OO Exchange, September 14, 2026
Topical focus: Ocean Carbon and Biogeochemistry
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Summary
Twenty-eight attendees participated in the virtual session. After quick, introductory information about the DCL process and resources, initial, full-group discussions focused on:

- The importance of following and sustaining protocols and best practices NSF has utilized in the past (e.g. balancing and prioritizing innovation and established technologies). NSF can rely on documents that already exist for excellent community-reviewed inputs and details about ocean observing system needs.
- The need to to support ocean observing as a whole system and how current and future activities align with Federal priorities. DCL responses can be framed in terms of how various observational assets complement one another on spatial and temporal scales, and also how observations align with the scope of NSF's new strategic plan (highlight connections to fisheries, human health/hazards [hurricanes, ENSO, earthquakes, tsunamis]).

Participants then split into four breakout groups. Attendees considered all questions contained in the request for input, however, much of the discussions focused on:

- Q2: What gaps exist in observations to address high impact science questions and what oceanic regions could benefit from NSF ocean observations system(s)?
- Q4: What types of observations (e.g., pre-selected sites vs. moveable assets) are needed and what technologies are ready for implementation to ensure advancement of the state of the science?
- Q5: Which elements in NSF's existing observational portfolio should be maintained or updated to fulfil the identified needs?
- Q8: How should NSF seek to balance the development of new ocean observing technologies with the collection of more data using established technologies?

Key takeaways from this OO Exchange included:

- **Support is critical for ocean observing elements as a whole; ensure that there is a balance between continuity of currently-funded critical observations and new, strategic activities**. How are observations made overall - articulate this vision and the overall importance of ocean observing, and continue to evaluate best practices as we use them.
- **Maintaining time-series is vital for ecosystem monitoring - without these large, time-series data sets, we would have huge knowledge gaps**. They also provide critical baselines and lay the groundwork for decision making on blue economy, geoengineering (e.g., mCDR), resource extraction (e.g., DSM), etc. Need to build on what we have, make things as multidisciplinary as possible, but ensure that we don't lose time series data sets.
- **AI connections**: Science-ready (QC and calibrated) data, with current/past-developed best practices applied, can lead to AI-ready, "analysis" ready data. Any ocean observing

system needs to create a pipeline to ensure data is analysis/science and eventually AI-ready (right now, we are not at a point where AI can just take in raw data)

- NOAA vs NSF and **better, cross-agency coordination/collaboration**. NOAA traditionally focuses on monitoring, white NSF-funded activities focus on hypothesis-driven science (another way to think about it…NSF is focused on discovery-driven research and other agencies are "mission-drvien"- NSF's work complements other agency efforts). What starts as hypothesis-driven science, then becomes long term monitoring (e.g. SOCCOM, BATS, HOT, etc.). The question then becomes, how do [we] cross the bridge from hypothesis-driven science to critical monitoring to inform and drive hypothesis science? To properly scale hypothesis-driven process studies, we need context provided by long-term monitoring and observing systems.
    - **Federal agencies work differently so they may not be maximizing return on investment (ROI) between agencies and the different levels of government.** There is a lot of room for growth and improvement on how much and in what ways agencies meet on these, and also includes improvements to tribal and international coordination as well. Improved coordination can be achieved at the programmatic/leadership level, as well as the data management and QA/QC level (how to better capture metrics across sites?)
- **Data and metadata standardization are critical.** We need a review of methods, instruments, practices, data alignment, reporting through similar repos, similar units, long_names, short_names, and consistent data reporting (AI-BCO-DMO is an example). **Funding needs to be improved for calibration and quality control (QC) efforts; investment is needed in data curation and making data widely and easily available for analysis (otherwise, many observations may be underutilized).**
    - Need a mechanism to bring in the experts to identify the correct update, calibration procedures, and data reporting for each niche question, and this needs to be done on a regular basis. BATS has a protocol for this; OOI has a tech refresh process. Which processes are working? Which are not? How, as a community, do we do this moving forward? **Compare across community practices; implement those that work across platforms.**
- Need to keep in mind **who the observing systems are serving**. For example, there are four tribes in the Columbia River area, as well as WA treaty tribes for which OOI data is vital to understanding ocean processes that affect their fisheries and navigation safeties. They depend on the state/Fed collecting the vital data they need but do not have funds to do themselves. Other (non-science) stakeholders rely on observing data in the same way: **providing data for individuals/groups that cannot collect the data themselves.**
- Missed opportunities (potential future activities): Public-private partnerships (fishermen are thoroughly invested in understanding the ocean and changes and matching them to their catches and historical knowledge. Create and locate sensors that work for hypothesis-driven science and economic priorities). Collaboration with NOAA which largely focuses on fisheries management?

- The U.S. maintains leadership in fisheries and other ocean industries; ocean observations are critical to supporting these industries (and thus, maintaining the U.S. as a leader in these fields).