

H13555

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H13555

LOCALITY

State(s): California

General Locality: Channel Islands National Marine Sanctuary

Sub-locality: 6NM Southeast of Santa Rosa Island

2022

CHIEF OF PARTY
CDR Meghan MCGovern

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

H13555

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): **California**

General Locality: **Channel Islands National Marine Sanctuary**

Sub-Locality: **6NM Southeast of Santa Rosa Island**

Scale: **20000**

Dates of Survey: **11/01/2022 to 11/03/2022**

Instructions Dated: **09/09/2022**

Project Number: **OPR-L397-FA-22**

Field Unit: **NOAA Ship *Fairweather***

Chief of Party: **CDR Meghan Mcgovern**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

Verification by: **Pacific 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 10N and NAD83 UTM 11N , 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 H13555

Project: OPR-L397-FA-22

Locality: Channel Islands National Marine Sanctuary

Sublocality: 6NM Southeast of Santa Rosa Island

Scale: 1:20000

November 2022 - November 2022

NOAA Ship *Fairweather*

Chief of Party: CDR Meghan McGovern

A. Area Surveyed

The survey area is located 6NM Southeast off the coast of Santa Rosa Island, California. Data were acquired within the following survey limits

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
33° 52' 42" N 120° 6' 18" W	33° 50' 38.4" N 119° 56' 42" W

Table 1: Survey Limits

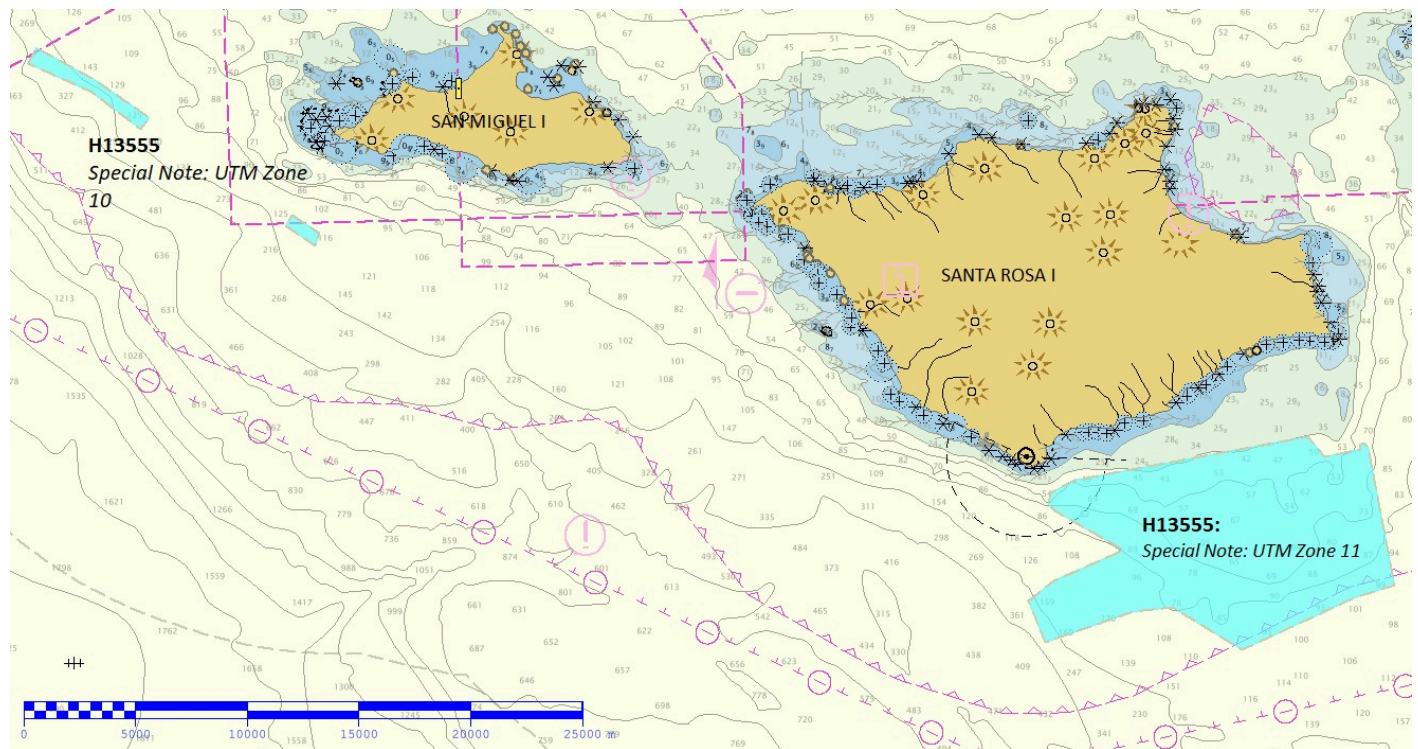


Figure 1: H13555 sheet limits (in blue) overlaid onto chart: US3CA69M

Data were acquired to the survey limits in accordance with the requirements in the Project Instructions and the 2022 NOS Hydrographic Surveys Specifications and Deliverables (HSSD). Coverage acquired in H13555 is shown in Figure 1.

A.2 Survey Purpose

This year the Channel Islands National Marine Sanctuary work will focus on the remaining survey area (prior projects 2017-2019 and 2021) offshore of the Channel Islands (about 40 SNM), located about 30 miles offshore of the California mainland city of Santa Barbara. This area is a popular tourist location, with regular commercial and recreational fishing, diving, and pleasure craft. It also covers Johnson's Lee, a location regularly used for anchorage in foul weather. Inaccurate charting data in these well-traveled areas poses a serious risk to life, property and the delicate ecosystem within the Channel Islands National Marine Sanctuary. In addition to providing data for crucial nautical chart updates, this survey will also generate backscatter data, which will be used in habitat mapping and substrate analysis. Both multibeam echo sounder and backscatter data will not only serve to enhance marine navigational safety, but will also be used by sanctuary managers, planners, and researchers, aiding them in the conservation of this most precious resource.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H13555 meet multibeam echo sounder (MBES) coverage requirements for complete coverage/set line spacing, as required by the HSSD. This includes cross lines (see Section B.2.1), 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.

Table 2: Survey Coverage

The entirety of H13555 was acquired with Complete Coverage, meeting the requirements listed above and in the HSSD.

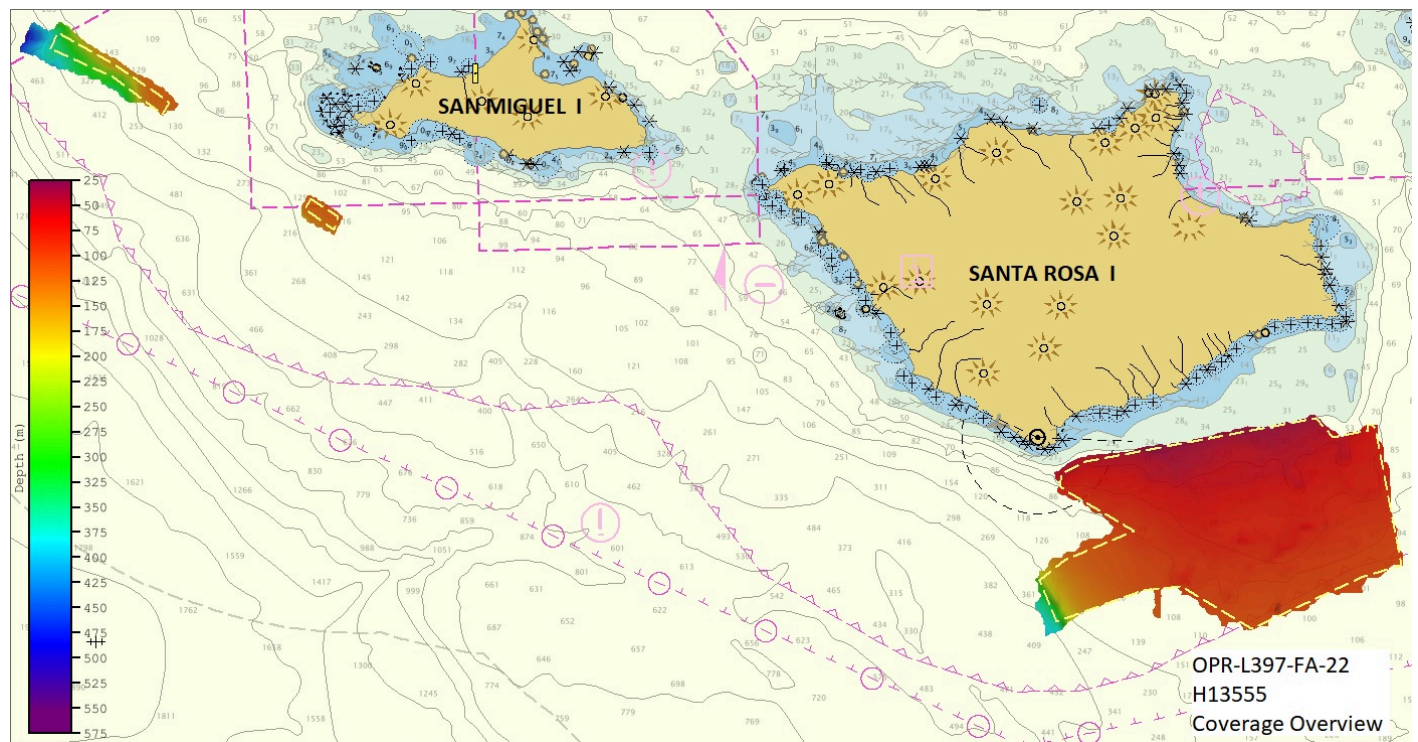


Figure 2: H13555 survey coverage overlaid onto chart: US3CA69M

A.6 Survey Statistics

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

	HULL ID	S220	Total
LNM	SBES Mainscheme	0.0	0.0
	MBES Mainscheme	359.03	359.03
	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	20.82	28.02
	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			36.77

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
11/01/2022	305
11/02/2022	306
11/03/2022	307

Table 4: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the OPR-L397-FA-22_CINMS 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	<i>S220</i>
LOA	70.4 meters
Draft	4.8 meters

Table 5: Vessels Used



Figure 3: NOAA Ship *Fairweather* (S220)

All units are in meters.

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg Maritime	EM 712	MBES
Kongsberg Maritime	EM 712	MBES Backscatter
AML Oceanographic	MVP200	Conductivity, Temperature, and Depth Sensor
Applanix	POS MV 320 v5	Positioning and Attitude System
Teledyne RESON	SVP 70	Sound Speed System

Table 6: Major Systems Used

The equipment was installed on the survey platform as follows: S220 utilizes the Kongsberg EM 712 MBES, a POS M/V v5 system for position and attitude, SVP 70 surface sound speed sensors, and AML Oceanographic MVP 200 for conductivity, temperature, and depth (CTD) casts.

B.2 Quality Control

B.2.1 Crosslines

Crosslines were collected, processed and compared in accordance with Section 5.2.4.2 of the HSSD. 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 (Figure 4). Statistics show the mean difference between the depths derived from mainscheme data and crossline data was 0.10 meters with mainscheme being deeper and 95% of nodes falling within 0.27 meters (Figure 5). For the respective depths, the difference surface was compared to the allowable NOAA uncertainty standards. In total, 99.5% of the depth differences between H13555 mainscheme and crossline data were within allowable NOAA uncertainties.

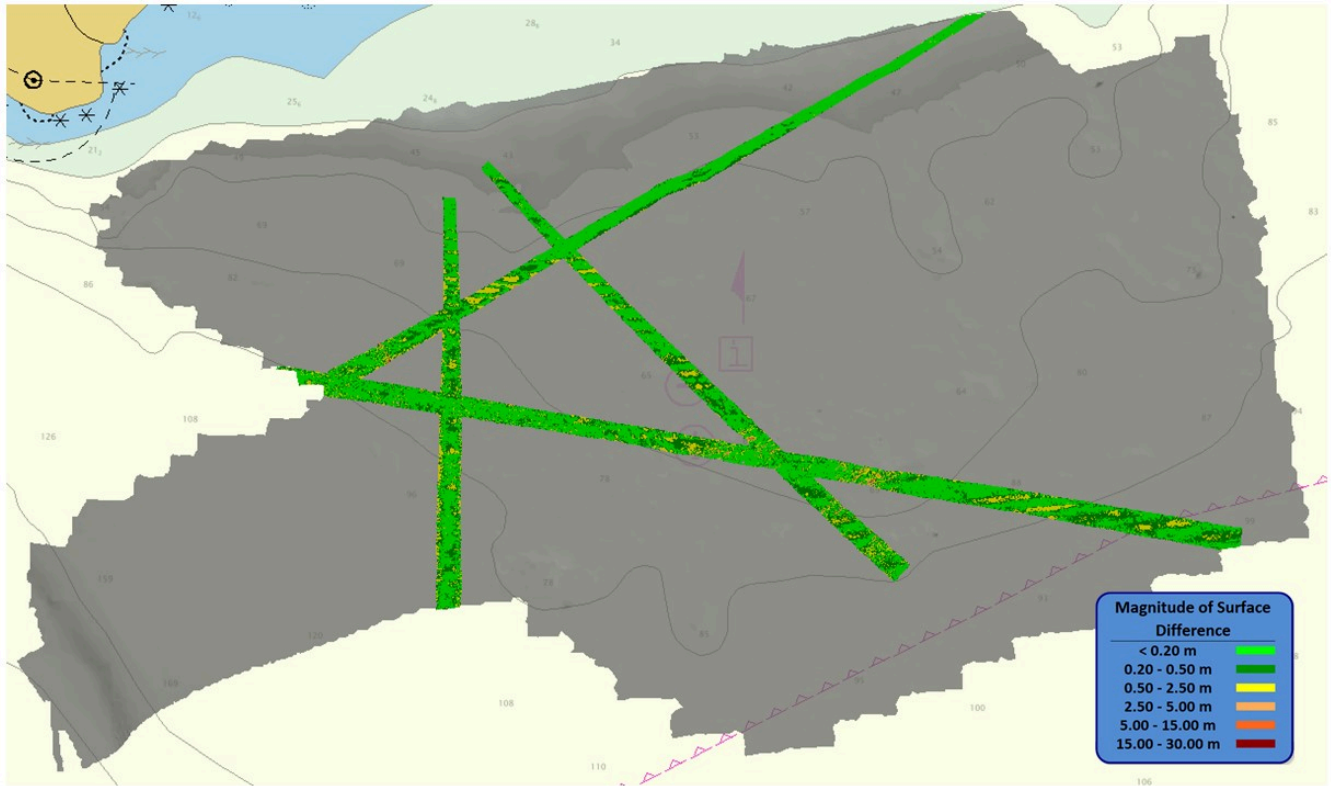


Figure 4: Overview of H13555 crosslines

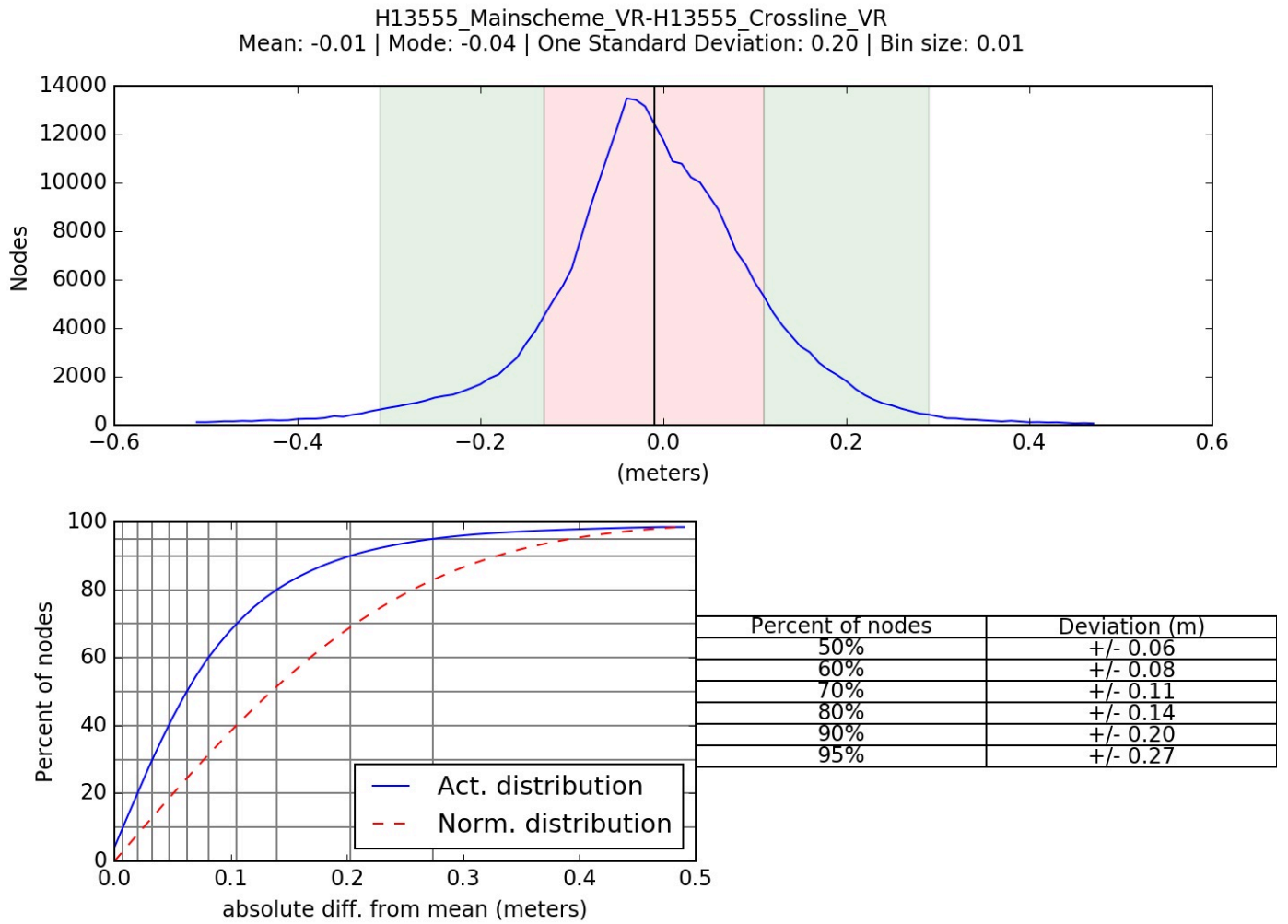


Figure 5: H13555 crossline and mainscheme difference statistics

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.0 meters	7.8 centimeters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S220	N/A meters/second	1 meters/second	N/A meters/second	0.5 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

In addition to the usual a priori estimates of uncertainty via device models for vessel motion and VDATUM, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of survey H13555. Real-time uncertainties were provided via EM 2040 MBES data and Applanix Delayed Heave RMS. Following post-processing of the real-time vessel motion, recomputed uncertainties of vessel roll, pitch, gyro and navigation were applied in CARIS HIPS and SIPS via a Smoothed Best Estimate of Trajectory (SBET) RMS file generated in Applanix POSPac.

B.2.3 Junctions

H13555 junctions with 2 surveys from prior projects, H13088 and W00447 as shown in Figure 6. Data overlap between H13555 and each adjacent survey was achieved. These areas of overlap between surveys were reviewed in CARIS HIPS and SIPS by surface differencing (at equal resolutions) to assess surface agreement. The multibeam data were also examined in CARIS Subset Editor for consistency and agreement. Junction with H13555 and H13088 are generally within the NOAA allowable uncertainty in their areas of overlap. Junctions with H13555 and W00447 exceed the NOAA allowable uncertainty in their areas of overlap. W00447 was conducted at a different data density and with XBT casts for sound speed measurements. Due to W00447 higher level of survey uncertainty, a greater difference between the surveys is expected. For all junctions with H13555, a negative difference indicates H13555 was shoaler and a positive difference indicates H13555 was deeper.

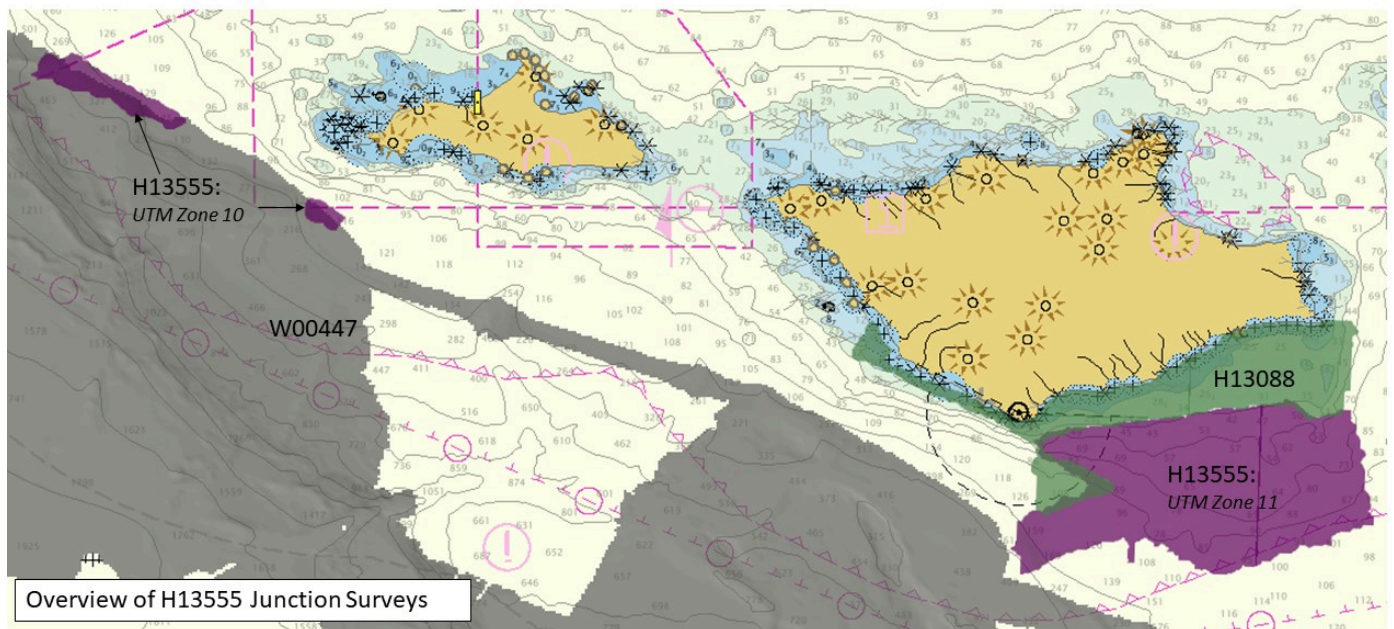


Figure 6: Overview of H13555 junction surveys

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13088	1:20000	2018	NOAA Ship Rainier	N
W00447	1:220	2011	NOAA Ship Okeanos Explorer	S

Table 9: Junctioning Surveys

H13088

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from H13555 and the surface from H13088 (Figure 7). The statistical analysis of the difference surface shows a mean of 0.10 meters with 95% of the nodes having a maximum deviation of +/- 0.39 meters, as seen in Figure 8. It was found that 99.50% of nodes are within NOAA allowable uncertainty.

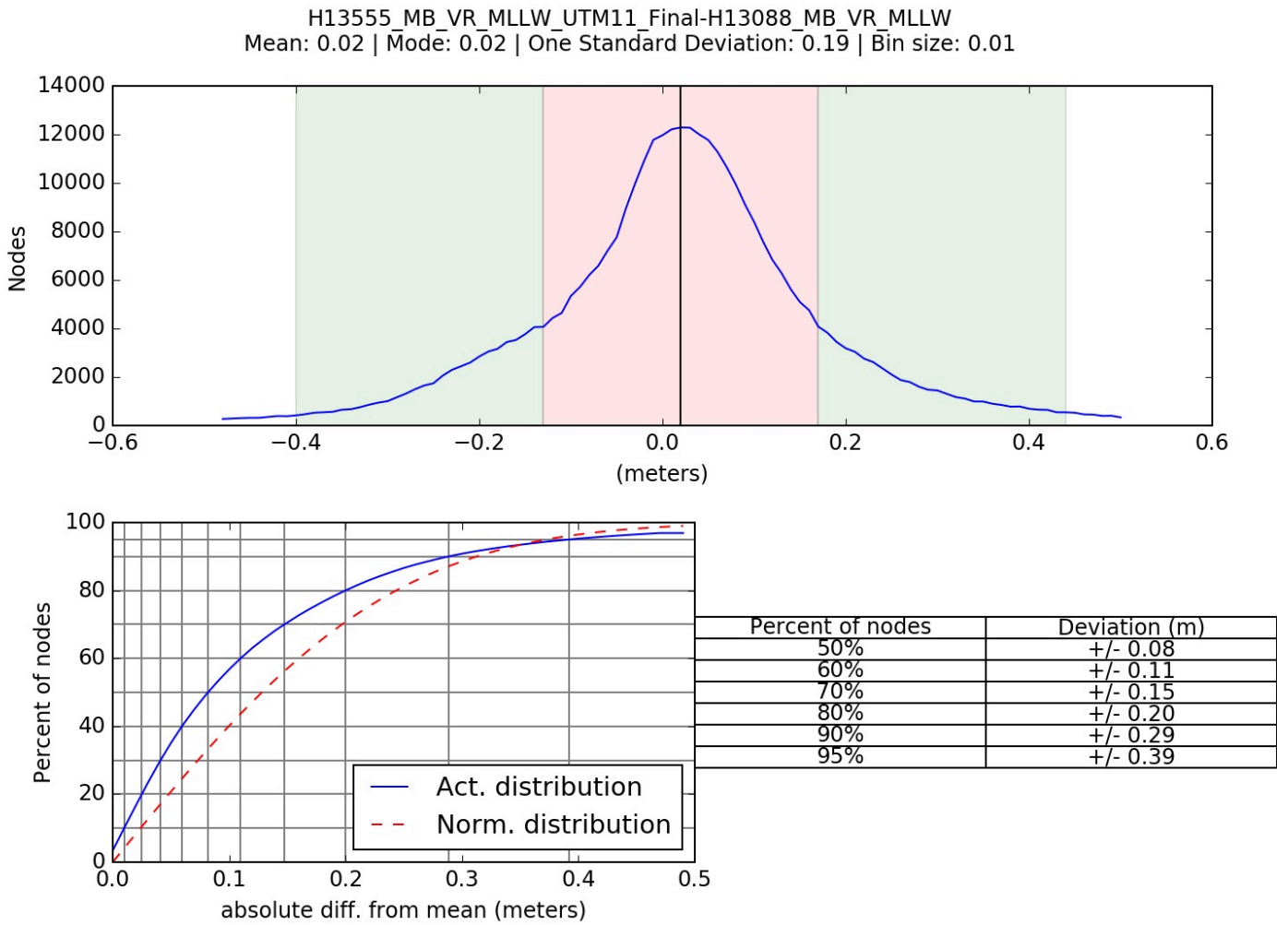


Figure 8: Difference surface statistics between H13555 and H13088

W00447

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from H13555 and the surface from W00447 (Figure 9). The statistical analysis of the difference surface shows a mean of 0.70 meters with 95% of the nodes having a maximum deviation of +/- 12.89 meters, as seen in Figure 10. It was found that 77.97% of nodes are within NOAA allowable uncertainty.

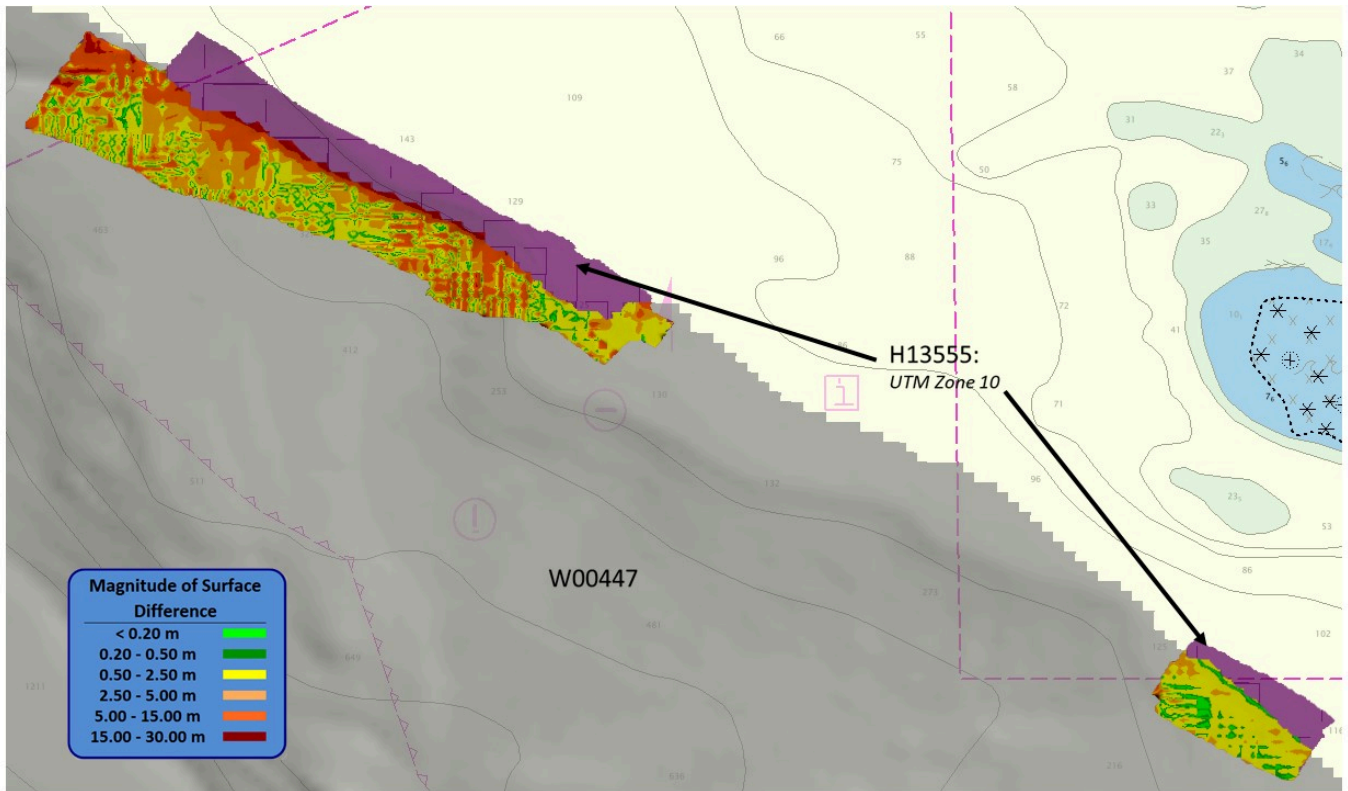


Figure 9: Difference surface between H13555 (purple) and junctioning survey W00447 (grey)

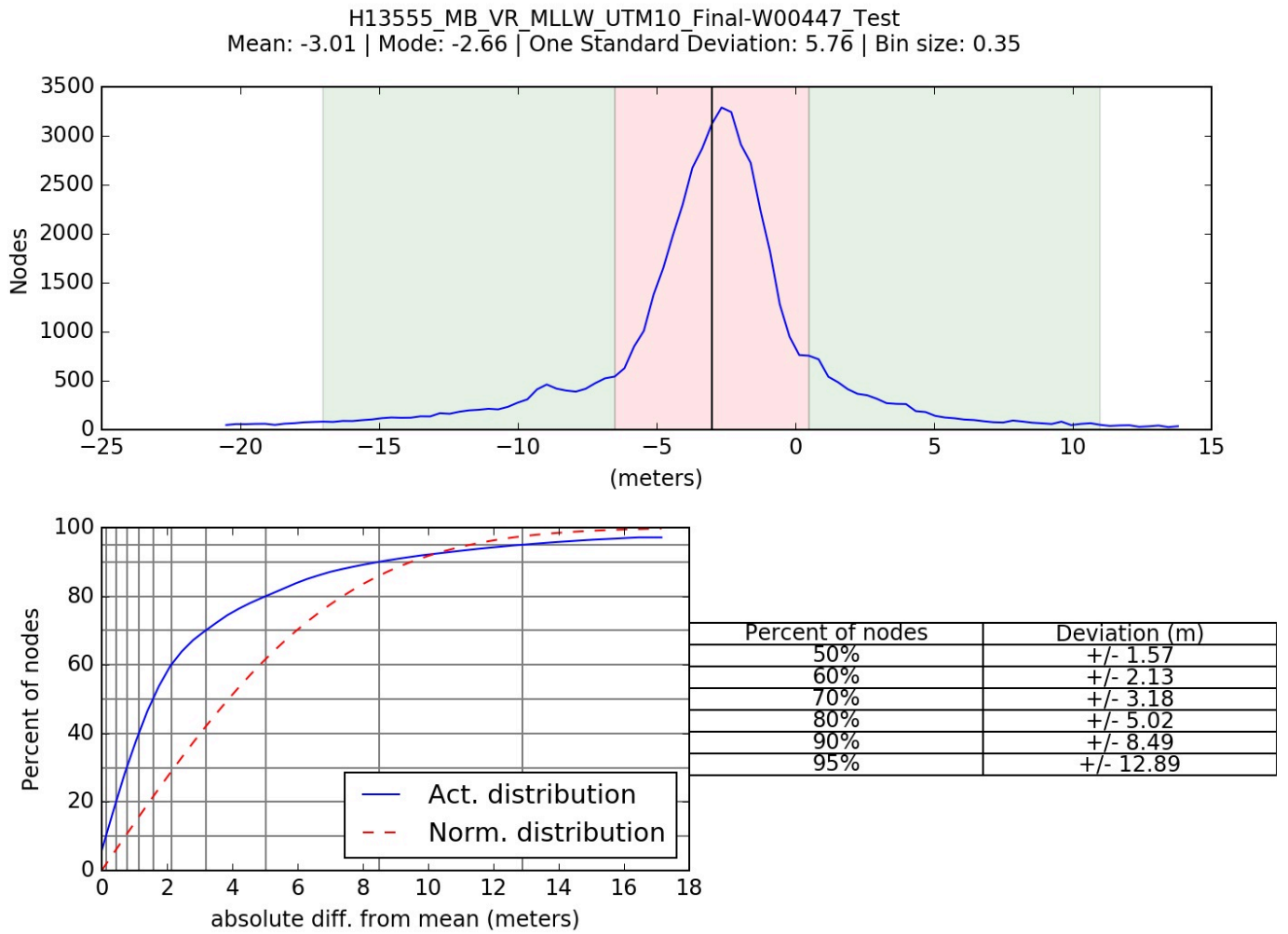


Figure 10: Difference surface statistics between H13555 and W00447

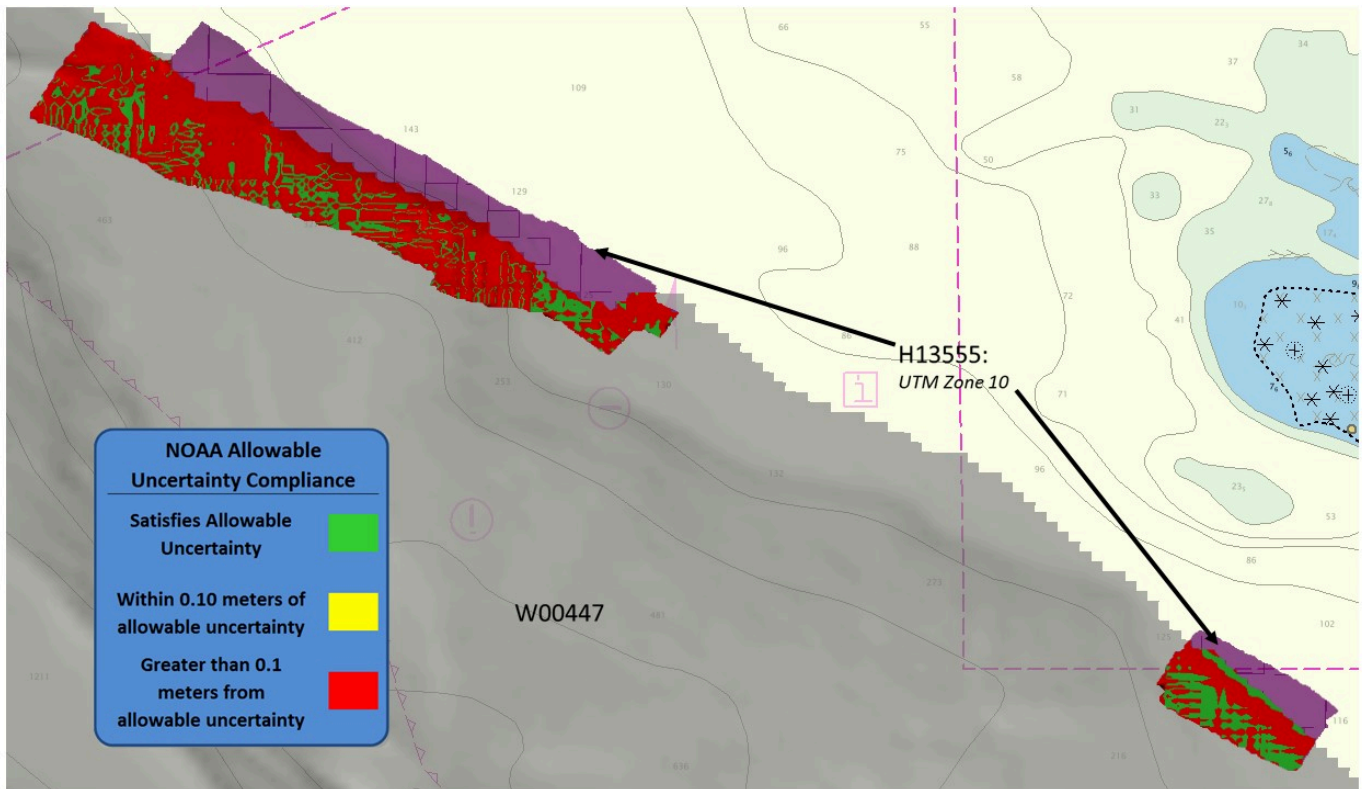


Figure 11: Difference surface compliance with NOAA allowable uncertainty between H13555 (purple) and junctioning survey W00447 (grey)

H13555 NOAA Allowable Uncertainty	
Variable Resolution Surface	
Total Nodes	53,998
Total Nodes Pass	42,104
Total Percent Pass	77.97%

Figure 12: Difference surface statistics between H13555 and W00447 showing percentage of nodes meeting NOAA allowable uncertainty

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

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Casts were conducted at a minimum of one every four hours during launch acquisition. Casts were conducted more frequently in areas where the influx of freshwater had an effect on the speed of sound in the water column and when there was a change in surface sound speed greater than two meters per second. MVP casts on S220 were conducted at an average interval of 210 minutes, guided by observation of the surface sound speed and targeted to deeper areas. All sound speed methods were used as detailed in the DAPR.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Holiday

H13555 data were reviewed in CARIS HIPS and SIPS for holidays in accordance with Section 5.2.2.3 of the HSSD. Zero holidays which meet the definition described in the HSSD for complete coverage were identified via HydrOffice QC Tools Holiday Finder tool. This tool automatically scans the surface for holidays as defined in the HSSD.

B.2.10 NOAA Allowable Uncertainty

The surface was analyzed using the HydrOffice QC Tools Grid QA feature to determine compliance with specifications. Overall, 99.5% of nodes within the surface meet NOAA Allowable Uncertainty specifications for H13555 in UTM Zone 10 (Figure 13). Overall, 99.5% of nodes within the surface meet NOAA Allowable Uncertainty specifications for H13555 in UTM Zone 11 (Figure 14).

Uncertainty Standards - NOAA HSSD

Grid source: H13555_MB_VR_MLLW_Final

99.5+% pass (44,981,544 of 44,981,688 nodes), min=0.02, mode=0.09, max=13.35

Percentiles: 2.5%=0.05, Q1=0.08, median=0.09, Q3=0.10, 97.5%=0.16

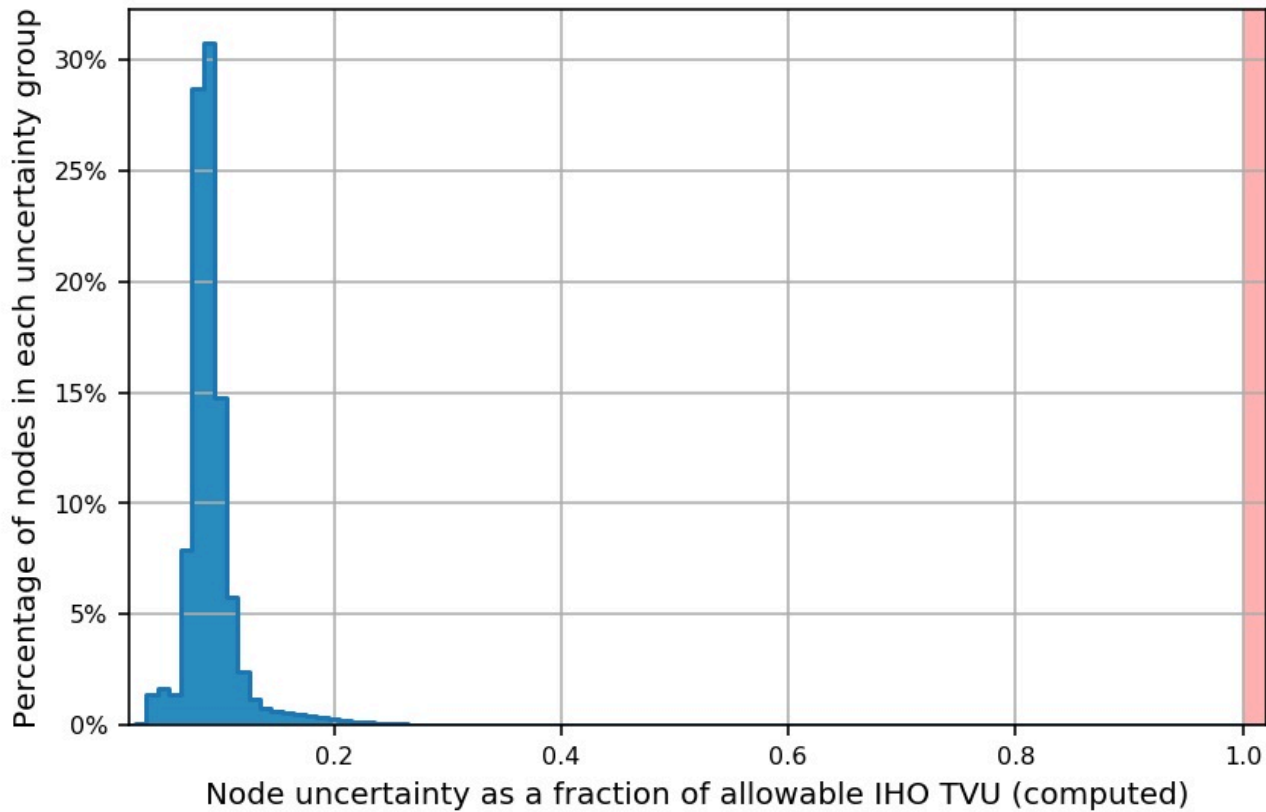


Figure 13: H13555 in UTM Zone 10 allowable uncertainty statistics

Uncertainty Standards - NOAA HSSD

Grid source: H13555_MB_VR_MLLW_UTM11_Final

99.5+% pass (4,604,651 of 4,604,659 nodes), min=0.01, mode=0.03, max=2.26

Percentiles: 2.5%=0.01, Q1=0.02, median=0.03, Q3=0.03, 97.5%=0.06

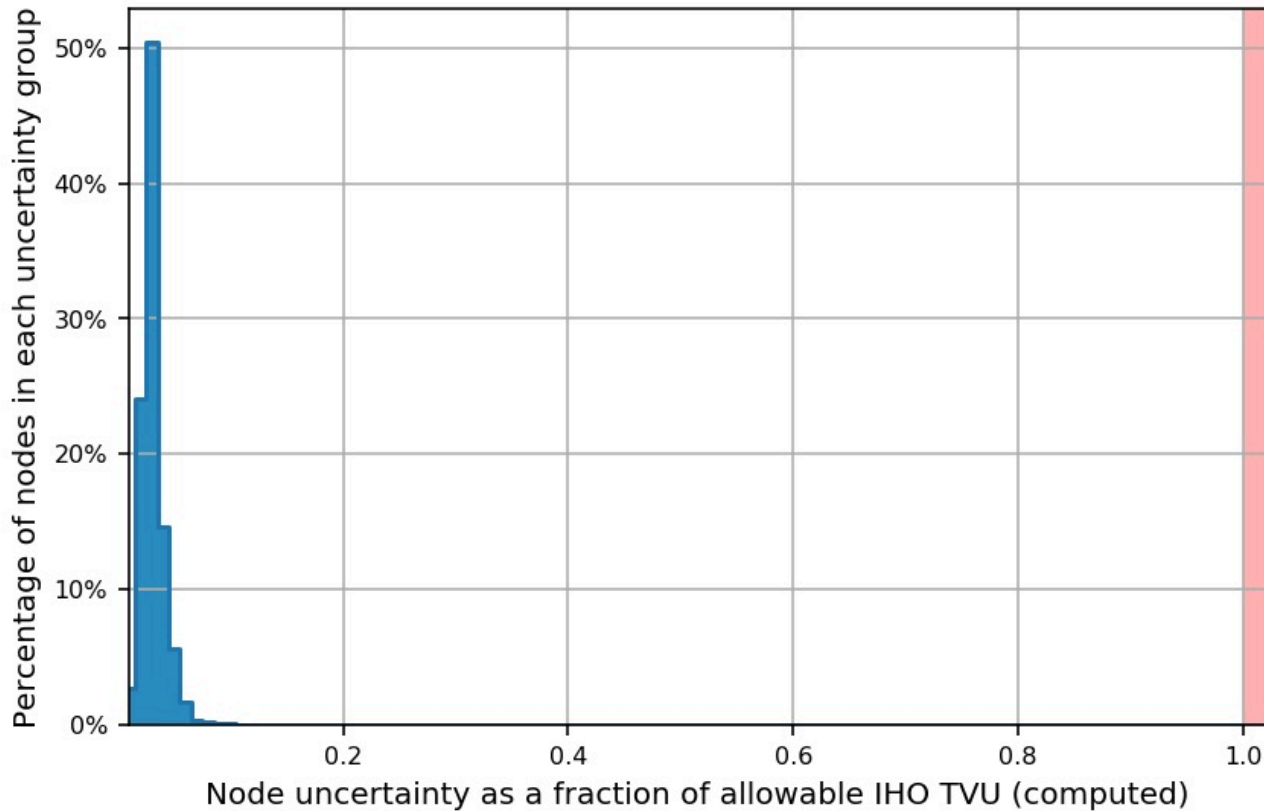


Figure 14: H13555 in UTM Zone 11 allowable uncertainty statistics

B.2.11 Density

The surface was analyzed using the HydrOffice QC Tools Grid QA feature to determine compliance with specifications. Density requirements for H13555 in UTM Zone 10 were achieved with at least 99.5% of surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3 (Figure 15). Density requirements for H13555 in UTM Zone 11 were achieved with at least 99.5% of surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3 (Figure 16).

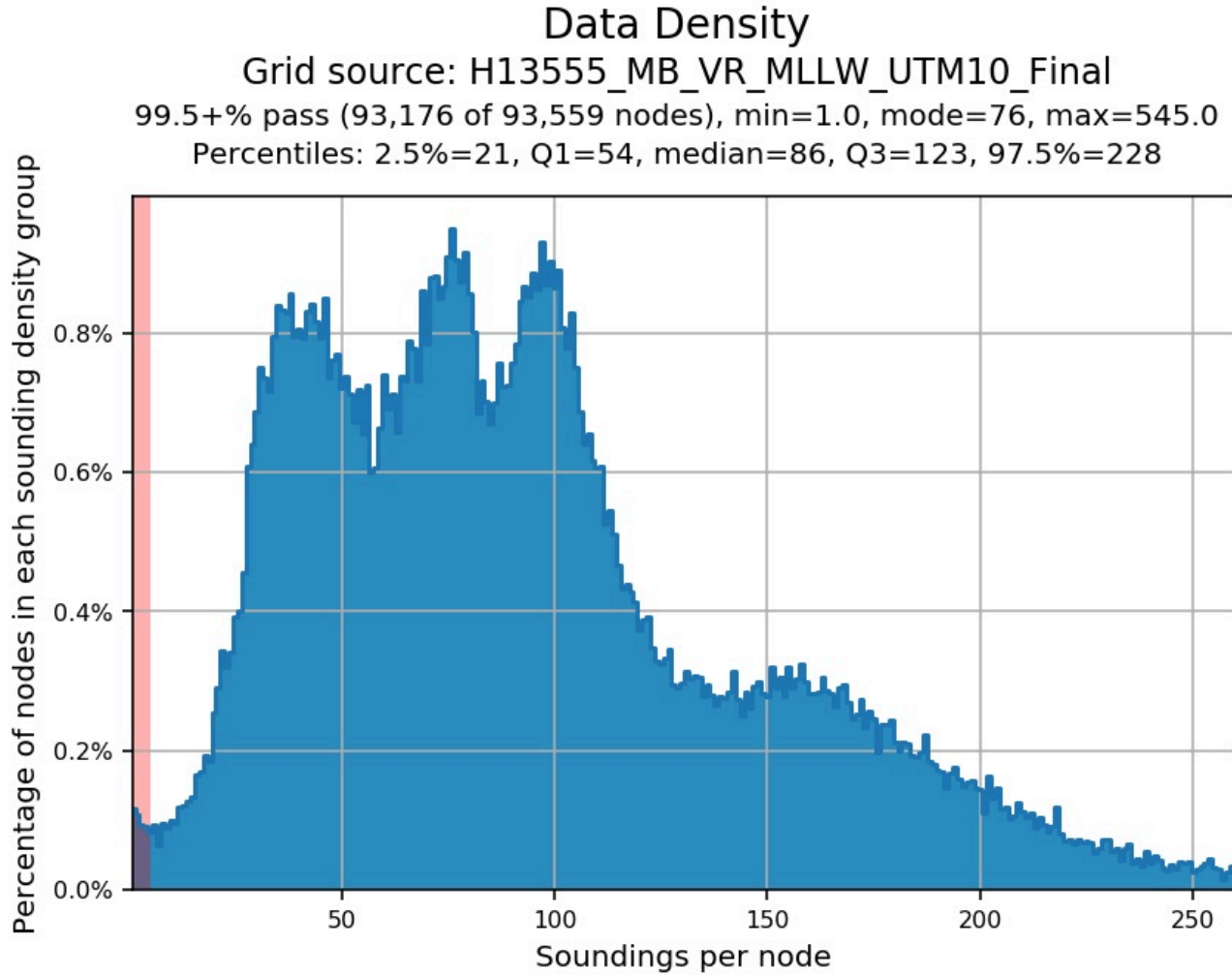


Figure 15: H13555 in UTM Zone 10 data density statistics

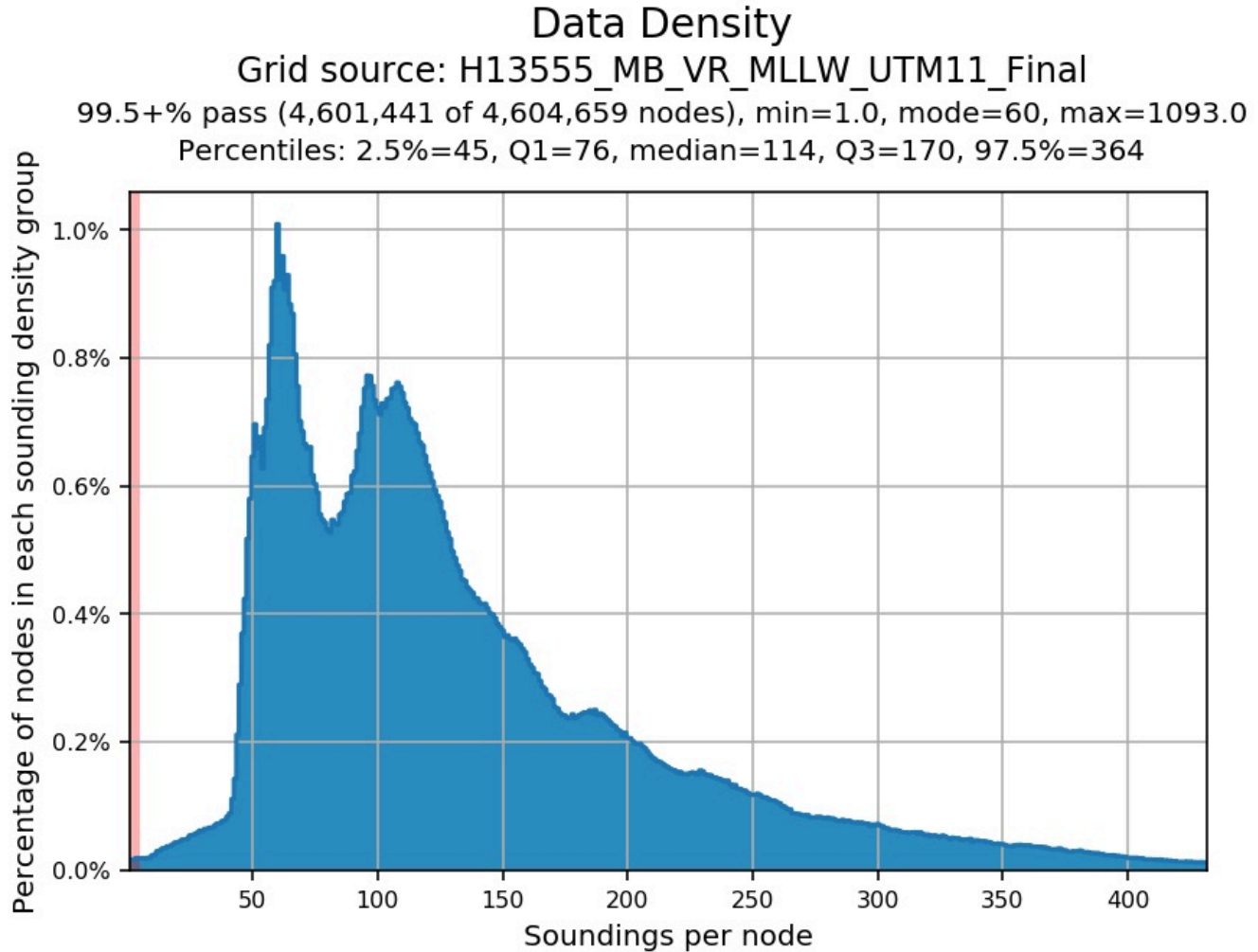


Figure 16: H13555 in UTM Zone 11 data density statistics

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 were stored in the .all file for Kongsberg systems. All backscatter were processed to GSF files and a floating point mosaic was created by the field unit via Fledermaus FMGT 7.10.2 for each UTM zone in H13555. See Figure 17 for a greyscale representation of the complete mosaic.

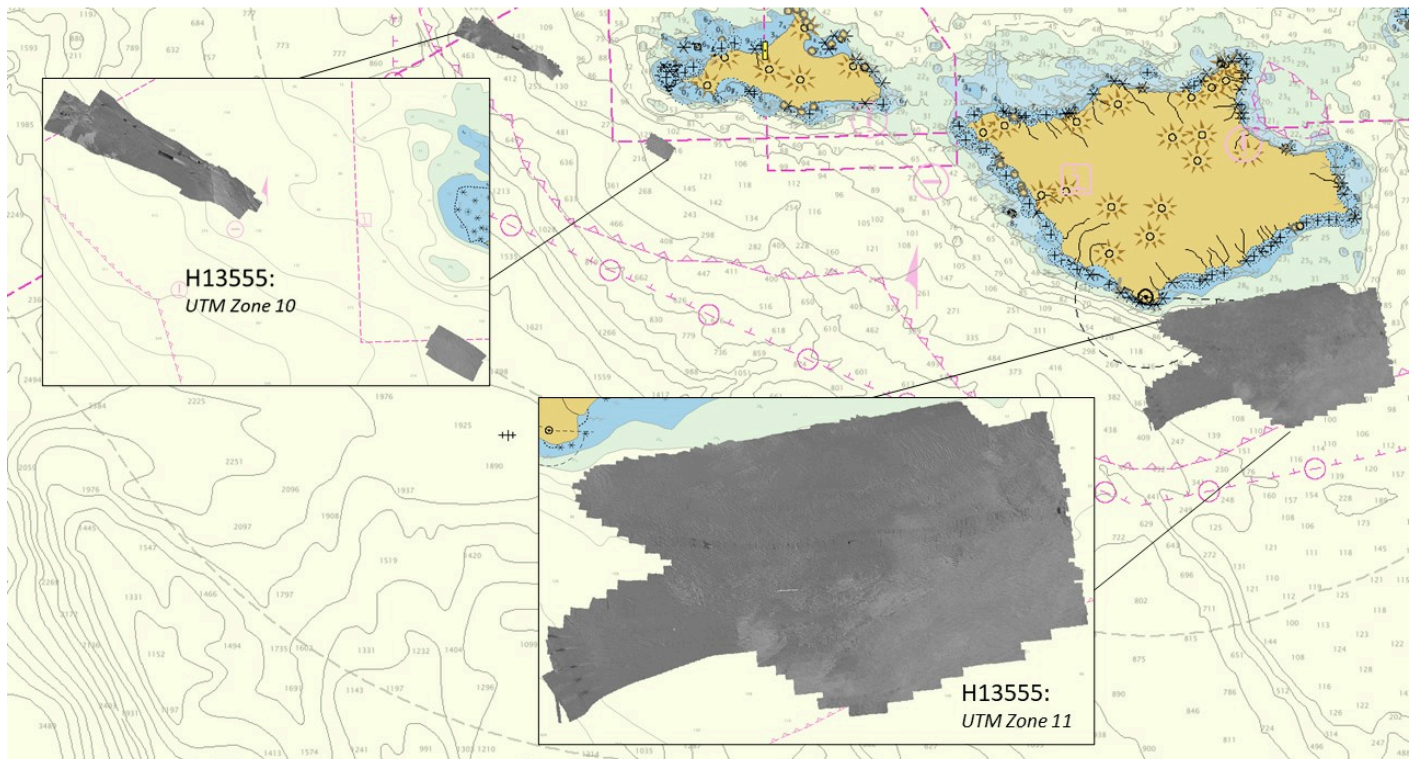


Figure 17: Backscatter mosaic for H13555.

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 and SIPS	11.4

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
QPS	Fledermaus	7.10.2

Table 11: Primary imagery 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
H13555_MB_VR_MLLW_UTM10_Final.csar	CARIS VR Surface (CUBE)	Variable Resolution	112.7 meters - 556.9 meters	NOAA_VR	Complete MBES
H13555_MB_VR_MLLW_UTM11_Final.csar	CARIS VR Surface (CUBE)	Variable Resolution	26.0 meters - 399.6 meters	NOAA_VR	Complete MBES
H13555_MB_VR_MLLW_UTM10.csar	CARIS VR Surface (CUBE)	Variable Resolution	112.7 meters - 556.9 meters	NOAA_VR	Complete MBES
H1355_MB_VR_MLLW_UTM11.csar	CARIS VR Surface (CUBE)	Variable Resolution	26.0 meters - 399.6 meters	NOAA_VR	Complete MBES

Table 12: Submitted Surfaces

The NOAA CUBE parameters defined in the HSSD were used for the creation of all CUBE surfaces for H13555. The CUBE surfaces were created for each portion of the sheet based on the UTM zone at the survey

location. The surfaces have been reviewed where noisy data, or "fliers" are incorporated into the gridded solutions causing the surface to be shallower or deeper than the true sea floor. Where these spurious soundings cause the gridded surface to vary from the reliably measured seabed by greater than the maximum allowable Total Vertical Uncertainty at that depth, the noisy data have been rejected by the hydrographer and the surface recomputed.

Flier Finder, part of the QC Tools package within HydrOffice, was used to assist the search for spurious soundings following gross cleaning. Flier Finder was run iteratively until all remaining flagged fliers were deemed to be valid aspects of the surface and/or outside the designated survey area. All 131 flagged fliers for H13555 were deemed to be actual representations of the sea floor (figure 18 and 19).

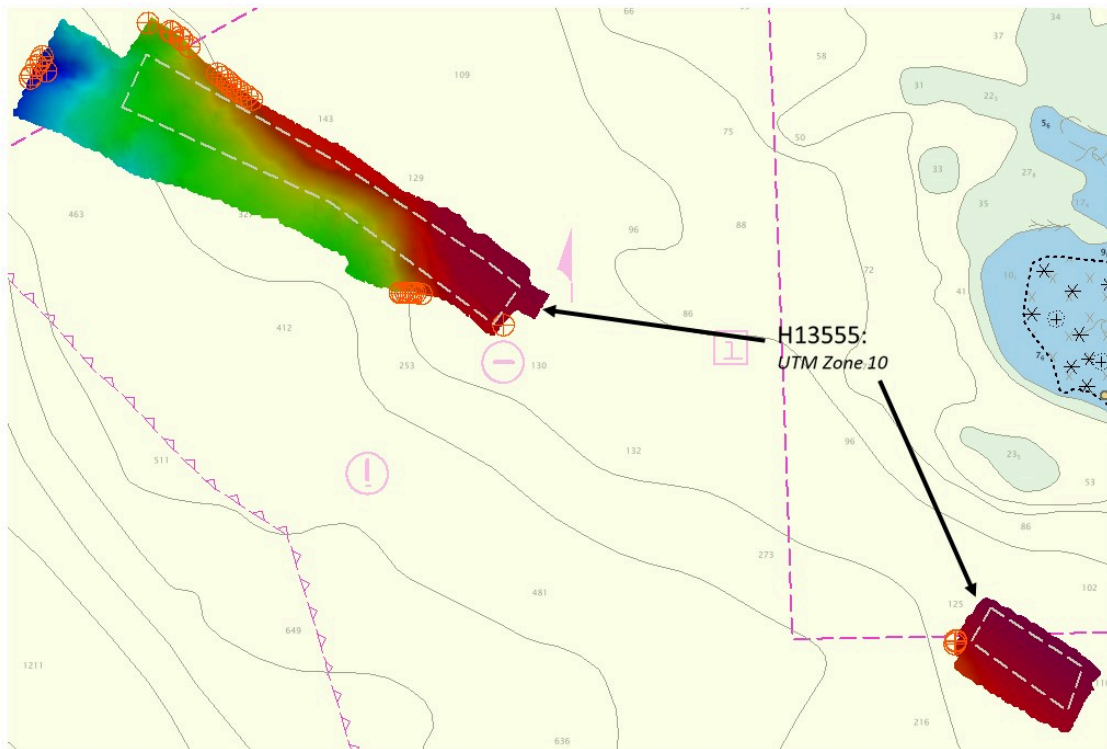


Figure 18: Flagged Fliers investigated for H13555 in UTM Zone 10 deemed to be actual representations of the sea floor.

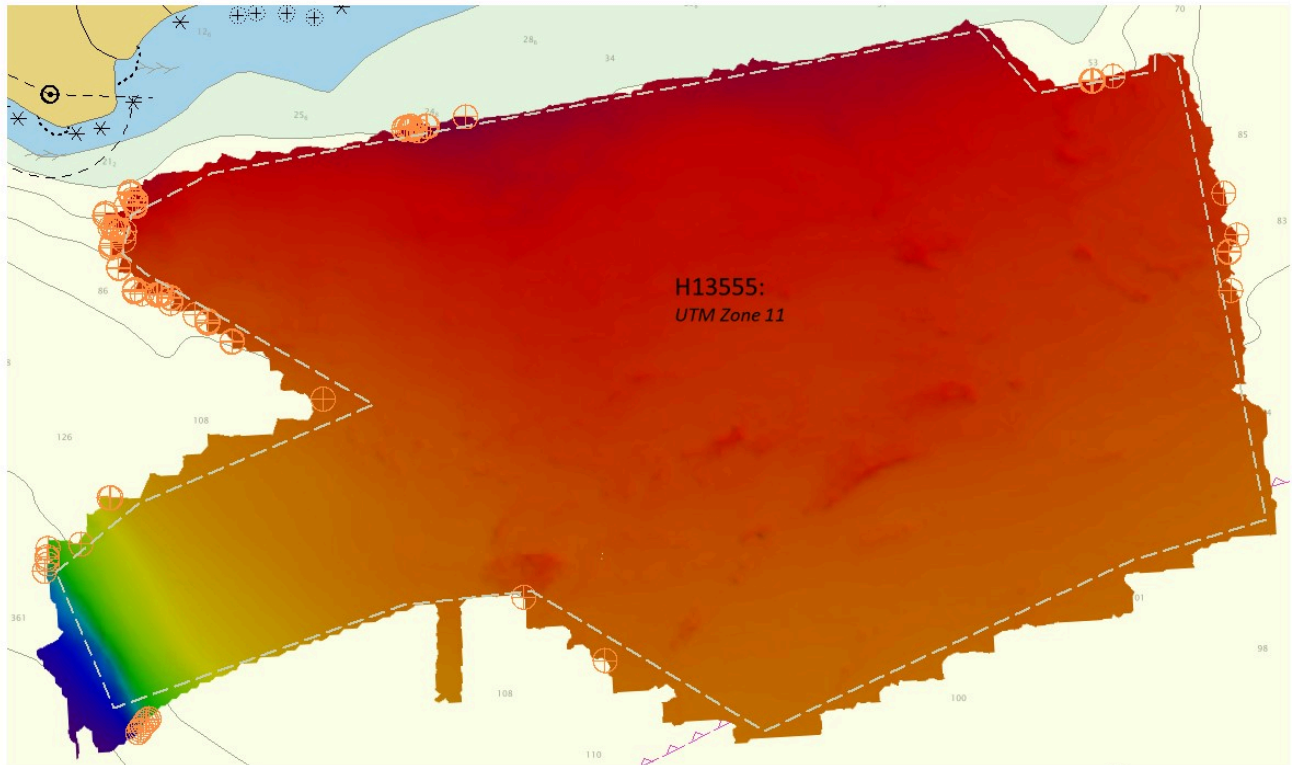


Figure 19: Flagged Fliers investigated for H13555 in UTM Zone 11 deemed to be actual representations of the sea floor.

C. Vertical and Horizontal Control

Per Section 5.2.2.1.3 of the 2020 Field Procedures Manual no Horizontal and Vertical Control Report has been generated for H13555.

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-L397-FA-21_100m_NAD83_2011- MLLW_geoid18.csar

Table 13: ERS method and SEP file

ERS methods were used as the final means of reducing H13555 to MLLW for submission.

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 10.

The following PPK methods were used for horizontal control:

- RTX

H13555 spanned both North American Datum 1983 Projected UTM 10 and Projected UTM 11. For all processed data the sections of H13555 were processed utilizing the respective datum. Files have been labeled to identify which datum was utilized for the data. UTM Zone separations were highlighted in Figure 1 under section 1. Vessel kinematic data were post-processed using Applanix POSPac processing software and RTX positioning methods described in the DAPR. Smoothed Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS and SIPS.

WAAS

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 H13555, as no DGPS stations were available for real-time horizontal control.

D. Results and Recommendations

D.1 Chart Comparison

D.1.1 Electronic Navigational Charts

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date
US3CA69M	1:232188	28	01/18/2022	08/18/2022

Table 14: Largest Scale ENC's

Concur with clarification. There are another 2 largest scales ENC's in the survey area: ENC US3CA68M (1:100,000) and US3CA64M (1:40:000)

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 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

No bottom samples were required for this survey.

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 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
CDR Meghan McGovern	Chief of Party	04/16/2023	MCGOVERN.MEGHAN.ELIZABETH.1284020495 <small>Digitally signed by MCGOVERN.MEGHAN.ELIZABETH.1284020495 Date: 2023.04.16 19:07:12 -08'00'</small>
LTJG Taylor Krabel	Operations Officer	04/16/2023	KRABIEL.TAYLOR.ALAN.1539169935 <small>Digitally signed by KRABIEL.TAYLOR.ALAN.1539169935 Date: 2023.04.16 19:07:59 -08'00'</small>
ENS Sarah Rollings	Sheet Manager	04/16/2023	ROLLINGS.SARAH.JEAN.1521575065 <small>Digitally signed by ROLLINGS.SARAH.JEAN.1521575065 Date: 2023.04.16 12:07:28 -08'00'</small>

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