H13622

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13622

LOCALITY

State(s):	Louisiana
General Locality:	Northern Gulf of Mexico
Sub-locality:	50 NM South of Mobile Point

2022

CHIEF OF PARTY
Michael Gonsalves, CDR/NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13622**

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s):	**Louisiana**
General Locality:	**Northern Gulf of Mexico**
Sub-Locality:	**50 NM South of Mobile Point**
Scale:	**40000**
Dates of Survey:	**04/06/2022 to 05/09/2022**
Instructions Dated:	**03/29/2022**
Project Number:	**OPR-J350-FH-22**
Field Unit:	**NOAA Ship *Ferdinand R. Hassler***
Chief of Party:	**Michael Gonsalves, CDR/NOAA**
Soundings by:	**Kongsberg Maritime EM 2040 (MBES)**
Imagery by:	**Kongsberg Maritime EM 2040 (MBES Backscatter)**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/. Products created during office processing were generated in NAD83 UTM 16N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

DESCRIPTIVE REPORT SUMMARY

A. Area Surveyed

The survey area for H13622 was 50 NM South of Mobile Point in the northern Gulf of Mexico. Data were acquired to the survey limits in accordance with the requirements in the Project Instructions OPR-J350-FH-22 and the 2022 NOS Hydrographic Surveys Specifications and Deliverables (HSSD) as shown in Figure 1.

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
29° 22' 50.94" N 87° 57' 35.44" W	29° 25' 37.5" N 87° 38' 42.74" W

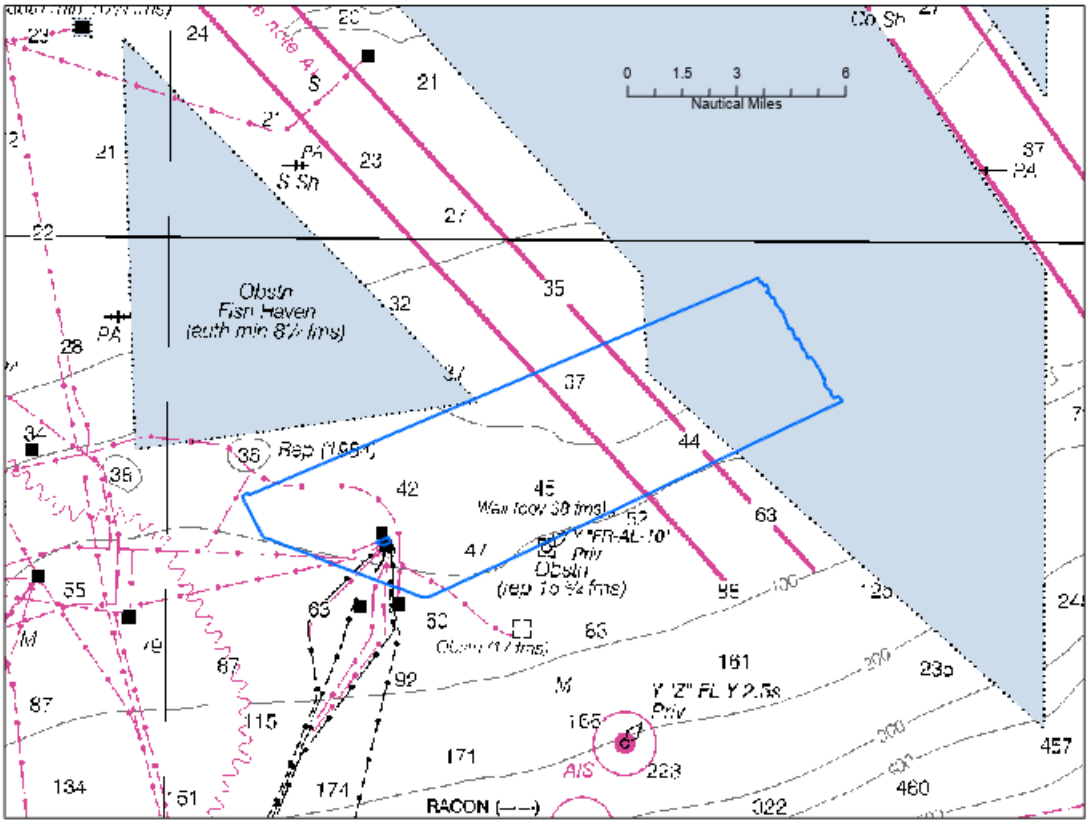


Figure 1: H13622 sheet limits (in blue) overlaid onto Chart 11360.

B. Survey Purpose

The 2010 Deepwater Horizon oil spill released over three million barrels of oil in the Gulf of Mexico, by far the largest offshore oil spill in US history. In 2016, the Deepwater Horizon Trustees reached a settlement for natural resource injuries caused by the Deepwater Horizon oil spill. The Deepwater Horizon Trustees documented a footprint of over 770 square nautical miles of injury to mesophotic and deep benthic habitat surrounding the wellhead and extending up the continental slope. Accurate high-resolution bathymetric and habitat maps and data on the abundance and distribution of mesophotic and deep benthic habitats are needed to guide restoration.

Only a small portion of the mesophotic and deepwater habitats in the Gulf of Mexico have been surveyed, and with the collaboration and partnership of NOAA's Deepwater Horizon Program and the National Centers for Coastal and Ocean Science (NCCOS), the NOAA Ship Ferdinand R. Hassler collected bathymetry and backscatter data in the region. This work supports one of many projects selected by the Open Ocean Trustee Implementation Group to restore natural resources injured by the Deepwater Horizon oil spill. The data collected will be foundational for exploring mesophotic and deepwater habitats of the marine ecosystem by informing ground truthing locations for underwater camera footage, sediment cores, grab samples, ROV, and AUV work and for identifying future restoration sites. The data will also be used to update nautical charting products.

C. Intended Use of Survey

The entire survey is adequate to supersede previous data.

Data acquired in H13622 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as required by the HSSD. This includes crosslines, NOAA allowable uncertainty, and density requirements.

D. Data Acquisition and Processing

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures, and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

Data acquisition efforts were led by crew of the Ferdinand Hassler with on-board support of NCCOS personnel and NOAA physical scientists. After acquisition, data were transferred off the ship and to NCCOS offices for additional multibeam and backscatter processing. A Final Feature File was created by the ships survey team and submitted separately from this report.

Due to environmental considerations, the ship was excluded from working within certain portions of project OPR-J350-FH-22 during the evening hours. This resulted in the ship conducting a daily migration from the eastern side of the project to the western side of the project at sunset, then reversing the transit at sunrise. To

remain productive, the ship acquired a single strip of data during each transit across some of the intermediate survey sheets (e.g. H13622, H13624, H13625). To simplify the file management, the sound velocity casts were concatenated across the entire project (rather than being strictly assigned to a single survey sheet).

Due to the servicing of the ship's Moving Velocity Profiler (MVP), all data acquired between April 4 - 26 (DN094 - DN116) had the sound speed corrected via static CTD casts. In conjunction with the aforementioned transits, a CTD cast was taken at each sheet boundary.

During processing, NCCOS followed procedures outlined in the Ferdinand Hassler DAPR and additional processing Standard Operating Procedures (SOP). Backscatter processing was completed using FMGT 7.10 software package. The raw (.all) data files were paired with post processed HDCS CARIS files resulting in a gsf file used to create the 2m intensity (-db) mosaic. Sensor characteristics and survey metadata within the .all and HDCS files are preserved in the gsf files. The intensity mosaic was normalized and exported as a floating point GeoTIFF.

E. Uncertainty

Final surfaces were analyzed using the HydrOffice QC Tools Grid QA feature to determine compliance with specifications. Overall, 99% of nodes meet NOAA Allowable Uncertainty and Data Density specification with grid nodes containing five or more soundings as required by HSSD Section 5.2.2.3 (Figures 2-5). Crosslines were collected in accordance with the NOAA HSSD, and are included as part of the finalized grids.

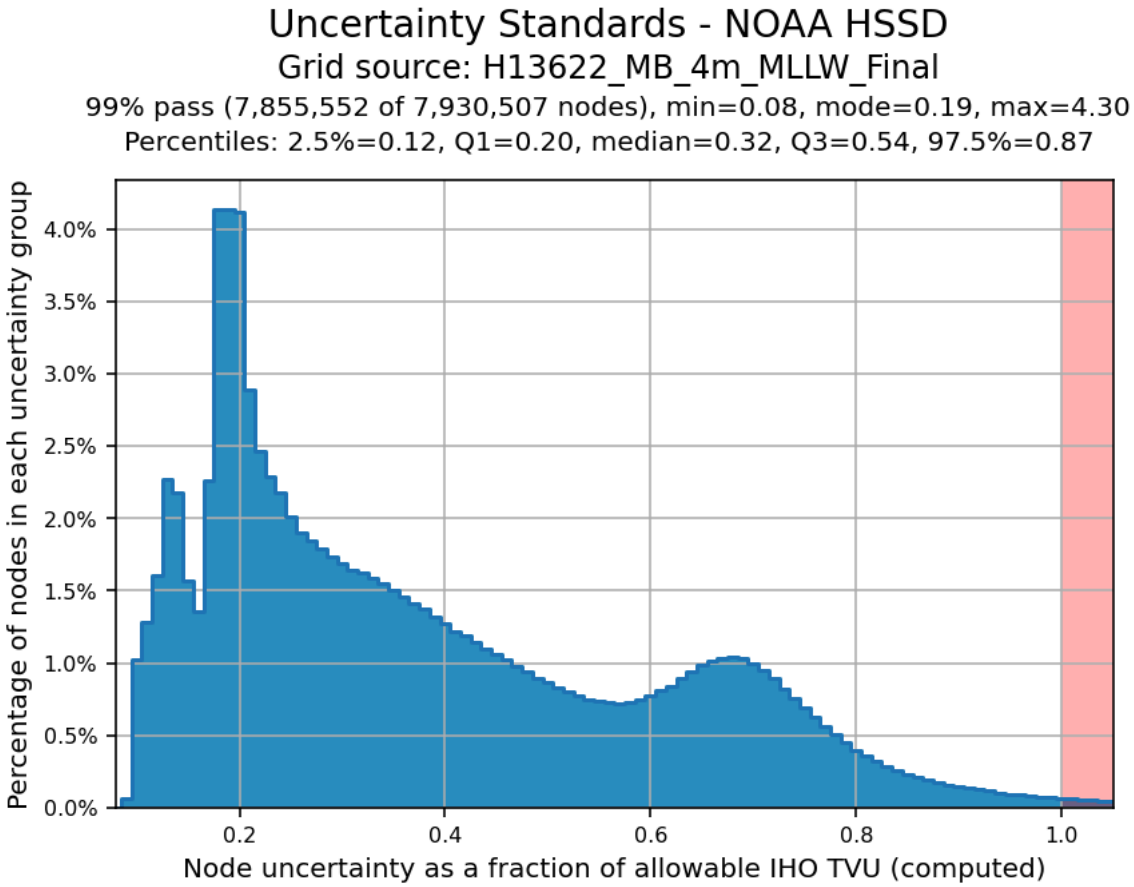


Figure 2: H13622 4m grid allowable uncertainty statistics.

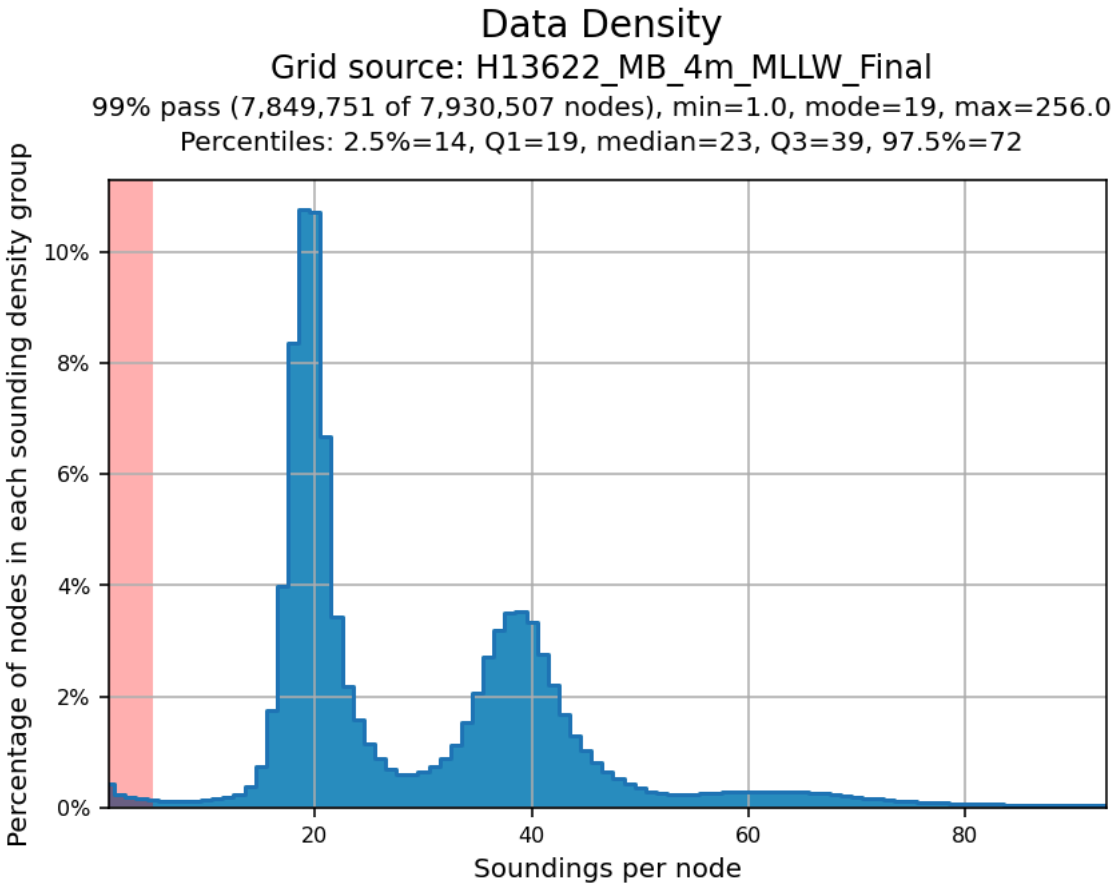


Figure 3: H13622 4m grid data density statistics.

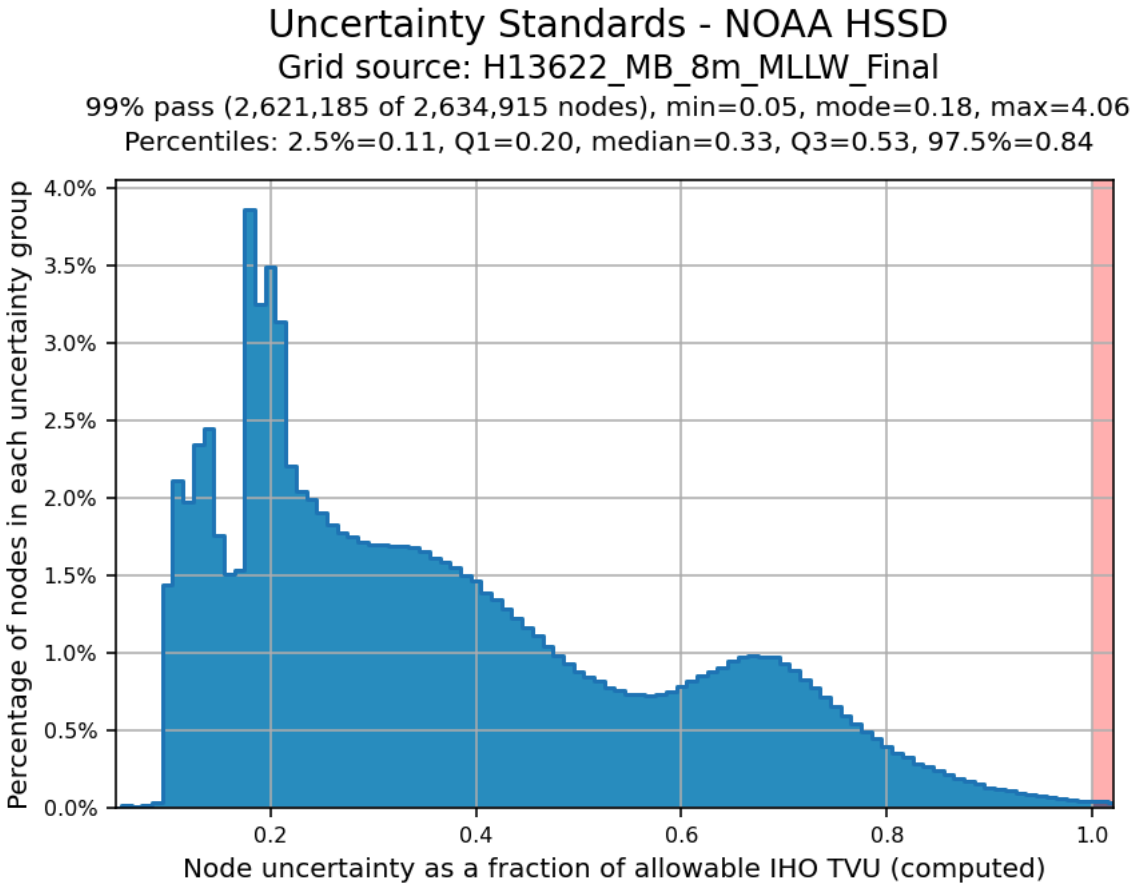


Figure 4: H13622 8m grid allowable uncertainty statistics.

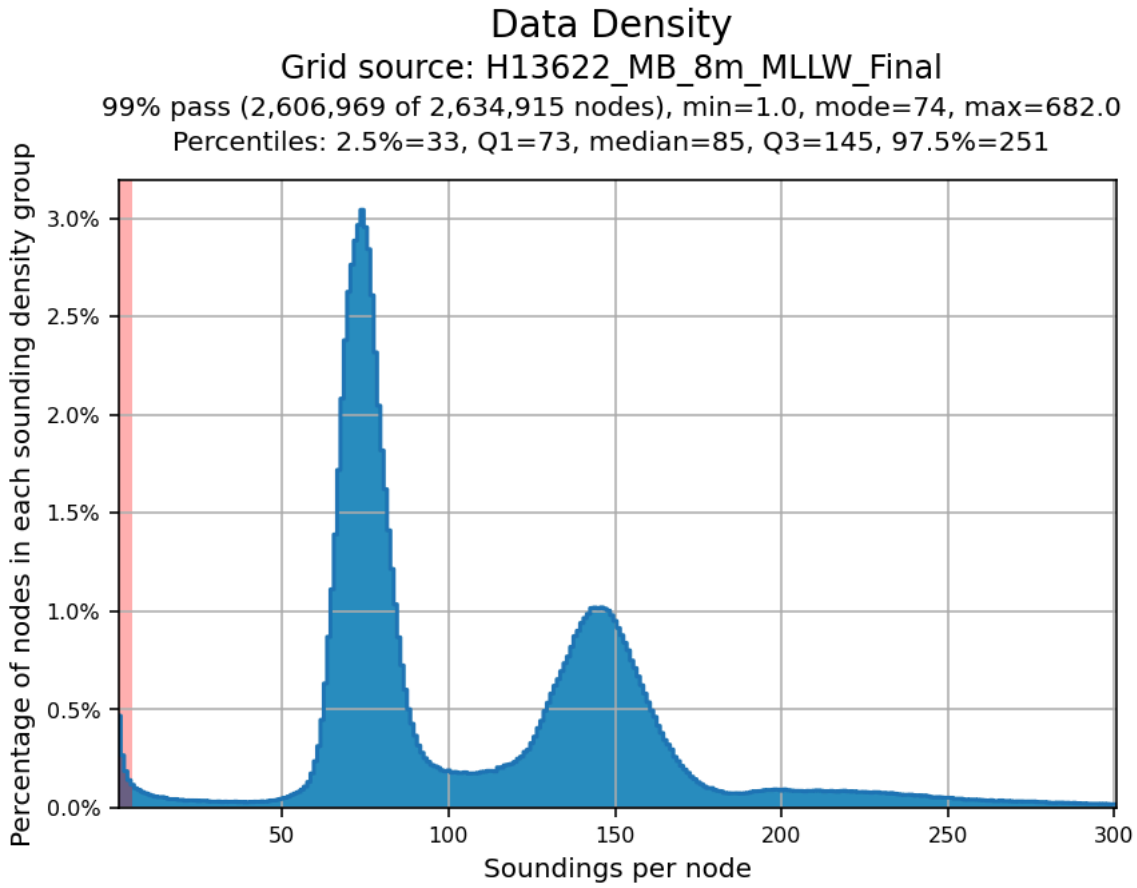


Figure 5: H13622 8m grid data density statistics.

F. Results and Recommendations

The following are the largest scale ENCs, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date
US3GC05M	1:456394	60	06/09/2022	06/09/2022

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13622_MB_4m_MLLW_Final	CARIS VR Surface (CUBE)	4 m	61.9 m - 80.0 m	NOAA_4m	Complete MBES
H13622_MB_8m_MLLW_Final	CARIS Raster Surface (CUBE)	8 m	72.0 m - 106.256 m	NOAA_8m	Complete MBES
H13622_MBAB_2m_S250_200kHz_1of1	MB Backscatter Mosaic	2 m	N/A	N/A	Complete MBES
Hassler_H13622_EM2040_Bathy_2m	CARIS Raster Surface (CUBE)	2 m	61.9 m - 105.5 m	NOAA_2m	Complete MBES

Three bathymetric and one backscatter surface were created for H13622 survey area. Two surfaces were created adhering to requirements of the HSSD, together these cover the survey area at 4m and 8m resolutions (Figure 6). Surfaces include crosslines and are broken up by HSSD depth requirements. There is a gap in the data corresponding with a charted production platform/oil derrick (Figure 7).

NCCOS created 2m resolution bathymetry and backscatter (Figure 8) surfaces for the entire survey area. These surfaces include mainscheme lines only, crosslines were excluded. These will be used for additional spatial analysis by NCCOS. The 2m bathymetric surface is included only as a working CSAR file, it was not finalized in Caris.

Crosslines were collected, processed and compared in accordance with Section 5.2.4.2 of the HSSD for quality control. To evaluate crosslines, a surface generated via data strictly from mainscheme lines and a surface generated via data strictly from crosslines were created. From these two surfaces, a difference surface (mainscheme - crosslines = difference surface) was generated. Statistics show that the mean difference between depths derived from mainscheme data and crossline data was 0.10 meters and 95% of nodes falling within +/- 0.41 meters (Figure 9). For the respective depths, the difference surface was compared to the allowable NOAA uncertainty standards. In total, 99.5% of the depth differences between mainscheme and crossline data were within allowable NOAA uncertainties (Figure 10).

Contours from the survey were generated and visually compared with the charted contours from the largest scale Electronic Navigation Chart (US3GC04M & US3GC05M). Referencing Figure 11, the charted 30, 40, 50 and 100-fathom contours (shown in black) have good agreement with the survey-derived contours (shown in blue); where any discrepancy can largely be dismissed as the result of chart generalization.

Survey soundings were generated from an 8-meter single resolution CUBE surface in CARIS HIPS and compared with the soundings from the largest scale ENC using the CA Tools - SS vs. Chart comparison tool

available in NOAA's Pydro Explorer suite. CA Tools will flag any surveyed sounding that is shoaler than what is expected from a chart-derived TIN surface - these could be potential Dangers to Navigation (DTON).

In all cases, these flagged soundings are significantly deeper than even the deepest draft vessels, and do not represent a hazard to surface navigation. It is worth observing that surveys H13620, H13621, H13622, H13623 and H13624 have a disproportionately large number of flagged soundings. This is an artifact due to the fact that these surveys intersect large fish havens which do not contain charted soundings. While an immediate update to the chart is not warranted, the hydrographer recommends the addition of these shoaler soundings to the ENC.

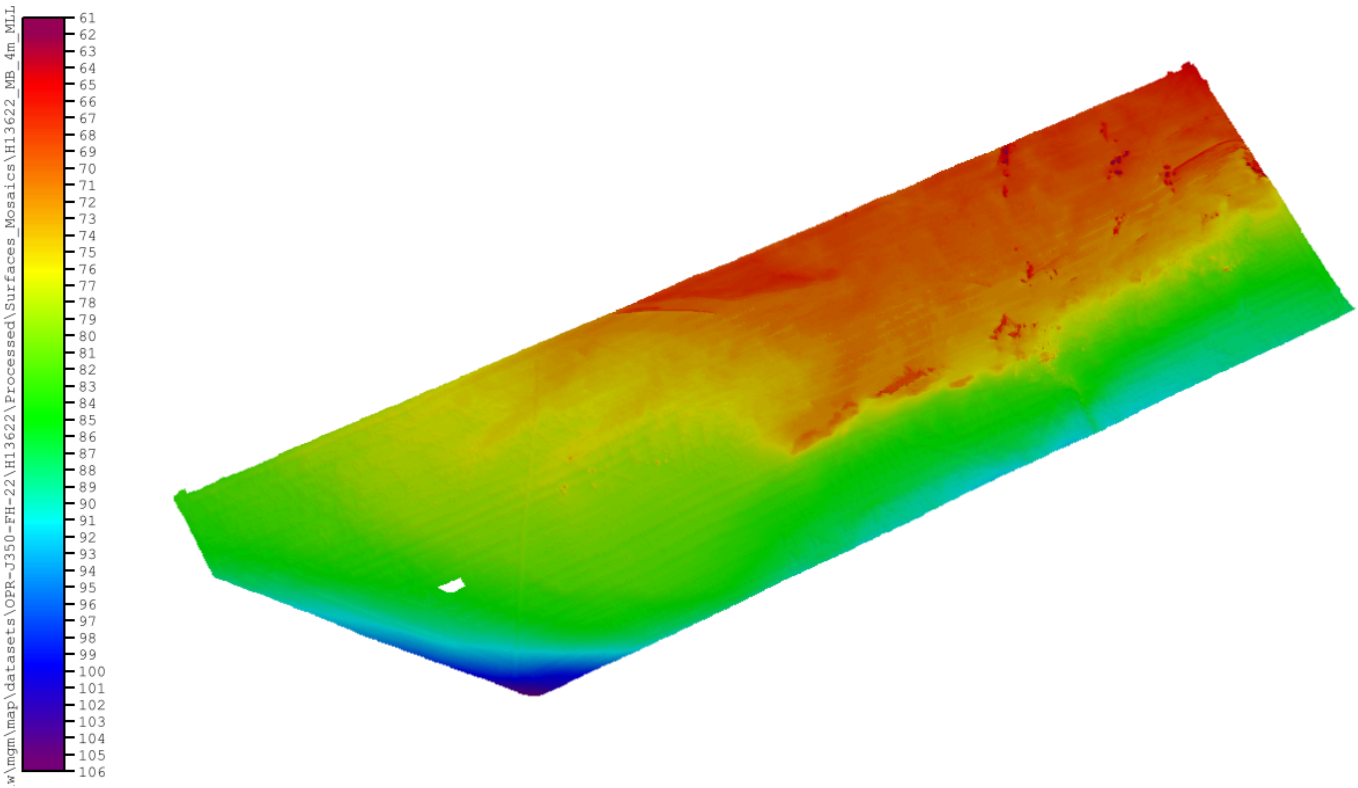


Figure 6: H13622 Coverage overview of combined 4m and 8m resolution CUBE grids.

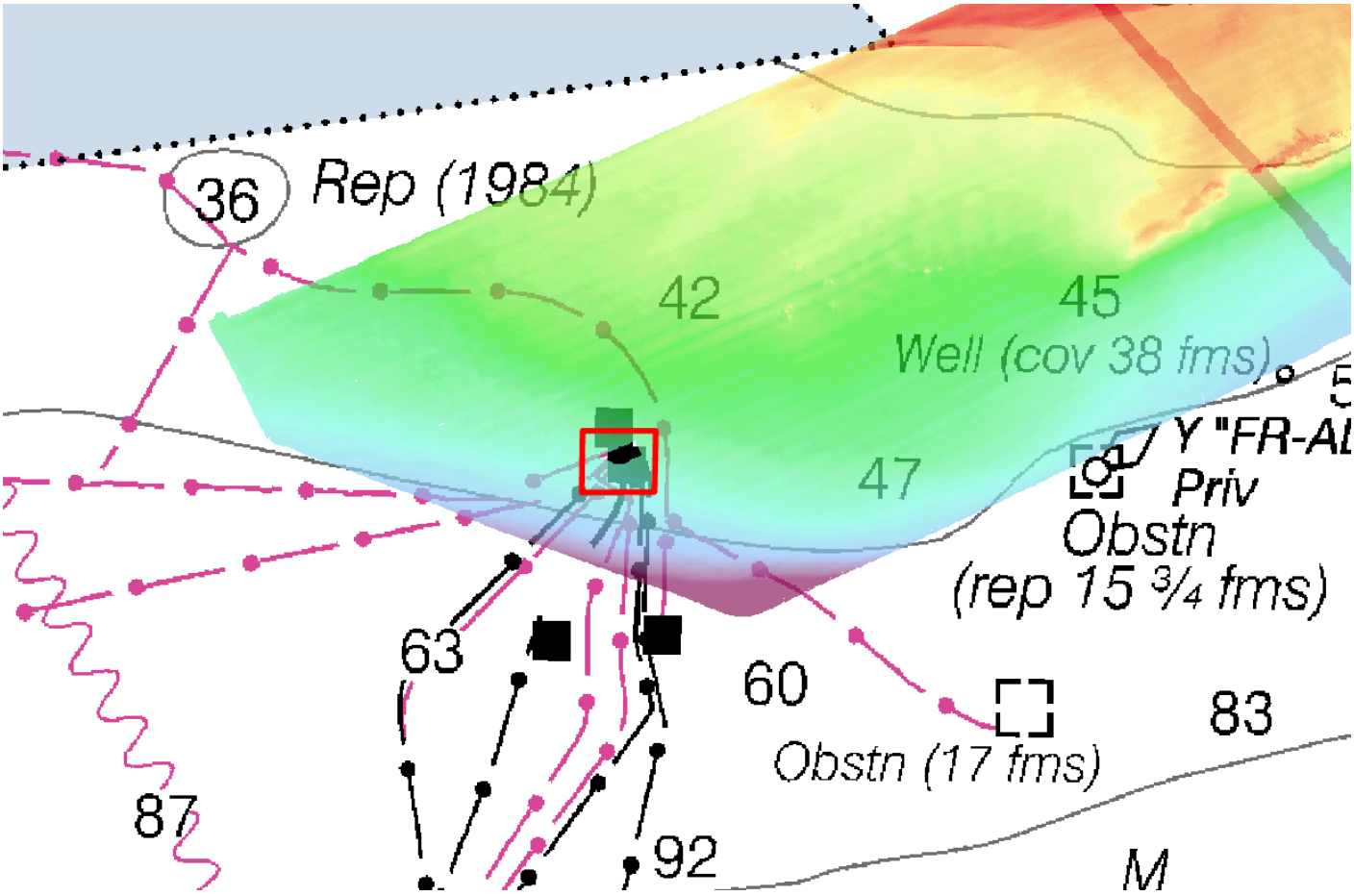
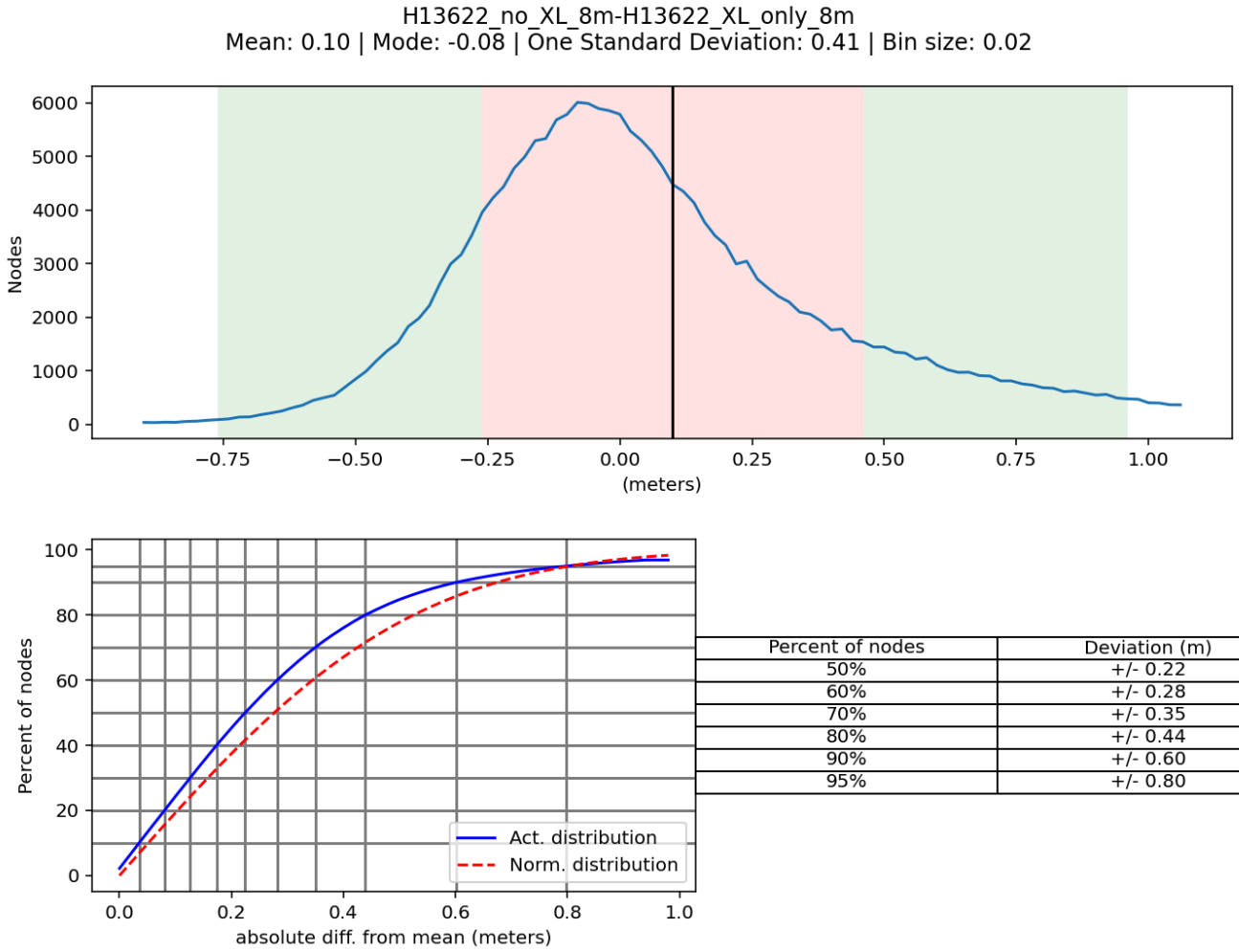


Figure 7: Data gap associated with charted obstruction.

Figure 8: Overview of backscatter data for H13622 at 2m resolution.



Percent of nodes	Deviation (m)
50%	+/- 0.22
60%	+/- 0.28
70%	+/- 0.35
80%	+/- 0.44
90%	+/- 0.60
95%	+/- 0.80

Figure 9: H13622 Distribution of depth difference values (m) calculated between crossline and mainscheme grids.

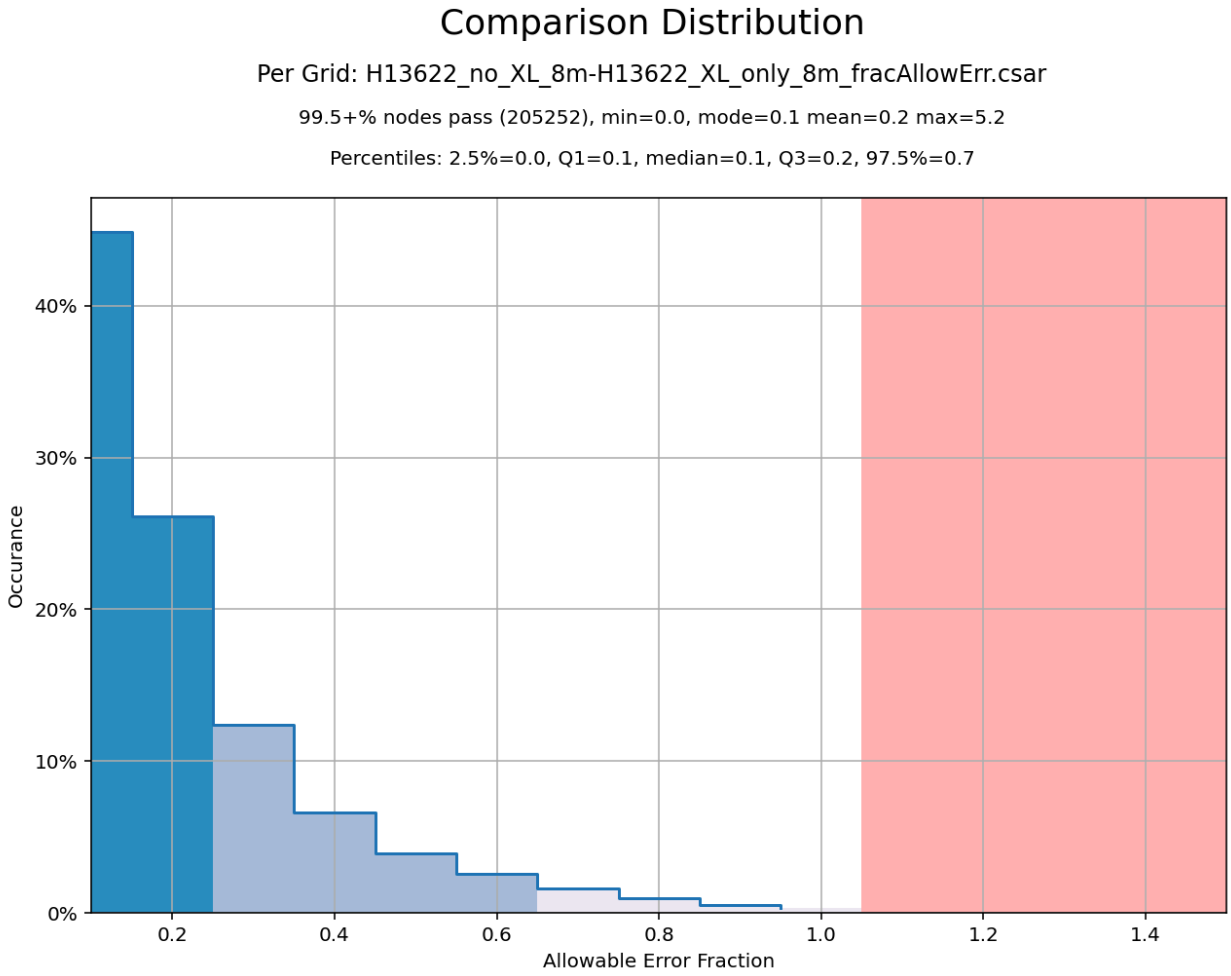


Figure 10: H13622 Crossline comparison distribution of nodes with an allowable error fraction.

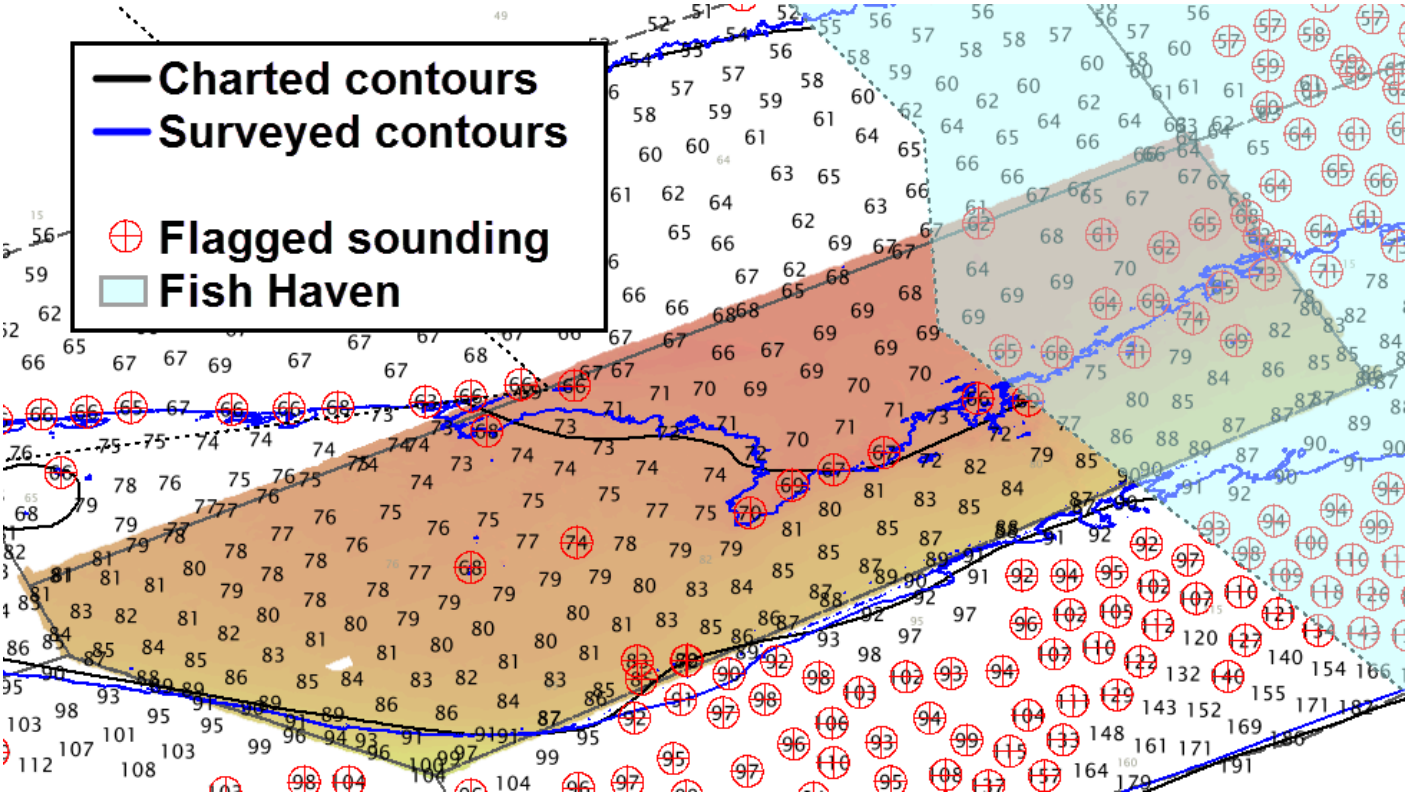


Figure 11: Comparison of charted vs. surveyed depths. Soundings in meters.

G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water. The vertical control method used was VDatum.

No Horizontal and Vertical Control Report has been generated in association with OPR-J350-FH-22. ERS methods were used as the final means of reducing the survey to MLLW for submission.

The horizontal datum for this project is North American Datum of 1983 (NAD 83). The projection used for this project is Universal Transverse Mercator (UTM) Zone 16.

Vessel kinematic data were post-processed using Applanix POSPac MMS processing software and RTX positioning methods described in the DAPR. A Smoothed Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS and SIPS.

During real-time acquisition, all platforms received correctors from the Wide Area Augmentation System (WAAS) for increased accuracies similar to USCG DGPS stations. WAAS and SBETs were the sole methods of positioning for this survey as no DGPS stations were available for real-time horizontal control.

H. Additional Results

Vertical Errors Due to Refraction

During acquisition the ships Moving Vessel Profiler experienced issues or became entirely inoperable, static CTD casts were taken to supplement MVP data. It is likely that the frequency and broad distribution of CTD casts were not sufficient to keep up with variability of sound velocity within the survey area, especially when surveying across adjacent sheets within the project area. There was a high amount of variability, particularly in the upper part of the water column (<20m), there was 20-25 m/s variability (Figure 12) .

The flat homogeneous nature of the seabed in combination with SVP refraction may have enhanced visible streaking between survey lines in the final grid. Most commonly sound velocity issues were seen as "frowns" in the bathymetric profiles both between survey lines, and at times between each of the dual EM2040 sonars. In all situations, a large amount of vertical exaggeration within CARIS Subset Editor was required to definitively see differences (Figures 13 and 14).

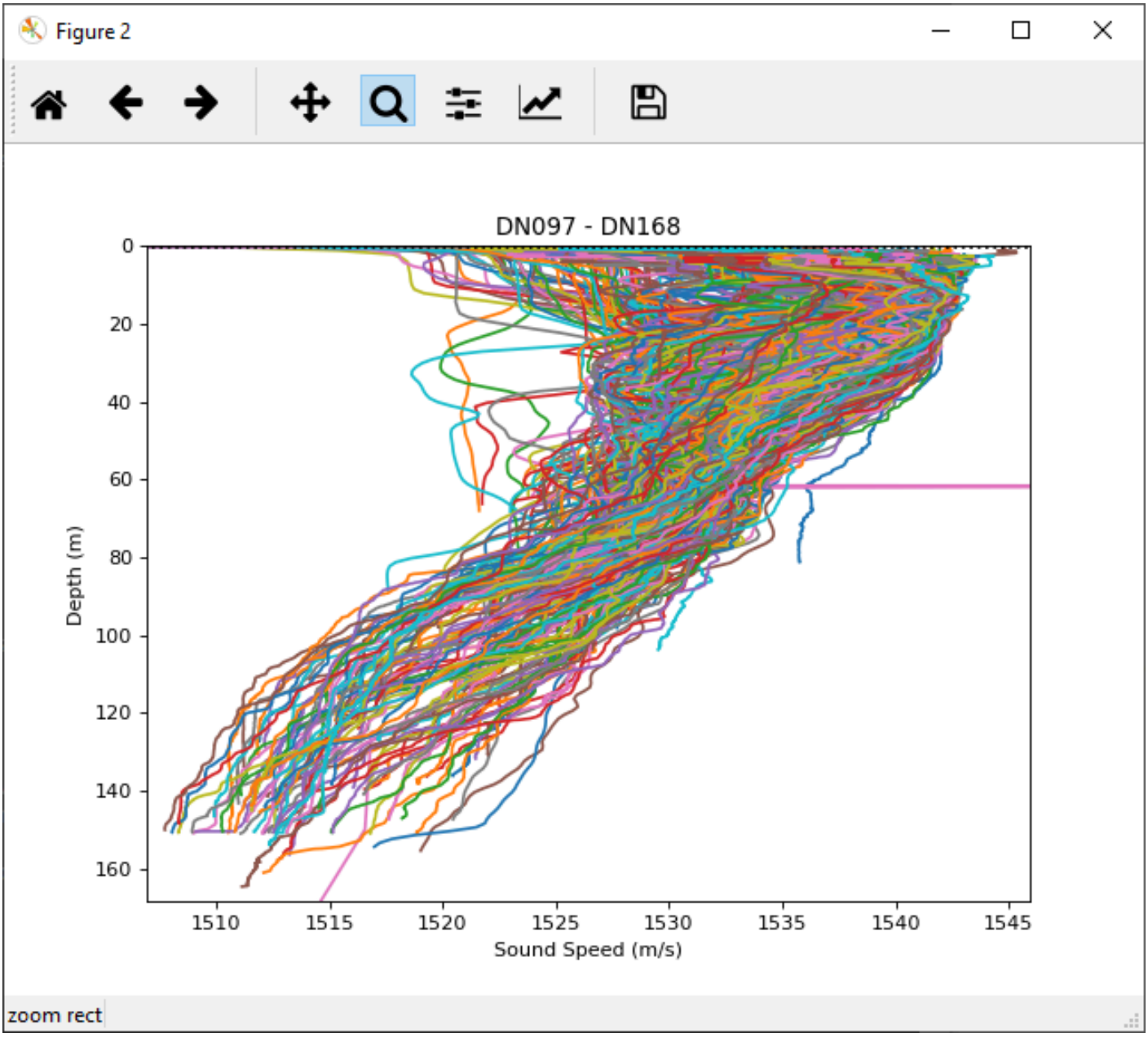


Figure 12: Plot of SV profiles applied to H13622.

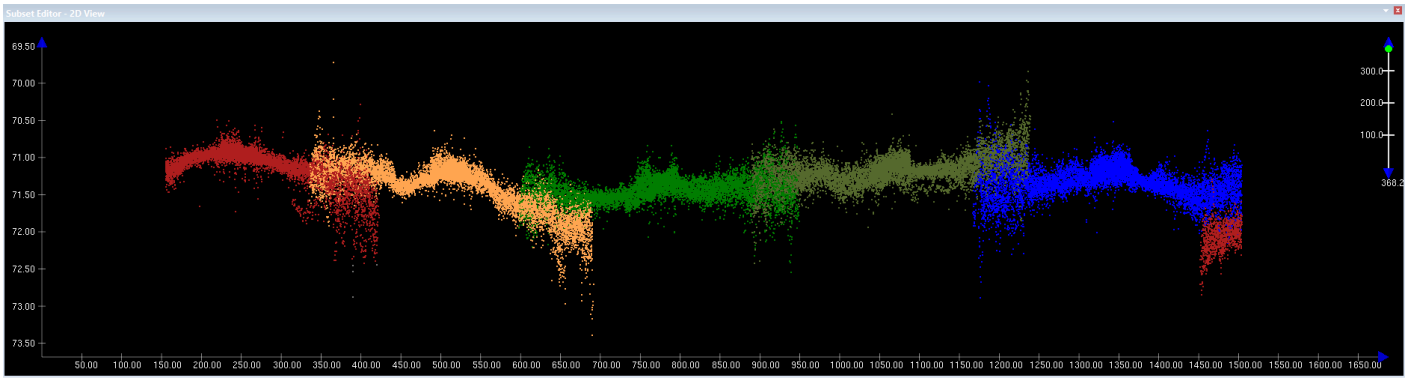


Figure 13: Example of common SV refraction in the bathymetric profile.

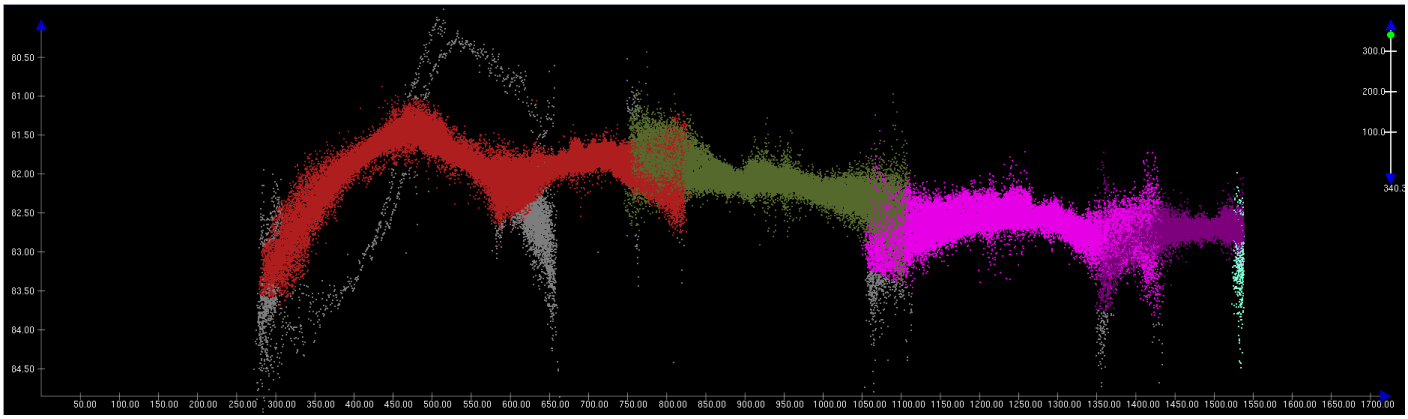


Figure 14: Example of "frowns" between the dual EM2040 sonars.

I. Approval

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Survey Summary Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys Specifications and Deliverables, Field Procedures Manual, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Survey Summary Report.

Approver Name	Title	Date	Signature
Michael Gonsalves, CDR/NOAA	Chief of Party	12/06/2022	Digitally signed by GONSALVES.MICHAEL.OLIVER.1275635126 Date: 2022.12.08 09:25:55 -07'00'
Karina Urquhart, LTJG/NOAA/NCCOS	Sheet Manager	12/06/2022	URQUHART.KARINA.JULIETTE.1554932629 Digitally signed by URQUHART.KARINA.JULIETTE.1554932629 Date: 2022.12.08 13:35:37 -05'00'