

H13846

35NM SE Offshore Charleston

OPR-G380-TJ-23
Approaches to
Charleston
South Carolina

Responsible Party

DOC/NOAA/NOS/OCS --
Office of Coast Survey

Contact Information

HSD.Chief@noaa.gov

Field Unit

NOAA Ship Thomas Jefferson (S222)

Survey Dates

September 20, 2023 - April 08, 2024

License Information

CC0-1.0

Approver

Captain Matthew Jaskoski

Platform and Sonar Equipment

Thomas Jefferson (S222)

Kongsberg Maritime EM 2040

Kongsberg Maritime EM 2040

2903 (2903)

Kongsberg Maritime EM 2040

Bathymetry Grid

H13846_MB_1m_MLLW_1of1 (North American Datum 1983 (2011), Mean Lower Low Water, Projected UTM 17)

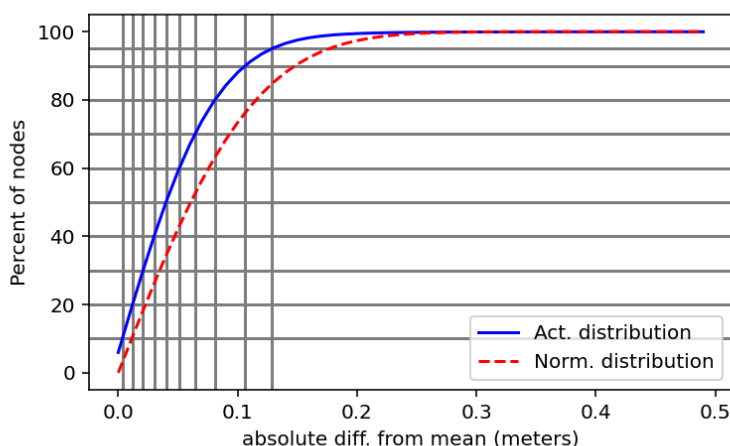
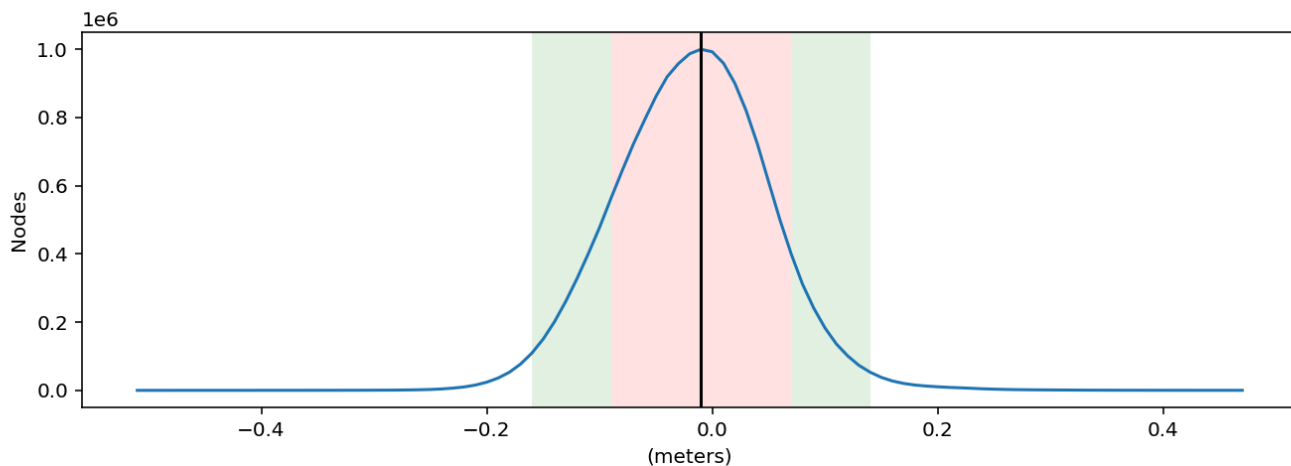
		Fixed		Variable	
Sounding Technique:	Multibeam	Full Seafloor Coverage:	Yes	Feature Detection Size:	2.00 10.00%
Features Detected:	Yes	Bathymetric Coverage:	Yes	Uncertainty Horizontal:	1.00 N/A
Least Depth Detected:	Yes	Interpolated:	No	Uncertainty Vertical:	0.15 0.0075

Quality Control Procedure

Crosslines

Pydro 22, a suite of software maintained by NOAA's Hydrographic Systems and Technology Branch (HSTB), contains various tools that aid in the analysis and quality control of hydrographic data. A Single Resolution (SR) 1m Combined Uncertainty and Bathymetry Estimator (CUBE) surface of this survey's mainscheme data and a SR 1m CUBE surface of this survey's crossline data were differenced with the Pydro 22 tool "Compare Grids." The results of this comparison indicate that over 99.5% of grid-node comparisons between the two surfaces are within the Fraction of Allowable Error for depth/height, exceeding the specification of 95% stipulated by NOAA's 2024 Hydrographic Surveys Specifications and Deliverables (HSSD). The resulting mean of this comparison was a 0.01m difference, with a standard deviation of 0.09m, verifying the consistency of the data. Vessels S222 and 2903 collected a combined total of approximately 91.31 linear nautical miles of MBES crosslines, a figure which constitutes about 4.38% of mainscheme mileage.

H13846_MB_1m_MLLW_Mainscheme_Final-H13846_MB_1m_MLLW_XL_Final
 Mean: -0.01 | Mode: -0.01 | One Standard Deviation: 0.09 | Bin size: 0.01



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.06
80%	+/- 0.08
90%	+/- 0.11
95%	+/- 0.13

A statistical summary of the comparison between H13846 crossline and mainscheme data.

Statistical Analysis

Statistical analysis of grid layers was conducted to assess the quality of the bathymetry. The "Grid QC" program contained within NOAA's Pydro 22 QC Tools was used to assess grid density, resolution, and

uncertainty against allowable standards specified in the most recent edition of the HSSD. This survey was assigned quality metrics of General 1 and the delivered grids exceed the specified standards. The uncertainty metrics reported in the Metadata section reflect the highest Quality Metric that was achieved for the survey (Exceptional).

Directed Editing

After initial collection, MBES data underwent a thorough process of editing and inspection to clean gridded surfaces of erroneous fliers that inaccurately affected seabed measurements, and to ensure that no systematic errors were present. Teledyne's CARIS software was used to generate and examine a 1m CUBE surface as well as its uncertainty and standard deviation layers, which guided visual inspection for fliers. In addition, the Pydro 22 tool "Flier Finder" and the ArcGIS Pro tool "ArcFlier" (developed by NOAA physical scientist Anthony Klemm) both scan grids for anomalous data and were utilized to guide editing. No soundings were designated in this survey.

Holiday Identification

Survey coverage was assessed daily by the field unit as part of night processing to identify data gaps to be addressed. Gaps in coverage that are larger than HSSD specifications are known as holidays. Various methods were utilized to aid in holiday identification including visual inspection and NOAA's Pydro 22 QC Tools program "Holiday Finder". "Holiday Finder" is most commonly used for holiday identification in areas of 100% bathymetric (MBES) coverage. The hydrographer inputs a CUBE surface and the tool returns a number of files which can be used in Caris HIPS & SIPS for holiday analysis and acquisition planning. There are ten holidays present in the coverage achieved for H13846 which the field unit was unable to address due to operational time constraints. These holidays were created through cleaning of noisy data and the absence of overlap between adjacent lines of MBES coverage. After inspection of surrounding areas and considering the depths of the survey area, these holidays do not appear to be navigationally significant.

Survey Adequacy

This entire survey is adequate to supersede previous data. The data in this survey was acquired in accordance with requirements set forth in the 2024 HSSD.

Imagery Coverage

Imagery coverage assessment was not performed for this survey

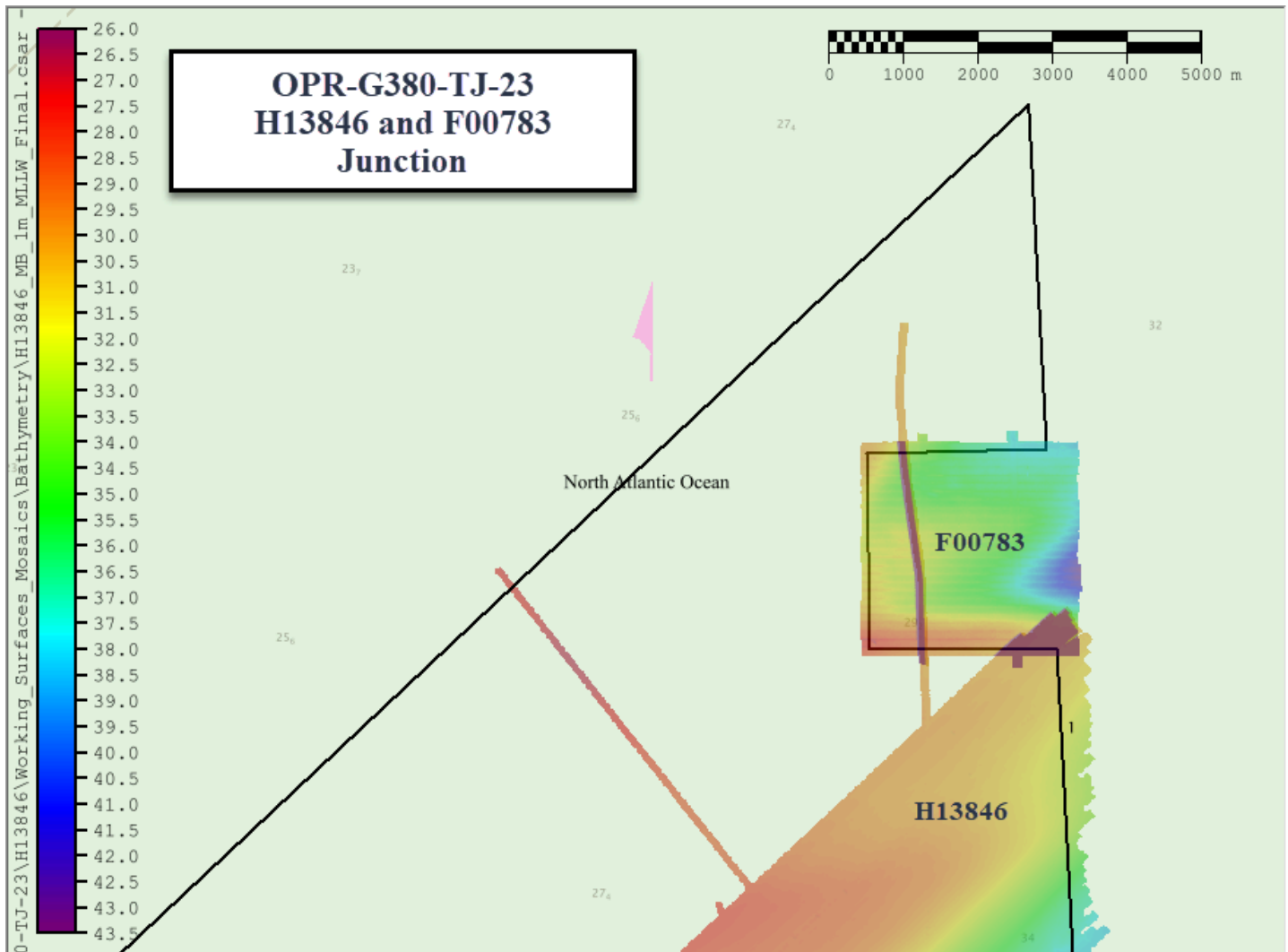
Data Interpolation

Data interpolation was not performed for this survey

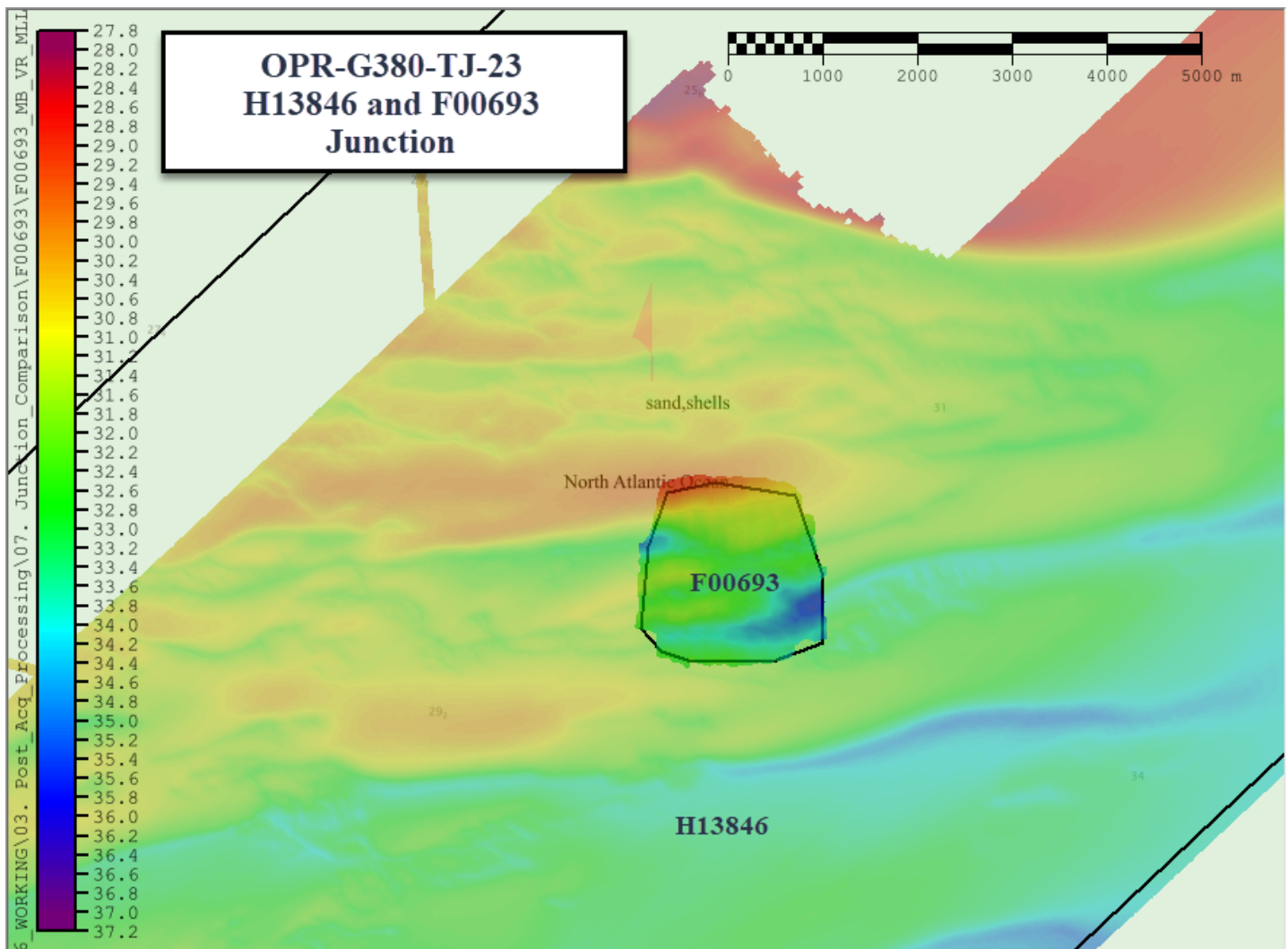
Junction Overlap

Survey H13846 junctions with prior surveys F00693 and F00783. The Pydro 22 tool "Compare Grids" was utilized to assess the overlap of each junction. The results of a comparison between a Variable Resolution (VR) CUBE CSAR surface of survey H13846 and a VR BAG surface of survey F00693 indicate that over 99.5% of grid-node comparisons between the two surfaces are within Fraction of Allowable Error standards for depth/height, exceeding the specification of 95% stipulated by NOAA's 2024 HSSD. The resulting mean of this comparison was a 0.19m difference, with a standard deviation of 0.16m which is within allowable TVU for the area.

The results of a comparison between a 1m CUBE CSAR surface of survey H13846 and a 2m CUBE BAG surface of survey F00786 indicate that 100% of grid-node comparisons between the two surfaces are within Fraction of Allowable Error standards for depth/height, exceeding the specification of 95% stipulated by NOAA's 2024 HSSD. The resulting mean of this comparison was a 0.07m difference, with a standard deviation of 0.06m, indicating good agreement between the surveys.



The north-western portion of survey H13846 junctions with survey F00783.



Survey F00693 is surrounded by survey H13846 coverage.

Backscatter

Calibration Method

N/A

Dynamic Range

The system echo sounders have the dynamic range to accommodate the relatively homogeneous survey area. The frequency was held constant at 300 kHz while the system automatically controlled pulse type.

Acquisition Configuration

No special techniques were used outside of normal considerations for quality data acquisition for a bathymetric survey.

Environmental Variable

Sound speed profiles were collected at the start of acquisition each day and at a minimum of once every four hours in order to apply appropriate absorption coefficients during acquisition.

Acquisition Output

Please refer to Section 4.3.2.1.2 Acoustic Backscatter Imagery of the Field Procedures Manual for the backscatter post processing workflow.

Report of Survey

Uncertainty Source

Information about uncertainty values used for data processing can be found within the Caris HIPS & SIPS processing project and in the associated Hydrographic Vessel Files (HVF) for each survey platform.

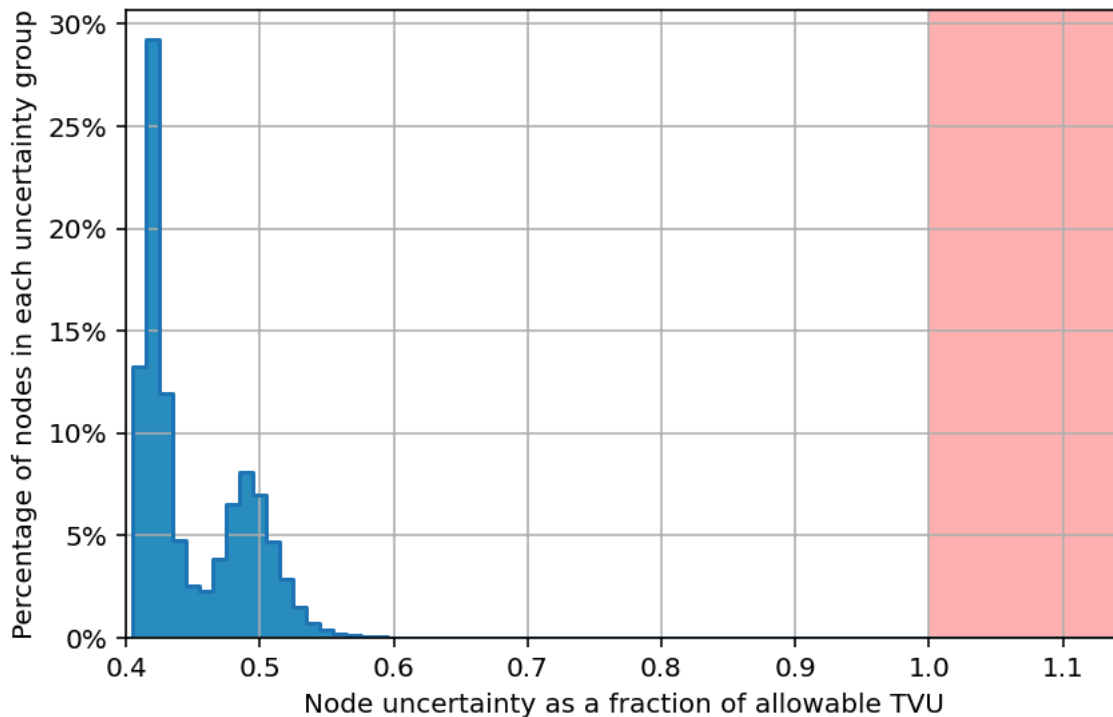
The bathymetric surface of survey H13846 exceeds uncertainty standards stipulated in the 2024 HSSD. The Uncertainty Standards plots depicted in the figures below were generated using the "Grid QC" tool which is part of NOAA's Pydro 22 QC Tools suite. The results illustrate that over 99.5% of nodes in the H13846 MBES surface comply with NOAA General 1, Critical, and Exceptional quality metrics for uncertainty.

Uncertainty Standards - NOAA General 1

Grid source: H13846_MB_1m_MLLW_Final

99.5+% pass (340,738,333 of 340,739,360 nodes), min=0.40, mode=0.42, max=2.31

Percentiles: 2.5%=0.41, Q1=0.42, median=0.43, Q3=0.49, 97.5%=0.53



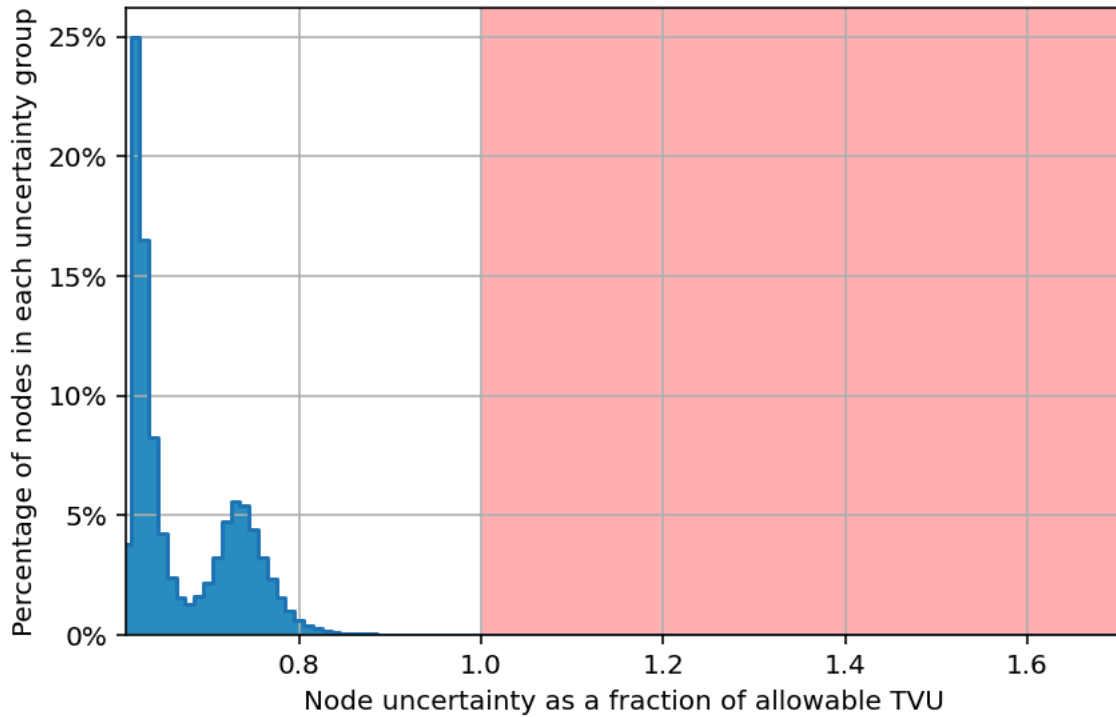
H13846 Uncertainty Standards, NOAA General 1

Uncertainty Standards - NOAA Critical

Grid source: H13846_MB_1m_MLLW_Final

99.5+% pass (340,709,945 of 340,739,360 nodes), min=0.61, mode=0.62, max=3.46

Percentiles: 2.5%=0.61, Q1=0.62, median=0.64, Q3=0.73, 97.5%=0.79



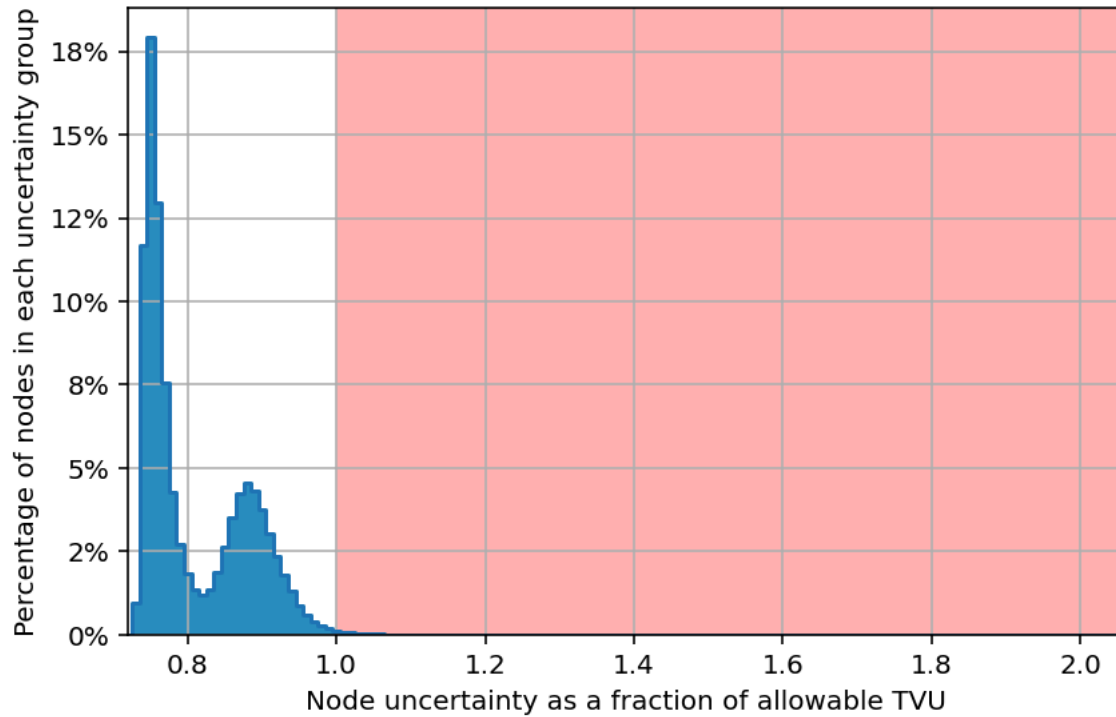
H13846 Uncertainty Standards, NOAA Critical

Uncertainty Standards - NOAA Exceptional

Grid source: H13846_MB_1m_MLLW_Final

99.5+% pass (339,312,710 of 340,739,360 nodes), min=0.72, mode=0.75, max=4.14

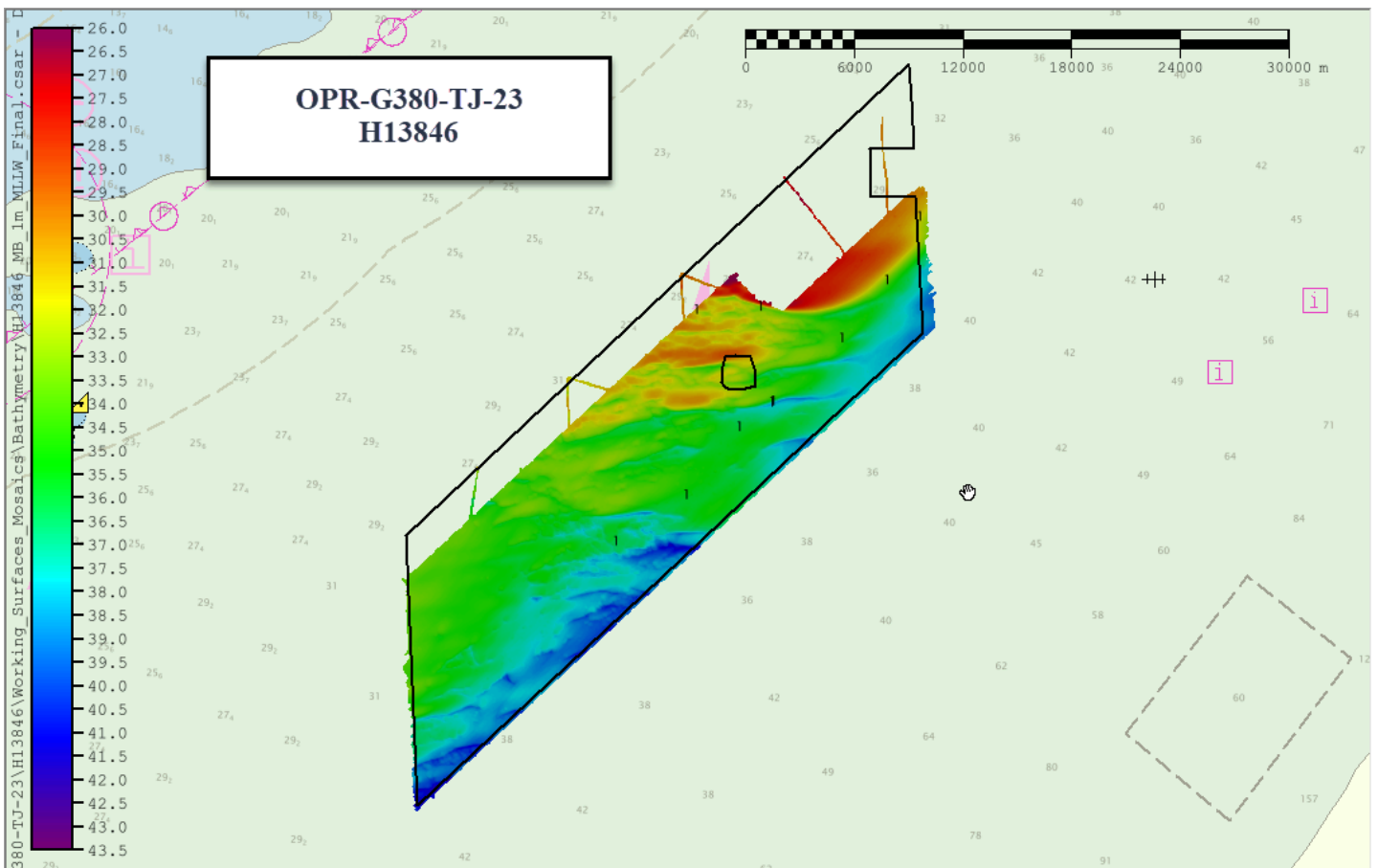
Percentiles: 2.5%=0.74, Q1=0.75, median=0.77, Q3=0.87, 97.5%=0.95



H13846 Uncertainty Standards, NOAA Exceptional

Additional Information

Due to operational time constraints, data was not collected for the entire survey area delineated in the Project Instructions. The field unit recommends that data in the remaining area be collected in a future survey. Ten holidays exist within the data collected for sheet H13846.



H13846 survey sheet limits outlined in black, plotted over ENC US3GA10M. The data collected for this survey are within the sheet limits. Holidays are represented by the digit "1." The legend depicts depth in meters.

Supplementals

- **Final Survey Outline** (Apr 24, 2024)
- **Coast Pilot Report** (May 13, 2024)
- **NCEI Sound Speed Data** (Oct 23, 2023)
- **NCEI Sound Speed Data** (May 13, 2024)
- **Trained Marine Mammal Observers list** (Oct 23, 2023)
- **Trained Marine Mammal Observers list** (Mar 05, 2024)
- **Potentially Sensitive Data Findings** (May 13, 2024)

At the time of the submission of this report, there is no guidance in the 2024 HSSD regarding reporting that there are no Potentially Sensitive Data Findings in a survey. The field unit has been advised by the HSSD committee to note in the Supplementals section that this survey has none.

Approval Statement

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 and approved all data and metadata. The survey meets or exceeds requirements as set forth in the Project Instructions and NOS Hydrographic Surveys Specifications and Deliverables. The survey is complete and no additional work is required with the exception of any deficiencies noted in the Report of Survey.

Approver Name	Approver Title	Approver Certification
Captain Matthew Jaskoski	Commanding Officer	

Personnel

Name	Title	Certification
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Full Equipment List						
Equipment Type	Manufacturer and System	Model Number	Serial Number	Calibration Date	Frequency	Accuracy Check Date
<i>Thomas Jefferson (S222)</i>						
Positioning and Attitude System	Applanix POS MV 320 v5	POS MV 320 v5	6497	2023-03-05	NA	NA
Positioning and Attitude System	Applanix POS MV 320 v5	POS MV 320 v5	6497	2023-03-05	NA	NA
Multibeam	Kongsberg Maritime EM 2040	EM 2040	40260	2023-03-07	200-400 kHz	2023-03-16
Multibeam	Kongsberg Maritime EM 2040	EM 2040	40260	2023-03-07	200-400 kHz	2023-03-16
CTD	Sea-Bird Scientific SBE 19plus V2	SBE 19plus V2	19P60744-6667	2022-11-17	n/a	2023-03-07
CTD	Sea-Bird Scientific SBE 19plus V2	SBE 19plus V2	19P60744-6667	2022-11-17	n/a	2023-03-16
Sound Speed System	Valeport Thru-Hull SVS	Modus SVS	33711	2022-11-17	n/a	2022-11-17
CTD	AML Oceanographic MVP200	MVP 200	M12981	2022-05-04	n/a	2022-05-04
CTD	AML Oceanographic MVP-X	MVP-X2	9199	2023-06-08	n/a	2023-08-08
CTD	AML Oceanographic MVP-X	MVP-X	9006	2023-11-23	n/a	2023-11-23
CTD	SonTek CastAway-CTD	CastAway-CTD	CC2325003	2023-07-24	n/a	2023-09-18
CTD	SonTek CastAway-CTD	CastAway-CTD	CC2333002	2023-08-21	n/a	2023-09-18
Sound Speed System	Teledyne RESON SVP 70	SVP 70	1013077	2019-01-06	n/a	2023-03-16

Equipment Type	Manufacturer and System	Model Number	Serial Number	Calibration Date	Frequency	Accuracy Check Date
<i>2903 (2903)</i>						
Positioning and Attitude System	Applanix POS MV 320 v5	POS MV 320 v5	8927	2023-07-20	NA	NA
Multibeam	Kongsberg Maritime EM 2040	EM2040	40143	2023-07-24	200-400 kHz	2023-08-07
Sound Speed System	Teledyne RESON SVP 70	SVP 70	1921073	2021-09-02	n/a	2021-09-02
CTD	Sea-Bird Scientific SBE 19plus	SBE 19plus	19P36399-4630	2022-11-16	n/a	2023-03-07
CTD	SonTek CastAway-CTD	CastAway-CTD	CC2333002	2023-08-21	n/a	2023-09-18
CTD	SonTek CastAway-CTD	CastAway-CTD	CC2325003	2023-07-24	n/a	2023-09-18