Ocean Observatories Initiative Facility Board
Meeting University of Washington, Seattle, WA
Marine Sciences Building, Room
123 May 7-8, 2018

Meeting Minutes

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Summary of Meeting Action Items and Motions:

OOIFB-2018-2: AGU Fall Meeting Town Hall – Identify an OOIFB member to draft an abstract for an OOIFB Town Hall. The abstract should be not more than 200 words and include a description of the target audience and goals. The Town Hall should focus on community engagement. The submitter must be an AGU member with dues up to date for 2018. Abstracts will be accepted from mid-June to August 1, 2018. See <https://fallmeeting.agu.org/2018/town-halls/>.

If the Town Hall is accepted the OOIFB member will provide a leadership role in organizing the Town Hall.

OOIFB-2018-3: OOI Non-Profit Collaborations Statement – The OOIFB should prepare a statement regarding collaborations with non-profit organizations with an interest in OOI.

OOIFB-2018-4: North East Pacific Partners Statement – The OOIFB should prepare a statement regarding OOI and Regional Observing Partners in the North East Pacific region. The statement should encourage ties between these groups that will allow for efficient operations and observations through sharing lessons learned and enhanced communications.

OOIFB-2018-5: Transition from Voting to Non-Voting member – OOIFB Voting Member, Kendra Daly, was transitioned to a non-voting OOIFB member for the period that she is

supported by COL for OOI-related work. Work with COL will end on September 30, 2018, at which time Kendra will transition back to an OOIFB voting member.

DDCI-2018-1: Formalize DDCI Terms of Reference & Membership – It is anticipated that the DDCI will be significantly tasked during 2018/2019. With this in mind, the DDCI should formalize their terms of reference and review their membership by September 30, 2018.

DDCI-2018-2: Data Delivery Evaluation –

- The DDCI is tasked to conduct a baseline evaluation on data delivery plans of the new OOI 2.0 operator no later than December 31, 2018.
- The DDCI is tasked to conduct a review of the success of the OOI data delivery for completion in April 2019 (6 months after the OOI 2.0 begins). Metrics for success will be established for the review.

Motion-OOIFB-2018-1: OOIFB Charter - The OOIFB unanimously passed a motion to adopt the OOIFB Charter dated May 8, 2018 (O'Donnell/He).

Meeting Minutes:

Monday, May 7, 2018

Introductions and Welcome from Host - Larry Atkinson (OOIFB Chair) opened the OOIFB Meeting on May 7, 2018 at 8:30 am PDT. Participants introduced themselves. The participant list is available on the meeting site.

Deb Kelley (UW) welcomed the group to the University of Washington (UW). She introduced Ginger Armbrust, Director, School of Oceanography, UW.

Ginger welcomed everyone to UW. UW has been involved with the Ocean Observatories Initiative from the start. They support the Cabled Array. It is exciting to hear about research that is using or plans to use the OOI data.

Announcements - Larry Atkinson announced that OOIFB member, Kendra Daly, is now being paid by COL to help out with the transition from 1.0 to 2.0. She will work for COL through September 30, 2018. During this time, Kendra will be a non-voting member of OOIFB (any COL-paid member needs to be non-voting). After September, Kendra will once again become a voting member of OOIFB.

NSF Announcements:

Results of NSF announcement and OOI 2.0 - Bob Houtman reported that at the National Science Board (NSB) meeting the previous week, NSF presented an action item requesting permission for the NSF director to enter into an award for OOI 2.0. The vote was taken by the NSB, but it was not made public. It cannot be announced until NSB posts the results of the vote their web page.

Bob said that OOIFB will need to be focused on the OOI 2.0 award with the start date of 1 Oct

2018. Consortium for Ocean Leadership (COL) did not bid on the proposal for OOI 2.0, so there will need to be a transition plan. The transition plan will need to be included in the Year-1 OOI 2.0 Work Plan. OOIFB will be asked to participate in the review of the annual work plan that they will see on October 1, 2018. This is what OOIFB and DDCI can anticipate.

Lisa Clough added that COL has hired Tom Kearney as the 1.0 transition lead. Transition will likely begin on 1 June for 2.0. The OOIFB Data Delivery and Cyber Infrastructure (DDCI) working group will have a continuing role during the transition. They have already provided 1.0 input. By end of year, there will be an updated look at 2.0. We can expect that there will be a fair amount of work for DDCI before the end of the year. There is an on-going NSF competition for a new OOIFB office. Hopefully it will be announced in late FY2018.

NSF Budget Update - Bob Houtman reported that it is in the public record, that the President's budget request had a significant cut to science. The Congress provided an increase of $300M to NSF's FY2018 budget. This increase is in discussion at NSF and hasn't been announced down to the division level. They may not know until May/late-June as to how the budget increase will be allocated. This is challenging since the divisions are close to the fiscal year close out. However, they are now authorized to spend up to 90%. The new OOI 2.0 was budgeted at $44M and that is what they are working towards. The word on the street will be that the FY19 budget will be level with the FY18 budget without the $300M. Which is level with FY17.

Lisa Clough reported that Rick Murray sends his regrets for not being at the meeting. He sends his thanks for the work that OOIFB has done. This month will likely be Rick's last in the NSF office.

OOI 1.0 Status Report and Plans for Transition – Chris Rutherford (Consortium for Ocean Leadership (COL)) introduced the topic and said that they are preparing for the transition.

Tom Kearney (COL) provided details about the transition effort. His slides are included as ***Appendix II***. The transition of 1.0 to 2.0 will be complete by the end of September 2018.

Larry Atkinson asked why Chris and Tom were selected to oversee the transition.
Tom Kearney – He has been with the program for nine years. He has been involved with standing up the operations and maintenance components for OOI. He has a Masters in Oceanography, but has a lot expertise in business. Chris Rutherford has a lot of management experience, as well as CI expertise.

See the slides for details:
A "Transition High Level Timeline" was presented. OOI program will go from one contract (1.0) to the next contract (2.0). There won't be an overlap of the two contracts. The 1.0 transition preparation is occurring in March 2018 to May 2018. September 30th is a hard deadline for completion of the transition.

Transition Working Group Charter: In a meeting in March 2018, seven transition working groups were formed and transition deliverables were defined. Each working group was to tasked to define:

- Objectives/success at completion
- Deliverables

- Team lead
- Team members
- Meeting Frequency
- Weekly status reports, timelines and milestones.

Tom Kearney is the Working Group PM.

Tom provided the membership and deliverable list for the Project Close Out and Transfer Working Group. They meet weekly. The Property transfer timeline is estimated to take 11 weeks from start to finish.

Chris Rutherford – It was recognized that many people who are involved with the transition are also going to sea at the same time. This has forced them to do some of the reports early.

Cruise/Refurbishment activities provide some transition challenges because they cross over the September 30th date. Candidate PY9 operational activities that cross 9/30 include instrument refurbish, long lead procurement, cruises, etc. The full list is included in the slides.

Discussion:
- Sarah Gille – What happens if there is a Government shutdown? Bob Houtman – This shouldn't be a problem because the OOI 2.0 award will be awarded in FY18, so it will have already been started.
- Bob Houtman – There COL award has a closeout period of 120 days. No new procurements are allowed, but COL can pay the outstanding bills.
- Lisa Clough – There is also a 90-day pre-award spending authorization for the OOI 2.0 operator at their own risk.

Tom described the draft Project Close Out Definitions/Actions (see slides). They will monitor these items for close out.

Discussion:
- Kendra Daly – What are the high-level insurance policies for OOI? Tom – Equipment at sea is uninsured. The operator is otherwise the insurer.
- Jim O'Donnell – What about staffing? Is there planning for the human side for the transition? Tom – They are working on the staffing plan and also working towards a successful knowledge transfer to the extent that they can.
- Rouying He – What happens to any unspent funds? Bob Houtman – This is one of the reasons they have asked the OOI team to increase reporting to monthly intervals so that any under-runs can be identified. COL can identify activities that can be accomplished before 30 September. Then NSF could apply potential unspent funds to these programs. They are trying hard to get the exact cost estimate of what will be spent out by the close of the project. Any unspent funds would go to the treasury.

Early Career Scientist (ECS) Workshops – Max Kaplan (COL) reported that the ECS workshops will begin in a couple weeks at Rutgers. The workshops are week-long events that have been organized by disciplinary. They will generate a data validation report. Rutgers has put together python scripts to compare the OOI data to ship data.

Discussion:

- Sarah Gille – Are the workshops full? Max – Yes, with the exception of interdisciplinary workshop.
- Jim O'Donnell – He would like to see the curriculum and participate in person at the Physics workshop. Max – He can share the curriculum and the python scripts. The workshops are 4.5 days long. It is a very hands-on workshop, so WebEx might not be effective. Max will check on the space for ECS workshops for OOIFB members to sit in.
- Jim O'Donnell – How will the ECS participants access the data? Max – They are exposing the ECS participants to the data portals. There will be just a little small focus on ERRDAP. M2M will be presented.
- Rouying He – How many participants will be at the workshops? Max – Between 7 And 12.
- Sarah Gille – Is there a metric for success? Max – Rutgers has put this together.
- Jim O'Donnell – Where did the money come from to support the workshops? Lisa – It was part of the excess project funds.
- Max – The workshop reports will be available on the OOI site.
- Sarah Gille – It would be nice to have the validation reports made public and accessible.
- The interdisciplinary workshop will be held in September.

Deep Ocean Observing Strategy (DOOS) Pilot Project – This workshop will be the last week of August.

Break

OOI Southern Ocean – Lisa Clough reported that NERC reached out to NSF with interest in the Southern Ocean Array. The Central Mooring is still deployed. The surface mooring is deployed and still working. NERC is willing to support this array. They intend for the data to still go through OOI and be owned by NSF.

Discussion on OOIFB's role, relations, and interactions with OOI during the transition - Larry Atkinson opened a discussion on OOIFB's role moving forward.

- Larry – When will OOIFB start to be engaged in transition and 2.0 activities, such as the Annual Work Plan? Bob Houtman – The Annual Work Plan needs to be approved before 1 Oct 2018 because that is the start of the new OOI 2.0. In July, NSF should be able to reach out to OOIFB to invite input and guidance. The Plan will be electronic and a fast turnaround will be needed. Realistically, it would be in the July/August timeframe. OOIFB will make comments on the draft.
- Kendra Daly – Are there specific areas in the work plan where you would want OOIFB input? Bob Houtman – A possible scenario where OOIFB feedback would be useful is if the OOI program budget stays at level $44M, but inflationary factors won't allow the program to continue to be supported at that level. Tradeoffs will need to be considered. So how will we get community input when these scenarios arise? If there needs to be a reduction in scope, then they want to be sure that the community has input to those areas. Cyber infrastructure, data delivery and implementation will be another area for OOIFB discussion.
- Deb Kelley – Are there any disclosure issues regarding access and review of the Annual Work Plan. Is any of it confidential? Bob Houtman – They will have to look into this. OOI 1.0 and 2.0 are under cooperative agreements and NSF can have substantial involvement.

OOIFB – Charter Review, Discussion, Adoption & FB Membership – Annette DeSilva reviewed the draft Charter. In creating the draft she reviewed examples from other NSF large

facility programs.

- Kendra Daly – Under membership, add gender diversity as a consideration.
- Annette asked everyone to send revisions to the draft to her.
- Lisa Clough – Under the definition of "meetings," phone calls are not meetings.
- The Charter will be revisited on Day-2.

Break

DDCI Working Group:

DDCI Co-Chair Report summarizing activities from 2017/2018 - Tim Crone provided the report. His slides are included as ***Appendix III***. Tim introduced the DDCI members. Over the past year, they have had five conference calls and one in-person meeting. They provided near-term and long-term recommendations on data delivery and CI. The recommendations were provided to OOIFB who endorsed them and in turn submitted them to NSF in October 2017. The near-term recommendations include actions that can be completed during the transition to OOI 2.0.

Discussion:

- Kendra Daly - What percent of ingestion has been completed? Orest Kawka – The data teams were doing the ingestion. There are some holes. It is an on-going effort and resource intensive.
- Jim O'Donnell – Ingestion of data was one of the highest priorities. They have made good progress.
- Tim Crone – Once the IMOs were allowed to do the ingestions, a lot of progress was made. It is a lesson learned.
- Orest – Creating the data products and Q/A is another whole area that needs to be addressed.

Tim reviewed a set of DDCI questions looking forward:

- What is the management structure going to look like data-wise? Friction points?
- How are the MIOs and CI going to interact? Previously interacting mostly through data team?
- Who is going to be on point regarding helpdesk and other interactions with scientists?
- What is the status of and plan for operator ERDDAP systems?
- Longer term, what is the vision for moving data into the cloud, bringing compute to data? Partnering with commercial?
- Can we find a way to mini-compete data delivery using demo projects/seed funding?

Discussion:

- Lisa Clough – EarthCube often partners with infrastructure. Perhaps there could be an HDR (harnessing the data revolution) for OOI. There have been Dear Colleague Letters (DCLs) for HDR. There are idea labs. The UK has a project to build research ideas called Sandpits. They decide on a project they want to fund and then they decide the people that they want to participate. NSF provides convergence accelerators (CAs). They fund many small projects. Then a subset of the small projects gets selected for larger funded programs. HDR will have an opportunity for CAs. This is something that can be applicable to OOI.
- Bob Houtman – The Convergence Awards will get more exposure. Some of the FY18 $300M funding will get allocated into the CAs. More information will be shared.
- Jim O'Donnell – It is important to recognize the weaknesses with OOI data delivery so that

new solutions can be identified.
- Deb Kelley – It would be good to have a strategic plan. We don't know where we want to be in 5 years.
- Tim Crone – If we could compute on the Cloud it could be efficient and cost effective.

OOI Data Integrator Report – Orest Kawka provided an update on OOI 1.0 data delivery and CI. His slides are included as ***Appendix IV***.

Some of the recurring CI-related activities include:
- Weekly CI coordination call (Wed) where they do a Redmine ticket review.
- ~ Weekly – Biweekly Data Team Management + DI call where they discuss Data Team activities, data quality issues and path to resolution.
- ~ Biweekly MIO POCs + DI call to discuss MIO-associated data flow issues, configuration data and other metadata availability entry, etc.
- Weekly COL CI+Transition Update to discuss MIO-associated data flow issues, configuration data and other metadata availability entry, etc.
- Weekly CI Transition (TDP) Working Group call with the goal to provide a sufficient level of documentation to enable OOI 2.0 to Manage CI and Deliver Quality Data to Community

Orest reviewed the current status of data delivery. Topics covered included:
- Data Availability Plots are now on OOINet at instrument level
- Daily and monthly stats for data coverage are available at the Data Team–supported site: ooi.visualocean.net
- There are Daily Alerts via email to Marine Operators re: Data Stream Issues (Knuth code)
- OOI Gliders - 103 are now available in IOOS Glider DAC
- Data Team is continuing Data Evaluation/Validation
- Data Team continues conducting ingestion process of all uncabled Data
- Data Team continues to identify significant issues with MIO-supplied configuration data (e.g. calibrations) and other metadata
- Global, Local, Spike, Stuck Thresholds –
- ERDDAP Server

Full details of these topics are included in Orest's slides. We visited ooi.visualocean.net. The data team has developed the tools that are available on the site. There is a risk that these tools will be lost during transition to OOI 2.0.

Discussion:
- Kendra Daly – Is the glider data available? Mike Vardaro – The glider tracks got deleted from the scope along the way. The glider data is in the IOOS Glider DAC
- Jim O'Donnell – How do we sustain the data? Orest – ERDDAP wasn't an original CI task.
- Jim O'Donnell – What is the hold-up now for the recovered ADCP? Orest – It is a formatting issue. He has reached out to Doug Luther and Erik Firing for suggestions. Any change we make to the system is an effort. The plan is to fix it with netCDF. Mike Vardaro pointed out that it is still an issue to get it fixed.
- Tim Crone – Is there a well-defined format that can be applied? Rich Signell – Some people like to see data as a grid and some like to see it other ways. The same netCDF format can be used for either.
- Jim O'Donnell – OOI has been collecting the ADCP data for five years. This is a high priority area and it is still a problem.

Orest reviewed the CI software and Redmine ticket status. Currently Sprint 14 is in progress and only 29 Redmine tickets are being addressed. There are fewer resources available. There are about 600 remaining Redmine tickets. With 600 tickets remaining, they will have to prioritize which to complete before 9/30/18. They are behind schedule by months.

Other current and upcoming activities include:
- CI refreshments refresh
- Formalized CI Change Control Board is in the process of being formed
- Management of Data Requests
- UI Assessment
- OOI Early Career Workshops
- CI activity prioritization and resource reallocation for transition to OOI 2.0

Tim Crone commented that he was at the UW Cabled Array Hackathon and the system shouldn't crash with only 20 people onboard accessing the data. Chris Rutherford – There were a lot of other people on the line who were not at Hackathon. They have to figure out how to handle demand better. The data isn't limited to only US. Mike Vardaro added that individual requests seem to be able to be answered quickly, but there are some definite choke points.

Ongoing issues and risks were reviewed:
- Significant CI software fixes work remains.
- Continuing issues with configurations data – this is a big issue. The user doesn't know they are using bad data.
- Validation of existing data by Data Team is an ongoing process and labor intensive.
- The most significant risk is the data team overload and attrition during the remainder of OOI 1.0. The data team will have no transition.

Lunch Break

Data Integrator Report (continued) – Orest's last slide on "Ongoing issues and risks" was revisited:
- OOIFB expressed that it is critical to fix bad and missing data. There is bad data that has been released to the community and there is no way to get the information to them that there is bad data.
- Lisa Clough – How do we inform the community of important situations, say like an occasion of when there is a hack?
- Orest – There isn't a list serve for the people who are using the data. To use the data, you should have to sign in. Then OOI could send out notices regarding data.
- Tim Crone – When you download a set of data with modern systems, there is crypto coding that has version control to prevent hacking problems. There are solutions. Data developers have been dealing with these issues for years and have solutions.
- Orest – The significant risk of Data team overload and attrition during remainder of OOI 1.0 is critical. 25% of the data analysts will leave by early July 2018. These are the people who have to support the ECS workshops.

Report from 'Lessons Learned' OOI meeting and other OOI Events (Hackathon):

Lessons Learned - Sheri White gave the report. Her slides are included as ***Appendix V***. There has been an ongoing process of technical development at the MIO, OOI Systems, and programmatic/sciences level. Deb Kelley commented that this was a great meeting and it brought the science and engineering teams together. It hasn't happened in a long time and should happen more frequently.

Sheri reviewed the key lessons learned:

- Performance Assessment - Quantitative, statistical assessment is critical to improving operational performance (e.g., instrument refresh prioritization assessment). OOIFB can assist by identifying, implementing metrics of success, and developing a process for community engagement where appropriate
  - Deb Kelley – The intensity of the MIOs evaluation and testing is more intense that what the vendors do. For the large part, many of the vendors have implemented more robust product testing as a result.
  - Sarah Gille – What will be the product of the Lessons Learned meeting? Max Kaplan – There is this PPT, there will be an internal report, and there will be an article in 2019.
  - Annette – Would the report be useful for OOIFB's review of the Work Plan for 2.0 and if so, how will they get access to the report?
  - Jim O'Donnell – There should be a technical report that can be accessible.
  - Kendra Daly – There is now a best practices newsletter and the lessons learned information should be shared in it.
  - Jan Newton – She echoes Jim's recommendations. There needs to be a communication path for mooring operators. So if there are reports, let her know so that she can circulate them.
  - Lisa Clough – This addresses Broader Impacts.
  - Rouying He – Have a special issue in MTS that highlights these lessons learned.
- Tech Refresh - We are facing programmatic risk due to the need for tech refresh (instruments, platform level issues: vehicle, mooring, node, cable).
- Data Quality - Although high quality data from across the OOI system may be available, the wide diversity of data types requires additional effort, including ongoing subject matter expert (SME) data quality validation and a consistent treatment of metadata
  - Jim O'Donnell – Why do we need SMEs when there are resources at the MIOs? Sheri – Although there are people at these institutions, they are not associated with OOI and will require support.
- Ship & ROV Scheduling - Uncertainty of ship schedules results in inefficiency and increased cost and risk (e.g., extensive ship-specific planning and preparation is required; non-optimal timing).
- Maximization of Science Activities - Ancillary activities on OOI cruises is win/win.
- Science Community Instruments & Sampling Strategies - Efforts to add community instruments to OOI platforms or change sampling regimes are expected to increase in the future.

The number of Engineering Change Requests (ECRS) per year over time. This has decreased dramatically as OOI has they transitioned into steady state.

Sheri reviewed the Instrument Refresh Priorities. A Google sheet has been prepared that shows

the rankings of each instrument. The higher the value of the sum, the higher the priority for refresh.

Hackweek – Deb Kelley presented a slide (see ***Appendix VI***). The Hackweek in February at UW involved about 20 people. The 5-day Hackweek is better than a 3-day hack session. Folks form teams and work with science groups. They worked through complex data sets.

There will by an OOI Ocean Hackweek on August 20-24 at UW and a Geoscience Hackweek in September.

Next Deb reviewed the Cabled Array PI-Proposal Path. MIOs have a webinar with the PIs. Instrument integration and the planning form are discussed. There is a one-on-one PI and cabled Array Team (engineering and science) information exchange. They formalize milestones and deliverables (test and integration, instruments on site, mission execution permitting, Navy permission etc.). If all issues are addressed, a technical feasibility letter is provided to the PI that he/she can include in the proposal.

- Annette- How long is the process? Deb – The process is from two weeks to a few months. APL has an intense burn-in process. Users need to provide the instruments soon before their cruise to allow adequate time. If this is the field season for UW, it could be tough fitting everything in.
- Sheri – Where does the ECR fit into this process? If they do the technical feasibility, why are they still doing the ECR? Lisa Clough – This is an area that will need discussion.
- Sheri – Data is also a part of this. Who handles the data – OOI?
- Annette – The UNOLS Chief Scientist Training Workshops include instruction about cruise planning along with a clear timeline. It would be useful to have this also be a part of the OOI ECS workshops.
- Chris Rutherford – Environmental compliance needs to be incorporated into the process.

Proposal numbers and awards made:

NSF Awards - Lisa Clough reported that there have been about 40 NSF projects in research and education utilizing OOI Data from 2013 to 2017.

Non-NSF Awards - Deb Kelley reported on outside funding for OOI. Her slides are included as ***Appendix VII***. Outside funding sources include:

- German Federal Ministry of Education and Research: Field programs 2018, 2019, possible extension in 2020 and *Sonne* program. "Sonar monitoring of natural release of methane greenhouse gas from the seafloor - A contribution to the understanding of global change."
- Office of Navy Research - "Turbo-Rankin Power system for Deep Sea Hydrothermal Vents." Field programs 2018, 2019, 2020.
- NASA Exobiology: Platform with laser spectroscopic and imaging instruments, real-time visualization, validate operational strategies and adaptive sampling, signatures for life in extreme environments. Large, multi-year award. This project still needs to work through permitting.

All of these awards include a variety of ship and ROV days as well as staffing.

Break

Updates from OOI Project Scientists and team members:

Cabled Array – Deb Kelley provided the report. Her slides are included as ***Appendix VIII***. She showed a map overlaying the cabled array over the states. It provides an amazing perspective of the scale of the array.

Deb displayed a series of charts showing the operational status of the cabled array.
Overall, Cabled instruments are fully operable 70.25% of the time. Across the board, systems are most operable right after deployment. Overall, cabled instruments are fully operable 70.25% of the time. Instruments deployed on functioning platforms are fully operable 81.38% of the time.

Blue Ocean is used for monitoring deployed systems with real-time updates of instrument status. Blue Ocean provides manual tracking spreadsheets and E-Log.

A graphic of the Shallow Profiler science pod was displayed showing all of the measurements that are possible. The profiler surfaces nine times daily. They try to do shipboard water casts close to the profiler so that the data can be compared. Deb would also like to collect ROV data from these sites.

- Jim O'Donnell – Where is this data. Deb – It is in el-fresco.

Deb discussed quality assurance. Data from the SAMI-pCO2 was bad from the CA Axial Base Shallow Profiler. The vender provided the wrong code. Since 2014 there is bad data out there. This is for all of the sites.

In looking forward to next summer, Cabled Array servicing will be on R/V *Atlantis*. It is a challenge working on different ships year to year.

Axial Seamount is alive and well. The earthquake data is on-line and updated daily. The seafloor is on the move with increased earthquake activity. They have seen in the past that when the magma gets up to about 3m, there is an eruption. They will continue to watch this trend.

Lastly, the cabled array seismometers and pressure sensors picked up the 6.9 M earthquake off Hawaii on May 4th.

Coastal Arrays:

Al Plueddemann provided the report on the Pioneer Array status. His slides are included as ***Appendix IX***.

The slides show the CGSN WHOI cruise schedule from fall 2017 to 2018. In the recent April Pioneer 10 Array turn platform deployments included:

- 3 x Surface Moorings – 2 are operating at 95% and one at 45%
- 5 x Profiler Moorings – all operating at 100%
- 3 x Gliders recovered – no gliders were deployed.

Some of the challenges include a problem with the power system controller, surface mooring SD card issues, glider repair backlog, and one profiler mooring buoy is still adrift.

Coastal Pioneer Weekly status reviews are a regular activity.

Al reviewed notable improvements to the profiler moorings, surface moorings, AUV, instruments, firmware, and facilities (see slides).

Al reviewed Pioneer science activities that include inquiries for ancillary activities, cruise ancillary activities, publications, fisheries engagement, and the Shelf break Frontal Dynamics (SFD) study. SFD is an SF-funded research proposal that involves seven PI at four institutions. This was the project that required the ECR reviewed by OOIFB. Details of the study are included in the slides. The CGSN team was excited by the challenge and the SFD PIs were pleased with the results.

Jack Barth provided the report on the Endurance Array status. His slides are included as ***Appendix X***.

There was an Endurance Array turn cruise on R/V *Sikuliaq* in spring. All platforms were deployed with a full complement of instruments. Of the telemetering uncabled platforms, 10 of the 159 instruments were not working.

Endurance Array Glider deployments were scaled back while a memorandum of negotiation (MoN) was prepared by OSU and approved by COL and NSF. Two gliders are presently deployed and at sea operating normally and two gliders will be deployed the week of this meeting.

Weekly status logging started in spring 2017. CI is reporting the status of what is getting through to the GUI.

Notable technical progress included the successful testing of UV antifouling. Additionally all telemetered data is now available on an internal ERDDAP server.

There are some challenges that the Endurance Array is facing. The heavy lift winch was repaired. It was used successfully on the Fall 2017 and Spring 2018 cruises; however, there are some continuing issues with lineout readouts. There are also some power constraints and sampling may need to be adjusted. Lastly, in this transition period, clarity on long-lead item and service purchases that cross the transition time boundaries is needed.

There were three articles in *Oceanography*'s OOI special issue based on Endurance Array data.

Jack suggested areas for OOIFB input:

- We need to be planning a "tech refresh" strategy (sensors, instruments, platforms, ...)
- We need to turn more eyes to performance metrics across the OOI and data quality
- Engaging external subject matter experts, students, and ancillary projects is extremely valuable and a win-win-win; we need to keep working to make this happen

Bob Weller provided the report on the Global Array status. His slides are included as ***Appendix XI***.

Global Array success stories include sampling data sparse regions, the Irminger Sea site, assessing models, and anchoring/validating global fields. Areas of concern include:

- Quantification of uncertainty in data, especially of met and fluxes.
- Ship-based validation
- Cold weather capable sensors
- Technology refresh
- QA/QC and the operator

A partial recovery of Southern Ocean was made in December 2017. Operations were constrained by a Navy exercise. There is still 42% data return from 12 instruments and power generation is consistently reliable. The lifetime may be extended pending NSF/NERC re-deployment in fall 2018. Some of the challenges of the Southern Ocean include weather issues prevented recovery of GSM and the lower SSM sections. The battery power is limited for inductively-coupled sensors (365 day plan).

Full Recovery was made at Argentine Basin in January 2018. The cruise was delayed because R/V *Atlantis* diverted for the Argentine Navy submarine search. The equipment recovered will be refurbished for re-use at Papa and Irminger.

Irminger Sea's scheduled turn is planned for June 2018. A surface buoy mooring Irminger went missing in October 2017. It was likely struck or trawled. An air-search was conducted. Some of the modifications for planned for Irminger include:

- Tower camera
- Heat elements to prevent tower icing
- Universal joint engineering
- Additional beacon on SUMO
- Universal joint failure testing

Global Papa's scheduled turn is planned for July 2018 using R/V *Sally Ride*. The will recover Papa 4 SSM and deploy Papa 5 SSM. The operation will be in coordination with NASA's EXPORTS project and will include glider deployment and sampling.

The Global arrays are providing new knowledge of data sparse regions. Surface meteorology and air-sea fluxes at Global sites have drawn high interest:

- Extreme events and climatology of data sparse region
- Validating/anchoring remote sensing products
- Characterizing errors in model fields
- Validating/anchoring blended or hybrid air-sea flux products

Full details are provided in the slides.

In summary, the Global Arrays have resulted in strong data utilization, research and publication are underway, and Irminger Sea workshop catalyzed efforts. There are concerns, however:

- Quantify accuracies
- Migrate to more suitable, improved sensors
- Better integration of operator in QA/QC
- Improve data access

OOI and Regional Partners:

Northwest Association of Networked Ocean Observing Systems (NANOOS) - Jan Newton provided the report. Her slides are included as ***Appendix XII***.

NANOOS is part of the Integrated Ocean Observing System (IOOS). The IOOS mission is to "Lead the integration of ocean, coastal, and Great Lakes observing capabilities, in collaboration with Federal and non-Federal partners, to maximize access to data and generation of information products, *inform decision making*, and *promote economic, environmental, and social benefits to our Nation and the world*. They have nine regional associations. The regional associations have been certified and data collection and archiving is up to par.

NANOOS has a governing council who selected five areas as the highest priorities. These are:

- Maritime Operations
- Ecosystem Assessment
- Fisheries and Biodiversity
- Coastal Hazards
- Climate

Their efforts are focused on

- Observations
- Modeling/forecasts
- Data management and communication
- Tailored user-driven products
- Outreach, Engagement, Education

The annual operational budget is $2.5 M.

The strategy is to develop a PNW observing system should include: 1) Integrate what we have *(observing assets, people, technologies)* and 2) Be strategic regarding what we need, based on priorities.

NANOOS has been partnering with OOI for many years. They also partner with ONC. Jan reviewed the NANOOS objectives for FY2017 (see slides). Jan reviewed the sustained observing needs and the NANOOS commitments. They would like to increase collaborations for:

- Data products – getting it out
- Sharing lessons learned

- Observing assets – gliders.
- Data processing/validation
- Community engagement

Jan explained the story of the NANOOS logo. It includes four animals (an orca, wolf, eagle, and raven (trickster)), the ecosystem, the circle of life (in red ink), and water (blue ink).

Discussion:
- Tim Crone – The NANOOS data portal is very nice.
- Ruoying He – what is the funding percentage spent on the data portal. Jan - $500K annually, but she will double check.

Station Papa - Meghan Cronin (NOAA-PMEL) provided the report on NOAA's Station P Surface Mooring Activities. Her slides are included as ***Appendix XIII***. Meghan began by thanking NSF for access to R/V *Sally Ride* for mooring turnaround operations on 2018 summer cruise.

The operational map for Ocean Station Papa was displayed (see slides). There is a Waverider mooring at Station Papa that is funded through NSF research grants. The wave height measurements from the mooring are shown by year from 2010 to present. From the ambient noise data collected at Station Papa, sperm whales can be detected. They heard sperm whales almost every month. They can listen to other parts of the spectrum to detect different sounds. www.pmel.noaa.gov/ocs/. Peaks in detection can be seen in the summer months; however, the trend shows a decline in detections.

Meghan provided examples and screen shots of mooring data and computed fluxes from the Ocean Climate Stations monitoring data portal. A lot of work has gone into the portal and it saves the users a lot of effort in plotting. An example of a science outcome using the data is the Global Biogeochemical Cycles.

Researchers can use all of these mooring data for long-term time series. This will be different from what you would see from data collected from one cruise.

Lastly, Meghan reported that NASA's EXPORTS program has selected Station Papa as their research site.

Question:
- Tim Crone – Do you have to log into to access Station Papa data? Meghan – You don't have to login. However, it is helpful if users provide information about themselves.

Ocean Networks Canada (ONC) – Kate Moran provided the presentation. Her slides will be included as Appendix XIV. Kate provided information about the Neptune and Venus observatories. Observation areas include:

- NEPTUNE Observatory sites:
  - Barkley Canyon
  - Cascadia Basin

    - Clayoquot Slope
    - Endeavour
    - Folger Passage
    - Middle Valley
- VENUS Observatory sites:
    - Fraser Delta
    - The Strait of Georgia
    - Saanich Inlet

The ONC science plan is based on four themes (see the website for the plan):

- Understanding climate change
- Life in the ocean
- Interconnections among the seafloor, ocean, and atmospheric
- Seafloor in motion

At Endeavour, cables had to be replaced. There will be new instruments installed this summer. Everything is optimally running. The Klackquote Slope site will be expanded by installing monuments.

ONC utilizes Oceans 2.0, an online data management system. Long-term, continuous scientific data from the ocean environment are gathered and made available through **Oceans 2.0**. It is a big venture that costs about $30M. The system offers interactive and broad, open access, and dissemination of data. It offers Internet tools for researchers, educators, and the public. ONC also utilizes Smart Ocean™ Systems.

Canada doesn't have a NOAA, but ONC is providing valuable data. Examples include:
They monitor sea ice thickness and make it accessible.
An earthquake early warning sensor is installed that provides a 30-90 seconds advance alert.
Earthquake induced tsunamis. – ONC can bring the data to the areas that have been most impacted by earthquakes.
Operation of area radars - These are of interest to Canada because of the port of Vancouver.
They have worked with the port of Vancouver for whale detection. They model the noise environment for whale detection.

ONC has partnered with indigenous communities. The have formed a partnership with Tsleil-Waututh Nation to monitor and improve the health of Burrard Inlet.

ONC's annual budget is $24M to $26M. Kendra Daly is chair of the ONC Advisory Board.

Kate highlighted some of the potential OOIFB collaborating areas. They include:

- Unify data systems and data products
- Science support, scientific exchanges, advisories
- Share in operational costs (ship ops, etc.)
- Share outreach resources.

Discussion of OOIFB Role in Long-term NE Pacific Observing, path forward and action items:

- Tim Crone – Can we learn more about the details of the ONC data system? Kate – It is on the website, but you are welcome to visit.
- Rouying He – How are funding decisions made for the science? Kate – ONC looks at their stakeholders. In their province, earthquake detection is a high priority.
- Jim O'Donnell – Do scientists write proposals to work on ONC? Kate – Yes. There is a US scientist going to work on the observatory.
- Jim O'Donnell – There are many parallels, but this is more like IOOS. Kate – However, there is a lot of science.
- Kendra Daly – Jack Barth and John Trowbridge are also on the ONC Advisory Board.
- Larry - What input and guidance would you recommend? Kate – ONC is provided clear guidance from their governance board. Having the data and science people close together is useful. Data people talk their own language.
- Meghan Cronin - Closer communications would be useful. Wave measurements are being funded by research grants. It would be good to have that supported by the program. Thank you for opening the cruise up to Station Papa.
- Jan Newton – She agrees with breaking down the walls between science and data teams. She likes the divide and conquer strategy that Kate suggested.
- Brian Glazer – Why re-invent the wheel regarding data access. He googled Placaderm, "keeping data experts focused on the data."
- Rouying He – There are potential for partnerships between funding agencies. They need to think of ways to coordinate.
- Sheri White – From lessons learned workshop they recognized the value of meeting more frequently together.
- Sarah Gille – There is a potential for collaborations. Jan Newton - There are areas where there could be improvements. Kate Moran – It could improve significantly. Reaching the science users would have a great benefit. Also access to various data sets of different research disciplines would be of great value.
- Deb Kelley – Nowhere in the world is there a place with so much observing areas. There are important profound opportunities that we haven't taken advantage of.
- Kendra Daly – We have all of these resources. For years we have talked about having modelers engaged. Maybe there are new strategies for reaching out to the modelers.
- Jim O'Donnell – He echos the motivation of enhancing data distribution. We need to look at what Neptune has.
- Tim Crone – It is really nice having these three groups at the meeting to discuss their systems. Once 2.0 is announced a workshop on data delivery of these groups would be of value. It would be nice to have it soon.
- Bob Houtman thanked everyone for the input.

1700 Day-1 of the Meeting adjourned

Tuesday, May 8th

Tour of UW OOI facilities – Day-2 of the meeting began with a tour of the UW OOI facilities at Sand Point. Dana Manalang and lead engineers guided the OOIFB on the tour.

Return to UW - Marine *Sciences Building, Room 123*

Special Announcement – Bob Houtman announced that WHOI would be awarded the operation and management of OOI 2.0. The award will start on Oct 1, 2018. It will be funded in FY2018 so it will not be a new start. John Trowbridge is the PI on the award.

John Trowbridge thanked Lisa and Bob for their stewardship. He reviewed the OOI 2.0 sub award plans:

- WHOI will continue to run the Pioneer Coastal and Global arrays and Al Plueddemann will serve as the PI.
- OSU will over operate the Endurance Array and Ed Dever will be the PI.
- UW will operate the Cabled Array and Deb Kelley be the PI.
- Rutgers will continue to oversee CI

OOIFB Chair Report - Larry Atkinson provided a summary of OOIFB activities over the past year. His slides are included in ***Appendix XV***. He provided a summary of the OOIFB action item status. Since OOIFB was formed in 2017, there have been 9 action items, 8 in 2017 and one in 2018. Four of the 2017 action items are complete, one is in progress and three are delayed. The one action item in 2018 has been completed. See the slides for details.

In the coming months, DDCI will need to formalize their terms of reference, which will be incorporated as an annex to the OOIFB Charter. They will also need to revisit their membership.

Larry reported that the OOIFB Townhall held at the Ocean Science Meeting was well attended and a success. All agreed that we should keep doing this sort of activity. As an action item, it was suggested that OOIFB look into hosting a townhall at the 2018 fall AGU meeting. The deadline for abstracts is August 1.

Deb Kelley reviewed a poster of the end-to-end data for the Shallow Profiler. All agreed that this is a valuable resource and would be useful for other sensors.

Education and OOIFB - Lisa Clough introduced Lisa Rom, NSF's Ocean Education Program Director. Lisa provided a presentation on the education activities associated with OOI. Her slides are included as ***Appendix XVI***. She reviewed the activities to date with OOI 1.0 and noted that education is not part of OOI 2.0.

OOI 1.0 included an education component **a**warded to Rutgers University via COL. They created the Education and Public Engagement Implementing Organization (EPE IO). The award was limited to development of the infrastructure for education and the award ended in February 2015. They created a system by which education users can easily display data. This effort was for 1.0 only and there wasn't a lot of OOI data available at the time of its development.

Three workshops were funded to help disseminate information about how to use the OOI data in undergraduate courses. The workshops each had a specific research focus area of exploring either Primary Production, Ocean Chemistry, or Geology in the Ocean with OOI Data. None of these workshops used real-time OOI data. Resources from these workshops (2016-2017) are available at http://explorations.visualocean.net/workshops.php.

Education was not included in 2.0 and the only current pathway for submissions via EHR Directorate programs is through Improving Undergraduate STEM Education (IUSE EHR) or Discovery Research K-12. OCE will co-review and co-fund education proposals. Lisa encourages everyone to notify her when a proposal is submitted. There could possibly be a future Dear Colleague Letter (DCL) or solicitation for education proposals. An example is available at: https://www.nsf.gov/pubs/2017/nsf17129/nsf17129.jsp

Discussion:

- Jim O'Donnell – How many education proposals are underway? Lisa Rom – There is one proposal for workshops.
- Deb Kelley – There are other education activities, but not through NSF.
- Annette DeSilva – At the OOIFB Town Hall we heard from Cheryl Greengrove and Bob Vaillencourt regarding their education activities. Deb explained Cheryl's program is supported by UW and was not a formal proposal to NSF.

At this time, an OOIFB education subcommittee is not needed.

Open Discussion about OOI 2.0

- Jim O'Donnell – will OOI 2.0 be similar in terms of what platforms/systems are in the water? John Trowbridge – He is new as the PI. Deb, Al, and Ed are much more experienced in the OOI systems. WHOI submitted their proposal in April 2016. Their proposal was based on an O&M budget of $44M. In water systems are basically the same and the plan is to keep the Cabled, Endurance, Pioneer, Irminger Sea, and Station Papa arrays.
- John Trowbridge - The concerns from reviews of the WHOI proposal highlighted two concerns, community engagement and CI. WHOI has had the opportunity to readdress these concerns. They will develop a community engagement plan as part of their Annual Work Plan (AWP). They will create goals and metrics. They came up with a long list of focus items including, data utility, engagement of stakeholders, and reaching out to non-MIO institution users. CI is the greatest challenge and risk to the program. Discussions yesterday brought that home. There will be a refresh of the CI requirements. They will evaluate OOI 1.0 against these new requirements and explore alternative options.
- Chris Rutherford – They have identified a person to conduct the evaluation and should be able to start as soon as next week. They will meet with Raytheon.
- John Trowbridge – Fuzzy requirements are a problem. New clear requirements are needed.
- Tom Kearney – Ken Feldman, Stephanie Petillo, and John Fram will be SMEs to help with the evaluation.
- John Trowbridge – The data products will be reviewed. In April 2017, WHOI thought they would get a mature CI system at the end of OOI 1.0 and then spend a year learning more about the system and how to operate it. It has been made very clear that the program will not survive because the approach is too slow. He looks forward to hearing more from DDCI. An approach going forward will be to take the QA/QC functions to the MIOs and leave data delivery with CI. It is clear that the Data Team is doing more that just data delivery. His preference would be that Rutgers focus on the data delivery only. The existing UFrame system will remain as a valuable platform. They will try to build on the assets that they have.
- Kendra Daly – The existing data product team at Rutgers is leaving. Would people at MIOs replace these people? John Trowbridge – They wrote the proposal so that the Rutgers people

would stay and focus on the data delivery. Rutgers is responsible for providing the staffing. If Rutgers doesn't do this, WHOI will have to come up with options.

- Jim O'Donnell – There are no standards that we can use. They don't have staff to do this. It illustrates that there has been poor management of the staffing and they haven't been allocated the responsibilities. Resources are in the wrong place. Getting data to the users should be the highest priority.
- Tim Crone – Data science is the biggest science moving forward. Start now by formulating systems that can adjust to new advances. Thinking about these possibilities is important.
- Larry Atkinson – We need to establish guidelines for DDCI as it sounds like they will be busy. Lisa Clough – DDCI will be needed for a baseline evaluation needed by the end of 2018. By April 2019, DDCI's review of where things are in terms of success will be needed.
- John Trowbridge – Will Tom and Chris require any input from OOIFB or DDCI during the transition? Tom – For the development of documents, no DDCI input is needed. However, review of the documents by DDCI will be helpful. They are prioritizing, reviewing and analyzing resources and reviewing/updating documentation.
- Tim Crone – It seems like there will be critical decisions made in the next couple months. Bob Houtman – WHOI can't make any changes until they receive the awarded on October 1.
- Jim O'Donnell – What about the issue of staff leaving OOI 1.0 early? Bob Houtman – The staffing plan is a 1.0 issue. The data team functions will need to stay in place. Rutgers has to ensure that they can deliver data.
- Lisa Clough – There is a lot of good news in that much of the expertise will remain.
- Debbie Kelley – During the Lessons Learned workshop, it became clear that metadata is an issue. If you don't have the correct numbers going in, data will be useless. She hopes that during the transition, this will be understood.
- Lisa Clough – John Trowbridge mentioned earlier that they responded to proposal review comments. WHOI has not received the full set of review comments, just excerpts.
- Sarah Gille – What is the plan to have data on GPS? John Trowbridge - Nothing yet.
- Larry Atkinson – When will the data delivery requirements be available? Chris Rutherford – September 2018.
- Lisa Clough reviewed the DDCI Tasking. The baseline evaluation is due not later than December 2018, preferably much sooner. DDCI will be tasked to conduct another review six months into 2.0 (April 2019) to review success of data deliver. The metrics haven't been defined, but will likely be based on the data delivery requirements established by Sept 2018.
- Larry Atkinson – Is OOIFB the only group reviewing all of OOI. Lisa Clough – For NSF large facilities, there will be a comprehensive review panel in year-3 of the 5-year review.

Annual Work Plan of OOI - Bob Houtman reported that the Annual Work Plan must be in place by 1 October 2018. It should be somewhat straightforward for most of OOI 2.0 since the MIOs are remaining. The annual operation and maintenance (O&M) budget is already at $44M.

- John Trowbridge - The one area that will need to be defined is community involvement. The draft AWP will be ready in July.
- Larry Atkinson – What is the status of the Science Oversight Committee (SOC) weekly calls? Lisa Clough – SOC will continue through OOI 1.0. John Trowbridge – There are some personnel changes. In OOI 2.0, Ed Dever will be the Endurance Array PI. There isn't a separate PI for Global. They will need to revisit CI.
- Larry Atkinson – In terms of community involvement, OOI 2.0 will not start until October

1st. OOIFB will need to take the lead for applying for a Town Hall at Ocean Sciences. It was suggested that OOIFB use the same abstract that was submitted for the Ocean Sciences meeting.

- John Trowbridge - Early Career Scientist workshops will be included in the AWP and there are funds in their budget.

Lunch Break

Tour of the OOI Ops center – The OOIFB toured the OOI Cabled Array Ops center at UW.

Engineering Change Requests (ECR) – Sheri White provided an overview of the OOI Change Control ECR process. Her slides are included as ***Appendix XVII*****.**

Custom software is used for change control process. The process steps are:

- Create Engineering Change Requests
- Submit/schedule for Change Control Board
- Review ECR
- Vote and complete or push to next board

There are two classes of ECRs. Sheri provided an example of the ECR form. There are Change Control Boards at the PMO/IO level, OOI System level, and at the NSF level.

There was discussion on ECR plans going forward.

- Lisa Clough – If an ECR comes to NSF that has science impacts, NSF might decide that it would benefit by OOIFB input and they would send it to OOIFB for review. There could be three different levels of response:
  1) Larry decides that it doesn't need review by OOIFB
  2) Larry feels OOIFB should review it.
  3) Larry feels that community feedback on the ECR is useful.
- Sarah Gille – What is the turnaround time? Bob Houtman – Generally, the team wants turnaround immediately, but it can depend. Lisa Clough – The ECR that OOIFB recently reviewed needed a quick turnaround.
- There was some confusion over when an ECR is needed. As an example, NSF Program Officers sometimes fund a science proposal before clearing the proposal for ECR approval.
- Bob Houtman – Just because there is a funded science award, that doesn't mean that it has to be approved by OOI.
- Jim O'Donnell – What if a PI submits a proposal only to find that OOI won't do it. Sheri/Lisa/Deb – This should be sorted out through the OOI Array webinars prior to submitting the proposal. The technical feasibility would be decided at that time. The technical feasibility is merely an endorsement, not an award.
- Kendra Daly – For NSF proposals a letter of feasibility should be submitted with the proposal. If an NSF Program Officer wants to recommend the proposal for award, then would the related ECR would be reviewed. Lisa Clough – The NSF Program Officers need to be educated about the process. This is sensitive since a declined ECR could impact the science award.
- Annette – Are technical costs of implementing the engineering changes included in the PI's proposal? Deb – Yes. The technical reviews that the MIOs conduct for the PIs will include

the budget. It will include costs for ship staffing, cables, CI impacts, etc. These would go into science proposal.
- Rouying He – What if there are multiple engineering change requests at the same time? Lisa - There is not an answer yet.

It was decided that an ECR working group in not needed at this time. OOIFB will conduct ECR reviews when requested.

Schmidt Ocean Institute (SOI) – Eric King (SOI) provided background information about SOI and their activities.

SOI is about 7 years old (since 2011) and is philanthropically funded by the Schmidts. They own and operate one ship, R/V *Falkor*. It is a Global Ship that operates globally. They have supported ROV *ROPOS* operations from the ship. SOI now has their own robotic vehicle. In the past they have supported HROV, *Nereid*, but it was lost. They have also used AUV *Sentry*.

SOI solicits 70 to 80 proposals each year and select about ten annually to support. SOI provides the ship and the science is funded separately by others (e.g. NSF, Australia, Germany, USGS, etc.)

SOI's connection to OOI is that they occasionally operate their ship at Cabled Array areas (Axial, Hydrate Ridge, etc.).

They are using ASV, ROVs, UAVs, etc. They can do real-time sampling at sea. They can do Telepresence. They can also store data for free. They work with R2R and support some video projects. SOI has teamed with Google to more quickly off-load data and send it to the Cloud.

SOI is now looking towards supporting projects with engineering/technology development efforts. Their criteria for the letters of intent have shifted to engineering development. There is a need for the ability to test systems at sea.

SOI has workshops occasionally. There are more organizations like SOI that are starting to come about. Each is a bit unique.

Discussion:
- Deb Kelley – For projects funded near the OOI sites, is the data proprietary? Eric – Nothing is proprietary that is collected from the SOI ship systems.
- Lisa Clough – Handling public data is a challenge. Is there any shared interest with SOI? Eric – This is an important area of interest especially with NSF's interest.
- Jim O'Donnell – The ability to deploy instruments that are doing smart computing is useful. Is SOI interested in visible stuff? Eric – It is nice to have things that SOI can hang their hat on, but it is not just an image, it is making a significant contribution.
- Eric – SOI will not be in the big ship operations forever. There are a lot of other big issues with focus on the oceans. There are other Schmidt activities focused on Global issues, gorillas, sustainable fisheries, fracking, new Schmidt Fellows Program, etc.
- Jim O'Donnell – Establishing a capability for sustained observations in the southern ocean would be a big contribution to science.
- Sarah Gille – Moorings are great, but there are other technologies that could support

observations.

- Eric King – There were two Sail-drones that were currently released from San Francisco. The R/V Falkor is leaving from Hawaii and will meet the Sail-Drones. At the same time a waveglider has been deployed from MBARI.
- Larry Atkinson suggested that OOIFB make a statement regarding collaborations with Schmidt Ocean Institute /Google and non-profits in general.

OOIFB Charter revisited – OOIFB members sent edits/comments to the draft OOIFB charter. Suggested changes were reviewed and discussed. The draft Charter was revised accordingly. The final version is available at:
http://ooifb.org/wp-content/uploads/Charter/OOIFB_Charter_050818.docx.pdf

> **Motion-OOIFB-2018-1: OOIFB Charter** - The OOIFB unanimously passed a motion to adopt the OOIFB Charter dated May 8, 2018 (O'Donnell/He).

Meeting *Adjourned* – The OOIFB meeting was adjourned at 4:45 pm.