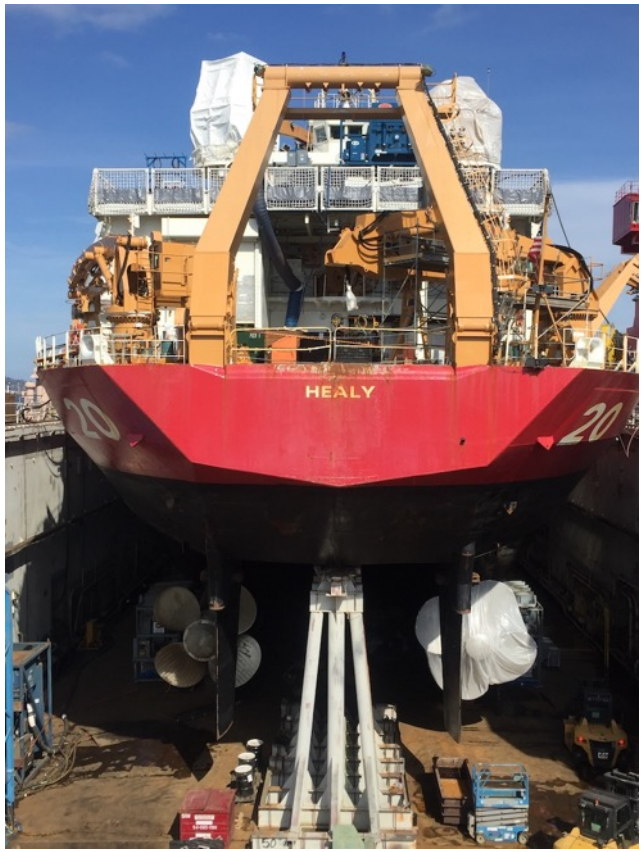
Winter/Spring 2019 – AICC

STARC Report

April 16, 2019

Presented by: Brett Hembrough, Lee Ellett



-Dry Dock and Dockside projects
-Science System Improvements
-Science Planning
-Shakedown
-Icefloe
-GIS Mapping Software e.g., Mapserver
-Local/Remote Network Monitoring
    -VMware Cluster

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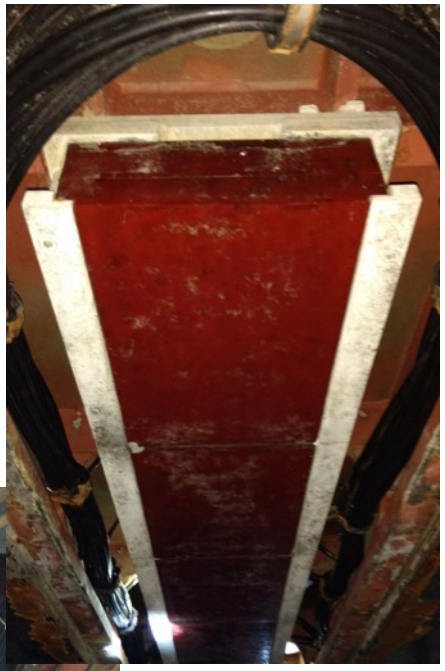
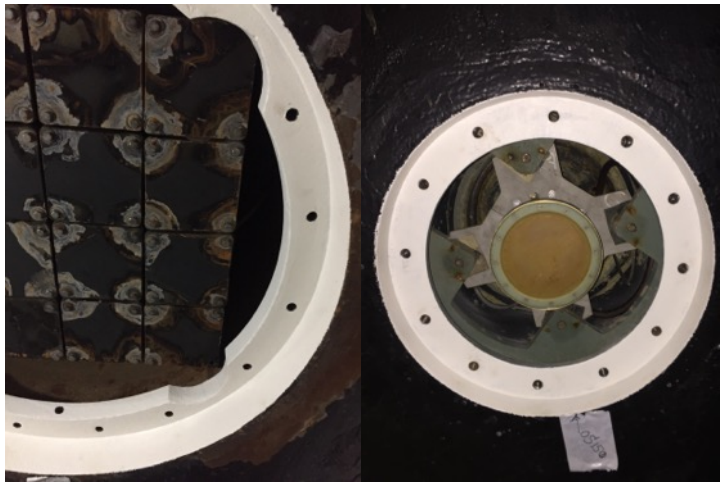
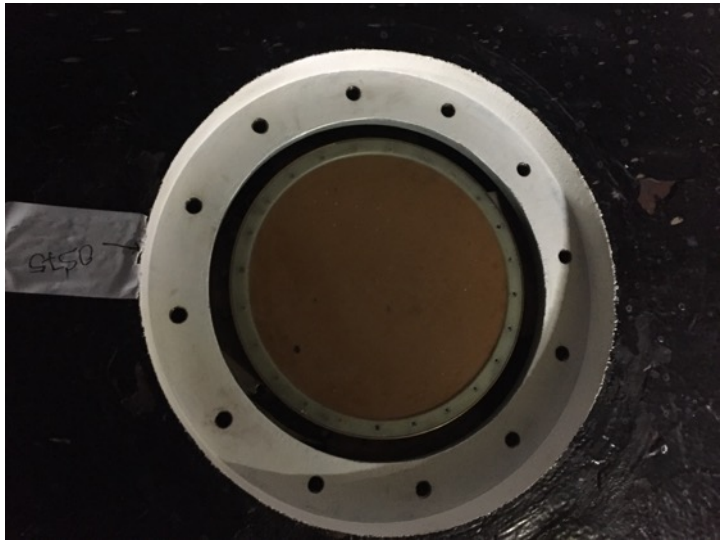
Dry Dock Projects

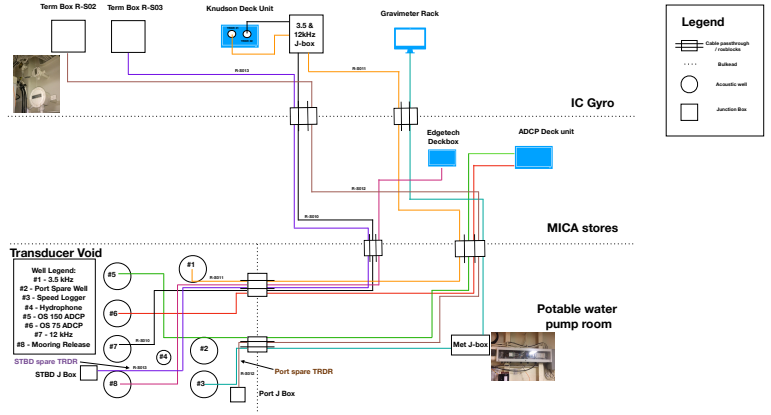
- STARC onsite for transducer work
  - New Ice Windows 12kHz, 3.5kHz, OS75, OS150
    - Inspect and document condition of all wells – including spare wells
- New 12kHZ transducer install (ongoing)
- Multibeam RX/TX windows removed
  - TX windows– good condition, new zincs, paint/preserve edges
  - RX window- good condition, new gasket, new zincs, paint/preserve edges
- Kongsberg site visit – report available

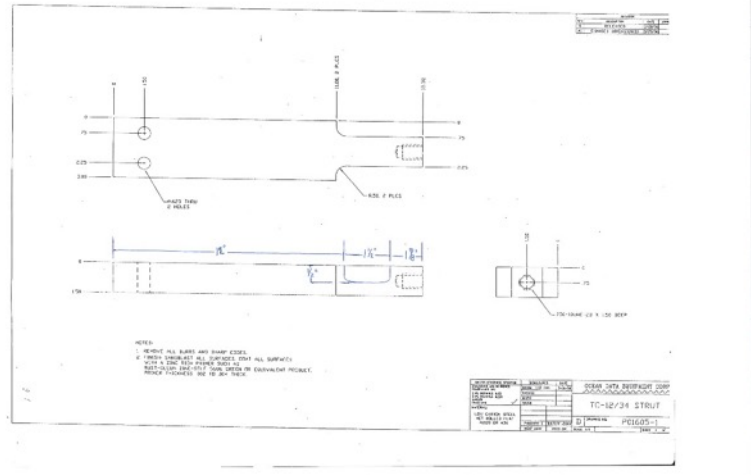


Dry Dock Projects









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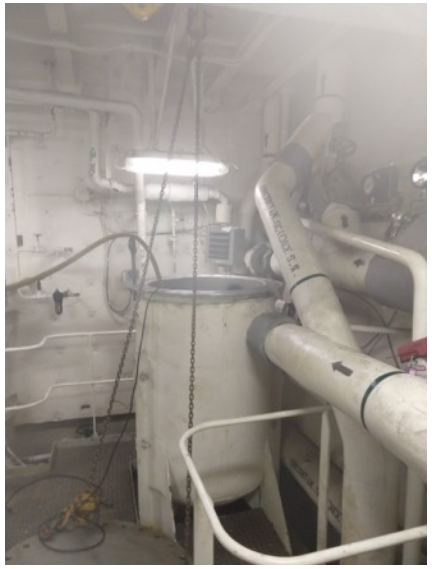
Dry Dock Projects

- Underway seawater plumbing flush
  - Complete hydro-jet and camera inspection from pumps to discharge (including ice separator)
  - Developing procedure as standard work item for future drydocks
    - Also developing in port/dockside procedure for between seasons/cruises



- Computer Rack improvements
  - Rack to Rack patch cables expanded
- Video (HDMI) display over IP project planning
  - Display upgrades to Main, Computer, Future Labs and Bridge

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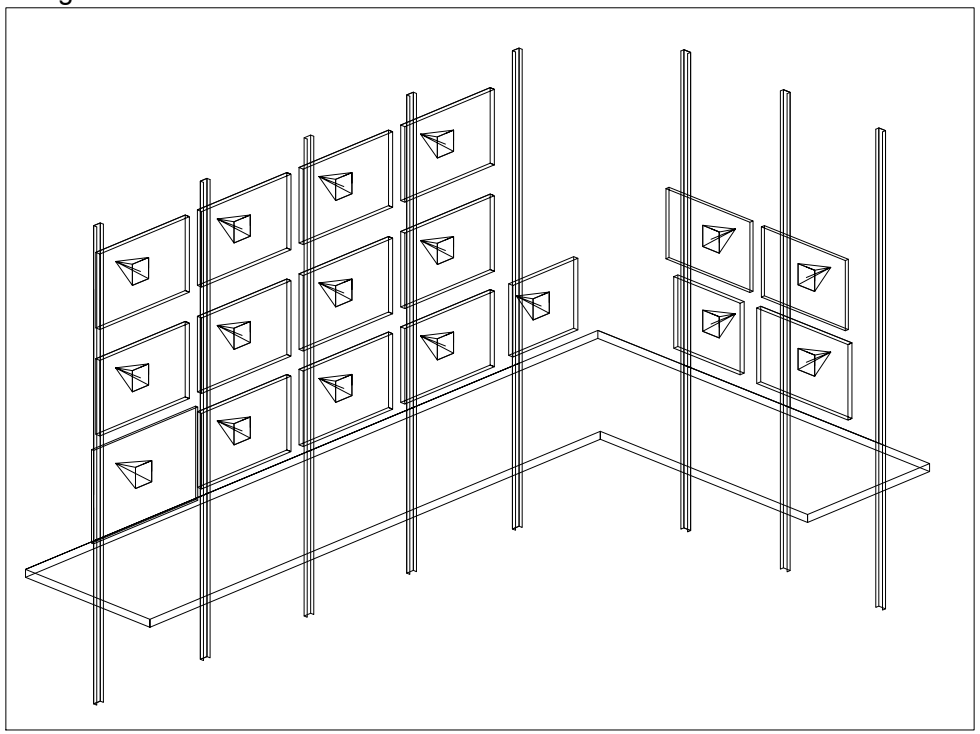
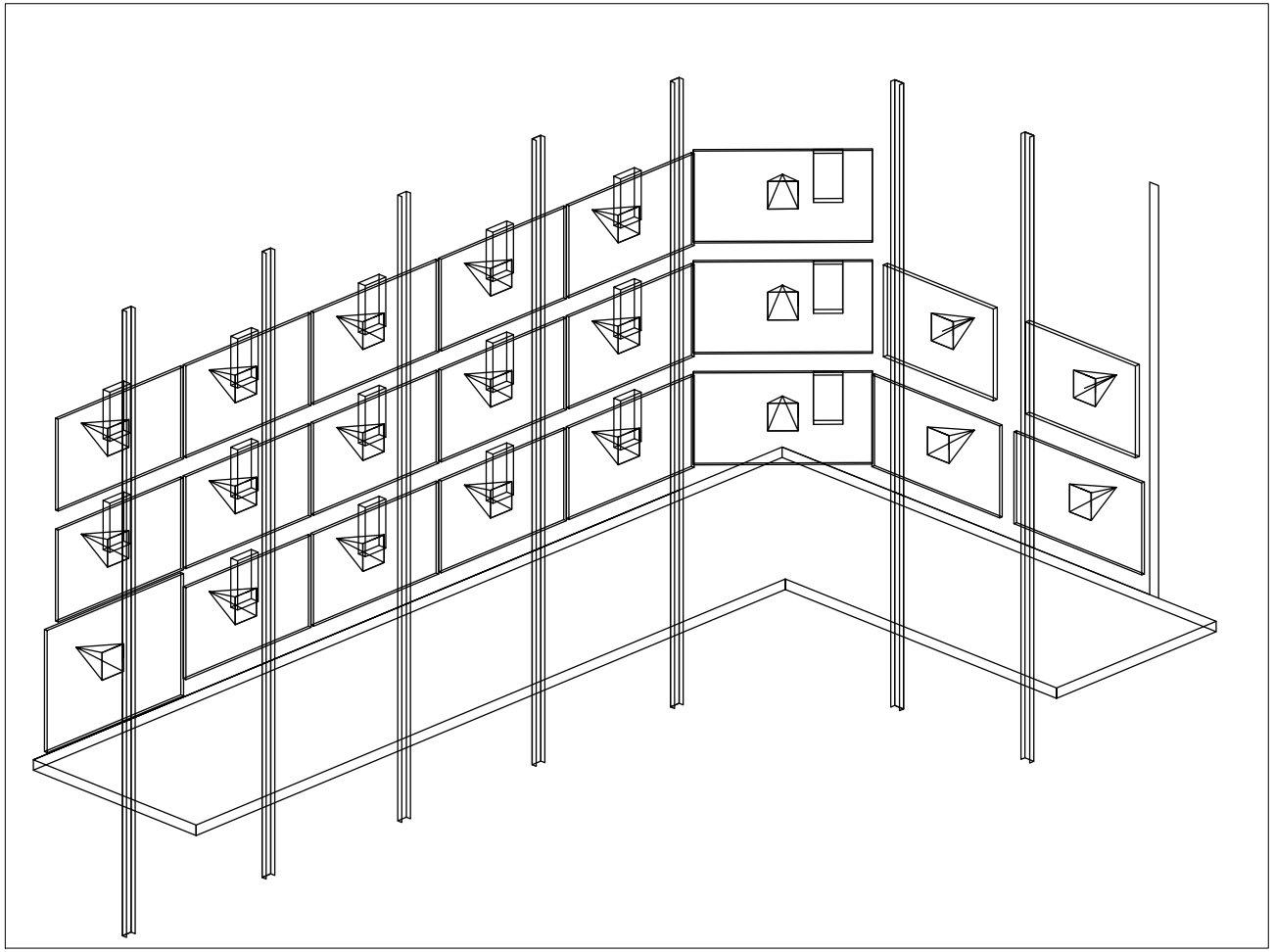
Display improvements

Computer Lab

Existing monitor wall



Proposed Healy Computer Lab Monitor Wall



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Proposed Display Improvements

- High resolution display and space saving design
- Easily change display options in multiple locations
  - No need for rewiring or display extenders to change display
- Multiple systems displays on single large screen (Main and Future Labs)
- Long term> broadcast any system display over network to any science location.
- More options for Bridge displays

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Other News

- New Sippican XBT deck unit (LMC16)
  - previous deck unit had packet loss problems on network, identified by InterMapper monitoring prior to field season
- Networked all STARC UPS units – monitoring and trends
  - Notifications when on battery power, etc
- Continuing use of documentation and ticket tracking for SOPs and project management (JIRA and Confluence)
- Coordinated with Healy MSTs and SKs to transfer Polar Star/Sea science equipment to Healy/STARC inventory
  - Deeper spares inventory
  - Reduced cost for new/replacement sensors
    - Refurbish and calibrate vs. buy new

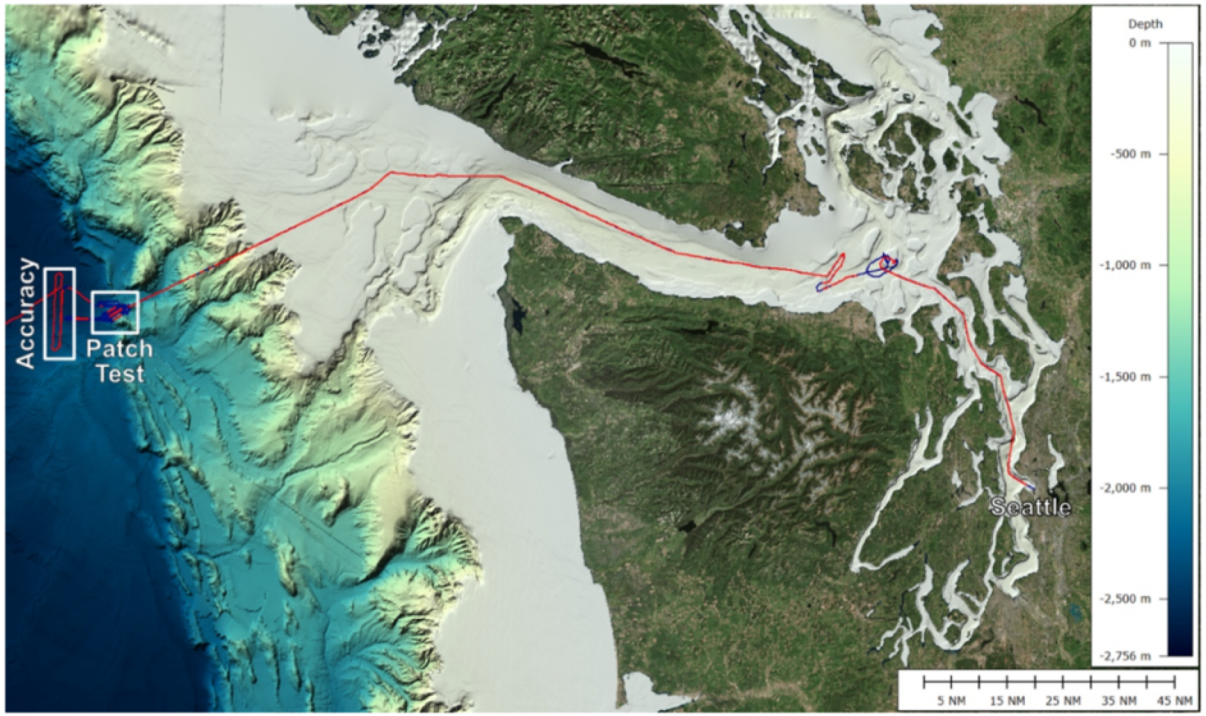
Upcoming Dockside Projects

- pCO2 site visit & gas bottle loading
- Milli-Q service call
- Gravimeter Re-install (possible site visit)
- Reinstall all MET and SSW sensors, etc.

Shakedown

Seattle to Seattle

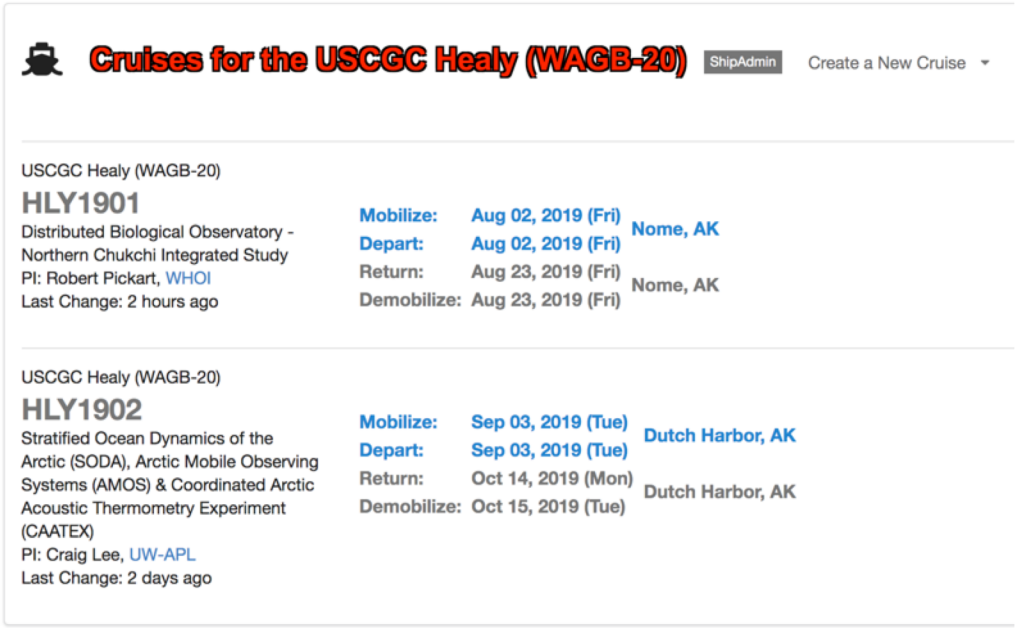
- CTDs
- ADCP Survey
- PosMV Calibration (GAMS)
- Winch testing
- XBTs
- Multibeam



Cruise Planning

Ongoing use since Jan/Feb ‘19

- Monthly telecon for each mission
- UNOLS Cruise Planner
  - In use for 2019
  - https://cruiseplanner.unols.org/
  - Questionnaire and Medical forms updated
  - Select Icefloe info uploaded to Cruise Planner
  - Contact STARC for access to review
- Icefloe.net links to UNOLS Cruise Planner
- https://sites.google.com/ucsd.edu/icefloe/home/cruise-planning



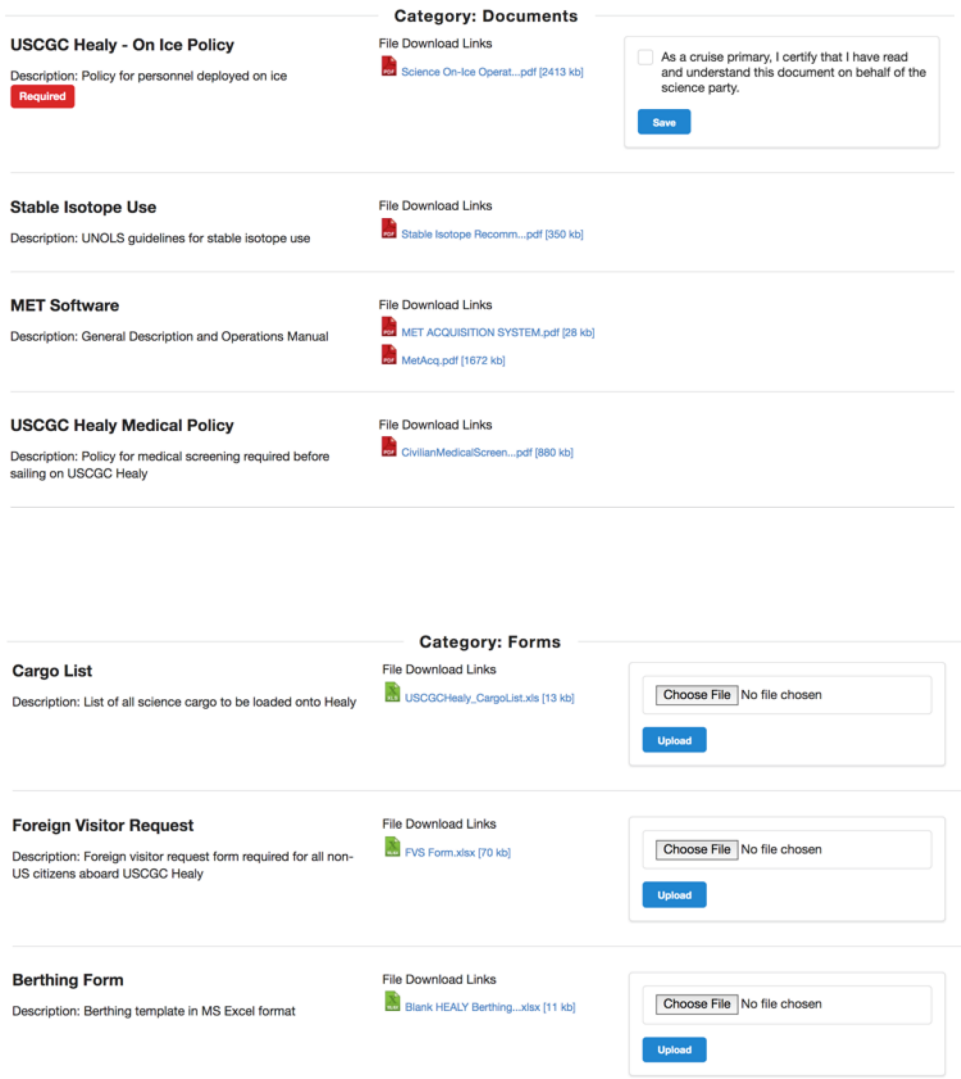
STARC works closely with the USCGC Healy officers and crew to plan and coordinate each science mission. This process begins far in advance of the Science Cruise and continues until Healy departs for the Arctic field season. Station plans, equipment requests, and overboard operations are discussed in detail to ensure an efficient and safe mission.

The UNOLS Cruise Planner is the primary tool for science mission planning and is supplemented by regular tele-conferences or ship visits as needed.

The details of each Science Mission are uploaded to the Healy section of the UNOLS Cruise Planner. Access to the Cruise Planner and content is **only** provided to the Science Party, Science Collaborators, STARC and USCGC Healy. To view cruise details a login is required and access is granted at the discretion of the Chief Scientist.

If you have questions please contact the Arctic Cruise Coordinator at Scripps Institution of Oceanography or the USCG Science Liaison

Cruise Planning



Category: Drawings

Healy Sensor Locations

Description: Locations of Meteorological, Underway Science Seawater, Navigation, and Sonar

File Download Links

Shipboard Science Dat...pdf [1490 kb]

A-Frames

Description: Drawings of aft and starboard a-frames

File Download Links

A-Frames.pdf [3335 kb]

Deck layout

Description: Working deck bolt pattern and layout

File Download Links

Healy_Fantail.pdf [1811 kb]

Overhead View

Description: Overhead view of decks

File Download Links

Overhead View.pdf [485 kb]

Science Seawater Plumbing

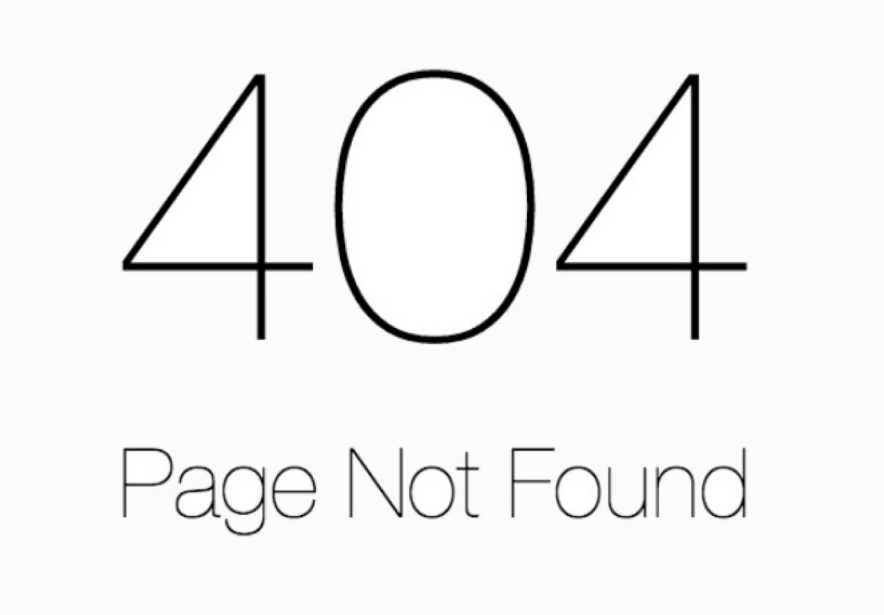
Description: General drawing of SSW piping from intake to lab spaces

File Download Links

SSW System Drawing.pdf [52 kb]

Icefloe.net

- Icefloe.net
  - Unexpected server hardware failure at hosting service in Jan 2019
  - Currently unable to migrate to newer server hardware due to Drupal version incompatibility.
  - Homepage was visible, but all links were broken
  - Given complexity of site and the out dated webtools used with Drupal, an upgrade of the site as is not feasible.
  - More efficient to rebuild and link to USCG PacArea website and UNOLS Cruise Planner.



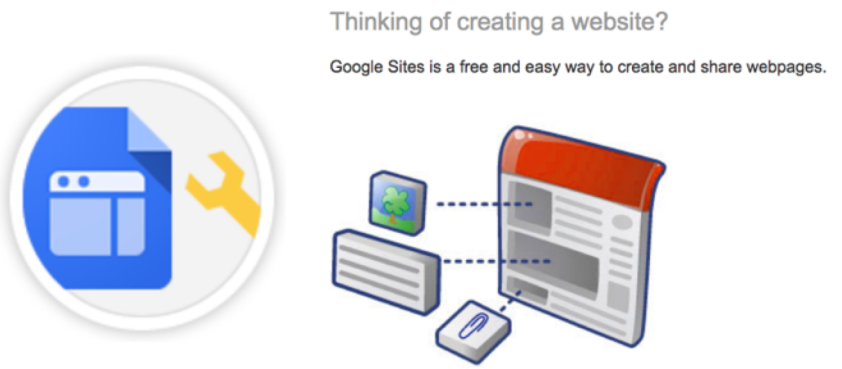
Icefloe.net

Rebuilding efforts in progress !

1. Prior to site failure the goal was to transition content to Atlassian Confluence site
2. Once recovery options were exhausted a Google site was put into place
   - Easier to edit content and collaborate
   - Improved layouts, mobile and tablet compatible

- https://sites.google.com/ucsd.edu/icefloe/home

  www.icefloe.net now **redirects** to new Google site



The new Google Sites

As a G Suite administrator using the new Google Sites, you and your organization can easily create and publish internal team sites, project sites, event sites, or other internal sites. No technical skills are required and you can collaborate with others to create and refine Sites, just like other Google Docs.

Icefloe: Then….

USCG ICEBREAKERS
UNITED STATES COAST GUARD SCIENCE OPERATIONS

Search this site SEARCH

Home | Icebreakers | Cruise Planning | Science Support | Data & Reports

STARC & ESU

Ship-based Science Technical Support in the Arctic (STARC)

Funded by the National Science Foundation, STARC is a collaboration between the Shipboard Technical Support (STS) department at Scripps Institution of Oceanography (SIO) and the Marine Technician Group (MTG) at Oregon State University (OSU). Both OSU/MTG and SIO/STS have a long history of providing comparable support on research ships in the U.S. academic fleet.

The mission of STARC is to plan, coordinate and deliver science technical support onboard research ships in the Arctic. Since a portion of NSF funded shipboard research in the Arctic occurs on board the USCG icebreakers HEALY and POLAR STAR, STARC coordinates with NSF, USCG and the US academic community to provide for the operation, maintenance and upgrade of science equipment installed on these two ships. Technical support for non-NSF-funded cruises on HEALY is provided by STARC through a reimbursement process that is managed by NSF through agreements established with each funding agency. Please contact Dr. Frank Rack (NSF Office of Polar Programs, Arctic Research Support and Logistics) at (703) 292-2684, or email <frack@nsf.gov> for more information.

The main contact for STARC is Brett Hembrough at Scripps Institution of Oceanography. He can be reached at (858) 822-6912 or email bhembrough@ucsd.edu

- Overview
- STARC & ESU
- Science Systems

Icefloe: ….. and Now

THIS SITE IS CURENTLY UNDER CONSTRUCTION !

Please check back soon as we continue to add more content.

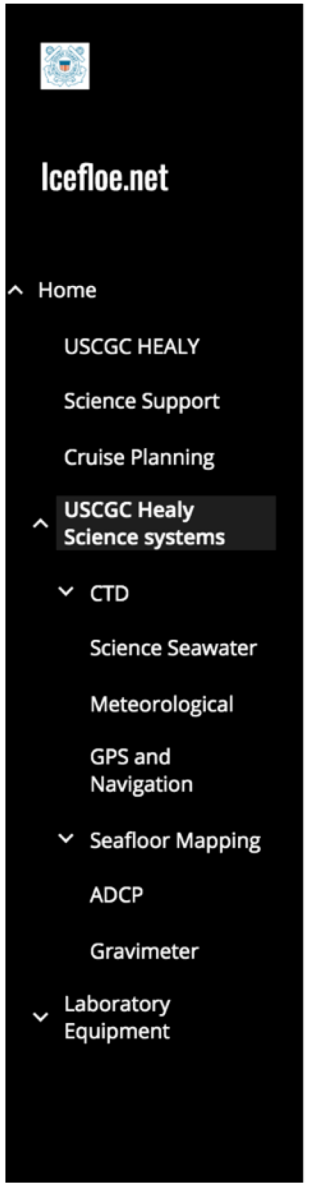
USCGC HEALY

USCGC *Healy* (WAGB-20) is the United States' largest and most technologically advanced icebreaker as well as the US Coast Guard's largest vessel. She is classified as a medium icebreaker by the U.S. Coast Guard. She is homeported in Seattle, Washington and was commissioned in 1999. On September 5, 2015, USCGC *Healy* became the first unaccompanied United States surface vessel to reach the North Pole.

Click her to visit the USCGC Healy hompage for more information.

You can also follow Healy on Facebook @CGCHEALY

Icefloe: ….. and Now



CTD

Conductivity, Temperature and Depth

SCIENCE SEAWATER

Underway Flow-through System

METEOROLOGICAL

GPS AND NAVIGATION

Icefloe: ….. and Now

CTD

CTD Sensor Information | Niskin Bottle and Rosett...

Conductivity, Temperature and Depth

A Profiling CTD measures water parameters as it travels through the water, whether lowered over the side of a ship with a winch to take measurements of a vertical column of water or integrated with an autonomous vehicle or glider. Common to all Sea-Bird Profiling CTDs:

- Purposeful designs built to perform under the unique dynamic conditions found on varying measurement platforms
- Pumped and ducted constant flow for matched temperature and conductivity response
- Measurements are made on the same sample of water with a predictable delay and predictable flow effects
- Aligning and coordinating measurements done with software or (for some models) automatically

Profiling CTDs can also be deployed in many ways other than being lowered and raised from a ship. They can be integrated with an autonomous vehicle like an ROV (Remotely Operated Vehicle), a glider, or an Argo float that drifts with the currents. The type of vehicle and characteristics of its use dictates the CTD design that will provide the best data; CTDs are not one-size-fits-all instruments, if you are interested in good data. Because some of these CTDs are deployed for an extended period of time (3 to 5 years for an Argo float!), they are subject to fouling – the growth of marine organisms on and inside the sensors. Fouling is more common in warm surface waters. Sea-Bird uses EPA-approved anti-foulant devices to keep the inside of the sensors clean, so that fouling will not affect the measurements.

CTD SENSORS

STARC works closely with each Science Party to determine their CTD requirements and select the appropriate sensor suite. During the Cruise Planning process a questionnaire is filled out by the Chief Scientist identifying the STARC sensors they wish to use and specifying any additional instrumentation they would like to integrate into the CTD electronics. Below you will find information on the basic sensors provided by STARC on USCGC Healy.

SBE 32 - Water Sampler

SBE911 Plus - CTD Profiler

SBE 5T - Pumps

SBE4C - Conductivity

SBE3S - Reference Temp

SBE3 Plus - Temperature

SBE 43 - Dissolved Oxygen

C-Star Transmissometer

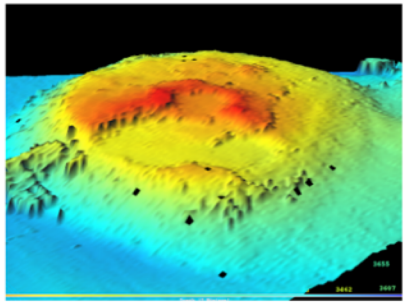
Icefloe: ….. and Now

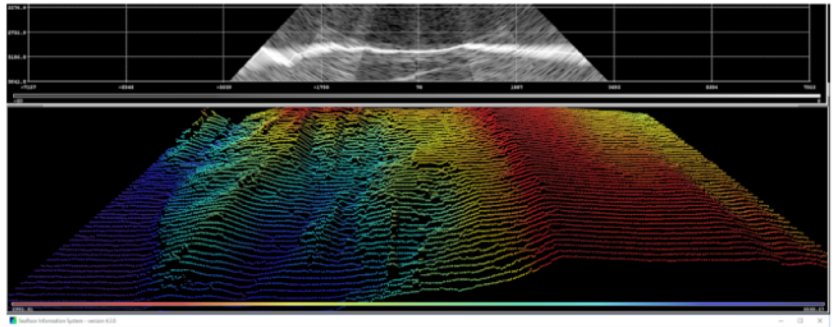
SEAFLOOR MAPPING

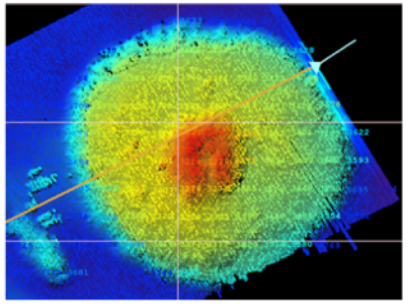
Healy is equipped with a Kongsberg EM-122 Multibeam Echosounder allowing for 3D mapping of the seafloor.

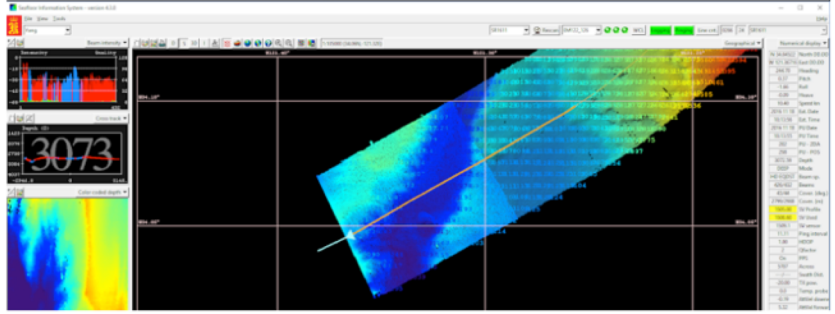
Not only can the multibeam create a map of the ocean bottom and terrain features by the Knudsen CHIRP 3260 Echosounder can penetrate into the seafloor sediment layers to determine what type of material the seabed consists of.

Multibeam Data Collecting

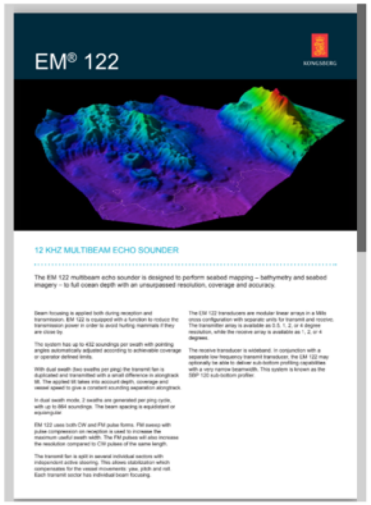








KONGSBERG EM122



Seafloor Mapping

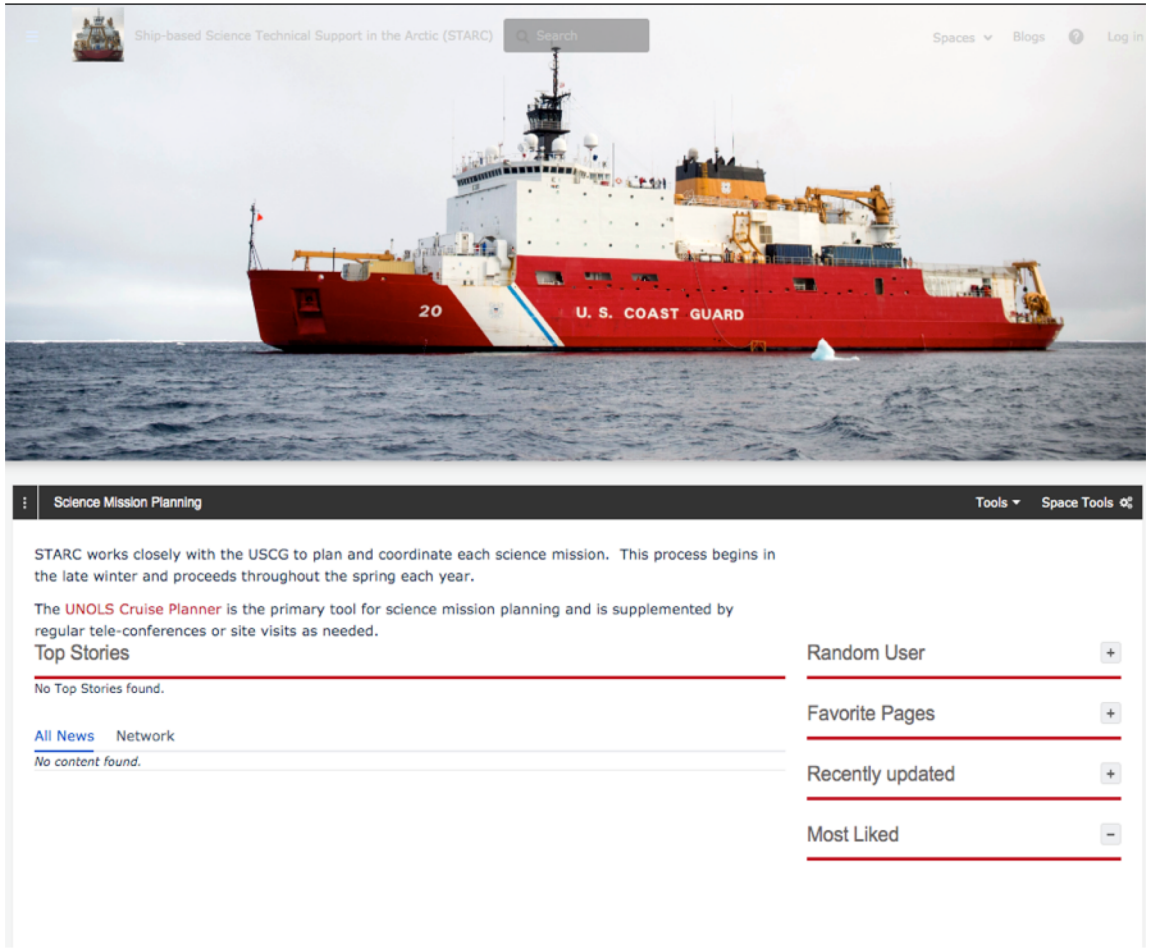
The EM 122 Multibeam Echosounder (MBES) is designed to perform seabed mapping – bathymetry and seabed imagery – to full ocean depth with an unsurpassed resolution, coverage and accuracy.

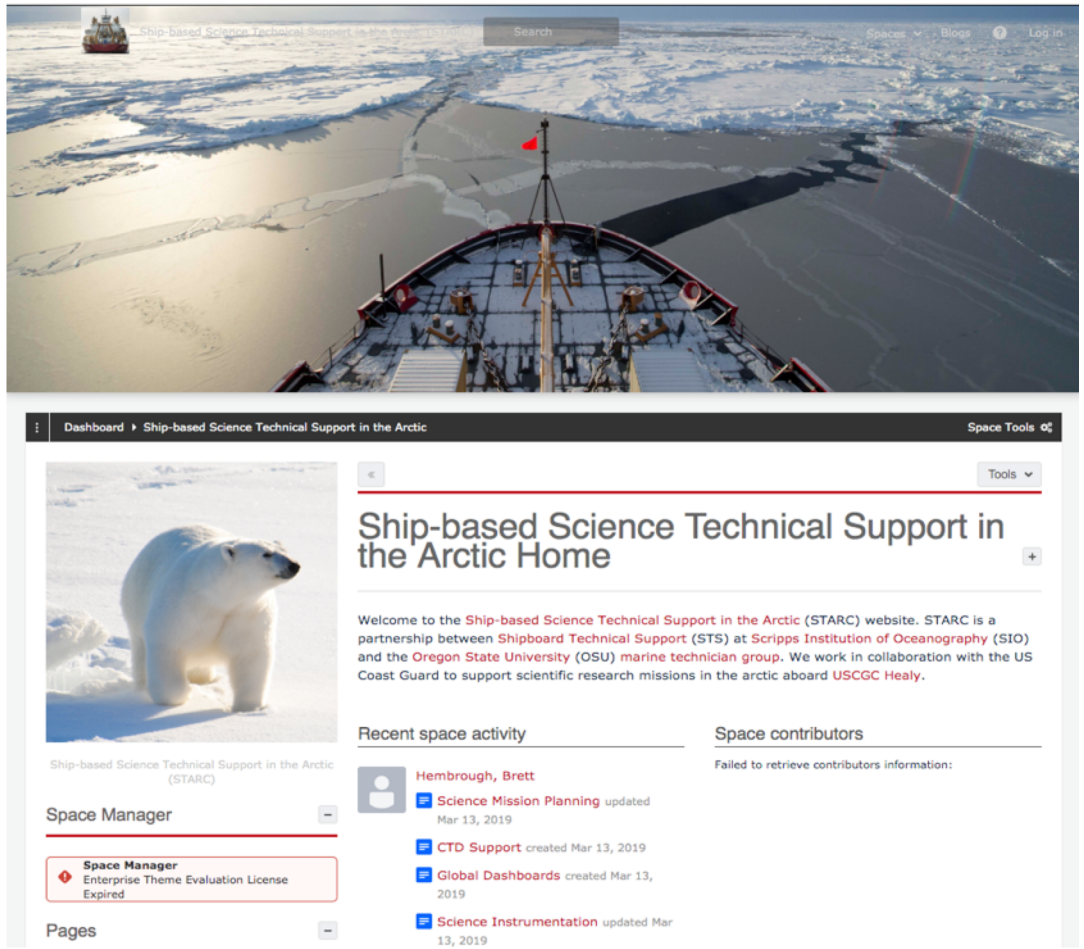
Icefloe: Hosted on Confluence

Continue icefloe.net using Atlassian Confluence

- Google sites is an interim measure due to Icefloe server crash
- Confluence structured documentation approach and tools offer more solutions and sustainability
- Confluence is already part of SIO and OSU work flow
- Hosted locally at SIO, control over server and data
- Site content can be exported
- Not dependent on Google features or Google App for education
- Atlassian Confluence is a software package we are already purchasing

Icefloe: Hosted on Confluence





GIS Mapping Software in Use

2018 Use of QINSY for Mapserver functions

- Display of science stations/tracks
- Display NOAA Charts and Coastlines
- Viewable on network via 5sec refresh screengrab
- Ice imagery updated daily: 24-72hr color scheme
- Separate display for Bridge (view and control)
- Real time and selective historic Multibeam display

GIS Mapping Software in Use

Limitations of QINSY observed in 2018

- Optimized for hydrographic survey op areas
- Limited # of ice images able to be displayed
- Does not overlay underway data (sea surface temp, etc.)
- Process to display varied ice imagery/remote sensing / models still under development

GIS Mapping Software Under Consideration

Commercial Solutions

1. Drift and Noise & Werum (Germany) – ice imagery and MapViewer (2018 trial)
2. Earth Analytics – (US based) – Custom GIS developer

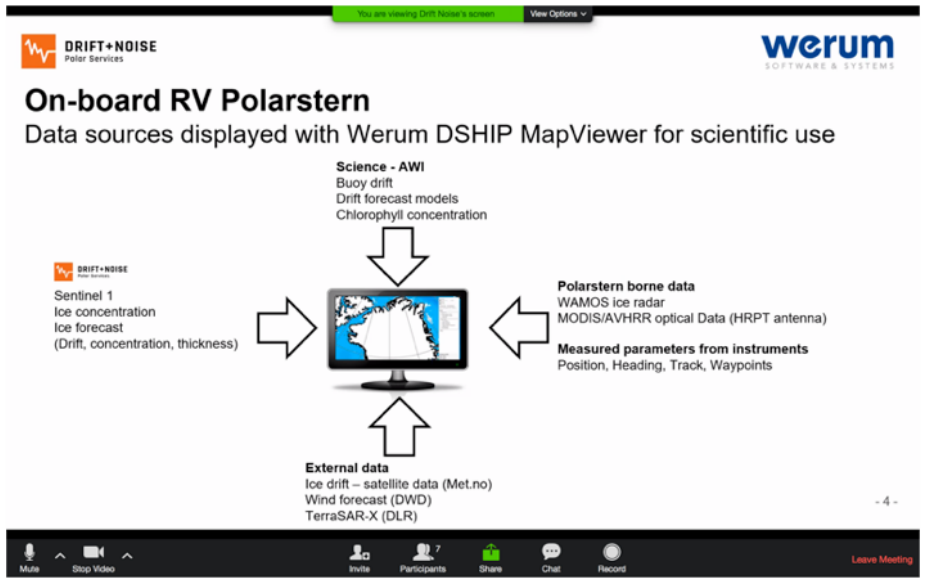
Challenges:

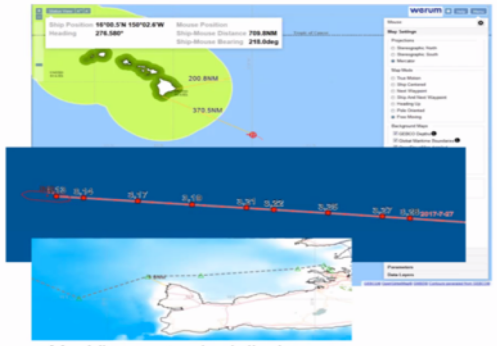
- No ”off the shelf solutions”
- Long term support
- These software solutions typically require a GIS Specialist FTE
- Subscription to custom ice imagery products and datasets

GIS Mapping Software Under Consideration

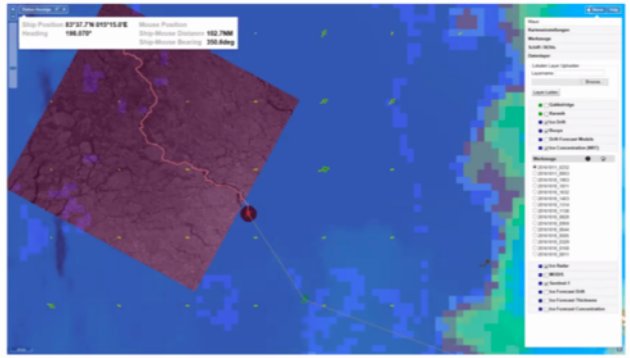
Drift and Noise - Werum

1. Subscription service providing curated ice imagery based on cruise dates and operations area
   - Sentinel 1, Modis, custom models, projected ice drift, etc.
   - Option to integrate RADARSAT images and other custom layers in future
2. Combined with Werum Software
   - DSHIP- instrumentation integration display and recording
   - MapViewer - user toggle on/off layers
   - Auto ice imagery import from Drift and Noise server

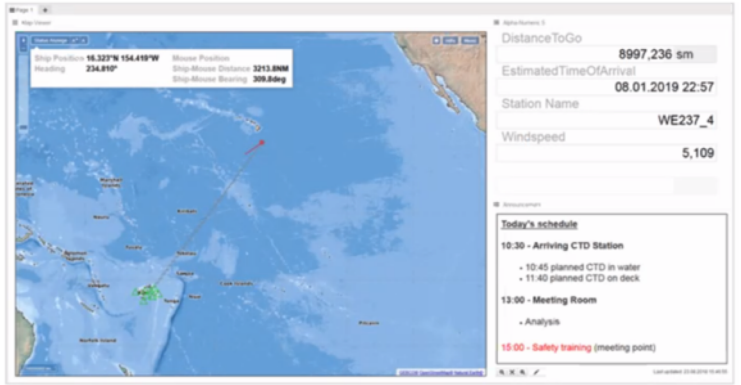




- MapViewer standard displays
- Display of measured values from scientific instruments or buoy tracks (from DSHIP)



- Drift+Noise data handled by MapViewer NRT-Extension

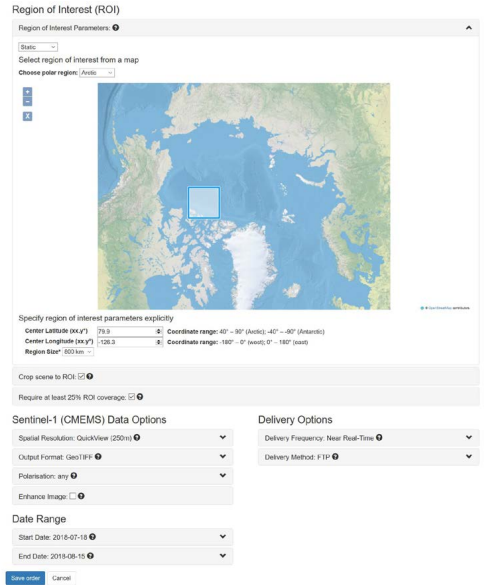


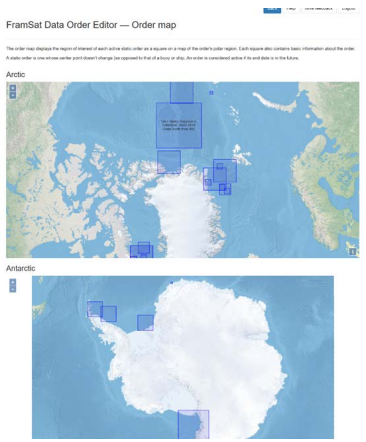
GIS Mapping Software Under Consideration

Drift and Noise – Werum (Germany)

DRIFT & NOISE

Image order system





Easy setup

We carry out the initial installation and configuration of individual customer setups. In the sequel, the customer may modify or enhance configuration and setup as required to meet changing needs.

Minimized follow-up efforts

DSHIP is designed for continuous and unattended operation. Owing to the generic interface technology, it is easy for administrators to integrate new devices. So, DSHIP minimizes follow-up costs as no additional software or licenses are required to do it.

Long-term maintenance

Werum provides maintenance and support services covering remote analysis and updates as well as periodic inspections.

DSHIP features at a glance

- Customer-configurable instrument connection and parameterization
- Data distribution with NMEA telegrams on board
- Data dissemination via e-mail
- Definition of derived parameters
- User-definable display configuration
- Unattended operation and system resilience
- Data export and long-term 24/7 access to shore-based data centers

DSHIP is under continuous development driven by requirements from the scientific community.

GIS Mapping Software Under Consideration

Werum – DSHIP in use on other R/Vs


RV Meteor


RV ARA Austral


RV Polarstern


RV Elisabeth Mann Borgese


RV Alkor


RV Heincke

DSHIP


RV Poseidon


RV Maria S. Merian


RV Mya II


MARNET DM


RV Uthörn


DRV Sonne


FRV Scotia


FRV Alba na Mara


RV ISABU

GIS Mapping Software Under Consideration

Earth Analytic – Ocean Smart

- Scheduling upcoming telecon(s) to discuss needs and features for STARC/Healy
- Experienced GIS / ESRI based custom mapping products for Gov and private sector
- Report findings to AICC at next meeting

EARTH ANALYTIC

EARTH ANALYTIC specializes in science-based design, implementation, and management of geographic information systems for energy and conservation projects.

VMware Cluster

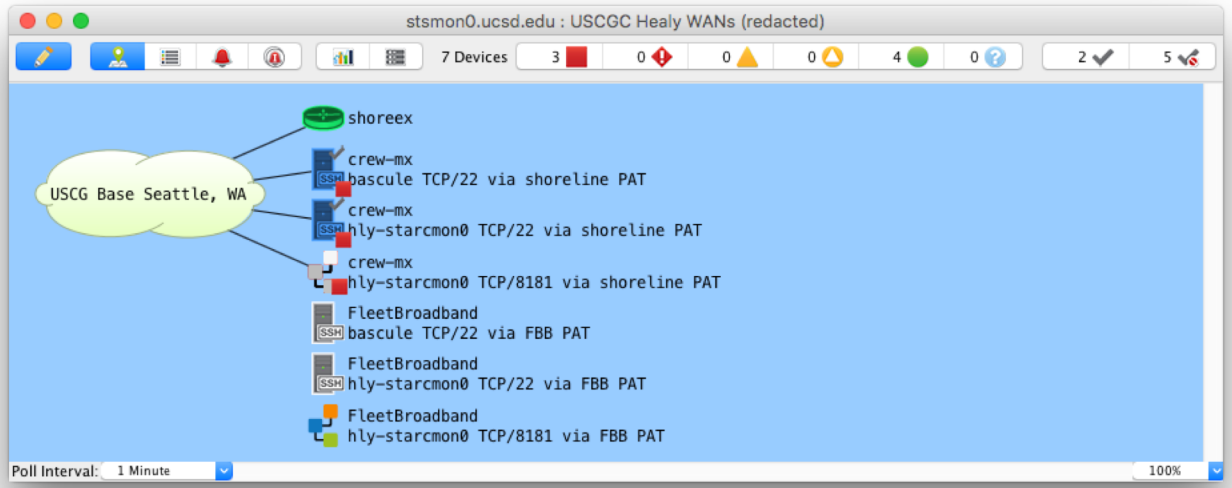
Dell enterprise grade servers

- VMWare
  - More resilient than traditional OS installs (i.e. primary and backup computers)
  - Backup image of operating systems
  - Easy recovery in case of VM/OS crash
  - Hardware under warranty, with defined lifecycle maintenance plan
- Capable of hosting GIS software (e.g. Mapserver)
- Auto-install scheduled updates and patches

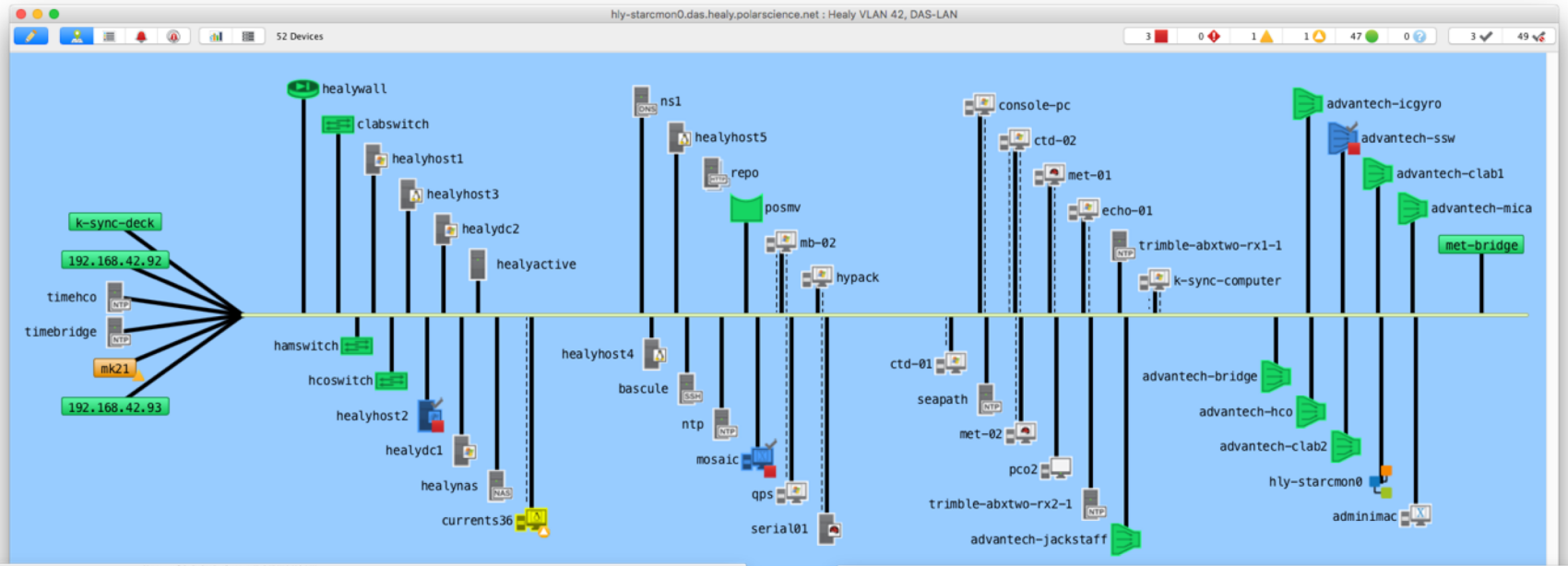
Network Instrumentation Monitoring

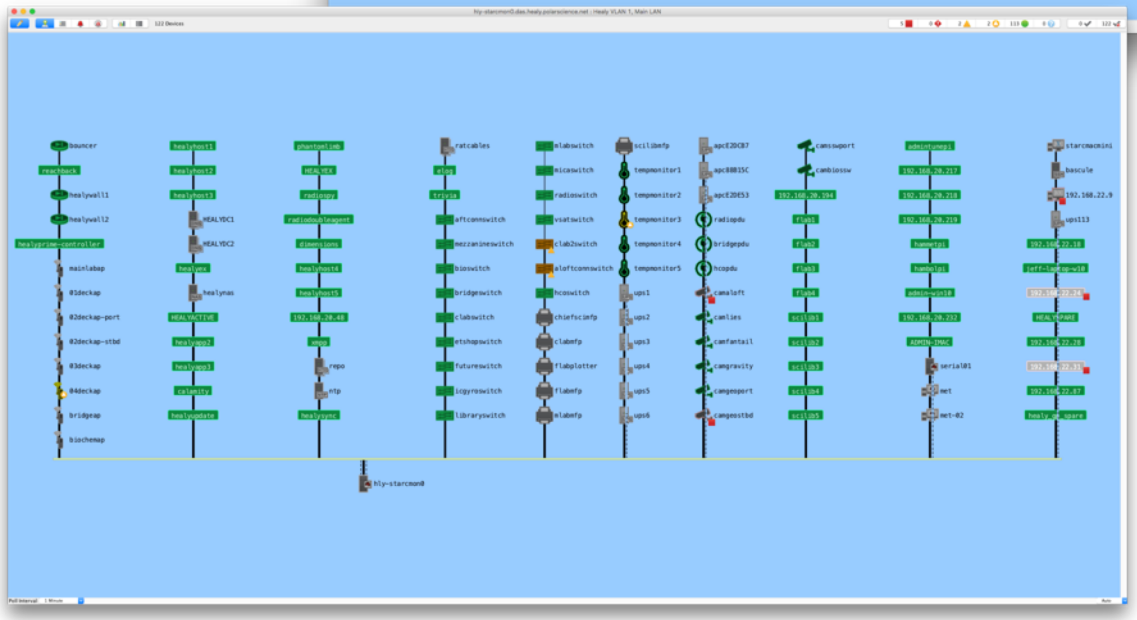
Local and Remote Access to Network Performance

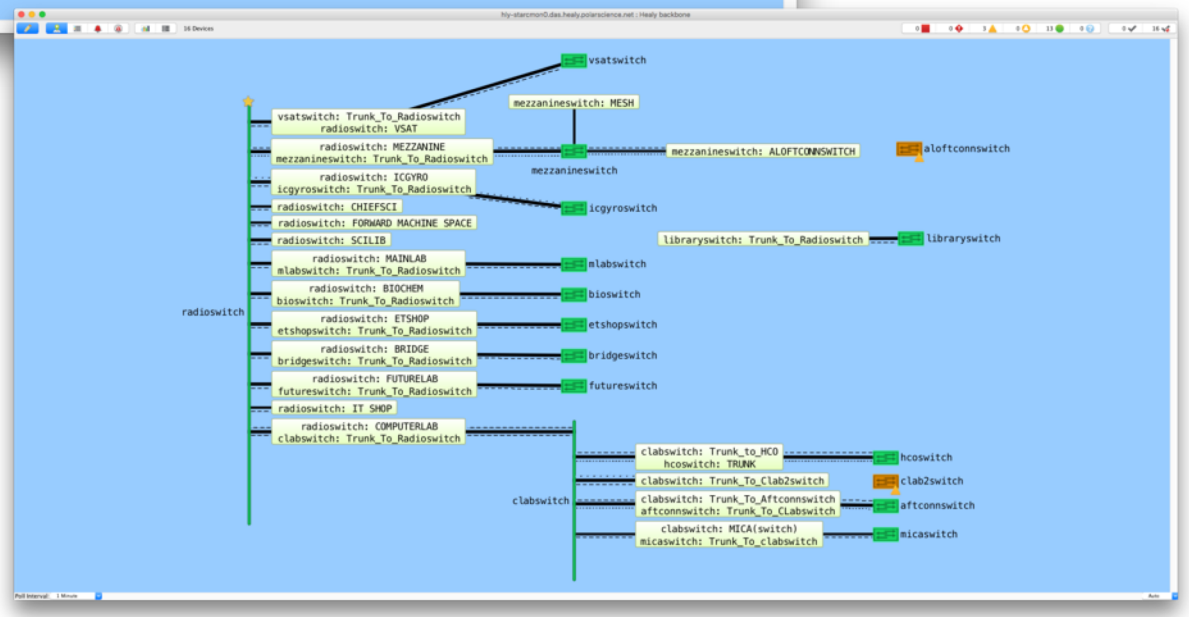
- InterMapper deployed w/ Puppet
  - Custom probes across network
  - Installed with scalability in mind
- Trend Monitoring
  - Power consumption / UPS status
  - Environmental Sensing
- Alerts and early warnings
  - Hard drive disk usage
  - Preventative action by techs at sea as well as shoreside personnel
  - Forensics to diagnose cause of problems



InterMapper







The End

Thank you

Questions ?