OBSIC Operations Subcommittee
Fall Meeting
Oct 31 – Nov 1, 2023
Woods Hole Oceanographic Institution

Attendees: Anne Becel, Jim Gaherty (chair), Emilie Hooft, Helen Janiszewski, Susan Schwartz, Matt Wei, John Collins (WHOI), Andrew Barclay (WHOI), Nicole Mantopoulos (WHOI), Gail Christeson (NSF)
Remote: Ross Parnell-Turner (Tues 11:15-14:30; Wed 11:15-12:30)

Meeting Summary: The OBSIC OS, including WHOI facility and NSF representatives, met for a 1.5 day meeting at the OBSIC facility in Woods Hole, MA. The meeting agenda consisted of: (1) program updates from NSF and the OBSIC facility (including operations, the data metric hub, and community activities); (2) prominent new business, including future facility developments to support the active-source communities and SZ4D, and planned committee activities in community outreach; (3) open discussion of OS topics articulated in the committee terms of reference. The agenda also included a comprehensive and highly informative tour of the OBSIC facility, led by WHOI-OBSIC technical staff. The bulk of the meeting included participation of the facility as well as NSF. The meeting closed with a short committee-only discussion.

Overall, the committee agrees that the OBSIC facility has been a productive and effective resource for the community, with significant advances in the last year on several fronts. Most importantly, the facility successfully supported a large number of OBS experiments in the field. In addition, the facility made significant progress updating key components (sensors and dataloggers) across the broadband fleet, including successfully replacing all of the aging Guralp sensors. Significant progress was made on acquiring key components for the new MSRI-funded instruments, and prototypes are ready to enter the test phase. The data metrics hub is now fully operational, continues to be improved (in part based on user feedback) and expanded significantly, and additional data products and data metrics are in the planning stage. Finally, the facility continues to improve community outreach via the website and social media. All of these activities are critical for ongoing and future success of OBSIC. The committee engaged in detailed discussion of advances and priorities in all three areas (as detailed in the minutes below), and is supportive of continuation of this suite of activities.

For new business, the committee had an extensive discussion on ideas for advancing OBSIC's goal of entirely replacing the pool of dedicated short-period instruments for active-source experiments. The committee previously developed a white paper articulating this need, but a resulting MSRI proposal was declined, and funding though this mechanism

seems unlikely. A number of ideas were considered for obtaining funds to develop a new design as a first step, as well as mechanisms for achieving science in the meantime. In addition, the committee is working with MSROC on an improved mechanism for community outreach, specifically by expanding the range of activities associated with the MSROC annual meeting. Planning is underway for an Early Career Workshop as part of that meeting.

Agenda
Tuesday, 31 October
Welcome, Introductions, Meeting Overview, Notes/Minutes (Gaherty)

NSF update (Gail Christeson, NSF)

- 8 field projects funded in FY2023: 4 with OBS and 4 with other seafloor
- geophysical equipment (EM, geodesy, MCS, heatflow)
- Major programs: OBSIC renewal, core repositories, helping support CRESCENT, providing NSF management for MSRI project to enhance OOI cable (3 new seismic sensors + seafloor pressure gauges),4 CAREER, 3 Mid-Career, 6 RAPID (hurricane) awards.
- OCE funding at about 42% success, similar to GEO as a whole
- GEO success rates: https://www.nsf.gov/funding/funding-rates.jsp?org=GEO
- Reminder on international lead agency opportunities – UK, new ones (Israel; Germany, climate only; Switzerland)
- Lead Agency International Cooperation Agreements: https://www.nsf.gov/geo/geo-leadagency-opps/
- Total turnover in MGG staff since Gail arrived 2 years ago. Two new Rotators: Al Wanamaker and Scott White.

Update on WHOI OBSIC facility activities (Collins)

- General update
  - OBSIC cruises from 2023.
    - Axial Seamount cruise: One ARRA OBS would not release but did communicate. This repeats issues from Gofar, and WHOI is hoping that Jason could be used to evaluate. Instruments rebatteried and redeployed. Data are under Navy review and are likely to arrive later than 90-day post-recovery target due to combination of a long deployment (1 year) at a high sample rate (200 sps).
    - Blake Plateau: 1 SIO SP OBS not recovered - 4.5 km water depth, could not communicate with it. Also happened with 3 SIO OBS on deep Cayman Rise. Data are under Navy review.
  - Data submissions: OHANA, Cayman Rise, NESMA all submitted.
  - Upcoming expeditions in Nov/Dec 2023:

    - Puerto Rico active OBS portion includes WHOI/SIO OBS to 5.5 km depth, and German OBS deployed >5.5 km). Active source SP instruments in both WHOI and SIO fleets are older OBSs with glass ball flotation. This 5.5 km depth limit was negotiated with the PIs, although the limit on the web site is 5 km (rating is to 6 km). The committee discussed the tradeoff of accepting increased risk to support PI needs, while acknowledging the potential impact on instrument loss to future cruises. During pre-experiment transit of instruments to the site, a hurricane within 24 hrs of leaving led to substantial damage to glass balls, as well as port-hole leakage in one of the OBS dry labs.
    - Tonga-Samoa deployment of 30 OBS.
- Instrument requests: two non-US requests without US colleagues likely to always get bumped. One request was for a very large number (63) BB OBS
    - Broadband OBS are booked out through 2026.
- Instrument numbers and total availability:
    - 25 SP OBS; 10 rapid response OBS; 81 BB OBS (35 MSRI forthcoming)
    - ~40 SP and 30 BBs are additionally available from SIO and being utilized regularly
    - All broadband deployments from this point forward will utilize Nanometrics sensors, as old Guralp sensors have been retired.
        - Multiple BB package designs, although all Nanometrics sensor, approximately ~65 of which are narrower-band Trillium Compacts (TC). Specific designs include: TC in Nanometrics housing; TC in WHOI housing; Trillium 240 in WHOI housing; Trillium 120 in Nanometrics housing; Trillium Horizon in Nanometrics housing
        - For strong motion sensors would swap out compact on the glass ball instruments. 6 channel is also possible but then the accelerometer sits on the frame instead of on the seafloor.
    - Currently all instruments use differential pressure guages (DPGs), rather than absolute-pressure APGs. If APGs are required, new APG sensors would need to be purchased – optimally new self-calibrating sensors and digitizers Paroscientific.
    - Future upgrades and additions include:
        - Acquired five T-120 (Nanometrics)
        - Have ordered or acquired components to field 15 Abalone shielded instruments, including: 1 new frame; 2 TC sensors; 15 Pegasus data loggers; 15 pressure housings for acquisition and battery systems
        - Ordered 6 Nanometrics Horizon (120s) seismometers
        - Planning to order additional T-120 for two upcoming experiments requiring fully broadband sensors (Naif, Eilon)

        - Contemplate: replace Q330 dataloggers on ARRA OBS with Q8s to extend recording duration to 18+ months
    - Further discussion regarding community interest in APGs.
        - Currently no requests for APGs from community
        - Possible APG availability was raised in a recent call between WHOI and SZ4D committee, but no clear answer if APGs would be necessary for goals.
        - Currently not in immediate budget plan for new instrumentation
        - ***Action Item for the next meeting: John will work out a cost estimate for what adding an APG to systems would look like, including design, component acquisition, and implementation.***
        - This may be a good topic for broader MSROC input. There is a likelihood that APGs could be available for community use via the seafloor geodesy equipment pool. *How to navigate overlap between the geodetic and seismic communities here.* ***Action item?***
- Update on MSRI-funded new instrumentation:
    - $6.5M was funded in fall 2021 to build 35 wideband/BB OBS.
    - Two design prototypes are nearly complete, and will be test-deployed in Dec. Almost everything is "off the shelf" except for the clocks.
    - Acquisition complete of 35 Pegasus dataloggers & 20 Nanometrics Trillium compact OBS. Expect delivery of 15 Trillium T-120 OBS soon.
    - Depth range; up to 6 km.
    - Sensor is shielded within frame, hopefully reducing current noise. Shielding not designed to be trawl resistant, but can be deployed in shallower water in areas where trawling is not prevalent.
    - Available 2025.
- Updated on Rapid Response instruments:
    - 10 USGS Sercel MicroObs in a dedicated container, basically ready to ship
    - Usage protocol not established yet but decision is USGS and NSF.
    - Lots of problems with them in initial tests, as discussed last July. Sercel not very responsive.
    - 100% USGS funded, and WHOI only works on them when USGS funds are available to do so.
- Webpage update: added statement on impact of dramatic cost changes for experiments that reach far into the future
- Progress on OBSIC renewal review-panel recommendations:
    - In progress – create webinar for development of effective OBSIC experiment plans & budgets.
    - Completed – website schedule pages now include list of funded but not yet scheduled experiments

    - Completed – Add cruise IDs and links to R2R/MGDS to website experiment list.
    - Completed – Set google alerts for publication lists.
    - Completed – Include information on website about how budgets are calculated.
    - Completed – contact link on web pages goes to facility email that is tracked by multiple people.
    - In progress: Improve collection and dissemination of post-cruise feedback from PIs, through zoom or phone interviews. Plan is to collate and share with OBSIC operations subcommittee and NSF.
    - In progress: Additional data metrics, including tracking: time from instrument recovery to data delivery to PIs and to data repository; individual instrument functionality; time from proposal funding to instrument deployment.
- Continuation of previous discussion on rising experiment costs
    - WHOI proposal: reduce data processing hours on experiments supported by subawards; increase drop fees to account for inflation (last updated 10 years ago). This was proposed last July but tabled at that time.
    - **The committee approved the modified drop cost algorithm as proposed by the facility - final decision on this change goes to NSF.**
- Update on Mid-Scale Research Infrastructure (MSRI) proposal for new short-period (active source) fleet (120 OBS): Declined 10/26/23. Panel feedback cited relative lack of broad participation and community engagement as weaknesses. The reality is that success rate of MSRI proposals is extremely low, as the proposed initiative needs to grab the attention of community that is much broader than just OBS, MGG, and Geosciences. It seems likely that forward strategy will not involve an MSRI. Time is scheduled later in the meeting to brainstorm on this issue.
- Tentative 2024-2025 Experiment Schedule:
    - 2024: Miller 2 OBS in Skilak lake, AK (May); Hooft Galapagos recovery 53 OBS (June); Wilcock Axial seamount recover 2nd year (Sept); Warren Chain transform (active/passive) (dates uncertain maybe Sept)
    - 2025: Naif Cocos plate (Jan/Feb) 27 WHOI BB OBS for 12 mo.; Eilon Galapagos Triple Junction Yr-1 (Feb/Mar) 44 WHOI OBS for 15 mo.; Miller 2 OBS recovery (May); Wei Tonga-Samoa recovery 30 OBS SIO (May/June); Warren Chain transform recovery (SIO, dates uncertain); Wiens 20 WHOI BB OBS deployment in Matthew-Hunter trench for 15 mo (dates uncertain); Abers NW NZ 20 WHOI BB OBS for 15 mo. (dates uncertain)
    - This schedule projects to nearly one cruise per month. Significant personnel stress, with a huge push needed to turn around 44 OBS in 6 mo to support Eilon following the Hooft recovery. Turnover time is improved from the past due to the retirement of the labor-intensive Gurulp sensors. The current level

of heterogeneity with the fleet is not proving to be a hindrance on instrument preparation time, and maximizes the available instruments for users.

Update on OBSIC Data products and tools (Barclay)

- Data Metrics Hub
    - Live version of metrics hub found at https://obsic-metrics.whoi.edu/
    - Local version now includes the NSEMA and Cayman Rise datasets.
    - Once data is ingested in DMC, it takes about a week to get all of the quality metrics posted. Only a few person-hours of work. It takes a bit longer due to security procedures, but in the future the total time should be reduced to a couple of weeks.
    - The quality is available currently for BBOBS, or passive deployment SPOBS. Short deployment time creates a challenge for applying the same metrics procedure to the SPOBS active source experiments.
    - New features not yet public:
        - Deployment Level
            - New information panel with each experiment
            - This will have direct links to R2R for each cruise - ***request to clearly label this an ancillary data***
            - Also links to relevant data reports (e.g., SRL Data mine style paper)
            - OBSIC Data Alerts - area to put a pdf to notify people of a longer issue for a specific instrument issue attached to a deployment.
        - Station Level
            - Now links to instrument description page for the instrument type
            - Now will have a link for each channel to a file that has the hourly data quality for each day (24 values of 0 or 1), which is directly generated from the metric database.
        - Cruise reports
            - Active source MGDS can be linked; good for Langseth cruises.
            - For broadband deployments, it is not clear where cruise reports eventually end up. Sometimes they make it to MGDS, but seems to be cruise (and PI) dependent.
                - **Action Item: MSROC should talk with the Earthscope ex officio person to find out where the cruise reports or other data documents sent to the DMC have ended up. Can also be a topic as part of the MSROC Early Career Session.**

            - In general, there is a fair bit of discussion about how there is not necessarily a clear procedure / location for cruise reports to be stored/ found by the community. OBSIC can easily track down PIs and add cruise reports to data metrics hub. But there should be a discussion with MSROC and cooperating groups to make sure this is accessible across different websites/ programs.
    - Overall, for each experiment, the time from data ingestion to public release of the metrics page is 3-4 weeks.
- Continued development – next steps
    - Quality metric available for download + ancillary information is complete.
    - Incorporating tilt information is on target to be available EOY 2023.
        - Tied to hourly metrics. Calculate tilt direction and angle on hourly data. Then average daily, and calculate piecewise smooth model to account for things like releveling by separating into clusters.
        - Provides information to do tilt corrections (e.g., direction and angle) in the time domain, not the frequency domain.
        - Evaluated incorporating into the ATaCR software, but not immediately clear how to do it. Could be a topic for future.
        - Nanometrics instruments have consistently low tilt.
    - Incorporating compliance information should follow soon after that
    - Further ahead: incorporate post-cruise diagnostics, user input (perhaps via ancillary links), reconstruction to adapt to software EOL issues.
- Metrics Hub Metrics
    - Overall increase of usage over time based on engagement sessions. Spikes in engagement tied to events (2022 SAGE-GAGE presentation, update emails)
- Quality Monitoring
    - Compilation of a PDF description of common instrumentation issues. Description of problem, affected deployments, correction status.
- Slab Testing
    - Procedure for evaluating seismometer and DPG performance
    - DPGs that have timing issues are tagged, tracked, and not used (~17 DPGs in pool). Currently working to repair problem sensors
    - Time constants for DPGs are relatively stable based on repeat slab tests over multiple years. Also relatively consistent with readings on seafloor. All suggests that these are inherent to the instrument.

Update on OBSIC outreach activities (Mantopoulos)

- Established a formal work-study program with Upper Cape Tech Co-op. Proving to be a great asset to the lab.

- OBSIC had a booth at Woods Hole Science Stroll in Aug 2023.
- Nicole working with WHOI to enhance social media impact
    - Instagram: @obsic.whoi; Facebook: www.facebook.com/obsic.whoi; X (formerly Twitter): #obsic_new
    - PI's should reach out to Nicole to coordinate potential outreach.

New Business

Brainstorming options for refurbishment of active-source fleet (Gaherty, Collins)

- Summary of effort to date: In the winter/spring of 2023, WHOI a ~$10M proposal to the Mid-Scale Research Infrastructure (MSRI) program. Pre-proposal (approved) was for 100 SPOBS to live as a coherent entity on the NSF Marine Seismic facility (i.e. Langseth and/or it's replacement). Full proposal refined this to for 120 SPOBS, with Year 1 being an instrument design phase, and Years 2-3 being a construction phase. The proposed design would be small, easy-to-handle, with rack-based data extraction and rechargeable batteries, a hydrophone, and either internal or external three-component geophone. Sensor location (internal versus external) requires user feedback regarding trade-off in ease of use versus data quality. Full proposal was rejected as summarized above.
- WHOI remains enthusiastic to submit a proposal to do a design phase with some testing, something of scale ~ $1M over two years, either as a regular proposal to OTIC (Jan deadline) or MG&G. At minimum, this would prepare them to go back to MSRI in 2 yrs with an acquisition proposal (not design). However, as noted above, MSRI is a low % chance.
- Alternative programs for acquisition do not scale well. For example, Major Research Initiative (MRI) funding is allocated to different directorates and divisions and is not a cross-NSF initiative, but capped at $1M. For OBSIC it is dramatically more efficient to acquire funding sufficient to make bulk purchases, but for OCE-accessible programs, smaller multiple expenditures are more supportable.
- There may be a current reality that uncertainty about the Langseth replacement also lessens NSF and/or community willingness to support a major ($10M) program to develop a new active-source fleet. LDEO continues to undergo changes in leadership, and while new leaders appear supportive of supporting a seismic facility, they need to raise a lot of money. From the NSF/OCE perspective, they are excited about the planned designs, which could reduce the pressure on existing global vessels, including with a planned the coring capability.
- Questions were raised about whether the design of the new system to live full time on the Marine Seismic Facility ship might open alternative funding mechanisms. Could the $10M OBS development be incorporated into the cost of a new ship, analogous to streamer, airgun, and other shipboard equipment? The reality is that this would be a significant percentage of the the ship cost ($40-90M). In addition, it seems possible

that O&M and other support costs could be shifted to the Oceanographic Facilities budget.

- For more immediate SPOBS needs, it has been useful for PIs to partner with international organizations with access to OBS – for example GeoMAR with shallow water OBS - Cubes, the new Canadian facility (BB but can be used for active source as well), UTIG instruments from a German company. These partnerships can relieve the pressure on the limited US SP pool. Building on these interactions could also be potentially enhance and strengthen the proposal for a new US pool.
    - Idea: International OBS discussion at AGU?
- Discussion of new OBS needs for potential SZ4D program. SZ4D offshore instrument needs are focused on longer term monitoring (2 year deployments for 10 years total). Most recent plan discussed with WHOI is scaled back to 45 BBOBS. Current SZ4D plan is to put in an MSRI Track II proposal that would include WHOI, along with a Geohazards Center proposal. SZ4D leadership has also mentioned the possibility of an MREFC.
- Key points to emphasize in arguing for a new SPOBS fleet: they will produce significant long-term operation savings compared to present-day equipment. The savings include: rechargeable batteries that will significantly reduce per-experiment expenditures; reduced deployment costs due to instruments operated and deployed by ship's marine techs and not OBSIC techs; elimination of per-experiment shipping costs.
- ***Action Items: WHOI will proceed on a modest ($1M) proposal to develop and test a new instrument design. WHOI will incorporate more info on website for potential PI's about international partnerships, etc. Future MSROC community meetings (e.g. Early Career Session) will discuss alternative (international) instrument sources for PIs.***

Planning for Early-Career session at MSROC annual meeting, future webinars, and workshops (Janiszewski, MSROC Chair Lindsay Worthington, UNM (remote))

- Early Career Session at Golden Gate University Sat morning and before AGU, prior to MSROC annual community meeting on Sunday. 50 applicants and 40 people funded - spans undergrads to grad students and postdocs, and early career researchers. Panelists also supported for travel as necessary. Draft agenda has 3 panels and an evening social event: 1. Panel with facilities (including WHOI OBSIC); 2. Technical interchange (open source processing programs); 3. Doing science: proposal prep., going to sea, project management (including OBSIC OS members).
- As part of the Facility Panel, John will describe instruments availablility looking into the future. He will also raise the strategy of utilizing international collaborators. Some international participants are expecting, including Pascal Audet from Canada.

    - ***Suggestion to relay to MSROC: create a web presence for information about the SIO high res system***
- ***ACTION ITEMS FOR MSROC EC planning committee***
    - ***Talk about how much marine data is already available and usable in the EarthScope DMC archive. Could be under the Topic 2 or 3. Can also be part of the broader MSROC meeting as well.***
    - ***Plan for additional networking opportunities. Speed networking???***
    - ***Develop a survey to ask participants directly what information they want more of for future webinars to fill out during the meeting. Perhaps one for each of the 3 panels.***
    - ***Make sure that facilities panel covers UNOLS ship time request (Alice Doyle) and OBS instrumentation request (John).***
- For the future, we should make sure to see how well we are engaging with the non-already-marine community. Advertise on EarthScope to get broader participation from land folks.
- Webinars to follow up: first one can be based on similar topics to the panels. Work with UNOLS to help facilitate hosting of the webinars.
- Shorter videos as a possibility? Template spreadsheet for cruise timeline available?
- Discussion of future Marine Seismology (Geophysics?) Workshop. NSF remains skeptical of specialty stand-alone in-person workshops. Certainly before developing a proposal, run the specific idea and plan by NSF. A proposal would need to clearly articulate specific goals: science question development? community building? Integrating communities (seismic, EM, and geodetic) is a better sell than a repeat of previous workshops.

Tour of Lab (WHOI OBSIC Facility team)

- Detailed overview of instrument development, maintenance, and testing activities delivered by WHOI technical staff. Specific presentations included: overview of prototype designs of the new broadband OBS funded through the MSRI grant; expanded sensor (seismometer and DPG) testing procedures; new datalogger testing and evaluation; development and implementation of a comprehensive equipment test-status database.

Wed 1 Nov

Action Items / Old Business

Update on experiment costs and possible budget estimate revisions (Collins)

- As noted above, revisions to budget estimation algorithm previous proposed by OBSIC were approved by the OS and are now with NSF for approval.

Terms of Reference Topics: updates/action needed? (Gaherty, all)

- ***Action items: update terms of reference to clean up as needed, including specifying WHOI members***
- ***Overall, request UNOLS to clean up webpage (complete)***

Equipment usage guidelines

- ***Action Items:***
- ***add text to the OBSIC Instrument request form that encourages PIs, especially early PIs, to call John to discuss plans. John will also try to proactively call first-time PIs as a follow up after receiving a request.***
- ***Develop community contributed experiment-planning resources such as deployment spreadsheets, codes, to be included on the OBSIC website***
- ***Develop an OBSIC FAQ list? Could get feedback from MSROC early career meeting as a starting point.***

Facility performance assessment: improved feedback from PIs needed?

- ***Action Item: OBSIC will share collated version of cruise and data evaluations with OBSIC-OS prior to next meeting, so that committee members can review for community issues.***

Facility health/effectiveness

- **Action Item - committee write a letter advocating for support from WHOI for facility for engineers/ technicians.**
- Continue to bring in technical interns.

Capacity building/training

- Returned to the topic of a possible future Marine Geophysics symposium, in particular possible compelling themes: building early career scientists, developing interdisciplinary science questions. Fewer talks, more interaction compared with previous meetings. Likely can't fund all attendees.
- Flipped meeting model? Reduced / no talks during actual meeting, instead focused on discussion. Suggestions for organizing participants in fixed small groups that regularly check in together for discussion during the meeting.
- Expand to increase International participation?
- **Action Items: Jim, Helen, Emilie, Matt will be point people to to continue conversations with Will about symposium/workshop.**

Coordination with MSROC and marine community

- There is a desire for more transparency for PIs (and maybe even OBSIC facility?) with ship scheduling. Some concern was expressed about how well the WHOI ship

scheduler articulates needs of OBS community. This may be unfounded, but lack of transparency in process leads to this notion.
- It is likely that the current backlog results from covid-delayed experiments from FY20 still getting in water.

Community initiative support

- OBSIC facility feels somewhat disconnected from community planning in SZ4D. The committee can encore SZ4D to incorporate OBSIC in ex-officio role on SZ4D OPC committee, to facilitate better planning, coordination, and communication.

Executive session