

Multibeam Advisory Committee

Vicki Ferrini (Lamont-Doherty Earth Observatory)

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COLUMBIA UNIVERSITY | EARTH INSTITUTE



What is the Multibeam Advisory Committee?

- Initially funded in 2011 for a 3 year period by the National Science Foundation
- Funded for a 2nd time in spring 2015
- Committee is composed of:
 - Vick Ferrini (Lamont)
 - Paul Johnson (UNH)
 - Kevin Jerram (UNH)
- A community-based effort with the goal of ensuring that consistent high-quality multibeam data are collected across the U.S. Academic Research Fleet.



What was the problem ?

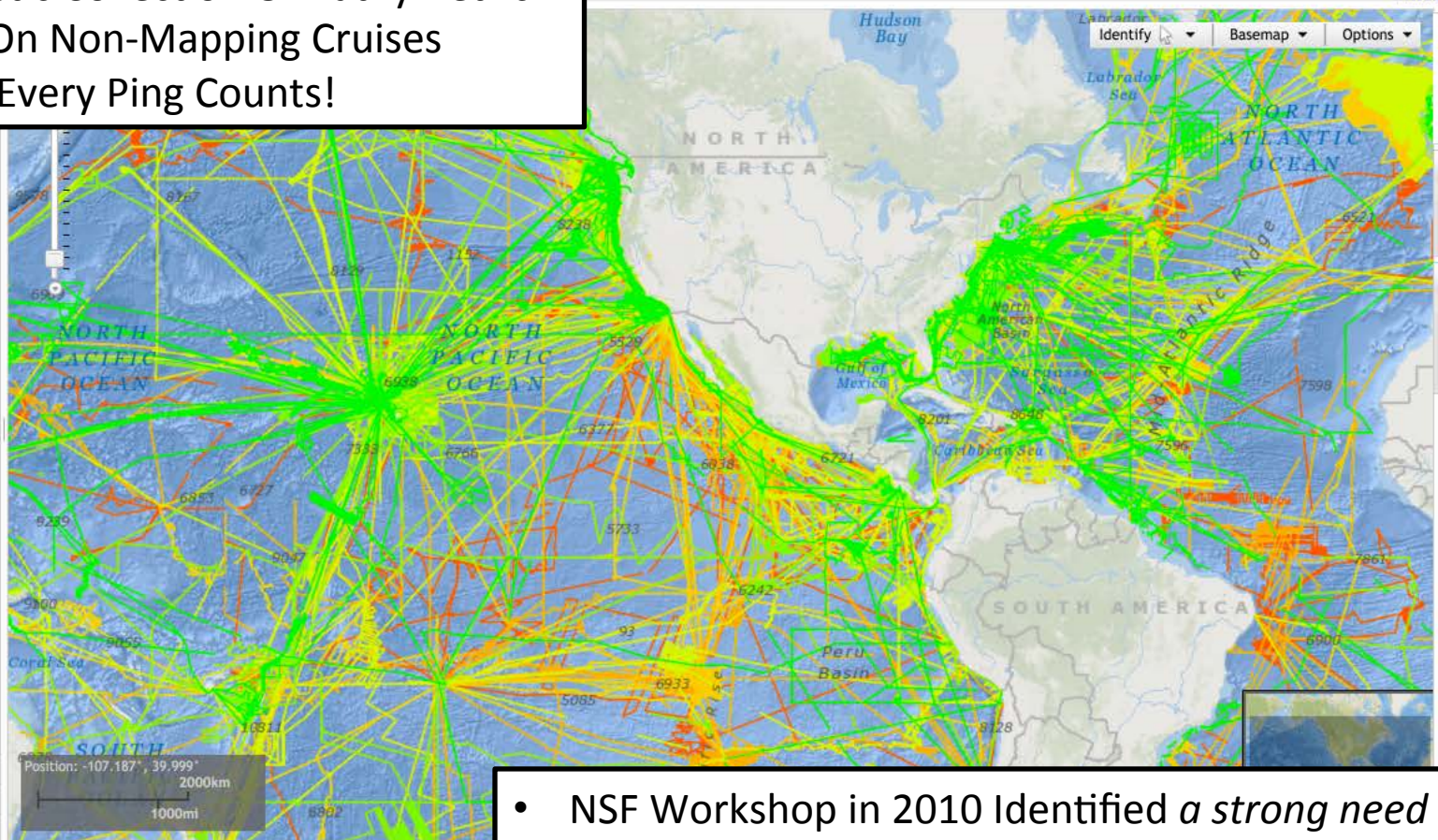


Modified From: <http://evillusionist.files.wordpress.com/2012/05/call-center-cartoon-149.jpg>

- The vessels of the U.S. Academic fleet are used for many different types of oceanographic work.
- Multibeam systems are just one of many complex sensors on each ship.
- The challenge of “Tribal Knowledge”
- Operation in isolation.

Why Is It Important ?

Opportunistic Collection Of Bathymetric Data On Non-Mapping Cruises
Every Ping Counts!



- NSF Workshop in 2010 Identified *a strong need to coordinate operational efforts across the fleet*
- MAC Proposal Funded In 2011 & 2015



Multibeam Advisory Committee (MAC)

SAT - Ensure all hull-mounted multibeam systems are installed, calibrated, and configured properly and consistently (Johnson, Jerram, Flinders Beaudoin,, Greenaway, & JHC)



ANT - Perform acoustic noise tests to assess and potentially improve sensor efficiency (coverage) and data quality (Gates)

QAT - Ensure multibeam sonar systems are operated in a consistent manner that maximizes data accuracy, precision, and scientific utility (Ferrini, Johnson, Jerram, Beaudoin)

Multibeam Advisory Committee (MAC)

- ANT – QAT – SAT all have areas of overlap.
- Tools and techniques developed for one area useful for all.
- Begins with good communications with all stakeholders in community
 - Operating Institutes
 - Technicians
 - Scientist
 - Industry
- Working with graduate students, NOAA, and experts in the field.



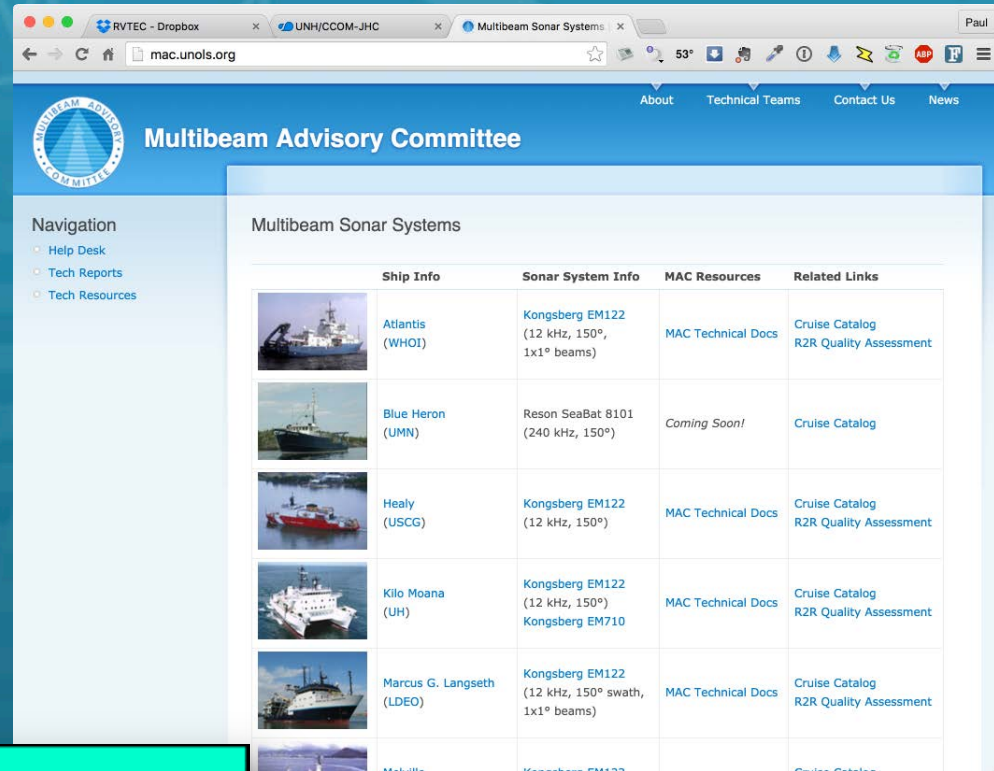
Ship	Multibeam System				MAC Technical Team		
	EM122	EM302	EM710	Reson 8101	SAT	ANT	QAT
Atlantis	X				<i>2011</i>	<i>2011</i>	2016?
Healy	X					<i>2014</i>	
Kilo Moana	X		X		<i>2010</i> <i>2012</i> <i>2015 (x2)</i>	<i>2010</i>	2012
Langseth	X					2011	2012 2013
Melville	X					2012	
Neil Armstrong	X		X		2015	<i>2015</i>	2016
Palmer	X				2014 2015	2014	
Revelle						TBD	2013
Sally Ride	X		X		2016	<i>2016</i>	2016
Sikuliaq		X	X		2014	<i>2014</i>	2014 2016
Thompson		X			<i>2010</i>	TBD	TBD
Hugh Sharp				X	2012		2012

- *Italics* – Not funded by MAC
- **Bold** - Planned









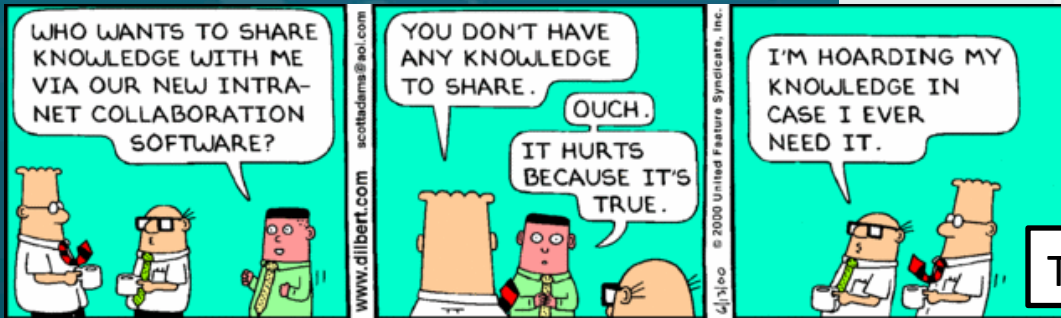
MAC – Helping the Multibeam Community

- <http://mac.unols.org>
- Technical Reports
- Technical Resources
- Help Desk



The screenshot shows the website for the Multibeam Advisory Committee. The page title is "Multibeam Sonar Systems". It features a navigation menu with "Help Desk", "Tech Reports", and "Tech Resources". The main content is a table with the following data:

Ship Info	Sonar System Info	MAC Resources	Related Links
 Atlantis (WHOI)	Kongsberg EM122 (12 kHz, 150°, 1x1° beams)	MAC Technical Docs	Cruise Catalog R2R Quality Assessment
 Blue Heron (UMN)	Reson SeaBat 8101 (240 kHz, 150°)	Coming Soon!	Cruise Catalog
 Healy (USCG)	Kongsberg EM122 (12 kHz, 150°)	MAC Technical Docs	Cruise Catalog R2R Quality Assessment
 Kilo Moana (UH)	Kongsberg EM122 (12 kHz, 150°) Kongsberg EM710	MAC Technical Docs	Cruise Catalog R2R Quality Assessment
 Marcus G. Langseth (LDEO)	Kongsberg EM122 (12 kHz, 150° swath, 1x1° beams)	MAC Technical Docs	Cruise Catalog R2R Quality Assessment
 Makilla	Kongsberg EM122		Cruise Catalog



The Early Days of the MAC



MAC Help Desk

The screenshot shows a web browser window with the address bar displaying `mac.unols.org/resources/mac-help-desk`. The page title is "MAC Help Desk | Multibeam Advisory Committee". The navigation menu includes "About", "Technical Teams", "Contact Us", and "News". The main content area features a "Home" breadcrumb, a "MAC Help Desk" heading, a date "04/04/2012" by "admin", and a paragraph stating: "The MAC has established a Help Desk to help address questions and/or operational issues associated with MB sonars. Please email your questions, feedback, requests to us at: mac-help@unols.org". A "QAT" link is visible on the right. At the bottom, it says "Funded by the National Science Foundation". A "Display a menu" link is at the bottom left of the browser window.



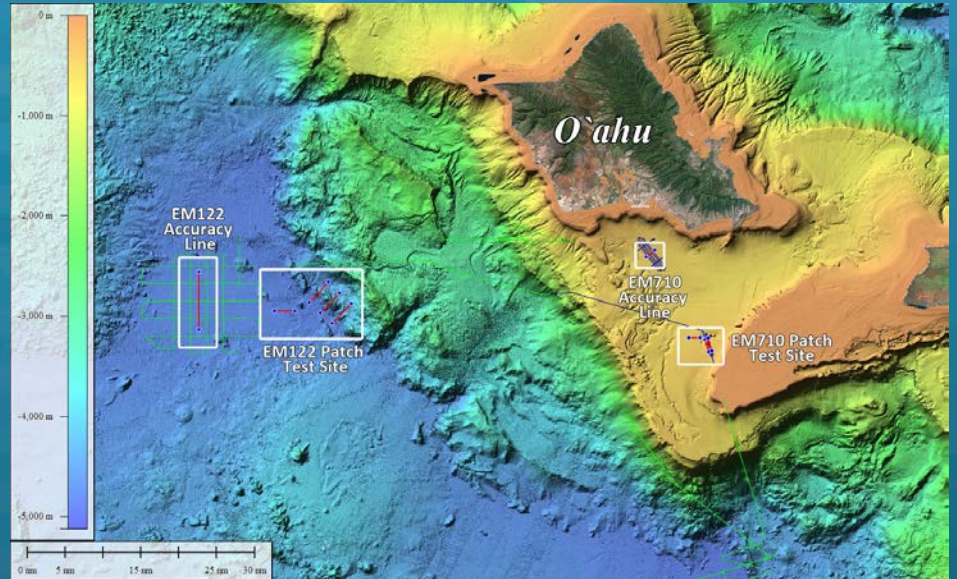
2015 Activities

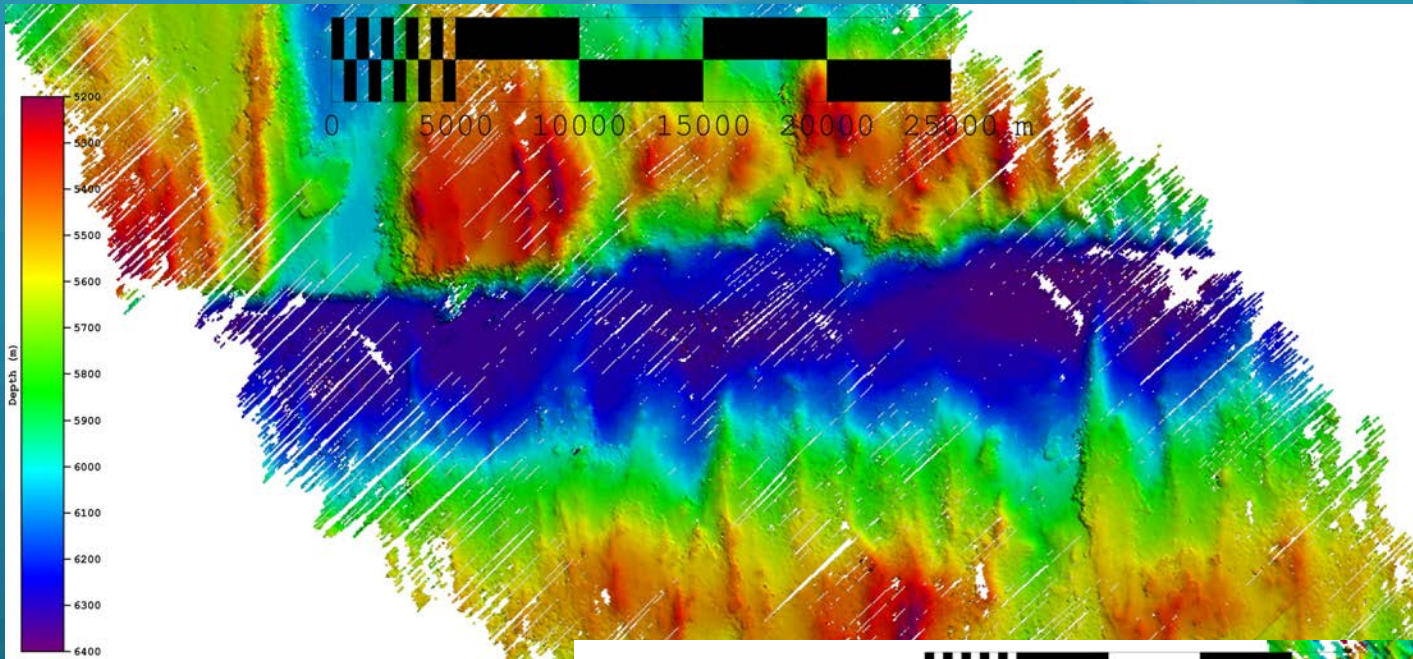
- R/V Kilo Moana – April
 - Quality Assessment
- RVIB Palmer – June
 - Shipboard Acceptance
- R/V Kilo Moana – August
 - Follow-up Quality Assessment



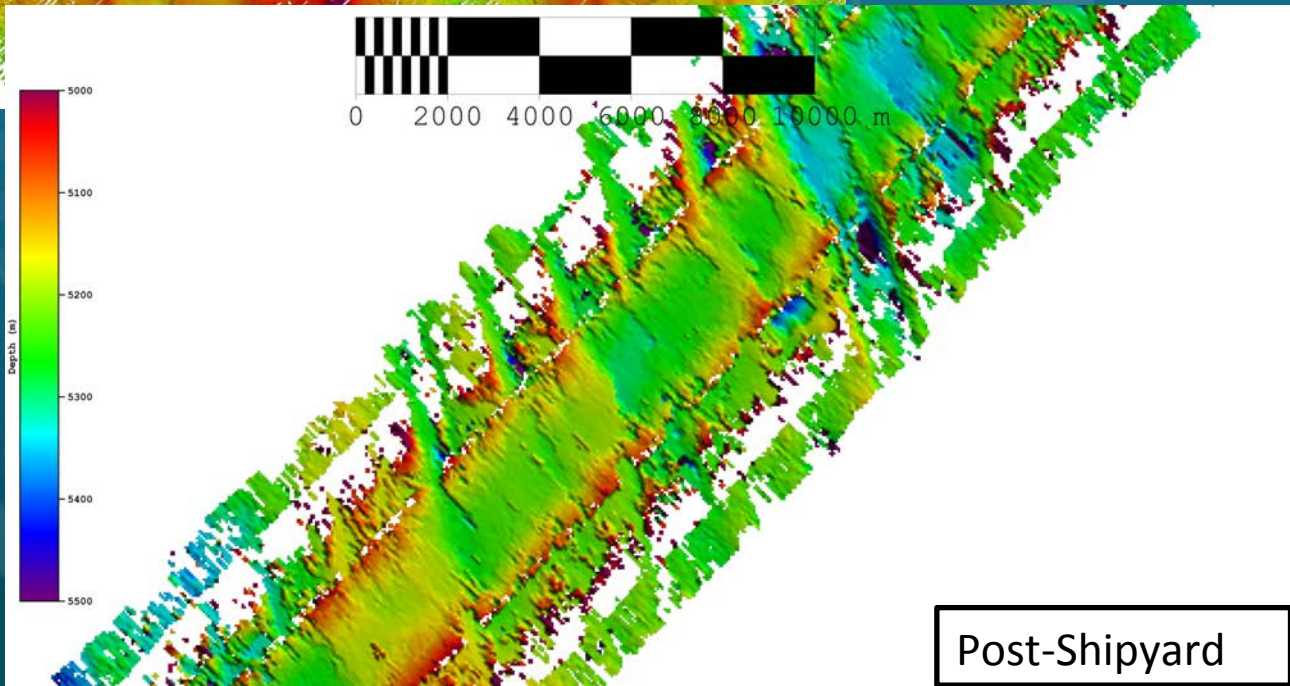
R/V Kilo Moana

- 1st vist in April
- Plan:
 - EM710 Patch Test
 - EM122 Patch Test
 - EM122 Accuracy Test
- Reality:
 - Successful EM710 Patch Test
 - Severe apparent acoustic interference affecting the the EM122
 - Testing halted





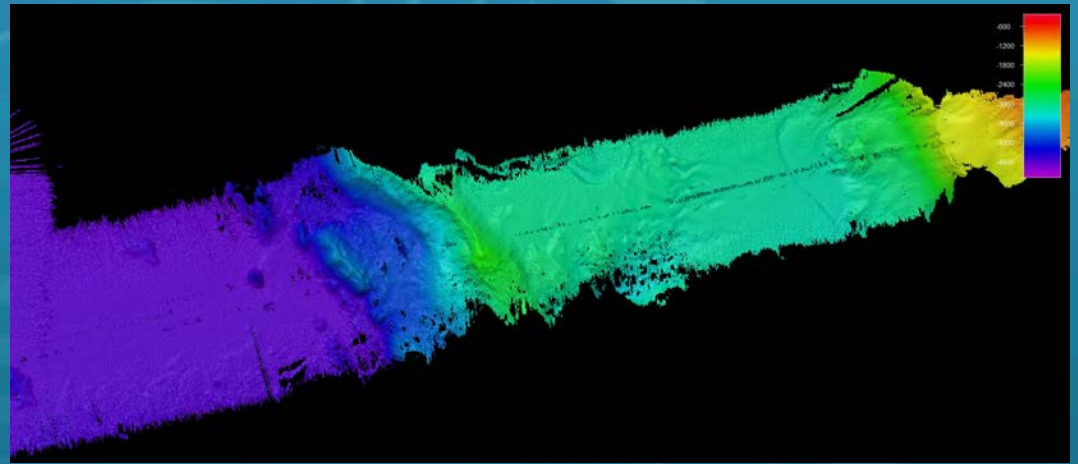
Pre-Shipyard



Post-Shipyard

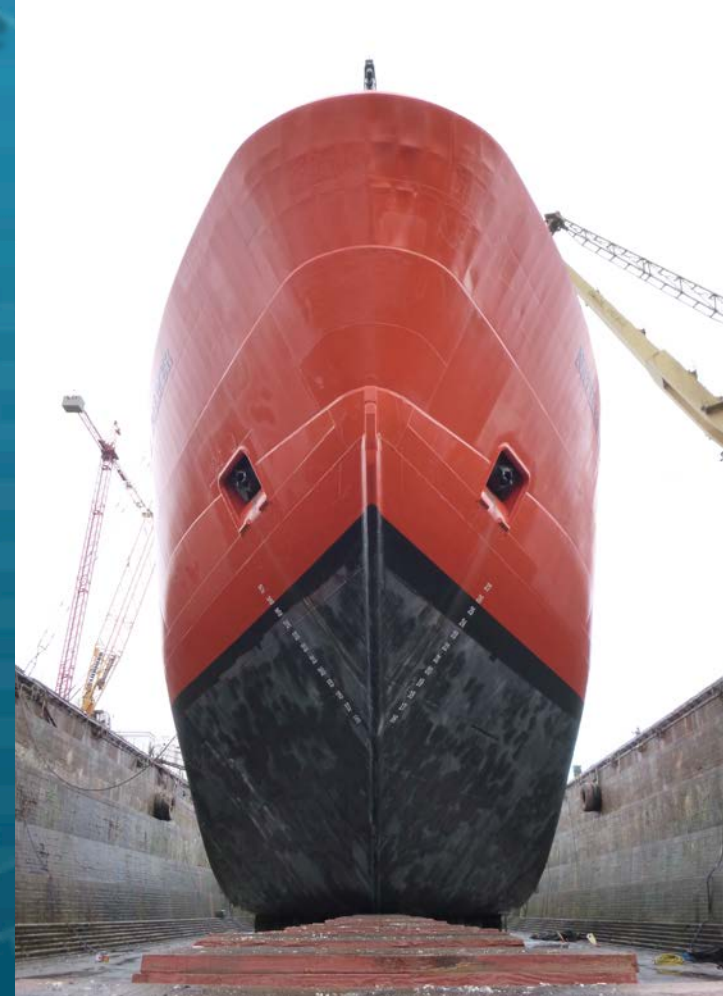
R/V Kilo Moana – August 2015

- Great Team
 - Gates Acoustics
 - UNH
 - MAC
 - Kongsberg
- Splitting Time with ROV Operations
- Multiple “a-ha” moments
- Final solution was a miswired RX module installed in shipyard
- Lucky wiring diagram find.



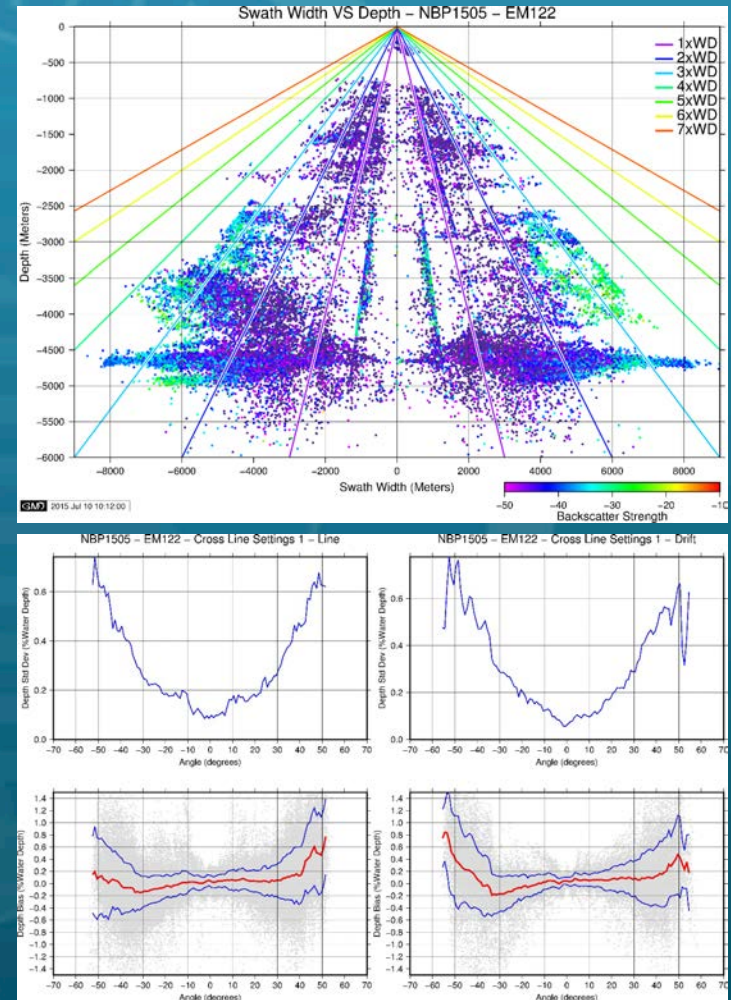
RVIB Nathaniel B. Palmer

- Kongsberg EM120 -> EM122 Upgrade
- Talcahuano, Chile
- 2014 – EM122 Transceiver SAT
 - suspected array degradation
- 2015 – EM122 TX/RX Array SAT
 - sensor survey in dry dock
 - system geometry review
 - calibration (patch test)
 - accuracy assessment
 - coverage assessment
 - RX noise level tests
 - TX channel BISTs



RVIB Nathaniel B. Palmer

- 2015 – EM122 TX/RX Array SAT
- Results
 - performance improved from 2014
 - increased TX power
 - stronger bottom returns
 - wider swath coverage
 - ship noise unchanged (12 kHz)
- Challenges
 - sea state (bubble interference)
- Moving Forward
 - more data, more BISTs
 - unify sensor reference frames



2016 Activities

- At Sea
 - R/V Neil Armstrong – SAT - Spring
 - R/V Sally Ride – SAT - Spring/Summer
 - R/V Atlantis - QAT - ?
 - R/V Sikuliaq - QAT - ?
- On Land
 - BIST Database and Visualization
 - SVP Editor Installation Package (CCOM building off MAC)
 - Cookbooks (Caris, Qimera, etc.)

