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

UC San Diego
Oregon State University
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
Drydock Maintenance

MICA XCVR Rack Front

MICA XCVR Rack Back
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
**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

**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
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**
EM304 30 kHz Multibeam
- Replaces EM122 TX and RX arrays, .5°x1° system vs 1°x2°
- 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

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

*CG and NSF currently discussing support model

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

Drydock Maintenance

Dockside Mobilization

Sonar Calibration

2023 Cruise Support

SLEP Update

Cooperative Agreement

Inside Passage