

STARC Update AICC Summer 2023



Drydock Maintenance

Dockside Mobilization

Sonar Calibration

2023 Cruise Support

SLEP Work Items

Cooperative Agreement



STARC, Healy CO, SAS Chief Scientists at the North Pole 2022

Acknowledgements



National Science Foundation (NSF)

United States Coast Guard (USCG) Healy, SFLC-LRE, NED

Arctic Icebreaker Coordinating Committee (AICC)

Multibeam Advisory Committee (MAC)

WHOI Potential Fields Pool Equipment (PFPE)

National Oceanic and Atmospheric Administration (NOAA)

STARC Partner Institutions and Techs (SIO, OSU, UW)

Drydock Maintenance



Transducer Well Deck Preservation

- 100% deck and 3" up bulkheads
- Transducer well exteriors and lids
- New ice windows for auxiliary wells

Transducer Maintenance:

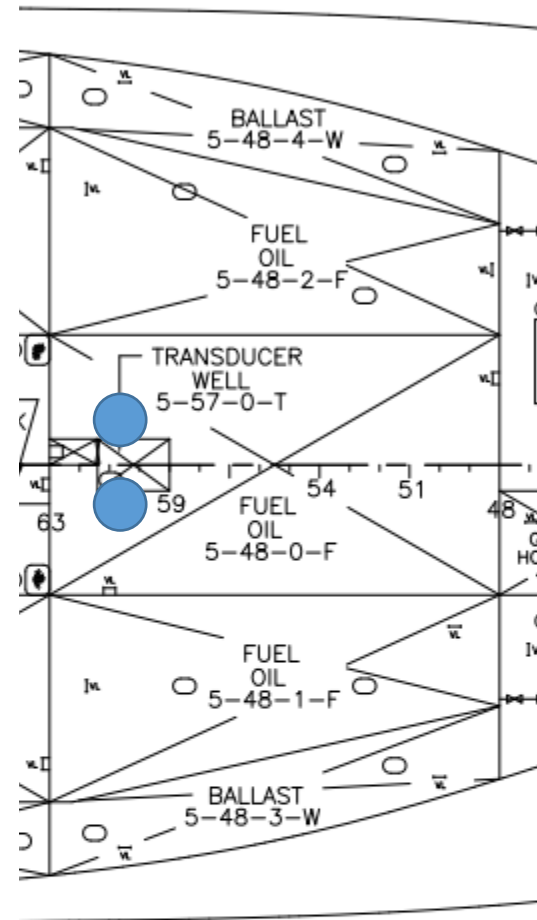
- Single transducers will be removed
- Clean and preserve transducer well interiors
- Replace OS75 and OS150 ADCP transducers
- Install EK80 18kHz and 38kHz fishery sonars

Multibeam:

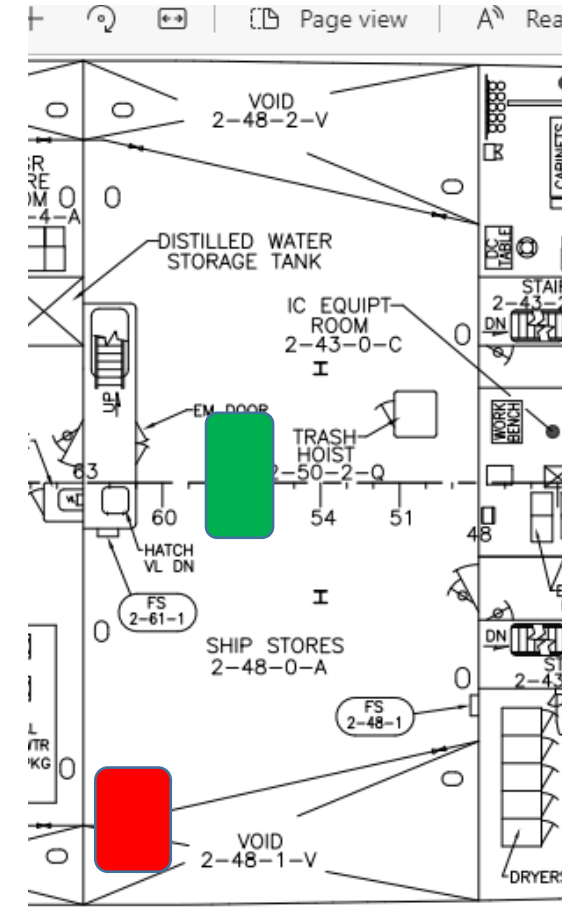
- EM122 RX array replacement
- Modify RX frame to install baffle kit
- Updated survey

Winches:

- Inspection of oceanographic winches/wires



3rd Deck



2nd Deck

Drydock Maintenance



Simrad EK80 Installation

- New 18 kHz and 38 kHz transducers installed in Aux wells
- Kongsberg supported installation and Harbor Acceptance

Multibeam RX Array Replacement

- NAVO surplus EM122 RX transducers installed as a stopgap in order to extend the life of the multibeam until SLEP

ADCP Recapitalization

- New RDI Ocean Surveyor 75kHz and 150kHz transducers
- New custom length transducer cables, terminated onsite
- Sent both deck units to Teledyne for analysis and testing

MICA Transceiver Rack

- Dedicated server rack for sonar transceivers, isolates signal and power from ship infrastructure, reduces EMI
- Centralizes electronics for Simrad EK80 18/38 kHz, Teledyne ADCP 75/150 kHz, Knudsen 3.5/12 kHz, Kongsberg KSYNC
- Two 6 kVA APC 240VAC UPS units

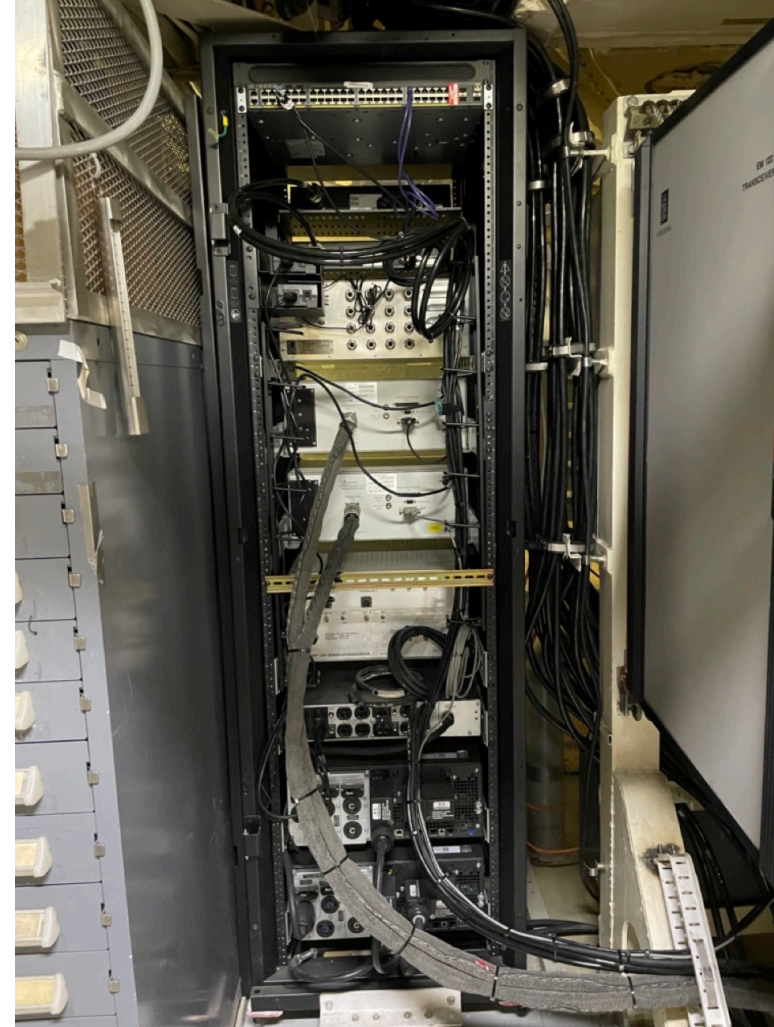


EK80 Transducer Installation

Drydock Maintenance



MICA XCVR Rack Front



MICA XCVR Rack Back

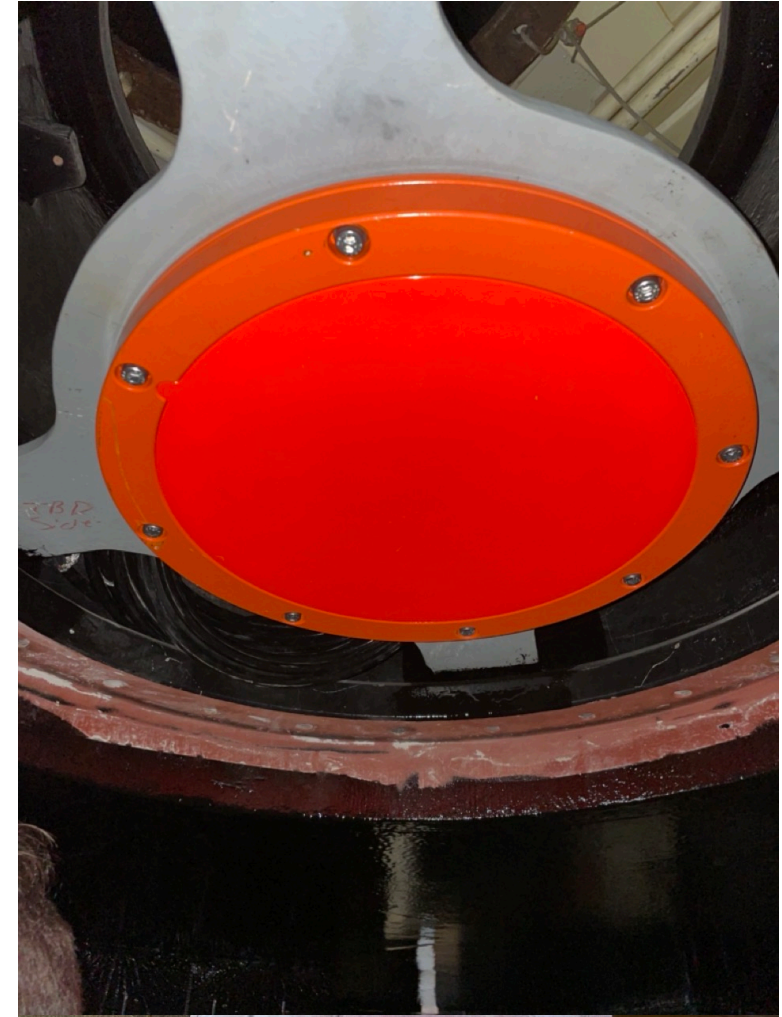
Drydock Maintenance



OS150 ADCP



OS75 ADCP



EK80 38kHz Transducer

Drydock Maintenance



EM122 RX Frame Baffle Kit



EM122 RX Casing Preserved



EM122 RX Array Installed

Dockside Mobilization



Computers and Data Management

- Software and hardware maintenance
- Virtual machine cluster maintenance
- Dedicated EK80 and ArcGIS machines
- Ocean Data Tools (OpenRVDAS, OpenVDM)

Underway Sensors

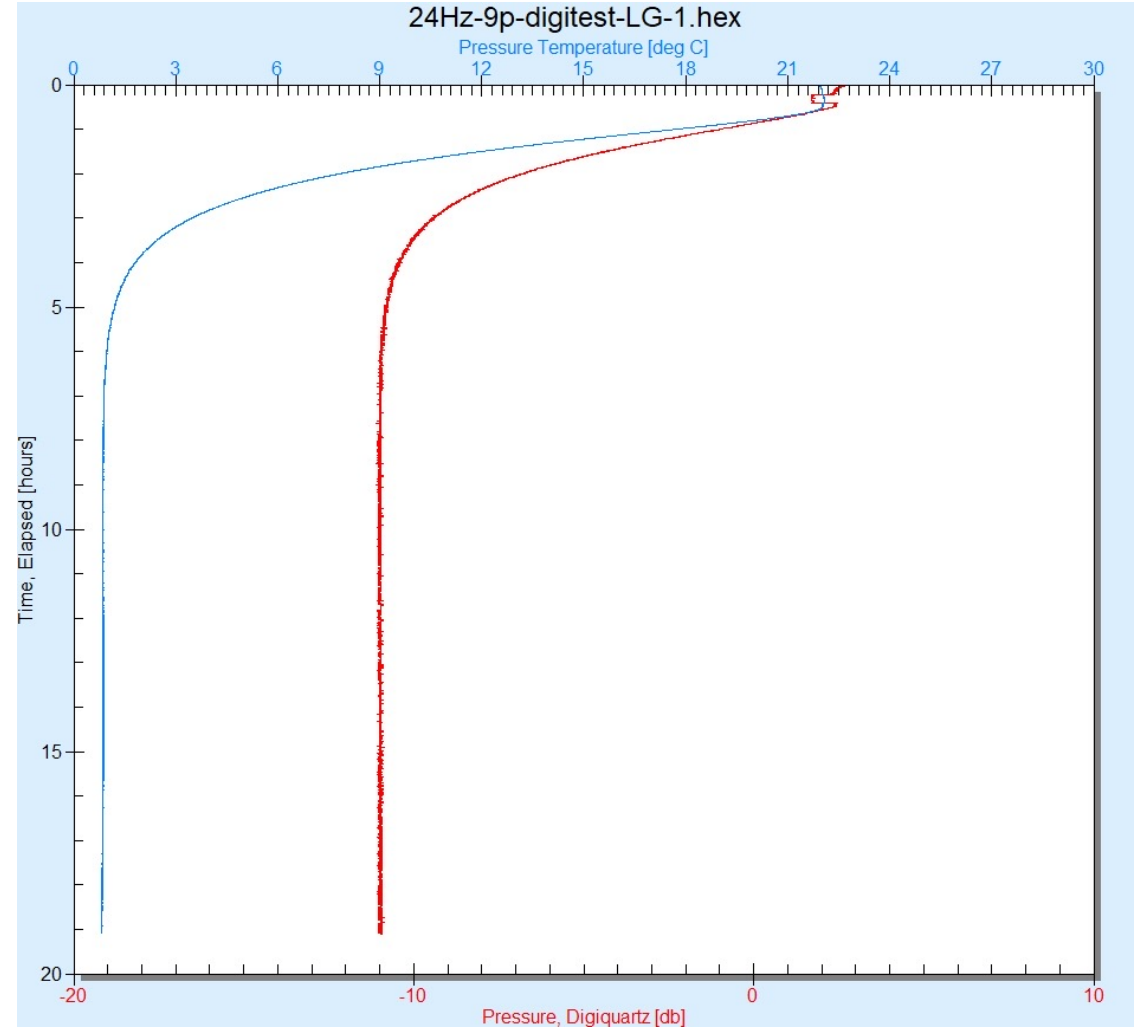
- Seabird RMAs complete, significant delays
- Science Seawater portside and Bio Lab
- Meteorological weather, PAR, radiometers
- PCO2 flow through, Picarro atmospheric - NOAA

Gravimeter

- BGM-3 gravimeter mobilization - PFPE

Sonars

- Transducer testing
- KSYNC interface



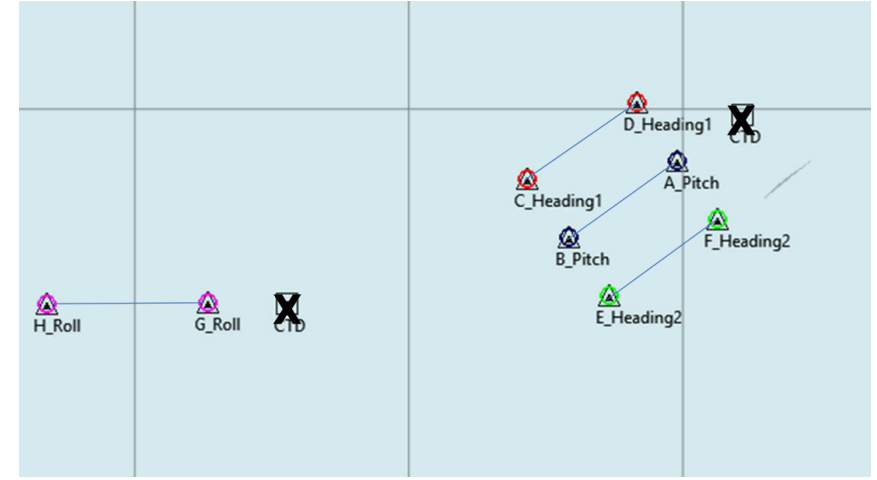
20 hour Pressure Temperature dependence bias

Sonar Calibrations



EM122 Multibeam Patch Test

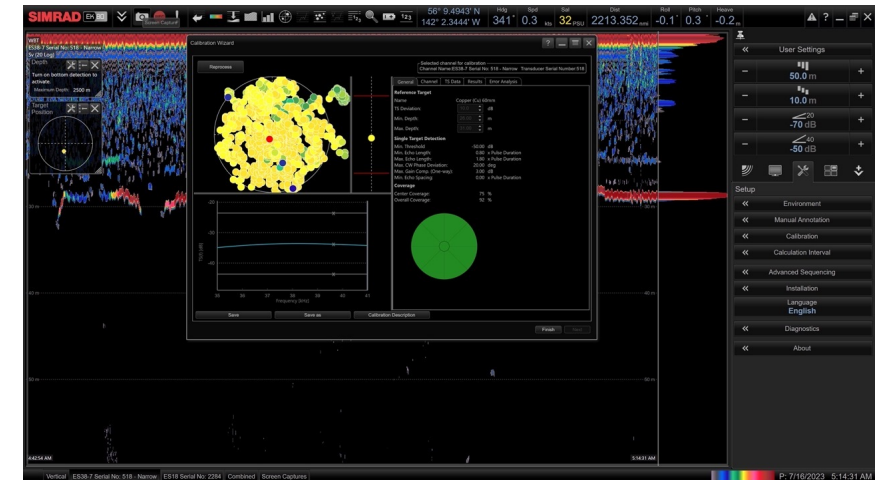
- MAC supported remotely
- Usual site due to bathymetric features and historical data
- First attempt on HLY23TA Vallejo – Seattle transit was not successful due to rough seas
- Second attempt on HLY23TB Seattle – Seward transit was successful
- Seapath and PosMV offsets applied for accurate mapping



Multibeam Patch Test Track

EK80 Calibration – first time on Healy

- Requires calm seas, drifting or at anchor, no thruster activity
- 60 mm copper ball suspended 10 meters beneath transducers
- Three downriggers with remote control provides vertical, fore, aft, port, and starboard positioning
- Approximately 5 hours from start to finish including rigging



EK80 Calibration Complete

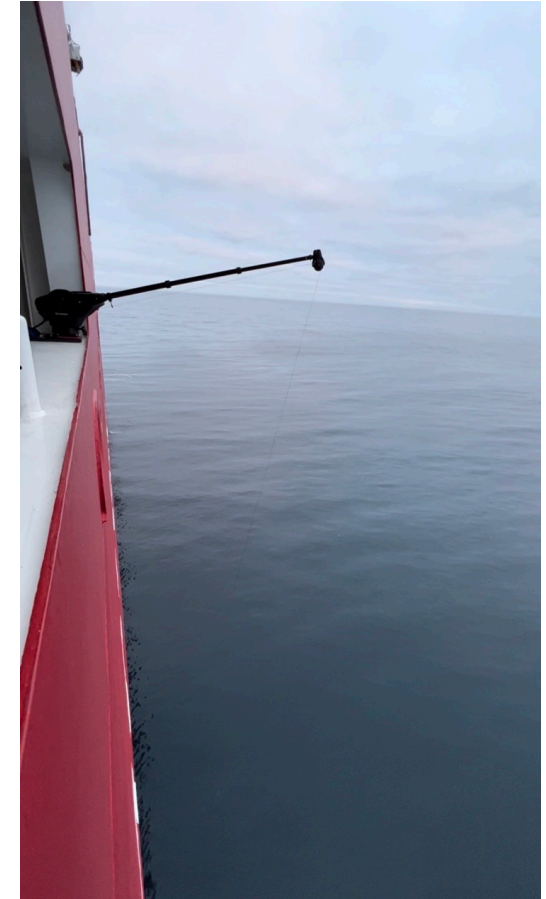
Sonar Calibrations



EK80 Calibration Downrigger



EK80 Calibration Aft Control



EK80 Calibration Downrigger

2023 Cruise Support



Shakedown: 6 technicians

- HLY23TA Vallejo – Seattle: 6 technicians

AMOS: 3 technicians

- Acoustic moorings
- Bathymetric survey
- XBT and CTD profiles

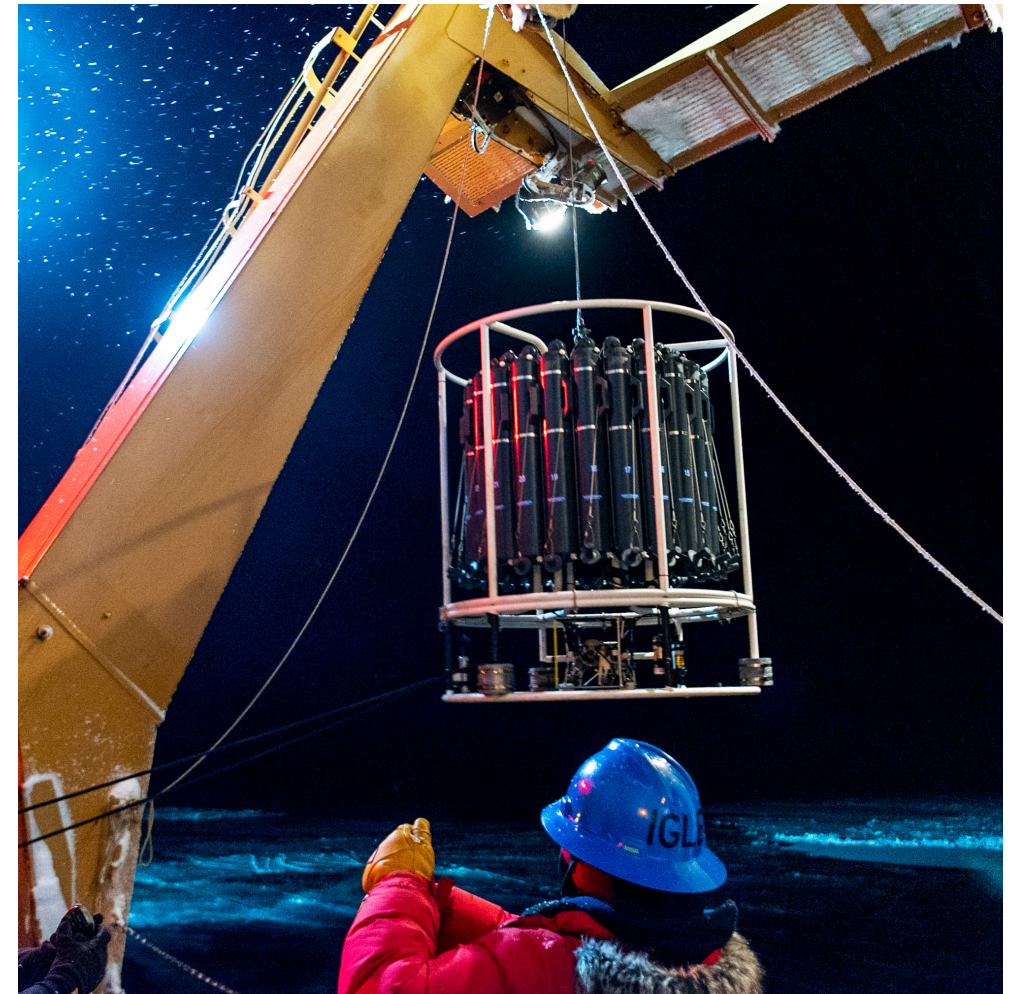
RDC and NABOS: 4 technicians

- Moorings, CTD and underway water sampling
- Healy provides a US based platform for such work
- Coordinate installations of temporary equipment installs
- Provide requested underway data, GNSS position, IMU etc

Transits: 2 technicians

- Collect underway data within EEZ restrictions
- Groom acquisition systems and data management
- Integrate new team members

Demobilization: 4 - 6 technicians



CTD Cast

EM304 30 kHz Multibeam

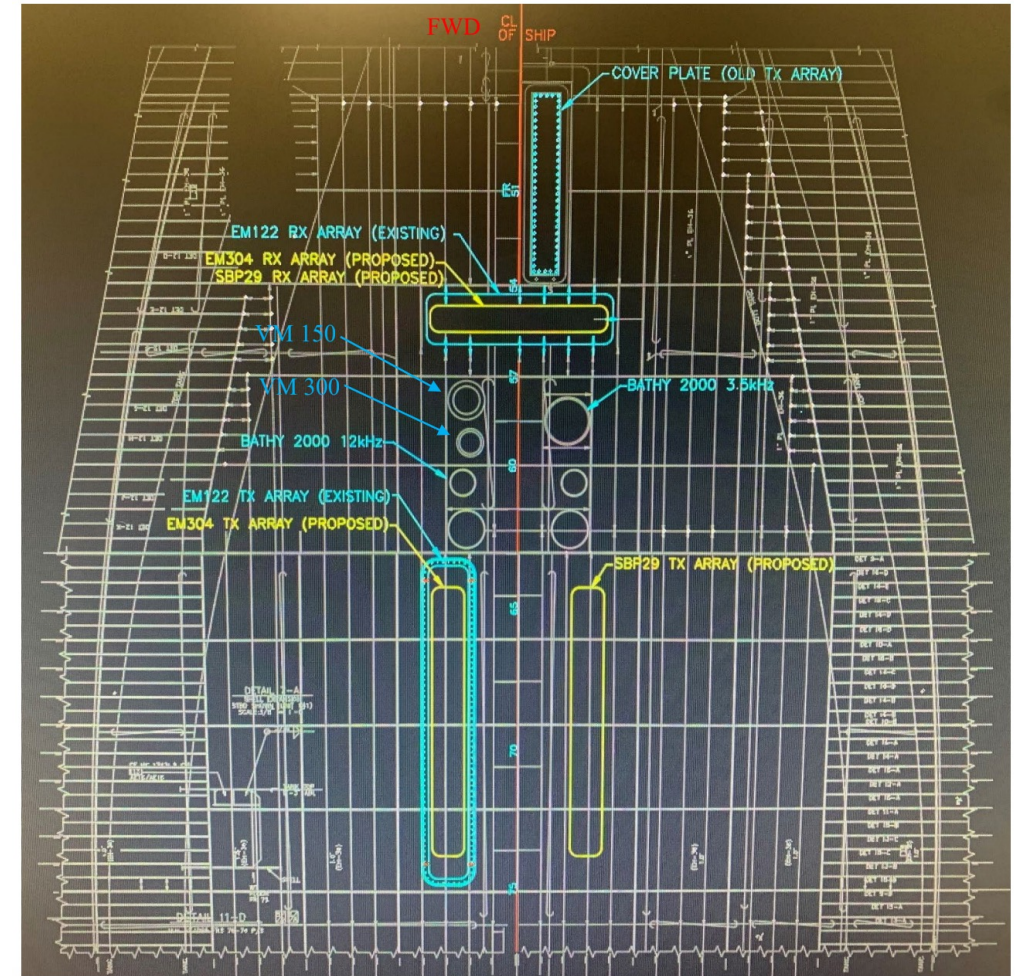
- Replaces EM122 TX and RX arrays, $.5^\circ \times 1^\circ$ system vs $1^\circ \times 2^\circ$
 - Similar footprint within the hull as existing casings
 - Requires two TX units, one RX installed in MICA
- Scheduled for the first drydock maintenance of SLEP

SB29 4-9 kHz Subbottom Profiler

- Replaces Knudsen 3.5kHz and Massa transducer array
- Requires additional hull casing parallel with EM304 TX array
- TRU cabinet installed in MICA
- Scheduled for the first drydock maintenance of SLEP

EM712 Shallow Water Multibeam

- Still being assessed by CG Engineering for feasibility
- Requires significant hull and tank modifications
- Potential for portside installation, parallel with single beam transducers, designed to avoid bubble effects



CGC HEALY-SLEP WI #20
Figure 10: Transducer Arrangement

Cooperative Agreement



Matrix Model: Expired August 2022

- Arctic Coordinator
- Marine technicians from SIO, OSU, and UW
- ARF schedule a significant variable
- CG Objectives often released just prior to season

Proposed Model

- Arctic Coordinator
- Cyberinfrastructure Coordinator
- Systems Integration Engineer
- Lead OSU Sailing Technician
- Lead UW Sailing Technician
- Matrixed technicians from SIO, OSU, and UW
- More robust and flexible for CG scheduling



STARC Technicians at the North Pole 2022
Photo courtesy of Laurie Juranek

*CG and NSF currently discussing support model

Questions and Discussion



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Inside Passage