



Arctic Observing Open Science Meeting

17 – 19 November 2015

Seattle, Washington, USA

Parallel Session Summary

Ocean Circulation and Mixing

Session Chairs: An Nguyen and Laurie Padman

Question 1: What scientific or operational advances have been facilitated by the network(s) of Arctic observations?

The session was highly engaging for all scientists involved, including several who just arrived back from their latest expeditions and reported on the data just collected for current/last-year/accumulation of years. The presentations cover a wide range of observations and scientific goals aiming to address the processes governing the Arctic Ocean including circulation/budgets. By design, these observations are part of the Arctic-wide observing network. The advantage of this, and to address question (1), is that scientists can see how observations from upstream/downstream (spatial), earlier/later (temporal) time fit into what they observed/trying to study at their particular sites. Discussions on scientific connections naturally arisen as a result. These discussions led to questions as to why meetings such as these, pure discussion on science based on their collective results, to enhance collaboration, have not happened more frequently. A few examples of advancement that has been facilitated by the network include: understanding the time-scale and pathway of the general circulation of the Atlantic Water from upstream at the NSF-funded NABOS sites (A.Pnyushkov, UAF) and down-stream in the Canada Basin (R.Pickart, WHOI), connection between the inflow of Pacific Water upstream (R.Woodgate, UW) and downstream (R.Pickart WHOI, P.Stabeno), connection between wind-driven upwellings upstream (P.Stabeno) and downstream (R.Pickart, WHOI) and how that affect ocean mixing and circulation of Pacific-origin water in the Western Arctic. System-wide questions such as budgets / pathways / mixings were still unclear due to lack of (a) data and (b) time to discuss amongst scientists.

On this last point, questions raised by the group include the lack of transparency of what has been achieved so far using the network of observations including those presented in the session, e.g., have the achieved work been publicized well enough? Have we made any progress to constrain budgets in the Arctic using the available data? The consensus is “no”, and thus the relevant question is what other type/locations of observations are needed to answer these questions. Given the long time-series of observations at various Arctic gateways, have we improved our understanding on mean/variability or are the spatial and temporal coverages still inadequate? A special note was made that significant advancement has been made with new technology (e.g., ITP) in the Western

Arctic but sites such as along the Russian shelves we have not made a lot of progress due to lack of access / data.

Question 3: How have observing activities contributed to the science needs of mission agencies or stakeholders?

To this, the scientists were quite unclear. Most of the PIs are funded by NSF to address specific science questions in their particular studied area, with “promises” in their proposals to connect what they observed to the “implications” on the larger-scale Arctic-wide changes. We did not get far with this question (3) primarily because for the central Arctic with ice cover it is not of high priorities to many stakeholders.

Question 2: What opportunities exist to address new science questions, operational challenges, or questions of Arctic communities through enhanced collaboration and a robust interagency observing system?

In addition to private and federal funding agencies, potentially new opportunities include those by IARPC and the new NPRB program in the Chukchi Sea. The details for IARPC and NPRB are included at the end of this summary.

Related to the challenges involving “availability” of the network of data and what opportunities or lack thereof are available for addressing scientific questions and enhancing collaborations, some PIs noted that they are spending a significant amount of their time collecting and distributing the data and not having enough funding opportunity to analyze and understand the system-wide science questions. In addition, data from different projects can be scattered on both the projects’ sites and/or the PIs’ own sites as well as some scattered on repository (e.g., ICES). From the PIs’ perspective, they know exactly where the data are and are puzzled by the “difficulty” the users were pointing out. From the users’ point-of-views, the data are too scattered and efforts to gather and clean up are repeated by every user. In addition, the users do not know when a certain data set become available, and thus cannot take full advantage of the network. A suggestion is perhaps a repository (AON) with a “mailing-list” such as NSIDC where for example if a new dataset for sea-ice becomes available there is an announcement either on the site itself or via the mailing lists. The team analyzing CRYOSAT data for example has made announcement to the CRYOLISTS mailing list advertising and calling for users to evaluate and use data for scientific research. Perhaps this can also be done with AON data sets to facilitate usage.

The group questioned whether an available observing network where any person can come and download the data without intimate knowledge of the details of data quality will be the best way forward. Perhaps it should be that the PIs who collected the data should also benefit. A related question is whether AON is not taking advantage of the vast knowledge of the PIs by not allowing room for “scientific research” questions to be addressed as part of the proposal. Given the funding involved in the field works, a

fraction dedicated to scientific investigation is miniscule but can have much higher potential return than a completely separate and time-consuming proposal written by the PIs / anyone to a separate program. Perhaps one possible way forward, and to include young / early career scientists, is to hold meetings such as this to allow one-on-one exchange of ideas / knowledge / strategy and facilitate collaborations and joint-writing proposals. It should be noted however that young scientists have limited resources to attend such meetings (and thus web based resources are preferred.)

Lastly, the community questioned whether they are doing themselves a dis-service via the proposal reviewing system. The once per year opportunity is too limited and collaborative efforts, especially those involving system-wide synthesis of data and/or models, can be difficult to get through the reviewing process. This essentially short-change our own community's advancement in exploring new ideas / approaches because they can be deemed too "risky".

1. IARPC Collaboration Teams
 - 12 Teams total, IARPC will meet in December to refine structure. Consider participating in monthly IARPC calls
 - Agencies participate in these calls and are looking for opportunities – encourage presentations by scientists to share work
 - Maybe IARPC needs to seek out participants more actively – or maybe not
 - Encourage all to visit the IARPC website, join relevant CTs
2. New NPRB program in Chukchi Sea
 - All PIs will meet and share science during 5 year study to get ecosystem picture. Interested in outside participants (if you can support your travel). Contact Danielle Dickson for more information.