H13424

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

DESCRIPTIVE REPORT

Type of Survey:	Basic Hydrographic Survey Navigable Area Maritime EEZ Mapping
Registry Number:	H13424

LOCALITY

State(s):	North Carolina Virginia
General Locality:	Approaches to Chesapeake Bay
Sub-locality:	40 NM SE of False Cape

2021

CHIEF OF PARTY
Matthew J. Jaskoski, CDR/NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13424

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 Virginia**
General Locality:	**Approaches to Chesapeake Bay**
Sub-Locality:	**40 NM SE of False Cape**
Scale:	**40000**
Dates of Survey:	**07/17/2021 to 07/18/2021**
Instructions Dated:	**02/25/2021**
Project Number:	**OPR-D304-TJ-21**
Field Unit:	**NOAA Ship *Thomas Jefferson***
Chief of Party:	**Matthew J. Jaskoski, 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 H13424

Project: OPR-D304-TJ-21

Locality: Approaches to Chesapeake Bay

Sublocality: 40 NM SE of False Cape

Scale: 1:40000

July 2021 - July 2021

NOAA Ship *Thomas Jefferson*

Chief of Party: Matthew J. Jaskoski, CDR/NOAA

A. Area Surveyed

Survey H13424, located in the Approaches to Chesapeake Bay, North Carolina and Virginia within the sublocality of Offshore Chesapeake Bay, was conducted in accordance with coverage requirements set forth in the Project Instructions OPR-D304-TJ-21.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
36° 51' 0.43" N 75° 8' 27.65" W	36° 41' 44.25" N 75° 6' 56.46" W

Table 1: Survey Limits

Survey data were acquired in accordance with the requirements set forth by the Project Instructions (PI) and the Hydrographic Surveys Specifications and Deliverables (HSSD) dated April 2021 (Figure 1).

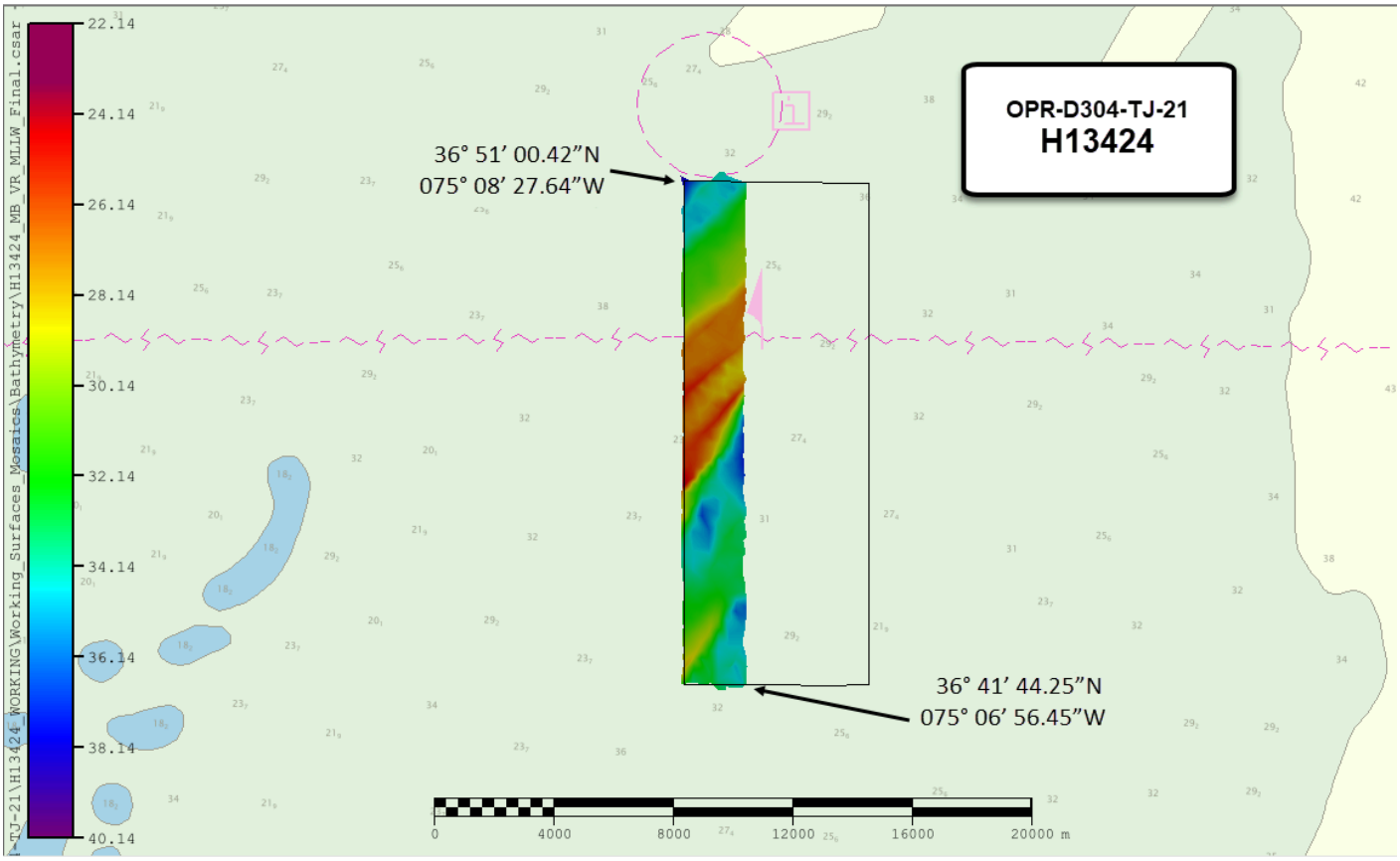


Figure 1: Survey layout for H13424, plotted over ENC US3DE01M. Black solid outline represents the survey limits set forth by the Project Instructions.

A.2 Survey Purpose

This project covers approximately 287 SNM approaching Chesapeake Bay, home for two top 20 container ports in the United States, Port of Baltimore and Port of Virginia. Together these ports net over 116 million tons of imports and exports per year.*

Prior data in the project area spans from the 1880s to 1940s. The bathymetric data vintage coupled with numerous storms and hurricanes having potentially changed the seabed over the last century raises a need to survey the area.

This project is part of an ongoing, multi-year hydrographic survey to support the safety of waterborne commerce to the Chesapeake Bay and transiting the eastern seaboard. This data from this project will provide modern bathymetry for updating National Ocean Service nautical charting products as well as support the Seabed 2030 global mapping initiative.

*U.S. Army Corps of Engineers, ”Waterborne Commerce Statistics Center: Tonnage for selected U.S. ports in 2018.” Institute for Water Resources. Submitted to USACE Digital Library 2019-12-12. https://usace.contentdm.oclc.)

A.3 Survey Quality

The survey is partially adequate to supersede previous data.

Due to operational time constraints, the field unit was unable to fully complete this survey. Crosslines are absent but junction analysis with current and prior year coverage shows good agreement (see Section B.2.3). Otherwise, the data acquired in H13424 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as outlined by the 2021 HSSD including NOAA allowable uncertainty (see Section B.2.10) and density requirements (see Section B.2.11).

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 is in accordance with requirements listed in Table 2 and in the 2021 HSSD. Coverage requirements were met with 100% multibeam echosounder (MBES) coverage (Figure 2). However, due to operational time constraints, the field unit was unable to obtain full coverage to the limits set forth in the PI (Figure 1).

There are two deficiences present in the coverage obtained for H13424 (Figure 2). One is a small gap on the northern edge of the sheet where coverage did not quite reach the sheet limit. However, this area does have coverage from survey H13416 and no significant features were found. The other deficiency is approximately 2900m in length and represents a portion of a line that could not be processed due to POS data being logged over GPS week change (see Section C.3). While there is no guarantee that significant features are absent from the void, the hydrographer is confident that nature of the seafloor is accurately represented by surrounding data. Survey H13416 also covers a portion of this void on the north edge of the sheet.

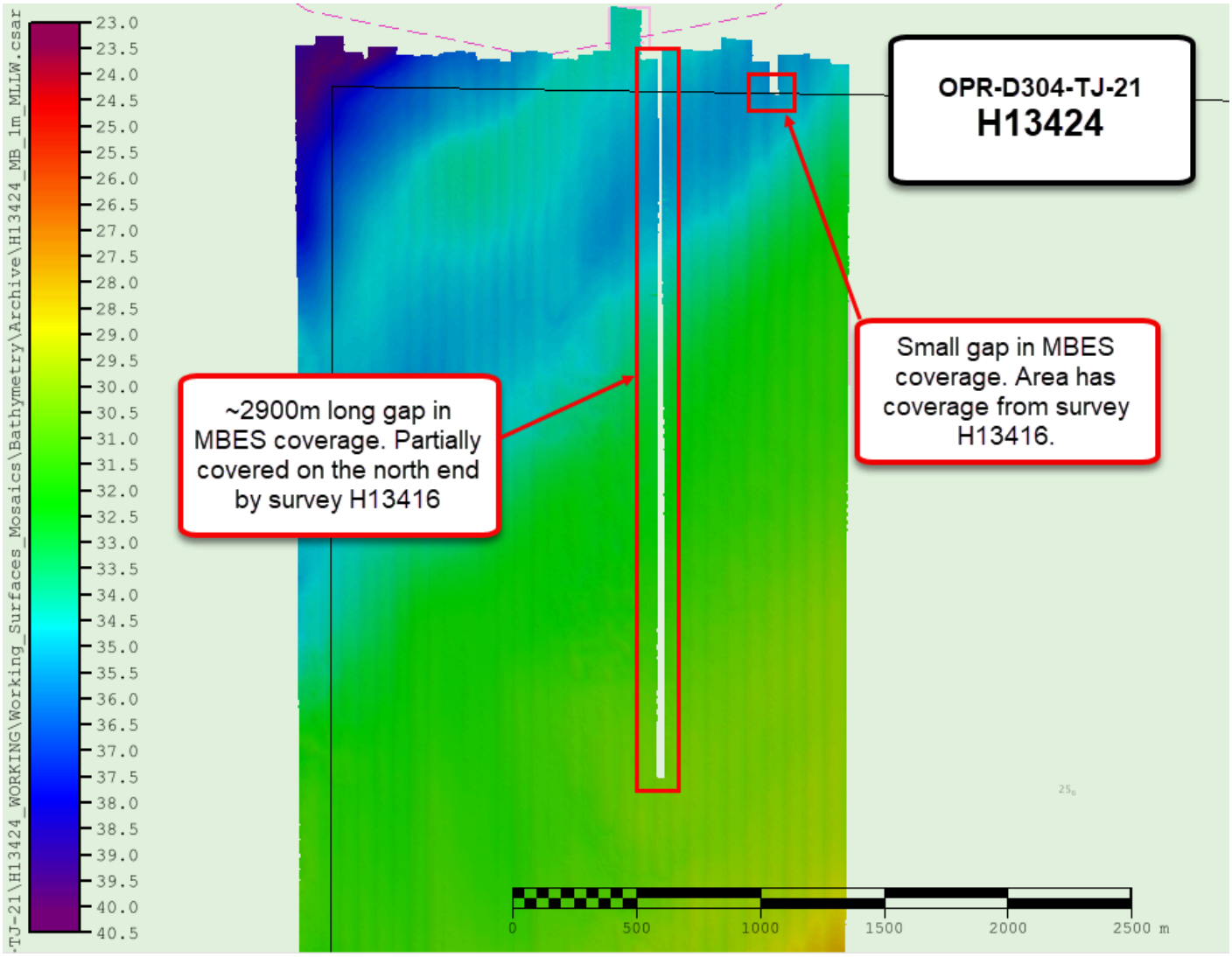


Figure 2: Holidays present in coverage obtained for H13424 (outlined in red).

A.6 Survey Statistics

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

	HULL ID	*S222*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0
	MBES Mainscheme	279.17	279.17
	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	0.0	0.0
	Lidar Crosslines	0.0	0.0
Number of Bottom Samples			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			11.04

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/17/2021	198
07/18/2021	199

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	***S222***
LOA	63.4 meters
Draft	4.6 meters

Table 5: Vessels Used

Figure 3: NOAA Ship Thomas Jefferson (S222)

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
Valeport	Thru-Hull SVS	Sound Speed System
AML Oceanographic	MVP100	Conductivity, Temperature, and Depth Sensor
AML Oceanographic	MVP-X	Conductivity, Temperature, and Depth Sensor
Applanix	POS MV 320 v5	Positioning and Attitude System

Table 6: Major Systems Used

Vessel configurations, equipment operations, data acquisition, and processing were consistent with specifications described in the DAPR.

B.2 Quality Control

B.2.1 Crosslines

Crosslines were not collected on H13424 due to operational time constriants and the unanticipated end of field operations for the year. The field unit received a waiver from the Hydrographic Surveys Division (HSD) which can be found in Appendix II- Survey Correspondence that was submitted with this project. While a proper crossline analysis could not be undertaken, junction analyses with surveys from both current and prior year surveys indicate good agreement (See Section B.2.3). The hydrographer is confident that no systematic or internal errors are present in the data collected for H13424.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.092 meters	N/A

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S222	n/a meters/second	4 meters/second	n/a meters/second	0.2 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

The bathymetric surface's uncertainty layer is compliant with the 2021 HSSD uncertainty standards. Over 99.5% of all nodes pass uncertainty standards (Figure 4).

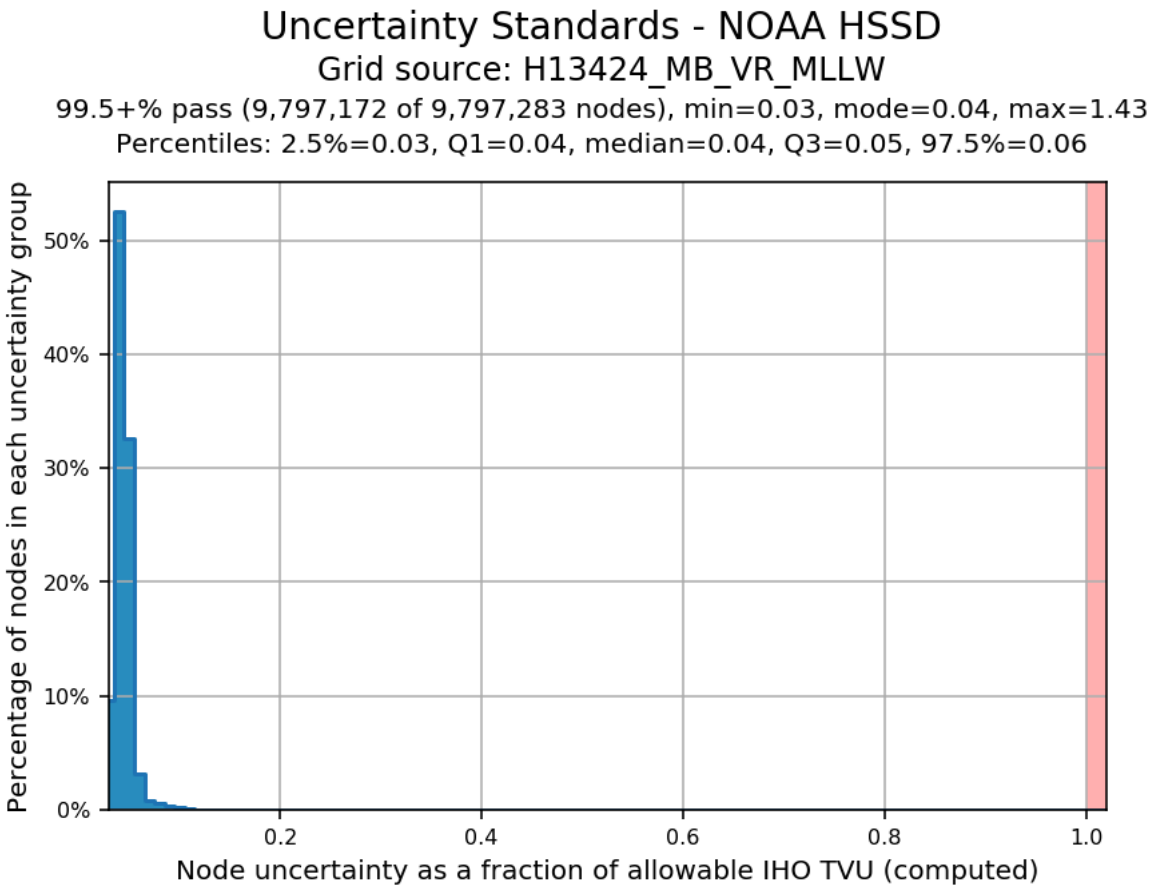


Figure 4: H13424 uncertainty standards.

B.2.3 Junctions

There are two contemporary surveys and one historic survey that junction with survey H13423 (Figure 5).

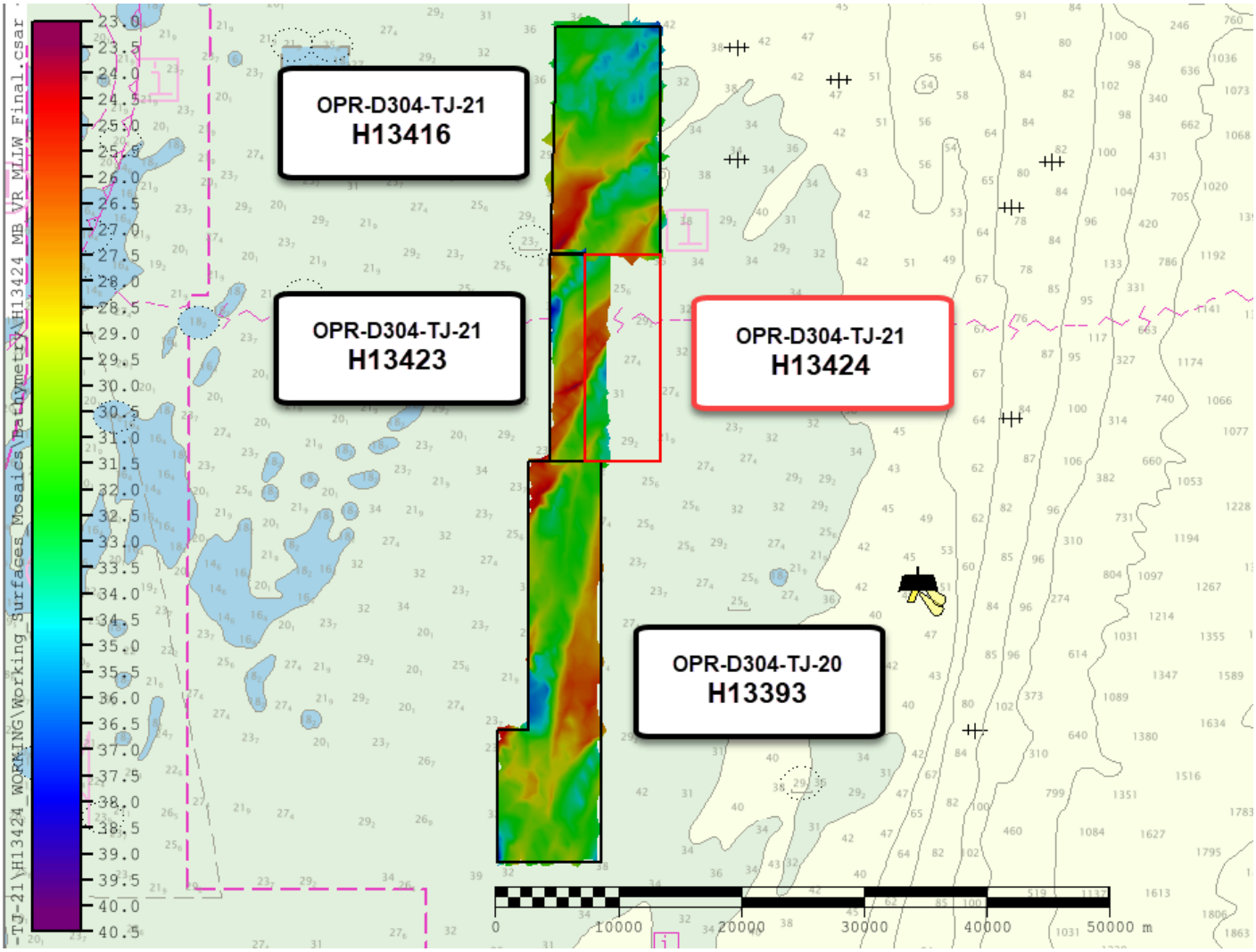


Figure 5: H13424 and junctioning sheets H13416, H13423, and H13393.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13416	1:40000	2021	NOAA Ship Thomas Jefferson	N
H13393	1:40000	2020	NOAA Ship Thomas Jefferson	S
H13423	1:40000	2021	NOAA Ship Thomas Jefferson	W

Table 9: Junctioning Surveys

H13416

The south side of Survey H13416 junctioned with Survey H13424 (Figure 6). A variable resolution (VR) Combined Uncertainty and Bathymetry Estimator (CUBE) surface of H13424 data and a VR CUBE surface of H13416 data were differenced. The mean difference between bathymetric surface nodes was 0.01m with a standard deviation of 0.08m. Statistics and visual inspection indicate that surveys H13423 and H13416 are in general agreement (Figure 7).

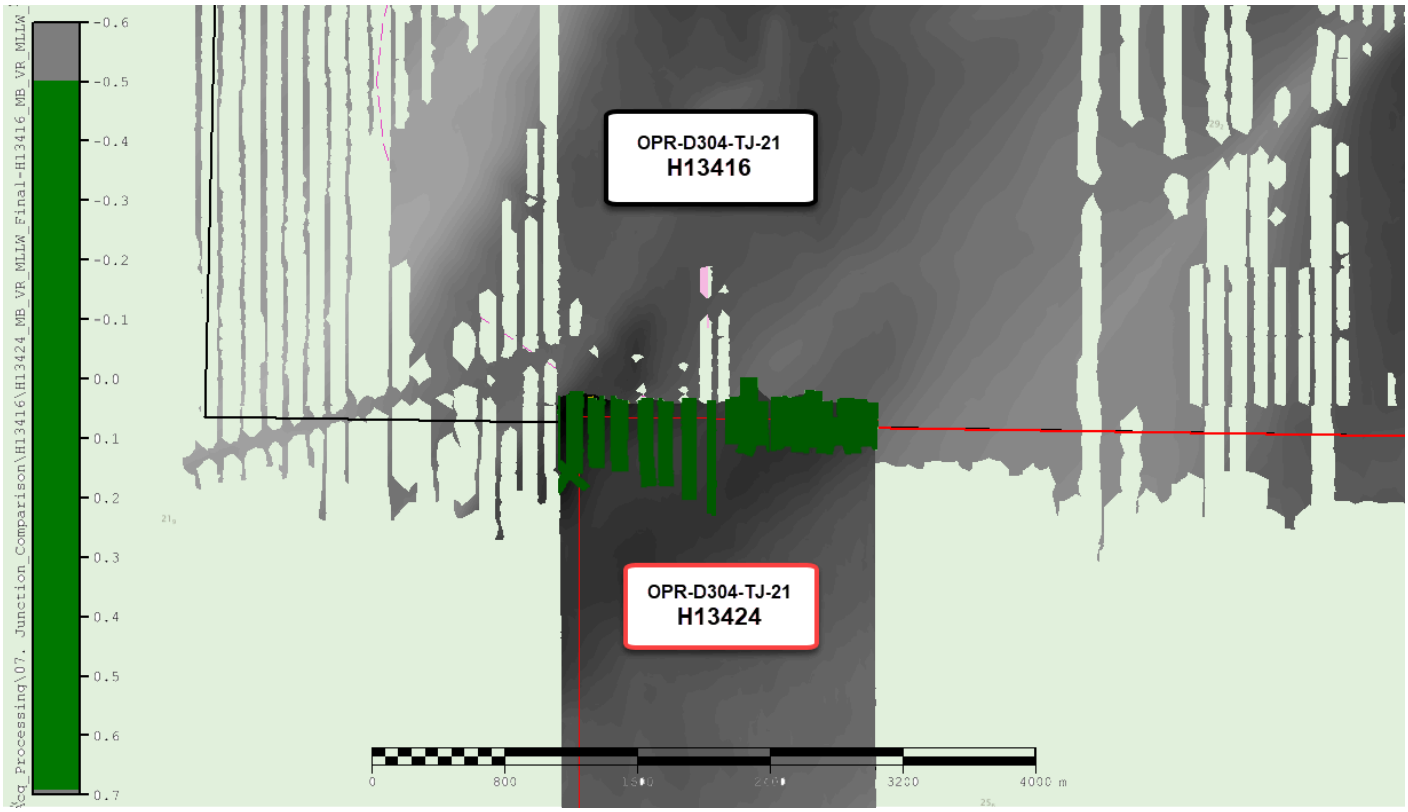
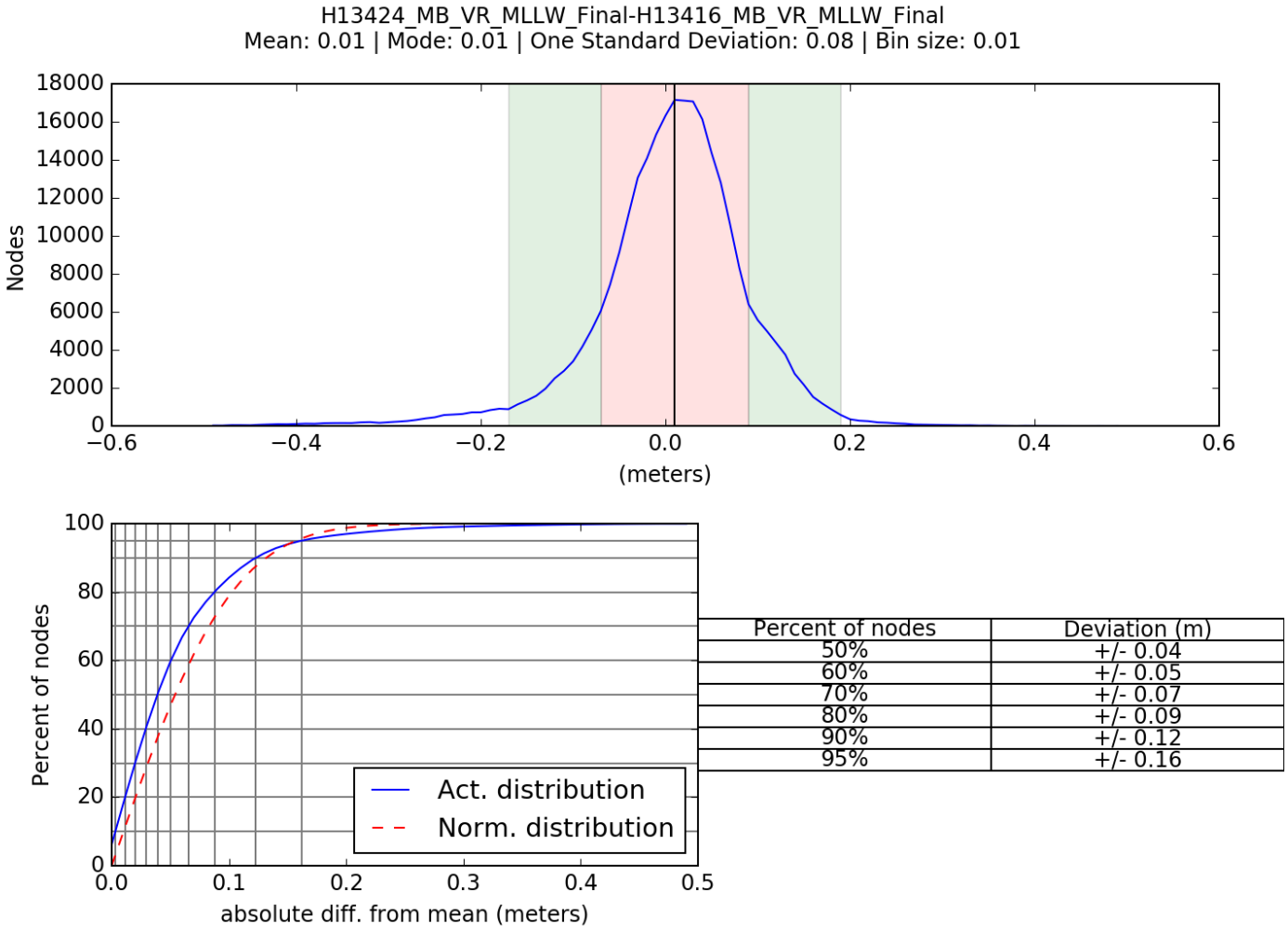


Figure 6: Fraction of allowable error between Survey H13424 and H13416 shown in color. Visual inspection indicates that the surveys are in general agreement.



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.07
80%	+/- 0.09
90%	+/- 0.12
95%	+/- 0.16

Figure 7: H13424 and H13416 surface difference comparison statistics.

H13393

The north side of Survey H13393 junctioned with Survey H13424 (Figure 8). A variable resolution (VR) Combined Uncertainty and Bathymetry Estimator (CUBE) surface of H13424 data and a VR CUBE surface of H13393 data were differenced. The mean difference between bathymetric surface nodes was 0.02m with a standard deviation of 0.07m. Statistics and visual inspection indicate that surveys H13424 and H13393 are in general agreement (Figure 9).

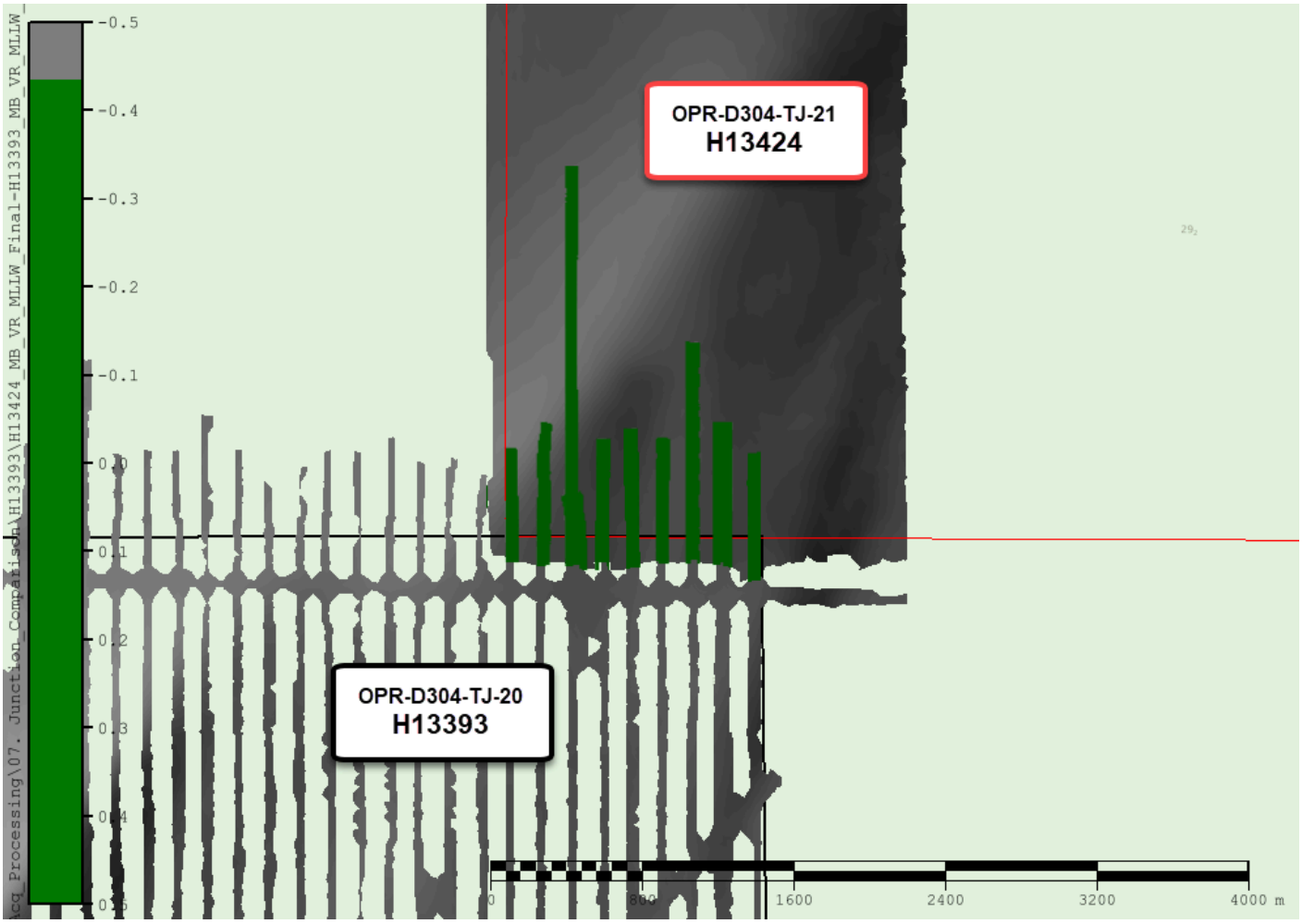
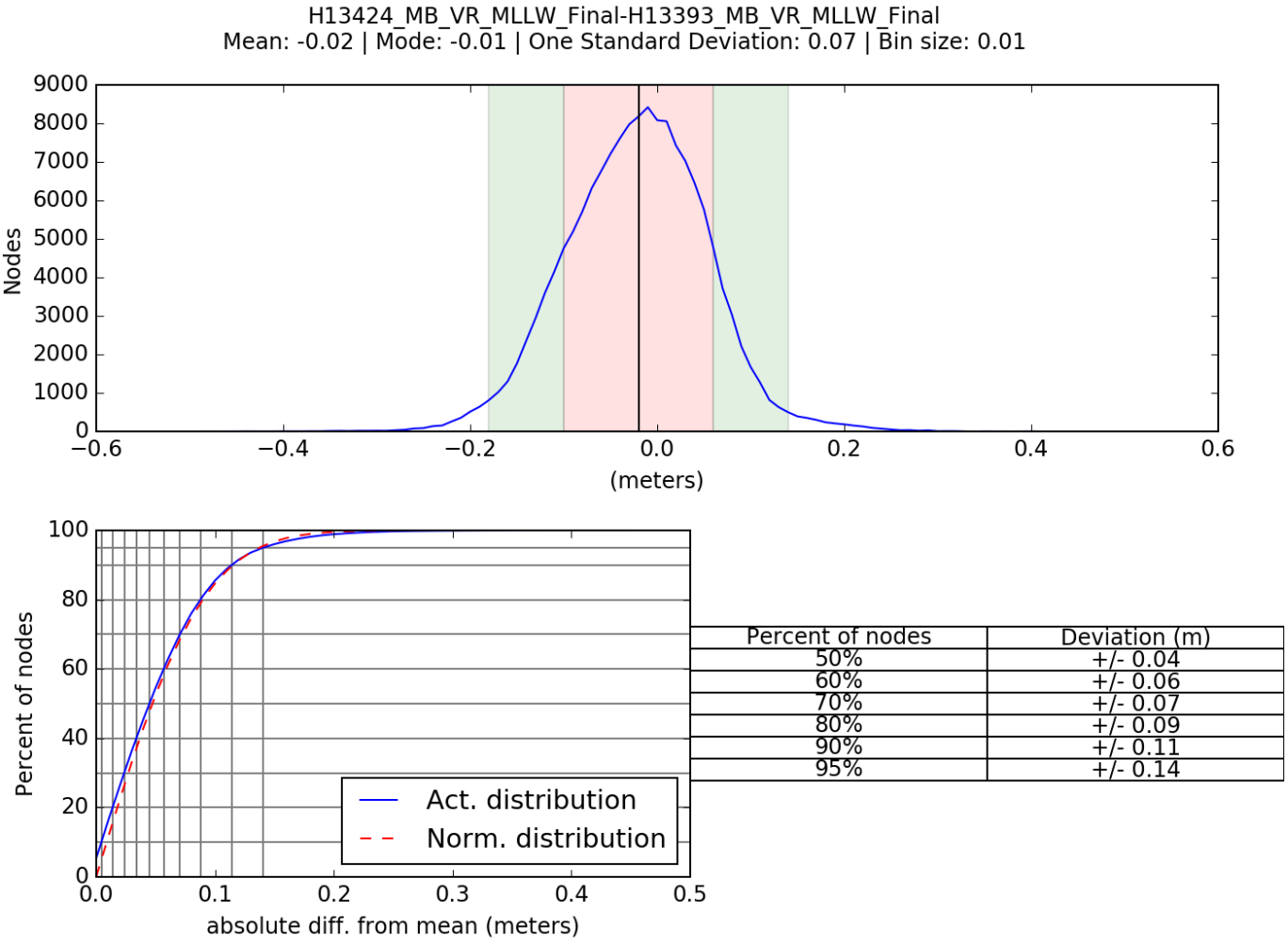


Figure 8: Fraction of allowable error between Survey H13424 and H13393 shown in color. Visual inspection indicates that the surveys are in general agreement.



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.06
70%	+/- 0.07
80%	+/- 0.09
90%	+/- 0.11
95%	+/- 0.14

Figure 9: H13424 and H13393 surface difference comparison statistics.

H13423

The east side of Survey H13423 junctioned with Survey H13424 (Figure 10). A variable resolution (VR) Combined Uncertainty and Bathymetry Estimator (CUBE) surface of H13424 data and a VR CUBE surface of H13423 data were differenced. The mean difference between bathymetric surface nodes was 0.10m with a standard deviation of 0.012m. Statistics and visual inspection indicate that surveys H13424 and H13423 are in general agreement (Figure 11) however the mean difference is greater than what is observed among the other junctions. This is likely due to sound speed issues causing refraction in the outer swath (see Section B.2.6) and the limited overlap between the data sets used for the analysis.

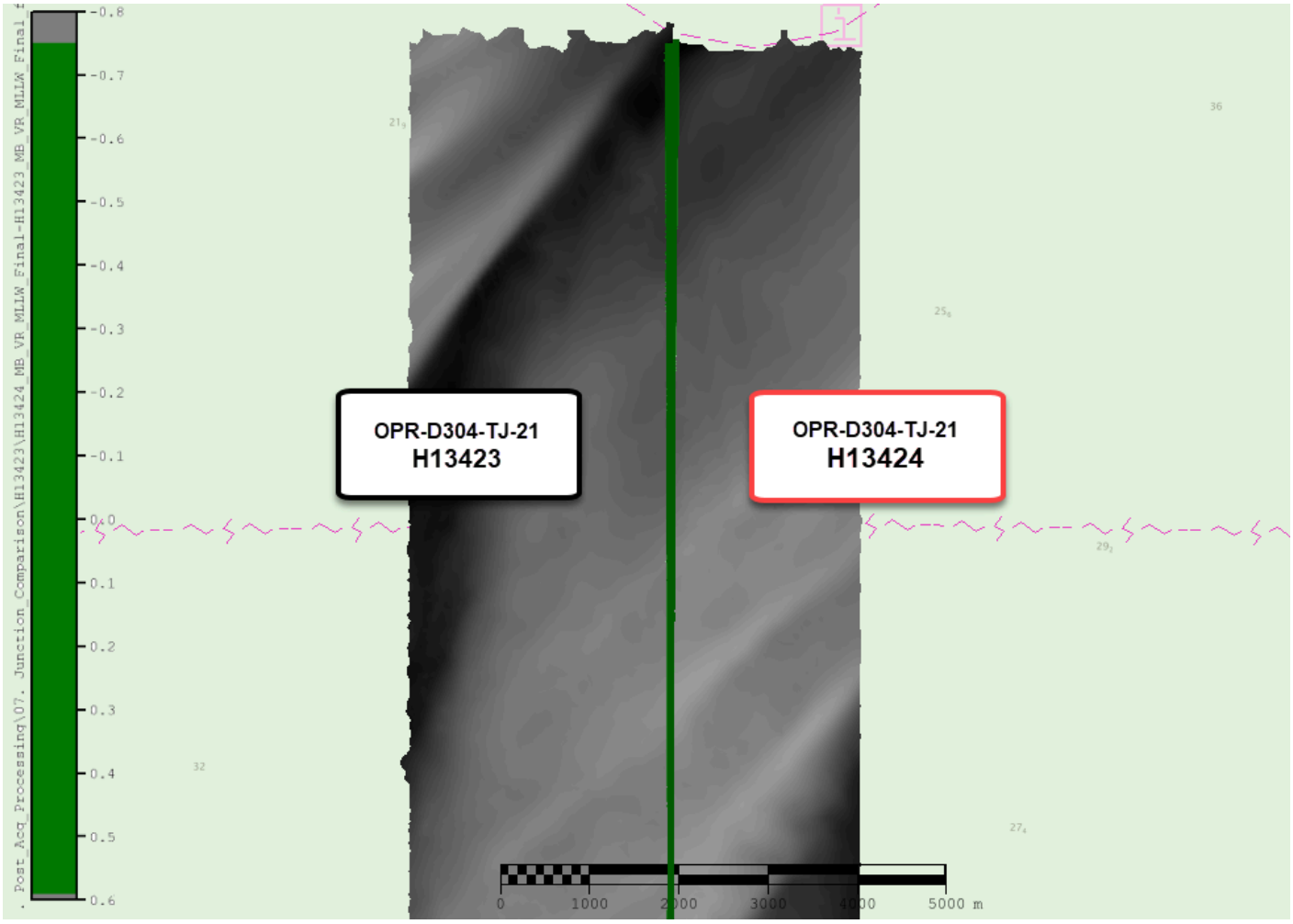
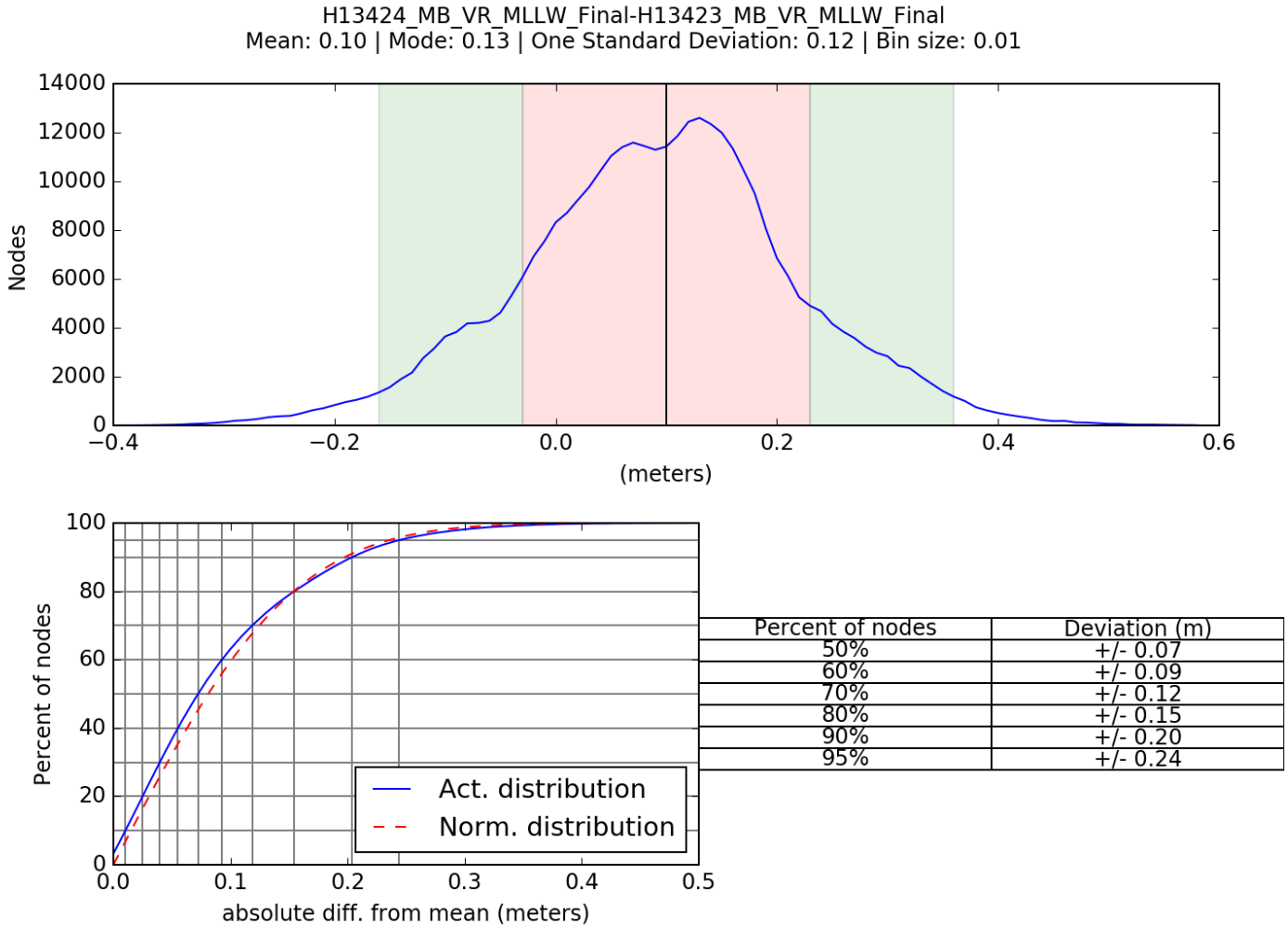


Figure 10: Fraction of allowable error between Survey H13424 and H13423 shown in color. Visual inspection indicates that the surveys are in general agreement.



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.09
70%	+/- 0.12
80%	+/- 0.15
90%	+/- 0.20
95%	+/- 0.24

Figure 11: H13424 and H13423 surface difference comparison statistics.

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

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

Thermal Stratification

Thermal stratification is a common, persistent environmental condition encountered in the Approaches to Chesapeake area and was present for the duration of the survey. This stratification was identified in the MVP sound speed profiles (Figure 12). While the bathymetric surface was not significantly impacted, there is noticable downturn in the outer beams of the MBES swath (Figure 13). Data are found to meet NOAA allowable vertical uncertainty parameters from the 2021 HSSD (Figure 4). As such, the data remain sufficient to supersede previous data.

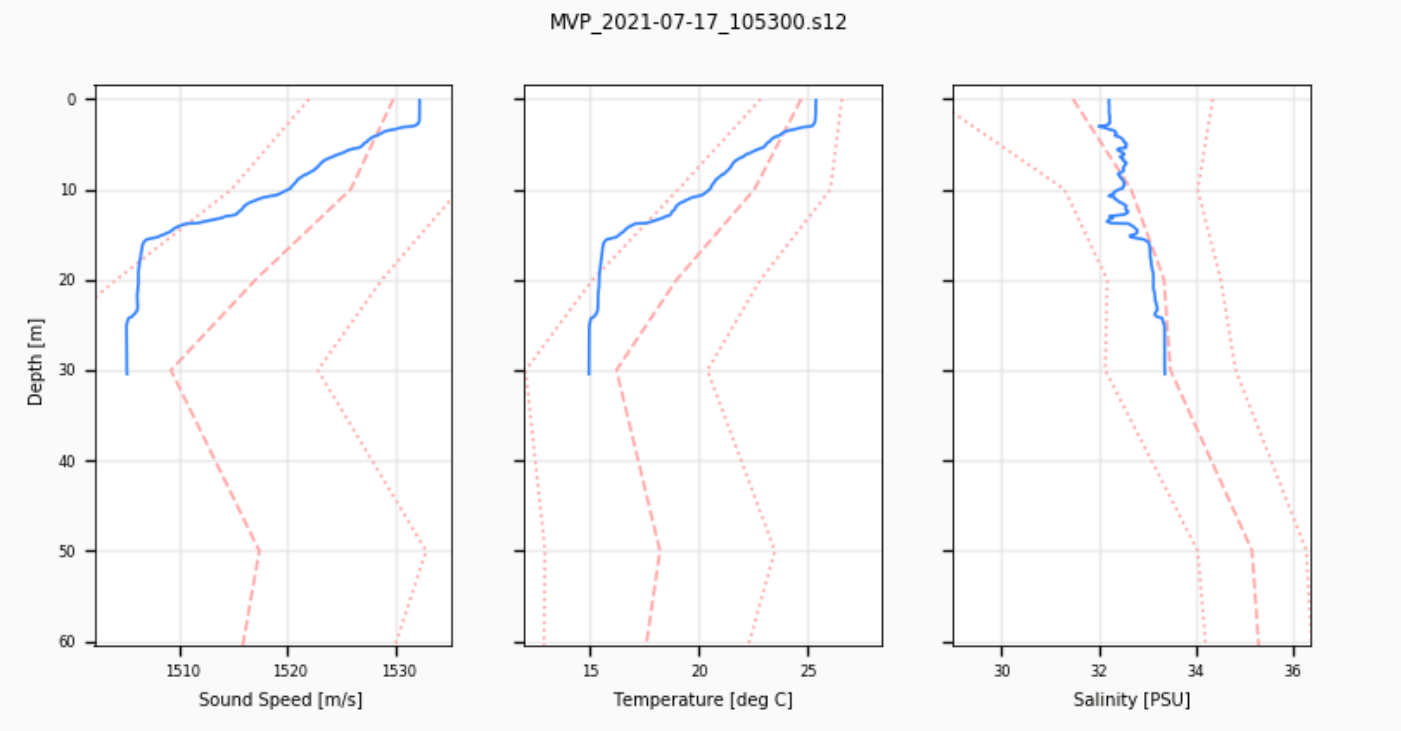


Figure 12: Profiles from an MVP cast that represent typical conditions in the survey area. The strong thermocline in this cast similarly appears in most of the casts taken for this sheet.

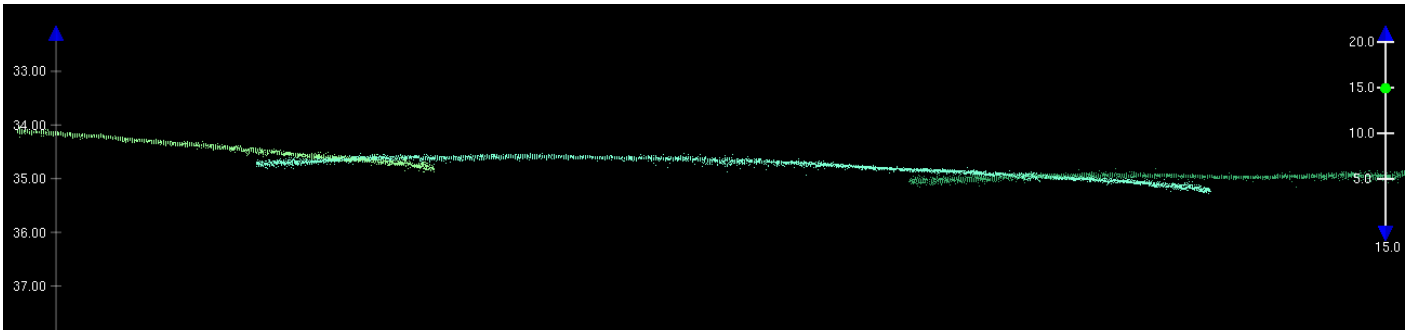


Figure 13: 2D view of survey data showing downturn in the outer swath likely caused by sound speed issues.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: MVP casts were conducted at the start of acquisition each day and at a minimum of one every four hours during acquisition.

MVP casts on S222 were conducted at an average interval of 60 minutes, guided by observation of the surface sound speed and targeted to deeper areas (Figure 14). All sound speed methods were used as detailed in the DAPR. There is one MVP cast that was taken outside the survey limits prior to acquisition and was followed by a subsequent cast with the sheet boundary. The profile collected by this cast is consistent with conditions found within the survey limits and is appropriate to be included in data processing.

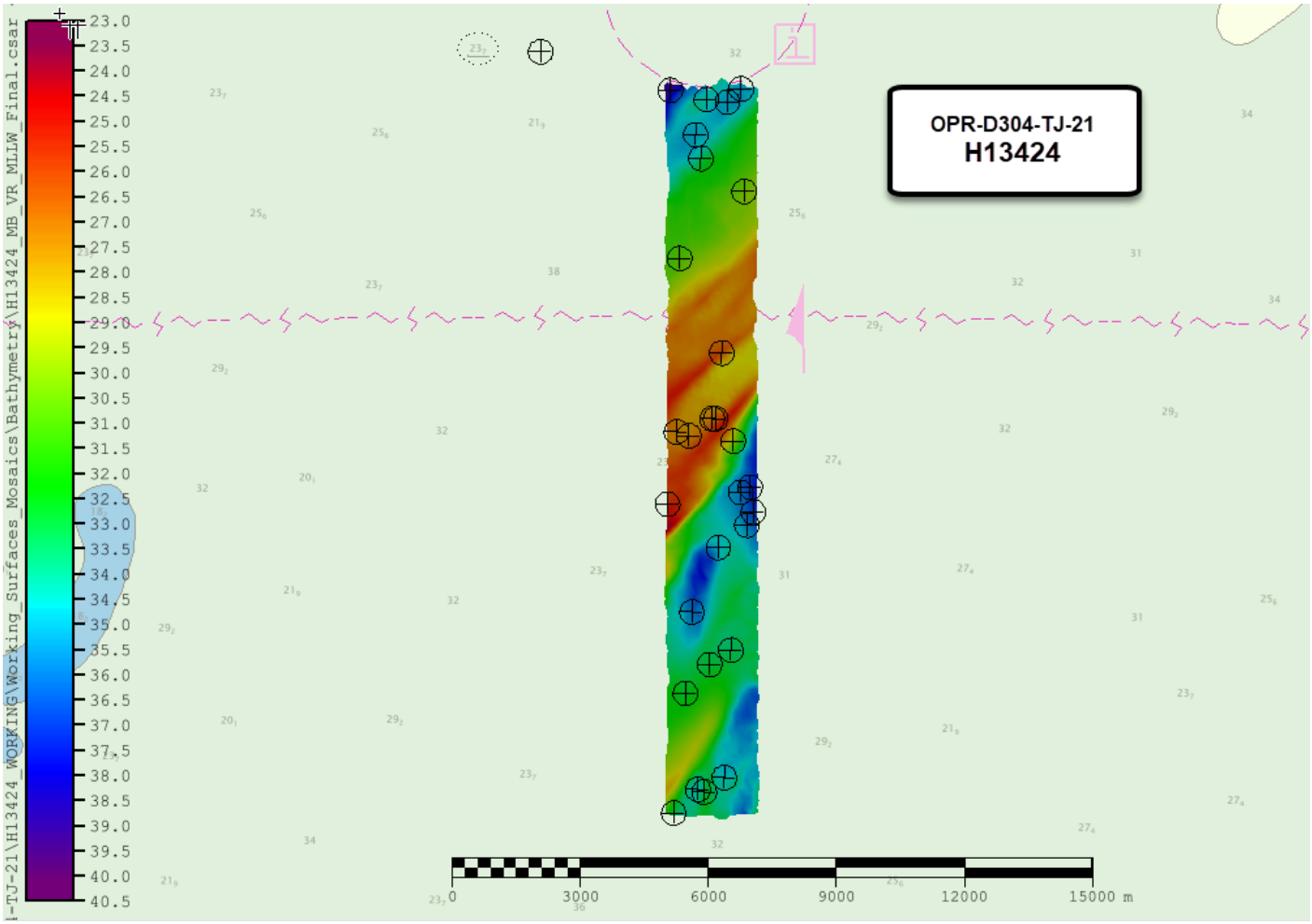


Figure 14: H13424 sound speed profile cast distribution collected by the MVP on S222.

B.2.8 Coverage Equipment and Methods

S222 acquired 100% MBES coverage to meet complete coverage requirements on H13424, as specified in the project instructions, using a Kongsberg EM2040 multibeam system.

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

All equipment and survey methods were used as detailed in the DAPR. Raw MBES backscatter was logged as part of the .all file of the Kongsberg EM2040 systems. Backscatter was processed in QPS Fledermaus GeoCoder Toolbox (FMGT) software, and the exported geotiffs are included in the final processed data package (Figure 15). Backscatter holidays are present and co-located with MBES holidays (Figure 2).

There are noticable changes in backscatter intensity for portions of two MBES lines (0043_20210718_073550_S222_EM2040 and 0044_20210718_085200_S222_EM2040) which correspond to changes in the absorption coefficient by a factor of 6 from 92.13 to 654.36 to 90.89 on subsequest MVP casts. The absorption coefficient is used by the EM2040 system in real-time data recording of backscatter intensity and is created when sound speed profiles from the MVP are transmitted to the multibeam system. Visual inspection of the temperature, salinity, and sound speed profiles for this MVP cast did not reveal any anomolous values and the cause of drastic change to the absorption coefficient remains unknown.

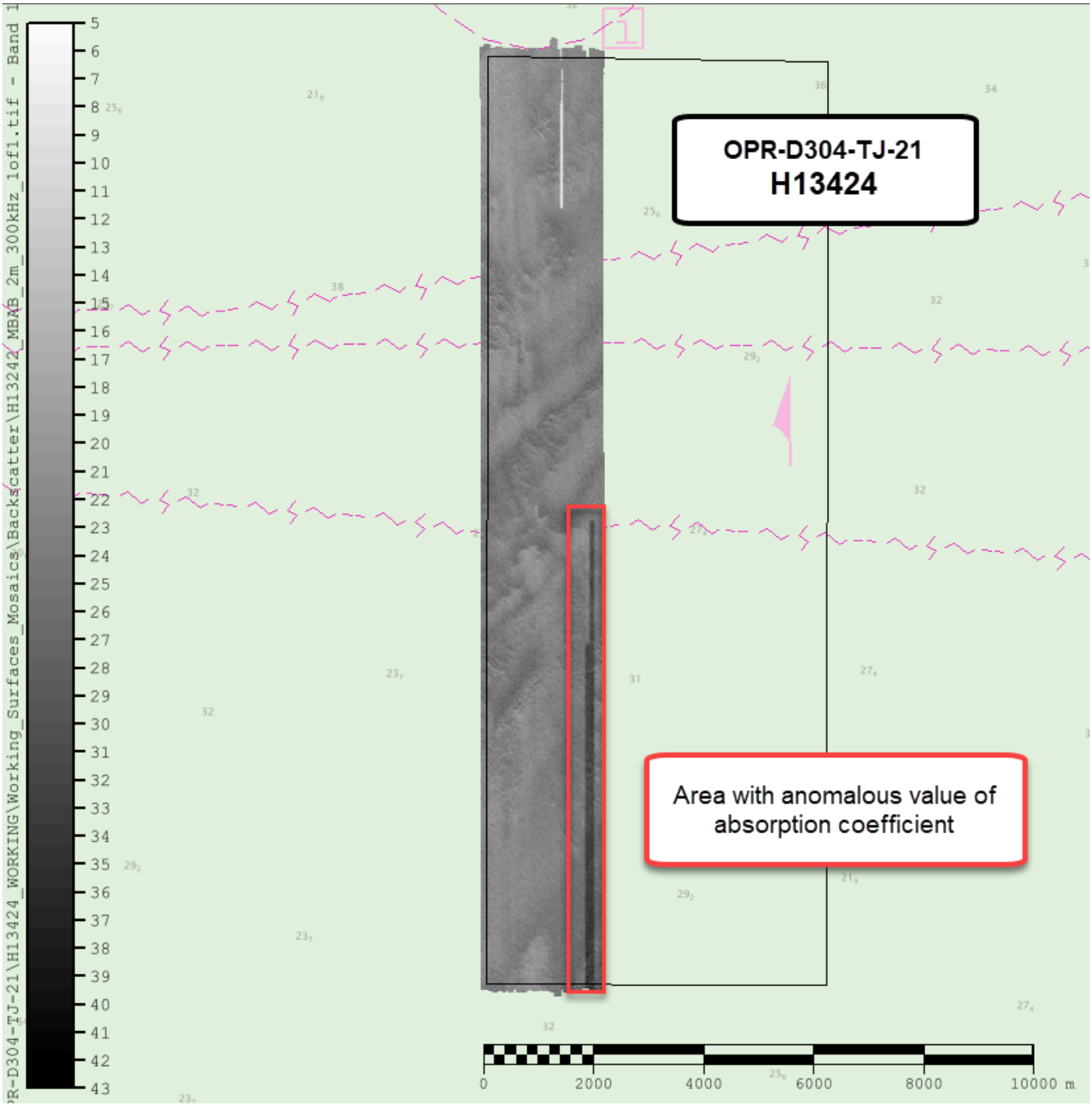


Figure 15: S222's 300kHz MBES acoustic backscatter coverage for H13424 at 2m resolution. Area outlined in red shows portions of lines that were acquired with an anomolous absorption coefficient.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile Version 2021.

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
H13424_MB_VR_MLLW.csar	CARIS VR Surface (CUBE)	Variable Resolution	23.4 meters - 40.1 meters	NOAA_VR	Complete MBES
H13424_MB_VR_MLLW_Final.csar	CARIS VR Surface (CUBE)	Variable Resolution	23.4 meters - 40.1 meters	NOAA_VR	Complete MBES
H13424_MBAB_2m_300kHz_1of1.tif	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES

Table 10: Submitted Surfaces

Complete coverage requirements were met by 100% complete coverage MBES as specified under section 5.2.2.3 of the 2021 HSSD. All bathymetric grids for H13424 meet density requirements per the 2021 HSSD (Figure 16).

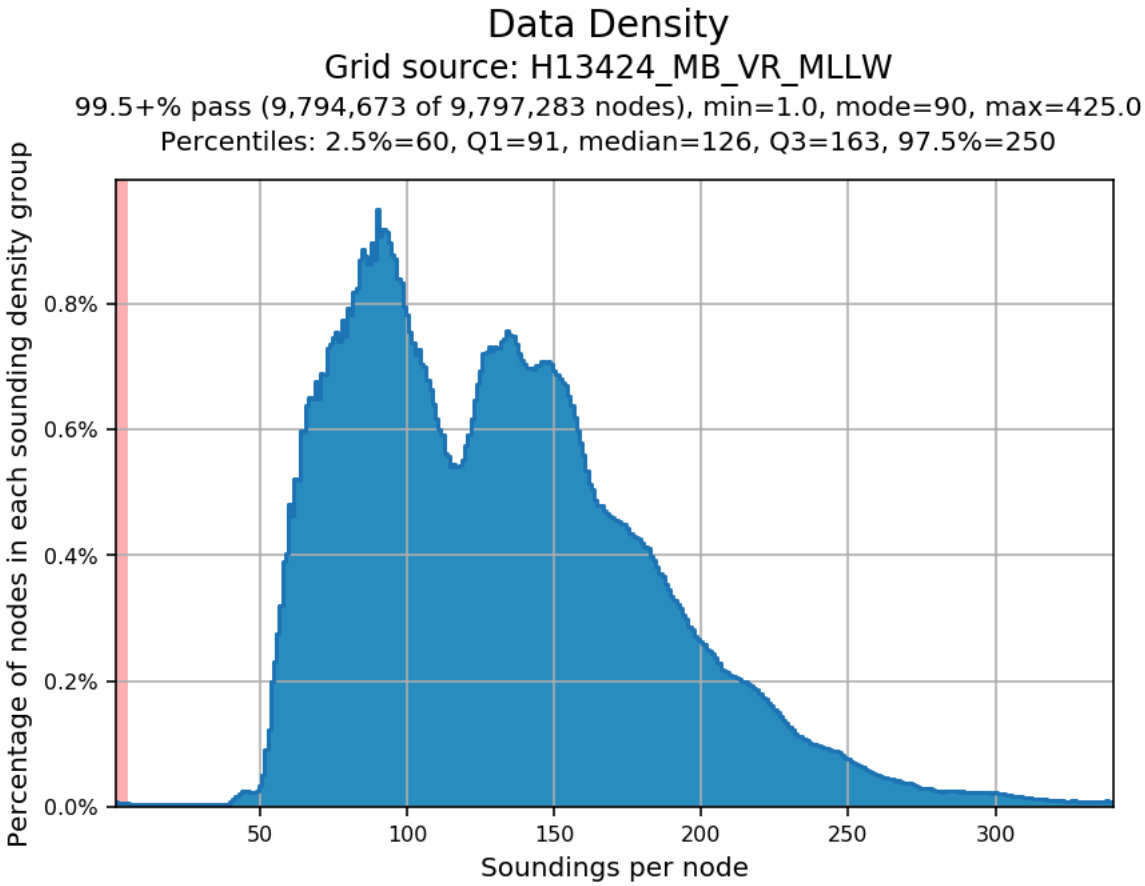


Figure 16: H13424 data density statistics.

C. Vertical and Horizontal Control

Field installed tide and GPS stations were not utilized for this survey. There is no HVCR report included with the submission of H13424.

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	VDatum Area_100m_NAD83-MLLW_geoid12b

Table 11: ERS method and SEP file

All soundings submitted for H13424 are reduced to MLLW using VDatum techniques as outlined in the DAPR.

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

Trimble-RTX service was used with an Applanix POS MVv5 GNSS_INS system to obtain highly accurate ellipsoidally referenced position data to meet ERS specifications for H13424 MBES data from vessel S222.

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition on vessel S222.

C.3 Additional Horizontal or Vertical Control Issues

C.3.1 POS files logged over GPS week change

Due to a survey acquisition oversight, a POS file was unable to be utilized for 2900 meters of line 0037_20210718_000831_S222_EM2040. The file was logged too early following GPS week change, and was not able to be used in post processing.

Due to operational constraints, the field unit was unable to return to the H13424 survey area to recollect this holiday. The hydrographer does not believe there are any items on the seafloor of navigational significance based on examining the surrounding area.

D. Results and Recommendations

D.1 Chart Comparison

A chart comparison was conducted between survey H13424 and electronic navigational chart (ENC) US3DE01M in accordance with methods outlined in the DAPR. There were no DTONs to report and all data from H13424 are recommended to supersede charted data.

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
US3DE01M	1:419706	23	06/06/2021	06/01/2021

Table 12: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

No charted features exist for this survey.

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

Assigned bottom sample locations exist within the originally assigned survey limits. However, none were located within the acquired coverage and a waiver was abtained to modify the survey limits to the extents of coverage achieved (see Appendix II).

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

One charted submarine cable exists within the survey limits and was not assigned for investigation. The hydrographer did not detect any evidence of this cable within the MBES data.

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 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 ENC scales 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 Specifications and 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.

Approver Name	Approver Title	Approval Date	Signature
Matthew J. Jaskoski, CDR/NOAA	Chief of Party	10/28/2021	JASKOSKI.MATTHEW.JACOB.1275636262 2021.11.09 08:16:55 -05'00'
Michelle M. Levano, LT/NOAA	Field Operations Officer	10/28/2021	Digitally signed by LEVANO.MICHELLE.MARIE.1516645888 Date: 2021.11.08 15:48:04 -05'00'
Erin K. Cziraki	Chief Survey Technician	10/28/2021	CZIRAKI.ERIN.KAYE.1550015338 Digitally signed by CZIRAKI.ERIN.KAYE.1550015338 Date: 2021.11.08 13:15:05 -05'00'
Allegra Menniti, ENS/NOAA	Sheet Manager	10/28/2021	MENNITI.ALLEGRA.ROSE.1580841011 Digitally signed by MENNITI.ALLEGRA.ROSE.1580841011 Date: 2021.11.08 13:29:34 -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