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Soapbox: The Academic Research Fleet: An Exciting Time for Renewal

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The Academic Research Fleet: An Exciting Time for Renewal—Larry Atkinson

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Committee of UNOLS, former member of the Marine Board and a fellow of the American Association for the Advancement of Science (AAAS).

Academic research ships in the United States are the envy of many scientists around the world. A great strength of our system is the diversity of ships and operators: users have a choice, the system can change. A weakness of the system is that very diversity: sometimes it is hard for us to act together. Nevertheless, we now must act together. The vitality of the academic fleet in the coming decades is at stake. The reason is simply because many of our ships, especially in the intermediate size range, will soon reach the end of their useful life.

In the past decade many new large ships have been designed, built and delivered. We have ships such as the *Thompson*, *Ewing*, *Revelle*, *Atlantis*, *Melville* and *Knorr*, roaming the globe supporting exciting new science projects. These ships are larger and more capable than any previous academic research ships.

At the same time the smaller ships, those in the intermediate class, like the *Endeavor*, *Oceanus* and *Wecoma*, are aging and have less capability to match future research needs. They will be laid up in less than ten years. If we are to support regional research they must be replaced. But what should they be replaced with? Where should the new ships go?

The Fleet Improvement Committee (FIC) of the University-National Oceanography Laboratory System (UNOLS) is in the process of addressing the replacement and renewal of the academic research fleet. First they must address the intermediate and regional class, then the larger ships.

The word replacement suggests a one for one process. The word renewal suggests upgrading the fleet and bringing it to new levels of sophistication and capability. Fleet replacement and renewal is a very complex process. Visualizing the future requirements for research ships is very difficult. Just as technology has revolutionized our lives from cell phones to computer-controlled car engines, so has ocean science changed. What will ships be asked to do in the future? Will they be large floating labs at ocean bio-observatories with rows of DNA sequencers with high bandwidth connections to shore-side collaborators? Will they be tenders for robotic systems probing deep-sea vent systems? Will they do extensive site surveys prior to deep-ocean drilling with riser technology? Will they be required to maintain station during winter storms when many important air-sea interaction and biological processes occur? Will there be more operations in ice covered oceans? Would better science be done from many smaller ships or fewer larger ships? Will autonomous and robotic vehicles be commonly used and require specialized deployment and recovery systems?

There have been workshops to see if there is any consensus on the future needs of our science. About the only common theme is the need for very high bandwidth connections between ships at sea and shore-side labs. That was always said with the added word - "affordable". Also, interestingly, scientists who would be expected to predict the demise of ships in favor of ROVs and AUVs overwhelmingly feel there will be a need for even more academic research ships in the future, not fewer.

Perhaps the most compelling argument for a renewed fleet is the strong feeling that we are at the edge of incredible new breakthroughs in oceanography. Our conceptual models will be tested in a way they haven't been in decades. This is because of the new sensor and vehicle systems coming on line. With sys-

tems such as ARGO we have real time CTD profiles from the global ocean. As new processes are detected in real time, we will want to go to sea and investigate. Our conceptual models of deep-sea processes, vents, and spreading centers will be revised with sea floor observatories. We will want to place ships at the locations with sophisticated laboratories. We will want to probe these systems with new sensors on new vehicles.

As if visioning the future is not bad enough we have a new type of ship coming on line: the SWATH. With the present operation of the *Western Flyer* by the Monterey Bay Aquarium Research Institute, the delivery of AGOR-26 to the University of Hawaii and the coastal SWATH vessel to Woods Hole Oceanographic Institution in early 2002, the research fleet will soon have a significant number of SWATH ships. If these ships perform as predicted scientists will be able to work at sea states at least one, and maybe two, higher than they now can. Imagine doing laboratory work and not getting sick. Imagine doing deployments and recoveries at high sea states and not risking equipment and life. If the SWATH design performs as hoped will all ships from now on be a SWATH design?

Standing on this Soapbox is a good feeling. More of us should do it. Our community is amazingly quiet when it comes to expressing opinion. While we have been thinking about the future, groups in astronomy and high-energy physics have been proposing capital programs exceeding \$1B. By comparison our whole fleet can be replaced with \$700M or less. Our ships are very similar to a telescope or accelerator. They get our probes and us to new locations.

It is time for the community to participate in the exciting process of replacement and renewal of our principal scientific instrument, the academic research ship. Check the UNOLS website (www.unols.org) and the FIC website (www.unols.org/fic) for more information. /st/