OBSIC Operations Subcommittee
Fall Meeting
3-4 October, 2022
Northern Arizona University
Ashurst Building, Room 109

Attendees
OBSIC OS: Jim Gaherty, Emilie Hooft, Helen Janiszewski, Susan Schwartz, Lindsay Worthington (in person); Kasey Aderhold, Ross Parnell-Turner (remote)
OBSIC facility: Andrew Barclay, John Collins
NSF: Gail Christeson

Meeting Summary
The 1.5-day meeting represented the first in-person get together since the inaugural OBSIC operations subcommittee meeting in October, 2019. The meeting agenda was grouped into four areas of discussion: (1) program updates from NSF and the OBSIC facility; (2) committee action items and discussion points brought forward from previous (remote) committee meetings in fall and winter of 2021; (3) new business; and (4) open discussion of OS topics articulated in the committee terms of reference. 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, despite ongoing logistical and personnel challenges associated with COVID. In addition, the facility made significant progress in designing and doing first tests on new broadband OBS designs that will supplement and/or replace aging and failing systems, using both new MSRI funds as well as existing (drop-fee) resources. Finally, the facility rolled out the first phase of a new set of data products and data metrics for community use. 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.

The committee discussed several new or emerging topics that will require attention over the next several months. NSF brought forward the issue of unpredictable experiment costs, driven in part by supply-chain disruptions and associated inflation. While some adjustments to the preliminary budget algorithm and associated communication may help alleviate these issues, the possibility of NSF requesting project re-scoping may at times be necessary to consider. The committee should work with the facility to effectively communicate this potential issue with the user community. In addition, there was extensive discussion of the critical need for improved and additional short-period instruments for active-source experiments. The committee is preparing a white paper articulating this need, with a goal of demonstrating strong community support for future OBSIC proposal efforts in this area. The white paper will be coordinated with MSROC, and hopefully will contribute to a broader emerging discussion on

a Langseth replacement vessel, which the new instruments would complement. Finally, there was broad agreement that the committee should proactively seek to promote and advertise OBSIC capabilities and opportunities to the broader seismology community. A suite of mechanisms (social media, workshop organization, webinar and meeting presence) were discussed, and will remain a focus for the next year.

Minutes
Monday, 3 October

09:00 Welcome, Introductions, Meeting Overview, Notes/Minutes (Gaherty)

- Minutes from all previous meetings have been approved by the committee and forwarded to UNOLS, but have not yet appeared on the website.
- Action item (Gaherty): re-engage with UNOLS office and get minutes posted.

09:15 Overview of OBSIC structure, award, and committee role (Gail Christeson, NSF)

- News from NSF/MGG
    - New OCE director Jim McManus
    - 12 sites of seafloor geodesy transponders now available for use
    - No major updates on the Langseth. LDEO is pursuing a new, general-purpose ship that can do seismic. There is demand for more large vessels and support from UNOLS for a seismic ship.
- Comments re OBSIC committee
    - Funds committed to date range from $4.8-7.2M per year. Available online.
    - Discussion of mechanisms of reporting to NSF. Requests a high-level executive summary of key meeting and committee discussions, in addition to raw minutes of meetings.
    - Recommends scheduling committee-only discussions as part of each meeting.
    - Notes that UNOLS website should be updated

09:30 Update on WHOI OBSIC facility activities (Collins)

- Activities since Oct 1 2021
    - Despite significant COVID impacts on lab and at-sea activities, the facility successfully conducted a very full schedule of deploy/recover operations
    - Have experienced more multi-year deployments with turnaround (at sea or in port) – challenging operationally, need to be monitored for impact.
    - Active-source experiment off Mexico – new model of using SIO SP instruments, but with no SIO personnel involved at sea. First experience was successful.
    - Data submissions issues – PI-sourced delays on getting community experiment data open at the DMC. Problems with data sets can contribute to this. Primarily a PI/DMC issues, but OBSIC may be able to facilitate in some cases.
    - Scheduling discussions with UNOLS has noted the potential for personnel shortages for ship crew, potentially leading to delays
    - It is noted that SP usage currently includes several passive deployments – regularly assess possible impact on active-source cruise scheduling. Demand for longer-term SP instruments in passive mode has been moderate but persistent.

- Conducted first at-sea tests of new OBS, dubbed the Angler, which are constructed using the fleet of (16) T-240 Nanometrics sensors acquired from NSF and SIO, using new Quanterra Q8 dataloggers. Test deployed an Angler, a WHOI ARRA OBS, and one of the new Sercel MicrOBS (acquired in collaboration with USGS for rapid response deployments) in 20 ft. of water off of Martha's Vineyard. Used divers to release and level the seismometer. Recorded data for four days. Looked at data for ARRA and Angler, about 60 ft apart. Good coherence at dominant noise peaks. MicrOBS are clearly still a beta instrument – hydrophone didn't work, etc. - and clearly require extensive testing and calibrating prior to making available to community. Experienced problems with data download. Doesn't write mini-seed. Experience so far offers one more data point on challenges with spinning up off-the-shelf solutions.
- Planning for continued testing of MicrOBS and Angler instruments offshore WHOI.
- Ongoing progress on the MSRI build – two proto-types with different sensors – both shielded, 2+ years deployments, half T-120, half T-Compact, both with new Nanometrics Pegasus dataloggers. Hoping for 36 total new instruments, but final number depends on price of titanium.
- Proceeding with retirement of WHOI CMG-3T sensors, replaced by Trillium Compacts, using existing inventory and funds (drop fees). Expectation is that future deployments will no longer utilize any 3Ts.
- Transfer of SIO Abalone instruments is underway. Requires acquisition of some pressure cases. Dataloggers will be updated to Nanometrics Pegasus (?).

10:45 Update on OBSIC Data products and tools (Barclay)

- Advances in metrics hub (obsic-metrics.whoi.edu)
  - Provides high-level, automated, standardized characterization of OBS experiments.
  - Presented at SAGE-GAGE and received community feedback. Goal is to provide assessment of data that is useful to facility engineers/techs, PIs, ultimate users, and future proposal writers. Aim to not duplicate existing efforts (specifically DMC Mustang metrics).
  - Now live on the web – outward page and underlying infrastructure is maintained by WHOI information technology group.
  - 3 levels – OBSIC overview (all available experiments), experiment page, station page, each page dynamically served.
  - Currently for 4 experiments, completion of "Phase 1" is applying to remaining OBSIC experiments.
  - Phase 2 – working on added content: hourly (rather than daily) information, clock quality, tilt/compliance corrections (in transfer-function form), short period (both active and passive) experiment data.
  - Questions on how quickly to publish/release these metrics for restricted data. PI choice? It was noted that the DMC publishes MUSTANG metrics for restricted data.

    - Committee recommends writing a short technical article (e.g. SRL) describing the metrics and their utility. Andrew anticipates undertaking this effort after phase 2 is implemented.
- Advances in slab testing
    - Monitoring of up to 5 seismometers plus a vault T240 reference at a time. Real-time antelope system, always on.
    - Also handles up to 5 DPG at a time, compared to a well-calibrated reference.
    - All instruments go through testing before shipping.
    - Previously sensor testing was a critical bottleneck for quick turnaround – 6 instruments a week, and some have fail/repair/retesting loop. Somewhat arbitrary metrics for pass/fail, lots of analyst and tech time.
    - Developing and implementing new system that is cheaper and faster. Formalize information and workflows, utilize analyst efficiently, automate where possible:
        - centralized spreadsheet for analyst and technician - drives subsequent technical workflow
        - define and document pass/fail criteria
        - utilize standard 2- to 3- day data collection, both DPG and seismic sensors
        - graphics-driven, spectra and cross-spectra/coherence – fast visual analyst evaluation

11:45 PI Data Access (Gaherty)

- What is the standard for PI data access at the end of an experiment or the time frame?
    - Depends on the instruments and staff availability (also Navy involvement) - ranges from immediately to ~1 month for SEGY from active source experiments.
    - Outline the expectations on the PI Information section of the OBSIC website.
    - For passive non-Navy experiments, mseed is immediately available, albeit sometimes not clock corrected.
    - Action item (all): evaluate whether PI guidelines on website establish reasonable expectations, independent of instrument provider.

New Business

13:00 Information Budget algorithm and evolving costs (Christeson, Collins)

- Revisiting the algorithm:
    - dates to 2001-2002
    - Labor – person-days per instrument on active/passive and total number of instruments, recommendation on number of personnel to sea, data processing
        - preparation and at-sea labor is probably appropriate
        - data processing time is overestimated – 8 hours per instrument on passive, 4 hours per drop on active. Can be reduced.
        - Action item (Collins): provide revised estimates for committee discussion by email.
- Inflation on battery costs and shipping costs:
    - huge increase in lithium costs
    - unpredictable pricing (one company won't commit prior to shipping)

- lead time has gone from 14-18 weeks to 32 weeks
- shipping costs have increased, e.g. domestic 43%
- possible change in scope may be necessary, as determined by NSF. Put warning of this in information budget.
- Action item (Collins): Draft up a warning statement regarding cost stability and possible need for scope changes from informational budget.

Action Items / Discussion Topics from previous meetings (Gaherty, all)

13:45 OBSIC and Community governance: NSF goal, OBSIC understanding, community perception

- OBSIC mid-award review raised questions about the role of the operations subcommittee, in the context of the terms of reference.
- Feedback to NSF useful for information: status, things to work on, facility health and effectiveness.
- Action item (complete): an overview summary of each OS meeting (including from closed session as appropriate) will be distributed along with the meeting minutes, providing a mechanism for sharing committee assessment & suggestions on OBSIC operations with NSF and OBSIC on a regular basis.
- Committee feels that it would be useful to evaluate community perception by being given access PI feedback (other than personnel-specific) after experiments.
- OBSIC notes that PI's are often unresponsive to request for PI feedback, even though it is required. Facility could perhaps overcome this using exit interviews with PIs rather than relying on survey results.
- Also useful to assess poll of all participants of the Marine geophysics symposium. Action item (Gaherty): share 2022 MSRS poll results with committee.

14:30 APG instruments: inventory, needs, outlook

- Current APG inventory – 25 (19 TRM, 6 Deep)
- range of max depths (1000m, 2100m, 7000m)
- highly specific custom-designed counters (dataloggers) would need to be replaced
- need new housing (won't fit in existing or new instrument designs) and end caps – expensive overall package design
- alternative – commercial systems, including A0A. A0A systems would require another entire pressure housing. If possible, those systems are likely much more useful – and easier to use by more people than current APGs.
- OBSIC facility agrees that it makes a lot of sense to be thinking about adding this capability. Forward looking, with broad oceanographic and other applications. Enhanced capabilities – suggest that OBSIC look to acquire one or two options that are fully self contained – add to package and see how they do. Eventually build up a fleet if they are successful and funds become available.
- Provides a clear connection for interaction and collaboration with emerging seafloor geodesy group.
- Just one example or component of the concept of a seafloor observatory – take advantage of the high deployment / O&M costs of seafloor installations with multiple

instruments. Also developing advances in magnetometer on the OBS platform. Water column measurements also possibly of interest.
- 2023 SSA Session proposal that might be of interest for this discussion: "Advances in Marine Seismoacoustics"

15:00 Strengthening and broadening social media promotion of OBSIC
- Our committee could prepare a short slide deck about OBSIC to show at relevant meetings (SZ4D community meeting etc.), especially at the early career symposia that accompany these meetings. Action item (Collins): share the introductory slides from the 2022 SAGE-GAGE plenary session for use by committee in talks.
- Goals: (1) public awareness of OBSs and associated science; (2) engaging more OBS users.
- Concerns of content - WHOI Social Media Guidelines
- Develop a template/ ideas list on promotion of the experiment and OBSIC/marine science
    - IRIS webinar: https://www.youtube.com/watch?v=JwtZabNoZBc "Social Media for Scientists"
- Improved use of #OBSIC_now, tagging of @whoi. Action item (Collins): talk to the WHOI press office about redistribution of community items tagging WHOI/OBSIC.
- More active use for OBSICtec for promoting new data releases, etc. How to get more users signed up? Webinar, regular promotion in talks.
- Action item (all): by or at next committee meeting, have a brainstorming session to nominate or reach out to potential speakers for IRIS webinar.

15:45 Marine Seismic/Geophysics Symposia proposal update (Aderhold, Janiszewski)
- Seismic, geodetic, EM communities and early career science support.
- Timeframe: fall 2023; possible location Maritime Conference Center (max ~250 attendees) in Maryland.
- Plan is for a couple pager from William Wilcock to NSF.
- Need to articulate why a special meeting is needed vs. special conference session
- Emphasize early career and interdisciplinary, opportunities for training and community building. Hierarchy of financial support to ensure ECI emphasis.

16:00 SZ4D, seafloor instrumentation, and OBSIC (Shillington presentation)
- Marine seismic needs in various degrees and scales – long-term broadband mega array, (50 km nominal spacing), more focused portion of mega-array for detailed seismicity, slow slip, etc. and then active-source and broadband 2D and 3D experiments on multiple scales. Town hall on overall SZ4D initiative in November is next opportunity to engage. Within SZ4D, there is presently a small subcommittee focused on seafloor instrumentation needs, which is populated by Wiens, McGuire, Naif, Abers, Frank. In the new growing SZ4D structure, this group is likely to sit within the Operations Planning committee, which is chaired by Wiens.
- As informed community members, committee members encouraged to contribute to discussions on SZ4D new-instrument needs.

- In longer term, consider the ways that the OBSIC pool could contribute to SZ4D goals.

Tuesday, 4 October

08:30 Update on MSROC user survey (Worthington)

- Feedback sought by NSF and Columbia from the community on active-source desires and needs.
- 22 respondents, a majority of whom were experienced marine-seismic facility users.
- Highest priority: 2D long offset streamer and lots of OBS for refraction
- Next was 3D capability – this remains a unique capability in the science community
- Question on ideal frequency response (above or below 10 Hz) was split. Some notion that lower frequency is needed for full-waveform inversion. Industry does FWI at high frequency but it requires far more resources. 10 Hz+ sensors can have a cost and engineering advantage because a number of companies sell ~15 Hz sensors that work in any orientation, and the addition of a tilt sensor would then allow correction of the data to standard coordinates.
- Some concern that staying in 2D (both streamer and refraction) might limit innovation.
- On the 3D refraction side, it is not yet clear how node technology might work for our community – potential scale, costs, benefits, and limitations.

08:45 SP OBS White Paper and future proposal opportunities (Gaherty, Collins)

- Clear need for a new white paper drafted by OBSIC operations subcommittee to encourage the development of a modernized active-source OBS fleet. Important to encapsulate the rest of MSROC as well. Discuss at MSROC meeting in December. Action item (Gaherty): get on MSROC agenda.
- OBSIC envisions developing new fleet of 100 instruments, sensor unclear (4.5Hz geophone with leveling or MEMS accelerometer), 6000 m capable, 1 piece, rack system for data handling, recharging batteries, etc., to live most of the time in a special container on the Langseth/replacement. Have a conceptional new design in hand. Leveling system for the geophone is the most complex and problematic portion of design. Utilize a datalogger from a node company rather than usual BB vendors.
- Action item (Gaherty/committee): Update draft white paper, add some science justification (utilize 2021 proposal text), and links/references to other community whitepapers that are now in the google drive. Circulate and finalize draft for sharing with MSROC.
- Action item (Collins/Barclay): obsip.org is no longer an active site – put functional specifications documents on obsic.whoi.edu site.

9:30 Rapid Response: UNOLS and OBSIC role

- 10 MicrOBS are being tested (2+months on bottom time up to 6,000 m depth; 3-axis accelerometer that compensates for tilt & hydrophone; rechargeable Li-ion battery)
- Goal is ready for use by early 2023.
- Awaiting USGS funds for related support equipment

- Pre-planned scenarios will be funded by USGS largely motivated by earthquake + volcano hazard focus in US. NSF funding mechanism is through RAPID proposals for non USGS-funded events.
- Priorities for use from N. Miller SAGE-GAGE: OBSIC-USGS criteria list.
- OBSIC OS is available to provide scientific input/guidance if OBSIC or USGS want input.

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

10:20 Equipment usage guidelines

- keeping the user guidance fresh and up to date
- Action item (all): collect example experiment layout spreadsheets, discuss sharing mechanisms.
- Action item (all): discuss realistic mechanisms for sharing/discussion of PI evaluation forms at next meeting.

Facility performance assessment: improved feedback needed?

- committee overview after each meeting – things going well, maybe things to see some improvement on
- use PI feedback plus direct information provided to the committee

Capacity building/training

- challenging to recruit – cost of living. Salary structure set by WHOI. Good retention – need to find people to recruit
- OBSIC continues to take in local technical interns
- utilize outside resources – tech pool, Lamont – need to expand on this
- SIO has one new hire, and continues to work with Constable lab

Facility health/effectiveness

- drop fees help cover costs of maintenance, repair, replacement
- instrument testing supported out of existing budget, side-by-side testing really useful – how to increase/continue support? At sea testing experiment(s) likely to require an additional proposal. OTIC (requires development) is a possibility, but might also require MGG support. Connect to new directorate TIP (Technology, Innovation, Partnership)? OS available to support OBSIC in such proposals.
- white papers focus on supporting recapitalization and expansion of short period OBS fleet.

Coordination with MSROC and marine community

- Already discussed workshop, white paper, standard OBSIC slides for use in talks (including OS and basic description of facility and available instruments)
- Make a point of presenting at community meetings, especially at early career sessions at those meetings. Action item (Gaherty/Janiszewski) : get on agenda for early career session at SZ4D
- Continue connecting to seafloor geodesy and seafloor MT–keep pursuing and emphasizing multi-platform opportunities. Consider alternative funding mechanisms (Keck, etc.).

Community initiative support

- Community interest in amphibious capability (e.g., SZ4D needs). Little recent proposal pressure, but white papers etc. express strong desire for capability. Get Abalones back

up to 15. TRM's are available if clear community need, but would require datalogger and sensor upgrades/maintenance.
- Request for deep (8km) OBS capability - went to international collaborators
- High sample rate hydrophones – eruptive processes, hydrothermal vents (1 kHz or higher? MicrOBS can go to 1 kHz)
- Linkages with CONVERSE - rapid response capabilities.
- SZ4D. Use as a mechanism for improving seafloor capabilities.
- Expand conversation to physical oceanography and other communities to expand support for seafloor instrumentation.

12:00 Committee only discussion