Ocean Exploration and Research

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MAPPING DATA ACQUISITION AND PROCESSING SUMMARY REPORT:

EX-18-03, Gulf of Mexico 2018 (ROV & Mapping)

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1. Introduction

The NOAA Office of Ocean Exploration and Research is the only federal program dedicated to exploring our deep ocean, closing the prominent gap in our basic understanding of U.S. deep waters and seafloor and delivering the ocean information needed to strengthen the economy, health, and security of our nation.

Using the latest tools and technology, OER **explores** previously unknown areas of our deep ocean, making discoveries of scientific, economic, and cultural value. Through live video streams, online coverage, training opportunities, and real-time events, OER allows scientists, resource managers, and students, members of the general public, and others to actively **experience** ocean exploration, expanding available expertise, cultivating the next generation of ocean explorers, and engaging the public in exploration activities. From this exploration, OER makes the collected data needed to **understand** our ocean publicly available, so we can maintain the health of our ocean, sustainably manage our marine resources, accelerate our national economy, and build a better appreciation of the value and importance of the ocean in our everyday lives.

Contents

2. Report Purpose

The purpose of this report is to briefly describe the acoustic seafloor and water-column mapping data collection and processing methods used during the mapping expedition EX-18-03 Gulf of Mexico 2018, and to present a summary of the overall mapping results and mapping related cruise activities. A separate report titled, 'Cruise Report: EX-18-03, Gulf of Mexico 2019 (ROV& Mapping)' detailing ROV and other science objectives is available from the NOAA Central Library. A detailed description of the *Okeanos Explorer's* mapping capabilities is available in the 2018 NOAA Ship *Okeanos Explorer* Survey Readiness Report, which is available at the NOAA Central Library.

3. Cruise Objectives

During EX-18-03 NOAA OER worked with the scientific and management community to characterize unknown and poorly-known areas of the Gulf of Mexico through telepresence-based exploration. Baseline information collected during the cruise will support and catalyze further exploration, research and management activities.

An online summary of all mission objectives be found here: https://oceanexplorer.noaa.gov/okeanos/explorations/ex1803/logs/summary/welcome.html (last accessed April 2020)

The complete objectives for this cruise are detailed in the EX-18-03 Project Instructions, which are archived in the NOAA Central Library here: https://doi.org/10.25923/zv0y-2c45 (last accessed April 2020)

4. Summary of Mapping Results

The expedition commenced from Pascagoula, Mississippi on April 11, 2018 and concluded in Key West, Florida on May 03, 2018. EX-18-03 mapped 21,033 square kilometers (km) of seafloor in the Gulf of Mexico during the 22 days-at-sea (Fig. 1 and Table 1). .

Cruise Overview Map

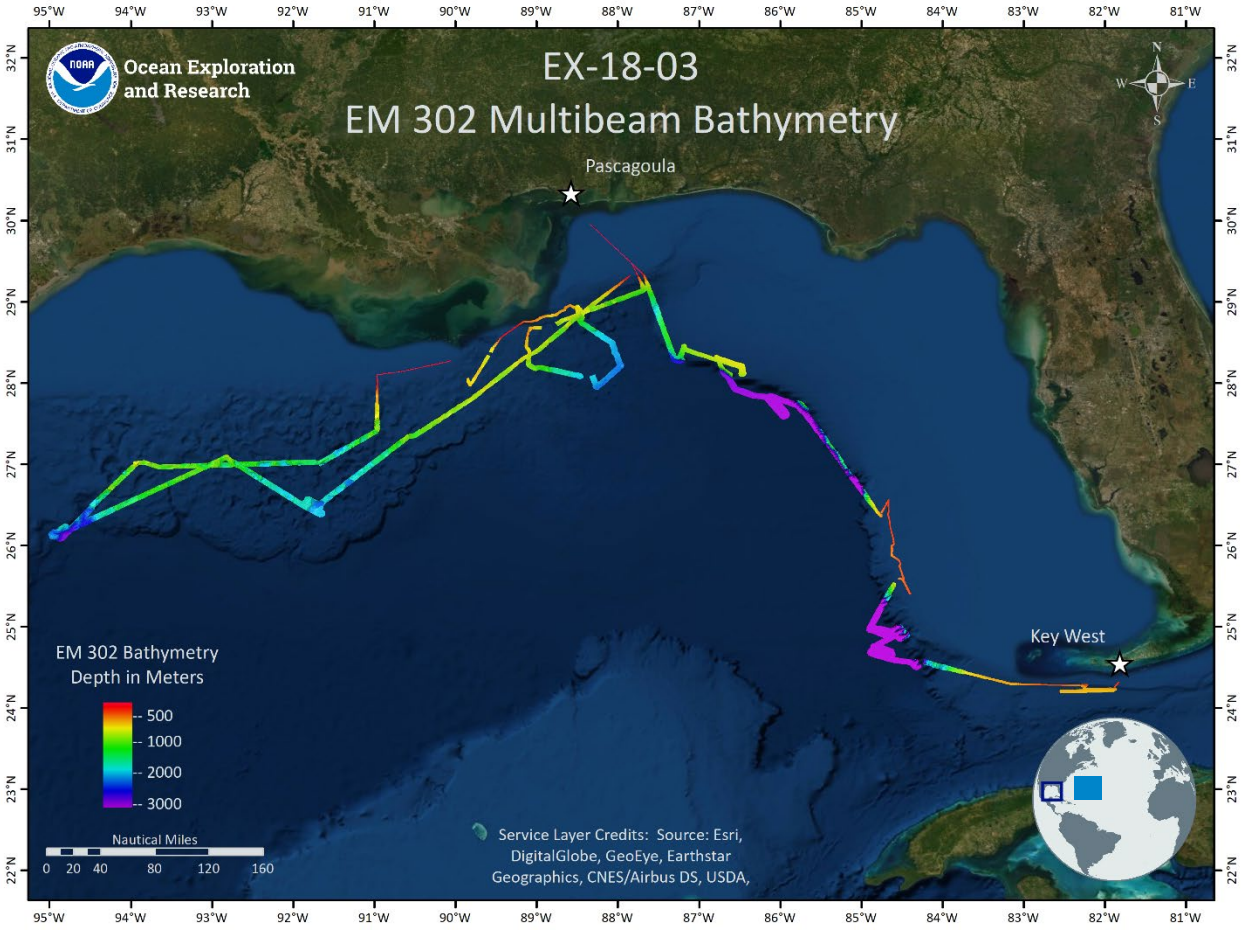

Figure 1. Overview of bathymetric mapping coverage completed during Gulf of Mexico 2018 expedition (EX-18-03).

5. Mapping Statistics

Table 1. Summary statistics of ocean mapping work completed during EX-18-03.

Dates of data collection	April 12 – May 3, 2018
Linear km of survey with EM 302	4,283
Square km mapped with EM 302	21,033
Number / Data Volume of EM 302 raw bathymetric / bottom backscatter multibeam files (.all)	373 files/ 29.5 GB (13 files/600 MB Restricted)
Number / Data Volume of EM 302 water column multibeam files	373 files / 93.4 GB (12 Files/ 1.58 GB Restricted)
Number / Data Volume of EK60 water column split-beam files (.raw/.idx)	235 Files/9.2 GB (16 Files/ 571 MB Restricted)
Number / Data Volume of sub-bottom sonar files (.segy, .kea, .keb)	488 Files / 3.97 GB (29 Files/223 MB Restricted)1
Number of XBT casts	72
Number of CTD casts (including test casts)	1

6. Mapping Sonar Setup

Kongsberg EM 302 Multibeam Sonar

NOAA Ship *Okeanos Explorer* is equipped with a 30 kilohertz (kHz) Kongsberg EM 302 multibeam sonar capable of conducting mapping operations in up to 8,000 m of water depth. The system generates a 150° beam fan containing up to 432 soundings per ping in waters deeper than 3300 m. In waters shallower than 3300 m the system is operated in dual swath mode, and obtains up to 864 soundings per ping by generating two swaths per ping cycle. The multibeam sonar is used to collect seafloor bathymetry, seafloor backscatter, and water column backscatter data. Backscatter represents the strength of the acoustic signal reflected from a target, such as the seafloor or bubbles in the water column. System calibration to determine the angular offsets ("Patch Test") is conducted annually and the results are reported in the annual readiness report. The 2018 NOAA Ship *Okeanos Explorer* Mapping Systems Readiness Report is available in the NOAA Central Library.

Simrad EK6 Split-beam Sonars

The ship operated four Simrad EK60 split-beam fisheries sonars: 18 kHz, 70 kHz, 120 kHz, and 200 kHz. These sonars are quantitative scientific echosounders calibrated to identify the target strength of water column acoustic reflectors - typically biological scattering layers, fish, or gas bubbles – providing additional information about water column characteristics and anomalies. These sonars were calibrated on the EX-18-02 cruise, and calibration values from that cruise were applied to the EK sonars for EX-18-03. The 2018 EK60 & EK Calibration Report (https://doi.org/10.25923/6nb5-f816, last accessed April 2020) is available in the NOAA Central Library.

Knudsen 3260 Sub-bottom Profiler

The ship is equipped with a Knudsen 3260 sub-bottom profiler that produces a frequency-modulated chirp signal with a central frequency of 3.5 kHz. This sonar is used to provide echogram images of shallow geological layers underneath the seafloor to a maximum depth of approximately 80 m below the seafloor. The sub-bottom profiler is normally operated to provide information about sub-seafloor stratigraphy and features. The data generated by this sonar are fundamental to helping geologists interpret the shallow geology of the seafloor.

Teledyne ADCPs

The ship utilizes a 38 kHz Teledyne RDI Ocean Surveyor Acoustic Doppler Current Profiler (ADCP), with a ~1000 m range; and a 300 kHz Teledyne RDI Workhorse Mariner ADCP, with a ~70 m range. The ADCPs gather data prior to ROV deployments in order to assess currents at the dive site in support of safe operations. They are kept running throughout the ROV dives. The ADCPs are typically not run concurrently with the other sonars during mapping operations due to interference issues.

7. Data Acquisition Summary

Mapping operations included data collection using the EM 302 multibeam sonar, EK60 split-beam (18, 38, 70, 120, and 200 kHz) sonars, and Knudsen 3260 sub-bottom profiler. Data were collected by each sonar concurrently during the transits

Survey lines were planned to either maximize edge matching of existing bathymetric data, or to fill data gaps in areas with existing bathymetric coverage. In regions with no existing data, lines were planned to optimize potential exploration discoveries. EX-18-03 when appropriate included focused overnight mapping of the ROV dive location.

Select data from April 12 and April 13 were collected using Underwater Cultural Heritage (UCH) protocols and have not been cleared for public access by OER. Individuals wishing to access these files can contact ncei.info@noaa.gov.

There was a break in data acquisition between April 22 and April 24, 2018 when the ship returned to Pascagoula, Mississippi for mechanical repairs mid-cruise.

Figure 2 displays the first publicly available bathymetric data acquired over Perdido Canyon in western Gulf of Mexico. Dive 02 was located near a floating submersible oil and gas rig. During overnight mapping operations, the team was able to locate the mooring chains in the EM 302 water column data and digitize the chains to ensure vehicle safety during the dive (Fig. 3). Figure 4 is a map of location of sonar anomalies, typically thought to be bubble plumes/cold water seeps, which were geo-picked from the EM 302 water column data. Some of these are new locations and some confirmed historical seep locations.

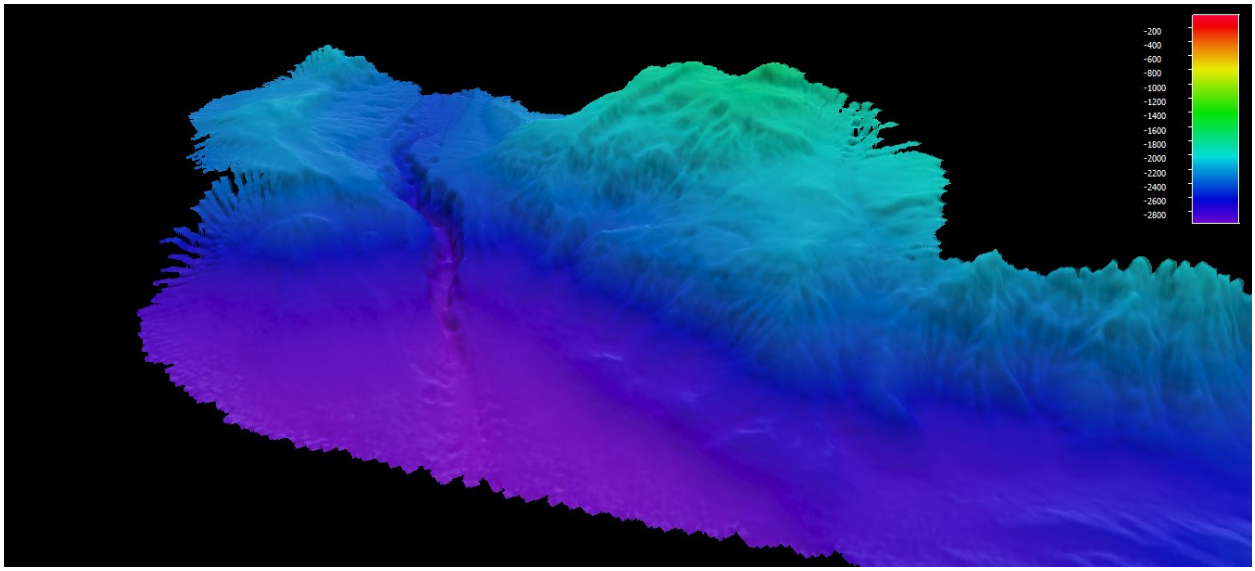

Figure 2: EX-18-03 MBES data for Perdido Canyon. Based on National Centers for Environmental Information (NCEI) records, this is the first publically available MBES data for Perdido Canyon. Vertical exaggeration 3x, 50m cell size, depth in meters.

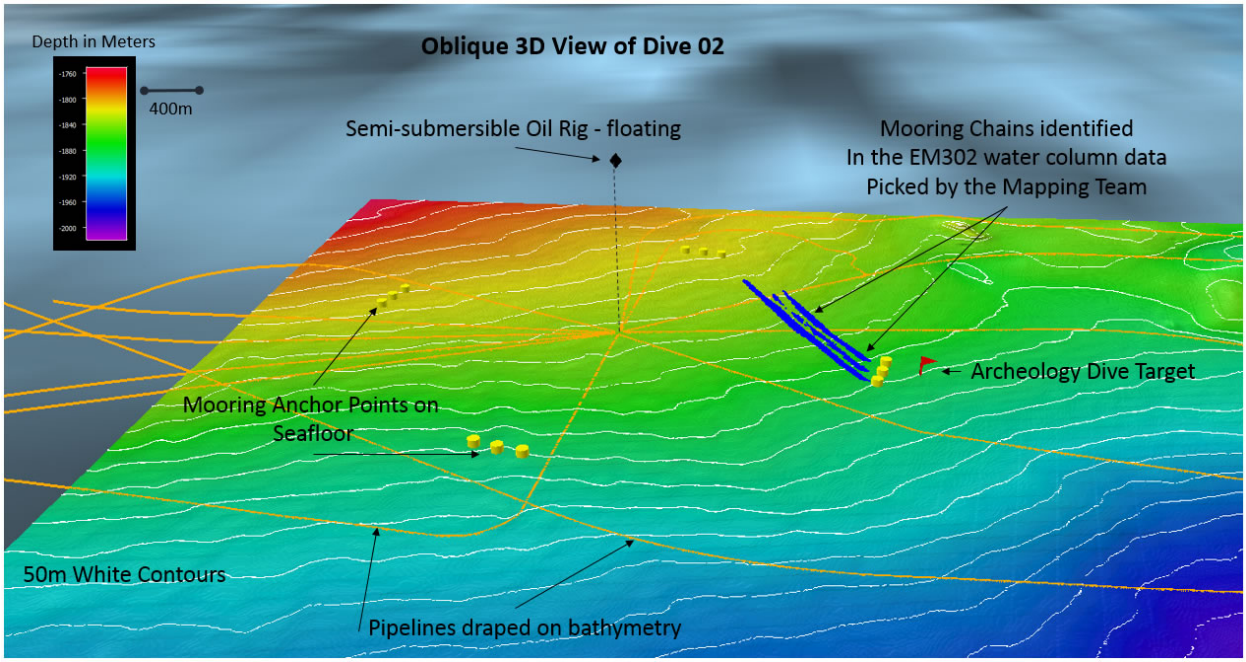

Figure 3: For Dive 02, Bathymetric image of a semi-submersible oil rig, its mooring anchor points, its mooring chains (identified by the Mapping Team in the water column data), pipelines, and the marine archaeological dive target.

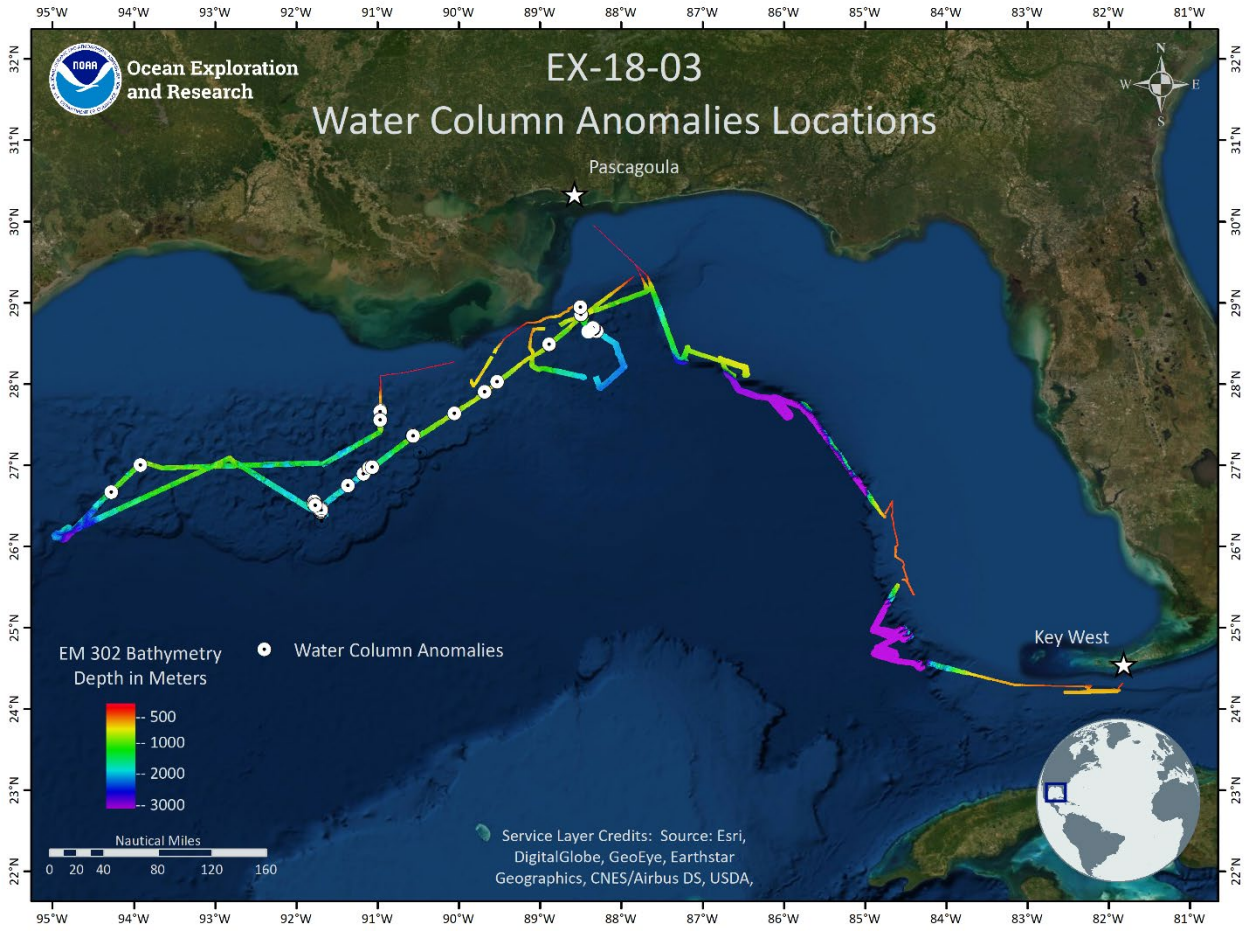

Figure 4. Locations of EM 302 water column anomalies from EX-18-03. These are typically thought to be cold water seeps/bubble plumes.

EX-18-03 mapping operations when possible included focused overnight mapping of the ROV dive location, an example is shown in Figure 5. Focused mapping of the Western Florida Escarpment for Dive 14 is shown in Figure 6.

Throughout the cruise multibeam data quality was monitored in real time by acquisition watch standers. Ship speed was adjusted to maintain data quality as necessary, and line spacing was planned to ensure at least ¼ swath width overlap between survey lines. Cutoff angles in the multibeam acquisition software Seafloor Information System (SIS) were generally left wide open for maximum exploration data collection and routinely adjusted on both the port and starboard side to ensure the best data quality and coverage.

Multibeam data received real time surface sound velocity corrections via the Reson SVP-70 probe at the sonar head, as well as through profiles generated from Expendable Bathythermographs (XBTs) conducted at intervals no greater than 6 hours, as dictated by local oceanographic conditions. Reson sound velocity values were constantly compared against

secondarily derived sound speed values from the ship's onboard thermosalinograph flow-through system as a quality assurance measure.

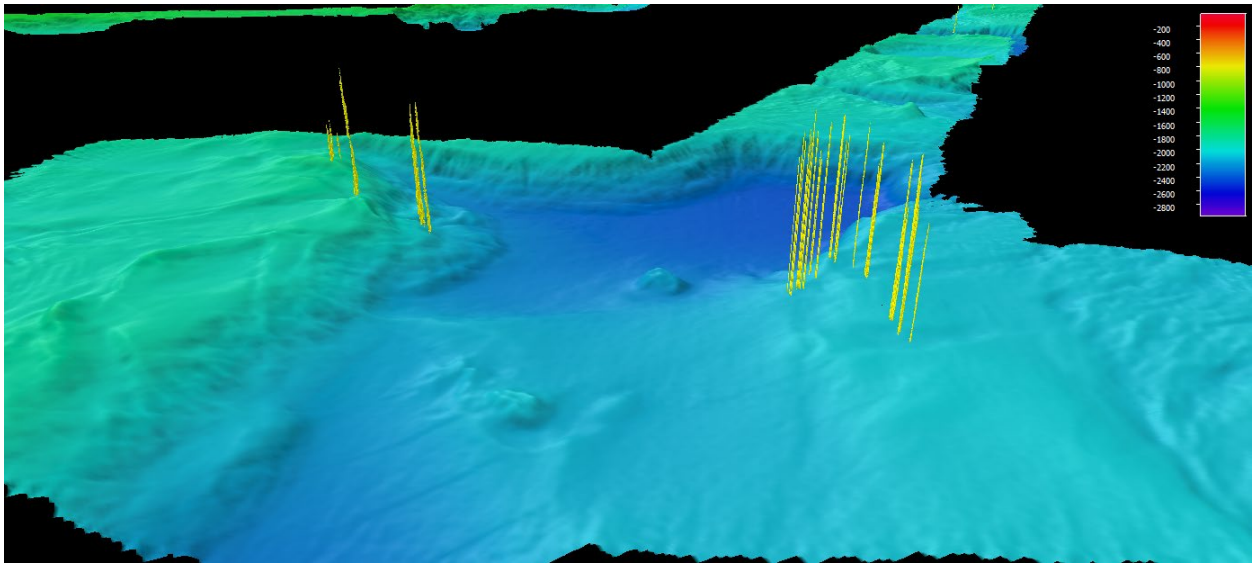

Figure 5. Example of overnight focused mapping over a ROV dive site with water column anomalies identified in the EM 302 data. Vertical exaggeration 3x, 50m cell size, depth in meters. Locations of EM 302 water column anomalies from EX-18-03. These are typically thought to be cold water seeps/bubble plumes.

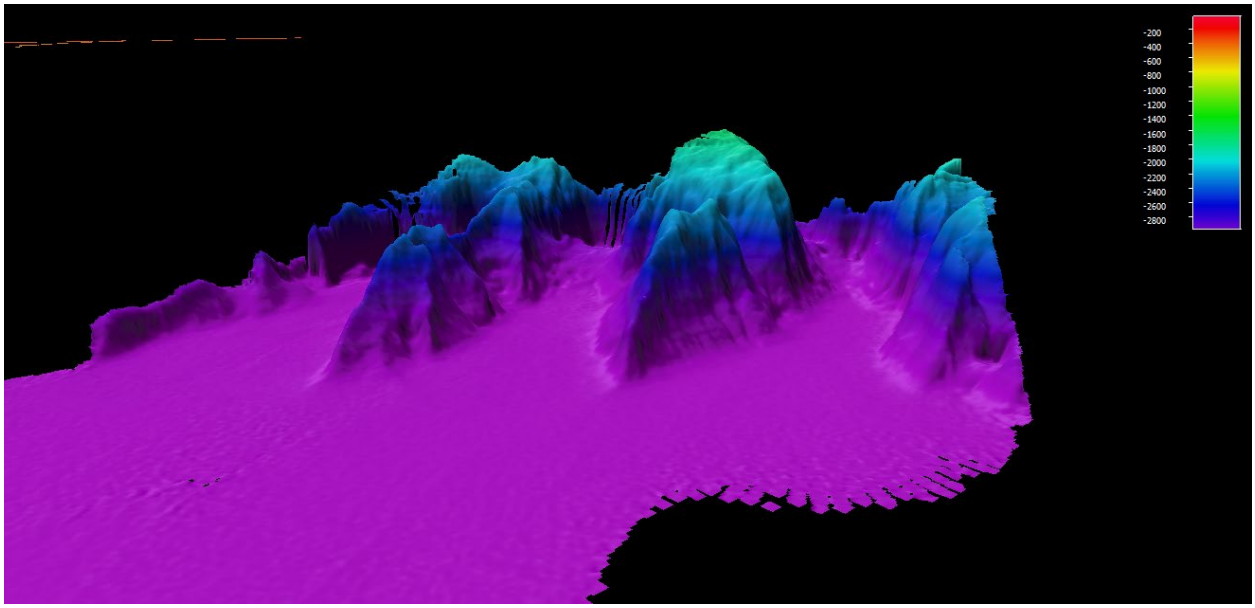

Figure 6. Example of MBES data collect on the Western Florida Escarpment in preparation for Dive 14. Vertical exaggeration 3x, 50m cell size, depth in meters

Simrad EK60 split-beam water column sonar data were collected throughout the majority of the cruise. Data were monitored in real time for quality but were not post-processed. Figure 7 shows the EK60 data collected during EX-18-03. The 38 kHz EK60 was only turned on during ROV dives.

Knudsen 3260 sub-bottom profiler data were also collected during the majority of the cruise. Figure 8 shows the locations where sub-bottom data were collected during EX-18-03.

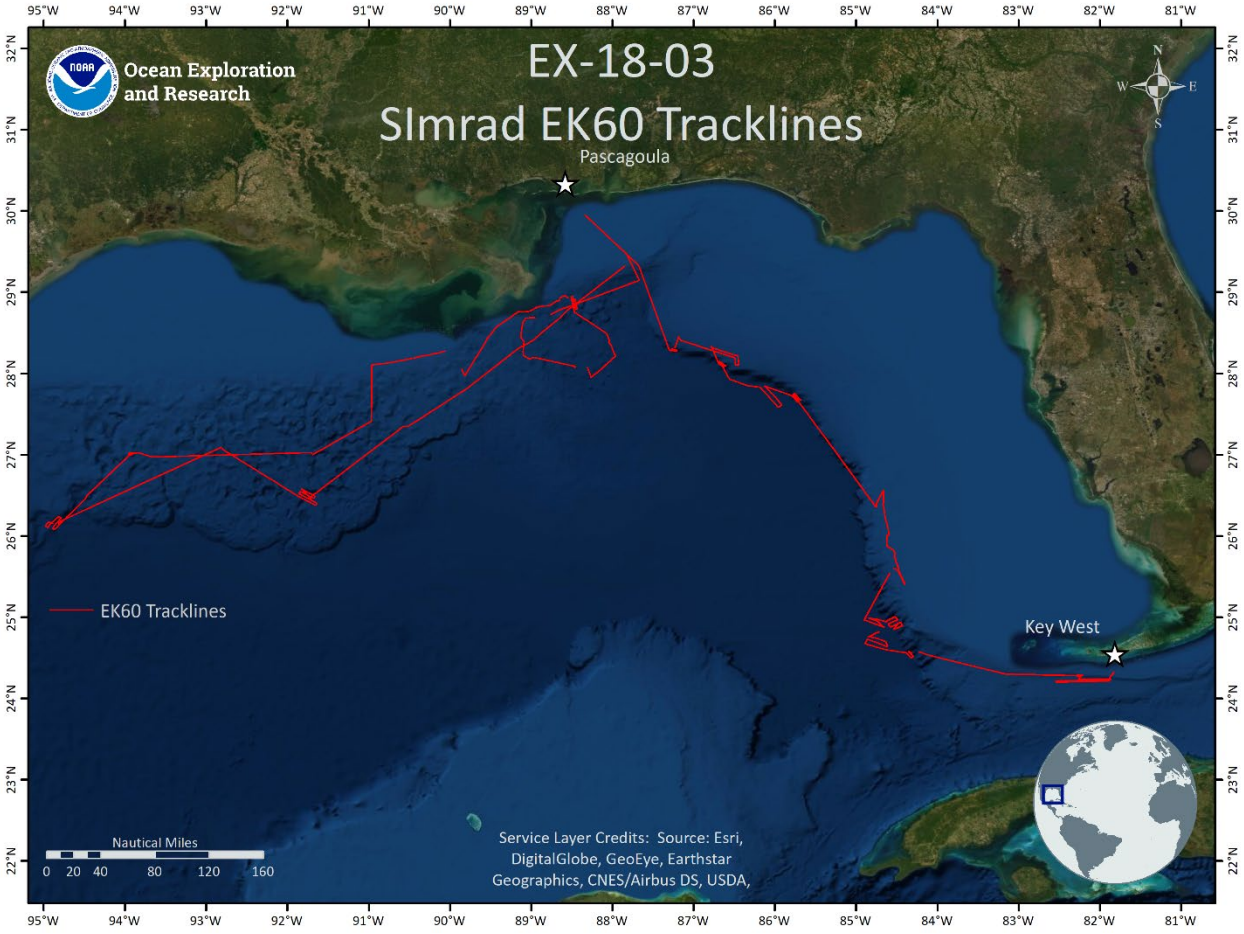

Figure 7. Simrad EK60 split-beam sonar data tracklines (in yellow) collected during EX-18-03.

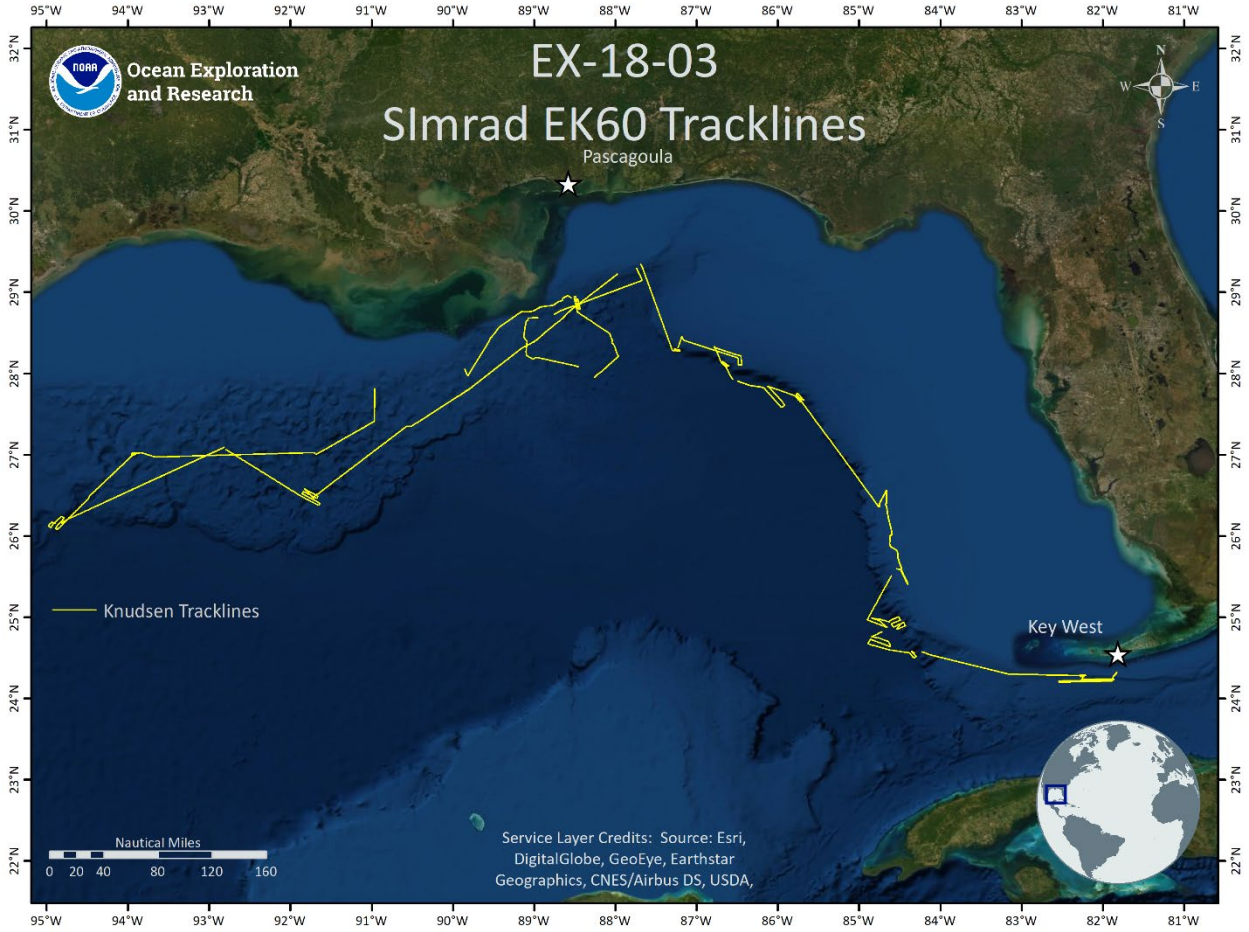

Figure 8. Sub-bottom profiler data tracklines (in red) collected during EX-18-03.

8. Multibeam Sonar Data Quality Assessment and Data Processing

Figure 9 shows the multibeam data processing workflow for this cruise. EM 302 Built-in Self Tests (BISTs) were run throughout the cruise to monitor multibeam sonar system status and are available as ancillary files in the sonar data archives. Raw multibeam bathymetry data files were acquired in SIS, then imported into QPS Qimera for processing. In Qimera, the attitude and navigation data stored in each file were checked, and erroneous soundings were removed using 2-D and 3-D editors. Gridded digital terrain models were exported utilizing QPS Fledermaus software and posted to the ship's ftp site for daily transfer to shore. Final bathymetry quality checks were completed post-cruise shore-side. With the vast majority of surveying completed in deep water, depth measurements were not adjusted for tides, as they are an essentially insignificant percent of the overall water depth. Data cleaning projects were in UTM zone projections for the operations area. Final data products were exported and archived as field geographic WGS84 coordinate reference frame (i.e., unprojected).

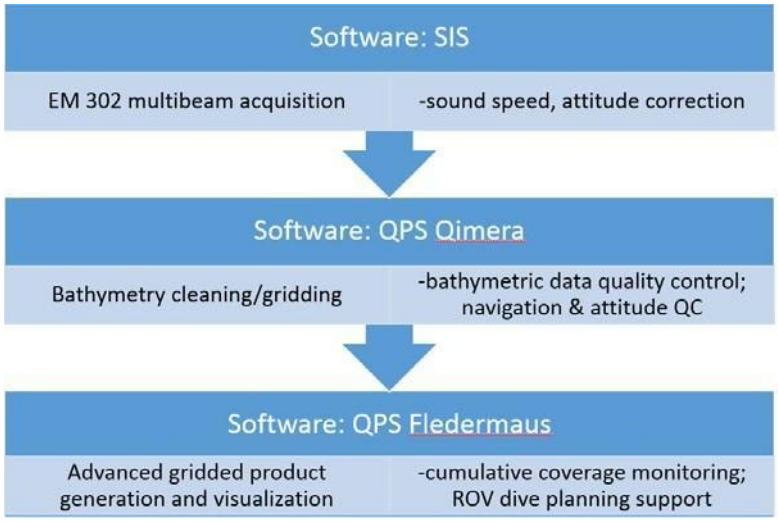

Figure 9. Shipboard multibeam data processing workflow.

Crosslines

Comparing depth values from orthogonal survey lines is a standard hydrographic quality control measure to evaluate the consistency of the multibeam sonar data collected during a cruise. A crossline was run on April 18, 2018 as shown in Figure 10. Crossline analysis was completed using the Crosscheck Tool in QPS Qimera software to evaluate if the survey meets the requirements for an International Hydrographic Order 1 survey. The results are shown below.

Crossline file:

0138_20180418_102226_EX1803_MB.all

Mainscheme line files:

0132_20180418_070743_EX1803_MB.all

0134_20180418_082015_EX1803_MB.all

Statistic	Value (in meters)
Number of points of comparison	128707
Grid Cell Size	65
Difference Mean	-0.092018
Difference Median	-1.115367
Difference Std. Dev	7.277148
Difference Range	[-307.12, 45.77]
Mean + 2*Stddev	14.646314
Median + 2*Stddev	15.669663
Data Mean	-2424.660753
Reference Mean	-2424.568736
Data Z-Range	[-2753.69, -2106.48]
Reference Z-Range	[-2747.73, -2114.16]
Order 1 Error Limit	31.523359
Order 1 # Rejected	221
Order 1 P-Statistic	0.001717
Order 1 Survey	**ACCEPTED**

These results confirm that the data collected meet International Hydrographic Organization (IHO) Order 1 specifications for data quality.

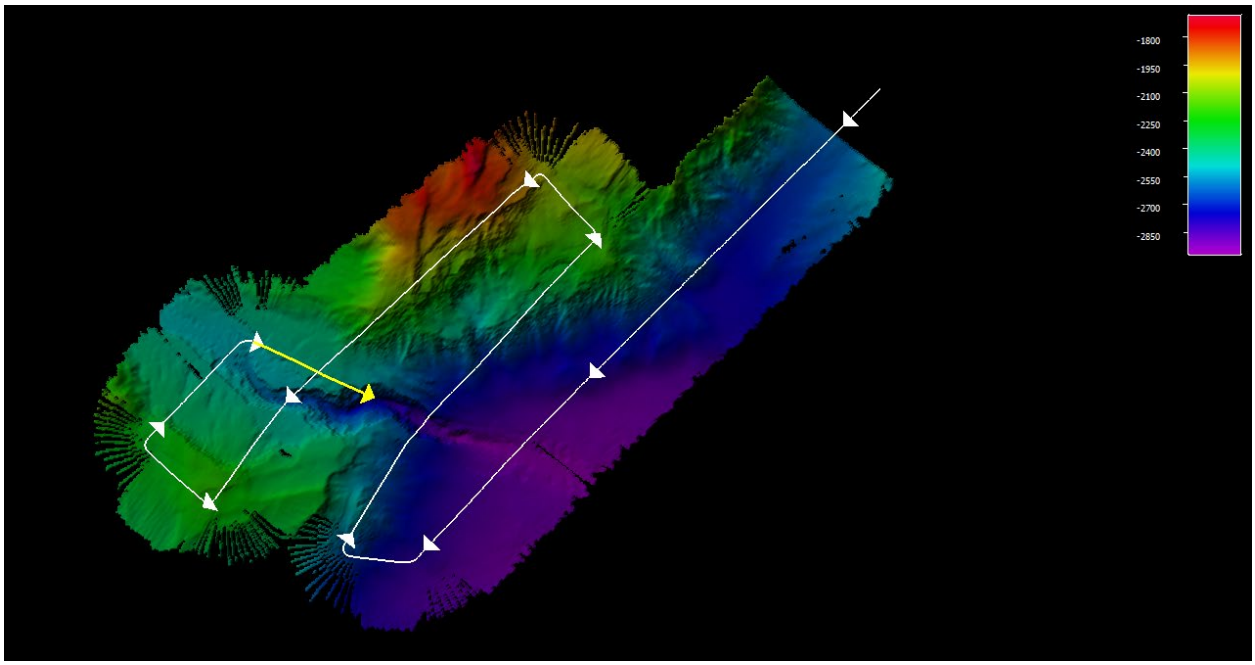

Figure 10. EX-18-03 crossline (shown in yellow) used for comparison against the bathymetric grid generated via orthogonal multibeam survey lines. Depth in meters.

9. Data Archival Procedures

All mapping data collected by the NOAA Ship *Okeanos Explorer* are archived and made publicly available within 90 days of the end of each cruise via the National Centers for Environmental Information (NCEI) online archives. The complete data management plan (which describes the raw and processed data formats produced for this cruise) is available as an appendix in the EX-18-03 project instructions, available in the NOAA Central Library here: https://doi.org/10.25923/zv0y-2c45 (last accessed April 2020) Ancillary and supporting files are archived with the sonar datasets. These include:

EM 302 Multibeam bathymetry and bottom backscatter dataset:

- Mapping watch stander log
- Weather log
- Sound velocity profile log
- Multibeam acquisition and processing log
- Built-In-System-Tests (BISTs)
- Processor Unit Parameters
- Text files of telnet sessions on the EM 302 transceiver unit (TRU)

Simrad EK60 split-beam water column dataset:

- Mapping watch stander log
- Weather log
- EK data log

Knudsen 3260 Sub-bottom Profiler dataset:

- Mapping watch stander log
- Weather log
- Sub-bottom data log

EM 302 Multibeam water column dataset:

- Mapping watch stander log
- Weather log
- Sound velocity profile log
- Multibeam acquisition and processing log

- Built-In-System-Tests (BISTs)
- Processor Unit Parameters
- Text files of telnet sessions on the EM 302 transceiver unit (TRU)
- Multibeam water column data review log if data were reviewed for presence of seeps in Fledermaus MidWater or QPS Qimera

All sonar data is permanently discoverable at https://www.ngdc.noaa.gov/ (last accessed April 2020).

At the time of writing this report, EM 302 and EK60 water column data, supporting data, and informational logs were available in the NCEI Water Column Sonar Archives: https://www.ngdc.noaa.gov/maps/water_column_sonar/index.html (last accessed April 2020).

Sub-bottom data, supporting data, and informational logs will be available in the NCEI Data Archives accessible at https://www.ngdc.noaa.gov/ (last accessed April 2020). For any challenges accessing SBP data, send an inquiry to ncei.info@noaa.gov requesting access to EX-18-03 Knudsen 3260 sub-bottom raw and processed data.

EM 302 bathymetry data, supporting informational logs, and ancillary files were/will be available in the NCEI Data Archives accessible at https://maps.ngdc.noaa.gov/viewers/bathymetry/ (last accessed April 2020)

10. Cruise Calendar

All times listed are local ship time, -5 hours from UTC

April - May 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		10 Mobilization, Pascagoula, MS`	11 Depart Pascagoula, MS	12 Dive 01, overnight mapping	13 Dive 02, overnight mapping	14 Dive cancelled, 24 hour mapping
15 Dive cancelled, mapping operations	16 Dive 03, overnight mapping	17 Dive 04, overnight mapping	18 Dive 05, overnight mapping	19 Dive 06, overnight mapping	20 Dive 07, overnight mapping	21 Transit mapping to Pascagoula for mechanical repairs
22 Arrive Pascagoula, MS	23 In port, Pascagoula, MS	24 Depart Pascagoula, MS. Transit mapping	25 Dive 08, overnight mapping	26 Dive 09, overnight mapping	27 Dive 10, overnight mapping	28 Dive 11, overnight mapping
29 Dive 12, overnight mapping	30 Dive 13, overnight mapping	May 01 Dive 14, overnight mapping	02 Dive 15, overnight mapping	03 Arrive Key West, Florida. All systems secured.		

11. Daily Cruise Log Entries

Generated from the daily expedition situation reports. All times listed are in local ship time (-5 hours from UTC)

April 10

EM 302 and SIS were started in the Morning. First Built-in self-test (BIST) was a full pass and system was pinging without logging transiting through the safety fairways. Logging began after OS 38 troubleshooting was complete. EK60s and Knudsen both activated and began acquiring data normally.

ADCP OS38 troubleshooting continues. The deck box turned on fine and all serial inputs were coming through (green lights). When the ship was in about 40m of water Mapping Team began pinging. Data was coming in and the custom ADCP Speed log display was updating accordingly. Speed values were consistent compared to values from the POS. Tomorrow during Dive 01 Engineering dive when the ship is in deep water will be able to check the quality better. Temperature readings are still high.

MBPROC2 has been installed and is operational. Softlock license was deactivated from MBPROC3 and activated on MBPROC2. Video card settings using the guidance from EX-18-02 were set.

A new dedicated POS computer has been installed.

Mapping Team and Global Foundation for Ocean Exploration (GFOE) worked successfully together to remotely access the EK60 Computer on the Knudsen. One has to login with admin privileges on the EK60, start the EK80 software and then remotely access the EK60 computer from the Knudsen using admin privileges. A byproduct of this situation is one cannot Keyboard-Video-Mouse (KVM) to the EK60 computer – mission team are looking for a better longtime solution.

Sound Speed Manager Server Mode was used to about 250m in depth and an XBT was performed. There are significant differences in the surface sound speed between the WOA and the Transducer Sound Speed, profiles require some smoothing. Ship is about 40-20miles from the Mississippi Delta.

Raw data from the EM 302 is not being pushed from the EM 302 Hydrographic Work Station (HWS) to the Mapping Drive. When the survey was created, a sub folder was created (a directory is automatically created with a new survey is begun) with the same survey name and the raw data is behind an extra folder. Mission team is troubleshooting.

April 11

Dive 01. Mapping Team successfully launched, acquired and processed profiles from the Atlantic Oceanographic and Meteorically Laboratory (AOML) XBT Autolauncher. It was slow to 'wake up' but seems to be responsive now. XBTs can be loaded in the afternoon and evenings to be used by the overnight Watch Lead. Mapping Team are working on developing SOPs but a few relevant points are: 1) Do not load XBTs at night, it requires the operator to extend themselves 2) The "check all tubes" function takes a while and 2) need to keep a hardcopy, maybe a lamented graph of the status of the probes in the tubes with serial numbers and whether or not their pins have been pulled.

Mapping Team continues to troubleshoot Qimera, our hydrographic processing software. Watch standers were concerned with freezing/crashing during slice editing as well as general slowness during 3-D editing. The latest release notes for Qimera 1.6.1 state:

- Fixed a bug caused by a change in 1.6.0 that slowed the refresh rates in the 3D Editor.
- The Slice Editor will no longer cause Qimera to freeze.

Normally Mapping Team would not change versions mid cruise, but since these fixes aligned exactly with the experienced issues, the cruise was only a day old and the issues were so bad it was preventing processing, Mapping Team upgraded Qimera to the latest version.

April 12

SIS real time gridding comes and goes. Team tried the 'Restart HDDS' function but seems to produce inconsistent results.

Mapping systems continue to operate normally. Qimera upgrade is working well - it is faster than ever. The new 'Auto Phase Mode' on the Knudsen is operating fine. Autolauncher is being used for overnight XBT casts successfully.

Mapping Team assisted in geo-referencing data in preparation for Dive 02 near (1 nautical mile) an oil rig. Mapping Lead was able to digitize the mooring anchor points. Overnight mapping ran over poor quality MBES data and then mapping lead attempted to map the oil rig's anchor chains in the water column data to ground truth. Mapping lead was successfully able to pick out the anchor chain in the EM 302 Water column data. This provided valuable information to the ROV dive team for dive preparations.

April 13

Dive 02, overnight mapping.

April 14

With the cancelled dive, Mapping Team switched over to 24 hour mapping operations. The plan is to edge match existing EX data. In the afternoon, conditions continued to deteriorate

with rapidly decreasing data quality. The decision was made for the ship to hold heading and speed for a safe ride until conditions improve. Mapping Team may secure Knudsen tonight since we may be shallower than 200m and the data is extremely poor anyway.

All systems continue to function normally.

Senior Survey Technician (SST) is working on a process to bring the ROCV CTD data through Sound Speed Manager.

Overnight the Mapping Team identified a potential new seep.

Some lines need to be brought in twice in Qimera in order for the data to come through. Unclear at this time of cause or fix.

April 15

Dive cancelled. In the early morning sonars were secured due to conditions, depth and extremely poor quality of data. At 0900 sonars began pinging with the EM 302 and Sound Speed Manager in server mode while ship operated in 100m of water.

The ship remained inshore for the rest of the day in about 100m of water. The EM 302 and EK60 were pinging and recording but the Knudsen remained secured. Data quality was poor. Synthetic profiles from SSM for SVP correction.

Around 1930 the ship turned south and as we go into deeper water data improved with improving sea states.

April 16

Data quality was good heading into Dive 03. All systems are functioning normally.

Fledermaus and Qimera are running well on MBPROC 1 and MBPROC2

16 successful casts by the auto-launcher have been completed.

April 17

Data quality is excellent with improving conditions. Overnight mapping identified a previously unknown sonar anomaly in the water column which will play into dive planning today.

MBPROC1 and MBRPOC2 are running smoothly with large projects. There are some kinks but the team believes them due to software issues and not computing issues.

Overnight mapping will focus on Perdido Canyon, where there is no high-resolution bathymetry.

All systems are running normally.

April 18

The Dual Station KVM in the Dry Lab is now operational. This will be a huge asset for the operations team – particularly the Mapping Team to have a dual screen workstation accessible during ROV dives.

SIS gridding is still not working, team has tried the Restart HDDS. Tomorrow after launch Mapping Team will try and start a new SIS survey with a larger cell size.

Overnight survey at Perdido Canyon was successful.

All systems continue to operate normally. All BISTs have been passed.

MBRPOC1 and MBRPOC2 continue to perform smoothly

April 19

A new SIS survey was started with a coarser cell size for grid creation. Thus far the grid in the 'Geographical Display' is working just fine.

SST is finalizing the XBT Autolauncher SOP. It is detailed and user friendly.

All systems are functioning normally. Overnight mapping will focus on WR488, Dive 07 and will search for seeps.

April 20

Overnight mapping revealed new seeps near the dive area and backscatter layers assisted with dive preparation.

Restarting with a new survey in SIS seems to have fixed the gridding issue, but the data still intermittently drops out for 5 or so minutes at a time. Processed data looks fine.

Systems continue to operate normally.

April 21

Transit mapping continued throughout the day and overnight. As the ship transited offshore the Mississippi Delta, SIS needed constant (~15min) SVP updates. Not wanted to burn through XBTs during a transit, Server Mode was enabled on Sound Speed Manager. Thus far the data has improved and sound speed artifacts have been mitigated.

Survey will to acquire data tonight in-shore to about 100m in depth.

April 22

Arrive Pascagoula, MS around 1200 for mechanical repairs. Mapping sonars have remained powered on, to allow for a quick turnaround.

April 23

SST secured all sonars for a hull dive. Sonars were restarted after the hull dive and a BIST was passed.

April 24

Depart Pascagoula, MS around 1400 local time. Mapping commenced in 40m of water in the safety fairways as the ship departed Pascagoula. Overnight mapping consisted of a transit to the dive site.

April 25

Dive 08. Overnight mapping culminated in a focused survey over Dive 08. Backscatter and bathymetry products were delivered to science leads in the morning.

While transiting on the shelf in waters of 1000m XBT had to be performed every 2 hours.

Sub-bottom processing software is being installed on MBPROC 3 and the ArcGIS computer.

April 26

Dive 09. Overnight mapping targeted gaps in the NCEI bathymetry. Two survey lines were run over the dive site to improve bathy resolution in a steep and deep area.

Systems continue to operate normally.

XBTs are being performed every 2-3 hours up on the shelf.

April 27

Dive 10. Survey has requested that the Operations Officers review survey line shifting with all Bridge officers. During surveys line shifting to match/overlap coverage is necessary to do 'on the fly.'

Systems continue to function normally.

April 28

Dive 11. Operations Officer created a lamented one sheet SOP for line shifts on the bridge. This will be a huge help shifting line plans during overnight hours.

Overnight mapping edge-matched existing EX data in water depths between 200-300 m. SVP artifacts were present in the data despite frequent XBTs. Sound Speed Manager was run in server mode for part of the transit.

SIS had to be restarted because backgrounds *.tifs were not displaying.

Mission team are planning to perform a test CTD cast tomorrow. Via a deck test SST reports all instruments are powered and collecting data.

Overnight mapping will focus on collecting higher resolution data over deep ridges southwest of Florida shelf for the next two dives.

April 29

Dive 12. Engineering Department reported a leak in the thermosalinograph (TSG) line in forward dry stores. The leak will take 24 hours to repair, mostly to let the epoxy set correctly. TSG was secured in the am. The salinity values from the TSG are used to update sound velocity parameters in multibeam acquisition. Salinity values have been fairly constant in the area (36.2-36.) so Mapping Team anticipates minimum effects to the MBES acquisition.

Test CTD cast to 200m was completed post-dive. One of the salinity sensors seems to be not working correctly. Troubleshooting started immediately and profiles have been sent to SeaBird. All other sensors, including the new Turbidity sensor, are working as expected. Mapping Team will request another CTD cast on EX1803.

April 30

Dive 13. Overnight mapping operations were conducted without issue.

Engineers continue to repair a leak in the TSG line in forward dry stores

May 01

Dive 14. Troubleshooting continued on the CTD. At this time, it is believed to be an issue with the connection to the Seabird CTD unit itself. This cannot be remedied on the ship. However, SST planned on having a back-up unit delivered to Key West and therefore Mapping Team are not anticipating any interruption in operational capabilities.

Mapping was able to produce a 20m surface from a compilation of EX data, assisting in the precise targeting of the ridge feature for Dive 14. Using backscatter and in cooperation with the science leads, mapping was able to communicate shifts in the ROV track line in order to stay on the large outcrops.

TSG fixed and data is coming in.

May 02

Dive 15. Overnight Survey operations focused on areas with poor/no data south of Key West. Due to sea states, data quality was poor.

Tomorrow Mapping Team will begin demobilization of mission spaces.

Before heading into port the Mapping Team plans to run some lines over a potential cultural heritage site.

May 03

Arrive Key West, Florida. Demobilization, all systems secured.

12. References

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