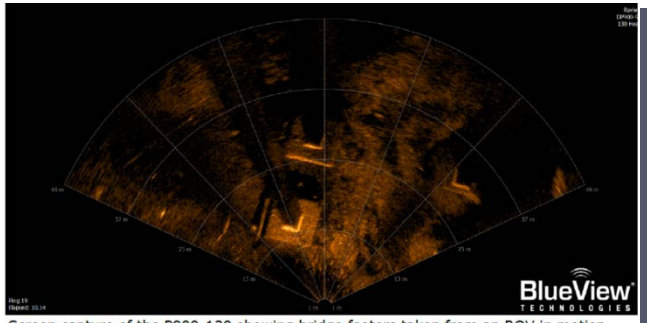
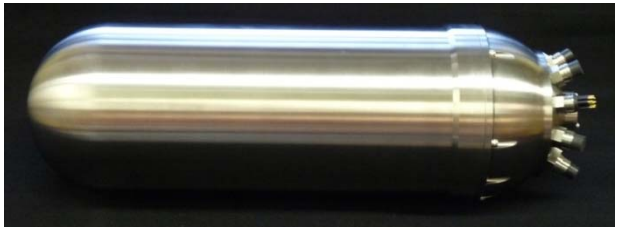
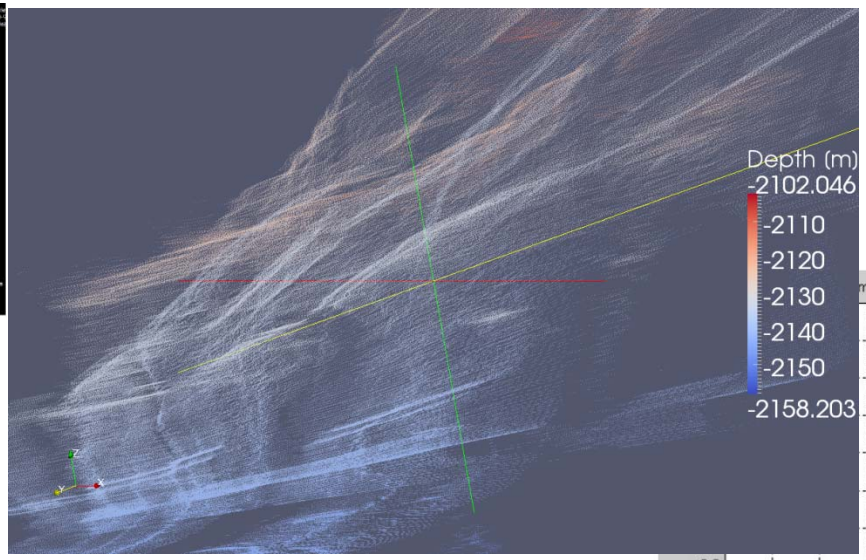
Sentry Upgrades
Sonar Systems

- Reson AUV3 – dual freq, 1/3 power, 15lbs lighter
  - New WHOI driver means full reconfigure and start up in water saves power and increases flexibility
- Blueview P900 forward looking – Obstacle Avoidance (big improvement) and science uses – no cost to NDSF
- Edgetech 2205 Dynamic Focus sidescan (8cm beam width) – no cost to NDSF – not yet successfully used on Sentry

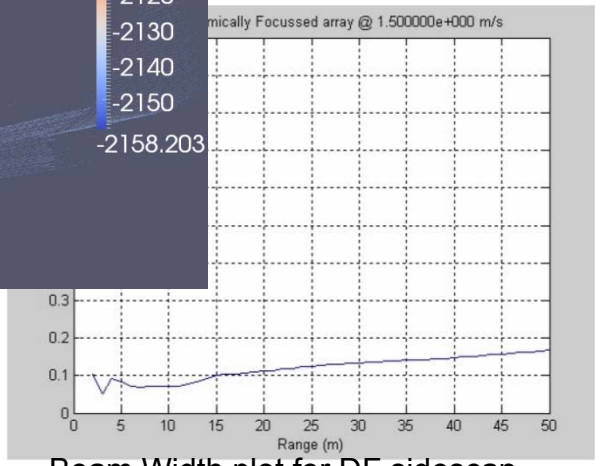


Screen capture of the P900-130 showing bridge footers taken from an ROV in motion.


New Multibeam Sonar



Extreme High Resolution Map of Section of Florida Escarpment with Blueview Sonar

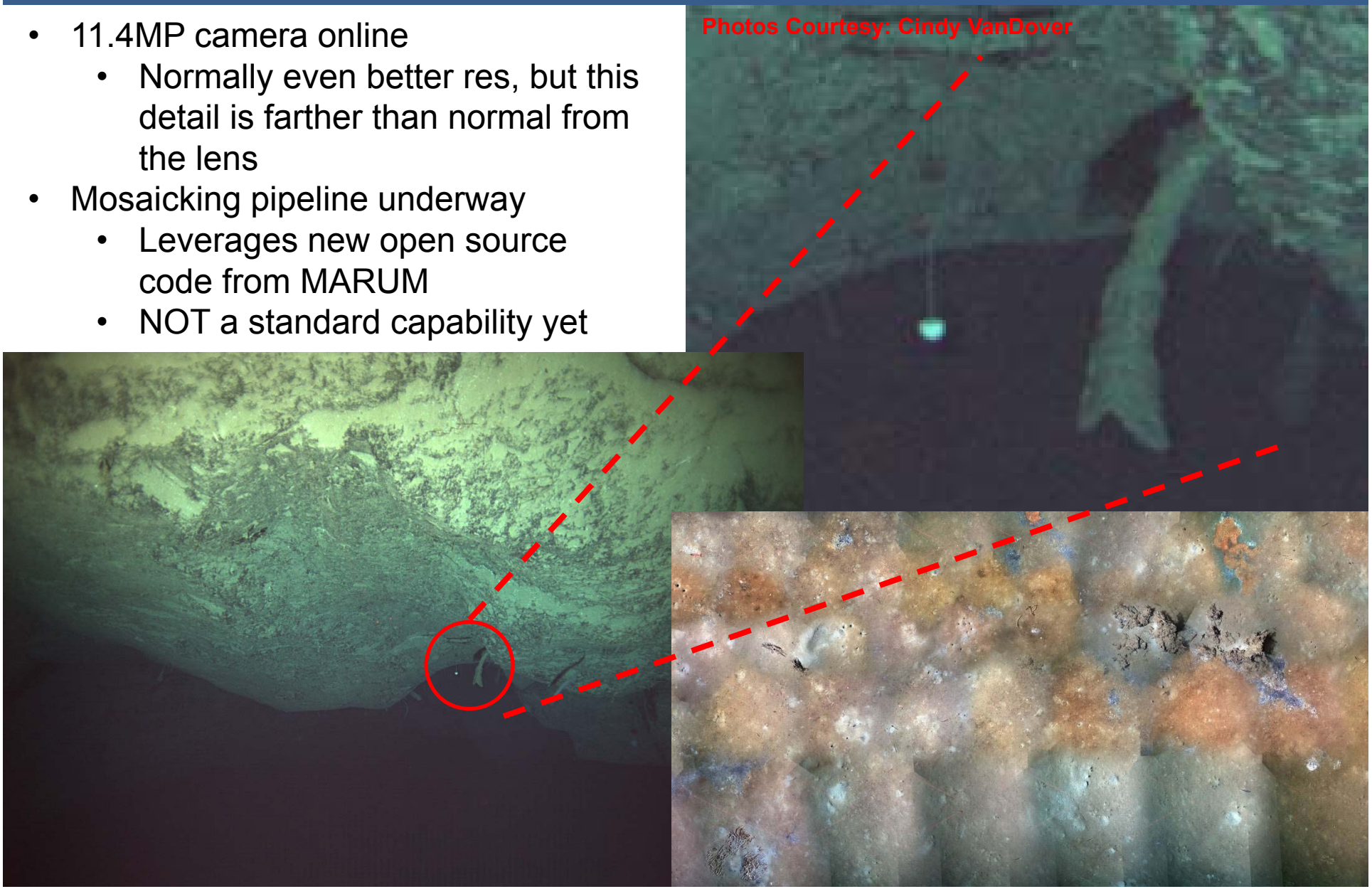


Beam Width plot for DF sidescan

Sentry Upgrades

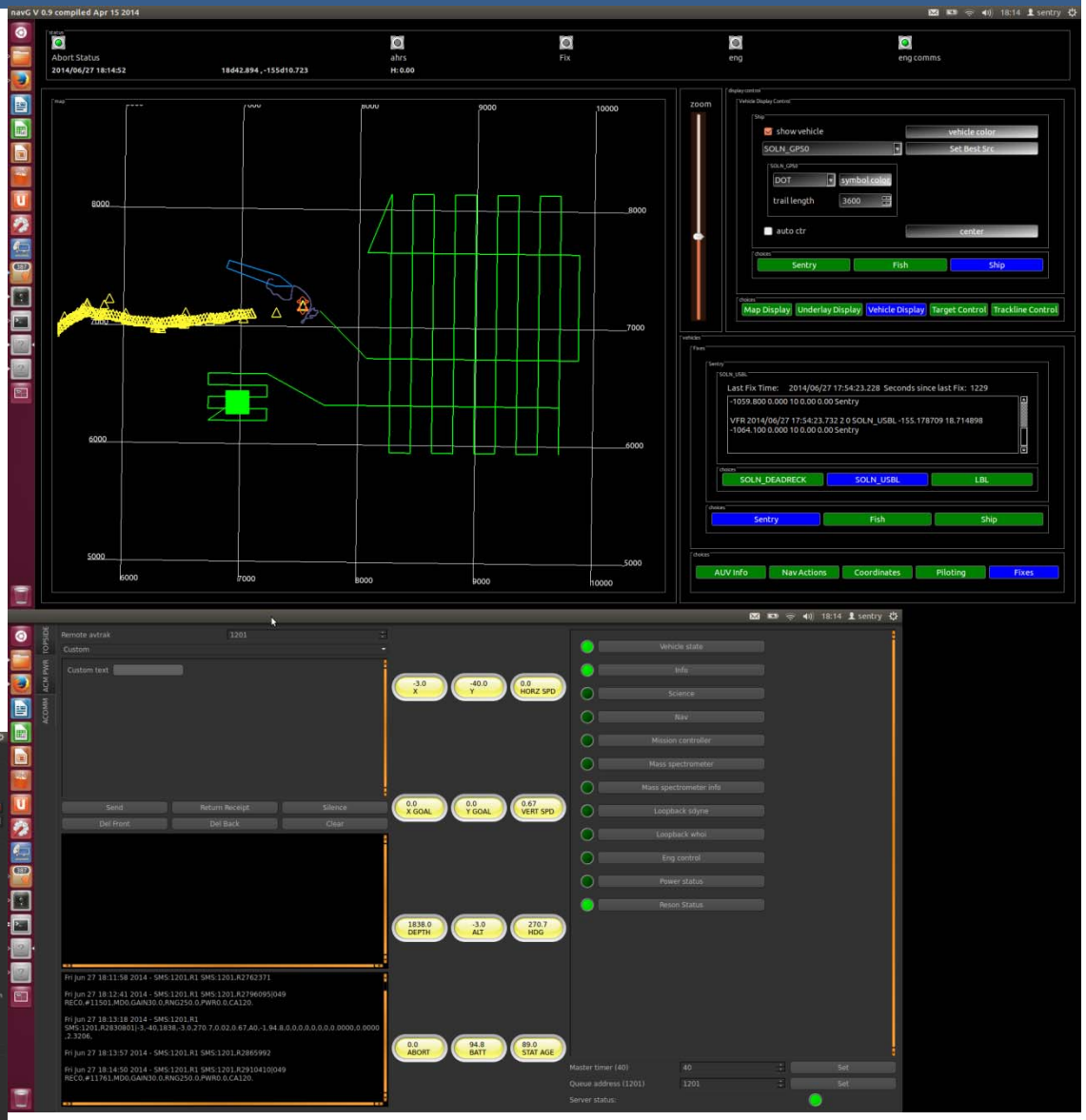
New Camera

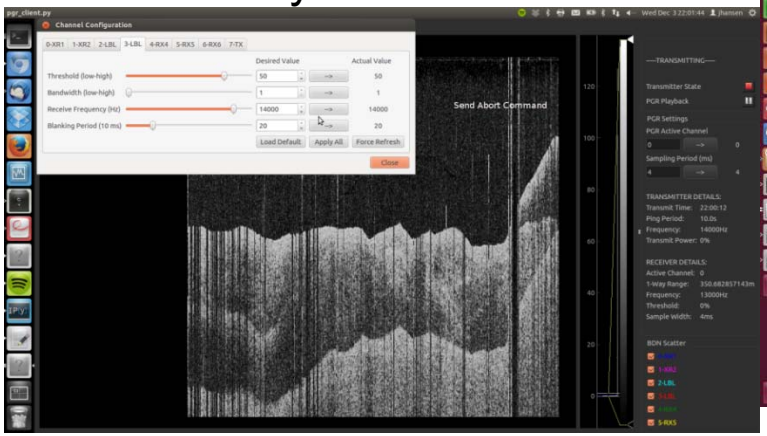
- 11.4MP camera online
  - Normally even better res, but this detail is farther than normal from the lens
- Mosaicking pipeline underway
  - Leverages new open source code from MARUM
  - NOT a standard capability yet



Science and Ops Interfaces

- Entirely new interface for:
  - Science user awareness
    - Can be interactive for scientists
  - Vehicle status & comms
  - Navigation
  - Tracking
  - Bridge communication
  - Pre/post dive
- Already in use for both operators and scientists
- Still adding additional functionality

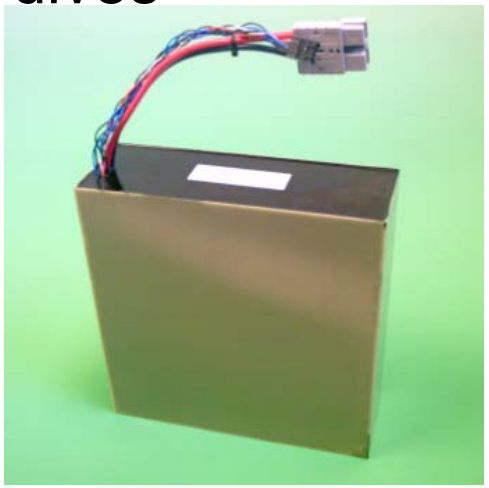




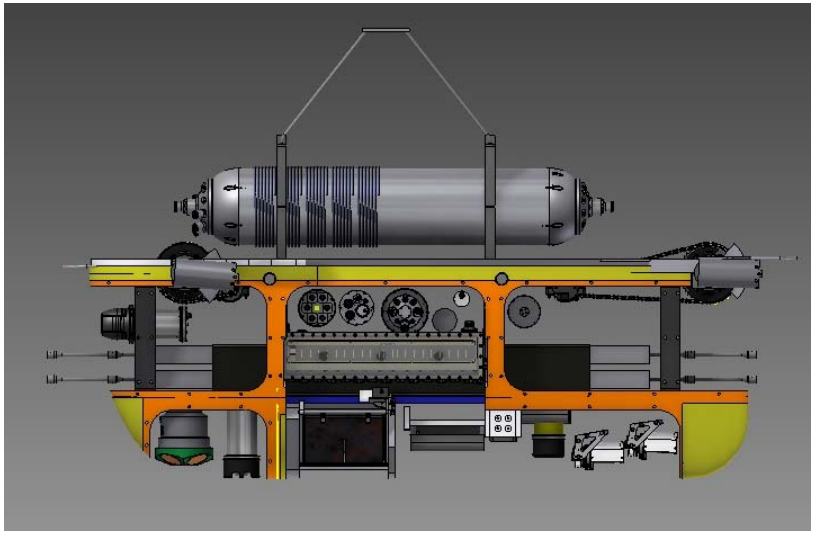
Sentry Upgrades

Battery System & Data Pod

- Will give 3 hour turnaround with 20 – 48 hour dives
- Major battery upgrade underway (~2016?)
  - Custom high density version
  - New instrument config > flexibility
  - Buoyancy neutral
- Interim battery maintenance (July 2015)
  - ~30% more power
  - Slightly faster recharge
  - New ceramic cylinder



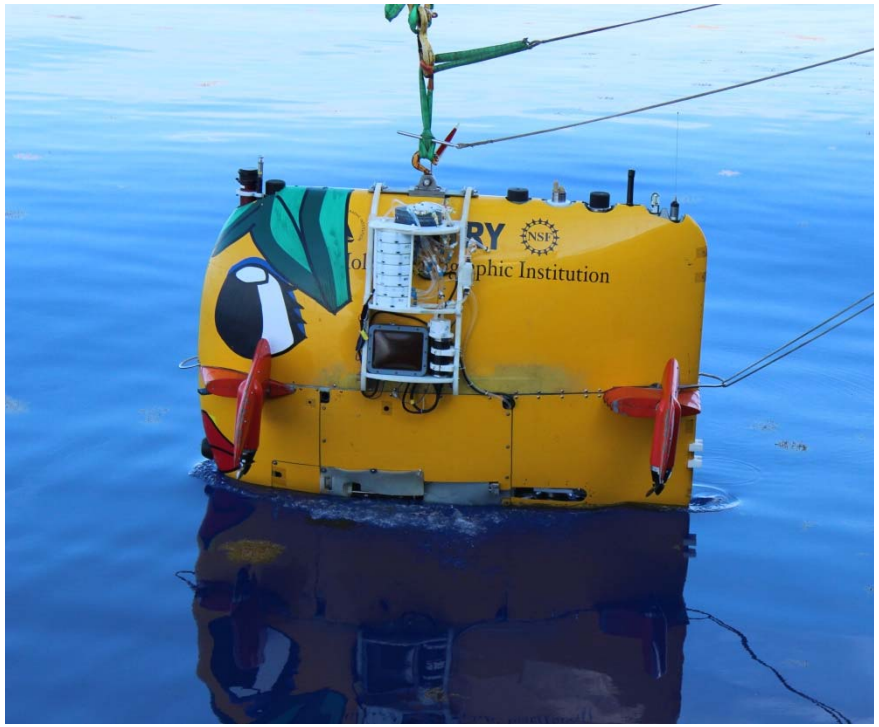
New module in development with SWE



Sentry Upgrades

New Thruster

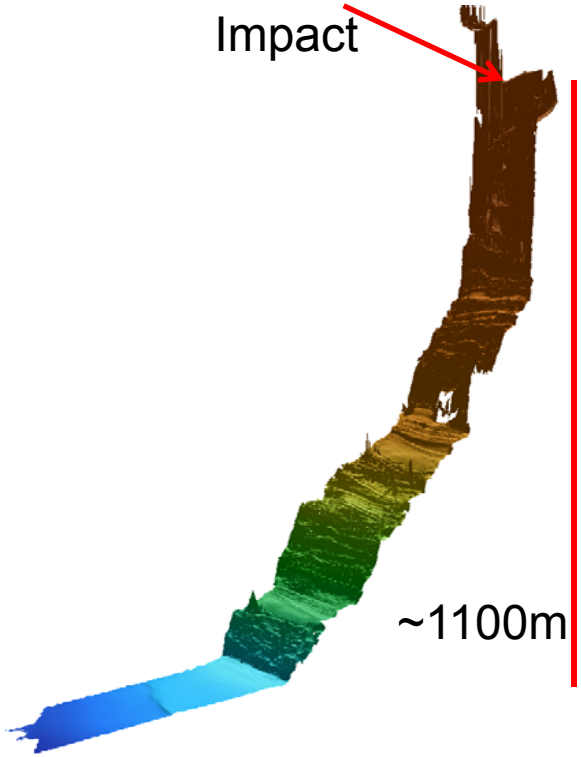
- Increased efficiency
- Top speed 1.2m/s (2.4knts) in low current
  - Likely 1.5 – 2m/s (3-4knts) with new batteries
- Very likely increased reliability
  - Already tested to 11,000m
  - Substantial impact testing
  - Lots of test hours
  - >50 *Sentry* dives – no failures
- Much more sophisticated controllers

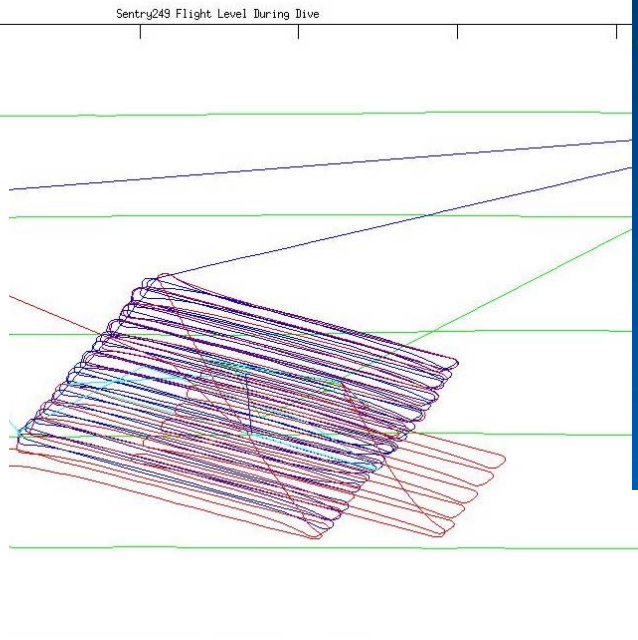


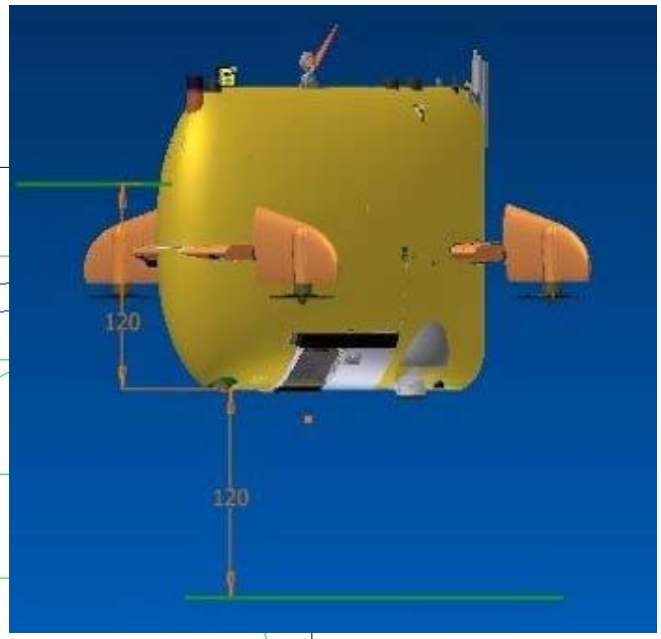
New Thrusters on *Sentry*
Photo Courtesy: Doreen McVeigh

Sentry Upgrades
Bottom Following

- *Sentry* flew full survey blocks at 120cm, 150cm, and 200cm above the seafloor for a total of over 8 hours
- Less than the height of *Sentry*







- Substantial improvements in bottom following software for extreme terrain as well
- Sophisticated forward looking obstacle avoidance sonar and software – paid for by outside funds
- Additional improvements underway

Operational Capabilities

- Joint ops – Originally had to put *Jason* in tow mode
  - Can now launch *Sentry* without interrupting *Jason* bottom activities - done
  - Automated surface drive – 2015 will allow recovery of *Sentry* without interrupting *Jason* activities
- Anchoring – leave the vehicle on the bottom at the end of a dive until ready
  - Mechanical components complete Jan 2015
  - Electrical and software elements under development (2015 – $ permitting)
- Datapod – on vehicle now
  - 6TB hot swappable storage means no more turn around limited by data
- AIS – locator beacon – shows up on any ships radar and longer range 2015
- New Iridium
  - Two way satellite coms for surface drive
  - On vehicle now and in testing

Sentry Upgrades
Documentation

- "Scientists Guide to *Sentry* Cruise Planning" on website
- Major upgrades to *Sentry* website
  - ~70% of envisioned content now live
- All drawings now fully up to date in modern CAD packages
- Revision control system almost fully implemented

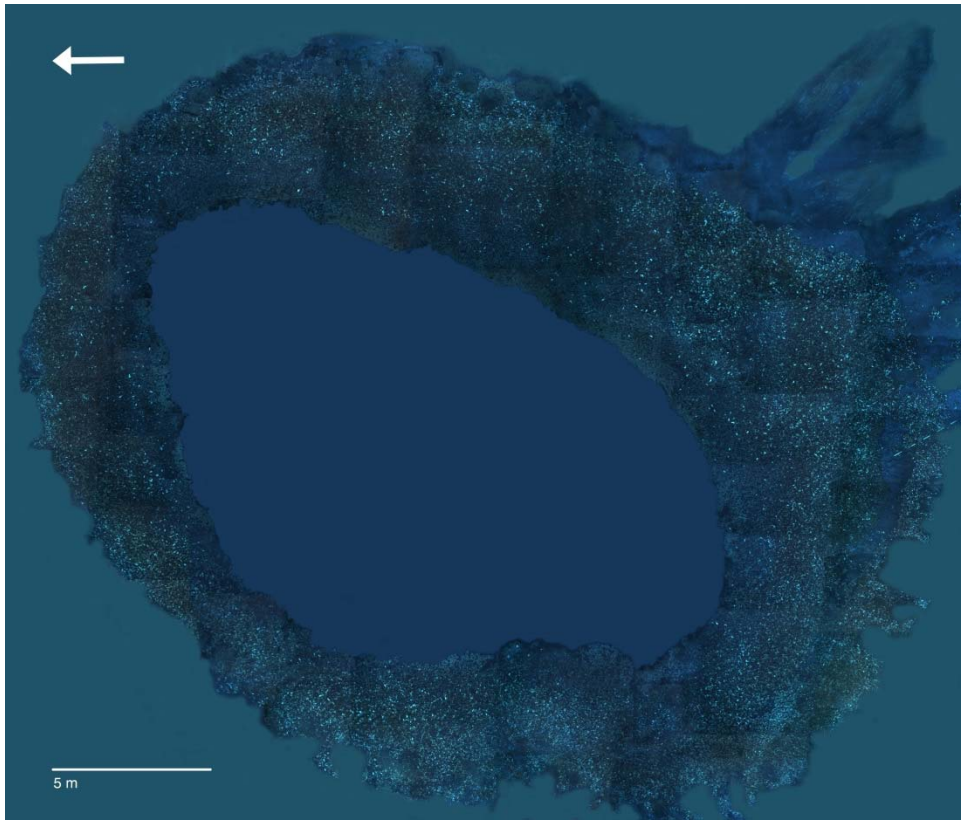
Main *Sentry* Page:
http://www.whoi.edu/main/sentry
Planning Guide:
http://www.whoi.edu/fileserver.do?id=159424&pt=10&p=39047

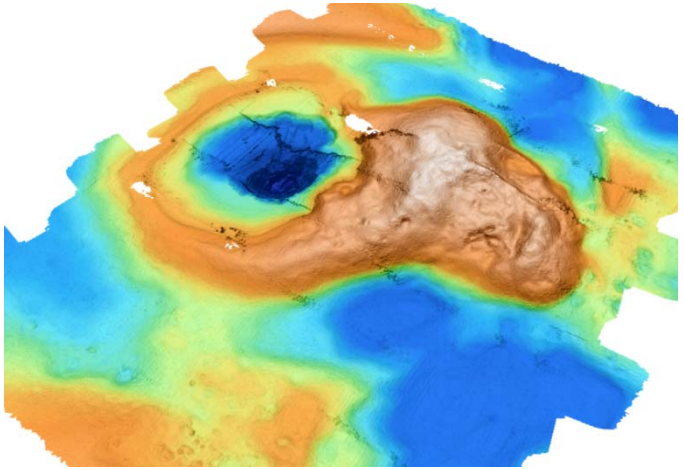
- Working on new automated metadata system to capture all sensor settings every dive

Sentry Upgrades

Brine Pool Investigations

- Multibeam image of bottom surface of brine pool – probably detected top as well → volume and 3-D shape (probably)
- Photo Mosaics by Eli Cole, Van Dover Lab, Duke University, NSF SeepC Project from *Sentry* images





September Maintenance Period

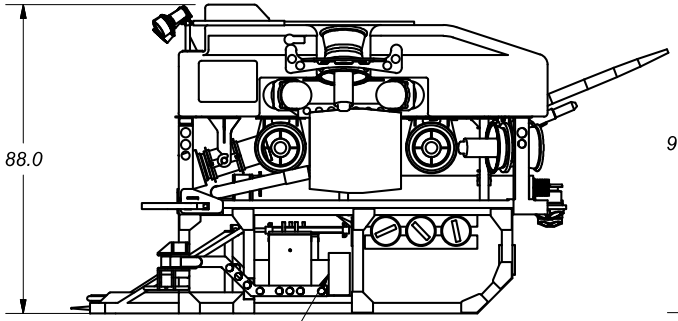
- Shortened by addition of Howe and Edwards cruises
- Augmentation of foam blocks increased payload 300 lb.
  - Removed, sent to manufacturer where foam was added
  - Repaired crazing damage
  - Optional add-on blocks when extra payload is needed
- Overhaul of Titan 4 manipulator, motor pods, hydraulic system, and thruster seals

- **Not completed due to lost time**
  - Did not replace J boxes
  - Did not replace plenum boots

Jason Upgrades
Flotation

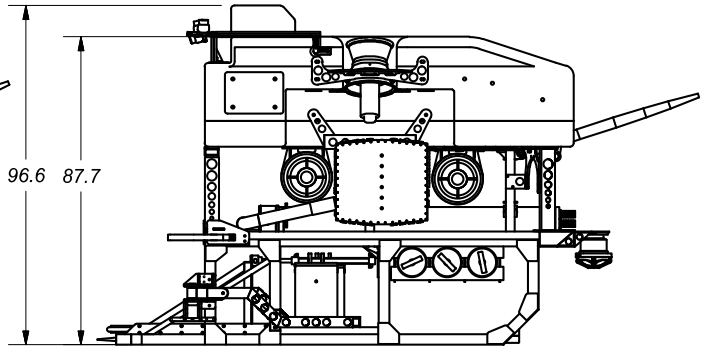
REVISION HISTORY			
REV	DATE	DESCRIPTION	APPROVED
A	12/10/2014	JASON II UPGRADE	

2012 Jason II



190 LBS
OF SYNTACTIC BOUYANCY
REMOVED

2014 Jason II



UPGRADE:
1. NET BOUYANCY ADDED:
496 LBS WITH TOP AND BOTTOM FOAM
306.6 LBS WITH TOP FOAM
118 LBS WITHOUT ANY ADDITIONAL FOAM
2. REPLACED FIRST GENERATION SYNTACTIC INSERTS WITH STRONGER UNITS.
3. IMPROVED LOAD DISTRIBUTION ON MAIN VEHICLE FRAME THROUGH SHIMMING/ RUBBER SPRINGS.
4. REMOVAL OF 8% OF "OLD" JASON'S TOTAL BOUYANCY FROM BOTTOM OF TOOLSLED.
- GREATLY IMPROVES VEHICLE RIGHTING MOMENT GIVING A MORE STABLE VEHICLE UNDERWAY.
- FREES INTERNAL VOLUME FOR ADDITIONAL SCIENCE GEAR.
5. SHOCK ABSORBING URETHANE COATING REPLACED EXISITNG FIBERGLASS.
- PREVENTS EXTERNAL CRACKING AND SCALLOPING OF THE SURFACE OF THE SYNTACTIC.

UNLESS OTHERWISE NOTED:
DIMENSIONS IN INCHES
TOLERANCES:
DECIMAL: .xx ± 0.01; .xxx ± 0.005
ANGULAR: ± 1 deg
BREAK ALL SHARP EDGES R0.02 MIN
MATERIAL
FINISH: *SEE APPLICABLE NOTES*

DESIGN	DATE
Mario Fernandez	*12/10/2014*
DRAFT	
CHECKED	

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Deep Submergence Laboratory
Challenger Drive, WOODS HOLE, MA, 02543

TITLE
Jason II ROV
UPGRADE COMPARISON

SIZE A | DWG NO Vehicle Model | REV
SCALE | SHEET 1 OF 1

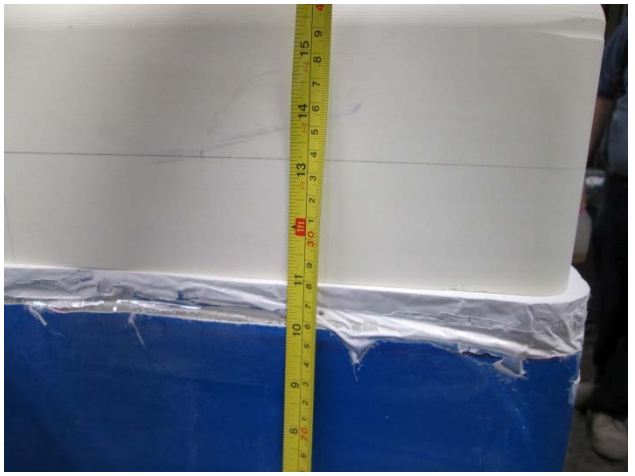
Jason Upgrades
Flotation

Wear and tear

Disassembly

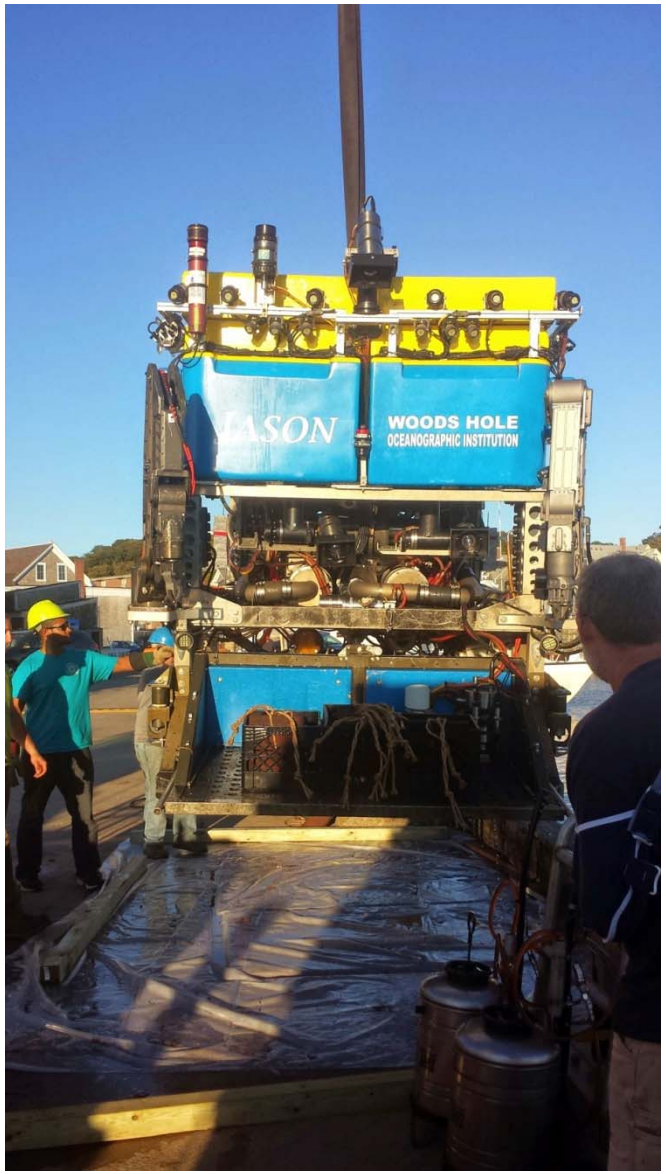
Jason Upgrades
Flotation

Augmentation



Reassembly

Jason Upgrades
Flotation



Weight & Ballast

Net increase of 300 lb. buoyancy and opened up large area in tool sled

Miscellaneous

- Super Scorpio integration complete
- Science camera control improvements
  - One controller for P&T and cam control
- New Titan 4 manipulator (2X)
- Redesigned multi-chamber slurp sampler
  - Geneva gear index, smaller
- Syringe samplers (DSL design)
- New Doppler with enhanced bottom lock
- Control van pilot ergonomics
- Monitor replacement completed

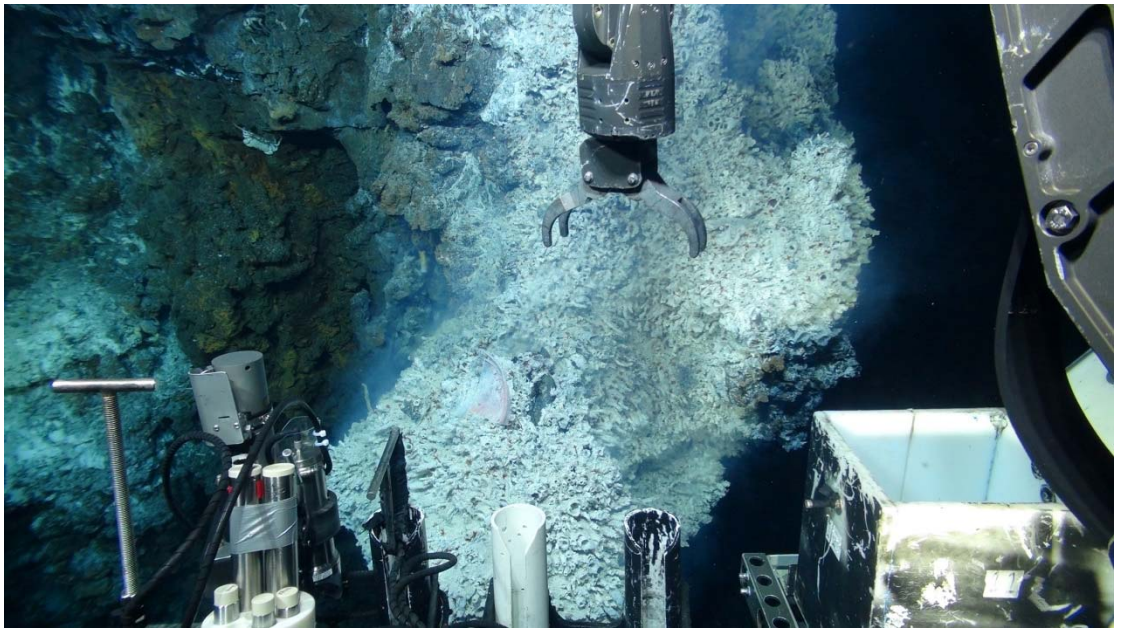
Miscellaneous

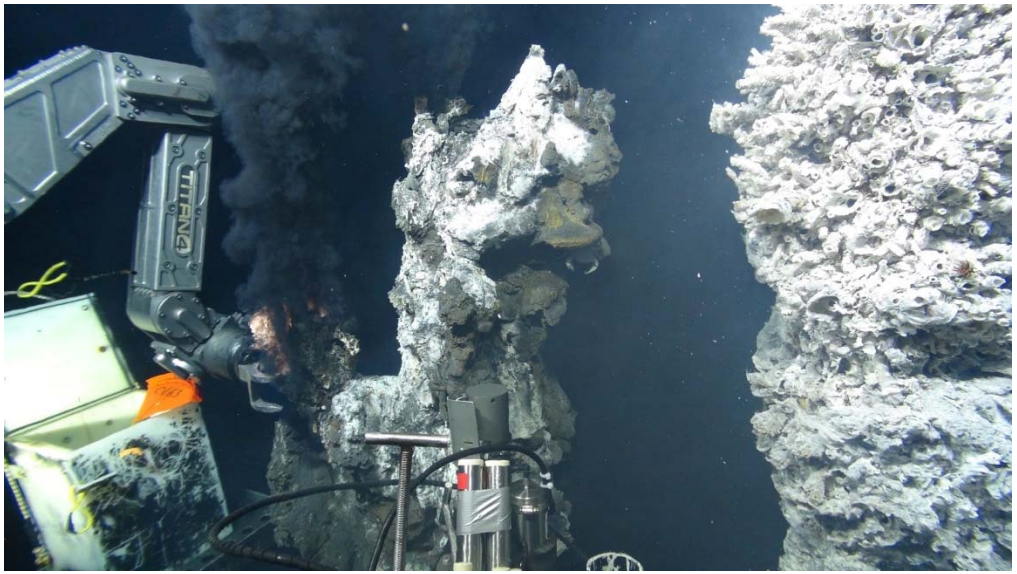
- Improved Virtual Van display arrangement
- Framegrabber upgrade
  - 2 new units and code
- Topside GUI and engineer computer
- Multi-Viewer for remote station improvements
- New wideband mini transponder USBL beacons
  - Lighter, smaller, user interface, reliable
- New LARS HPU design underway

Super Scorpio

Insite *Super Scorpio*

- 16:9 aspect ratio
- 4672 X 2628
- 12.3 MP DSC
- 10X optical zoom
- 64G internal flash
- Real time video
- Image download via Ethernet



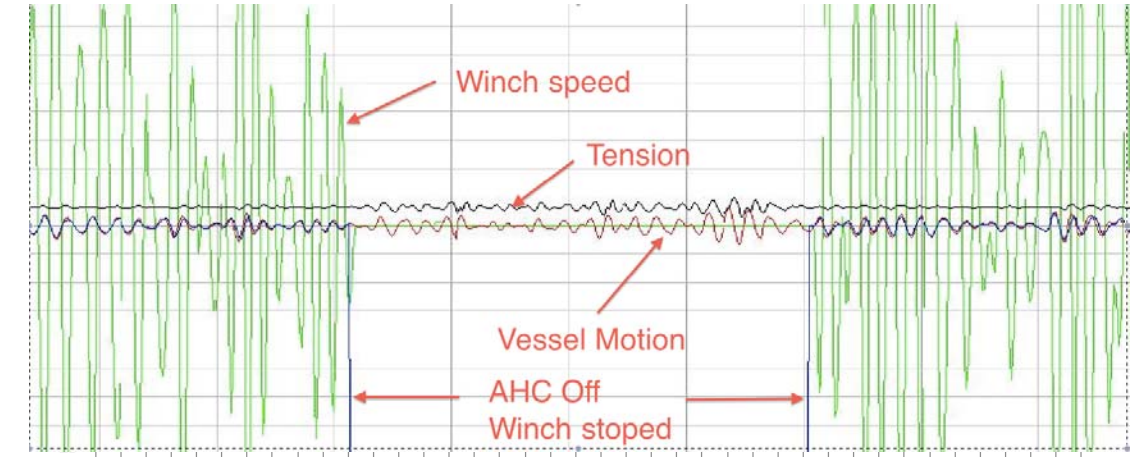


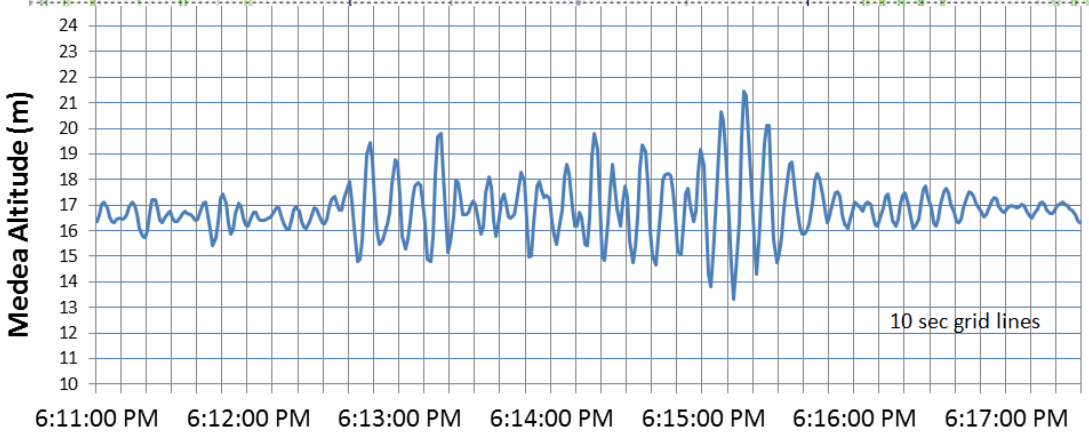
Jason Upgrades

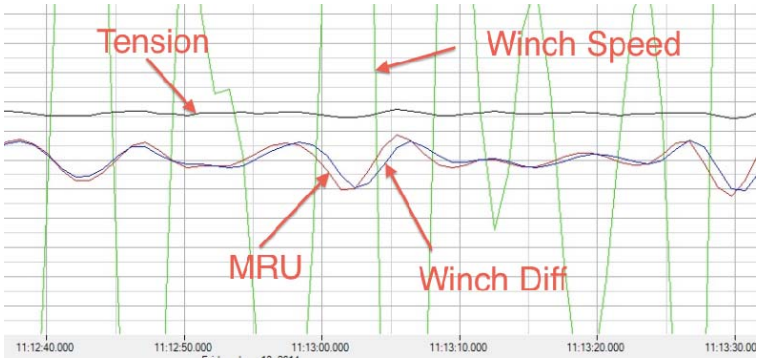
Rapp Winch

- 2 *Jason* cruises on TGT
- 1 cruise on *Ron Brown*
- All functions operational
- AHC operational
- Automated pay/haul

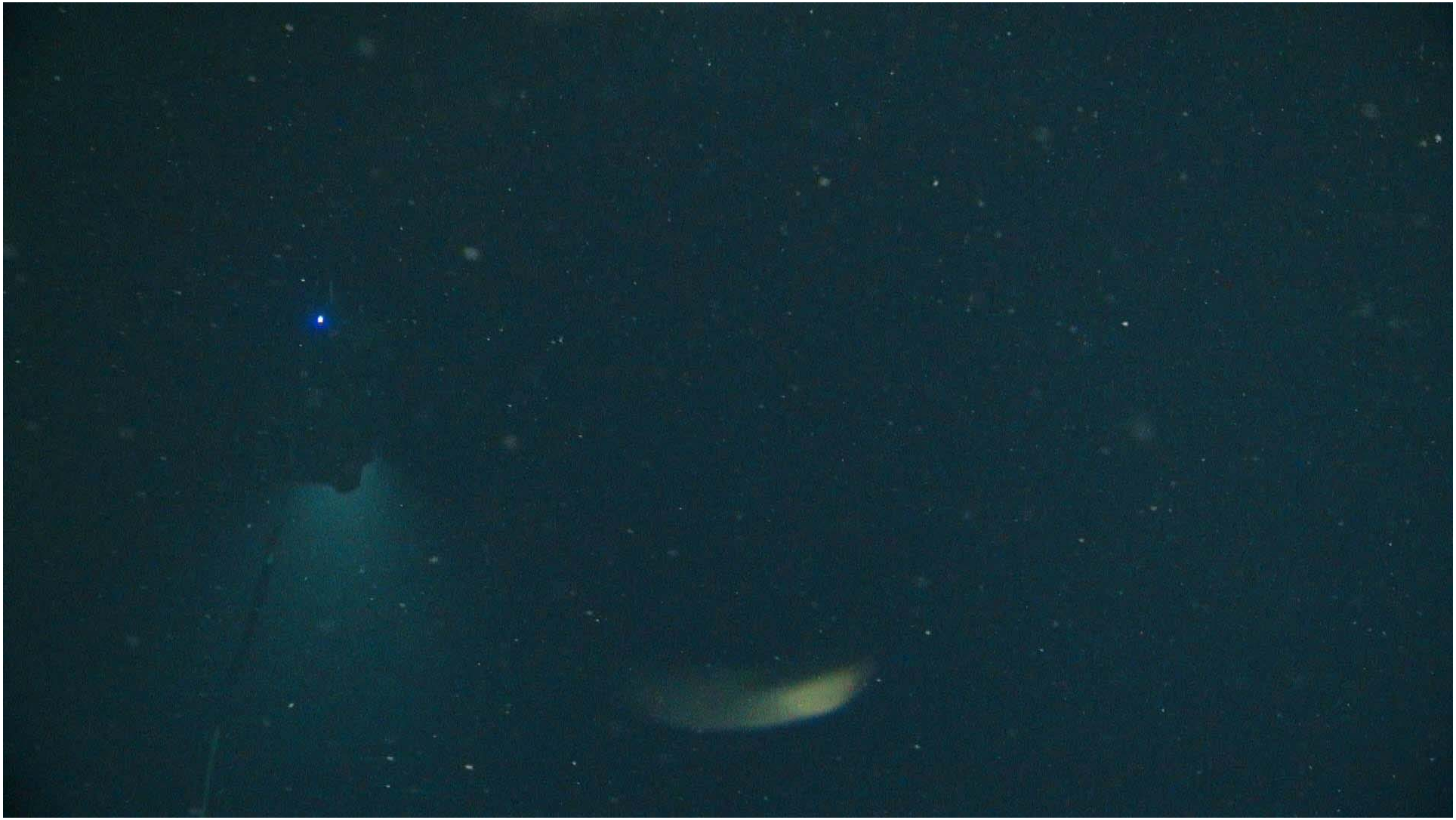
AHC Performance



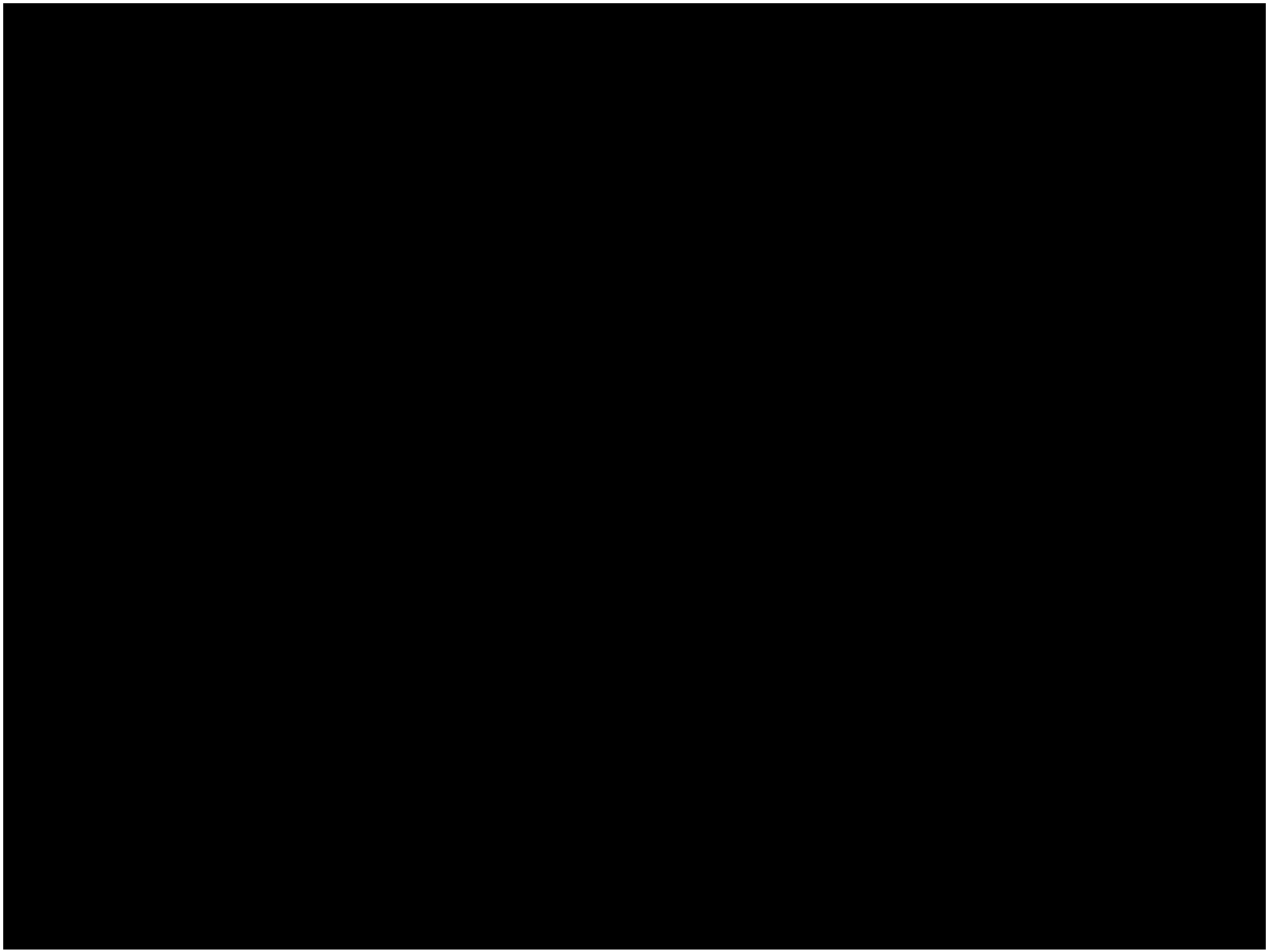




AHC Performance



AHC Performance



Alvin Upgrades

- The implementation of the framegrabber with tools post-dive
- The modified scrubber design is complete and approval package submission is imminent
- The SubC camera (science still/video) was rebuilt by the manufacturer and is operating well with a much more user-friendly software package
- We have added a Nikon SLR to our in-hull camera complement and will offer this as a regular option for in-hull cameras

Alvin Upgrades

- The major overhaul and update of the Schilling manipulator arm
- Battery monitoring circuit that will help better understand battery voltages (at the cell level), leading to better dive performance
- Installation of the Reson multibeam sonar, including integration of the NDSF processing pipeline
- Updating the weight and balance which should reduce the amount of extra ballast steel per dive

Alvin Upgrades

- New weight dropper design
- Improvements to the video system: annotation and post-dive tools
- Interior ergonomics to improve condensation control and seating
- Navigation post processing tools and cross-training