AN INTRODUCTION TO DSV ALVIN

DeSSC New User Program - December 13, 2025

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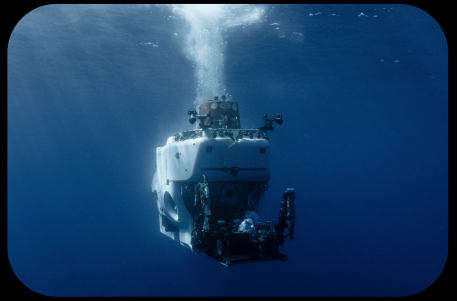
DSV ALVIN Group

NDSF NATIONAL DEEP SUBMERGENCE FACILITY

DSV ALVIN PROGRAM BRIEF

- DSV/HOV Basics
- Program history
- Alvin specifications
- R/V Atlantis
- Science and data interfaces
- Imaging
- Operations



DSV/HOV BASICS

DSV = Deep Submergence Vehicle

A special class of deep-diving submersible (>1000 meters)

A high-tech HOV - human occupied submersible

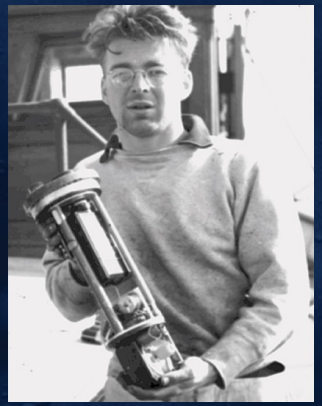
Untethered, no cable to the surface ship

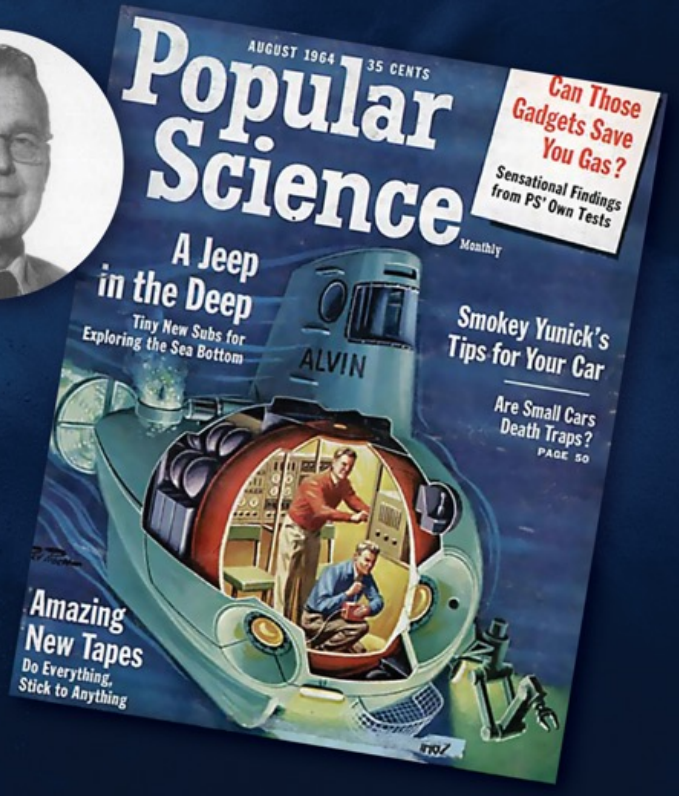
Operated off of a “mothership”

Typically uses a spherical hull for passenger safety

Internal cabin atmosphere is the same as in this room

IT ALL STARTED WITH ALLYN VINE





Alvin conceived by WHOI ocean engineer Allyn Vine and the US Navy

"It is very difficult to design an instrument that can be surprised"

ALVIN'S INCREDIBLE RECORD

1964 to PRESENT DAY
61 YEARS CONTINUING OPERATIONS

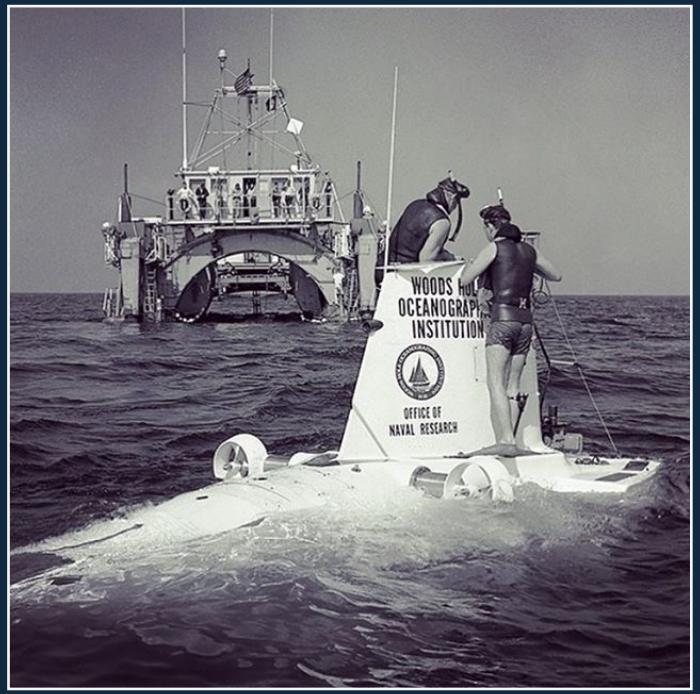
5340 DIVES

46 QUALIFIED DSV PILOTS

OVER 10,500 OBSERVERS

TOTAL VERTICAL (DESCENT/ASCENT) SINCE DIVE 1
22,184,808 m 13,785 miles

ALVIN IN THE EARLY DAYS



DIVE OPERATIONS OFF OF R/V “LULU”
CIRCA 1968

Alvin Specifications

Crew:
1 Pilot, 2 Scientific Observers

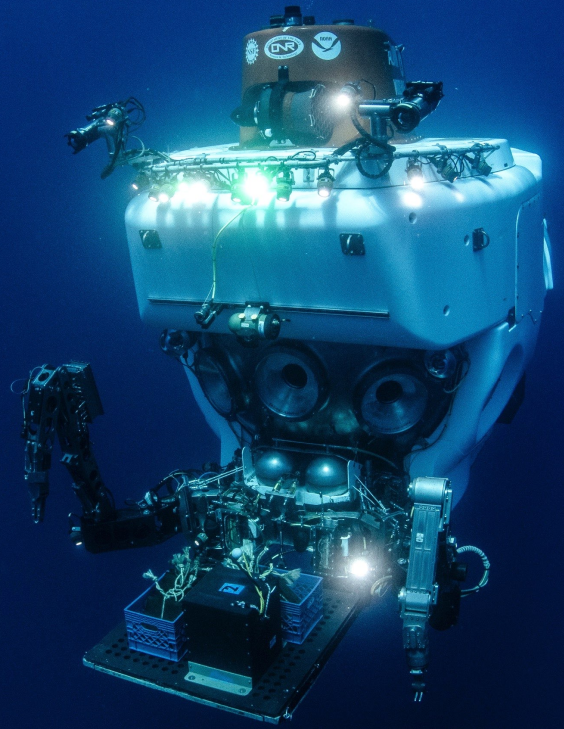
Depth:
6,500 meters, 21,325 feet
4.1 miles

Sunlight vanishes:
150m to 200m depth

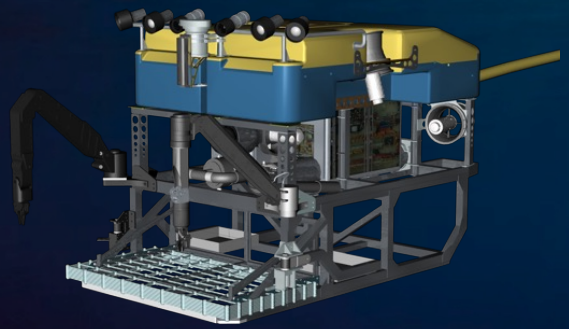
Pressure at 6,500m:
646 atmospheres
9,678 psi

Time submerged:
9 to 12 hours

Available life support:
96 hours



NDSF NATIONAL DEEP SUBMERGENCE FACILITY



ROV JASON

DSV ALVIN

AUV SENTRY

R/V ATLANTIS

Length:
274 ft

Beam:
51 ft

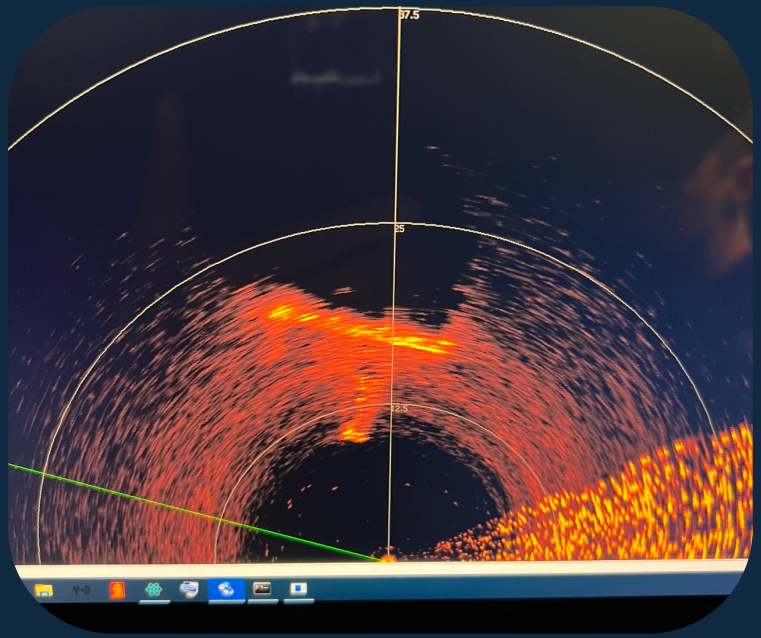
Personnel:
20 Ship's Crew
10 Alvin crew
26 Visiting Scientists

Duration:
Up to 60 Days

SCIENCE AND DATA INTERFACES

ALVIN'S DATA SYSTEM PROVIDES USERS WITH NUMEROUS OPTIONS TO INTERFACE NOVEL SENSORS, SAMPLERS, AND DATA COLLECTION TOOLS

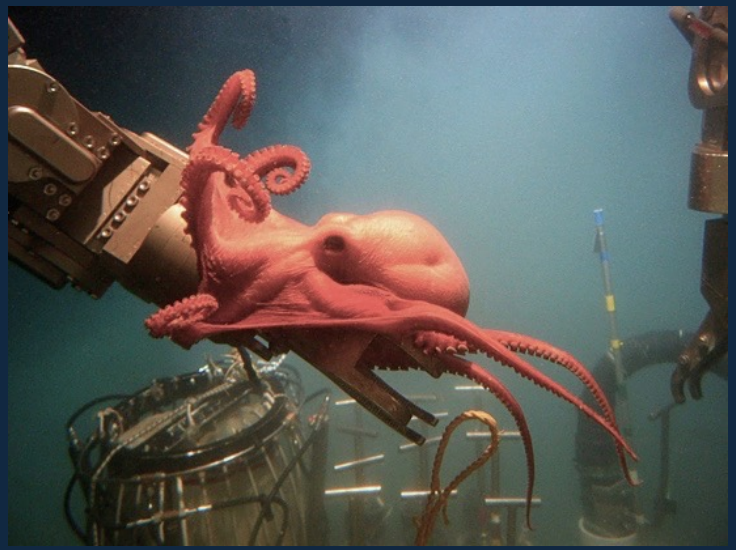
- **FULLY INTEGRATED SCIENCE DATA NETWORK**
  - Multiple Ethernet and RS232 serial data interfaces
  - Multiple digitally controlled DC power channels
  - Through-hull data over fiber-optics
  - Multiple digitally controlled DC power channels
  - In-hull WiFi
- **ALVIN IN-HULL COMPUTERS**
  - Available for use with science supplied software
    - LINUX, WINDOWS
- **SCIENCE USER SUPPLIED COMPUTER LAPTOPS/TABLETS**
  - Typically Interface with network via USB, RS232
  - Requires toxicity/flammability testing in advance
- **ALVIN SUPPLIED LAPTOPS, TABLETS**
  - Available for science use
  - SEALOG Science user data interface on iPad/tablets



ALVIN IMAGING CAPABILITIES

THE NEW ALVIN IMAGING SYSTEM PROVIDES ADVANCED IMAGING CAPABILITIES WITH PROFESSIONAL GRADE EQUIPMENT AND CONTROLS

- **MULTIPLE EXTERNAL CAMERAS**
  - 2 x DSPL 4K Optim Cameras on P/T units
  - 2 x PATZ (Pan and Tilt Zoom) HD cameras
  - 3 x fixed-focus wide-angle DSPL Flexlink cameras
  - Available interfaces for user-supplied cameras
- **IN-HULL INTERFACES**
  - Ipad Tablet camera/video control - with SEALOG
  - Optional laptop/game-style controller w/tactile controls
- **IMAGE RECORDING**
  - 2 x Pro-res recorders can access all primary video sources
  - Real time proxy creation during the dives
- **MISO GOPRO CAMERAS**
  - Up to 3 MISO GoPro cameras (still and 5K images)
  - Mounted on front-end of sub, basket or landers
  - 5k video or hi resolution still capability



A TYPICAL ALVIN DIVE RESULTS IN NEARLY 2 TERABYTES OF VIDEO AND STILL IMAGES

ALVIN OPERATIONS

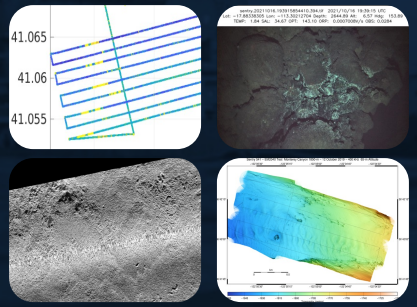
RELIABLE DIVE OPERATIONS ENABLE SIGNIFICANT TIME FOR SCIENTIFIC INVESTIGATION AND SAMPLING

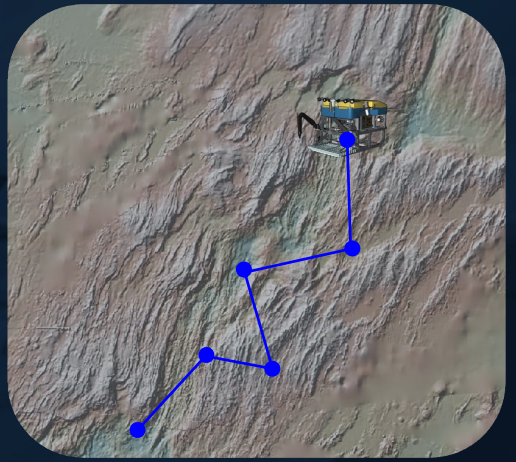
- **DIVES SCHEDULE**
  - Daily dive operations for up to 30 days
  - Typically 0800 in-water, 1700 return to surface
  - Extended dive time option with prior planning and power
- **COLLABORATIVE SCIENCE FOR 24 HOUR SCIENCE ACTIVITIES**
  - Evening science activities during Alvin post-dive and evening break
  - Atlantis' resident capabilities
    - multi-beam mapping, dredging, coring, etc.
- **SUPERB NAVIGATION FOR EXACT SCIENCE**
  - Alvin utilizes DVL, USBL, and INS for precise navigation during dives
  - Hi-res bathymetric maps as underlays for navigation interface

Alvin is a high tech marvel for deep sea research

COLLABORATIVE SENTRY & ALVIN OPERATIONS

ROV
HOV
CTDs
Dredging
Box coring





COMBINED OPS

Sentry can be added to many programs to increase efficiency, add a high level view of the worksite, and create a better data product

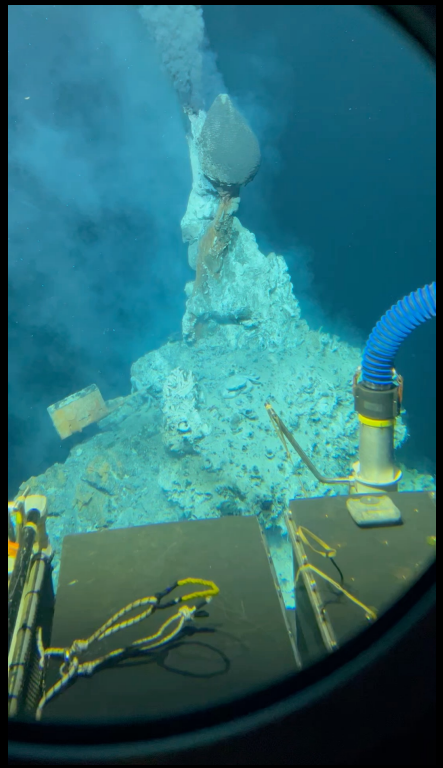
DATA

Data products are produced after each dives, photos, MB, Sidescan, sensor plots over navigation and available to the science user

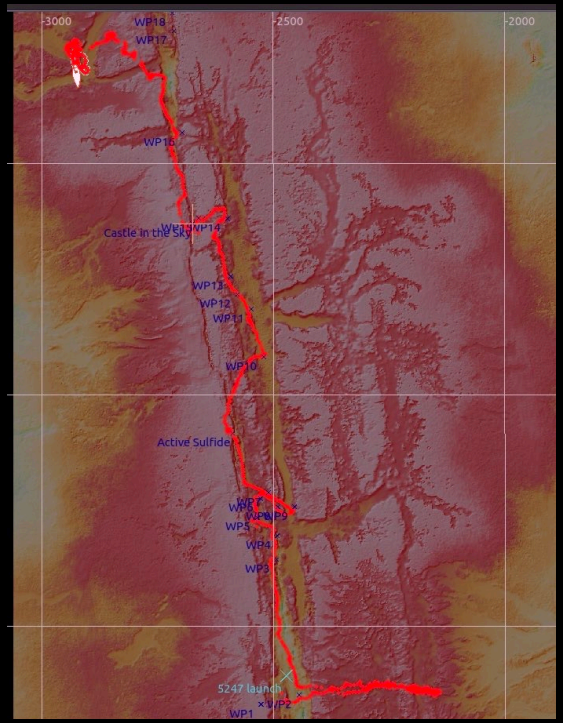
DIVE PLANNING

Better informed with high fidelity data about your worksite

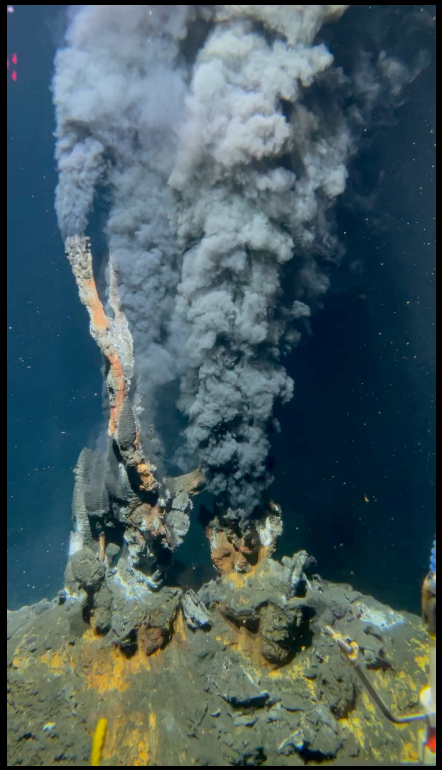
9N Axial Summit Caldera



Beehive Smoker



Typical dive profile in the ASC



Vent fluids ~380C

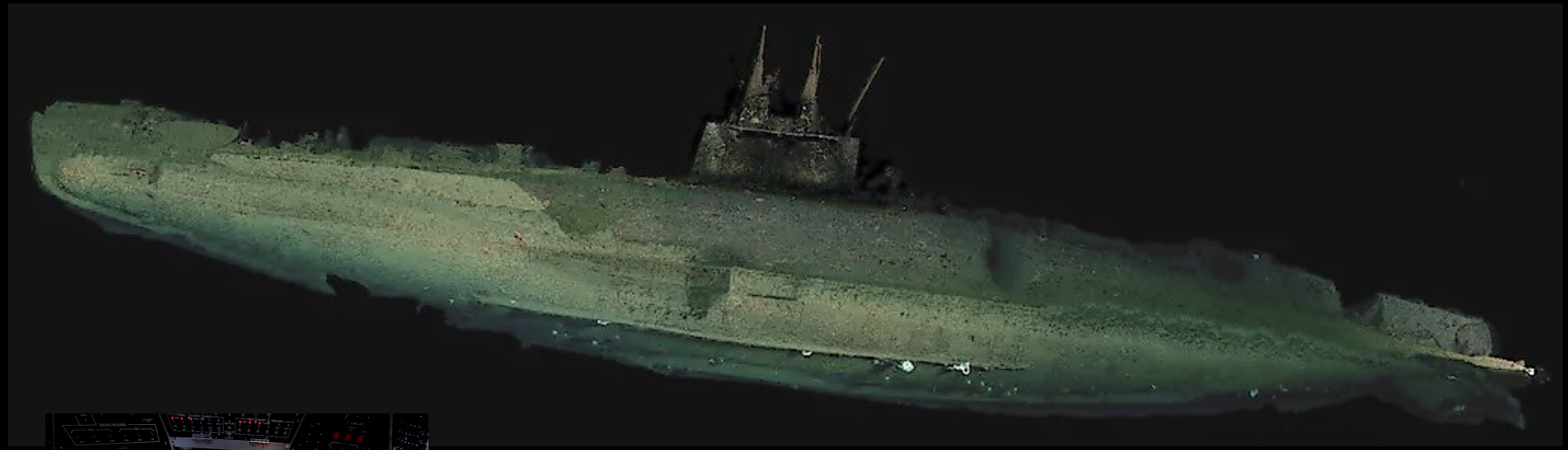
MARCH 2025, US NAVY ARCHAEOLOGY DIVES

Collaboration with Navy Historical and Heritage Command

Grumman Avenger and US Submarine F1

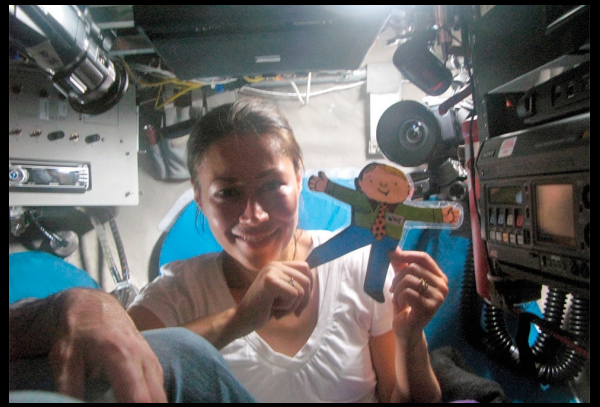
Wreck of Grumman Avenger @ 520m

NHHC & ONR DIVE ON WRECK OF USS F1



ONR & NHHC IN ALVIN ON USS F1
Rob Sparrock & Bradley Kruegar

USS F1 LOST December 17, 1917
WHOI Photogrammetry from Alvin Images



A dive day in Alvin is a life changing experience

ALVIN PROGRAM CONTINUING MISSION

Continue to provide superb, state-of-the-art access to the deep sea

Implement advanced methodologies and novel technologies

Increase community & public engagement and collaboration

Ensure Alvin's legacy of discoveries and operational excellence continue into the future

THANKS FOR PARTICIPATING IN THE DESSC NEW USER PROGRAM!!!