2018 Research Vessel Operators Committee Meeting- (RVOC)
University of Rhode Island- Graduate School of Oceanography
Coastal Institute Building, South Ferry Rd. Narragansett RI

Safety Committee Meeting
Tues. 17 April 2018- 0900 to 1600

RVOC Meeting
Wed. 18 April 2018- 0830 to 1700
Thurs. 19 April 2018- 0830 to 1700

Meeting Summary

UNOLS Research Vessel Operators Committee (RVOC) held their annual meeting at the University of Rhode Island's Graduate School of Oceanography on April 18-19, 2018. The RVOC- Safety Committee held their annual meeting on 17 April 2018, also at URI-GSO, and for this meeting all RVOC participants were invited to attend.

Minutes

Tom Glennon/Director of Marine Operations at URI-GSO and RVOC Chair opened the meeting with welcome remarks and introductions.

Bruce Corliss, Dean of the URI-Graduate School of Oceanography welcomed the participants to URI. He expressed special thanks to all the UNOLS marine superintendents who provide such great service to the UNOLS community.

RVOC Topics of Interest- We began the meeting with an overview and an update of these topics.

- New UNOLS Scheduling System- Changes to a 365 day year & Day Type definitions
- Full Optimal Year- Sustainable Operating Year
- Charging for home port loading & unloading- modified day rate calculation
- Appendix B- Revisions to the RVSS
- Lithium Battery- Revisions to the RVSS
- Chapter 6 and Appendix E- Harassment Prevention
- Chapter 18- Chartering Non-UNOLS vessels
- RVOC Liaison to Fleet Improvement Committee
- Cruise Planning Module

Jon Alberts/UNOLS covered these topics and slides are in the meeting presentations. Over the past year, there have been modifications to the UNOLS Ship Time Request System (STRS). These changes included adding features to allow an accounting of each calendar day. The UNOLS day types have been updated and additional details on the definition of each day type have been incorporated into the system. Jon reviewed each of the day type definitions for the

general discussion. We also discussed the full optimal year definitions, which will remain unique to each ship operation.

Another recent change is a new requirement to charge for loading and unloading in a UNOLS vessel's homeport. NSF informed us of a federal regulation titled CFR 46- 200.468, Specialized Service Facilities.
Specifically, 200.468 Specialized service facilities (b) The costs of such services, when material, must be charged directly to applicable awards based on actual usage of the services on the basis of a schedule of rates or established methodology that:
1) Does not discriminate between activities under Federal awards and other activities of the non-Federal entity, including usage by the non-federal entity for internal purposes, and
2) Is designed to recover only the aggregate costs of the services.

Each operator will be required to develop a methodology for determining a day rate for when their ship is in their homeport engaged in mobilizing,(loading) or demobilizing (unloading) for a research cruise. This methodology will be reviewed by NSF's Director of Ship Operations, Rose Dufour for final approval.
The days spent in out ports/foreign ports will be charged at the at sea day rate as has been done in the past. This will go into effect for the CY2019 ship schedules.

Jon Alberts reviewed the Safety Committee's progress on revisions to the RVSS Appendix B- Overboard Handling Systems- Design and Operation Standards and the Lithium Battery section in RVSS Chapter 9.

RVSS Chapter 18- Chartering Non-UNOLS Vessels- At the UNOLS Council meeting in June 2-18, the Council discussed this issue. Council members agreed the responsibility for ensuring the safety of a non-UNOLS vessel should not fall on the UNOLS Marine Superintendents to conduct an inspection and "approve" a vessel charter. The University, which receives a federal award for a project, takes on this responsibility for managing the risk. The Council recommended this RVSS Chapter 18 be removed from the RVSS. A vote was taken and the Council approved. It was agreed that a stand-alone document would be available as a resource for the funding agencies to use as a guideline. The UNOLS Safety Committee was asked to develop this document.

RVOC Liaison to Fleet Improvement Committee-
When Al Suchy retires from Woods Hole Oceanographic this important position to the FIC will become vacant. The UNOLS Marine Superintendents were requested to consider this and encouraged someone to volunteer. We had one candidate who submitted interest in this role. Zoltan Kelety/SIO volunteered, was strongly endorsed, and is now serving as RVOC liaison to the FIC.

Ocean Class Transition Process-
We spent a few minutes on the transition from construction to operation of the two new ocean class ships, *R/V Neil Armstrong and R/V Sally Ride*. The take home message was to plan for more time to conduct sea trials, shakedown, and science verification cruises. In addition, the importance of documenting warranty issues was stressed.

Cruise Planning Module-
Erich Gruebel/URI presented the recent work he has done on developing a cruise-planning module. The system is:

- An information sharing portal
- Loosely coupled with the STRS
- Initiated by UNOLS & NSF
- Developed by URI
- User-led development in mind
- Based on the *URI Cruise Planning App*

MERAS- The committee to *Maintain an Environment of Respect Aboard Ships* (MERAS) continues their work on addressing gender climate at sea issues and researching harassment prevention. The module one video of the latest film on harassment prevention was shown. Further work on Module II and Module III continues.

Old Business and New Business

The minutes from the 2017 RVOC meeting were accepted.

Group Purchases
John Bichy/SKIO updated the RVOC on the recent group purchase of emergency escape breathing devices. His slides gave the timeline of the purchase and the procedures followed.

Next Group Purchase- Jon Swallow/UDEL has volunteered to lead the group purchase for personal locator beacons.

Council Report
Deb Steinberg/VIMS and UNOLS Chair presented the Council report. She highlighted the current Council membership and the UNOLS transition process for the next UNOLS Office. This covered in detail the recompetition process, timeline and selection committee. The work of MERAS and the membership of that committee were provided. The new film will be three modules.

- Module I- NOAA supported
- Module II- UNOLS fleet specific
- Module III- All UNOLS Operators and their harassment prevention posters, which are prominently posted on the ships.

UNOLS Goals- Smooth transition of the UNOLS office and Improving Morale at Sea.

SMR's- The FIC is currently working on a new set of science mission requirements for Global Class Vessels. A time line slide was shown.

U.S. Federal Agency Reports

NSF
Rose Dufour provided the NSF report, which focused on the federal budget process, the congressional FY18 spending bill, American Innovation and Competitiveness Act, MOSA, and a progress report on various projects. In FY 2018, there have been three continuing resolutions and two government shutdowns. The grants to Cooperative Agreements over 10 million trigger an external review audit. The OCE budget for ship time is ~ 65 million, which does not include tech support. The science and facilities are closely aligned now at a 50/50 split. On the Major Overhaul Stabilization Account, (MOSA) there have not been many changes, although reporting requirements have increased. The charging for loading in homeports was explained as per the CFR 200.468 statute. This goes into effect for CY 2019.

Rose also emphasized the importance of NSF branding. There are recent language changes that requires displaying NSF flag and NSF credit. For example, this is now part of the CA.

"NSF requires that vessels owned by the National Science Foundation display appropriate and approved logos and/or flags on the vessel at all times. Vessels owned by other Federal agencies or by operating institutions are also required to display appropriate/approved NSF flag during voyages funded by the NSF…"

ONR
Tim Schnoor reported on recent events within ONR. Rear Admiral David Hahn is the new Chief of Naval Research. There has been some reorganization over the past year. An overview of the Department Research Initiatives that are currently in the works was shared. Tim reviewed the Navy-owned vessels of the U.S. Academic research fleet with details on the number of project and total ONR days. In 2017, there were 687 days and in 2018, ~ 460 days are planned. Updates to the Ocean class vessels, AGOR midlife refits, and the planning for the *Kilo Moana's* new overboard handling system were touched on. Tim left us with a question to consider. With the new ships being so dependent upon computers, PLC and PLU's are we adequately supporting the ships and the science technical requirements.

NOAA
Stephen Barry gave the report for NOAA. The homeport of each of the NOAA ships was reviewed. The cruise tracts for CY 2017 were shown along with the number of days at sea versus days planned highlighted. In FY 2018, 21.5 million was awarded to address deferred maintenance, which caused five NOAA ships to lose a significant number of days in lost sea time. NOAA will begin to extend winter maintenance periods to improve upon this. Recapitalization remains a focus of NOAA as the fleet would be reduced by 50 % by 2028 if no new ships were built. A review of FY18 fleet initiatives include continued efforts on the Shipboard Civility video, vessel service life assessments and polar code compliance.

U.S. State Dept.
Matt Kastrinsky reported on the marine research clearance office. The State Dept. team is now Matt Kastrinsky, Allison Reed and Amanda Williams. Matt provided a quick refresher on the laws and articles governing the Marine Scientific Research and the United Nations Convention

on the Law of the Sea. Cases when an MSR permit would be required when working within the U.S. EEZ was reviewed.

In the U.S., the nationality of the principle investigator or the chief scientists determines if a clearance is required. For example, a UNOLS ship working within the US EEZ with a Canadian Chief Scientist, would require an MSR clearance.

The process to apply for consent for a U/.S. citizen to work in foreign waters was reviewed again.

Matt's slides covered the recent challenges and trends for several countries we typically research clearances for

RATS 3.0 is soon to be released with a target date of summer/fall of 2018.

National Transportation Safety Board
Morgan Turrell of the NTSB gave an extensive presentation on the NTSB. This included an introduction on his background, the organizational structure of the NTSB and the investigative process used in the event of a maritime accident. The mission of the NTSB is to:

- Investigate accidents
- Assist the U.S. Coast Guard
- Conduct Safety Studies
- Provide Outreach materials and Advocate for Safety Improvements and Recommendations.

NTSB is an independent organization that investigates major marine accidents. "Major" is defined as having over 500,000 dollars in damages or more then five casualties. In a public/nonpublic collision resulting in 75, 000 in damages and one fatality, then NTSB will get involved.

Morgan shared that personal locator beacons will soon be a federal requirement within U.S. waters.

The federal regulations which give NTSB authority are 49 CFR Part 831 and 49 CFR Part 850.

In the event of an accident on a UNOLS ship, the NTSB Investigator in Charge would work with a party coordinator, who would then work with the UNOLS Marine Superintendents.

The "Safer Seas Digest" is an NTSB publication printed and covers broad topics on safety at sea.

***El Faro* Report-** Morgan's presentation then focused on the sinking of the *M/V El Faro.* Details on the search for the vessel were provided. The first mission was on the *USNS Apache* using the NAVY's ROV Curv21 and they located the debris field but not the voyage data recorder. In April/May of 2016 the UNNOLS vessel, *R/V Atlantis* from Woods Hole Oceanographic with the *AUV Sentry* conducted an extensive survey and the Voyage Data Recorder was found on April 26. The third mission in August of 2016 aboard the *USNS Apache*

with CURV21 recovered the VDR. Many lessons were learned from this search and VDR recovery program.

Regional Class Research Vessel Report (RCRV)
Demian Bailey presented an update on the progress of the regional class research vessel project. The main points were the timeline for the planning and building of up to three vessels. This has been in the works for over 20 years and is an integral part of the long term UNOLS planning for fleet renewal.

- NSF funded under the Major Research Equipment and Facilities Construction, (MREFC)
- OSU selected in December 2012 to lead the design refresh and over the construction.
- In FY 2017 appropriated 121.8 million. In FY 18 received 105 million for hulls # 2 and #3.
- Project Timeline has dates of November 2020 for delivery of Hull #1, then April 2021 for Hull # 2, and March 2022 for Hull # 3.

As of this report, there are five change orders approved, five pending and five under consideration. Details on the shipyard and some of the subcontractors were provided as well as vessel specifications.

Coring from UNOLS Vessels
Paul Walczak/OSU and Jim Broda/WHOI reported on the coring from UNOLS vessels.
Jim started with an historical perspective of the WHOI Long Core System on the *R/V Knorr*. Then details on the new Jumbo Piston core system were given which has a core length of 25-30 meters. This has been tested on the *R/V Neil Armstrong, in September 2017*. Components from the retired Long Core System were used. Jim described a new program to drill in Antarctica that he is developing now.

Other R/V Reports

NOC-NERC
Stuart Younghusband, Head of ship Compliance at National Marine Facilities/National Oceanography Centre presented on a recent reorganization. The National Oceanography Centre, as part of the UK Research and Innovation, will continue to operate the *RRS Discovery* and the *RRS James Cook*. An overview of the research programs for 2017 & 2018 were given with the *Discovery* operating between Newfoundland and Greenland then from Southampton to the Falkland Island doing seismic, coring, and dredging work. They also had a 35-day refit in Damen Shipyard in Cape Town. The *Discovery* is now Polar Code compliant.

The *RRS James Cook* work in the Caribbean in 2017 and then had a 27-day refit in a Damen/Amsterdam Shipyard.

The office has moved to Ownership and Governance under a Charity Limited structure. This will allow them to do work that is more commercial.

NIOZ
Erica Koning reporting.
The agency, which funds NIOZ, has completed a reorganization and the result is a determination to invest in marine science. A new funding model is being considered.
Erica gave an overview of the 2017 and 2018 operating year. The *R/V Pelagia* in 2017 worked in the North Atlantic and then into the Caribbean. In 2018, they will be working in Mediterranean Black Sea, Red Sea, then into the Indian Ocean.
They have received new equipment including a new synthetic deep-sea cable with mixed results. Further testing is required. They do have a new ELAN 2 LN generator which has worked well.

Ocean Facilities Exchange Group- OFEG
They meet two times a year and just had the spring meeting. The most important aspect of OFEG is the sharing of cruises and opportunities to share ships. The sharing of cruise programs is easier now with three of the six OFEG members using a common cruise-planning module, called the Marine Facilities Planning System. Details on the system were provided.
OFEG Tech is now up and working which allows technical group to share information.

On other news, the European Marine Board (EMB) has set up a working group to look at the future of the European research fleet.

CMRE-NATO Science and Technology
Ian Sage reporting on recent activities with a focus on the *NRV Alliance* polar operations.
They supported an NSF program in February of 2018 for Bob Pickart/WHOI. Working north of Iceland studying winter storms. In order to support this cruise the vessel had to be brought up to Polar Code Compliance. Ian explained the polar categories and the process he used to meet all the requirements.

The challenges to supporting this cruise included weather, personnel safety, ensuring the ship's equipment worked properly in extreme temperatures etc. Some valuable lessons came out of this, which can be summarized as:

- Work in extreme conditions requires comprehensive preparation
- Polar Code useful but not clear in application
- Useful information available from IACS on winterisation of ships
- Do not underestimate the cost

Thursday 19 April 2018

Ship Happens
Dennis Nixon/URI and the UNOLS Risk Manager presented an annual address on these topics:

- World Insurance Market
- Comparison of UNOLS Vessels and Risks Covered
- Research Vessel News
- Regulatory News, assisted by Morgan Turrell/NTSB
- Relevant Legal Decisions

- Conclusions

The world's global underwriting premiums are valued at 27.5 billion, but while the fleet is growing in numbers, the age of the world's fleet is aging. This is resulting in a drop in the cost of insurance premiums. There has been a ~ 10 % decrease since 2015.

Details on the costs for insurance on each of the UNOLS vessels was illustrated and the recent changes in premiums. The UNOLS fleet is getting older, which results in lower premiums, but if the ship is lost, you get less money.

Slides showed the number of total losses since 2002. A list of the issues to watch for include high value risks, oil prices and quality, climate change, human factors, cyber risk, complex technologies, and fires on commercial ships.

The number of P & I claims have also dropped in recent years. There are 35 international Protection and Indemnity clubs around the world. With insurance, it pays to shop around to get the best price.

Dennis did recommend to NSF and ONR that the deductible levels should be reviewed. If the deductible was raised, it could help save money and share the risk more widely.

Vessel News

- NOAA recently partnered with Microsoft- Paul Allen to deploy Argo floats. The Allen AUV helped locate the *USS Indianapolis* wreck.
- US Coast Guard Medivacs Chinese Patient from Icebreaker
- Captain Javier Montojo Salazar of the *R/V Hesperides* lost at sea in Antarctica.
- Details on the Research Clearances in the Philippines
- Success of the AUV Boaty McBoatface in under the ice surveys in Antarctica.
- World's First Deep-sea Mining Vessel

Regulatory News

The portion of the presentation focused on the U.S Coast Guards Final Report on the loss of the *M/V El Faro.*
The document can be found here:
https://media.defense.gov/2017/Oct/01/2001820187/-1/-1/0/FINAL%20PDF%20ROI%2024%20SEP%2017.PDF

A list of the combined factors that culminated in the loss of the ship included:

- Ship track was too close to Hurricane Joaquin to plan a safe route
- Open scuttles and vents allowed flooding once the ship took a starboard list
- Ship had been lengthened and new stability calculations were not developed for the new length.
- Cargo below decks broke free which caused internal damage.
- With the ship listing, the loss of lube oil to the main engines resulted in loss of propulsion.

- Evidence of recent crew training
- Immersion suits were dated from 1985
- No high water alarms
- Unclear policies for Designated Person Ashore

Ballast Water Convention- Enters into force September 2017; however, the laws and regulations are still very much unsettled.

US Navy Warships begin transmitting position over AIS

Public Vessel Status- Dennis reported on a recent study he worked on in regards to public vessel status for the UNOLS fleet. With Mike Prince/MLML and Read Porter from the Rhode Island Sea Grant Legal Program did research on this issue. The findings in recent case law are that the federally owned vessels in the UNOLS fleet meet the requirements of the definition for public vessel status. However, NSF and ONR announced in Nov 2017 they would continue their policies and consider the vessels as private.

Relevant Legal Decisions- Dennis presented several interesting legal decisions. See slides!

Schmidt Ocean Institute
Eric King presented the SOI report for UNOLS RVOC.
The SOI Annual Report was given with highlights from the past year's cruises. Details on the number of days in each of the various categories for 2017, 2018, and plans for 2019 were detailed. The ROV SuBastian remains very active.
A list of the institutions and the chief scientists from each was shown.

Some of the crew inspired safety practices put into place were shown which included a portable water mist fire suppression system and additional labelling on the "dogs" of watertight hatches and door.

Significant computer upgrades in recent years were described. High performance computer, matrix switchers and Google Cloud hardware were added.

Xiamen University- New *R/V Tan Kah Kee*
Haili Wang from the Marine Operations of Xiamen University attended and presented on his university's vessel operations. He presented details on the newest vessel, *R/V Tan Kah Kee.*. Glosten did the preliminary design work and construction began in March 2015 and the vessel was delivered in April 2017. General arrangement drawings were shared as well as the science handling systems. This vessel is currently the quietest research vessel in China. Some details on the Geotraces cruise plan for 2019 were discussed. Haili Wang then described the vessels of other Chinese research centers.

Marine Safety Equipment
Andy Hiller from Survitec presented on marine safety technology and some of the new products that are now available. He began with a brief overview of the Survitec Group. They are the largest provider of life rafts globally and represent every type of life raft except Viking.

Some key points presented were:
Life raft containers are not watertight as the painter allows water to seep into the case. In addition, the vibration and noise of the ship causes some deterioration. If the life rafts are not regularly serviced the inflation, charge may fail. Service bulletins are send out by the manufacturers.

The International Maritime Organization and the Code of Federal Regulations mandates how and when life rafts must be serviced.

Details on the steps involved in servicing life rafts was given.

Update on Research Vessel Safety Standards
Jeff Garrett gave this report with a review of the Terms of Reference of the RVOC Safety Committee. The recent accomplishments the safety committee has been working on since April 2017 includes reviewing and processing of four RVSS Waiver Requests. All involved incorrect wire diameter to sheave groove size mis-match.

The Safety Committee chair has been actively participating with the Science Committee for Oceanographic Aircraft Research, (SCOAR) as this committee is developing a policy for Unmanned Aerial Systems, which will be incorporated into the RVSS when finished.

The Safety Committee has been working on RVSS revisions to these chapters:

- Chapter 6 and Appendix E- Personal Behavior and Individual Safety- revisions completed
- Chapter 9 Lithium Batteries- revisions complete
- Chapter 16.3.3.3- Emergency Escape Breathing Devices- revisions complete
- Chapter 18 and Appendix D- Chartering of Non-UNOLS vessels- draft completed. Note: In June 2018, the Council recommended this be removed from the RVSS and be maintained as a stand-alone reference document.

Appendix B- Overboard Handling Systems- Updates complete, pends additional comments.

Membership. The membership of the Safety Committee as presented and RVOC was notified that new members would be need to replace current members who are rotating off.

Special Reports

Ship Inspections-
Blake Powell/JMS Naval Architects presented the report on the Ship Inspection Program. The focus continues to be both a condition and assistance survey to assist UNOLS vessel operators to "maintain safety and operational effectiveness." A review of the recently completed inspections was given. Information on some recent revisions to the RVSS were given which included lithium batteries, Appendix A, Appendix B and Environmentally Acceptable lubricants.
Blake left the group with a caution not to let complacency ruin your vessel operation.

UNOLS Wire Pool
Rick Trask/WHOI provided the annual update on the oceanographic cable pool. A correction was made to the agenda in that the pool is the NSF Wire Pool, not the UNOLS Wire Pool as shown on the agenda.
Rick introduced Andrea Harvey as the new Wire Pool Database Administrator. Rick then went on to caution RVOC members that there are differences in wire thimbles, which need to be considered on the duty service each one, will be subject to. A "standard thimble" is designed for light duty. There are significant differences in the thimble strength of thimbles of the same size. Rick's slides illustrated the differences in two ¾-inch thimbles. Under heavy strain, a small radius thimble may cause the wires wrapped around that thimble to fail.
Synthetic Cables were discussed and the analysis of synthetics and the alternatives for CTD cable. A chart comparing the synthetic cables of various manufacturers was shown.

Satellite Communications Policy and SatNAG
Jon Meyer/SIO presented an update on the Satellite Network Advisory Group. The members are currently Laura Stolp/WHOI< Ken Feldman/UW, Jon Meyer/SIO, and John Havelack/Univ. of Alaska. A progress report of what has been accomplished over the past two years was given. See slides for specific details. Work continues on managing the bandwidth and improving where possible. The Internet Usage Policy is continuing.

Ship Scheduling Committee Report
Doug Ricketts/Univ. of Minnesota gave this report on the activities of the UNOLS ship schedules as the SSC Chair. Quentin Lewis/BIOS is the Chair-Elect. Fleet utilization from 2009 to 2018 illustrates the ten-year downward trend in the number of days funded. The fleet is operating at approximately 3000 days per year with 18 ships.

Fleet Improvement Committee Report
Al Suchy/WHOI presented some news of the FIC. The FIC has taken on the task of developing written science mission requirements for the next generation of global class ships. FIC is collecting data from the science and technical community as well as the UNOLS marine superintendents. Greg Cutter/ODU is the committee chair.

Fleet Broad Band
Al Suchy/WHOI continues to manage the Fleet Broad Band and the Fleet Express.

Medical Service Update- George Washington Maritime Medical Access
Kai Neander provided the annual report from the UNOLS tele-medicine provider, which is based at George Washington Hospital in Washington DC. Kai Neander is the contract manager for UNOLS although this is his last meeting. Some background information on the company was given. Then a report of the services rendered to the UNOLS fleet from March 2017 to March 2018 was highlighted. We had 47 unique cases in the past year, up from 36 cases in the previous year, (6/16 to 3/2017). There were 155 encounters into the call center, which equals 3.3 calls per case. Statistics on the number of cases per month, cases by chief complaint, and details of 12 different categories were shown. In addition, the number of cases per vessel were provided.

This past year the UNOLS fleet operators encountered several supply issues on the procurement side. GW is addressing this with:

- A new procurement system is being put into place for faster purchase orders and shipping. Improved direct access to global maritime supply chain.
- Improvements in item labeling
- Online inventory tracking system.

The new system will enable you to interface directly with warehouse. Online tracking system will have added costs and will require fresh inventory. You will be able to purchase piece meal or a complete medical kit. The issues of shipping expired drugs and short shelf life is being looked into.

Kai Neander did state that GW could provide health assessments for crewmembers and it would take at least 72 hours.
Other news from GW are:

- Two new maritime physicians added
- Medical center rebranding and reorganization
- Increase in staff support
- Refreshed reporting procedures
- Improved newsletters.

West Coast Winch Pool
Aaron Davis/Scripps provided this report. The west coast winch pool is based at Scripps Marine Facility. The mission, funding, and how the winch pool works was clearly stated. The Scripps personnel who are part of the Winch Pool are Eric Buck as the Manager and QC, Aaron Davis is the Winch and Wire Engineer and Lorenzo McCoy is the WP technician.

Details on all the winches specifications in the pool were given and can be found on the presentation slides.

Some of the recent projects for 2017-2018 are:

- FAT on a new Hawboldt winch
- Shakedown of Markey Tensioning spooler
- Training and Maintenance programs.
- Starboard net towing attachment for the Sally Ride
- New WCWP proposal for 2018-2022
- UNOLS RVSS Appendix B. review, edits, feedback as a subject matter expert.

***R/V Thomas Thompson* Midlife Refit**
Doug Russell/UW provided an extensive review of the mid-life refit of the *R/V Thompson*. The major ship systems, which were replaced, were detailed as well as the key milestones. Some important post-delivery issues were covered. One important piece of the entire project was UW's ability to retain the ship's crew. This proved highly important in being able to bring the ship back into service after a nearly eighteen-month mid-life.

***R/V Rachel Carson* and *R/V Barnes* Update-**
Doug Russell/UW also updated in his presentation and slides the process to locate a R/V *Barnes* replacement and the steps in bringing a foreign built vessel into the United States and then into UNOLS. The *R/V Barnes* has been retired from the UNOLS fleet.

***R/V Roger Revelle* Midlife Refit and *R/V Sproul* Replacement**
Zoltan Kelety/SIO presented on the planning for the *Revelle* midlife refit, which is scheduled to begin in the spring of 2019. Zoltan shared an historical perspective of the ability of Scripps through time to take on large projects and meet the challenge in "Getting it Right"

***R/V Sproul* Replacement**
SIO and MLML are working collaboratively on a ship replacement for *Sproul*. They began by collaborating with Sandia Labs to research the feasibility of building a zero emission vessel with Sandia Labs. A hydrogen fuel powered vessel was designed but there are some challenges in meeting the endurance with a vessel the size of the Sproul. Cost is also a major consideration.

Closing Remarks.

Tom Glennon and URI/GSO was thanked y RVOC for hosting the meetings. We briefly discussed the 2019 meeting and Scripp has offered to host it in La Jolla in April 2019. Exact dates are still being worked on.

Adjourn Meeting- The 2018 RVOC meeting was closed at ~ 5 pm on Thursday 19 April