

An aerial photograph showing a red autonomous underwater vehicle (AUV) floating on the surface of the ocean. The AUV is cylindrical with a white deck and various instruments. It is surrounded by numerous ice floes of varying sizes. The water is dark, and the sky is overcast.

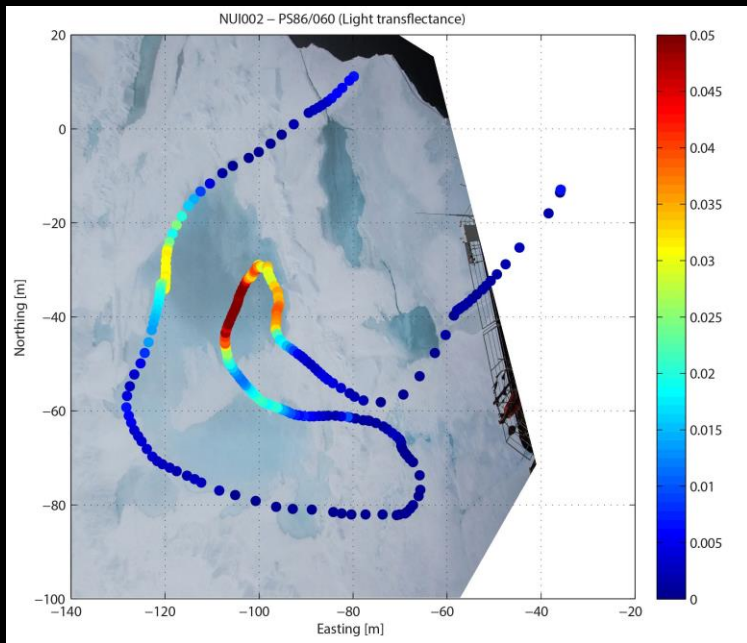
NUI Overview

Mike Jakuba

Woods Hole Oceanographic Institution

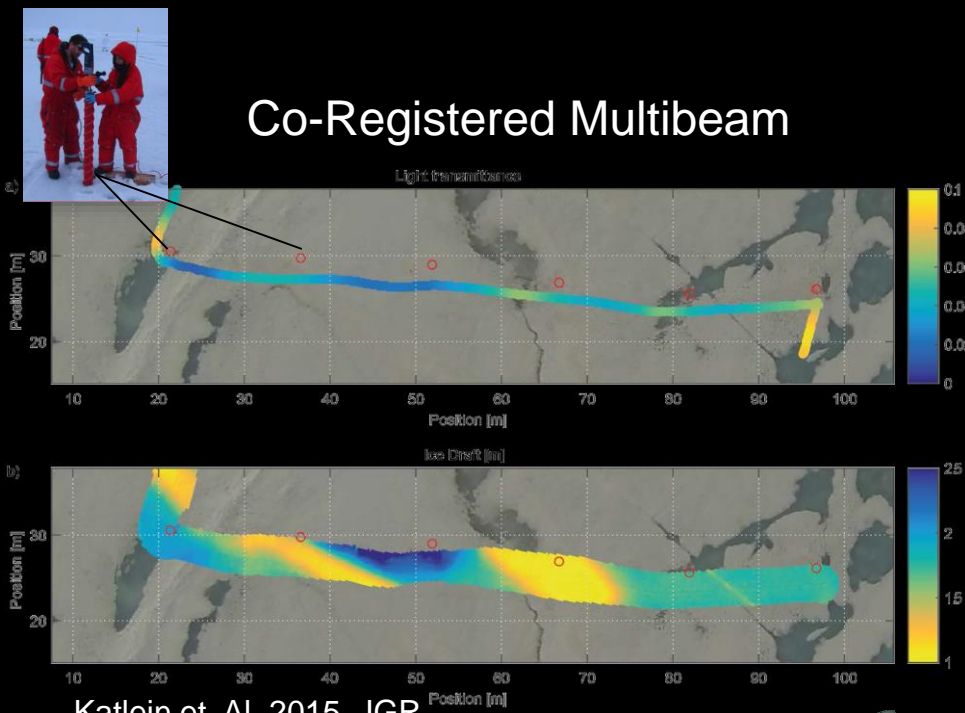
2016-03-11

Optics



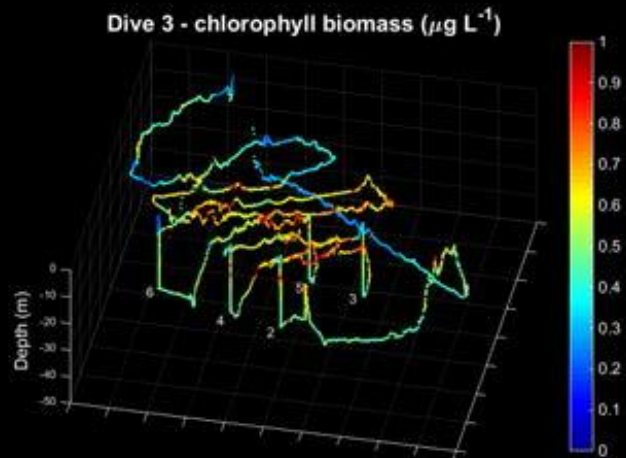
C. Katlein (AWI)

Co-Registered Multibeam



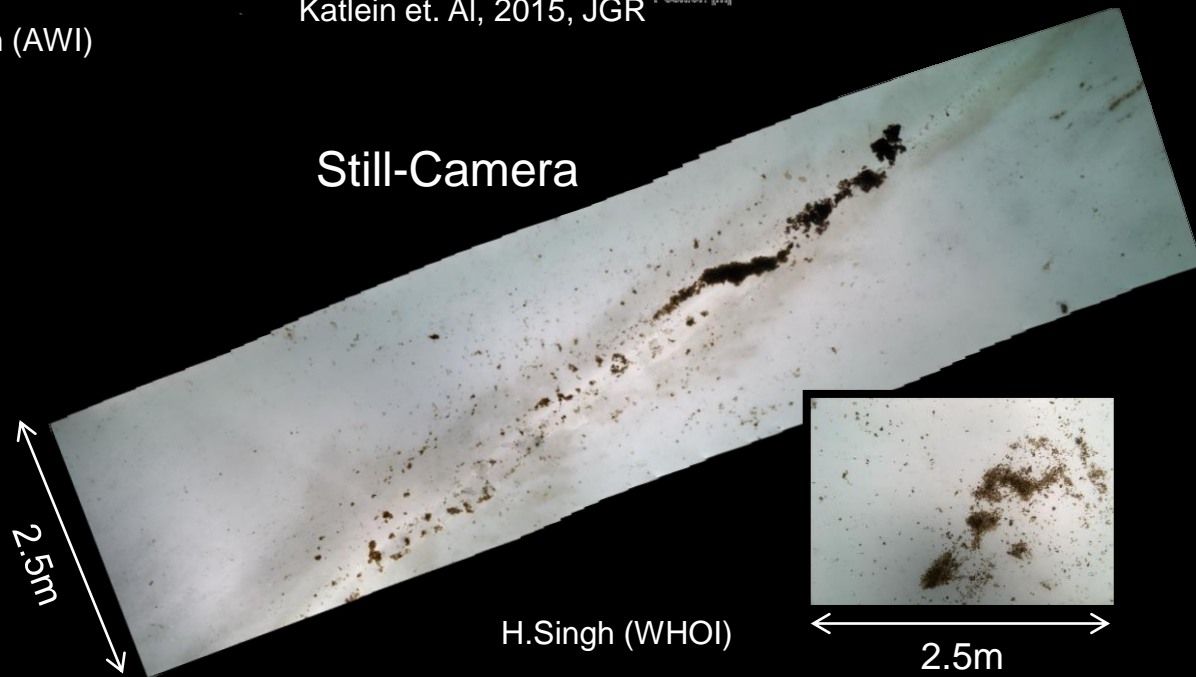
Katlein et. Al, 2015, JGR

Fluorometry



S. Laney (WHOI)

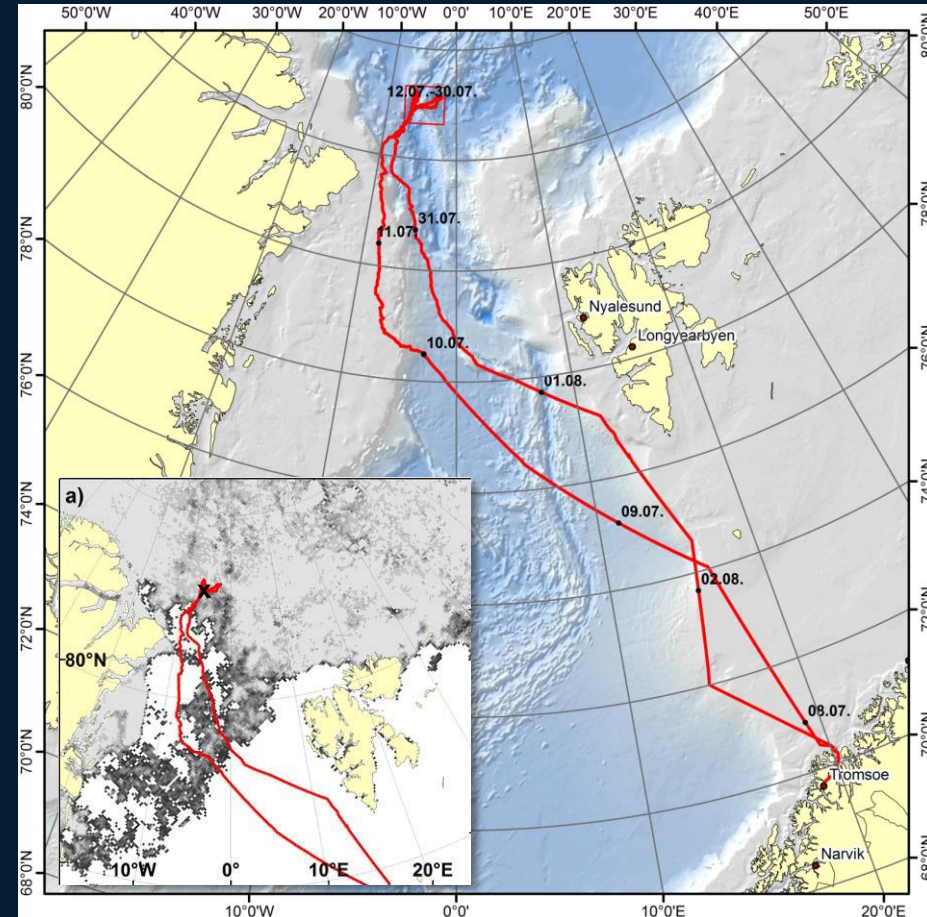
Still-Camera



H.Singh (WHOI)

NUI Summer 2014 Deployments at 83 N 6 W F/V *Polarstern* PS86-3

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Cape Cod Bay, September 2015

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R/V Tioga



Built: 2004
Length: 60 feet
Beam: 17 feet
Draft: 5 feet
Gross Tons: 53 T
Range: 300 NM
A-Frame: SWL 4600 lbf



Vehicle Overview – *Sentry* Commonalities Highlighted

Emergency Beacons

Short Range Acoustic Comms (10 kHz)

Redundant Propulsion

Situational Awareness Cameras

Contingency Recovery Aids

Long Range Acoustic Comms (3.5 kHz)

Launch and Recovery Modeled on *Sentry*

High End Navigation Suite

NDSF Control and Navigation software

2000 m Depth Rating

Redundant Batteries

Dual Up/Dn ADCP/DVLs

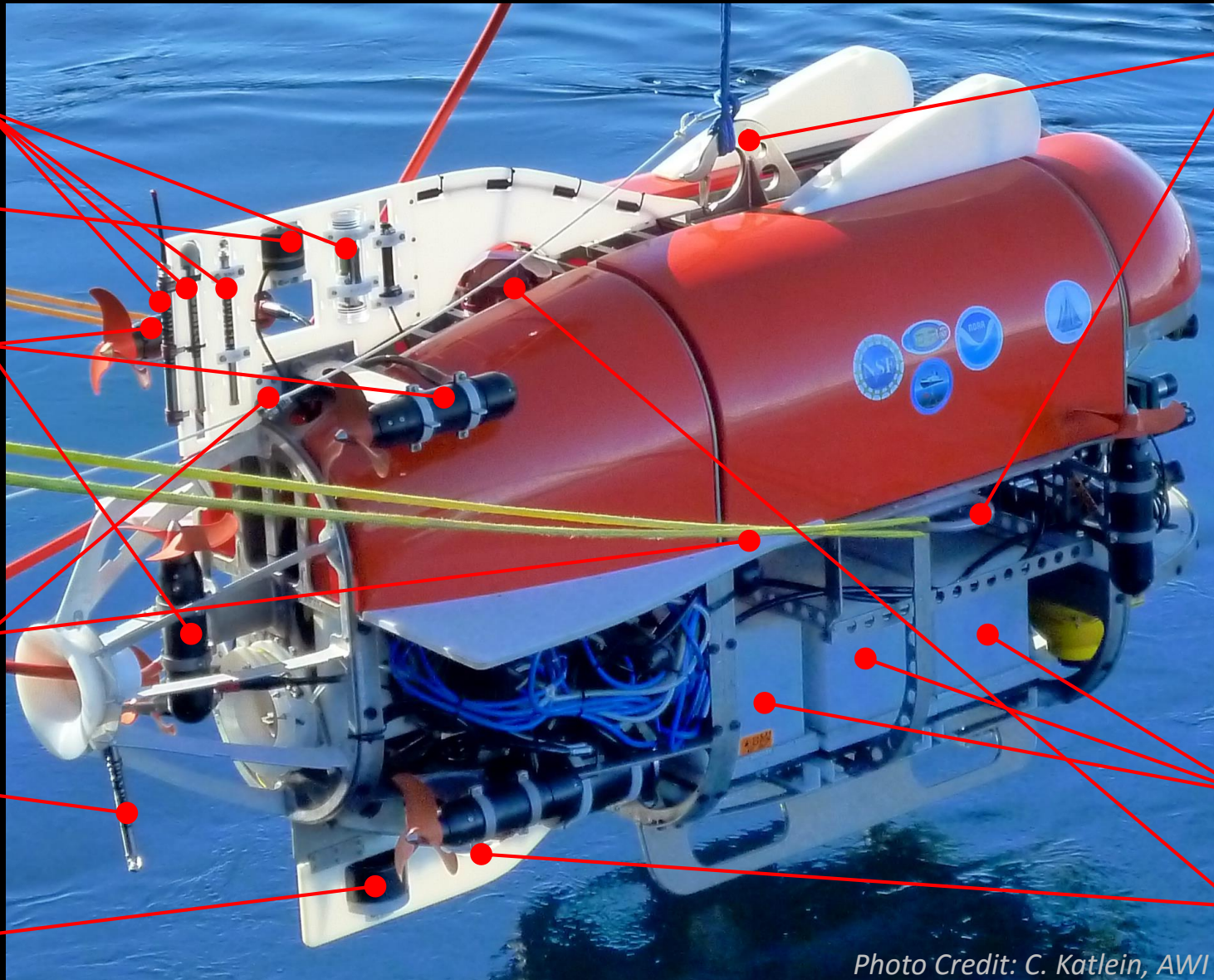


Photo Credit: C. Katlein, AWI

Specifications: www.whoi.edu/main/nereid-under-ice

Physical	Range	40 km @ 1 m/sec plus 20 km reserve (preliminary). Maximum speed in excess of 1.3 m/s. Closed-loop control of heading, depth, ice-relative and geo-referenced position (within 150 m of ice and seafloor, respectively)
	Air Weight	1800-2000 kg depending on configuration.
	Depth Rating	2000 m
	Battery	18 kWhr pressure-tolerant lithium-ion
	Time	On board precision atomic clock synchronized to GPS, 1 ppb drift rate/year.
Navigation	Inertial	IXSea Phins INS/north-seeking gyro-compass; back-up magnetic compasses (3)
	Depth	Paroscientific Nano-Resolution pressure sensor; SBE 49 FastCAT back-up
	Acoustic	up/down 300 kHz DVLS; 200 kHz Imagenex DeltaT multibeam (July 2016); Blueview P900 imaging sonar for obstacle avoidance, One-way travel-time acoustic navigational aiding at 10 Hz, 3.5 kHz.
Intervention	Electro-Hydraulic Manipulator	Kraft Telerobotics 7-function manipulator arm and custom high-efficiency HPU (March 2016): push coring, ice sampling, instrument emplacement, etc.
Native Sensing	Optical	Real-time color HD-SDI video on internal pan/tilt/zoom (Kongsberg OE12-522); LED lighting (8 DSPL Sphere, dimmable), 5 channels SD, encoded on board. 1 MP up-looking still camera (summer 2016)
	Acoustic	up/down 300 kHz ADCPs; 200 kHz Imagenex DeltaT multibeam (summer 2016);
	Chemical	Seabird FastCAT-49 pumped CTD; WetLabs FLNTURTD Chl/backscatter fluorometer (0-30 ug/l, 0-10 NTU)
Auxiliary payload allowance (all bays):		Native support for 10 auxiliary sensors. ~100 kg wet weight, 500 Whr Energy, 1000 W total (6 high-power channels with Gb Ethernet and/or RS-232, 100 W per channel, 6 low-power channels 3-15 W per channel, RS-232). 4 hardware trigger lines. All channels logged on board and delivered in real-time topside. Other communications protocols on request.

SVC4 Objectives – AUV Ops Capability Demonstrator

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- Launch and recovery (Sentry-analogous)
 - Coordination with bridge and appropriate ship motion
 - Deck ops
- Navigation and possibly SMS comms using Armstrong's Sonardyne USBL - again Sentry-analogous. Includes map generation to validate navigation.
 - Requires rental of a Sonardyne beacon or use of Armstrong's if available.
- Appropriate ship motion during dives for maintaining USBL including making navG available on bridge - again Sentry-analogous
 - Coordination with bridge, pre and during mission
- Demonstration of micromodem acomms using ship's 10 and 3.5 kHz transducers
 - Fallback will use NUI's self-contained system
- Deck and topside installation
 - Ship's power for charging
 - deck cabling for charge power and comms connections
 - ship's data feeds