OO Exchange, September 17, 2026
Topical focus: Sustained infrastructure for observing ocean biology and biogeochemistry, Air-sea interaction
Facilitator: Heather Benway

Summary

Twenty-three attendees participated in the virtual session (49 individuals registered). The group first reviewed introductory information about the DCL process and resources.

- NSF seeks community input on the ocean observing systems in their investment portfolio and what parts of ocean observing that are scientifically relevant, up to date, and aligned with NSF's mission and priorities (refer to guidepost documents: the NSF strategic plan 2026-2030, OSTP released a document, the decadal survey document and the NAS decadal survey for earth science).
    - Guidepost documents are available in the Resource Document on the OOIFB website (and shared to all OO Exchange groups).
    - "National security" is a stated priority, however, it is not necessarily military focused; it involves the government protecting citizens from internal and external threats, which include broad, environmental threats. If your research (and use of OO systems) works to mitigate risks from environmental, extreme events like a hurricane, protecting coastal communities, and helping fisheries, then that science parallels national security priorities.
- Input is welcome and encouraged from all, including US and non-US scientists on all aspects of ocean observing, not necessarily one specific platform or program. They are welcoming group responses, your institution might be putting one together, but individual responses are strongly encouraged. If we can formulate individual responses for NSF to support basic science, ocean science questions, that will be far more powerful than institutional or group responses.
- Responses are not required for all 9 questions. Even if you only answer ONE question (responses to all not req'd!) and do it meaningfully, it's important to submit. The deadline is 9/30. Effectively convey how NSF should invest in observing to support ocean science research.
- **Why are we here?** To seed the development of individual responses to the NSF DCL by sharing expertise and perspectives across the community on how NSF-supported observing assets support our science
- **Recommendations:** 1) Individual responses should be authentic and specific, not generic form letters. 2) Advocate holistically on how NSF should invest in observing to support ocean science research - being strategic in your response about how different platforms/assets/observing programs (representing different spatial and temporal perspectives) work together to answer your big science Qs is more likely to help the panel be more strategic in their advice to NSF on future observing investments. 3) Avoid negative commentary on specific observing programs or infighting among observing initiatives - this weakens ocean science platforms.

The group then split into three breakout groups focused on key topics. Attendees were asked to consider these three topics in the framing of the questions asked through the DCL, and focus on observing gaps, what technologies/infrastructure are needed to address gaps, what opportunities exist

to augment current ocean observing systems, and complementary efforts across agencies and internationally.

- B1 Air-sea gas exchange
- B2 Biological carbon pump
- B3 Marine organisms and their environments

Key takeaways from this OO Exchange included:

- **Collaboration with the international ocean science and observing communities is critical and NSF ocean observing systems are part of the larger, global, observing network**. At this time, there is much uncertainty surrounding U.S. ocean observing assets, and the international community is increasingly viewing the U.S. as an unreliable partner in these strategic efforts (for example, the U.S. was mentioned very little in new SOLAS science plan v3.0 that was just published).
    - The U.S. does not want to fall behind other countries in this type of science…with its unique observing technology and capabilities, it's important to instill American pride and engage and excite the public (e.g., exploring remote parts of the ocean…similar to exploring space)
    - **Collaboration with international community provides opportunity to leverage and consolidate observing assets to maximize global coverage** of key ocean parameters
        - Example: UN Decade program JETZON. Bringing together biological carbon pump process studies and observations across nations. https://jetzon.org/
- NSF ocean observing systems have an opportunity to provide valuable information across a range of temporal **and spatial scales**; the synergies of these complementary observing capabilities help constrain key processes driving complex dynamics such as carbon export and air-sea gas exchange
- Need for **better coordination across existing ocean observing assets and the different agencies (regardless of different missions) that are funding and managing these systems**. This includes the need for shared governance (across infrastructure, personnel, and data management plans). Better coordination will yield a better return on investment (ROI) for these agencies and the funds they are using to support various platforms.
- A globally distributed network of **sustained multidisciplinary time series observations** from ships, moorings, gliders, floats, etc. are essential for studying ocean processes, providing baselines to characterize variability, and monitoring long-term ecosystem changes. This includes observations from the air-sea interface to the deep ocean - multi-platform approaches provide improved spatiotemporal coverage. The challenges of supporting and maintaining time series:
    - **Long-term stability and reliability in how programs are structured and funding needs to be reconsidered**. Funding time series programs via 3-5-year grant cycles is an unstable and ineffective approach to maintaining infrastructure.
    - It's not only about infrastructure, and assets in the water, but also about **supporting training of the people to use and operate things**, **and manage the data**. Human infrastructure is just as critical as technological infrastructure (and augments it).

        - A highly-trained technical workforce has emerged from many ocean observing programs - this could be enhanced and highlighted as it is relevant to the next generation workforce needed for example for QA/QC with AI driven data tech.
    - **Data management needs to be a priority**. If the data doesn't come out in a useful way from day one, then it is not successful. **Any program for long term monitoring, data management curation has to be a significant part that is funding.**
- There are **opportunities to engage more with private companies- tech translation from other fields through cross-directorate initiatives (NSF TIP, etc.), and increasing advanced manufacturing through ships, AUVs, Argo, sensor tech, etc.**
- **Considering fisheries and aquaculture (U.S. food supply) and how ocean observing contributes. Harmful algal blooms (HABs) and other changes in the environment (e.g. marine heatwaves)** that the food web can't respond to in time…impact shellfish harvest and/or can cause fisheries collapse. There is a gap here that needs to be observed. **Aligns with NSF goals, things like early warning systems, for national security, protecting fisheries, and early morning systems, how long you should wait before harvesting your shellfish.**
    - Underwater observing systems like flow cytometers and imaging cytometers for larger cells; molecular methods (eDNA) for microdiversity; functional transcriptomics (micro to macro); AUVs to augment existing fixed infrastructure.
        - Look at plume progression, cells blooming up and then being degraded by bacteria, life stages, environmental triggers for the different life stages, response times of organisms
    - Large datasets currently collected through OO systems such as OOI. Right now, much is curated by hand. Opportunity to work with AI and train it to look for patterns.
    - NASA, complimentary spectral analysis to identify organisms- a spectral shift correlated with a bloom of phytoplankton, would be a way to create an early warning signal.