

Optimizing Alvin's Use and NDSF Outreach

NDSF NATIONAL
DEEP SUBMERGENCE
FACILITY



Why has Alvin use declined over the last decade?

Are their real & perceived differences in HOV and ROV operations?

What are we doing well to promote Alvin use, and what do we need to initiate or do better?

Alvin Utilization

There is more deep submergence science being accomplished today than at any point in the past.

Addition of Jason & Sentry to NDSF

Introduction of SIO, OET, NOAA, MBARI, SOI, SOEST

Perhaps there is a greater familiarity with ROVs than HOVs



HOW TELEPRESENCE IS CHANGING EXPLORATION

By Jeffrey Marlow 5:00 A.M.

THE
NEW YORKER

“I’d much rather use an R.O.V.,” she said. “Everyone can watch. Geologists will know what’s going on, biologists can contribute—specialists for this or that can ask for the exact samples they want.”

When exploring the deep sea from the comfort of our offices, she told me, we might experience it more abstractly. “We might expect people to be more theory-oriented and less description-oriented,”

The hum of office activity didn’t exactly evoke deep-sea adventure. Compressed by streaming-video codecs, the microbial mats had lost their spectral glow. Spreadsheets and heavily edited manuscript drafts filled my other monitor, suggesting a false equivalence that, in a way, cheapened what I knew to be a remarkable scene at the bottom of the sea.

SEAFLOOR MAPS REVEAL UNDERWATER CAVES, SLOPES—AND FAULT LINES

The mission is just one of many recently in which ocean scientists have deployed new seafloor mapping technology and advanced autonomous vehicles to uncover startling new information about the ocean bottom. There are discoveries like the underwater sea caves, deepwater coral formations off the East Coast, and new species of marine life clustered around hydrothermal vents spewing out methane and other chemicals from the Earth's crust. Yet even with robotic vehicles puttering through the oceans, humans will still need to go to sea to interpret the data their instruments are collecting.

Real & Perceived Differences

[2017 Alvin Debrief] “The sub is as good or better at many things than Jason, due to its greater mobility and for sampling. Alvin pilot's can come up on a chimney and locate where to collect samples more efficiently. It is possible to end up with better samples, albeit fewer, than with an ROV.”

[2019 Alvin Debrief] “Was really shocked at how fast work got done in Alvin relative to Jason. Didn't realize the difference of how quick it was to sample. Some of that is tougher to do through video screens. When something drops you can look and see where it is rather than backing up, moving cameras, etc. Got as many samples in 6h with Alvin as with Jason in 24h.”

Real & Perceived Differences

Bottom time

Heavy lift capability

Handling

Collaborative decision making

Efficiency of sampling, measuring, etc.

Weather window

Support vessel (i.e., fixed v fly-away platforms)

Cost

Safety

Humans-in-the-loop: The case for modern research HOVs

Adam Soule, Amanda Demopolous, Bruce Strickrott, Amy Baco-Taylor

Deep Submergence Landscape

Increase in ROVs, emergence of AUVs, <Stasis of HOVs

Perceived and Real Differences

The 'space case' – public perception

Hard and soft capabilities (bottom time vs. human eyes & brains)

Overall similarity in capabilities

Case studies: ROV preferred, HOV preferred, either

Emerging Capabilities

Improved reliability and bottom times

Concurrent operations with AUVs

In-sub electronic documentation

Sub-to-ship data sharing

New depth rating to 6500m

Utilizing HOVs

Challenges regarding availability of research vessels

Challenges with research communities familiarity

Early Career Scientist opportunities

What are we doing to promote Alvin utilization?

Improving the vehicle and retiring differences to ROVs (e.g., Jason)

Increased depth rating, Sub-to-ship data/image sharing, concurrent ops with AUV + Waveglider; deployable pumping solutions.

Integrating new users from within our community

Annual DeSSC N.U.P.; 2015 Alvin Boot Camp; 2016 UNOLS Deep Submergence Leadership Cruise; 2018 EPR ECS cruise; what's next?

Spreading the word

EOS article; screenplay 😊

Other opportunities

Add focus on mid-career scientists (e.g., 6500m Alvin SciVer?)

Reach out to other communities (e.g., space exploration)

Inreach (i.e., develop an RCN)