Summary of 2025 DSV *Alvin* Debriefs

Achberger/McDermott, 9°50’N East Pacific Rise (Alvin/Sentry, AT50-33), Jan-Feb 2025

Wozniak, 9°50’N East Pacific Rise (Alvin, AT50-36), Apr-May 2025

Demopoulos, Aleutian Arc (Alvin AT50-38), Jun 2025

McDermott/Murdock, Main Endeavour, Juan de Fuca (Alvin AT50-42), Sept 2025

Alvin Debrief Highlights

"The new *Alvin* is great. The forward windows are spectacular. It is a completely different experience than before."

Science goals were largely met despite significant challenges including weather, strong currents, eruption activity, equipment failures.

New tool developed to improve electrical isolation for user-provided equipment.

A training cruise was valuable for new Chief Scientists and PIs, improving readiness for understanding integration needs.

Alvin Debrief Highlights

The *Alvin* data leads were praised across all cruises for "the best-organized data delivery we've ever seen!"

The *Alvin* team continues to provide safe, effective submergence operations. Science parties praised the professionalism, creativity, and problem-solving skills of the entire seagoing team, including the Expedition Leaders, experienced and newer pilots, engineering support groups, and data lead.

Pre-cruise and mobilization

Pre-cruise checklists were helpful, though overwhelming for newer users. *Alvin* team did well to supplement the checklist by providing extra guidance on underlay needs, basket planning and weight limits, required documentation.

Planning meetings were effective, especially when pilots participated. Extra meetings were appreciated before cruises with short transits.

On a cruise with new instrument integration (e.g., UFO), an in-person visit to WHOI was a key means to identify and solve electrical and pressure housing issues.

Operations: Vehicle Performance

Weather and strong, shifting currents caused several shortened or cancelled dives. E.g., in the Aleutians currents limited maneuverability and shortened bottom time.

Battery life constrained dive duration on multiple cruises. Bottom times were often shorter than expected, especially immediately after battery changes. Battery life improved after a couple days in each case.

Operations: Vehicle Performance

Alvin's mechanical performance was generally strong but experienced several significant interruptions:

- A battery issue identified early in one cruise required returning to port
- A hydraulic problem led to a six-day operational stop
- Manipulator failures, grounds, on two cruises

Despite setbacks, science teams noted that pilots navigated challenging conditions well and maintained safety as the top priority.

Operations: NDSF-provided equipment

Camera system issues: occasional frozen 4K cameras, loss of recording during file recording switches, some need to restart iPads

However, external users (e.g., professional filmmakers) and some scientists produced exceptional imagery.

The imaging system is very capable but limited by training, settings familiarity, and reliability issues.

Users appreciated the quick turnaround post-dive visual summaries captured by the GoPros, often assembled by an *Alvin* team member.

Operations: NDSF-provided equipment

Major samplers were used often. Some pairs failed mechanically or did not maintain stable temperatures after triggering.

Pushcores varied in success. Problems included incorrect assembly of stoppers, uncertain procedures for removal from holders, extruder availability.

Some instruments (e.g., slurp sampler, T-probe, optode) failed mid-dive but were repaired successfully.

ADCP data were essential on the Aleutian cruise.

Lander deployments performed very well when used.

Operations: User-provided equipment

Complex integrations such as the UFO, *in situ* electrochemical sensors, CTDs, ORP probes, and IGTs were successful thanks to early coordination.

The *Alvin* team provided strong support for user instrumentation troubleshooting, including electrical connector repair, mechanical adjustments. Also suggested creative solutions for lander-based sampling, using burn bottles on winch-operated equipment.

Science-provided cameras (MISO GoPros) typically delivered reliable, high-quality imagery.

General Recommendations

The dedicated data lead role is transformative. Data transfer from *Alvin* to science was quick, well-organized and consistently praised by science users.

Alvin's forward and side visibility greatly enhances situational awareness, the ability to navigate close to structures, and sample precisely.

The *Alvin* shipboard team is widely recognized for their professionalism, problem-solving, and calm, effective communication. Newer team members are well integrated.

General Recommendations

Additional in person or video-based training sessions for new pilots could help build confidence and skill with certain sampling tasks (e.g., push coring, fluid sampling)

Push corers could benefit from clearer procedures, more consistent setup practices. Science users suggested identifying a dedicated “pushcore lead,” developing standardized use and troubleshooting guidance (analogous to the approach for the ‘majors’ bottles).

General Recommendations

Create an imaging best-practice guide for science teams, informed by metadata from dives where video quality was strongest.

Continued evaluation of battery performance and a potential future upgrade will increase bottom time and continue to support productive, ambitious science goals.