H13239

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13239

LOCALITY

State(s):	Alaska
General Locality:	Alaska
Sub-locality:	Cape Peirce to Cape Newenham

2019

CHIEF OF PARTY
CDR Marc Moser, NOAA

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Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13239

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):	**Alaska**
General Locality:	**Alaska**
Sub-Locality:	**Cape Peirce to Cape Newenham**
Scale:	**40000**
Dates of Survey:	**06/10/2019 to 07/13/2019**
Instructions Dated:	**04/30/2019**
Project Number:	**OPR-R320-FA-19**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**CDR Marc Moser, NOAA**
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 3N, 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 H13239

Project: OPR-R320-FA-19

Locality: Alaska

Sublocality: Cape Peirce to Cape Newenham

Scale: 1:40000

June 2019 - July 2019

NOAA Ship *Fairweather*

Chief of Party: CDR Marc Moser, NOAA

A. Area Surveyed

The survey area is located between Cape Peirce and Cape Newenham, Alaska.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
58° 30' 20.65" N 161° 33' 33.3" W	58° 37' 1.94" N 162° 8' 21.73" W

Table 1: Survey Limits

Data were acquired to the survey limits in accordance with the requirements in the Project Instructions and the March 2019 NOS Hydrographic Surveys Specifications and Deliverables (HSSD) as shown in Figure 1. In all areas where the 3.5 meter depth contour or the sheet limits were not met, the Navigable Area Limit Line (NALL) was defined as the inshore limit of bathymetry due to the risks of swells, maneuvering the survey vessel in close proximity to the steep and rocky shoreline, or to avoid disturbing nesting bird colonies. An example of such an area is shown in Figure 2.

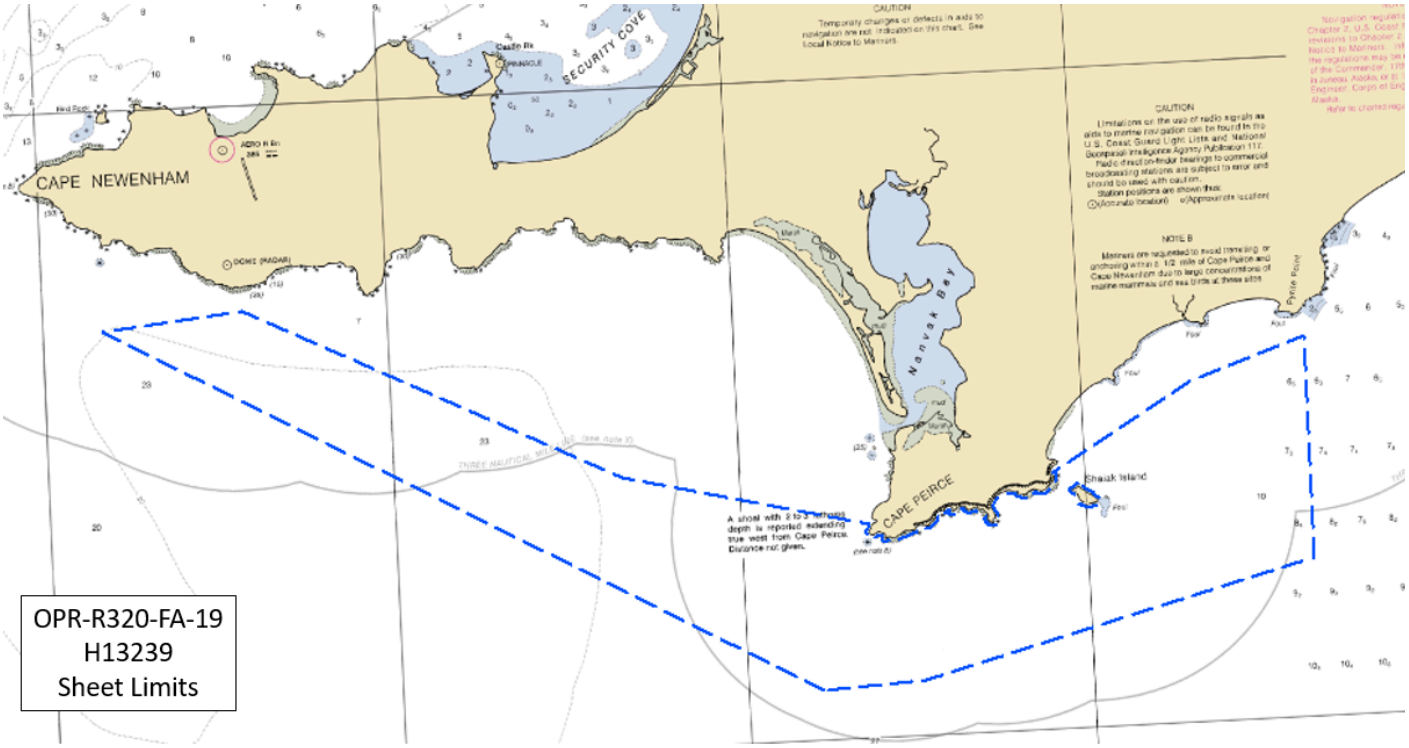


Figure 1: H13239 sheet limits (in blue) overlaid onto Chart 16305

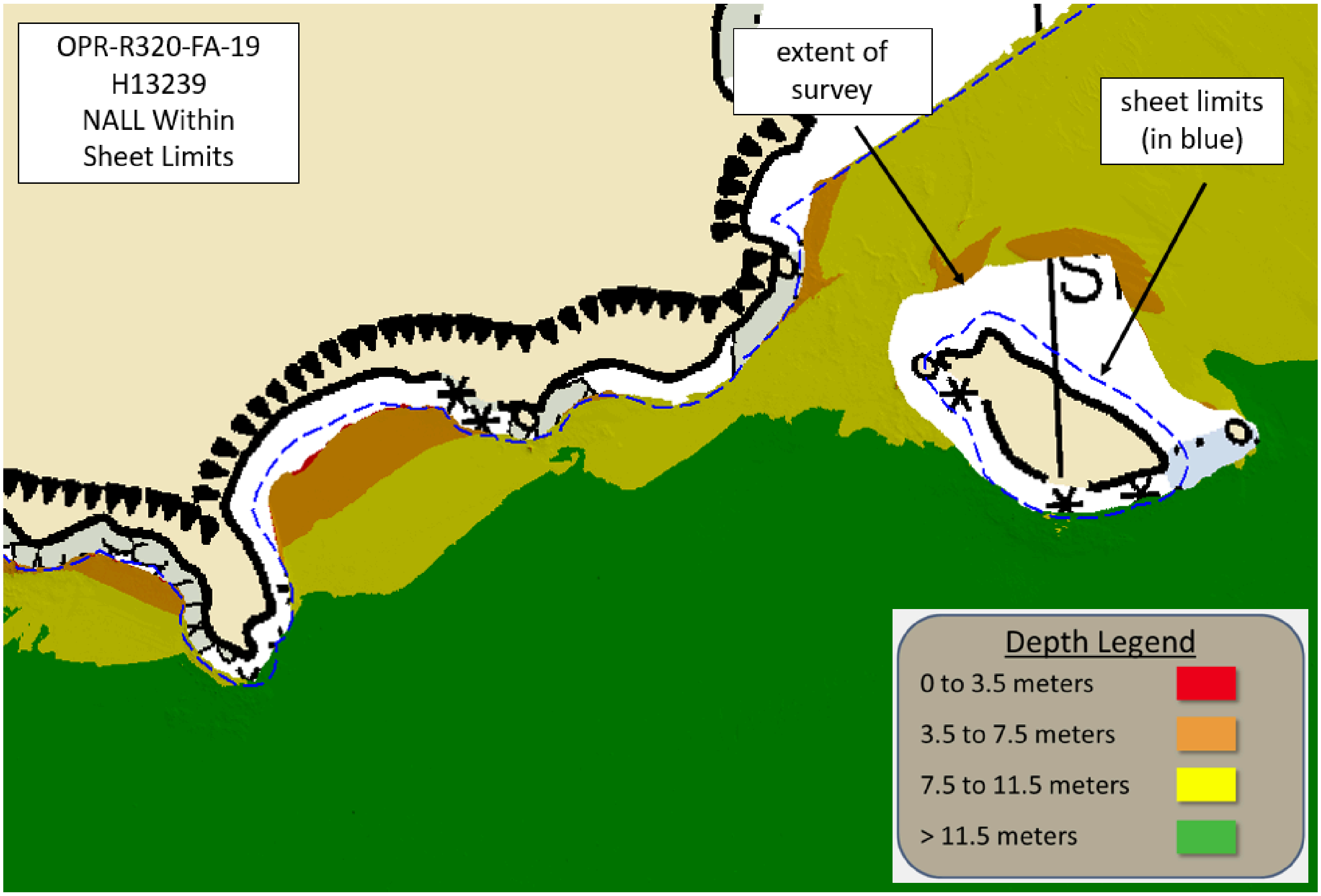


Figure 2: H13239 Example of where the NALL was not reached due to the risks of maneuvering the survey vessel in close proximity to the rocky shoreline and nesting birds near Shaiak Island

A.2 Survey Purpose

The purpose of this hydrographic survey is to update National Ocean Service nautical charting products and support commerce to the northern Bristol Bay region. Capes Newenham and Peirce, Alaska are the southwestern corner of the Togiak National Wildlife Refuge and provide habitat to numerous birds and sea mammals. Ship and barge traffic delivering industrial, consumer, and energy products to the communities of northern Bristol Bay, or continuing north to the Etolin Strait must transit around these capes. Marine commerce is critical for the survival of these western Alaskan communities as they are detached from the rest of the state road system. Legacy hydrographic data in this survey area is extremely sparse and was acquired prior to the 1920s. Updating the nautical charts and accurately charting reported shoals by modern hydrographic means is critical for the future safety of regional commerce, local tanker lightering, emergency response, and the protection of the local wildlife. Survey data from this project is intended to supersede all prior survey data in the common area.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H13239 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as required by the HSSD. This includes crosslines (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 H13239 was acquired with complete coverage, meeting the requirements listed above and in the HSSD. See Figure 3 for an overview of coverage.

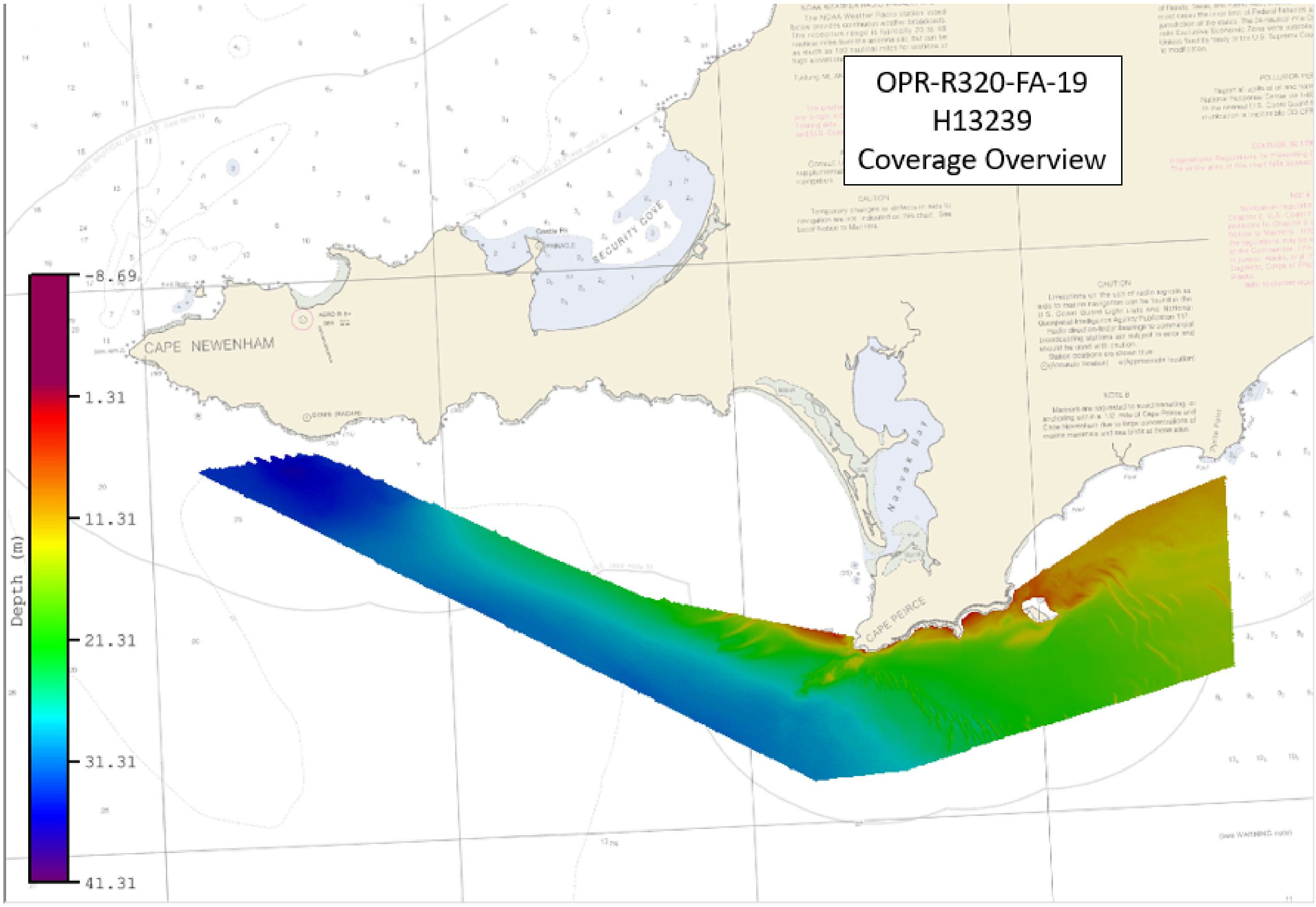


Figure 3: H13239 survey coverage overlaid onto Chart 16305

A.6 Survey Statistics

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

	HULL ID	*FA 2805*	*FA 2806*	*FA2807*	*FA 2808*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0	0
	MBES Mainscheme	493.49	326.85	268.05	0.71	1089.10
	Lidar Mainscheme	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0
	SBES/MBES Crosslines	1.65	0	29.78	14.86	46.28
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						4
Number Maritime Boundary Points Investigated						0
Number of DPs						0
Number of Items Investigated by Dive Ops						0
Total SNM						38.01

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
06/10/2019	161

Survey Dates	Day of the Year
06/11/2019	162
06/12/2019	163
06/20/2019	171
06/21/2019	172
06/23/2019	174
06/24/2019	175
06/28/2019	179
07/01/2019	182
07/11/2019	192
07/12/2019	193
07/13/2019	194

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	***2805***	***2806***	***2807***	***2808***
LOA	8.6 meters	8.6 meters	8.6 meters	8.6 meters
Draft	1.1 meters	1.1 meters	1.1 meters	1.1 meters

Table 5: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg Maritime	EM 2040	MBES
Sea-Bird Scientific	SBE 19plus V2	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 71	Sound Speed System
Applanix	POS MV 320 v5	Positioning and Attitude System

Table 6: Major Systems Used

All launches utilize Kongsberg EM 2040 MBES, Applanix POS MV v5 systems for positioning and attitude, Teledyne RESON SVP 71 surface sound speed sensors, and Sea-Bird Scientific 19plus 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), and is submitted in the Separates II Digital Data folder. Statistics show the mean difference between the depths derived from mainscheme data and crossline data was 0.02 meters (with mainscheme being deeper) and 95% of nodes falling within +/- 0.16 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 H13239 mainscheme and crossline data were within allowable NOAA uncertainties.

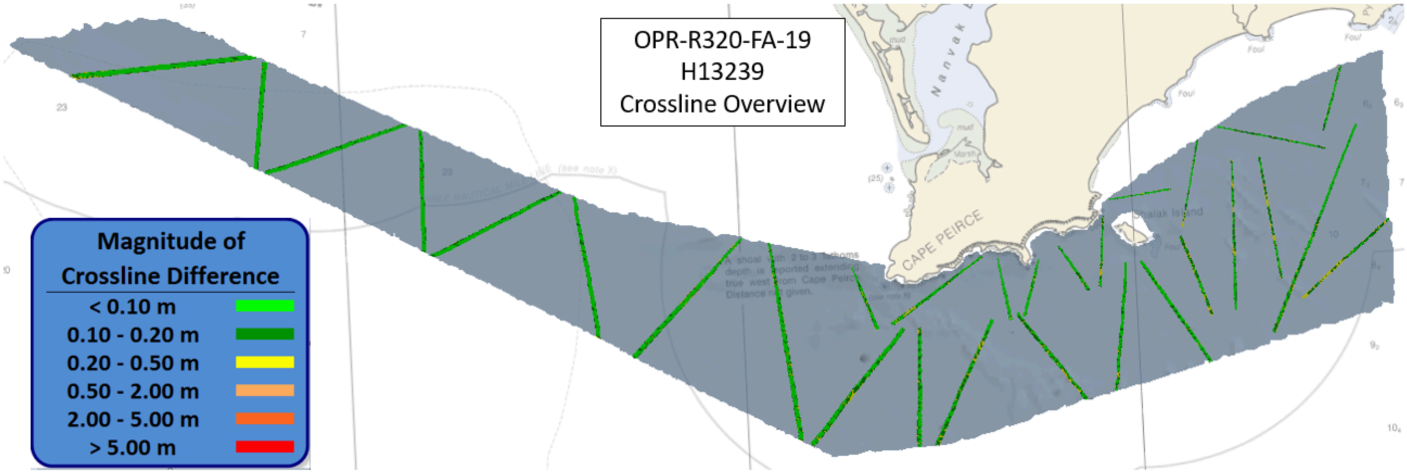
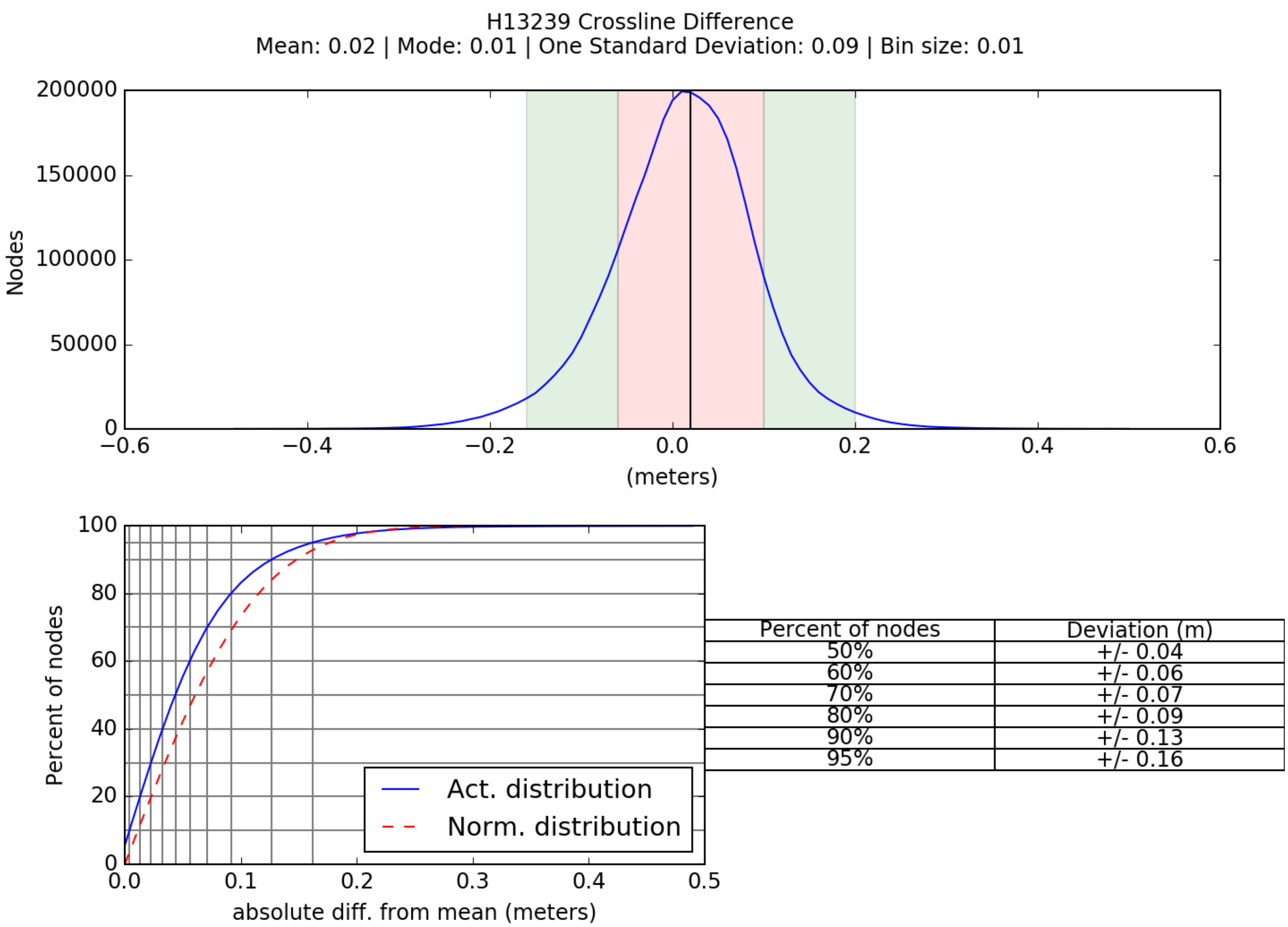


Figure 4: Overview of H13239 Crosslines



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.06
70%	+/- 0.07
80%	+/- 0.09
90%	+/- 0.13
95%	+/- 0.16

Figure 5: H13239 Crossline and Mainscheme Difference Statistics

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via ERTDM	0.14 meters	0 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
280x (all launches)	2 meters/second	N/A	0.5 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

In addition to the usual a priori estimates of uncertainty provided via device models for vessel motion and ERTDM, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of survey H13239. 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

H13239 junctions with four adjacent surveys from this project, H13238, H13240, H13244, H13245, as shown in Figure 6. Data overlap between H13239 and each adjacent survey was achieved, with the exception of H13244, as discussed below. These areas of overlap between surveys were reviewed with 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. The junctions with H13239 are generally within the NOAA allowable uncertainty in their areas of overlap. For all junctions with H13239, a negative difference indicates H13239 was shoaler, and a positive difference indicates H13239 was deeper.

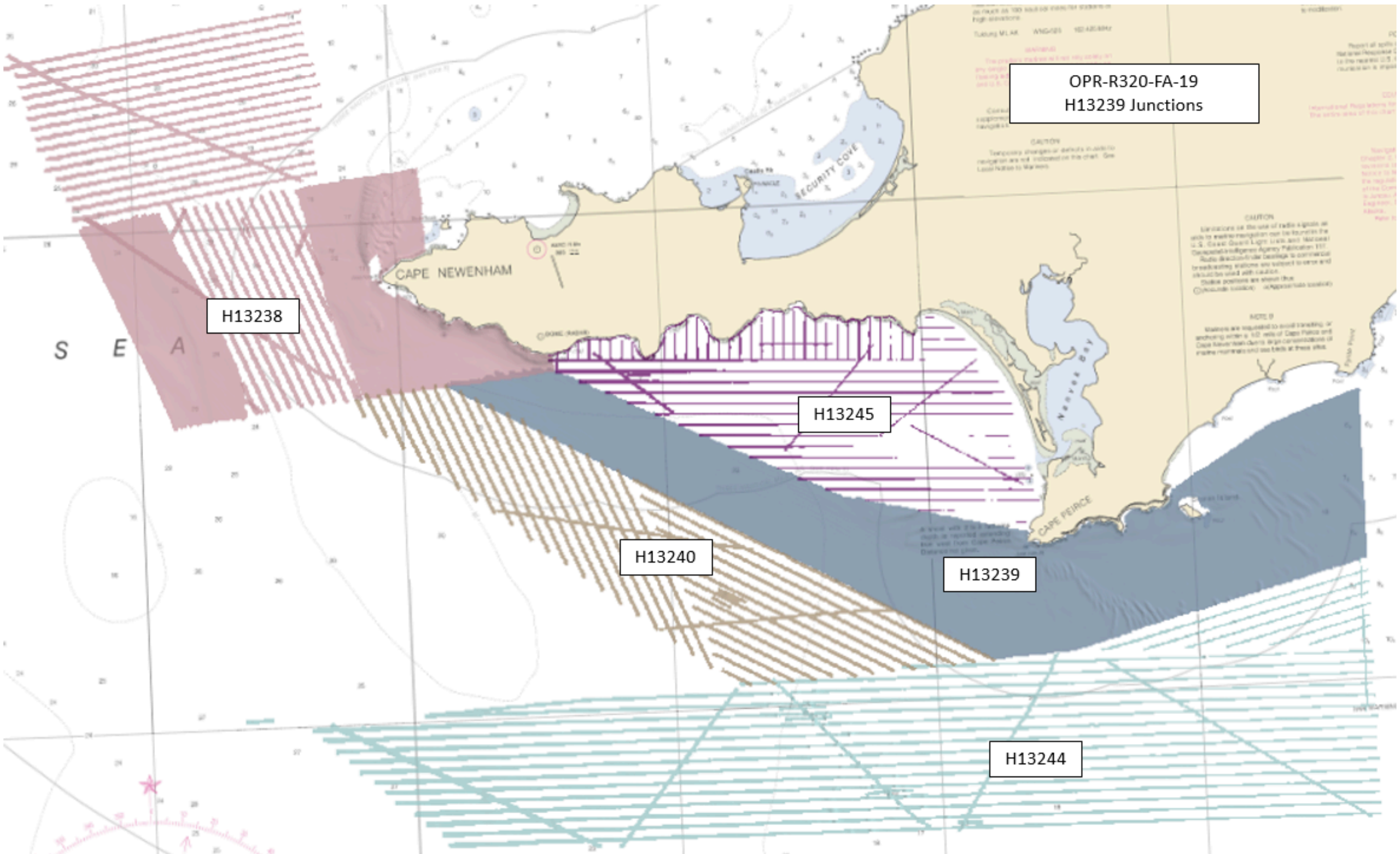


Figure 6: Overview of H13239 junction surveys

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13238	1:40000	2019	NOAA Ship FAIRWEATHER	NW
H13240	1:40000	2019	NOAA Ship FAIRWEATHER	SW
H13244	1:40000	2019	NOAA Ship FAIRWEATHER	S
H13245	1:40000	2019	NOAA Ship FAIRWEATHER	N

Table 9: Junctioning Surveys

<u>H13238</u>

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from H13239 and the surface from H13238, shown in Figure 7. The statistical analysis of the difference surface shows a mean of -0.01 with 95% of all nodes having a maximum deviation of +/-0.14 meters, as seen in Figure 8. It was found that 99.5+% of nodes are within NOAA allowable uncertainty.

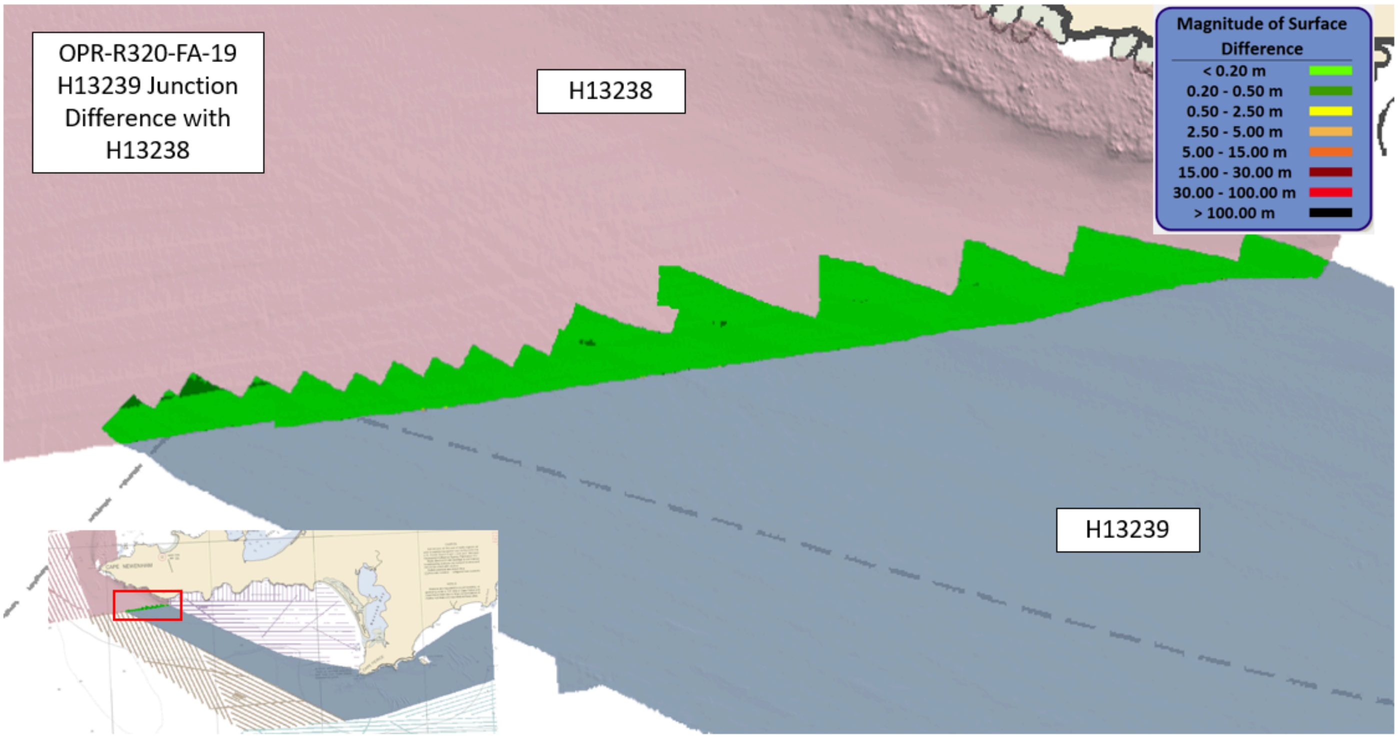
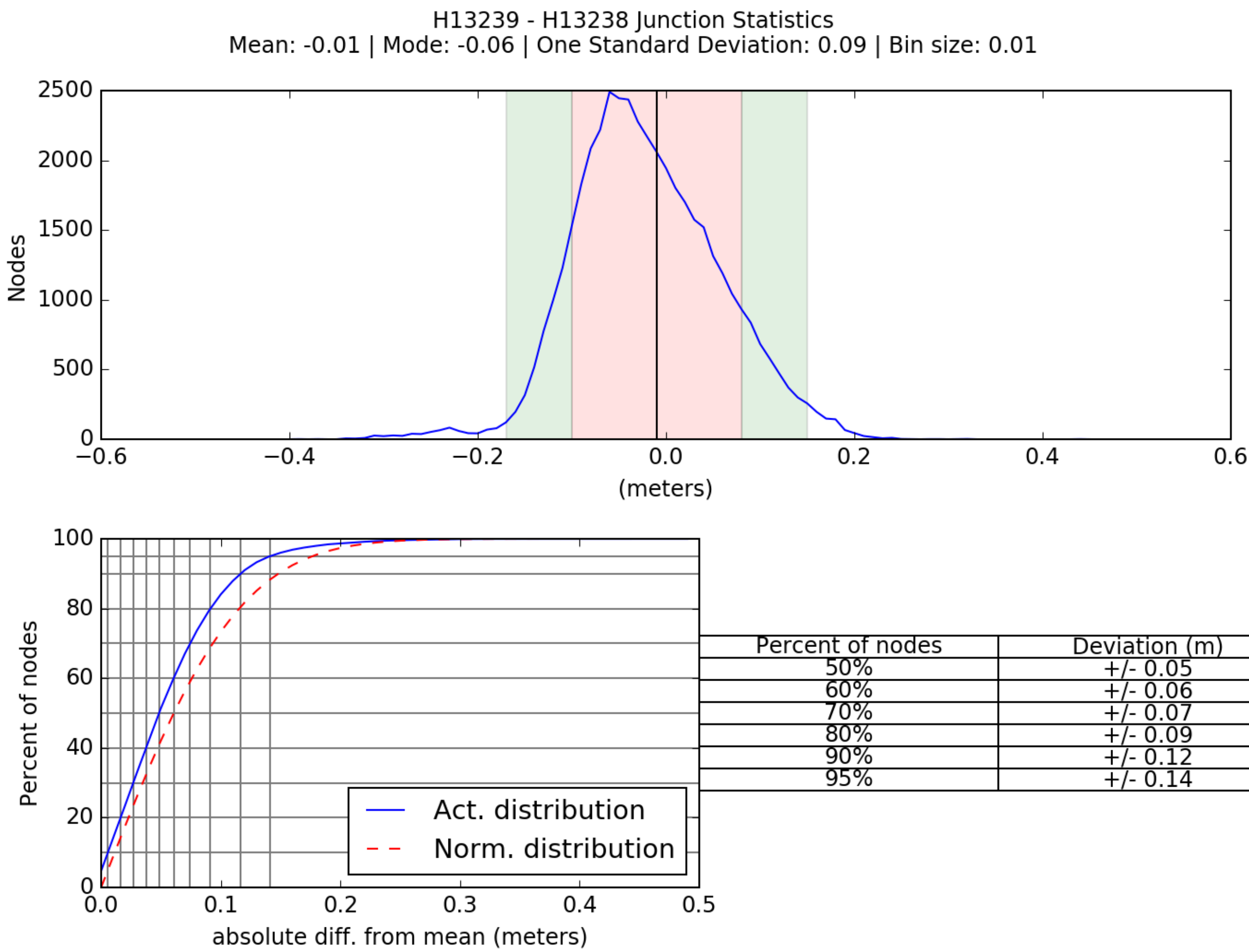


Figure 7: Difference surface between H13239 (gray) and junctioning survey H13238 (pink)



Percent of nodes	Deviation (m)
50%	+/- 0.05
60%	+/- 0.06
70%	+/- 0.07
80%	+/- 0.09
90%	+/- 0.12
95%	+/- 0.14

Figure 8: Difference surface statistics between H13239 and H13238 (4 meter surface)

H13240

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from H13239 and the surface from H13240, shown in Figures 9, 10, and 11. The statistical analysis of the difference surface shows a mean of 0.07 with 95% of all nodes having a maximum deviation of +/-0.11 meters, as seen in Figure 12. It was found that 99.5+% of nodes are within NOAA allowable uncertainty.

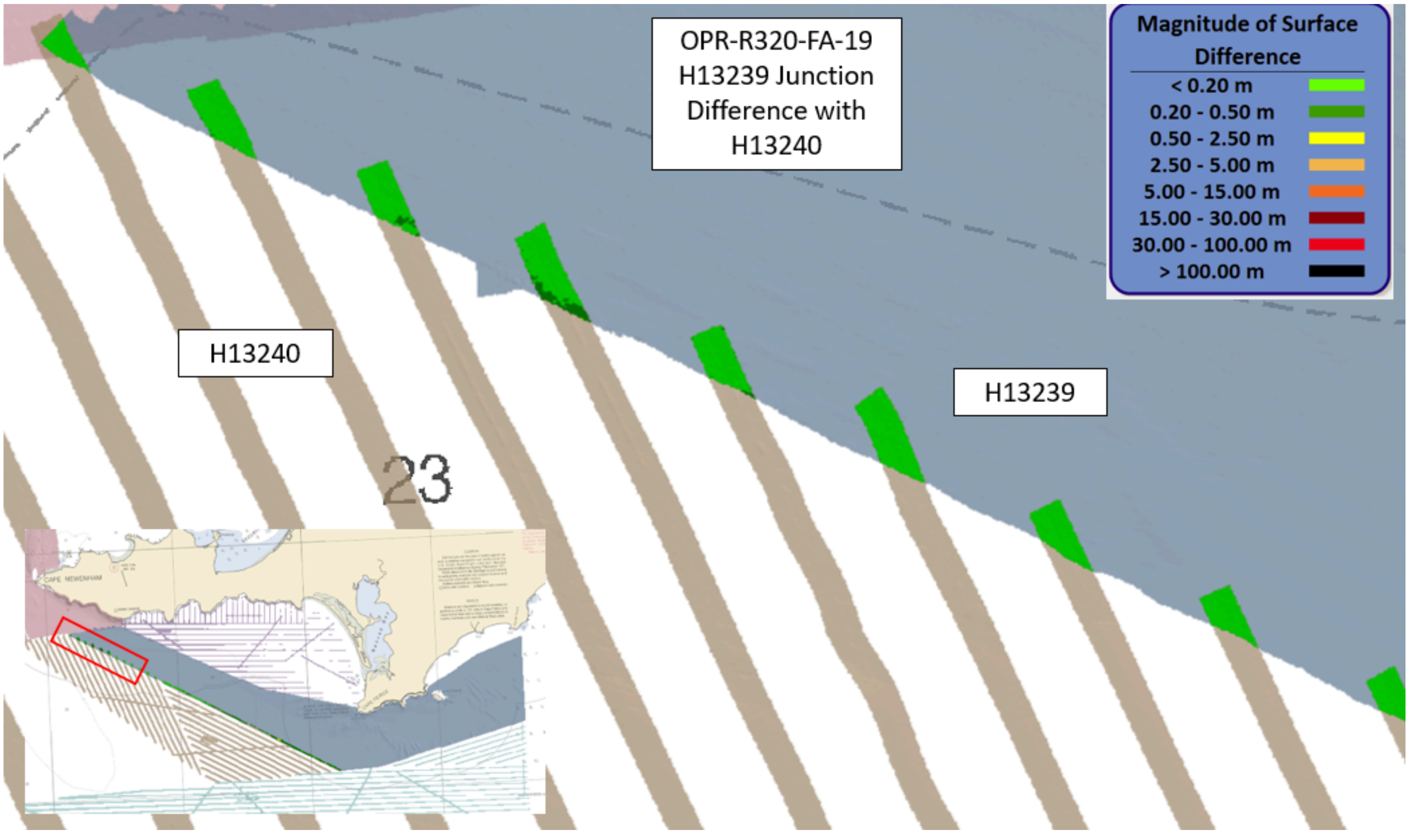


Figure 9: Difference surface between H13239 (gray) and junctioning survey H13240 (light brown)

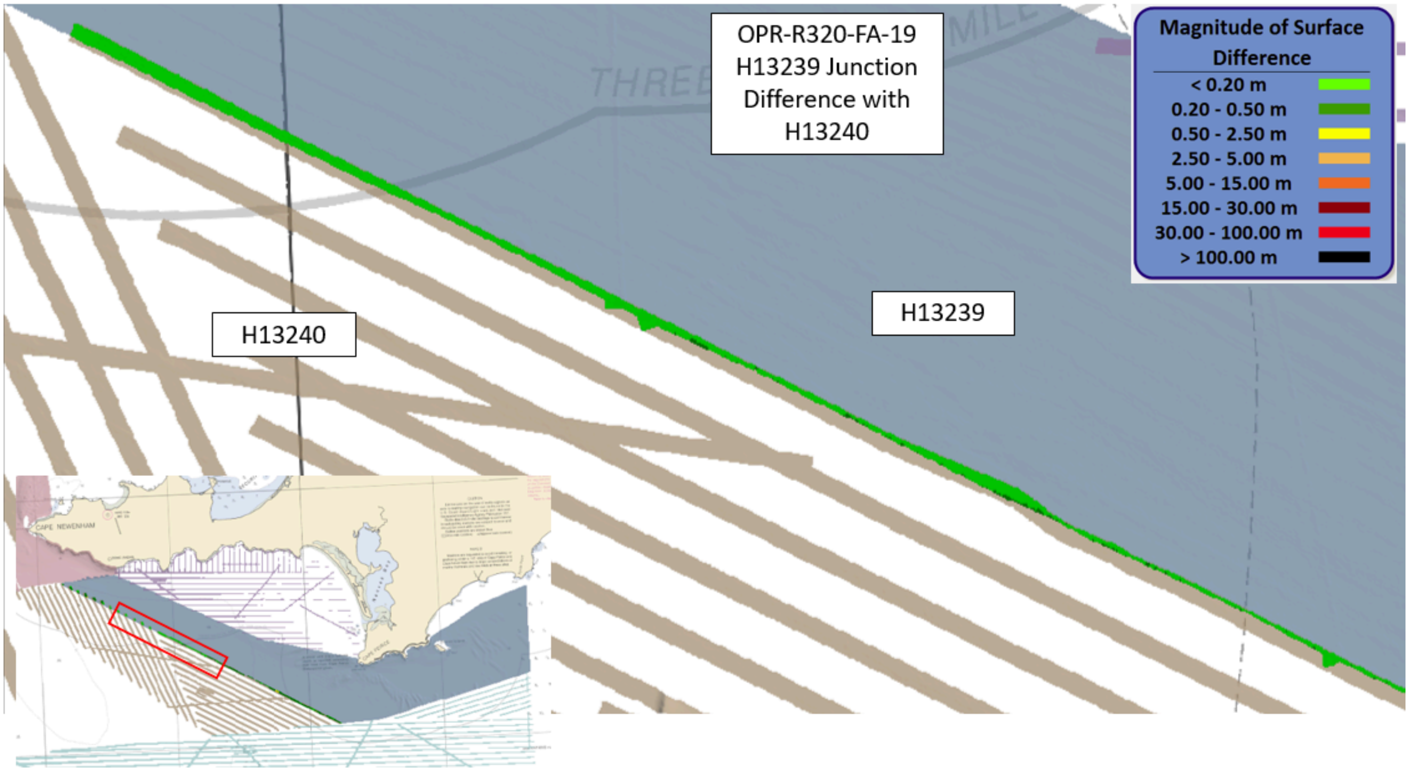


Figure 10: Difference surface between H13239 (gray) and junctioning survey H13240 (light brown)

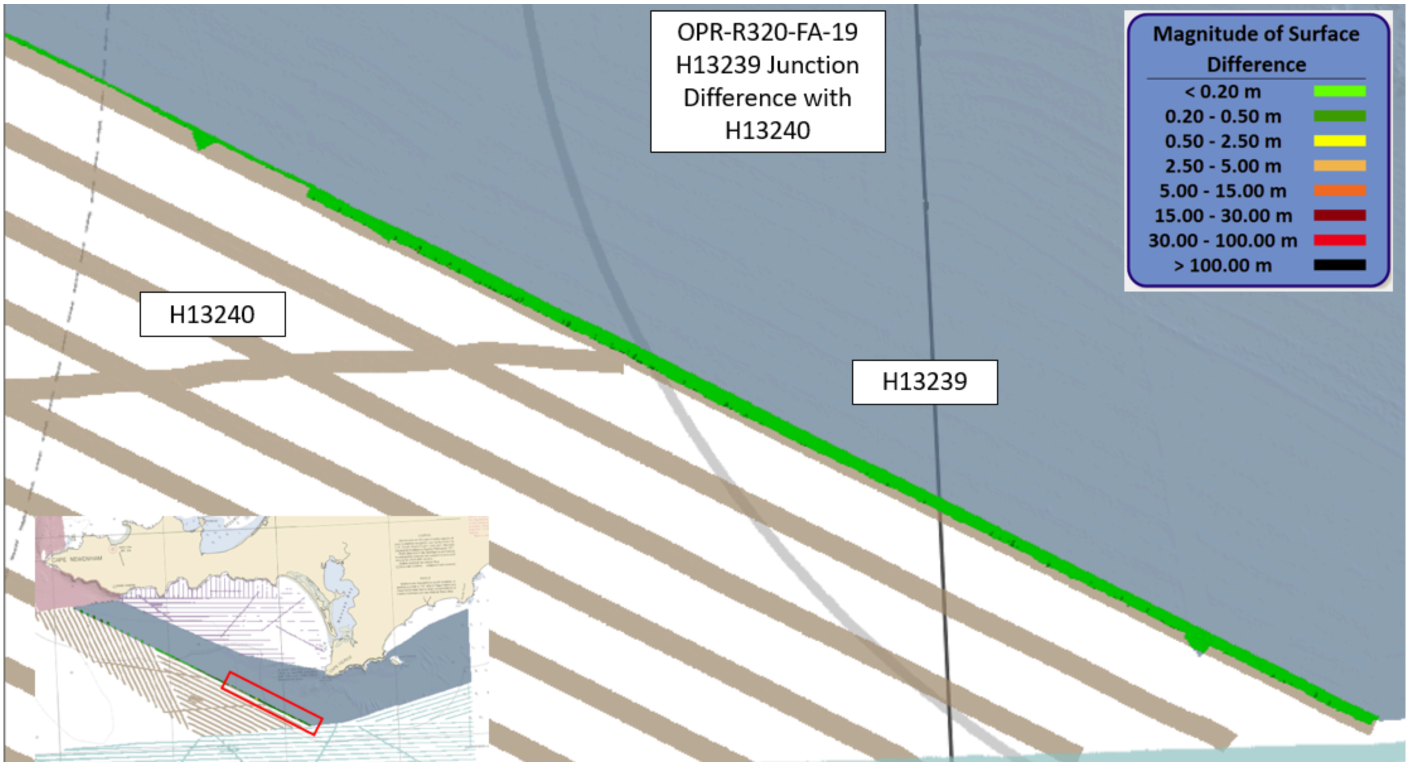
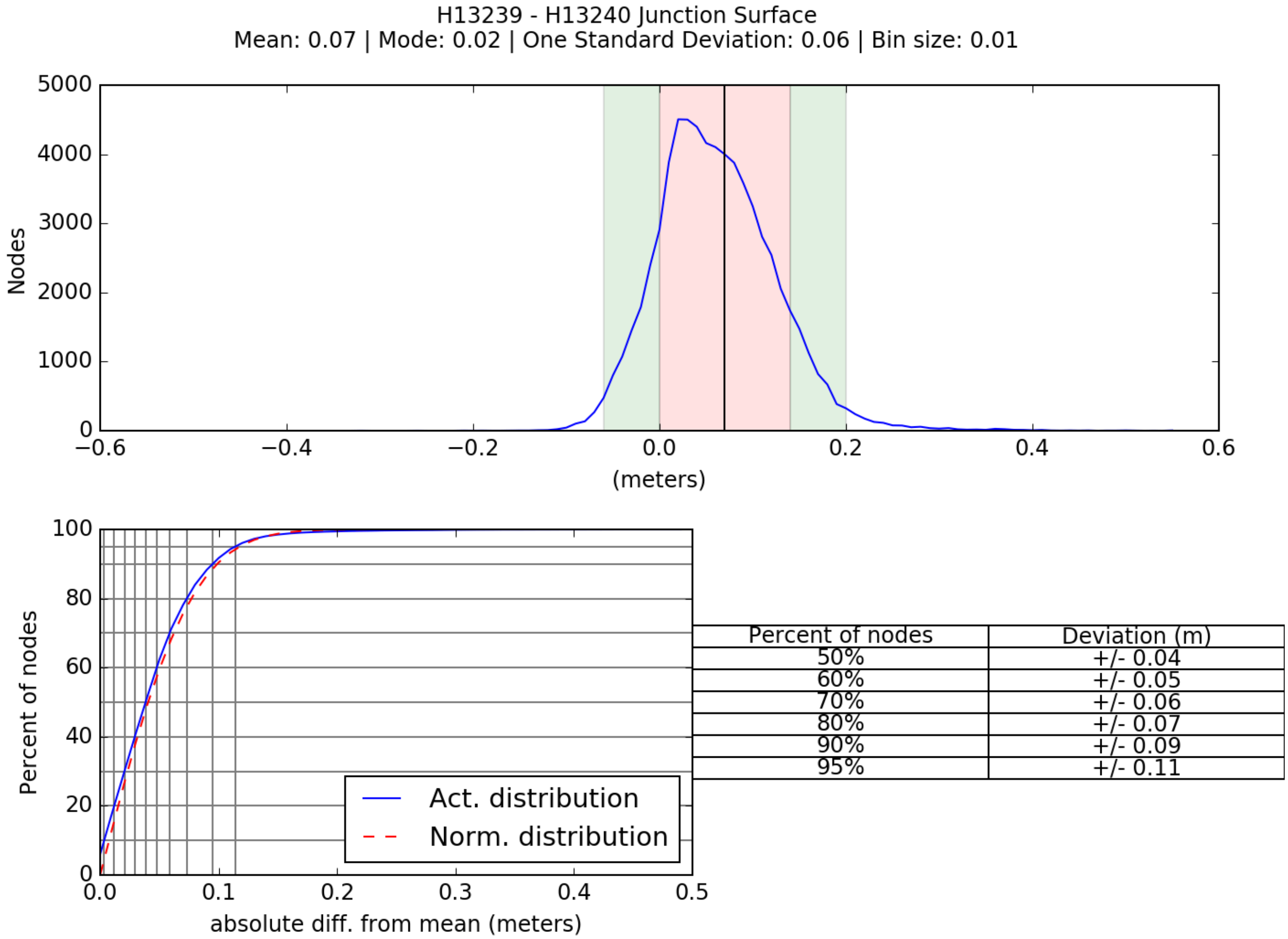


Figure 11: Difference surface between H13239 (gray) and junctioning survey H13240 (light brown)



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.06
80%	+/- 0.07
90%	+/- 0.09
95%	+/- 0.11

Figure 12: Difference surface statistics between H13239 and H13240 (4 meter surface)

<u>H13244</u>

Due to the set line spacing acquisition technique of H13244 proper data overlap was not achieved with this survey. Due to the strong agreement between H13239 data and the other three adjacent surveys, the hydrographer is confident that no significant systematic biases exist in the data collected for this sheet.

<u>H13245</u>

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from H13239 and the surface from H13245, shown in Figure 13. The statistical analysis of the difference surface shows a mean of 0.02 with 95% of all nodes having a maximum deviation of +/-0.20 meters, as seen in Figure 14. It was found that 99.5+% of nodes are within NOAA allowable uncertainty.

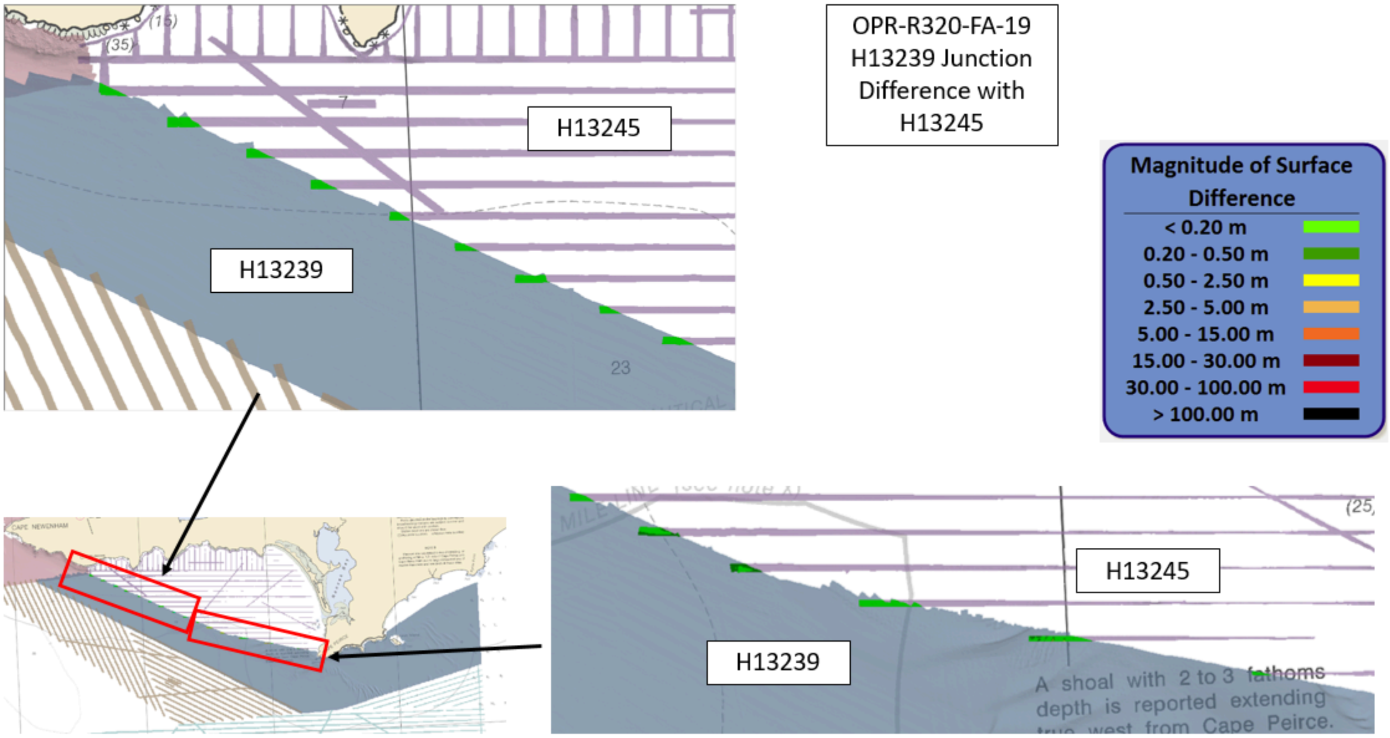
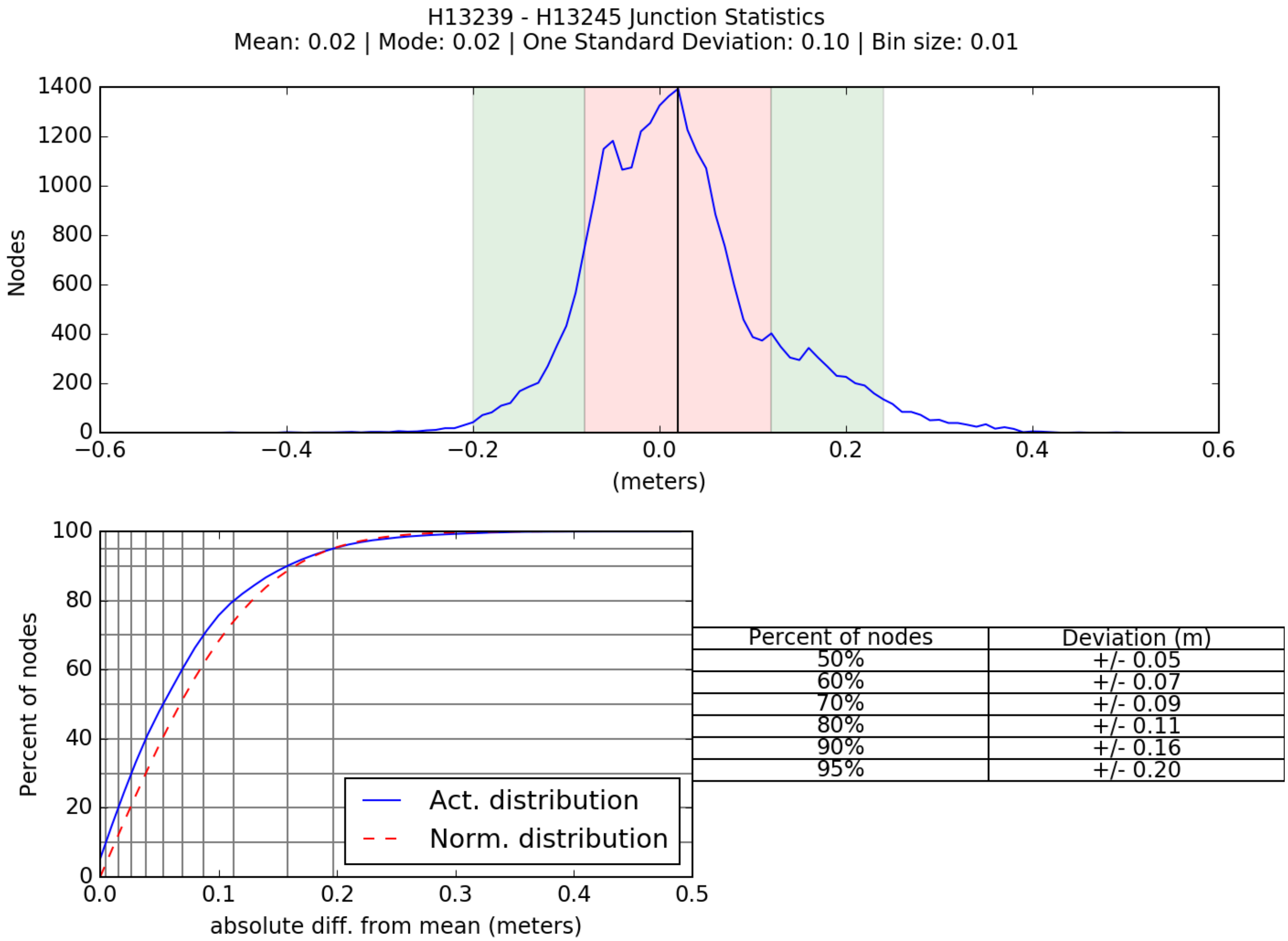


Figure 13: Difference surface between H13239 (gray) and junctioning survey H13245 (purple)



Percent of nodes	Deviation (m)
50%	+/- 0.05
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.11
90%	+/- 0.16
95%	+/- 0.20

Figure 14: Difference surface statistics between H13239 and H13245 (4 meter surface)

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

<u>Sound Speed Issues</u>

Throughout the survey area, small sound speed artifacts are visible primarily as "smiles" in the data, resulting in a slight raise in the surface where adjacent lines overlap. An example is shown in Figure 15. All data were examined to ensure that these artifacts do not exceed the NOAA allowable uncertainty. The hydrographer is confident that all data remain sufficient to supersede previous data.

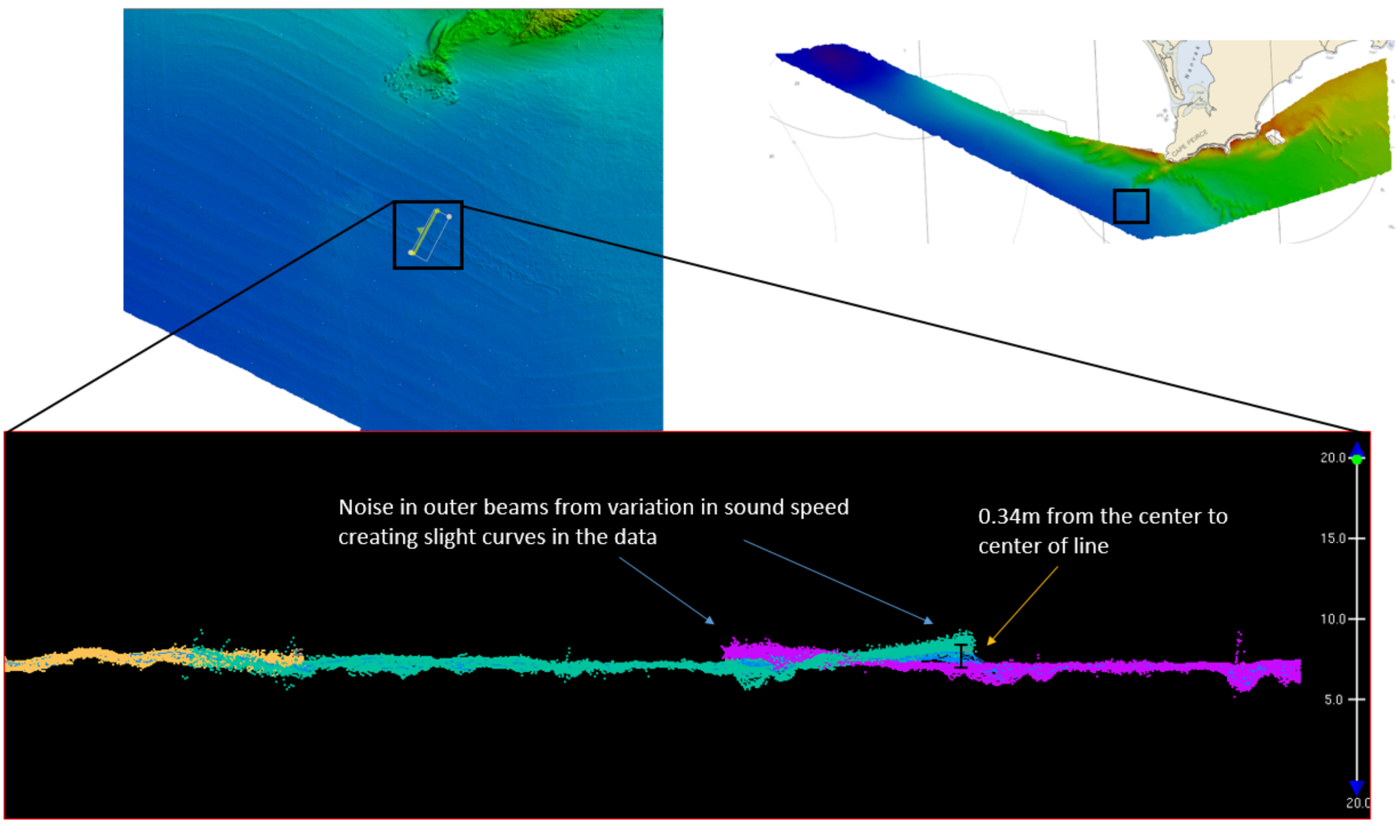


Figure 15: Example of an area with sound speed artifacts, the vertical difference between lines is as much as 0.34 meters (surface exaggerated 20x)

<u>Weather</u>

Strong winds and considerable swells were experienced throughout the survey area, leading to excessive bubbles in the water column near the transducer. This resulted in occasional temporary losses in bottom detection across consecutive pings, or "blowouts" (Figure 16). All blowouts were assessed in CARIS Subset Editor, and artifacts in excess of the TVU were rejected (Figure 17).

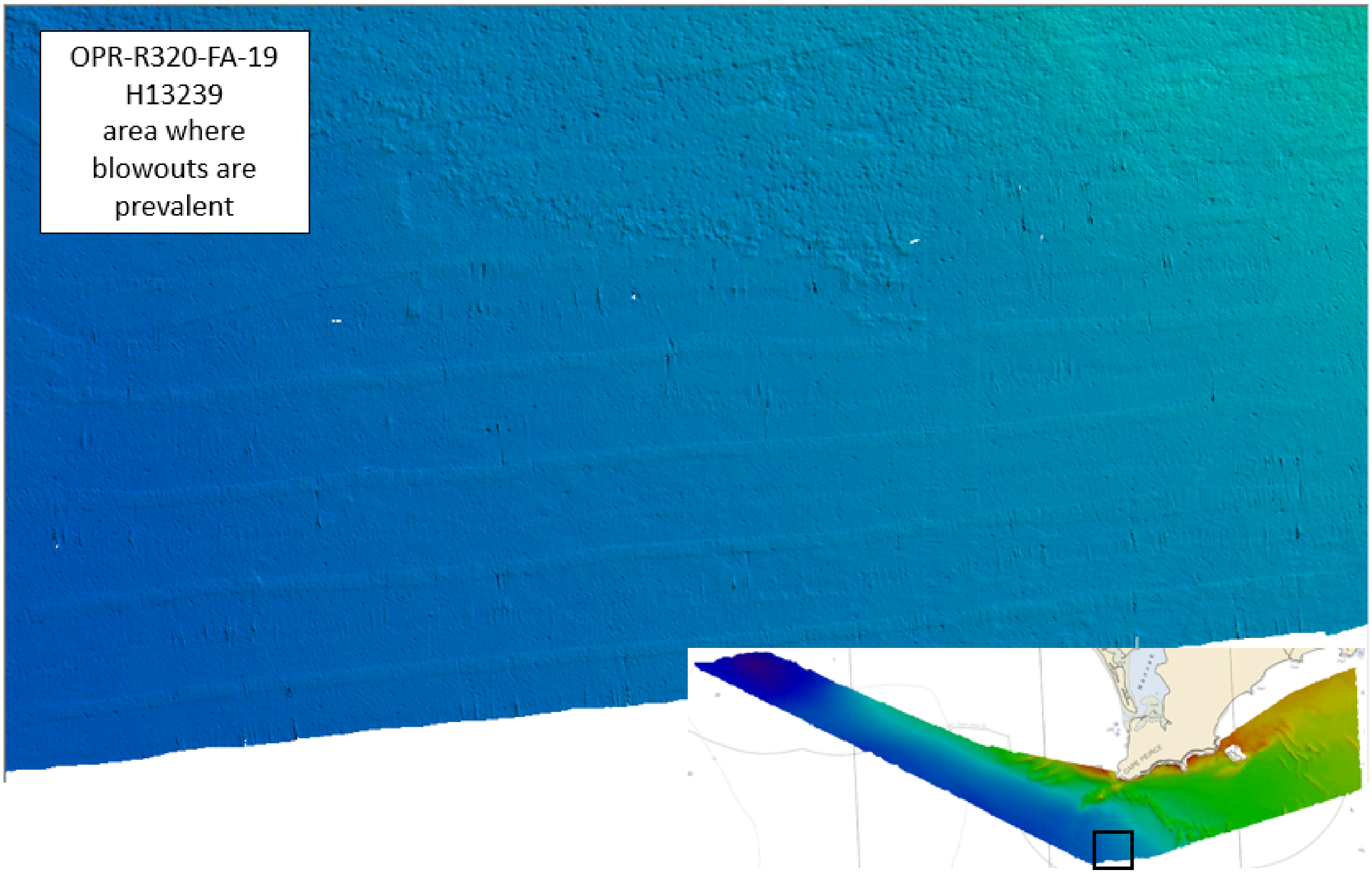


Figure 16: Example of area where blowouts are prevalent (surface has 10x vertical exaggeration)

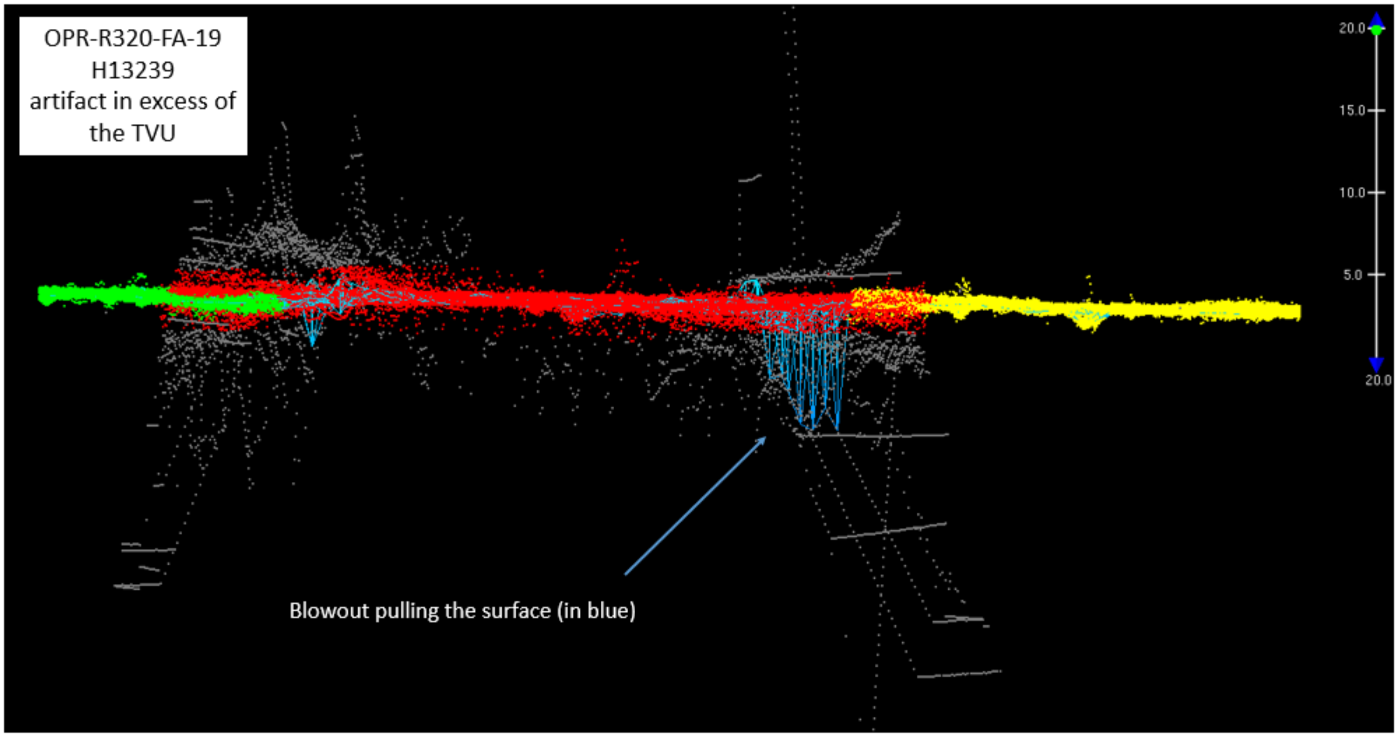


Figure 17: Example of an artifact in excess of the TVU as viewed in CARIS Subset Editor (surface exaggerated 20x)

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 when there was a change in surface sound speed greater than two meters per second. 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 Holidays

H13239 data were reviewed in CARIS HIPS and SIPS for holidays in accordance with Section 5.2.2.3 of the HSSD. Six 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 and was run in conjunction with a visual inspection of the surface by the hydrographer. One holiday is a result of improper spacing between survey lines leading to a gap in coverage, as shown in Figure 18. The other holidays were caused by removing data from blowouts, as shown in Figures 19-23. The holidays were determined by the hydrographer to be in areas of relatively unchanging bathymetry, where it is highly unlikely for any hazards to navigation to exist.

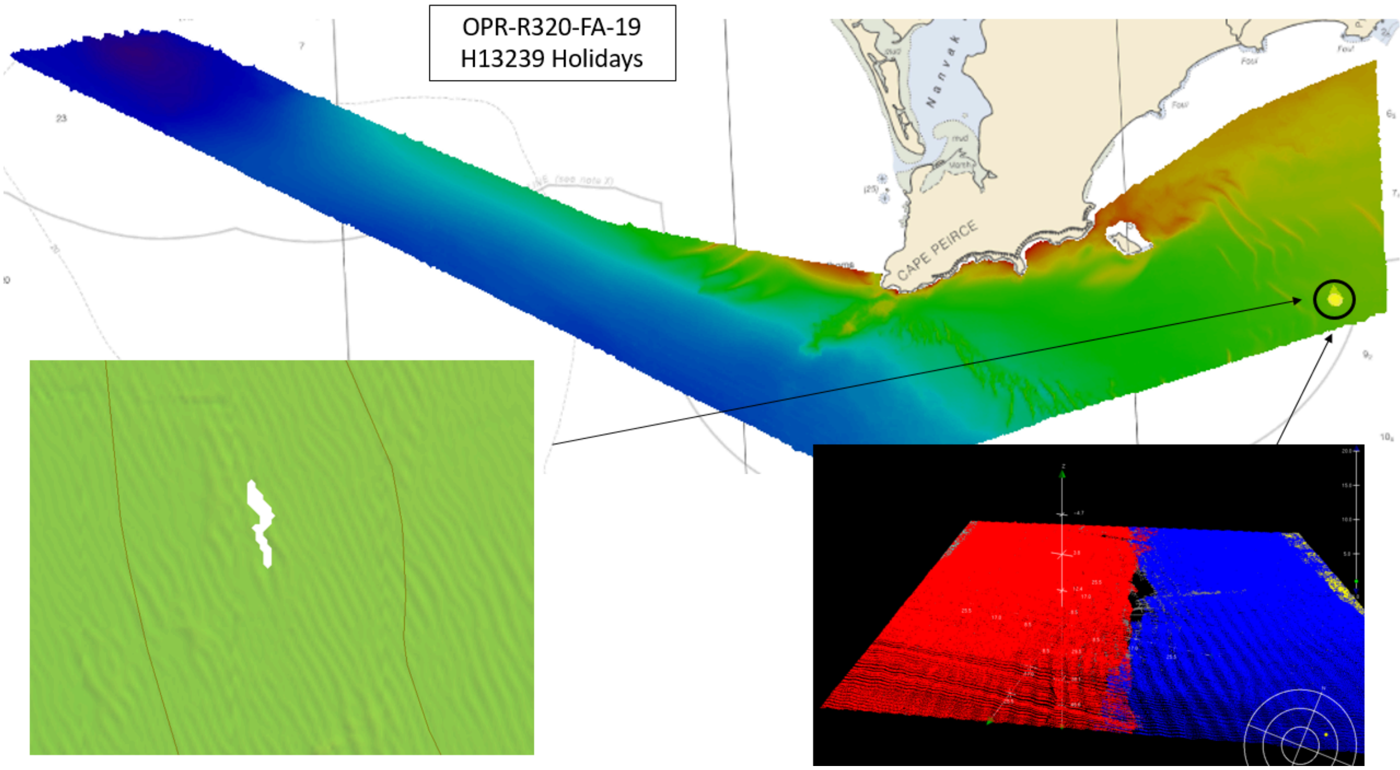


Figure 18: Holiday due to a gap in coverage between survey lines

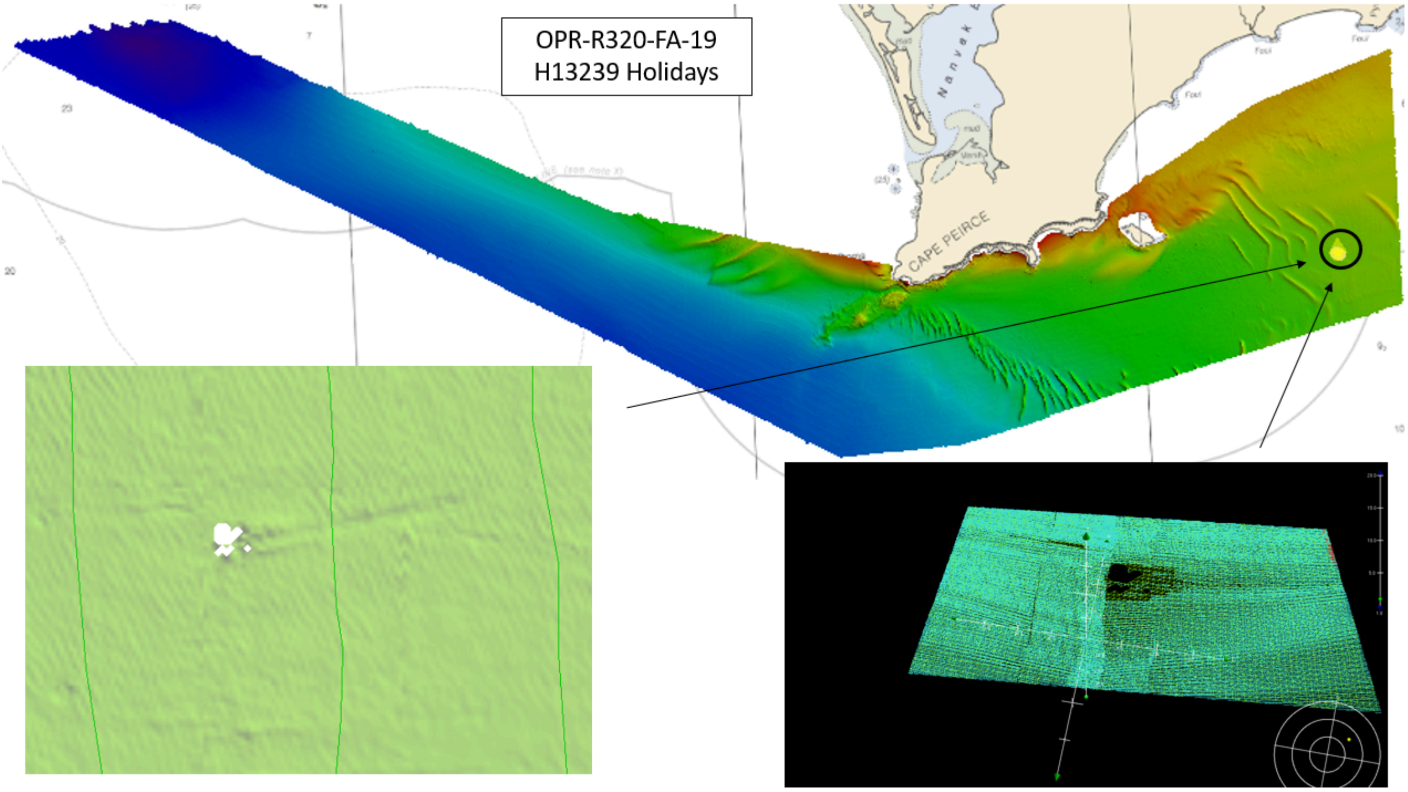


Figure 19: Holiday due to removing data from a blowout

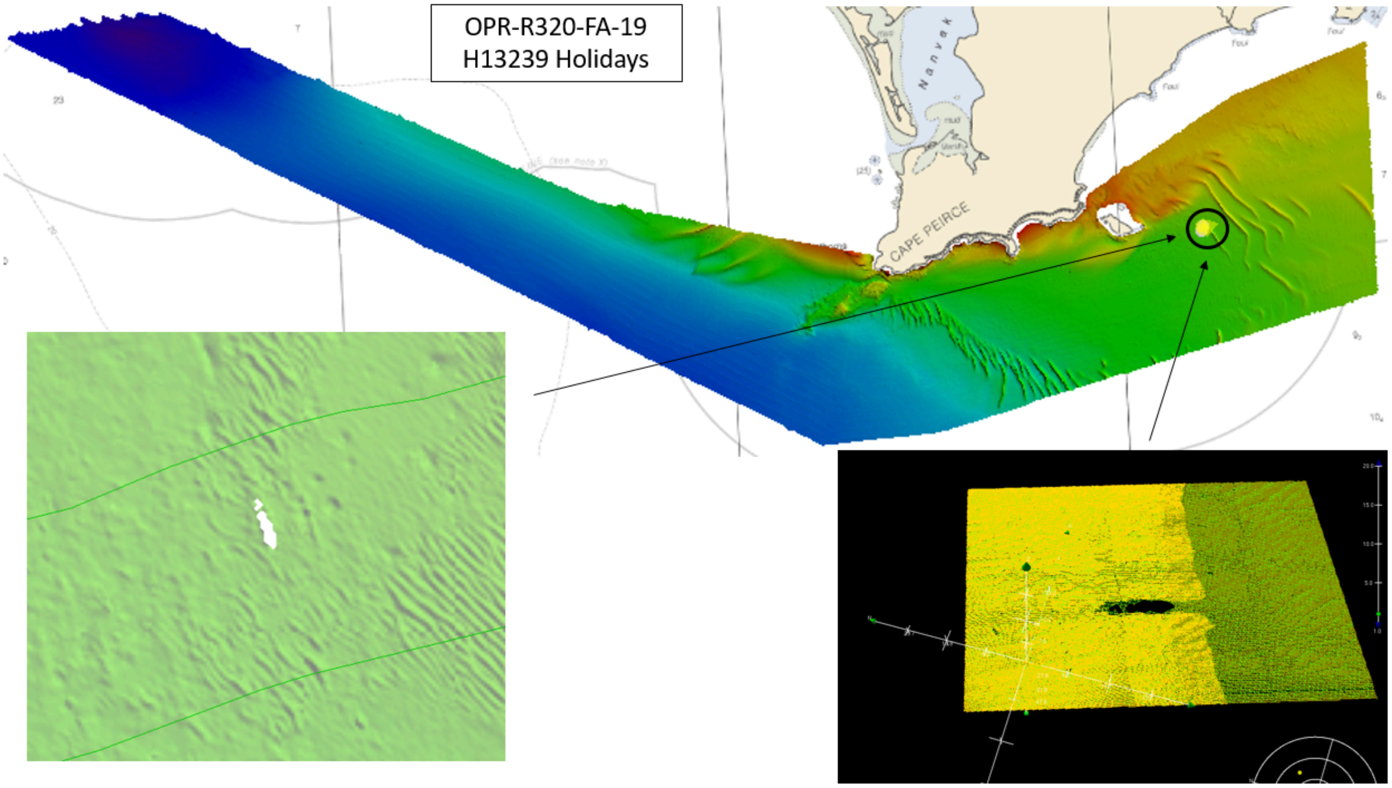


Figure 20: Holiday due to removing data from a blowout

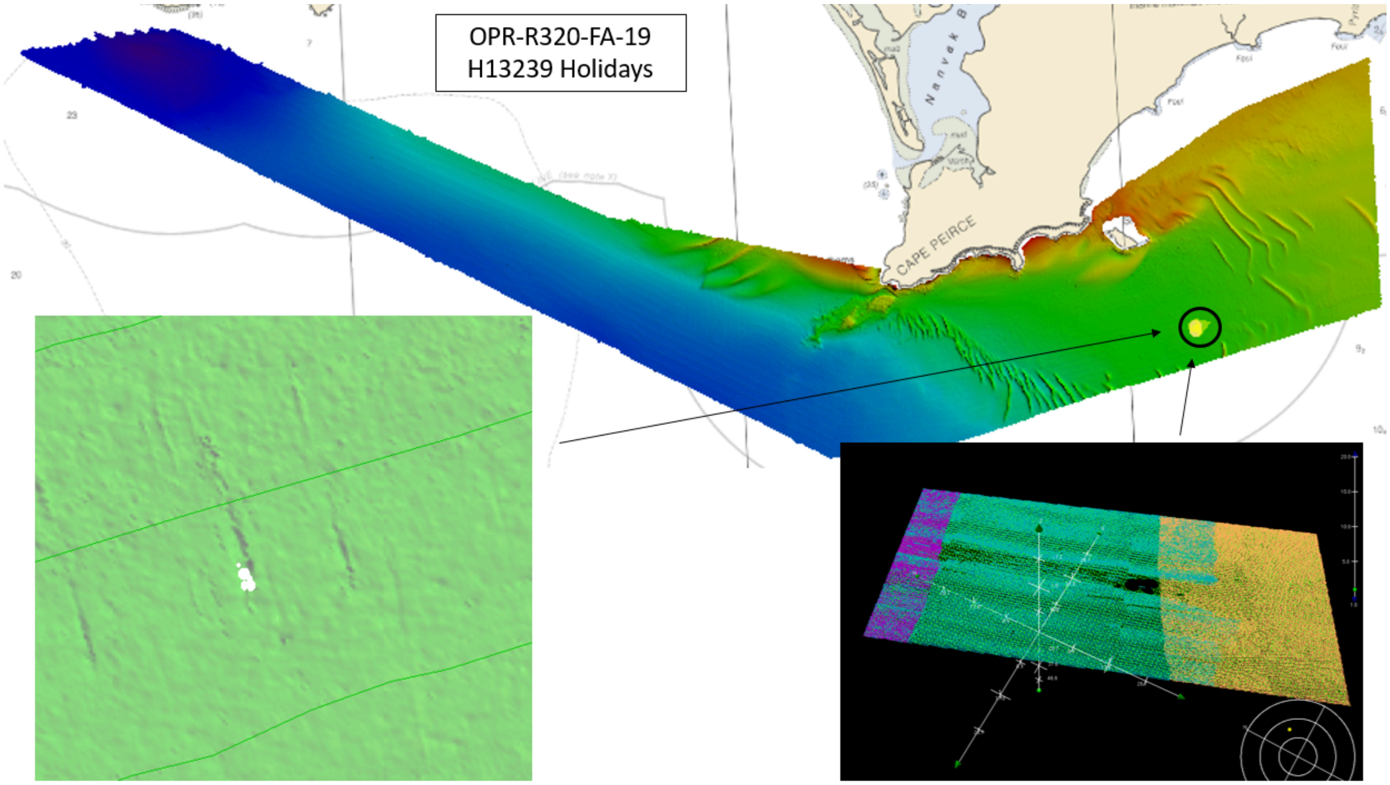


Figure 21: Holiday due to removing data from a blowout

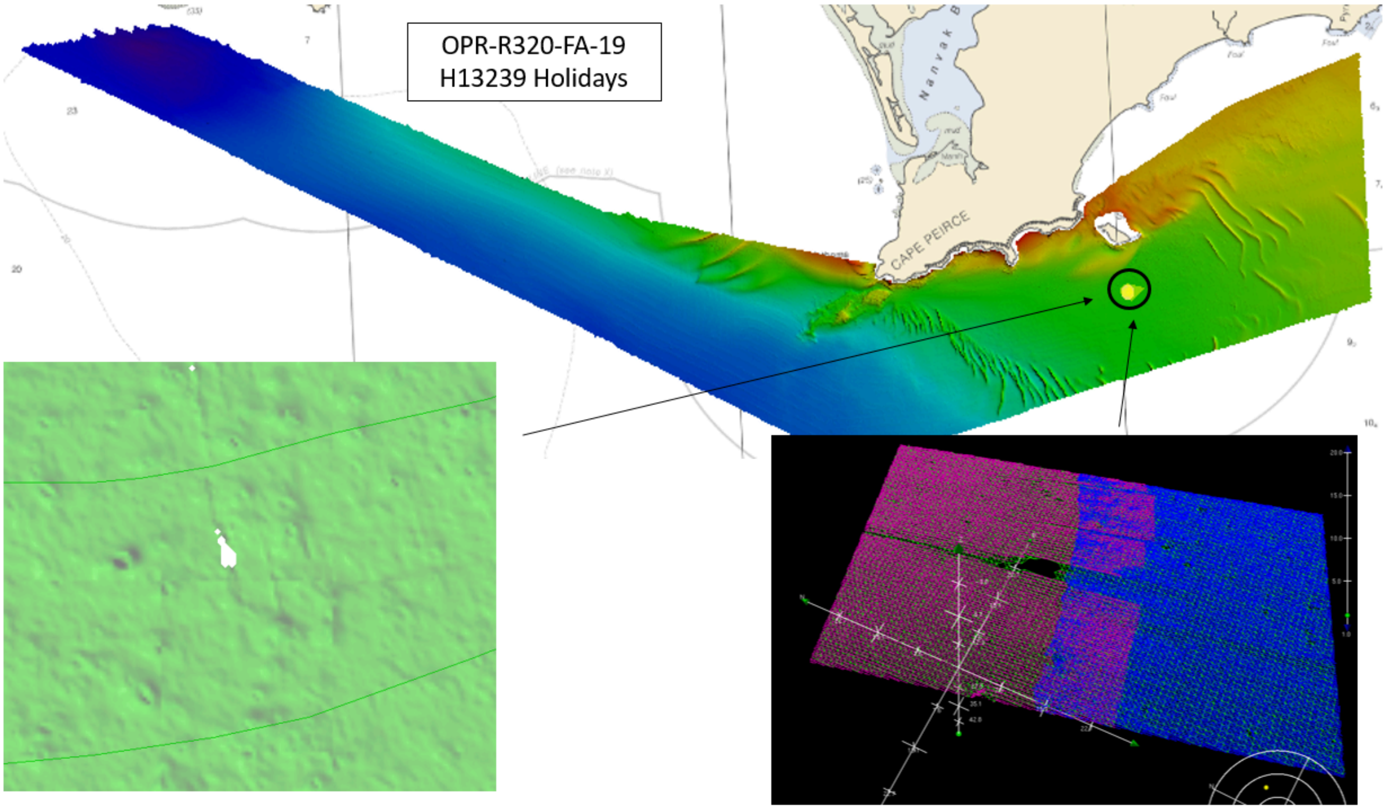


Figure 22: Holiday due to removing data from a blowout

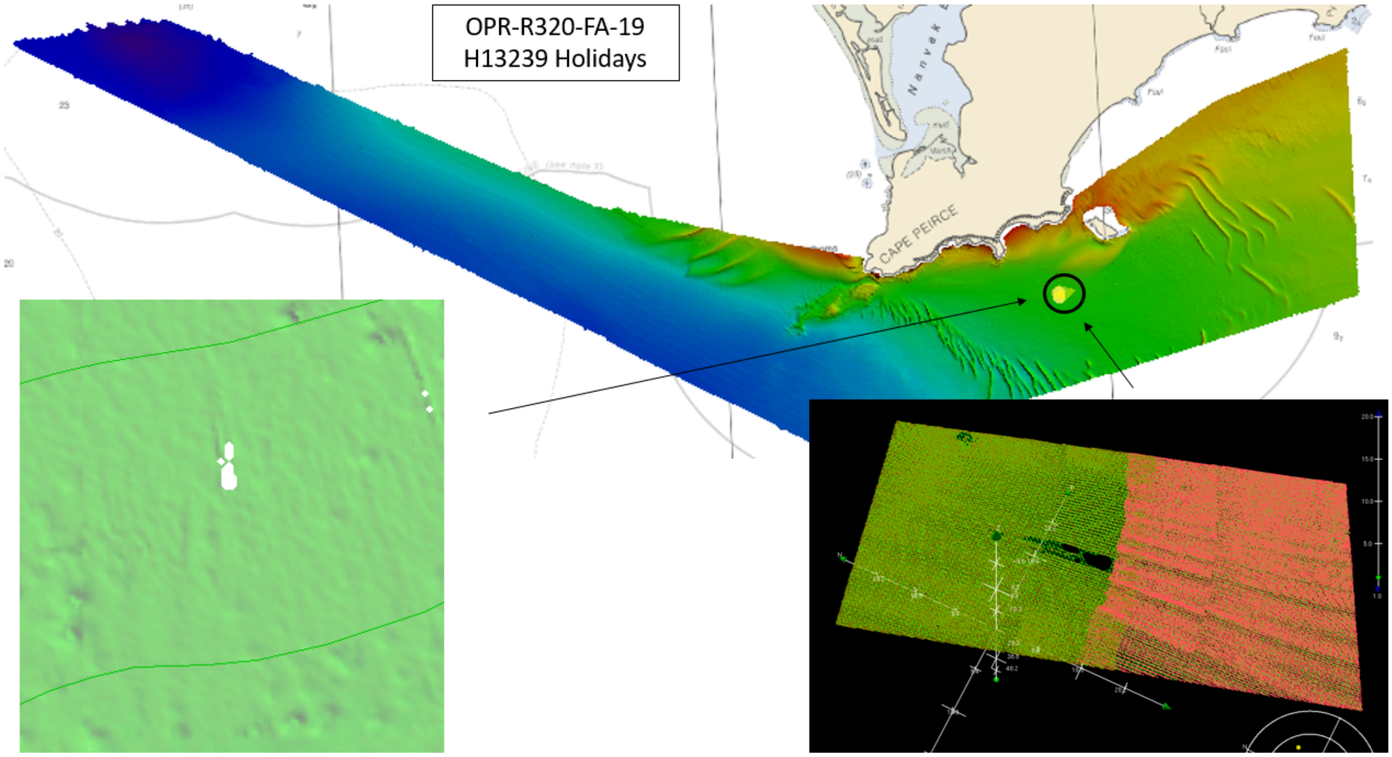


Figure 23: Holiday due to removing data from a blowout

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 standards for H13239. For a graphical representation of compliance with uncertainty standards, see Figure 24 below.

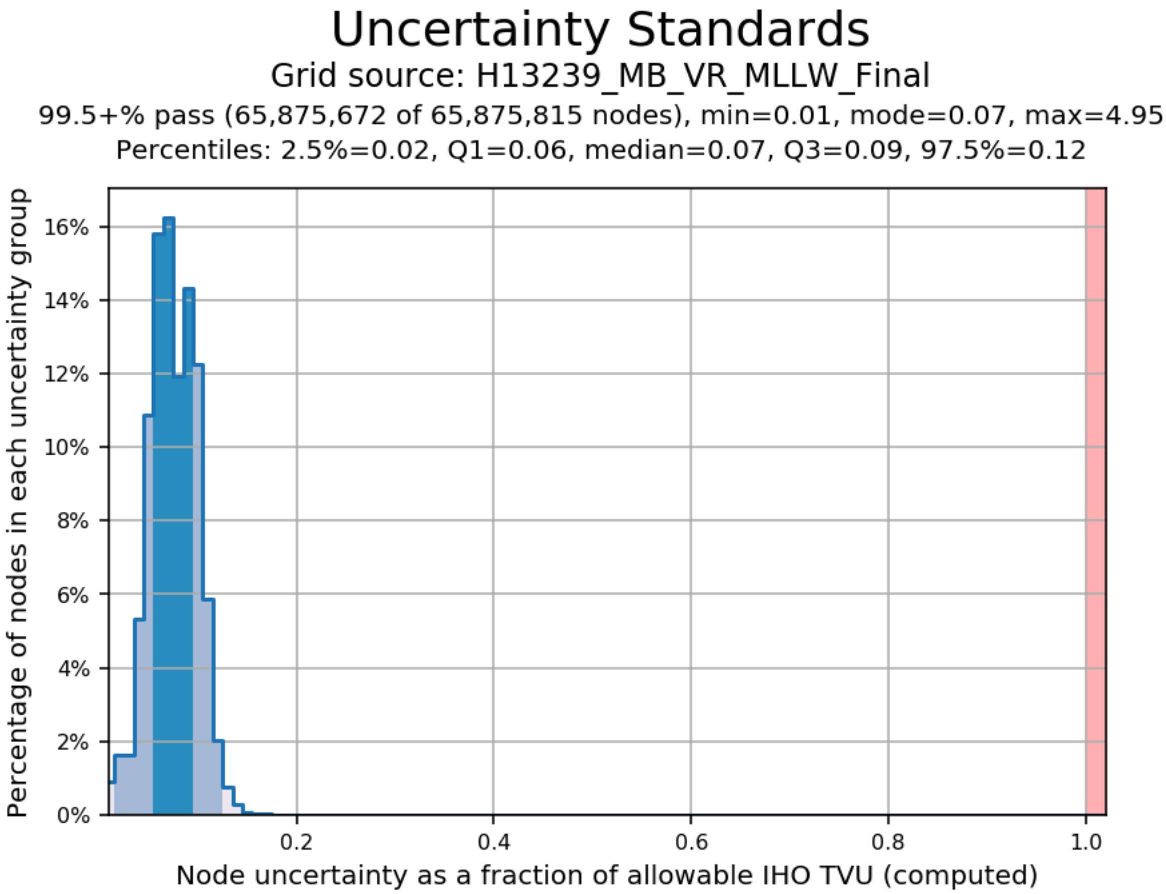


Figure 24: H13239 allowable uncertainty statistics

B.2.11 Density

The surface was analyzed using the HydrOffice QC Tools Grid QA feature to determine compliance with specifications. Density requirements for H13239 were achieved with at least 99.5% of surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3. For a graphical representation of compliance with density standards, see Figure 25 below.

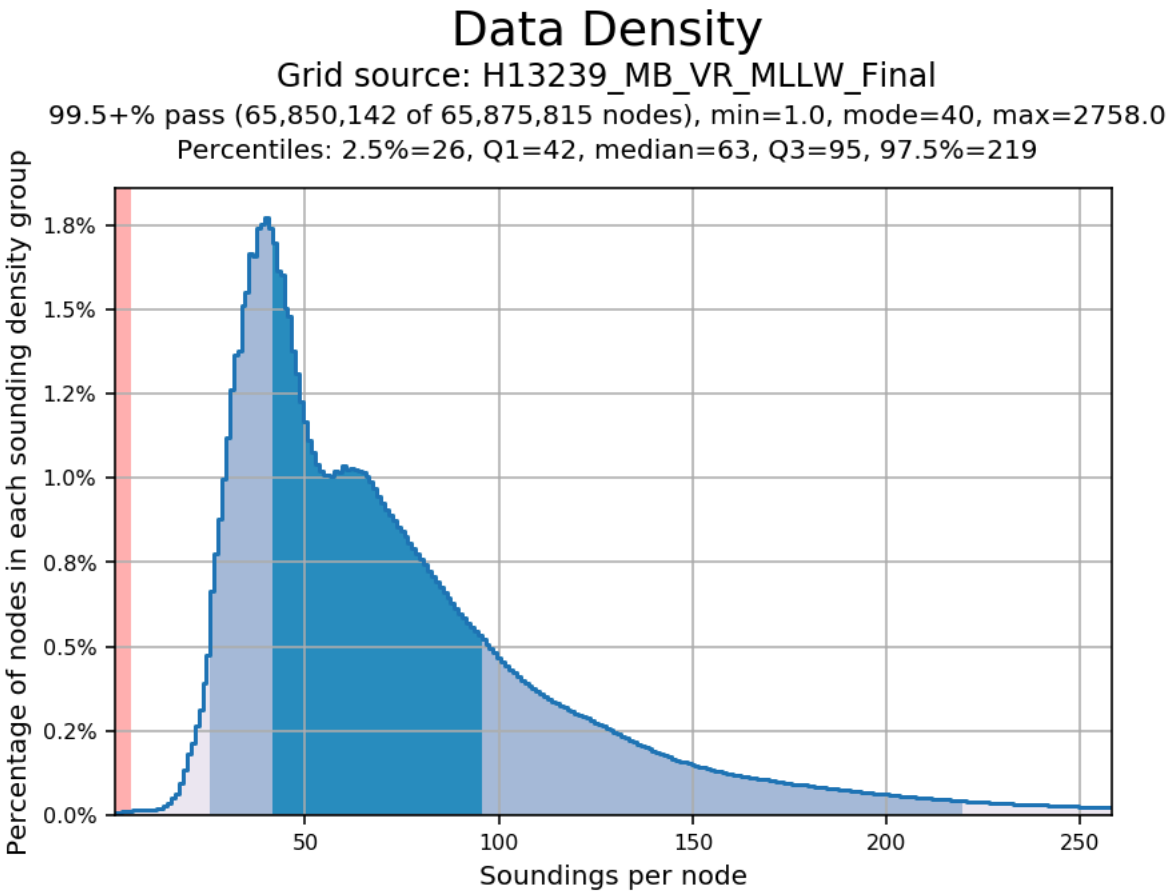


Figure 25: H13239 data density statistics

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 the Kongsberg systems. All backscatter were processed to GSF files, and a floating point mosaic per vessel was created by the field unit via Fledermaus FMGT 7.8.10. A relative backscatter calibration was performed by HSTB in order to bring the survey systems on each of the launches into alignment. The offsets between launch sonar systems identified were entered into the Processing Settings within FMGT to increase continuity in the backscatter imagery collected by each vessel. See Figure 26 for a table of the entered calibration values. Due to an artifact observed in the mosaic generated from all data collected at 300kHz, separate mosaics were generated for each vessel. See Figure 27 for a greyscale representation of the complete mosaics.

	200				300				400		
	Short CW	Med CW	Long CW	FM (Both)	Short CW	Med CW	Long CW	FM (Both)	Short CW	Med CW	Long CW
2805	-1.1	-1.4	-1.8	2.7	**-0.7**	**-0.9**	**-1.0**	**1.4**	3	3.9	4.8
2806	1.8	1.8	1.8	2.4	**-0.1**	**-0.3**	**-0.4**	**-0.8**	3.6	4.65	5.7
2807	-0.3	-0.15	0	0	**0**	**-0.2**	**-0.3**	**-0.7**	3.3	4.2	5.1
2808	0	0.6	1.2	1.6	**-0.3**	**-0.5**	**-0.6**	**-1.0**	1.8	2.7	3.6

Figure 26: Backscatter Calibration Values

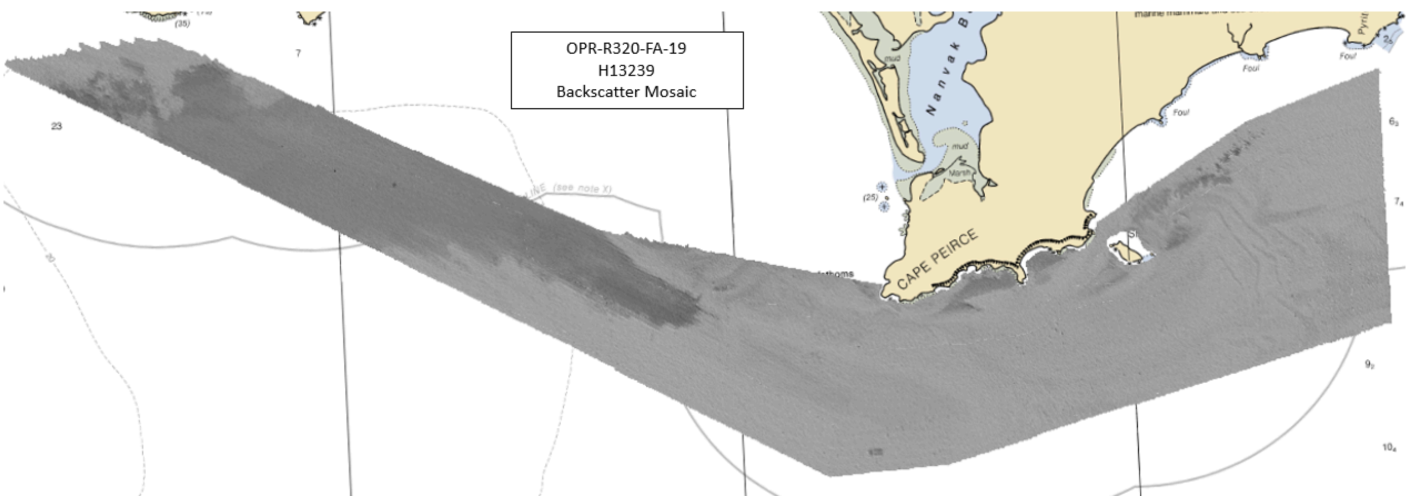


Figure 27: Backscatter Mosaic

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
Teledyne CARIS	HIPS and SIPS	11.1.3

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 FMGT	7.8.10

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2019.

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
H13239_MB_VR_MLLW_Final.csar	CARIS VR Surface (CUBE)	Variable Resolution	0.1 meters - 37.2 meters	NOAA_VR	Complete MBES
H13239_MB_VR_MLLW.csar	CARIS VR Surface (CUBE)	Variable Resolution	0.1 meters - 37.2 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 H13239. The surfaces have been reviewed where noisy data, or "fliers," are incorporated into the gridded solutions causing the surface to be shoaler 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.

B.5.3 Data Logs

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as vertical control and sound speed application are noted in the H13239 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

C. Vertical and Horizontal Control

Per Section 5.1.2.3 of the 2014 Field Procedures Manual, no Horizontal and Vertical Control Report has been generated for H13239.

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 ERTDM	R320FA2019_ERTDM_NAD83-MLLW.csar

Table 13: ERS method and SEP file

ERS methods were used as the final means of reducing H13239 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 3.

RTK

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, 2805, 2807, and 2808 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 H13239 as no DGPS stations were available for realtime horizontal control.

D. Results and Recommendations

D.1 Chart Comparison

A comparison was performed between survey H13239 and ENC US4AK86M using CARIS HIPS and SIPS sounding and contour layers derived from the VR surface. The contours and soundings were overlaid on the charts to assess differences between the surveyed soundings and charted depths. ENCs were compared by visual inspection to a VR grid, as the chart contained only four soundings within the sheet limits of H13239.

All data from H13239 should supersede charted data. In general, surveyed soundings agree with the majority of charted depths. A full discussion follows below.

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
US4AK86M	1:100000	5	12/27/2017	12/27/2017

Table 14: 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

Three bottom samples were acquired for survey H13239. Due to the risk of utilizing the image grab sampler from the launches in the observed sea states while on project, the smaller, non-image recording bottom sampler was used for all samples. One bottom sample with the coordinates of 58.547635 N, 161.681390 W was attempted three times, but was unsuccessful, likely due to rocky substrate. All successful bottom samples were entered in the H13239 Final Feature File. See Figure 31 for a graphical overview of sample locations.

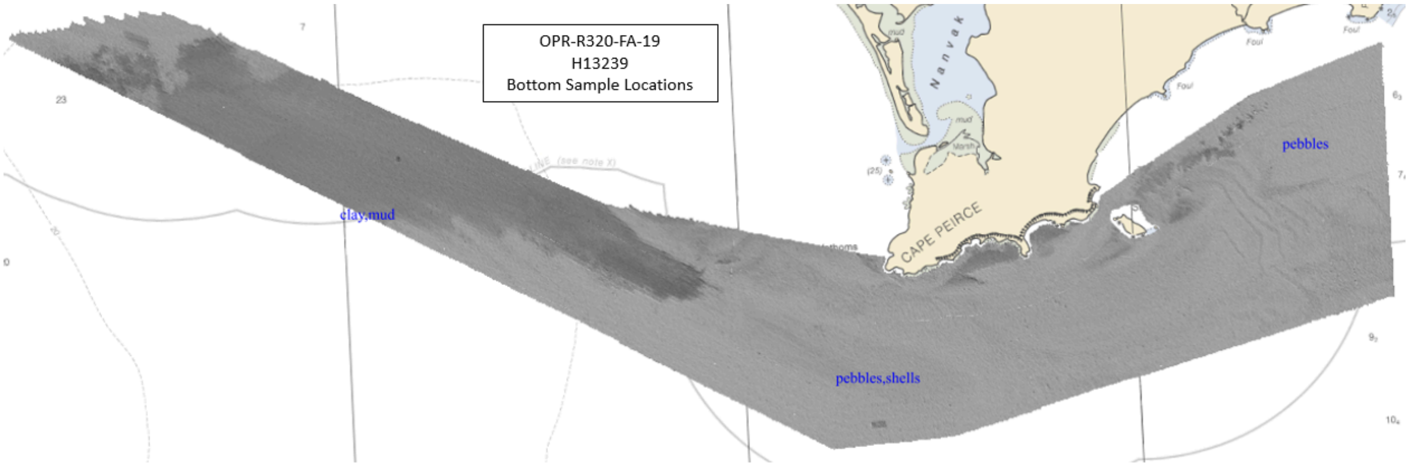


Figure 28: H13239 bottom sample locations

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

Large rolling sand waves up to 6.5 meters proud of the surrounding seafloor are present 2.2 nautical miles west of Cape Peirce, 0.5 to 2.4 nautical miles south of Cape Peirce, and 1.8 nautical miles east of Cape Peirce, as shown in Figure 32. Caution is advised to mariners transiting in this area, as the heights and locations of these sand waves likely varies temporally.

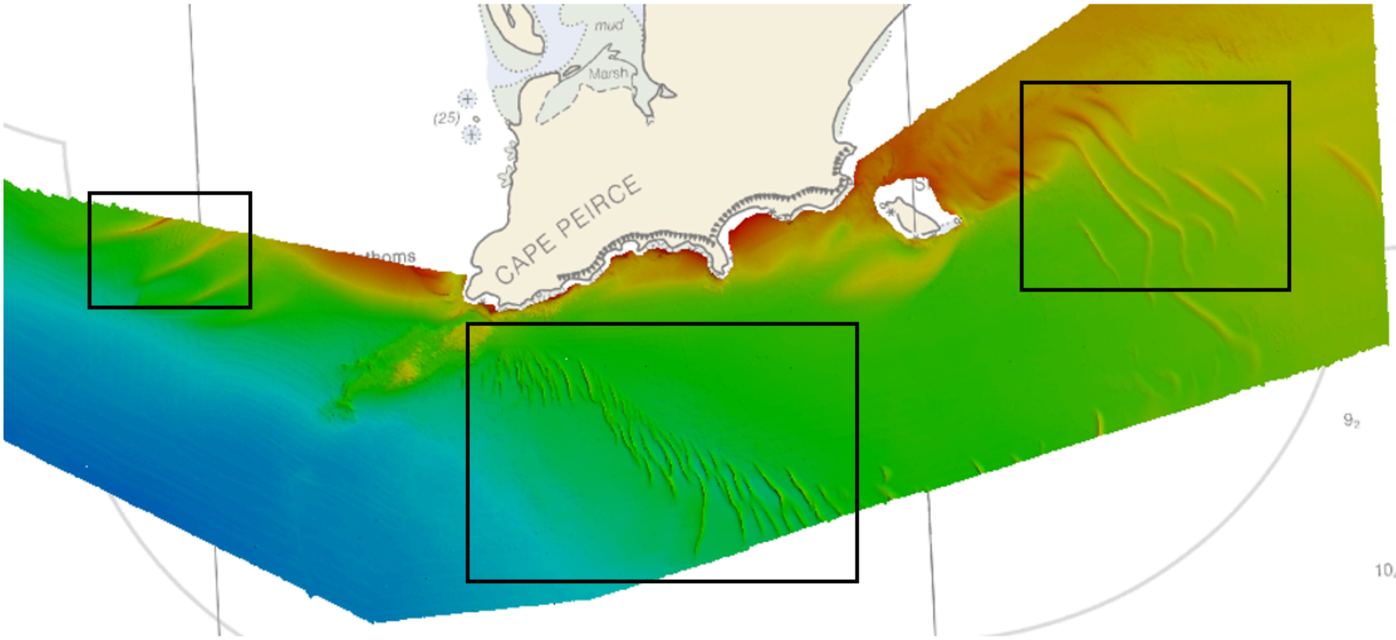


Figure 29: Highlighted areas of rolling sand waves

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 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 herein.

Approver Name	Approver Title	Approval Date	Signature
CAPT Marc Moser	Chief of Party	09/17/2019	MOSER.MARC.STANTON.1163193902 Digitally signed by MOSER.MARC.STANTON.1163193902 Date: 2019.09.17 14:59:51 -07'00'
LT Steve Moulton	Field Operations Officer	09/17/2019	MOULTON.STEPHEN.F.1282116835 Digitally signed by MOULTON.STEPHEN.F.1282116835 Date: 2019.09.17 08:13:37 -07'00'
CST Samuel Candio	Chief Survey Technician	09/17/2019	
HAST Joseph Allman	Sheet Manager	09/17/2019	ALLMAN.JOSEPH.PATRICK.1043983390 Digitally signed by ALLMAN.JOSEPH.PATRICK.1043983390 Date: 2019.09.17 13:39:01 -07'00'

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

APPROVAL PAGE

H13239

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- Bottom samples
- GeoPDF of survey products

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Digitally signed by HAUSER.OLIVIA.A.1275636009
Date: 2020.08.17 16:28:42 -07'00'

Approved:____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch