

Survey of Future Needs and Upgrades for Deep-Submergence Biological Research

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34 Respondents

Macro-ecology -	25
Microbiology -	4
Bio-instrumentation/engineers -	2
Geology & Geophysics-	3

*Present results from Biologists only

Survey of Future Needs and Upgrades for Deep-Submergence Biological Research

Survey Design:

Demographics (discipline; usage; future importance)

Tools and Samplers (usage; priority for upgrade/replacement)

Vacuum Samplers

Biobox Collection Boxes

Imaging Systems

Biological Mapping

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Demographics - experience

73% used HOVs in the past 2 years (1% never)

63% used ROVs in the past 2 years (7% never)

41% used Towed Vehicles in the past 2 years (38% never)

24% used AUVs in the past 2 years (67% never)

Future research and vehicles - importance

92% - ROVs important to very important for research in next 5 years

83% - HOVs important to very important for research in next 5 years

60% - AUVs important to very important for research in next 5 years

48% - Towed Vehicles important to very important for research in next 5 years

Future research and depth - importance

500-1000m - 44% - Very important; 24% Not important

1000-2000m - 56% - Very important; 30% important; 0% not important

2000-3000m - 68% - Very important; 18% important; 0% not important

3000-4000m - 54% - Very important; 23% important; 4% not important

4000-5000m - 33% - Very important; 38% important; 17% not important

5000-6000m - 21% - Very important; 21% important; 42% not important

6000-7000m - 17% - Very important; 17% important; 61% not important

Future research deeper than 5000m - importance

35% - HOVs very important; 46% not important

45% - ROVs very important; 30% not important

46% - AUVs very important; 38% not important

29% - Towed Vehicles very important; 50% not important

Research shallower than 1000m - importance

44% - HOVs very important

42% - ROVs very important

42% - AUVs not important

38% - Towed Vehicles not important

Envisioned observatory research - importance

68% - HOVs important/very important; 25% not important

78% - ROVs important/very important; 19% not important

50% - AUVs important/very important; 31% not important

36% - Towed Vehicles important/very important; 44% not important

Tools and Samplers

(12 options)

Used most often:

74% - Vacuum samplers

63% - Manipulator Claw

59% - Sediment push cores

56% - Nets and Scoops

56% - Bioboxes

40% - Water chem/in situ sensors

37% - Quantitative faunal samplers

Importance for future research:

70% - very important

61% - very important

36% - very important

28% - very important (32% not impt)

54% - very important

57% - very important

30% - very important (35% not impt)

Tools and Samplers - Upgrades

(highest; high; medium; low)

Highest Priority for Alvin:

- 44% - Vacuum samplers
- 60% - Manipulator Claw
- 40% - Sediment push cores
- 11% - Nets and Scoops
- 29% - Bioboxes (44% impt)
- 65% - Water chem/in situ sensors
- 50% - Quantitative faunal samplers

Highest Priority for Jason II:

- 50% - (44% high)
- 33% - (53% high)
- 43% - (14% high)
- 25% - (25% high)
- 21% - (50% high)
- 71% - (18% high)
- 27% - (27% high)

Hmmm.....

Vacuum Samplers

(summary)

- 60% of respondents have used one in the past 3 years
- Only 22% satisfied with current samplers available with Alvin
- Optimal size chamber is 2 liters (37%)
- 8 to as many as possible chambers desired (56%)
- Chambers must be free of contamination, thermally insulated, removable, adjustable for size (50%)

Biobox Collection Boxes

(summary)

- 63% of respondents have used one in the past 3 years
- 59% are not satisfied with currently available boxes
- Boxes must free of contamination (61%), thermally insulated (58%), compartmentalized (58%), adjustable for size (56%); provided by the NDSF (73%); 55% of biologist use boxes not provided by themselves
- Good sealing mechanisms, Clear lids, Easy to drain

Imaging Systems

(summary)

	Alvin	Jason II
Important to current research	85%	92%
Satisfied with overall quality	49%	35%
Importance to upgrade	78%	78%
How? Camera resolution	71%	67%
How? Camera configuration	57%	60%
How? Lighting intensity	57%	60%
Importance to quantify	72%	84%
increase quantitative usability	75%	84%

Upgrade suggestions: JII: “computer decoded holography; 3D diffractive elements instead of lenses; high-res digital still on J2, record the zoom and angle of the cameras, Alvin: record all Alvin channels, access to High Definition, better resolution pan and tilt on Alvin, move the Alvin 3-chip off the arm”

Biological Mapping (summary)

	Alvin	Jason II
Prior use of vehicle to map	56%	25%
Importance of image resolution upgrade		95%
Importance to navigation resolution upgrade		91%

Comments: “Doppler navigation has been a great help with Alvin”

Upgrade suggestions: “The most important thing for biologists in mapping...is that the images be geo-referenced...funding should be put into continued navigation improvements; Make high-accuracy navigation standard rather than a costly option; improve variable ballast control on Jason II”

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(selected quotes)

“...a whole new breed of imaging systems to obtain 3 dimensional images will revolutionize the field”

“...it would be great if there were a submersible system that could function to assist mid-water research”

“...at times it seems that the WHOI web pages, what are very helpful overall, do not keep up with changes that have been made on the ship. This includes the new battery pack which reduces payload”

“...Use of elevators should be made more transparent...Has anyone actually compiled the data on using elevators with Alvin dives- are dives shorter with elevators than those without?...how often are they lost?”

“...the Pisces submersibles are also excellent vehicles that should be added to the UNOLS system, or at least made fundable through NSF”

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(selected quotes)

“Pelagic work requires a much greater field of view, and the depth requirement of the Alvin preclude using a sphere like on the Johnson-sea-link submersibles. Therefore, I would also like to have the option of being able to request support for using the Johnson-sea-link for pelagic work, as it is optimized for such work.”

“...need a slurp gun on Jason II with rosette bottles like those used on ROPOS.”

“...need a towed system that could be developed that senses a biological specimen and then takes a picture automatically. This could be towed for long periods of time and do a complete survey...independent of Alvin, Jason, or ABE (a new small vehicle).”

“...any improvements to make elevators easier for the crew to deal with, for the sub to find, and for the scientist to use would be welcome.”