

Submergence Technology Meeting

Miami Beach Convention Center - Room D229

April 4, 2001 - 5:30 pm

Meeting Summary Report

A UNOLS Submergence Technology Meeting was held on April 4, 2001 at the Miami Beach Convention Center, Room D229. Daniel Schwartz called the meeting to order at 5:30 pm and served as the meeting facilitator. He presented the meeting rules of engagement and asked that all participants comply with these rules throughout the discussion period (see [Appendix I](#)). The meeting participants introduced themselves. The attendance list is attached as [Appendix II](#).

Jim Bellingham opened the meeting and asked that the discussion focus on submergence needs, problems, and opportunities. The agenda for the meeting is attached as Appendix I. Jim continued with a brief history and background of the DESCEND Workshop. The workshop was held in October 1999 and brought together scientists, engineers, and agency representatives to address scientific priorities and investigative methodologies. The findings and recommendations of the workshop have been published as a brochure titled, *Discovering the Oceans*, which is being widely distributed throughout the community. The executive summary and the full proceedings of the DESCEND workshop are published on the UNOLS website at, <http://archive.unols.org/meetings/1999/199910dcd/199910dcdmi.htm>. Jim reviewed the findings and recommendations of the DESCEND brochure:

Key Findings

- The oceans remain a scientific frontier for the 21st century, with broad societal and academic relevance to issues such as the role of the oceans in moderating global climate change, and the limits of life-processes in extreme environments on Earth and other planets.
- Dramatic advances in submergence vehicle technologies and instruments, including autonomous underwater vehicles (AUVs), occupied submersibles, remotely operated vehicles (ROVs), specialized sensors, and *in situ* samplers, now provide the potential for unprecedented access to the oceans and sea-floor. These new technologies and vehicles will foster a revolution in our ability to synoptically measure the chemical, biological and physical processes that occur in the oceans.
- New mechanisms are required to improve access to all types of submergence vehicles and tools by the scientific community. These should be developed in order to address issues relating to scheduling existing assets, conducting field work outside traditional operating areas, and the need to respond to time-sensitive processes at the seafloor or in the water column (e.g. submarine eruptions). The broadest range of vehicle capabilities needs to be provided to investigators throughout the U.S. while preserving the existing capabilities achieved by our National Deep Submergence Facility.
- Long-standing U.S. leadership in submergence science and technology is being challenged by other countries, principally France, Germany and Japan. These countries have greater funding levels for submergence science and vehicle facilities and long-standing support for the advancement of submergence technologies.

Recommendations

- Develop new sensors and tools.
- Accelerate development of autonomous underwater vehicles (AUVs).
- Construct a new, state-of-the-art, deep diving (>6000 meter) occupied submersible.
- Plan for a new, robust deep diving (>7000 meter) ROV for science.

- Increase access to submergence vehicles and tools.
- Convene a submergence technology meeting.

Now is the time to pursue the technological developments recommended by the DESCEND workshop participants. This meeting represents a first step in that process. The International Oceanology conference presented an opportunity to bring scientists and technical experts together to discuss some of the technology issues and opportunities.

Jim went on to explain that there would be additional opportunities for follow-on community input. The DESSC will seek community input. A second workshop will be proposed to bring together representatives from the technology and science communities to identify future strategies for obtaining needed submergence facilities.

Identify submergence technology needs, problems and opportunities – The meeting participants were asked to focus on two of the DESCEND recommendations:

- Develop new sensors and tools.
- Increase access to submergence vehicles and tools.

Additionally, participants were encouraged to identify any other related needs, problems and opportunities. The open discussion began and meeting participants identified submergence technology problems, needs and opportunities. Annette DeSilva recorded each suggested item on flip chart sheets. The list of recorded items is provided in [Appendix III](#).

Some common concerns seemed to arise from the discussion and an attempt to summarize these areas is included below:

Increase Access to All Assets - The need for increased access to all available facilities was repeatedly cited. A new mechanism for coordinating and scheduling all submergence assets should be addressed. Increased federal financial support for the use of these assets would be beneficial. Increased availability to assets is needed to access wide geographic regions (shallow and deep) at any time. Foreign collaborations should be encouraged to meet the needs of the global submergence research. Scheduling flexibility is required to provide access to assets for response to events and repair of observatory-type systems.

Address the Needs of the Shallow Water Community - (This item is directed related to the "increased access" issue.) There is concern that the needs of the "shallow-water" community are not being met under the current funding scenarios and UNOLS facility planning efforts. It was noted that this was also identified as a concern during the DESCEND meeting. In response to that concern Shirley Pomponi as an advisor has been included on the DESSC to help identify ways of addressing the needs of the shallow-water community. This issue will be addressed at DESSC's May meeting.

Foster New Technology Development and Introduction – A process to enhance and encourage new tool development and translation of these technologies into community available assets is needed. Facilities need to be equipped with the latest technological advances. Planning for new facilities should consider future technology potentials. A proactive approach to bringing new capabilities on line is needed and a dedicated technology development program is recommended.

Educate the Science Community on Capabilities and Use of New Technologies - Education of the community/user on available assets, technologies and their capabilities is needed. Education on the effective use of facilities is needed.

New Vehicles, Tool and Sensor Capabilities are Needed to Address New Science Demands – The implementation of seafloor observatories will place new demands on the capabilities of vehicles, tools and sensors. In turn these will require better equipped support platforms (dedicated platforms) to handle ROVs/AUVs. Some of the specific needs and capabilities identified by meeting participants included:

- Increased bottom time.
- Heavy lift capability.
- Ability to work around cables.
- Compatibility of vehicles/tools with observatory connectors.
- Compatibility with larger and more complex systems.
- Mobile, lightweight, expeditionary systems.

It should be noted that, all of the items identified by the meeting participants and included in Appendix III are important and should be considered when planning strategies for new technology acquisition.

Follow-on Activities and Technology Meeting – There will be opportunities for additional community input. This might take the form of community surveys. Plans are underway to propose a submergence technology workshop to be held in the summer. The workshop is intended to bring approximately 25-30 science users and technology experts together to identify technology needs and strategies for acquisition of new assets.

In closing, Jim stated that developments in submergence tools, sensors and vehicles are accelerating. The community must be poised to take advantage of these important opportunities.

The meeting adjourned at 7:45 PM.

Appendix I

Meeting Agenda and Rules of Engagement

**Submergence Technology Meeting
Miami Beach Convention Center - Room D229
April 4, 2001 - 5:30 pm**

The Submergence Technology meeting will begin at 5:30 pm and is limited to two hours. In order to address the items of the agenda and allow all participants to contribute, the following rules of engagement will be instituted. Jim Bellingham will conduct the meeting and lead the discussion items. The discussion will focus on submergence needs, problems, and opportunities. Future follow-on forums will address the actual process of developing solutions to the submergence needs and problems. Dan Schwartz will serve as the meeting facilitator. By following the agenda and adhering to the rules of engagement a productive meeting can be achieved.

Meeting Agenda

5:30 pm General Introduction

- Review the DESCEND Findings and Recommendations (15 minutes)
- Review the Rules of Engagement (5 minutes)

5:50 pm Identify submergence technology needs, problems and opportunities. The focus of the discussion will be on two of the DESCEND Key Recommendations:

- Develop new sensors and tools (30 minutes)
- Increase access to submergence vehicles and tools (30 minutes)
- Identification of other related needs, problems and opportunities (20 minutes)

7:10 pm Follow-on Activities and Technology Meeting

- Opportunities for additional community input (15 minutes)
- Follow-on Technology Workshop Plans (5 minutes)

Rules of Engagement

- There is no such thing as a bad idea.
 - Be open-minded.
 - Stick to the agenda.
 - Let everyone speak without interruption.
 - Explain your ideas quickly and concisely.
 - Limit your discussion to addressing technology needs, problems and opportunities.
 - Do not get defensive.
 - Be considerate.
 - Avoid institutional and personal biases.
 - Suggestions should represent the interests of community.
 - Avoid repeating/paraphrasing other people's thoughts.
 - Try to generate as many ideas as possible.
 - Show respect for the meeting facilitator.
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Appendix II

Meeting Attendance List

Askew, Tim HBOI taskew@hboi.edu

Au, Douglas MBARI audo@mbari.org

Becker, Keir U.Miami/RSMAS kbecker@rsmas.miami.edu

Bellingham, Jim MBARI jgb@mbari.org

Chaffey, Mark MBARI/DESSC chma@mbari.org

Chayes, Dale LDEO dale@columbia.edu

Chazal, John Nekton Research LLC jchazal@ntrobotics.com

Clark, Larry NSF hclark@nsf.gov

Curtain, Tom ONR curtint@onr.navy.mil

Delaney, John U. Washington jdelaney@u.washington.edu

DeSilva, Annette UNOLS Office office@unols.org

Duennebier, Fred U. Hawaii fred@soest.hawaii.edu

Johnson, Ken MBARI johnson@mbari.org

Kirkwood, Bill MBARI kiwi@mbari.org

Olson, Scott HBOI Olson@hboi.edu

Pfeiffer, Tim ONR pfeifft@onr.navy.mil

Schwartz, Dan U. Washington schwartz@ocean.washington.edu

Shepard, Andrew NURC at UNCW sheparda@uncwil.edu

Slater, David Delta Oceanographics delta4@mindspring.com

Smith, Holly NSF hesmith@nsf.gov

Wilcock, William U. Washington wilcock@u.washington.edu

Yoerger, Dana WHOI dyoerger@whoi.edu

Appendix III

Submergence Technologies Meeting

The following list of problems, needs and opportunities were identified by meeting participants:

Access, Fiscal Needs/Problems

- Need – Design, develop and plan for archiving as new technologies are developed.
- Need - The ability to access wide geographic regions at any time.
- Need – Education of the community on available assets and technologies.
- Need – UNOLS type coordination of submergence facilities.
- Need – Effective use of facilities (e.g. use AUVs for exploratory research) – recognize complementary abilities.
- Need – New paradigm for conducting submergence science.
- Need – A lot of bottom time.
- Need – Better coordination of field programs.
- Need – Better/increased access to all assets – fair competition/allocation to all assets.
- Need – Increased federal financial support.
- Need – Dedicated technology development program.
- Need – A totally new strategy for meeting the demands/needs of submergence science.
- Need – Increased foreign collaborations.
- Need – Better equipped support platforms (dedicated platforms) - design new ships to handle ROVs/AUVs
- Need – Broad coordination of all future facilities (observatories, moorings, vehicles, vessels, etc.).
- Need – FOFC level guidance on future submergence science directions.
- Need – A proactive approach to bringing new capabilities on line.
- Need – A process to enhance and encourage new tool development and translation of these to the developments into community assets.
- Need – Lack of scheduling flexibility for repair response/ event response.
- Problem – There are not enough submergence facilities available to the community.
- Problem – Lack of financial support and mechanism for gaining access to other (non- NDSF) submergence assets.
- Problem – No easy mechanism to make tools widely available.
- Problem – Facilities need to be equipped with the latest technological advances.
- Problem – Lack of risk taking in tool development by the science community.
- Problem – Lack of proposal pressure for non-UNOLS assets (perceived low funding probability)
- Problem – Planning for new facilities without consideration of future technology potentials.

Tool/Sensor Technology Needs –

- Need – Heavy lift capability.
- Need – Ability to work around cables.
- Need – Compatibility of vehicles/tools with observatory connectors.
- Need – Vehicles need to be able to work with the weight, size, and complexity of systems.
- Need – More mobile, lightweight, expeditionary systems.