studies, state-of-the ocean reports and climate forecasts. A recent technological advancement by Seatrec² allows Argo float technology to generate its own power, making the floats last longer and allowing them to be more versatile.
- Sofar Spotter Buoys³: These instruments provide an affordable, cloud connected wave and weather monitoring platform. A complementary project to the spotter buoys is Bristlemouth⁴, an open source hardware product that allows users to customize their oceanographic instruments allowing them to become more versatile.

¹ <https://argo.ucsd.edu/>

² <https://seatrec.com/>

³ <https://www.sofarocan.com/products/spotter>

⁴ <https://www.bristlemouth.org/>

- Solutions for Cost-Effective Ocean Observation Platform (SCOOP)⁵: A (largely) European funded project that provides a platform for “people involved in collecting marine and oceanographic observations in a cost-effective way” to create a community & share products (at all stages of maturity). Projects such as the Coastal Observations Lab in a Box (COLaB)⁶ make use of SCOOP to collate a region (and need)-specific suite of instruments to help low income countries and or regions observe and monitor their ocean using internationally standardised methods.

The G20 nations have a unique opportunity to promote inclusive innovations which enable equitable access to technologies that foster sustainable development and enhance global ocean resilience. This note recommends the establishment of a G20 Accessible Ocean Innovation Initiative supported by funding mechanisms that supports inclusive research and development and innovative ocean technologies, open data policies, capacity building and the development of communities of practice to extend these capacity building initiatives into established programmes.

1. Identifying gaps and needs in Accessible Ocean Observing Technologies

One of the first objectives within this discussion of accessible ocean observing technologies is to understand where there are gaps in ocean observing systems, be they coastal or open ocean, and if these gaps can be filled with accessible technologies. Three gaps that were highlighted in discussions included:

- Synthesis for data systems, especially new networks such as surface autonomous instruments and the integration of data from low-cost technologies currently being developed.
- High quality vs stable data and the reliability of data sets. Data needs to be handled efficiently and with the appropriate metadata to ensure continued value.
- Benthic sampling techniques such as camera systems and those providing biological samples for taxonomy. The use of AI to analyse large volumes of videodata acquisition and the need for sea-going vessels for deep sea sampling are essential.
- Calibration networks within regional hubs which assist in providing “cheaper” calibration opportunities for highly sensitive sensors such as oxygen and carbonate sensors.

One aspect that would greatly increase access to low-cost sensor technologies is mechanisms for accelerating the commercialisation of prototypes, accessibility workshops, open access to 3D printable versions of the hardware itself, twinning pilot projects for communities to learn from one another, access to databases for uploading data, and easy access to use of existing data.

⁵ <https://www.scoop-ocean.org/>

⁶ <https://oceandecade.org/actions/coastal-observation-lab-in-a-box/>

2. Barriers to procurement and maintenance of ocean observing technologies that could be addressed by the G20

Numerous barriers exist for developing countries and small island developing states to access ocean observing technologies, regardless of cost and affordability, which could be addressed through national economic policies. The G20 countries are encouraged to engage with the following recommendations to assist their ocean observing institutions to enhance their ocean observing networks:

- Encourage Global North and Global South interactions: While these exist to some degree, there also exists a great divide. The Global North are traditionally the leaders in the development of ocean observation technologies, but the Global South have many innovative ideas that hold great potential which could be of further interest.
- Joint measuring campaigns for both science and capacity development opportunities: It must be noted “parachute science”, mostly impacting Global South states, continues to occur. This is the practice of researchers from more affluent countries collecting data in a countries’ waters, “training” their scientists, but then processing and publishing these data without Global South participants. It is also incorrectly assumed that because there are no “dots on a map” of ocean observations that there are no ocean observations at all within these regions. There needs to be an honest and truly inclusive discourse around scientific campaigns, especially in foreign waters.
- Create and facilitate access to new markets and encourage procurement of technologies between G20 states.
- Government agreements, whether bilateral or multi-lateral, on preferential tariffs and import taxes for scientific equipment.
- Enabling implementation of F.A.I.R.⁷ and C.A.R.E.⁸ open science principles on data and data access.
- Encourage and facilitate citizen science projects and data systems.

⁷ Findable, Accessible, Interoperable, and Reusable

⁸ Collective Benefit, Authority to Control, Responsibility, Ethics