

DRAFT

**UNOLS Fleet Improvement Committee Meeting
Tuesday, November 29, 2016
The Holiday Inn at Ballston - Ballroom
4610 North Fairfax Drive , Arlington, VA 22203**

Meeting Minutes

Appendices

I: Participant List

II: R/V Neil Armstrong and R/V Sally Ride Update

III: Regional Class Research Vessel Update

IV: Mid-Life Refit Plans for Thompson, Revelle, and Atlantis

V: California Effort to Replace Robert Gordon Sproul

VI: Fleet Projected Service Life End Dates and FOY Ranges

VII: Modification of UNOLS STRS Ship Schedules

VIII: Research Vessel Safety Standards Appendix B Update

IX: In situ stable isotope systems

Committee Action Items (New and On-going)

Action Item	Assignment	Status
Provide UNOLS input to NSF's Polar Vessel plans. Coordinate with AICC. Invite Bob Campbell to the FIC meeting.	Jim Swift	
Mid-life refits for the Global ships: <ul style="list-style-type: none">• Stay abreast of refit plans for Global ships• Request that Rick Keil participate in the <i>Thompson</i> shakedown cruise.	FIC	
Coastal/Local ships – Stay abreast of plans for new ships in Washington and California	FIC	
Science Mission Requirements for Global Class <ul style="list-style-type: none">• Develop the mission scenarios / science drivers.• Compare these to the Global class capabilities.• Collect lessons learned from recent vessel construction projects• Gather UNOLS Community input• Engage federal agencies• Compile a list of international Global R/Vs.• Data mining (see next task)	Subcommittee - Greg Cutter, Jim Swift, Clare Reimers, and Byron Blomquist. -Greg and Jim Swift	
Data Mining Suggestion - Turn qualitative data into quantitative knowledge via data mining (past data) or reorganization of the post-cruise assessment (future) to answer specific questions? Examples of questions are provided in the minutes. Town halls and surveys could also be useful	Annette with input from FIC	
Gather post-cruise feedback on <i>Armstrong</i> and <i>Sally Ride</i> as they enter into science operations:	FIC and Annette	

<ul style="list-style-type: none"> • Conduct debriefs with PIs who used new vessels (see 2017 debrief assignment spreadsheet). • Look into converting the debrief form into a database form. 		
<p>Guest Speakers/topics for future FIC meetings – suggestions include:</p> <p>Jules Hummon (ADCP)</p> <ul style="list-style-type: none"> • A speaker on cables – past, present, and future • Autonomous vehicles. How will they influence ship designs? • Innovative ship designs • A representative from Alion Science and Technology Corporation. 	Jim Swift and Annette DeSilva	
FIC Membership – Announce a call for nominations to fill two open positions. Continue to recruit for Acoustics Expertise	Annette DeSilva	
<p>Full Optimal Year (FOY) Range Definitions and Utilization Charts</p> <ul style="list-style-type: none"> • Contact each ship operator to review FOY at the start of the year to accommodate major events and adjust as needed. • Revise the utilization chart to account for each calendar day. 	Annette DeSilva	On-going
<p>Projected Service Life End (SLE) Date Chart:</p> <ul style="list-style-type: none"> • Maintain updates and post on the FIC Webpage. • Add the median Fleet age data to the chart 	Annette DeSilva	Ongoing
Ship Service Life Memos – Contact Tom Janacek (NSF) for Ship Service Memos. FIC will reviewed memos and make SLE recommendations	Annette DeSilva and FIC	Ongoing

Meeting Summary Report

Call the Meeting: Jim Swift, Fleet Improvement Committee (FIC) Chair, called the meeting to order at 9:00 am EST. The agenda was reviewed. Participants introduced themselves. The participant list is included as **Appendix I**.

Opportunity for Agency and Guest Comments:

National Science Foundation (NSF) - Bob Houtman (NSF) reported that NSF is on a Continuing Resolution (CR) until December 9th. Under the CR, each NSF section is provided with a budget to continue operations. The Continuing Resolution might be extended until the end of March 2017. The impact of how this could impact their projects is being evaluated.

This has been an exciting year for NSF:

- The new vessel, R/V *Neil Armstrong*, has provided OOI support for the Pioneer and Irminger Sea arrays. The operations were very successful.
- R/V *Sikuliaq* was also used for the first time to service the OOI Cabled Array. These operations included the use of ROV *Jason* and were also very successful.

- As part of the coring program, a test was conducted to experiment with the use of synthetic rope and had good results. A coring cruise is planned on R/V *Sally Ride*.

Discussion:

- Jon Alberts – Under the continuing resolution is NSF authorized to spend to a certain budget level?
Bob Houtman – Traditionally spending has been authorized at 90% of the past year’s budget. However, due to the uncertainty of the final budget, it has been decided that there will be an allocation for spending going forward.

Navy - Tim Schnoor (ONR) provided the report. ONR has an FY2017 budget and it is smaller than last year. ONR will start new field projects in 2018 that will take the ships to the Western Pacific.

Ship Design, Construction, Science Verifications, Refit, and Repair Activities:

Ocean Class Research Vessel (OCRV) – R/V *Neil Armstrong* and R/V *Sally Ride* – Tim Schnoor and Mike Prince provided the report. Their slides are included as **Appendix II**.

Tim reported that there is a new Chief of Naval Research (CNR), Rear Admiral David J. Hahn.

The ONR Research Fleet activities in 2016 and plans for 2017 were reviewed:

- *Knorr* was retired in 2014 and transferred to the Mexico Navy in May 2016 and is now painted white.
- *Melville* was retired in 2014 and transferred to the Philippines in May 2016.
- Tim praised WHOI and SIO for their assistance in the transfer of the ships and in training the foreign crews.
- R/V *Armstrong* was delivered in September 2015
- R/V *Sally Ride* was delivered July 2016
- 2016 operations included:
 - *Atlantis*: 279 days; 45 Navy; Feb Shipyard
 - *Revelle*: 303 days; 110 Navy; Nov-Jan Shipyard
 - *Thompson*: 126 days; 20 Navy; June-Dec Mid-Life
 - *Kilo Moana*: 183 days; May-Nov; Propulsion Control System Upgrade
 - *Armstrong*: 187 days; 72 Navy; 2 Shipyards & SVC
 - *Sally Ride*: Delivery July; 105 days; 88 Navy; SVC
 - *Flip*: 15 days Navy
- 2017 preliminary operating day estimates for Navy are:
 - *Atlantis*: 299
 - *Revelle*: 293
 - *Thompson*: 114
 - *Kilo Moana*: 244
 - *Armstrong*: 243
 - *Ride*: 198
 - *Flip*: 76 days. FLIP is getting more work than typical. They will have multi ship operations and will have joint ops with the CIRPAS aircraft.

The transition of *Neil Armstrong* and *Sally Ride* to full operations was reported:

- After delivery, both ships conducted shakedown cruises, deep water winch testing, sea acceptance testing (SAT) of acoustic systems and Science Verification Cruises (SVCs).
- The SVCs are carried out with experienced sea-going scientists conducting normal science operations and providing feedback.

- *Neil Armstrong* started science operations in May 2016 including an expedition to the North Atlantic and Iceland.
- A SVC cruise is underway on *Sally Ride* to verify operations with the ROV *Jason* and next year for Jumbo Piston Coring.
- *Sally Ride* completed the JMS Inspection and received designation as a UNOLS vessel. Its first science cruise (CALCOFI) was successfully completed.

Tim reported on the technical enhancements made on the Navy vessels.

- For the new vessels (*Armstrong* and *Ride*) enhancements include:
 - Deep and Shallow Water Multibeam
 - Multiple ADCP frequencies (38, 75, 300 kHz)
 - EK80: 5 frequencies
 - Additional transducer wells
 - Multiple Ship/Shore Communication paths
- For the older vessels (as part of Mid-Life refit)
 - *Thompson*: EM302, Labs, OTS gear, Instrument well
 - *Revelle*: planning new EM712, HDSS upgrade, Gondola for improved Multi-beam performance, and other upgrades
 - *Kilo Moana*: improvements to the CTD handling system

ONR provided support for a thorough preparation of R/V *Neil Armstrong* and R/V *Sally Ride* prior to the commencement of funded science operations.

Tim reported that both ships have completed Phase III shipyard installation of mission equipment that was funded by NAVSEA and ONR. Jim Swift (FIC Chair) and Clare Reimers (Past FIC Chair) served as co-chief scientists on the *Sally Ride* SVC. A summary of some of the major activities by ship is below:

- *Neil Armstrong*:
 - Two shakedown/SAT Cruises were carried out involving the UNOLS MAC, UHDAS support, Kongsberg and Radiated Noise Testing at the Navy Range in the Bahamas (15 days at sea).
 - There were six separate Science Verification Cruises
 - Inspection by JMS with participation by ONR and NAVSEA/PMS325
- *Sally Ride*:
 - There were four shakedown cruises for 21 sea days.
 - Five SVC cruises have been carried for 31 sea days.
 - A Jumbo Poston Coring SVC is scheduled for 2017 and will be led by Mitch Lyle for 9 days.
 - Other SVC and SONAR Characterization will be potentially scheduled.

Mike reported on participant feedback (see Appendix II) from the SVCs that included assessments of the:

- CTD Handling System
- Work Deck and A-Frame/Crane - The ships are not Global Class, but the decks are large. The OOI cruises have gone well. They did the first Pioneer cruise in 3 legs.
- Acoustic Systems – There are issues with bubble sweepdown. The propeller cavitation is out of spec and the fix is estimated at \$1M. Funding for the fix will be evaluated. All in all, the ships' interior spaces are very quiet.
- Telecommunications
- Ship is too light – Ballast will be added to *Armstrong*.
- Various other issues were identified and are being addressed:
 - The anchor handling system

- Lab water intrusion
- Sheltered space for CTD operations
- Heavy lift capability on the starboard side - Jim Broda is looking into a core handling system for over-the-side. The *Sikuliaq* coring operations are from the aft.

Mike reported that all aspects of the new ships are computer driven. These systems need to be supported and this is an issue in terms of engineering support.

Discussion:

- Jon Alberts – Is the propeller cavitation problem covered by warranty? Mike Prince – Yes, but the dollar amount needs to be negotiated.
- Jim Holik – RVTEC has a major concern regarding the demands on marine technicians. The new ships are complex and the techs are called upon for support of ship related issues. Bunk space is more limited. To add additional marine tech support, science would need to give up bunk space. This issue will be brought to the Council.
- Al Suchy – Ballast Addition: On the *Armstrong* 01 level, they evaluated strengthening the deck to make it more structurally sound to accommodate extra vans. They looked at mounting the vans longitudinally. Two vans seemed to be the right compromise. Since they were in the process of adding ballast to the ship, this was the right time to also strengthen the deck. WHOI is also adding a lot of tie-downs. This is a big part of the Post Shipyard Availability (PSA).
- Tim Schnoor commented on the design and construction process. Since the design process was competitive and based on the Science Mission Requirements (SMRs) there is little or no ability for the Navy to improve the ship as it is designed. The Navy only has the authority to tell competitors if their design meets or does not meet the specs. The ship is then built to the design. The advantage of the OCRV process is that the cost for two ships was reasonably low at \$180M. However, the owner is responsible to fix the ships afterwards for things that could not be changed during the construction process. The RCRV process has more opportunities for feedback throughout the process. The design/construction of *Kilo Moana* was an R&D process and we don't want to do it again.
- Mike Prince – Based on lessons learned, moving from SMRs to performance requirements is where we could use more input.

Regional Class Research Vessel (RCRV) – Brian Midson (NSF) provided the report. His slides are included as **Appendix III**.

The Request for Proposal (RFP) Phase-1 was completed in November 2016. Eight bids were submitted from shipyards for the construction of the RCRVs. Phase-2 is underway which is the potential protest period.

The RCRV Final Design Review (FDR) was completed in November 2016 and the recommendation was to proceed to the Construction Phase.

It is unlikely that NSF will be able to move forward with operator selection until spring 2017, at the time of the FY2018 budget request. OSU was awarded as the design/construction contract and they would operate the first vessel. Once the ships are built, the funds for the first year of operation will be supported from MRE-FC funds. NSF will try to isolate a full year of operation funding for science verification activities.

Discussion:

- Jim Swift – is there a UNOLS representative in this process? Should there be a FIC representative on the RCRV review? Brian Midson – Members of the community are involved in the reviews. He would be happy to call on FIC at anytime. They also have a science oversight committee chaired by Bill Fanning (URI) with representatives from all research disciplines.

Mid-Life Refit Plans for *Thompson*, *Revelle*, and *Atlantis* – Mike Prince, Tim Schnoor, and Doug Russell provided the report.

Mike Prince began the report. His slides are included in **Appendix II** (slide 5). *Thompson*, *Revelle*, and *Atlantis* are beyond the mid-point of their 30 year service lives. The mid-life overhauls will address regulatory requirements, obsolescence, upgrade/replace problematic systems, and extend the service lives of the vessels beyond 30 years.

Design work was completed on July 14 for *Thompson's* mid life refit and the shipyard was selected on August 15, 2016. *Thompson's* overhaul will run until July 2017 in Seattle at the Vigor shipyard.

Planning for the 2018 overhaul of *Roger Revelle* has begun. Funds permitting, a late 2019 overhaul project is anticipated for *Atlantis*. The overhauls are expected to extend the service life of these ships by 10 to 15 years.

Tim Schnoor commented that *Revelle* will begin its overhaul in 2018, but will coordinate with UNOLS. It is a 12-month process. They are not sure if the 2017 budget will include funds for the *Atlantis* refit.

Discussion:

- Peter Ortner – Is NOAA planning to refit *Ron Brown*? Tim Schnoor – NOAA is watching the UNOLS mid-life plans carefully. NOAA would not take their ship out of service for a full year.

Doug Russell continued the report via WebEx. His slides are included as **Appendix IV**. He reviewed the *Thompson* mid-life timeline and milestones.

The mid-life contract was awarded on 24 August 2015. *Thompson* ended science operations on 24 May 2016 and entered the shipyard on 16 June. The first seismic compressor was removed on 28 June and the ship was dry-docked on 15 August. The first generator was removed in August and the first new generator set was onboard in late September. The ship came out of the dry-dock on 25 October.

The shipyard period is scheduled to be complete on 28 July 2017 and a shakedown cruise will be in late August 2017. *Thompson* will return to service in mid-September 2017.

Doug showed a series of slides with images of the shipyard activities (see Appendix IV). Good progress is being made on the refit, but there is still a lot of work ahead. They found a lot of things that needed attention that were unexpected. They look forward to get back to work.

Discussion:

- Rose Dufour – NSF supported improvements to the lab spaces on *Thompson*. Doug Russell – They received a lot of great support from ONR, NSF and Congress. Mike Prince – There has been approximately \$40M total for the refit effort.
- Annette DeSilva – Is the same level of funding expected for *Revelle*? Mike Prince – The same amount is expected from Congress.

Engine Control and other modifications on R/V *Kilo Moana* - Tim Schnoor and Sandy Shor provided the report.

Kilo Moana upgrades have been made to replace outdated and un-supportable propulsion control and generator control systems. This has included:

- Switchboard Components
- Bow Thruster Drive
- Update to Propulsion Drives
- Filters
- Automation and Alarm System
- Upgrade to DP system
- ECDIS System

Tim Schnoor reported that the University of Hawaii put together a proposal to eliminate the problems with the engine control system. R/V *Kilo Moana* was taken out of service in May to make the upgrades. It was a very ambitious project and they had hoped to be finished by the end of July. The schedule didn't work out as planned. After initial testing, electrical issues were revealed and some redesign had to be done. There was an interim solution and long-term solution suggested. In order to resume operations by late 2016, the interim solution was pursued (the ship is now back in service). After it completes its operations and returns to port, the ship will go out of service again to pursue the long-term solution. NSF will also invest some funding support for the long-term fix.

Sandy Shor reported that the problem with the control system was because the active filtering system did not work and it put out spikes. The interim solution was to put line conditioners into the propulsion system. On the down side, the interim solution reduces the power by 15%. The ship has been underway to Samoa for a 36-day cruise. The long-term solution will take place over the winter (after 17 January). The active filters will be replaced with passive filters.

In other news, U. Hawaii moved their marine facility this year. This was a big effort and very time consuming. During the same timeframe, they ran a submersible program on *KOK*. Approximately 95% of the dive program was completed, but then the ship experienced a propulsion problem and limped home.

Discussion:

- Rose Dufour – Did the US Coast Guard (USCG) charge UH for their inspections?
 - Sandy Shor – They are charging for overtime, but not travel expenses. When the ship was in Portland, the process was taking too long and the USCG became concerned over the cost for their people's time.
 - Tim Schnoor – The USCG has indicated that since the Navy owns the vessel, it is a public ship and doesn't get inspected by USCG. Navy war ships are not inspected. A number of years ago the USCG agreed to do the inspections because institutions operate the ships. In recent years the USCG indicated that they want to be paid for carrying out the inspections. The Navy is working on a Memorandum of Agreement with the USCG to support FTEs on each coast for the inspections.
 - Sandy – When the actual inspection on *Kilo Moana* happened in late November, it was very constructive. USCG worked to identify issues. U. Hawaii resolved the problems and received the Certificate of Inspection last week.
- Jim Holik – How is *Kilo Moana's* Caley handling system working? Scott F – Travel arrangements for a Caley technician is needed to work on the system.

R/V Barnes Replacement Plans – Rick Keil provided the report. He has been a 25-year user of *Barnes*. The University of Washington (UW) has made a high priority request to the state for \$16M for construction of a replacement ship. They are engaged with the state legislature to see this through. The funding source has been moved it out of the education fund to the transportation/ferry fund. UW has also called on the other Washington state universities to help support the ship. The ship is now being referred to as a State ship. The state legislature resumes in January and they are optimistic that funds will be approved. Rick thanked Doug and his team for all of their work moving the replacement project along.

Jim Swift – Is there a role for FIC? Rick – He doesn't think that FIC needs to do anything now.

Status of a California state effort to acquire a vessel to replace *Robert Gordon Sproul* – Jim Swift provided the report for Bruce Appelgate. His slides are included as **Appendix V**.

Jim explained that California needs a dedicated research vessel. California depends on the ocean for resources, commerce, defense, infrastructure, and quality of life. There is a growing need for undergraduate and graduate education involving instruction, research, and practical training at sea. The California economy is strongly tied to the ocean and drives a growing demand for maritime research. *Roger Revelle* and *Sally Ride* have worldwide research portfolios, and will not predictably be available in California waters.

Universities throughout California require an accessible, affordable, capable research vessel for classes and student research projects, operating on time frames tailored to academic calendars. California also needs the ability to mount rapid response missions to ephemeral events, with quick access to a research vessel.

Research vessels able to carry out California's local research and education needs have decreased from 3 to 1 (R/V *New Horizon* and R/V *Point Sur* have been retired from UNOLS service), with the last remaining ship, R/V *Robert Gordon Sproul*, approaching the end of its service life.

The vision is to establish a new kind of partnership within California, involving public and private universities, research institutions, state agencies and non- governmental organizations to support a new California Coastal Research Vessel (CCRV) for seagoing education and research.

Efforts to date include:

- Moss Landing Marine Laboratories and the Scripps Institution of Oceanography have agreed to collaborate jointly on this effort.
- Committed significant seed funding from each institution
- Assembled Scripps *Small Ship Task Force* to define institutional needs
- Sent *Dear Colleague* letter to 100+ ship users statewide to solicit input
- Scripps began a DOT-sponsored feasibility study (with Sandia National Labs) of a zero-emission research vessel, including conceptual design

The CCRV goals for 2017 include:

- Develop SMRs
- Develop a management plan: How will a single vessel be managed and operated such that it is able to support multiple institutions?
- Engage, educate, and build support within the state and local government
- Develop a conceptual design for the CCRV.

Correspondence on this project can be directed to Bruce Appelgate tba@ucsd.edu and Mike Prince prince@mlml.calstate.edu.

Polar Vessels – Update on future design/construction activities – Tim McGovern provided the report. They are very encouraged with the strength of the response from contractors interested in providing ships for the Polar program. A project office has been set up to start plans for two new vessels. The timeline is still being worked out. *Nathaniel B. Palmer* will reach the end of its service life in 2022 when the contact ends. *Laurence M. Gould* will reach the end of its service life in 2020.

NSF will remain with the contractor own/operated ship model. By the time of the spring 2017 FIC meeting, NSF will hopefully have a management plan drawn up. They will call on FIC for feedback.

In other program activities:

- *Gould* is now the only ship that can tie up at Palmer station. They would like to be able to accommodate more ships at the Palmer pier.
- The *Palmer* and *Gould* have gone through the NSF inspection and it was a very positive activity.
- Two new RIBs have been delivered to Palmer Station. They each have twin 224 HP diesel engines and are equipped with winches. These will be able to reach 25 miles out beyond the support ship (currently the Zodiacs can only operate within 5 miles).

Discussion:

- Jim Swift – When will NSF engage an oversight committee on the design for the new Polar ships?
 - Tim McGovern – The RFI specifications included a range of capabilities. The low end is the current capabilities (found on *Palmer*). The high end is the UNOLS Polar Research Vessel (PRV) specifications.
 - Jim Swift – UNOLS could help put together an oversight committee. He plans to coordinate with Bob Campbell (AICC Chair) on future plans.
- Tim McGovern – Over the past 10 years the integration between Polar Programs and OCE has increased a lot.
- Jim Swift – The Polar ships have been used to support general-purpose oceanographic research. It makes sense to have the broader community involved.
- Jim Swift – Has there been any more activity on the acquisition of the USCG’s new icebreaker?
 - Tim McGovern – NSF gets involved only when asked.
 - Jason Minett (NAVSEA) – He has been on the project for two weeks. Science capabilities have been identified. However the project is over-budget so they are looking at reductions. The science capabilities could be impacted. It is an ongoing discussion. If the community wants something, they have to speak up.
 - Tim McGovern – NSF does not have a science capability request for the USCG ship. They would like a heavy icebreaker for breakout to McMurdo Station.

Break

R/V *Langseth* & MLSOC/FIC Liaison Report - Rick Murray provided the report. In August, NSF circulated a “Dear Colleague Letter” (DCL) seeking written expressions of interest regarding new financial and/or managerial models that would provide the marine seismic capabilities to meet the expected needs of academic research scientists. The DCL is part of OCE’s effort to develop a long-term, stable seismic capability. The deadline for community responses was November 11, 2016. NSF is pleased that they received several responses to the DCL.

Currently NSF is in the process of reviewing the responses to determine if there are commonalities. NSF won't make a decision before the fall AGU meeting. They will use the AGU meeting to get additional community feedback. NSF has worked hard to engage the community through UNOLS and workshops. They will do something and do not plan on continuing the current model. NSF is pleased by the breadth of information collected. It was a very useful endeavor. NSF is slowly sorting out a path forward. Rick thanked LDEO for all of their help.

Sean Higgins continued the report. *Langseth* finished seismic operations off of Chile and is thrilled to report that operations have gone smoothly. The amount of data collected rivals a 3D cruise. It is nice to carry out projects that have been in the works for many years. The ship is now retrieving OBS'.

The exact twin ship of R/V *Langseth* was decommissioned and is in Norway. With support from NSF, LDEO was able to salvage various equipment from the ship, including compressor spares. The value of this has been great. They were able to replace *Langseth's* evaporator system. The cost has already paid for itself. Some of the equipment will be sold.

Nathan Bang's cruise will take place in January. *Langseth* has a port stop in Valparaiso and a media event is planned.

Nathan Bangs reported that in early November, MLSOC sent out a request for Letters of Interest (LOIs) to assist in long-range planning for *Langseth* operations. The response has been good.

A meeting was held at LDEO on November 21, 2016 to discuss strategies for more efficient international coordination and scheduling of seismic infrastructure assets – ships and their portable seismic systems. The meeting included participation from international colleagues. A white paper will be drafted that highlights recommendations.

Fleet Projected Service Life End Dates - Annette DeSilva shared slides with charts of the Fleet Service Life end dates. Her slides are included as **Appendix VI**.

- NSF recently suggested a new chart format to display Fleet service life. The new format along with the previous format was presented.
- Nancy Rabalais pointed out that there is a real need for a ship in the Gulf of Mexico. The Pelican will reach the end of its service life in 2020.
- It was suggested that the median age of the fleet be included on the chart.

Ship Service Life Memos – Annette reported that prior to the FIC meeting, NSF provided Jim Swift with a memo regarding the service life end dates for Barnes, Sproul, Pelican, Oceanus, and Endeavor. NSF supports the end dates as indicated in the Service Life End-Date Chart. The end dates for these ships will continue to be re-evaluated during future ship inspections.

Full Optimal Year (FOY) Range Definitions – Annette DeSilva reviewed the FOY definitions for each ship in the Fleet (see **Appendix VI**). The FOYs will be re-evaluated annually and updated with feedback from the ship operators. The FOYs are not based on the ship schedules, but instead on activities such as major shipyard periods, etc.

Modification of UNOLS Ship Time Request and Scheduling (STRS) System to Account for each Calendar Day – Jon Alberts provided the report. His slides are included as **Appendix VII**.

The goal of this effort is to clearly illustrate all activities that the ships are engaged in over a calendar year, beyond just the charge days on the ship schedules.

As a first step, we will review the current “types of days” to create a complete list of the types of ship activities that we will track on the UNOLS ship schedules. NSF has funded additional hours for the UNOLS Programmer to modify the STRS system. The STRS system will be modified so that on the bottom of ship schedules in addition to which agencies funded X amount of days, we will also track other types of days, such as maintenance, outreach, shipyards, inspections, etc.

The ship schedules will show both “charge days” and other types of days which have traditionally been called Non-Op days. When the STRS programming is completed detailed instruction for the schedulers will be provided. Going forward, utilization graphs will be modified to show the new usage data.

Science Verification Cruises and Post-cruise feedback on *Sikuliaq*, *Armstrong* and *Ride* as they enter into science operations – Annette reported that a “FIC Members” only webpage has been created that contains an archive of the debrief documents and SVC reports.

There was a discussion on the debrief process and if the debrief reports should be shared further with agency representatives and the marine operator. It was decided to table the discussion until the executive session.

Annette reviewed the status sheet of debriefs that had been completed. Some FIC members commented that debriefs had been completed, but the report had not yet been submitted to the UNOLS Office.

The 2017 assignments will be made during the executive session. It was noted that there are many cruises for the new ships in 2017. The FIC decided that there has been a sufficient number of debriefs conducted for *Sikuliaq* and that we can end the debriefs after 2016 operations are complete.

Lunch Break

Bruce Appelgate (SIO) joined the FIC meeting from via Telepresence and WebEx. Bruce is on the R/V *Sally Ride* for a Science Verification Cruise to assess Telepresence and ROV operations. All is going well at sea.

New Technologies and System Evaluations:

Scripps Institution of Oceanography (SIO) ROV update – Annette DeSilva provided a brief update. In late 2015, SIO hired a full-time ROV Engineer to work on ROV *Trident*. The first quarter of 2016 was spent readying the vehicle for sea trials. At the end of that period there was a critical failure of the topside control system of the vehicle. SIO has engaged Greensea for the integration of a new control system. The repair is scheduled for January 9, 2017 with sea trials to follow based on vessel availability.

Univ. of Hawaii ROV update - Scott Ferguson provided the report. The vehicle was ready for trials in August, but the ship was unavailable. U. Hawaii also migrated to the Greensea System control system. There are two scheduled cruises next year for the ROV. One is for support of the Aloha Cabled Observatory and the other is a private funded cruise.

The status of the *Research Vessel Safety Standards Appendix B* (UNOLS Overboard Handling Systems) – Jon Alberts and Alice Doyle provided the report. Their slides are included as ***Appendix VIII***.

The community is still struggling to gain compliance. The plan as of November 2016 is to:

1. Assess the fleet to determine the compliance level and get feedback.
2. Get Sample Documents online (sample MCD, OHS Operator Manual, simplified App B Assist Sheet, etc.)
3. Review the assessment to determine what is giving us trouble and how can it be remedied (training, resources)?
4. Determine if a partial compliance is possible.
5. Conduct App B Training
6. Provide further education to the science community

Discussion:

- Bob Houtman – What is the timeline? Jon Alberts - We hope to have the assessment complete in the next couple of weeks. A presentation will be made to the RVOC.
- Chris Measures – The scientists need more than education about Appendix B. They need help to facilitate compliance.
- Annette DeSilva – Is there a new Appendix B compliance date? Bob Houtman – Will the Safety Committee set a new compliance date? Jon Alberts – After the assessment is complete, the Safety Committee will take this on.
- Jim Holik – He is concerned that the fleet will never be in compliance. We need to determine what is realistic.
- Al Suchy – WHOI has spent \$150K on this issue and still is not in compliance. They cannot carryout the tests that were recommended by Glisten.
- Rose Dufour – Compliance with Appendix B will be part of the new Cooperative Agreements. She needs direction on what should be included in the agreement.
- Bob Houtman – We need to establish a requirement that that can be complied with and a date for compliance. This is a task for the Safety Committee
- Peter Ortner – Wearing his lawyer hat, this situation needs an acceptable solution.
- The topic will be revisited.

Continuous, real-time measurements of the Arctic water and carbon cycles using in situ stable isotope systems: Examples from 2015 & 2016 Healy missions - Jeff M Welker and Eric Klein, University of Alaska Anchorage. Jeff Welker presented the talk via WebEx. His slides are included as **Appendix IX**.

Jeff's research group carried out *Healy* isotope cruises in the Gulf of AK, Bering Sea, Chukchi Sea Borderlands, and the Beaufort Sea in 2015 and 2016. They did fine-scale surface seawater isotope geochemistry looking at the seasonality of seawater isotopes (in and out of the Arctic Basin along similar transects). They also examined surface water responses to sea ice variation and feedbacks to marine boundary layer water vapor traits (sourcing moisture).

Jeff wants to inform FIC about the new technologies that are available for deployment on vessels. He has been having similar discussions with AICC on how to move forward. Jeff showed plots of the data collected during his cruises (see slides). He presented data that would be possible with some of the instrument packages.

Jeff advocated for strengthening the in-situ capacity and mission of the UNOLS platforms. There is an urgent need for dedicated advanced instrument packages installed and operational on the UNOLS vessels for Atmospheric, Cyrospheric, Hydrologic, Oceanographic, Marine and Terrestrial System Research.

Discussion:

- Tim McGovern – He would be interested in learning how much support these systems require and how they are supported?
- Rose Dufour – What systems are on *Sikuliaq*? Jeff Welker – There are none. Rose encouraged Jeff to contact Brad Moran.
- Jeff will give a talk at AGU.

Overview of MAC Resources & Update on Sea Acceptance Tests of Multibeam Systems on New Vessels – Guest Speaker, Vicki Ferrini, was invited to the FIC meeting to provide a talk on MAC and the resources that are offered. Vicki’s slides are included as **Appendix X**.

The Multibeam Advisory Committee (MAC) that was motivated by a 2010 workshop at NSF that focused on issues with Multibeam performance. It is a community-based effort with the goal of ensuring that high-quality Multibeam data are consistently collected across the Fleet. MAC was funded by NSF (Jim Holik’s program) in 2011 and renewed in 2015. Multibeam systems are just one of many complex sensors on each ship.

The MAC collaborators include Vicki (LDEO), Paul Johnson (UNH), and Kevin Jerram (UNH). MAC focuses on data acquisition. They work to address issues in close to real time. MAC is made up of three teams:

- Shipboard Acceptance Team (SAT) - Ensures all hull-mounted Multibeam systems are installed, calibrated, and configured properly and consistently (Johnson, Jerram)
- Acoustic Noise Team (ANT) - Performs acoustic noise tests to assess and potentially improve sensor efficiency (coverage) and data quality (Gates).
- Quality Assessment Team (QAT) - Ensures Multibeam sonar systems are operated in a consistent manner that maximizes data accuracy, precision, and scientific utility (Ferrini, Jerram, & Johnson)

The MAC goals are to:

- Engage the community of stakeholders (operating institutions, technicians, scientists, funding agencies, industry, and specialists).
- Share information within and beyond UNOLS (e.g. NOAA, OET, SOI, etc.)
- Facilitate communication
- Develop consistent protocols and best practices
- Complement other fleet-wide efforts
- Educate the next generation

Vicki displayed a matrix of the Fleet’s Multibeam systems by ship and system types.

At the request of ship operators, MAC will visit their ship. There are standard protocols for assessing systems across the fleet. A report is generated for each ship visit. After review by the ship operator, the report is made publicly available on the MAC website. Vicki reviewed the activities that take place during a ship visit. These include:

- System review
- Patch Test
- Accuracy Assessment
- Swath Performance Test
- Noise Testing
- Water Column & Backscatter

Details about each of these tests are contained in the slides. Some of these tests can be done remotely.

A list of the MAC SAT visits since 2012 is provided in the slides. Plots of the Multibeam data from these tests are also included in the slide set.

There are open access resources available to the community that includes technical reports, technical resources, and a Help Desk. Resources can be found on the MAC website at <http://mac.unols.org>. The MAC technical resources include software tools, cookbooks, and documentation (see examples in slides).

The QAT provides various shore-based activities that include:

- Best Practice Documentation
- Remote Patch Tests
- Help Desk mac-help@unols.org
- Troubleshooting
- Assisting scientists with survey planning and data processing

Vicki reviewed some future plans for MAC:

- Poster at 2016 AGU
- BIST Database [under development]
- Encyclopedia of lessons learned
- UNOLS-wide coordination related to potential acoustic interference

Discussion:

- The FIC expressed their appreciation for the MAC support. They are a tremendous resource.
- Scott Ferguson – NSF has funded teams of people for ADCP, gravimeters, SATNAG. This makes a huge difference in helping the marine technicians get their jobs done.
- Rose Dufour – Do you get involved with ancillary facilities? Vicki – Not really.

Break

Science Mission Requirements for Global Class – At the last meeting a subcommittee was formed to draft Global Class mission scenarios. The subcommittee includes Greg Cutter, Jim Swift, Clare Reimers, and Byron Blomquist. Some of the tasks that had been suggested for the subcommittee include:

- Develop the mission scenarios / science drivers.
- Gather UNOLS Community input
- Engage federal agencies
- Lessons learned from recent vessel construction projects
- Compare these to the Global class capabilities.
- Design the SMR so that it is a living document

Jim Swift opened the topic and stated that one of the most important tasks for FIC is preparing for the next class of Global Class ships. When we think of the Ocean Class ships as replacements for *Knorr/Melville*, they have less capacity. The Ocean Class ships are fabulous, but we need to think about how we will carry out cruises with large science parties and complex operations.

In addressing this task, we should examine how other international groups deal with global general oceanographic needs. The Germans have a new ship, R/V *Sonne*. Jim and Greg Cutter offered to put together a list of international Global R/Vs.

Discussion:

- There was a discussion on bunk utilization:
 - R2R has cruise manifests

- Pls are asked to indicate the science party size on their ship time request.
- Byron – it isn't just science party size, he brings a lot of equipment on cruises.
- Jim Swift – The debriefs are noting that space isn't available to bring students aboard.
- Rick Keil – He suggested that we convert the debrief form into a database form. Annette – the UNOLS Office can look into this.
- Tim McGovern – We should also look at what tasks can be done on shore.
- Sandy Shor – Perhaps consider contracting for a large ship for international work when needed.
- Comment – Two-ship operations can be considered when needed to accommodate large science parties.
- Chris Measures – Two-ship operations are a nightmare when it comes to sharing samples, etc. during a cruise.
- Rose Dufour – NSF would consider bartering internationally and with other agencies when needed.
- Annette DeSilva – Design information for the *Palmer* replacement could be useful, especially since OCE plans to use the ship in the future.

Rick Keil inquired about the historical fleet data and how much is available. Jim Swift asked Rick to prepare an email to describe the types of data that could be helpful for defining SMRs for future Global Class vessels. [Note: After the FIC meeting, Rick responded and provided the comments and suggestions below:

“Should we try to turn qualitative data into quantitative knowledge via data mining (past data) or reorganization of the post-cruise assessment (future) to answer specific questions? Such questions might include:

- * *How many bunks (and percentage of total bunks) are typically used and how does this vary by mission or discipline?*
- * *How many PhDs, grad students, techs, undergrads, educators and others sailed? (Helps with understanding distribution of berths)*
- * *If you could add one operation/underway measurement/other to your cruise what would it have been?*
- * *If you were redesigning the ship you just sailed on, what one or two changes would you make?*
- * *Other questions to ask?*

Additional thoughts:

- * *Town halls and surveys will be useful*
- * *Can we talk about science berthing being 2+2 where the rooms are normally for 2 scientists but when warranted there are pull down beds for additional scientists? This could allow a Global Class to normally serve 30 scientists but to handle as many as 50 for special circumstances (which could be held to specific criteria).*
- * *We need to learn about the Sonne, and about Boaty MacBoatface*
- * *We should probably also get information about design goals and field performance from Australia's RV Investigator project.*

I have two students who are shared with a colleague in the UK. They have both sailed on US and UK ships. I asked them about a comparison and was told only two things:

- * *US ships are more willing to work in bad weather. This is meant as a compliment but I wonder if we should evaluate our safety record versus other Globals? Clearly we want more and more weather capability. Just curious.*
- * *The bottles on the CTD rosette need to get bigger (I hear this quite a bit)”*

Other Business

FIC Membership – FIC position openings were reviewed.

- Deb Glickson has taken a position at the National Academy of Science and has resigned from FIC.
- Nancy Rabalais' first term is ending. Nancy has agreed to serve a second term. Council endorsement will be requested.
- Fernando Martinez' second term will end in February. His research discipline is MG&G.
- Annette – Representation from a person with an acoustics background is also desirable.
- Annette will draft a call for nominations for the two positions that will be open in 2017.

FIC Guest Speakers – FIC members were asked to identify special topics and speakers of interest for the spring meeting:

- Jim Swift – A speaker on cables – past, present, and future
- Byron Blomquist – as we look at Global ships, an overview on autonomous vehicles. How will they influence ship designs?
- Jim Swift – Innovative ship designs
- Al Suchy – A representative from Alion Science and Technology Corporation. Alion worked on the design for Australia's R/V *Investigator*.

Spring Meeting Venue Suggestions – The University of Washington was suggested as the spring venue. If R/V *Thompson* is available, FIC members could see the mid-life refit upgrades.

Opportunity for Additional Reports:

New Vessel Debrief Documents – The FIC recommended that the debrief reports be kept private to FIC. If requested, consolidated summary reports can be provided.

The debriefs for R/V *Sikuliaq* will wrap up at the end of 2016.

A motion was made and passed to adjourn the FIC meeting.