Minutes
Ocean Observatories Initiative Facility Board (OOIFB) Meeting
The Westin Alexandria Old Town, 400 Courthouse Square,
Alexandria, VA 22314 and Via Web Conference
October 26, 27, & 28, 2022
Start Time: 9:00 am ET each day

Appendices:

Meeting Minutes:

Wednesday October 26th – Data Systems Committee Meeting

Welcome, Introductions & Review agenda - Tim Crone welcomed participants to the meeting and reviewed the agenda. Introductions of all in person and those joining online were conducted. Slides reviewing the goals of the day's meeting were displayed and discussed. The participant list is available at *Appendix 1*. Tim's slides are included as *Appendix 2*.

OOI Data Delivery Systems: Present and Future - Jeff Glatstein spoke about the OOI data delivery systems, including the present systems, as well as objectives for the future. His slides are included as *Appendix 3*. Jeff encouraged discussion throughout his presentation.

Jeff reviewed the Cyberinfrastructure (CI) Resources that include roles, level of support, organizations, and personnel. The Data Explorer tool set was introduced just over a year ago and was created by Axiom.

Jeff reviewed the data processing components. The high-level components include:
- Data Processing
  - Databases (Cassandra and PostgreSQL)
  - Edex
  - Data Ingestion
- Data Delivery
  - StreamEngine/M2M – this runs OOINet
  - QARTOD

Data Discovery components include:
- Data Explorer – relatively new and it works on top of ERDDAP
- Data Portal (OOINET)
- Thredds 'Gold Server' – collection of all data in NetCDF format
- Raw Data Server
- Jupyter Hub (Alpha)

Discussion:
- Rich Signell - Is Jupyter Hub running on local hardware? Jeff – Yes, it is not in the Cloud yet. They are trying to understand the footprint that it will have. They have a small set of users.

Jeff reviewed the significant projects and impacts to date. This included the following (see slides for details):
- Performance
- Data accuracy and FAIR have been a focus. Discussion followed regarding M2M, Data Explorer, real time data and how to get it.
- User Experience
  - Adjustments of the OOINet
  - Implementation of Data Explorer
  - Move to precalculated data sets
  - Established user feedback loops (e.g., Discourse)

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- Efficiency and effectiveness adjustments include redundancy in data back-ups, increased cyber security, effective monitoring of issues, and advanced communication plans allowing increased open discussion of concerns and solutions than previously.

The latest configuration of Data Explorer is now up and running, including an increase in cluster size. Regarding the OOInet system, there are people who still use it for various reasons. Some prefer its search features and are accustomed to the system.

Jeff reported on objectives for Program Year V (PYV):
- Stream Engine re-architecture that includes upgrading to Python3 and adjustments to the data request management
- Data Explorer improvements include:
  - Completion of full resolution data visualization
  - Expansion of media server to HD video
  - Operational training
  - Further reingestion automation and reporting
  - ZPLS and AUV data availability soon
  - Addition of remaining scientific data.
- Compute in place - Jupyter hub beta release planned this year.
- Asset management – they have been able to reduce the time required for management. They are also developing Roundabout that will allow for better management by the MIOs.
- Targeting data accuracy and FAIR- continue to support preload database and analysis as well as tuning to FAIR practices on-going.
- Performance observation during the migration of data. This can help keeping an eye out on what queries are and can adjust.
- Operational changes include cloud storage transfer to TACC, NCEI data archival, and disaster recovery scenario exercises.

Discussion:
- Orest - Is there a cost in transferring data to the NCEI?
  - Jeff - Yes there is one time cost for transferring that is included in the budget. This covers most data, and the team is starting with the processed data, then the raw data will be added later.
- Kendra confirmed with Jeff that NCEI will be the long-term plan for data storage.

Jeff continued his report:
- OOI is targeting accuracy by each ticket. Cost for these updates and upcoming updates are all within the planned budget.
- Strategic planning is on-going regarding ERDDAP. ERDDAP will eventually phase out. OOI is also becoming too large for ERDDAP.
- OOI is exploring the ability to mint Digital Object Identifiers (DOI)
- They are analyzing ways to make the document management system easier to use.
- Analysis of alternatives for Alfresco, Confluence, and Jira is planned.
- There may be an option to eliminate Cassandra database footprints, but it is a costly part. This is not a performance issue but more of a cost issue.
- OOI will need to consider the future OOI DOI policy, as they move forward and add to the NCEI database.

Jeff reported on the OOI Cloud strategy. OOI is committed to looking at the cloud on a yearly basis. Moving infrastructure to the cloud is not cost effective. There are still ways to benefit, such as using the cloud to hold data sets while processing it. There will be possibilities of increasing the server but also using the cloud.

- Lisa Clough – Suggested to consider what NEON is doing in terms of the Cloud. Jeff replied that he has been in touch with NEON and is considering whether their strategy would work for OOI. Right now, it is not a good investment, but if OOI got rid of Casandra that might then be a better consideration. OOI is also looking at Jupyter hub.

Jeff reviewed OOI's five-year roadmap concept. High level line items include:
- There is a need to replace CENT OS and upgrade OOI software stack.
- Placement of engineering data and new Data Explorer personal analysis (what will be the new persona).
- Document management changes.
- Data Lake model connection to cloud computing; how the raw data discovery interface can be improved.
- System storage cap and discoverability; they need to think about how to manage the system to make data discoverable. This may eventually have to move toward a request-based system (i.e., if someone needs data before a certain time frame they request it, so less is actually stored on the system).
- Adjustments to the system and data status page.
- Do we want to migrate off of Python? This does not affect the end user but does affect the programmers. Python is slightly on the slower side so there could move to another code system.

Open discussion
- Fortran, C++, Juliet, were mentioned (jokingly), but these need to be maintainable.
- Legacy code can become a cost factor in the future.
- Jeff – The lower the level of the code, the faster the system is. Jeff reminds the committee that physics takes over. We will need to balance the future processes.
- Richard Dewey - Can data be put on a High Performance Computing (HPC) system?
    - Jeff - OOI is working with Texas Advanced Computing (TAC); data cannot just be parked out in these systems, there is an application process. OOI with TAC is moving towards democratizing data.
- Rich Signell asked how to distribute bigger data sets and make them accessible to scalable compute? Could OOI participate in an open storage network, such as the NSF-funded purchase object storage? It is low cost. Right now, this system has low egress charges, and this will work well in the future to compute from anywhere.
    - Jeff noted that he is aware of this but hasn't done a lot of research yet.
- Tim Crone – Over the life of OOI's 25-year program, systems evolve, and new technologies become available. In terms of data management, use of DOIs, resourcing, etc., should these be upgraded or rebuilt all from scratch?
    - Jeff – He doesn't think that there will ever be a total remake of the system. As this team moves forward, there should be a future discussion of these ideas along with consideration of future OOI budgets.
    - Lisa Clough noted that while OOI looks in 5-year time frames that coincide with their NSF awards, it's risky for them to consider that farther out. The current operator might not be

the operator in the longer term. DSC does not have that limitation and can think longer term and observe and collaborate with the new options that are coming online.
- ○ Bob Houtman – There are two possible future options that could be considered. There could be a continuous upgrade model, or a full turnover that could involve taking the system offline for a long or shorter period of time. Or there could be a beta system that is built in parallel.
- ○ Kendra reminded the committee to keep in mind that we don't want to miss collecting climate data if the system is considered being taken offline for a period.

Break

DSC Survey Report Recommendations - Review the findings and recommendations from the DSC report that summarizes the community survey results on OOI's Data Explorer System and other data delivery systems.

Tim Crone discussed the DSC survey conducted in late 2021/early 2022. He shared his screen and displayed the latest draft of the DSC Survey report, which is a Google Document. Tim created heat maps that offered a comparison of the 2019 survey data and the 2021 data. Suggestions were made by DSC members, and he incorporated many of the comments into the Google Doc during the discussion. Some of the suggestions and comments included:

- ● Add a cover sheet and table of contents.
- ● Lisa Clough reminded everyone to think about the audience. This report will be delivered to NSF. Are there any advantages of having the full report public? Are there sections of the report that could be public? Permission for release of the report, or sections of the report, would need to be requested to NSF.
- ● DSC could create a high-level summary report that could be distributed publicly after NSF approval.
- ● Thank everyone who took the time for taking the survey.
- ● Flip the axis on the plots so that they go from 1 to 10 and add the Axis labels.
- ● State that frequency = # of responses.
- ● Add a general statement that there were 62 responses.
- ● There was a discussion regarding all the different systems that can be used to access OOI data. There doesn't seem to be a preferred method for access. It was explained that some data is only accessible by certain methods. As an example, seismic data is only accessible by IRIS. Some people might be most familiar with the OOINet, and this is why they are still using it. They invested a lot of time getting familiar with it.
- ● Annette asked if Discourse is seeing an increase in users since this survey? Jeff Glatstein responded - it seems that people are increasing their use, but they have the analytics so they can further review user data.
- ● There are a few other questions that would be good to have a comparison between Survey 1 and 2 responses.
- ● Include plots for questions regarding the demographics.
- ● Add how many people responded to the questions regarding the OOI data access system.

There was discussion on the survey recommendations that should be included in the report:

- Rich Signell – In regard to more training sessions, consider submitting those as cookbooks to Project Pythia. This is an NSF funded project. This is a useful resource. Also, it would make people more aware of OOI. This could be linked to Discourse.
- Lisa Clough - It might be helpful to have recommendations for the OOI program, recommendations for NSF, and recommendations for Users.
- Richard Dewey - What is the thought process on maintaining all of the systems that are available for OOI data access. Should there be a recommendation?
  - Karen Bemis - We need to understand why people are still using the various systems.
  - Jeff Glatstein - This is a common problem. How do we move away from a legacy system?

Revisit the 2021 DSC Annual Report – This was tabled for later discussion.

Lunch Break

NOAA ESIP NCPP Brief on cohort study – A closer look at the phases - Guest Speakers: Steve Olson (NOAA National Weather Service) and Shane Miller (NODD Collaborator)

Steve Olson and Shane Mill provided a presentation titled, "ESIP NCPP Brief on cohort study – A closer look at the phases - Exploring Cloud backends for the new OGC Environmental Retrieval API." Steve began the presentation by explaining that there is a huge amount of data, but there is frequently a lack of data in a format that can be used. NWS began to address this issue in a partnership with UK Met Office. Together they sought to make access and exchange with the Meteorological and Oceanographic community easier. The OGC Environmental Data Retrieval (EDR) API was developed to address data sharing issues. It has become a methodology that shows promise for sharing data in many communities.

Steve and Shane's talk provided the following:
1. Background
   a. Data Silo Problem
   b. OGC and Environmental Data Retrieval (EDR) API
   c. ESIP NCPP Program
2. Goals and Objectives for cohort study
3. Phase 1 Key Findings and takeaways
4. Phase 1 Results
5. Demo
6. A Look Towards the Phase 2 Work

Steve and Shane's slides that contain details of their presentation are available in *__Appendix 4__* with a link to the recording in *__HERE__*.

Beyond FAIR – What data infrastructure does open science need? - Guest Speaker: Ryan Abernathy (LDEO)

Ryan Abernathy provided a presentation titled, "Beyond FAIR – What data infrastructure does open science need?" He talked about the idea of open science and technical barriers. Data needs to be Findable, Accessible, Interoperable, and Reusable (FAIR). To provide open science, a platform would be needed, and everyone would need access to the platform. The cloud could offer a "digital watering hole" for research and education. Ryan's presentation topics included:

- The status quo of data-intensive scientific infrastructure
- Cloud Computing and Pangeo
- From Software to SaaS: Pangeo Forge and Earthmover
- Where are things headed?

Ryan's slides that contain details of his presentation are available in ***Appendix 5*** with a link to the recording ***HERE****.*

Discussion:
- Tim Crone asked what Ryan would consider priorities if he was in charge of OOI data.
  - Ryan recommended we focus on providing raw direct access to analysis ready cloud optimized data. Catalog using an open standard. Have that be the foundation, and then build services to enable other user profiles to enable the data.
- Karen Bemis asked if a specific coding language would have to be used for the Pangeo Forge platform.
  - Ryan explained that data could be accessible from any programming language but if you wanted to adjust recipes within the system that would have to be done using Python.
- Richard Dewy - Ocean Networks Canada wants to increase and encourage users to cite them for the data collected and then analyzed. Would this be a possibility?
  - Ryan clarified that all data in the system would be linked back to the original providers and would preserve metadata citation. They are not actively tracking usage now; that is currently bigger than his projects current budget and scope.
- The final question asked what the priority should be from an OOI facility perspective (i.e., analysis ready data quality issues, syncing data sets, cloud optimization, etc.)?
  - Ryan suggests focusing on data access and cloud accessible data. Analysis-ready data could be addressed by the individual users for their specific purposes.

Break

Recognition of DSC Member, Rich Signell

Tim Crone expressed his and the committee's appreciation of Rich Signell's time with the committee. He was an inaugural member of DDCI and the DSC. He has been integral to many different of the committee's activities and his work was greatly appreciated.

Rich thanked all for the recognition and while he will be retiring from the US Geological Service (USGS), he plans on staying involved and invested in the community. He hopes to see the continuation of the various community collaborations and connections, as each head towards the common goals that Ryan Abernathy spoke about.

Brainstorming Session - Identify and prioritize future activities for the DSC – Tim Crone initiated a discussion on possible future activities and focus areas for the committee. Are there recommendations from past year's survey report that should have follow-up? How can the committee help better engagement between the community and OOI? The committee also identified some suggested improvements for the OOI facility. Tim created a Google Doc where the committee was encouraged to populate with future activities and focus areas. As a starting point, Tim reviewed the recommendations that were made in the DSC 2001 Annual Report and some of these should continue to be a focus.

Many of the committee's suggestions and comments were captured in their Google document and are also summarized below:

- How do we work as the interface between the community and the OOI?
- There could be more focus on Discourse.
- Is data access enough? Probably not.
- Holding community workshops were suggested and topics could include:
  - Potential shutdown of OOINet.
  - Higher level analysis.
  - Identify the services that aren't provided yet.
  - Doing science in an interactive way.
- Form a working group for users of OOI's acoustic data, more than just through OOI.
- How do we leverage other investments in data science? (e.g., MBARI imaging grant)
- What fits with the Facility Board role?
- People using Artificial Intelligence/Machine Learning (AI/ML) are looking for big datasets to do their development.
- Multimedia databases should be available as open source.
- Create best practices on how the community wants data annotated and stored.
- Provide an interface so that people can search for desired images.
- Offer value added data.
- Gather community input on which value-added products the community would like. This could be a high-priority focus. Determine what the users are interested in as a starting point. Ocean and data scientists could be included. A forum that identifies and prioritizes value added products/data sets would be beneficial. It could be workshop, town hall, and/or webinar session.
- Have a discussion on retiring some of the legacy OOI data access platforms (e.g., OOINet). Determine why people are using the systems they use. Should any programs come off the table? Continued maintenance of all systems is required if they are still active.
- Should we rethink how everything is built from the ground up?
- Hold a workshop to gather feedback on what OOI 3.0 should include?
- Communicate with the DSC equivalents at IOOS, LIGO, NEON, Data Center to see what they're doing.
- Consider instrument refresh/hardware refresh/software refresh/processing environment refresh.
- Missing pieces of data should be identified, and this is a high priority. There are big chunks of OOI data that are not being used. Determine why. If it is desired, then make if more findable and recoverable.
- There are data (images and acoustics) that are unsearchable. There are too many images to manually sort through. People are asking for access to biological datasets.
  Tim Crone stated that he has a reverse engineered Python code for getting screenshots from videos (it is located in his GitHub). Also, Google photos automatically tags data. Perhaps Google could assist.
  There is a need to make data discoverability easier and faster:
  - Build partnerships so data can be annotated a bit at a time.
  - Have a shared system that can be updated from multiple sources and that can be curated on some level.
  - Provide an interface for working on images and begin to sort through them.
- Workshop considerations:

- o Host a training session on how to use store images/acoustics, and figure out bottlenecks etc.
    - ▪ This could be a discussion between interdisciplinary (bio and acoustics scientists) or host two separate workshops.
  - o Questions to consider asking at the workshop:
    - ▪ What should OOI focus on? What are priorities to start somewhere.
    - ▪ Do you use OOI data and how?
    - ▪ What data is or is not discoverable? Are there any that are of higher priority?
  - o Each of these could also be considered for a townhall, zoom meeting, survey on our homepage, and/or a discourse discussion.
- • Craig Risien commented that:
  - o OOI is working on certain databases like zooplankton now.
  - o To increase access to these data, we need to decide which datasets to start on.
  - o Publish it in a useful format without being too large to handle.
- • In regard to the upcoming 2022 AGU Fall Meeting, we can ask OOI users to stop in at the OOI booth and discuss what they need/want from OOI.

DSC Other Business – Annette DeSilva reported on the other business topics. Her slides are included as *Appendix 6*.

Review DSC membership - Rich Signell completed his second term and the OOIFB Office will advertise for the open position. What expertise area does the committee want to focus on for this position? Annette will work with Tim to draft a call for applications. Kristen Fogaren completed her first term on the DSC and will be contacted to determine if she would like to serve a second term.

Review Action Item Status - Annette DeSilva reviewed the past DDCI and DSC action item status. All DDCI actions items during the period from 2018 to 2020 have been completed or tabled. In 2021, there were five DSC actions, four are complete, and one is in progress. In 2022, there was one action, and it is complete. Action item details can be review in *Appendix 6*.

DSC Annual Report for 2022 - Tim Crone indicated that this report can be addressed during the next DSC web conference.

Around the Table - Tim Crone offered participants around the table and on zoom to provide comments. Everyone thanked the group and commented on the great discussion that was had throughout the day.

DSC Closing Remarks - Tim Crone thanked everyone for their questions and thoughtful comments and contributions to the day's meeting and adjourned.

Thursday October 27th - Joint Session of the OOIFB and DSC
Welcome, Introductions & Review agenda - Kendra Daly welcomed participants to the meeting and reviewed the agenda. All participants introduced themselves and their organization. The participant list is included as *Appendix 1*.

Bob Houtman, Lisa Clough and George Voulgaris welcomed all and thanked all for the ongoing work and accomplishments over the past year.

Update from NSF - OCE Division Director, Dr. James McManus**, and OOI Program Director,** George Voulgaris

Dr. James McManus provided background information about himself. His previous position was at Bigelow Lab in Maine and his research focuses on sediment geochemistry and paleoceanography. While he is new to NSF, Dr. McManus is excited to be in this position and to work with this group. Over time he has seen OOI mature and grow and be incredibly productive. He sees a lot of promise in future work regarding data and educational programs. Dr. McManus is looking forward to reaching new communities and is very impressed with the community effort that selected the new Pioneer Array location. In the future, he hopes to best use NSF resources to promote the most forward-thinking science that can be accomplished.

George Voulgaris gave a quick NSF update. The continuing resolution for funding is continuing. George then introduced members from NSF who are participating in the meeting, including, Bob Houtman, Lisa Clough, himself, along with the support of Rich Kaczmarek, Shelby Walker, Cynthia Suchman, and Dana Savidge.

Updates from the OOI Program Management Office (PMO) - Jim Edson from Woods Hole Oceanographic Institute (WHOI) provided the PMO report. He provided a broad OOI summary that described the facility. The array of platforms are located in regions that can be environmentally demanding. Jim displayed the OOI organizational chart and PMO personnel structure. An overview of OOI's scientific impacts and publications were provided. OOI can expand collaboration by sharing knowledge of its programs and other features to wider audiences. This could be accomplished through data ambassadors. As an example, a data user and data technician could visit other schools to explain how OOI data is accessed and used. Ed Dever initiated this sort of activity pre-Covid and OOI would like to continue it. They communicate with the WHOI Diversity, Equity, and Inclusion (DEI) office for advice.

Jim reviewed the Program Year V (PYV) OOI budget by activity. Refurbishment is the largest budget item with operations and maintenance second. These make up ⅔ of the entire OOI budget.
OOI is pursuing continued and new partnerships opportunities.
For details about the PMO report, see the slides in *Appendix 7*.

Discussion:
- Jim Allen - Part of the offshore wind industry is interested in modeling. They are very interested in using OOI data.

Community Engagement activities - Darlene Trew Crist (WHOI) spoke about the increasing visibility and growth of the community involved in OOI. She highlighted the various ways OOI engages with the community. With the exception of Facebook, OOI's social media followers have seen an upward trend and there has been a discussion of joining other media platforms. There are plans to revamp the OOI website and the newsletter. Details of Darlene's report are included in *Appendix 8*.

Regional Cabled Array (RCA) Update - Deb Kelley (UW) provided the RCA update and her slides are included as *Appendix 9*. She discussed the ongoing collection of data from the deep sea to surface waters. There is real-time monitoring of over 150 instruments in order to maintain operations and to detect any malfunctions.

Deb described the RCA systems along with the science themes addressed by the infrastructure. She presented the RCA team at the University of Washington. They have a diverse portfolio of funding external to OOI. RCA developed NEREUS for operational and data status monitoring, and logging/resolution of issues.

In 2022, RCA has their VISIONS '22 operations and maintenance cruise that consisted of five legs of field operations running from August to September 2022. The cruise was on R/V *Thompson* and used the ROV *ROPOS*. 222 OOI core instruments were recovered and reinstalled. Repair of the Primary Node PN3B by APL with installation by IT Intrepid was successful. VISIONS '22, an at sea learning program allowed 20 undergraduates and three graduate students to join the field vessel operations.
Axial Seamount, the largest volcano off the OR/WA coast being monitored by the RCA and is expected to erupt again in the future. Deb highlighted the many science experiments that are underway at RCA, for details, see her slides.

Morning Break (15 min)

Endurance Array Update - Ed Dever (OSU) reviewed the Endurance Array (EA) infrastructure, the organizational chart of the EA team, along with the observations the Array provides. His slides are included as *Appendix 10*.

Measurements have shown details about the warm blob, hypoxia, and ocean acidification concerns. The EA infrastructure and its connections to the RCA are collecting a variety of surface and water column measurements (inshore, shelf, and offshore). He highlighted the technology of the Coastal Surface Piercing Profiler. OSU has taken over support for this instrument and Ed noted that it is a difficult system to maintain because of the challenging conditions it operates in.

The EA cruise schedule was presented, along with the flow of maintenance-related activities. Ed showed a graphic of the operational data flow for review of deployed instrumentation. The chart describes the step to take if there is an issue that impacts data and or results in a failure. Ed concluded his report with a couple examples of performance highlights.

Discussion:
- John Wilkin – He raised a question regarding data that has been identified to have issues. Will there be two versions of the data in Data Explorer, one with the issues and one with the corrections?
  - Ed Dever - they are working on QARTOD. It is not easy to download the annotations. In terms of data control data sets, they would love to mint DOIs. At that point they would have to think about versioning.
  - Deb Kelley – It would be difficult to do this for all data sets.
  - Kendra – Has this been communicated to the community? Deb - There isn't a consensus yet. What are the high priority/key data sets? Ed - There are also storage issues.

Pioneer & Global Arrays (Coastal Global Scale Nodes – CGSN) Update - Al Plueddemann and Derek Buffitt (WHOI) provided the report on the Pioneer and Global Arrays. Their slides are included as *Appendix 11*. There was a short review of the three CGSN Array locations (Irminger array, Global Papa, and Coastal Pioneer), and the personnel and team structure. Each array was described along with the science themes that can be addressed. An update on technology highlights was discussed including pressure compensated terminations, rechargeable batteries, iridium modem, secondary controllers, glider optode air calibration, along with a glider technology review.

Maintenance cruise activities were described and an operational summary for each Array was provided. A plot showing operational statistics over the last six months was displayed. The operational data workflow is of a cyclical nature. The QARTOD working group is moving forward across the MIOs and CI groups.

Science highlights from each array were discussed [Pioneer: first sustained, interdisciplinary shelfbreak observatory, Irminger: sustained surface/subsurface array in a challenging environment; Papa: collaborative site with historical continuity]. Al ended his report with community engagement statistics and highlights.

Cyberinfrastructure (CI) and Data Delivery Updates:

OOI Data Delivery Manager Report - Jeff Glatstein (WHOI) reported on the OOI data delivery system and reviewed the Program Year IV (PYIV) activities and highlights of the PYV work plan. His slides are included as *Appendix 12*.

In PYIV, the Data Explorer v1.3 and 1.4 were launched and included many improvements. PYIV also included expansion of Jupyter notebook access. Activities that still need to be addressed include Steam Engine modernization, QARTOD support, and Roundabout connectivity to uFrame. Regarding PYV, there will be a Stream Engine re-architecture, continued upgrades to Data Explorer, a Jupyter Hub beta release, assess management via Roundabout development, data accuracy and FAIR, along with performance, operational, and strategic adjustments.

OOI Cyberinfrastructure Report - Anthony Koppers OSU provided the cyberinfrastructure update. He reviewed PYIV accomplishments and planned activities for PYV. His slides are included as *Appendix 13*. Anthony first described the OSU Data Center, its purpose, the status of its transition from Rutgers, and its features. The OSU Data Center became the OOI system of record on July 30, 2021. A schematic of the system is included in Anthony's slides.

Some of the PYIV accomplishments included:
- A cyber security strategic plan was submitted to NSF.
- System monitoring improvements
- Kubernetes Jupyter Hub POC. A 3-node Kubernetes cluster running Jupyter Hub was created.
- Data protection improvements.

Future plans include:
- Enhancements to cybersecurity,
- Releasing the Jupyter Hub beta,
- Completing NOAA-NCEI and TACC deep store data archiving,

- Upgrading Cassandra to version 4.x,
- Adding virtualized Data Explorer,
- And continued system maintenance and support.

Discussion:
- How many instruments can physical fit on the nodes?
  - Depends on how big the pod grows [10-20 units fit on system Kubernetes, 4CPU 16-64gigs ram, depending on range].
- Kendra - Will the video data go on the TACC?
  - Craig Risien– Yes, that is the plan.

Lunch Break

Data Systems Committee (DSC) Report - Tim Crone, DSC Chair, proved the report. His slides are included as ***Appendix 14*.**

DSC Survey Report - findings and recommendations
Tim discussed the Committee's past two community surveys that were conducted in 2019 and 2021/2022.

Since the spring, the DSC has devoted a significant effort to analyzing the data and writing the report. Tim displayed the draft report, and he recognized the DSC members for their contributions.

Tim showed the heat maps that are included in the report. The heat maps offer a comparison of the data collected in the first survey as compared to the second survey. The people who responded to the survey, use all of the various OOI data access systems (IRIS, Raw Data, M2M, ERDDAP, Data Portal, and Data Explorer). Only about a third of the respondents know about Discourse and more outreach is needed. In the report, the committee members worked to characterize the sentiment of the open-ended questions.

OOIFB members offered suggestions for the report that were captured in the draft Google Doc. Tim will work to finalize the draft and the full report will be available to the DSC and OOIFB soon.

Recap of DSC Discussions from October 26th
Tim Crone reviewed the DSC meeting highlights and discussions from the previous day. A report was given on the OOI data delivery system by Jeff Glatstein. There were two talks about the future of ocean science data and data systems; one was focused on EDR API (a potential replacement for ERRDAP) and the other was on the NSF funded project, Pangeo Forge by Ryan Abernathy. Additional discussions included updates on the technical infrastructure, brainstorming future priorities, reviewing survey data, and the future use of the cloud.

DSC Future focus areas and activities – There was open discussion and a few of the topics included:
- Question – In the community survey, how many of total respondents don't use OOI data?
  - Fourteen respondents.
- Dax Soule - Training for visualization of OOI data is popular. and demand will likely increase. Increasing awareness and use of the Jupyter Hub can be helpful.
- An area that should be explored further is on larger and potentially underutilized datasets (e.g., hydrophone and video data)

- Explore the idea of a full "mid-life" for an OOI data delivery refresh. This could be a long-term effort. We may want to think about workshops and bringing experts to collect ideas on what a refresh could include.

Relocation of the Pioneer Array Update - Al Plueddemann and Derek Buffitt (WHOI) reviewed the relocation progress of the Pioneer Array. Their slides are included as *Appendix 15*.

The move of this array was a community driven decision process. The Pioneer Array was conceived as a re-locatable array. It was deployed on the New England Shelf since 2016 and will be fully recovered in November 2022. Relocation of the Array to the Southern Mid-Atlantic Bight (MAB) will be in April 2024. The relocation process approach was guided by the 2021 Innovations Labs science questions and the array design was based on the Lab consensus with refinement by the OOI team.

The full timeline of the relocation planning, engineering, and implementation phases runs from July 2021 to April 2024. A visual of the workflow process was reviewed. High level science themes of the Array will include dynamic shelf/slope exchanges, BGC cycling and transport, and extreme events. The moored Array will be about 60x 60 km, and the site conditions are similar to the NE Shelf, however, the extremes are more frequent and slightly stronger. Water-space management studies of the site is an ongoing process now and it is a highly active shipping area. The regulatory studies are progressing, and some have already been completed. Permits will be filed in Phase 3.

Mooring modeling for CSM and CPM has taken place and all plans should work in this new location. Regional ocean modeling was conducted in a coordinated effort with Ruoying He and John Wilkin. Modeling considered the water movement of the Chesapeake Bay. The model confirmed the proposed array shape and spacing are appropriate, and also identified some adjustments and refinements. Field tests will be conducted in 2023.

This Array will be located offshore of North Carolina, north of Cape Hatteras and the design area of the moorings and a glider/AUVs is shown in the slides.

The engineering phase will take place this fall 2022, with implementation to come in 2023. For full details of the relocation progress, please view the slides.

Discussion:
- What sensor will be used to measure suspended particles and turbidity?
  - Acoustic backscatter will be used as a proxy for turbidity.
- Will we collect Phytoplankton imagery, and who will be responsible for that?
  - The Phytobot (at WHOI) is being explored, but there will need to be an assessment to determine what's the most functional option.
- Joel Scott (NASA) - The PACE project may align with the timing of the Pioneer Array deployment.
  - Al – He will connect with Joel for further discussions.
- Zhen Le- Are any collaborations of this program with MARACOOS?
  - Al - Yes, there will be. The focus now is internal as they are consumed with other activities, but engaging the other stakeholders is planned.
- George Voulgaris - How will biofouling affect sensors?
  - Al - Certain instruments are more robust to it, others will have to be deployed for shorter durations in the water before being cleaned.

OOI Sensor Refresh Status - Ed Dever (OSU), Chris Wingard (OSU), Wendi Ruef (UW), and Andrew Reed (WHOI) prepared the presentation. Chris Wingard was the lead presenter. Their slides are included as *Appendix 16*.

Overview – The MIO Instrument Team compiled a list of common instruments and ranked them based on data quality, reliability, ease of use, safety, vendor quality, obsolescence, and available alternatives (2017-2019). The pH sensor was identified as an unreliable sensor. Primary issues were data quality and reliability/vendor quality. Beginning in 2019, the team undertook an effort to develop quantifiable metrics of instrument performance.

pH and PCO2 sensor status- The initial pH assessment used data collected from deployments ending Fall 2019 (N = 254). The % Success = Days of Good Data / Opportunity Days = 44%. The % Data Collected = Days of Collected Data / Opportunity Days = 71%.

Chris reviewed the progress and path forward. Completed tasks include:
- Prioritized and reviewed list of instrumentation for tech refresh.
- Updated Common Instrument Specification.
- Drafted Instrument Tech Refresh Process Document.
- Quality assessment of PHSEN data (N = 254).
- Identified potential pH instrument vendors.
- Evaluate PHSEN requirements.
- Drafted RFI document.
- Issue RFI.
- Assess RFI responses.

The next steps include:
- Analysis of Alternatives
- Generate a recommendation plan
- Analysis of Alternatives

Details of the analysis of alternatives were provided, including:
- Benchtop testing of the sensors by RCA and EA staff
- Integration and burn-in testing by EA staff
- Side-by-side comparisons of the sensors:
  - Mounted on shipboard CTD rosette, with collection of water samples at multiple depths
  - Long term deployment on the midwater platform

In summary, the issues common to all sensors included poor documentation and biofouling control (none to limited). The OS310 is not a viable alternative due to significant offsets and drift. The SeapHOx outperformed the other two sensors as a *moored* sensor. However, Honeywell has discontinued manufacture of the Durafet pH sensor used in the SeapHOx and OOI is currently unable to proceed with the SeapHOx purchase.

The path forward is:
- SeaBird has identified a supplier for a DuraFET replacement.
- Qualification and testing of new chips expected to begin spring 2023.

- OOI will participate in field testing, expected late 2023.
- ANB pH sensor will be added to field testing (expected delivery December 2022).

<u>Discussion:</u>
- Ed Dever - Was there overlap in March 2022 with the SAMI and SeapHox?
  - Chris - No, the SAMI clogged.
- Kendra - Is the downcast the same as upcast? Chris - yes.
- Chris - They will have to keep looking for pH profilers.
  - Kendra - can the other sensors be used to can get pH while you look for new pH sensors?
  - Chris - Probably not.
- Darlene - if the 310 is a viable option, could we buy it (they are made in Italian)?
  - Jim Edson - Because it is not permanent equipment, it should be okay.
  - George Voulgaris - Back up information would be needed.
- Wendi Ruef - When the SAMI works, it works well.
- Ed Dever - If the sensors are small enough, they can go on gliders. There might be other potentials, but not in the near future.

<u>Status of Calibration of Acoustic Sensors-</u> The bio-acoustic sonar data along with calibration issues were reported (see slides for details). The AZFP is calibrated at the factory in a small tank. There is unknown accuracy *in situ.* The EK60 is calibrated *in situ* with 38.1-mm tungsten-carbide reference sphere and it is limited to the Oregon shelf site only due to technical constraints. In terms of shipboard surveys, not all vessels are equipped with bio-acoustic systems (in situ calibrations). There are also time and site constraints.

Going forward, *in situ* calibrations are preferred, however, there are technical issues without an identified cross-site/cross-array solution. Issues include entanglement risks and resources.

<u>Discussion</u>
- There is the potential to profile pH using gliders.
- Deb Kelley - She suggested having a workshop.
- Al Plueddemann - The team will need community subject matter experts to help with field calibrations and determine the best option and approaches. Help is needed for evaluating the data after cruises.
- Kendra – There was a working group, and the ALS was not recommended. She indicated that she hasn't experienced the issues with the Tungsten sphere.
- Chris Wingard shared a 2012 paper by *Urmy et al.* with references to the use of the in-situ Tungsten sphere: https://academic.oup.com/icesjms/article/69/2/184/701699
- Kendra – Are there plans to look at other sensors?
  - Chris - The pCO2 are probably next on the list of sensors to check.

<u>From the Zoom chat:</u>
- From Michael F Vardaro - Based on info from Wu-Jung Lee, we need two things to calibrate effectively: 1) the effective sampling volume (given the transducer's beam pattern) and 2) the conversion to "map" the measured voltage signal to echo pressure. Both of these could change depending on pressure (and also depend strongly on how the transducers are made), and hence people want in situ measurements.

- From Joel Scott (NASA HQ | he/him)- I know that the discussion was in the context of acoustic calibrations. However, Al's comment about getting community involvement regarding calibration and protocols. NASA has supported the development of these community-developed and extensively reviewed set of bio-optical data calibration and collection protocols, if those might be relevant or helpful: https://ioccg.org/what-we-do/ioccg-publications/ocean-optics-protocols-satellite-ocean-colour-sensor-validation/

Break

OOIFB 2023 Sensor Summer School Pilot Program - Kendra Daly reviewed tentative plans for the 2023 sensor summer school pilot program. Her slide is included as ***Appendix 17***. It will focus on an optical attenuation and absorbance instrument, the Seabird AC-S. The school will be held at OSU for five days. Up to 25 advanced graduate students, post-docs, and early career scientists will be selected to participate. The summer school will introduce students to the sensor, accessing the data, include working with curated data sets, reviewing sensor and data issues, and how to interpret the data (including global applications and/or ground truthing). An organizing group has been formed to work on plans. Pending funding, applications should open in early 2023.

Biogeochemistry Sensor Working Group and Workshop Recommendations- Sophie Clayton

Report on activities and plans - Sophie Clayton (ODU) reported on the OOI Biogeochemical (BGC) Sensor Data Working Group activities and workshop. Her slides are included as ***Appendix 18***.
The BGC workshop organizers include Sophie, Hilary Palevsky (Boston College) and Heather Benway (WHOI). The aim was to broaden the use of OOI biogeochemical sensor data and increase community capacity to produce analysis-ready data products. A working group was formed in July 2021 and virtual meetings were held followed by a 3-day workshop in June 2022. Members of the group collaborated before the workshop to draft an OOI BGC "Best Practices and User Guide." The goals of the workshop were to:
- Review and work to finalize the Best Practices & User Guide.
- Brainstorm cool science ideas using OOI BGC data.
- Strengthen community connections and collaborations.
- Provide feedback to OOI.

The Best Practices and User Guide chapters focused on Oxygen, Nitrate Carbonate chemistry and Bio-optics. A community supported best practices guide was created. The guide includes an introduction, deployment and calibration of instruments, internal data processing, common data quality issues, and worked example illustrating end user data processing. They worked to have standard content across all sensor chapters and create a guide as user friendly as possible. This was done by using flow charts including what OOI has done and what the scientist could/should do with that specific data.
The goal for publication of the document is to publish it in the Ocean Best Practices (OBS) repository, ideally with GOOS endorsement. Sophie reviewed the qualifications for "GOOS endorsement." The leaders of the workshop are also planning a publication in *Frontiers in Marine Science* about how the guide was built.

The workshop also produced a set of recommendations to OOI that were shared with OOI and the OOIFB in August 2022. In turn, OOI provided a response in October 2022.

Next steps for the Working Group will focus on:

- Making the Best Practices & User Guide available for open community review and then seek GOOS endorsement.
- Science Ideas, Community & collaboration.
- Providing feedback to OOI.

Recommendations to OOI from BGC Workshop:

OOI Follow-up activities - Jim Edson provided a follow-up on OOI's response to the BGC Working Group's recommendations. He offered much praise for this large body of work that had many thoughtful recommendations as to how to accomplish each question or idea.
Some of the recommendations are a bit challenging to respond to. As an example, there was a question about Alfresco, but when Jim investigated the problem, he got two different answers. This is a work in progress and OOI will stay engaged with the BGC working group.

Open Discussion
- Sophie -There are various OOI internal documents, but they are not included in the Ocean Best Practices. There are OOI documents in the best practices, but they are from before deployment of the arrays. It would be good to have all of these in one place and up to date.
- Lisa Clough - The initial documents were from OOI 1.0. They should be tagged clearly as 1.0.
- Jim Edson – OOI is having these types of discussions; however, there are also DOI issues.
- Kristen Fogaren - Should there be an official 'OOI recommended way' for DOI sets so that they are similar. There should be a way for curated and/or processed data from scientists that could then be added and submitted back to OOI so we have a place for these types of data set (Lisa Rhodes may have money for a proposal to cover this idea, potentially).
- Lisa Clough praised Sophie, Hilary, and Heather for all of their efforts. This was in response to an NSF Dear Colleague Letter (DCL). She would welcome proposals to do these sorts of things.
- Jim Edson – This group has provided such a great model. It would be good to have a similarly group for Air-Sea interactions.
- Jim Edson – None of the OOI data sets have DOIs.
- John Wilkin - DOIs need to be a priority. As of now the website is not helpful in this regard and doesn't even include the Data Explorer info/data (it tells you to cite OOI.net). This needs more urgency. Publications require the citations.
- Al Plueddemann – OOI is working to update the citation guidance to meet AGU and other requirements. It should be public in about a month.
- Ed Dever - It is worth revisiting the data products. We need to decide which should be updated and what new ones are there. There should be consideration with OOI and the community to determine what data products could be prioritized, collected, updated, or eliminated.

Follow-up on the OOIFB 2022 Community Workshop focused on the OOI NE Pacific Arrays
Participants provided feedback during breakout sessions that were part of the OOI NE Pacific Arrays workshop that took place in June 2022. The feedback was captured in Google worksheets that are available at: https://ooifb.org/meetings/northeast-pacific-ooi-community-workshop-2022/breakout-session-worksheets/. OOIFB members (Deb Kelley, Dax Soule, Kendra Daly, and Paulinus Chigbu) summarized the recommendations and/or issues identified in the worksheets. Their slides are included as *Appendix 19*.

Deb Kelley discussed the Axial Seamount region. The Array helps us understand the life cycle of hydrothermal systems and volcanos, the subsea biosphere real time detection of life, and plume activity. The important placement of this array system offers overlap of many important geological features. and observations of natural events. Deb suggested that this region is ripe for a community workshop. Next Deb summarized the major science questions associated with the Seafloor/Geophysics. scientific studies will look at how the life cycle of volcanos, tremor and earthquake events, and cold seep fluxes. Proactive observations help to better understand future events and additional instruments would be helpful.

Dax Soule reviewed feedback from the Biogeochemical Fluxes breakout session. Biogeochemical fluxes big questions include What are the dominate drivers of ocean acidification in the deep ocean and how zooplankton communities are impacted by ocean acidification and hypoxia. To address these questions, there should be an analysis to determine which sensor packages could inform climate policy. An expert in the field would be helpful to characterize the processes influencing vertical carbon export to understand the combined impacts of different climate stressors of different ocean ecosystems.

Discussion:
- Richard Dewey - ONC is diving into marine CDR. Marine CDR could be added to this list and OOI needs to catch up.

Next Dax reviewed feedback from the Physical-Biological Interaction session. The big question from this session was: What is the relative importance of advections versus local sources/sinks of biological, chemical or physical properties in determining the myriad of processes that are driven by physical interactions? To address this question, suggestions included increased taxonomic resolution across trophic levels, increased spatial, and temporal resolution and a swarm study using OOI gliders.
- Ed Dever asked if OOI data can be used to inform models for increased spatial extent and temporal coverage?
- George Voulgaris - Some of these things can be answered by non-OOI process data. Proposals can be submitted to NSF. We need to train our community look at other disciplines and what tools are available beyond OOI.

Kendra Daly summarized the large-scale climate patterns and processes, including the Warm Blob worksheet. A question identified for looking at large scale climate pattern, was if the data set was long enough to detect change in marine heat waves. There are problems with sensor stability over time. There was a question of whether or not data from instruments that drift could be fixed afterward with post calibration data. OOI works to annotate data with issues that are identified. Drift, biofouling, or clock problems are a challenge; however, OOI doesn't have the capacity to address all of these. It is not OOI's job to be to show changes in data over time; they work to provide the data for the science. Proposals are needed to support this effort. One suggestion was to do some outreach to clarify that OOI does supply data to inform about climate.

Next Kendra reviewed feedback from the Open Ocean and Station Papa breakout session. It included how profiling mooring data could deviate from the baseline and that burst profiling was recommended. This would mean changing internal requirements, which could be possible, but may not happen. There is a need for a full-depth profiles of horizontal velocity and vertical displacement, which would require a request for more sensors, or a consideration of adding wave power generation. It was recommended that the team work more collaboratively with PMEL to make data more seamless for users.

Paulinus Chigbu summarized the Shelf to Slope Base breakout group input that includes hypoxia and fisheries. There are many research topics and themes relevant to these regions (see slide). It was suggested that an OOI modeling workshop would be useful. Sensors for measuring biodiversity, measuring eDNA, gas tension device, microstructure profiles, and DAS across the shelf for Passive Acoustic Measurements (PAM) data for marine mammal observations.

George Voulgaris suggested that OOIFB compile a list of priorities from these breakout sessions into a 1-page document that he can use to highlight suggestions.

Wrap up the day and closing remarks - Kendra Daly adjourned the meeting for the day.
Adjourn

Friday, October 28th - OOIFB Meeting

Opening for the day - Annette DeSilva welcomed participants to the final day of the meeting. Kendra will join the meeting shortly, but we will begin.

OOI Education Programs - Update and discussion on future OOI education initiatives - Annette reported that Lisa Rom could not join the meeting, but George Voulgaris shared a few words. OCE Education still welcomes proposals to use OOI for education projects. There is a DCL for Workshops that is still active.

Reports from other Agencies and Observatories

Bureau of Ocean Energy Management (BOEM) Report - Tom Kilpatrick provided a BOEM update on NC/VA projects. His slides are included as *Appendix 20*. He discussed the status of offshore wind projects and showed an image of the proposed areas in relationship to the new Pioneer Array location. The Coastal Virginia Offshore Wind (CVOW) has proposed up to 205 turbines and Kitty Hawk North has proposed up to 69 turbines.

In April 2022, BOEM announced a Call for Information and Nominations to access commercial interest in additional Central Atlantic sites. BOEM will be interested in baseline oceanographic monitoring for the areas.

BOEM's science interests include the impact of wind turbines on the local/regional ocean circulation and biogeochemistry, and resulting impacts on fish, marine mammals, and birds/bats. BOEM is keen to partner with OOI, particularly for: (1) mobile assets with coverage of the wind lease areas; (2) passive acoustic monitoring of marine mammals / fish; (3) eDNA.

Discussion:
- Jim Allen - Are there any consequences with others, such as offshore oil and gas leasing blocks.
  - Jennifer Draher (BOEM) - Not in the Atlantic.
- Ed Dever - What about wind sites in Pacific?
  - Tom – The furthest north site is off Humboldt, CA.
- Lisa Clough – Is BOEM considering reprogramming some of the OOI assets? Does BOEM have funds for new observing assets, like more gliders?
  - Tom - He would have to convince management.

- o   Al Plueddemann - Adding a sensor, isn't too difficult. Adding more sensors, however, would require funding. Supporting more OOI gliders would require additional staff, and it would be a change in scope.
- Ed Dever - Would BOEM fund external scientists for work around the observatories?
- Jon Wilkin - encouraged the offshore operator developers to share their data.
    - o   Tom - They would have liked to see the offshore wind developers share their data.
    - o   Jennifer Draher – BOEM has been encouraging this.
    - o   George Voulgaris - Is this specified in the lease language?
    - o   Jennifer – There is a need for a data management plan or mechanism for sharing data with BOEM. There is currently no written language. BOEM doesn't pay for the contracts, so they don't own the data.

Ocean Networks Canada (ONC) Report - **Richard Dewey** gave an update on Ocean Networks Canada. His slides are included as **_Appendix 21_**. There will be new initiatives, including outreach with native communities. New BGC Argo floats will be purchased to increase ONC's water column measurements and includes microstructure and deep BGC Argo Floats. These are non-standard Argo floats. There will be Deep Sea Argo floats sensors deployed in the Northeast Pacific area and measurements will include oxygen. In regard to Geodesy/deformation and wave glider surveys, there would be networks of transponders installed with the wave gliders providing GPS. These should last about 10 years.

Ocean-based climate solutions are a high priority with active ideas and planning for carbon assessment and feasibility of sequestering carbon deep into ocean basalt. Marine Carbon Dioxide Removal (mCDR) and the associated measuring, monitoring, reporting, and verification (M2RV) strategies are needed. There are various technologies to explore with a lot of issues to sort out, field trials, and assessing impacts and efficiency will be key. There is a need to assess baselines and natural conditions/variations/ecosystem function. There is also a need to assess impacts associated with mCDR field trial/activities. There is a strong need for marine scientists to play a role in this discussion. Richard has been considering hosting a workshop to focus on the measurement aspect of this and discuss what's on the table and what is needed to fill knowledge gaps.

Discussion:
- Lisa Clough – The US is investing in mCDR, but where does the OOI facility fit and how could they contribute?
- Richard - NSF could fund a kelp sinking experiment. ONC monitor the kelp that has sunk. This is a simple example.
- Deb Kelley – When ONC makes injections, how would they monitor the carbon in the sea floor? Richard – This would be a challenge. They would need to put out sensors to demonstrate there are no leakages.
- Jamie Allen – Is the Middle Valley are being considered? Richard Dewey- It would be interesting to instrument Middle Valley. They don't have a node there. Although there is a concern about disturbing sites for are of science interest, the damage from CO2 outweighs these concerns.
- Jamie – how would you make the injection? Richard – It would be from a surface rig, like the drill ship. Jaimie encouraged Richard to contact Texas A&M for feasibility.
- Ed - OOI instruments do offer the ability to look at the MMRC questions? There are sensors that could be added, perhaps to gliders for additional measurements.
- Kristen - For the gliders, what kind of oxygen sensor are putting on? Richard Dewey - not sure. Kristen - There are optimal placements for oxygen sensors. There have been lessons learned and it is good to look into this.

- George – There is a lot of post processing from Argo. How will this be managed? Richard – On the microstructure floats, they might recover them to look more closely at the data. There is some internal processing.

Town Halls, National Meetings, and Workshops

OOIFB Town Hall at the 2022 AGU Fall Meeting - Annette DeSilva reported on plans for the OOIFB Town Hall at the AGU Fall meeting. Her slide is included as *Appendix 22*. It will be held in person and virtually. All participants must be registered for AGU to attend the Town Hall. The OOIFB Town Hall will be on Monday at 1830 CDT. There will be updates on the OOI program, NSF, OOIFB. There is an open call for lightning talks, and we expect to be able to accept six to eight lightning talks.

Break

Future activities and focus areas for the OOIFB – Kendra introduced a few future focus areas suggestions and then opened a discussion. Her slide is included as *Appendix 23*.

2024 Community Workshop – Pioneer Array at SMAB **-** Kendra Daly discussed the tentative plans for a 2024 community workshop that would be focused on the Pioneer Array at the Southern MAB, as it should be up and running at that time. NSF members recommended collaborating with Carolina universities groups and underrepresented colleges.

Other sensors to feature at future summer schools – There was a group discussion of other sensors to with the following suggestions:
- Ed Dever – Feature analysis ready cloud-optimized data sets (value added data sets).
- Dax and Tim - Camera HD data. These are valuable but underutilized data sets, largely because it cannot be found.
- Lisa Clough - NSF is working alongside other partners. There are a lot of partnership opportunities. Maybe we can reach out to other groups and join their workshops.
- Jim Edson - SOLAS is a group that we could partner with.
- Orest – OOI is working to make hydrophone broadband data more easily available. There could be engagement with SMEs and perhaps a workshop.
  - Kendra – there has been interest in forming an acoustic working group.
  - George V - Since BOEM is interested in the biosensors, perhaps this is an area where we can work together.

OOIFB Other Business – Annette DeSilva reported on other business. Her slides are included as *Appendix 24*.

OOIFB action items - Annette DeSilva discussed the past action items and their status. In 2022 there were five action items; two are complete and three are in progress. Action items details can be found in the slides. The next OOIFB web conference will be held in early December.

OOIFB Membership Review - Annette DeSilva reviewed the current membership and their respective terms. Kendra will complete her second term as Chair in November 2023. Dax Soule is the Chair Elect. NSF suggested that Kendra continue on with the OOIFB as a Past Chair. This will provide continuity during the transition period. It was noted that addition of the Past Chair position will require a charter revision.

Next in-person meeting -The next OOIFB meeting will be the spring meeting. The spring meeting typically focuses on the OOI Annual Work Plan. There will also be discussions on OOI 2.5.
Lisa commented NSF might still not be ready for in-person meetings in the spring but should be available for the fall 2023 meeting. That would be a good time to have another in-person meeting. The spring meeting could be planned as virtual.

Recognition of Bob Houtman - The OOIFB recognized Bob Houtman for all his work, contributions, and support as the NSF program officer for OOI. He was presented with a certificate of appreciation and a mug signed by the OOIFB and NSF members that have worked with him over the years.

Annette DeSilva presents Bob Houtman with a Certificate of Appreciation. From left to right: Annette DeSilva, Bob Houtman, and Lisa Clough. Photo credit – Danielle Bailey, OOIFB Office.

Around the Table – Individuals were welcome to share comments and feedback.

Closing Remarks and Wrap-up - Kendra Daly thanked participants for joining and contributing to the meeting. She adjourned the meeting.

Adjourn OOIFB Meeting

Summary of Action Items and Suggested Future Activities that were Identified during the Meeting

Over the course of the three-day OOIFB and DSC Fall Meeting, discussions were held to identify potential action items, future activities, and focus areas for the OOIFB and the DSC. Some of these activities could potentially be joint between the OOIFB and DSC. The order in which the items are listed below do not indicate a priority level. Additionally, this long list of topics will need to be further refined and articulated. This will be an activity for additional discussion over the coming months. A summary of the suggestions is listed below:

OOIFB actions and future focus areas:

In-Progress and Near-term Action Items:
- OOIFB-2022-1 – Plan an OOIFB Town Hall session for the 2022 Fall AGU Meeting
- OOIFB-2022-4 – Fill an open position on the OOIFB
    - Schedule Zoom meeting with OOIFB in mid-November
- OOIFB-2022-5 – Host an OOIFB Sensor School Pilot Program
- Reschedule the OOIFB November and December 2022 monthly web conferences
- OOIFB Charter Review – form a subcommittee
- Prioritize the Future OOIFB Activities and Focus Areas (see below)

Future Activities and Focus Areas:
- 2024 Community Workshop – Pioneer Array at SMAB
- Identify other sensors to feature at future summer schools
- Consider ways to better engage the modeling community that uses OOI data
- Station Papa workshop
- Axial and Endurance workshop
- Review of OOI Best Practices every five years (pending final endorsement)
- Are there OOIFB subcommittees that should be considered

DSC actions and future focus areas:

Near-term action items:
- DSC-2021-3 - Complete the Community Survey Report
    - Complete the survey report and submit it to the OOIFB
    - Prepare a brief (2-page) summary of the report and request permission from NSF to circulate to the public
- DSC Call for Applications – Draft a call for applications to fill one open position on the DSC
- Prepare the 2022 DSC Annual Report: Submit the report to the OOIFB by 1 February 2023
- Prioritize the DSC Future Activities and Focus Areas (see below)

Future Activities and Focus Areas

- How does DSC work as the interface between the community and the OOI? - Dig in on Discourse?
- Is data access enough? Probably not. What can be changed or altered in order to better help data access or similar requests
- Community workshop suggestions:
  - Potential shutdown of OOINet
  - Explore how scientists can do their science in an interactive way
- Engage scientists in a more interactive way, such as workshops, webinars, etc. Some suggestions:
  - From the community survey, there was an interest in higher level analysis
  - Hydrophone, acoustic network or similar subjects
  - Some data is not discoverable so our choices may be limited
- Get community input on which value-added products (analysis products) the community would like and how data should be stored
  - How can we update or adjust value added data products (available to Axiom - NASA model)
- People using AI/ML are looking for big datasets to do their development
  - Annotation database for multimedia database
- Communicate with the DSC equivalent at IOOS, LIGO, NEON, Data Center to see what they're doing
- What can the DSC do to provide valuable feedback to the OOI Data Manager in terms of data, missing pieces of data, etc.
- Create working groups to help build out discoverable data
- How do we leverage other investments in data science? (e.g., MBARI imaging grant)
- Provide datasets that are easier to deal with. Example: BPE-ADCP dataset can be made more accessible
- How to best provide an interface to allow images to be searched, what options are available and what works best for how it will be used?
- Multimedia databases should be available as open source
- Consideration of retiring some of the other OOI data access platforms (e.g., OOINet) - figure out why people are using the systems they use
- Keeping up with new methodologies (both software and hardware)

Joint OOIFB and DSC Future Activities: The activities listed below will need to be reviewed to determine if they should be addressed jointly between the OOIFB and DSC, or if they should better fit under the OOIFB or DSC.
- Form a working group of users of acoustic data, more than just through OOI
- Should there be a consideration of instrument refresh/hardware refresh/software refresh/processing environment refresh? What systems are best suited for future work and use?
- Should we rethink how everything is built from the ground up? – (a mid-life refit for OOI)
- OOI DOIs and versioning, consider how data is tagged in the future?
- OOI Program Solicitation for OOI 3.0:
  - OOIFB & DSC meet with NSF to discuss suggestions for incremental changes for the OOI Program 3.0 solicitation
  - Hold a community workshop to brainstorm thoughts for the OOI 3.0