U.S. IOOS Advisory Committee
Public Meeting (virtual)
Meeting Minutes
August 4-6, 2020

Notification and Availability of Meeting Materials

The Integrated Ocean Observing System Advisory Committee (IOOS AC) was announced to the public by Federal Register Notification and on the IOOS Advisory Committee Website.

Meeting presentations and background material are posted on the IOOS website.

All attendees participated virtually by GoToMeeting video conferencing.

IOOS Advisory Committee Members Present:

Scott Rayder, University Corporation for Atmospheric Research (Chair)
Sara Graves, Ph.D, The University of Alabama Huntsville (Co-Chair)
Thomas B. Curtin, University of Washington
Molly McCammon, Alaska Ocean Observing System (AOOS)
Ruth Perry Ph.D., Shell Exploration & Production Company
Doug Vandemark, Ph.D., University of New Hampshire
Jyotika Virmani, Ph.D., Schmidt Ocean Institute
Dick West, Consultant
Bob Winokur, Consultant
Daniel Rudnick, Scripps Institution of Oceanography, UC San Diego
Jennifer Hagen, Quileute Indian Tribe
Josie Quitrell, IOOS Regional Association (ex officio)
Laura Lorenzoni, NASA (ex officio)
Jennifer Read, Ph.D., Univ of Michigan Water Center Graham Sustainability Institute
Oscar Schofield, Ph.D., Rutgers University Center for Ocean Observing Leadership
Hoyt Battey, DOE (ex officio)
Jennifer Hailes, NAVY (ex officio)

IOOS Leadership and Staff in Attendance:

Carl Gouldman, IOOS
Krisa Arzayus (DFO), IOOS
Becca Derex (Alternate DFO), IOOS
Laura Gewain, IOOS Affiliate
Derrick Snowden, IOOS
Kate Culpepper, IOOS Affiliate
Michelle Harris, IOOS Sea Grant Fellow
Tiffany Vance, IOOS
Oriana Villar, IOOS
Kruti Desai, COL
Nick Rome, COL

Stephanie Murphy, COL
Sheri Rahman Schwartz, COL

Presenters (non-FAC members):
Dr. Neil Jacobs, Assistant Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere, NOAA
Dr. Lonnie Gonsalves, NOAA
Mike Jarvis, NOAA

Public Observers:
Irvin Huang, NOS/NOAA
Chrissy Hayes, NOS/NOAA
Katie Morrice, DOE
Christine Castillo, SCCOOS/UCSD
Nic Kinsman, NOAA
Katherine Brogan
Eric Bayler, STAR/NESDIS

Day 1
August 4, 2020

1. **Call to Order (K. Arzayus)** K. Arzayus called the Summer Public Meeting of the U.S. IOOS Advisory Meeting to order at 11:03 ET and informed participants that the meeting will be internally recorded. The chats will be captured in the recording. All materials will be added to the IOOS website and Google Drive.

2. **Opening remarks (S. Rayder)** S. Rayder offered opening remarks and thanked participants for joining the virtual meeting. He reminded participants that even in a virtual setting, work is ongoing and that current initiatives need to continue forward. One of the main takeaways to consider: Where do we want our working groups to focus for future work and initiatives? Additionally, should we discuss how to position IOOS within the community of public/private data sharing groups. Our first working group on partnerships will be discussed today. S. Rayder provides an overview of the agenda and discusses the outline for the next few days of the meeting. He reminds the FAC that the current timeline includes 14 months to address initiatives, and it is important to consider how a virtual environment will influence the future.

3. **IOOS Program Office Updates (C. Gouldman)** C. Gouldman provided an overview of the IOOS Program Office in NOAA for 2020 and highlighted current initiatives and successes (slides available on the IOOS FAC website). He reviewed the start of the UN Decade and IOOS' role, integration into international efforts, and the outlook for

2020-2021. There was also an overview of the IOOS budget from 19-20 as it relates to the Program Office and Regions.Some highlights from the presentation:

- Implementing IOOS in the Weather Research and Forecasting Innovation Act
- CENOTE Act 2018: We are partnering on gliders and other technology
- Water Initiative: Gained traction within NOAA through cross-LO teams. This is being reviewed through the Weather, Water, Climate Board (WWCB). C. Gouldman is the NOS lead within the NOAA Water Initiative.
- Blue Economy: 2nd round of the Ocean Enterprise Study, and support for all 4 of NOAA's recent strategies: 'Omics, UxS, Cloud Computing, AI.
- Coastal modeling: COMT, improved funding.

B. Winokur asked how these initiatives impact the IOOS Budget. Are they cross-cutting coordination activities? Is there new money for this? C. Gouldman confirmed that most are cross-cutting coordination efforts. These utilize existing resources and may provide for future budgetary increases.

- IOOS/OAR Workshops: A series of three workshops to develop a future collaboration framework to align strategic operations for future investments.
- AOML partnership on deploying gliders for hurricane monitoring, or other mission gliders for HABs, whale detection. Despite COVID-19, gliders are still being deployed and data is ingested into the Glider DAC.

C. Gouldman explained that passive acoustics or active detection from tagged animals is used to track right whales, and informed that this information is reported to ships and mariners to avoid collisions.

- NOS Modeling Portfolio Manager will begin August 16th, 2020. They will be housed in the IOOS Office

S. Rayder questioned whether IOOS (as related to requirements for UFS), was hosting a seat within the NWS, and asked who members of the Coastal Applications Team (CAT) were. C. Gouldman confirmed that the CAT will serve in that capacity, with representation from CO-OPS, IOOS, and Coast Survey.
D. Snowden added that a potential OAR, NESDIS, or Fisheries rep may be added to the team within the month.
On the topic of modeling efforts, J. Quintrell asked whether or not there were regional expectations for modeling. C. Gouldman explained that from a regional perspective, priorities would fall to user needs and maintaining awareness. D. Snowden further added that the regions serve as the community of developers for all earth models. Whether UFS under NOAA will accept a regional model as a NOAA product is something to be further discussed. E. Bayler recommends that IOOS engages on International OceanPredict, and C. Gouldman confirmed it has been an initiative he is assisting with.

- 1 million increase for HAB research and monitoring (5 projects)

In a discussion between B. Winokur, C. Gouldman, and D. Vanemark, it was explained that in partnership with NCCOS, this HAB work was funded. Continued collaborations may lead to sustained or increased funding.

B. Winokur asked whether the Ocean Enterprise Study was an international effort, to which C. Gouldman explained that it has a U.S. focus, but some multinational companies would report on their U.S. subsidiaries. J. Virmani asked if there could potentially be a follow-up survey to businesses prior to the report to disclose if they have experienced a change in hiring or company status due to COVID-19.C. Gouldman explained that there were questions within the survey to address the virus, but that is a good consideration prior to the report release.

B. Winokur asked about the National line (6.7) and if there wasn't much discretionary funding. C. Gouldman: Correct, by partnering with others we can leverage staff and resources. S. Rayder noted the house mark seen for FY20 and asked if we expect to see any changes. C. Gouldman: We expect to see more of the same, accordingly.

4. **Role of Ocean Obs in Improving Forecasts (Neil Jacobs)** N. Jacobs provided an overview on forecasting with ocean observations. Observations are hugely critical for verification of weather events. An example is rapid intensification of Hurricane Isaias on the east coast.
    - N. Jacobs noted that observations can be divided into 2 types: 1. Acquired, direct observations and 2. Indirect observations where information is extracted from assets meant to measure/observe something else.
    - NOAA is working on two projects. Discussed that code is on Github and development groups/universities external to NOAA were interested in initializing the model. In the process of aggregating observations in a "data lake," which ties into a larger data project (NOAA using commercial cloud service providers to store the data)
        - This is interesting to NOAA because they have an information storage problem. Having data centralized to one repository would be incredibly convenient. The idea is to put modeling systems in the public domain and cloud service providers would charge for running/processing of the data, but would store the data for free (easier on taxpayers).
        - Models need initialization and verification from in situ observations, working with open ocean and nearshore observations.
    - N. Jacobs discussed work to do data assimilation into open ocean models. Large aspect driving this is a lack of observations (JCSDA has been working on this a lot). There is a pretty extensive set of code available and focus is on two-way coupled modeling systems, which will need observations for the ocean side of that. Goal is to figure out how to get rapid access to sub-surface observations.
        - One of challenges for the data community is the time it takes - doesn't always get into the modeling system fast enough (critical issue).

    - Two-way coupled modeling systems will produce essential data. Data covers physical variables, as well as biological (HABs, OA, etc). A lot of modeling systems initialize off larger scale models, critical to also have a form of verification.
- N. Jacobs noted that this concept can't be done by the public sector alone, and organizations need private partnerships as well.
    - He asked what makes a successful partnership. Market opportunity can be critical for public-private partnerships.
    - Partners need to have different strengths (limit redundancy) and appropriate resources should be streamlined.
    - NOAA needs to take on shared risk with the private sector.
    - Also need to have favorable and stable economic policies. A good example is IDSS and Weather Service - Weather Service stated there were specific markets that would not be targeted, which ensured that the private sector understood that market opportunity would be left to them. Those companies want to know if NOAA would come around in 2-3 years and essentially compete with them/put them out of business. A successful public-private partnership should be the way of the future as that is more sustainable business for them.
    - These are some of the higher level challenges moving forward.
    - Also need to use observations to guide data assimilation systems (and quality control). Often, the community works backwards when it would be more beneficial to write observation operator code around observing systems that we have and focus on QC.
    - Lack of observation density will always be a limiting factor - will be tricky until it is possible to relay observations from deep in the ocean to satellites.

N. Jacobs opened this session up for discussion to consider options for public-private partnerships.

S. Rayder: Expressed thanks to N. Jacobs and appreciation for what NOAA is doing right now. Discussed that we are looking at requirements and asked what the entire forecast process is when building the budget.

T. Curtin noted that one answer to the observation density/latency issue is mobile platforms (e.g. gliders) and target observations (implies a feedback loop to move sensors where they are needed and potentially increase sampling rate). T. Curtin asked where the control center would be located to address the latency/density problem?

- N. Jacobs stated to look at it from 2 angles: (1) Difficult to moor instruments in the middle of the gulf stream, not a lot of subsurface moored instruments there because the flow is so strong. Trying to maintain observations in the gulf stream current would be hugely beneficial. (2) If we wanted to send them elsewhere, it would depend on weaknesses in the forecast. If we wanted a high density of

operations/high sampling rate, it would have a much higher cost. In theory, one could look at longer-range forecast projections. N. Jacobs stated that in general, they have been fortunate with the Weather Act calling out observations and providing a solid argument. In regards to budget, N. Jacobs is working hard for every penny and noted that rapid intensification of storms like hurricanes really captures people's attention when discussing funding. Have been able to tie the acquisition of observations to the modeling effort - the focus is on the short-term severe weather (particularly with hurricanes), but the observations are just as helpful in longer range S2S models. Can also be beneficial for the agricultural community if they are able to pin down the 2-3 month scale.

- Have also been successful in making the argument that if you want better water management in the 10-day to 3-week range, reservoir operators really need to understand what the longer range precipitation patterns will be (particularly important for CA and the Pacific).
- In regards to the budget with COVID-19, N. Jacobs noted that one-off projects can be used to show value and integrate them into long-term budgets. Agriculture has been the budget path that shows most success, however.
- Can send devices where events are projected to occur in the ocean. In shorter range, could modulate sampling rate based on how dynamic the conditions are in which the device is located. Have to balance cost of comms, reporting rate for how deep these devices go (e.g. In Argos, ones that go deeper take longer to get back to the surface). In that case, a forecast-driven approach would be one way to look at it. Would be beneficial to invest research money in where to deploy.
- T. Curtin asked who would be issuing control commands and how it would be coordinated (gliders operated by many different groups, no central control ops center).
- N. Jacobs noted that a control center doesn't exist now, so there is the opportunity to design it. Even "autonomous" vessels require human controllers, so not entirely autonomous. It might be possible to automate where they go, but command and control (especially with many different owners/operators) would be a challenge. It might lend itself to some type of opt-in program where devices could be volunteered under this command and control.

B. Winokur mentioned the Navy might be able to help. J. Hailes (Navy) noted that this is similar to what they do and they are working on efforts to work with NOAA.

J. Hailes noted that every platform is a sensor in the ocean and that capability should be leveraged. An opportunity for Navy partnership: assimilation ends up being the bigger issue and from the ocean standpoint, they are not quite as standardized and are struggling to work with the commercial industry. End up spending a lot of resources to parse data, manage it, and complete assimilation (will never be able to assimilate every platform with this method). At some point as a community of ocean observers, it would be beneficial to standardize how to best receive those different observation datasets

(streamline that capability). She asked if NOAA is looking at this as well or is it more of a Navy problem.

- N. Jacobs noted that metadata, control flags, and structure is currently being standardized so data assimilation systems have easier time reading it. But still need to have a lot of converters to get data into that particular format. Agreed that everything needs to be in some form of standardized format. If able to require that systems put out data in the agreed-upon format, that would be beneficial but many don't have that luxury. The ocean community should probably take a look at what WMO has done to standardize.
- N. Jacob discussed points on data assimilation systems - would love to work on it with the Navy but as an observing system community, there may be some sensitivities with anyone on the planet having access to that code. Can make assimilation code free/available, but it is of limited value without observations. Restrictions for security should be on obs side, not on the DA side. This is an opportunity to make it known to the community, in particular the private sector.

5. **DISCUSSION: Role of the Private Sector in Ocean Obs (S. Rayder; C. Gouldman, N. Jacobs; L. Lorenzoni)** S. Rayer discussed the interest of data buys throughout Congress and the Administration, and how to justify your program against a zero-base. Private companies are now collecting data, creating models, and we need to know what that might mean for IOOS and similar programs. LiquidRobots, Saildrone, and others are relevant to IOOS - how can we bring that data in to improve forecasting? S. Rayder mentioned that the Air Force, NASA, and NOAA are the three data buy-ins, each with separate requirements. He asked how we could make this work moving forward. This was led to an open discussion.

   N. Jacobs provided a summary of how this process is completed with aircraft data. He mentions that the price of comms made it a challenge, and considerations needed to be met to make it competitive or possible for the NWS to purchase the data. Another challenge included displaying the benefits derived from the data, which took a significant amount of time (8-10 years) and funding before revenue was achieved.

   N Jacobs discussed leveraging existing infrastructure (sat comms on ships, etc) that could be useful for weather observing platforms if the connections are made. The current voluntary system is hit or miss, and there aren't incentives or a business model to motivate new collaborations/observation deployments. Similarly, a broad RFP that could be applied from a singular basis could expedite the process instead of multiple RFP's.

   S. Rayder mentioned SeaKeepers as a prior example where IOOS tried to acquire data from private megaships. This was a beneficial study, but is limited in that it only applies to yacht owners.

L. Lorenzoni discussed NASA commercial data buy, where data is bought from vendors for various resolutions or imagery needs. NASA encourages a mutually beneficial agreement. This process started in 2017 to evaluate commercial data for applicability to applied science. Interested vendors could apply, and 4 were selected for pilot evaluations and calibration. Since then, discussions with the vendors have assisted with refinement and transition to sustained partnerships/purchases of data, assimilation, and dissemination.Moving forward, the products will be available to NASA-funded researchers. Data sharing has been one point of deep discussion. We are seeking a public-private collaboration for future satellite data buys. Another area of public-private partnership for NASA is focused on sensors and instrumentation.

S. Rayder asked what advice should we take away from this that could relay to and benefit the IOOS Office. B. Winokur mentioned that NOAA does already have connections to this, listing Coast Survey as an example.

S. Rayder discussed how he has seen data buys throughout the years and actions on the hill, and how data in RT is essential to IOOS. This could be an opportunity for private companies to leverage their resources. He describes the partnership with Shell in the Gulf of Mexico and asks for the FAC to give potential recommendations or to outline obstacles.

M. McCammon describes a current partnership with Saildrone and PMEL in the arctic and agrees that it could be beneficial to the future. She questions how IOOS, as a smaller program, can integrate into this and serve a role. What is our niche in this?

J. Quintrell discusses how the cooperative agreements with the RAs serve similarly to data buys by providing RT data that is certified. She agrees that the scale of data buys can be difficult for smaller groups like IOOS. S. Graves questions how motivation plays a role in these partnerships between government and private industries. N. Jacobs gives the example of buying data as a subscription service in the future. Industry is efficient at providing data, repairing instruments, and we can establish standards. If we purchased data as a subscription, the equipment liability would fall to the industry. This might heighten the cost, but make for an overall easier assimilation for NOAA. One challenge is the motivation for industry to create innovative equipment/observation platforms.

N. Jacobs describes that providing data for scientists to be referenced in PRJ's provides an advantage for data integrity and reputation. From a sales perspective, data quantity is the first consideration. If you aggregate a dataset globally, it could be leveraged. The discussion between open source data and NOAA's mission statement can be complex.

D. Snowden mentions that in NWS products, value is seen in forecast models. This isn't always the case for ocean observation. He asked how we can value observations, or those that are new, not QC'd yet. N. Jacobs confirmed that QC requirements have been

established, but for some observation types, they are so new that QC standards don't exist. An example of market opportunities include insurance companies wanting water level data. Other observations like water quality are valuable to the fish industry. N. Jacobs described other partnerships, such as ballasting with satellites.

D. Vandemark wanted to follow up on M. McCammon's earlier comment about the position of IOOS as it relates to large companies looking at data buys who may focus on the Navy or NWS. He asked how we can navigate this, or get more involved in developing marketing opportunities.

N. Jacobs responded by giving examples from Universities purchasing instruments from the private sector, recruited through an RFP for university or private stakeholders who aggregate the data. He mentions the need for a governing body to establish a business model or QC standards for data acquisition.
J. Virmani asked if other agencies were moving to the discussed data purchase model, such as the USCG or other IOOS-driven stakeholders? As Josie said, IOOS is structured similarly to this. Perhaps we restructure it to where users purchase the data, such as HFR for the USCG.

N. Jacobs confirmed that others are moving in this direction, and that the DOE, DOC will need data moving forward. There are concerns that the government can't purchase the same data multiple times when requirements are similar. If the requirements align, it makes for a stronger case which can adapt to administrative changes.

6. **Partnerships Deliberations (O. Schofield)** N. Rome began a presentation on partnerships deliberations. Discussed the Vision and Partnership working group to discuss relationships across federal agencies, provide recommendations, strategize, and investigate for more strategic alignments with potential new communities. J. Quintrell stated the idea of understanding what regional partnerships were for IOOS. They went through 11 RAs for different regions and found around 700 different partnerships from academic to government (federal agencies, military, etc). A lot of them have regional offices and work with regional associations and look at partnerships with NGOs, industry, and a few individual members. There are a range of institutions, but it is difficult to understand how active the partners are and what kind of partnerships they maintain.

   N. Rome stated that the vision for partnerships was to look at individual partners (started with federal agencies but could be expanded to include private industry, indigenous groups, non-traditional partners, etc) to provide a sample of how it can be assessed. He noted the following questions that need to be asked:
   - What is the status of the partnerships we know about? Which ones are active/dormant? Would be important to clean that list and focus on the ones that are most engaging?

- Relationship with IOOS can be a two-way partnership. Is IOOS receiving a benefit from agencies and are agencies receiving products from IOOS? What are hurdles/challenges to overcome?

J. Quintrell discussed existing types of partnerships that occur. One of most successful is with OA program within NOAA's OAR. She noted that this has been around for 7-8 years. IOOS is funded to collect observations, host data portal and information exchange, etc. Recently, the OAP is funding the regions' CANs (bringing together researchers at federal and regional levels) to try to understand what is known about ocean acidification problems in those regions, as well as outreach and networking. She also discussed DOPPIO - model that USCG uses for search and rescue (example of critical societal benefit). She also noted the following:

- Data is also used in Great Lakes as resource managers depend on data from GLOSS to monitor, mitigate, and manage drinking water supplies.
- Shell is an example partnership to demonstrate data sharing and working together to ensure data is available and accessible. As offshore wind is being developed in East coast, a lot of opportunities there worth exploring. A lot of examples on small scale, local users.
- Next step is to discuss and debate what partnerships are critical for the future, what are opportunities for data/interest

N. Rome asked how the advisory committee recommend to balance investment and how much needs to be invested mega users or for research/development.

S. Rayder began discussion on how to take partnerships and leveraging them. He asked how do we leverage partnerships and how do we explain that they have value. He posed a question to the committee - is there anything we are missing or doing that we ought not to be doing?

D. Vandemark noted that it might be a good idea to discuss the group's charge again in terms of leveraging partnerships. S. Rayder mentioned that sometimes money has to stay inside or be sent outside to show value.

M. McCAmmon asked if there are any particular 1 or 2 private sector companies that would add value to the overall program (majority of regions) and how can we focus on building a stronger partnership with that entity?

S. Graves asked what is the value of partnerships that provide more value to IOOS today? Are there some that could be mentioned and do not provide much value to avoid that type of partnership? Important to focus on positive partnerships and determine if there are particular needs that should also be a focus.

J. Hagen mentioned it was important in the big picture to determine what products are being used that are produced by IOOS. Also need to recognize that some partnerships

are a very small scale and some things might not be highlighted from a national scale even if they are important to the particular region.

R. Perry expressed agreement with previous comments. Added to the comment from S. Graves and stated that there is value in different types/scopes of partnerships. These should be aligned with regional needs. How can we take the positive elements of things and make sure it sticks regardless of federal administration? Would be beneficial to discuss concrete values on why IOOS needs specific sets of partnerships and try to make them bipartisan to achieve that goal.

J. Read discussed that partnerships should always maintain an endgame/goal in mind. Important to consider what we want to achieve by Nov 2021 (sunset period) and then can think about how to achieve that. We don't need to tell the regions how to make partners (they have been doing that effectively for a long time), so it would be more beneficial to figure out the specific end game.

S. Rayder also noted that there is a difference between regions that have partnerships and IOOS partnerships. B. Winokur asked what the overall problem is if RA's already have partnerships? M. McCammon answered that it is more about finding missed opportunities and where new, strategic opportunities are that could be a focus. S. Rayder continued by adding that partnerships also show value of the regions and how they are being leveraged as well. The program is punching above its weight, but it needs to be shown in terms of requirements and partnerships - the programs that achieve this will have the opportunity to grow in the future. J. Hagen stated the value to the partnerships is the products developed and service that is provided for the public good, which is very important to capture. B. Winokur noted it would be interesting to see how leveraging occurs and benefits the program. If some partnerships fail, the program could be in trouble, so important to understand/quantify the cost-benefits of this. S. Rayder noted it can be difficult to show the value of a partnership, but accomplishing this through case studies or analysis would be extremely helpful. J. Quintrell noted that they are working on an economic valuation study for IOOS to determine the value of the IOOS data. Preliminary information should be available in the fall/winter. This can be one piece in determining the value of partnerships. J. Hagen asked what metric are being used in context of this study. J. Quintrell noted PI is following traditional techniques and well-vetted processes are being used, but would be happy to discuss further offline. J. Hagen noted that some systems want to apply values to even emotional/well-being metrics and could be important to keep that scale in there as well. S. Rayder noted that goals are doable from his perspective.

E. Bayler discussed that the IOOS is a component of GOOS, which is traditionally focused on observations. The value chain goes from observations to data analysis and to use cases. IOOS RAs have strong investments in doing something with the data and providing a purpose for it. This is something that needs to be capitalized/coalesced.

What significant roles do we see within RAs and augmenting points for their efforts? That is a critical piece for broader national oceanography enterprise - could provide a sustainable piece for the blue economy.

S. Rayder discussed the idea of talking to current partners and discussing how they currently are leveraging it. E. Bayler suggested leveraging contact with J. White at COL to help develop some leads. S. Rayder wants to keep contacts within FAC for time-being in the interest of fairness.

M. McCammon discussed determining which partnerships/entities would make people interested and eager to participate. R. Perry agreed and noted it would be beneficial to hear from the regions, as there is likely a variance in what they define as “private” partnerships. Also, are there any sectors they haven’t been able to tap into yet? J. Hailes also mentioned defining what partnerships will be used for and have another step where working groups can come back to streamline those areas of opportunity. This could tell us where in the partnership to concentrate and provide a broad understanding of where those are. S. Rayder asked if there was anyone who should be tasked with this? K. Arzayus noted that action should be to solicit regions to highlight partnerships they are struggling to engage or would like to expand the engagement. S. Graves asked if that would allow them to take it to the IOOS level? J. Virmani asked if information on partners has been consolidated in the sense of defining what federal partners get, what value IOOS gets, and what the hurdles are? S. Rayder asked what the best way is to get the group to normalize and create a level playing field for the partnerships to compare/contrast the different regions. J. Virmani suggested that consolidating it would help lead towards answering this question. It doesn’t have to be equal, but both sides need to know what they get and what the hurdles are.
S. Rayder noted there is different meaning for partnerships to different regions.
S. Rayder asked about Next Steps and if there are any other tasks we want to hand off to the team. C. Gouldman agreed with the discussion so far. Noted that weaker networks will typically provide capabilities that an organization may not have. Stronger connections can already provide capabilities that organization has, so it would be important to consider exploring weaker partnerships. T. Curtin added that it is hard to normalize partnerships due to the major differences between working with small tribes/local fishermen and larger corporations. Agreed with C. Gouldman’s statement about the strength of partnerships.

H. Battery echoed that there is one trend that increases across the federal government, which is focusing on new, longer-term technology capabilities. Also important to tap into mission space to solve energy challenges across different areas of opportunity, which might be possible to leverage or take advantage of to realize longer term benefits. J. Read suggested that Requirements work would show where the big gaps are and would help to determine how to fill those gaps.

7. **Public Comment Period (K. Arzayus)** K. Arzayus opened the discussion to the public for any new comments that should be added to the record. S. Rayder invited comments and questions. No comments submitted.

8. **Closing Remarks (S. Rayder)** S. Rayder suggested to shape some of these comments/actions and send them out for review to the partnerships team as the Next Steps. Consensus taken and the group agreed. K. Arzayus and N. Rome agreed to have that documented for the Partnership Team.
    - S. Rayder reviewed the break schedule and tomorrow's agenda.
    - J. Hagen noted she may not be able to attend tomorrow's meeting.
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    - S. Rayder discussed that IOOS needs to understand how partnerships and data should be managed (particularly in the private sector). B. Winokur noted that the government has the necessary infrastructure and plays the role of issuing critical watches/warnings.

Day 2
August 5, 2020

1. **Meeting Welcome (K. Arzayus)** K. Arzayus called the meeting to order for the second day of the U.S. IOOS Federal Advisory Committee at 11:04 AM ET and reminded participants of meeting logistics and that the meeting materials will be on the FAC webpage. C. Gouldman provided an overview of a recent visit with Ru Morrison who received a Congressional award and was able to visit with Josie and Carl.

2. **DISCUSSION: IOOC Engagements (L. Lorenzoni)** L. Lorenzoni referred to the meeting materials/read aheads to facilitate the discussion. The first topic is the follow-on for OceanObs '19 (RCN and follow-on objectives). She asked the following: How can IOOS capitalize on these recommendations? The discussion of partnerships is a pertinent one. We have discussed doing a NOPP call, which can help fund common goals. Do you believe using NOPP is an effective way to address OceanObs '19 recommendations? Secondly, how can we garner support for different sectors? Lastly, are there other recommendations that we haven't previously captured?
    - M. McCammon related these goals to the decade, asking how can we relate our efforts across multiple venues to the UN Decadal goals?
    - L. Lorenzoni agreed, stating that it's important to avoid duplicative efforts.
    - S. Rayder questioned whether the impact of COVID-19 would be addressed in the UN Decade goals. L. Lorenzoni mentioned that she hadn't seen any calculations of impact to funding, but it has been acknowledged that there is an anticipated impact.
    - S. Rayder asks everyone to think about how we can collate our input for a relevant letter to NOAA leadership regarding this.

- B. Winokur recommends NOPP as an effective tool moving forward, and mentions connecting to MTS as a linkage to the public and academic constituents, and possibly hosting a webinar. He recommends reaching out sooner rather than later (FY 21 vs FY22), pending COVID-19 changes.
- L. Lorenzoni requested recommendations for other opportunities outside of NOPP.
- M. McCammon mentioned the IOOS role for the GOOS RA (IOOS focuses on marine shipping and food security). Could IOOS be used to help frame these priorities?
- C. Gouldman questions whether this relates to resource needs and funding.
- L. Lorenzoni brought up the role of stakeholders for the UN Decade, and stated that IOOS is well poised to address UND goals given the proper funding. How do we secure those funds?
- J Virmani questioned if the Climate Community (NGO's, Congressional committees, scientific communities) had been connected with, especially following COVID-19 and how this change might impact the next 10 years and UND goals. There is growing interest and funding in this field and atmospheric/ocean interactions.
- L. Lorenzoni confirmed that the climate community has not been connected with.
- S. Rayder mentioned SilverLining, an example of a successful ocean-climate public-private partnership.
- D. Vandemark agrees with the recommendation to connect to MTS and other marketing vendors. This could be a fruitful opportunity for public-private partnerships for Ocean obs.

L. Lorenzoni led the discussion to metrics (MOOS) to measure and assess how different observing areas are doing: SLR, OA, and HABs. There is room for improvement on the design of these metrics. She asked: How do we make these metrica valuable and sustainable for decision makers? Which groups could benefit from these metrics?

- S. Rayder reiterated how important metrics are for OMB and Congress to show program efficacy.
- J. Read agrees that selecting several metrics to "sell" obs is helpful, but mentions that we must be cognizant of how metrics change per audience (e.g., managers). Which path do we want to go down given our limited resources? Were managers engaged with the first iteration of metrics, or should we reach out to these and relevant stakeholders to ensure the metrics assist with decision making?
- M. McCammon agrees, and discusses the example of metrics for SLR. What are the outcomes from these metrics? Forecasting? Storm surge and flooding? Decreasing SLR? We need to create clear metrics that feed into a goal, not just asset monitoring alone.
- L. Lorenzoni discussed how these improvements could assist with MOOS 2.0 metrics, which focus on ocean observations.If we have increased obs, how could

these improve forecast capabilities? What is needed? (E.g., AOML glider deployments that are ingested into the hurricane forecasts).

- D. Vandemark discussed the example of hurricane metrics as a great example of this.
- O. Schofield discussed EISWG and the Weather Act as a potential community to emulate in their current analyses of metrics. This could help lead IOOS. Further, within the RA, there is a large amount of customization based on regional needs. Would an interRA working group on metrics, return on $, or specific events (such as hurricanes or surge forecasting) be useful moving forward?
- B. Winokur agreed about the example of Environmental Information Services Working Group (EISWG) under the SOST, and mentioned that they are a great group to coordinate on topics such as hurricane metrics, which is of relevance to the NWS.
- D. Rudnick agreed that we should focus on what ocean observations add (their value). Designing metrics on ocean value can be difficult, and we need to be careful not to oversell our value given some skepticism outside of our group.
- C. Gouldman agrees with D. Rudnick, and mentions the example of NOAA's involvement with glider's being used for improving hurricane intensity. This was mentioned in the recent IOOS/OAR workshop. It's an in progress role that is of growing interest and attention within the atmospheric community. Metrics must align with operational capabilities within agencies.

L. Lorenzoni shifted to the topic of social science, and the discussion of how previous topics relate to value or benefit to users. There is consideration of developing a task team of ocean science values to stakeholders, and she asks FAC members to review the IOOC proposal on this topic.She asks everyone to review and send recommendations after the meeting as needed.

- M. McCammon recommends collaborating with Sea Grant on this effort because of the relevant role that they play on this topic.
- J. Read further mentioned potential collaboration with Regional Integrated Sciences and Assessment (RISA), who look at community involvement.

L. Lorenzoni mentioned the Biology-Integrating Core to Essential Variables (BIO-ICE) Task Team which was adopted by the IOOC in May, 2020. She asked: Do we have recommendations for this Task Team?

- J. Virmani recommends connecting with members of the 'OMICS community.
- M. McCammon brought up the transition between monitoring and forecasting technology. This should be considered as an overarching end goal for this group. This requires additional variables for biological monitoring.
- T. Curtin mentioned that the impact of additional ocean observations is best analyzed by rigorous Observation System Simulation Experiments (OSSEs). That impact in terms of improved forecasts then needs to be translated into a risk

analysis for which there are sophisticated tools (e.g., used by insurance companies, and options traders).

3. **Legislative Updates (J. Quintrell; M. Jarvis)** J. Quintrell spoke first about the legislative outreach the IOOS Association has been conducting, and an update on her latest conversations with Hill staff. At the time of the meeting, the House had just passed their minibus bill that included CJS marks-- that bill marked IOOS up by $1.5M. This continues on the trajectory of what we have seen in response to the "Fill the Gaps" campaign, which incrementally increases funds for gliders, high frequency radars, and streamlined access to observations. The language also included $2M for the HAB Observing Network, which is an increase of $1M from last year. Of course, since the directed funds may end up being more than the final allocated funds, this could potentially put IOOS in a bind, but Josie and others are continuing to work closely with the Senate Appropriations Committee staff on that. The Senate mark is not expected to be released until after the November election. B. Winokur asked what the impact of a CR would have on the program; J. Quintrell answered that it would be good news for the program overall. J. Quintrell has also been working with the Hill to advance ICOOS Act Reauthorization. The Senate just passed S914, which authorizes $2M increases for the next 5 years.

   M. Jarvis from NOAA's Office of Legislative and Intergovernmental Affairs followed with his own set of updates. This office is the liaison between NOAA and Congress, and M. Jarvis works exclusively with the National Ocean Service. M. Jarvis provided the following updates:

   NOAA's FY 21 Budget Update

   - The House FY 21 CJS bill provides $5.454 billion, an increase of $100.4 million or two percent above the FY 2020 Enacted level of $5.353 billion.
   - The House FY 21 CJS bill provides $631.4 million for the National Ocean Service (NOS), an increase of $25 million or four percent above the FY 2020 Enacted level of $606.5 million. The bill rejects all proposed reductions and terminations and funds all NOS funding lines equal to or above the enacted funding level.
     - The bill funds Integrated Ocean Observing System (IOOS) Regional Observations at $40.5 million, providing $2 million within these funds for IOOS to enhance the nation's capacity for monitoring and detection of Harmful Algal Blooms (HABs).

   Enacted Legislation

   - Weather Act of 2017 - Implementation is well underway, having completed many of the reporting requirements. The Weather Act reports are being housed online by the NOAA Institutional Repository in the Weather Act Collection .
   - Commercial Engagement Through Ocean Technology Act of 2018 (CENOTE) - The Act requires NOAA to coordinate research, assessment and acquisition of

unmanned maritime systems with the U.S. Navy, other federal agencies, industry and academia. NOAA is actively working to expand our use of unmanned maritime systems. For example:

- ○ Released UxS strategy that highlights coordination with both the DoD and the private sector.
- ○ Finalizing a new supplement or "annex" that will update the existing NOAA-Navy Memorandum of Agreement and clarify roles, responsibilities, and partnership activities per CENOTE.

Introduced Legislation

- ● Regional Ocean Partnership Act
  - ○ S.2166 - Regional Ocean Partnership Act (Senator Roger Wicker, MS)
    - ■ Introduced 07/18/2019, Passed Senate Commerce Committee on 12/19/2019
  - ○ H.R. 5390 Regional Ocean Partnership Act (Rep. Charlie Crist, FL)
    - ■ Introduced 12/18/2019, Referred to the House Natural Resources Committee
  - ○ This legislation would provide a mechanism for coastal states to participate in a Regional Ocean Partnership with one or more other coastal states that share a common ocean or coastal area, gives NOAA authority to designate Regional Ocean Partnership (ROP), and designated ROPs would be able to award grants and contracts to monitor water quality and living resources of multistate ocean and coastal ecosystems.
- ● National Oceanographic Partnership Program (NOPP)
  - ○ H.R. 7713 - To reauthorize the National Oceanographic Partnership Program, and for other purposes (Rep. Jimmy Panetta, CA)
    - ■ Introduced July 21, 2020 and referred to the House Natural Resources Committee and House Science, Space, and Technology Committee, and House Armed Services Committee
  - ○ This legislation would authorize the Ocean Policy Committee and create a NOPP treasury fund which would allow agencies to leverage funds between agencies as well as along with funds from philanthropic organizations.

How IOOS is Contributing to Recent Harmful Algal Bloom Congressional Outreach

- ● May 8th - Ask an Expert Webinar on Harmful Algal Bloom: Interested Congressional staff were invited to an Ask an Expert webinar where a panel of HAB experts from around the country were on hand and available to answer questions ranging from policy, interagency collaboration, ecology, detection, operational monitoring, forecasting, prevention and control. Clarissa Anderson from SCOOS joined our expert panel.
- ● June 2nd - Forecasting Harmful Algal Blooms All Interested Staff Briefing: At this briefing, we shared how HAB researchers are working to forecast when and where blooms will occur, where they will travel, and how toxic they will be. This briefing provided an overview of each of NOAA's seven HAB forecasts and the

regional HAB observing partnerships that enable them. Barb Kirkpatrick from GCOOS joined our expert panel.

4. **Fill the Gaps (J. Quintrell)** J. Quintrell provided an overview of Congressional marketing strategies for increasing appropriations for FTG by discussing the budget from program inception to current day. IOOS became a sustained program in 2008 within NOAA. FTG was initiated in 2007, which is an incremental, scalable campaign with tangible outcomes. This sought to identify benefits for Congress and aligned priorities, focusing on well-known assets within IOOS: gliders, HFR, and moorings. An overview of current assets, use, and data portals was provided. Some presentation highlights:
    - Congress agreed to radar installations within the last 5 years, but further displayed interest in gliders.
    - 2017-2020: Increase in funding line, ~8.5 million
    - HFR success: Coast guard applications for search and rescue; 72 hr forecast
    - Observations are able to be tailored for regional needs and addressing stakeholder concerns (e.g., GL HABs, Water levels in Alaska, HAB bulletin for California).
    - The importance of addressing aging infrastructure (15+ yrs) was discussed as a priority question for the FAC to address. How do we handle this? How do we sell the costs of replacement or maintenance, rather than adding new equipment?
    - Next 5 year goal: Focus on biology as a Congressional interest. How do we expand further now that we have operational platforms?
    - What are the potential opportunities to bring in other partners (e.g., BOEM, offshore wind)

    J. Quintrell began open discussion.
    - B. Winokur brought up the concept of RA budgetary needs vs. Presidential budget lines. How does the IOOS Office help with the RA's identifying regional focuses?
    - S. Rayder discussed similar examples across agencies where offices collaborate and advocate on the hill that has been helpful.
    - R. Perry addressed HFR and mentioned an opportunity for data sharing across industry. This may be a future proprietary partnership. These partnerships might be able to be leveraged for replacing aging infrastructure rather than requesting the funds.
    - S. Rayder recommended using this as an opportunity for push for IOOC/NOAA support. He brought up the concept of standardization of costs across regions and how that might play into congressional funds. Could the RA's promote standardization for easier repairs/purchases.
    - T. Curtin commented on D. Rudnick's glider shop, saying it was a great example of known costs that could be useful for standardizing glider costs, operations, and maintenance. D. Rudnick agrees that there is an economy of scale, which depends largely on the number of operators.

- M. McCammon mentioned that this might be equipment specific (HFR costs vary by region for example).
- S. Rayder asked about the NOAA budget structure, and recommended a PAC line for servicing infrastructure to be set up. NOS or IOOS could benefit from a PAC line to address aging infrastructure or unanticipated repairs (e.g., hurricane damage).
- D. Rudnick recommends raising climate as an emerging issue. IOOS has a unique role to play in collection observations for decision makers. This is an essential gap to be filled.
- B. Winokur returned to J. Quintrell's point about balancing observations with regional and stakeholder needs for societal benefit. The scale of our obs (gliders for example) are getting closer to a national scale or NDBC level. Where do you see this going in the future?
- J. Quintrell stated that we need to discuss this further by identifying future needs and priorities. This is still in early discussion.
- S. Graves questioned if lobbying on the hill will continue to be effective, or if this approach needs to shift. J. Quintrell agreed that this is a critical part, along with building Congressional partnerships and NOAA's involvement.
- B. Winokur related the concept of aging infrastructure within IOOS to OMAO's approach to ship repairs/maintenance. In that case, a reauthorization plan was created.

5. **Vision and Strategy Deliberations (M. McCammon; D. Rudnick)** M. McCammon provided a summary of the IOOS Vision and Strategy activities. The nine regions collaborated to come up with common and/or emerging issues and primary assets among the RAs. The Regional Activities Spreadsheet captures the specific activities and partnerships in each region using common language to parse out similarities. Using this spreadsheet, it was determined that four major themes affect each region: Coastal Hazards; Maritime Commerce/Safety; Fish, Ecosystems, Climate; and Eco-forecasting. This information can be used to balance the needs of stakeholders and the priorities of Congress.

   D. Rudnick added that the goal is to create an accurate and attainable vision. He reminded the group that the four themes are very similar to the initial goals of the group. He added that climate deserves a special emphasis in this realm. Climate has been buried for political regions in recent years, but the public is now behind the issue, and as scientists we have a responsibility to put climate at the forefront.

   M. McCammon noted that the regional activities spreadsheet focuses on current activities, as opposed to activities the regions would like to implement.

   M. McCammon opened the floor for discussion.

- J. Virmani asked if there is anything similar to Smart Oceans or a similar program that is catchy and may help to replace ageing infrastructure.The committee will look into how this idea could be incorporated into recapitalization/fill the gaps campaign.
- C. Gouldman asked what the niche is in regards to IOOS getting involved in climate. D. Rudnick responded that society experiences climate changes through the coasts, and this is IOOS domain. Understanding how climate affects the regions is important and can answer public questions.
- B. Winokur noted that several years ago, the Ocean Studies Board wrote a report on ageing infrastructure and needs. The program should have some kind of vision for infrastructure moving forward. This is a part of filling the gaps. He suggested a new ocean infrastructure vision is needed. It will involve replacement of old infrastructure in addition to the incorporation of new technology for example unmanned systems or gliders. J. Virmani agreed that this is a good suggestion.
- M. McCammon suggested a recommendation to grow the R&D budget
- C. Goulman adds that significant investment from other agencies has spurred other projects. So there are sources of funding available, but IOOS doesn't have control over that.
- J. Quintrell asked if OTT could be run through NOPP as a way to leverage support from other agencies and private sources.
- S. Raydar asked if IOOS could serve as an operational hub for the other line offices. How do we prioritize all of the mission activities listed in the spreadsheet?
- D. Rudnick notes that by having a regional structure, regions have a close connection with users on the local level. We should focus on raising the profile of that service to Congress. IOOS is the best-positioned to connect with local users.
- S. Raydar suggests that we recommend that NOPP should be used to advance these priorities. C. Gouldman agrees that NOPP is a good vehicle to try. There are multiple ways to leverage NOPP BAAs. The new NOPP legislation may influence how available the funds are.
- M. McCammon notes that there is often tension between funding research and operations. When it comes to HABs, NCCOS funds research, but there is no sustained funding for operations. This is a gap in the NOAA infrastructure. M. McCammon suggests we could write a more explicit recommendation for IOOS to take on the role of supporting operations.
- E. Baylor adds that NOAA needs an operational oceanography enterprise framework that would be integrated with IOOS RAs, NWS, etc.
- M. McCammon and D. Rudnick offered several key recommendations from the conversation:
    - NOAA has a huge asset in 11 regional data centers, and should be taking better advantage of this data. D. Vandemark noted that N. Jacobs suggested on 8/5 that these 11 data entities somehow form an ocean data aggregator.

        - It is time to raise the concept of climate again as a key element of the vision
        - IOOS should consider operationalizing the OA/HABs type issues that currently lack an operational home
    - S. Raydar notes that PAC line funding is essential to moving forward our vision. PAC money can be carried over if needed and is more flexible.
    - S. Raydar suggested we write up these recommendations for further discussion, and closed out the session. M. McCammon added that we consider what partners need to be added to advance the conversation.

6. **Public Comment Period (K. Arzayus)** S. Rayder opened the discussion to the public and invited comments and questions that could be added to the record.
    - E. Baylor noted that NOAA needs to operationalize how we conduct oceanography. The components are currently scattered in different programs across the organization. These pieces needed to be better integrated within NOAA and with the IOOS RAs. The key question is how to address integrating observations as a whole. This is a potential recommendation: NOAA needs an internal operational oceanography strategy to advance the enterprise and align with the budget. In addition, how do we address ecological forecasting in oceans and coasts? These questions need to be addressed from a modeling perspective. Consideration of how to integrate with the UN Ocean Decade should also be considered.

7. **Closing Remarks (S. Rayder)** S. Raydar noted that these recommendations will be considered and used to inform tomorrow's discussions. S. Raydar and K. Arzayus thanked the committee for their input.

Day 3
August 6, 2020

1. **Meeting Welcome (K. Arzayus)** K. Arzayus called the meeting to order for the third day of the U.S. IOOS Federal Advisory Committee at 11:07 AM ET. She reminded participants of meeting logistics, additional meeting materials that have been added to the FAC webpage, and reviewed the daily agenda. S. Rayder noted that this will be the last face to face meeting for the remainder of the year and noted that any recommendations created and synthesized in this meeting will be vital to the election and other events.

2. **IOOS AC Priority Deliberations: Requirements (C. Gouldman)** C. Gouldman shared a briefing with the full committee that he had previously given to the Requirements Preparatory Working Group, which describes how the IOOS Office manages all of its requirements. Originally, all of the requirements for creating IOOS came from the foundational documents (briefed at the last IOOS AC public meeting), such as the

Ocean.US Workshop Proceedings, the U.S. IOOS Development Plan, and the U.S. IOOS Blueprint for Full Capability. Each year, the IOOS Office executes an analysis that works in new and emerging requirements from the Regional Associations, IOOS partners, NOS and other NOAA Line Offices, and other federal partners. This culminates in the development of an Annual Guidance Memo, which outlines the IOOS Director's "marching orders" for the next year, and which maps to the goals and objectives in the 2018-2021 U.S. IOOS Strategic Plan. C. Gouldman also stressed the collaboration with the Regional Associations that underpins requirements management: every 5 years, the Regional Associations have to apply for cooperative agreements through the IOOS Office up to $6M; however, the IOOS Office usually can only fund each to a lesser extent. The proposed projects can be thought of as the list of "unfunded Regional Association requirements".

B. Winokur reflected that IOOS is not a typical federal entity that manages requirements solely according to Federal Acquisition Regulations, but is unique and complex due to the partnerships and relationships with the IOOS Regional Associations, as well as other partners. C. Gouldman agreed and reiterated that IOOS is supposed to play an "integrating" role and that many times, partners will be responsible for managing and tracking requirements-- for example, this is the case with the Ocean Acidification Program at NOAA. T. Curtin added that while this may be unconventional for a federal agency, there are many similar models that exist, including Federal and State governments.

D. West notes that NOAA's requirements process is difficult to understand, particularly regarding ocean observing, which is segmented into several Line Offices and budget pools. B. Winokur and S. Rayder recommended that the committee look at several reports and analyses that NOAA OMAO conducted as examples of successful requirements analyses, including the MITRE Study, the Aircraft Analyses of Alternatives, and the "Doorman Report". B. Derex has an action to secure these from OMAO to share with the committee.

3. **Advancing NOAA's Ecological Forecasting Capabilities with IOOS Regional Observations (L. Gonsalves)** S. Rayder and K. Arzayus welcomed participants back before transitioning into L. Gonsalves' presentation on Ecological Forecasting. The focus on opportunities for engagement between the IOOS RA's was a main focus of the presentation. Observations, innovation, sustainability, and impact were the driving categories for discussion, along with an overview of ecological forecasting (slides available on the IOOS FAC website). Some highlights from the presentation and subsequent discussion:
    - Current observations focus on forecasting for HABs and hypoxia to meet stakeholder needs across the regions. Observations feed into models and finally, forecasts.

L. Gonsalves mentioned the topic of sustainability and asked about potential partnerships that could be leveraged to assist with R&D efforts to modeling and forecasting. What are the appropriate roles for the RAs and the private sector, and how can we connect with them to assess potential interest in tools/capabilities?

- S. Rayder recommended connecting with Jupiter Intel and Fugro to assist with forecasting. Additionally, connections to Aquaculture companies might be beneficial.
- R. Stumpf provided input on partnerships on cloud computing and big data services through partnerships with GLOS. Data handling issues and cloud computing is being further explored.

L. Gonsalves noted the Pacific Northwest HAB Bulletin as an example of a successful partnership between all entities (obs, modeling, forecasting).

- S. Graves mentioned that sustained partnerships are essential and can be difficult to maintain. How can we promote and sustain those partnerships?
- L. Gonsalves indicated that stakeholder engagement to assess priorities, needs, and to build lasting partnerships have helped with prior successes. Leveraging LO roles and capabilities together is necessary to address regional needs.
- J. Hagen linked sustainability of the HAB Bulletin to funding at multiple levels: tribal, state, and NANOOS (regional).

L. Gonsalves provided an overview of engaging with Diverse STEM talent, suggesting an increased effort to incorporate talent outside of the traditional “ocean science” community. How can we implement this effort? How can NOAA increase involvement with this as it relates to our workforce, partners, and R&D?

- R. Perry questioned whether academic institutions and partners could also be involved in this, and if so, what could these groups be doing to increase the breadth of this approach?
- L. Gonsalves recommended that the organizations should be versatile and work to identify and collaborate with special interest groups as they pertain to this effort. RA and partnership involvement in ongoing initiatives (rather than starting new ones) would be a strong approach.
- J. Read connected these efforts to NOAA student fellowships and Sea Grant involvement, which can help spread awareness and increase D&I.

4. **Committee Work Time I (S. Rayder)** S. Rayder asked for Committee reactions to the actions and recommendations listed so far from the meeting outcomes. The confirmation was made that recommendations are made for both NOAA and the IOOC. S. Rayder led the FAC through confirmation or discussion on all suggested recommendations.

5. **Committee Work Time II (S. Rayder)** S. Rayder continued the review of actions and recommendations.
   WEDNESDAY 8/5/2020

IOOC Engagement:

- B. Winokur suggested that this suggestion go to the IOOC specifically.
- D. Vandemark mentioned that the IOOC representation during yesterday's meeting might be a more useful platform to discuss points like this.
- K. Arzayus mentioned that any recommendations for the NOAA Administrator and IOOC must be documented during the FAC meeting.
- S. Rayder advocated for greater IOOC engagement, which is fostered through these recommendations, and asked for any conflicts for the current recommendations.
- M. McCammon questioned if there were actions the IOOC could take to assist with engagement? Are there roles for them to fill moving forward?
- J. Hagen added that it can be difficult to know what is currently going on with the IOOC, and clarifying their role within the IOOS Enterprise would be beneficial.
- D. Vandemark asked if the IOOC should be more actively involved with the entire FAC process. Is that a beneficial step?
- B. Derex commented that IOOC engagement was desired from the start of this year, and COL staff have been helping to facilitate deeper conversations and connections between meetings.
- N. Rome added that he and K. Desai staff the IOOC and help to bridge the two groups by working as support staff. Regular co-chair calls are held, ex-officio members have been added, and the AC meetings have more representation. The IOOC has been briefing on their current work during each FAC meeting. This is a great opportunity to influence that process and identify any gaps.
- M. McCammon suggested having S. Rayder or S. Graves meets regularly with the IOOC to discuss the ongoing efforts and recommendations of the FAC.
- D. Rudnick suggested a clear response to the 4 initiatives mentioned by the IOOC. He would like to hear the IOOC brief their connection to the FAC.
- C. Gouldman asked for clarification for non-NOAA, IOOC recommendations. (e.g., recommendation of how NSF implements CoPe). One thing not discussed today: Should we set up a task team for deep ocean observing following OceanObs '19? We could add this to the list of emerging issues.

Fill the Gaps:

- B. Derex recommends a conversation with NOS leadership to discuss the role of climate as a priority and how it could influence other NOS LOs.
- M. McCammon recommends writing a transition document on this topic.

Requirements PWG:

- J. Read questioned whether we should include current initiatives that are successful and ongoing. Is it beneficial to include these?
- M. McCammon described prior build out plans as part of the 5 year proposal process to identify requirements (unfunded needs).
- S. Rayder recommended an Administrative call in Late September/October to create a subcommittee to help make a transition document (Molly, Josie, Dan, others?).
- S. Rayder will work with K. Arzayus and B. Derex on a recommendation letter moving forward.
- B. Winokur mentioned that the letter should include context along with the recommendations.
- B. Derex attached a few examples of similar recommendation letters to the read ahead materials for consideration on how to construct the FAC recommendation letter. We could discuss this on the next administrative call: How do we want to structure this?

6. **Public Comment Period (K. Arzayus)** The public comment period opened at 4:00 PM ET, with no public commentary given.

7. **Closing Remarks (S. Rayder)** K. Arzayus acknowledged the several comments that were made that this virtual platform setting ran smoothly and noted that an administrative call will be scheduled for September/October.

   S. Rayder gave his thanks to the COL staff for organizing the meeting, the IOOS Office for their ongoing efforts, and to the RA's for their adaptability given the current circumstances. The meeting was adjourned at 4:32 PM ET.