NOAA *Ocean Exploration*

MAPPING DATA ACQUISITION AND PROCESSING REPORT

CRUISE EX-15-02 Leg I

Caribbean Exploration (Mapping)

February 24 to March 11, 2015
N. Kingston, RI to San Juan, PR

Report Contributors:
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August 7, 2015

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1. Introduction

NOAA Ship *Okeanos Explorer*

Commissioned in August 2008, the NOAA Ship *Okeanos Explorer* is the nation's only federal vessel dedicated to ocean exploration. With 95% of the world's oceans left unexplored, the ship's combination of scientific and technological tools uniquely positions it to systematically explore new areas of our largely unknown ocean. These exploration cruises are explicitly designed in collaboration with the broad science community to provide a foundation of publicly accessible baseline data and information to support science and management needs. This baseline information often leads to further, more detailed, investigations by other parties.

The unique combination of mission capabilities including a high-resolution multibeam sonar, deep water remotely operated vehicles, telepresence technology, and integrated data management system quicken the scientific discovery and dissemination process. These systems enable us to identify new targets in real time, dive on those targets shortly after initial detection, and then send this information back to shore for immediate near-real-time collaboration with scientists and experts at Exploration Command Centers around the world. The integrated data management system provide for the quick dissemination of information-rich products to the scientific community. This ensures that discoveries are immediately available to experts in relevant disciplines for research and analysis.

Through the operation and maintenance of the mission capabilities, NOAA's Office of Ocean Exploration and Research (OER) provides the nation with unparalleled capacity to discover and investigate new oceanic regions and phenomena, conduct baseline research required to document discoveries, and seamlessly disseminate data and information-rich products to a multitude of users. OER strives to develop technological solutions and innovative applications to critical problems in undersea exploration and to provide resources for developing, testing, and transitioning solutions to meet these needs.

***Okeanos Explorer* Management – a unique partnership within NOAA**

The *Okeanos Explorer* combines the capabilities of a NOAA research ship with shore-based high speed networks and infrastructure to conduct systematic telepresence-enabled exploration of the world ocean. The ship is operated, managed and maintained by NOAA's Office of Marine and Aviation Operations, which includes commissioned officers of the NOAA Corps and civilian wage mariners. OER owns and is responsible for operating and managing the cutting-edge ocean exploration systems on the vessel (ROV, mapping and telepresence) and ashore including Exploration Command Centers and terrestrial high speed networks. The ship and shore-based infrastructure combine to be the only federal program dedicated to systematic telepresence-enabled exploration of the planet's largely unknown ocean.

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2. Report Purpose

The purpose of this report is to briefly describe the mapping data collection and processing methods, and to report the results of the mapping portion of the cruise. For a detailed description of *Okeanos Explorer* mapping capabilities, see the appendices section 'Kongsberg EM 302 Multibeam Sonar Description and Operational Specifications' and the ship's readiness report, which can be obtained by contacting the ships operations officer (ops.explorer@noaa.gov).

This report focuses on the mapping exploration of EX-15-02 Leg I.

3. Cruise Objectives

The cruise objectives for EX-15-02 Leg I were defined in EX-15-02 Leg I Project Instructions. EX-15-02 Leg I operations focused on transit mapping down to the Caribbean, a patch test, an EK60 calibration, and targeted mapping in the canyons to the southeast of St. Croix Island. The primary goals for this cruise included collecting exploratory mapping data, and calibrating the EK60 sonar and EM302 multibeam with a patch test. The primary operating area was southeast of St. Croix. The mapping specific objectives included the following.

4. Mapping Objectives

Objectives noted with an "*" were objectives added to the Cruise Instructions after the field season shakedown cruise was cut short due to mechanical problems.

1) Collect deep water multibeam bathymetry sonar data (MBES)
    a. Conduct 24-hour mapping operations for the duration of the cruise
    b. Collect bathymetric, seafloor backscatter, and water column backscatter data

2) Collect ancillary sonar data
    a. EK60 single beam sonar (24 hours/day)
    b. Knudsen sub-bottom profiler (24 hours/day)

3) XBT operations
    a. XBT casts will be collected at regular intervals of no more than 6 hours
4) Deploy Slocum glider
5) Conduct EK60 calibration
6) Conduct multibeam system testing in vicinity of Veatch Canyon*
    a. Conduct multibeam patch test
    b. Conduct EM 302 system noise testing (BIST tests)
    c. Conduct multibeam reference surface survey
    d. Conduct crossline comparison
7) Collect EK80 data over seeps at Veatch Canyon*
8) XBT and CTD operations*
    a. Conduct CTD cast at Veatch Canyon prior to multibeam patch test
    b. Test the ship's 3 XBT hand-launchers
    c. XBT casts will be collected at regular interval of no more than 6 hours
    d. Testing and verification of CTD sensors
9) NASA Maritime Aerosols Survey of Opportunity, Appendix C

5. Cruise Summary

The cruise was initially scheduled to depart the morning of February 18, 2015. However, during the field season shakedown, the windlass anchor capstan broke and the ship had to return to port for repairs. Several objective from the shakedown cruise were added to EX-15-02 Leg I including, 1) EM302 patch test; 2) collecting EK80 data over Vetch Canyon seeps; 3) conducting a test CTD cast.

The start of EX-15-02 Leg I was initially delayed five days for repairs. The ship was then delayed an extra day when an augmenting engineer was needed at the last minute due to a crew injury. Despite the 6 day delay, many of the initial cruise objective and the addition shakedown cruise objectives were met.

During EX-15-02 Leg I, multibeam, single beam, and sub-bottom profile data was generally collected 24 hours a day. Sonar data quality was monitored in realtime by acquisition watchstanders. At certain times during the cruise the seas were very rough, particularly on the transit down to the Caribbean, so at times the sonars were secured because the data was too poor quality to justify collecting.

Expendable bathythermograph (XBT) casts were conducted at an interval defined by prevailing oceanographic conditions, generally every three to four hours, to maintain data quality. Ship speed was adjusted to maintain data quality as necessary. Line spacing was planned to ensure ¼ to ½ overlap between lines at all times. Cutoff angles in multibeam acquisition software, Seafloor Information Software (SIS), were adjusted on both the port and starboard sides depending on ocean depth and prevailing weather conditions.

All multibeam sonar data was fully processed according to established onboard procedures and was archived with the National Geophysical Data Center. Ancillary sonar datasets were archived at the National Oceanographic Data Center or the National Geophysical Data Center.

An EK60 calibration was successfully conducted offshore of Vieques Island, Puerto Rico. A NAVY/NOAA NOS Slocum glider was successfully deployed. As part of a partnership project between NOAA's National Ocean Service (NOS) and the U.S. Naval Oceanographic Office, NOS staff onboard NOAA Ship *Okeanos Explorer* planned to deploy one Slocum glider in the vicinity of the Virgin Island Trough. Underwater gliders are a type of autonomous underwater vehicle that can typically travel far distances over long periods without servicing. The glider deployed from the *Okeanos* was equipped to record oceanographic conditions, providing near real-time observations for use in oceanographic current models in poorly studied regions of the Caribbean. The glider also carried passive acoustic recorders to record ambient noise such as sounds made by fish and marine mammals as well as human-made sounds from ships and other sources. Bioacoustic data is used to help in identifying and locating reef fish spawning aggregations for grouper species and other fishes. Unfortunately, the Navy could not successfully make the glider remotely dive, so the glider operations were canceled and the instrument was successfully retrieved by the *Okeanos Explorer* crew. The Slocum glider was successfully deployed on a later expedition (EX-15-02 Leg II).

Patch test lines for roll, pitch, timing, and heading were conducted northwest of St. Croix island. A small offset was established for heading, this was expected because work had been done to the ship's heading antennas during the winter in-port. See Okeanos Explorer 2015 Readiness report for detailed information about the patch test. A CTD test cast was conducted to 2500 m, however there was a problem with the data

past 560 m, connectivity to GPS, conductivity and temperature sensors was lost. No further trouble shooting of CTD was conducted.

6. Participating Mapping Personnel

NAME	ROLE	AFFILIATION
CDR Mark Wetzler	Commanding Officer	NOAA Corps.
LT Emily Rose	Operations Officer	NOAA Corps.
Lindsay McKenna	Expedition Coordinator/ Mapping Team Lead	NOAA OER/ERT. Inc.
James Miller	Watch Lead	NOAA AHB
Allison Stone	Augmenting Survey Tech	NOAA OMAO
Josh Humbertson	Mapping Intern/Watch Lead	UCAR
Margot Buchbinder	Mapping Intern	UCAR
Jennifer Johnson	Mapping Intern	UCAR
Maxime Philip	Mapping Intern	UCAR
Maria Cardona Maldonado	Mapping Intern	NOAA EPP
Chris Taylor	EK60/Glider Scientist	NOAA NOS
Laura Kracker	EK60/Glider Scientist	NOAA NOS
Bill Danforth	EK60/Glider Observing Scientist	USGS

7. Mapping Statistics

Dates	February 24 – March 11, 2015
Days lost to weather	2.7 days
Total mapping days	9.8 days
Total non-mapping days	8.6 days
Line kilometers of survey	3800.5 km
Square kilometers mapped	22,500 km^2
Number / Data Volume of EM 302 raw bathymetric / bottom backscatter multibeam files	391 files / 25 GB
Number / Data Volume of EM 302 water column multibeam files	391 files / 90 GB
Number / Data Volume of EK 60 water column singlebeam files	511 files / 3.0 GB
Number / Data Volume of subbottom sonar files	217 files / 2.4 GB
Number of XBT casts	51
Number of CTD casts (including test casts)	1
Beginning draft	Forward: 15'; Aft: 14'3”
Ending draft	Forward: 12'10”; Aft: 14'10"
Average ship speed for survey	8.9 kts

8. Cruise Calendar

February/March 2015						
Sun	Mon	Tues	Wed	Thur	Fri	Sat
			2/18 Ship originally scheduled to depart	2/19	2/20	2/21 Mission personnel arrive to ship in Davisville, RI
2/22 Mission personnel arrive to ship in Davisville, RI	2/23 On standby	2/24 Ship departs Rhode Island	2/25 Collect data over seeps with EK80	2/26 Transit mapping to Puerto Rico	2/27 Transit mapping to Puerto Rico	2/28 Transit mapping to Puerto Rico
3/1 Transit mapping to Puerto Rico	3/2 Transition to AST from EST	3/3 Small boat ops in San Juan for personnel transfer	3/4 EK60 calibration, slocum glider deployment	3/5 Visiting scientists depart ship, attempt CTD cast, collect patch test lines	3/6 Mapping off SE St. Croix	3/7 Mapping off SE St. Croix
3/8 Daylight savings, EST and AST both -4 UTC. Mapping off SE St. Croix, CTD cast to 2500 m	3/9 Mapping off SE St. Croix	3/10 Mapping off SE St. Croix, begin transit to San Juan	3/11 Arrive in port in San Juan, PR. Mission personnel depart ship.	3/12 Mission personnel depart ship.		

9. Daily Cruise Log

All times listed are local ship time, which was -5 hours from UTC from Feb 24 to Mar 1 and -4 hours from UTC from March 2 to March 11.

February 24, 2015
After being delayed 24-hours, an augmenting engineer was secured. The ship departed the Quonset pier by 0930 and headed to seeps near Veatch Canyon. The CTD winch is not working. Science is sailing one mapping lead short.

February 25, 2015
Collected 4 survey lines over seeps in Veatch Canyon with the EK80. Continued transit down to Puerto Rico, transit speeds were higher than normal, averaging 11 knots. Seas were very rough, with 7-9 ft swell and a confused sea state. Ship took a detour closer to shore to try to avoid intersecting the 14-17 ft seas. Despite the change in plan ship is still on track to arrive in San Juan for the small boat transfer on time.

February 26, 2015
Continued transit mapping to Puerto Rico with the EM302, EK60, and Knudsen. Had to veer off the most direct transit line and head towards the east coast of the US to avoid very bad weather. The ship is moving as fast as possible, but might arrive into Puerto Rico 2-3 hours late for the small boat transfer.

February 27, 2015

Continued transit mapping to Puerto Rico with the EM302, EK60, and Knudsen. Mapped over the transition between the continental rise and abyssal plain. Depths are greater than >5000 m and transit speeds are >10 knots, so there are gaps between pings, but data quality remains fair to good.

February 28, 2015
Continued transit mapping to Puerto Rico with the EM302, EK60, and Knudsen. Depths are still greater than >5000 m and transit speeds are >10 knots, so there are gaps between pings. Seas were 2-3 ft for most of the day so data quality was good. Attempted a test with the EK80, but unable to track bottom.

March 1, 2015
Continued transit mapping to Puerto Rico with the EM302, EK60, and Knudsen. Depths are still greater than >5000 m and transit speeds are >10 knots. Conducted another test with EK80 sonar. There were some minor issues with the ship's AC but they were addressed and we were only without AC for ~30 minutes.

March 2, 2015
The ship transitioned to Atlantic Standard Time (-4 GMT). Ship time now matches Puerto Rico time, which is one hour ahead of EST. Puerto Rico does not observe Daylight savings, so after March 8, both AST and EST should be -4 GMT. The ship will not make water within 25 nm of land, so water is being somewhat rationed, and plans are being made to run over 25 nm offshore tonight so more water can be made. Continued transit mapping to Puerto Rico with the EM302, EK60, and Knudsen. There was some intermittent needle gunning on deck that caused interference with the EK60 and EM302. Transited over the Puerto Rico trench at 8.5-9 knots, depths > 8500 m at times. The EM302 held on and tracked bottom, but the EK60 stopped working around 7500 m.

March 3, 2015
24-hour survey operations continued until the ship arrived on station off of San Juan for small boat operations at around 0800. The small boat was launched and arrived at the USCG station in Old San Juan at 0930. The engineering department had a replacement engine part shipped to the CG station, but it had not arrived on time, so the small boat return was delayed a few hours. Three visiting scientists joined the ship for EK60 calibration and glider operations. The planned evening glider deployment was canceled because clearance to deploy from the Navy was denied. After the small boat was recovered, the ship had to run north to an area 25 nm away from land to make water. Mapping operations were conducted over existing mapping coverage, but all three sonars were run and resolution was better than existing coverage. The ship arrived at Isla de Culebra for the EK60 calibration at 0500. Sonars were secured at 50 m.

March 4, 2015
Successfully completed the EK60 calibration. Successfully deployed the Navy/NOS Slocum glider. And then successfully recovered the glider at night, in 30 knot winds, and 6-8 ft seas after the Navy was unable to make the glider dive and the mission was aborted.

March 5, 2015
Small boat operations off St. Thomas for personnel transfer to shore. The CTD was deployed but once it was in the water there was a connection error. CET swapped the CTD for the spare but connection was never established so it was not deployed. CET is trouble-shooting the issue and believe it is a cable and cable termination problem. The patch test was conducted despite not having a CTD cast. Patch test started out well, but seas and wind built quickly and the outer beams on the heading lines were too narrow and too inconsistent to accurately calibrate heading. Mapping within the targeted mapping box southeast of St. Croix will begin on March 06.

March 6, 2015
Continued 24-hour mapping in the targeted mapping area SE of St. Croix. Mapping data was collected with all three sonars. Multibeam data quality was fair to good. The system had a harder time tracking over the very rough terrain of the canyons, leading to several blowouts, so line spacing was tight to ensure 100% overlap. The Knudsen was not logged at certain times when the terrain was too steep.

March 7, 2015
Continued 24-hour mapping in the targeted mapping area SE of St. Croix. Mapping data was collected with all three sonars. Multibeam data quality was fair to good. The system had a harder time tracking over the very rough terrain of the canyons, leading to several blowouts, so line spacing was tight to ensure 100% overlap. The Knudsen was not logged at certain times when the terrain was too steep.

March 8, 2015
Continued mapping in the targeted mapping area SE of St. Croix. CTD was conducted to 2500 m, all went well except the NMEA string was not being fed it. Final patch test heading lines were completed.

March 9, 2015
Continued mapping in the targeted mapping area SE of St. Croix. Heading lines were calibrated and there was a small positive offset. The weather deteriorated through the night and seas were very heavy. Data quality suffered on all three sonars.

March 10, 2015
Finished mapping the targeted area SE of St. Croix, much of the original planned box was filled despite losing 6 DAS. The seas were very rough, but a few holidays were filled on the transit back to San Juan. Continued mapping to San Juan and filled in part of one line of the Leg 2 southern priority box. The Knudsen was secured at 500 m and the EK60 and EM302 were secured at the buoy outside of the port.

March 11, 2015
Mission personnel departed ship.

10. Summary of Major Findings

Cruise Map

EM 302 bathymetry and backscatter (bottom and water column) data were collected while in transit to the Caribbean from Rhode Island. The data acquisition was limited to depth greater than 50 m. The transit trackline was chosen based on getting down to the Caribbean as quickly as possible, while also avoiding a strong storm offshore of the mid-Atlantic.

Once in vicinity of Puerto Rico, survey lines were laid to cover an area of canyons southeast of St. Croix Island. The area around Puerto Rico and the U.S. Virgin Island was identified as an area of high priority for exploration during the 2013 Caribbean Basin Workshop held by the Ocean Exploration Trust and the NOAA Office of Ocean Exploration and Research (OER). Specific exploration targets were established in consultation with members of the ocean management community and numerous federal and territorial partners, including the U.S. Geological Survey (USGS), NOAA's National Centers for Coastal Ocean

Science, NOAA's Deep Sea Coral Research and Technology Program, the Caribbean Fisheries Management Council, Puerto Rico Sea Grant, University of Puerto Rico, and the Puerto Rico Departamento de Recursos Naturales y Ambientales. The mapping areas were chosen to provide full coverage adjacent existing bathymetric data in the area collected by the USGS, and to map canyon features never before mapped with a multibeam sonar.

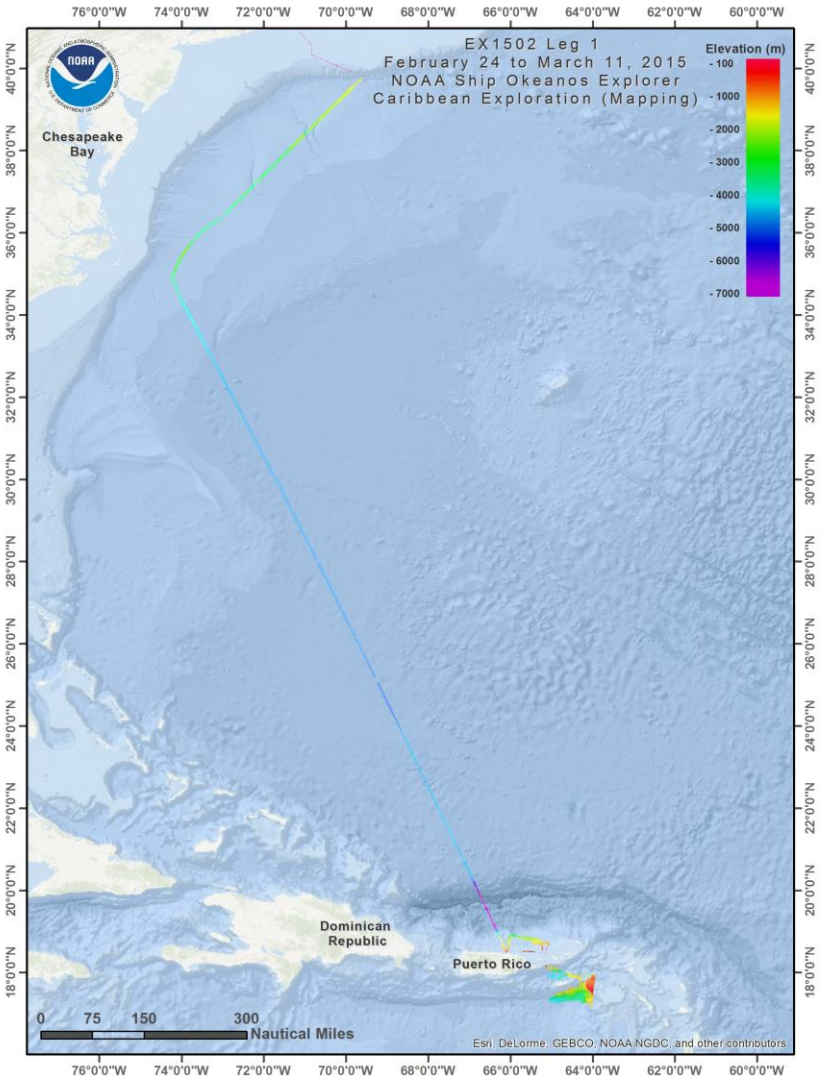


Figure 1. Cruise map made in ArcMap 10.3 showing overall cruise track.

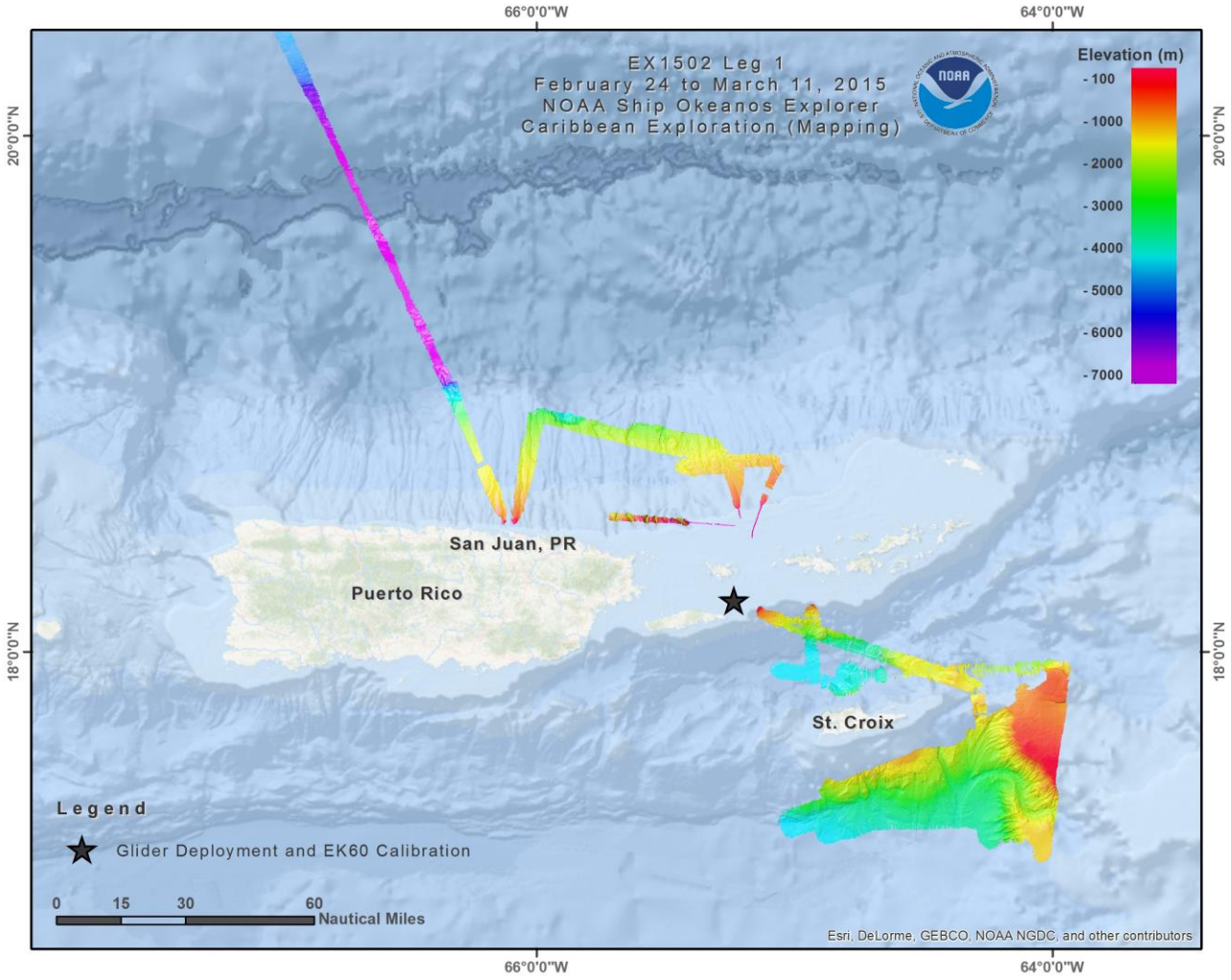


Figure 2. Cruise map made in ArcMap 10.3 showing overall key operational areas.

EM302 water column backscatter data was not processed during the cruise. No water column anomalies were observed by multibeam watch standers during real-time data monitoring of EM 302.

The mapping "Explorers-In-Training" interns developed a bottom backscatter mosaic in the vicinity of St. Croix, figure 3.

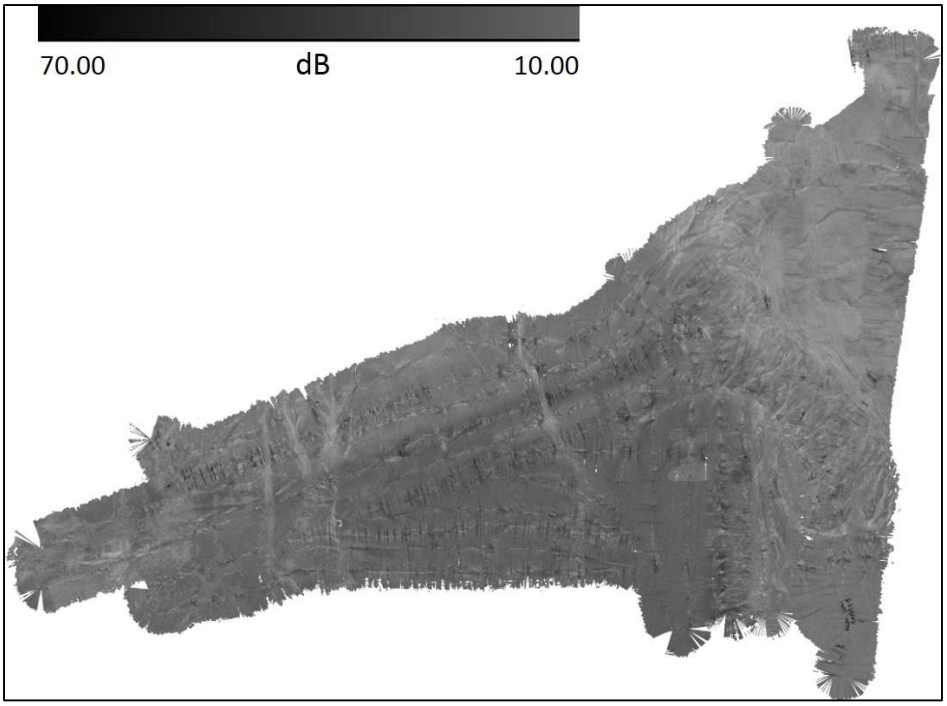


Figure 3. Backscatter mosaic of the targeted mapping area off St. Croix.

The diel vertical migration was often visible in the EK60 data. In Figure 4 the transition of the organisms from the mesopelagic zone during the day to the epipelagic zone during the night is apparent in 100 to 400 m water depths.

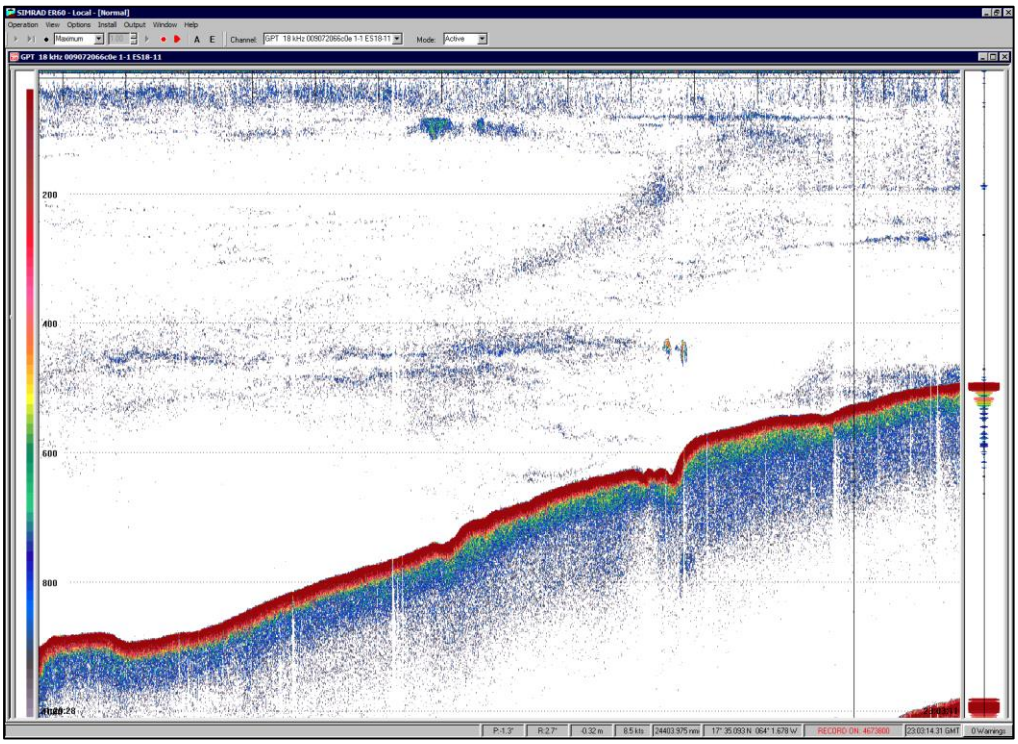


Figure 4. Screen grab of the ER60 software, showing the diel vertical migration captured by the EK60 split beam sonar.

11. Mapping Sonar Setup and Data Processing

The NOAA Ship *Okeanos Explorer* is equipped with a 30 kHz Kongsberg EM 302 multibeam sonar capable of mapping the seafloor in 0 to 8000 meters of water. The system generates a 150° beam fan containing up to 432 soundings per ping in waters deeper than 3000 meters. In waters less than 3000 meters, the system is operated in multiping, or dual swath mode, and obtains up to 864 soundings per ping, by generating two swaths per ping cycle. Appendix D contains a detailed description of sonar system functionality and technical specifications, including crosstrack and alongtrack data resolutions.

Raw multibeam bathymetry data files were acquired by SIS, and were imported into CARIS. In CARIS, attitude and navigation data stored in each file were checked, and erroneous soundings were removed using CARIS Subset Editor. Once per day, cleaned, gridded bathymetric data were exported to ASCII text files (y,x,z) at 50 meter cell size in WGS84 datum. The ASCII files were then used to create Fledermaus SD objects. These SD objects were then exported to geotiff and Google Earth KMZ, which were copied to the shoreside FTP on a daily basis for shoreside scientist participation.

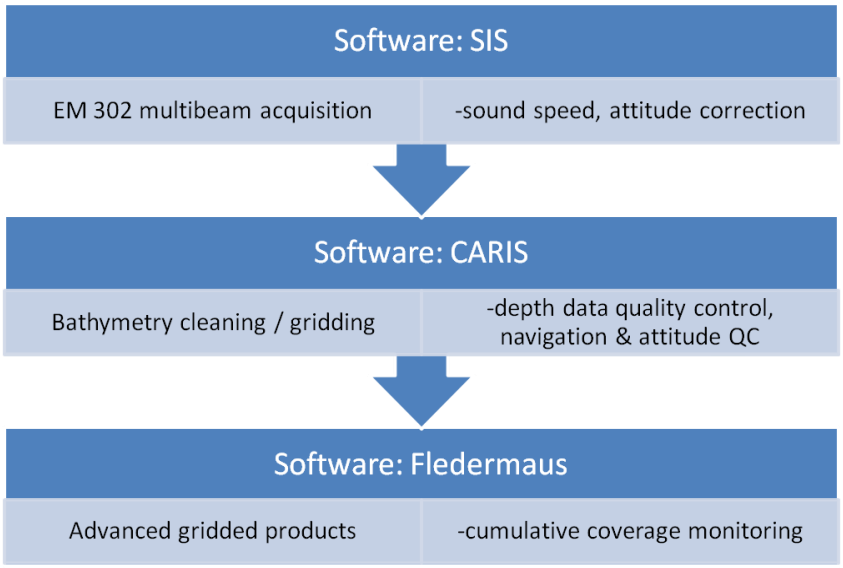


Figure 5. Shipboard multibeam data flow.

The ship is also equipped with a Kongsberg EK 60 singlebeam fisheries sonar. The transducer operates at 18 kHz and transmits a 7° beam fan. Data was monitored in realtime but was not processed. The power was set to 2000 W, and pulse duration was set to 4096 kHz.

Additionally, the ship is equipped with a Knudsen 3260 subbottom profiler. The transducers produce a 3.5 kHz chirp signal. Data was monitored in realtime but was not processed. The subbottom profiler was run during all survey operations in > 500 m of water, weather and seafloor terrain permitting.

12. Data Acquisition Summary

Sonars

EX-15-02 Leg I operations included EM 302 multibeam, EK 60/EK 80 singlebeam, and Knudsen subbottom profile data collection. The general schedule of operations included 24-hour multibeam, singlebeam, and subbottom mapping. While the EK80 was tested, the EM302 and Knudsen were secured. Active mapping was not conducted during the EK60 sonar calibration, the patch test, or glider deployment. Tables listing all sonar files collected and products created during the cruise are provided in the appendices of this report. The EK 80 data was a test data set and is not achieved in the national archives. Dr. Tom Weber at the University of New Hampshire maintains the EK 80 data.

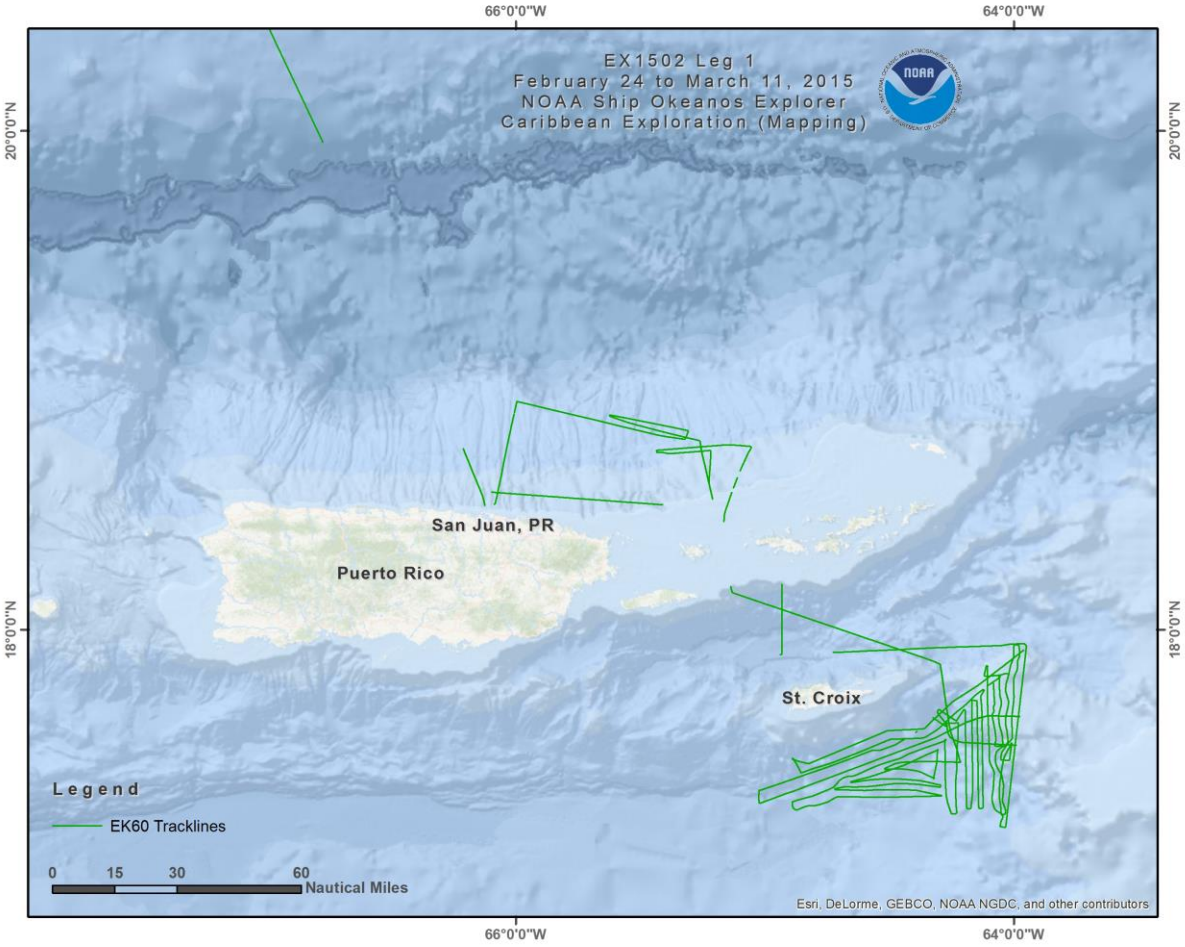


Figure 6. Tracklines of EK 60 singlebeam sonar data collected in the targeted mapping areas during EX-15-02 Leg I.

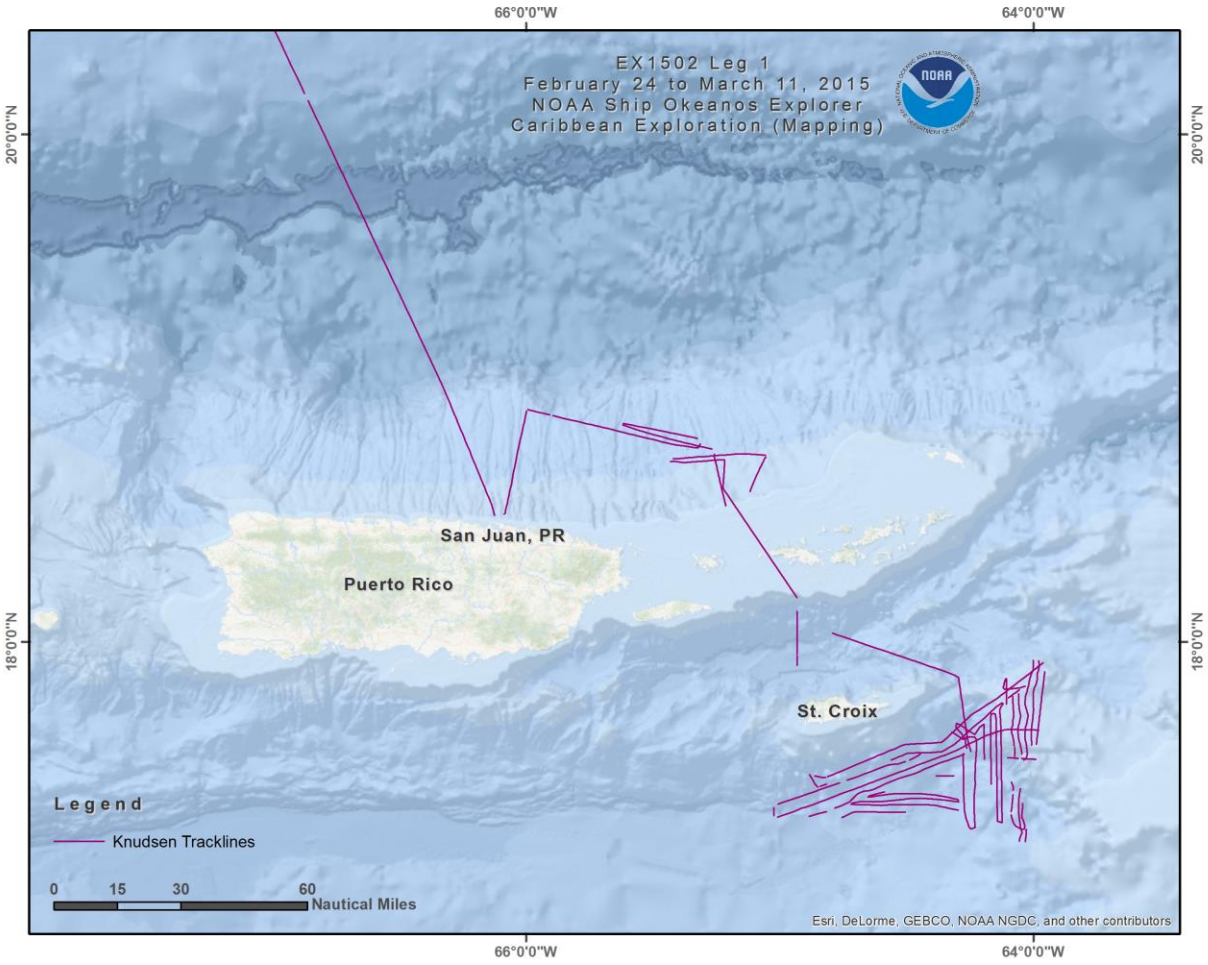


Figure 7. Tracklines of Knudsen subbottom profiler data collected in the targeted mapping areas during EX-15-02 Leg I.

Sound Velocity

Expendable bathythermographs were collected every three to six hours to correct multibeam data for changes in sound speed in the water column, and were applied in real time using SIS. Sound speed at the sonar head was determined using a Reson SVP-70 probe and the thermosalinograph (TSG). Data from these two systems was monitored for consistency throughout the cruise, and whichever was performing better was applied in realtime using SIS.

Background data used for exploration mapping included existing multibeam data collected by *the Okeanos Explorer*, the U.S. Geological Survey, (Andrews et al., 2014)*)*, and Sandwell and Smith satellite altimetry bathymetric data.

The CTD was not operational during the cruise.

NASA Maritme Aerosols survey

NASA maritime Aerosols instrument was deployed daily at noon by watch-standers when conditions permitted.

13. Sonar Data Quality Assessment

EM 302 Bottom Tracking

During transit mapping, the ship's speed was often 10 knots or above. Transit mapping in greater than 5000 m caused sparse coverage of the seafloor. Transit maps were gridded to a resolution of 100 m.

In general the ping was auto selected in SIS, and changes according the water depth. In water depths greater than 5000 m, SIS auto selects the Extra Deep ping mode. This resulted in some outer beam artifacts on the starboard side. Manually adjusting the ping mode to Very Deep alleviated the problem. In water depths greater than 5420 m, the nadir artifact transitioned from a single artifact to a double parallel artifact (or railroad track).

EM 302 Built In System Tests (BISTs)

Some of the EM302 TX boards were replaced prior to the start of this field season. To check on the system, a built-in system test (BIST) test was run every 24 to 48 hours. During the cruise ten BIST tests were run. A summary table of BIST results and a sample full BIST result is provided in the appendices of this report.

Patch-Test

A multibeam patch test was conducted on the shelf near St. Croix Island in the Caribbean Sea. Details of the patch test can be found in the EX 2015 Readiness Report. A positive 0.2 degree heading offset was established during the patch-test. The offset was post-applied in the Caris vessel file and all lines were re-merged so that the offset was applied to all data collected on EX-15-02 Leg I. Prior to the start of EX-15-02 Leg II, the heading offset was input into SIS so that offset would be applied in real-time during future data collection.

EK 80 and EK 60

During EK 80 data collection over seeps in Veatch Canyon, a diagonal artifact was seen at a regular interval in the water-column. The ships Doppler speed log could have caused this artifact. The EK test 80 data were transferred to UNH / CCOM (Dr. Tom Weber) for further analysis.

The EK60 was not calibrated prior to the transit down to Puerto Rico. Near the Puerto Rico trench, in water deeper than 7500 m the EK 60 was not able to maintain synchronization with EM 302. The rest of the cruise was in shallow water (<5000m) so this problem was not troubleshot during EX-15-02 Leg I. During EX-15-02 Leg II, the issue was further examined, and it was determined that a cable running to the trigger-jigger system was loose, and was causing the time-out issues.

Once in Caribbean waters, the EK 60 calibration was successfully conducted between Vieques and Culebra islands. The EK60 calibration was conducted on March 4, and was run by Chris Taylor of NOAA NOS, using equipment provided by UNH's Center for Coastal and Ocean Mapping. The calibration procedures followed during this calibration can be found in the EK60 calibration Standard Operating Procedure document updated by Chris Taylor, see Appendix H for a copy of the updated Standard Operating Procedures. Theoretical target strengths were calculated using the following link: http://swfscdata.nmfs.noaa.gov/AST/SphereTS/. All calibrations across four pulse lengths, 0.512ms, 1.024ms, 2.048ms, and 4.096 ms, were updated in the calibration software and were nearly identical to results from previous calibrations. All beam data and parameters were updated in the ER60 acquisition software based on the calibration results.

Crosslines

Crossline analysis was conducted using surface differencing in Caris. Two reference surfaces were computed, the first using multibeam lines 0282, 0248, and 0242 that are run in the N/S direction. The second using line 0326 oriented E/W, figure 8. The two surfaces were differenced, and statistics were computed based on the differences. The attribute value bin sized used for the differencing was 1 m.

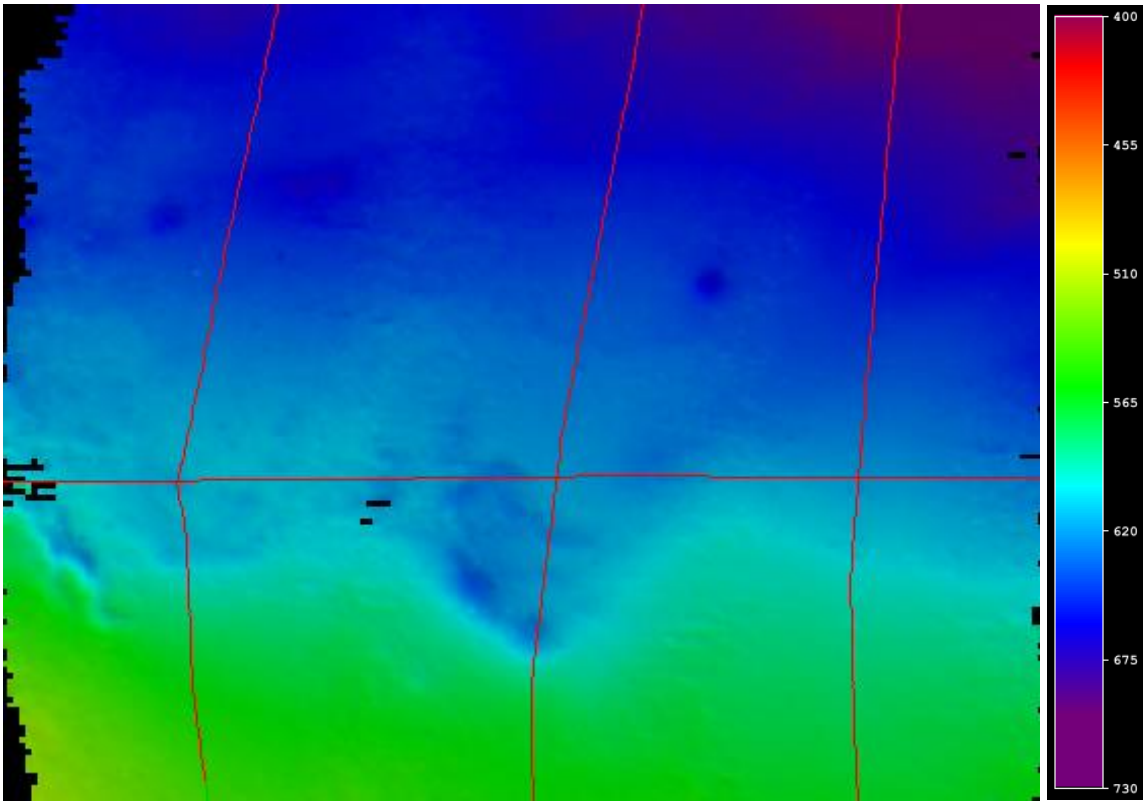


Figure 8. Reference surface and lines used in cross-line analysis. Depths are in meters.

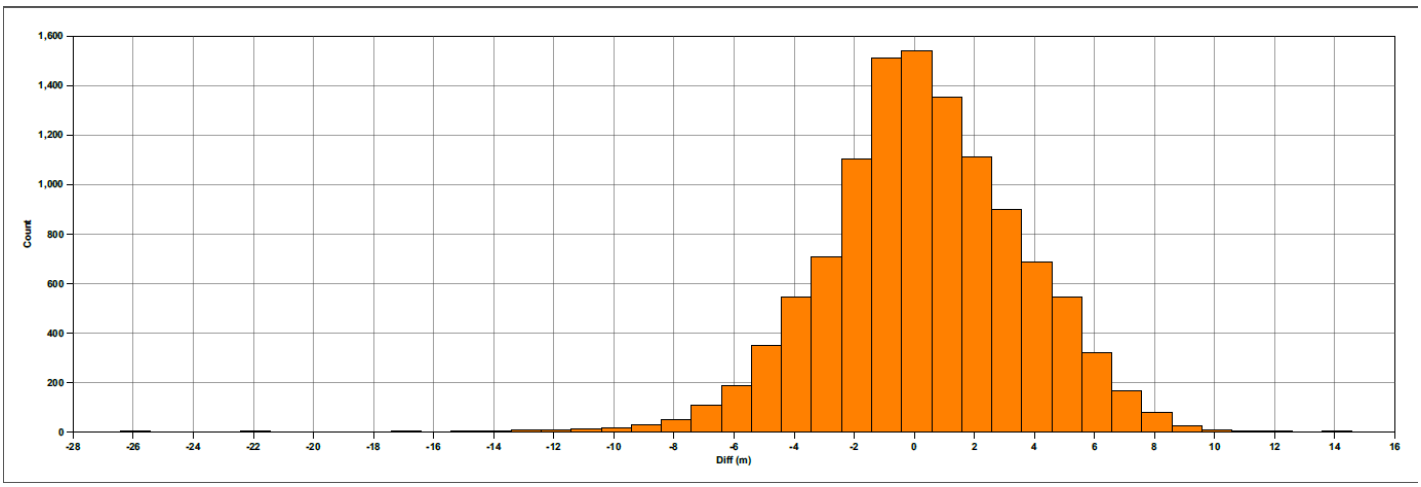


Figure 9. Difference histogram. The water depth of the cross-line analysis ranged from 500 m to 600 m. Statistics of the differencing are shown in Table 1.

Table 1. Differencing statistics.

Differencing Statistics	
Minimum (m)	-26.28
Maximum (m)	14.4
Mean (m)	0.34
Standard Deviation (m)	3.25
Total Count	11,377

14. Data Archival Procedures

All mapping data collected by *Okeanos Explorer* are archived and publically available within 90 days of the end of each cruise via the National Center for Environmental Intelligence (NCEI, formerly NGDC) online archives. Data can be accessed via the following websites (last accessed 6/24/2015):

- the NCEI Interactive Bathymetry Data Viewer at http://maps.ngdc.noaa.gov/viewers/bathymetry/
- the NCEI Interactive Multibeam Data Viewer at http://maps.ngdc.noaa.gov/viewers/multibeam/

The complete 2015 Field Season *Okeanos Explorer* Data Management Plan can be found in the Data Management Report, accessible through http://service.ncddc.noaa.gov/rdn/oer-waf/media/docs/EX_FY15_DMP.pdf.

EK 80 data is maintained by Dr. Tom Weber at the University of New Hampshire.

15. Telepresence

A 5 mb/s ship-to-shore connection was available throughout the cruise.

The 1-panel multicast feed was transmitted to shore throughout the cruise and was available at http://oceanexplorer.noaa.gov/okeanos/media/exstream/exstream.html.

16. References

Andrews, B.D., ten Brink, U.S., Danforth, W.W., Chaytor, J.D., Granja Bruña, José-Luis, Llanes Estrada, Pilar, and Carbó-Gorosabel, Andrés, 2014, Bathymetric terrain model of the Puerto Rico trench and the northeastern Caribbean region for marine geological investigations: U.S. Geological Survey Open-File Report 2013–1125, 10 p., 1 pl., *http://dx.doi.org/10.3133/ofr20131125*.

The 2015 Survey Readiness Report can be obtained by contacting NOAA Ship *Okeanos Explorer* at ops.explorer@noaa.gov.

EX-15-02 Leg I Project Instructions can be obtained by contacting NOAA Ship *Okeanos Explorer* at ops.explorer@noaa.gov.

16. Appendices

Appendix A: EX-15-02 Leg I Data Management Plan

The EX-15-02 Leg I cruise specific Data Management Plan is below. For more detailed information see the 2015 NCDDC Data Management Plan

Data Management Plan
Okeanos Explorer (EX1502L1): Caribbean Exploration (Mapping)

OER Data Management Objectives

Ensure consolidation of standard sensor and mapping products; Ensure ship to shore data synchronization between shipboard and shoreside repositories; Ensure generation and shoreside display of dashboard datasets

05-Feb-15

1. General Description of Data to be Managed

1.1 Name and Purpose of the Data Collection Project

Okeanos Explorer (EX1502L1): Caribbean Exploration (Mapping)

1.2 Summary description of the data to be collected.

During the transit, multibeam data will be collected 24 hours a day and XBT casts will be conducted no less than every 6 hours. Singlebeam (EK60) data and sub-bottom profile data will be also collected 24 hours a day.

1.3 Keywords or phrases that could be used to enable users to find the data.

expedition, exploration, explorer, marine education, noaa, ocean, ocean discovery, ocean education, ocean exploration, ocean exploration and research, ocean literacy, ocean research, OER, science, scientific mission, scientific research, sea, stewardship, systematic exploration, technology, transformational research, undersea, underwater, Davisville, mapping survey, multibeam, multibeam backscatter, multibeam sonar, multi-beam sonar, noaa fleet, okeanos, okeanos explorer, R337, Rhode Island, scientific computing system, SCS, single beam sonar, singlebeam sonar, single-beam sonar, sub-bottom profile, water column backscatter, Puerto Rico Trench, St Croix Ridge, Turner Hole Canyon, Saba Valley, Puerto Rico Shelf, Isla de Culebra, Muertos Trough, glider, maritime aerosol network, NAVOCEANO glider

1.4 If this mission is part of a series of missions, what is the series name?

Okeanos Mapping Cruises

1.5 Planned or actual temporal coverage of the data.

Dates: 2/18/2015 to 3/11/2015

1.6 Planned or actual geographic coverage of the data.

Latitude Boundaries:	41	to	17
Longitude Boundaries:	-71.5	to	-63

1.7 What data types will you be creating or capturing and submitting for archive?

Cruise Plan, Cruise Summary, Data Management Plan, Highlight Images, Quick Look Report, EK60 Singlebeam Data, Bottom Backscatter, Floating Point GeoTIF, GSF, Mapping Summary, NetCDF, Multibeam (raw), Multibeam (processed), Multibeam (image), Multibeam (product), SCS Output (compressed), SCS Output (native), Sub-Bottom Profile data, Water Column Backscatter, XBT (raw)

1.8 What platforms will be employed during this mission?

Okeanos Explorer (EX1502L1): Caribbean Exploration (Mapping)

NOAA Ship Okeanos Explorer, Glider

2. Point of Contact for this Data Producing Project

Overall POC:	Lindsay McKenna, Physical Scientist, NOAA Office of Ocean Exploration and Research, Lindsay.M
Title:	Expedition Coordinator, Mapping Lead
Affiliation/Dept:	NOAA OER; University of New Hampshire, Center for Coastal and Ocean Mapping, Joint Hydrogr
E-Mail:	lindsay.mckenna@noaa.gov
Phone:	609-862-5246

3. Point of Contact for Managing the Data

Data POC Name:	Susan Gottfried, Data Management Coordinator, NOAA National Coastal Data Development Ce
Title:	NOAA/NCEI, Senior Scientist, General Dynamics Information Technology
E-Mail:	susan.gottfried@noaa.gov

4. Resources

4.1 Have resources for management of these data been identified? True

4.2 Approximate percentage of the budget devoted to data management. (specify % or "unknown")

unknown

5. Data Lineage and Quality

5.1 What is the processing workflow from collection to public release?

SCS data shall be delivered in its native format as well as an archive-ready, documented, and compressed NetCDF-3 format to NODC; multibeam data and metadata will be compressed and delivered in a bagit format to NGDC.

5.2 What quality control procedures will be employed?

Quality control procedures for the data from the Kongsberg EM302 is handled at UNH CCOM/JHC. Raw (level-0) bathymetry files are cleaned/edited into new data files (level-1) and converted to a variety of products (level-2). Data from sensors monitored through the SCS are archived in their native format and are not quality controlled. Data from CTD casts and XBT firings are archived in their native format and are not quality controlled. CTDs are processed into profiles for display only on the Okeanos Atlas.

6. Data Documentation

6.1 Does the metadata comply with the Data Documentation Directive? True

6.1.1 If metadata are non-existent or non-compliant, please explain:

not applicable

6.2 Where will the metadata be hosted?

Organization:	An ISO format collection-level metadata record will be generated during pre-cruise planning
URL:	www.ncddc.noaa.gov/oer-waf/

discovery and access. The record will be harvested by data.gov.

Meta Std: ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed; a NetCDF-4 standard for oceanographic data will be employed for the SCS data; the Library of Congress standard, MAchine Readable Catalog (MARC), will be employed for NOAA Central Library records.

6.3 Process for producing and maintaining metadata:

Metadata will be generated via xml editors or metadata generation tools.

7. Data Access

7.1 Do the data comply with the Data Access Directive? True

7.1.1 If the data are not to be made available to the public at all, or with limitations, provide a valid reason.

Not Applicable

7.1.2 If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure.

Account access to mission systems are maintained and controlled by the Program. Data access prior to public accessibility is documented through the use of Data Request forms and standard operating procedures.

7.2 Name and URL of organization or facility providing data access.

Org: NOAA National Centers for Environmental Intelligence

URL: explore.noaa.gov/digitalatlas

7.3 Approximate delay between data collection and dissemination. By what authority?

Hold Time: not applicable

Authority: not applicable

7.4 Prepare a Data Access Statement

No data access constraints, unless data are protected under the National Historic Preservation Act of 1966.

8. Data Preservation and Protection

8.1 Actual or planned long-term data archive location:

Data from this mission will be preserved and stewarded through the NOAA National Centers for Environmental Intelligence . Refer to the Okeanos Explorer FY15 Data Management Plan at NOAA's EDMC DMP Repository (EX_FY15_DMP_Final.pdf)

8.2 If no archive planned, why?

not applicable

8.3 If any delay between data collection and submission to an archive facility, please explain.

60-90 days

8.4 How will data be protected from accidental or malicious modification or deletion?

Data management standard operating procedures minimizing accidental or malicious modification or deletion are in place aboard the Okeanos Explorer and will be enforced.

8.5 Prepare a Data Use Statement

Data use shall be credited to NOAA Office of Ocean Exploration and Research.

Appendix B: Categorical Exclusion Letter

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OCEANIC AND ATMOSPHERIC RESEARCH
Office of Ocean Exploration and Research
Silver Spring, MD 20910

January 7, 2015

MEMORANDUM FOR: The Record

FROM: John McDonough
Acting Director NOAA Office of Ocean Exploration
and Research (OER)

SUBJECT: Categorical Exclusion for NOAA Ship *Okeanos Explorer*
Cruise EX-15-02 Leg 1 and Leg 2

NAO 216-6, Environmental Review Procedures, requires all proposed projects to be reviewed with respect to environmental consequences on the human environment. This memorandum addresses the NOAA Ship *Okeanos Explorer's* scientific sensors possible effect on the human environment.

This project is part of the NOAA Office of Ocean Exploration and Research's "Science Program" and entails multi-disciplinary ocean mapping and exploration activities designed to increase knowledge of the marine environment. This project is entitled "EX-15-02 Legs 1 and 2 Exploration, Caribbean (Mapping)" and will be led by Lindsay McKenna (Leg 1), and Elizabeth Lobecker (Leg 2), both Physical Scientists for the *Okeanos Explorer* program within OER. NOAA Ship *Okeanos Explorer* will depart North Kingstown, RI for Leg 1 on February 18, 2015, and arrive in port in San Juan, Puerto Rico on March 11, 2015. Leg 2 will depart San Juan, Puerto Rico on March 16, 2015 and arrive in port in San Juan, Puerto Rico on April 3, 2015. NOAA Ship *Okeanos Explorer* will conduct sonar mapping operations at all times during the cruise. Focused mapping and sonar testing operations will occur along a transit path from Rhode Island to Puerto Rico, then within top priority exploration target areas in U.S. federal waters around Puerto Rico and St. Croix islands. Acoustic instruments that will be operational during the project are a 30 kHz multibeam echosounder (Kongsberg EM 302), an 18 kHz singlebeam echosounder (Kongsberg EK 60), and a 3.5 kHz sub-bottom profiler (Knudsen Chirp 3260). Additionally, expendable bathythermographs (XBTs) will be deployed at regular intervals in association with multibeam data collection.

As expected for ocean research with limited duration or presence in the marine environment, this project will not have the potential for significant impacts. Knowledgeable experts who are aware of the sensitivities of the marine environment will conduct the at-sea portions of this project.

This project would not result in any changes to the human environment. As defined in Sections 5.05 and 6.03.c.3 (a) of NAO 216-6, this is a research project of limited size or magnitude or with only short-term effects on the environment and for which any cumulative effects are negligible. As such, this project is categorically excluded from the need to prepare an environmental assessment.

Appendix C: NASA Maritime Aerosols Survey of Opportunity

Survey or Project Name

Maritime Aerosol Network

Points of Contact (POC)

Lead POC or Principle Investigator (PI & Affiliation)	*Supporting Team Members ashore*
POC: Dr. Alexander Smirnov	*Supporting Team Members aboard (if required)*

Activities Description(s) *(Include goals, objectives and tasks)*

The Maritime Aerosol Network (MAN) component of AERONET provides ship-borne aerosol optical depth measurements from the Microtops II sun photometers. These data provide an alternative to observations from islands as well as establish validation points for satellite and aerosol transport models. Since 2004, these instruments have been deployed periodically on ships of opportunity and research vessels to monitor aerosol properties over the World Oceans.

Appendix D: EM 302 Processing Parameters and BISTs

FILE NAME	Date (Local)	TIME (Local)
PreEX1502L1_PUparameters.txt	2/17/2015	12:17 PM
PreEX1502L1_BIST_1.txt	2/17/2015	12:15 PM
EX1502L1_BIST_1.txt	2/24/2015	11:03 AM
EX1502L1_BIST_2.txt	2/24/2015	12:54 PM
EX1502L1_BIST_3.txt	2/27/2015	5:47 PM
EX1502L1_BIST_4.txt	2/28/2015	3:25 PM
EX1502L1_BIST_5_runningEK80.txt	3/1/2015	10:27 AM
EX1502L1_BIST_6.txt	3/5/2015	1:24 AM
EX1502L1_BIST_7.txt	3/5/2015	11:22 PM
EX1502L1_BIST_8.txt	3/7/2015	6:12 PM
EX1502L1_BIST_9.txt	3/8/2015	4:21 PM
EX1502L1_BIST_FINAL.txt	3/11/2015	9:27 AM
PostEX1502L1_PUparameters.txt	3/11/2015	9:28 AM

Post-cruise PU parameters:

Saved: 2015.03.11 13:27:42

Sounder Type: 302, Serial no.: 101

Date Time Ser. No. BIST Result

2015.03.11 13:20:17.843 101 0 OK
Number of BSP67B boards: 2
BSP 1 Master 2.2.3 090702 4.3 070913 4.3 070913
BSP 1 Slave 2.2.3 090702 4.4 070911
BSP 1 RXI FPGA 3.6 080821
BSP 1 DSP FPGA A 4.0 070531
BSP 1 DSP FPGA B 4.0 070531
BSP 1 DSP FPGA C 4.0 070531
BSP 1 DSP FPGA D 4.0 070531
BSP 1 PCI TO SLAVE A1 FIFO: ok
BSP 1 PCI TO SLAVE A2 FIFO: ok
BSP 1 PCI TO SLAVE A3 FIFO: ok
BSP 1 PCI TO SLAVE B1 FIFO: ok
BSP 1 PCI TO SLAVE B2 FIFO: ok
BSP 1 PCI TO SLAVE B3 FIFO: ok
BSP 1 PCI TO SLAVE C1 FIFO: ok
BSP 1 PCI TO SLAVE C2 FIFO: ok
BSP 1 PCI TO SLAVE C3 FIFO: ok
BSP 1 PCI TO SLAVE D1 FIFO: ok
BSP 1 PCI TO SLAVE D2 FIFO: ok
BSP 1 PCI TO SLAVE D3 FIFO: ok
BSP 1 PCI TO MASTER A HPI: ok
BSP 1 PCI TO MASTER B HPI: ok
BSP 1 PCI TO MASTER C HPI: ok
BSP 1 PCI TO MASTER D HPI: ok
BSP 1 PCI TO SLAVE A1 HPI: ok
BSP 1 PCI TO SLAVE A2 HPI: ok
BSP 1 PCI TO SLAVE A3 HPI: ok

BSP 1 PCI TO SLAVE B1 HPI: ok
BSP 1 PCI TO SLAVE B2 HPI: ok
BSP 1 PCI TO SLAVE B3 HPI: ok
BSP 1 PCI TO SLAVE C1 HPI: ok
BSP 1 PCI TO SLAVE C2 HPI: ok
BSP 1 PCI TO SLAVE C3 HPI: ok
BSP 1 PCI TO SLAVE D1 HPI: ok
BSP 1 PCI TO SLAVE D2 HPI: ok
BSP 1 PCI TO SLAVE D3 HPI: ok
BSP 2 Master 2.2.3 090702 4.3 070913 4.3 070913
BSP 2 Slave 2.2.3 090702 4.4 070911
BSP 2 RXI FPGA 3.6 080821
BSP 2 DSP FPGA A 4.0 070531
BSP 2 DSP FPGA B 4.0 070531
BSP 2 DSP FPGA C 4.0 070531
BSP 2 DSP FPGA D 4.0 070531
BSP 2 PCI TO SLAVE A1 FIFO: ok
BSP 2 PCI TO SLAVE A2 FIFO: ok
BSP 2 PCI TO SLAVE A3 FIFO: ok
BSP 2 PCI TO SLAVE B1 FIFO: ok
BSP 2 PCI TO SLAVE B2 FIFO: ok
BSP 2 PCI TO SLAVE B3 FIFO: ok
BSP 2 PCI TO SLAVE C1 FIFO: ok
BSP 2 PCI TO SLAVE C2 FIFO: ok
BSP 2 PCI TO SLAVE C3 FIFO: ok
BSP 2 PCI TO SLAVE D1 FIFO: ok
BSP 2 PCI TO SLAVE D2 FIFO: ok
BSP 2 PCI TO SLAVE D3 FIFO: ok
BSP 2 PCI TO MASTER A HPI: ok
BSP 2 PCI TO MASTER B HPI: ok
BSP 2 PCI TO MASTER C HPI: ok
BSP 2 PCI TO MASTER D HPI: ok
BSP 2 PCI TO SLAVE A1 HPI: ok
BSP 2 PCI TO SLAVE A2 HPI: ok
BSP 2 PCI TO SLAVE A3 HPI: ok
BSP 2 PCI TO SLAVE B1 HPI: ok
BSP 2 PCI TO SLAVE B2 HPI: ok
BSP 2 PCI TO SLAVE B3 HPI: ok
BSP 2 PCI TO SLAVE C1 HPI: ok
BSP 2 PCI TO SLAVE C2 HPI: ok
BSP 2 PCI TO SLAVE C3 HPI: ok
BSP 2 PCI TO SLAVE D1 HPI: ok
BSP 2 PCI TO SLAVE D2 HPI: ok
BSP 2 PCI TO SLAVE D3 HPI: ok

Summary:

BSP 1: OK
BSP 2: OK

2015.03.11 13:20:20.694 101 1 OK
High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 120.5
0-3 120.1
0-4 120.5
0-5 120.1
0-6 120.5
0-7 119.7
0-8 119.3
0-9 120.1
0-10 120.5
0-11 119.3
0-12 119.7
0-13 119.7
0-14 120.9
0-15 120.1
0-16 120.9
0-17 119.3
0-18 119.7
0-19 120.5
0-20 120.1
0-21 120.1
0-22 119.7
0-23 120.5
0-24 118.8

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 120.1
0-3 120.1
0-4 119.7
0-5 119.7
0-6 119.7
0-7 120.1
0-8 119.3
0-9 120.5
0-10 120.1
0-11 120.1
0-12 120.1
0-13 118.9
0-14 120.5
0-15 120.5
0-16 120.5
0-17 120.1
0-18 120.1
0-19 120.9
0-20 120.5
0-21 120.1
0-22 119.7
0-23 120.1
0-24 119.3

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.9
0-3 11.9
0-4 11.8
0-5 11.9
0-6 11.8
0-7 11.8
0-8 11.8
0-9 11.8
0-10 11.9
0-11 11.8
0-12 11.8
0-13 11.8
0-14 11.8
0-15 11.9
0-16 11.9
0-17 11.8
0-18 11.8
0-19 11.8
0-20 11.8
0-21 11.9
0-22 11.8
0-23 11.8
0-24 11.8

Digital 3.3V

TX36 Spec: 2.8 - 3.5
0-1 3.3
0-2 3.3
0-3 3.3
0-4 3.3
0-5 3.3
0-6 3.3
0-7 3.3
0-8 3.3
0-9 3.3
0-10 3.3
0-11 3.3
0-12 3.3
0-13 3.3
0-14 3.3
0-15 3.3
0-16 3.3
0-17 3.3
0-18 3.3
0-19 3.3
0-20 3.3
0-21 3.3
0-22 3.3
0-23 3.3
0-24 3.3

Digital 2.5V

TX36 Spec: 2.4 - 2.6
0-1 2.5
0-2 2.5
0-3 2.5
0-4 2.5
0-5 2.5
0-6 2.5
0-7 2.5
0-8 2.5
0-9 2.5
0-10 2.5
0-11 2.5
0-12 2.5
0-13 2.5
0-14 2.5
0-15 2.5
0-16 2.5
0-17 2.5
0-18 2.5
0-19 2.5
0-20 2.5
0-21 2.5
0-22 2.5
0-23 2.5
0-24 2.5

Digital 1.5V

TX36 Spec: 1.4 - 1.6
0-1 1.5
0-2 1.5
0-3 1.5
0-4 1.5
0-5 1.5
0-6 1.5
0-7 1.5
0-8 1.5
0-9 1.5
0-10 1.5
0-11 1.5
0-12 1.5
0-13 1.5
0-14 1.5
0-15 1.5
0-16 1.5
0-17 1.5
0-18 1.5
0-19 1.5
0-20 1.5
0-21 1.5
0-22 1.5
0-23 1.5
0-24 1.5

Temperature

TX36 Spec: 15.0 - 75.0
0-1 38.8
0-2 36.0
0-3 35.6
0-4 34.8
0-5 35.2
0-6 36.4
0-7 36.8
0-8 37.2
0-9 36.4
0-10 33.6
0-11 32.0
0-12 33.6
0-13 37.2
0-14 35.6
0-15 36.8
0-16 36.0
0-17 37.2
0-18 36.8
0-19 38.0
0-20 38.0
0-21 37.6
0-22 36.4
0-23 37.6
0-24 38.8

Input Current 12V

TX36 Spec: 0.3 - 1.5
0-1 0.6
0-2 0.5
0-3 0.5
0-4 0.5
0-5 0.5
0-6 0.6
0-7 0.5
0-8 0.5
0-9 0.6
0-10 0.5
0-11 0.5
0-12 0.5
0-13 0.6
0-14 0.6
0-15 0.6
0-16 0.5
0-17 0.5

0-18 0.8
0-19 0.5
0-20 0.7
0-21 0.6
0-22 0.6
0-23 0.7
0-24 0.5

TX36 power test passed

IO TX PPC Embedded PPC Download
2.11 1.14 Mar 5 2007/1.07 May 7 2013/1.11

TX36 unique firmware test OK

2015.03.11 13:20:20.877 101 2 OK
Input voltage 12V

RX32 Spec: 11.0 - 13.0
7-1 11.6
7-2 11.7
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

Digital 3.3V

RX32 Spec: 2.8 - 3.5
7-1 3.3
7-2 3.3
7-3 3.3
7-4 3.3

Digital 2.5V

RX32 Spec: 2.4 - 2.6
7-1 2.5
7-2 2.5
7-3 2.4
7-4 2.5

Digital 1.5V

RX32 Spec: 1.4 - 1.6
7-1 1.5
7-2 1.5
7-3 1.5
7-4 1.5

Temperature

RX32 Spec: 15.0 - 75.0
7-1 42.0
7-2 44.0
7-3 43.0
7-4 37.0

Input Current 12V

RX32 Spec: 0.4 - 1.5
7-1 0.7
7-2 0.7
7-3 0.7
7-4 0.6

Input Current 6V

RX32 Spec: 2.4 - 3.3
7-1 2.7
7-2 2.7
7-3 2.8
7-4 2.8

RX32 power test passed

IO RX MB Embedded PPC Embedded PPC Download
1.12 1.14 May 5 2006/1.06 May 5 2006/1.07 Feb 18 2010/1.11

RX32 unique firmware test OK

2015.03.11 13:20:21.010 101 3 OK
High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.5
0-2 120.5
0-3 120.1
0-4 120.1
0-5 120.1
0-6 120.5
0-7 119.7
0-8 119.3
0-9 120.1
0-10 120.5
0-11 119.3
0-12 119.7
0-13 119.7
0-14 120.9
0-15 120.1
0-16 120.5
0-17 119.3
0-18 119.7
0-19 120.5
0-20 119.7
0-21 120.1
0-22 119.7
0-23 120.5
0-24 118.8

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 120.1
0-3 120.1
0-4 119.7
0-5 119.7
0-6 119.7
0-7 120.1
0-8 119.7
0-9 120.5
0-10 120.1
0-11 120.1
0-12 120.1
0-13 118.9
0-14 120.5
0-15 120.5
0-16 120.5
0-17 120.1
0-18 120.1
0-19 120.9
0-20 120.5
0-21 119.7
0-22 119.7
0-23 120.1
0-24 119.3

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.9
0-3 11.9
0-4 11.8
0-5 11.9
0-6 11.9
0-7 11.8
0-8 11.8
0-9 11.8
0-10 11.9
0-11 11.8
0-12 11.8
0-13 11.8
0-14 11.8
0-15 11.9
0-16 11.9
0-17 11.8
0-18 11.8
0-19 11.8
0-20 11.8
0-21 11.9
0-22 11.8
0-23 11.8
0-24 11.8

RX32 Spec: 11.0 - 13.0
7-1 11.6
7-2 11.7
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

TRU power test passed

2015.03.11 13:20:21.194 101 4 OK
EM 302 High Voltage Ramp Test
Test Voltage:20.00 Measured Voltage: 19.00 PASSED
Test Voltage:40.00 Measured Voltage: 38.00 PASSED
Test Voltage:60.00 Measured Voltage: 58.00 PASSED
Test Voltage:80.00 Measured Voltage: 79.00 PASSED
Test Voltage:100.00 Measured Voltage: 100.00 PASSED
Test Voltage:120.00 Measured Voltage: 119.00 PASSED
Test Voltage:120.00 Measured Voltage: 119.00 PASSED
Test Voltage:100.00 Measured Voltage: 106.00 PASSED
Test Voltage:80.00 Measured Voltage: 85.00 PASSED
Test Voltage:60.00 Measured Voltage: 64.00 PASSED
Test Voltage:40.00 Measured Voltage: 45.00 PASSED

11 of 11 tests OK

2015.03.11 13:22:57.053 101 5 OK

BSP 1 RXI TO RAW FIFO: ok
BSP 2 RXI TO RAW FIFO: ok

2015.03.11 13:23:02.537 101 6 OK
Receiver impedance limits [600.0 1000.0] ohm
Board 1 2 3 4
1: 852.3 841.2 816.7 853.0
2: 827.4 855.8 813.5 857.0
3: 804.9 839.3 841.6 852.2
4: 839.2 825.8 833.3 849.2
5: 839.9 833.1 791.5 861.6
6: 849.4 845.2 824.7 863.3
7: 826.5 844.4 822.4 866.9
8: 834.8 832.7 844.9 843.1
9: 367.7* 835.1 818.9 836.2
10: 809.5 850.7 781.2 851.1
11: 831.4 824.6 827.1 834.6
12: 837.8 815.3 843.5 377.0*
13: 834.4 824.3 809.0 848.5
14: 816.7 827.5 847.6 852.3
15: 814.6 838.3 840.5 846.4
16: 842.6 817.6 841.8 840.5
17: 817.0 0.0* 846.2 848.7
18: 839.6 816.5 849.0 857.9
19: 806.6 826.9 836.1 843.7
20: 819.7 863.3 840.0 851.0
21: 849.8 833.5 870.2 856.0
22: 867.7 841.9 824.2 856.2
23: 858.8 856.9 844.5 855.9
24: 872.2 880.1 863.3 866.5
25: 833.6 830.7 836.0 856.6
26: 835.3 819.0 841.2 851.5
27: 818.0 828.8 834.5 853.3
28: 804.3 827.7 806.6 852.0
29: 806.1 841.2 829.5 851.9
30: 846.0 818.9 838.8 853.5

31: 819.2 817.0 840.7 842.0
32: 843.0 869.1 850.4 856.6

Transducer impedance limits [250.0 2000.0] ohm
Board 1   2   3   4
 1: 325.8 348.8 354.9 356.1
 2: 346.2 347.5 353.8 353.6
 3: 333.5 335.7 360.1 344.0
 4: 332.8 349.0 369.0 347.5
 5: 327.0 360.3 362.7 335.6
 6: 316.0 338.8 345.2 347.8
 7: 330.2 343.3 379.9 355.0
 8: 324.7 331.1 353.4 356.5
 9: 152.1* 350.0 369.3 352.6
10: 349.1 342.4 365.7 346.0
11: 320.2 353.8 354.4 355.7
12: 330.3 357.6 349.2 145.8*
13: 327.6 337.4 370.9 340.5
14: 353.4 341.6 364.8 334.5
15: 321.1 337.1 363.2 329.8
16: 322.3 352.7 363.7 333.8
17: 322.2   0.0* 343.7 346.0
18: 338.1 344.3 357.0 350.9
19: 344.0 348.5 351.0 353.1
20: 340.8 335.7 352.5 335.2
21: 334.0 341.9 344.6 348.7
22: 346.4 350.7 368.2 344.6
23: 355.3 339.4 351.2 351.0
24: 350.2 350.2 348.0 333.8
25: 337.4 359.9 357.4 345.6
26: 341.8 363.4 357.3 350.3
27: 335.0 350.4 359.7 349.6
28: 352.2 357.4 360.5 334.0
29: 346.6 357.1 369.1 349.3
30: 324.2 340.7 343.7 361.0
31: 339.6 360.9 352.3 349.3
32: 332.5 348.7 349.7 348.3

Receiver Phase limits [-50.0 20.0] deg
Board 1   2   3   4
 1: -2.5   2.1   5.0   2.2
 2:   0.6   -5.3   3.8   0.9
 3:   4.1   -2.1   -0.7   0.1
 4: -1.6   1.8   1.0   0.4
 5: -1.2   1.1   5.1   -0.9
 6: -3.8   -2.5   0.4   -1.6
 7:   1.9   -0.8   3.6   -0.7
 8: -1.7   0.5   -3.4   0.9
 9:   0.4   2.2   3.2   1.9
10:   3.3   -3.4   6.7   -0.1
11: -2.5   2.2   -1.0   3.2
12: -0.8   2.2   -3.8   -0.5
13:   0.6   1.5   4.3   -0.7
14:   2.5   0.2   -0.5   -1.5
15:   1.2   -3.8   -1.3   0.4
16: -2.3   3.0   -1.6   -1.5
17:   0.7 123.9* -2.9   1.7
18: -3.3   4.3   -3.0   -1.9
19:   2.3   2.6   -3.7   2.6
20:   2.3   -3.6   -0.9   1.0
21: -0.4   2.5   -4.6   -1.8
22: -2.0   -1.7   1.8   -1.5
23:   0.3   -3.5   -0.2   -2.0
24: -2.7   -4.7   -3.7   -3.1
25: -0.6   1.7   1.4   0.4
26: -1.0   4.7   -3.1   -0.3
27:   1.9   -1.0   0.2   -0.6
28:   5.8   -0.9   2.4   -1.3
29:   2.9   1.5   0.8   0.3
30: -2.8   1.5   -1.4   1.6
31:   1.5   2.5   -0.9   3.2
32: -3.0   -4.7   -2.7   -0.5

Transducer Phase limits [-100.0 0.0] deg
Board 1   2   3   4
 1: -34.7 -38.7 -35.2 -34.1
 2: -37.2 -40.3 -32.6 -38.8
 3: -31.0 -42.3 -35.3 -36.4
 4: -38.4 -36.8 -38.4 -30.7
 5: -38.0 -39.3 -38.5 -32.4
 6: -36.5 -35.5 -35.9 -32.3
 7: -34.0 -40.1 -35.7 -33.3
 8: -36.6 -42.0 -42.4 -32.5
 9: -37.8 -35.8 -35.6 -34.3
10: -41.4 -39.7 -29.6 -29.3
11: -37.8 -39.0 -42.8 -32.2
12: -35.3 -37.3 -45.3 -33.6
13: -35.4 -42.6 -34.2 -36.9
14: -36.8 -44.1 -36.4 -33.6
15: -30.7 -47.1 -38.7 -25.4
16: -37.9 -37.2 -36.2 -33.6
17: -28.5 163.0* -41.4 -31.0
18: -34.1 -34.1 -39.7 -33.9
19: -35.1 -37.0 -37.1 -33.0
20: -33.3 -41.1 -41.3 -32.2
21: -33.1 -38.0 -36.4 -32.8
22: -36.3 -40.5 -33.0 -32.0
23: -35.6 -43.1 -34.8 -31.2
24: -36.5 -40.6 -39.9 -26.7
25: -29.8 -35.7 -36.3 -32.0
26: -41.2 -37.1 -35.6 -34.3
27: -32.4 -38.6 -35.6 -34.2
28: -36.1 -39.4 -34.1 -31.4
29: -37.4 -38.7 -38.9 -30.2
30: -34.1 -38.3 -39.5 -27.7
31: -40.0 -40.8 -35.5 -25.0
32: -39.7 -42.6 -36.9 -35.0
Rx Channels test passed

2015.03.11 13:23:30.672 101   7   OK
Tx Channels test passed

2015.03.11 13:26:11.681 101   8   OK
RX NOISE LEVEL

Board No: 1   2   3   4

 0:      46.9   41.7   42.5   41.6 dB
 1:      45.2   41.9   43.6   42.3 dB
 2:      44.3   42.4   43.5   42.2 dB
 3:      43.0   41.5   41.7   40.1 dB
 4:      42.9   43.6   42.7   42.2 dB
 5:      42.9   43.3   44.2   43.4 dB
 6:      43.5   44.0   45.2   40.6 dB
 7:      42.3   42.7   44.3   42.0 dB
 8:      50.6   45.3   44.9   42.9 dB
 9:      42.3   42.6   43.1   41.7 dB
10:      43.9   43.1   44.7   41.5 dB
11:      44.4   44.3   44.2   52.2 dB
12:      43.0   45.2   44.8   39.2 dB
13:      43.5   44.0   45.2   40.3 dB
14:      41.8   45.4   45.7   39.6 dB

15:	42.7	44.0	44.0	45.3	dB
16:	40.6	61.7	40.1	39.3	dB
17:	43.0	44.6	41.5	38.9	dB
18:	41.7	43.4	40.9	38.9	dB
19:	41.5	44.9	41.2	39.0	dB
20:	41.2	44.0	40.2	40.3	dB
21:	44.2	43.9	43.3	42.1	dB
22:	45.4	44.1	43.8	43.0	dB
23:	45.1	45.4	43.4	42.4	dB
24:	45.3	43.9	45.9	42.0	dB
25:	46.3	45.8	43.6	41.8	dB
26:	45.8	44.6	44.4	42.1	dB
27:	43.5	45.3	44.1	42.0	dB
28:	44.2	44.1	44.3	43.1	dB
29:	43.3	43.5	42.2	42.0	dB
30:	43.9	44.7	43.5	43.6	dB
31:	44.8	45.2	44.3	44.8	dB

Maximum noise at Board 2 Channel 16 Level: 61.7 dB

Broadband noise test

Average noise at Board 1 44.4 dB OK
Average noise at Board 2 48.5 dB OK
Average noise at Board 3 43.7 dB OK
Average noise at Board 4 43.1 dB OK

2015.03.11 13:26:18.515 101 9 OK
RX NOISE SPECTRUM

Board No:	1	2	3	4	
26.1 kHz:	48.6	62.7	44.6	52.1	dB
26.3 kHz:	43.2	42.6	43.0	44.6	dB
26.5 kHz:	43.5	43.0	43.3	43.9	dB
26.7 kHz:	43.1	43.8	43.8	44.4	dB
26.9 kHz:	43.0	43.2	43.3	44.3	dB
27.1 kHz:	45.5	46.5	46.9	46.2	dB
27.3 kHz:	47.8	49.4	50.1	48.2	dB
27.5 kHz:	42.4	44.2	44.3	44.6	dB
27.7 kHz:	43.5	44.4	44.6	44.4	dB
27.9 kHz:	44.0	44.2	44.6	44.1	dB
28.1 kHz:	43.4	44.4	44.5	44.2	dB
28.3 kHz:	48.9	50.8	51.4	49.6	dB
28.5 kHz:	46.3	47.9	48.7	46.3	dB
28.7 kHz:	43.7	44.0	44.5	43.6	dB
28.9 kHz:	42.8	43.5	43.9	42.8	dB
29.1 kHz:	42.2	42.1	41.5	41.1	dB
29.3 kHz:	41.2	40.8	40.7	41.0	dB
29.5 kHz:	41.5	41.7	41.7	41.0	dB
29.7 kHz:	42.0	41.0	41.2	40.8	dB
29.9 kHz:	41.2	41.4	40.9	40.5	dB
30.1 kHz:	42.0	40.6	41.2	40.4	dB
30.3 kHz:	41.8	41.9	41.5	40.8	dB
30.5 kHz:	42.2	40.4	40.6	40.9	dB
30.7 kHz:	41.5	41.3	40.4	40.1	dB
30.9 kHz:	42.0	40.7	40.0	40.9	dB
31.1 kHz:	41.7	40.4	40.3	40.2	dB
31.4 kHz:	41.4	40.6	40.4	40.4	dB
31.6 kHz:	41.9	40.7	40.1	40.9	dB
31.8 kHz:	40.7	40.9	40.7	40.8	dB
32.0 kHz:	41.8	40.6	40.1	40.9	dB
32.2 kHz:	40.5	40.8	40.7	41.0	dB
32.4 kHz:	41.9	40.2	40.7	41.0	dB
32.6 kHz:	40.6	40.3	40.4	40.6	dB
32.8 kHz:	40.7	39.4	40.1	40.7	dB
33.0 kHz:	40.4	39.4	39.7	40.8	dB
33.2 kHz:	39.9	38.7	39.1	41.3	dB
33.4 kHz:	39.8	38.9	39.0	41.1	dB
33.6 kHz:	39.7	37.8	39.2	40.6	dB
33.8 kHz:	45.4	38.1	39.9	40.9	dB
34.0 kHz:	51.0	39.0	42.3	42.8	dB

Maximum noise at Board 2 Frequency 26.1 kHz Level: 62.7 dB

Spectral noise test

Average noise at Board 1 43.9 dB OK
Average noise at Board 2 48.3 dB OK
Average noise at Board 3 43.7 dB OK
Average noise at Board 4 43.8 dB OK

2015.03.11 13:26:25.349 101 10 OK
CPU: KOM CP6011
Clock 1795 MHz
Die 37 oC (peak: 52 oC @ 2015-03-06 - 16:34:17)
Board 38 oC (peak: 47 oC @ 2015-03-06 - 22:46:24)
Core 1.34 V
3V3 3.30 V
12V 12.05 V
-12V -12.04 V
BATT 0.00 V
Primary network: 157.237.14.60:0xffff0000
Secondary network: 192.168.2.20:0xffffff00

2015.03.11 13:26:25.415 101 15 OK
EM 302
BSP67B Master: 2.2.3 090702
BSP67B Slave: 2.2.3 090702
CPU: 1.5.7 140129
DDS: 3.5.9 130926
DSV: 3.1.6 130104
RX32 version : Feb 18 2010 Rev 1.11
TX36 LC version : May 7 2013 Rev 1.11
VxWorks 5.5.1 Build 1.2/2-IX0100 May 16 2007, 11:31:17

Appendix E: EM 302 Final Built In System Test (BIST) Results

Saved: 2015.03.11 13:27:42

Sounder Type: 302, Serial no.: 101

Date Time Ser. No. BIST Result

2015.03.11 13:20:17.843 101 0 OK

Number of BSP67B boards: 2

BSP 1 Master 2.2.3 090702 4.3 070913 4.3 070913

BSP 1 Slave 2.2.3 090702 4.4 070911

BSP 1 RXI FPGA 3.6 080821

BSP 1 DSP FPGA A 4.0 070531

BSP 1 DSP FPGA B 4.0 070531

BSP 1 DSP FPGA C 4.0 070531

BSP 1 DSP FPGA D 4.0 070531

BSP 1 PCI TO SLAVE A1 FIFO: ok

BSP 1 PCI TO SLAVE A2 FIFO: ok

BSP 1 PCI TO SLAVE A3 FIFO: ok

BSP 1 PCI TO SLAVE B1 FIFO: ok

BSP 1 PCI TO SLAVE B2 FIFO: ok

BSP 1 PCI TO SLAVE B3 FIFO: ok

BSP 1 PCI TO SLAVE C1 FIFO: ok

BSP 1 PCI TO SLAVE C2 FIFO: ok

BSP 1 PCI TO SLAVE C3 FIFO: ok

BSP 1 PCI TO SLAVE D1 FIFO: ok

BSP 1 PCI TO SLAVE D2 FIFO: ok

BSP 1 PCI TO SLAVE D3 FIFO: ok

BSP 1 PCI TO MASTER A HPI: ok

BSP 1 PCI TO MASTER B HPI: ok

BSP 1 PCI TO MASTER C HPI: ok

BSP 1 PCI TO MASTER D HPI: ok

BSP 1 PCI TO SLAVE A1 HPI: ok

BSP 1 PCI TO SLAVE A2 HPI: ok

BSP 1 PCI TO SLAVE A3 HPI: ok

BSP 1 PCI TO SLAVE B1 HPI: ok

BSP 1 PCI TO SLAVE B2 HPI: ok

BSP 1 PCI TO SLAVE B3 HPI: ok

BSP 1 PCI TO SLAVE C1 HPI: ok

BSP 1 PCI TO SLAVE C2 HPI: ok

BSP 1 PCI TO SLAVE C3 HPI: ok

BSP 1 PCI TO SLAVE D1 HPI: ok

BSP 1 PCI TO SLAVE D2 HPI: ok

BSP 1 PCI TO SLAVE D3 HPI: ok

BSP 2 Master 2.2.3 090702 4.3 070913 4.3 070913

BSP 2 Slave 2.2.3 090702 4.4 070911

BSP 2 RXI FPGA 3.6 080821

BSP 2 DSP FPGA A 4.0 070531

BSP 2 DSP FPGA B 4.0 070531

BSP 2 DSP FPGA C 4.0 070531

BSP 2 DSP FPGA D 4.0 070531

BSP 2 PCI TO SLAVE A1 FIFO: ok

BSP 2 PCI TO SLAVE A2 FIFO: ok

BSP 2 PCI TO SLAVE A3 FIFO: ok

BSP 2 PCI TO SLAVE B1 FIFO: ok

BSP 2 PCI TO SLAVE B2 FIFO: ok

BSP 2 PCI TO SLAVE B3 FIFO: ok

BSP 2 PCI TO SLAVE C1 FIFO: ok

BSP 2 PCI TO SLAVE C2 FIFO: ok

BSP 2 PCI TO SLAVE C3 FIFO: ok

BSP 2 PCI TO SLAVE D1 FIFO: ok

BSP 2 PCI TO SLAVE D2 FIFO: ok

BSP 2 PCI TO SLAVE D3 FIFO: ok

BSP 2 PCI TO MASTER A HPI: ok

BSP 2 PCI TO MASTER B HPI: ok

BSP 2 PCI TO MASTER C HPI: ok

BSP 2 PCI TO MASTER D HPI: ok

BSP 2 PCI TO SLAVE A1 HPI: ok

BSP 2 PCI TO SLAVE A2 HPI: ok

BSP 2 PCI TO SLAVE A3 HPI: ok

BSP 2 PCI TO SLAVE B1 HPI: ok

BSP 2 PCI TO SLAVE B2 HPI: ok

BSP 2 PCI TO SLAVE B3 HPI: ok

BSP 2 PCI TO SLAVE C1 HPI: ok

BSP 2 PCI TO SLAVE C2 HPI: ok

BSP 2 PCI TO SLAVE C3 HPI: ok

BSP 2 PCI TO SLAVE D1 HPI: ok

BSP 2 PCI TO SLAVE D2 HPI: ok

BSP 2 PCI TO SLAVE D3 HPI: ok

Summary:

BSP 1: OK

BSP 2: OK

2015.03.11 13:20:20.694 101 1 OK

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0

0-1 120.9

0-2 120.5

0-3 120.1

0-4 120.5

0-5 120.1

0-6 120.5

0-7 119.7

0-8 119.3

0-9 120.1

0-10 120.5

0-11 119.3

0-12 119.7

0-13 119.7

0-14 120.9

0-15 120.1

0-16 120.9

0-17 119.3

0-18 119.7

0-19 120.5

0-20 120.1

0-21 120.1

0-22 119.7

0-23 120.5

0-24 118.8

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0

0-1 120.9

0-2 120.1

0-3 120.1
0-4 119.7
0-5 119.7
0-6 119.7
0-7 120.1
0-8 119.3
0-9 120.5
0-10 120.1
0-11 120.1
0-12 120.1
0-13 118.9
0-14 120.5
0-15 120.5
0-16 120.5
0-17 120.1
0-18 120.1
0-19 120.9
0-20 120.5
0-21 120.1
0-22 119.7
0-23 120.1
0-24 119.3

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.9
0-3 11.9
0-4 11.8
0-5 11.9
0-6 11.8
0-7 11.8
0-8 11.8
0-9 11.8
0-10 11.9
0-11 11.8
0-12 11.8
0-13 11.8
0-14 11.8
0-15 11.9
0-16 11.9
0-17 11.8
0-18 11.8
0-19 11.8
0-20 11.8
0-21 11.9
0-22 11.8
0-23 11.8
0-24 11.8

Digital 3.3V

TX36 Spec: 2.8 - 3.5
0-1 3.3
0-2 3.3
0-3 3.3
0-4 3.3
0-5 3.3
0-6 3.3
0-7 3.3
0-8 3.3
0-9 3.3
0-10 3.3
0-11 3.3
0-12 3.3
0-13 3.3
0-14 3.3
0-15 3.3
0-16 3.3
0-17 3.3
0-18 3.3
0-19 3.3
0-20 3.3
0-21 3.3
0-22 3.3
0-23 3.3
0-24 3.3

Digital 2.5V

TX36 Spec: 2.4 - 2.6
0-1 2.5
0-2 2.5
0-3 2.5
0-4 2.5
0-5 2.5
0-6 2.5
0-7 2.5
0-8 2.5
0-9 2.5
0-10 2.5
0-11 2.5
0-12 2.5
0-13 2.5
0-14 2.5
0-15 2.5
0-16 2.5
0-17 2.5
0-18 2.5
0-19 2.5
0-20 2.5
0-21 2.5
0-22 2.5
0-23 2.5
0-24 2.5

Digital 1.5V

TX36 Spec: 1.4 - 1.6
0-1 1.5
0-2 1.5
0-3 1.5
0-4 1.5
0-5 1.5
0-6 1.5
0-7 1.5
0-8 1.5
0-9 1.5
0-10 1.5
0-11 1.5
0-12 1.5
0-13 1.5
0-14 1.5
0-15 1.5
0-16 1.5
0-17 1.5
0-18 1.5
0-19 1.5
0-20 1.5
0-21 1.5
0-22 1.5
0-23 1.5
0-24 1.5

Temperature

TX36 Spec: 15.0 - 75.0
0-1 38.8
0-2 36.0
0-3 35.6
0-4 34.8
0-5 35.2
0-6 36.4
0-7 36.8
0-8 37.2
0-9 36.4
0-10 33.6
0-11 32.0
0-12 33.6
0-13 37.2
0-14 35.6
0-15 36.8
0-16 36.0
0-17 37.2
0-18 36.8
0-19 38.0
0-20 38.0
0-21 37.6
0-22 36.4
0-23 37.6
0-24 38.8

Input Current 12V

TX36 Spec: 0.3 - 1.5
0-1 0.6
0-2 0.5
0-3 0.5
0-4 0.5
0-5 0.5
0-6 0.6
0-7 0.5
0-8 0.5
0-9 0.6
0-10 0.5
0-11 0.5
0-12 0.5
0-13 0.6
0-14 0.6
0-15 0.6
0-16 0.5
0-17 0.5
0-18 0.8
0-19 0.5
0-20 0.7
0-21 0.6
0-22 0.6
0-23 0.7
0-24 0.5

TX36 power test passed

IO TX PPC Embedded PPC Download
2.11 1.14 Mar 5 2007/1.07 May 7 2013/1.11

TX36 unique firmware test OK

2015.03.11 13:20:20.877 101 2 OK
Input voltage 12V

RX32 Spec: 11.0 - 13.0
7-1 11.6
7-2 11.7
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

Digital 3.3V

RX32 Spec: 2.8 - 3.5
7-1 3.3
7-2 3.3
7-3 3.3
7-4 3.3

Digital 2.5V

RX32 Spec: 2.4 - 2.6
7-1 2.5
7-2 2.5
7-3 2.4
7-4 2.5

Digital 1.5V

RX32 Spec: 1.4 - 1.6
7-1 1.5
7-2 1.5
7-3 1.5
7-4 1.5

Temperature

RX32 Spec: 15.0 - 75.0
7-1 42.0
7-2 44.0
7-3 43.0
7-4 37.0

Input Current 12V

RX32 Spec: 0.4 - 1.5
7-1 0.7
7-2 0.7
7-3 0.7
7-4 0.6

Input Current 6V

RX32 Spec: 2.4 - 3.3

7-1 2.7
7-2 2.7
7-3 2.8
7-4 2.8

RX32 power test passed

IO RX MB Embedded PPC Embedded PPC Download
1.12 1.14 May 5 2006/1.06 May 5 2006/1.07 Feb 18 2010/1.11

RX32 unique firmware test OK

2015.03.11 13:20:21.010 101 3 OK
High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.5
0-2 120.5
0-3 120.1
0-4 120.1
0-5 120.1
0-6 120.5
0-7 119.7
0-8 119.3
0-9 120.1
0-10 120.5
0-11 119.3
0-12 119.7
0-13 119.7
0-14 120.9
0-15 120.1
0-16 120.5
0-17 119.3
0-18 119.7
0-19 120.5
0-20 119.7
0-21 120.1
0-22 119.7
0-23 120.5
0-24 118.8

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 120.1
0-3 120.1
0-4 119.7
0-5 119.7
0-6 119.7
0-7 120.1
0-8 119.7
0-9 120.5
0-10 120.1
0-11 120.1
0-12 120.1
0-13 118.9
0-14 120.5
0-15 120.5
0-16 120.5
0-17 120.1
0-18 120.1
0-19 120.9
0-20 120.5
0-21 119.7
0-22 119.7
0-23 120.1
0-24 119.3

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.9
0-3 11.9
0-4 11.8
0-5 11.9
0-6 11.9
0-7 11.8
0-8 11.8
0-9 11.8
0-10 11.9
0-11 11.8
0-12 11.8
0-13 11.8
0-14 11.8
0-15 11.9
0-16 11.9
0-17 11.8
0-18 11.8
0-19 11.8
0-20 11.8
0-21 11.9
0-22 11.8
0-23 11.8
0-24 11.8

RX32 Spec: 11.0 - 13.0
7-1 11.6
7-2 11.7
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

TRU power test passed

2015.03.11 13:20:21.194 101 4 OK
EM 302 High Voltage Ramp Test
Test Voltage:20.00 Measured Voltage: 19.00 PASSED
Test Voltage:40.00 Measured Voltage: 38.00 PASSED
Test Voltage:60.00 Measured Voltage: 58.00 PASSED
Test Voltage:80.00 Measured Voltage: 79.00 PASSED
Test Voltage:100.00 Measured Voltage: 100.00 PASSED
Test Voltage:120.00 Measured Voltage: 119.00 PASSED
Test Voltage:120.00 Measured Voltage: 119.00 PASSED

Test Voltage:100.00 Measured Voltage: 106.00 PASSED
Test Voltage:80.00 Measured Voltage: 85.00 PASSED
Test Voltage:60.00 Measured Voltage: 64.00 PASSED
Test Voltage:40.00 Measured Voltage: 45.00 PASSED

11 of 11 tests OK

2015.03.11 13:22:57.053 101 5 OK

BSP 1 RXI TO RAW FIFO: ok
BSP 2 RXI TO RAW FIFO: ok

2015.03.11 13:23:02.537 101 6 OK
Receiver impedance limits [600.0 1000.0] ohm
Board 1 2 3 4
 1: 852.3 841.2 816.7 853.0
 2: 827.4 855.8 813.5 857.0
 3: 804.9 839.3 841.6 852.2
 4: 839.2 825.8 833.3 849.2
 5: 839.9 833.1 791.5 861.6
 6: 849.4 845.2 824.7 863.3
 7: 826.5 844.4 822.4 866.9
 8: 834.8 832.7 844.9 843.1
 9: 367.7* 835.1 818.9 836.2
10: 809.5 850.7 781.2 851.1
11: 831.4 824.6 827.1 834.6
12: 837.8 815.3 843.5 377.0*
13: 834.4 824.3 809.0 848.5
14: 816.7 827.5 847.6 852.3
15: 814.6 838.3 840.5 846.4
16: 842.6 817.6 841.8 840.5
17: 817.0 0.0* 846.2 848.7
18: 839.6 816.5 849.0 857.9
19: 806.6 826.9 836.1 843.7
20: 819.7 863.3 840.0 851.0
21: 849.8 833.5 870.2 856.0
22: 867.7 841.9 824.2 856.2
23: 858.8 856.9 844.5 855.9
24: 872.2 880.1 863.3 866.5
25: 833.6 830.7 836.0 856.6
26: 835.3 819.0 841.2 851.5
27: 818.0 828.8 834.5 853.3
28: 804.3 827.7 806.6 852.0
29: 806.1 841.2 829.5 851.9
30: 846.0 818.9 838.8 853.5
31: 819.2 817.0 840.7 842.0
32: 843.0 869.1 850.4 856.6

Transducer impedance limits [250.0 2000.0] ohm
Board 1 2 3 4
 1: 325.8 348.8 354.9 356.1
 2: 346.2 347.5 353.8 353.6
 3: 333.5 335.7 360.1 344.0
 4: 332.8 349.0 369.0 347.5
 5: 327.0 360.3 362.7 335.6
 6: 316.0 338.8 345.2 347.8
 7: 330.2 343.3 379.9 355.0
 8: 324.7 331.1 353.4 356.5
 9: 152.1* 350.0 369.3 352.6
10: 349.1 342.4 365.7 346.0
11: 320.2 353.8 354.4 355.7
12: 330.3 357.6 349.2 145.8*
13: 327.6 337.4 370.9 340.5
14: 353.4 341.6 364.8 334.5
15: 321.1 337.1 363.2 329.8
16: 322.3 352.7 363.7 333.8
17: 322.2 0.0* 343.7 346.0
18: 338.1 344.3 357.0 350.9
19: 344.0 348.5 351.0 353.1
20: 340.8 335.7 352.5 335.2
21: 334.0 341.9 344.6 348.7
22: 346.4 350.7 368.2 344.6
23: 355.3 339.4 351.2 351.0
24: 350.2 350.2 348.0 333.8
25: 337.4 359.9 357.4 345.6
26: 341.8 363.4 357.3 350.3
27: 335.0 350.4 359.7 349.6
28: 352.2 357.4 360.5 334.0
29: 346.6 357.1 369.1 349.3
30: 324.2 340.7 343.7 361.0
31: 339.6 360.9 352.3 349.3
32: 332.5 348.7 349.7 348.3

Receiver Phase limits [-50.0 20.0] deg
Board 1 2 3 4
 1: -2.5 2.1 5.0 2.2
 2: 0.6 -5.3 3.8 0.9
 3: 4.1 -2.1 -0.7 0.1
 4: -1.6 1.8 1.0 0.4
 5: -1.2 1.1 5.1 -0.9
 6: -3.8 -2.5 0.4 -1.6
 7: 1.9 -0.8 3.6 -0.7
 8: -1.7 0.5 -3.4 0.9
 9: 0.4 2.2 3.2 1.9
10: 3.3 -3.4 6.7 -0.1
11: -2.5 2.2 -1.0 3.2
12: -0.8 2.2 -3.8 -0.5
13: 0.6 1.5 4.3 -0.7
14: 2.5 0.2 -0.5 -1.5
15: 1.2 -3.8 -1.3 0.4
16: -2.3 3.0 -1.6 -1.5
17: 0.7 123.9* -2.9 1.7
18: -3.3 4.3 -3.0 -1.9
19: 2.3 2.6 -3.7 2.6
20: 2.3 -3.6 -0.9 1.0
21: -0.4 2.5 -4.6 -1.8
22: -2.0 -1.7 1.8 -1.5
23: 0.3 -3.5 -0.2 -2.0
24: -2.7 -4.7 -3.7 -3.1
25: -0.6 1.7 1.4 0.4
26: -1.0 4.7 -3.1 -0.3
27: 1.9 -1.0 0.2 -0.6
28: 5.8 -0.9 2.4 -1.3
29: 2.9 1.5 0.8 0.3
30: -2.8 1.5 -1.4 1.6
31: 1.5 2.5 -0.9 3.2
32: -3.0 -4.7 -2.7 -0.5

Transducer Phase limits [-100.0 0.0] deg
Board 1 2 3 4
 1: -34.7 -38.7 -35.2 -34.1
 2: -37.2 -40.3 -32.6 -38.8
 3: -31.0 -42.3 -35.3 -36.4
 4: -38.4 -36.8 -38.4 -30.7
 5: -38.0 -39.3 -38.5 -32.4
 6: -36.5 -35.5 -35.9 -32.3
 7: -34.0 -40.1 -35.7 -33.3
 8: -36.6 -42.0 -42.4 -32.5
 9: -37.8 -35.8 -35.6 -34.3
10: -41.4 -39.7 -29.6 -29.3
11: -37.8 -39.0 -42.8 -32.2
12: -35.3 -37.3 -45.3 -33.6

13: -35.4 -42.6 -34.2 -36.9
14: -36.8 -44.1 -36.4 -33.6
15: -30.7 -47.1 -38.7 -25.4
16: -37.9 -37.2 -36.2 -33.6
17: -28.5 163.0* -41.4 -31.0
18: -34.1 -34.1 -39.7 -33.9
19: -35.1 -37.0 -37.1 -33.0
20: -33.3 -41.1 -41.3 -32.2
21: -33.1 -38.0 -36.4 -32.8
22: -36.3 -40.5 -33.0 -32.0
23: -35.6 -43.1 -34.8 -31.2
24: -36.5 -40.6 -39.9 -26.7
25: -29.8 -35.7 -36.3 -32.0
26: -41.2 -37.1 -35.6 -34.3
27: -32.4 -38.6 -35.6 -34.2
28: -36.1 -39.4 -34.1 -31.4
29: -37.4 -38.7 -38.9 -30.2
30: -34.1 -38.3 -39.5 -27.7
31: -40.0 -40.8 -35.5 -25.0
32: -39.7 -42.6 -36.9 -35.0
Rx Channels test passed

2015.03.11 13:23:30.672 101 7 OK
Tx Channels test passed

2015.03.11 13:26:11.681 101 8 OK
RX NOISE LEVEL

Board No: 1 2 3 4

0:	46.9	41.7	42.5	41.6	dB
1:	45.2	41.9	43.6	42.3	dB
2:	44.3	42.4	43.5	42.2	dB
3:	43.0	41.5	41.7	40.1	dB
4:	42.9	43.6	42.7	42.2	dB
5:	42.9	43.3	44.2	43.4	dB
6:	43.5	44.0	45.2	40.6	dB
7:	42.3	42.7	44.3	42.0	dB
8:	50.6	45.3	44.9	42.9	dB
9:	42.3	42.6	43.1	41.7	dB
10:	43.9	43.1	44.7	41.5	dB
11:	44.4	44.3	44.2	52.2	dB
12:	43.0	45.2	44.8	39.2	dB
13:	43.5	44.0	45.2	40.3	dB
14:	41.8	45.4	45.7	39.6	dB
15:	42.7	44.0	44.0	45.3	dB
16:	40.6	61.7	40.1	39.3	dB
17:	43.0	44.6	41.5	38.9	dB
18:	41.7	43.4	40.9	38.9	dB
19:	41.5	44.9	41.2	39.0	dB
20:	41.2	44.0	40.2	40.3	dB
21:	44.2	43.9	43.3	42.1	dB
22:	45.4	44.1	43.8	43.0	dB
23:	45.1	45.4	43.4	42.4	dB
24:	45.3	43.9	45.9	42.0	dB
25:	46.3	45.8	43.6	41.8	dB
26:	45.8	44.6	44.4	42.1	dB
27:	43.5	45.3	44.1	42.0	dB
28:	44.2	44.1	44.3	43.1	dB
29:	43.3	43.5	42.2	42.0	dB
30:	43.9	44.7	43.5	43.6	dB
31:	44.8	45.2	44.3	44.8	dB

Maximum noise at Board 2 Channel 16 Level: 61.7 dB

Broadband noise test

Average noise at Board 1 44.4 dB OK
Average noise at Board 2 48.5 dB OK
Average noise at Board 3 43.7 dB OK
Average noise at Board 4 43.1 dB OK

2015.03.11 13:26:18.515 101 9 OK
RX NOISE SPECTRUM

Board No: 1 2 3 4

26.1 kHz:	48.6	62.7	44.6	52.1	dB
26.3 kHz:	43.2	42.6	43.0	44.6	dB
26.5 kHz:	43.5	43.0	43.3	43.9	dB
26.7 kHz:	43.1	43.8	43.8	44.4	dB
26.9 kHz:	43.0	43.2	43.3	44.3	dB
27.1 kHz:	45.5	46.5	46.9	46.2	dB
27.3 kHz:	47.8	49.4	50.1	48.2	dB
27.5 kHz:	42.4	44.2	44.3	44.6	dB
27.7 kHz:	43.5	44.4	44.6	44.4	dB
27.9 kHz:	44.0	44.2	44.6	44.1	dB
28.1 kHz:	43.4	44.4	44.5	44.2	dB
28.3 kHz:	48.9	50.8	51.4	49.6	dB
28.5 kHz:	46.3	47.9	48.7	46.3	dB
28.7 kHz:	43.7	44.0	44.5	43.6	dB
28.9 kHz:	42.8	43.5	43.9	42.8	dB
29.1 kHz:	42.2	42.1	41.5	41.1	dB
29.3 kHz:	41.2	40.8	40.7	41.0	dB
29.5 kHz:	41.5	41.7	41.7	41.0	dB
29.7 kHz:	42.0	41.0	41.2	40.8	dB
29.9 kHz:	41.2	41.4	40.9	40.5	dB
30.1 kHz:	42.0	40.6	41.2	40.4	dB
30.3 kHz:	41.8	41.9	41.5	40.8	dB
30.5 kHz:	42.2	40.4	40.6	40.9	dB
30.7 kHz:	41.5	41.3	40.4	40.1	dB
30.9 kHz:	42.0	40.7	40.0	40.9	dB
31.1 kHz:	41.7	40.4	40.3	40.2	dB
31.4 kHz:	41.4	40.6	40.4	40.4	dB
31.6 kHz:	41.9	40.7	40.1	40.9	dB
31.8 kHz:	40.7	40.9	40.7	40.8	dB
32.0 kHz:	41.8	40.6	40.1	40.9	dB
32.2 kHz:	40.5	40.8	40.7	41.0	dB
32.4 kHz:	41.9	40.2	40.7	41.0	dB
32.6 kHz:	40.6	40.3	40.4	40.6	dB
32.8 kHz:	40.7	39.4	40.1	40.7	dB
33.0 kHz:	40.4	39.4	39.7	40.8	dB
33.2 kHz:	39.9	38.7	39.1	41.3	dB
33.4 kHz:	39.8	38.9	39.0	41.1	dB
33.6 kHz:	39.7	37.8	39.2	40.6	dB
33.8 kHz:	45.4	38.1	39.9	40.9	dB
34.0 kHz:	51.0	39.0	42.3	42.8	dB

Maximum noise at Board 2 Frequency 26.1 kHz Level: 62.7 dB

Spectral noise test

Average noise at Board 1 43.9 dB OK
Average noise at Board 2 48.3 dB OK
Average noise at Board 3 43.7 dB OK
Average noise at Board 4 43.8 dB OK

2015.03.11 13:26:25.349 101 10 OK
CPU: KOM CP6011
Clock 1795 MHz
Die 37 oC (peak: 52 oC @ 2015-03-06 - 16:34:17)
Board 38 oC (peak: 47 oC @ 2015-03-06 - 22:46:24)
Core 1.34 V

DSV: 3.1.6 130104
RX32 version : Feb 18 2010 Rev 1.11
TX36 LC version : May 7 2013 Rev 1.11
VxWorks 5.5.1 Build 1.2/2-IX0100 May 16 2007, 11:31:17

3V3 3.30 V
12V 12.05 V
-12V -12.04 V
BATT 0.00 V
Primary network: 157.237.14.60:0xffff0000
Secondary network: 192.168.2.20:0xffffff00

2015.03.11 13:26:25.415 101 15 OK
EM 302

BSP67B Master: 2.2.3 090702
BSP67B Slave: 2.2.3 090702
CPU: 1.5.7 140129
DDS: 3.5.9 130926
DSV: 3.1.6 130104
RX32 version : Feb 18 2010 Rev 1.11
TX36 LC version : May 7 2013 Rev 1.11
VxWorks 5.5.1 Build 1.2/2-IX0100 May 16 2007, 11:31:17

Appendix E: Data Tables

NOTE: Local ship time was EST (UTC -5) from 2/24/2015 to 3/2/2015 0200. Ship time changed to AST (UTC -4) on 3/2/2015 0200 and remained in AST for the remainder of the cruise.

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0000_20150224_194051_EX1502L1_MB	XBT 001	10.8	144.7	2015-02-24	19:40:51.378	20:11:00.883	071-07-48.77W	071-03-22.85W	40-48-52.69N	40-53-19.25N
0001_20150224_201051_EX1502L1_MB	XBT 001	10.8	144.7	2015-02-24	20:10:41.385	21:11:00.399	071-03-34.46W	070-54-53.02W	40-40-10.29N	40-48-58.83N
0002_20150224_211051_EX1502L1_MB	XBT 001	10.7	159.4	2015-02-24	21:10:41.399	22:11:00.415	070-55-07.74W	070-49-47.60W	40-30-43.87N	40-40-18.35N
0003_20150224_221051_EX1502L1_MB	XBT 001	10.8	181.1	2015-02-24	22:10:41.912	22:37:11.418	070-50-12.63W	070-49-45.69W	40-25-59.56N	40-30-43.88N
0004_20150224_223701_EX1502L1_MB	XBT 002	10.6	155.4	2015-02-24	22:36:52.418	23:37:11.432	070-50-14.89W	070-44-40.05W	40-17-34.93N	40-25-59.82N
0005_20150224_233702_EX1502L1_MB	XBT 002	10.4	120.9	2015-02-24	23:36:52.436	00:03:05.936	070-44-53.87W	070-39-33.46W	40-15-19.95N	40-17-51.51N
0006_20150225_000306_EX1502L1_MB	XBT 002	10.3	119.4	2015-02-25	00:02:56.438	01:03:15.945	070-39-47.37W	070-27-42.71W	40-10-24.57N	40-15-38.09N
0007_20150225_010306_EX1502L1_MB	XBT 002	10.5	119.9	2015-02-25	01:02:56.950	02:03:15.956	070-27-56.58W	070-15-43.74W	40-05-13.69N	40-10-44.43N
0008_20150225_020306_EX1502L1_MB	XBT 002	9.9	119.6	2015-02-25	02:02:56.957	03:03:06.470	070-16-01.29W	070-04-27.68W	40-00-31.77N	40-05-41.00N
0009_20150225_030306_EX1502L1_MB	XBT 002	9.6	119.6	2015-02-25	03:02:57.468	04:03:16.482	070-04-43.61W	069-53-31.49W	39-55-46.90N	40-00-52.41N
0010_20150225_040306_EX1502L1_MB	XBT 002	9.4	119.8	2015-02-25	04:02:56.984	04:09:47.480	069-53-54.62W	069-52-16.90W	39-55-09.15N	39-56-17.88N
0011_20150225_073410_EX1502L1_MB	XBT 003	9.2	219.3	2015-02-25	07:34:11.020	08:34:21.533	069-45-28.07W	069-35-39.16W	39-38-24.13N	39-46-37.34N
0012_20150225_083411_EX1502L1_MB	XBT 003	9.3	218.7	2015-02-25	08:34:02.534	09:34:18.549	069-53-33.64W	069-42-36.65W	39-30-43.99N	39-39-56.40N
0013_20150225_093409_EX1502L1_MB	XBT 003	10.3	219.0	2015-02-25	09:33:59.550	10:34:10.063	070-01-32.39W	069-49-38.93W	39-22-52.36N	39-33-02.19N
0014_20150225_103410_EX1502L1_MB	XBT 003	10.9	219.1	2015-02-25	10:34:01.061	11:34:23.074	070-10-19.36W	069-58-07.60W	39-14-00.55N	39-24-46.05N
0015_20150225_113413_EX1502L1_MB	XBT 004	10.6	219.1	2015-02-25	11:34:03.579	12:34:22.091	070-18-56.66W	070-06-49.23W	39-05-44.64N	39-16-33.62N
0016_20150225_123412_EX1502L1_MB	XBT 004	10.8	219.1	2015-02-25	12:34:02.591	13:34:17.604	070-27-23.11W	070-15-24.17W	38-57-15.27N	39-08-09.24N
0017_20150225_133407_EX1502L1_MB	XBT 004	10.6	219.4	2015-02-25	13:33:58.608	14:34:23.145	070-35-44.27W	070-24-03.16W	38-48-52.15N	38-59-37.55N
0018_20150225_143413_EX1502L1_MB	XBT 004	10.9	219.7	2015-02-25	14:34:03.623	14:44:08.139	070-37-12.25W	070-32-28.85W	38-47-33.85N	38-51-24.40N
0019_20150225_144359_EX1502L1_MB	XBT 005	10.0	230.6	2015-02-25	14:43:49.142	14:51:40.138	070-38-50.22W	070-33-54.20W	38-46-03.42N	38-49-59.57N
0020_20150225_145131_EX1502L1_MB	XBT 005	7.6	42.1	2015-02-25	14:51:22.138	14:51:40.138	070-38-35.05W	070-34-38.00W	38-47-15.65N	38-48-57.40N
0021_20150225_151507_EX1502L1_MB	XBT 005	11.0	218.9	2015-02-25	15:15:08.146	16:15:08.146	070-46-09.44W	070-33-56.37W	38-38-50.48N	38-49-34.27N
0022_20150225_161508_EX1502L1_MB	XBT 005	10.7	219.5	2015-02-25	16:14:59.143	17:15:13.661	070-54-36.94W	070-42-51.88W	38-30-29.41N	38-41-02.04N
0023_20150225_171504_EX1502L1_MB	XBT 005	10.3	219.6	2015-02-25	17:14:54.660	18:15:13.673	071-02-54.20W	070-51-22.47W	38-22-15.50N	38-32-30.33N
0024_20150225_181504_EX1502L1_MB	XBT 005	9.8	219.6	2015-02-25	18:14:54.671	19:15:05.687	071-10-23.60W	070-59-48.02W	38-14-23.89N	38-24-29.23N
0025_20150225_191505_EX1502L1_MB	XBT 005	8.0	219.8	2015-02-25	19:14:56.686	19:53:47.195	071-14-12.84W	071-07-22.35W	38-10-14.11N	38-16-58.06N
0026_20150225_195337_EX1502L1_MB	XBT 006	7.3	219.8	2015-02-25	19:53:28.194	20:53:29.209	071-20-02.87W	071-11-37.58W	38-04-31.58N	38-12-58.71N
0027_20150225_205329_EX1502L1_MB	XBT 006	7.3	219.8	2015-02-25	20:53:19.709	21:53:41.725	071-25-55.70W	071-17-17.24W	37-58-48.78N	38-07-12.13N
0028_20150225_215331_EX1502L1_MB	XBT 006	7.3	219.9	2015-02-25	21:53:22.721	22:53:43.739	071-31-43.70W	071-22-48.81W	37-53-03.92N	38-01-29.76N
0029_20150225_225334_EX1502L1_MB	XBT 006	7.5	219.9	2015-02-25	22:53:24.737	23:49:56.749	071-37-20.83W	071-28-33.75W	37-47-38.00N	37-55-41.33N
0030_20150225_234946_EX1502L1_MB	XBT 007	7.6	219.9	2015-02-25	23:49:37.749	00:00:09.758	071-38-24.28W	071-34-00.30W	37-46-33.53N	37-50-03.88N
0031_20150226_000010_EX1502L1_MB	XBT 007	7.9	219.9	2015-02-26	00:00:00.756	01:00:14.770	071-44-32.94W	071-35-00.16W	37-40-25.82N	37-49-05.47N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0032_20150226_010005_EX1502L1_MB	XBT 007	8.3	220.1	2015-02-26	00:59:55.771	02:00:17.285	071-50-57.47W	071-41-05.78W	37-34-04.11N	37-42-57.00N
0033_20150226_020008_EX1502L1_MB	XBT 007	8.1	220.1	2015-02-26	01:59:58.284	03:00:16.800	071-57-23.17W	071-47-38.58W	37-27-40.61N	37-36-17.60N
0034_20150226_030007_EX1502L1_MB	XBT 007	7.8	220.2	2015-02-26	02:59:57.799	04:00:16.814	072-03-18.61W	071-53-52.48W	37-21-31.76N	37-29-59.42N
0035_20150226_040007_EX1502L1_MB	XBT 008	8.2	220.2	2015-02-26	03:59:57.815	05:00:04.830	072-09-42.17W	072-00-01.93W	37-15-03.16N	37-23-53.28N
0036_20150226_050005_EX1502L1_MB	XBT 008	8.4	220.3	2015-02-26	04:59:55.830	06:00:20.840	072-16-17.43W	072-06-25.43W	37-08-26.53N	37-17-26.46N
0037_20150226_060011_EX1502L1_MB	XBT 008	8.9	220.4	2015-02-26	06:00:02.339	07:00:16.359	072-23-06.03W	072-12-54.00W	37-01-32.51N	37-10-57.99N
0038_20150226_070006_EX1502L1_MB	XBT 008	9.3	220.4	2015-02-26	06:59:57.359	08:00:06.371	072-30-16.83W	072-19-46.04W	36-54-21.52N	37-03-59.20N
0039_20150226_080006_EX1502L1_MB	XBT 008	9.5	220.5	2015-02-26	07:59:57.370	09:00:13.884	072-37-35.62W	072-26-53.16W	36-46-55.84N	36-56-37.13N
0040_20150226_090004_EX1502L1_MB	XBT 009	9.9	220.5	2015-02-26	08:59:54.883	10:00:20.901	072-45-10.23W	072-34-09.99W	36-39-11.95N	36-49-11.12N
0041_20150226_100011_EX1502L1_MB	XBT 009	9.9	220.6	2015-02-26	10:00:01.898	11:00:04.917	072-52-51.22W	072-41-47.83W	36-31-28.77N	36-41-24.99N
0042_20150226_110005_EX1502L1_MB	XBT 009	9.8	220.7	2015-02-26	10:59:55.417	12:00:03.427	073-00-04.31W	072-49-15.77W	36-23-50.13N	36-33-42.59N
0043_20150226_120003_EX1502L1_MB	XBT 009	9.6	228.1	2015-02-26	12:00:03.928	13:00:07.445	073-07-58.29W	072-57-10.28W	36-16-54.22N	36-24-52.81N
0044_20150226_130007_EX1502L1_MB	XBT 009	9.0	238.6	2015-02-26	13:00:07.948	14:00:07.961	073-17-57.13W	073-06-00.56W	36-12-17.89N	36-19-33.99N
0045_20150226_140008_EX1502L1_MB	XBT 010	9.2	230.6	2015-02-26	13:59:58.961	15:00:15.978	073-26-08.11W	073-14-28.46W	36-06-19.21N	36-14-21.31N
0046_20150226_150006_EX1502L1_MB	XBT 010	8.3	223.9	2015-02-26	14:59:56.975	16:00:14.490	073-32-50.93W	073-22-39.28W	36-00-00.04N	36-08-22.31N
0047_20150226_160005_EX1502L1_MB	XBT 010	9.3	220.8	2015-02-26	15:59:55.490	17:00:04.508	073-39-48.03W	073-29-30.65W	35-52-53.90N	36-02-11.45N
0048_20150226_170004_EX1502L1_MB	XBT 010	8.6	217.7	2015-02-26	16:59:55.006	18:00:18.524	073-45-19.72W	073-36-27.71W	35-46-20.82N	35-54-45.16N
0049_20150226_180009_EX1502L1_MB	XBT 010	8.3	216.1	2015-02-26	17:59:59.522	19:00:03.042	073-51-12.42W	073-42-51.90W	35-39-26.90N	35-47-23.96N
0050_20150226_190003_EX1502L1_MB	XBT 010	8.3	216.2	2015-02-26	19:00:03.542	20:00:09.060	073-56-53.41W	073-48-18.89W	35-32-18.63N	35-40-46.39N
0051_20150226_200009_EX1502L1_MB	XBT 010	8.5	210.2	2015-02-26	19:59:59.562	21:00:13.074	074-01-39.42W	073-53-22.27W	35-25-07.77N	35-33-59.65N
0052_20150226_210003_EX1502L1_MB	XBT 010	8.8	204.8	2015-02-26	20:59:53.573	22:00:03.095	074-05-47.31W	073-58-22.55W	35-16-53.50N	35-26-13.47N
0053_20150226_220003_EX1502L1_MB	XBT 010	9.2	203.5	2015-02-26	21:59:54.090	23:00:16.611	074-09-43.70W	074-02-11.13W	35-08-15.57N	35-18-16.46N
0054_20150226_230007_EX1502L1_MB	XBT 010	9.5	202.5	2015-02-26	22:59:57.610	00:00:07.622	074-13-22.14W	074-06-03.19W	34-59-40.74N	35-09-37.53N
0055_20150227_000008_EX1502L1_MB	XBT 010	10.2	186.4	2015-02-26	23:59:58.142	01:00:18.143	074-15-30.74W	074-09-52.97W	34-49-31.15N	35-00-22.51N
0056_20150227_010008_EX1502L1_MB	XBT 010	10.7	160.7	2015-02-27	00:59:58.641	02:00:08.156	074-14-27.26W	074-06-19.14W	34-39-42.24N	34-50-44.62N
0057_20150227_020008_EX1502L1_MB	XBT 010	10.7	167.6	2015-02-27	01:59:58.659	03:00:09.671	074-09-30.64W	074-03-04.02W	34-29-32.54N	34-40-50.69N
0058_20150227_030010_EX1502L1_MB	XBT 010	10.3	160.7	2015-02-27	03:00:10.171	04:00:12.689	074-06-00.72W	073-57-56.83W	34-20-01.24N	34-30-12.45N
0059_20150227_040003_EX1502L1_MB	XBT 010	10.1	158.8	2015-02-27	03:59:53.690	05:00:20.204	074-01-20.00W	073-52-55.78W	34-10-50.65N	34-21-25.65N
0060_20150227_050010_EX1502L1_MB	XBT 010	9.9	158.7	2015-02-27	05:00:00.705	06:00:08.218	073-56-44.89W	073-48-17.77W	34-01-37.97N	34-12-03.68N
0061_20150227_060008_EX1502L1_MB	XBT 010	9.8	158.6	2015-02-27	05:59:59.216	07:00:20.734	073-51-36.42W	073-43-28.75W	33-52-49.02N	34-03-03.22N
0062_20150227_070011_EX1502L1_MB	XBT 010	9.9	158.4	2015-02-27	07:00:01.733	08:00:21.747	073-46-57.09W	073-38-19.70W	33-43-50.96N	33-53-57.80N
0063_20150227_080012_EX1502L1_MB	XBT 010	10.1	158.5	2015-02-27	08:00:02.749	09:00:22.262	073-42-23.12W	073-33-39.52W	33-34-38.47N	33-44-53.25N
0064_20150227_090012_EX1502L1_MB	XBT 010	10.1	158.5	2015-02-27	09:00:02.766	10:00:04.280	073-37-05.07W	073-28-58.50W	33-25-27.84N	33-35-40.70N
0065_20150227_100004_EX1502L1_MB	XBT 010	9.8	157.9	2015-02-27	10:00:04.781	11:00:19.796	073-31-56.86W	073-23-49.10W	33-16-33.19N	33-26-16.21N
0066_20150227_110010_EX1502L1_MB	XBT 010	10.2	158.8	2015-02-27	11:00:00.792	12:00:10.306	073-27-25.33W	073-18-57.41W	33-07-12.17N	33-17-33.12N
0067_20150227_120010_EX1502L1_MB	XBT 010	10.1	158.2	2015-02-27	12:00:10.807	13:00:06.323	073-22-31.39W	073-14-27.64W	32-58-03.41N	33-08-14.73N
0068_20150227_130006_EX1502L1_MB	XBT 010	9.7	157.5	2015-02-27	12:59:56.825	14:00:17.837	073-17-38.81W	073-09-28.55W	32-49-19.99N	32-59-05.98N
0069_20150227_140008_EX1502L1_MB	XBT 010 / XBT 011	10.2	158.9	2015-02-27	13:59:58.839	15:00:16.355	073-12-43.17W	073-04-39.15W	32-39-51.88N	32-50-14.34N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0070_20150227_150007_EX1502L1_MB	XBT 011 / XBT 012	10.7	158.1	2015-02-27	14:59:57.355	16:00:07.368	073-07-51.64W	072-59-30.44W	32-30-06.87N	32-40-42.28N
0071_20150227_160007_EX1502L1_MB	XBT 012	10.9	158.1	2015-02-27	16:00:07.868	17:00:10.879	073-02-49.57W	072-54-17.14W	32-20-03.84N	32-30-57.07N
0072_20150227_170011_EX1502L1_MB	XBT012	10.6	157.9	2015-02-27	17:00:11.382	18:00:08.396	072-57-15.34W	072-49-04.83W	32-10-18.27N	32-21-06.49N
0073_20150227_180008_EX1502L1_MB	XBT 012	10.6	157.9	2015-02-27	18:00:08.895	19:00:10.911	072-52-32.16W	072-43-57.86W	32-00-28.55N	32-11-26.58N
0074_20150227_190011_EX1502L1_MB	XBT 012	10.8	157.9	2015-02-27	19:00:11.413	20:00:10.431	072-47-10.17W	072-38-48.91W	31-50-34.97N	32-01-35.74N
0075_20150227_200010_EX1502L1_MB	XBT 012	10.1	157.8	2015-02-27	20:00:10.930	21:00:07.940	072-41-58.70W	072-33-51.61W	31-41-26.33N	31-51-52.82N
0076_20150227_210008_EX1502L1_MB	XBT 012	10.1	157.7	2015-02-27	21:00:08.440	21:10:42.442	072-37-08.72W	072-33-04.34W	31-39-45.87N	31-42-30.35N
0077_20150227_211042_EX1502L1_MB	XBT 013	10.3	157.8	2015-02-27	21:10:42.942	21:39:36.456	072-36-16.28W	072-30-43.81W	31-35-18.23N	31-40-55.69N
0078_20150227_215122_EX1502L1_MB	XBT 013	10.4	157.7	2015-02-27	21:51:22.453	22:51:27.970	072-32-51.22W	072-24-50.25W	31-23-57.17N	31-34-34.29N
0079_20150227_225128_EX1502L1_MB	XBT 013	10.8	157.6	2015-02-27	22:51:28.470	23:51:24.488	072-27-55.90W	072-19-46.43W	31-14-06.80N	31-25-08.38N
0080_20150227_235124_EX1502L1_MB	XBT 013	10.9	157.8	2015-02-27	23:51:24.986	00:03:52.488	072-22-50.81W	072-18-46.29W	31-12-04.14N	31-15-20.65N
0081_20150228_000352_EX1502L1_MB	XBT 013	10.8	157.6	2015-02-28	00:03:52.988	01:03:51.006	072-21-47.99W	072-13-35.83W	31-02-04.92N	31-13-11.14N
0082_20150228_010351_EX1502L1_MB	XBT 013	10.9	157.6	2015-02-28	01:03:51.505	02:03:44.017	072-16-41.42W	072-08-26.61W	30-52-04.15N	31-03-23.39N
0083_20150228_020344_EX1502L1_MB	XBT 013	11.1	157.5	2015-02-28	02:03:44.522	03:03:51.536	072-11-29.80W	072-03-04.79W	30-42-00.22N	30-53-23.93N
0084_20150228_030351_EX1502L1_MB	XBT 013	11.0	157.5	2015-02-28	03:03:52.036	04:03:48.551	072-06-15.47W	071-57-57.97W	30-31-58.49N	30-43-08.07N
0085_20150228_040348_EX1502L1_MB	XBT 013	10.8	157.4	2015-02-28	04:03:49.048	05:03:43.067	072-01-01.19W	071-52-44.59W	30-22-07.45N	30-32-56.98N
0086_20150228_050343_EX1502L1_MB	XBT 014	10.7	157.3	2015-02-28	05:03:43.567	06:03:48.579	071-56-08.73W	071-47-43.80W	30-12-11.59N	30-23-02.84N
0087_20150228_060349_EX1502L1_MB	XBT 014	10.6	157.3	2015-02-28	06:03:49.079	07:03:43.097	071-51-01.99W	071-42-45.46W	30-02-33.48N	30-13-24.25N
0088_20150228_070343_EX1502L1_MB	XBT 014	11.5	145.9	2015-02-28	07:03:43.597	08:03:50.146	071-46-09.00W	071-35-26.96W	29-53-00.05N	30-03-45.04N
0089_20150228_080350_EX1502L1_MB	XBT 014	12.1	164.8	2015-02-28	08:03:50.612	09:03:53.144	071-38-19.62W	071-31-05.44W	29-41-59.36N	29-54-20.44N
0090_20150228_090353_EX1502L1_MB	XBT 014	11.9	160.1	2015-02-28	09:03:53.625	10:03:44.641	071-34-35.21W	071-26-26.35W	29-30-32.11N	29-42-35.56N
0091_20150228_100344_EX1502L1_MB	XBT 014	11.7	157.1	2015-02-28	10:03:45.146	11:03:44.656	071-29-28.91W	071-20-58.81W	29-19-47.36N	29-31-52.15N
0092_20150228_110345_EX1502L1_MB	XBT 015	11.2	157.1	2015-02-28	11:03:45.155	12:03:48.167	071-24-06.72W	071-15-37.33W	29-09-39.50N	29-21-08.62N
0093_20150228_120348_EX1502L1_MB	XBT 015	11.3	157.0	2015-02-28	12:03:48.669	13:03:43.187	071-18-53.97W	071-10-21.33W	28-59-14.34N	29-10-47.99N
0094_20150228_130343_EX1502L1_MB	XBT 015 / XBT 016	11.2	156.9	2015-02-28	13:03:43.687	14:03:49.698	071-13-23.33W	071-05-16.28W	28-49-00.05N	29-00-29.50N
0095_20150228_140349_EX1502L1_MB	XBT 016	10.4	156.9	2015-02-28	14:03:50.197	15:03:52.216	071-08-15.63W	071-00-28.43W	28-39-24.07N	28-50-16.50N
0096_20150228_150352_EX1502L1_MB	XBT 016	10.2	156.8	2015-02-28	15:03:52.714	16:03:47.230	071-03-24.40W	070-55-42.84W	28-30-05.02N	28-40-50.36N
0097_20150228_160347_EX1502L1_MB	XBT 016	10.1	156.8	2015-02-28	16:03:47.731	17:03:47.247	070-58-42.26W	070-50-59.45W	28-20-48.76N	28-31-27.68N
0098_20150228_170347_EX1502L1_MB	XBT 016	10.2	156.7	2015-02-28	17:03:47.747	18:03:47.760	070-54-02.50W	070-46-10.00W	28-11-34.90N	28-22-11.21N
0099_20150228_180348_EX1502L1_MB	XBT 016	10.4	156.7	2015-02-28	18:03:48.258	19:03:46.275	070-49-18.71W	070-41-09.76W	28-02-12.07N	28-12-44.88N
0101_20150228_192834_EX1502L1_MB	XBT 017	10.6	156.6	2015-02-28	19:28:34.782	20:28:42.796	070-42-30.22W	070-34-38.31W	27-49-14.27N	27-59-30.10N
0102_20150228_202843_EX1502L1_MB	XBT 017	10.6	156.8	2015-02-28	20:28:43.296	21:28:35.813	070-37-57.09W	070-29-52.83W	27-39-28.65N	27-49-54.46N
0103_20150228_212836_EX1502L1_MB	XBT 017	10.3	156.6	2015-02-28	21:28:36.312	22:28:43.831	070-33-07.69W	070-25-15.33W	27-29-58.91N	27-40-23.96N
0104_20150228_222844_EX1502L1_MB	XBT 017	10.1	156.5	2015-02-28	22:28:44.330	23:28:37.344	070-28-22.30W	070-20-32.64W	27-20-39.84N	27-30-55.73N
0105_20150228_232837_EX1502L1_MB	XBT 017	10.0	156.4	2015-02-28	23:28:37.844	23:29:50.846	070-23-36.06W	070-20-26.59W	27-20-29.69N	27-21-47.09N
0106_20150228_232951_EX1502L1_MB	XBT 018	10.1	156.5	2015-02-28	23:29:51.346	00:29:50.860	070-23-35.62W	070-15-50.15W	27-11-10.62N	27-21-36.11N
0107_20150301_002951_EX1502L1_MB	XBT 018	10.5	156.5	2015-03-01	00:29:51.360	01:29:50.875	070-18-48.04W	070-11-04.18W	27-01-31.98N	27-12-22.03N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0108_20150301_012951_EX1502L1_MB	XBT 018	10.6	156.5	2015-03-01	01:29:51.374	02:29:48.896	070-14-10.69W	070-06-16.44W	26-51-58.08N	27-02-42.58N
0109_20150301_022949_EX1502L1_MB	XBT 018	10.6	156.2	2015-03-01	02:29:49.396	03:29:53.409	070-09-08.59W	070-01-32.94W	26-42-14.69N	26-53-03.78N
0110_20150301_032953_EX1502L1_MB	XBT 018	10.4	156.6	2015-03-01	03:29:53.909	04:29:45.922	070-04-35.22W	069-56-45.23W	26-32-37.04N	26-43-17.58N
0111_20150301_042946_EX1502L1_MB	XBT 018	10.0	156.2	2015-03-01	04:29:46.422	05:29:56.941	069-59-42.94W	069-52-44.31W	26-23-39.03N	26-33-53.93N
0112_20150301_052947_EX1502L1_MB	XBT 018	10.0	156.3	2015-03-01	05:29:37.438	06:29:52.955	069-55-18.06W	069-47-54.22W	26-14-29.34N	26-24-30.94N
0113_20150301_062953_EX1502L1_MB	XBT 018	9.9	156.3	2015-03-01	06:29:53.454	07:29:52.468	069-50-32.38W	069-43-36.16W	26-05-26.98N	26-15-18.27N
0114_20150301_072952_EX1502L1_MB	XBT 018	9.9	156.2	2015-03-01	07:29:52.969	08:29:57.486	069-46-00.13W	069-38-56.90W	25-56-22.34N	26-06-18.29N
0115_20150301_082947_EX1502L1_MB	XBT 018	9.9	156.3	2015-03-01	08:29:38.484	09:29:57.000	069-41-27.95W	069-34-41.31W	25-47-15.84N	25-57-21.68N
0116_20150301_092947_EX1502L1_MB	XBT 018	9.9	155.9	2015-03-01	09:29:38.001	10:29:45.017	069-36-50.41W	069-29-57.79W	25-38-17.07N	25-48-21.66N
0117_20150301_102945_EX1502L1_MB	XBT 018	9.8	156.2	2015-03-01	10:29:35.519	11:29:56.032	069-32-24.89W	069-25-35.57W	25-29-08.92N	25-39-16.31N
0118_20150301_112946_EX1502L1_MB	XBT 019	9.9	156.2	2015-03-01	11:29:37.033	12:29:53.048	069-28-05.23W	069-21-16.49W	25-20-12.74N	25-30-20.49N
0119_20150301_122944_EX1502L1_MB	XBT 019	10.0	156.0	2015-03-01	12:29:34.550	13:25:33.063	069-23-33.81W	069-17-01.30W	25-11-39.84N	25-21-17.16N
DNP										
0121_20150301_143152_EX1502L1_MB	XBT 019	9.8	156.0	2015-03-01	14:31:52.581	15:31:54.099	069-15-01.18W	069-08-19.54W	24-53-55.16N	25-03-55.24N
0122_20150301_153154_EX1502L1_MB	XBT 020	9.6	155.9	2015-03-01	15:31:45.096	16:31:56.147	069-10-52.36W	069-03-52.31W	24-45-08.86N	24-55-16.97N
0123_20150301_163156_EX1502L1_MB	XBT 020	9.4	156.0	2015-03-01	16:31:56.617	17:31:53.631	069-06-22.54W	068-59-37.76W	24-36-29.14N	24-46-24.40N
0124_20150301_173153_EX1502L1_MB	XBT 020	9.1	155.9	2015-03-01	17:31:54.147	18:31:52.149	069-02-28.81W	068-55-36.24W	24-28-12.91N	24-37-45.26N
0125_20150301_183152_EX1502L1_MB	XBT 020	9.0	155.8	2015-03-01	18:31:52.648	19:32:06.662	068-58-14.38W	068-51-56.56W	24-20-07.46N	24-29-16.15N
0126_20150301_193156_EX1502L1_MB	XBT 020	9.1	155.8	2015-03-01	19:31:47.165	20:32:03.679	068-53-48.27W	068-47-31.16W	24-11-43.23N	24-20-51.31N
0127_20150301_203154_EX1502L1_MB	XBT 020	9.5	155.9	2015-03-01	20:31:44.179	21:32:07.696	068-50-11.16W	068-43-25.79W	24-03-06.47N	24-12-42.23N
0128_20150301_213158_EX1502L1_MB	XBT 020	9.8	155.8	2015-03-01	21:31:48.199	22:32:02.214	068-45-25.43W	068-39-15.62W	23-54-09.82N	24-03-55.68N
0129_20150301_223152_EX1502L1_MB	XBT 020	9.8	155.8	2015-03-01	22:31:42.715	23:17:30.225	068-41-17.75W	068-35-56.11W	23-47-15.12N	23-55-03.95N
0130_20150301_231720_EX1502L1_MB	XBT 021	9.6	155.7	2015-03-01	23:17:10.729	00:01:52.736	068-37-57.62W	068-32-42.59W	23-40-39.38N	23-48-17.22N
0131_20150302_000152_EX1502L1_MB	XBT 021	9.7	155.7	2015-03-02	00:01:53.239	01:02:04.254	068-34-49.24W	068-28-23.33W	23-31-49.54N	23-41-39.41N
0132_20150302_010154_EX1502L1_MB	XBT 021	9.4	155.7	2015-03-02	01:01:44.758	02:01:58.773	068-30-27.72W	068-24-09.21W	23-23-18.52N	23-32-49.63N
0133_20150302_020149_EX1502L1_MB	XBT 021	9.3	155.7	2015-03-02	02:01:39.777	03:01:59.287	068-26-19.60W	068-19-55.67W	23-14-42.74N	23-24-08.17N
0134_20150302_030149_EX1502L1_MB	XBT 021	9.5	155.7	2015-03-02	03:01:40.289	04:01:57.809	068-22-19.24W	068-15-45.68W	23-06-03.05N	23-15-39.30N
0135_20150302_040148_EX1502L1_MB	XBT 021	9.5	155.6	2015-03-02	04:01:39.303	05:02:03.321	068-17-58.29W	068-11-34.21W	22-57-14.96N	23-06-55.74N
0136_20150302_050154_EX1502L1_MB	XBT 021 / XBT 022	9.9	155.6	2015-03-02	05:01:44.326	06:01:53.337	068-13-49.34W	068-07-09.01W	22-48-12.32N	22-58-14.63N
0137_20150302_060153_EX1502L1_MB	XBT 022	9.7	155.5	2015-03-02	06:01:43.840	07:01:47.359	068-09-19.35W	068-02-41.18W	22-39-18.54N	22-49-03.17N
0138_20150302_070147_EX1502L1_MB	XBT 022	10.0	155.5	2015-03-02	07:01:47.856	08:02:02.370	068-05-19.60W	067-58-20.60W	22-30-04.66N	22-40-18.22N
0139_20150302_080152_EX1502L1_MB	XBT 022	10.1	155.5	2015-03-02	08:01:43.369	09:02:00.888	068-00-53.66W	067-54-03.39W	22-20-58.70N	22-31-14.47N
0140_20150302_090151_EX1502L1_MB	XBT 022	9.7	155.5	2015-03-02	09:01:41.890	10:01:50.406	067-56-15.93W	067-49-46.23W	22-12-04.10N	22-21-52.26N
0141_20150302_100150_EX1502L1_MB	XBT 022	9.7	155.4	2015-03-02	10:01:50.905	11:01:58.422	067-51-53.67W	067-45-34.48W	22-03-07.96N	22-12-56.38N
0142_20150302_110149_EX1502L1_MB	XBT 022 / XBT 023	9.7	155.4	2015-03-02	11:01:39.420	12:01:49.439	067-47-36.88W	067-41-23.85W	21-54-30.84N	22-04-06.23N
0143_20150302_120149_EX1502L1_MB	XBT 023	9.6	155.4	2015-03-02	12:01:49.938	13:01:54.953	067-43-01.33W	067-37-13.26W	21-45-36.65N	21-54-46.04N
0144_20150302_130155_EX1502L1_MB	XBT 023	7.2	155.4	2015-03-02	13:01:45.457	14:01:50.972	067-39-15.70W	067-33-48.58W	21-38-57.58N	21-46-23.36N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0145_20150302_140151_EX1502L1_MB	XBT 023	9.7	155.4	2015-03-02	14:01:51.472	15:01:49.484	067-36-14.93W	067-29-41.62W	21-30-03.10N	21-40-04.06N
0146_20150302_150149_EX1502L1_MB	XBT 023	9.7	155.3	2015-03-02	15:01:40.487	16:01:50.501	067-32-00.19W	067-25-27.07W	21-21-12.38N	21-31-11.77N
0147_20150302_160150_EX1502L1_MB	XBT 023	9.5	155.4	2015-03-02	16:01:51.001	17:02:04.018	067-27-45.79W	067-21-16.07W	21-12-29.07N	21-22-09.55N
0148_20150302_170154_EX1502L1_MB	XBT 023	9.5	155.3	2015-03-02	17:01:45.516	18:01:59.534	067-23-36.45W	067-17-09.51W	21-03-47.33N	21-13-30.08N
0149_20150302_180150_EX1502L1_MB	XBT 023	9.6	155.2	2015-03-02	18:01:40.535	18:06:47.533	067-19-21.39W	067-16-43.85W	21-03-01.26N	21-04-45.07N
0150_20150302_180647_EX1502L1_MB	XBT 024	9.8	155.2	2015-03-02	18:06:38.037	19:06:40.052	067-18-55.42W	067-12-35.98W	20-54-08.80N	21-04-05.22N
0151_20150302_190640_EX1502L1_MB	XBT 024	9.9	155.3	2015-03-02	19:06:30.553	20:06:50.567	067-14-39.25W	067-08-11.69W	20-45-04.45N	20-55-03.16N
0152_20150302_200641_EX1502L1_MB	XBT 024	9.6	155.2	2015-03-02	20:06:31.068	21:06:48.588	067-10-26.81W	067-03-39.29W	20-36-04.07N	20-46-06.28N
0153_20150302_210648_EX1502L1_MB	XBT 024	9.6	155.2	2015-03-02	21:06:49.085	22:06:48.101	067-06-46.56W	066-59-13.43W	20-27-14.92N	20-37-30.20N
0154_20150302_220648_EX1502L1_MB	XBT 024	9.6	155.2	2015-03-02	22:06:48.599	23:06:43.139	067-02-28.13W	066-55-10.47W	20-18-28.90N	20-28-43.83N
0155_20150302_230643_EX1502L1_MB	XBT 024	9.5	154.7	2015-03-02	23:06:43.616	23:13:24.615	066-58-14.95W	066-54-49.54W	20-17-37.69N	20-19-56.05N
0156_20150302_231325_EX1502L1_MB	XBT 025	9.5	155.3	2015-03-02	23:13:25.141	00:01:21.139	066-57-43.10W	066-51-44.92W	20-10-52.71N	20-18-54.47N
0157_20150303_000121_EX1502L1_MB	XBT 025	9.5	155.2	2015-03-03	00:01:21.629	01:01:28.148	066-54-10.67W	066-48-01.21W	20-02-12.02N	20-11-41.26N
0158_20150303_010128_EX1502L1_MB	XBT 025	9.7	155.1	2015-03-03	01:01:28.648	02:01:24.168	066-49-28.22W	066-43-54.30W	19-53-24.93N	20-02-51.00N
0159_20150303_020124_EX1502L1_MB	XBT 025	9.1	155.1	2015-03-03	02:01:24.666	03:01:19.680	066-45-17.26W	066-40-18.79W	19-45-07.65N	19-53-50.81N
0160_20150303_030120_EX1502L1_MB	XBT 025	8.8	155.1	2015-03-03	03:01:20.179	04:01:29.698	066-41-29.61W	066-36-13.19W	19-36-52.56N	19-45-29.87N
0161_20150303_040130_EX1502L1_MB	XBT 025	8.7	155.1	2015-03-03	04:01:30.200	04:51:34.711	066-37-44.69W	066-32-43.58W	19-30-15.81N	19-37-28.60N
0162_20150303_045135_EX1502L1_MB	XBT 026	9.5	155.1	2015-03-03	04:51:35.211	05:51:37.729	066-34-32.35W	066-29-10.33W	19-21-34.46N	19-31-00.88N
0163_20150303_055137_EX1502L1_MB	XBT 026	9.8	155.1	2015-03-03	05:51:38.229	06:51:38.244	066-30-24.71W	066-24-30.00W	19-12-33.91N	19-21-59.89N
0164_20150303_065138_EX1502L1_MB	XBT 026	9.6	155.0	2015-03-03	06:51:38.744	07:51:37.260	066-26-18.30W	066-20-10.46W	19-03-34.00N	19-13-11.87N
0165_20150303_075137_EX1502L1_MB	XBT 026	9.5	156.5	2015-03-03	07:51:37.759	08:51:30.773	066-22-30.59W	066-16-24.51W	18-54-48.12N	19-04-34.02N
0166_20150303_085131_EX1502L1_MB	XBT 026	9.5	157.7	2015-03-03	08:51:21.774	09:51:38.792	066-18-39.48W	066-13-05.74W	18-46-02.20N	18-55-45.98N
0167_20150303_095129_EX1502L1_MB	XBT 026	9.6	157.7	2015-03-03	09:51:19.792	10:06:13.793	066-14-37.02W	066-12-15.98W	18-43-52.86N	18-46-45.30N
0168_20150303_101414_EX1502L1_MB	XBT 026	7.8	157.7	2015-03-03	10:14:14.795	11:14:15.815	066-13-41.51W	066-08-04.93W	18-35-07.95N	18-43-34.03N
0169_20150303_111416_EX1502L1_MB	XBT 026	6.2	160.4	2015-03-03	11:14:06.814	12:14:11.329	066-10-36.95W	066-06-54.72W	18-29-35.58N	18-36-29.93N
0170_20150303_190044_EX1502L1_MB	XBT 026	10.0	12.9	2015-03-03	19:00:43.939	20:00:43.955	066-05-50.60W	066-01-20.03W	18-29-38.56N	18-39-54.04N
0171_20150303_200044_EX1502L1_MB	XBT 026	9.9	10.2	2015-03-03	20:00:34.455	20:52:25.967	066-04-35.06W	065-59-30.32W	18-39-07.65N	18-48-28.31N
0172_20150303_205216_EX1502L1_MB	XBT 027	9.8	11.4	2015-03-03	20:52:06.467	21:36:03.981	066-03-26.49W	065-58-03.31W	18-47-24.52N	18-55-38.73N
0173_20150303_213554_EX1502L1_MB	XBT 027	8.7	90.7	2015-03-03	21:35:44.482	21:37:44.483	066-00-48.51W	065-58-37.80W	18-53-15.82N	18-56-38.64N
0174_20150303_213744_EX1502L1_MB	XBT 027	9.7	103.0	2015-03-03	21:37:35.483	22:37:55.498	065-59-46.64W	065-49-13.99W	18-50-54.56N	18-56-40.78N
0175_20150303_223745_EX1502L1_MB	XBT 027	9.8	102.9	2015-03-03	22:37:36.497	23:37:55.513	065-49-55.40W	065-39-17.71W	18-48-29.44N	18-54-38.09N
0176_20150303_233745_EX1502L1_MB	XBT 027	9.8	103.4	2015-03-03	23:37:36.015	00:00:19.521	065-39-57.37W	065-35-32.76W	18-47-29.93N	18-52-01.69N
0177_20150304_000019_EX1502L1_MB	XBT 027	9.7	102.9	2015-03-04	00:00:20.019	01:00:24.038	065-36-12.04W	065-25-39.23W	18-45-19.54N	18-50-53.57N
0178_20150304_010014_EX1502L1_MB	XBT 027	9.6	97.8	2015-03-04	01:00:05.034	01:40:02.044	065-26-13.57W	065-19-16.23W	18-44-33.41N	18-48-34.93N
0179_20150304_013952_EX1502L1_MB	XBT 027	9.7	21.2	2015-03-04	01:39:42.543	01:53:07.551	065-20-39.81W	065-16-41.48W	18-44-25.92N	18-48-10.19N
0180_20150304_015258_EX1502L1_MB	XBT 027	10.0	295.2	2015-03-04	01:52:49.051	01:56:51.553	065-20-13.57W	065-16-41.10W	18-46-30.48N	18-49-57.89N
0181_20150304_015642_EX1502L1_MB	XBT 027	10.5	280.9	2015-03-04	01:56:33.052	02:56:49.070	065-30-14.20W	065-18-46.60W	18-46-31.50N	18-51-49.98N
0182_20150304_025640_EX1502L1_MB	XBT 027	10.5	280.3	2015-03-04	02:56:30.069	03:38:07.577	065-37-36.65W	065-29-29.08W	18-48-12.64N	18-53-16.66N
0183_20150304_033758_EX1502L1_MB	XBT 027	8.4	155.4	2015-03-04	03:37:48.578	03:42:57.580	065-38-55.54W	065-35-36.83W	18-49-42.96N	18-53-21.35N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0184_20150304_034248_EX1502L1_MB	XBT 027	9.7	108.9	2015-03-04	03:42:39.079	04:08:28.585	065-37-34.32W	065-32-33.79W	18-47-56.85N	18-52-59.34N
0185_20150304_040829_EX1502L1_MB	XBT 028	9.7	104.3	2015-03-04	04:08:19.585	05:08:29.103	065-33-36.76W	065-22-52.22W	18-45-39.05N	18-51-54.65N
0186_20150304_050829_EX1502L1_MB	XBT 028	9.6	103.7	2015-03-04	05:08:29.603	05:54:18.143	065-23-16.43W	065-15-40.13W	18-44-06.31N	18-48-57.36N
0187_20150304_055408_EX1502L1_MB	XBT 028	10.3	167.7	2015-03-04	05:53:59.139	06:00:11.141	065-17-14.68W	065-13-58.83W	18-44-13.66N	18-46-18.19N
0188_20150304_060002_EX1502L1_MB	XBT 028	10.3	167.0	2015-03-04	05:59:52.143	07:00:10.142	065-17-11.91W	065-12-45.16W	18-34-11.89N	18-44-41.88N
0189_20150304_070000_EX1502L1_MB	XBT 028	10.3	166.3	2015-03-04	06:59:51.143	07:20:04.638	065-13-56.33W	065-12-28.85W	18-30-59.58N	18-34-32.18N
0190_20150305_040903_EX1502L1_MB	XBT 028	9.4	15.2	2015-03-05	04:09:03.479	05:09:14.999	065-09-56.73W	065-06-32.20W	18-26-28.78N	18-35-44.36N
0191_20150305_050905_EX1502L1_MB	XBT 028	9.1	18.7	2015-03-05	05:08:55.499	05:16:37.000	065-07-44.40W	065-06-03.63W	18-35-11.72N	18-36-47.53N
0192_20150305_052819_EX1502L1_MB	XBT 028	9.2	23.7	2015-03-05	05:28:20.005	06:09:12.014	065-06-44.72W	065-02-14.99W	18-37-45.03N	18-44-26.35N
0193_20150305_061301_EX1502L1_MB	XBT 028	9.5	273.4	2015-03-05	06:13:01.520	06:26:43.520	065-05-47.92W	065-03-22.81W	18-42-50.41N	18-46-13.28N
0194_20150305_062643_EX1502L1_MB	XBT 029	9.3	267.0	2015-03-05	06:26:34.023	07:26:53.539	065-15-33.15W	065-05-33.57W	18-42-25.95N	18-46-19.83N
0195_20150305_072644_EX1502L1_MB	XBT 029	9.0	264.0	2015-03-05	07:26:34.536	08:26:53.554	065-24-54.76W	065-15-13.39W	18-41-27.59N	18-45-54.56N
0196_20150305_082643_EX1502L1_MB	XBT 029	8.8	264.3	2015-03-05	08:26:34.556	08:32:03.055	065-25-46.11W	065-24-39.33W	18-41-28.14N	18-45-02.95N
0197_20150305_083153_EX1502L1_MB	XBT 029	7.6	203.9	2015-03-05	08:31:43.557	08:40:46.057	065-27-53.27W	065-24-20.65W	18-41-15.83N	18-45-02.48N
0198_20150305_084036_EX1502L1_MB	XBT 029	6.6	88.5	2015-03-05	08:40:27.056	09:40:34.573	065-26-08.22W	065-18-59.96W	18-40-41.74N	18-44-17.24N
0199_20150305_094034_EX1502L1_MB	XBT 029	6.7	84.1	2015-03-05	09:40:25.072	10:30:43.593	065-19-11.19W	065-13-07.67W	18-41-13.52N	18-44-49.09N
0200_20150305_103034_EX1502L1_MB	XBT 029	6.8	141.4	2015-03-05	10:30:25.088	10:32:03.590	065-14-34.80W	065-11-53.13W	18-41-36.99N	18-44-35.55N
0201_20150305_103153_EX1502L1_MB	XBT 029	10.2	179.2	2015-03-05	10:31:44.090	11:28:11.604	065-14-47.48W	065-11-39.89W	18-33-26.10N	18-43-20.55N
0202_20150305_164203_EX1502L1_MB	XBT 029	10.0	178.8	2015-03-05	16:42:03.691	17:42:07.706	064-58-15.08W	064-53-53.10W	18-00-50.85N	18-11-00.70N
0203_20150305_174208_EX1502L1_MB	XBT 029	7.9	181.0	2015-03-05	17:42:08.206	18:36:36.223	064-57-52.18W	064-53-51.71W	17-52-08.25N	18-01-04.32N
0204_20150305_183626_EX1502L1_MB	XBT 029	6.7	279.6	2015-03-05	18:36:16.726	18:37:30.722	064-56-40.27W	064-56-01.86W	17-52-09.31N	17-55-58.42N
0205_20150305_202533_EX1502L1_MB	XBT 030	8.1	277.8	2015-03-05	20:25:33.255	21:05:17.765	065-03-52.71W	064-57-51.36W	17-52-59.29N	17-57-36.52N
0206_20150305_210508_EX1502L1_MB	XBT 030	6.3	59.2	2015-03-05	21:04:58.767	21:19:33.270	065-05-49.72W	065-02-41.36W	17-53-54.31N	17-57-39.73N
0207_20150305_211924_EX1502L1_MB	XBT 030	7.8	98.1	2015-03-05	21:19:14.765	22:00:27.780	065-03-52.13W	064-57-43.32W	17-53-27.83N	17-57-36.21N
0208_20150305_220018_EX1502L1_MB	XBT 030	8.9	107.4	2015-03-05	22:00:08.780	23:00:22.296	064-58-32.00W	064-49-01.82W	17-50-29.58N	17-56-29.36N
0209_20150305_230013_EX1502L1_MB	XBT 030	8.9	106.9	2015-03-05	23:00:03.797	23:07:59.799	064-49-49.41W	064-48-00.34W	17-49-45.48N	17-53-35.18N
0210_20150305_230750_EX1502L1_MB	XBT 031	8.6	90.5	2015-03-05	23:07:40.297	23:17:48.299	064-48-40.36W	064-46-46.57W	17-49-41.49N	17-53-19.96N
0211_20150305_231738_EX1502L1_MB	XBT 031	8.7	18.7	2015-03-05	23:17:28.802	23:21:39.807	064-48-25.15W	064-44-30.69W	17-49-55.79N	17-53-02.55N
0212_20150305_232130_EX1502L1_MB	XBT 031	7.7	355.3	2015-03-05	23:21:20.804	23:54:37.316	064-48-49.55W	064-44-03.36W	17-51-49.06N	17-56-35.54N
0213_20150305_235428_EX1502L1_MB	XBT 031	9.4	250.3	2015-03-05	23:54:18.315	23:59:25.816	064-48-46.08W	064-44-52.72W	17-54-43.22N	17-58-01.30N
0214_20150305_235916_EX1502L1_MB	XBT 031	10.5	230.9	2015-03-05	23:59:06.813	00:04:41.817	064-49-17.70W	064-46-07.27W	17-54-16.58N	17-57-39.22N
0215_20150306_000442_EX1502L1_MB	XBT 031	9.4	193.6	2015-03-06	00:04:32.816	00:40:24.828	064-51-37.56W	064-46-34.10W	17-49-39.01N	17-56-58.27N
0216_20150306_004015_EX1502L1_MB	XBT 031	8.0	48.7	2015-03-06	00:40:06.324	01:17:47.835	064-50-06.50W	064-44-14.41W	17-50-34.67N	17-56-34.99N
0217_20150306_011738_EX1502L1_MB	XBT 032	7.9	229.6	2015-03-06	01:17:28.339	01:23:39.339	064-46-38.62W	064-43-49.65W	17-53-46.07N	17-56-42.53N
0218_20150306_012329_EX1502L1_MB	XBT 032	7.9	228.5	2015-03-06	01:23:20.338	01:58:59.851	064-50-09.25W	064-44-12.47W	17-50-34.74N	17-56-02.74N
0219_20150306_015850_EX1502L1_MB	XBT 032	5.1	329.6	2015-03-06	01:58:40.850	02:09:05.350	064-51-05.48W	064-46-58.90W	17-49-50.61N	17-53-47.43N
0220_20150306_020855_EX1502L1_MB	XBT 032	4.0	48.9	2015-03-06	02:08:46.350	03:09:05.870	064-49-57.77W	064-44-57.93W	17-50-16.48N	17-56-18.98N
0221_20150306_030856_EX1502L1_MB	XBT 032	4.4	67.8	2015-03-06	03:08:46.871	03:12:56.869	064-46-53.62W	064-44-56.31W	17-52-54.76N	17-56-27.34N
0222_20150306_032440_EX1502L1_MB	XBT 032	7.2	87.3	2015-03-06	03:24:40.372	04:15:35.387	064-44-06.81W	064-38-23.89W	17-52-27.48N	17-56-45.40N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0223_20150306_042433_EX1502L1_MB	XBT 032	7.8	86.1	2015-03-06	04:24:33.889	05:24:34.909	064-36-36.14W	064-28-38.03W	17-53-40.76N	17-56-02.14N
0224_20150306_052435_EX1502L1_MB	XBT 032	8.1	85.5	2015-03-06	05:24:35.407	06:24:45.923	064-28-30.54W	064-19-58.85W	17-53-50.74N	17-57-18.29N
0225_20150306_062436_EX1502L1_MB	XBT 032	8.4	86.4	2015-03-06	06:24:26.424	07:24:47.439	064-20-02.92W	064-11-16.73W	17-53-49.51N	17-58-00.23N
0226_20150306_072437_EX1502L1_MB	XBT 032	8.5	85.9	2015-03-06	07:24:27.940	08:24:44.455	064-11-17.75W	064-02-12.46W	17-54-28.74N	17-57-55.24N
0227_20150306_082434_EX1502L1_MB	XBT 032	8.6	84.6	2015-03-06	08:24:25.458	08:55:32.465	064-02-31.84W	063-57-40.23W	17-55-41.71N	17-58-13.78N
0228_20150306_085611_EX1502L1_MB	XBT 032	9.2	148.5	2015-03-06	08:56:01.968	09:03:32.969	063-58-01.37W	063-55-39.28W	17-55-31.81N	17-57-57.68N
0229_20150306_090333_EX1502L1_MB	XBT 032/XBT 033	9.0	185.0	2015-03-06	09:03:23.469	10:03:42.986	063-59-34.09W	063-55-49.76W	17-46-47.27N	17-55-55.82N
0230_20150306_100333_EX1502L1_MB	XBT 033	8.9	184.8	2015-03-06	10:03:23.984	11:03:32.001	063-59-59.72W	063-56-44.70W	17-37-54.50N	17-46-51.66N
0231_20150306_110332_EX1502L1_MB	XBT 033	9.0	184.8	2015-03-06	11:03:23.001	12:03:43.519	064-01-12.32W	063-58-12.39W	17-28-52.41N	17-37-56.79N
0232_20150306_120334_EX1502L1_MB	XBT 033	8.8	184.8	2015-03-06	12:03:24.022	13:03:45.535	064-02-52.30W	063-58-28.85W	17-20-04.55N	17-28-59.06N
0233_20150306_130336_EX1502L1_MB	XBT 033	8.7	184.9	2015-03-06	13:03:26.535	13:55:44.053	064-03-34.35W	063-59-41.30W	17-12-30.56N	17-20-13.04N
0234_20150306_135534_EX1502L1_MB	XBT 033	8.9	279.9	2015-03-06	13:55:25.549	14:06:08.554	064-04-35.50W	064-00-25.25W	17-11-00.71N	17-14-11.10N
0235_20150306_140609_EX1502L1_MB	XBT 033	8.9	357.1	2015-03-06	14:06:09.055	15:06:06.567	064-05-22.75W	064-01-07.05W	17-12-29.37N	17-21-33.34N
0236_20150306_150606_EX1502L1_MB	XBT 034	8.6	8.4	2015-03-06	15:05:57.067	16:06:17.088	064-05-23.47W	064-00-34.90W	17-21-32.17N	17-30-36.74N
0237_20150306_160607_EX1502L1_MB	XBT 034	8.3	26.4	2015-03-06	16:05:57.587	16:25:42.091	064-03-10.21W	064-00-08.93W	17-29-16.60N	17-32-41.93N
0238_20150306_162532_EX1502L1_MB	XBT 034	7.6	34.1	2015-03-06	16:25:23.092	16:31:03.594	064-01-25.81W	064-00-05.09W	17-32-02.43N	17-33-17.17N
0239_20150306_163104_EX1502L1_MB	XBT 034	8.8	186.4	2015-03-06	16:30:54.096	16:58:12.104	064-02-52.88W	063-59-42.16W	17-27-58.18N	17-32-36.11N
0240_20150306_165802_EX1502L1_MB	XBT 034	9.8	277.2	2015-03-06	16:57:53.103	17:11:09.138	064-04-27.20W	063-59-57.76W	17-26-48.20N	17-30-28.31N
0241_20150306_171059_EX1502L1_MB	XBT 034	8.5	16.9	2015-03-06	17:10:50.139	18:10:58.142	064-04-44.32W	063-59-35.53W	17-28-45.90N	17-36-39.89N
0242_20150306_181058_EX1502L1_MB	XBT 034	8.6	1.3	2015-03-06	18:10:48.621	19:11:07.635	064-01-27.93W	063-58-44.69W	17-36-32.41N	17-45-13.59N
0243_20150306_191057_EX1502L1_MB	XBT 034	8.6	7.1	2015-03-06	19:10:48.634	20:10:58.653	064-01-27.11W	063-57-36.92W	17-45-05.83N	17-53-50.11N
0244_20150306_201058_EX1502L1_MB	XBT 034	8.9	355.3	2015-03-06	20:10:49.154	20:30:03.163	064-00-30.42W	063-57-15.45W	17-53-07.51N	17-56-32.72N
0245_20150306_202953_EX1502L1_MB	XBT 034	9.5	260.3	2015-03-06	20:29:44.161	20:38:37.165	064-01-40.74W	063-57-37.17W	17-55-01.30N	17-57-59.12N
0246_20150306_203828_EX1502L1_MB	XBT 034	9.1	179.7	2015-03-06	20:38:18.164	20:55:30.171	064-01-45.25W	063-58-31.05W	17-53-33.16N	17-56-11.60N
0247_20150306_205520_EX1502L1_MB	XBT 035	9.0	189.7	2015-03-06	20:55:11.170	21:55:28.683	064-03-20.01W	063-58-55.44W	17-44-28.05N	17-53-40.54N
0248_20150306_215519_EX1502L1_MB	XBT 035	8.8	177.8	2015-03-06	21:55:09.184	22:55:17.699	064-03-01.99W	064-00-12.48W	17-36-01.67N	17-45-13.34N
0249_20150306_225517_EX1502L1_MB	XBT 035	8.9	196.8	2015-03-06	22:55:08.203	23:55:28.220	064-06-09.96W	064-00-43.97W	17-28-23.72N	17-36-24.22N
0250_20150306_235519_EX1502L1_MB	XBT 035	8.0	156.2	2015-03-06	23:55:09.720	00:20:21.223	064-06-10.82W	064-01-55.58W	17-24-42.75N	17-28-45.72N
0251_20150307_002021_EX1502L1_MB	XBT 035	8.4	172.4	2015-03-07	00:20:21.723	01:20:30.240	064-04-37.04W	064-00-39.54W	17-16-43.70N	17-26-18.86N
0252_20150307_012020_EX1502L1_MB	XBT 035	8.8	323.3	2015-03-07	01:20:11.243	02:20:25.759	064-06-52.84W	064-00-20.23W	17-14-06.42N	17-21-24.34N
0253_20150307_022016_EX1502L1_MB	XBT 035	8.3	3.0	2015-03-07	02:20:06.758	02:37:03.763	064-06-52.01W	064-02-50.48W	17-20-47.15N	17-23-39.75N
0254_20150307_023654_EX1502L1_MB	XBT 036	8.3	351.3	2015-03-07	02:36:44.760	03:37:02.776	064-07-54.75W	064-02-53.79W	17-23-17.83N	17-31-35.24N
0255_20150307_033653_EX1502L1_MB	XBT 036	8.2	356.5	2015-03-07	03:36:43.781	04:36:46.792	064-07-47.04W	064-03-54.02W	17-31-18.01N	17-39-41.18N
0256_20150307_043647_EX1502L1_MB	XBT 036	8.0	357.8	2015-03-07	04:36:37.297	05:36:59.311	064-07-45.67W	064-04-53.13W	17-39-37.24N	17-47-44.19N
0257_20150307_053649_EX1502L1_MB	XBT 036	8.0	358.6	2015-03-07	05:36:39.811	06:04:03.323	064-07-58.27W	064-04-50.69W	17-47-30.74N	17-51-22.58N
0258_20150307_060450_EX1502L1_MB	XBT 036	8.0	228.1	2015-03-07	06:04:40.323	06:08:36.822	064-08-09.70W	064-05-10.38W	17-50-01.49N	17-52-36.13N
0259_20150307_060827_EX1502L1_MB	XBT 036	7.7	159.2	2015-03-07	06:08:17.826	06:35:05.329	064-08-43.55W	064-05-20.78W	17-47-27.82N	17-51-23.84N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0260_20150307_063455_EX1502L1_MB	XBT 036	7.1	79.5	2015-03-07	06:34:45.829	07:10:20.339	064-06-05.80W	064-01-28.31W	17-47-26.24N	17-50-36.85N
0261_20150307_081900_EX1502L1_MB	XBT 036	9.1	229.5	2015-03-07	08:19:01.362	09:19:11.875	064-06-01.42W	063-57-05.33W	17-48-23.19N	17-55-53.13N
0262_20150307_091902_EX1502L1_MB	XBT 036	8.9	231.8	2015-03-07	09:18:52.377	10:08:45.888	064-12-18.07W	064-04-12.51W	17-43-38.55N	17-50-28.10N
0263_20150307_100836_EX1502L1_MB	XBT 037	9.0	228.9	2015-03-07	10:08:26.892	11:08:41.410	064-19-47.71W	064-10-15.87W	17-38-07.35N	17-46-23.99N
0264_20150307_110832_EX1502L1_MB	XBT 037	9.2	226.9	2015-03-07	11:08:22.908	11:39:13.914	064-22-58.22W	064-17-05.55W	17-34-27.56N	17-40-24.56N
0265_20150307_113904_EX1502L1_MB	XBT 037	9.5	265.8	2015-03-07	11:38:54.416	11:40:44.918	064-22-24.57W	064-21-37.05W	17-34-29.51N	17-37-54.15N
0266_20150307_114045_EX1502L1_MB	XBT 037	9.0	263.0	2015-03-07	11:40:35.917	12:40:51.435	064-32-14.09W	064-22-10.23W	17-33-41.22N	17-38-08.64N
0267_20150307_124041_EX1502L1_MB	XBT 037	8.6	245.0	2015-03-07	12:40:31.935	13:40:50.949	064-40-32.70W	064-30-47.45W	17-30-18.53N	17-36-48.43N
0268_20150307_134041_EX1502L1_MB	XBT 037	8.6	245.2	2015-03-07	13:40:31.452	14:40:51.964	064-48-51.54W	064-39-06.71W	17-26-54.34N	17-33-24.67N
0269_20150307_144042_EX1502L1_MB	XBT 037	8.6	272.1	2015-03-07	14:40:32.967	15:13:50.479	064-53-20.48W	064-47-19.65W	17-25-56.72N	17-30-31.62N
0270_20150307_151350_EX1502L1_MB	XBT 037	7.0	284.2	2015-03-07	15:13:40.978	15:25:32.481	064-54-20.05W	064-51-16.96W	17-26-52.37N	17-30-38.79N
0271_20150307_152523_EX1502L1_MB	XBT 037	6.8	145.0	2015-03-07	15:25:13.479	15:59:48.486	064-54-23.47W	064-49-44.87W	17-23-42.41N	17-29-57.32N
0272_20150307_155938_EX1502L1_MB	XBT 037	7.2	69.9	2015-03-07	15:59:28.985	16:59:30.506	064-51-38.98W	064-43-44.85W	17-24-01.77N	17-29-42.58N
0273_20150307_165930_EX1502L1_MB	XBT 037	8.2	66.5	2015-03-07	16:59:31.005	17:59:41.020	064-44-12.99W	064-35-30.75W	17-26-01.55N	17-32-34.87N
0274_20150307_175931_EX1502L1_MB	XBT 037	8.2	69.5	2015-03-07	17:59:22.023	18:59:32.538	064-36-29.03W	064-27-51.64W	17-29-55.82N	17-35-36.50N
0275_20150307_185933_EX1502L1_MB	XBT 037	8.0	79.2	2015-03-07	18:59:23.539	19:59:40.555	064-28-09.26W	064-19-10.10W	17-32-06.09N	17-36-30.19N
0276_20150307_195931_EX1502L1_MB	XBT 037	8.1	55.4	2015-03-07	19:59:22.056	20:08:20.056	064-20-50.95W	064-18-12.15W	17-33-46.21N	17-37-01.90N
0277_20150307_200820_EX1502L1_MB	XBT 038	8.4	46.4	2015-03-07	20:08:20.557	21:08:18.072	064-19-36.70W	064-11-19.58W	17-34-29.36N	17-42-32.06N
0278_20150307_210818_EX1502L1_MB	XBT 038	7.5	46.3	2015-03-07	21:08:09.072	22:03:00.087	064-13-19.15W	064-06-26.16W	17-39-45.73N	17-46-52.00N
0279_20150307_221723_EX1502L1_MB	XBT 038	8.2	51.2	2015-03-07	22:17:24.093	22:43:42.103	064-07-01.83W	064-02-20.42W	17-45-29.79N	17-49-36.67N
0280_20150307_224342_EX1502L1_MB	XBT 038	8.2	191.8	2015-03-07	22:43:33.102	22:51:59.106	064-04-58.85W	064-02-16.68W	17-47-42.48N	17-49-52.52N
0281_20150307_225150_EX1502L1_MB	XBT 039	8.7	174.8	2015-03-07	22:51:40.103	23:34:59.615	064-04-57.23W	064-02-00.61W	17-41-36.03N	17-48-00.58N
0282_20150307_233450_EX1502L1_MB	XBT 039	8.8	185.8	2015-03-07	23:34:40.149	00:01:17.144	064-04-47.26W	064-02-06.21W	17-37-47.62N	17-41-52.32N
0283_20150308_000117_EX1502L1_MB	XBT 039	8.8	169.8	2015-03-08	00:01:17.625	00:39:48.145	064-04-36.42W	064-01-45.09W	17-32-24.25N	17-38-01.76N
0284_20150308_003939_EX1502L1_MB	XBT 039	8.9	286.3	2015-03-08	00:39:29.143	00:58:28.142	064-06-10.75W	064-01-43.30W	17-30-04.23N	17-33-40.44N
0285_20150308_005818_EX1502L1_MB	XBT 039	8.6	355.7	2015-03-08	00:58:09.142	01:58:15.152	064-06-09.57W	064-02-52.62W	17-32-23.45N	17-41-24.77N
0286_20150308_015815_EX1502L1_MB	XBT 039	8.7	358.4	2015-03-08	01:58:06.153	02:38:23.168	064-06-19.03W	064-03-29.37W	17-41-17.49N	17-47-05.68N
0288_20150308_031011_EX1502L1_MB	XBT 039	7.4	183.0	2015-03-08	03:10:12.177	04:10:21.692	064-09-12.25W	064-06-13.05W	17-38-13.27N	17-46-16.68N
0289_20150308_041012_EX1502L1_MB	XBT 039	8.3	180.2	2015-03-08	04:10:03.191	04:21:05.196	064-09-23.61W	064-06-47.58W	17-36-42.29N	17-38-31.30N
0290_20150308_042105_EX1502L1_MB	XBT 039	8.1	177.6	2015-03-08	04:20:55.698	04:47:25.204	064-09-27.73W	064-05-46.08W	17-33-15.00N	17-37-01.39N
0291_20150308_044715_EX1502L1_MB	XBT 040	8.2	177.9	2015-03-08	04:47:06.202	05:47:21.220	064-09-29.00W	064-05-34.34W	17-25-06.52N	17-33-34.55N
0292_20150308_054712_EX1502L1_MB	XBT 040	8.3	178.3	2015-03-08	05:47:02.221	06:45:11.238	064-09-16.33W	064-05-32.52W	17-16-48.25N	17-25-15.73N
0293_20150308_064501_EX1502L1_MB	XBT 040	8.5	279.1	2015-03-08	06:44:52.235	06:53:38.239	064-10-06.81W	064-06-00.41W	17-15-15.86N	17-18-47.89N
0294_20150308_065338_EX1502L1_MB	XBT 040	8.7	357.3	2015-03-08	06:53:29.240	07:53:45.252	064-10-23.98W	064-06-38.95W	17-17-10.02N	17-26-05.49N
0295_20150308_075336_EX1502L1_MB	XBT 040	8.8	357.8	2015-03-08	07:53:26.753	08:53:43.769	064-10-41.01W	064-06-21.71W	17-25-58.43N	17-34-54.55N
0296_20150308_085334_EX1502L1_MB	XBT 040	8.6	357.7	2015-03-08	08:53:24.770	09:49:47.787	064-10-43.06W	064-06-54.65W	17-34-44.54N	17-42-54.50N
0297_20150308_094937_EX1502L1_MB	XBT 040	9.1	258.9	2015-03-08	09:49:28.289	09:59:49.793	064-11-53.83W	064-08-01.83W	17-41-28.82N	17-44-36.03N
0298_20150308_095940_EX1502L1_MB	XBT 040	8.6	178.2	2015-03-08	09:59:30.292	10:42:22.805	064-12-05.35W	064-08-22.11W	17-36-29.36N	17-42-42.35N
0299_20150308_104213_EX1502L1_MB	XBT 041	8.5	177.9	2015-03-08	10:42:03.803	11:42:10.321	064-11-51.34W	064-07-51.78W	17-28-03.90N	17-36-44.22N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0300_20150308_114210_EX1502L1_MB	XBT 041	8.6	179.3	2015-03-08	11:42:01.318	12:42:19.338	064-11-42.31W	064-07-45.15W	17-19-22.19N	17-28-15.03N
0301_20150308_124210_EX1502L1_MB	XBT 041	8.3	184.4	2015-03-08	12:42:00.837	12:56:20.339	064-12-07.19W	064-08-10.46W	17-17-27.11N	17-19-36.11N
0302_20150308_125620_EX1502L1_MB	XBT 041	8.4	348.4	2015-03-08	12:56:10.839	13:56:26.354	064-13-20.85W	064-08-38.21W	17-15-25.79N	17-24-04.27N
0303_20150308_135616_EX1502L1_MB	XBT 041	8.5	357.8	2015-03-08	13:56:07.854	14:56:26.872	064-13-30.35W	064-09-44.15W	17-24-00.45N	17-32-35.44N
0304_20150308_145617_EX1502L1_MB	XBT 041	8.4	357.4	2015-03-08	14:56:08.370	15:55:08.891	064-13-35.01W	064-09-38.10W	17-32-25.89N	17-40-49.27N
0305_20150308_155459_EX1502L1_MB	XBT 041	9.1	221.3	2015-03-08	15:54:49.892	16:05:47.893	064-14-23.71W	064-10-17.85W	17-38-42.06N	17-42-30.91N
0306_20150308_160538_EX1502L1_MB	XBT 042	7.8	241.7	2015-03-08	16:05:28.394	16:27:30.899	064-15-42.54W	064-11-00.48W	17-36-36.04N	17-40-27.55N
0307_20150308_162721_EX1502L1_MB	XBT 042	8.0	303.4	2015-03-08	16:27:11.900	16:53:44.412	064-18-57.95W	064-13-38.88W	17-37-28.42N	17-42-04.39N
0308_20150308_165335_EX1502L1_MB	XBT 042	8.7	163.8	2015-03-08	16:53:25.906	17:32:35.419	064-20-14.13W	064-14-27.18W	17-35-13.87N	17-42-33.94N
0309_20150308_173225_EX1502L1_MB	XBT 042	8.1	303.5	2015-03-08	17:32:16.419	17:55:56.426	064-20-39.51W	064-15-31.06W	17-35-37.87N	17-40-10.89N
0310_20150308_204645_EX1502L1_MB	XBT 043	8.6	232.3	2015-03-08	20:46:45.476	21:21:53.485	064-24-51.67W	064-18-07.62W	17-33-51.20N	17-39-00.17N
0311_20150308_214242_EX1502L1_MB	XBT 043	8.5	248.6	2015-03-08	21:42:42.487	22:42:55.506	064-35-05.09W	064-25-46.69W	17-29-13.49N	17-35-03.68N
0312_20150308_224245_EX1502L1_MB	XBT 043	8.5	247.2	2015-03-08	22:42:36.006	23:42:08.023	064-43-22.92W	064-33-53.12W	17-25-57.03N	17-32-37.59N
0313_20150308_234158_EX1502L1_MB	XBT 044	8.5	248.2	2015-03-08	23:41:49.523	00:00:19.527	064-45-50.46W	064-41-55.42W	17-24-54.90N	17-29-41.33N
0314_20150309_000019_EX1502L1_MB	XBT 044	8.1	248.9	2015-03-09	00:00:20.026	01:00:33.545	064-53-48.80W	064-44-23.59W	17-22-05.35N	17-28-46.40N
0315_20150309_010024_EX1502L1_MB	XBT 044	8.0	249.3	2015-03-09	01:00:14.542	02:00:17.062	065-01-31.82W	064-52-21.86W	17-19-31.25N	17-25-57.23N
0316_20150309_020017_EX1502L1_MB	XBT 044	7.5	195.8	2015-03-09	02:00:17.562	02:17:09.563	065-03-50.88W	064-58-52.44W	17-19-23.44N	17-23-12.66N
0317_20150309_021709_EX1502L1_MB	XBT 044	7.3	144.0	2015-03-09	02:17:10.064	02:34:16.072	065-03-10.59W	064-59-18.91W	17-16-41.65N	17-20-44.83N
0318_20150309_023416_EX1502L1_MB	XBT 044	7.9	68.2	2015-03-09	02:34:16.571	03:34:08.585	065-01-27.36W	064-52-28.51W	17-16-58.50N	17-23-16.78N
0319_20150309_033409_EX1502L1_MB	XBT 044	8.0	67.4	2015-03-09	03:33:59.586	04:34:16.103	064-53-38.96W	064-44-24.16W	17-19-37.74N	17-25-58.66N
0320_20150309_043406_EX1502L1_MB	XBT 044	7.7	67.4	2015-03-09	04:33:57.106	05:34:21.139	064-45-55.88W	064-37-01.87W	17-22-14.23N	17-28-36.69N
0321_20150309_053411_EX1502L1_MB	XBT 044	7.8	67.0	2015-03-09	05:34:01.620	05:46:04.623	064-38-16.33W	064-35-33.80W	17-25-29.35N	17-29-02.72N
0322_20150309_054555_EX1502L1_MB	XBT 045	7.9	67.3	2015-03-09	05:45:45.624	06:45:57.637	064-36-48.63W	064-28-00.74W	17-25-57.81N	17-31-52.97N
0323_20150309_064548_EX1502L1_MB	XBT 045	8.0	67.4	2015-03-09	06:45:38.639	07:45:55.657	064-29-04.09W	064-20-17.16W	17-28-54.27N	17-34-53.28N
0324_20150309_074546_EX1502L1_MB	XBT 045	8.2	62.4	2015-03-09	07:45:36.157	08:45:46.172	064-21-15.08W	064-12-21.46W	17-31-47.68N	17-38-20.68N
0325_20150309_084546_EX1502L1_MB	XBT 045	8.4	72.0	2015-03-09	08:45:36.675	09:45:55.191	064-13-48.62W	064-04-48.27W	17-35-33.48N	17-40-12.02N
0326_20150309_094545_EX1502L1_MB	XBT 045	8.6	89.8	2015-03-09	09:45:36.193	10:24:33.704	064-04-48.61W	063-58-58.01W	17-38-15.62N	17-40-11.85N
0327_20150309_111447_EX1502L1_MB	XBT 045	8.5	271.5	2015-03-09	11:14:48.219	12:14:49.735	064-08-26.49W	063-59-50.35W	17-30-34.93N	17-34-33.53N
0328_20150309_121450_EX1502L1_MB	XBT 045	9.0	290.0	2015-03-09	12:14:40.734	13:11:56.753	064-17-42.89W	064-08-15.66W	17-30-51.46N	17-35-46.45N
0329_20150309_131147_EX1502L1_MB	XBT 045	8.2	57.7	2015-03-09	13:11:38.250	13:49:32.758	064-18-00.03W	064-11-32.09W	17-35-17.55N	17-39-26.15N
0330_20150309_134923_EX1502L1_MB	XBT046	8.6	181.2	2015-03-09	13:49:13.258	14:49:36.775	064-15-46.44W	064-11-27.04W	17-28-29.00N	17-37-04.45N
0331_20150309_144927_EX1502L1_MB	XBT046	8.5	179.8	2015-03-09	14:49:17.278	15:49:29.292	064-15-55.50W	064-11-48.18W	17-19-51.34N	17-28-29.70N
0332_20150309_154929_EX1502L1_MB	XBT046	8.4	175.1	2015-03-09	15:49:19.794	16:17:50.301	064-15-47.83W	064-11-57.13W	17-15-48.77N	17-20-07.00N
0333_20150309_161740_EX1502L1_MB	XBT046	9.2	278.3	2015-03-09	16:17:31.300	16:29:53.806	064-17-00.71W	064-12-05.36W	17-14-00.14N	17-17-31.24N
0334_20150309_162953_EX1502L1_MB	XBT046	8.6	350.2	2015-03-09	16:29:44.805	17:30:03.818	064-18-22.75W	064-13-37.52W	17-15-51.18N	17-24-47.48N
0335_20150309_172954_EX1502L1_MB	XBT046	8.3	357.7	2015-03-09	17:29:44.817	18:30:05.833	064-18-48.28W	064-14-43.01W	17-24-34.36N	17-33-08.42N
0336_20150309_182956_EX1502L1_MB	XBT046	8.2	1.3	2015-03-09	18:29:46.336	18:33:11.838	064-18-26.85W	064-15-00.68W	17-32-51.66N	17-33-38.55N
0337_20150309_183302_EX1502L1_MB	XBT046	7.5	198.6	2015-03-09	18:32:52.338	18:39:53.344	064-18-23.62W	064-14-44.95W	17-31-44.90N	17-35-13.63N
0338_20150309_183953_EX1502L1_MB	XBT046	8.5	248.2	2015-03-09	18:39:44.342	19:40:02.858	064-25-46.12W	064-16-05.65W	17-28-45.03N	17-34-39.28N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0339_20150309_193953_EX1502L1_MB	XBT046	8.8	247.0	2015-03-09	19:39:43.859	20:40:00.376	064-34-16.60W	064-24-22.72W	17-25-28.61N	17-31-48.53N
0340_20150309_203950_EX1502L1_MB	XBT046	8.8	243.9	2015-03-09	20:39:41.374	21:04:59.881	064-37-45.41W	064-32-50.15W	17-23-49.91N	17-28-39.83N
0341_20150309_210459_EX1502L1_MB	XBT 047	9.2	240.9	2015-03-09	21:04:50.882	22:04:50.898	064-45-54.61W	064-36-19.96W	17-19-34.59N	17-27-00.96N
0342_20150309_220451_EX1502L1_MB	XBT 047	9.3	249.4	2015-03-09	22:04:41.398	22:58:33.913	064-53-59.98W	064-44-31.13W	17-17-03.25N	17-22-54.57N
0343_20150309_225824_EX1502L1_MB	XBT 047	8.4	92.9	2015-03-09	22:58:14.914	23:58:37.428	064-55-11.22W	064-45-58.36W	17-15-15.44N	17-19-52.10N
0344_20150309_235827_EX1502L1_MB	XBT 047	8.4	70.2	2015-03-09	23:58:18.429	00:07:56.933	064-46-55.16W	064-44-40.33W	17-16-36.34N	17-20-04.98N
0345_20150310_000757_EX1502L1_MB	XBT 047	8.4	60.0	2015-03-10	00:07:57.431	00:26:02.438	064-45-13.88W	064-42-03.99W	17-17-23.40N	17-21-14.21N
0346_20150310_002552_EX1502L1_MB	XBT 047	8.1	88.4	2015-03-10	00:25:43.435	01:26:02.954	064-43-31.35W	064-34-23.36W	17-18-07.68N	17-21-55.34N
0347_20150310_012553_EX1502L1_MB	XBT 047	7.5	88.1	2015-03-10	01:25:43.952	02:25:59.471	064-34-24.97W	064-26-34.63W	17-18-37.71N	17-21-32.92N
0348_20150310_022550_EX1502L1_MB	XBT 047	7.2	87.2	2015-03-10	02:25:40.973	03:25:48.987	064-26-34.67W	064-19-04.33W	17-18-45.24N	17-21-39.01N
0349_20150310_032549_EX1502L1_MB	XBT 047	4.7	87.2	2015-03-10	03:25:49.487	03:44:31.996	064-18-58.26W	064-17-32.44W	17-18-55.75N	17-21-38.26N
0350_20150310_034432_EX1502L1_MB	XBT 047	7.4	300.5	2015-03-10	03:44:32.497	03:48:25.998	064-18-22.72W	064-16-24.85W	17-18-42.01N	17-21-14.82N
0351_20150310_034826_EX1502L1_MB	XBT 047	9.6	276.4	2015-03-10	03:48:16.998	04:48:31.519	064-27-44.15W	064-17-38.05W	17-18-41.42N	17-23-19.79N
0352_20150310_044822_EX1502L1_MB	XBT 048	9.7	269.7	2015-03-10	04:48:13.013	04:48:57.014	064-27-47.18W	064-27-36.07W	17-19-51.67N	17-23-17.61N
0353_20150310_044847_EX1502L1_MB	XBT 048	9.4	268.1	2015-03-10	04:48:38.013	05:48:51.030	064-37-33.17W	064-27-40.57W	17-19-43.66N	17-23-24.34N
0354_20150310_054841_EX1502L1_MB	XBT 048	9.6	270.2	2015-03-10	05:48:32.031	06:15:04.038	064-41-56.92W	064-37-25.74W	17-19-31.50N	17-23-39.77N
0355_20150310_061454_EX1502L1_MB	XBT 048	8.9	272.3	2015-03-10	06:14:44.540	06:23:18.044	064-43-41.26W	064-41-45.48W	17-19-16.37N	17-23-37.32N
0356_20150310_062308_EX1502L1_MB	XBT 048	6.6	35.7	2015-03-10	06:22:59.041	06:26:30.546	064-43-40.92W	064-42-19.96W	17-20-32.95N	17-23-23.87N
0357_20150310_062621_EX1502L1_MB	XBT 048	5.4	84.2	2015-03-10	06:26:11.542	07:26:23.059	064-43-31.83W	064-37-22.95W	17-20-25.69N	17-24-08.62N
0358_20150310_072623_EX1502L1_MB	XBT 048	5.5	84.0	2015-03-10	07:26:14.059	08:26:32.574	064-37-28.26W	064-31-38.91W	17-20-49.67N	17-24-01.94N
0359_20150310_082622_EX1502L1_MB	XBT 048	5.6	85.3	2015-03-10	08:26:13.073	09:26:24.091	064-31-46.59W	064-25-48.15W	17-21-19.45N	17-24-46.61N
0360_20150310_092624_EX1502L1_MB	XBT 048	5.7	94.4	2015-03-10	09:26:24.591	10:26:32.138	064-25-57.91W	064-19-56.94W	17-21-14.67N	17-24-35.94N
0361_20150310_102622_EX1502L1_MB	XBT 048	5.3	96.0	2015-03-10	10:26:12.612	10:37:57.613	064-20-06.58W	064-18-48.40W	17-21-05.34N	17-23-45.49N
0362_20150310_103748_EX1502L1_MB	XBT 049	5.7	95.1	2015-03-10	10:37:38.144	10:50:22.140	064-19-12.50W	064-17-34.55W	17-20-44.17N	17-23-53.84N
0363_20150310_105012_EX1502L1_MB	XBT 049	6.5	345.8	2015-03-10	10:50:03.139	10:56:33.143	064-18-46.07W	064-16-17.82W	17-20-59.83N	17-24-22.39N
0364_20150310_105623_EX1502L1_MB	XBT 049	8.4	277.8	2015-03-10	10:56:13.621	11:56:24.638	064-26-32.17W	064-17-38.03W	17-21-02.13N	17-25-50.82N
0365_20150310_115624_EX1502L1_MB	XBT 049	8.2	267.4	2015-03-10	11:56:15.144	12:56:35.655	064-35-16.74W	064-26-30.02W	17-22-01.47N	17-26-01.41N
0366_20150310_125626_EX1502L1_MB	XBT 049	8.4	261.3	2015-03-10	12:56:16.653	13:25:57.164	064-40-10.05W	064-34-54.61W	17-21-39.78N	17-25-39.82N
0367_20150310_132547_EX1502L1_MB	XBT 049	5.3	54.5	2015-03-10	13:25:38.164	13:32:24.160	064-41-03.06W	064-37-42.25W	17-22-03.62N	17-24-54.66N
0368_20150310_133214_EX1502L1_MB	XBT 049	7.5	72.1	2015-03-10	13:32:04.663	14:32:08.680	064-39-16.63W	064-31-18.28W	17-22-14.63N	17-26-58.24N
0369_20150310_143209_EX1502L1_MB	XBT 049	7.8	67.0	2015-03-10	14:32:09.180	15:32:10.698	064-31-39.45W	064-23-23.87W	17-24-38.06N	17-29-57.34N
0370_20150310_153211_EX1502L1_MB	XBT 049	6.8	63.5	2015-03-10	15:32:01.694	16:24:18.709	064-24-29.58W	064-17-52.67W	17-27-15.01N	17-32-28.14N
0371_20150310_162408_EX1502L1_MB	XBT 049	7.5	207.7	2015-03-10	16:23:59.209	16:28:44.715	064-20-05.56W	064-16-32.49W	17-29-37.05N	17-32-27.07N
0372_20150310_162835_EX1502L1_MB	XBT 049	8.6	200.7	2015-03-10	16:28:25.712	17:28:46.729	064-21-42.02W	064-16-35.14W	17-22-53.60N	17-30-51.34N
0373_20150310_172836_EX1502L1_MB	XBT 050	8.7	278.5	2015-03-10	17:28:27.230	18:28:46.245	064-29-53.07W	064-20-13.43W	17-23-21.27N	17-28-25.56N
0374_20150310_182836_EX1502L1_MB	XBT 050	8.7	264.7	2015-03-10	18:28:26.750	18:36:31.751	064-31-04.99W	064-29-27.78W	17-24-40.96N	17-28-17.65N
0375_20150310_183622_EX1502L1_MB	XBT 050	5.7	47.6	2015-03-10	18:36:13.248	18:54:48.250	064-32-27.27W	064-29-26.51W	17-24-38.96N	17-28-39.46N
0376_20150310_185448_EX1502L1_MB	XBT 050	5.7	77.7	2015-03-10	18:54:48.750	19:54:45.270	064-30-20.61W	064-24-10.24W	17-25-58.25N	17-30-01.65N
0377_20150310_195445_EX1502L1_MB	XBT 050	5.7	88.1	2015-03-10	19:54:36.268	20:54:42.285	064-24-15.56W	064-18-16.33W	17-26-26.91N	17-30-16.33N

MB LINE FILENAME (from Log)	SVP FILE APPLIED	SOG (kt)	HDG	Date (UTC)	MIN TIME (UTC)	MAX TIME (UTC)	MIN LONG (dec min)	MAX LONG (dec min)	MIN LAT (dec min)	MAX LAT (dec min)
0378_20150310_205442_EX1502L1_MB	XBT 050	5.2	90.4	2015-03-10	20:54:33.285	21:54:43.803	064-18-17.59W	064-12-52.28W	17-26-30.39N	17-30-10.25N
0379_20150310_215444_EX1502L1_MB	XBT 050	7.4	339.9	2015-03-10	21:54:44.303	22:02:53.809	064-14-53.87W	064-11-19.10W	17-27-34.69N	17-29-17.15N
0380_20150310_220244_EX1502L1_MB	XBT 050	8.4	342.7	2015-03-10	22:02:34.808	23:02:50.827	064-17-25.47W	064-11-34.38W	17-28-52.02N	17-37-14.86N
0381_20150310_230241_EX1502L1_MB	XBT 050	8.2	350.3	2015-03-10	23:02:31.827	00:02:42.844	064-18-30.82W	064-13-53.67W	17-37-03.53N	17-45-21.87N
0382_20150311_000243_EX1502L1_MB	XBT 050	8.1	351.0	2015-03-11	00:02:43.344	00:06:10.341	064-18-34.61W	064-14-46.56W	17-45-17.50N	17-45-48.65N
0383_20150311_000600_EX1502L1_MB	XBT 051	8.8	332.7	2015-03-11	00:05:50.846	01:06:05.863	064-21-10.03W	064-15-04.96W	17-45-42.41N	17-54-27.87N
0384_20150311_010555_EX1502L1_MB	XBT 051	10.6	288.2	2015-03-11	01:05:46.364	02:06:05.877	064-31-31.10W	064-19-46.47W	17-51-16.69N	17-58-10.70N
0385_20150311_020556_EX1502L1_MB	XBT 051	10.8	288.2	2015-03-11	02:05:46.381	03:06:10.399	064-42-07.52W	064-30-10.46W	17-54-43.29N	18-01-36.61N
0386_20150311_030601_EX1502L1_MB	XBT 051	10.7	288.3	2015-03-11	03:05:51.893	04:05:56.413	064-52-38.03W	064-40-54.24W	17-58-27.27N	18-05-05.09N
0387_20150311_040556_EX1502L1_MB	XBT 051	10.7	288.3	2015-03-11	04:05:47.411	05:06:09.428	065-03-04.20W	064-51-29.34W	18-01-54.94N	18-08-19.08N
0388_20150311_050600_EX1502L1_MB	XBT 051	10.6	290.1	2015-03-11	05:05:50.431	05:36:58.939	065-08-44.20W	065-02-14.25W	18-05-34.15N	18-09-50.29N
0389_20150311_053649_EX1502L1_MB	XBT 051	9.3	344.0	2015-03-11	05:36:39.941	05:45:42.439	065-08-46.62W	065-06-42.09W	18-08-56.75N	18-10-29.08N
0390_20150311_080008_EX1502L1_MB	XBT 051	9.4	273.2	2015-03-11	08:00:08.981	09:00:18.495	065-23-33.49W	065-13-42.22W	18-29-12.27N	18-30-09.52N
0391_20150311_090008_EX1502L1_MB	XBT 051	9.4	273.3	2015-03-11	08:59:58.996	10:00:09.012	065-33-27.29W	065-23-32.58W	18-27-53.50N	18-32-24.93N
0392_20150311_100009_EX1502L1_MB	XBT 051	9.2	275.2	2015-03-11	10:00:00.012	11:00:11.029	065-43-06.26W	065-33-21.69W	18-29-48.52N	18-32-30.10N

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	Date (Local)	File Size (bytes)
0000_20150224_194051_EX1502L1_MB.wcd	2/24/2015	313,143,234
0001_20150224_201051_EX1502L1_MB.wcd	2/24/2015	668,651,060
0002_20150224_211051_EX1502L1_MB.wcd	2/24/2015	755,552,360
0003_20150224_221051_EX1502L1_MB.wcd	2/24/2015	347,967,166
0004_20150224_223701_EX1502L1_MB.wcd	2/24/2015	847,755,582
0005_20150224_233702_EX1502L1_MB.wcd	2/24/2015	412,444,292
0006_20150225_000306_EX1502L1_MB.wcd	2/24/2015	950,050,176
0007_20150225_010306_EX1502L1_MB.wcd	2/24/2015	944,231,074
0008_20150225_020306_EX1502L1_MB.wcd	2/24/2015	967,384,792
0009_20150225_030306_EX1502L1_MB.wcd	2/25/2015	988,069,912
0010_20150225_040306_EX1502L1_MB.wcd	2/25/2015	81,631,172
0011_20150225_073410_EX1502L1_MB.wcd	2/25/2015	368,299,682
0012_20150225_083411_EX1502L1_MB.wcd	2/25/2015	392,847,636

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	Date (Local)	File Size (bytes)
0013_20150225_093409_EX1502L1_MB.wcd	2/25/2015	405,690,748
0014_20150225_103410_EX1502L1_MB.wcd	2/25/2015	420,033,142
0015_20150225_113413_EX1502L1_MB.wcd	2/25/2015	478,759,048
0016_20150225_123412_EX1502L1_MB.wcd	2/25/2015	431,811,120
0017_20150225_133407_EX1502L1_MB.wcd	2/25/2015	437,724,726
0018_20150225_143413_EX1502L1_MB.wcd	2/25/2015	73,734,432
0019_20150225_144359_EX1502L1_MB.wcd	2/25/2015	54,047,394
0020_20150225_145131_EX1502L1_MB.wcd	2/25/2015	920,484
0021_20150225_151507_EX1502L1_MB.wcd	2/25/2015	434,328,040
0022_20150225_161508_EX1502L1_MB.wcd	2/25/2015	477,792,406
0023_20150225_171504_EX1502L1_MB.wcd	2/25/2015	314,085,040
0024_20150225_181504_EX1502L1_MB.wcd	2/25/2015	407,824,344
0025_20150225_191505_EX1502L1_MB.wcd	2/25/2015	279,449,770

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0026_20150225_195337_EX1502L1_MB.wcd	2/25/2015	353,163,846
0027_20150225_205329_EX1502L1_MB.wcd	2/25/2015	206,997,470
0028_20150225_215331_EX1502L1_MB.wcd	2/25/2015	207,794,646
0029_20150225_225334_EX1502L1_MB.wcd	2/25/2015	194,682,198
0030_20150225_234946_EX1502L1_MB.wcd	2/25/2015	35,667,564
0031_20150226_000010_EX1502L1_MB.wcd	2/25/2015	206,729,006
0032_20150226_010005_EX1502L1_MB.wcd	2/25/2015	206,142,622
0033_20150226_020008_EX1502L1_MB.wcd	2/25/2015	206,814,764
0034_20150226_030007_EX1502L1_MB.wcd	2/26/2015	207,997,338
0035_20150226_040007_EX1502L1_MB.wcd	2/26/2015	207,007,686
0036_20150226_050005_EX1502L1_MB.wcd	2/26/2015	216,769,574
0037_20150226_060011_EX1502L1_MB.wcd	2/26/2015	220,071,180
0038_20150226_070006_EX1502L1_MB.wcd	2/26/2015	206,741,750
0039_20150226_080006_EX1502L1_MB.wcd	2/26/2015	208,612,576
0040_20150226_090004_EX1502L1_MB.wcd	2/26/2015	212,230,468
0041_20150226_100011_EX1502L1_MB.wcd	2/26/2015	218,450,960
0042_20150226_110005_EX1502L1_MB.wcd	2/26/2015	244,458,292
0043_20150226_120003_EX1502L1_MB.wcd	2/26/2015	277,134,542
0044_20150226_130007_EX1502L1_MB.wcd	2/26/2015	229,251,026
0045_20150226_140008_EX1502L1_MB.wcd	2/26/2015	217,992,978
0046_20150226_150006_EX1502L1_MB.wcd	2/26/2015	216,724,362
0047_20150226_160005_EX1502L1_MB.wcd	2/26/2015	220,274,252
0048_20150226_170004_EX1502L1_MB.wcd	2/26/2015	253,511,980
0049_20150226_180009_EX1502L1_MB.wcd	2/26/2015	241,953,548
0050_20150226_190003_EX1502L1_MB.wcd	2/26/2015	243,911,628
0051_20150226_200009_EX1502L1_MB.wcd	2/26/2015	240,760,430
0052_20150226_210003_EX1502L1_MB.wcd	2/26/2015	238,330,340
0053_20150226_220003_EX1502L1_MB.wcd	2/26/2015	230,084,192
0054_20150226_230007_EX1502L1_MB.wcd	2/26/2015	234,047,528

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0055_20150227_000008_EX1502L1_MB.wcd	2/26/2015	240,949,010
0056_20150227_010008_EX1502L1_MB.wcd	2/26/2015	252,759,352
0057_20150227_020008_EX1502L1_MB.wcd	2/26/2015	267,431,240
0058_20150227_030010_EX1502L1_MB.wcd	2/27/2015	257,611,768
0059_20150227_040003_EX1502L1_MB.wcd	2/27/2015	252,268,582
0060_20150227_050010_EX1502L1_MB.wcd	2/27/2015	254,753,392
0061_20150227_060008_EX1502L1_MB.wcd	2/27/2015	255,630,720
0062_20150227_070011_EX1502L1_MB.wcd	2/27/2015	254,190,184
0063_20150227_080012_EX1502L1_MB.wcd	2/27/2015	259,852,008
0064_20150227_090012_EX1502L1_MB.wcd	2/27/2015	262,587,156
0065_20150227_100004_EX1502L1_MB.wcd	2/27/2015	268,061,924
0066_20150227_110010_EX1502L1_MB.wcd	2/27/2015	264,700,526
0067_20150227_120010_EX1502L1_MB.wcd	2/27/2015	275,541,978
0068_20150227_130006_EX1502L1_MB.wcd	2/27/2015	280,505,728
0069_20150227_140008_EX1502L1_MB.wcd	2/27/2015	274,050,798
0070_20150227_150007_EX1502L1_MB.wcd	2/27/2015	264,731,684
0071_20150227_160007_EX1502L1_MB.wcd	2/27/2015	264,936,030
0072_20150227_170011_EX1502L1_MB.wcd	2/27/2015	264,567,036
0073_20150227_180008_EX1502L1_MB.wcd	2/27/2015	256,774,050
0074_20150227_190011_EX1502L1_MB.wcd	2/27/2015	254,614,130
0075_20150227_200010_EX1502L1_MB.wcd	2/27/2015	253,957,778
0076_20150227_210008_EX1502L1_MB.wcd	2/27/2015	44,399,916
0077_20150227_211042_EX1502L1_MB.wcd	2/27/2015	122,559,994
0078_20150227_215122_EX1502L1_MB.wcd	2/27/2015	254,382,128
0079_20150227_225128_EX1502L1_MB.wcd	2/27/2015	259,671,056
0080_20150227_235124_EX1502L1_MB.wcd	2/27/2015	53,609,988
0081_20150228_000352_EX1502L1_MB.wcd	2/27/2015	253,917,718
0082_20150228_010351_EX1502L1_MB.wcd	2/27/2015	257,864,206
0083_20150228_020344_EX1502L1_MB.wcd	2/27/2015	258,917,920

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0084_20150228_030351_EX1502L1_MB.wcd	2/28/2015	254,816,552
0085_20150228_040348_EX1502L1_MB.wcd	2/28/2015	253,450,060
0086_20150228_050343_EX1502L1_MB.wcd	2/28/2015	252,602,918
0087_20150228_060349_EX1502L1_MB.wcd	2/28/2015	251,781,426
0088_20150228_070343_EX1502L1_MB.wcd	2/28/2015	251,179,730
0089_20150228_080350_EX1502L1_MB.wcd	2/28/2015	253,563,740
0090_20150228_090353_EX1502L1_MB.wcd	2/28/2015	253,908,148
0091_20150228_100344_EX1502L1_MB.wcd	2/28/2015	254,166,428
0092_20150228_110345_EX1502L1_MB.wcd	2/28/2015	256,858,528
0093_20150228_120348_EX1502L1_MB.wcd	2/28/2015	253,086,008
0094_20150228_130343_EX1502L1_MB.wcd	2/28/2015	251,041,044
0095_20150228_140349_EX1502L1_MB.wcd	2/28/2015	251,473,146
0096_20150228_150352_EX1502L1_MB.wcd	2/28/2015	252,579,138
0097_20150228_160347_EX1502L1_MB.wcd	2/28/2015	251,468,254
0098_20150228_170347_EX1502L1_MB.wcd	2/28/2015	252,484,108
0099_20150228_180348_EX1502L1_MB.wcd	2/28/2015	252,310,552
0101_20150228_192834_EX1502L1_MB.wcd	2/28/2015	252,391,236
0102_20150228_202843_EX1502L1_MB.wcd	2/28/2015	249,597,760
0103_20150228_212836_EX1502L1_MB.wcd	2/28/2015	251,250,558
0104_20150228_222844_EX1502L1_MB.wcd	2/28/2015	250,285,574
0105_20150228_232837_EX1502L1_MB.wcd	2/28/2015	5,159,464
0106_20150228_232951_EX1502L1_MB.wcd	2/28/2015	252,426,796
0107_20150301_002951_EX1502L1_MB.wcd	2/28/2015	253,119,308
0108_20150301_012951_EX1502L1_MB.wcd	2/28/2015	255,462,386
0109_20150301_022949_EX1502L1_MB.wcd	2/28/2015	254,269,768
0110_20150301_032953_EX1502L1_MB.wcd	3/1/2015	252,061,346
0111_20150301_042946_EX1502L1_MB.wcd	3/1/2015	273,095,338
0112_20150301_052947_EX1502L1_MB.wcd	3/1/2015	268,669,360
0113_20150301_062953_EX1502L1_MB.wcd	3/1/2015	269,176,744

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0114_20150301_072952_EX1502L1_MB.wcd	3/1/2015	270,919,916
0115_20150301_082947_EX1502L1_MB.wcd	3/1/2015	270,133,084
0116_20150301_092947_EX1502L1_MB.wcd	3/1/2015	268,915,566
0117_20150301_102945_EX1502L1_MB.wcd	3/1/2015	269,845,384
0118_20150301_112946_EX1502L1_MB.wcd	3/1/2015	274,284,068
0119_20150301_122944_EX1502L1_MB.wcd	3/1/2015	251,902,260
0120_20150301_132542_EX1502L1_MB.wcd	3/1/2015	9,402
0121_20150301_143152_EX1502L1_MB.wcd	3/1/2015	273,453,384
0122_20150301_153154_EX1502L1_MB.wcd	3/1/2015	272,186,604
0123_20150301_163156_EX1502L1_MB.wcd	3/1/2015	269,909,684
0124_20150301_173153_EX1502L1_MB.wcd	3/1/2015	268,896,954
0125_20150301_183152_EX1502L1_MB.wcd	3/1/2015	276,185,912
0126_20150301_193156_EX1502L1_MB.wcd	3/1/2015	277,344,884
0127_20150301_203154_EX1502L1_MB.wcd	3/1/2015	271,446,610
0128_20150301_213158_EX1502L1_MB.wcd	3/1/2015	272,536,800
0129_20150301_223152_EX1502L1_MB.wcd	3/1/2015	204,981,560
0130_20150301_231720_EX1502L1_MB.wcd	3/1/2015	197,499,800
0131_20150302_000152_EX1502L1_MB.wcd	3/1/2015	266,618,140
0132_20150302_010154_EX1502L1_MB.wcd	3/1/2015	267,563,068
0133_20150302_020149_EX1502L1_MB.wcd	3/1/2015	266,611,780
0134_20150302_030149_EX1502L1_MB.wcd	3/2/2015	267,010,550
0135_20150302_040148_EX1502L1_MB.wcd	3/2/2015	268,528,908
0136_20150302_050154_EX1502L1_MB.wcd	3/2/2015	264,904,480
0137_20150302_060153_EX1502L1_MB.wcd	3/2/2015	264,230,782
0138_20150302_070147_EX1502L1_MB.wcd	3/2/2015	266,627,144
0139_20150302_080152_EX1502L1_MB.wcd	3/2/2015	264,110,714
0140_20150302_090151_EX1502L1_MB.wcd	3/2/2015	270,480,008
0141_20150302_100150_EX1502L1_MB.wcd	3/2/2015	268,454,644
0142_20150302_110149_EX1502L1_MB.wcd	3/2/2015	274,208,124

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0143_20150302_120149_EX1502L1_MB.wcd	3/2/2015	274,132,866
0144_20150302_130155_EX1502L1_MB.wcd	3/2/2015	272,638,062
0145_20150302_140151_EX1502L1_MB.wcd	3/2/2015	260,309,296
0146_20150302_150149_EX1502L1_MB.wcd	3/2/2015	260,214,816
0147_20150302_160150_EX1502L1_MB.wcd	3/2/2015	259,655,496
0148_20150302_170154_EX1502L1_MB.wcd	3/2/2015	261,864,158
0149_20150302_180150_EX1502L1_MB.wcd	3/2/2015	21,821,402
0150_20150302_180647_EX1502L1_MB.wcd	3/2/2015	274,927,958
0151_20150302_190640_EX1502L1_MB.wcd	3/2/2015	265,511,066
0152_20150302_200641_EX1502L1_MB.wcd	3/2/2015	256,289,168
0153_20150302_210648_EX1502L1_MB.wcd	3/2/2015	245,731,060
0154_20150302_220648_EX1502L1_MB.wcd	3/2/2015	248,464,798
0155_20150302_230643_EX1502L1_MB.wcd	3/2/2015	28,234,782
0156_20150302_231325_EX1502L1_MB.wcd	3/2/2015	211,053,722
0157_20150303_000121_EX1502L1_MB.wcd	3/2/2015	294,137,440
0158_20150303_010128_EX1502L1_MB.wcd	3/2/2015	304,034,824
0159_20150303_020124_EX1502L1_MB.wcd	3/2/2015	288,222,758
0160_20150303_030120_EX1502L1_MB.wcd	3/3/2015	307,760,456
0161_20150303_040130_EX1502L1_MB.wcd	3/3/2015	239,901,056
0162_20150303_045135_EX1502L1_MB.wcd	3/3/2015	305,057,544
0163_20150303_055137_EX1502L1_MB.wcd	3/3/2015	289,938,666
0164_20150303_065138_EX1502L1_MB.wcd	3/3/2015	272,991,842
0165_20150303_075137_EX1502L1_MB.wcd	3/3/2015	257,168,988
0166_20150303_085131_EX1502L1_MB.wcd	3/3/2015	233,364,108
0167_20150303_095129_EX1502L1_MB.wcd	3/3/2015	52,079,322
0168_20150303_101414_EX1502L1_MB.wcd	3/3/2015	304,515,088
0169_20150303_111416_EX1502L1_MB.wcd	3/3/2015	308,435,402
0170_20150303_190044_EX1502L1_MB.wcd	3/3/2015	351,648,342
0171_20150303_200044_EX1502L1_MB.wcd	3/3/2015	301,260,926

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0172_20150303_205216_EX1502L1_MB.wcd	3/3/2015	324,645,302
0173_20150303_213554_EX1502L1_MB.wcd	3/3/2015	14,502,172
0174_20150303_213744_EX1502L1_MB.wcd	3/3/2015	370,847,290
0175_20150303_223745_EX1502L1_MB.wcd	3/3/2015	397,674,428
0176_20150303_233745_EX1502L1_MB.wcd	3/3/2015	148,937,778
0177_20150304_000019_EX1502L1_MB.wcd	3/3/2015	378,833,854
0178_20150304_010014_EX1502L1_MB.wcd	3/3/2015	237,562,696
0179_20150304_013952_EX1502L1_MB.wcd	3/3/2015	76,657,012
0180_20150304_015258_EX1502L1_MB.wcd	3/3/2015	21,830,818
0181_20150304_015642_EX1502L1_MB.wcd	3/3/2015	381,820,586
0182_20150304_025640_EX1502L1_MB.wcd	3/3/2015	276,971,204
0183_20150304_033758_EX1502L1_MB.wcd	3/3/2015	36,276,430
0184_20150304_034248_EX1502L1_MB.wcd	3/4/2015	175,559,142
0185_20150304_040829_EX1502L1_MB.wcd	3/4/2015	392,047,534
0186_20150304_050829_EX1502L1_MB.wcd	3/4/2015	311,765,508
0187_20150304_055408_EX1502L1_MB.wcd	3/4/2015	39,967,306
0188_20150304_060002_EX1502L1_MB.wcd	3/4/2015	322,683,956
0189_20150304_070000_EX1502L1_MB.wcd	3/4/2015	203,888,316
0190_20150305_040903_EX1502L1_MB.wcd	3/5/2015	837,629,780
0191_20150305_050905_EX1502L1_MB.wcd	3/5/2015	72,342,604
0192_20150305_052819_EX1502L1_MB.wcd	3/5/2015	177,441,518
0193_20150305_061301_EX1502L1_MB.wcd	3/5/2015	69,640,976
0194_20150305_062643_EX1502L1_MB.wcd	3/5/2015	308,850,788
0195_20150305_072644_EX1502L1_MB.wcd	3/5/2015	314,694,236
0196_20150305_082643_EX1502L1_MB.wcd	3/5/2015	28,618,438
0197_20150305_083153_EX1502L1_MB.wcd	3/5/2015	49,071,700
0198_20150305_084036_EX1502L1_MB.wcd	3/5/2015	351,841,994
0199_20150305_094034_EX1502L1_MB.wcd	3/5/2015	266,520,902
0200_20150305_103034_EX1502L1_MB.wcd	3/5/2015	6,685,290

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0201_20150305_103153_EX1502L1_MB.wcd	3/5/2015	320,141,018
0202_20150305_164203_EX1502L1_MB.wcd	3/5/2015	321,179,316
0203_20150305_174208_EX1502L1_MB.wcd	3/5/2015	229,891,190
0204_20150305_183626_EX1502L1_MB.wcd	3/5/2015	4,400,824
0205_20150305_202533_EX1502L1_MB.wcd	3/5/2015	169,967,228
0206_20150305_210508_EX1502L1_MB.wcd	3/5/2015	66,105,404
0207_20150305_211924_EX1502L1_MB.wcd	3/5/2015	189,354,556
0208_20150305_220018_EX1502L1_MB.wcd	3/5/2015	278,000,868
0209_20150305_230013_EX1502L1_MB.wcd	3/5/2015	32,367,386
0210_20150305_230750_EX1502L1_MB.wcd	3/5/2015	44,266,052
0211_20150305_231738_EX1502L1_MB.wcd	3/5/2015	16,493,848
0212_20150305_232130_EX1502L1_MB.wcd	3/5/2015	138,922,928
0213_20150305_235428_EX1502L1_MB.wcd	3/5/2015	20,349,124
0214_20150305_235916_EX1502L1_MB.wcd	3/5/2015	22,246,266
0215_20150306_000442_EX1502L1_MB.wcd	3/5/2015	147,023,448
0216_20150306_004015_EX1502L1_MB.wcd	3/5/2015	160,803,242
0217_20150306_011738_EX1502L1_MB.wcd	3/5/2015	26,818,352
0218_20150306_012329_EX1502L1_MB.wcd	3/5/2015	139,437,760
0219_20150306_015850_EX1502L1_MB.wcd	3/5/2015	42,303,942
0220_20150306_020855_EX1502L1_MB.wcd	3/5/2015	245,006,020
0221_20150306_030856_EX1502L1_MB.wcd	3/5/2015	16,745,276
0222_20150306_032440_EX1502L1_MB.wcd	3/5/2015	247,496,704
0223_20150306_042433_EX1502L1_MB.wcd	3/6/2015	442,157,988
0224_20150306_052435_EX1502L1_MB.wcd	3/6/2015	293,647,048
0225_20150306_062436_EX1502L1_MB.wcd	3/6/2015	307,747,206
0226_20150306_072437_EX1502L1_MB.wcd	3/6/2015	265,273,198
0227_20150306_082434_EX1502L1_MB.wcd	3/6/2015	111,083,008
0228_20150306_085611_EX1502L1_MB.wcd	3/6/2015	20,708,462
0229_20150306_090333_EX1502L1_MB.wcd	3/6/2015	340,578,068

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0230_20150306_100333_EX1502L1_MB.wcd	3/6/2015	364,262,926
0231_20150306_110332_EX1502L1_MB.wcd	3/6/2015	539,104,712
0232_20150306_120334_EX1502L1_MB.wcd	3/6/2015	400,300,100
0233_20150306_130336_EX1502L1_MB.wcd	3/6/2015	282,148,802
0234_20150306_135534_EX1502L1_MB.wcd	3/6/2015	58,486,000
0235_20150306_140609_EX1502L1_MB.wcd	3/6/2015	344,034,010
0236_20150306_150606_EX1502L1_MB.wcd	3/6/2015	390,173,722
0237_20150306_160607_EX1502L1_MB.wcd	3/6/2015	88,359,634
0238_20150306_162532_EX1502L1_MB.wcd	3/6/2015	15,145,272
0239_20150306_163104_EX1502L1_MB.wcd	3/6/2015	124,820,654
0240_20150306_165802_EX1502L1_MB.wcd	3/6/2015	69,018,570
0241_20150306_171059_EX1502L1_MB.wcd	3/6/2015	423,840,642
0242_20150306_181058_EX1502L1_MB.wcd	3/6/2015	495,827,158
0243_20150306_191057_EX1502L1_MB.wcd	3/6/2015	281,984,962
0244_20150306_201058_EX1502L1_MB.wcd	3/6/2015	86,015,738
0245_20150306_202953_EX1502L1_MB.wcd	3/6/2015	54,491,826
0246_20150306_203828_EX1502L1_MB.wcd	3/6/2015	74,251,912
0247_20150306_205520_EX1502L1_MB.wcd	3/6/2015	258,686,558
0248_20150306_215519_EX1502L1_MB.wcd	3/6/2015	240,509,348
0249_20150306_225517_EX1502L1_MB.wcd	3/6/2015	436,456,944
0250_20150306_235519_EX1502L1_MB.wcd	3/6/2015	196,605,486
0251_20150307_002021_EX1502L1_MB.wcd	3/6/2015	397,434,224
0252_20150307_012020_EX1502L1_MB.wcd	3/6/2015	364,891,832
0253_20150307_022016_EX1502L1_MB.wcd	3/6/2015	119,431,396
0254_20150307_023654_EX1502L1_MB.wcd	3/6/2015	455,180,150
0255_20150307_033653_EX1502L1_MB.wcd	3/7/2015	402,143,838
0256_20150307_043647_EX1502L1_MB.wcd	3/7/2015	518,459,142
0257_20150307_053649_EX1502L1_MB.wcd	3/7/2015	133,007,364
0258_20150307_060450_EX1502L1_MB.wcd	3/7/2015	19,001,028

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0259_20150307_060827_EX1502L1_MB.wcd	3/7/2015	123,925,726
0260_20150307_063455_EX1502L1_MB.wcd	3/7/2015	160,859,286
0261_20150307_081900_EX1502L1_MB.wcd	3/7/2015	400,025,586
0262_20150307_091902_EX1502L1_MB.wcd	3/7/2015	236,469,940
0263_20150307_100836_EX1502L1_MB.wcd	3/7/2015	386,106,414
0264_20150307_110832_EX1502L1_MB.wcd	3/7/2015	219,126,406
0265_20150307_113904_EX1502L1_MB.wcd	3/7/2015	12,615,392
0266_20150307_114045_EX1502L1_MB.wcd	3/7/2015	373,421,494
0267_20150307_124041_EX1502L1_MB.wcd	3/7/2015	342,933,962
0268_20150307_134041_EX1502L1_MB.wcd	3/7/2015	406,264,384
0269_20150307_144042_EX1502L1_MB.wcd	3/7/2015	236,311,012
0270_20150307_151350_EX1502L1_MB.wcd	3/7/2015	77,734,626
0271_20150307_152523_EX1502L1_MB.wcd	3/7/2015	234,365,058
0272_20150307_155938_EX1502L1_MB.wcd	3/7/2015	359,771,484
0273_20150307_165930_EX1502L1_MB.wcd	3/7/2015	423,715,218
0274_20150307_175931_EX1502L1_MB.wcd	3/7/2015	401,908,804
0275_20150307_185933_EX1502L1_MB.wcd	3/7/2015	454,718,814
0276_20150307_195931_EX1502L1_MB.wcd	3/7/2015	71,716,084
0277_20150307_200820_EX1502L1_MB.wcd	3/7/2015	428,877,064
0278_20150307_210818_EX1502L1_MB.wcd	3/7/2015	259,559,124
0279_20150307_221723_EX1502L1_MB.wcd	3/7/2015	121,160,340
0280_20150307_224342_EX1502L1_MB.wcd	3/7/2015	36,705,698
0281_20150307_225150_EX1502L1_MB.wcd	3/7/2015	189,914,850
0282_20150307_233450_EX1502L1_MB.wcd	3/7/2015	95,957,062
0283_20150308_000117_EX1502L1_MB.wcd	3/7/2015	142,933,182
0284_20150308_003939_EX1502L1_MB.wcd	3/7/2015	107,712,486
0285_20150308_005818_EX1502L1_MB.wcd	3/7/2015	225,697,616
0286_20150308_015815_EX1502L1_MB.wcd	3/7/2015	170,647,656
0288_20150308_031011_EX1502L1_MB.wcd	3/8/2015	249,116,964

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0289_20150308_041012_EX1502L1_MB.wcd	3/8/2015	56,616,712
0290_20150308_042105_EX1502L1_MB.wcd	3/8/2015	164,193,116
0291_20150308_044715_EX1502L1_MB.wcd	3/8/2015	443,553,640
0292_20150308_054712_EX1502L1_MB.wcd	3/8/2015	399,333,250
0293_20150308_064501_EX1502L1_MB.wcd	3/8/2015	57,848,162
0294_20150308_065338_EX1502L1_MB.wcd	3/8/2015	431,192,732
0295_20150308_075336_EX1502L1_MB.wcd	3/8/2015	431,742,996
0296_20150308_085334_EX1502L1_MB.wcd	3/8/2015	317,438,850
0297_20150308_094937_EX1502L1_MB.wcd	3/8/2015	48,963,758
0298_20150308_095940_EX1502L1_MB.wcd	3/8/2015	257,035,310
0299_20150308_104213_EX1502L1_MB.wcd	3/8/2015	443,571,572
0300_20150308_114210_EX1502L1_MB.wcd	3/8/2015	446,158,024
0301_20150308_124210_EX1502L1_MB.wcd	3/8/2015	103,543,488
0302_20150308_125620_EX1502L1_MB.wcd	3/8/2015	310,154,062
0303_20150308_135616_EX1502L1_MB.wcd	3/8/2015	436,373,792
0304_20150308_145617_EX1502L1_MB.wcd	3/8/2015	402,722,520
0305_20150308_155459_EX1502L1_MB.wcd	3/8/2015	63,530,526
0306_20150308_160538_EX1502L1_MB.wcd	3/8/2015	141,280,214
0307_20150308_162721_EX1502L1_MB.wcd	3/8/2015	168,729,420
0308_20150308_165335_EX1502L1_MB.wcd	3/8/2015	257,916,728
0309_20150308_173225_EX1502L1_MB.wcd	3/8/2015	156,000,898
0310_20150308_204645_EX1502L1_MB.wcd	3/8/2015	234,897,164
0311_20150308_214242_EX1502L1_MB.wcd	3/8/2015	407,174,588
0312_20150308_224245_EX1502L1_MB.wcd	3/8/2015	415,567,824
0313_20150308_234158_EX1502L1_MB.wcd	3/8/2015	133,317,176
0314_20150309_000019_EX1502L1_MB.wcd	3/8/2015	286,180,930
0315_20150309_010024_EX1502L1_MB.wcd	3/8/2015	212,820,290
0316_20150309_020017_EX1502L1_MB.wcd	3/8/2015	60,791,564
0317_20150309_021709_EX1502L1_MB.wcd	3/8/2015	63,982,114

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0318_20150309_023416_EX1502L1_MB.wcd	3/8/2015	218,752,774
0319_20150309_033409_EX1502L1_MB.wcd	3/9/2015	220,752,176
0320_20150309_043406_EX1502L1_MB.wcd	3/9/2015	223,818,872
0321_20150309_053411_EX1502L1_MB.wcd	3/9/2015	42,301,940
0322_20150309_054555_EX1502L1_MB.wcd	3/9/2015	230,317,844
0323_20150309_064548_EX1502L1_MB.wcd	3/9/2015	218,089,002
0324_20150309_074546_EX1502L1_MB.wcd	3/9/2015	274,750,522
0325_20150309_084546_EX1502L1_MB.wcd	3/9/2015	413,681,558
0326_20150309_094545_EX1502L1_MB.wcd	3/9/2015	342,073,104
0327_20150309_111447_EX1502L1_MB.wcd	3/9/2015	425,620,010
0328_20150309_121450_EX1502L1_MB.wcd	3/9/2015	402,712,874
0329_20150309_131147_EX1502L1_MB.wcd	3/9/2015	257,662,144
0330_20150309_134923_EX1502L1_MB.wcd	3/9/2015	354,073,166
0331_20150309_144927_EX1502L1_MB.wcd	3/9/2015	285,003,022
0332_20150309_154929_EX1502L1_MB.wcd	3/9/2015	107,348,772
0333_20150309_161740_EX1502L1_MB.wcd	3/9/2015	50,509,970
0334_20150309_162953_EX1502L1_MB.wcd	3/9/2015	246,791,454
0335_20150309_172954_EX1502L1_MB.wcd	3/9/2015	239,740,666
0336_20150309_182956_EX1502L1_MB.wcd	3/9/2015	25,181,668
0337_20150309_183302_EX1502L1_MB.wcd	3/9/2015	53,819,498
0338_20150309_183953_EX1502L1_MB.wcd	3/9/2015	438,452,972
0339_20150309_193953_EX1502L1_MB.wcd	3/9/2015	290,970,454
0340_20150309_203950_EX1502L1_MB.wcd	3/9/2015	89,950,012
0341_20150309_210459_EX1502L1_MB.wcd	3/9/2015	212,161,084
0342_20150309_220451_EX1502L1_MB.wcd	3/9/2015	203,495,928
0343_20150309_225824_EX1502L1_MB.wcd	3/9/2015	249,145,158
0344_20150309_235827_EX1502L1_MB.wcd	3/9/2015	38,928,110
0345_20150310_000757_EX1502L1_MB.wcd	3/9/2015	77,247,146
0346_20150310_002552_EX1502L1_MB.wcd	3/9/2015	262,028,572

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0347_20150310_012553_EX1502L1_MB.wcd	3/9/2015	273,348,208
0348_20150310_022550_EX1502L1_MB.wcd	3/9/2015	282,039,312
0349_20150310_032549_EX1502L1_MB.wcd	3/9/2015	86,694,566
0350_20150310_034432_EX1502L1_MB.wcd	3/9/2015	17,652,670
0351_20150310_034826_EX1502L1_MB.wcd	3/10/2015	236,524,704
0352_20150310_044822_EX1502L1_MB.wcd	3/10/2015	1,530,580
0353_20150310_044847_EX1502L1_MB.wcd	3/10/2015	232,794,800
0354_20150310_054841_EX1502L1_MB.wcd	3/10/2015	102,706,094
0355_20150310_061454_EX1502L1_MB.wcd	3/10/2015	31,086,376
0356_20150310_062308_EX1502L1_MB.wcd	3/10/2015	14,553,470
0357_20150310_062621_EX1502L1_MB.wcd	3/10/2015	270,453,938
0358_20150310_072623_EX1502L1_MB.wcd	3/10/2015	276,342,962
0359_20150310_082622_EX1502L1_MB.wcd	3/10/2015	268,917,042
0360_20150310_092624_EX1502L1_MB.wcd	3/10/2015	274,375,550
0361_20150310_102622_EX1502L1_MB.wcd	3/10/2015	53,142,230
0362_20150310_103748_EX1502L1_MB.wcd	3/10/2015	54,903,354
0363_20150310_105012_EX1502L1_MB.wcd	3/10/2015	28,759,030
0364_20150310_105623_EX1502L1_MB.wcd	3/10/2015	225,443,090
0365_20150310_115624_EX1502L1_MB.wcd	3/10/2015	214,717,598
0366_20150310_125626_EX1502L1_MB.wcd	3/10/2015	107,418,494
0367_20150310_132547_EX1502L1_MB.wcd	3/10/2015	29,007,760
0368_20150310_133214_EX1502L1_MB.wcd	3/10/2015	258,540,582
0369_20150310_143209_EX1502L1_MB.wcd	3/10/2015	261,649,754
0370_20150310_153211_EX1502L1_MB.wcd	3/10/2015	220,647,308
0371_20150310_162408_EX1502L1_MB.wcd	3/10/2015	18,848,644
0372_20150310_162835_EX1502L1_MB.wcd	3/10/2015	232,988,402
0373_20150310_172836_EX1502L1_MB.wcd	3/10/2015	218,765,278
0374_20150310_182836_EX1502L1_MB.wcd	3/10/2015	26,950,354
0375_20150310_183622_EX1502L1_MB.wcd	3/10/2015	70,232,892

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0376_20150310_185448_EX1502L1_MB.wcd	3/10/2015	233,368,860
0377_20150310_195445_EX1502L1_MB.wcd	3/10/2015	246,982,578
0378_20150310_205442_EX1502L1_MB.wcd	3/10/2015	261,462,620
0379_20150310_215444_EX1502L1_MB.wcd	3/10/2015	33,454,314
0380_20150310_220244_EX1502L1_MB.wcd	3/10/2015	218,006,480
0381_20150310_230241_EX1502L1_MB.wcd	3/10/2015	210,023,076
0382_20150311_000243_EX1502L1_MB.wcd	3/10/2015	17,946,526
0383_20150311_000600_EX1502L1_MB.wcd	3/10/2015	349,303,696
0384_20150311_010555_EX1502L1_MB.wcd	3/10/2015	346,302,354

EX1502L1 EM 302 Water Column Files (Local Time = UTC -5 or -4)		
Filename	**Date (Local)**	**File Size (bytes)**
0385_20150311_020556_EX1502L1_MB.wcd	3/10/2015	376,781,766
0386_20150311_030601_EX1502L1_MB.wcd	3/11/2015	376,638,300
0387_20150311_040556_EX1502L1_MB.wcd	3/11/2015	363,297,706
0388_20150311_050600_EX1502L1_MB.wcd	3/11/2015	160,316,036
0389_20150311_053649_EX1502L1_MB.wcd	3/11/2015	64,724,976
0390_20150311_080008_EX1502L1_MB.wcd	3/11/2015	714,919,230
0391_20150311_090008_EX1502L1_MB.wcd	3/11/2015	574,556,138
0392_20150311_100009_EX1502L1_MB.wcd	3/11/2015	427,496,096

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	**Date (Local)**	**File size (bytes)**
EX1502L1_SBP_000.kea	2/25/2015	182,717
EX1502L1_SBP_000.keb	2/25/2015	2,074,440
EX1502L1_SBP_001.kea	2/25/2015	62,567
EX1502L1_SBP_001.keb	2/25/2015	623,642
EX1502L1_SBP_002.kea	2/25/2015	16,667
EX1502L1_SBP_002.keb	2/25/2015	155,395
EX1502L1_SBP_003.kea	2/25/2015	32,642
EX1502L1_SBP_003.keb	2/25/2015	327,037
EX1502L1_SBP_004.kea	2/25/2015	65,717
EX1502L1_SBP_004.keb	2/25/2015	616,732
EX1502L1_SBP_005.kea	2/25/2015	684,242
EX1502L1_SBP_005.keb	2/25/2015	6,174,033
EX1502L1_SBP_006.kea	2/25/2015	21,392
EX1502L1_SBP_006.keb	2/25/2015	181,267
EX1502L1_SBP_007.kea	2/25/2015	9,467
EX1502L1_SBP_007.keb	2/25/2015	90,533

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	**Date (Local)**	**File size (bytes)**
EX1502L1_SBP_008.kea	2/25/2015	5,867
EX1502L1_SBP_008.keb	2/25/2015	58,224
EX1502L1_SBP_009.kea	2/26/2015	1,325,492
EX1502L1_SBP_009.keb	2/26/2015	12,009,052
EX1502L1_SBP_010.kea	2/26/2015	73,592
EX1502L1_SBP_010.keb	2/26/2015	818,621
EX1502L1_SBP_011.kea	2/27/2015	2,433,617
EX1502L1_SBP_011.keb	2/27/2015	23,839,257
EX1502L1_SBP_012.kea	2/28/2015	1,997,567
EX1502L1_SBP_012.keb	2/28/2015	17,947,499
EX1502L1_SBP_013.kea	2/28/2015	125,567
EX1502L1_SBP_013.keb	2/28/2015	1,069,105
EX1502L1_SBP_014.kea	3/1/2015	1,194,767
EX1502L1_SBP_014.keb	3/1/2015	13,204,935
EX1502L1_SBP_015.kea	3/1/2015	101,492
EX1502L1_SBP_015.keb	3/1/2015	1,117,020

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	**Date (Local)**	**File size (bytes)**
EX1502L1_SBP_016.kea	3/1/2015	1,033,667
EX1502L1_SBP_016.keb	3/1/2015	10,836,894
EX1502L1_SBP_017.kea	3/1/2015	1,592
EX1502L1_SBP_017.keb	3/1/2015	17,267
EX1502L1_SBP_018.kea	3/1/2015	21,167
EX1502L1_SBP_018.keb	3/1/2015	254,456
EX1502L1_SBP_020.kea	3/2/2015	1,416,392
EX1502L1_SBP_020.keb	3/2/2015	15,734,755
EX1502L1_SBP_021.kea	3/2/2015	272,942
EX1502L1_SBP_021.keb	3/2/2015	3,033,727
EX1502L1_SBP_022.kea	3/3/2015	1,103,984
EX1502L1_SBP_022.keb	3/3/2015	10,020,539
EX1502L1_SBP_024.kea	3/3/2015	375,418
EX1502L1_SBP_024.keb	3/3/2015	3,044,079
EX1502L1_SBP_025.kea	3/3/2015	64,817
EX1502L1_SBP_025.keb	3/3/2015	587,093
EX1502L1_SBP_026.kea	3/3/2015	396,017
EX1502L1_SBP_026.keb	3/3/2015	3,130,986
EX1502L1_SBP_028.kea	3/3/2015	175,967
EX1502L1_SBP_028.keb	3/3/2015	1,628,222
EX1502L1_SBP_029.kea	3/4/2015	245,060
EX1502L1_SBP_029.keb	3/4/2015	2,137,983
EX1502L1_SBP_030.kea	3/4/2015	438,330
EX1502L1_SBP_030.keb	3/4/2015	2,919,562
EX1502L1_SBP_033.kea	3/5/2015	195,916
EX1502L1_SBP_033.keb	3/5/2015	1,602,804
EX1502L1_SBP_034.kea	3/5/2015	313,046
EX1502L1_SBP_034.keb	3/5/2015	2,932,872
EX1502L1_SBP_035.kea	3/5/2015	421,225

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	**Date (Local)**	**File size (bytes)**
EX1502L1_SBP_035.keb	3/5/2015	3,790,320
EX1502L1_SBP_036.kea	3/5/2015	164,602
EX1502L1_SBP_036.keb	3/5/2015	1,549,042
EX1502L1_SBP_039.kea	3/6/2015	461,506
EX1502L1_SBP_039.keb	3/6/2015	4,063,688
EX1502L1_SBP_040.kea	3/6/2015	9,529
EX1502L1_SBP_040.keb	3/6/2015	123,457
EX1502L1_SBP_041.kea	3/6/2015	53,370
EX1502L1_SBP_041.keb	3/6/2015	294,214
EX1502L1_SBP_042.kea	3/6/2015	190,817
EX1502L1_SBP_042.keb	3/6/2015	1,332,147
EX1502L1_SBP_043.kea	3/6/2015	564,110
EX1502L1_SBP_043.keb	3/6/2015	4,266,974
EX1502L1_SBP_044.kea	3/6/2015	632,210
EX1502L1_SBP_044.keb	3/6/2015	3,886,232
EX1502L1_SBP_045.kea	3/6/2015	187,892
EX1502L1_SBP_045.keb	3/6/2015	1,236,012
EX1502L1_SBP_046.kea	3/6/2015	66,842
EX1502L1_SBP_046.keb	3/6/2015	688,429
EX1502L1_SBP_047.kea	3/6/2015	3,392
EX1502L1_SBP_047.keb	3/6/2015	29,030
EX1502L1_SBP_048.kea	3/6/2015	40,517
EX1502L1_SBP_048.keb	3/6/2015	419,486
EX1502L1_SBP_049.kea	3/7/2015	330,073
EX1502L1_SBP_049.keb	3/7/2015	1,719,541
EX1502L1_SBP_050.kea	3/7/2015	869,883
EX1502L1_SBP_050.keb	3/7/2015	6,524,965
EX1502L1_SBP_051.kea	3/7/2015	12,392
EX1502L1_SBP_051.keb	3/7/2015	110,331

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	**Date (Local)**	**File size (bytes)**
EX1502L1_SBP_052.kea	3/7/2015	30,617
EX1502L1_SBP_052.keb	3/7/2015	285,771
EX1502L1_SBP_053.kea	3/7/2015	61,892
EX1502L1_SBP_053.keb	3/7/2015	695,765
EX1502L1_SBP_054.kea	3/7/2015	50,867
EX1502L1_SBP_054.keb	3/7/2015	600,358
EX1502L1_SBP_055.kea	3/7/2015	444,992
EX1502L1_SBP_055.keb	3/7/2015	3,495,346
EX1502L1_SBP_056.kea	3/7/2015	68,569
EX1502L1_SBP_056.keb	3/7/2015	333,987
EX1502L1_SBP_057.kea	3/7/2015	262,427
EX1502L1_SBP_057.keb	3/7/2015	1,322,353
EX1502L1_SBP_059.kea	3/7/2015	77,195
EX1502L1_SBP_059.keb	3/7/2015	578,306
EX1502L1_SBP_060.kea	3/7/2015	7,217
EX1502L1_SBP_060.keb	3/7/2015	63,636
EX1502L1_SBP_061.kea	3/7/2015	45,710
EX1502L1_SBP_061.keb	3/7/2015	269,466
EX1502L1_SBP_062.kea	3/7/2015	277,863
EX1502L1_SBP_062.keb	3/7/2015	1,198,710
EX1502L1_SBP_063.kea	3/8/2015	1,151,819
EX1502L1_SBP_063.keb	3/8/2015	10,834,442
EX1502L1_SBP_064.kea	3/8/2015	337,292
EX1502L1_SBP_064.keb	3/8/2015	3,182,538
EX1502L1_SBP_065.kea	3/8/2015	46,592
EX1502L1_SBP_065.keb	3/8/2015	436,241
EX1502L1_SBP_066.kea	3/8/2015	181,367
EX1502L1_SBP_066.keb	3/8/2015	1,840,876
EX1502L1_SBP_067.kea	3/8/2015	165,842

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	**Date (Local)**	**File size (bytes)**
EX1502L1_SBP_067.keb	3/8/2015	1,830,638
EX1502L1_SBP_068.kea	3/8/2015	29,717
EX1502L1_SBP_068.keb	3/8/2015	292,499
EX1502L1_SBP_069.kea	3/9/2015	992,042
EX1502L1_SBP_069.keb	3/9/2015	8,383,965
EX1502L1_SBP_071.kea	3/9/2015	174,392
EX1502L1_SBP_071.keb	3/9/2015	1,404,345
EX1502L1_SBP_073.kea	3/9/2015	965,492
EX1502L1_SBP_073.keb	3/9/2015	9,698,803
EX1502L1_SBP_074.kea	3/9/2015	44,792
EX1502L1_SBP_074.keb	3/9/2015	495,271
EX1502L1_SBP_075.kea	3/9/2015	215,342
EX1502L1_SBP_075.keb	3/9/2015	2,423,886
EX1502L1_SBP_076.kea	3/10/2015	1,041,767
EX1502L1_SBP_076.keb	3/10/2015	11,263,658
EX1502L1_SBP_077.kea	3/10/2015	81,917
EX1502L1_SBP_077.keb	3/10/2015	841,401
EX1502L1_SBP_078.kea	3/10/2015	553,742
EX1502L1_SBP_078.keb	3/10/2015	3,700,558
EX1502L1_SBP_70870_CHP3.5_RAW_000.sgy	2/25/2015	5,945,928
EX1502L1_SBP_70870_CHP3.5_RAW_001.sgy	2/25/2015	5,574,176
EX1502L1_SBP_70870_CHP3.5_RAW_002.sgy	2/25/2015	1,373,782
EX1502L1_SBP_70870_CHP3.5_RAW_003.sgy	2/25/2015	1,935,332
EX1502L1_SBP_70870_CHP3.5_RAW_004.sgy	2/25/2015	5,169,860
EX1502L1_SBP_70870_CHP3.5_RAW_005.sgy	2/25/2015	62,829,814
EX1502L1_SBP_70870_CHP3.5_RAW_006.sgy	2/25/2015	2,115,028
EX1502L1_SBP_70870_CHP3.5_RAW_007.sgy	2/25/2015	313,952
EX1502L1_SBP_70870_CHP3.5_RAW_008.sgy	2/25/2015	195,288
EX1502L1_SBP_70870_CHP3.5_RAW_009.sgy	2/26/2015	48,774,504

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	**Date (Local)**	**File size (bytes)**
EX1502L1_SBP_70870_CHP3.5_RAW_010.sgy	2/26/2015	4,203,994
EX1502L1_SBP_70870_CHP3.5_RAW_011.sgy	2/27/2015	192,480,478
EX1502L1_SBP_70870_CHP3.5_RAW_012.sgy	2/28/2015	79,891,856
EX1502L1_SBP_70870_CHP3.5_RAW_013.sgy	2/28/2015	5,087,896
EX1502L1_SBP_70870_CHP3.5_RAW_014.sgy	3/1/2015	23,358,024
EX1502L1_SBP_70870_CHP3.5_RAW_015.sgy	3/1/2015	3,015,840
EX1502L1_SBP_70870_CHP3.5_RAW_016.sgy	3/1/2015	83,809,322
EX1502L1_SBP_70870_CHP3.5_RAW_017.sgy	3/1/2015	0
EX1502L1_SBP_70870_CHP3.5_RAW_018.sgy	3/1/2015	542,152
EX1502L1_SBP_70870_CHP3.5_RAW_019.sgy	3/1/2015	48,524
EX1502L1_SBP_70870_CHP3.5_RAW_020.sgy	3/2/2015	107,461,808
EX1502L1_SBP_70870_CHP3.5_RAW_021.sgy	3/2/2015	20,893,260
EX1502L1_SBP_70870_CHP3.5_RAW_022.sgy	3/3/2015	148,711,952
EX1502L1_SBP_70870_CHP3.5_RAW_023.sgy	3/3/2015	11,459,220
EX1502L1_SBP_70870_CHP3.5_RAW_024.sgy	3/3/2015	32,843,044
EX1502L1_SBP_70870_CHP3.5_RAW_025.sgy	3/3/2015	5,057,550
EX1502L1_SBP_70870_CHP3.5_RAW_026.sgy	3/3/2015	26,062
EX1502L1_SBP_70870_CHP3.5_RAW_027.sgy	3/3/2015	66,314,656
EX1502L1_SBP_70870_CHP3.5_RAW_028.sgy	3/3/2015	27,350,208
EX1502L1_SBP_70870_CHP3.5_RAW_029.sgy	3/4/2015	39,012,732
EX1502L1_SBP_70870_CHP3.5_RAW_030.sgy	3/4/2015	25,741,584
EX1502L1_SBP_70870_CHP3.5_RAW_031.sgy	3/4/2015	12,806,940
EX1502L1_SBP_70870_CHP3.5_RAW_032.sgy	3/4/2015	6,876,984
EX1502L1_SBP_70870_CHP3.5_RAW_033.sgy	3/5/2015	6,995,648
EX1502L1_SBP_70870_CHP3.5_RAW_034.sgy	3/5/2015	10,710,744
EX1502L1_SBP_70870_CHP3.5_RAW_035.sgy	3/5/2015	14,590,144
EX1502L1_SBP_70870_CHP3.5_RAW_036.sgy	3/5/2015	1,344,120
EX1502L1_SBP_70870_CHP3.5_RAW_037.sgy	3/5/2015	7,034,206
EX1502L1_SBP_70870_CHP3.5_RAW_038.sgy	3/5/2015	1,747,048

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	**Date (Local)**	**File size (bytes)**
EX1502L1_SBP_70870_CHP3.5_RAW_039.sgy	3/6/2015	44,905,138
EX1502L1_SBP_70870_CHP3.5_RAW_040.sgy	3/6/2015	115,910
EX1502L1_SBP_70870_CHP3.5_RAW_041.sgy	3/6/2015	5,214,784
EX1502L1_SBP_70870_CHP3.5_RAW_042.sgy	3/6/2015	17,187,030
EX1502L1_SBP_70870_CHP3.5_RAW_043.sgy	3/6/2015	22,294,176
EX1502L1_SBP_70870_CHP3.5_RAW_044.sgy	3/6/2015	24,430,128
EX1502L1_SBP_70870_CHP3.5_RAW_045.sgy	3/6/2015	17,905,814
EX1502L1_SBP_70870_CHP3.5_RAW_046.sgy	3/6/2015	7,778,616
EX1502L1_SBP_70870_CHP3.5_RAW_047.sgy	3/6/2015	0
EX1502L1_SBP_70870_CHP3.5_RAW_048.sgy	3/6/2015	5,455,048
EX1502L1_SBP_70870_CHP3.5_RAW_049.sgy	3/7/2015	32,214,108
EX1502L1_SBP_70870_CHP3.5_RAW_050.sgy	3/7/2015	72,421,088
EX1502L1_SBP_70870_CHP3.5_RAW_051.sgy	3/7/2015	1,149,162
EX1502L1_SBP_70870_CHP3.5_RAW_052.sgy	3/7/2015	2,115,028
EX1502L1_SBP_70870_CHP3.5_RAW_053.sgy	3/7/2015	3,844,602
EX1502L1_SBP_70870_CHP3.5_RAW_054.sgy	3/7/2015	4,427,316
EX1502L1_SBP_70870_CHP3.5_RAW_055.sgy	3/7/2015	70,246,848
EX1502L1_SBP_70870_CHP3.5_RAW_056.sgy	3/7/2015	13,453,484
EX1502L1_SBP_70870_CHP3.5_RAW_057.sgy	3/7/2015	51,568,936
EX1502L1_SBP_70870_CHP3.5_RAW_058.sgy	3/7/2015	26,062
EX1502L1_SBP_70870_CHP3.5_RAW_059.sgy	3/7/2015	7,460,984
EX1502L1_SBP_70870_CHP3.5_RAW_060.sgy	3/7/2015	1,299,436
EX1502L1_SBP_70870_CHP3.5_RAW_061.sgy	3/7/2015	8,359,508
EX1502L1_SBP_70870_CHP3.5_RAW_062.sgy	3/7/2015	27,384,778
EX1502L1_SBP_70870_CHP3.5_RAW_063.sgy	3/8/2015	81,271,116
EX1502L1_SBP_70870_CHP3.5_RAW_064.sgy	3/8/2015	25,026,268
EX1502L1_SBP_70870_CHP3.5_RAW_065.sgy	3/8/2015	3,148,280
EX1502L1_SBP_70870_CHP3.5_RAW_066.sgy	3/8/2015	23,507,384
EX1502L1_SBP_70870_CHP3.5_RAW_067.sgy	3/8/2015	21,049,764

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1_SBP_70870_CHP3.5_RAW_068.sgy	3/8/2015	3,980,476
EX1502L1_SBP_70870_CHP3.5_RAW_069.sgy	3/9/2015	115,824,528
EX1502L1_SBP_70870_CHP3.5_RAW_070.sgy	3/9/2015	24,150,250
EX1502L1_SBP_70870_CHP3.5_RAW_071.sgy	3/9/2015	9,482,564
EX1502L1_SBP_70870_CHP3.5_RAW_072.sgy	3/9/2015	682,780
EX1502L1_SBP_70870_CHP3.5_RAW_073.sgy	3/9/2015	171,188,004

EX1502L1 Subbottom Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1_SBP_70870_CHP3.5_RAW_074.sgy	3/9/2015	7,510,512
EX1502L1_SBP_70870_CHP3.5_RAW_075.sgy	3/9/2015	30,344,036
EX1502L1_SBP_70870_CHP3.5_RAW_076.sgy	3/10/2015	143,573,292
EX1502L1_SBP_70870_CHP3.5_RAW_077.sgy	3/10/2015	11,666,124
EX1502L1_SBP_70870_CHP3.5_RAW_078.sgy	3/10/2015	94,376,208

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150225-T072523.raw	2/25/2015	2,866,812
EX1502L1-D20150225-T075725.raw	2/25/2015	2,850,372
EX1502L1-D20150225-T082959.raw	2/25/2015	3,431,668
EX1502L1-D20150225-T090242.raw	2/25/2015	3,590,324
EX1502L1-D20150225-T091634.raw	2/25/2015	2,469,016
EX1502L1-D20150225-T140520.raw	2/25/2015	5,268,816
EX1502L1-D20150225-T143300.raw	2/25/2015	4,361,832
EX1502L1-D20150225-T151355.raw	2/25/2015	5,091,840
EX1502L1-D20150225-T154010.raw	2/25/2015	5,252,180
EX1502L1-D20150225-T160732.raw	2/25/2015	5,539,540
EX1502L1-D20150225-T163536.raw	2/25/2015	6,419,136
EX1502L1-D20150225-T173703.raw	2/25/2015	5,535,088
EX1502L1-D20150225-T180612.raw	2/25/2015	5,633,292
EX1502L1-D20150225-T183537.raw	2/25/2015	6,065,176
EX1502L1-D20150225-T190624.raw	2/25/2015	6,957,556
EX1502L1-D20150225-T194121.raw	2/25/2015	8,196,608
EX1502L1-D20150225-T202229.raw	2/25/2015	7,959,540
EX1502L1-D20150225-T210259.raw	2/25/2015	7,996,384
EX1502L1-D20150225-T214407.raw	2/25/2015	7,952,212
EX1502L1-D20150225-T222517.raw	2/25/2015	7,776,084
EX1502L1-D20150225-T230537.raw	2/25/2015	7,641,608
EX1502L1-D20150225-T234525.raw	2/25/2015	7,487,080
EX1502L1-D20150226-T002427.raw	2/25/2015	7,231,656

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150226-T010203.raw	2/25/2015	6,964,900
EX1502L1-D20150226-T013815.raw	2/25/2015	6,969,800
EX1502L1-D20150226-T021429.raw	2/25/2015	7,107,740
EX1502L1-D20150226-T025130.raw	2/25/2015	7,471,988
EX1502L1-D20150226-T033021.raw	2/26/2015	7,241,020
EX1502L1-D20150226-T040754.raw	2/26/2015	7,114,300
EX1502L1-D20150226-T044437.raw	2/26/2015	7,038,516
EX1502L1-D20150226-T052100.raw	2/26/2015	6,817,864
EX1502L1-D20150226-T055633.raw	2/26/2015	6,625,008
EX1502L1-D20150226-T063050.raw	2/26/2015	6,408,376
EX1502L1-D20150226-T070410.raw	2/26/2015	6,301,488
EX1502L1-D20150226-T073646.raw	2/26/2015	6,205,556
EX1502L1-D20150226-T080857.raw	2/26/2015	6,075,168
EX1502L1-D20150226-T084039.raw	2/26/2015	5,993,020
EX1502L1-D20150226-T091156.raw	2/26/2015	5,794,312
EX1502L1-D20150226-T094219.raw	2/26/2015	5,782,528
EX1502L1-D20150226-T101233.raw	2/26/2015	5,822,452
EX1502L1-D20150226-T104305.raw	2/26/2015	5,794,196
EX1502L1-D20150226-T111328.raw	2/26/2015	5,852,932
EX1502L1-D20150226-T114401.raw	2/26/2015	5,908,016
EX1502L1-D20150226-T121540.raw	2/26/2015	5,983,048
EX1502L1-D20150226-T124654.raw	2/26/2015	5,847,720
EX1502L1-D20150226-T131734.raw	2/26/2015	6,665,396

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150226-T135215.raw	2/26/2015	6,240,824
EX1502L1-D20150226-T142434.raw	2/26/2015	6,351,224
EX1502L1-D20150226-T145729.raw	2/26/2015	6,963,484
EX1502L1-D20150226-T153334.raw	2/26/2015	6,745,240
EX1502L1-D20150226-T160835.raw	2/26/2015	6,182,572
EX1502L1-D20150226-T164040.raw	2/26/2015	6,465,216
EX1502L1-D20150226-T171325.raw	2/26/2015	7,311,892
EX1502L1-D20150226-T174849.raw	2/26/2015	7,447,848
EX1502L1-D20150226-T182458.raw	2/26/2015	7,552,612
EX1502L1-D20150226-T190139.raw	2/26/2015	7,302,420
EX1502L1-D20150226-T193731.raw	2/26/2015	7,342,048
EX1502L1-D20150226-T201318.raw	2/26/2015	7,283,876
EX1502L1-D20150226-T204834.raw	2/26/2015	7,159,460
EX1502L1-D20150226-T212313.raw	2/26/2015	7,031,892
EX1502L1-D20150226-T215728.raw	2/26/2015	6,592,424
EX1502L1-D20150226-T223015.raw	2/26/2015	6,610,268
EX1502L1-D20150226-T230242.raw	2/26/2015	6,417,708
EX1502L1-D20150226-T233428.raw	2/26/2015	6,365,136
EX1502L1-D20150227-T000534.raw	2/26/2015	6,021,580
EX1502L1-D20150227-T003528.raw	2/26/2015	5,792,384
EX1502L1-D20150227-T010414.raw	2/26/2015	5,642,144
EX1502L1-D20150227-T013218.raw	2/26/2015	5,735,908
EX1502L1-D20150227-T020023.raw	2/26/2015	5,787,420

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150227-T022833.raw	2/26/2015	5,432,508
EX1502L1-D20150227-T025641.raw	2/26/2015	5,486,008
EX1502L1-D20150227-T032433.raw	2/26/2015	5,727,780
EX1502L1-D20150227-T035450.raw	2/27/2015	5,704,196
EX1502L1-D20150227-T042449.raw	2/27/2015	5,437,380
EX1502L1-D20150227-T045358.raw	2/27/2015	5,539,208
EX1502L1-D20150227-T052411.raw	2/27/2015	5,531,308
EX1502L1-D20150227-T055418.raw	2/27/2015	5,559,984
EX1502L1-D20150227-T062424.raw	2/27/2015	5,637,408
EX1502L1-D20150227-T065516.raw	2/27/2015	5,760,564
EX1502L1-D20150227-T072620.raw	2/27/2015	5,334,660
EX1502L1-D20150227-T075608.raw	2/27/2015	5,383,068
EX1502L1-D20150227-T082556.raw	2/27/2015	5,338,132
EX1502L1-D20150227-T085522.raw	2/27/2015	5,395,560
EX1502L1-D20150227-T092509.raw	2/27/2015	5,377,848
EX1502L1-D20150227-T095442.raw	2/27/2015	5,480,508
EX1502L1-D20150227-T102447.raw	2/27/2015	5,655,976
EX1502L1-D20150227-T105553.raw	2/27/2015	5,242,072
EX1502L1-D20150227-T112443.raw	2/27/2015	5,355,164
EX1502L1-D20150227-T115445.raw	2/27/2015	5,199,624
EX1502L1-D20150227-T122434.raw	2/27/2015	5,218,256
EX1502L1-D20150227-T125415.raw	2/27/2015	5,362,964
EX1502L1-D20150227-T132508.raw	2/27/2015	5,456,044
EX1502L1-D20150227-T135612.raw	2/27/2015	5,199,552
EX1502L1-D20150227-T142550.raw	2/27/2015	5,154,612
EX1502L1-D20150227-T145507.raw	2/27/2015	5,012,368
EX1502L1-D20150227-T152345.raw	2/27/2015	4,768,720
EX1502L1-D20150227-T155141.raw	2/27/2015	4,733,760
EX1502L1-D20150227-T161922.raw	2/27/2015	4,678,504
EX1502L1-D20150227-T164645.raw	2/27/2015	4,769,060
EX1502L1-D20150227-T171430.raw	2/27/2015	4,796,844
EX1502L1-D20150227-T174247.raw	2/27/2015	4,837,724
EX1502L1-D20150227-T181123.raw	2/27/2015	4,868,584
EX1502L1-D20150227-T183947.raw	2/27/2015	4,795,756
EX1502L1-D20150227-T190740.raw	2/27/2015	4,793,256
EX1502L1-D20150227-T193532.raw	2/27/2015	4,812,920
EX1502L1-D20150227-T200327.raw	2/27/2015	4,952,080
EX1502L1-D20150227-T203219.raw	2/27/2015	5,230,300
EX1502L1-D20150227-T210256.raw	2/27/2015	5,034,468

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150227-T213226.raw	2/27/2015	4,701,304
EX1502L1-D20150227-T220138.raw	2/27/2015	4,930,832
EX1502L1-D20150227-T223038.raw	2/27/2015	4,861,708
EX1502L1-D20150227-T225909.raw	2/27/2015	4,751,656
EX1502L1-D20150227-T232716.raw	2/27/2015	4,675,168
EX1502L1-D20150227-T235437.raw	2/27/2015	4,740,948
EX1502L1-D20150228-T002213.raw	2/27/2015	4,737,732
EX1502L1-D20150228-T004958.raw	2/27/2015	4,755,348
EX1502L1-D20150228-T011746.raw	2/27/2015	4,707,404
EX1502L1-D20150228-T014508.raw	2/27/2015	4,599,868
EX1502L1-D20150228-T021220.raw	2/27/2015	4,548,400
EX1502L1-D20150228-T023916.raw	2/27/2015	4,615,212
EX1502L1-D20150228-T030617.raw	2/27/2015	4,649,880
EX1502L1-D20150228-T033321.raw	2/28/2015	4,679,068
EX1502L1-D20150228-T040035.raw	2/28/2015	4,690,408
EX1502L1-D20150228-T042758.raw	2/28/2015	4,792,588
EX1502L1-D20150228-T045551.raw	2/28/2015	4,756,856
EX1502L1-D20150228-T052340.raw	2/28/2015	4,805,220
EX1502L1-D20150228-T055142.raw	2/28/2015	4,963,116
EX1502L1-D20150228-T062045.raw	2/28/2015	4,885,308
EX1502L1-D20150228-T064924.raw	2/28/2015	4,568,132
EX1502L1-D20150228-T071613.raw	2/28/2015	4,533,920
EX1502L1-D20150228-T074248.raw	2/28/2015	4,322,844
EX1502L1-D20150228-T080809.raw	2/28/2015	4,214,028
EX1502L1-D20150228-T083240.raw	2/28/2015	4,237,160
EX1502L1-D20150228-T085731.raw	2/28/2015	4,240,140
EX1502L1-D20150228-T092211.raw	2/28/2015	4,332,788
EX1502L1-D20150228-T094728.raw	2/28/2015	4,421,472
EX1502L1-D20150228-T101316.raw	2/28/2015	4,364,000
EX1502L1-D20150228-T103845.raw	2/28/2015	4,336,168
EX1502L1-D20150228-T110417.raw	2/28/2015	4,584,820
EX1502L1-D20150228-T113109.raw	2/28/2015	4,607,028
EX1502L1-D20150228-T115756.raw	2/28/2015	4,557,664
EX1502L1-D20150228-T122429.raw	2/28/2015	4,506,276
EX1502L1-D20150228-T125058.raw	2/28/2015	4,521,252
EX1502L1-D20150228-T131729.raw	2/28/2015	4,538,860
EX1502L1-D20150228-T134411.raw	2/28/2015	4,683,924
EX1502L1-D20150228-T141145.raw	2/28/2015	4,883,044
EX1502L1-D20150228-T144026.raw	2/28/2015	4,942,568

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150228-T150929.raw	2/28/2015	4,948,952
EX1502L1-D20150228-T153837.raw	2/28/2015	5,044,596
EX1502L1-D20150228-T160820.raw	2/28/2015	5,052,292
EX1502L1-D20150228-T163759.raw	2/28/2015	5,026,336
EX1502L1-D20150228-T170728.raw	2/28/2015	4,977,712
EX1502L1-D20150228-T173643.raw	2/28/2015	4,972,508
EX1502L1-D20150228-T180554.raw	2/28/2015	4,596,640
EX1502L1-D20150228-T193509.raw	2/28/2015	4,763,412
EX1502L1-D20150228-T200317.raw	2/28/2015	4,684,388
EX1502L1-D20150228-T203100.raw	2/28/2015	4,907,276
EX1502L1-D20150228-T210010.raw	2/28/2015	4,698,304
EX1502L1-D20150228-T212753.raw	2/28/2015	4,845,964
EX1502L1-D20150228-T215630.raw	2/28/2015	4,962,768
EX1502L1-D20150228-T222547.raw	2/28/2015	5,030,480
EX1502L1-D20150228-T225520.raw	2/28/2015	5,030,812
EX1502L1-D20150228-T232505.raw	2/28/2015	5,071,848
EX1502L1-D20150228-T235456.raw	2/28/2015	5,029,464
EX1502L1-D20150301-T002428.raw	2/28/2015	4,876,268
EX1502L1-D20150301-T005304.raw	2/28/2015	4,877,208
EX1502L1-D20150301-T012140.raw	2/28/2015	4,897,060
EX1502L1-D20150301-T015019.raw	2/28/2015	4,846,776
EX1502L1-D20150301-T021832.raw	2/28/2015	4,870,360
EX1502L1-D20150301-T024703.raw	2/28/2015	4,787,072
EX1502L1-D20150301-T031507.raw	2/28/2015	4,842,332
EX1502L1-D20150301-T034330.raw	3/1/2015	4,940,424
EX1502L1-D20150301-T041230.raw	3/1/2015	4,949,404
EX1502L1-D20150301-T044126.raw	3/1/2015	5,058,344
EX1502L1-D20150301-T051057.raw	3/1/2015	5,479,424
EX1502L1-D20150301-T054152.raw	3/1/2015	5,262,396
EX1502L1-D20150301-T061150.raw	3/1/2015	5,213,452
EX1502L1-D20150301-T064133.raw	3/1/2015	5,350,408
EX1502L1-D20150301-T071201.raw	3/1/2015	5,383,544
EX1502L1-D20150301-T074243.raw	3/1/2015	5,295,732
EX1502L1-D20150301-T081253.raw	3/1/2015	5,314,608
EX1502L1-D20150301-T084306.raw	3/1/2015	5,368,276
EX1502L1-D20150301-T091335.raw	3/1/2015	5,290,720
EX1502L1-D20150301-T094342.raw	3/1/2015	5,213,880
EX1502L1-D20150301-T101326.raw	3/1/2015	5,467,312
EX1502L1-D20150301-T104435.raw	3/1/2015	5,355,668

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150301-T111509.raw	3/1/2015	5,305,672
EX1502L1-D20150301-T114526.raw	3/1/2015	5,311,472
EX1502L1-D20150301-T121546.raw	3/1/2015	5,265,780
EX1502L1-D20150301-T124543.raw	3/1/2015	5,248,628
EX1502L1-D20150301-T131539.raw	3/1/2015	895,540
EX1502L1-D20150301-T143517.raw	3/1/2015	5,311,056
EX1502L1-D20150301-T150536.raw	3/1/2015	5,400,580
EX1502L1-D20150301-T153628.raw	3/1/2015	5,404,192
EX1502L1-D20150301-T160733.raw	3/1/2015	5,404,752
EX1502L1-D20150301-T163838.raw	3/1/2015	5,461,908
EX1502L1-D20150301-T171015.raw	3/1/2015	5,593,592
EX1502L1-D20150301-T174231.raw	3/1/2015	5,656,000
EX1502L1-D20150301-T181510.raw	3/1/2015	5,846,984
EX1502L1-D20150301-T184850.raw	3/1/2015	5,864,344
EX1502L1-D20150301-T192220.raw	3/1/2015	5,773,052
EX1502L1-D20150301-T195452.raw	3/1/2015	5,752,020
EX1502L1-D20150301-T202745.raw	3/1/2015	5,581,948
EX1502L1-D20150301-T205939.raw	3/1/2015	5,533,720
EX1502L1-D20150301-T213109.raw	3/1/2015	5,440,200
EX1502L1-D20150301-T220153.raw	3/1/2015	5,433,408
EX1502L1-D20150301-T223232.raw	3/1/2015	5,425,912
EX1502L1-D20150301-T230305.raw	3/1/2015	5,482,748
EX1502L1-D20150301-T233359.raw	3/1/2015	5,506,276
EX1502L1-D20150302-T000457.raw	3/1/2015	5,494,624
EX1502L1-D20150302-T003547.raw	3/1/2015	5,487,280
EX1502L1-D20150302-T010631.raw	3/1/2015	5,610,704
EX1502L1-D20150302-T013803.raw	3/1/2015	5,803,880
EX1502L1-D20150302-T021037.raw	3/1/2015	5,779,460
EX1502L1-D20150302-T024304.raw	3/1/2015	5,622,796
EX1502L1-D20150302-T031443.raw	3/1/2015	5,551,516
EX1502L1-D20150302-T034602.raw	3/2/2015	5,596,168
EX1502L1-D20150302-T041733.raw	3/2/2015	5,594,408
EX1502L1-D20150302-T044902.raw	3/2/2015	5,434,788
EX1502L1-D20150302-T051941.raw	3/2/2015	5,240,672
EX1502L1-D20150302-T054928.raw	3/2/2015	5,396,484
EX1502L1-D20150302-T062013.raw	3/2/2015	5,454,524
EX1502L1-D20150302-T065117.raw	3/2/2015	5,331,328
EX1502L1-D20150302-T072146.raw	3/2/2015	5,263,952
EX1502L1-D20150302-T075137.raw	3/2/2015	5,213,324

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150302-T082115.raw	3/2/2015	5,237,748
EX1502L1-D20150302-T085058.raw	3/2/2015	5,300,616
EX1502L1-D20150302-T092107.raw	3/2/2015	5,511,140
EX1502L1-D20150302-T095210.raw	3/2/2015	5,504,852
EX1502L1-D20150302-T102307.raw	3/2/2015	5,511,608
EX1502L1-D20150302-T105410.raw	3/2/2015	5,478,684
EX1502L1-D20150302-T112501.raw	3/2/2015	5,461,476
EX1502L1-D20150302-T115550.raw	3/2/2015	5,500,920
EX1502L1-D20150302-T122647.raw	3/2/2015	5,617,108
EX1502L1-D20150302-T125812.raw	3/2/2015	7,572,000
EX1502L1-D20150302-T134114.raw	3/2/2015	6,075,580
EX1502L1-D20150302-T141550.raw	3/2/2015	5,476,844
EX1502L1-D20150302-T144650.raw	3/2/2015	5,494,668
EX1502L1-D20150302-T151750.raw	3/2/2015	5,398,596
EX1502L1-D20150302-T154826.raw	3/2/2015	5,500,704
EX1502L1-D20150302-T161932.raw	3/2/2015	5,600,592
EX1502L1-D20150302-T165119.raw	3/2/2015	5,558,104
EX1502L1-D20150302-T172246.raw	3/2/2015	5,539,832
EX1502L1-D20150302-T175410.raw	3/2/2015	5,528,380
EX1502L1-D20150302-T182514.raw	3/2/2015	5,432,768
EX1502L1-D20150302-T185541.raw	3/2/2015	5,441,008
EX1502L1-D20150302-T192614.raw	3/2/2015	5,394,468
EX1502L1-D20150302-T195636.raw	3/2/2015	5,431,588
EX1502L1-D20150302-T202713.raw	3/2/2015	5,506,188
EX1502L1-D20150302-T205834.raw	3/2/2015	5,264,616
EX1502L1-D20150302-T212935.raw	3/2/2015	5,299,280
EX1502L1-D20150302-T220052.raw	3/2/2015	5,324,884
EX1502L1-D20150302-T223216.raw	3/2/2015	5,254,840
EX1502L1-D20150302-T230321.raw	3/2/2015	5,350,192
EX1502L1-D20150302-T233450.raw	3/2/2015	5,281,836
EX1502L1-D20150303-T000626.raw	3/2/2015	4,118,152
EX1502L1-D20150303-T003807.raw	3/2/2015	4,408,472
EX1502L1-D20150303-T010935.raw	3/2/2015	3,123,700
EX1502L1-D20150303-T101032.raw	3/3/2015	6,564,536
EX1502L1-D20150303-T104129.raw	3/3/2015	10,333,672
EX1502L1-D20150303-T112932.raw	3/3/2015	11,781,404
EX1502L1-D20150303-T190231.raw	3/3/2015	7,910,764
EX1502L1-D20150303-T193244.raw	3/3/2015	6,660,732
EX1502L1-D20150303-T200245.raw	3/3/2015	5,785,348

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150303-T203302.raw	3/3/2015	7,751,024
EX1502L1-D20150303-T210330.raw	3/3/2015	3,641,064
EX1502L1-D20150303-T211858.raw	3/3/2015	330,156
EX1502L1-D20150303-T212043.raw	3/3/2015	7,289,284
EX1502L1-D20150303-T215147.raw	3/3/2015	6,892,044
EX1502L1-D20150303-T222255.raw	3/3/2015	6,922,292
EX1502L1-D20150303-T225331.raw	3/3/2015	7,491,864
EX1502L1-D20150303-T232404.raw	3/3/2015	7,629,224
EX1502L1-D20150303-T235443.raw	3/3/2015	6,838,252
EX1502L1-D20150304-T002520.raw	3/3/2015	7,032,688
EX1502L1-D20150304-T005608.raw	3/3/2015	7,358,228
EX1502L1-D20150304-T012730.raw	3/3/2015	7,326,916
EX1502L1-D20150304-T015825.raw	3/3/2015	5,985,000
EX1502L1-D20150304-T022705.raw	3/3/2015	6,044,764
EX1502L1-D20150304-T025544.raw	3/3/2015	6,018,688
EX1502L1-D20150304-T032424.raw	3/3/2015	6,832,796
EX1502L1-D20150304-T035449.raw	3/4/2015	6,738,664
EX1502L1-D20150304-T042556.raw	3/4/2015	7,118,940
EX1502L1-D20150304-T045652.raw	3/4/2015	7,317,392
EX1502L1-D20150304-T052747.raw	3/4/2015	7,563,676
EX1502L1-D20150304-T055844.raw	3/4/2015	7,014,324
EX1502L1-D20150304-T062750.raw	3/4/2015	6,051,440
EX1502L1-D20150304-T065706.raw	3/4/2015	4,778,076
EX1502L1-D20150305-T040626.raw	3/5/2015	5,040,784
EX1502L1-D20150305-T043821.raw	3/5/2015	2,369,108
EX1502L1-D20150305-T050005.raw	3/5/2015	2,479,588
EX1502L1-D20150305-T051422.raw	3/5/2015	459,056
EX1502L1-D20150305-T052830.raw	3/5/2015	679,184
EX1502L1-D20150305-T053217.raw	3/5/2015	32,528
EX1502L1-D20150305-T053300.raw	3/5/2015	6,252,228
EX1502L1-D20150305-T060526.raw	3/5/2015	755,356
EX1502L1-D20150305-T061306.raw	3/5/2015	5,412,704
EX1502L1-D20150305-T064516.raw	3/5/2015	5,977,060
EX1502L1-D20150305-T071734.raw	3/5/2015	5,967,576
EX1502L1-D20150305-T075030.raw	3/5/2015	6,002,104
EX1502L1-D20150305-T082407.raw	3/5/2015	7,773,788
EX1502L1-D20150305-T090425.raw	3/5/2015	9,664,540
EX1502L1-D20150305-T095132.raw	3/5/2015	8,218,616
EX1502L1-D20150305-T103446.raw	3/5/2015	6,299,620

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150305-T110413.raw	3/5/2015	3,883,464
EX1502L1-D20150305-T164222.raw	3/5/2015	3,997,920
EX1502L1-D20150305-T171208.raw	3/5/2015	3,564,784
EX1502L1-D20150305-T174218.raw	3/5/2015	3,830,056
EX1502L1-D20150305-T181542.raw	3/5/2015	2,519,012
EX1502L1-D20150306-T032901.raw	3/6/2015	10,632,068
EX1502L1-D20150306-T040952.raw	3/6/2015	10,365,516
EX1502L1-D20150306-T044953.raw	3/6/2015	9,647,112
EX1502L1-D20150306-T052824.raw	3/6/2015	8,911,460
EX1502L1-D20150306-T060550.raw	3/6/2015	7,443,060
EX1502L1-D20150306-T064144.raw	3/6/2015	8,141,100
EX1502L1-D20150306-T071711.raw	3/6/2015	9,157,592
EX1502L1-D20150306-T075237.raw	3/6/2015	7,438,236
EX1502L1-D20150306-T082749.raw	3/6/2015	6,890,480
EX1502L1-D20150306-T090211.raw	3/6/2015	6,667,604
EX1502L1-D20150306-T093518.raw	3/6/2015	6,474,312
EX1502L1-D20150306-T100857.raw	3/6/2015	7,642,200
EX1502L1-D20150306-T104244.raw	3/6/2015	7,753,204
EX1502L1-D20150306-T111552.raw	3/6/2015	6,236,788
EX1502L1-D20150306-T114904.raw	3/6/2015	5,294,448
EX1502L1-D20150306-T122255.raw	3/6/2015	4,314,196
EX1502L1-D20150306-T125655.raw	3/6/2015	4,575,116
EX1502L1-D20150306-T133109.raw	3/6/2015	4,662,820
EX1502L1-D20150306-T140530.raw	3/6/2015	4,617,364
EX1502L1-D20150306-T143943.raw	3/6/2015	4,310,676
EX1502L1-D20150306-T151254.raw	3/6/2015	4,391,252
EX1502L1-D20150306-T154745.raw	3/6/2015	5,127,120
EX1502L1-D20150306-T162330.raw	3/6/2015	5,579,972
EX1502L1-D20150306-T165831.raw	3/6/2015	5,861,852
EX1502L1-D20150306-T173159.raw	3/6/2015	8,025,436
EX1502L1-D20150306-T180728.raw	3/6/2015	9,632,988
EX1502L1-D20150306-T184200.raw	3/6/2015	8,615,260
EX1502L1-D20150306-T191720.raw	3/6/2015	8,372,604
EX1502L1-D20150306-T195241.raw	3/6/2015	6,632,360
EX1502L1-D20150306-T202652.raw	3/6/2015	6,436,696
EX1502L1-D20150306-T205927.raw	3/6/2015	6,980,280
EX1502L1-D20150306-T213222.raw	3/6/2015	6,622,700
EX1502L1-D20150306-T220653.raw	3/6/2015	5,981,448
EX1502L1-D20150306-T224025.raw	3/6/2015	7,569,208

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150306-T231514.raw	3/6/2015	6,266,436
EX1502L1-D20150306-T234752.raw	3/6/2015	7,891,016
EX1502L1-D20150307-T002443.raw	3/6/2015	7,360,396
EX1502L1-D20150307-T010014.raw	3/6/2015	8,495,808
EX1502L1-D20150307-T013558.raw	3/6/2015	7,877,528
EX1502L1-D20150307-T020913.raw	3/6/2015	7,781,652
EX1502L1-D20150307-T024509.raw	3/6/2015	7,682,984
EX1502L1-D20150307-T032121.raw	3/6/2015	7,920,400
EX1502L1-D20150307-T035806.raw	3/7/2015	7,566,080
EX1502L1-D20150307-T043433.raw	3/7/2015	7,210,136
EX1502L1-D20150307-T052349.raw	3/7/2015	4,277,116
EX1502L1-D20150307-T054945.raw	3/7/2015	6,058,456
EX1502L1-D20150307-T062718.raw	3/7/2015	7,069,216
EX1502L1-D20150307-T070952.raw	3/7/2015	106,048
EX1502L1-D20150307-T081908.raw	3/7/2015	5,856,980
EX1502L1-D20150307-T085137.raw	3/7/2015	5,848,336
EX1502L1-D20150307-T092532.raw	3/7/2015	6,496,676
EX1502L1-D20150307-T095909.raw	3/7/2015	6,239,572
EX1502L1-D20150307-T103238.raw	3/7/2015	7,059,428
EX1502L1-D20150307-T110559.raw	3/7/2015	7,292,756
EX1502L1-D20150307-T113857.raw	3/7/2015	8,628,312
EX1502L1-D20150307-T121213.raw	3/7/2015	9,343,028
EX1502L1-D20150307-T124553.raw	3/7/2015	9,942,024
EX1502L1-D20150307-T132045.raw	3/7/2015	9,417,272
EX1502L1-D20150307-T135521.raw	3/7/2015	9,120,352
EX1502L1-D20150307-T143015.raw	3/7/2015	9,406,992
EX1502L1-D20150307-T150535.raw	3/7/2015	10,410,648
EX1502L1-D20150307-T154655.raw	3/7/2015	11,475,888
EX1502L1-D20150307-T163352.raw	3/7/2015	8,635,968
EX1502L1-D20150307-T170943.raw	3/7/2015	9,655,572
EX1502L1-D20150307-T174637.raw	3/7/2015	10,100,392
EX1502L1-D20150307-T182355.raw	3/7/2015	9,933,116
EX1502L1-D20150307-T190002.raw	3/7/2015	10,195,620
EX1502L1-D20150307-T193758.raw	3/7/2015	10,179,600
EX1502L1-D20150307-T201523.raw	3/7/2015	8,347,936
EX1502L1-D20150307-T205055.raw	3/7/2015	7,747,632
EX1502L1-D20150307-T212533.raw	3/7/2015	6,697,828
EX1502L1-D20150307-T222015.raw	3/7/2015	6,004,252
EX1502L1-D20150307-T225601.raw	3/7/2015	6,020,804

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150307-T233038.raw	3/7/2015	6,084,864
EX1502L1-D20150308-T000442.raw	3/7/2015	5,938,292
EX1502L1-D20150308-T003907.raw	3/7/2015	6,506,740
EX1502L1-D20150308-T011313.raw	3/7/2015	5,693,012
EX1502L1-D20150308-T014756.raw	3/7/2015	5,773,264
EX1502L1-D20150308-T022250.raw	3/7/2015	2,574,696
EX1502L1-D20150308-T031047.raw	3/7/2015	7,503,472
EX1502L1-D20150308-T035323.raw	3/8/2015	6,273,684
EX1502L1-D20150308-T042959.raw	3/8/2015	7,033,284
EX1502L1-D20150308-T050702.raw	3/8/2015	7,923,764
EX1502L1-D20150308-T054334.raw	3/8/2015	8,033,404
EX1502L1-D20150308-T062005.raw	3/8/2015	7,392,548
EX1502L1-D20150308-T065551.raw	3/8/2015	7,487,180
EX1502L1-D20150308-T073035.raw	3/8/2015	7,502,764
EX1502L1-D20150308-T080436.raw	3/8/2015	8,033,644
EX1502L1-D20150308-T083847.raw	3/8/2015	7,456,448
EX1502L1-D20150308-T091346.raw	3/8/2015	5,657,688
EX1502L1-D20150308-T094831.raw	3/8/2015	5,810,340
EX1502L1-D20150308-T102242.raw	3/8/2015	7,061,060
EX1502L1-D20150308-T105813.raw	3/8/2015	8,426,156
EX1502L1-D20150308-T113325.raw	3/8/2015	8,506,684
EX1502L1-D20150308-T120840.raw	3/8/2015	7,955,704
EX1502L1-D20150308-T124329.raw	3/8/2015	7,925,948
EX1502L1-D20150308-T131918.raw	3/8/2015	7,822,812
EX1502L1-D20150308-T135452.raw	3/8/2015	7,777,792
EX1502L1-D20150308-T143005.raw	3/8/2015	8,187,068
EX1502L1-D20150308-T150600.raw	3/8/2015	8,247,728
EX1502L1-D20150308-T154148.raw	3/8/2015	8,539,312
EX1502L1-D20150308-T161805.raw	3/8/2015	8,507,728
EX1502L1-D20150308-T165524.raw	3/8/2015	7,686,176
EX1502L1-D20150308-T172920.raw	3/8/2015	5,978,780
EX1502L1-D20150308-T211841.raw	3/8/2015	732,688
EX1502L1-D20150308-T214441.raw	3/8/2015	7,706,692
EX1502L1-D20150308-T221944.raw	3/8/2015	7,277,532
EX1502L1-D20150308-T225514.raw	3/8/2015	7,236,512
EX1502L1-D20150308-T233050.raw	3/8/2015	7,406,720
EX1502L1-D20150309-T000617.raw	3/8/2015	7,419,408
EX1502L1-D20150309-T004256.raw	3/8/2015	7,903,448
EX1502L1-D20150309-T012039.raw	3/8/2015	7,999,256

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150309-T015820.raw	3/8/2015	9,398,108
EX1502L1-D20150309-T023836.raw	3/8/2015	8,898,096
EX1502L1-D20150309-T031615.raw	3/8/2015	9,248,388
EX1502L1-D20150309-T035409.raw	3/9/2015	9,517,180
EX1502L1-D20150309-T043117.raw	3/9/2015	9,191,112
EX1502L1-D20150309-T051001.raw	3/9/2015	9,132,100
EX1502L1-D20150309-T054903.raw	3/9/2015	9,380,328
EX1502L1-D20150309-T062708.raw	3/9/2015	8,771,708
EX1502L1-D20150309-T070520.raw	3/9/2015	9,013,368
EX1502L1-D20150309-T074223.raw	3/9/2015	9,152,924
EX1502L1-D20150309-T081923.raw	3/9/2015	8,480,084
EX1502L1-D20150309-T085522.raw	3/9/2015	8,483,992
EX1502L1-D20150309-T093208.raw	3/9/2015	6,746,660
EX1502L1-D20150309-T100644.raw	3/9/2015	3,800,148
EX1502L1-D20150309-T111431.raw	3/9/2015	6,042,560
EX1502L1-D20150309-T114858.raw	3/9/2015	7,022,976
EX1502L1-D20150309-T122437.raw	3/9/2015	6,529,640
EX1502L1-D20150309-T125734.raw	3/9/2015	7,147,208
EX1502L1-D20150309-T133212.raw	3/9/2015	7,476,164
EX1502L1-D20150309-T140830.raw	3/9/2015	6,908,164
EX1502L1-D20150309-T144334.raw	3/9/2015	7,104,288
EX1502L1-D20150309-T151859.raw	3/9/2015	6,879,576
EX1502L1-D20150309-T155405.raw	3/9/2015	6,964,480
EX1502L1-D20150309-T162846.raw	3/9/2015	6,873,504
EX1502L1-D20150309-T170158.raw	3/9/2015	7,659,292
EX1502L1-D20150309-T173904.raw	3/9/2015	7,172,132
EX1502L1-D20150309-T181453.raw	3/9/2015	7,438,276
EX1502L1-D20150309-T185131.raw	3/9/2015	7,265,404
EX1502L1-D20150309-T192647.raw	3/9/2015	7,187,812
EX1502L1-D20150309-T200215.raw	3/9/2015	6,650,616
EX1502L1-D20150309-T203558.raw	3/9/2015	7,446,828
EX1502L1-D20150309-T210955.raw	3/9/2015	7,421,672
EX1502L1-D20150309-T214318.raw	3/9/2015	7,142,612
EX1502L1-D20150309-T221441.raw	3/9/2015	7,801,012
EX1502L1-D20150309-T224715.raw	3/9/2015	8,716,324
EX1502L1-D20150309-T232237.raw	3/9/2015	8,644,132
EX1502L1-D20150309-T235733.raw	3/9/2015	9,176,032
EX1502L1-D20150310-T003322.raw	3/9/2015	9,661,264
EX1502L1-D20150310-T011008.raw	3/9/2015	10,461,524

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150310-T014911.raw	3/9/2015	10,839,116
EX1502L1-D20150310-T022928.raw	3/9/2015	11,026,644
EX1502L1-D20150310-T031058.raw	3/9/2015	12,274,328
EX1502L1-D20150310-T035630.raw	3/10/2015	8,258,904
EX1502L1-D20150310-T042752.raw	3/10/2015	8,051,696
EX1502L1-D20150310-T045931.raw	3/10/2015	8,298,964
EX1502L1-D20150310-T053158.raw	3/10/2015	8,062,988
EX1502L1-D20150310-T060327.raw	3/10/2015	10,314,880
EX1502L1-D20150310-T064341.raw	3/10/2015	14,992,492
EX1502L1-D20150310-T073945.raw	3/10/2015	14,559,496
EX1502L1-D20150310-T083335.raw	3/10/2015	14,551,188
EX1502L1-D20150310-T092737.raw	3/10/2015	14,148,256
EX1502L1-D20150310-T102002.raw	3/10/2015	12,419,368
EX1502L1-D20150310-T110722.raw	3/10/2015	8,979,936
EX1502L1-D20150310-T114308.raw	3/10/2015	9,082,876
EX1502L1-D20150310-T121935.raw	3/10/2015	9,080,008
EX1502L1-D20150310-T125618.raw	3/10/2015	9,830,612
EX1502L1-D20150310-T133501.raw	3/10/2015	10,444,976
EX1502L1-D20150310-T141438.raw	3/10/2015	10,588,808
EX1502L1-D20150310-T145420.raw	3/10/2015	10,462,588
EX1502L1-D20150310-T153244.raw	3/10/2015	12,067,196
EX1502L1-D20150310-T161653.raw	3/10/2015	9,756,588
EX1502L1-D20150310-T165331.raw	3/10/2015	9,168,976
EX1502L1-D20150310-T172829.raw	3/10/2015	8,758,688
EX1502L1-D20150310-T180255.raw	3/10/2015	8,762,780
EX1502L1-D20150310-T183742.raw	3/10/2015	14,090,056
EX1502L1-D20150310-T193143.raw	3/10/2015	13,538,156
EX1502L1-D20150310-T202232.raw	3/10/2015	15,062,904
EX1502L1-D20150310-T211824.raw	3/10/2015	14,149,244
EX1502L1-D20150310-T220936.raw	3/10/2015	9,023,216
EX1502L1-D20150310-T224441.raw	3/10/2015	9,744,364
EX1502L1-D20150310-T232030.raw	3/10/2015	9,002,308
EX1502L1-D20150310-T235703.raw	3/10/2015	8,399,376
EX1502L1-D20150311-T003333.raw	3/10/2015	6,852,640
EX1502L1-D20150311-T010602.raw	3/10/2015	6,087,396
EX1502L1-D20150311-T013436.raw	3/10/2015	5,365,628
EX1502L1-D20150311-T020257.raw	3/10/2015	5,380,952
EX1502L1-D20150311-T023102.raw	3/10/2015	6,215,248
EX1502L1-D20150311-T025842.raw	3/10/2015	6,732,396

EX1502L1 EK 60 Data Collection Log (Local Time = UTC - 5 or -4)		
File Name	Date (Local)	File size (bytes)
EX1502L1-D20150311-T032639.raw	3/10/2015	6,817,020
EX1502L1-D20150311-T035437.raw	3/11/2015	7,122,356
EX1502L1-D20150311-T042257.raw	3/11/2015	7,194,204
EX1502L1-D20150311-T045102.raw	3/11/2015	7,069,100
EX1502L1-D20150311-T051904.raw	3/11/2015	4,485,144
EX1502L1-D20150311-T090649.raw	3/11/2015	4,871,636
EX1502L1-D20150311-T093757.raw	3/11/2015	5,061,236
EX1502L1-D20150311-T101011.raw	3/11/2015	5,775,256
EX1502L1-D20150311-T104245.raw	3/11/2015	5,799,980
EX1502L1-D20150311-T111546.raw	3/11/2015	5,703,244
EX1502L1-D20150311-T114700.raw	3/11/2015	5,446,016
EX1502L1-D20150311-T121814.raw	3/11/2015	5,879,104
EX1502L1-D20150311-T124906.raw	3/11/2015	5,466,720

EX1502L1 SVP LOG						
DATE (UTC)	TIME (UTC)	XBT/CTD FILE NAME	LAT (WGS84) (dec min)	LONG (WGS84) (dec min)	PROBE TYPE	NOTES
2/24/2015	19:21	EX1502L1_XBT001_150224	40 56.0896N	71 10.48145W	DEEP BLUE	
2/24/2015	22:25	EX1502L1_XBT002_150224	40 28.09888N	70 49.9873W	DEEP BLUE	
2/25/2015	05:32	EX1502L1_XBT003_150225	39 49.85278N	69 39.14746W	DEEP BLUE	
2/25/2015	12:09	EX1502L1_XBT004_150225	39 10.30884N	70 13.66553W	DEEP BLUE	
2/25/2015	14:28	EX1502L1_XBT005_150225	38 50.85449N	70 33.37842W	DEEP BLUE	
2/25/2015	19:45	EX1502L1_XBT006_150225	38 12.32056N	71 12.22412W	DEEP BLUE	
2/25/2015	23:44	EX1502L1_XBT007_150225	37 49.40967N	71 35.15771W	DEEP BLUE	
2/26/2015	05:27	EX1502L1_XBT008_150226	37 13.28662N	72 11.07275W	DEEP BLUE	
2/26/2015	09:32	EX1502L1_XBT009_150226	36 43.98145N	72 39.99463W	DEEP BLUE	
2/26/2015	14:28	EX1502L1_XBT010_150226	36 10.57764N	73 20.26953W	DEEP BLUE	
2/27/2015	14:42	EX1502L1_XBT011_150226	32 43.33545N	73 7.87598W	DEEP BLUE	Cast taken on 02/27 but file name is wrong
2/27/2015	15:25	EX1502L1_XBT012_150226	32 36.12500N	73 4.09619W	DEEP BLUE	Cast taken on 02/27 but file name is wrong
2/27/2015	21:01	EX1502L1_XBT013_150226	31 41.82788N	72 35.54395W	DEEP BLUE	Cast taken on 02/27 but file name is wrong
2/28/2015	05:03	EX1502L1_XBT014_150226	30 22.59497N	71 54.39970W	DEEP BLUE	Cast taken on 02/28 but file name is wrong
2/28/2015	11:08	EX1502L1_XBT015_150228	29 19.64697N	71 22.08789W	DEEP BLUE	
2/28/2015	13:31	EX1502L1_XBT016_150228	28 55.00757N	71 9.54492W	DEEP BLUE	
2/28/2015	18:53	EX1502L1_XBT017_150228	28 4.10938N	70 43.76611W	DEEP BLUE	
2/28/2015	23:24	EX1502L1_XBT018_150228	27 21.77026N	70 22.50977W	DEEP BLUE	
3/1/2015	11:01	EX1502L1_XBT019_150301	25 33.95337N	69 28.92627W	DEEP BLUE	
3/1/2015	15:38	EX1502L1_XBT020_150301	24 53.54028N	69 9.06543W	DEEP BLUE	
3/1/2015	23:08	EX1502L1_XBT021_150301	23 49.07861N	68 37.58789W	DEEP BLUE	
3/2/2015	05:14	EX1502L1_XBT022_150302	22 55.9021N	68 11.81641W	DEEP BLUE	
3/2/2015	11:24	EX1502L1_XBT023_150302	22 0.24048N	67 45.03076W	DEEP BLUE	
3/2/2015	17:59	EX1502L1_XBT024_150302	21 4.58179N	67 18.43066W	DEEP BLUE	
3/2/2015	23:04	EX1502L1_XBT025_150302	20 19.46826N	66 56.99023W	DEEP BLUE	
3/3/2015	04:37	EX1502L1_XBT026_150303	19 32.41907N	66 34.73389W	DEEP BLUE	
3/3/2015	20:44	EX1502L1_XBT027_150303	18 46.75049N	66 1.59424W	DEEP BLUE	
3/4/2015	03:54	EX1502L1_XBT028_150304	18 50.65393N	65 35.21875W	DEEP BLUE	
3/5/2015	06:20	EX1502L1_XBT029_150305	18 44.25317N	65 4.63184W	DEEP BLUE	
3/5/2015	20:17	EX1502L1_XBT030_150305	17 54.71899N	64 57.80176W	DEEP BLUE	
3/5/2015	22:58	EX1502L1_XBT031_150305	17 52.15186N	64 49.53223W	DEEP BLUE	
3/6/2015	01:05	EX1502L1_XBT032_150306	17 54.22827N	64 46.44434W	DEEP BLUE	
3/6/2015	09:12	EX1502L1_XBT033_150306	17 54.35767N	63 57.23096W	DEEP BLUE	
3/6/2015	16:06	EX1502L1_XBT034_150306	17 30.03552N	64 2.04297W	DEEP BLUE	
3/6/2015	20:50	EX1502L1_XBT035_150306	17 54.39746N	64 0.10742W	DEEP BLUE	
3/7/2015	02:32	EX1502L1_XBT036_150307	17 22.7832N	64 4.97021W	DEEP BLUE	
3/7/2015	08:46	EX1502L1_XBT037_150307	17 52.40283N	64 1.11768W	DEEP BLUE	
3/7/2015	16:35	EX1502L1_XBT038_150307	17 26.98145N	64 47.16455W	DEEP BLUE	
3/7/2015	23:22	EX1502L1_XBT039_150307	17 43.47375N	64 3.25244W	DEEP BLUE	

EX1502L1 SVP LOG						
DATE (UTC)	**TIME (UTC)**	**XBT/CTD FILE NAME**	**LAT (WGS84) (dec min)**	**LONG (WGS84) (dec min)**	**PROBE TYPE**	**NOTES**
3/8/2015	04:36	EX1502L1_XBT040_150308	17 34.8092N	64 7.70166W	DEEP BLUE	
3/8/2015	10:37	EX1502L1_XBT041_150308	17 37.2002N	64 10.16846W	DEEP BLUE	
3/8/2015	16:20	EX1502L1_XBT042_150308	17 38.19824N	64 14.03516W	DEEP BLUE	Close to Heading lines
3/8/2015	18:32	EX1502L1_XBT043_150308	28 4.4397N	70 43.93311W	DEEP BLUE	Conducted at the beginning of CTD Cast
3/8/2015	23:36	EX1502L1_XBT044_150308	17 28.06909N	64 41.90332W	DEEP BLUE	
3/9/2015	05:37	EX1502L1_XBT045_150308	17 27.1637N	64 37.18652W	DEEP BLUE	Cast taken on 03/09 but file name is wrong
3/9/2015	13:54	EX1502L1_XBT046_150308	17 36.36768N	64 13.51367W	DEEP BLUE	Cast taken on 03/09 but file name is wrong
3/9/2015	20:56	EX1502L1_XBT047_150309	17 26.04358N	64 35.84082W	DEEP BLUE	
3/10/2015	04:40	EX1502L1_XBT048_150310	17 21.51245N	64 26.40332W	DEEP BLUE	
3/10/2015	10:32	EX1502L1_XBT049_150310	17 22.37109N	64 19.5542W	DEEP BLUE	
3/10/2015	17:43	EX1502L1_XBT050_150310	17 25.92639N	64 22.93115W	DEEP BLUE	
3/10/2015	23:57	EX1502L1_XBT051_150310	17 44.59888N	64 16.7627W	DEEP BLUE	

Appendix F: Kongsberg EM 302 Multibeam Sonar Description and Operational Specifications

Several features of the *Okeanos Explorer's* 30 kHz multibeam make it an excellent tool for ocean exploration. The following is a brief description of these features.

Depth Range

The system is designed to map the seafloor in water depths of 10 to 7000 meters. This leaves only the deepest parts of the deeper ocean trenches out of the EM 302's reach. In fact, when the ship transited over the Mariana Trench going to and from Indonesia in 2010, the system was able to detect the bottom at depths of up to 8000 meters.

High Density Data

In multibeam data, the denser the data, the finer resolution maps can be produced. In water deptsh 3000 meters and shallower, the system can operate in dual swath, or multiping mode, which results in increased along track data density. This is achieved by detecting two swaths per ping cycle, resulting in up to 864 beams per ping.

The *Okeanos Explorer* mapping team typically operates the multibeam in high density equidistant ping mode, which results in up to 864 evenly spaced soundings on the seafloor per ping.

Multiple Data Types Collected

The system collects seafloor backscatter data, which provides information about the character of the seafloor in terms of bottom type.

The system also collects water column backscatter data, which has the ability to detect gaseous plumes in the water column. The full value of this feature is still being realized.

FM chirp mode is utilized in water depths greater than 1000 meters, and allows for the detection of the bottom further out from nadir than with previous 30 kHz systems. This results in wider swath widths, giving a higher likelihood of new discoveries as well as efficiency of survey operations.

Multibeam Primer

The area of the seafloor covered, or ensonified, by a single beam within a pulse of sound, or ping, is called the beam footprint. This beam footprint is defined in terms of the across track and along track values. Both of these values are dependent on water depth and the beam width at which the sound pulse is transmitted and received. The across track beam width value is also dependent on the receive angle, or "listening" angle, of the system, and the angle from nadir which it is received. The transmit angle for the transmit transducer is 0.5°, which is the smallest possible angle currently available for the EM302 system. The further out from nadir a sounding occurs, the larger the footprint will be. The receive angle for the receive transducer is 1°. As an example, as seen in Table 1 below, in 2000 meters of water, a beam footprint will have a radius of 18 meters at nadir but 25 meters by the time it hits the seafloor at an angle 140 degrees out from nadir.

Calculated acrosstrack acoustic beam footprint in meters for EM 302 (high density ping mode, 432 soundings/profile)				
Water depth (m)	**Angle from nadir**			
50	1 deg RX center	90 deg	120 deg	140 deg
100	1	0.5	1	1
200	2	1	2	3
400	4	2	3	5
1000	7	4	6	10
2000	18	9	16	25
4000	35	19	32	-
6000	70	37	-	-
7000	105	56	-	-

Table 1. Calculated across track EM302 beam footprint. Reference: Kongsberg Product description, Kongsberg document 302675 Rev B, Date 14/06/06, p. 17.

Calculated acrosstrack sounding density for EM 302 (high density ping mode, 432 soundings/profile)			
Water depth (m)	**Swath Width**		
50	90 deg	120 deg	140 deg
100	0.2	0.4	0.9
200	0.5	0.8	1.7
400	0.9	1.6	3.5
1000	1.9	3.2	6.9
2000	4.6	8.1	17.4
4000	9.3	16.2	-

Table 2. Calculated across track EM302 sounding density. Reference: Kongsberg Product description, Kongsberg document 302675 Rev B, Date 14/06/06, p. 17.

Acrosstrack sounding density describes the spacing between individual soundings on the seafloor in the acrosstrack direction. The maximum swath of the EM 302 is 150 degrees. At this swath, the sounding density will be the least dense, since the beams will be spread out over a larger horizontal distance over the seafloor. As the swath angle (width) is decreased, the sounding density will increase, as the same number of beams are now spread out over a smaller horizontal distance over the seafloor.

Calculated ping rate and alongtrack resolution for EM 302					
140 deg swath, one profile per ping					
			Alongtrack distance between profiles (m)		
Water depth (m)	Swath Width (m)	Ping Rate (pings/second)	@4 kts	@8 kts	@12 kts
50	275	3.2	0.7	1.2	1.9
100	550	1.8	1.1	2.2	3.3
200	1100	1	2.1	4.2	6.3
400	2200	0.5	4.1	8.2	12.2
1000	5500	0.2	10	20	30
2000	8000	0.1	15.2	30.5	45.7
4000	8000	0.06	19.2	38.5	57.7
6000	8000	0.04	24.5	49	73.4

Table 3. Calculated ping rate and along track EM302 sounding density, one profile per ping. Reference: Kongsberg Product description, Kongsberg document 302675 Rev B, Date 14/06/06, p. 15.

Calculated ping rate and alongtrack resolution for EM 302					
140 deg swath, two profiles per ping					
			Alongtrack distance between profiles (m)		
Water depth (m)	Swath Width (m)	Ping Rate	@4 kts	@8 kts	@12 kts
50	275	3.2	0.3	0.6	0.9
100	550	1.8	0.6	1.1	1.7
200	1100	1	1.1	2.1	3.2
400	2200	0.5	2	4.1	6.1
1000	5500	0.2	5	10	15
2000	8000	0.1	7.6	15.2	22.8

Table 4. Calculated ping rate and along track EM302 sounding density, two profiles per ping. Reference: Kongsberg Product description, Kongsberg document 302675 Rev B, Date 14/06/06, p. 15.

Reference: Kongsberg Product Description: EM 302 multibeam echosounder

Appendix G: Weather Log

This weather log is provided to give environmental conditions related to multibeam data quality.

EX1502L1 WEATHER LOG									
LOCAL DATE	LOCAL TIME	UTC TIME	UTC DATE	WIND DIRECTION (deg)	WIND SPEED (kt)	WAVE HEIGHT (ft)	SWELL DIRECTION (deg)	SWELL HEIGHT (ft)	NOTES
02/24/2015	12:00	17:00	02/24/2015	230	7	0	190	0-1	
02/24/2015	15:00	20:00	02/24/2015	205	10	0-1	100	0-1	
02/24/2015	18:00	23:00	02/24/2015	100	16	0-1	230/150	1-2	
02/24/2015	21:00	2:00	02/25/2015	150	14	2-4	150	3-5	
02/25/2015	0:00	5:00	02/25/2015	150	28	2-4	150	4-6	
02/25/2015	3:00	8:00	02/25/2015	160	22	2-4	130	5-8	
02/25/2015	6:00	11:00	02/25/2015	332	20.9	2-3	150/310	5-7	
02/25/2015	9:00	14:00	02/25/2015	300	27	2-4	150/300	4-6	
02/25/2015	12:00	17:00	02/25/2015	310	22	2-4	280	4-6	
02/25/2015	15:00	20:00	02/25/2015	320	22	2-4	280	3-5	
02/25/2015	18:00	23:00	02/25/2015	310	20	2-4	150/310	4-6	
02/25/2015	21:00	2:00	02/26/2015	005	10	0-1	150	3-5	
02/26/2015	0:00	5:00	02/26/2015	100	5	0-1	150	2-3	
02/26/2015	3:00	8:00	02/26/2015	090	18	1-2	150	2-4	
02/26/2015	6:00	11:00	02/26/2015	090	20	1-2	120	2-4	
02/26/2015	9:00	14:00	02/26/2015	120	20	2-4	050/100	4-6	
02/26/2015	12:00	17:00	02/26/2015	005	25	2-4	010	3-5	
02/26/2015	15:00	20:00	02/26/2015	000	20	2-4	350	5-8	
02/26/2015	18:00	23:00	02/26/2015	340	24	2-4	240/340	8-10	
02/26/2015	21:00	2:00	02/27/2015	340	18	5-6	240/340	10-14	
02/27/2015	0:00	5:00	02/27/2015	10	20	5-7	240/340	8-10	
02/27/2015	3:00	8:00	02/27/2015	010	18	2-4	240/340	4-6	
02/27/2015	6:00	11:00	02/27/2015	000	10	2-4	240/340	4-6	
02/27/2015	9:00	14:00	02/27/2015	290	20	2-4	290	4-6	
02/27/2015	12:00	17:00	02/27/2015	305	16	2-4	320	4-6	
02/27/2015	15:00	20:00	02/27/2015	310	12	2-4	270/310	3-5	
02/27/2015	18:00	23:00	02/27/2015	300	11	2-3	280/310	3-5	
02/27/2015	21:00	2:00	02/28/2015	320	2	2-3	320	2-4	
02/28/2015	0:00	5:00	02/28/2015	010	12	1-2	310	2-4	
02/28/2015	3:00	8:00	02/28/2015	030	18	1-2	310	2-4	
02/28/2015	6:00	11:00	02/28/2015	035	16	1-2	080	2-4	
02/28/2015	9:00	14:00	02/28/2015	055	18	1-2	060	2-4	
02/28/2015	12:00	17:00	02/28/2015	150	4	1-2	010	2-4	
02/28/2015	15:00	20:00	02/28/2015	060	7	1-2	010	2-4	
02/28/2015	18:00	23:00	02/28/2015	070	10	1-2	160/040	2-4/1-3	
02/28/2015	21:00	2:00	03/01/2015	055	17	1-2	160/040	2-4	
03/01/2015	0:00	5:00	03/01/2015	060	16	1-2	130	3-5	
03/01/2015	3:00	8:00	03/01/2015	045	15	1-2	120	2-4	
03/01/2015	6:00	11:00	03/01/2015	040	15	1-2	110	2-4	
03/01/2015	9:00	14:00	03/01/2015	055	22	1-2	110	4-6	
03/01/2015	12:00	17:00	03/01/2015	060	18	1-2	100	3-5	
03/01/2015	15:00	20:00	03/01/2015	050	17	1-2	100	3-5	
03/01/2015	18:00	23:00	03/01/2015	060	24	2-4	100	3-5	
03/01/2015	21:00	2:00	03/02/2015	065	18	2-3	100	3-5	
03/02/2015	0:00	5:00	03/02/2015	060	20	2-4	100	3-5	
03/02/2015	3:00	8:00	03/02/2015	060	22	2-4	100	3-5	
03/02/2015	6:00	11:00	03/02/2015	060	24	2-4	100	3-6	
03/02/2015	9:00	14:00	03/02/2015	075	20	2-4	100	3-6	
03/02/2015	12:00	17:00	03/02/2015	070	24	2-4	105	3-5	

03/02/2015	15:00	20:00	03/02/2015	055	20	2-4	105	3-5	
03/02/2015	18:00	23:00	03/02/2015	045	16	2-4	100/060	3-5	
03/02/2015	21:00	2:00	03/03/2015	045	15	2-4	080	3-5	
03/03/2015	0:00	5:00	03/03/2015	060	20	2-4	100	3-5	
03/03/2015	3:00	7:00	03/03/2015	060	21	2-4	100	3-5	Switched time zones from EST to AST
03/03/2015	6:00	10:00	03/03/2015	055	18	2-3	060/100	3-5	
03/03/2015	9:00	13:00	03/03/2015						No Data
03/03/2015	12:00	16:00	03/03/2015	085	18	1-2	045	2-4	
03/03/2015	15:00	19:00	03/03/2015	050	17	1-2	045	2-4	
03/03/2015	18:00	22:00	03/03/2015	040	19	2-3	060	3-4	
03/03/2015	21:00	1:00	03/04/2015	060	23	3-4	065	5-6	
03/04/2015	0:00	4:00	03/04/2015	070	24	2-4	065	3-5	
03/04/2015	3:00	7:00	03/04/2015	080	30	2-4	060	3-5	
03/04/2015	6:00	10:00	03/04/2015	080	20	1-3	100	2-3	
03/04/2015	9:00	13:00	03/04/2015	085	18	1-2	140	2-3	
03/04/2015	12:00	16:00	03/04/2015	070	17	1-2	120	2-4	
03/04/2015	15:00	19:00	03/04/2015	080	20	1-2	110	2-4	
03/04/2015	18:00	22:00	03/04/2015						No Data
03/04/2015	21:00	1:00	03/05/2015						No Data
03/05/2015	0:00	4:00	03/05/2015	080	27	2-4	130	3-5	
03/05/2015	3:00	7:00	03/05/2015	075	25	2-4	070	4-6	
03/05/2015	6:00	10:00	03/05/2015	080	25	2-4	090	3-6	
03/05/2015	9:00	13:00	03/05/2015	070	20	2-4	110	4-6	
03/05/2015	12:00	16:00	03/05/2015						No Data
03/05/2015	15:00	19:00	03/05/2015						No Data
03/05/2015	18:00	22:00	03/05/2015	080	25	2-4	070	4-6	
03/05/2015	21:00	1:00	03/06/2015	095	21	2-4	070	5-7	
03/06/2015	0:00	4:00	03/06/2015	070	22	3-5	100	5-8	
03/06/2015	3:00	7:00	03/06/2015	100	20	3-5	100	5-8	
03/06/2015	6:00	10:00	03/06/2015	070	25	3-5	090	5-8	
03/06/2015	9:00	13:00	03/06/2015	070	18	2-4	090	5-7	
03/06/2015	12:00	16:00	03/06/2015			2-4	070	5-7	
03/06/2015	15:00	19:00	03/06/2015	090	21	2-4	060	5-7	
03/06/2015	18:00	22:00	03/06/2015	070	21	2-4	070/090	5-7	
03/06/2015	21:00	1:00	03/07/2015	060	20	2-4	080	5-7	
03/07/2015	0:00	4:00	03/07/2015	090	20	2-4	070	4-6	
03/07/2015	3:00	7:00	03/07/2015	070	22	2-4	070	4-6	
03/07/2015	6:00	10:00	03/07/2015	080	23	2-4	090	4-7	
03/07/2015	9:00	13:00	03/07/2015	070	24	2-4	070	4-6	
03/07/2015	12:00	16:00	03/07/2015	080	18	2-4	090	4-6	
03/07/2015	15:00	19:00	03/07/2015	060	18	2-4	080	4-6	
03/07/2015	18:00	22:00	03/07/2015	050	21	2-4	070	4-6	
03/07/2015	21:00	1:00	03/08/2015	080	21	2-4	070	4-6	
3/8/2015	0:00	4:00	03/08/2015	020	18	2-4	090	4-6	
3/8/2015	3:00	7:00	03/08/2015	065	20	2-4	050/130	4-6	
3/8/2015	6:00	10:00	03/08/2015	050	15	2-3	050	4-6	
3/8/2015	9:00	13:00	03/08/2015	056	19	2-3	060	4-6	
3/8/2015	12:00	16:00	03/08/2015	070	14	2-3	090	4-6	
3/8/2015	15:00	19:00	03/08/2015	045	16	2-3	080	4-6	
3/8/2015	18:00	22:00	03/08/2015	070	10	2-3	090	3-6	
3/8/2015	21:00	1:00	03/09/2015	065	19	2-3	090	2-4	
03/09/2015	0:00	4:00	03/09/2015	070	23	2-3	090	3-5	
03/09/2015	3:00	7:00	03/09/2015	090	18	2-3	090	3-5	
03/09/2015	6:00	13:00	03/09/2015	080	16	2-3	070	3-5	
03/09/2015	9:00	16:00	03/09/2015	105	13	2-3	070	3-5	
03/09/2015	12:00	19:00	03/09/2015	065	18	2-3	070	3-5	
03/09/2015	15:00	22:00	03/09/2015	080	15	2-3	070	3-5	

03/09/2015	18:00	1:00	03/09/2015	075	17	1-2	080/110	3-5/2-4	
03/09/2015	21:00	4:00	03/10/2015	060	22	2-3	00/110	4-6/2-3	
03/10/2015	0:00	7:00	03/10/2015	080	25	3-5	070	6-8	
03/10/2015	3:00	13:00	03/10/2015	075	20	3-5	080	6-8	
03/10/2015	6:00	16:00	03/10/2015	065	24	2-4	070	6-8	
03/10/2015	9:00	19:00	03/10/2015	085	23	2-4	090	6-8	
03/10/2015	12:00	22:00	03/10/2015	080	22	3-5	090	6-8	
03/10/2015	15:00	4:00	03/10/2015	070	21	3-5	080	6-8	
03/10/2015	18:00	7:00	03/10/2015	075	22	3-5	060	6-8	
03/10/2015	21:00	13:00	03/11/2015	070	22	2-4	70	6-8	
03/11/2015	0:00	16:00	03/11/2015	065	23	2-4	070	3-5	
03/11/2015	3:00	19:00	03/11/2015	080	22	2-4	070	4-6	
03/11/2015	6:00	22:00	03/11/2015	070	22	2-4	070	4-6	
03/11/2015	9:00	4:00	03/11/2015	055	20	2-4	070	4-6	

Appendix H: EK60 Calibration Standard Operating Procedures

EK60 Calibration

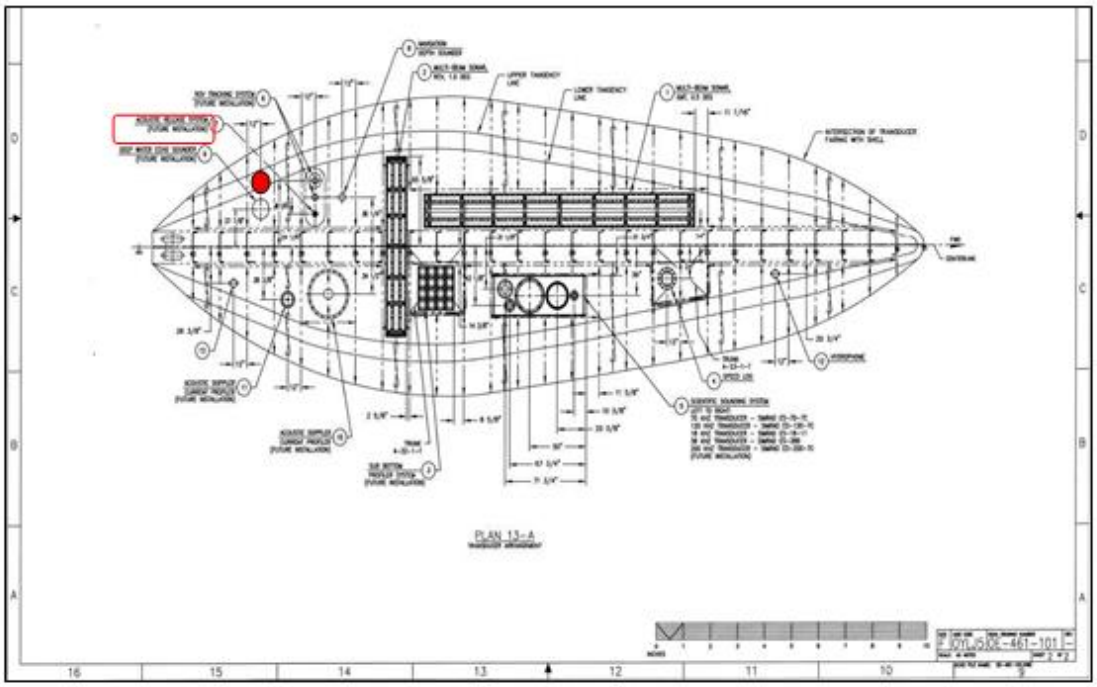
PROCESS OWNER
NOAA Ship *Okeanos Explorer*

REVISION HISTORY			
REV	**Description of Change**	**Author**	**Effective Date**
0	Initial release	Malik and Peters	August 2011
1	Revised to reflect updated pictures using calibration equipment provided by UNH CCOM as part of EK80 testing. Simplified text.	Sowers	March 2015

REFERENCE DOCUMENTS	
Document Number	**Document Title**
	Simrad EK60 Scientific Echo Sounder Reference Manual Release 2.2.0, January 2008

Simrad EK60 calibration procedures are outlined in **Simrad EK60 Scientific Echo Sounder Reference Manual Release 2.2.0, January 2008**. The following procedures have been adapted for the *Okeanos Explorer*. EK60 calibration is required to maintain the accuracy of the data for scientific applications and is generally recommended when the ship moves to an operating area with substantially different water mass properties (*e.g.* temperature, salinity, depth, or moving from N. Atlantic to the Gulf of Mexico or Tropical Pacific).

EK60 18kHz Transducer, installed May 2011. Arrows point towards the bow of the ship. The transducer is on the port side of the ship.



EX Transducer Arrangement in hull blister. Not all of the labeled equipment is currently installed. Indicated is the location of the EK60 transducer. It is on the port side of the vessel.

1.0. Purpose/Overview

This plan describes an in situ beam pattern measurement procedure for the Simrad ES-18-11, 18kHz split-beam scientific transducer using the Simrad EK60 general purpose transceiver (GPT, 18 kHz) aboard the *Okeanos Explorer*. During calibration a reference target with known target strength (TS) is lowered into the sound beam, and the measured target strength is compared with the known target strength. If it is necessary to adjust the echo sounder, this is performed automatically by the calibration software. If you have an EK60 system with several transceivers, you must calibrate each frequency separately. All the different combinations of pulse duration and transmitter power for each frequencythat will be used during normal operation of the echo sounder must be calibrated.

A CTD profile should be conducted prior to calibration to obtain temperature and salinity depth profiles. If it is relatively shallow and expected mixed watercolumn, the readout from the surface TSG can be used. Measurements on the main response axis (MRA) are of primary importance to provide a general offset for TS in the center of the beam pattern. If no other data are collected elsewhere in the echosounder FOV, this MRA offset may be used in conjunction with beam pattern models to estimate TS corrections across the beam pattern. If conditions and time constraints allow, and only after MRA data have been collected, it is also useful to collect data with the sphere in positions across the beam pattern to provide beam pattern corrections directly.

Preparation of the materials on deck and selection of favorable sea conditions can save several hours of ship time. It is ideal to minimize current relative to the ship, because relative currents of 1 kt or more will severely complicate sphere deployment and control. More importantly, stress and failure of the lines, rods, and reels increase the chances of losing the sphere and may present hazards to personnel on deck.

2.0. Location

A water depth of at least 30m is required to conduct this calibration. It is recommended to conduct calibration at a deep pier facility (with depth > 30 m). If no deep pier facility is available the calibration can be conducted at anchor or drifting in a location where there is minimal impact by fish (to avoid acoustic interference) and current/sea conditions (to avoid excessive movement which makes the mechanics of the calibration difficult). The calibration can also be conducted while the ship is drifting in an area with light winds, calm seas, mild currents, and minimal traffic hazards. A final location will be chosen based on the impeding weather conditions and discussions with the ship's command.

3.0. Equipment

The following equipment is required to conduct the calibration and resides on the EX:

- 150 feet of line and a weight (large shackle) secured in a loop in the center of the line.
  - *The line is bright yellow as of Feb. 2015 (white line shown in picture has been replaced)*
- EK 60 transducer and ER60 software
  - *These are installed on the ship.*
- 4 people minimum: 1 for each of 3 outriggers and at least 1 in the lab to conduct the calibration.

- *Lead Scientist/Mapping Lead/Expedition Coordinator, Survey Technicians, Mapping personnel.*

- 4 handheld VHF radios
  - *Located in the Dry Lab and/or available from upon request from ETs.*

- 3 Canon Easi-Troll ST Manual Downrigger reels with 100+ meters of high strength braided line (100lb or 200lb test green or yellow "Spectra", "PowerPro" or similar braided fishingline is excellent)

  - 3 stainless outrigger holders
  - 3 eight-foot long fiberglass outrigger poles with eye-bolt at end
  - Hardware to secure downriggers to the side of the ship
    - 3 (three) 6" angle aluminum with reel base screwed in – one per downrigger
    - 6 (six) metal C-clamps – 2 per downrigger
    - 9 (nine) hose clamps – 3 per outrigger
  - Calibration sphere (Copper, 63.0 mm diameter) and liquid soap +
  - 3-way swivel for connecting bow, port, and starboard lines without entanglements
  - 20-25 m length of monofilament line (30 lb test) with snap swivel for sinker weight. Make loop knot at end to attach to three downrigger snap swivels. Make loop knot in mono line 10 meters down to attach sphere.

- Gloves for protecting hands during deployment of the monofilament line, sphere, and weight
- Boat hook for maneuvering lines for setup and retrieving sphere/weight.

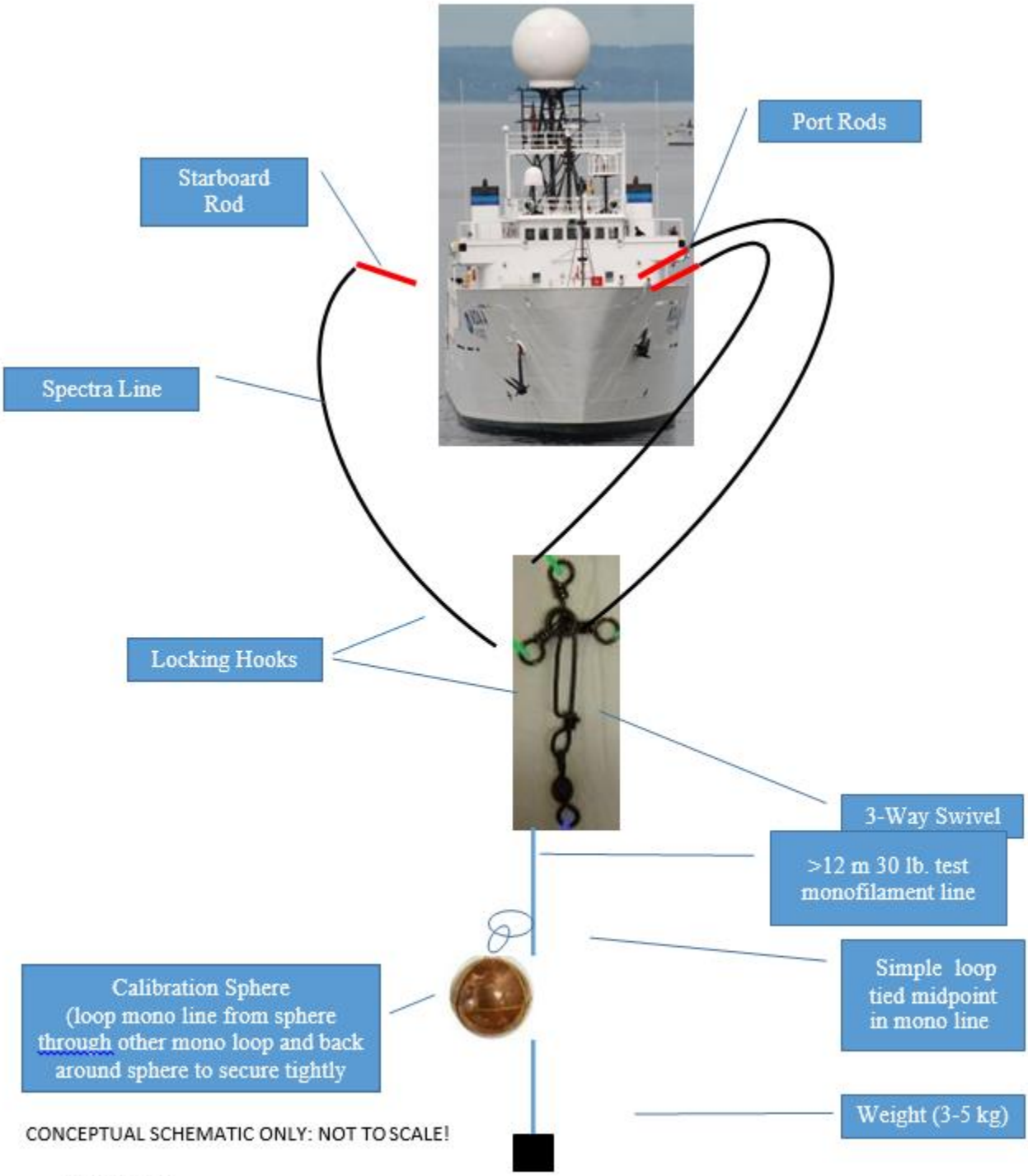
3.0. Pre Calibration

Significant preparations have to be made to set up the gear for EK 60 calibrations. Three lines on reels with outrigger rods are used for positioning the sphere within the beam of the transducer. Control over the sphere position within the beam requires approximately equiangular and equidistant spacing of rods and reels with respect to the transducer. Having the rods, reels, lines, sinker, sphere, and personnel prepared and in place before the calibration will save many hours of ship time.

3.1. Equipment Setup:

1. Set up the downrigger reels and outriggers with two on the port side (fwd and aft) and one on the starboard side of the ship in line with location of hull installed EK 60 transducer.

The following is a conceptual diagram illustrating the arrangement of the lines, sphere, and weight.



Port Forward:

This station is set up on the port side 0-1 deck, as shown below. The pole is mounted on the stanchion furthest forward, and the Canon reel is mounted on the bulwarks vertical flaring just aft of this.

Secure the angled aluminum plate to the metal bulwarks flaring on the ship using C-clamps as shown in the photo below.

Attach the Canon downrigger into its mounting plate that is screwed into the aluminum plate. Orient the downrigger reel handle to face the walkway so it is easy to operate. Secure the metal pole holder to the stanchion using rubber padding and screwing tightly three hose clamps to minimize rotation of the holder.

Before putting the fiberglass pole in the holder, run the end of the monofilament line through the eyelet at the end of the fiberglass downrigger pole. Make sure to run the line through the eyelet in such a way that it will freely move when being reeled in or let out. While having one person holding the end of the monofilament line and letting line out from the reel, have another person place the pole into the holder. Clip the end of the monofilament line into the orange zip tie at the end of the Canon reel. Keep the line taught to avoid any tangles.

Port Aft:

This station is mounted just forward of the chains on the port 01-deck forward of the breezeway.

Secure the angled aluminum plate to the metal post on the ship using C-clamps as shown in the photo below. Secure the metal pole holder to the first ship stanchion forward of the chains using rubber padding and screwing tightly three hose clamps to minimize rotation of the holder.

Put the monofilament line through the fiberglass pole and secure to the orange zip tie as described for the Port Forward station.

Starboard:

This station is set up between the 4th and 5th stanchions (counting forward to aft).

Once the mounting equipment is in place, the line can be run through the eyes of the poles, and the poles can be placed in the holders until it is time to connect the rest of the gear.

2. Take the yellow paracord line and shackle weight to the front deck, tie one end of the paracord to a railing, and carefully unreel the paracord line around the front of the ship's bow. Maneuver the paracord around the ship's anchors to get the line below them without entanglement. Keep the loop in the middle of the paracord at the front of the bow (you can tie it the front with a lot of slack on either side.) Once the line has been place around the bow and tied to railings on both the starboard and port side, attach the shackle weight to the loop and drop the line clear of the ship to sink the paracord underneath the vessel. Carefully move on end of the paracord line to the starboard downrigger and attach to the downrigger's spectra line. Move the other end of the paracord to the forward port downrigger and do the same. This line will then be used to join the port and stbd filament line on the downriggers.

    a. **Note: If anchoring, set up the line with the weight prior to anchoring or it will not be possibleto get the line past the anchor chain on the bow.**

3. Dip the sphere in liquid dish detergent to ensure there are no bubbles or fouling on the target.

4. Confirm that the vessel is secure in a suitable location (bow/stern anchored in still water that is free of biological scatterers, or drifting). If anchoring is not possible, calibration can be conducted while adrift.

3.2. CTD Cast:

A CTD cast is required to obtain a sound velocity measurement for the depth of the sphere. The CTD only needs to be lowered to about 50 meters. Once the cast is completed, print out a sound velocity profile for the top 50 meters of the water column. Once the sphere is lowered, and a depth is determined, use the profile to select the appropriate sound velocity. You will also need the sound speed or temperature in order to select the correct sphere target strength during the calibration. The CTD cast will be conducted by the Ship's crew—OOD, SST and deck department.

3.3. Time Estimates:

It could take a few hours to precisely place the sphere under the EK60. Up to 12 hours on-site may be required to conduct the full calibration.

NOTE: Make sure everyone working outside is cognizant of the weather conditions—to take breaks and wear sunblock in extreme heat or to bring suitable layers for cold weather—this process may take several hours. Also make sure to rotate personnel through the positions so that everyone can have enough breaks.

3.4. Risks:

Gear entanglement: The ship's motion during the calibration procedure should be minimal to avoid any gear entanglement. If gear entanglement is suspected, the calibration procedure will be halted and ship's divers will inspect the ship hull for any entanglement.

4.0. Calibration

Once the line with the weight has been draped below the ship's hull, and the vessel is secure either at anchor or adrift, the following methodology is the recommended approach for giving us the best control of the gear under the ship's hull.

4.1. Deployment

1) With the spectra line fully reeled in to end of the outrigger pole, reset reel counters to zero. Attach one end of the line to a pole/reel on the side of the vessel.

all the stbd

2) Pay out the monofilament on stbd side reel, and pull in the paracord on the port side until monofilament is reached. Detach the line, attach the two remaining (e.g., fwd and aft port reels).

the

the

and reels

3) Attach a >12m length of monofilament, the calibration sphere, and a weight (weight needs to be at least one pulse length below the calibration sphere, and the sphere needs to be at least one pulse length below the swivel) to the point where the monofilament from all three reels are attached.

4) Soap the calibration sphere using ordinary dish detergent to avoid bubble development on the surface of the sphere.

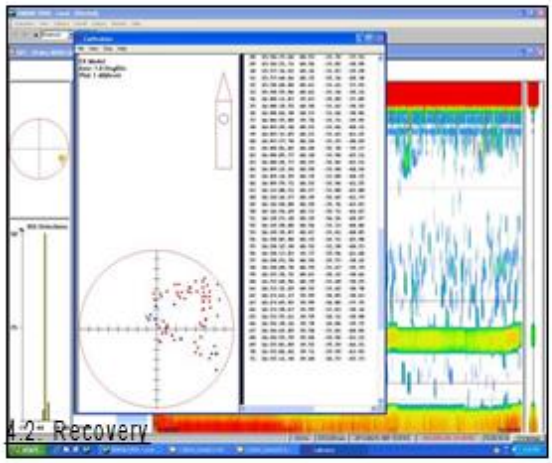
5) Lower the weight and calibration sphere over the port side with the port side reels holding tension. Instruct the port side reel personnel to pay out line slowly as the starboard side takes up line. Keep some tension on the starboard side to avoid too much slack in the line that could entangle ship's hull or instruments. Instruct reel operators to payout/takeup line until the sphere can be seen in the sonar's field of view. The following reel out numbers should get the sphere positioned close to the center of the

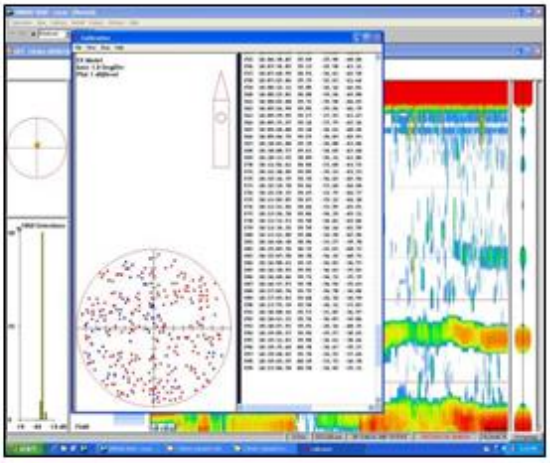
sonar's field of view. These numbers on the reel will have the sphere at about 18-20m below the transducer: The numbers assume the reel counters were zeroed with the snap swivel at the end of the downrigger (rather than at the end of the outrigger pole).

STBD: 76 ft
Port Aft: 96 ft
Port FWD: 75 ft

6) Adjust the lines in order to conduct the calibration. This will require someone in the control room and on each reel, all with radios, to communicate the direction each reel needs to be operated to position the sphere.

7) The sphere needs to be moved into all four quadrants of the sonar beam. It is suggested to keep a written log of these changes in order to keep track of the motion of the sphere. Once the entire circle has been filled with points, the calibration is complete. (Consult section 5.0 for details of operating the calibration software. **Make sure the RAW data is being recorded. The calibration can be re-examined in playback mode if necessary.**





1) After the calibration is finished, pay out the lines on port side and reel in on stbd until the stbd line is vertical and the connection point reaches the surface.

2) Next, grab the stbd line with a boat hook to bring it closer to the ship. Haul in the sphere and weight by hand until the gear is on deck. Use gloves for protection.

3) Disconnect the sphere and the weights.

4) Disconnect the port lines and attach a small weight to each line and tell each person standing by the reels to haul in.

5) Inform the bridge when all equipment is out of the water and stowed.

4.0. Troubleshooting

- If the ship is drifting, and you cannot get the sphere into a particular quadrant simply by shifting the lines on the downriggers, consider turning the ship around. A shift in current direction may help get the sphere into the sector you need.

5.0. ER60 18 calibration software

Once the sphere has been lowered below the transducer, use the following procedure to run the calibration routine on the EK 60 software. The settings used for calibration on 08/29/2011 are provided as guidelines.

The theoretical target strength of the calibration sphere can be calculated using the following link http://swfscdata.nmfs.noaa.gov/AST/SphereTS/. Enter the sphere material (e.g., Cu), size (e.g., 64mm), temperature and salinity at target depth, frequency and pulse length for calibration.

Setting up the calibration window

1. Click **Operation →Ping control**.
2. In the **Ping Control** dialogue, set **Ping rate** to *Interval* and *1 second*. This can also be done from the toolbar.
3. Click **Operation →Normal**.
4. In the **Normal Operation** dialogue:
Select transceiver, and switch to *Active* mode.
Set the *Transmit Power* to the level you wish to calibrate [2000 W]
Choose the *Pulse Duration* you wish to calibrate [0.512ms, 1.024ms, 2.048ms, or 4.096 ms]
5. In the **Output** -> **File** set the Current Output Directory to a folder ../<Cruise>/Calibration/<pulselength>/. On the **Raw Data** tab, specify a filename prefix to reference the cruise/ship and pulselength used. Set **Range** to 50m and Max. file size to 50Mb. **Start recording the raw data!**
6. Right-click in an echogram, select **Range** on the short-cut menu, and set the range for one of the echogram views to cover the range you wish to see around the sphere. This range should include the depth range where you expect to find the reference target, weight below the target (and seafloor if visible).
7. Check that you see the reference target in the *Single Echo* view.
8. Right-click in the *Single Echo* view corresponding to the echogram to open the **Single Target Detection** dialogue box.
9. In the **Single Target Detection** dialogue, click the **Calibration** button to start the calibration program, and to create a new *Calibration* window. The calibration program allows you to record new calibration data, or read previously recorded calibration data.
10. In the *Calibration* window, click **File →New** to open the **Record** dialogue and to start a new calibration.

11. Enter the following data in the **Record** dialogue box:

a.Transducer's serial number [2097]

b. Correct theoretical target strength (TS) for the reference target [e.g., -34.60 dB, dependent on sphere and sound speed at the calibration depth, see http://swfscdata.nmfs.noaa.gov/AST/SphereTS/ for a TS calculator]

*c. Allowed deviation from the TS for the reference target [5 dB]

**d. Upper and lower depth limits for the target window (that include only the sphere and exclude the weight and seafloor).

e. Any comments you may wish to add to the calibration file

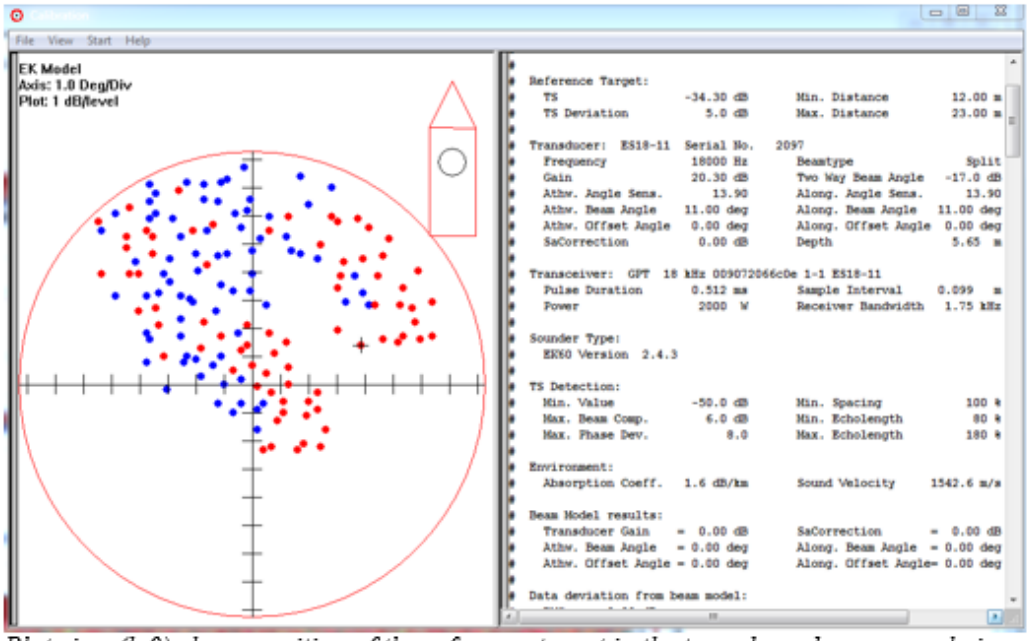
*This is a window giving the limits for the system's acceptance of single target echoes coming from fish. The closer to the correct reference target TS the limits have been set, the more of the unwanted fish echoes will be rejected. On the other hand, if the echo from the reference target is too close to one of the limits, the deviation has to be increased before starting collecting data. This is because it will always be a certain variation in TS values when the reference target is being moved to cover the complete beam.

**A narrow window will have same effect as above, reducing the possibility of detecting unwanted echoes from fish. But change in the range of the sphere may take it outside the depth. It is best to keep the sphere within 1-2 m range/depth during entire calibration.

12. Click OK when you have finished entering data. The calibration program will now begin.

Running the calibration routine

Different views can be set up during the calibration. You will see two views in the *Calibration* window; a *Plot* view and an *Information* view.



Plot view (left) shows position of the reference target in the transducer beam, crosshairs over dot show current or last target location. Information view (right) shows calibration and EK60 system parameters. Scrolling down in right panel shows target strength and position as target position is recorded.

A vertical bar is shown on the left side of each view. A blue colour indicates that the view is active, while gray colour indicates a passive view. If you wish to print a view, or perform other operations connected to it, you must make sure that the desired view is active.

In the *Plot* view you will see recorded data plotted as blue and red circles. Blue circles indicate TS values below the current beam model, while red circles indicate values above the current beam model. In the upper part of the *Information* view you will see various information associated with recording of the calibration data. Lines containing this information all begin with a #. Below this information, recorded values for each new TS detection are updated continuously during data recording.

1. Move the reference target slowly around to record a sufficient number of data points (>100) evenly distributed inside the beam. Make sure that a reasonable number of hits are made close to the centre of the beam. This is important in order to ensure a correct estimate for the Sa correction parameter.

2. While moving the target you should keep the reference target within the depth limits you entered in the **Record** dialogue (<2m change in range over calibration).

3. While moving the target and recording of data points stops, the measured TS value may be outside the limits entered in the **Record** dialogue.

4. Stop and restart recording as required by using the **Stop/Start** command found in the **Main** menu. It is recommended to stop collecting data if unwanted fish echoes are entering into the depth window, and restart again when disappeared.

5. When you have finished data recording, click **File →Save As** to open the **Save As** dialogue.

6. Choose the directory where you want the calibration file to be saved, and enter a file name for your calibration file.

7. Click **Save As** to finish.

Name the Results file according to the Date, Frequency and Pulse Length.

The calibration program will now use two different models to fit recorded data, a polynomial model and a beam model. The *Plot* view will plot the model along with the recorded data points. Blue circles indicate values below the model; red circles indicate values above the model. The green circles close to the centre axis indicate the points that have been used when estimating the Sa Correction value.

Examine the Information view. Under the "Data Deviation from Beam Model", the RMS value should be <0.4 A higher RMS may be caused by encroaching fish targets or other noise that has contributed to the reference target strength. If there were fish targets during portions of the Calibration, the RAW file can be Replayed (Main Menu – Operation – Replay) and follow the same Calibration program procedures above. Use Stop/Start in the Calibration program main menu to not record targets when fish are present.

Updating transducer parameters

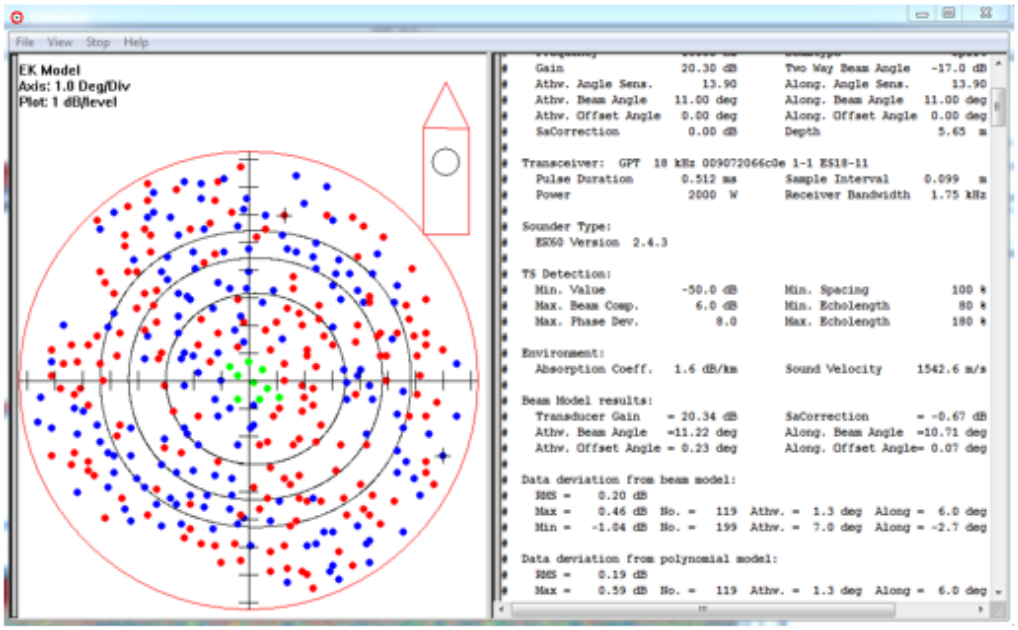
When you are satisfied with the calibration results you can use the results to update your transducer parameters in the echo sounder.

In the ER60 installation directory, find the TrList.ini file. This file contains factory default parameters for all Simrad Tranceiver and Transducers. Copy this file and paste is the same directory as "TrList-Default.ini".

1. In the *Calibration* window, click **File →Update Beam Data** to perform this task.

This step updates the Gain, SaCorrection, and Beam Angle parameters in the TrList.ini file for the selected transducer and pulse length for the calibration.

NOTE:



Calibration program view after saving calibration data. Green targets indicate those used to calculate Gain and Sa Correction. Blue targets are below expected target strength and red are above expected target strength using the updated Beam Model.

Repeat Calibration steps for other pulse lengths and frequencies. Copy and rename the TrList.ini with TrList_<date> <frequency><pulse length(s)>.ini

Note:
This is a serious operation, which will affect the transducer installation parameters and will thus affect all future results to be obtained using the current transducer and pulse duration.Thus, to prevent accidentally use of this operation, you are asked to confirm this operation. The changes take effect automatically the next time you start Normal operations on the echo sounder. ***If the RMS in the calibration beam model results is >0.4, do not update beam data.***

August 29, 2011 calibration results

(Tom)

```
#  Calibration   Version    2.1.0.12
#
#  Date:  8/29/2011
#
#  Comments:
#
#
#  Reference Target:
#    TS                   -34.60 dB       Min. Distance          36.00 m
#    TS Deviation           5.0 dB        Max. Distance          47.00 m
#
#  Transducer:   ES18-11   Serial No.   2097
#    Frequency             18000 Hz       Beamtype                 Split
#    Gain                  23.00 dB       Two Way Beam Angle    -17.2 dB
#    Athw. Angle Sens.       13.90        Along. Angle Sens.       13.90
#    Athw. Beam Angle     10.60 deg       Along. Beam Angle    10.40 deg
#    Athw. Offset Angle    0.00 deg       Along. Offset Angle   0.00 deg
#    SaCorrection          0.00 dB        Depth                  4.57  m
#
#  Transceiver:   GPT  18 kHz 009072066c0e 1-1 ES18-11
#    Pulse Duration       4.096 ms        Sample Interval      0.771   m
#    Power                 2000  W        Receiver Bandwidth    0.72 kHz
#
#  Sounder Type:
#    EK60 Version  2.2.1
#
#  TS Detection:
#    Min. Value           -38.0 dB        Min. Spacing            100 %
#    Max. Beam Comp.        6.0 dB        Min. Echolength          80 %
#    Max. Phase Dev.          10.0        Max. Echolength         470 %
#
#  Environment:
#    Absorption Coeff.    1.5 dB/km       Sound Velocity     1505.0 m/s
#
#  Beam Model results:
#    Transducer Gain     = 23.09 dB       SaCorrection        = -0.43 dB
#    Athw. Beam Angle    =10.93 deg       Along. Beam Angle   =10.61 deg
#    Athw. Offset Angle = 0.17 deg        Along. Offset Angle= 0.03 deg
#
#  Data deviation from beam model:
#    RMS =     0.42 dB
#    Max =     1.21 dB  No. =    228  Athw. = -5.2 deg  Along = -2.8 deg
#    Min =    -1.87 dB  No. =    263  Athw. = -1.2 deg  Along =  5.0 deg
#
#  Data deviation from polynomial model:
#    RMS =     0.39 dB
#    Max =     1.16 dB  No. =    228  Athw. = -5.2 deg  Along = -2.8 deg
#    Min =    -1.66 dB  No. =    263  Athw. = -1.2 deg  Along =  5.0 deg
```

```
#
#  Data:
#  No.     Time      Distance   TS-c     TS-u       Athw.     Along      sA
#                      [m]      [dB]     [dB]       [deg]     [deg]   [m2/nm2]
#
 1   15:39:55.89   40.42    -34.54   -34.81      1.11      0.20        482
 2   15:40:00.64   40.41    -34.56   -34.74      0.91      0.00        484
 3   15:42:04.39   40.37    -34.43   -34.74      1.11      0.40        516
   ///////
   ///////
295   18:19:11.83   39.90    -34.61   -38.64     -3.24      2.93        207
296   18:19:35.66   40.30    -34.47   -39.17     -3.54      3.14        154
297   18:19:40.42   39.78    -34.22   -37.64     -2.73      2.93        257
298   18:19:45.22   40.19    -33.71   -36.78     -2.63      2.73        308
299   18:23:06.58   40.50    -34.92   -35.31      0.51      1.21        444
```

Appendix I: Acronyms

- AERONET – Aerosols Robotic Network
- AHB – Atlantic Hydrographic Branch
- ASCII – American Standard Code for Information Interchange
- BIST – built in system test
- CDR – Commander
- CO – Commanding Officer
- CTD – conductivity, temperature, depth
- dB - decibel
- DNP – do not process
- ERT – Earth Resources Technology Inc.
- ET – Electronics Technician
- EX – NOAA Ship *Okeanos Explorer*
- FM – frequency modulated / modulation
- FTP – file transfer protocol
- GB - gigabytes(s)
- KB - kilobytes(s)
- kHz – kilohertz
- km – kilometer
- kts – knots
- LT – Lieutenant
- LSS - light scattering sensor
- m - meters
- MAN – Maritime Aerosols Network
- MB – multibeam sonar
- MB – megabytes(s)
- ms – millisecond
- NASA – National Aeronautics and Space Agency
- NCDDC – National Coastal Data Development Center
- NCEI - National Center for Environmental Intelligence
- NGDC – National Geophysical Data Center
- NMEA – National Marine Electronics Association
- NOAA – National Oceanic and Atmospheric Administration
- NODC – National Oceanographic Data Center
- OER – NOAA Office of Ocean Exploration and Research
- OMAO – NOAA Office of Marine and Aviation Operations
- OPS – Operations Officer
- ROV – remotely operated vehicle
- SBP – subbottom profiler
- SCS – scientific computer system
- SIS – Seafloor Information System
- SVP – sound velocity profile
- TRU – transceiver unit
- TSG - thermosalinograph
- TX – transmit boards

- USGS – United States Geological Survey
- W - watt
- XBT – expendable bathythermograph
- XO – Executive Officer

Appendix J: Software Inventory

Software	Version	Computer	License	Expiration Date	Agreements	Hot fix	Contract Duration	Warranty Expiration	Contact	Notes
SIS EM 302	4.1.3	Multibeam	[redacted]	N/A	N/A	N/A	No info available	No info available	Support email:km.support.lynnwood@kongsberg.com Email:tony.dahlheim@kongsberg.com	purchased & maintained by OER personel
Velocipy	13.2 (r4441)	CTD		N/A	N/A	N/A	N/A	N/A		
POS Controller/Applanix	POS MV V4 Firmware v5.08 and POSView v4.0.2.0 SN# 2572	Wetlab		N/A	N/A	N/A	N/A		NOAA Internal - HSTP Caryn Arnold - 206.526.4762 (caryn.arnold@noaa.gov)	
Caris HIPS	8.1.11	MBPROC1		12/31/2014 Yearly update via website	all	all	5 years for both dongles (2014)		Leon Quick at CARIS customer support (leon.quick@caris.com) Downloads: http://support.caris.com	
	8.1.11	MBPROC2								
	build 2014-12-11_19-30-23									
Fledermaus (IVS 3D)	7.4.2a build 114	MBPROC2		8/31/2014		N/A	1 year (09/2015)	30-Sep-15	support@ivs3d.com, 1.506.454.4487 License # 1601472614 use dongle ID to download	purchased & maintained by OER personel
	7.4.2a build 114	MBPROC3		8/31/2014	1 yr of support w/ dongle	N/A	1 year (09/2015)			
	7.4.2a	MBPROC1								
KAP Converter	4.0.0.10	N/A		N/A	N/A	N/A	N/A		NOAA Internal - HSTP Caryn Arnold - 206.526.4762 (caryn.arnold@noaa.gov)	
Pydro	13.2m (r4441)	CTD		1/1/2010	N/A	N/A	N/A		NOAA Internal - HSTP Caryn Arnold - 206.526.4762 (caryn.arnold@noaa.gov)	
Hypack ROV	14.0.023	EX-Hypack		9/30/2014	Maintenance	N/A	N/A	8/30/2012	Mike Annis (HSTP POC) Michael.J.Annis@noaa.gov	
Hypack	15.0.1.1	EXPlanning		2/18/2012	Maintenance	N/A	N/A	2/18/2012	www.hypack.com| http://support.hypack.com/support	purchased & maintained by OER personel
Seasave 7	7.23.2	CTD & Hydrophone		N/A	N/A	www.seabird.com	N/A	N/A	1.425.643.9954 Sea-Bird Electronics, Bellingham WA	
SCS	v4.9.0.2769	SCS-A		N/A	N/A	N/A	N/A	N/A	EEB - Tom Stepka 240.472.5351 (cell) 301.713.7678 (work) 703.641.0195 (home); tom.stepka@noaa.gov	Client on SCS Display, Engineering Computer, and Bridge
C-NAV	5.1.18	N/A		8/6/2015	6 mos	N/A	6 mos		CC Technology - 1.337.261.0660 cnav.support@cctechnol.com	
Knudson SBP, Sounder Suite Echo Control Server and Client	Client: V.271 Server: V.2.73	Knudsen SBP		N/A	N/A	N/A	N/A		Technical Operations Manager - Darren Gibson - 613.267.1165	Server= V.273 Part# D409-04185 Client=V 2.71 | software updated March 3, 2013 Chirp Firmware 2.85; Client v2.73; Server v2.77
SEG-Y JP2 & Viewer	1	EXSCSCL2								
SonarWiz	5.04.0006	EXSCSCL2		10-Apr-15	EMA 05/14/12	N/A	3 Years	7-Feb-14	Cheasapeake Technologies Inc. Eileen Gann (etgann@chesapeaketech.com)	purchased & maintained by OER personel
ESRI ArcMap	10.3	EXSCSCL2		25-Sep-14	Software Updates	N/A	1 year		Andra Bobbitt	purchased & maintained by OER personel
Global Mapper	16.1 (B021115)	EXSCSCL2		1-Apr-16	Support	N/A	1 year		Global Mapper Support - support@globalmapper.com	
SIMRAD ER60	2.4.0	EK60							Support email:km.support.lynnwood@kongsberg.com Email:tony.dahlheim@kongsberg.com	
FileZilla		**SCS Server A**								