People
- Kerry Strom
- Anthony Tarantino
- Danik Forsman & Drew Bewley
- Ian Vaughn

NDSF Vehicle Highlights
- Alvin
- Jason
- Sentry

Related Activities
- R/V Neil Armstrong SVCs
- NLF Projects
DeSSC Dec 16

Jason Upgrade

OBJECTIVE:

Modifications to enable routine operation and maintenance of OOI/RSN components, including heavy lift and cable laying

INVESTMENT: $2.4 million

HIGHLIGHTS:

- Increased payload to 4,000 lb
- Hydraulic latch system
- New crane and docking head
- Increased science payload
OBJECTIVE:

Provide opportunity for early career scientists to use *Alvin* and *Sentry*

HIGHLIGHTS:

- 24 ECS participants
- 5 mentors
- 12 new *Alvin* divers
- Telepresence
• December – February – Detyens Shipyard, Charleston, SC
• Acoustic trials, AUTEC Range
• SVC 1 – Charleston - Charleston
• SVC 2 – Charleston - Norfolk
• SVC 3 – Norfolk – Woods Hole
• SVC 4/5/6 – Woods Hole – Woods Hole
• Acceptance into UNOLS May 4
• May-June – First science (OOI/Pioneer Array)
• July – OOI/CGSN Irminger Sea
• August – OSNAP, North Atlantic
• October – OOI/Pioneer Array
• Nov – February – Warranty Yard Period, Detyens
## Armstrong Science Verification Cruises

<table>
<thead>
<tr>
<th>SVC</th>
<th>Scope</th>
<th>Participating Institutions</th>
<th>Port</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moorings; ARGO floats</td>
<td>Duke; USC; WHOI</td>
<td>Charleston</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Water sampling; SONAR</td>
<td>ECU; USGS</td>
<td>Charleston</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>OOI service; glider recovery</td>
<td>WHOI</td>
<td>Norfolk</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>ROV; AUV; OOI service; telepresence</td>
<td>WHOI; Michigan; URI; USGS</td>
<td>Woods Hole</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Geophysics; geology</td>
<td>WHOI; Rice; USGS</td>
<td>Woods Hole</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Biology; MOCNESS; trawls</td>
<td>WHOI; NOAA; UNH</td>
<td>Woods Hole</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>Coring</td>
<td></td>
<td>Woods Hole</td>
<td>TBD</td>
</tr>
<tr>
<td>8</td>
<td><em>Jason</em> Training</td>
<td>WHOI</td>
<td>Woods Hole</td>
<td>TBD</td>
</tr>
</tbody>
</table>
## Good

<table>
<thead>
<tr>
<th>Mooring recoveries</th>
<th>Crane sight lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck space and flexibility</td>
<td>Vehicle overboarding methodology</td>
</tr>
<tr>
<td>CTD overboarding system</td>
<td>Bulwarks</td>
</tr>
<tr>
<td>A-Frame</td>
<td>Uncontaminated SW system</td>
</tr>
<tr>
<td>Stationkeeping</td>
<td>Deck drainage</td>
</tr>
<tr>
<td>ROV and AUV ops</td>
<td>Method for retrieving water samples</td>
</tr>
<tr>
<td>Coring ops</td>
<td>“Wet” lab</td>
</tr>
<tr>
<td>EK 80</td>
<td>Network/email</td>
</tr>
<tr>
<td>USBL</td>
<td>Telepresence</td>
</tr>
<tr>
<td>Interior space</td>
<td>ADCP interference</td>
</tr>
<tr>
<td>Auxiliary power</td>
<td>Main lab “ergonomics”</td>
</tr>
<tr>
<td>Habitability</td>
<td></td>
</tr>
</tbody>
</table>

## Key: Provide SSSG and crew training for the many complex systems
NLF Guiding Principles
• Develop deep submergence technology with broad impact
• Enable new operational paradigms and open new realms to scientific enquiry
• Deliver deep submergence tools that enhance ocean science

NLF Project criteria
• Benefit a wide range of DSV users
• Provide synergistic opportunities (material or otherwise) between vehicles
• Provide leveraging opportunities for future growth
• Provide mechanism to continue development of forward-looking tools for deep submergence science
Pioneered novel solutions to challenges for exploring hadal depths with light fiber tether.

Pushing the limits of conventional cable/tether.

Robust light fiber tether revisions and smart autonomous situational awareness.
**Nereus Legacy Fund**

<table>
<thead>
<tr>
<th>Project</th>
<th>Investment</th>
<th>Investigator</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nereid Hybrid Tether</td>
<td>$182,668</td>
<td>Bowen</td>
<td>Complete lift tether development; sea trial vehicle and ready for operations</td>
</tr>
</tbody>
</table>

**Status**

- Destructive testing, dockside testing and sea trials completed in Q3 2016
- Concept of operations developed and being implemented
- Transitioning to operations
- Interest from industry
### Project Investment Investigator Objective

<table>
<thead>
<tr>
<th>Project</th>
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<th>Investigator</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentry ASV Tender</td>
<td>$177,024</td>
<td>Kaiser</td>
<td>Develop capability to autonomously monitor and control <em>Sentry</em> using an ASV</td>
</tr>
</tbody>
</table>

**Status**

- Wave glider acquired
- Acoustic and iridium communications on-board systems nearly complete
- Software development to integrate navigation systems with *Sentry* to begin in Q1 2017
- Developing operational procedures
- Identifying cruise of opportunity in early 2018

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**Status**

- Systems impacted by 6,500 m requirement identified
- Focus on power, variable ballast, life support, frame and hydraulics
- Begin work with NAVSEA in Q1 2017; their support is key
- Target design review in June 2017
# Nereus Legacy Fund

<table>
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</tr>
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<tbody>
<tr>
<td>Data Convergence &amp; Telepresence</td>
<td>$300,000</td>
<td>Howland</td>
<td>Develop a common automated data processing pipeline, data tracking and delivery system, determine benefits of telepresence-enabled on-shore data processing.</td>
</tr>
</tbody>
</table>

## Status

- Developing prototype NDSF data management tool using existing open source code
- Telepresence white paper in preparation; to be delivered in January
- Participated in Sally Ride SVC
<table>
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<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUI Transition</td>
<td>$823,923 + $120,000</td>
<td>Jakuba</td>
<td>Transition NUI into a science-ready vehicle for routine high-latitude operations.</td>
</tr>
</tbody>
</table>

**Status**
- Two 2016 field experiences (*Armstrong SVC 4 and 87°N on Polarstern*)
- Redesigned depressor
- Improved software and upgraded acomms
- Enhanced capabilities (manipulator, imaging, multibeam)
- Created O&M documentation
### Nereus Legacy Fund

#### Project Investment

<table>
<thead>
<tr>
<th>Project</th>
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<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadal Technology Ph 1</td>
<td>$100,000</td>
<td>Shank</td>
<td>Science driven vehicle technology development program to operate at full ocean depth</td>
</tr>
<tr>
<td>Hadal Technology Ph 2</td>
<td>$800,000</td>
<td>Shank</td>
<td>Science driven vehicle technology development program to operate at full ocean depth</td>
</tr>
</tbody>
</table>

#### Status
- Surveyed hadal science community; >75% of respondents want ROV capability
- Key desired capabilities include sampling, imaging and good navigation
- Plan for Phase II developed, with the goal to leverage existing resources and the Nereid family design
- Phase II funding pending

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