

Challenges and Opportunities in Physical Oceanography

Melanie Fewings

Associate Professor, Physics of Oceans and Atmospheres
College of Earth, Ocean, and Atmospheric Sciences
Oregon State University

NASEM Information-Gathering Meeting #3 for NSF Ocean Sciences Decadal Survey

Portland, Oregon
October 24, 2023

- **Need: Long time series**
- **Solution #1: Historical data rescue**
- **Problem: Too little data...but more than we can analyze**
- **Solution #2: LTORs**



Oregon State
University



To understand our changing climate, we need **long time series** (decades)

- Changing climate → we want to identify trends, anomalies, extreme events
 - MHWs, including El Niños
 - subarctic invasions
 - droughts
 - unusual precipitation and river inputs
- For reliable identification of anomalies and extreme events, we need **robust climatologies**
 - require long time series = **many decades** (convention is 30 years)
 - much greater than the length of a single typical project
 - NSF presently supports this via Long-Term Ecological Research Network, Ocean Observatories Initiative, ...
- What can we do while we wait to build up more >30-yr long time series?
RESCUE HISTORICAL OBSERVATIONS!
Examples:
 - Newport Hydrographic Line shipboard data (1960s–1970s; 1997–present)
 - NH-10 mooring site on 80-m isobath on Oregon shelf (1997–present)
 - Olympic Coast National Marine Sanctuary data (20 moorings, 2000–present)
 - Historical tide gauge data (Talke)

Historical oceanographic data sets are national treasures that are in danger of being lost as the original PIs retire.

Needs and recommendations

- Need for **climate data records**:
 - We need more **long-term** data sets of **subsurface observations where Argo floats don't go**: continental shelves and slopes.
 - We need to **rescue historical data sets**.
- Suggestion: start an **in-house NSF effort for historical data rescue** (USGS has had this)
 - Provide personnel to support getting new observations into archives, rather than expecting PIs to provide as part of each project.
 - This would result in more consistent and efficient data archiving efforts and let PIs and scientists concentrate on writing papers.
- A paradox: we have both **not enough data** to understand the changing climate and **more data** than we can fully exploit.
 - There's already lots of data available to be analyzed!
 - We need **people time** funded to analyze existing data: more **grad student and postdoc funding**, perhaps targeted at underrepresented groups
- Suggestion: start **NSF Long-Term Oceanographic Research (LTOR) sites** similar to Long-Term Ecological Research (LTER) sites
 - LTOR sites would fund long-term, hypothesis-driven observing and analysis, complementing the OOI
- Suggestions related to OOI:
 - Remove barriers between OOI data experts and grad student/postdoc funding/advising
 - **Fund data ambassadors/helpers** (like Ocean Networks Canada does) to assist new PIs with accessing OOI data and help them prepare figures for proposals