H13595

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

# DESCRIPTIVE REPORT

| | |
|---|---|
| Type of Survey: | Basic Hydrographic Survey |
| Registry Number: | H13595 |

## LOCALITY

| | |
|---|---|
| State(s): | North Carolina |
| General Locality: | Cape Lookout Onslow Bay, NC |
| Sub-locality: | 21 NM SE of Cape Lookout |

**2022**

CHIEF OF PARTY
Michael Gonsalves, CDR/NOAA

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Date:

| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | REGISTRY NUMBER: |
|---|---|
| **HYDROGRAPHIC TITLE SHEET** | **H13595** |

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): | **North Carolina** |
| General Locality: | **Cape Lookout Onslow Bay, NC** |
| Sub-Locality: | **21 NM SE of Cape Lookout** |
| Scale: | **40000** |
| Dates of Survey: | **03/23/2022 to 08/13/2022** |
| Instructions Dated: | **02/08/2022** |
| Project Number: | **OPR-F364-FH-22** |
| Field Unit: | **NOAA Ship *Ferdinand R. Hassler*** |
| Chief of Party: | **Michael Gonsalves, CDR/NOAA** |
| Soundings by: | **Multibeam Echo Sounder** |
| Imagery by: | **Multibeam Echo Sounder 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 18N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.***

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# Descriptive Report to Accompany Survey H13595

Project: OPR-F364-FH-22

Locality: Cape Lookout Onslow Bay, NC

Sublocality: 21 NM SE of Cape Lookout

Scale: 1:40000

March 2022 - August 2022

**NOAA Ship *Ferdinand R. Hassler***

Chief of Party: Michael Gonsalves, CDR/NOAA

# A. Area Surveyed

Survey H13595 (sheet 2) is located 21 nautical miles southeast of Cape Lookout in Onslow Bay, North Carolina and encompasses approximately 60 square nautical miles.

## A.1 Survey Limits

Data were acquired within the following survey limits:

| Northwest Limit | Southeast Limit |
|---|---|
| 34° 19' 49.04" N<br>76° 16' 32.1" W | 34° 9' 49.42" N<br>76° 8' 57.04" W |

*Table 1: Survey Limits*

Data were acquired within the assigned survey limits as required in the Project Instructions and HSSD unless otherwise noted in this report.

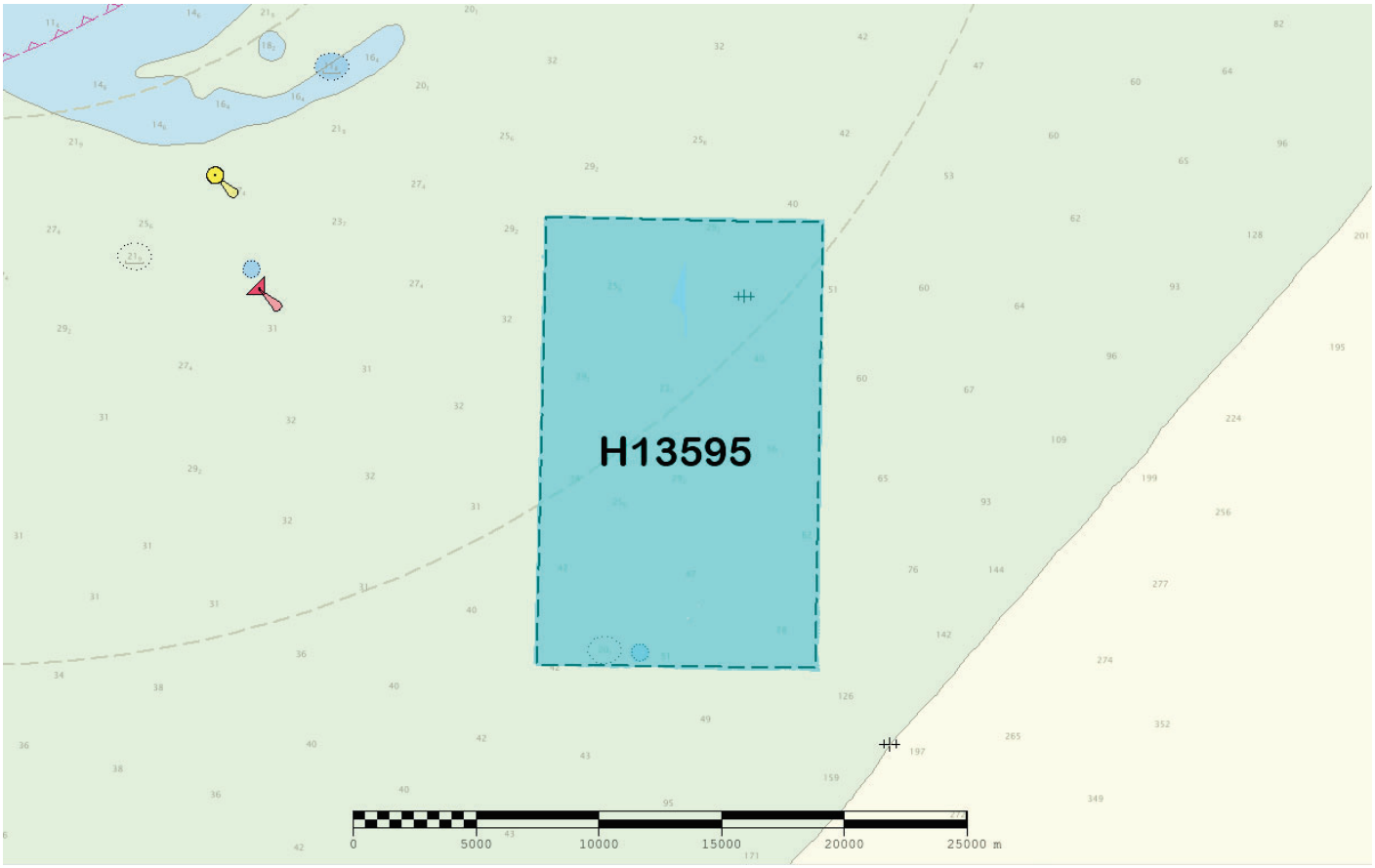



*Figure 1: Sheet limits for survey H13595 (ENC US3SC10M).*

## A.2 Survey Purpose

The objective of survey H13595 was to acquire high quality multibeam bathymetric and backscatter data. The existing charted soundings within this area is from 1970 and earlier. The shoaling seabed is exposed to open ocean and has likely changed from numerous storms and hurricanes over the past several decades. This data will provide modern bathymetry for updating National Ocean Service nautical charting products as well as support the Seabed 2030 global mapping initiative.

## A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H13595 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as specified by the 2022 HSSD. This includes crosslines (Section B.2.1), NOAA allowable uncertainty (Section B.2.2) and density requirements (Section B.5.2).

## A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

| Water Depth | Coverage Required |
|---|---|
| All waters in survey area | Complete Coverage (Refer to HSSD Section 5.2.2.3) |
| All waters in survey area | Acquire backscatter data during all multibeam data acquisition (Refer to HSSD Section 6.2) |

*Table 2: Survey Coverage*

Survey coverage was in accordance with the requirements listed above and in the HSSD.

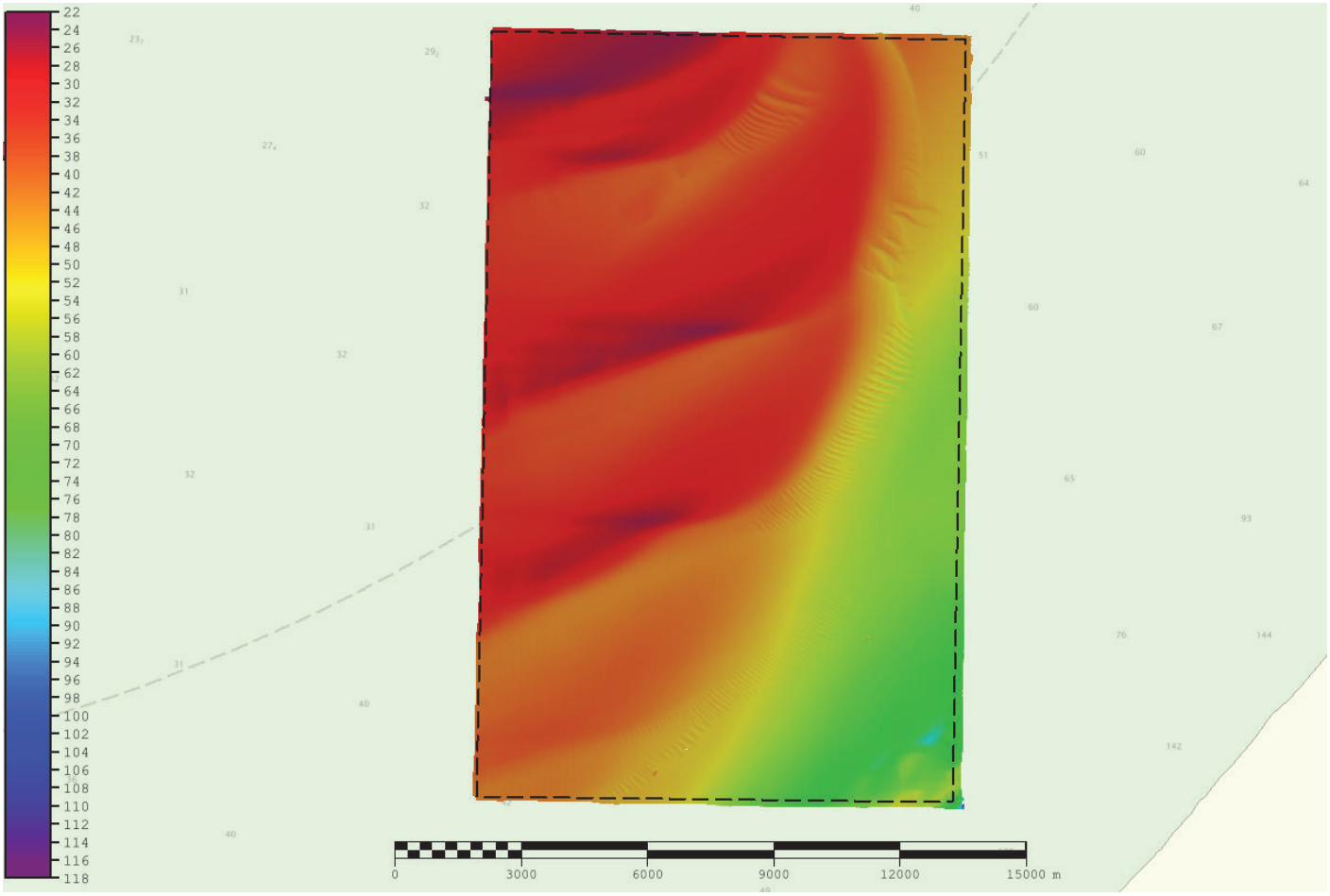



*Figure 2: Survey coverage for H13595 (ENC US3SC10M). Dashed black line indicates assigned sheet limits.*

## A.6 Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey:

| | HULL ID | *S250* | *Total* |
|---|---|---|---|
| **LNM** | **SBES Mainscheme** | 0.0 | 0.0 |
| | **MBES Mainscheme** | 774.72 | 774.72 |
| | **Lidar Mainscheme** | 0.0 | 0.0 |
| | **SSS Mainscheme** | 0.0 | 0.0 |
| | **SBES/SSS Mainscheme** | 0.0 | 0.0 |
| | **MBES/SSS Mainscheme** | 0.0 | 0.0 |
| | **SBES/MBES Crosslines** | 32.23 | 32.23 |
| | **Lidar Crosslines** | 0.0 | 0.0 |
| **Number of Bottom Samples** | | | 6 |
| **Number Maritime Boundary Points Investigated** | | | 0 |
| **Number of DPs** | | | 0 |
| **Number of Items Investigated by Dive Ops** | | | 0 |
| **Total SNM** | | | 61.77 |

*Table 3: Hydrographic Survey Statistics*

The following table lists the specific dates of data acquisition for this survey:

| Survey Dates | Day of the Year |
|---|---|
| 03/23/2022 | 82 |
| 03/25/2022 | 84 |
| 03/26/2022 | 85 |
| 03/27/2022 | 86 |
| 03/28/2022 | 87 |
| 03/29/2022 | 88 |
| 07/04/2022 | 185 |
| 07/05/2022 | 186 |
| 07/06/2022 | 187 |
| 07/19/2022 | 200 |
| 07/20/2022 | 201 |
| 08/13/2022 | 225 |

*Table 4: Dates of Hydrography*

# B. Data Acquisition and Processing

## B.1 Equipment and Vessels

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.

### B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

| **Hull ID** | ***S250*** |
|---|---|
| **LOA** | 37.7 meters |
| **Draft** | 3.85 meters |

*Table 5: Vessels Used*


*Figure 3: NOAA Ship Ferdinand R. Hassler (S-250).*

### B.1.2 Equipment

The following major systems were used for data acquisition during this survey:

| Manufacturer | Model | Type |
|---|---|---|
| Kongsberg Maritime | EM 2040 | MBES |
| Kongsberg Maritime | EM 2040 | MBES Backscatter |
| Applanix | POS MV 320 v5 | Positioning and Attitude System |
| Sea-Bird Scientific | SBE 19plus V2 | Conductivity, Temperature, and Depth Sensor |
| AML Oceanographic | MVP200 | Conductivity, Temperature, and Depth Sensor |
| Teledyne RESON | SVP 70 | Sound Speed System |

*Table 6: Major Systems Used*

## B.2 Quality Control

### B.2.1 Crosslines

Multibeam echo sounder crosslines acquired for this survey totaled 4.16% of mainscheme acquisition. NOAA Ship Ferdinand R. Hassler (S-250) acquired 32.23 nautical miles of multibeam crosslines. H13595 crossline data is adequate for verifying and evaluating the internal consistency of the survey data. The Compare Grids function in Pydro Explorer analyzed finalized VR surfaces of H13595 crossline-only data and mainscheme-only data. In the difference surface, 99.5% of nodes met IHO allowable Total Vertical Uncertainty (TVU) standards. Refer to Figures 4-6 for additional crossline results.

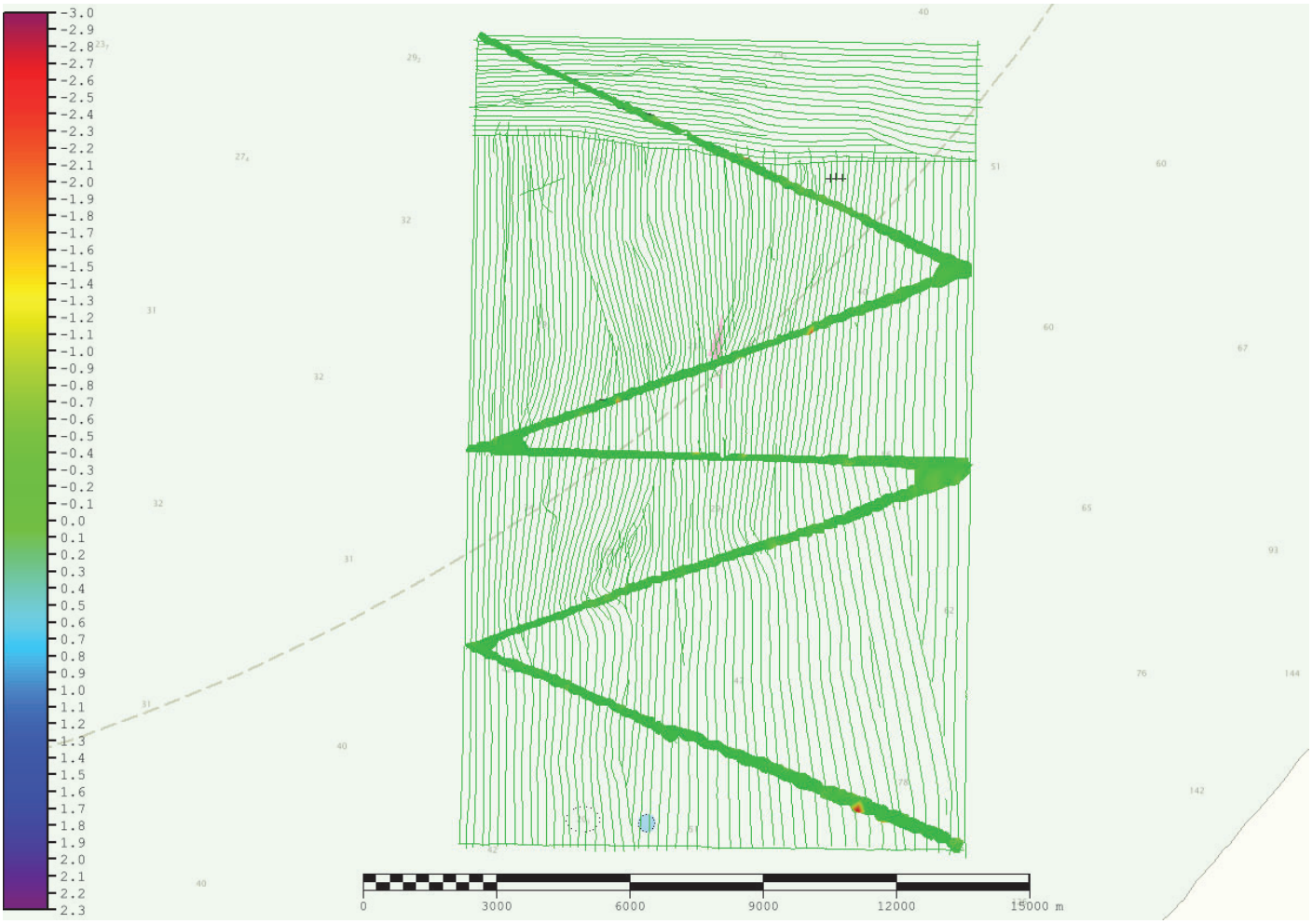



*Figure 4: H13595 crossline surface overlaid on mainscheme tracklines. Color scale coded as green = meets IHO standard and red = fails IHO standard (ENC US3SC10M).*

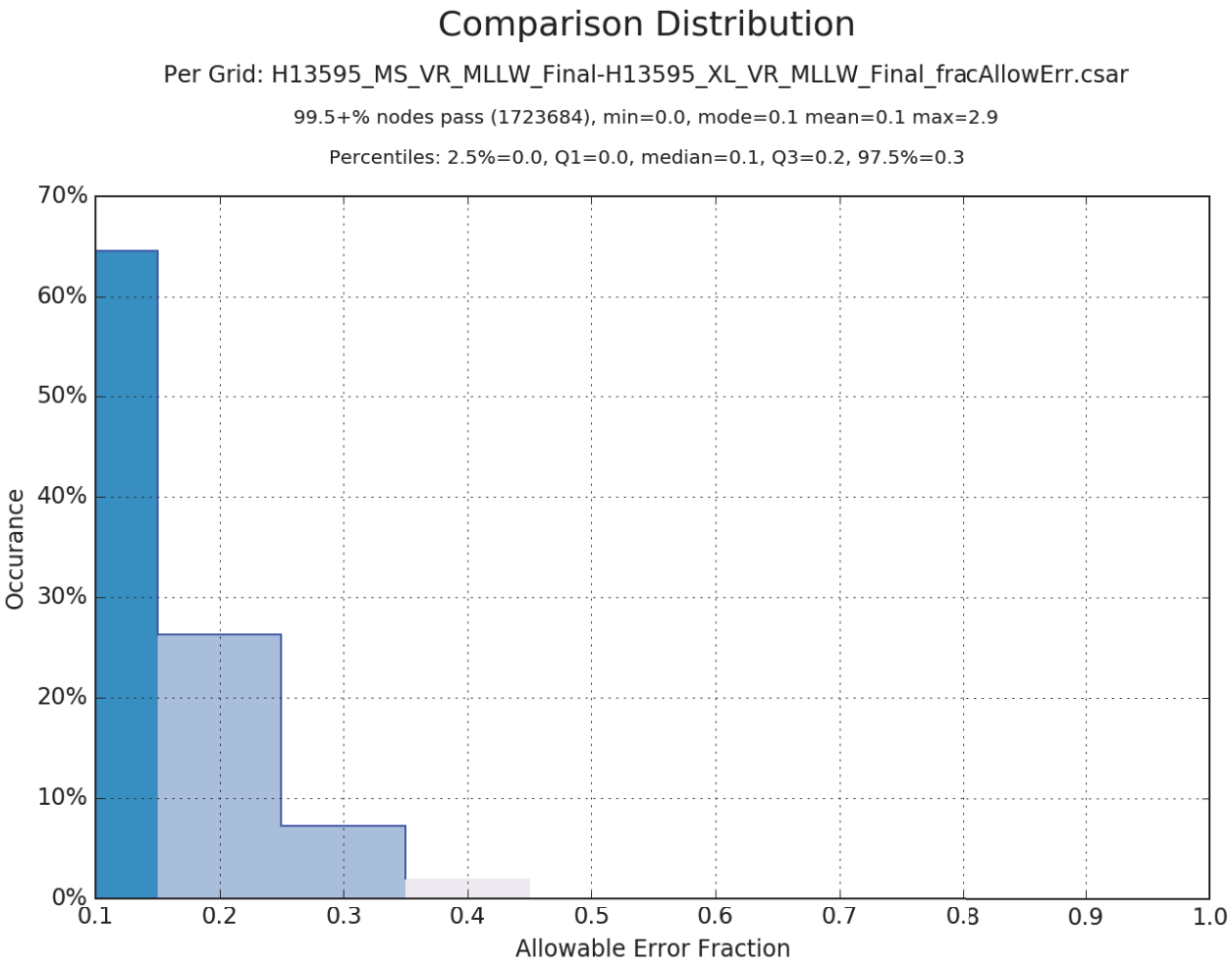
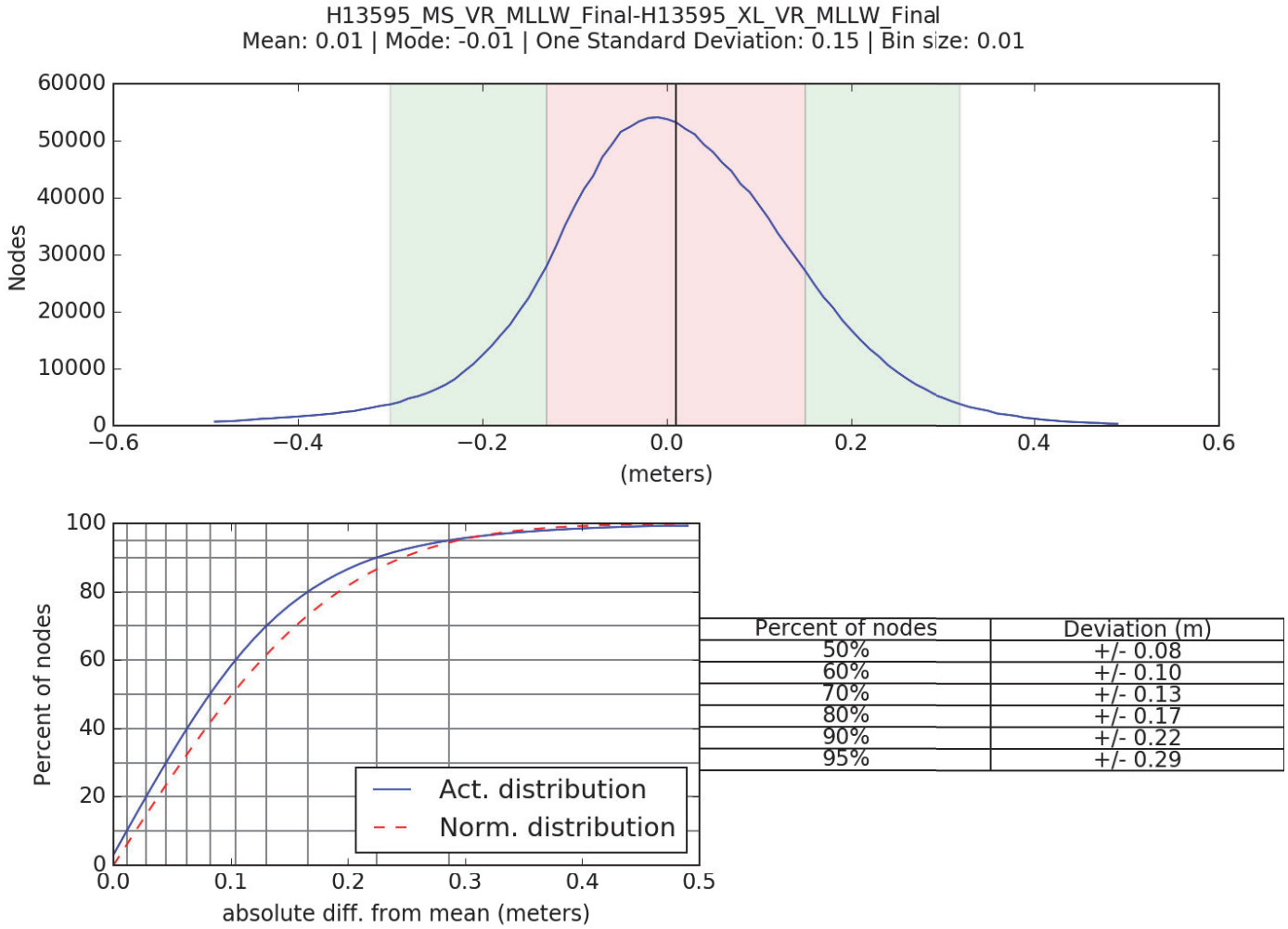



*Figure 5: Pydro derived plot showing percentage-pass value of nodes in H13595 mainscheme and crossline data.*




| Percent of nodes | Deviation (m) |
|---|---|
| 50% | +/- 0.08 |
| 60% | +/- 0.10 |
| 70% | +/- 0.13 |
| 80% | +/- 0.17 |
| 90% | +/- 0.22 |
| 95% | +/- 0.29 |

*Figure 6: Pydro derived plot showing absolute difference statistics of H13595 mainscheme and crossline data.*

### B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

| Method | Measured | Zoning |
|---|---|---|
| ERS via VDATUM | 0.0 meters | 0.097 meters |

*Table 7: Survey Specific Tide TPU Values.*

| Hull ID | Measured - CTD | Measured - MVP | Measured - XBT | Surface |
|---|---|---|---|---|
| S250 | 4.0 meters/second | 1.0 meters/second | N/A meters/second | 0.5 meters/second |

*Table 8: Survey Specific Sound Speed TPU Values*.

Total Propagated Uncertainty (TPU) values for survey H13595 were derived from a combination of fixed values for equipment and vessel characteristics, as well as from field assigned values for sound speed uncertainties. Additionally, real-time and post-processed uncertainty sources associated with position were applied using SBET and RMS files generated using POSPac MMS software. The bathymetric surface is compliant with 2022 HSSD uncertainty standards; over 99.5% of all nodes pass.

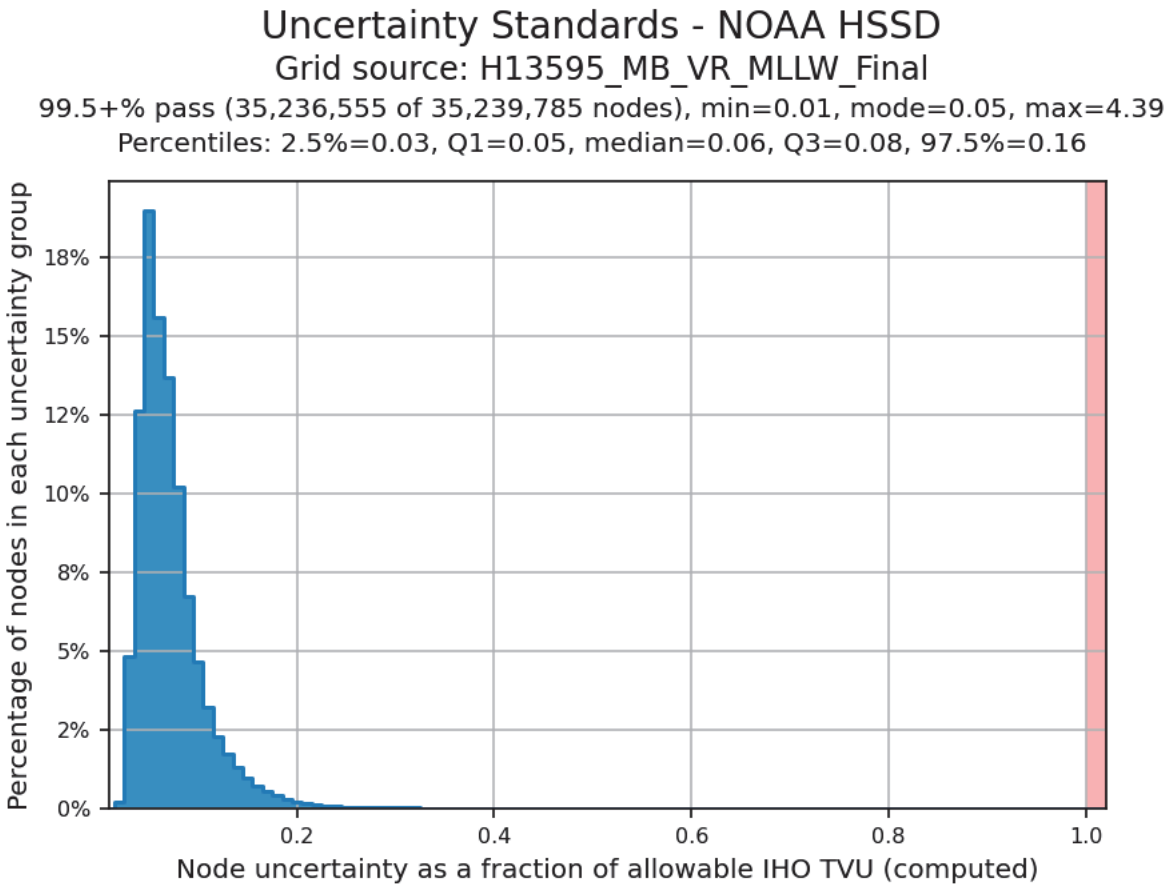



*Figure 7: Pydro derived plot showing Total Vertical Uncertainty (TVU) compliance of H13595's finalized VR surface.*

### B.2.3 Junctions

H13595 junctions with surveys H13594 (sheet 1) and H13596 (sheet 3). All surveys are within the same project area (OPR-F364-FH-22).

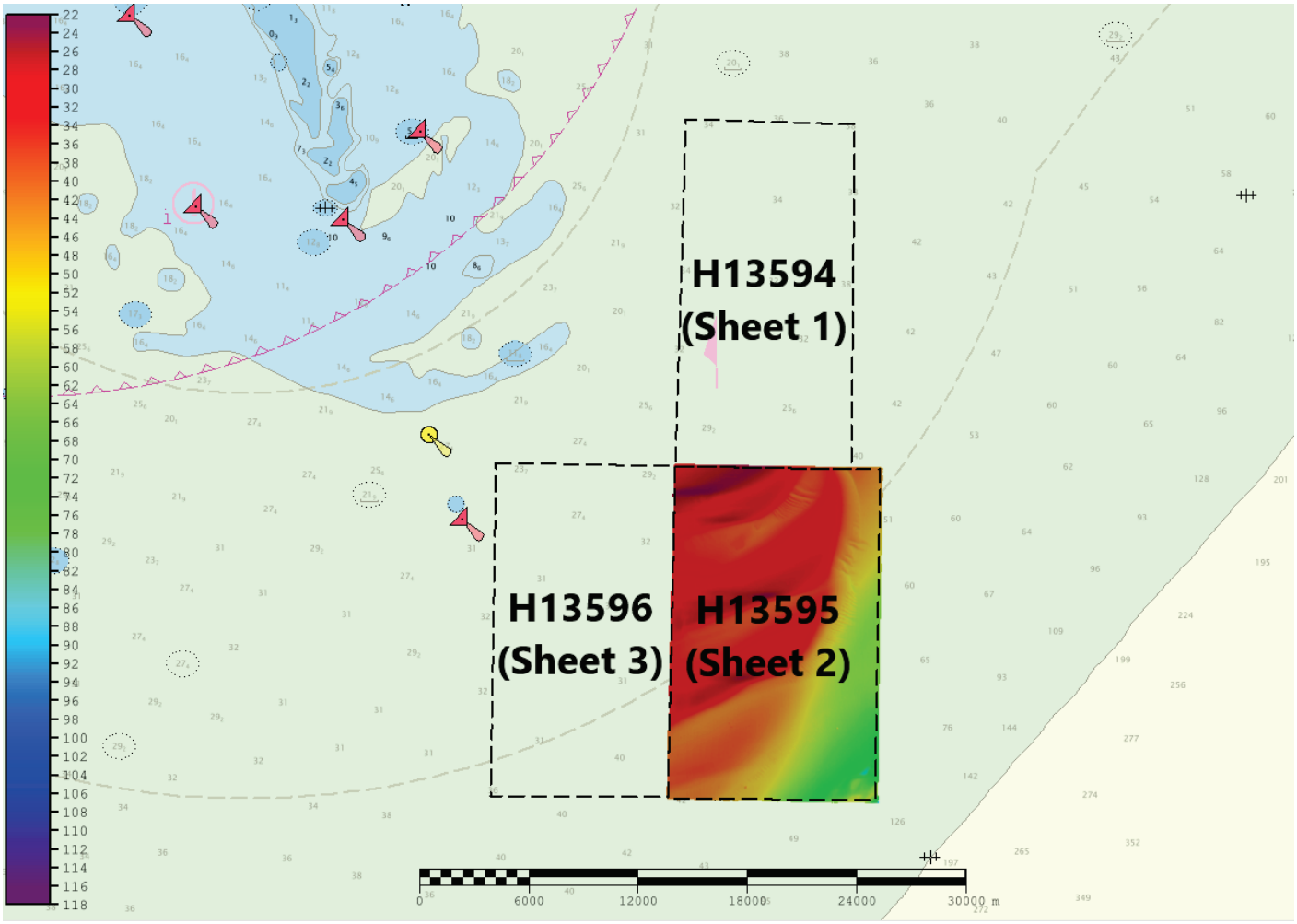



*Figure 8: Overview of H13595 junctions with H13594 and H13596 (ENC US3SC10M).*

The following junctions were made with this survey:

| Registry Number | Scale | Year | Field Unit | Relative Location |
|---|---|---|---|---|
| H13594 | 1:40000 | 2022 | Ferdinand R. Hassler (S-250) | N |
| H13596 | 1:40000 | 2022 | Ferdinand R. Hassler (S-250) | W |

*Table 9: Junctioning Surveys*

H13594

The junction with survey H13594 encompasses 0.43 square nautical miles along the northern boundary of H13595. The Compare Grids function in Pydro Explorer derived a difference surface from the variable resolution (VR) CUBE surfaces of each survey for comparison. Analysis of the difference surfaces indicates that H13594 is an average of 0.01 meters deeper than H13595 with a standard deviation of 0.18. There is a slight skewing to the difference data (mode = 0.08 meters), this may be due to the fact that the two surveys were acquired several months apart from one another, in an area of shifting sands. Refer to Figures 9-11 for additional results.

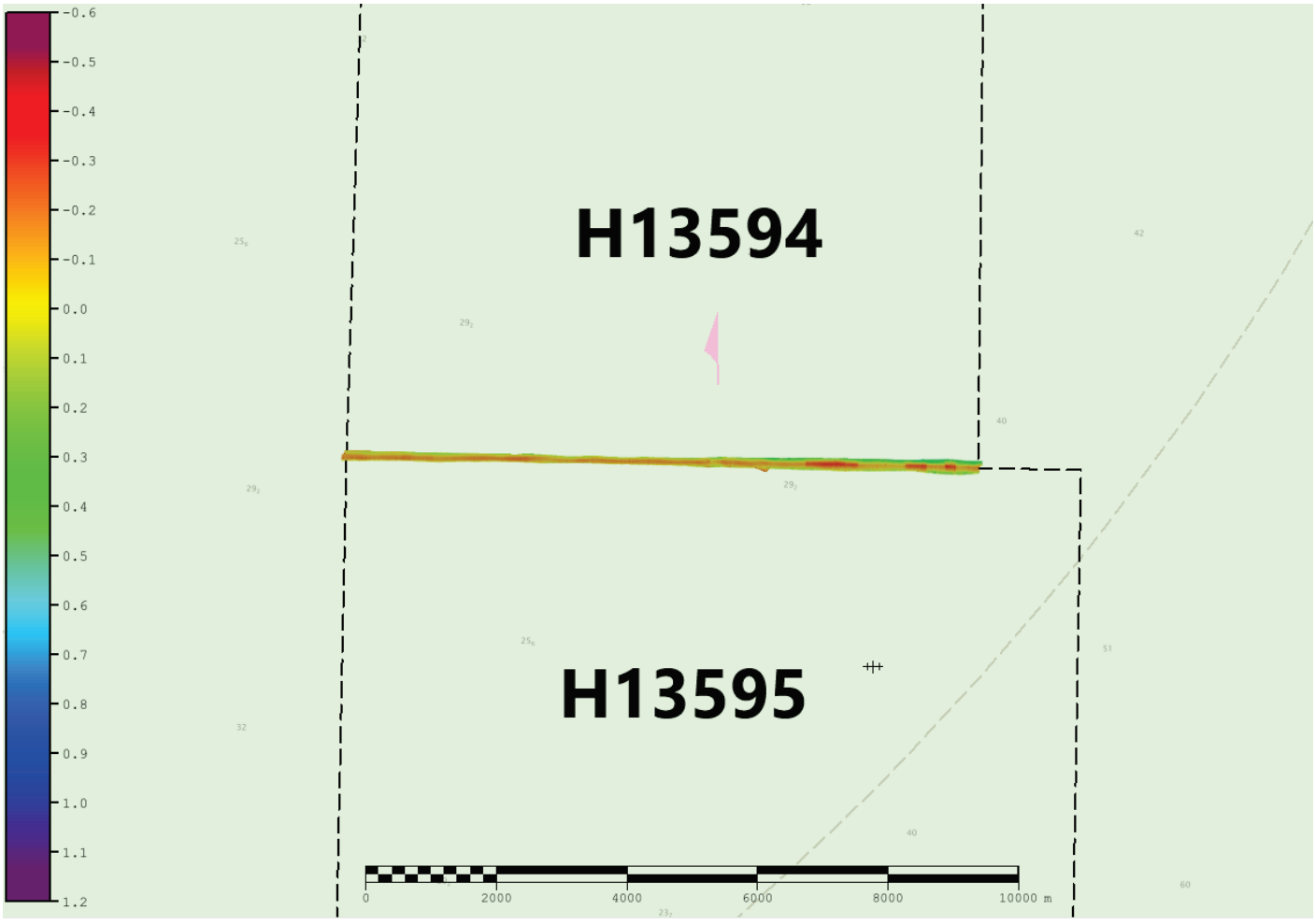



*Figure 9: Junction surface created by Compare Grids tool that indicates the depth differences between H13594 and H13595.*

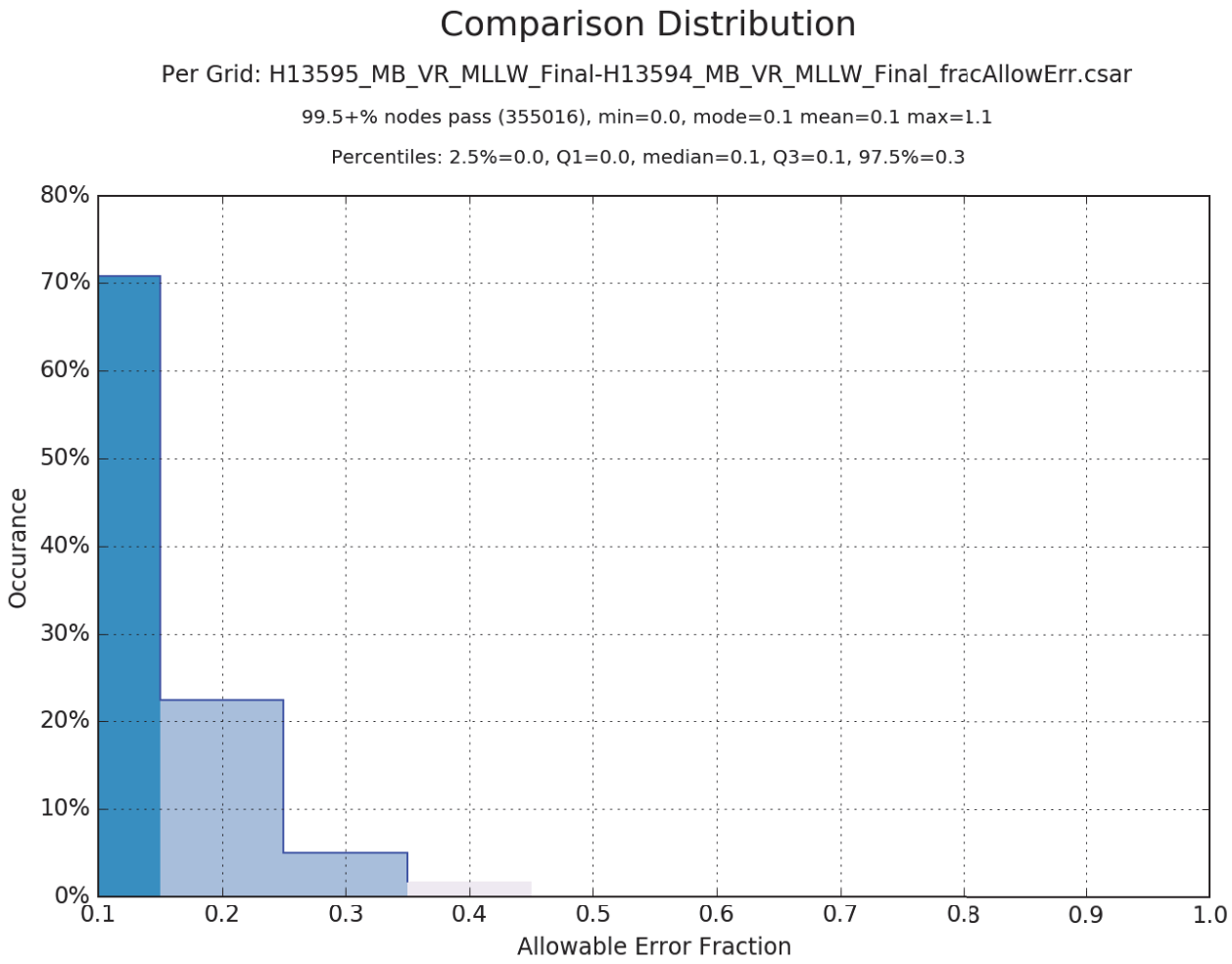
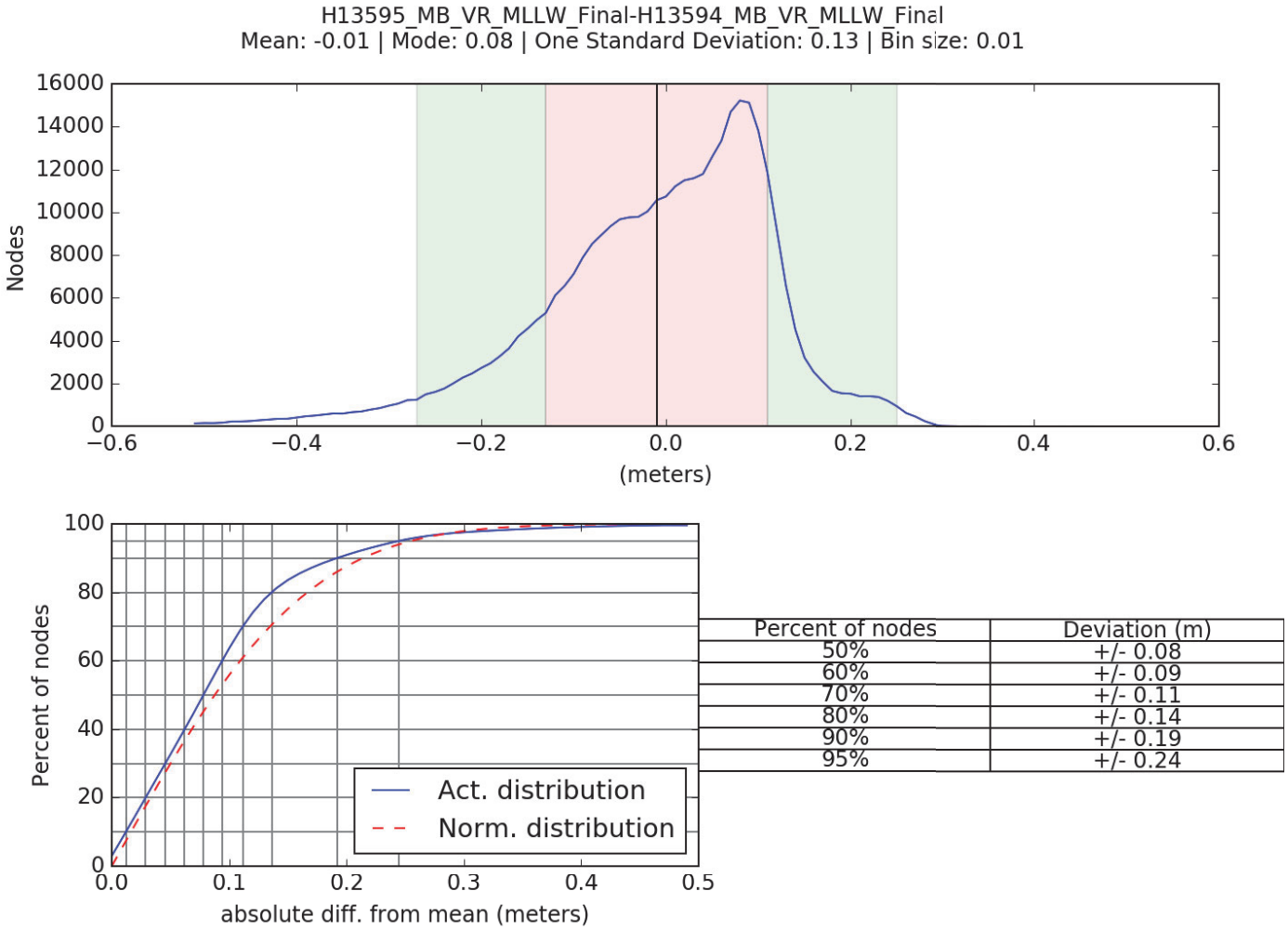



*Figure 10: Pydro derived plot showing percentage-pass value of nodes compared between surveys H13594 and H13595.*




| Percent of nodes | Deviation (m) |
|---|---|
| 50% | +/- 0.08 |
| 60% | +/- 0.09 |
| 70% | +/- 0.11 |
| 80% | +/- 0.14 |
| 90% | +/- 0.19 |
| 95% | +/- 0.24 |

*Figure 11: Pydro derived plot showing absolute difference statistics of comparison between surveys H13594 and H13595.*

H13596

The junction with survey H13596 encompasses 0.48 square nautical miles along the western boundary of H13595. The Compare Grids function in Pydro Explorer derived a difference surface from the variable resolution (VR) CUBE surfaces of each survey for comparison. Analysis of the difference surfaces indicates that H13596 is an average of 0.03 meters deeper than H13595 with a standard deviation of 0.11. Refer to Figures 12-14 for additional results.

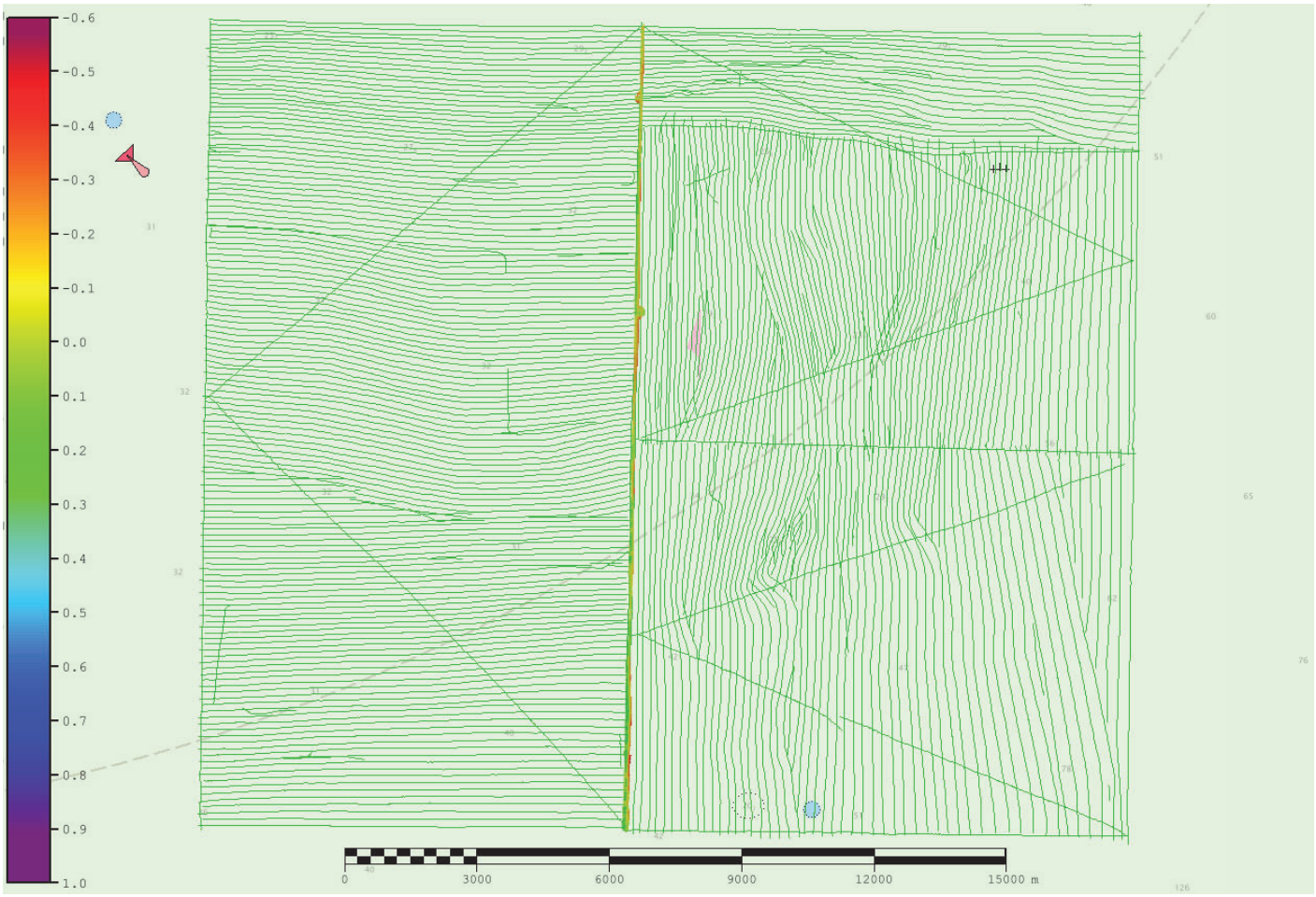



*Figure 12: Junction surface created by Compare Grids tool that indicates the depth differences between H13595 and H13596.*

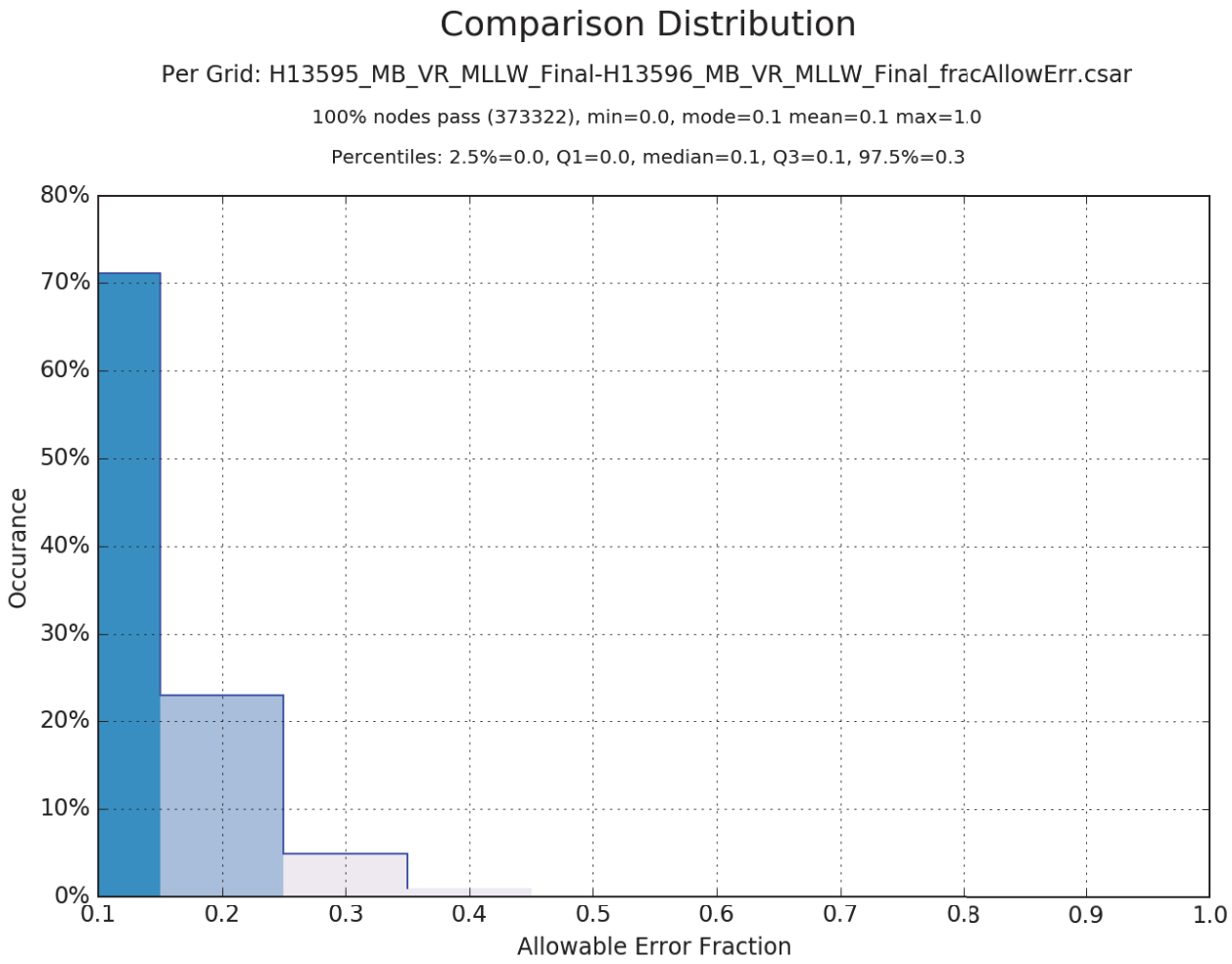
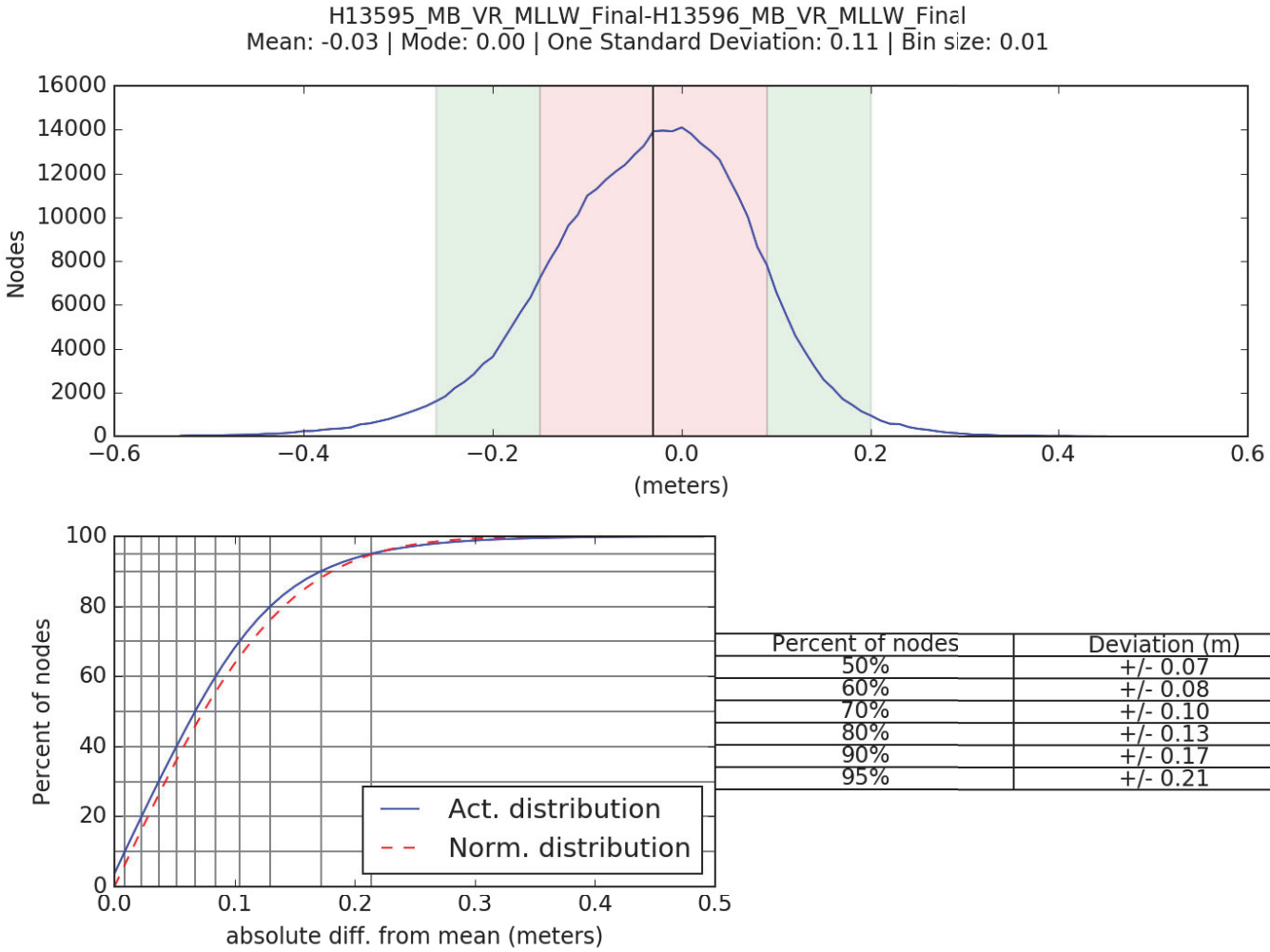



*Figure 13: Pydro derived plot showing percentage-pass value of nodes compared between surveys H13595 and H13596.*




| Percent of nodes | Deviation (m) |
|---|---|
| 50% | +/- 0.07 |
| 60% | +/- 0.08 |
| 70% | +/- 0.10 |
| 80% | +/- 0.13 |
| 90% | +/- 0.17 |
| 95% | +/- 0.21 |

*Figure 14: Pydro derived plot showing absolute difference statistics of comparison between surveys H13595 and H13596.*

### B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

### B.2.5 Equipment Effectiveness

Vertical Offset - Day Number 185

On Julian Day Number (DN) 185, the first part of the first multibeam line (line 0001) shows a vertical offset of about 0.30 meters relative to its neighboring lines (see image below). At the start of each Julian Day, a new positioning file is created, and if it is not adequately buffered before multibeam acquisition begins, the ellipsoidally-referenced heights can be compromised - this is believed to be the case. The effected area is approximately 600 meters in length. The data is adequate to supersede the chart.

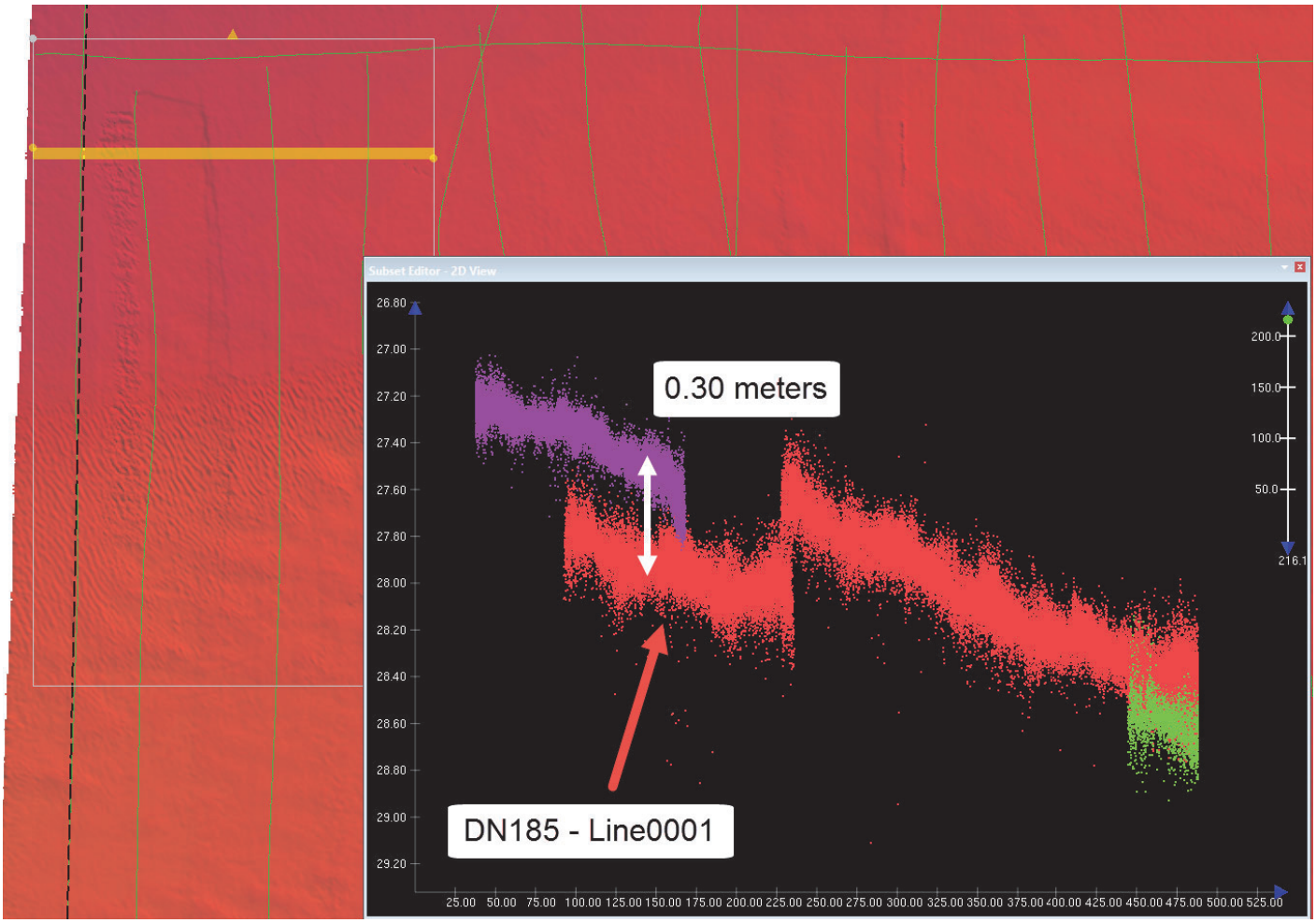



*Figure 15: The first part (~600 meters) of the first survey line of DN185 has a vertical offset relative to its neighboring lines.*

### B.2.6 Factors Affecting Soundings

Refraction due to sound speed issues

As discussed in Section B.2.7 - Sound Speed Methods, the first week of data acquisition was conducted in conjunction with a CTD (while the ship's MVP was away for servicing). To minimize refraction errors, efforts were made to keep the ship within similar water masses, however the two shoals that extend into the western side of the sheet did shelter a couple different water masses that were difficult to model. This issue was largely confined to DN 088 (see image below). The data is adequate to supersede the chart.

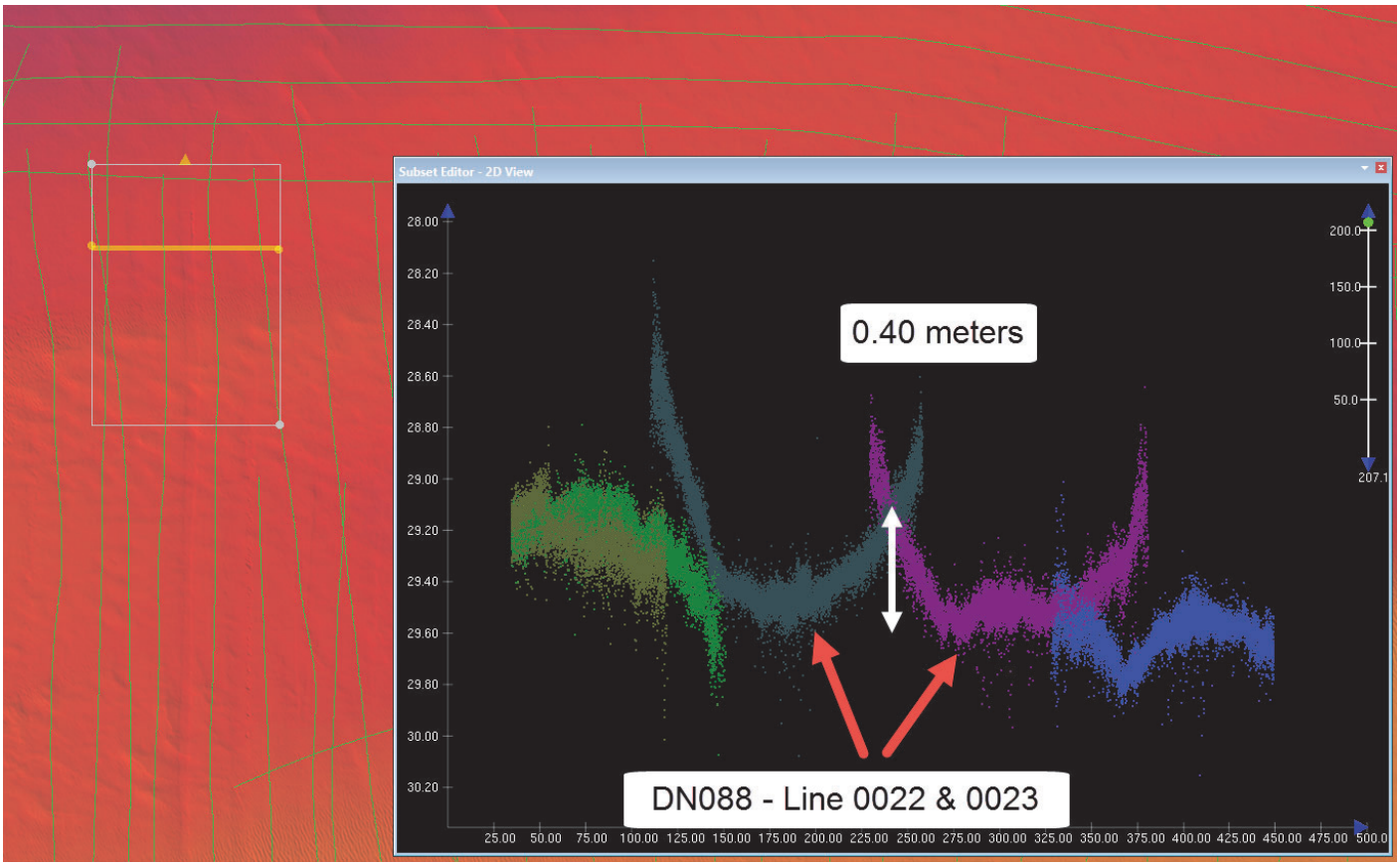



*Figure 16: Example of data refraction on western side of survey, when sound speed was modeling using CTD casts every four hours.*

### B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed casts acquired March 23 - 29 were taken approximately every four hours using a Sea-Bird Scientific SBE 19plus profiler. Casts acquired after July were taken approximately every hours AML Oceanographic Moving Velocity Profiler (MVP200).

A total of 57 sound speed casts were acquired on H13595. All casts were concatenated into a master file and applied to the MBES data using the "Nearest in distance within time" (4 hours) profile selection method.

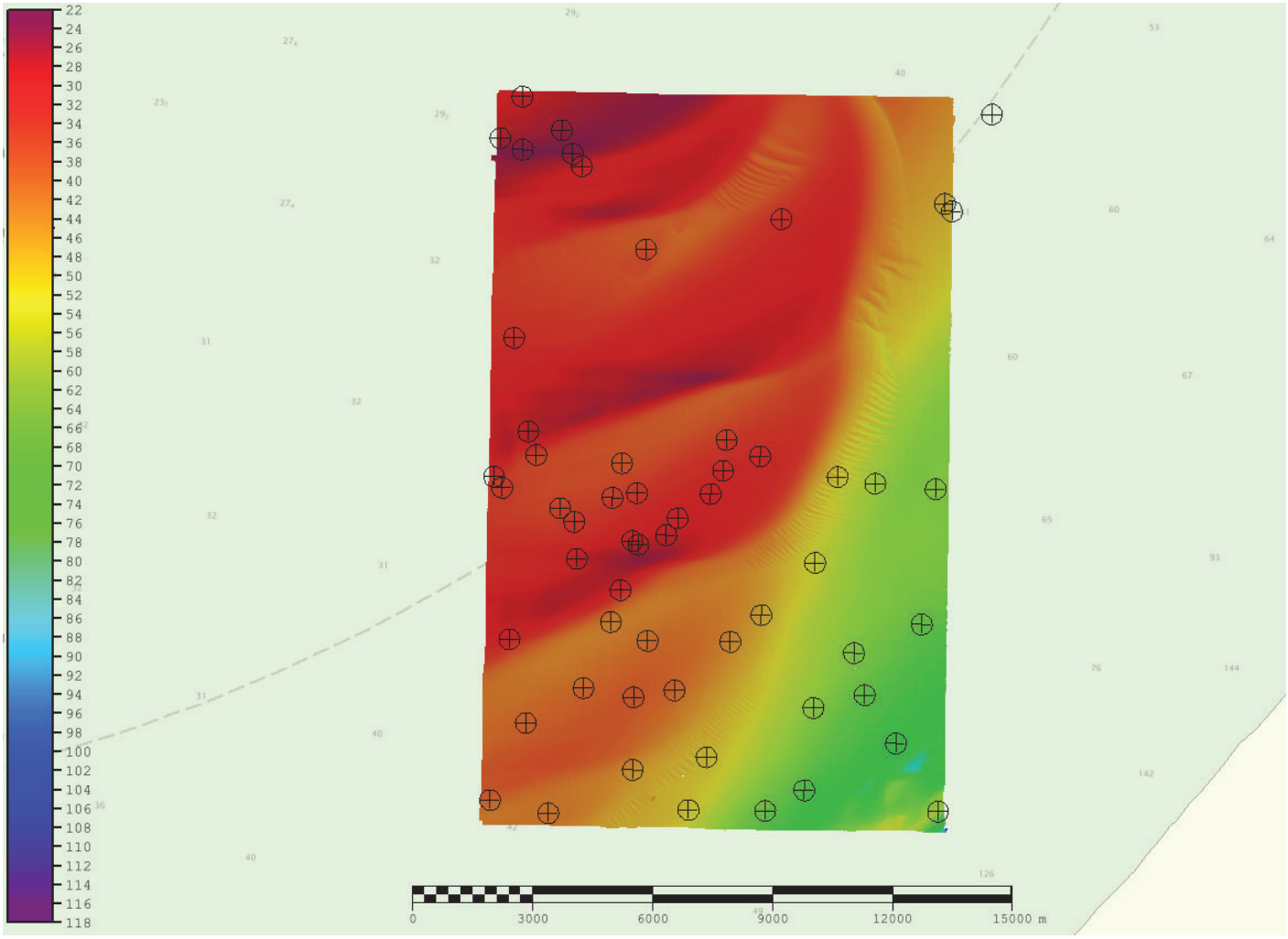



*Figure 17: H13595 sound speed profile locations.*

### B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR.

## B.3 Echo Sounding Corrections

### B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

### B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

## B.4 Backscatter

Raw backscatter data was acquired as .all files logged during MBES acquisition and processed by the field unit per 2022 HSSD. The .GSF files and backscatter mosaic has been delivered with this report.


*Figure 18: Overview of H13595 backscatter mosaic (US3SC10M).*

## B.5 Data Processing

### B.5.1 Primary Data Processing Software

The following software program was the primary program used for bathymetric data processing:

| Manufacturer | Name | Version |
|---|---|---|
| CARIS | HIPS/SIPS | 11.4.7 |
| CARIS | BASE Editor | 5.5.8 |

*Table 10: Primary bathymetric data processing software*

The following software program was the primary program used for imagery data processing:

| Manufacturer | Name | Version |
|---|---|---|
| Fledermaus | FMGT | 7.10.1 |

*Table 11: Primary imagery data processing software*

The following Feature Object Catalog was used: **NOAA Profile Version 2022**

### B.5.2 Surfaces

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

| Surface Name | Surface Type | Resolution | Depth Range | Surface Parameter | Purpose |
|---|---|---|---|---|---|
| H13595_MB_VR_MLLW | CARIS VR Surface (CUBE) | Variable Resolution | 22.8 meters - 116.3 meters | NOAA_VR | Complete MBES |
| H13595_MB_VR_MLLW_Final | CARIS VR Surface (CUBE) | Variable Resolution | 22.8 meters - 116.3 meters | NOAA_VR | Complete MBES |
| H13595_MBAB_2m_S250_300kHz_1of1 | MB Backscatter Mosaic | 2 meters | - | N/A | Complete MBES |

*Table 12: Submitted Surfaces*

Submitted surfaces were generated using the NOAA recommended parameters for depth-based (Ranges) CARIS variable-resolution bathymetric grids as specified in the 2022 HSSD.

QC Tools' Flier Finder, available in NOAA's Pydro22 Explorer suite, detected edge fliers that were rejected during surface cleaning. After multiple rounds of cleaning, Flier Finder detected 21 fliers. These were investigated and determined to be false positives flagged as #7 Noise Edges [Experimental]. Most are the result of the steep drop into deep water on the southeastern side of the sheet.

Pydro QC Tools Grid QA was used to analyze H13595 multibeam echosounder (MBES) data density. The submitted H13595 variable-resolution (VR) surface met HSSD density requirements as shown in the histogram below.

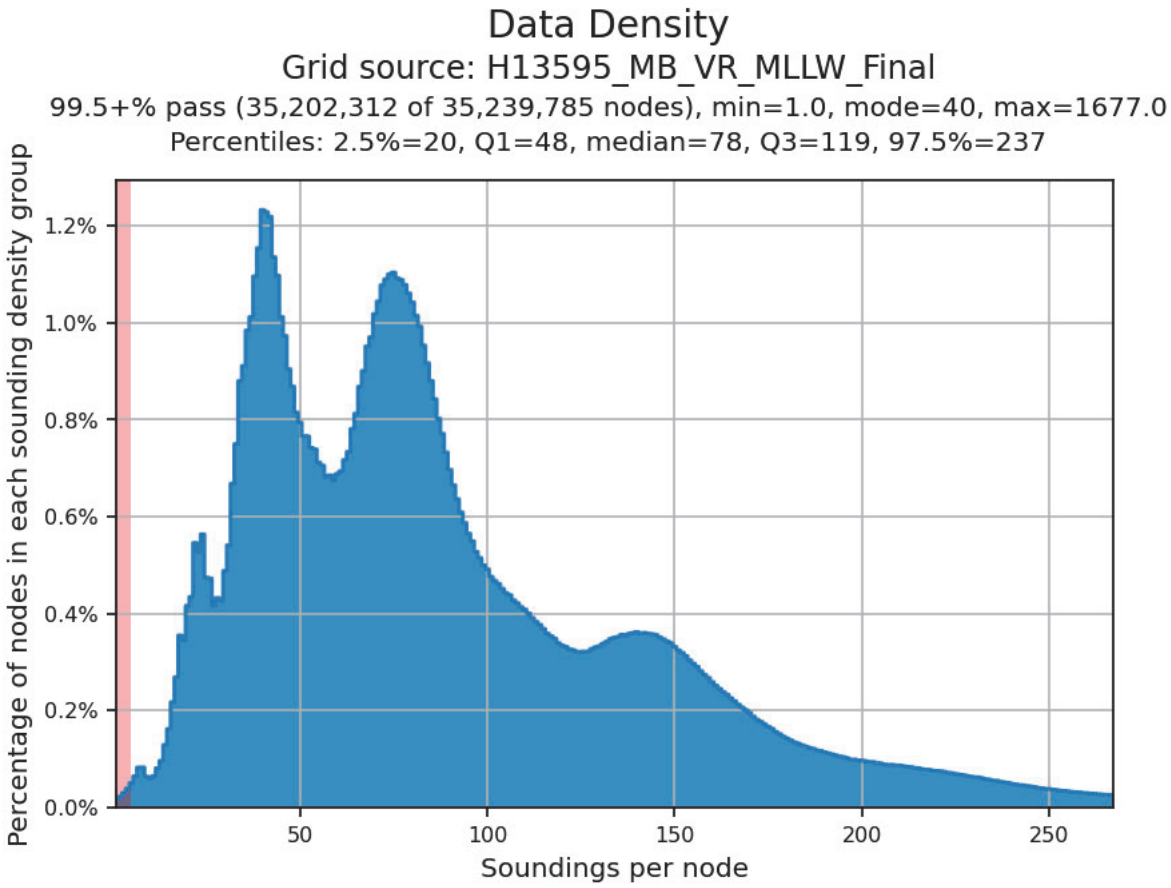



*Figure 19: Pydro derived plot showing HSSD density compliance of H13595 finalized variable-resolution surface.*

# C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying 2022 DAPR.

## C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

ERS Datum Transformation

The following ellipsoid-to-chart vertical datum transformation was used:

| Method | Ellipsoid to Chart Datum Separation File |
|---|---|
| ERS via VDATUM | OPR_F364_FH_22_VDatum_xyNAD83-MLLW_geoid12b.csar |

*Table 13: ERS method and SEP file*

## C.2 Horizontal Control

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 18.

The following PPK methods were used for horizontal control:

- RTX

Post Processed Real-Time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS 8.7 software to produce SBETs for horizontal and vertical corrections.

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition.

# D. Results and Recommendations

## D.1 Chart Comparison

Survey soundings from H13595 were generated from a finalized variable resolution CUBE surface in CARIS HIPS and SIPS and compared with the soundings from the largest scale Electronic Navigational Chart (US3SC10M) using CA Tools SS vs Chart comparison tool. See Section D.1.2 for results.

ENC US4NC16M did not provide full coverage over the survey area but comparison with the survey's soundings showed consistency with charted depths.

### D.1.1 Electronic Navigational Charts

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

| ENC | Scale | Edition | Update Application Date | Issue Date |
|---|---|---|---|---|
| US4NC16M | 1:80000 | 23 | 09/07/2021 | 11/23/2021 |
| US3SC10M | 1:432720 | 35 | 12/10/2021 | 04/18/2022 |

*Table 14: Largest Scale ENCs*

### D.1.2 Shoal and Hazardous Features

CA Tools flagged 6 soundings as potential Dangers to Navigation, and, although none of these soundings fall within the HSSD requirements for sounding designation/DtoN designation, the hydrographer recommends the addition of these shoaler soundings to appropriate ENCs, under a standard processing time line (see figure below). These shoal soundings still fall within their charted depth contour.

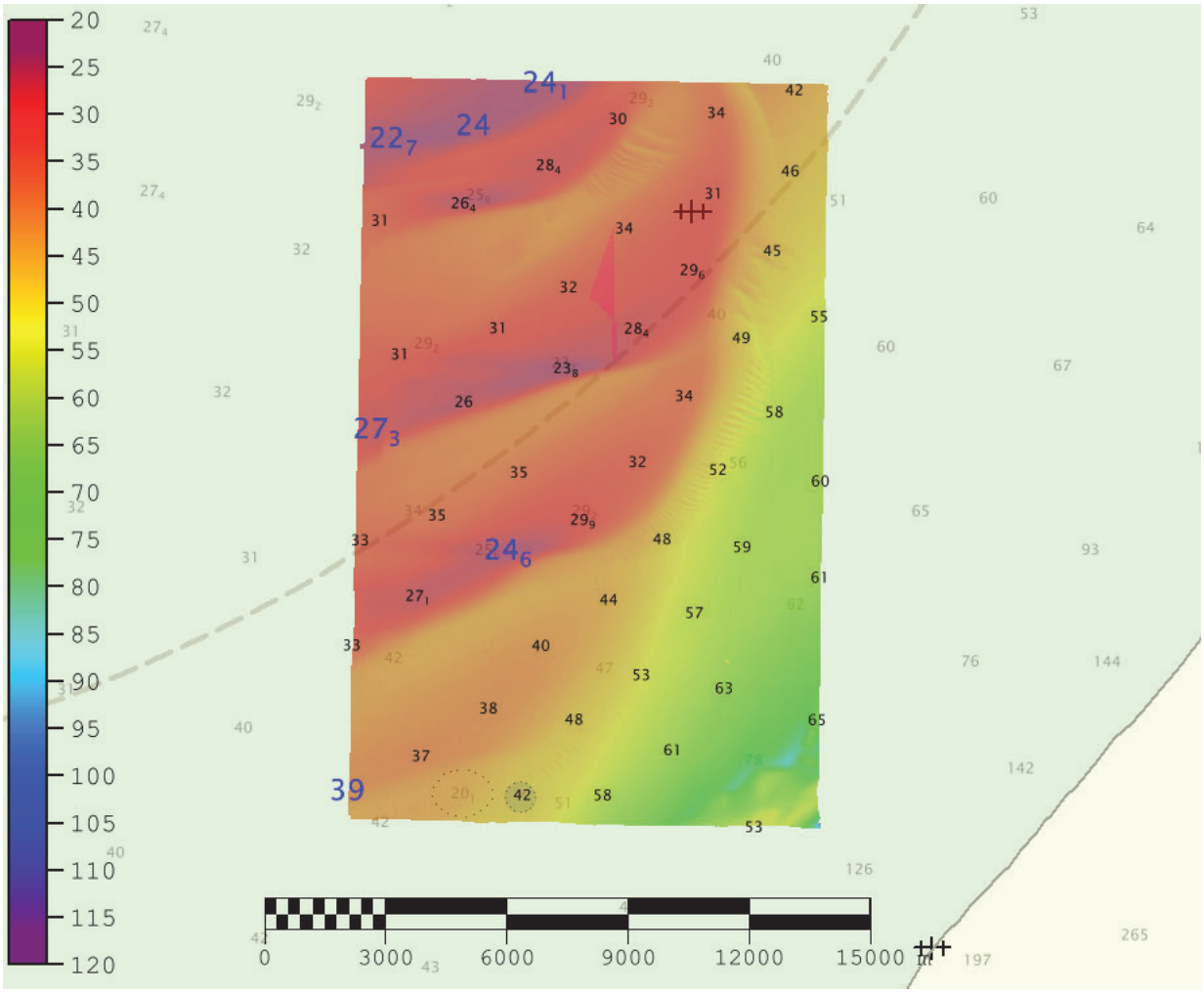



*Figure 20: Overview of H13595's soundings vs. ENC US3SC10M: black soundings were generated in CARIS; large blue soundings indicate potential DtoNs flagged by CA Tools.*

### D.1.3 Charted Features

Charted features existed for this survey. Reference the Final Features File for more information.

### D.1.4 Uncharted Features

No uncharted features exist for this survey.

### D.1.5 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

## D.2 Additional Results

### D.2.1 Aids to Navigation

No Aids to navigation (ATONs) exist for this survey.

### D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

### D.2.3 Bottom Samples

Six bottom samples were assigned and investigated. Refer to the Final Feature File for location and sample attribution.

### D.2.4 Overhead Features

No overhead features exist for this survey.

### D.2.5 Submarine Features

No submarine features exist for this survey.

### D.2.6 Platforms

No platforms exist for this survey.

### D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

### D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor and/or environmental conditions exist for this survey.

### D.2.9 Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

### D.2.10 New Survey Recommendations

No new surveys or further investigations are recommended for this area.

### D.2.11 ENC Scale Recommendations

No new insets are recommended for this area.

# E. Approval Sheet

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 Descriptive 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 and Specifications Deliverables, Field Procedures Manual, 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 Descriptive Report.

| Report Name | Report Date Sent |
|---|---|
| Data Acquisition and Processing Report | 2022-05-20 |

| Approver Name | Approver Title | Approval Date | Signature |
|---|---|---|---|
| Michael Gonsalves, CDR/NOAA | Chief of Party | 10/27/2022 | GONSALVES.MICHAEL.OLIVER.1275635126 Digitally signed by GONSALVES.MICHAEL.OLIVER.1275635126 Date: 2022.12.01 13:09:02 -05'00' |
| Daniel Helmricks, LT/NOAA | Operations Officer | 10/27/2022 | |
| Amanda M. Finn, Physical Scientist | Sheet Manager | 10/27/2022 | FINN.AMANDA.MARIA.1540474253 Digitally signed by FINN.AMANDA.MARIA.1540474253 Date: 2022.12.01 12:58:42 -05'00' |

# F. Table of Acronyms

| Acronym | Definition |
|---|---|
| **AHB** | Atlantic Hydrographic Branch |
| **AST** | Assistant Survey Technician |
| **ATON** | Aid to Navigation |
| **AWOIS** | Automated Wreck and Obstruction Information System |
| **BAG** | Bathymetric Attributed Grid |
| **BASE** | Bathymetry Associated with Statistical Error |
| **CO** | Commanding Officer |
| **CO-OPS** | Center for Operational Products and Services |
| **CORS** | Continuously Operating Reference Station |
| **CTD** | Conductivity Temperature Depth |
| **CEF** | Chart Evaluation File |
| **CSF** | Composite Source File |
| **CST** | Chief Survey Technician |
| **CUBE** | Combined Uncertainty and Bathymetry Estimator |
| **DAPR** | Data Acquisition and Processing Report |
| **DGPS** | Differential Global Positioning System |
| **DP** | Detached Position |
| **DR** | Descriptive Report |
| **DTON** | Danger to Navigation |
| **ENC** | Electronic Navigational Chart |
| **ERS** | Ellipsoidal Referenced Survey |
| **ERTDM** | Ellipsoidally Referenced Tidal Datum Model |
| **ERZT** | Ellipsoidally Referenced Zoned Tides |
| **FFF** | Final Feature File |
| **FOO** | Field Operations Officer |
| **FPM** | Field Procedures Manual |
| **GAMS** | GPS Azimuth Measurement Subsystem |
| **GC** | Geographic Cell |
| **GPS** | Global Positioning System |
| **HIPS** | Hydrographic Information Processing System |
| **HSD** | Hydrographic Surveys Division |

| Acronym | Definition |
|---|---|
| **HSSD** | Hydrographic Survey Specifications and Deliverables |
| **HSTB** | Hydrographic Systems Technology Branch |
| **HSX** | Hypack Hysweep File Format |
| **HTD** | Hydrographic Surveys Technical Directive |
| **HVCR** | Horizontal and Vertical Control Report |
| **HVF** | HIPS Vessel File |
| **IHO** | International Hydrographic Organization |
| **IMU** | Inertial Motion Unit |
| **ITRF** | International Terrestrial Reference Frame |
| **LNM** | Linear Nautical Miles |
| **MBAB** | Multibeam Echosounder Acoustic Backscatter |
| **MCD** | Marine Chart Division |
| **MHW** | Mean High Water |
| **MLLW** | Mean Lower Low Water |
| **NAD 83** | North American Datum of 1983 |
| **NALL** | Navigable Area Limit Line |
| **NTM** | Notice to Mariners |
| **NMEA** | National Marine Electronics Association |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **NOS** | National Ocean Service |
| **NRT** | Navigation Response Team |
| **NSD** | Navigation Services Division |
| **OCS** | Office of Coast Survey |
| **OMAO** | Office of Marine and Aviation Operations (NOAA) |
| **OPS** | Operations Branch |
| **MBES** | Multibeam Echosounder |
| **NWLON** | National Water Level Observation Network |
| **PDBS** | Phase Differencing Bathymetric Sonar |
| **PHB** | Pacific Hydrographic Branch |
| **POS/MV** | Position and Orientation System for Marine Vessels |
| **PPK** | Post Processed Kinematic |
| **PPP** | Precise Point Positioning |
| **PPS** | Pulse per second |

| Acronym | Definition |
|---|---|
| **PRF** | Project Reference File |
| **PS** | Physical Scientist |
| **RNC** | Raster Navigational Chart |
| **RTK** | Real Time Kinematic |
| **RTX** | Real Time Extended |
| **SBES** | Singlebeam Echosounder |
| **SBET** | Smooth Best Estimate and Trajectory |
| **SNM** | Square Nautical Miles |
| **SSS** | Side Scan Sonar |
| **SSSAB** | Side Scan Sonar Acoustic Backscatter |
| **ST** | Survey Technician |
| **SVP** | Sound Velocity Profiler |
| **TCARI** | Tidal Constituent And Residual Interpolation |
| **TPU** | Total Propagated Uncertainty |
| **USACE** | United States Army Corps of Engineers |
| **USCG** | United States Coast Guard |
| **UTM** | Universal Transverse Mercator |
| **XO** | Executive Officer |
| **ZDF** | Zone Definition File |