Meeting Minutes

UNOLS COUNCIL – Phone/Web Conference

Wednesday and Thursday, June 21 & 22, 2006, 1:00 pm – 4:00 PM EDT (each day)

A copy of these minutes can be downloaded as a pdf <200606cncmi.pdf>

Executive Summary -

The UNOLS Council convened a phone/web conference on June 21 and 22, 2006. This conference served as the summer meeting. The primary focus of the meeting was to review the UNOLS Subcommittee draft document that recommends a process for considering ship lay-ups and early retirements. It was agreed that UNOLS would provide criteria and values to the federal agencies. The agencies in turn would use these to develop recommendations regarding ship non-operational periods. A UNOLS Subcommittee of un-conflicted members would review and respond to the agency recommendations. Following the phone/web meeting, revisions, based on the Council comments, were incorporated into the document and circulated for Council approval. Peter Wiebe then prepared a cover letter forwarding the draft document and criteria/values to Mike Reeve. The final document on "Criteria and Process for Recommending Non-Operational Periods in the UNOLS Fleet" was circulated to the UNOLS membership.

Other Council items reviewed and discussed included:

- Ship time demand for 2007 along with agency budget projections
- Annual Meeting plans
- Council approval of the Criteria for Adding New Assets to the National Deep Submergence Facility (NDSF)
- Council approval of the addition of *ABE/Sentry* to the NDSF.
- Committee and Subcommittee activities
- FOFC Fleet Renewal Update and FIC Fleet Improvement Plan Update

- UNOLS objectives, priorities and goals for 2006/2007

Action Items

New Items	
Recommendations for Non-Operational periods of ships in UNOLS Fleet: • Finalize white paper on criteria and process. • Provide agency reps with criteria and values • Appoint Sub-Committee on non-operators • Implement process	• McNutt, Collins, Gardner, and Ortner with input from Council • Council • Peter Wiebe • Sub-Committee
Arrange for an Annual Meeting Keynote Speaker back-up plan	Peter Wiebe and Office
Invite speaker on Scientific Ethics, the impact of research activities (Lee Kimball, IUCN)	Peter Wiebe, Cindy Van Dover, Office
Establish priorities and goals for 2007.	Council, Office, & Committees
Finalize Council March Minutes – review and provide comments to Office by 6/30/06.	Council and Office
Addition of ABE/Sentry to the NDSF: • Send UNOLS recommendation to NSF, ONR, NOAA • Send announcement to Community • Revise ship time request form with check-box for *ABE*	• Wiebe and Kelley • Kelley and Office • Office
DESSC nominations - Send letters to Mike Tryon and Marsh Youngbluth appointing them to DESSC.	Peter Wiebe
Continuing Items	
Review draft UNOLS brochure and provide comments to Peter Wiebe.	Council

2006 Council Nominations: • Prepare Slate for Council approval (July 06)	Tim Cowles, Wilf Gardner, and Margo Edwards
Follow-up on USFWS importation regulations.	Peter Ortner
Implement priorities and goals for 2006, especially finding ways to improve communications with the community.	Council, Office, Agencies, & Committees
Mooring locations, release codes, set up information page/database in protected Web location	Office

Appendices

I	Meeting Agenda
II	Participant List
III	Guidelines for Incorporating Assets into the National Deep Submergence Facility (NDSF)
IV	DESSC Recommendation to add ABE/Sentry to the NDSF (4.3 MB)
V	DESSC Nominations
VI	Summary of UNOLS Issues and On-going Activities
VII	Committee Reports
VIII	Ship Scheduling Report

Day 1: Wednesday, June 21st

Call the Meeting: Peter Wiebe, UNOLS Chair, called the meeting to order at 1300 and provided an opportunity for introductions. The list of participants is included as ***Appendix II***. Peter reviewed the agenda (***Appendix I***). A major portion of the meeting was to focus on the process for ship lay-up recommendations. The March Meeting Minutes will be distributed later in the day for review.

Committee Activities and Issues requiring Council Attention:

DEep Submergence Science Committee (DESSC) - Debbie Kelley introduced two DESSC items that required Council endorsement: 1) Criteria for adding assets to the National Deep Submergence Facility (NDSF), and 2) Whether or not to bring *ABE/Sentry* into the NDSF. Deb explained that DESSC was asked by NSF to come up with a set of criteria for adding assets to the NDSF in anticipation of new assets such as *ABE* requesting to become part of the NDSF (***Appendix III***). Council discussion followed.

- John Bane asked if an asset must have a proven record of operation or could a new asset with no previous use be added. Deb explained that the committee was interested in assets that were not in the development phase. Assets should be proven with a strong demand and reliability.

- Curt Collins asked if an asset must be supported from a specific ship, or can it be used from multiple platforms? Deb – As long as the asset has broad demand, the committee doesn't feel that it is as important that it is or is not ship specific. Deb said that she would add words to the criteria requesting that the applicant specify if the asset is ship specific, of if DP was needed, etc.

- Eileen Hofmann recommended that words be added to better define "timely fashion" in item #7.

- Cindy Van Dover asked for clarification on how the guidelines would get implemented. Deb explained that agencies and/or institutions could propose adding an asset and would seek a recommendation from DESSC.

- Deb will make edits to the document for presentation to the Council on day-two of the meeting.

DESSC Recommendation to add *ABE/Sentry* to the NDSF (*Appendix IV*) – Request for Council Endorsement - Deb Kelley reported that about a year ago, Dana Yoerger (WHOI) came to DESSC with a request to add the AUV *ABE/Sentry* to the NDSF. Their proposal was to transition *DSL-120a* and *Argo* out of NDSF and bring in *ABE*. Once *Sentry* is in service, it would replace *ABE*. Woods Hole has put together an information package about *ABE/Sentry*. The package was provided to the Council prior to the meeting. Dana Yoerger would oversee the first year *ABE* operations, and then a junior engineer or manager would be hired to oversee operations. This person would report to Barrie Walden (or replacement). Deb reported that there is a lot of endorsement from the community for adding *ABE/Sentry*. *ABE* has had about 180 missions.

Discussion followed:

- Cindy Van Dover asked if is there any sense in waiting to have Dana turn over operation to a junior engineer before bringing it into the community. Deb replied that Dana is in the process of training individuals.

- Deb reported that WHOI would like to be able to announce that *ABE* can be requested as part of the NDSF for the August 15th NSF proposal deadline.

- Question - What platform can support *ABE*? Reply - As long as there is deck space for a van it can operate from many UNOLS vessels.

- Since the August 15th proposal deadline is for facility operations in 2008, the earliest that

ABE/Sentry would go to sea as part of the NDSF is probably 2008. All Council members voted in favor, except Peter Wiebe and Carin Ashjian of WHOI, who abstained.

DESSC Nominations – Deb continued with a request for confirmation of two DESSC nominees. The nominations are included in ***Appendix V***. Deb Kelley reviewed the backgrounds of the two nominees, Michael Tryon (SIO) and Marsh Youngbluth (HBOI). The Council concurred with the nominations. Peter will send letters appointing them to DESSC.

Research Vessel Operators' Committee (RVOC): Tim Askew reported that new members have been appointed to the Safety Committee and they met just prior to the April RVOC meeting. Work on the *Research Vessel Safety Standards* is progressing.

Safe Working Loads (SWL) on Wires – The RVOC will use the UK model and modify it to fit with the UNOLS safety standards. The goal is to have it completed by the next RVOC meeting.

Peter Wiebe questioned if the wires are meeting the user specifications. Reply - Some of the wires are not meeting the test specifications, but some of the specifications may not be realistic.

Mike Prince said that one thing to keep in mind is that there are some operations that we do now that would not be allowed under the UK rules. The UK rules indicated a SWL of 2:1. We need to be careful in developing the criteria for testing. Peter suggested that we start thinking about motion compensation systems so that the wires never see these loads.

Gender Climate - The last issue is the climate on board ships regarding harassment. The RVOC meeting addressed this issue through a report by Liz Caporelli and through a workshop. There are incidents that go unreported. All institutions have policies and the effort will be to make sure these policies are made known to science users and employees on a uniform basis. This has the deadline of April 2007. Rose Dufour stated that after the last Council meeting, SIO added a harassment section to their policy information form. Their harassment policy is consistent with California law. They require signatures from scientists embarking on their ships to be sure they are all aware of the SIO polices regarding drugs, alcohol and now harassment.

Subcommittee Report on Recommendations on Ship Lay-Ups and Early Retirements –Marcia McNutt, Chair of the ad-hoc committee, presented their draft recommendations on ship lay-ups and early retirements. Other Committee members included Curt Collins, Wilf Gardner, and Peter Ortner. Marcia said this was a difficult task. Much effort was put into defining the values that would be

used in making recommendations. They created a list of values and put them into a prioritized order rather than giving them different weights. The document begins with findings and a discussion of realities. Marcia reviewed the values that they are recommending. "Meeting science needs" was the highest priority. Other considerations include geographic availability, quality of operations (weighting the more recent), spreading the pain, diversity of operators. The relative cost of operations is not the biggest driver.

Marcia also reviewed the recommendations for the other questions. Marcia discussed at length the reasoning behind who would make the recommendations and how they would arrive at consensus. The subcommittee recommends that the non-operator (un-conflicted) members of the Council make up the subcommittee. The decision should be made based on what is best for the community. If the operators made the decision, it might be seen as being in the best interest of the operators. Yet, the committee should consult with the operators – operators can still play a very active role.

Linda Goad suggested that the subcommittee meet with the agency program managers before making lay-up recommendations. This would be in late July to early August.

Liz Brenner asked what would be a definition of reasonable demand for the special purpose vessels, such as *Atlantis* or *Marcus Langseth*.

Rose asked if the definition of a single ship operator applied if an institution operated UNOLS vessels as well as other vessels. Marcia thought that institutions such as Hawaii would be considered a multi-ship operator.

Julie Morris joined in and commented that she will join the phone conference for parts of today and tomorrow. NSF will take the recommendations seriously.

Liz Brenner stated that during the last few scheduling conference calls ONR and NSF indicated that non-agency owned ships would not receive lay-up funds. Is this a consideration of the recommendations? The ships impacted include *New Horizon*, and *Seward Johnson*. Marcia replied that only considering lay-up of federally funded ships is not one that is good for the community. Linda Goad commented that the ships that came into the fleet that are not owned by the agencies are not the responsibility of the agencies. NSF cannot tell a privately owned ship to lay up; the operator can still chose to operate the ship. Bob Knox stated that SIO received a letter that *New Horizon* was welcome into the Fleet and

that it was not brought in just to serve SIO's needs. SIO worked with UNOLS to bring the ship in.

The issue of institutional money that would be lost if a ship was laid up was raised. The subcommittee discussed this and decided it was not a large differentiating issue, but should be taken into account. Mike Prince suggested that UNOLS explore a new funding paradigm. Lay-ups that span over two operating years could be considered, but the agencies would have to be receptive to this. There would be a partial lay-up and partial operating year with the costs divided over two years. This should be looked into as a way to avoid losing state funds.

The discussion will continue of Day-2 of the meeting.

Break

Nominating Committee Report –Wilf reported for the Nominating Committee, which also includes Tim Cowles as Chair and Margo Edwards. They have a partial list of people interested in standing for election. They need to find nominees for Chair-Elect, an At-Large position, an Operator position and a Non-Operator position. Wilf pointed out that the response is not overwhelming. Marcia suggested that they call institutions that are not represented on the Council and solicit specific recommendations for nominees.

UNOLS Brochure - Peter Wiebe said that he would like to finalize the brochure and circulate it. Comments on the draft can be sent to the UNOLS Office. A list of suggestions was made for circulation, such as potential ship users (NAVO, NUWC, etc), Congress, The House Science Committee, The Senate Ocean Policy Committee, the NOPP Office, CORE, etc. There was a suggestion to update the brochure yearly, post it on the website, and circulate it both in hard copy and as a URL. It should be sent to the UNOLS membership and in included in any mailings.

John Freitag asked that Navy be dropped from the statement about funds not appropriated for Ocean Class vessels.

UNOLS Issues - A brief written summary of various UNOLS issues was distributed prior to the meeting (***Appendix VI***). These were quickly summarized during the phone conference.

Federal Oceanographic Facilities Committee (FOFC) Fleet Renewal Update – Peter reported that the draft FOFC plan was provided to Mike Prince, Dave Hebert, Annette DeSilva, and him for review.

Minor changes will be incorporated into the document then it will be circulated to the agencies for approval. Peter asked if the Naval Research Advisory Committee (NRAC) report would impact the FOFC plan recommendations. Reply - The NRAC report will impact Navy's report to Congress in early July. The report will impact what the official Navy view will be as reflected in the FOFC report. Rob Pinkel asked if UNOLS lay-up recommendations would have a negative impact on Navy planning. Bob Houtman replied, "definitely" and they are working hard to find full utilization for their ships.

Fleet Improvement Committee (FIC) Fleet Improvement Plan (Reclassification of Ship Classes) – FIC has worked with FOFC to establish a reclassification of the Ship classes along with the definition of full utilization numbers. The new classification is included in ***Appendix VI***. The FIC is also staying engaged with ORION to get new information on observatory facility needs. The FIC hopes to finalize their draft Improvement Plan this summer and distribute it in early fall for Council and FIC review.

Regional Class Acquisition Process – The plans and timeline were reviewed (***Appendix VI***). Mike Reeve believes that NSF can go forward with the operator selection process before they down-select to final design and construction contractor. The exact timing will depend on how the details are approved. If all goes as planned the contract for construction of the first ship would be awarded in fall 2007.

Ocean Class Acquisition Status: The Ocean Class funds for design that were appropriated in FY06 will only be used if the Navy decides to build ships. The funds are NAVSEA funds and would be executed by them, but the timing may dictate turning them back and getting them in a later Fiscal Year.

Earlier in the spring Navy formed a Naval Research Advisory Committee (NRAC) to provide a recommendation regarding Navy's role in the acquisition of Ocean Class vessels. The NRAC has provided their recommendations to the Assistant Secretary of the Navy (ASN). The recommendations are not public. The NRAC recommendations to ASN will be used in Navy's report to Congress.

Global Class Science Mission Requirements – An on-line survey for community input on Global vessel science mission requirements has been drafted and reviewed by the subcommittee. Their comments will be incorporated. When ready, the form will be advertised to the community.

Marcus Langseth Conversion Status – Paul Ljunggren provided a written report on the status of the *Langseth* conversion. It is included in ***Appendix VI***. The report describes the shipyard activities that have been completed and that are planned. Mike Purdy (LDEO) has withdrawn their plans for a ship welcoming ceremony in September 2006, citing some uncertainties in the conversion schedule.

UNOLS STR/Scheduling Database – Mike Prince reported on the status of the UNOLS STR/Scheduling database project. Science users would have a login name and password. Mike showed a sample form. There is a form for submitting comments. There is a page for science program managers. Essentially, the ship time request form and scheduling form work fine and by the end of the year it should be available for use. Mike would like to synchronize the introduction of the form with the start of a particular scheduling season. It has been a challenging project.

Americans with Disabilities Act (ADA) Guidelines – Annette DeSilva reported on the effort to develop ADA Guidelines. Slides are included in ***Appendix VI***. Terry Whitledge (University of Alaska, Fairbanks), Fleet Improvement Committee member, chairs the ADA Guidelines Committee. Membership on the ADA Committee includes FIC members, the UNOLS Risk Manager, Marine Superintendent, *Langseth* Conversion Rep, an RVTEC Representative, seagoing scientists with disabilities, a Ship Master, and a Safety Committee Representative.

Two phone/web conferences have been held (2/06 & 6/06). A Preliminary ADA Guidelines for the Regional Class document has been drafted. The document is being revised based on Committee input. Planning is underway to convene a Workshop. The attendance will include ship operator representatives, agency reps, and sea-going scientists including those with disabilities. The preferred site for the workshop is at a location where a UNOLS vessel could be toured. The workshop will be used to review the draft guidelines, test the practicality of the procedural guidelines, and identify any additional ADA guidelines.

Safety Standards for Human Occupied Vehicles (HOV) – Annette DeSilva reviewed progress on the effort to create Safety Standards for Human Occupied Vehicles. Slides are included in *Appendix VI*. The committee is chaired by Dana Wilkes (NOAA), and includes HOV Operators, a UNOLS Safety Committee member, Science HOV users, and HOV pilots. The committee has held two meetings, one in January 2006 in Tampa, FL and

one in May 2006 at Woods Hole, MA. They plan to hold a phone conference every other month starting in August to review Chapters. They expect to have the document finalized by October 2008

US Fish & Wildlife Service Importation Policy – NSF and NOAA have worked to investigate the importation policy, but no additional information has become available.

Frequency Spectrum Management – No status report was available.

UNOLS Annual Meeting – The Annual Meeting is on October 6, 2006 and will be held at NSF. The Keynote Speaker is Leon E. Panetta. A list of Annual Meeting topic suggestions was reviewed.

Codes of Conduct - The Impact of Scientific Studies on the Environment – This item was tabled until day two.

UNOLS objectives, priorities and goals for 2006 – 2007 - Mike Prince discussed the need to review existing goals and priorities. He asked the Council to provide remarks on any needed changes. The draft objectives, priorities and goals will be reviewed, discussed, and finalized at the next Council meeting.

Bill Martin asked if the Council could report to the RVTEC on the progress made in achieving last year's goals. He feels that it would be useful for the RVTEC to hear what has been done.

Adjourn Day One

Day 2: Thursday, June 22nd

Day 2 - Opening Remarks – Peter Wiebe opened the second day of the Council phone/web conference. The meeting participants introduced themselves and are listed in ***Appendix II***.

Eileen Hofmann and Marcia McNutt pointed out some typos in the March Council minutes. The typos

will be corrected and the revised minutes will be re-circulated for approval.

Criteria for Incorporating New Assets into the NDSF – Deb Kelley reported that she incorporated the revisions to the Criteria that were suggested on day one. Marcia McNutt indicated that the revision looks good. A motion was made and approved to accept the criteria (McNutt/Gardner).

Codes of Conduct - The Impact of Scientific Studies on the Environment – The Council discussed the importance of this issue and the need to stay informed. It was decided to invite Lee Kimball of IUCN to the fall Council meeting.

Subcommittee Report on Recommendations on Ship Lay-Ups and Early Retirements – Discussion continued from Day 1 - Curt Collins raised the issue about whether or not the Council would even want to make specific recommendations. Many of the Council members are from institutions that operate vessels and would potentially be conflicted in decisions regarding lay-ups. Lengthy discussion centered on whether the Council should make the recommendations, the subcommittee, or perhaps that the Council only makes recommendations about the factors and process, but not the specific recommendations. Another alternative would be to suggest possible scenarios or to suggest priorities. Linda re-iterated the benefit of having the subcommittee meet with the agencies. Discussed how to proceed with the process.

Marcia suggested the following process:

- Council approves the criteria and values.

- Agencies with Schedulers develop specific recommendations back to the subcommittee

- Subcommittee considers the recommendations, considers arguments and suggestions from operators and the agencies and then concurs, and/or suggests alternative solutions.

- UNOLS Recommendations will be vetted by the Council.

Liz Brenner stated that the schedulers would like to avoid this situation of determining ship lay-ups every year. They thought that it would be useful to have out-year recommendations and perhaps a rotational lay-up plan. John Freitag pointed out that rotational lay-up plans might not be feasible. Demands for ship classes and geographic research areas vary annually. Fleet operations would need to be revisited each year.

There was some discussion about the graphs and what to present in the recommendations document. It was decided to review the ship utilization graphs first.

Break

Agency Budget Projections:

UNOLS Fleet schedules, estimated operation costs, and 2007 ship scheduling – Mike Prince reviewed the status of the ship scheduling process and estimated costs for 2007. Slides are included in ***Appendix VIII***. There are about 4500 days requested for 2007. Mike has applied a 1.35 factor when calculating the ship days required (this is to account for port days, etc). The ship schedules at the time of the Council meeting include double and triple bookings of requests. The schedulers have been directed to construct consolidated schedules.

Mike provided a chart of the 2007 operating days and estimated cost by agency. The Navy ship time is low, but there is likely more to come. The NSF cost is higher than in 2006 because R/V *Langseth* is scheduled to begin service. In 2007, NSF would have 75 percent of the fleet cost.

A chart showing funded requests for 2007 through 2011 was displayed. Mike Reeve cautioned that this chart could send the wrong message. People unfamiliar with the process, might think that the funded requests are going sharply down. Instead the chart shows that there is already funded work into the out-years.

The Council consensus was that the UNOLS Fleet Utilization (2000-2007) chart and the 2002 – 2007 UNOLS Fleet Operating Days and Costs chart do a good job of illustrating the ship scheduling situation.

Break

There here was further discussion on the draft criteria document for recommending ship lay-up periods.

- Bruce Corliss recommended that the subcommittee size be at least three members. Additional words were added to indicate that it is the responsibility of the UNOLS Chair to supplement the committee as needed to maintain a disciplinary balance and appoint additional non-conflicted members as needed to have more than two members. These individuals should be appointed from past Council members who served in the previous three years.

- Eileen Hofmann recommended to change the word "would" to "will" in the document.

- It was recommended to adjust the timeline so that it specifies, "within 30 days of receiving the agency recommendations, the subcommittee will provide the response to the agencies." The agency recommendations would be circulated to the operators and Council and Subcommittee at the same time.

- All types of alternate utilization recommendations should be considered, such as, stand-downs, lay-ups, and giving a ship up for Navy use. Any out year considerations should be identified.

UNOLS will send the criteria to the agencies following the Council meeting.

Summary of process:

1. The Council would make recommendations regarding the criteria and process.

2. The substantive recommendations, using the recommended criteria, should be made by the Agencies to the subcommittee of the UNOLS Council consisting only of members from non-ship-operating institutions. The UNOLS Chair may appoint past Council members or other UNOLS committee members if necessary.

3. The subcommittee will share the draft recommendations from the Agencies with UNOLS ship operators, the Council, and any other interested parties (e.g., the UNOLS office, users, etc.). Based on input from those groups, the subcommittee will prepare a response to the Agencies on the recommendations and possible alternative scenarios to consider.

4. Within 30 days of receiving lay-up and/or retirement recommendations from the Federal agencies, the subcommittee will conduct their review and then provide a response back to agencies after vetting their response through the full Council.

5. The subcommittee recommendations to the Agencies should be approved by the subcommittee by simple majority. Minority opinions in the case of less than unanimous consent should be transmitted as well.

Additional comments:

- The benefit of the recommended process and decision is that it is more open. It will also give the Council a better feel for the match of science to the mix of ships.

- Agencies recommendations would be circulated to everyone at the same time.

Agency Reports:

NSF - Mike Reeve reported that the 2007 NSF budget includes a 6.5 % increase. There is a $4.5M increase requested for ship operations. Peter Wiebe asked that if the budget increase were received would there be additional NSF work approved to go to sea. Mike Reeve – Yes, there were many requests for 2007.

ONR - John Freitag reported that the ONR budget for 2007 is expected to be the same as this year.

NOAA – The NOAA/PMEL programs that require large ships; will continue to want to use UNOLS ships if the money is available. However, the NOAA Ocean Exploration usage of UNOLS ships is expected to go down. For 2007 there is one request for *Jason2*. The budget for the DART mooring is about half of what NOAA had previously expected it to be. Originally Shannon McCarthy had wanted one designated ship (Charter or UNOLS), now multiple ships including *Wecoma, Ron Brown, Seward Johnson, Pelican,* and ships of opportunity will support the DART work. At best, NOAA's budget will be level, with perhaps a dip in the near term.

Peter Wiebe extended a UNOLS farewell to John Freitag. He stated that we have appreciated John's efforts over the years and we thank him. John said he has enjoyed his time with UNOLS.

Committee Reports and Comments – Written reports were provided by Committee Chairs and are included as ***Appendix VII***.

Bill Martin suggested that the RVOC Safety Committee strongly consider a phone/web conference meeting before the next RVOC meeting. Tim Askew seconded that idea. Peter agreed and stated that an agenda for the meeting should be drafted and circulated. Mike Prince reported that Tom Althouse will be retiring in a few years and would like to step down as Chair of the Safety Committee in another year. He is looking for a replacement. The members of the committee as a group need to step forward and come up with a Chair replacement.

Bill Martin continued by stating that the document drafted by the ship-layup subcommittee seems to be just ship related, and does not address the impact on crew and marine techs. If an operator lays-up a ship, they stand to lose their marine technicians and a wealth of education/training investment. If an operator cannot keep the technicians employed at their institution, they stand to lose a lot. Marcia McNutt explained that the subcommittee was not asked to consider the effects of the lay-ups. They looked at the aspects raised, but in more general terms. She gave the example of the multi-ship operator considerations and that they would have the ability to move people around more easily if only one of their ships were layed-up. Marcia suggested that perhaps another document is needed to address the impacts of lay-ups. This would include the impacts on graduate education, the value of the trained professionals – crew and technical. Linda Goad encouraged operators to contact Sandy Shor regarding marine technician lay-up issues.

It was recommended that the title of the lay-up document be changed to "Criteria and Process for Recommending Non-Operational Periods in the UNOLS Fleet." John Bane suggested that the definition of the term "non-operational periods" be defined somewhere in the document.

There was a long discussion on which ships would be excluded from consideration for lay-up. Rob Pinkel stressed that UNOLS should consider the Agency recommendation on both lay-ups and stand-downs. He expressed concern as to why *Melville* was selected by the agencies for a stand-down.

The subcommittee will take the recommendations from the phone conference and incorporate them into the document. The revised document will be circulated to the Council one last time before finalization.

Linda Goad thanked the Council for their thoughtful consideration of this topic.

A motion was made and approved to adjourn (Collins/Askew).

June 14, 2006

DRAFT

Tentative Agenda

UNOLS COUNCIL – Phone/Web Conference

Wednesday and Thursday, June 21 & 22, 2006, 1:00 pm – 4:00 PM EDT (each day)

Instructions for logging on and dialing into the phone/web conference will be provided prior to the meeting.

A pdf version of this agenda can be downloaded by clicking <200606cncag.pdf>

Day 1: Wednesday, June 21st

1250 **Log into Picturetalk Web Conference**

1300 **Call the Meeting:** Peter Wiebe, UNOLS Chair, will call the meeting to order and provide an opportunity for introductions.

- Accept the minutes of the March 2006 Council Meeting.

1315 **Committee Activities and Issues requiring Council Attention:**

- DEep Submergence Science Committee: (Debbie Kelley)
  - Criteria for Adding Assets to the National Deep Submergence Facility – Request for Council Endorsement
  - DESSC Recommendation to add ABE/Sentry to the NDSF – Request for Council Endorsement
  - DESSC Nominations – Request for confirmation of DESSC Nominees.
- Research Vessel Operators' Committee: (Tim Askew)

RVOC Safety Committee Membership and status of Safe Working Loads project.

- Gender Climate at sea –Report on discussion and recommendations from the RVOC meeting.

- Committee Chairs will have an opportunity to raise any other issues requiring Council attention.

1345 **Subcommittee Report on Recommendations on Ship Lay-Ups and Early Retirements** – The Ad-hoc committee of Marcia McNutt (Chair), Curt Collins, Wilf Gardner, and Peter Ortner will present their draft recommendations on Ship Lay-ups and Early Retirements. (Marcia McNutt)

1415 **Nominating Committee Report**– The Nominating Committee will provide the status of this year's Council slate. (Tim Cowles)

1430 ***Break***

1445 **UNOLS Brochure** (Peter Wiebe)

1500 **UNOLS Issues** - A brief written summary of the following items will be distributed prior to the meeting. There will be opportunity for Council comments or discussion.

- Academic Fleet Renewal Activities and Plans:
  - FOFC Fleet Renewal Update
  - FIC Fleet Improvement Plan Update (Reclassification of Ship Classes)
  - Renewal Implementation:
    - Regional Class Acquisition Process
    - Ocean Class Acquisition Status

- Global Class Science Mission Requirements
- *Marcus Langseth* Conversion Status
- UNOLS STR/Scheduling Database

- Americans with Disabilities Act (ADA) Guidelines
- Safety Standards for Human Occupied Vehicles
- US Fish & Wildlife Service Importation Policy
- Frequency Spectrum Management – RVTEC subcommittee activities
- UNOLS Annual meeting - October 6, 2006, Keynote Speaker - Leon E. Panetta

1530 **Codes of Conduct - The Impact of Scientific Studies on the Environment –** Discuss the suggestion to invite an IOCN representative, or Margaret Hayes to a future UNOLS Meeting to address this topic.

1545 **UNOLS objectives, priorities and goals for 2006 – 2007** (Mike Prince)

1600 ***Adjourn Day One***

Day 2: Thursday, July 14th

1250 **Log into Picturetalk Web Conference**

1300 **Day 2 - Opening Remarks** – Peter Wiebe

1310 **Subcommittee Report on Recommendations on Ship Lay-Ups and Early Retirements** – Discussion continued from Day 1. Identify follow-up actions.

1350 **Agency Budget Projections** – Discussion on Agency utilization and

budget projections.

1400 **UNOLS Fleet schedules, estimated operation costs, and 2007 ship scheduling – (**Liz Brenner and Mike Prince)

1430 **Break**

1445 **Agency Reports** - Agency Representatives will have an opportunity to report on matters of interest to UNOLS.

1500 **Subcommittee Report on Recommendations on Ship Lay-Ups and Early Retirements** – Discussion continued. Identify follow-up actions.

1600 ***Adjourn Day Two***

UNOLS COUNCIL – Phone/Web Conference						
Wednesday and Thursday, June 21 & 22, 2006						
Meeting Participant List						
Day 1	**Day 2**	**Last**	**First**	**Affiliation**	**Phone**	**Email**
x	x	Ashjian	Carin	WHOI	(508) 289-3457	cashjian@whoi.edu
x	x	Askew	Tim	HBOI	(772) 465-2400 x 262	taskew@hboi.edu
x	x	Bane	John	UNC	(919) 962-0172	bane@unc.edu
x	x	Brenner	Liz	SIO/UCSD	(858) 534-2841	shipsked@ucsd.edu
x	x	Collins	Curtis	NPS	(831) 656-3271	collins@nps.edu
x	x	Corliss	Bruce	Duke	(919) 684-2951	bruce.corliss@duke.edu
x	x	DeSilva	Annette	UNOLS	(401) 874-6827	office@unols.org
x		Detrick	Bob	WHOI	(508) 289-3335	rdetrick@whoi.edu
x	x	Dieter	Dolly	NSF	(703) 292-8583	edieter@nsf.gov
x	x	Dippold	Laura	UNOLS	(831) 771 4411	office@unols.org
x		Dufour	Rose	SIO/UCSD	(858) 534-2841	shipsked@ucsd.edu
x	x	Freitag	John	ONR	(703) 696-4530	freitaj@onr.navy.mil
x	x	Gardner	Wilf	TAMU	(979) 845-7211	wgardner@ocean.tamu.edu
x	x	Goad	Linda	NSF	(703) 292-7706	lgoad@nsf.gov
x	x	Hebert	David	URI	(401) 874-6610	hebert@gso.uri.edu
x	x	Hofmann	Eileen	ODU	(757) 683-5334	hofmann@ccpo.odu.edu
x	x	Houtman	Bob	Ocean.US	(703) 588-0847	b.houtman@ocean.us
x	x	Kelley	Deborah	UW	(206) 543-9279	kelley@ocean.washington.edu
x		Knox	Robert	SIO/UCSD	(858) 534-4729	rknox@ucsd.edu
x	x	Lamerdin	Stewart	MLML	(831) 771-4134	lamerdin@mlml.calstate.edu
x	x	Martin	Bill	UW	(206) 616-3998	bmartin@u.washington.edu
x	x	McNutt	Marcia	MBARI	(831) 775-1814	mcnutt@mbari.org
x	x	Morris	Julie	NSF	(703) 292-8580	jdmorris@nsf.gov
x	x	Pinkel	Rob	SIO/UCSD	(858)534-2056	rpinkel@ucsd.edu
x	x	Prince	Mike	UNOLS	(831) 771-4410	office@unols.org
x	x	Reeve	Mike	NSF	(703) 292-7707	mreeve@nsf.gov
	x	Shor	Alexander	NSF	(703) 292-8583	ashor@nsf.gov
x	x	Smith	Holly	NSF	(703) 292-7713	hsmith@nsf.gov
x		Van Dover	Cindy	W&M/VIMS	(757) 221-2229	clvand@wm.edu
x	x	Wiebe	Peter	WHOI	(508) 289-2313	pwiebe@whoi.edu

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM
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Guidelines For Incorporating New Assets Into the National Deep Submergence Facility

In the coming years there will be significant demand for new tools designed to carry out or support research, exploration, and installations within the ocean basins and on the deep seafloor. In conjunction with the development of new assets, there will also be a need for uniform community access to them. Because of these important pending issues, the National Science Foundation requested the DEep Submergence Science Committee (DESSC) to develop criteria for incorporating assets into the National Deep Submergence Facility (NDSF). This document provides guidelines for how new, appropriate assets will be evaluated for incorporation into the NDSF.

Federal agencies and academic institutions considering incorporation of a deep-sea research asset into the NDSF will request DESSC to review and consider the item for status. DESSC will contact the current operator for further information. In consultation with the appropriate scientific community, DESSC will evaluate the information provided and respond to the requesting Federal agency with a letter of recommendation.

A current operator should be prepared to provide the following information to the DESSC in order for the item to be evaluated as a potential addition to the NDSF resource pool:

1) Is there a significant and established broad demand by the community for the asset and will this demand continue in the future? Evidence for meeting this requirement should include a sustained record of funding and successful deployments, documentation that includes publications based on this success, and letters of endorsement from the user community.

2) Would incorporating the asset into the NDSF make it significantly more beneficial to the community than it is now? How would the community benefit by having it in the facility?

3) Does the asset provide a unique capability to the deep submergence community that is not currently available from other facility assets and/or is the demand so high that a single asset cannot fulfill the demand? A full description of the asset should include its unique capabilities, the type of environment it is suited to work in, and the types of science (present and future) that it is suited to address. Operators should also include a statement regarding what type of vessels and capabilities are required to operate the asset (e.g. is dynamic positioning a requirement?)

4) Is the asset proven to be robust and beyond a developmental stage? Documentation of successful missions/deployments should be included with records of reliability, durations of deployments, and life expectancy.

5) What is the plan for transitioning this asset into the NDSF and how will it be incorporated operationally into the facility? This plan should include a detailed time line.

6) What are the financial costs associated with the asset? Include complete documentation of the operational, maintenance, and personnel costs (current and estimated in the future), complete inventory of high-price components, documentation of off the shelf versus one-of-a-kind required components, and number of required shore-based and ship-based personnel. Consideration should be given to the logistical support required for expeditions and shore-based work.

7) What is the mechanism for providing high-quality data products from the asset in a timely fashion that are easily accessible to the users? Are the data products in a standard format useable by the general community? Are the data products similar to those from other NDSF assets? Products such as navigation track lines and bathymetric maps should be produced by the end of the expedition. Other products may require longer time periods for processing. Information regarding expected timeline for completion of products should be included in the request.

DESSC will review all NDSF assets on a periodic basis. New NDSF assets will be formally reviewed in the first and third year after initial incorporation into the facility. For these reviews, the operator will provide DESSC a detailed analysis of the performance of the asset, including evaluations from recent users and a summary of true costs associated with the tools use over a period of time designated by DESSC.

DESSC Recommendation to Incorporate ABE/Sentry into the NDSF

The operators of ABE requested DESSC to consider incorporation of ABE/Sentry into the NDSF. They have reviewed their request and associated documents and fully endorse inclusion of ABE/Sentry into the National Deep Submergence Facility (NDSF). Incorporation of ABE into the National Deep Submergence Facility (NDSF) would be concurrent with the removal of the towed systems DSL-120A and Argo II. DESSC also endorses the transitioning of the autonomous vehicle Sentry into the NDSF, and its replacement of ABE when Sentry becomes fully operational.

In support of the DESSC request, the following documents are provided for consideration at the next UNOLS Council meeting:

1) A letter of endorsement from DESSC

2) Support letters from the international science user community that include endorsements from:

Charlie Langmuir	Harvard University
Russell McDuff	University of Washington
Gretchen Fruh-Green	ETH-Zurich
Suzanne Carbotte	Lamont-Doherty Earth Observatory
Maurice Tivey	Woods Hole Oceanographic Inst.
Tim Shank	Woods Hole Oceanographic Inst.
John Sinton	University of Hawaii
Colin Devy	IFM-GEOMAR

3) Attachment 1 - The original ABE/Sentry white paper presented to DESSC by WHOI at their meeting in Woods Hole in May 2006.

4) Attachment 2 - A brief overview of the ABE vehicle, what it does, how - and its specifications.

5) Attachment 3 - Detailed information of the ABE data products that would be provided as standard as an NDSF vehicle.

UNIVERSITY OF WASHINGTON
Seattle, WA 98195

Peter Wiebe
UNOLS Council Chair
Woods Hole Oceanographic Institution
Woods Hole, MA 02543

June 12, 2006

Dear Peter:

The operators of the Autonomous Benthic Explorer (*ABE*) have requested the DEep Submergence Science Committee to consider incorporation of *ABE* into the National Deep Submergence Facility (NDSF) concurrent with the removal of the towed systems *DSL-120A* and *Argo II*. DESSC has reviewed the information package and proposal submitted by the *ABE* operators and fully endorses inclusion of *ABE* into the NDSF in as timely of fashion as possible. The replacement of the two older assets (*DSL-120A* and *Argo II*) by *ABE* will improve the mapping, imaging, and exploration capabilities of the NDSF and place the facility in a good position to meet future challenges associated with deep sea exploration and research. DESSC also endorses the transitioning of the autonomous vehicle *Sentry* into the NDSF, and its replacement of *ABE* when Sentry becomes fully operational.

The flexibility and reliability of *ABE* has made this vehicle a favorite of the community for mapping, exploration, and geophysical and water column studies and there is very strong community support for bringing *ABE* into the NDSF (please see supplemental letters of support that are included with this letter of recommendation). Missions flown by *ABE* are routinely highly successful. They have lead to the collection of 1) some of the highest resolution, highest quality seafloor bathymetry obtained within the ocean basins; 2) the discovery and efficient mapping of new hydrothermal vent fields (e.g. Lau Basin); 3) novel heat flow and geochemical studies of hydrothermal plumes; and 4) detailed photographic imagery of the seafloor that allows assessment of ecosystems. *ABE* is also well suited for flying in highly rugged terrain (e.g. vertical and overhanging ledges and 60 m tall chimneys at Lost City). Its synchronous use with Jason 2 and Alvin allow extremely efficient and cost effective use of ship time and it is an important asset to have on multidisciplinary cruises.

The demand for *ABE* has been high, with over 180 missions completed, and it is anticipated that this demand will only continue to grow. *ABE* has been the AUV workhorse for the science community and new technological developments incorporated into and planned for *Sentry* will help NDSF meet upcoming challenges associated with rapid response capabilities, ocean observatories, and a growing demand by biological oceanographers for detailed measurements and observations. Because of increased community demand for *ABE* and its proven track record it is important that *ABE* becomes incorporated into the NDSF in a timely fashion so that this facility can continue to meet community science needs now and in the future.

Sincerely,

Deborah S. Kelley
Chair of DESSC

HARVARD UNIVERSITY

DEPARTMENT OF EARTH AND PLANETARY SCIENCES
20 OXFORD ST.
CAMBRIDGE, MA 02138
TEL. (617) 495-2351 FAX. (617) 495-8839

Debbie Kelley
Chair, DESSC
School of Oceanography
University of Washington

12 June, 2006

Dear Debbie:

I am writing to you in support of including an AUV in the National Deep Submergence Facility (NDSF). My recommendation is based on my experience with ABE during a cruise to the Lau Basin a year and a half ago, so I will start with a brief report on what ABE allowed us to do that led to a far more efficient use of valuable ship time.

The Lau Basin in the southwest Pacific is a distant location for US Ships, and therefore the development of this area as a Ridge2000 (R2K) integrated study site was logistically challenging. I was chief scientist of the second cruise of this four cruise program, with the aim to locate hydrothermal vents and carry out regional rock sampling along a ridge length of about 44km. How could this be most efficiently accomplished?

Through consultation with Chris German, then based in the UK, and Woods Hole colleagues, we came up with the idea of using ABE as the hydrothermal exploration tool. While the planning documents for R2K had envisaged the second cruise as localizing but probably not actually finding vent sites, we envisaged that with ABE we might be able to go from water column signals to actual vent field location, completion with photo-mosaics. Then, while ABE was diving and recharging batteries, we could do rock sampling from the surface, effectively doubling the efficiency of shiptime compared to a sequential series of rock sampling and plume sampling programs carried out from the ship itself.

We used ABE in three different modes. In Phase 1, ABE flew at the depth of the neutrally buoyant plume, which permitted us to map the plume well in two dimensions. Then based on this information we designed Phase 2 to fly 50-75 meters above the bottom, carrying out further water column work and obtaining sea floor bathymetry. Since ABE's depth and propeller usage were continually monitored by the vehicle, analysis of these data not only provided us with superb bathymetry far beyond what the ship was able to obtain, but also showed abrupt vertical changes in depth showing when ABE intersected the buoyant plume stem. These data then permitted Phase 3, 5-10 meters above the bottom when ABE was able to take color photography for the identification of specific vent fields and first order characterization of the biota. ABE was able to navigate through complex chimney terrain, even in areas that subsequently were viewed logistically challenging for Jason. Through this series of phased exploration, we were able to discover and characterize three new vent fields, and also

provided the Japanese information that led them directly to the discovery of the Mariner field in the southern part of the study region.

While ABE was working and recharging, we were able to carry out the most intensive rock sampling program of any back-arc basin, making the Eastern Lau Spreading Center the best studied back-arc basin in the world.

ABE had three major advantages for us. First, it enabled a strategic and very successful approach to vent discovery, with unprecedented success over such a short period of time in a poorly known and tectonically complex area. Second, ABE provided an unparalleled data set-- three dimensional water column information over many square km, high resolution bathymetry, and photo-mosaics, all navigated on a common basis. Third, ABE enable far more efficient use of ship time, providing 50% more rock samples than would have been obtained otherwise.

This program was very expensive because ABE was included as a line item. It could be funded through the normal proposal process because this cruise was an essential part of the R2K program, with a long planning process and community mandate behind it. I would be very reluctant to propose such a program without such a background. It is one of the strange aspects of our funding system that even programs that allow more efficient use of our valuable and increasingly scarce shiptime can run into problems owing to the review process and the natural psychological sticker shock response. If ABE were to be included in the NDSF, such programs of exciting science and increased efficiency would be facilitated.

To conclude, I had not previously used an AUV, and I found the ABE capabilities and personnel professional, helpful and accommodating. They worked long hours to ensure the success of our program. I am confident that they would work well within a structure such as the NDSF, permitting wider use of this emerging and rapidly improving technology, and more efficient use of our ship resources. I strongly recommend the inclusion of ABE, and hopefully more advanced vehicles in the future, within the NDSF.

Sincerely,

Charles Langmuir
Professor of Geochemistry

UNIVERSITY OF WASHINGTON

SCHOOL OF OCEANOGRAPHY
Russell E. McDuff, Director

June 13, 2006

Dr. Deborah Kelley
UNOLS DESSC Chair
University of Washington
School of Oceanography
Box 357490
Seattle, Washington 98195-7940

Dear Deb,

I would like to add my strong endorsement to the ABE AUV (and eventually its successor Sentry) being added to the National Deep Submergence Facility in conjunction with the removal of older, less capable platforms.

This is a transition that I have advocated since 2000 and so I consider this a step that is long overdue. The cost effective conduct of many R2K studies has been impaired by the "free" availability of the Jason family versus funding ABE costs from science funds. ABE has primarily focused on mapping, but my own experiences demonstrate that it is a flexible vehicle, with top technical support for adaptation to other missions.

I hope in the future DESSC adopts an approach to stewardship of NDSF such that these transitions occur in a more timely way.

Sincerely,

Russell E. McDuff
Professor and Director

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Email: frueh-green@erdw.ethz.ch

Chair, Deep Submergence Science Committee
Prof. Deborah Kelley
University of Washington
School of Oceanography
Box 357940
Seattle, WA 98195

June 8, 2006

Inclusion of ABE in the National Deep Submergence Facility

Dear Debbie,

In anticipation of the up-coming recommendations to UNOLS about AUVs, I would like to express my support of the addition of the Autonomous Benthic Explorer (ABE) as part of the National Deep Submergence Facility. As you are aware, our experience with the use of ABE during the 2003 Lost City expedition was extremely positive and I was very impressed with its unique mapping and exploration capabilities.

I think it is important to emphasize to UNOLS that the bathymetric data collected from the Lost City field is truly astounding and has proven crucial to our understanding of this spectacular hydrothermal system. Our work with ABE produced a unique bathymetric map with a resolution at the meter scale, which has allowed us to recognize very small-scale geological features and has led to a much better understanding of how the Atlantis Massif was formed, what processes have led to the formation of Lost City, and why it is located where it is. In addition, our expedition in 2003 was the first time that ABE had flown in an extremely steep and complex terrain. It performed amazingly well and proved its flexibility not only in navigation but also in the mode of conducting sonar surveys – in addition to down-looking surveys, the possibility to have the sonar placed at a side-looking angle was invaluable to better image the steep cliffs along the face of the massif and the pinnacles and towers in the hydrothermal field.

I am convinced that other groups have experienced similar successful deployments of ABE and that a very broad marine community would benefit greatly if ABE were added as an official AUV of the National Deep Submergence Facility. The highly flexible and versatile operating conditions available with ABE and its potential for producing high quality, 3D bathymetric data open up numerous possibilities for mapping and exploring new areas of the ocean floor. In addition, the ability to couple ABE missions with other vehicles is a highly efficient way to conduct field programs like that at Lost City.

With best wishes

Gretchen Früh-Green

LAMONT-DOHERTY
EARTH OBSERVATORY
OF COLUMBIA UNIVERSITY
P.O. Box 1000 61 ROUTE 9W Palisades, NY 10964-8000 USA

Dr Deborah Kelley
Chair of DESSC
School of Oceanography,
University of Washington
(kelley@ocean.washington.edu).

June 12, 2006

Dear Dr Kelley,

I am writing in response to a request for a letter of support for adding the ABE-Autonomous Underwater Vehicle (AUV) to the National Deep Submergence Facility. Since it's development in the 1990's, ABE has been used for a number of unique seafloor and water column mapping studies that have provided new insights into fundamental crustal accretion and hydrothermal processes. In the coming years there is no doubt that AUVs like ABE will play an important role in observatory science and will be crucial for the event response studies envisioned under ORION. Adding the ABE AUV to the NSDF would facilitate wider use of this remarkably versatile vehicle for marine science and would encourage the further development of AUV technology for academic research. I am highly supportive of this proposal to transfer the vehicle to the NSDF.

My own experience with ABE is as a user of ultra-high resolution bathymetry survey data collected using this vehicle by Cormier and Ryan in 1999. During this program, ABE was configured with a variety of sensors enabling the collection of co-located and complementary data along pre-programmed tracks. My focus was the Imagenex bathymetry collected to provide a complete coverage of a portion of the southern East Pacific Rise at 18°14'S. The resolution of the seafloor bathymetry obtained with this system was unprecedented and provided for the first time seafloor maps comparable in resolution to the highest achievable on land.

The significance of this vastly improved spatial (3-5m) and vertical (< 1m) resolution for my study is that it enabled application of a fault restoration technique to assess the relative contributions of magmatic and tectonic extension to seafloor spreading and axial trough relief. A variety of mechanisms have been proposed for the crestal troughs found along portions of the fast spreading ridges including tectonic extension, volcanic collapse and subsurface magmatic movements. The complete coverage Imagenex bathymetry enabled us to fully characterize the tectonic displacement field associated with faults and vertical-offset fissures in the region and calculate the seafloor subsidence volume represented by the crestal trough. Comparison of the trough volume

with typical seafloor eruption volumes, revealed that only a small subset of the frequent magmatic events which build the upper crust are needed to form the pronounced axial depression. A significant reduction in magma supply to the ridge crest, which is invoked in some models for axial troughs, is not required. This study would not have been possible without the ultra-high resolution data that can only be acquired with near bottom vehicles. The precise navigational capabilities of ABE were as important to the success of the mapping capability as the ability to operate a high resolution sonar near the seafloor.

From my involvement with Ridge2000 and MARGINS related science it is clear that there is increasing need for the high resolution mapping capability only achievable with autonomous underwater vehicles. ABE has proven itself to be a highly versatile platform of use for a variety of investigations. Operation of the vehicle as part of a national facility is now needed to stabilize support and facilitate the broader use of this unique capability.

Best Regards,

Suzanne Carbotte
Doherty Research Scientist
Carbotte@ldeo.columbia.edu
845-365-8895

WOODS HOLE OCEANOGRAPHIC INSTITUTION

Dr. Maurice A. Tivey, *Tenured Associate Scientist Department of Geology and Geophysics*

Dr. Maurice A. Tivey
phone (508)-289-2265
email: mtivey@whoi.edu

June 8th 2006.

Prof. Deborah Kelley
Chair – Deep Submergence Science Committee (DESSC)
Sch. Of Oceanography
University of Washington
Seattle, WA

RE: Incorporation of AUV ABE/Sentry into the NDSF

Dear Debbie

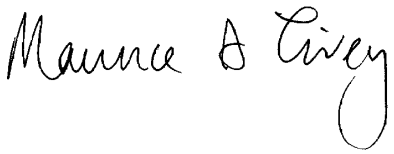
I would like to express my support for bringing an autonomous underwater vehicle into the National Deep Submergence Facility (NDSF) which is operated by Woods Hole Oceanographic Institution (WHOI). It is my understanding that the Autonomous Benthic Explorer or ABE vehicle will be initially used within the facility, but that ABE will be replaced with the second generation vehicle Sentry by the end of 2007 once that vehicle has been demonstrated to be equal to or superior to the ABE vehicle.

I was the first science user of ABE back in 1995 when I suggested that the ABE engineering team led by Al Bradley, Dana Yoerger and Barrie Walden could collect magnetic field data for me while testing their various subsystems. Since that time, ABE has gone on to log more than 180 science-driven missions collecting more than 3000 km of bottom tracks with remarkable success. The data ABE has been able to collect has both excited and inspired scientists and technologists alike. The funding agencies of the National Science Foundation (NSF) and the NOAA Ocean Exploration program were very supportive of science programs utilizing this new technology. This support was particularly impressive as the costs of the vehicle operations had to come out of the science funding portion of the programs. Scientists were willing to sacrifice increased bottom lines to their budgets because of the quality and high-resolution nature of the data and because the ultimate scientific insight one obtained from an ABE survey was simply unparalleled at the time. With tighter budgets becoming *de rigeur* it has been more difficult to sustain this. Many colleagues have asked me why such technology is not more widely available and part of the NDSF. The remarkable robustness of the ABE system, its compatibility with the navigational systems of other NDSF vehicles has meant that joint missions using ABE and Alvin or ABE and Jason have been remarkably successful. This synergy makes the idea of having ABE/Sentry part of the NDSF a no brainer in my book.

While the use and availability of AUVs has expanded tremendously over the last few years, the availability of deep ocean capable AUVs and also the ability to navigate and negotiate in typically rough terrain has been much more limited. ABE and its successor Sentry are specialized platforms for science which like other vehicles in the NDSF offer unique capabilities for research in the deep ocean. These capabilities, such as the ability to hover, or back up in rough terrain and to navigate using existing NDSF navigational infrastructure are a force-multiplier to the existing use of NDSF vehicles freeing up Jason or Alvin to concentrate on manipulator-intensive operations rather than having these systems "mow-the-lawn" for a portion of their operations. The additional capability of unattended AUV operation freeing the ship to pursue other science operations such as CTD casts or multibeam mapping or even dive the submersible Alvin means increased efficiency and cost-effectiveness of ship time for science.

In summary, I believe that having an AUV with the unique capabilities offered by ABE and its successor Sentry is a very positive step for the NDSF and one that will make the facility even more successful than it has been to date.

Sincerely,



Maurice A. Tivey

MS #24 ♦ Woods Hole, MA 02543 USA ♦ Phone: 508-289-2265 ♦ Fax: 508-457-2023 ♦ E-mail: mtivey@whoi.edu

WOODS HOLE OCEANOGRAPHIC INSTITUTION

To: Dr. Deborah Kelley
Chair, Deep Submergence Science Committee
School of Oceanography
University of Washington

June 10, 2006

From: Dr. Tim Shank
Associate Scientist
Biology Department
Woods Hole Oceanographic Institution

Re: Consideration of ABE into the NDSF- a biological perspective

Dear Debbie,

I understand the ABE (Autonomous Benthic Explorer) is currently being considered for inclusion in the National Deep-Submergence Facility. As a past user of ABE, I would like to provide you with my perspective, perhaps somewhat unique (but not for long) as I am one of the few biologists (actually perhaps the only one so far) who has used ABE repeatedly to conduct biological research. Over the past ~5 years, I have utilized ABE as part of five research programs (over 25 dives) and have witnessed enormous advances in the capabilities and field-readiness of the ABE's systems. ABE has been essential for rapidly and efficiently locating and mapping remote vent sites to investigate the composition and distribution of vent communities (e.g., from 2002- Galapagos, to 2004- Lau Basin, to 2006- South Atlantic) as well as to interact synergistically with partnered vehicles (e.g., Alvin and ROV Quest) to collect fauna and other data for a variety of detailed studies, including the pursuit of the evolutionary relationships among hydrothermal vent fauna around the world (e.g., discovery of vent sites in the South Atlantic and Lau Basin).

As you know, ABE conducts fully autonomous surveys of the seafloor and is especially well suited to working in the rugged terrain on the mid-ocean ridge crest. ABE has proven reliable for constructing micro-bathymatric maps of the seafloor as well as overlapping digital imagery for the critical characterization of seafloor fauna and their habitats prior to follow on bottom operations (e.g., Shank et al., 2003). Recently, ABE has been used for several biological programs in the Galapagos Rift, Lau Basin, New England Seamouts and the South Atlantic which have further proved its reliability as a high-resolution seafloor survey vehicle, and pointed to its unique characteristics not only to collect detailed, near-bottom geological, geophysical and ground-truthing data, but also detailed photographic imagery and subsequent mosaics that permit the characterization and assessment of organismal-habitat relationships.

The next five years of deep-sea biological research will utilize ABE and it's imaging capability for diverse biological objectives, including: 1) detailed mapping of the temporal and spatial changes in faunal community structure with repeat transect imaging surveys (observatory-type applications), 2) biologically mapping large continuous swath-like expanses of the seafloor (e.g., several degrees of latitude along a mid-ocean ridge, in concert with other AUVs) to document the patchy distribution of populations for developing metapopulation models; and 3) exploring under polar ice for potentially unique species and

ecosystems. Actually, I am happy to let you know that each of these examples is already funded and underway, with biological hypotheses driving the use and need for ABE (and other AUVs).

Biological science applications in the future include the autonomous tracking of pelagic organisms (e.g., larvae, harmful dinoflagellates) and the fusion of autonomous delivery mechanims, adaptive sampling, and species-specific molecular probes to detect, characterize, and assess microbial community structure, the movements and behavior of larvae, phytoplankton, and zooplankton, and how their genes function in differing environments. These new perspectives on seafloor biological processes (and their scales) will revolutionize our ability to image the deep ocean and seafloor and have already fostered a paradigm shift in field techniques and measurements that will surely result in new perspectives for earth and biological processes.

ABE is currently at the forefront of being the scientific "workhorse" and has rightfully garnered this respect. Biological oceanographic research and AUVs are already in a courtship phase and together they will revolutionize biological approaches, measurements, and observations in the deep-sea for decades to come. Biological research will (and is already) synergistically driving the needs for the future development of AUV technology. ABE is a clear leader in the consistent delivery of scientific products, maintaining proven abilities, and meeting the challenges of rapidly-evolving hypotheses in deep-ocean science. I encourage you to consider including ABE as an autonomous underwater vehicle asset in the NDSF.

I would be more than happy to discuss any questions or thoughts regarding ABE and the future of deep-submergence science with you anytime. Thank you.

Sincerely,

Timothy M. Shank

Date: Tue, 13 Jun 2006 12:11:30 -1000
From: John Sinton <sinton@hawaii.edu>
To: kelley@ocean.washington.edu
Cc: cgerman@whoi.edu
Subject: ABE and the NDSF
Parts/Attachments:
1 OK ~41 lines Text
2 Shown ~50 lines Text

Dear Deb,

I want to express my support for the idea of including ABE into the NDSF. This is an extremely versatile vehicle that makes an ideal ancillary program for many deep submergence investigations. ABE was a night program during my 1999 STOWA cruise and this arrangement worked exceedingly well. Al and Dana even rigged up a mini wax corer on ABE, which gave us additional sampling sites! I know that there is now the possibility to use ABE concurrently with Alvin so it is becoming ever more attractive as a complementary vehicle. I have recently written proposals to use both ABE and Alvin on an investigation of lava flow fields of the Galapagos spreading center because the two data sets - visual observations and sampling from Alvin, magnetics, high-resolution bathymetry, sub-bottom profiler and potential for near-bottom photographs from ABE are a near-perfect combination for the scale and types of studies that are required for this project. I would think that there are many high-resolution geological investigations that would want to use this combination of capabilities and for this reason it simply makes sense to incorporate ABE into the NDSF. I would be happy to provide additional comments if you think it would be useful.

Regards,
John Sinton

Attachment 1

Introduction of a Deep-Diving, Multipurpose AUV into the National Deep Submergence Facility

C. R. German, B. Walden, D. R Yoerger (WHOI)

1. Overview

We propose to introduce an autonomous underwater vehicle (AUV) equipped for deep (up to 5000m), near-bottom operations as a natural complement to the HOV *Alvin* and ROV *Jason II* within the National Deep Submergence Facility (NDSF). Initially, we propose to add *ABE (Autonomous Benthic Explorer)* to the NDSF. *ABE* is a proven and reliable research AUV with more than 170 scientific dives. Incorporation of *ABE* into NDSF will bring new capabilities to the facility and offer investigators from a wide spectrum of disciplines greater flexibility in conducting a remarkable array of mid-water and near-bottom scientific investigations. Our vision is that *ABE* will be replaced by the new *Sentry* AUV by January 2008 once its operational and scientific capabilities have been demonstrated. *Sentry* will not only have improved capabilities over *ABE*, but because it has been designed as an operational vehicle it will be simpler and more cost-effective to operate than *ABE*. Estimated day rates for *ABE/Sentry* range from $7,250 (for 105 operational days/yr) to $9,050 (for 63 operational days/yr). In order to introduce an AUV into the NDSF with minimal impact on current NDSF operating budgets we recommend to DESSC that the *Argo II* and *DSL-120A* towed vehicles be removed from the NDSF. *Argo II* will be retired; the *DSL-120A* vehicle will continue to be available for scientific use outside of the NDSF.

2. Scientific Capabilities of an *ABE*-like AUV

In recent years *ABE* has proven its usefulness as a deep-diving AUV dedicated to scientific investigations near the seafloor - both as a complement to human- and remotely-operated vehicles and as a stand-alone vehicle-of-choice for novel investigations. During more than 170 dives, *ABE* has conducted a remarkable array of scientific operations for marine geologists and geophysicists, physical and chemical oceanographers and biologists. Specific examples include: high resolution geological and geophysical mapping at the EPR 9-10°N and 17°S (e.g. Carbotte et al., 2003), Juan de Fuca Ridge (Glickson et al., 2006) and Galapagos Spreading Center 86°W; detailed seafloor mapping even in extremely rough terrain (e.g. Lost City; Kelley et al., 2005; Karson et al., 2006; Ludwig et al., 2006); sub-seafloor geophysical investigations using high-resolution magnetics (e.g. northern MAR); comprehensive water column mapping of heat-flow from known hydrothermal fields (e.g. Juan de Fuca Ridge Thompson et al., 2005); detection of completely new hydrothermal systems in previously unexplored ridge-systems using chemical sensors and the first photo-reconnaissance of the ecosystems hosted at these sites (e.g. Lau Basin; southern MAR); and cable route surveying on the Juan de Fuca Ridge.

AUVs have greater maneuverability than towed vehicles used for the same purpose and can provide both higher quality data and improved survey efficiency compared to vehicles towed by a surface ship. Because an AUV is decoupled from the surface ship, its operations are less sensitive than towed vehicles to sea state except during launch and recovery. AUVs can also be operated simultaneously with other shipboard operations allowing more efficient use of ship time. Both *ABE* and *Sentry* can be mobilized worldwide from a single 20' van and can be deployed from a range of non-specialized research ships (e.g. ships without a dynamic positioning system), facilitating rapid response efforts and exploratory research in new areas.

3. The Long-term Plan for the *ABE* & *Sentry* Vehicles Within the NDSF

ABE is now a reliable and proven research platform for scientific investigations near the deep seafloor with high demand from scientists across the U.S. research community. Its powerful capabilities,

proven track record, and use by a wide range of investigators motivate us to propose that it be incorporated into the NDSF. *ABE* meets many of the criteria that DESSC has discussed for adding a new vehicle to the NDSF, including:

- the vehicle provides a unique capability to the deep submergence community in comparison to other available assets
- the vehicle has a proven track record of serving the deep submergence science community
- there is strong community demand for future use of the vehicle
- the vehicle complements other vehicles in the NDSF scientifically and/or operationally
- the vehicle would benefit from utilization of common personnel and infrastructure with other vehicles in the NDSF
- vehicle costs are affordable within the NDSF budget

WHOI's new AUV, *Sentry*, will soon offer improved scientific and operational capabilities to *ABE* and, hence, improved scientific opportunities to the U.S. community. Recognizing this, we plan to replace *ABE* with *Sentry* by January 2008 once the operational and scientific capabilities of the *Sentry* vehicle are demonstrated to users of the NDSF in 2007. At that point, the NDSF would then consist of three vehicles: an HOV (*Alvin*), an ROV (*Jason/Medea*), and an AUV (*Sentry*).

4. Timetable for Transition from *ABE* to *Sentry*

The first sea-trials of *Sentry* were completed in April 2006 with a series of dives progressing from 500m to 2500m in the North Atlantic off Bermuda. The results of these trials will be presented to DESSC at its meeting in May 2006. These trials were very successful and demonstrated that *Sentry* can operate autonomously following pre-programmed navigational instructions along pre-set courses and at fixed heights off bottom and/or survey depths in modes nearly identical to *ABE's*. All basic systems on the *Sentry* vehicle worked well. The heading control is good to about +- 1/2 degree and depth control to a few centimeters. Tests indicate *Sentry* will have a single dive range well in excess of 100 km (compared to 20-30 km along track per dive for *ABE*) at a speed of up to 1m/sec (~ 2 kts)

To transition from the basic *Sentry* vehicle tested in Bermuda to one equipped and ready for scientific operations, comparable to *ABE*, will require three additional steps:

- Completion of final vehicle system engineering, including surface radio-control, work-van, and purchase of seagoing spares.
- Equipping the vehicle with the existing *ABE* sensor suite (CTD, optical back-scatter and Eh sensors, magnetometer, near-bottom multibeam mapping tool, and a digital camera/strobe system for imaging)
- Interfacing of the vehicle with long-baseline navigational systems used by *Alvin* and *Jason*.

We estimate that the above efforts will require a total of ca. 7 person-months of effort (as listed below) and can be implemented readily, including sea-trials aboard R/V *Tioga*, during the remainder of calendar year 2006:

May-July 2006: Completion of vehicle system engineering (4 months total effort)
July-Aug 2006: Interfacing with science sensor suite (2 months)
Sept-Oct 2006: Completion of LBL interfacing and sea-trials aboard *Tioga* (1 month)

WHOI has committed $500K of institution funds for the completion of *Sentry* development. This work will provide a science-ready vehicle complete with a dedicated transport/work-van and a set of the most critical operational/sea-going spares.

During calendar year 2007 we plan to operate *ABE* and *Sentry* side-by-side within the NDSF facility to demonstrate the operational and scientific capabilities of *Sentry* to science users. By January 2008 at the latest, and possibly earlier in 2007, we envisage *Sentry's* operational capabilities to be similar or superior to that of *ABE*. Once these capabilities are confirmed, *ABE* will be withdrawn from NDSF service and the transition will be complete.

Milestones:

- June 2006: *ABE* enters NDSF: announcement pre-Aug 15th NSF grant deadline.
- Aug. 2006: *Sentry* vehicle engineering complete.
- Oct. 2006: Science sensor suite and LBL capabilities for *Sentry* implemented.
- Jan.-Dec.2007: *Sentry* operated alongside *ABE* to demonstrate its capabilities
- Jan. 2008 (at latest): *ABE* withdrawn from NDSF; *Sentry* becomes dedicated NDSF AUV.

5. Removal of DSL-120A and ARGO from NDSF and Plans for Providing Sidescan and Photo-imaging to Science Users

It is our belief that the deep submergence community in the U.S. would be best served by the introduction of a deep-diving AUV like *ABE/Sentry* into the NDSF. Technologically, AUV are supplanting towed vehicles like *Argo II* and *DSL-120A* because of their superior versatility, maneuverability, and surveying efficiency. This transition is reflected in the usage of these vehicles over the past few years. For example, *ABE* had 104 'at-sea' days in 2004, 47 days in 2005, and 70 days in 2006. By comparison, usage of *DSL-120A* was 75 days in 2004, 51 days in 2005 and none in 2006; *Argo* was not used at all during the 2004-2006 period. In order to introduce an AUV into the NDSF with minimal impact on current NDSF operating budgets we recommend to DESSC that the *Argo II* and *DSL-120A* towed vehicles be removed from the NDSF. *Argo II* would be retired; the *DSL-120A* will continue to be available for scientific use outside of the NDSF.

In the case of the *Argo II* deep-towed camera system, we anticipate that future deep submergence community needs for real-time seafloor imaging can be met by the upgraded *Medea* vehicle (in the NDSF) or the Tow-Cam system that is operated as part of the MISO shared-use facility (outside the NDSF). *Medea* (which was upgraded in 2005) currently provides a stand-alone, real-time imaging system utilizing a fiber-optic cable that can be used for the same high-altitude (~10m) reconnaissance surveying that *Argo II* was used for. For imaging applications that don't require real-time data, AUVs are rapidly developing photo-mosaicing capabilities that are supplanting that of towed vehicles. During 2007, as the capabilities of *ABE* are transitioned to *Sentry*, a high-resolution, seabed photographic capability will be implemented on *Sentry*.

High-frequency, near-bottom side scan sonars remain an important tool for the deep submergence community especially for large-scale tectonic and reconnaissance mapping. Although we are recommending that the *DSL-120A* be taken out of the NDSF, it would still be available for use in deep submergence studies as shared-use equipment similar to the Tow-Cam. If the *DSL-120A* becomes shared-use equipment, in the future PIs will have to include the cost of using the *DSL-120A* in their proposals (as they do now for *ABE*). The day rate for the *DSL-120A* for two month-long field programs each year is estimated to be roughly comparable to the expected day rate for *ABE/Sentry* (see below). Thus the replacement of the *DSL-120A* with *ABE/Sentry* will not place a significant additional financial burden on NDSF.

There are several options for the delivery of high-resolution sidescan to the deep submergence science community in the future that DESSC may wish to discuss:

(1) The *DSL-120A* vehicle can continue to be supported by WHOI's Deep Submergence Laboratory

(DSL), with the operational assistance of the University of Hawai'i's HMRG group (as it has for the past 6 years). This is the most likely mechanism to support the only funded *DSL-120A* program scheduled for 2007 (Klein EPR program). This arrangement will facilitate the coordination of *DSL-120A* operations with those of other NDSF vehicles operated by WHOI.

(2) The *DSL-120A* vehicle could be migrated to the HMRG group at the University of Hawai'i. Members of this group are intimately involved in the operation of this vehicle and they are also the sole operators of the newer, complementary, *IMI-30* deep-tow vehicle, already offered as a separate facility at the University of Hawai'i. There may be costs savings by the management of the *DSL-120A* and the *IMI-30* vehicles by a single operational team.

(3) In the longer term, *Sentry* could be upgraded with an equivalent 120kHz sidescan system if there were community support (and funding) to do so. The advantages in terms of vehicle stability, speed and maneuverability make this an interesting option to explore in the longer term. As noted above, the April 2006 trials have confirmed that *Sentry* will be able to achieve a range significantly in excess of 100km at a cruising speed of 1.5 knots (maximum survey speeds typical for any deep-tow vehicle+cable combination, due to drag). With this range an AUV becomes an attractive, cost-effective option for seafloor mapping operations. For example, our preliminary calculations show that *Sentry* could achieve a ca.15% saving in shiptime for conducting "exploratory" type mapping operations over ca.200km range (e.g. Martinez et al., 2004; Lau Basin) where AUVs are least favored. Savings closer to 50% in shiptime could be achieved in surveys that require multiple parallel swaths (hence vehicle turns) such as past studies of the slow-spreading MAR (Humphris et al., 2002) and future studies such as off-axis mapping of the East Pacific Rise, process studies along an active ocean margins, and thorough characterization of ocean observatory sites.

6. Management of the NDSF AUV

- The management plan for an AUV in NDSF will follow the model already successfully implemented for both *Alvin* and *Jason II* by having a dedicated point-of-contact manager who is directly responsible for the AUV.
- During the first year (2007), when *ABE* is introduced into the NDSF and its capabilities are transitioned to *Sentry*, the AUV manager will be Dana Yoerger. Dana has been intimately involved in the development of both the *ABE* and *Sentry* AUVs. Yoerger, like Foster (*Alvin*) and Bowen (*ROV*) would report directly to the Chief Engineer for Deep Submergence (Walden) and scientific aspects of AUV use would be overseen, just as they are for *Alvin* and *Jason*, by the Chief Scientist for Deep Submergence (German).
- In managing the AUV facility, Yoerger would also receive administrative support from experienced staff at WHOI who are already familiar with NDSF operation (Offinger and Chandler). After this first transitional year, Yoerger would step down as manager but continue to provide shore-side engineering support for the NDSF AUV. A junior engineer/manager will be hired who will assume day-to-day management of the AUV.

7. Operational plan

- Ashore, *ABE* will be maintained and upgraded as required by Yoerger and Bradley. For *Sentry*, Yoerger, Catanach and Bradley (or Bradley's replacement upon retirement) will continue to be intimately involved in shore-side vehicle maintenance and development.
- At-sea operations of the AUV will require a three-person team: a mechanical engineer who also oversees all shipboard launch and recovery operations and coordinates with the ship's crew and officers; an electrical engineer to maintain the health of the vehicle systems and batteries and a software engineer to over-see mission programming, vehicle navigation and data manipulation/delivery to science. *Sentry* has been designed to not require senior engineering

support at sea. A team of experienced and qualified AUV operators will be established to meet increasing at-sea demands. In anticipation of this, we currently have 5 personnel active in DSL or NDSF being trained to support *Sentry* and/or *ABE* at-sea.

- The NDSF Data Manager (Vicki Ferrini) will develop scripts to assess the quality of AUV navigation and sensor data (e.g. C, T and optical back-scatter sensors, magnetometer, SM2000 and Imagenix, digital still camera). A list of standard *ABE* data products is described in an accompanying document.

Representative ABE Publications

Carbotte, S.M., W. B. Ryan, W. Jen, M.-H. Cormier, E. Bergmanis, J. Sinton, and S. White. 2003, Magmatic subsidence of the EPR at 18°14S revealed through fault restoration of ridge crest bathymetry. Geochem. Geophys. Geosyst, 4(1).

Cormier, M-H., W. B. Ryan, A. M. Bradley, D. R. Yoerger, A. Shah, J. Sinton, R. Batiza, and K. Rubin. 2003, Variable extrusive emplacement mechanisms in the axial region of the East Pacific Rise. Geology, 31(7).

Glickson, D., D.S. Kelley, and J.R. Delaney. 2006, Geological and hydrothermal evolution of the Mothra Hydrothermal Field, Endeavour Segment Juan de Fuca Ridge, *in prep.*

Karson, J.A. E.A. Williams, G.L. Früh-Green, D.S. Kelley, D.R. Yoerger and M. Jakuba. 2006, Detachment Shear Zone on the Atlantis Massif Core Complex, Mid-Atlantic Ridge 30°N. *Geochemistry, Geophysics, Geosystems in press.*

Kelley, D.S. J.A. Karson, G.L. Früh-Green, D.A. Yoerger, D.A. Butterfield, J. Hayes, T. Shank, M.O. Schrenk, E.J. Olson, G. Proskurowski, M. Jakuba, A. Bradley, B. Larson, K. Ludwig, D. Glickson, K. Buckman, A. S. Bradley, W.J. Brazelton, K. Roe, M.J. Elend, A. Delacour, S. M. Bernasconi, M.D. Lilley, J.A. Baross, R.E. Summons, S.P. Sylva. 2005, A serpentinite-hosted submarine ecosystem: The Lost City Hydrothermal Field. *Science,* 307, 1428-1434.

Ludwig, K.A., D.S. Kelley, D.A. Butterfield, B.K. Nelson, G.L. Früh-Green. 2006, Formation and evolution of carbonate structures at the Lost City Hydrothermal Field, *Geochemica Cosmochemica Acta*. in press.

Schouten, H., M. Tivey, D. Fornari, D. Yoerger, A. Bradley, M. Edwards, and P. Johnson. 2003, Central Anomaly Magnetization High: Constraints on the volcanic construction and architecture of young upper oceanic crust, EPR 9-10N, Ridge 2000 Events, 1, 30-34.

Shah, A. K., M.-H. Cormier, W. B. Ryan, W. Jin, J. Sinton, E. Bergmanis, J. Carlut, A. M. Bradley, and D. R. Yoerger. 2003, Episodic dike swarms inferred from near-bottom magnetic anomaly maps at the southern east pacific rise. J. Geophysical Research, 108(B2).

Thompson, W.J., R.E. McDuff, F.R. Stahr, D.R. Yoerger, M. Jakuba. 2005, Heat flux from the Endeavour Segment of the Juan de Fuca Ridge, Eos Trnas. AGU Fall Meeting T31A-0489.

Tivey, M.A., A. Bradley, D. Yoerger, R. Catanach, A. Duester, S. Liberatore and H. Singh. 1997. Autonomous underwater vehicle maps seafloor, EOS, 78, 229-230.

Tivey, M.A., H.P. Johnson, A. Bradley, and D. Yoerger. 1998, Thickness measurements of submarine lava flows determined from near-bottom magnetic field mapping by autonomous underwater vehicle Geophys. Res. Lett., 25, 805-808.

Veirs, S.R., R.E.McDuff and F.R.Stahr, 2006, Magnitude and variance of near-bottom horizontal heat flux at the Main Endeavour hydrothermal vent field. *Geochemistry, Geophysics, Geosystems* 7, doi. Q02004.

Estimated Operating Budget

Transition period

As described above, the *ABE* AUV will be initially introduced into the NDSF in 2007. Existing NSF funding, coupled with WHOI institutional support, will be used to transition the *Sentry* vehicle to operational status. Following this transitional period *ABE* will be removed from the NDSF and *Sentry* will become the operational AUV in NDSF. Undoubtedly we will discover problems and improvements that will need eventual attention, but it should be possible to address critical issues using the suggested "baseline" support. The remainder can be the subject of future proposals

Routine Operations following transition period

Baseline Support:
3 person-months for AUV manager
6 person-months of engineering/technical support
1 person-month of administrative support
$10,000/yr: normal & expected parts & supplies
$50,000/yr: major modifications (science equipment installations/upgrades)

Total: $278,000

Operational costs (per cruise):

Normal Cruise:
Mobilization: 2 person-week of technician support
Cruise: 3 technicians door-to-door
Travel: 3 persons RT - $4,500
De-mobilization: 1 person-week of technician support
Expendables: $250 per dive, 1 dive/day
Insurance: $1,500
Shipping: 20' van RT - $20,000

Daily rate – Assume three 3-week cruises per year

Base	$278,000
Cruises	$291,750
Total	$569,750

63 operational days (door-to-door cruise days)
Daily-rate = $9,050

Daily rate – Assume three 4-week cruises & one 3-week cruise

105 operational days (door-to-door cruise days)
Daily-rate = $7,250

High level support personnel (e.g. Bradley, Yoerger)
Technical support personnel (e.g. Catanach, Billings, Duester)
Administrative support (Offinger/Chandler)

Attachment 2

The Autonomous Underwater Vehicle *ABE*

1. Overview

The *Autonomous Benthic Explorer* (*ABE*) is a fully autonomous underwater vehicle used for exploring the deep ocean up to depths of 4500 meters. *ABE* produces bathymetric and magnetic maps of the seafloor and has also been used for near-seabed oceanographic investigations, to quantify hydrothermal vent fluxes. Most recently, *ABE* has been used to locate, map, and photograph deep-sea vent sites following preliminary work by towed and lowered instruments. *ABE* has taken digital bottom photographs in a variety of deep-sea terrains, including the first autonomous surveys of an active hydrothermal vent site. To date, ABE has completed 181 dives in the deep ocean over 16 cruises, covering more than 3000 km of survey tracks at an average survey depth greater than 2000 meters.

2. Vehicle characteristics

ABE is a three body, open frame vehicle that utilizes glass balls as flotation in two free-flooded upper pods while the single, lower housing is host to the batteries that power the vehicle and all of its electronics. This separation of buoyancy and payload gives a large righting moment that simplifies control and allows the vertical and lateral thrust propellers to be located inside the protected space between the three, faired bodies. ABE has five thrusters allowing it to move in any direction. It can travel forward at a cruising speed of 0.6m/sec but one of ABE's most unique characteristics is that it can also hover and reverse – characteristics that are particularly valuable in the rugged terrain routinely encountered when investigating the deep seafloor. The navigation system onboard ABE consists of two proven and complementary navigation systems. For general use, ABE uses long "baseline" transponders, identical to those used by the research submersible *Alvin* and ROV *Jason*, and these allow deep seafloor surveys over distances of ca.5km to be carried out. In addition, however, ABE also carries an acoustic doppler velocity log (DVL) which provides short-range, high-precision navigation. With these navigation systems, ABE has the ability to follow tracklines with a repeatability of order 10m or better.

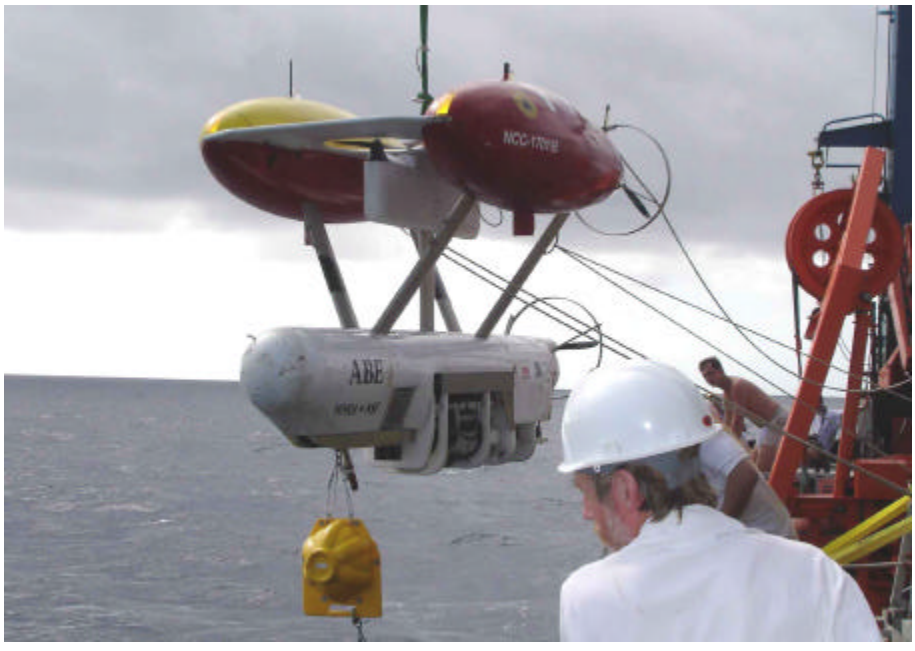


Fig.1 The ABE vehicle during at-sea deployment (Mid-Atlantic Ridge, 2005)

3. ABE Specifications

Dimensions:	Length = 3 m, width = 2 m, height = 2.5 m
Weight:	550 kg
Operating range:	20-40 km (14-20 hours)
Energy:	Lithium Ion batteries (5 kWh)
Consumption:	Hotel load: < 50W Total: 210-300W (depending on mission type)
Recharge time:	Maximum of 12 hours (80% recharge in ~6 hours)
Bus power:	42-60 Volts DC (for sensors)
Survey speed:	0 to 1.4 kt (top speed)
Descent time:	1000m/hour (expendable weights for descent and ascent)
Navigation:	Long baseline acoustic transponders Doppler Velocity Log
Sensor suites:	The standard science and engineering suite for ABE is detailed on the following page.

4. How ABE Works

ABE operates autonomously from the support research vessel. It has no tether, and is controlled in real-time by onboard computers using its own rechargeable batteries for all power. Upon launch, ABE descends to the seafloor through the use of a descent weight that is released after safe arrival at the seafloor. Throughout any dive, ABE uses acoustic long-baseline transponder navigation together, when close enough to the seafloor, with bottom-lock acoustic doppler measurements to determine its position and velocity over the seabed. ABE descends at 15-20m/minute following a controlled spiral trajectory to ensure that it reaches the desired starting point while consuming minimal energy.

After reaching the seafloor and performing a series of checks, ABE releases its descent weight to become neutrally buoyant and begins its pre-programmed survey. A dive can consist of any mix of water column investigations (e.g. hydrothermal plume surveys) at constant water depths, seafloor geophysical investigations at fixed heights above the seafloor (anywhere from 50-200m off depending on the application: e.g. magnetics, high-resolution bathymetric mapping) and digital photography at a height of just 5 meters above the seafloor. ABE usually surveys until either it reaches the end of its programmed survey or its batteries are depleted (typically between 20-30km along track and 15-30 hours of survey time, depending on sensor payload,

survey type, and terrain). At the end of its dive, ABE releases two ascent weights to become positively buoyant and return to the surface at 15-20m/minute.

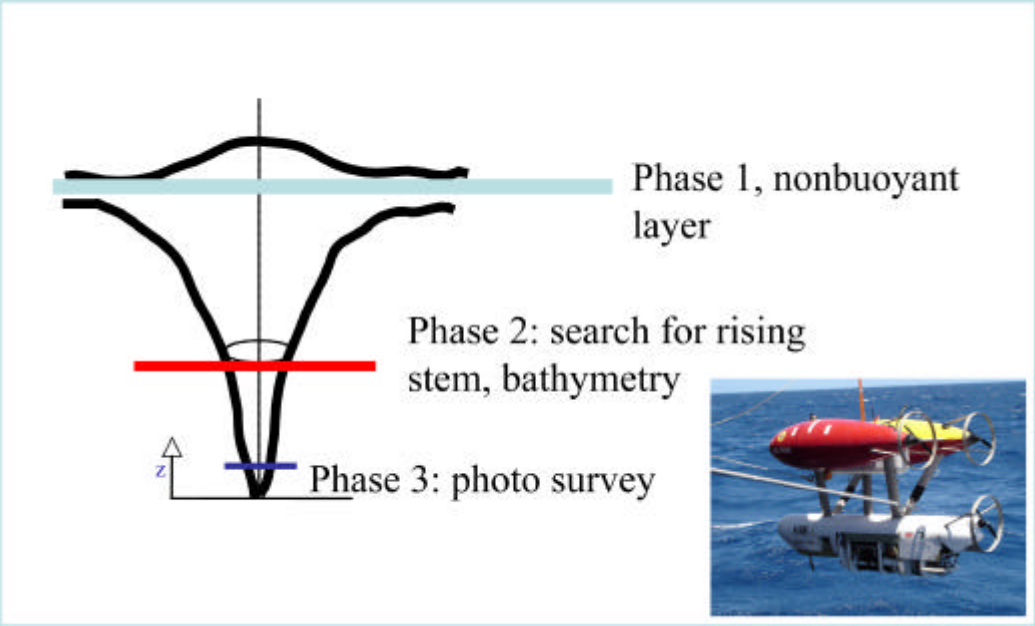


Fig.2 Schematic illustration of one recent use of *ABE* (2004-2006) - to locate new sites of hydothermal activity in the Pacific and Atlantic Oceans. Phase 1: oceanographic (physical/chemical) sensors are used to locate the centre of a dispersing effluent plume 100-300m above the seabed. Phase 2: SM2000 or Imagenex system is used to map the seafloor at high resolution; simultaneously, oceanographic sensors detect when the *ABE* vehicle intercepts the stem of the rising plume. Phase 3: digital still imaging is conducted of the seafloor at and around the vent-site to reveal the detailed geologic setting of he new vent-site and the nature of any associated chemosynthetic ecosystem.

5. Standard Science Sensor-Suite on ABE

ABE is equipped with a standard suite of science and engineering sensors (see below). In addition, ABE is a sufficiently flexible platform that additional sensors can be interfaced by PIs according to their specific interests and scientific needs.

Engineering sensors:

- ParaScientific pressure sensor, rated to 4500m
- Attitude sensors (pitch, roll, heading)

Geophysical sensors:

- SIMRAD SM2000 200kHz multibeam sonar, rated to 3000m
- Imagenex 675kHz scanning sonar, rated to 4500m
- 3-component Develco fluxgate magnetometer, rated to 4500m
- EdgeTech CHIRP (6-18kHz) sweep sub-bottom profiler, rated to 4500m

Oceanographic sensors:

- 2 sets of C, T sensors SeaBird models SBE3 & SBE4, rated to 4500m
- SeaPoint optical backscatter sensor (OBS) rated to 4500m

Seafloor photography

- a 1024 x 1024 pixel 12-bit digital still camera, rated to 4500m

Project-specific sensors interfaced to ABE by PIs during recent cruises

- Eh electrode (redox sensor) – Dr.Koichi Nakamura, Japan
- Fe(II) and Mn sensors – Prof Chris German, NOC, United Kingdom

NB All sensor data are stored on the vehicle and retrieved upon recovery.

Attachment 3

ABE Data Products

Precise navigation, robust control, and co-registered sensors permit ABE to characterize the seafloor and the near-bottom environment on the meter-scale through complementary sensing modes. Consequently, there are four different kinds of data and, hence, data products that can be expected routinely from *ABE* operations.

1. Navigation data

The most fundamentally important data-set for any *ABE* operation – a requirement for all *autonomous* vehicles if missions are to be achieved successfully – is accurate seafloor navigation.

The navigation used for *ABE* is a long-baseline (LBL) system augmented with doppler velocity logging. For LBL, *ABE* uses between 2 and 4 seafloor transponders, which are identical to those used by *Alvin* and *Jason*. The techniques used to set, survey, and recover the transponders are also identical. Presently, *ABE* uses 4 fixed frequencies, although plans are in place to expand this to eight and to allow the frequencies to be selected in software. *ABE* interrogates the transponders on a 10 second cycle. These interrogations are also heard at the vessel, which allows *ABE* to be tracked from the ship with only occasional interrogations from the ship to keep clocks synchronized. *ABE* does not depend on these interrogations from the vessel, however, so if the vessel leaves the site *ABE*'s navigation is not impacted.

In real-time, *ABE* uses the round-trip travel times, the vehicle depth measurement, and the local sound velocity profile to compute slant ranges. Based on vehicle and transponder depths, these slant ranges are projected into the horizontal plane and a fix computed using either a deterministic (two transponders) or least-squares (3 or more transponders) solution. *ABE* uses a series of filters to eliminate incorrect ranges caused by surface reflections and noise. The fixes are combined with the dead-reckoning solution from the doppler navigator and compass to produce the real-time position estimate, which is typically repeatable within a given transponder array to about 2 meters.

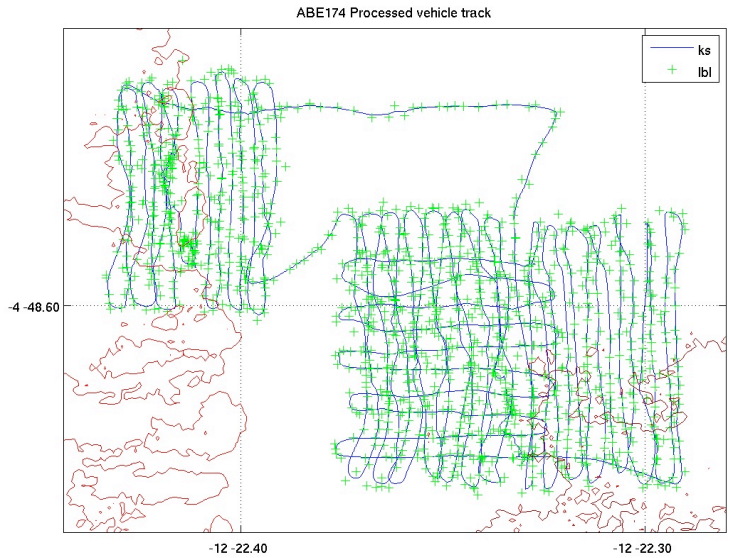


Fig.1 Example of processed post-dive navigation data (blue line) as derived from within-dive LBL fixes (green crosses) from an *ABE* near-bottom (5m off) photographic survey on the Mid-Atlantic Ridge – see Fig.3 for an example of a color photograph so obtained (C.German & D.Yoerger, WHOI).

At the end of each run, the data is postprocessed to produce a more accurate track. On the first dive in each area, the compass is recalibrated using magnetometer and compass data from slow spins during descent. Acoustic travel times are refiltered to recover as many good fixes as possible. For the first run in a new net, the transponder positions are adjusted to minimize the least-squares error for fixes with three or more ranges. Finally, the refined fixes, the recalibrated compass, and the doppler navigator data are recombined using a kalman smoother. The final processed navigation data is reported in Latitude and Longitude in decimal degrees (suitable for importing into, e.g., GMT amongst other mapping tools) and is embedded within the time-stamped scientific data file for each dive (see later).

2. Bathymetric data

Using either the SM2000 multibeam system (to depths up to 3000m) or the Imagenex scanning sonar, high resolution bathymetric data (precision ~1m, accuracy ~2-3m) can be obtained over an area of, typically, ≥2km^2 per dive depending on (i) height off bottom/line-spacing selected for the survey and (ii) choice of mapping instrument used (multibeam vs scanning sidescan). The bathymetric data products generated will be made available to the science user in three forms suitable for different science user needs:-

- raw x, y, z bathymetry data files that can be re-processed by the scientist, as required.
- gridded (5m) data files in .grd format which can readily be imported by the scientist into generic software such as *GMT* or *Fledermaus*, whether at sea or for post-cruise analysis.
- processed map *images* in .tif format that can be used by the science party for immediate visualization of the gridded data set, further dive planning while at sea and post-cruise report generation and publications.

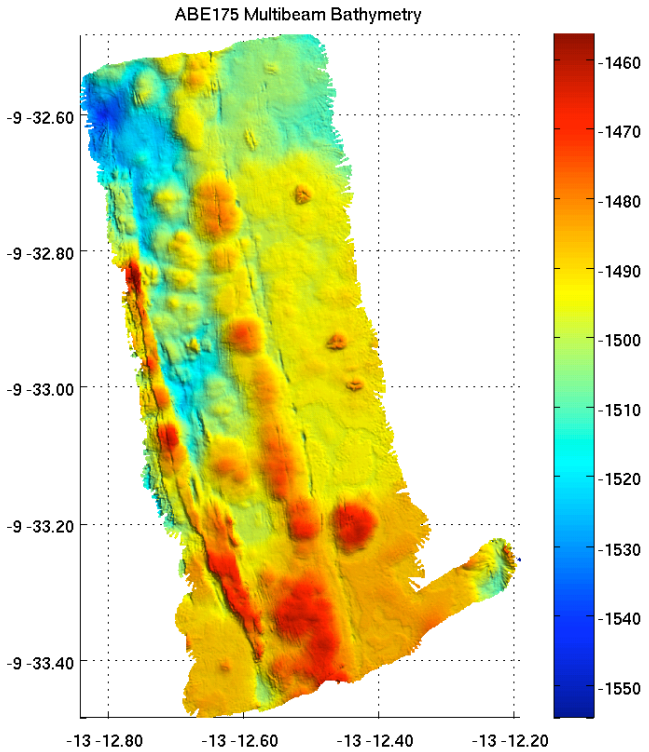


Fig.2 Example of a bathymetric map image generated at sea in May 2006 at 9°30'N on the Mid-Atlantic Ridge using the SM2000 multibeam system (C.German & D.Yoerger, WHOI).

3) Photographic Images

Using a dedicated high dynamic range (12-bit) 1024 x 1024 digital still camera, color photographs can routinely be obtained from ABE. At an altitude of 5m above bottom, each image measures approximately 3m x 3m. A fresh image can be captured every 5 seconds from ABE which, at a programmed survey speed of 0.4m/sec, generates a 33% overlap between adjacent images. The standard photographic data product generated by ABE will be a series of processed, time-stamped, color JPEG files. Together with the navigation, heading and altitude (height-off-bottom) data included in the science sensor data files (below) this will provide all the material necessary for interested scientists to generate photo-mosaics of areas of particular interest. (Under the auspices of the NDSF data manager, Dr.Vicki Ferrini, users will free access to software suitable for generating such photo-mosaics just as is already the case for Alvin and Jason photographs).

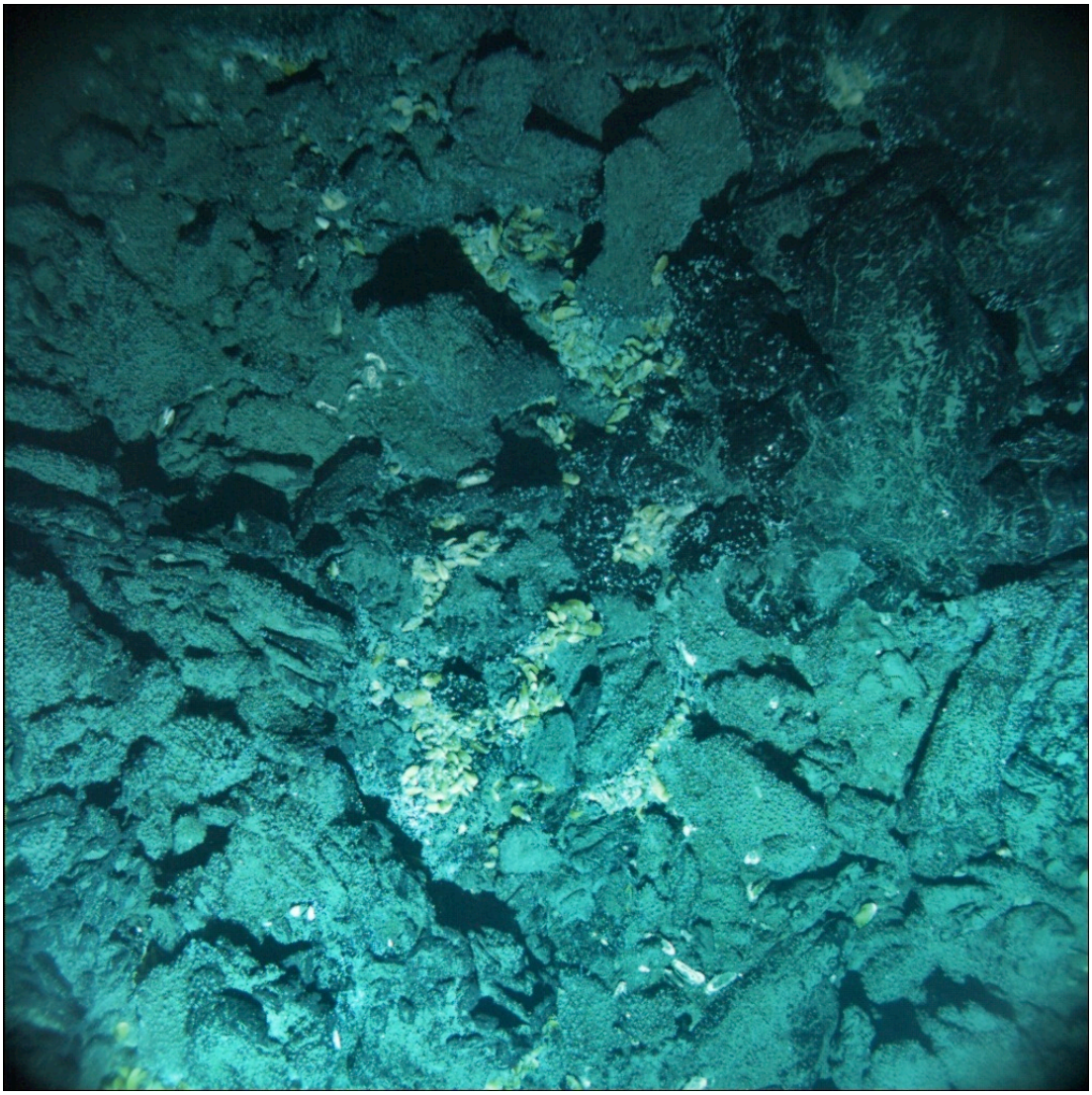


Fig.3 Example of a color photograph generated at sea in May 2006 on the Mid-Atlantic Ridge using ABE's 12-bit 1024 x 1024 pixel Digital Still Camera during ABE dive 174 – see Fig.1 (C.German & D.Yoerger, WHOI).

4) Standard 3-D navigation & science (geophysical and oceanographic) data arrays.

In addition to bathymetry and photographic data, numerous other sensors are routinely deployed on ABE and their data acquired. These are compiled at the end of each dive into a single scientific data file that is made available as a comma-separated-variable (.csv) text file. This is a format that can readily be imported into numerous data-analysis programs such as MatLab or other software appropriate for handling large data-files (e.g. Kaleidagraph - Mac OSX). [NB: although .csv format files make for easy accessibility, the volumes of data collected by ABE on any given dive are large. Consequently, some non-specialist software (e.g. Microsoft Excel) which only allow files of up to ca.65,000 lines of to be opened, cannot be relied upon for routine usage. Science users wishing to take advantage of ABE will need to come to sea ready to take full advantage of the wealth of data that they will generate from their funded projects!]

The science data in each .csv file are organised into columns with labelled headings that cover time, processed navigation (vehicle position given in latitude and longitude in decimal degrees), depth, pressure (the primary variable from which depth is derived), height off bottom and heading (both essential for photo-mosaicing). Oceanographic data included in the same file include conductivity and temperature from each of the two C,T pairs mounted on the vehicle and optical backscatter output from the Seapoint OBS instrument. Geophysical data collected routinely on all deployments (in addition to the bathymetric data discussed previously) includes 3 components of magnetic field data. CHIRP sub-bottom profiler data can also be acquired if requested. For these geophysical data to be processed, a further .csv file is also provided that is typically used just buy the ABE group for engineering purposes: it includes pitch and roll data in addition to the heading data provided routinely to all science users (Table 1).

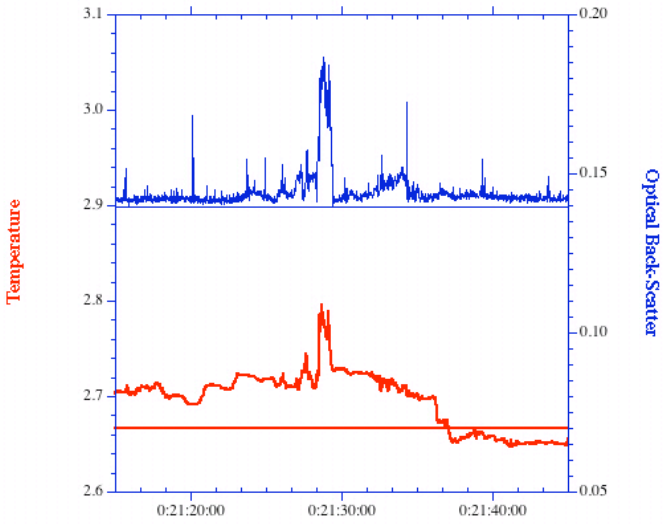


Fig.4 Plot of temperature and optical backscatter data recorded by ABE when intercepting a buoyant hydrothermal plume near 8°S Mid-Atlantic Ridge, May 2006 (C.German & D.Yoerger, WHOI).

Table 1: Example of Science Data routinely geenrated by ABE (ABE dive 175; May 2006)

Date	Time (h:mm:ss)	Latitude	Longitude	Depth	Pressure	Heading	MagX	MagY	MagZ	OBS	T1	C1	T2	C2	Height
15/5/06	5:48:58	-4.810074	-12.37186	2964.3	3005.8	7.23	2.0822	3.434	3.2894	0.1266	2.6021	3.2482	2.6009	3.2479	5.09
15/5/06	5:48:59	-4.810071	-12.37186	2964.3	3005.9	7.09	2.0822	3.4354	3.29	0.1268	2.6042	3.2484	2.601	3.2479	5.09
15/5/06	5:49:00	-4.810067	-12.37186	2964.2	3005.9	7.01	2.0818	3.4362	3.2906	0.1272	2.6049	3.2483	2.601	3.2479	5.09
15/5/06	5:49:01	-4.810062	-12.37186	2964.2	3005.9	6.95	2.0818	3.4378	3.2904	0.1266	2.6033	3.2483	2.6011	3.2479	5.09
15/5/06	5:49:02	-4.810058	-12.37186	2964.2	3005.8	6.94	2.0834	3.4404	3.2902	0.1268	2.6032	3.2483	2.6012	3.2479	5.09
15/5/06	5:49:03	-4.810054	-12.37186	2964.3	3005.9	6.92	2.0856	3.4428	3.2904	0.1262	2.6028	3.2483	2.6012	3.2479	5.27
15/5/06	5:49:04	-4.81005	-12.37186	2964.3	3005.9	6.96	2.086	3.4438	3.2912	0.1266	2.6036	3.2483	2.6012	3.2479	5.46
15/5/06	5:49:05	-4.810046	-12.37186	2964.3	3005.9	7.02	2.085	3.4444	3.2916	0.1266	2.6042	3.2484	2.6014	3.2479	5.48
15/5/06	5:49:06	-4.810041	-12.37186	2964.3	3005.9	7.06	2.084	3.4452	3.2916	0.1266	2.6035	3.2483	2.6013	3.2479	5.39
15/5/06	5:49:07	-4.810036	-12.37186	2964.3	3005.9	7.05	2.0824	3.4468	3.2902	0.1272	2.6044	3.2484	2.6013	3.2479	5.47
15/5/06	5:49:08	-4.810032	-12.37186	2964.3	3005.9	7.01	2.0802	3.4486	3.2884	0.1268	2.605	3.2484	2.6014	3.2479	5.48
15/5/06	5:49:09	-4.810028	-12.37186	2964.3	3005.9	6.91	2.08	3.4506	3.2872	0.127	2.6072	3.2487	2.6014	3.2479	5.39
15/5/06	5:49:10	-4.810023	-12.37186	2964.3	3005.9	6.81	2.0806	3.451	3.288	0.126	2.6093	3.2489	2.6014	3.2479	5.28
15/5/06	5:49:11	-4.81002	-12.37186	2964.3	3005.9	6.75	2.0816	3.4516	3.2886	0.1262	2.6093	3.2488	2.6015	3.2479	5.15
15/5/06	5:49:12	-4.810015	-12.37186	2964.3	3005.9	6.74	2.0822	3.4526	3.288	0.1264	2.6098	3.249	2.6016	3.2479	5.15

DESSC Nominations

Enclosed please find nominations and CV's for the following individuals:

Michael Tryon

Marsh Youngbluth

UNIVERSITY OF CALIFORNIA, SAN DIEGO **UCSD**

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

SCRIPPS INSTITUTION OF OCEANOGRAPHY
GEOSCIENCES RESEARCH DIVISION

9500 GILMAN DRIVE
LA JOLLA, CALIFORNIA, 92093-0244

March 8, 2006

Dear UNOLS Chair and DESSC Committee members,

This letter is to introduce myself and to express my interest in serving on the DESSC Committee. I have a longstanding and strong interest in deep submergence vehicles both from the standpoint of a scientist user and a designer/engineer. My research has centered on the development and application of deep sea instrumentation for marine hydrogeological research. This work has required extensive use of a variety of vehicles including Alvin, Johnson Sea Link, Delta, SeaCliff, Oceanic Explorer, Jason (I&II), Hyper Dolphin, Scorpio, Ventana, and ROPOS. During these projects I have enjoyed good working relationships with the vehicle crews while striving to create instrument designs that the vehicles can work with efficiently. The bulk of my work has been in the cold seep environment and the cruises have been collaborative and multidisciplinary. In particular, I have worked extensively with biologist Lisa Levin and chemist Joris Gieskes at sites off the US west coast and Alaska. As a result of these experiences I feel I have a good grasp of the needs of a diverse portion of the marine science community as well as the practicalities and limitations of deep sea vehicles.

I also have an interest in being a representative of DESSC to Scripps. The Scripps community has a number of people active in UNOLS and we receive regular reports on issues within the research vessel area but there seems to be a lack of timely reports on the status of the deep submergence group. If chosen for the open committee position I will make regular reports to the Scripps community on issues of interest as well as bring back to the committee any Scripps feedback.

I understand that a significant part of DESSC (and all other) committee work is management: timely information compilation, assimilation, and dissemination. I take the duties of committee membership seriously and I have the time to commit to this work. I hope that you will look favorably on my application for the open DESSC committee position.

Sincerely,

Michael Tryon

Curriculum Vitae

Michael Donald Tryon
Assistant Project Scientist III
Scripps Institution of Oceanography
9500 Gilman Dr, 0244
La Jolla, CA 92093-0244
(858) 822-0591

Born: January 5, 1952

Citizenship: United States

Education

Post-graduate: Scripps Institution of Oceanography, UCSD, La Jolla, CA. 3/2002-12/2004.

Graduate: PhD, Earth Science, 2002, Scripps Inst. of Oceanography, UCSD, La Jolla CA 92093; Dissertation: The development and application of a new benthic aqueous flux meter for very low to moderate discharge rates

Undergraduate: BS Earth Science, University of California, San Diego, La Jolla, CA 92093; 1995.

Employment

Research Assistant, Scripps Inst. of Oceanography, La Jolla, CA; 1992 to 1995.
Graduate Research Assistant, Scripps Inst. of Oceanography, La Jolla, CA; 1995-2002.
Graduate Teaching Assistant, Field Geology and Optical Mineralogy classes; 1996-2001.
Post-Doctoral Researcher, Scripps Inst. of Oceanography, La Jolla, CA, 3/2002-1/2005.
Project Scientist, Scripps Inst. of Oceanography, La Jolla, CA, 1/2005-present.

Research Interests

Hydrogeology of accretionary prisms
Physical and geochemical consequences of gas hydrate formation and destruction
Tectonic and geochemical processes which drive fluid production and geopressure

Honors

Dean's list, University of California, San Diego; 1991-1995.
Regents' Fellowship, Scripps Institution of Oceanography; 1995-1996.

Professional Memberships

American Geophysical Union
Geological Society of America

Publications

Primary published work

Tryon, M.D., K.M. Brown, M.E. Torres, A.M. Trehu, J. McManus, and R.W. Collier, Measurements of transience and downward fluid flow near episodic methane gas vents, Hydrate Ridge, Cascadia, *Geology*, *27* (12), 1075-1078, 1999.

Tryon, M.D., K.M. Brown, L. Dorman, and A. Sauter, A new benthic aqueous flux meter for very low to moderate discharge rates, *Deep-Sea Research, Part I*, 48 (9), 2121-2146, 2001.

Tryon, M.D., and K.M. Brown, Complex flow patterns through forearc gas hydrates and their impact on seep biota, *Geophysical Research Letters, 28* (14), 2863-2866, 2001.

Tryon, M.D., K.M. Brown, M.E. Torres, Fluid and chemical fluxes in and out of sediments hosting hydrate deposits on Hydrate Ridge, OR, II: Hydrological processes, *Earth and Planetary Science Letters, 201* (3-4), 541-557*,* 2002.

Torres, M.E., J. McManus, D. Hammond, M.A de Angelis, K. Heeschen, S.L. Colbert, M.D. Tryon, K.M. Brown, and E. Suess, Fluid and chemical fluxes in and out of sediments hosting hydrate deposits on Hydrate Ridge, OR, I: Hydrological provinces, *Earth and Planetary Science Letters, 201* (3-4), 525-540*,* 2002.

Tryon, M.D., *The Development and Application of a New Benthic Aqueous Flux Meter for Very Low to Moderate Discharce Rates*, Doctoral Dissertation, University of California, San Diego, 2002.

Tryon, M.D. and K.M. Brown, Fluid and chemical cycling at Bush Hill: Implications for gas- and hydrate-rich environments, *Geology, Geophysics, and Geosystems (G-Cubed)*, 5 (12), 1-7, 2004.

Brown, K.M., M.D. Tryon, H.R. DeShon, S. Schwartz, and L.M. Dorman, Correlated Transient Fluid Pulsing and Seismic Tremor in the Costa Rica Subduction Zone, *Earth and Planetary Science Letters*, *238*, 189-203, 2005.

Other work

Fryer, G.J., and M.D. Tryon, Great earthquakes, gigantic landslids, and the continuing enigma of the April Fool's tsunami of 1946, Eos Trans. AGU, 86 (52), T11A-0355, 2005.

Tryon, M.D., and K.M. Brown, Observations of hydrotectonic stress/strain events at a basement high at the Nicoya outer rise, Eos Trans. AGU, 86 (52), T33A-0516, 2005.

Fueri, E., D.R. Hilton, K.M. Brown, and M.D. Tryon, Helium and Carbon Isotope Systematics of Cold Seep Fluids at Monterey Bay (California, USA), Eos Trans. AGU, 86 (52), V13C-0563, 2005.

Adamic, J.F., Kluesner, J.W., Rathburn, A.E., Perez, M.E., Basak, C., Levin, L., Gieskes, J.M., Martin, J., Ziebis, W., Tryon, M., Comparisons of vertical distribution patterns of living (stained) benthic foraminifera from the Aleutian margin, Geological Society of America Annual Meeting, Salt Lake City, Oct. 2005.

Hilton, D.R., de Leew, G.A.M., Güleç, N., Mutlu, H., Furi, E., Kulongoski, J., Brown, K., Tryon, M., Recent helium isotope studies in seismically-active regions: results from the San Andreas Fault Zone, California and the North Anatolian Fault Zone, Turkey, International Congress on Gas Geochemistry, Sicily, Oct. 2005.

Levin, L., Rathburn, A., Tryon, M.D., Lonsdale, P., Escobar, E., Gutierrez, D, Gallardo, V., Sellanes, J., Quiroga, E., Stress and strain on eastern Pacific Margin: the biology of newly explored oxygen minimum zone and methane seep ecosystems, submitted. June, 2005 TOS meeting in Paris - Open Ocean Exploration Session.

Rathburn, A.E., Levin. L.A., Gieskes, J.M., Ziebis, W., Martin, J.B., Tryon, M.D., Fryer, G.J., McMurtry, G.M., Perez, M.E., Fodrie, J., Bahls. A., Abriani, M., Wrightsman, B., Adamic, J., McMillan, P.A., Neira, C.E., Mendoza, G.F., Leddick, J.E., Do, J., 2004. Of Tsunamis and Seafloor Dynamics: Initial Results of Research Off the Aleutian Islands, Alaska. Joint Meeting of the 15th Annual Argonne Symposium and CSUI, November 2004, Chicago, IL, I-5.

Dorman, L.M., DeShon, H.R., Tryon, M.D., Brown, K.M., Schwartz, S., and Tryon, M.D., 2004, Seismic Noise Correlation with Seismicity and Fluid Flow: Eos Trans. AGU, v. 85(47), Fall Meet. Suppl., Abstract S51B-0150

Brown, K.M., Tryon, M.D., DeShon, H.R., Dorman, L.M., and Schwartz, S., 2004, Transient Fluid Pulsing and Seismic Tremor-like Seismic Noise: Episodic Creep and/or Fluid Expulsion at the Updip Edge of the Seismogenic Zone, Costa Rica: Eos Trans. AGU, v. 85(47), Fall Meet. Suppl., Abstract S41D-08

Tryon, M.D., LaBonte, A.L., Fueri, E., Hilton, D.R., and Brown, K.M., 2004, Toward long-term geochemical sampling of gases and deep fluids in subduction zone fore-arcs: New instrument developments: Eos Trans. AGU, v. 85(47), Fall Meet. Suppl., Abstract V13A-1440

Tryon, M.D., Brown, K.M., Long-term fluid flow measurements from widely varied oceanic settings elucidate near-surface hydrologic environments, *Eos, (Transactions, American Geophysical Union),* 84 (46), 846, 2003.

Brown, K.M., DeShon, H., Tryon, M.D., Dorman, L., and Schwartz, S., Transient fluid pulsing and noise in the Costa Rican subduction zone: Nearly silent slip events?, *Eos, (Transactions, American Geophysical Union),* 84 (46), 1420, 2003.

Brown, K.M., M.D. Tryon, H. DeShon, L. Dorman, and S. Schwartz, Transient fluid flow processes in margin settings: Earthquakes and pulsing in the Costa Rican subduction zone, in *Ocean Margin Research Conference*, Paris, 2003b.

Levin, L.A., W. Ziebis, G.F. Mendoza, V.A. Growney, M.D. Tryon, K.M. Brown, C. Mahn, J.M. Gieskes, and A.E. Rathburn, Spatial heterogeneity of macrofauna at northern California methane seeps: influence of sulfide concentration and fluid flow, *Marine Ecology Progress Series*, *265*, 123-139, 2003.

Tryon, M.D., Brown, K.M., Aqueous flux measurements at the Bush Hill hydrate mound, Gulf of Mexico, Oceans 2003 Conference, San Diego, CA., 2003.

Iwase, R., Machiyama, H., Soh, W., Brown, K.M., Tryon, M.D., Detailed mapping of subbottom temperature gradient and flow rate observation at the seepage site on deep seafloor off Hatsushima Island in Sagami Bay, central Japan, IUGG Conference, 2003.

Spinelli, G.A., A.T. Fisher, C.G. Wheat, M.D. Tryon, K.M. Brown, and A.R. Flegal, Groundwater seepage into San Francisco Bay estimated from seepage meters and porewater geochemistry: Implications for disolved metals budgets, *Water Resources Research*, 38 (7), 19 pp., 2002.

Torres, M.E., J. McManus, M. deAngeles, M.D. Tryon, A. Trehu, K.M. Brown, and D. Hammond, Benthis fluxes from sediments hosting methane hydrate deposits at Hydrate Ridge, Cascadia, in *Abstracts with Programs - Geological Society of America*, 34 (5), pp.42, Apr 2002.

Tryon, M.D., C. Mahn, J. Gieskes, and K.M. Brown, Methods of fluid and geochemical flux measurements and new insights from seep studies at the Eel River Margin, *Eos, (Transactions, American Geophysical Union)*, 82 (48), 1302, 2001.

Tryon, M.D., and K.M. Brown, Results from long-term aqueous flux measurements on the Costa Rican convergent margin, *Eos, (Transactions, American Geophysical Union)*, 81 (48), 1161, 2000.

Tryon, M.D., Brown, K. M., The Chemical and Aqueous Transport meter; A benthic flux meter for long term monitoring of low to moderate flow rates: *RIDGE in situ Workshop*, Aptos, CA, 2000.

Brown, K.M., and M.D. Tryon, Could temporal changes in fluid expulsion patterns from cold seep regions located on faults be used to monitor transient stress changes in the seismogenically coupled region of the subduction thrust?, *Special Paper – Oregon, Department of Geology and Mineral Industries*, 33, 33-34, 2000.

Tryon, M.D., and K.M. Brown, Transient fluid flow patterns on Hydrate Ridge, Cascadia: A response to methane gas discharge?, *Eos, (Transactions, American Geophysical Union)*, *80* (46), 528, 1999.

Tryon, M.D., and K.M. Brown, Aqueous flux measurements on Hydrate Ridge, Cascadia, in *Pacific Section Convention, Program with Abstracts*, pp. 45, American Association of Petroleum Geologists, Monterey, California, 1999.

Brown, K.M., C. Goldfinger, G. Bohrmann, M. Torres, M. Tryon, C. Jung, E. Suess, H. Sahling, and A.M. Trehu, Geological and Hydrogeologic Interrelationships Around Seep and Gas Vent Regions on Hydrate Ridge: Seabed Observations, *Eos, Transactions, American Geophysical Union*, *80* (46), 1999.

Linke, P., O. Pfannkuche, M.E. Torres, R.W. Collier, U. Witte, J. McManus, D.E. Hammond, K.M. Brown, M.D. Tryon, and K. Nakamura, Variability of benthic flux and discharge rates at vent sites determined by in situ instruments, *Eos, Transactions, American Geophysical Union*, *80* (46), 509, 1999.

Torres, M.E., K. Brown, S. Colbert, R.W. Collier, M. deAngelis, D. Hammond, K. Heeschen, D. Hubbard, J. McManus, C.L. Moyer, G. Rehder, A. Trehu, M.D. Tryon, and P.J. Whaling, Active gas discharge resulting from decomposition of gas hydrates on Hydrate Ridge, Cascadia Margin, *Eos (Transactions, American Geophysical Union)*, *79* (45), 461, 1998.

Tryon, M.D., K.M. Brown, and D. Elliott, Instrument development and results from sea floor flux meter deployments off California and Oregon, *Eos (Transactions, American Geophysical Union)*, *78* (46), 690, 1997.

Tryon, M.D., K.M. Brown, L.M. Dorman, and A.W. Sauter, Instrument Development and Results From Sea Floor Flux Meter Deployments Off N. California and the EPR, *Eos (Transactions, American Geophysical Union)*, *77* (46), 236, 1996.

Brown, K.M., T.G. Fitts, M.D. Tryon, and B. Ransom, An experimental study of the physical and chemical property changes occurring during the smectite to illite reaction, *AAPG Meeting Abstracts*, 5, 19, 1996.

Fitts, T.G, K.M. Brown, M.D. Tryon, and B. Ransom, Measurement of porosity and smectite hydration state under deviatoric stress conditions; implications for water partitioning between pores and minerals in sedimentary basins, *AAPG Meeting Abstracts*, 5, 46, 1996.

Fitts, T.G, K.M. Brown, M.D. Tryon, Gradual vs instantanious dewatering of smectites; experimental data and implications for physical properties of smectite-rich sediments in nature, *AAPG Meeting Abstracts*, 5, 89, 1996.

Fitts, T.G, K.M. Brown, M.D. Tryon, Smectite diagenesis; preliminary experimental results and implications for the development of overpressuring during the burial of smectite-rich sediments, *Eos, Transactions, American Geophysical Union,* 76 (46), 189, 1995.

Subject: DeSSC Nomination
Date: Thu, 23 Mar 2006 08:10:23 -0500
From: "Shirley Pomponi" <Pomponi@Hboi.edu>
To: <office@unols.org>,
"Marsh Youngbluth" <youngbluth@hboi.edu>

To the UNOLS council:

I'd like to nominate Dr. Marsh Youngbluth to fill the vacancy on the Deep Submergence Science Committee of UNOLS.

Dr. Youngbluth has long and active history in deep-water biology, especially biological research conducted in situ with a variety of manned and robotic submersibles. He has conceived, developed and adapted sampling and sensor technologies to both kinds of submersibles, and has both national and international collaborators. For the future, Marsh envisions a stronger emphasis on sensors for ocean optics projects (HDTV and red light for studies of behavior; multi-spectral light instruments for profiling upwelling, downwelling, and microbial ecology) and on sensors for chemical pursuits (nutrient and oxygen profiling to examine the importance of thin layers in water column dynamics).

I've served on the Deep Submergence Science Committee, and from my experiences on DeSSC, I believe that Marsh would make a significant contribution. Please give his candidacy strong consideration. A copy of his CV is attached.

Thank you.

Shirley A. Pomponi, Ph.D.
President and CEO
Harbor Branch Oceanographic Institution, Inc.
5600 US 1 North
Fort Pierce, FL 34946 USA

Phone: 1-772-465-2400, ext. 449
Fax: 1-772-465-7156
email: pomponi@hboi.edu

MARSH J. YOUNGBLUTH *Tel* – 772-465-2400, ext. 319
Harbor Branch Oceanographic Institution (HBOI) *Fax* – 772-461-9424
5600 U.S. 1, North, Fort Pierce, Florida 34946 USA *email: youngbluth@hboi.edu*

EDUCATION:

Ph.D. (Biology, 1972)	Stanford University
M.S. (Zoology, 1966)	University of Hawaii
B.S. (Biology, 1963)	Portland State University

PROFESSIONAL EXPERIENCE:

Research

Senior Scientist (1979-1992, 1993-2006), Associate Scientist (1975-1978): Principal Investigator for Water Column Ecology Department, HBOI, Fort Pierce, Florida

Visiting Scientist: University of Umeå(2004, 2005); University of Bergen (1998-2004); Japanese Society for Promotion of Science (1997); National Center for Scientific Research (CNRS), Station Zoologique, France (1988, 1990-1992, 2000, 2002-2003)

Chief Scientist (1969-2005): HBOI, NOAA, UNOLS, and Norwegian vessels in Atlantic, Pacific, Caribbean and Mediterranean Seas

Administration

Executive Officer (2000-2006) Protect Wild Dolphin Program, HBOI

Program Director (1995-1997), Biological Oceanography, NSF, IPA Appointment, Arlington, VA; (1992-1993), National Undersea Research Program, NOAA, Silver Spring, MD

Division Director (1982-1985) Division of Marine Sciences, HBOI

RESEARCH EXPERIENCE:

Ecology and Behavior of Midwater Zooplankton, especially Gelatinous Species
Particle Transport and Transformation in Mesopelagic Regimes

SELECTED PUBLICATIONS (13 of 75)

Gorsky, G. , M.J. Youngbluth and D. Deibel (eds) 2005. Response Of Marine Ecosystems To Global Change: Ecological Impact Of Appendicularians. Contemporary Publishing International, Paris. 435 p.

Båmstedt, U., S. Kaartvedt, and M. Youngbluth 2003. An evaluation of acoustic and video methods to estimate the abundance and vertical distribution of jellyfish. J Plankton Res. 25: 1307-1318.

Youngbluth, M.J. and U. Båmstedt 2001. Distribution, abundance, behavior and metabolism of *Periphylla periphylla*, a mesopelagic coronate medusa in a Norwegian fjord. Hydrobiologia 451: 321-333.

Purcell, J.E., D.L. Breitburg, M.B. Decker, W.M. Graham, M.J. Youngbluth, K.A. Raskoff. 2001. Pelagic cnidarians and ctenophore in low dissolved oxygen environments: A Review. pp. 77-100, In: N.N. Rabalais and R.E. Turner (eds.) Coastal Hypoxia, Coastal and Estuarine Studies 58, American Geophysical Institution, Washington, D.C.

Gorsky, G., P.R. Flood, M.J. Youngbluth, M. Picheral and J-M. Grisoni. 2000. Zooplankton distribution in four western Norwegian fjords. Estuar. Coastal Shelf Sci. 50: 129-135

Bailey, T.G., J.J. Torres, M.J. Youngbluth and G.P. Owen. 1994. Effect of decompression on mesopelagic gelatinous zooplankton: A comparison of *in situ* and shipboard measurements of metabolism. Mar. Ecol. Prog. Ser. 113: 13-27.

Greene, C.H., E.A. Widder, M.J. Youngbluth, A. Tamso and G.E. Johnson. 1992. The

migration behavior, fine structure, and bioluminescent activity of krill sound-scattering layers. Limnol. Oceanogr. 37: 650-658.
Fenaux, R. and M.J. Youngbluth. 1991. Two new mesopelagic appendicularians, *Inopinata inflata* and *Mesopelagica caudaornata* gen. nov., sp. nov. J. Mar. Biol. Assoc. U.K.71: 613-621.
Youngbluth, M.J., T.G. Bailey and C.A. Jacoby. 1990. Biological explorations in the mid-ocean realm: foods webs, particle flux and technological advancements, pp. 191-208. In: Y.C. Lin and K.K. Shida (eds.) *Man in the Sea*, Volume II. San Pedro, CA:Best Publishing.
Youngbluth, M.J., T.G. Bailey, P.J. Davoll, C.A. Jacoby, P.I. Blades-Eckelbarger, C.A. Griswold. 1989. Fecal pellet production and diel migratory behavior by the euphausiid *Meganyctiphanes norvegica* effect benthic-pelagic coupling. Deep-Sea Res. 36:1491-1501.
Youngbluth, M.J., P. Kremer, T.G. Bailey and C.A. Jacoby. 1988. Chemical composition, metabolic rates and feeding behavior of the midwater ctenophore *Bathocyroe fosteri*. Mar. Biol. 98: 87-94.
Pugh, P.R. and M.J. Youngbluth. 1988. Two new species of prayine siphonophore (Calycaphorae, Prayidae) collected by the submersibles 'Johnson-Sea-Link' I and II. J. Plankton Res. 10: 637-657.
Youngbluth, M.J. 1982. Utilization of a fecal mass as food by the pelagic mysis larva of the penaeid shrimp *Solenocera atlantidis*. Mar. Biol. 66: 47-51.

COLLABORATORS IN LAST 48 MONTHS:

Ann Bucklin, Ulf Båmstedt, Don Deibel, Per Flood, Gaby Gorsky, Russ Hopcroft, Charles Jacoby, Larry Madin, Francesc Pages, Jennifer Purcell, Kevin Raskof, Franz Uiblein

GRADUATE AND POST-GRADUATE ADVISORS AND ADVISEES:

Peter Davoll, Malvern Gilmartin, Charles Jacoby, Ronald Larson, Brian Ortman, Ernest Reese, David Smith, Barbara Sullivan, Chad Walters

RECENT ADVISORY ACTIVITIES:

MAR-ECO Workshops, Census of Marine Life (Bremerhaven, Germany (Jan-2002), Bergen, Norway (Jan-2003), Lisbon, Portugal (Jun-2005), Nice, France (Mar-2006)
International Workshop, Exploration of the Seas, Paris, France (May, 2002)
NOAA Workshop, Global Exploration in Arctic Ocean, Washington DC (Jul-2001)

GRANTS (Current and Recent):

2001-2005 –Predation by the physonect siphonophore *Nanomia cara*. – NSF OCE-0002493
2002-2003, 2005-2006 –The Hidden Ocean: Explorations under the ice of the Western Arctic – the pelagic fauna. NOAA Ocean Exploration
2001-2003 –Development of *in situ* techniques for quantifying rates for feeding, house production and house flux of appendicularians. NSF OCE-0086229.
1999-2002 –The predatory role of the coronate medusa *Periphylla periphylla* in a Norwegian fjord NSF INT-9903467.

UNOLS Council Meeting

Activities and Issues of Interest

Phone Web Conference

June 21-22, 2006

Academic Fleet Renewal
FOFC Fleet Long-Range Plan

- Recommended changes from FOFC principles have been reviewed and entered as appropriate to the draft document.
- Bob Winokur has reviewed the latest draft. It will be circulated to the FOFC principles for one final review (2 week review period)
- This will be followed by an editorial review/revision by Professional Editor, and conversion to pdf.
- Late July – Send draft document to JSOST.

Academic Fleet Renewal
FIC Fleet Improvement Plan

- Work continued on the draft update to the Fleet Improvement Plan
- Reclassification of UNOLS Ship Classes in Coordination with FOFC (next slide)
- Draft Timeline:
  - Summer 06 – finalize draft
  - Sept 06 – distribute to Council for review and comment
  - Oct 4 & 5 – Discuss at FIC and Council Meetings
  - Mid Oct – Post for community review
  - Nov 06 – Incorporate comments
  - Dec 06 – Final Draft for Council Approval

Academic Fleet Renewal

FIC Fleet Improvement Plan

Reclassification of UNOLS Ship Classes:

GLOBAL CLASS [Full Operating Year (FOY) = 300 days]

- *Atlantis*
- *Knorr*
- *Marcus Langseth*
- *Melville*
- *Revelle*
- *Thompson*

OCEAN CLASS

[FOY = 275 days]

- ARRV
- *Kilo Moana*

Academic Fleet Renewal

FIC Fleet Improvement Plan

Reclassification of UNOLS Ship Classes:

INTERMEDIATE CLASS [FOY = 250 days]

- *Endeavor*
- *New Horizon*
- *Oceanus*
- *Seward Johnson*
- *Wecoma*

REGIONAL CLASS [FOY = 200 days]

- *Alpha Helix*
- *Cape Hatteras*
- *Point Sur*
- *Atlantic Explorer*

Academic Fleet Renewal

FIC Fleet Improvement Plan

Reclassification of UNOLS Ship Classes:

REGIONAL CLASS
(non-Federal)
[FOY = 180 days]

- *Longhorn*
- *Pelican*
- *Hugh R. Sharp*
- *Sproul*

LOCAL CLASS
[FOY 110 days]

- *Blue Heron*
- *Clifford A. Barnes*
- *Savannah*
- *Urraca*
- *Walton Smith*

Academic Fleet Renewal
Regional Class Acquisition Process

- Early FY 2007: NSF Board Approval will be sought for expenditure of R&RA funds not to exceed $15 million in any one year over six years.

- Ship Acquisition and Operator Selection Timeline:

Phase I:

- April 2006 – Two design teams selected:
  - Nichols Brothers' Boat Builders/Glosten & Associates
  - Dakota Creek Industries, Inc./Guido Perla & Associates
- Fall 2006 – NSF issues solicitation for Operator of first ship
- Spring 2007 – NSF selects Ship Operator

Phase II:

- May 2007 - Select winning design/contract
- June 2007 – 2013: Consecutive 3-ship construction/outfitting

Academic Fleet Renewal
ARRV Acquisition Status

JUL 2006	Competitive solicitation to be issued for Cooperative Agreement for construction and operation
SEP – NOV 2006	Proposals reviewed
JAN 2007	NSB approval sought to award Cooperative Agreement for construction ($98M) and operation of ARRV
CY10	Complete Construction

Academic Fleet Renewal
Ocean Class Acquisition Status

- **Spring 06 -** Navy formed a Naval Research Advisory Committee (NRAC) to provide a recommendation regarding Navy's role in the acquisition of Ocean Class vessels.
  - NRAC provided their recommendations to the ASN-RDA.
  - Recommendations are not public
  - NRAC has completed their task.
- **July 2006 –** Navy to submit Congressional report on Ocean Class proposed plans.
  - The NRAC recommendations to ASN will be used in Navy's report to Congress
  - Upon submission of Navy's report to Congress, the report becomes open to the public.
- **FY2006 Funds for Ocean Class design**:
  - No status or actions on funding to date.

Academic Fleet Renewal

Global Class Science Mission Requirements

- On-line Survey has been drafted and reviewed by subcommittee
- Advertise to the community

Academic Fleet Renewal

Marcus Langseth Conversion Status

- Written report provided by Paul Ljunggree – next slide

Revised – 6/20/06

NEW-06/20/06

Lamont-Doherty Earth Observatory
Marine Department-Palisades, NY 10964
Phone:845-365-8845 Fax: 845-359-6817 - Email: pwl@ldeo.columbia.edu
19 June 2006

Conversion - R/V Marcus G. Langseth

The R/V Marcus Langseth sailed from Quonset Point, RI on 23 February arriving in Shelburne Ship Repair Shelburne, Nova Scotia on 25 February. Shelburne Ship Repair is a satellite yard of Halifax Shipbuilding in Halifax, Nova Scotia.

The better part of the early shipyard effort involved rip outs and opening up of the starboard side to permit the over the side launch and recovery of instrumentation. The helo flight deck was cut back and the marine mammal observation tower support structure was modified. At the same time major work items were initiated to address Coast Guard damage stability requirements. These involved athwartship bulkheads subdividing both the engine room and seismic recording room. As part of the stability modifications several fuel tanks were subdivided.

The main yard in Halifax undertook the prefabrication of panels to be used to construct the new laboratory spaces and the staterooms. They also undertook the fabrication of the new science pod to house the ship Kongsberg EM 120 multi beam system and other transducers. While we had sought throughout the process to benefit from the Navy redesign effort for a science pod to house the multi beam time was not on our side and the shipyard required a plans for the pod. The decision was made to go forward using the original design.

Panels for laboratory spaces were delivered the week of 2 May and began to be fitted as laboratory spaces started to take shape. During the week of 18 May the pod was delivered in 3 pieces and the final assembly of the pod began.

On 31 May and 1 June EROCC and MLSOC met in Shelburne, Nova Scotia.

On 6 June the ship was hauled on the marine railway with the science pod positioned in the dock prior to the Langseth going on the blocks. Work continues with the fit out of the bulkhead panels for new accommodation and laboratory spaces. The hull is being sandblasted to remove any antifoulant containing TBT and will be coated anti-corrosive and anti-foulant paints meeting international regulatory standards. Other ongoing projects will include the modification to the starboard bridge wing for better work deck visibility, installation of the new starboard A-frame and stern telescoping boom.

As of 31 May the ship conversion was estimated to be at a little more than 50% complete. The original delivery date for the vessel was scheduled for 2 July, but with production lagging behind the production plan Lamont and the shipyard entered discussions. Additional personnel have been assigned to the conversion project. Discussions are underway that will result in a revised delivery date.

UNOLS STR / Scheduling Database

Americans with Disabilities Act (ADA) Guidelines

Membership :

- FIC Member - Terry Whitledge (UAF) [Chair]
- Risk Manager - Dennis Nixon (URI)
- Marine Superintendent & FIC – Al Suchy (WHOI)
- *Langseth* Conversion Rep & FIC – Jim Cochran (LDEO)
- RVTEC Representative – Joe Ustach (Duke)
- Seagoing scientists with disabilities – Amy Bower (WHOI) and Terry Glover (contributing member)
- Ship Master – Eric Buck (SIO)
- UNOLS Safety Committee Rep – Matt Hawkins (UDel)
- David Chapman (UDel)
- Ex-officio members – NSF and NOAA agency reps

Americans with Disabilities Act (ADA) Guidelines (continued)

- Two phone/web conferences have been held (2/06 & 6/06)
- Preliminary ADA Guidelines for the Regional Class document has been drafted. The document is being revised based on Committee input.
- Tasks to be addressed:
  - Establish General ADA Guidelines for new ship construction/conversion.
  - Draft procedural guidelines for at-sea research operations by seagoing scientists with disabilities.
- Planning is underway to convene a Workshop.
  - Attendance to include ship operator representatives, agency reps, sea-going scientist including those with disabilities. Invited speakers (USCG, others)
  - Workshop preferred site – UNOLS vessel
  - The workshop will be used to review the draft guidelines and test the practicality of the procedural guidelines, and identify any additional ADA guidelines.

Safety Standards for Human Occupied Vehicles

Dana Wilkes, Chair - NOAA Representative
Tim Askew (HBOI) – HOV Operator, UNOLS Safety Committee
Colleen Cavanaugh (Harvard U.) – Science HOV user
Pat Hickey (WHOI) - HOV pilot
Terry Kerby (HURL) – HOV Operator and Pilot
Dan Schwartz (UW) - Marine Superintendent, past Ship Captain
Barrie Walden (WHOI) – HOV Operator
Craig Young (U. of OR) - Science HOV user, DESSC

Agency Representatives:

NSF- Dolly Dieter, Holly Smith
NOAA – Barbara Moore

Safety Standards for Human Occupied Vehicles

Two meetings have been held:

- January 2006 in Tampa, FL and May 2006 at Woods Hole, MA

Timeline:

- **Document drafting** (6 Chapters, modeled after the Research Vessel Safety Standards)
  - HOV Operations (vehicle) –August 2006
  - HOV Support Ship – Oct 2006
  - HOV Handling Systems – Dec 06
  - Science User Safety Guidelines – Feb 07
  - Training Procedures for HOV Crewpersons – Apr 07
  - Introduction, Definitions, Procedures **–** Jun 2007
- **Committee Review –** (2 months) **–** November 2007 begin review
- **Council Review** (1 month) **–**January 2008 begin review
- **Agency Review** (6 months) **–** Begin April 2008
- **Document Final Acceptance** - October 2008

US Fish & Wildlife Service Importation Policy

Frequency Spectrum Management

- Requested status from Richard Perry

The 2006 UNOLS Annual Meeting
Friday, October 6, 2006
at
The National Science Foundation

The keynote speaker will be
Former California Congressman and White House Chief of Staff

The Honorable Leon E. Panetta

Council Elections will be Held for the following positions:

- **Chair-Elect**
- **One At-large Position**
- **One Operator Position**
- **One Non-Operator Position**

UNOLS Annual Meeting *(continued)*

Annual Meeting Topic Suggestions:

- **UNOLS Accomplishments in 2006**
- **Committee Reports**
- **Agency Reports**
- **Academic Fleet Renewal Activities and Plans**
- **Budget shortfalls and impact on future operations – UNOLS Sub Committee recommendations**
- **UNOLS objectives, priorities and goals for 2006 – 2007**
- **American's with Disabilities Act (ADA) Guidelines**
- **Safety Standards for Human Occupied Vehicles**
- **Gender Climate at Sea**
- **Definition of Safe Working Loads**
- **US Fish & Wildlife Service Importation Policy**
- **Codes of Conduct - The Impact of Scientific Studies on the Environment**
- **UNOLS STR/Scheduling Database**

Research Vessel Technical Enhancement Committee (RVTEC)
Report by Bill Martin, RVTEC Chair

Planning for INMARTECH 2006 continues. The symposium will be hosted by Woods Hole Oceanographic Institution, October 17-19. A reminder to the UNOLS Chair – you are scheduled to give a Welcome address on Day One.

The annual RVTEC meeting will be held in conjunction with INMARTECH 2006 on October 16.

On March 28, 2006 the group assembled by RVTEC to provide feedback on the Regional Class Vessel SOR submitted their final comments to NSF. Although the group was not formally formed due to the short notice and fast response required it is safe to say the group was chaired by Stewart Lamerdin. I would like to thank him for his hard work and dedication to this process.

RVOC REPORT
Tim, Askew, RVOC Chair
June 21, 2006

A long awaited and very productive Annual Meeting took place at the University of Washington in Seattle, April 25, 26, 27, 2006. Kudos to Dan Schwartz and his Marine Operations staff, for all the hard work setting up the meeting, hotels, and activities for the membership.

The Safety Committee held a meeting on April 24, 2006 to address the revisions and chapter updates to the Research Vessel Safety Standards (RVSS). The new edition will use the same format for all the chapters.

The three day RVOC meeting had a full schedule of agency reports. Group Purchase updates and special reports from Foreign Operators as well as UNOLS vessel updates. The members were all ears for Ian Sage's (SACT/NATO) report on the R/V Alliance grounding in the Mediterranean as well as the presentation by Morgan Terrell of the National Transportation Safety Board (NTSB), Marine Accident Section. He gave an excellent perspective on "What to expect if your ship has an accident".

Workshops finished up the second day and provided very stimulating discussions on "Alcohol, Drugs and Sexual Harassment Policies", Liz Caporelli (WHOI) was the facilitator and "Wire, Wire Testing (Safe Working Loads)", Tom Althouse (SIO) was the facilitator.

Thanks to Randy Maxon, Marine Superintendent, the 2007 Annual Meeting will be hosted by the Florida Institute of Oceanography in St. Petersburg, Florida the week of April 23 through 27, 2007.

Report of the DEep Submergence Science Committee
June 15, 2006
By Deborah Kelley, DESSC Chair

DESSC met at Woods Hole Oceanographic Institution May 24-25 for their bi-yearly meeting. The meeting presentations and action item list are available online on the UNOLS web site. The meeting resulted in the formation of numerous action items. Three of the most significant items have been nearly completed and include: 1) completion of a draft document outlining criteria for incorporating new assets into the Deep Submergence National Facility (NDSF); 2) completion of a recommendation by DESSC to include the autonomous vehicle *ABE* into the NDSF, concurrent with the removal of the two towed vehicles *DSL-120A* and *Argos II*; and 3) identification of a DESSC watchdog for *Alvin*, *Jason 2* and *ABE* (if it becomes part of the NDSF) that would interface with the PI's, NDSF, and DESSC regarding vehicle performance, availability of data products, and navigation etc. A complete listing of the action items is provided below with updates on progress indicated in red.

Action Items:

1. **December 2005 DESSC Meeting Minutes** – Incorporate revisions provided by Hedy and repost at final. (DeSilva)

2. **Ocean Observatory ROV Workshop** – Organize an ROV workshop for technology exchange and defining future needs to support ocean observatories. Participation should include ROV operators and engineers from WHOI, MBARI, and ROPOS. Commercial entities might also be considered. The workshop would be supported through UNOLS. DESSC, in collaboration with the agencies and UNOLS, will formulate the workshop description, objectives, and invitation list. (Kelley/DeSilva) anticipated submittal week of June 19th

3. **DESSC Recommendation on WHOI's ABE/Sentry proposal** – DESSC recommends that ABE/ Sentry be incorporated into the National Deep Submergence Facility with the following conditions: 1) ABE/Sentry replaces DSL-120, 2) WHOI provides clarification on the final bullet of their proposal letter regarding Data support, and 3) clarification on how the AUV missions will be programmed (if Yoerger/Bradley are not cruise participants). Deb will request the additional clarification from Bob Detrick. Additionally, she will request an information package that provides details on ABE/Sentry vehicle specifications, capabilities and how to use. This document is needed no later than June 13, 2006 so that it can be provided to the UNOLS Council prior to their June meeting. Deb will present the DESSC recommendation to the UNOLS Council on June 21st. If the Council endorses DESSC's recommendation, the Council will forward the recommendation to the supporting agencies and request that it be available for the August proposal deadline. ABE/Sentry will be added to the UNOLS Ship Time Request on-line form. An announcement will be distributed to the community at the appropriate time that provided information about ABE/Sentry and it's inclusion in the NDSF. The announcement will also inform that the DSL120 is no longer included in the NDSF (we

should let them know who to contact for future use). (Kelley/Detrick/UNOLS). All materials submitted to the UNOLS Council

4. **NDSF Vehicle Debrief Interviews** – In order to better track the status of vehicle and system performance, DESSC will conduct debrief interviews of PIs who use Jason2, Alvin, and ABE/Sentry. Agendas for future meetings will include summary reports of these debrief. Participation in the debriefs will include DESSC, the science user, and the NDSF operator (Chris German). DESSC will compile a list of items that have been identified as problems or areas where improvement is needed, then track them. A standard set of debrief questions will be drafted (the AICC debrief questions can be used as a template). The following individuals volunteered to conduct debriefs:
    a. Jason2 – Bill Chadwick
    b. Alvin – Michael Tryon
    c. ABE/Sentry – Hedy Edmonds

    (Action – DESSC draft debrief questions, Watchdogs conduct interviews). Hedy has provided previously used protocols , and examples of questions. These will be refined.

5. **R2K Database and Visualization Tools** – Invite Suzanne Carbotte or Vicki to a future DESSC meeting to provide a presentation on the R2K database and visualization tools. (Kelley) Inquiry sent to Suzanne.

6. **Shore-side Data Management** – DESSC recommends that shipboard personnel conduct the daily quality checks of cruise navigation data (as opposed to shore-side checks). Deb will send a recommendation to Barry Walden and Bob Detrick (Kelley)

7. **Science Training Opportunities for Pilots** - DESSC will formulate a recommendation to offer a workshop/training science session for pilots. The session should demonstrate how the data from the vehicles are used for different research disciplines. Offer the training in an interesting setting such as Hawaii or Iceland. (Kelley)

8. **R2K Lectureship program** – DESSC recommends that the R2K Lectureship program include an Alvin or ROV pilot as a distinguished lecturer. (Kelley) e-mail sent to RIDGE office, R2K Lectures already chosen for 2006-2007; will bring up at next RIDGE steering committee meeting

9. **Career Advancement /Learning Opportunities for Pilots** – DESSC recommends that WHOI Management promote learning opportunities and career advancement opportunities for pilots. (Kelley)

10. **Criteria for Adding Assets to the NDSF –** DESSC accepted the draft Criteria. Deb will present it to the UNOLS Council on June 21st for endorsement. (Kelley) completed

11. **Science Sensors for Replacement HOV** – A community on-line survey on science sensors for the RHOV has been drafted. Annette will add science outfitting such as tools and sensors based on input from Bob Brown. Buttons that will link to "additional

information" will be added. A deadline of when the information is needed will be added. Annette will circulate to the DESSC for review when available. (DeSilva/Brown/DESSC)

12. **Winter Meeting Strategies** – Contact Phil Taylor regarding the next DESSC meeting venue. The two upcoming biology meetings are the 2007 Benthic Ecology Meeting - Atlanta or Savannah -- dates TBA and the Western Society of Naturalists - November 9-12, 2006. Redmond, WA. NDSF users will be contacted for slides in advance of the meeting. (DeSilva) Craig Young has explored both options and Phil Taylor has responded to Craig's e-mail outlining these options. Decision should be made very soon.

13. **DESSC Membership** – Annette and will Deb contact DESSC members with terms ending in 2007 about staggering term lengths. Deb and Annette will present a recommendation at the next meeting. (Kelley/DeSilva)

SCOAR Report

June 19, 2006

John M. Bane, SCOAR Chair

SCOAR and ICCAGRA Meetings.

SCOAR met jointly with ICCAGRA (the Interagency Coordinating Committee for Airborne Geosciences Research and Activities) at the Naval Postgraduate School's Center for Interdisciplinary Remotely Piloted Aircraft Studies (CIRPAS) in Marina, CA on May 23 and 24, 2006. Discussion items included:

1) Scheduling among the various research aircraft operating agencies continues to be of interest. Aircraft operators are primarily federal agencies and for the most part are dedicated to agency missions or particular research programs. There is no uniform method for requesting, scheduling or for cost reimbursement of aircraft operations. There is still a need to better utilize some of the aircraft facilities and to improve access for users that need aircraft support. Making information about schedules, requesting procedures and costs centrally available will help facilitate access. Moving towards a “UNOLS-like” process might start with a aircraft schedule coordinating group made up of aircraft schedulers and funding agency representatives.

2) Some good news was presented by several of the agencies, including the establishment of a "catalog of available aircraft" by NASA, the acquisition of one more Twin Otter and one more P-3 by NOAA, the HIAPER Gulfstream jet being brought into service by NSF-NCAR, and the addition of one more King Air by the Naval Research Lab. Tempering this news is the fact that budgets to operate the fleet of federal research aircraft continues to be tight.

3) A presentation was made to SCAOR by Jim Hain of Associated Scientists at Woods Hole about their interest in using a twin-engine ultralight aircraft called a TwinCam. They have filed a petition with the FAA asking for an exemption to a regulatory limitation within the Experimental category of aircraft certification, and Jim asked if SCOAR would write a letter of support for this, stating that SCOAR recognizes the value of such aircraft in marine scientific research. Following the meeting, John Bane wrote such a letter and circulated it to the SCOAR members. They all approved of the letter's wording, with several saying that it is the type of thing that SCOAR should be assisting with. Peter Wiebe subsequently gave his UNOLS Chair's OK, and the letter was submitted to the FAA as part of the exemption-request package submitted by Associated Scientists of Woods Hole. As of this date, a final ruling on their request has not been made by the FAA.

4) There will be one SCOAR membership rotation this year, and we hope to have candidates identified prior to the next SCOAR meeting, which will be during Fall 2006, probably late October or early November.

5) A major part of the discussion at the SCOAR meeting was on details regarding the First UNOLS Airborne Ocean Science Conference, which was held the evening of May 24 and all day on May 25.

UNOLS Airborne Ocean Science Conference.

About 40 research aircraft scientists, technicians and agency operators attended this conference at the Moss Landing Marine Laboratories. Twenty-five oral and poster presentations were made. The meeting agenda, list of attendees and slides from the oral presentations can be seen at:

http://www.unols.org/meetings/2006/200605aosc/200605aoscmi.html

The general sense from attendees following the meeting was that it was a great success and that SCOAR and UNOLS should consider having a similar meeting periodically, perhaps every two years. An additional idea was to have a session for aircraft science results at an AGU or Ocean Sciences meeting and then an evening "Town Hall" meeting on the future of aircraft in ocean sciences. SCOAR will follow up on this.

Ship Scheduling Committee Report
By Liz Brenner and Rose Dufour

Since the last Council meeting in March the Ship Scheduling Committee has held three different meetings. All of the meetings were held by teleconference and PictureTalk as a visual tool.

On May 11, 2006 the Large Ship Scheduling Meeting was held. All large ship schedulers as well as agency representatives from NSF, ONR and NOAA were in attendance.

Linda Goad explained that NSF would hope to receive an extra million for 2006 and 2007additionaly may receive up to 3 or 4 million extra for 2007 ship operations. NOAA-OE was unable to commit to any ship time in 2007. NOAA is requesting the use of JASON II for a cruise on R/V *Ron Brown* in 2007.

Each schedule was reviewed and problematic cruises such as the coordination of *Langseth* and other OBS cruises were discussed. Problems were outlined to be followed up with negotiations between schedulers and funded scientists and program managers as well as negotiations between schedulers. Double bookings remained.

John Freitag and Linda Goad made a request to combine *Melville* and *Thompson* 2007 Letters of Intent to make one schedule thereby leaving one ship open and available to pick up an undisclosed mission or set of cruises. No other information was offered at that time. This schedule was to be called *Melson*. Each version would look a bit different as Thompson and Melville end the year 2006 in different parts of the world. *Melville* is scheduled to end the year with six DART mooring deployments in the east and south Pacific then south for a shipyard period in Brisbane, Australia. Thompson will end the 2006-year in homeport for a maintenance period.

On June 14, 2006 the West Coast Intermediate and Regional scheduling meeting was held. Before the meeting a message of was sent to the schedulers from Linda Goad at NSF. Below is an excerpt.

1. Right now, using 2006 rate estimates for the ship days in 2007, I'm over my projected budget. This budget also does not allow for lay up funds. So the picture is dim...

2. Anything listed on any ship schedule as pending for NSF should be removed from the LOIs. I'll have a hard enough time funding the ship time for research programs already funded.

3. You're going to have to be creative and tough with your budgets. If someone retires, and you can make do without that person (even if it's only a partial year), then do without.

4. Rate increases are only going to decrease ship days and increase lay-ups further.

5. There will be no partial lay-ups this year. If NSF ships are laid up, the funds for these ships will be minimal. If privately owned ships choose to continue working, that is their choice. However, your choice to operate at half an optimal schedule does not mean that I will pay twice the day rate. Many decisions will be made based on appropriate ship for the work, and if two vessels are equivalent, the least expensive option will get the work.

Each schedule was reviewed. One specific cruise was triple booked. Discussions took place regarding the challenge of laying up the smaller more local ships due to their flexibility in the scheduling of test and local class cruises.

The recommendation was for each west coast ship scheduler to create a version of their schedule without the one triple booked cruise. In addition each ship scheduler was asked to create a consolidated schedule, *New Horizon* and *Wecoma*, *Pt. Sur* and *R.G. Sproul* and to work up an estimate of the level of support needed for lay-up, perhaps with an option that included operating for the local work. However, Linda Goad stated that NSF would be under no obligation to provide lay up support for non-federal ships.

The East Coast Intermediate/Regional scheduling meeting was held, June 15th 2006. In attendance were east coast schedulers as well as federal agency representatives and SSC chairs.

Schedules were reviewed; several cruises remain double or triple booked. Three different east coast ship operators are essentially posting the same ship schedule; the only difference is the individual state funds.
A small conference call was previously held with Linda Goad and east coast intermediate operators. At that meeting it was decided by Linda Goad that a funded NSF cruise to be carried out in Venezuelan waters be scheduled on *Seward Johnson*, this cruise had been previously triple booked with other east coast ships.

The recommendation from NSF was to keep budgets as low as possible, be creative and try to find other sources of funding. Lay up funds will probably not be more than $500K per ship. And again the message to non-federal ships to not expect to receive lay up funds. Total costs will be a factor in decision-making and partial schedules will not be supported at a very high day rate.

Schedulers for *Seward Johnson*, *Endeavor*, *Oceanus*, *Sharp* and *Cape Hatteras* should create a second LOI (_2) which would be the consolidated schedule that is a reasonably full as possible with legitimate work.
The first LOI should show the work that is specific to the ship, requesting the ship or otherwise should only be scheduled on that ship.

Since the large ship conference call SSC chairs and Mike Prince were informally given word that the option of taking a global class vessel offline to carry out an undisclosed mission has been aborted. Apparently the groups ONR was speaking to did not have enough money to support a global class vessel for one entire year.

Conversations have taken place with NBDC-DART regarding potential work in 2007. The UNOLS fleet will be competing against other ship operations including the NOAA fleet for the DART deployments and maintenance operations around the world. Individual UNOLS ship operators will deal directly with DART to propose schedules and cost estimates. Currently the DART budget is around $4 million

Schedulers are working up and posting combined schedules. Projecting accurate proposed day rates may be problematic especially for multi-ship institutions. More information will be needed to take into account all factors before projecting a rate especially if one of the multi ship institutions' ship is targeted for lay-up.

The Ships Scheduling committee awaits recommendation from the sub-committee for guidance on lay up procedures. After recommendations we will continue to hold teleconference meetings throughout the summer culminating with the Ship Scheduling meeting to be held in Arlington, VA in September. Date TDB.

Arctic Icebreaker Coordinating Committee Report
June 2006

USCGC HEALY successfully completed the first program of her summer 2006 field season, HLY0601. The unscheduled emergency dry dock to fix a bow thruster that was expected to take place in April was cancelled when Todd shipyard lost its certification to lift HEALY. The ship did have the bow thruster functioning before its HLY0601 deployment, and the condition of this unit did not seem to affect this program, which took place south of St. Lawrence island in the Bering Sea in light ice conditions. A significant change for HEALY between last summer and this summer is that helicopter operations for 2006 are being run by a commercial contractor as the USCG POP-DIV has been disbanded and, at the present time, seems unlikely to be reformed. CAPT Dan Oliver reported that operations with the commercial company on HLY0601 were very successful. The Change of Command ceremony for CAPT Daniel Oliver, who sailed as the HEALY's CO since 2003, took place in Dutch Harbor, AK in June, and CAPT Douglas Russell is now in charge. HEALY is presently completing training exercises and is expected to load a seismic system next month to begin a survey of the Canada Basin. That will be followed by EEZ mapping for the United States and autonomous underwater vehicle testing. The ship will return to Seattle in the fall, when it is expected to have a thirteen-week long maintenance period that will include 9 weeks in drydock and several significant modifications of existing ship's systems.

Short-term repairs on the POLAR SEA continue, and that ship remains expected to support Deep Freeze in 2007. POLAR STAR is still at dock. USCG Headquarters reports that the Commandant is looking for guidance on the POLAR-class icebreakers from the final National Academy of Science report "Assessment of US Coast Guard Polar Icebreaker Roles and Future Needs" that should be released before the end of this year. In the meantime, NSF continues to pursue options that involve foreign icebreakers for resupplying McMurdo Station in Antarctica.

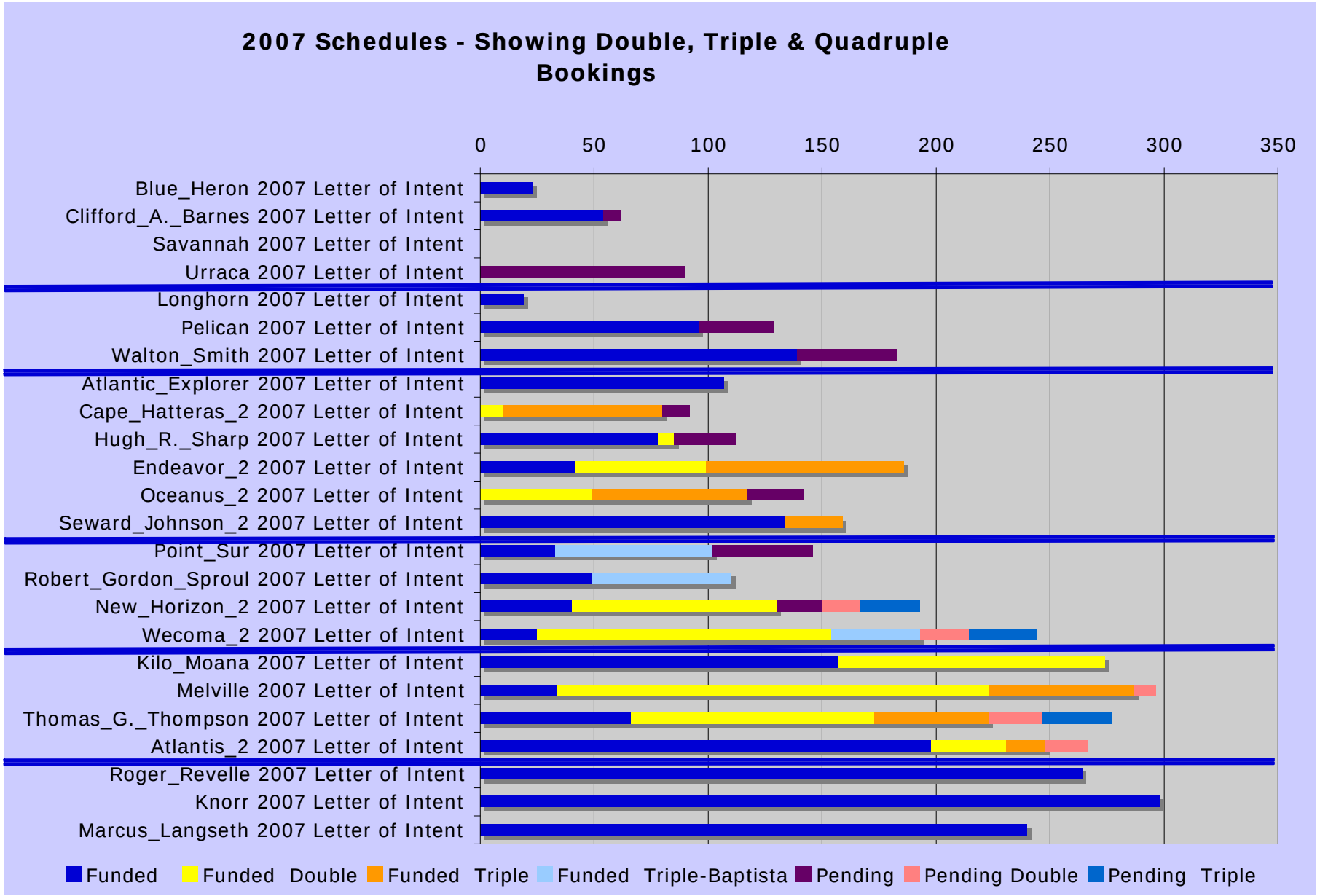
AICC completed its spring meeting at the National Science Foundation on April 18^{h} and 19th. The second day of this meeting was scheduled to allow AICC to meet with the Antarctic Research Vessel Oversight Committee (ARVOC) to discuss mutual interests with respect to the POLAR-class icebreakers and ongoing support of science in ice-covered waters at both poles, but an emergency caused ARVOC to cancel their participation. It is hoped that the joint meeting will take place early next year when AICC meets in Seattle to view the HEALY while she is in drydock.

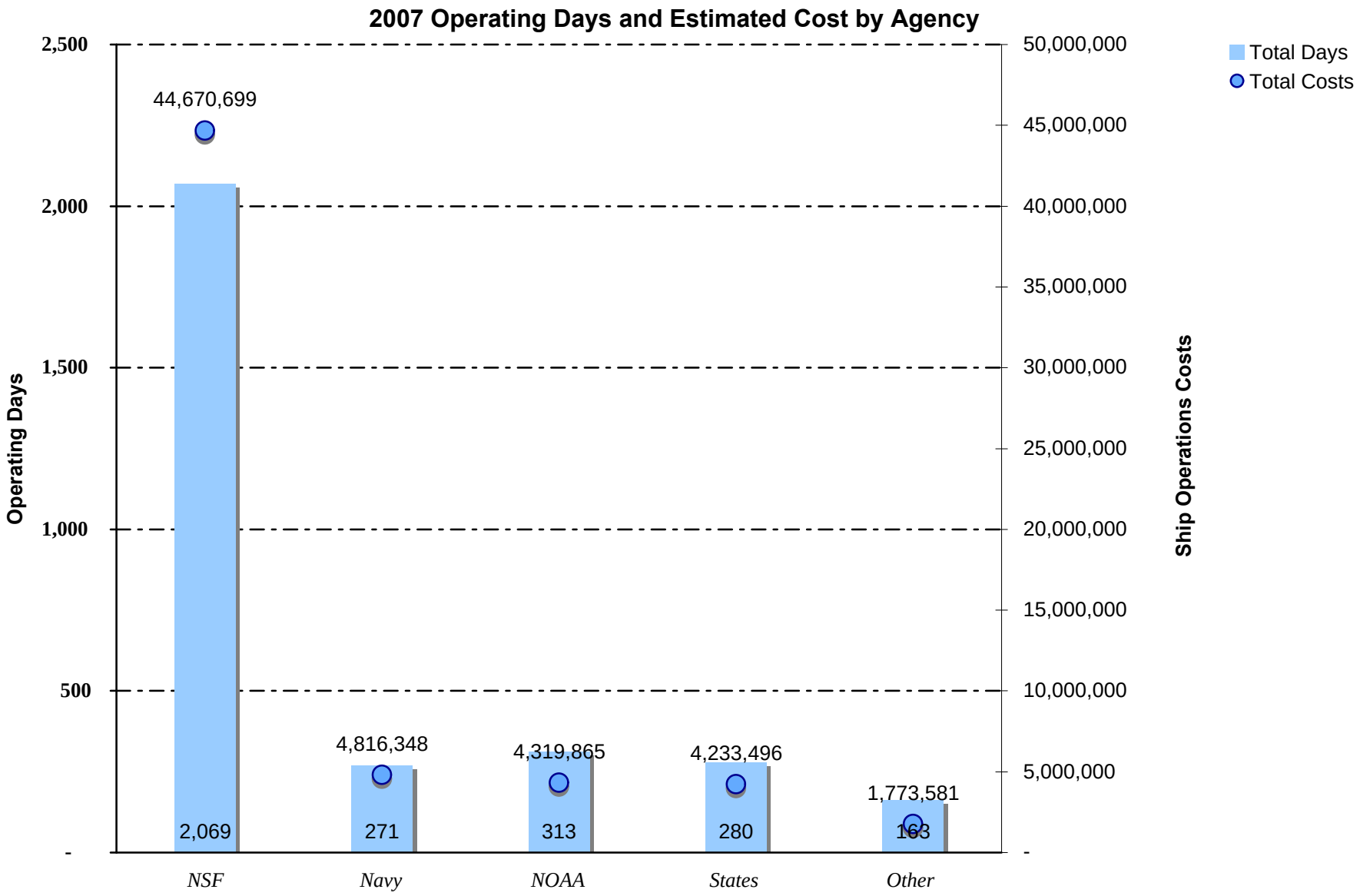
An announcement soliciting potential new members for AICC was circulated by the UNOLS office and generated several applications. The present committee membership will review the applicants this summer and make selections to replace the three outgoing committee members who rotate off in January. At the April AICC meeting there was a discussion about who would replace Margo Edwards as Chair of AICC and Carin Ashjian of the Woods Hole Oceanographic Institution was the sole volunteer for this role. She will assume the leadership of the group at the next meeting in early 2007.

The AICC can be reached by writing to the Chair (margo@soest.hawaii.edu) or to the UNOLS Office (office@unols.org).

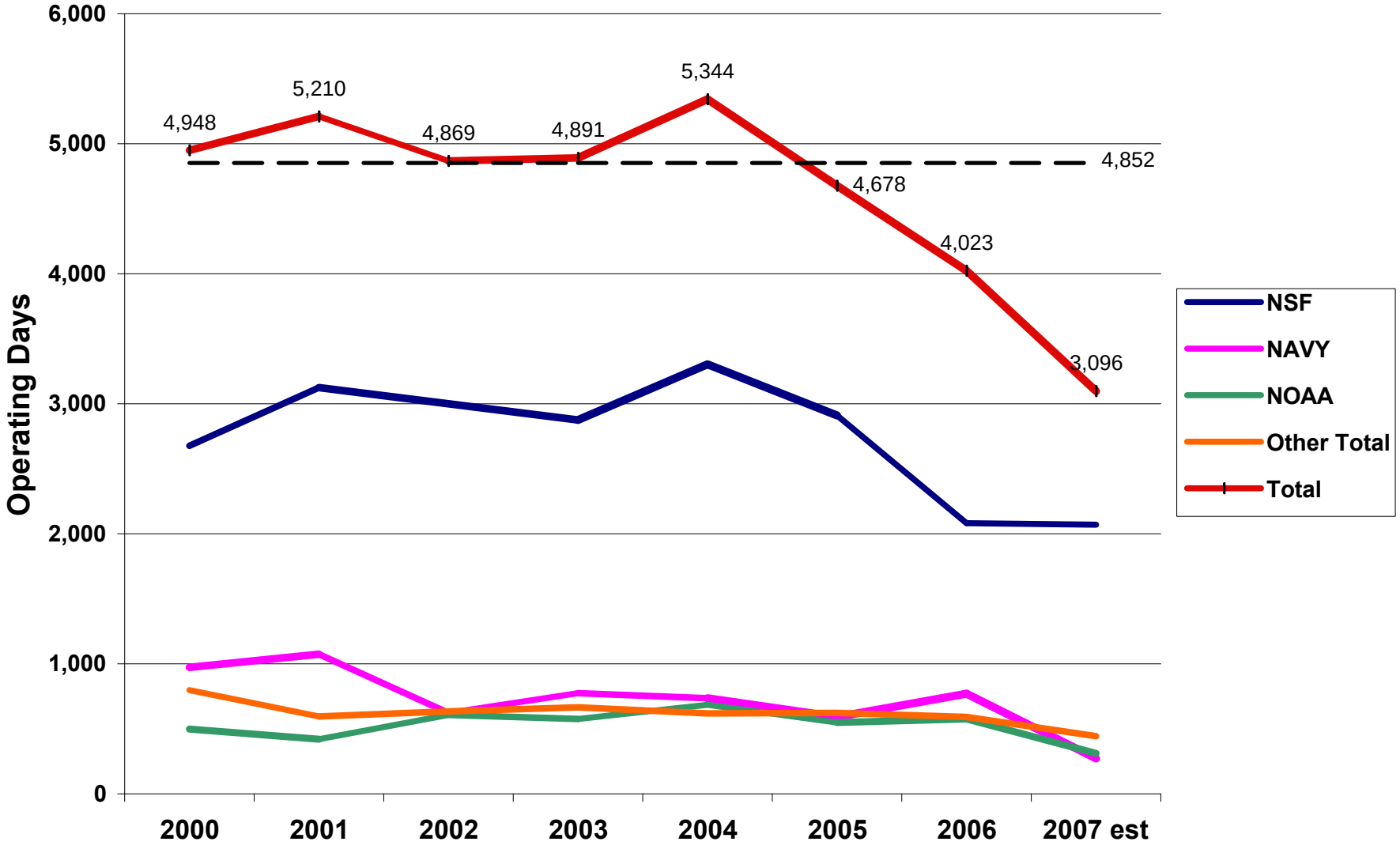
Report submitted by M. Edwards

Scheduling Graphs

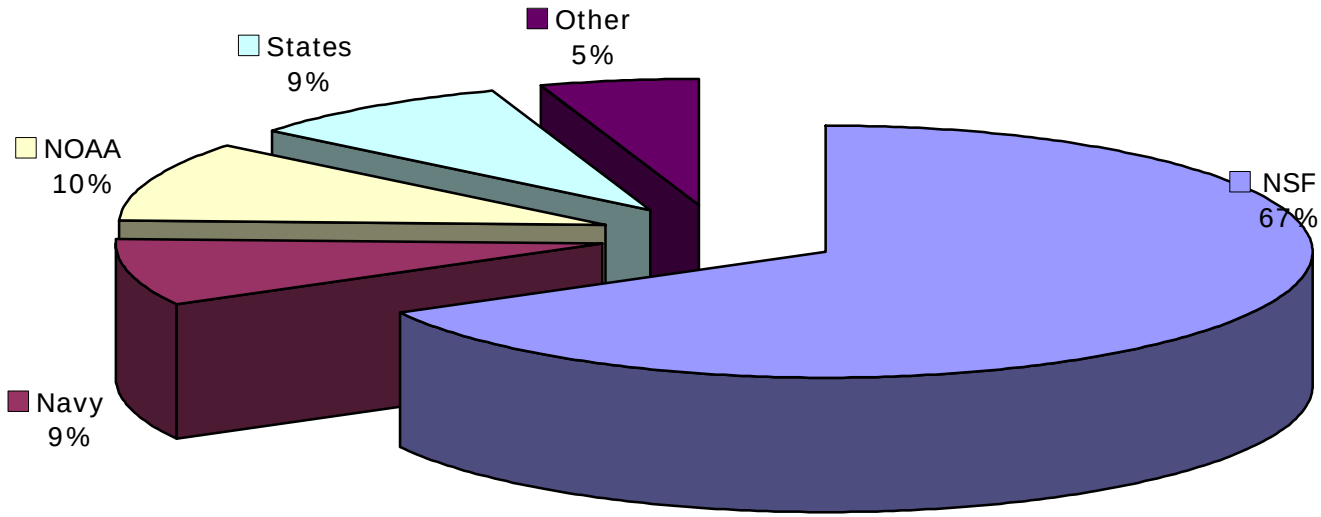

2007 Schedules - Showing Double, Triple & Quadruple Bookings
0
50
100
150
200
250
300
350
Blue_Heron 2007 Letter of Intent
Clifford_A._Barnes 2007 Letter of Intent
Savannah 2007 Letter of Intent
Urraca 2007 Letter of Intent
Longhorn 2007 Letter of Intent
Pelican 2007 Letter of Intent
Walton_Smith 2007 Letter of Intent
Atlantic_Explorer 2007 Letter of Intent
Cape_Hatteras_2 2007 Letter of Intent
Hugh_R._Sharp 2007 Letter of Intent
Endeavor_2 2007 Letter of Intent
Oceanus_2 2007 Letter of Intent
Seward_Johnson_2 2007 Letter of Intent
Point_Sur 2007 Letter of Intent
Robert_Gordon_Sproul 2007 Letter of Intent
New_Horizon_2 2007 Letter of Intent
Wecoma_2 2007 Letter of Intent
Kilo_Moana 2007 Letter of Intent
Melville 2007 Letter of Intent
Thomas_G._Thompson 2007 Letter of Intent
Atlantis_2 2007 Letter of Intent
Roger_Revelle 2007 Letter of Intent
Knorr 2007 Letter of Intent
Marcus_Langseth 2007 Letter of Intent
Funded
Funded Double
Funded Triple
Funded Triple-Baptista
Pending
Pending Double
Pending Triple


2007 Operating Days and Estimated Cost by Agency
Operating Days
Ship Operations Costs
Total Days
Total Costs
2,500
2,000
1,500
1,000
500
-
50,000,000
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
-
44,670,699
4,816,348
4,319,865
4,233,496
1,773,581
2,069
271
313
280
163
NSF
Navy
NOAA
States
Other

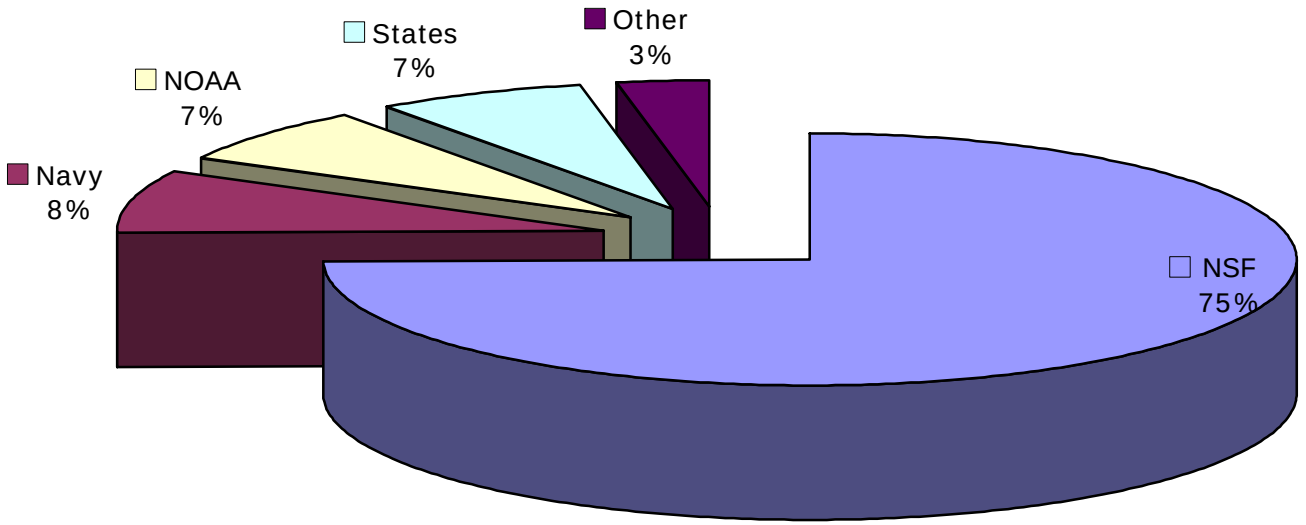
UNOLS Fleet Utilization (2000 - 2007)



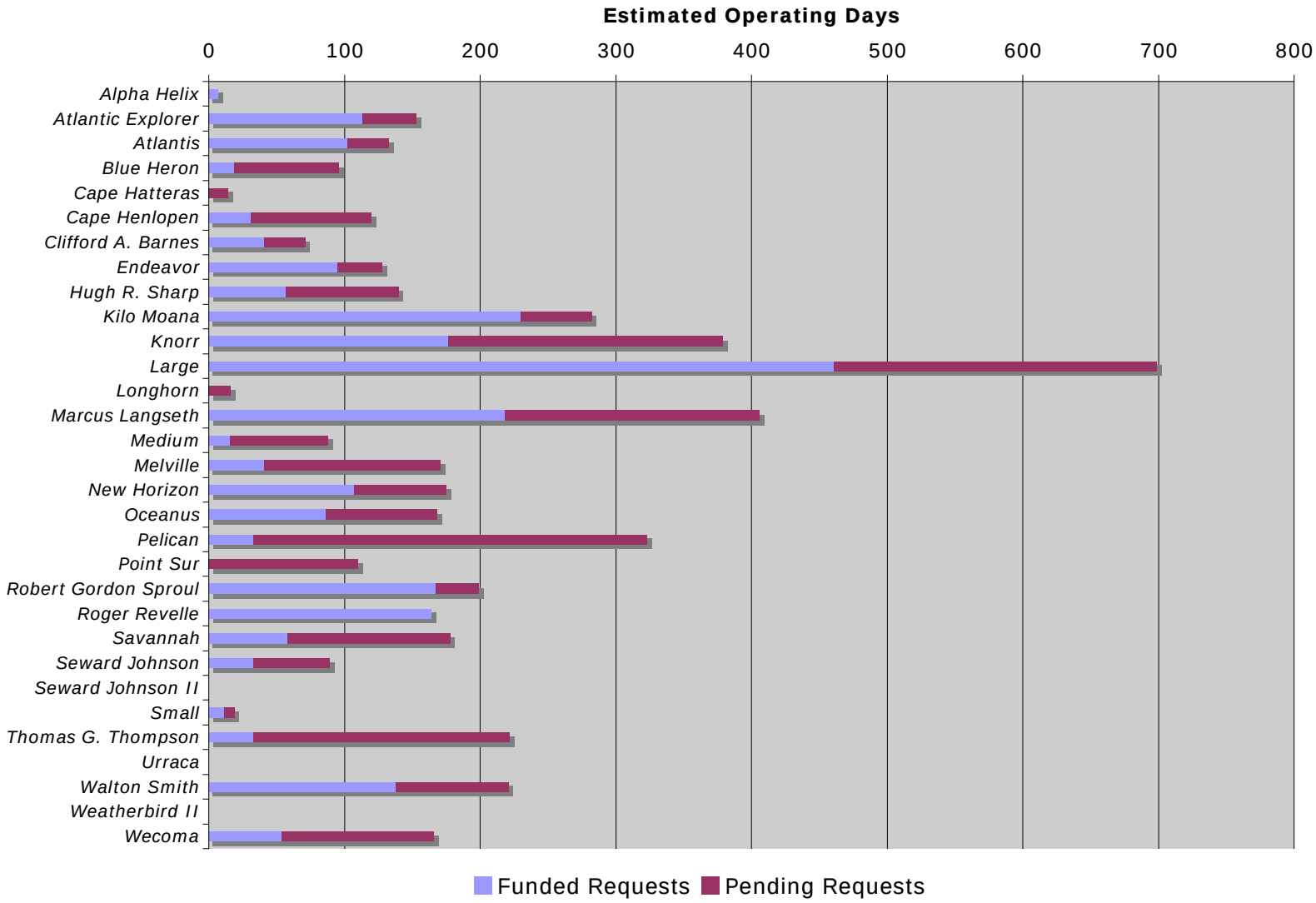
Percent of 2007 Op Days by Agency



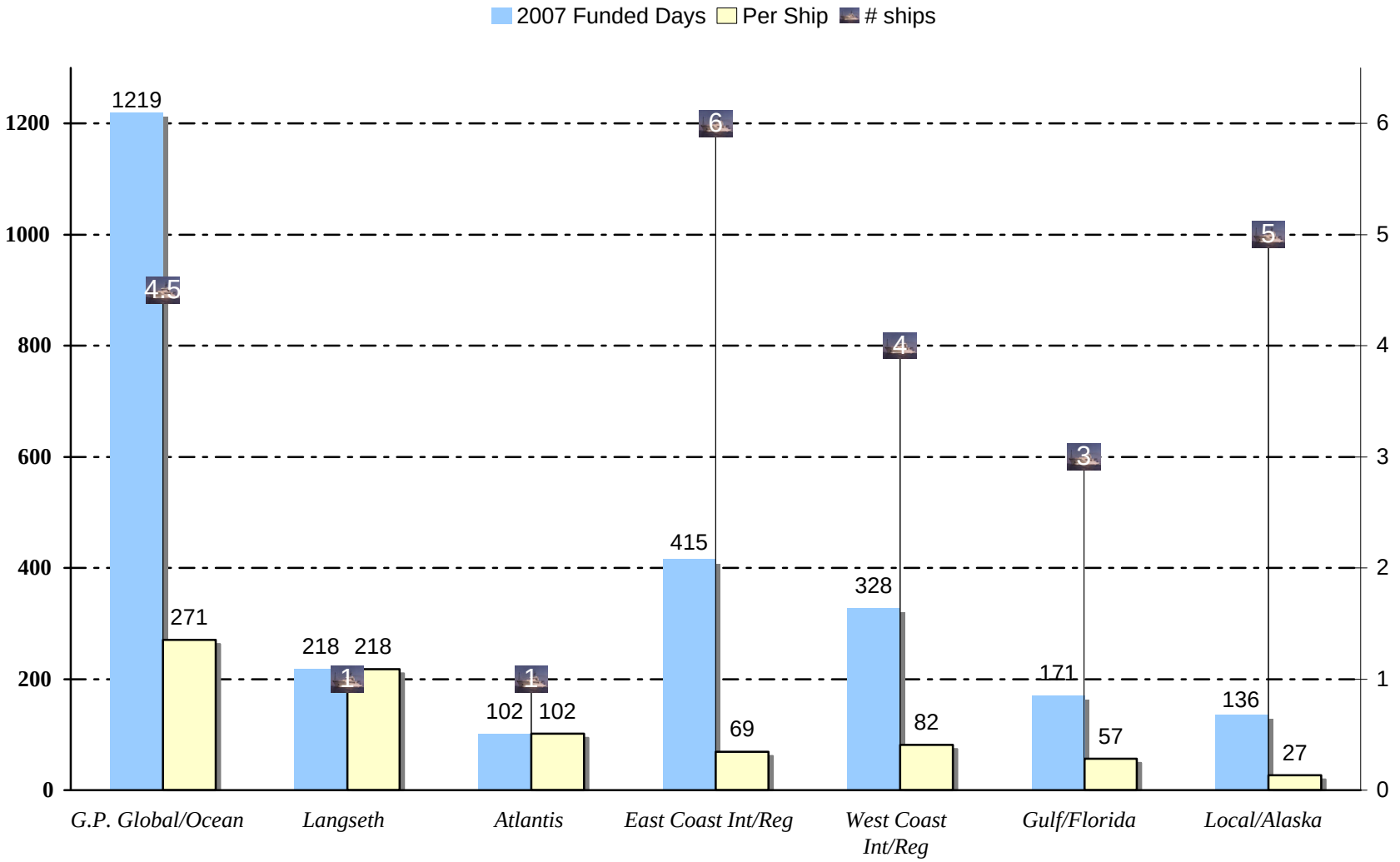
Percent of 2007 Total Ship Operations Costs by Agency



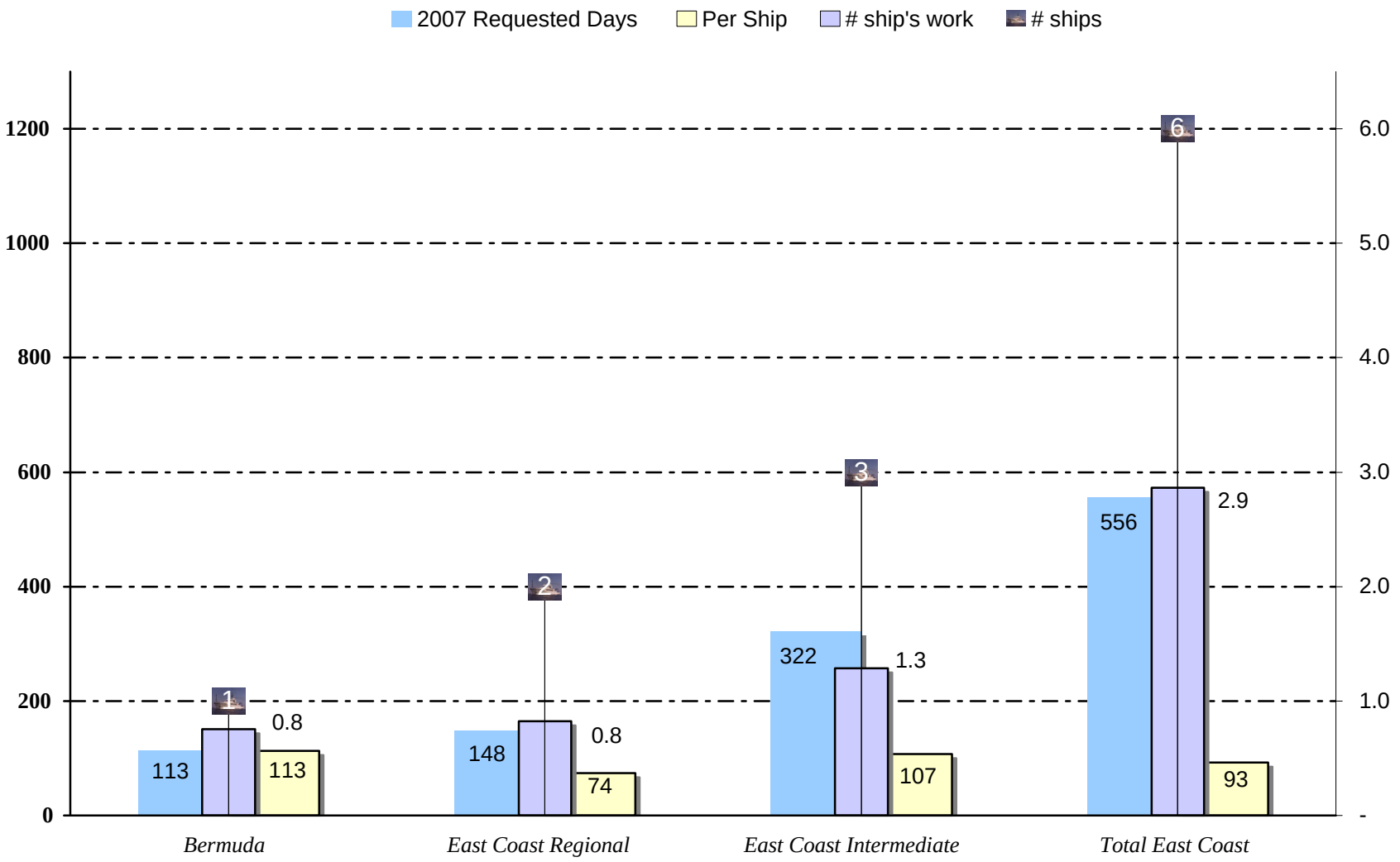
Requests by Ship



2007 Shiptime Requests per Vessel Class/Region



2007 Shiptime Requests per Vessel Class/Region



2007 Shiptime Requests per Vessel Class/Region