H12780

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12780

LOCALITY

State(s):	Alaska
General Locality:	Shumagin Islands
Sub-locality:	8 NM East of Simeonof Island

2015

CHIEF OF PARTY
CDR David J. Zezula, NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12780**

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:	**Shumagin Islands**
Sub-Locality:	**8 NM East of Simeonof Island**
Scale:	**40000**
Dates of Survey:	**05/25/2015 to 05/29/2015**
Instructions Dated:	**04/06/2015**
Project Number:	**OPR-P183-FA-15**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**CDR David J. Zezula, 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:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via http://www.ngdc.noaa.gov/.

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Descriptive Report to Accompany Survey H12780

Project: OPR-P183-FA-15

Locality: Shumagin Islands

Sublocality: 8 NM East of Simeonof Island

Scale: 1:40000

May 2015 - May 2015

NOAA Ship *Fairweather*

Chief of Party: CDR David J. Zezula, NOAA

A. Area Surveyed

The survey areas is located in the Shumagin Islands, 8 NM East of Simeonof Island, Alaska.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
55° 0' 39.23" N 159° 6' 35.35" W	54° 48' 8.97" N 158° 56' 25.85" W

Table 1: Survey Limits

Survey limits were acquired in accordance with the requirements in the Project Instructions and the National Ocean Service Hydrographic Surveys Specifications and Deliverables (HSSD) dated approved April 2014.

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. This area is considered navigationally significant and of critical survey priority. In addition, soundings will support a new, larger scale navigation chart.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

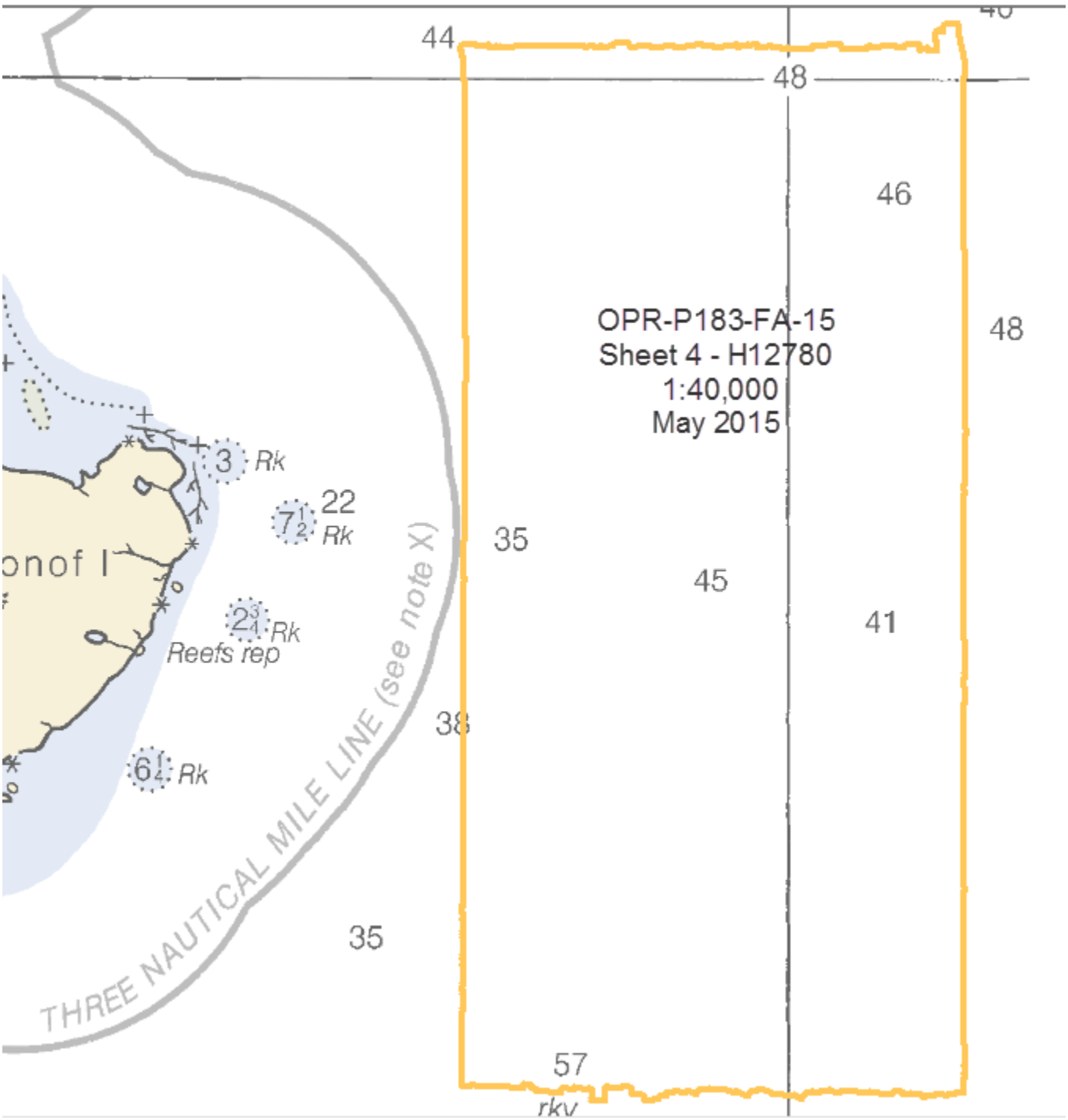


Figure 1: H12780 Survey Outline

Survey coverage was in accordance with the requirements in the Project Instructions and the HSSD.

A.5 Survey Statistics

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

	HULL ID	*2805*	*2806*	*2808*	*S220*	*Total*
LNM	SBES Mainscheme	0	0	0	0	0
	MBES Mainscheme	0	0.993	0	633.324	634.317
	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	14.343	11.547	5.718	0	31.608
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						3
Number of AWOIS Items Investigated						0
Number Maritime Boundary Points Investigated						0
Number of DPs						0
Number of Items Investigated by Dive Ops						0
Total SNM						70.54

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/25/2015	145
05/26/2015	146
05/27/2015	147
05/28/2015	148
05/29/2015	149

Table 3: 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*	*2808*	*S220*
LOA	8.64 meters	8.64 meters	8.64 meters	70.4 meters
Draft	1.12 meters	1.12 meters	1.12 meters	4.7 meters

Table 4: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS/MV V4	Positioning and Attitude System
RESON	SVP71	Sound Speed System
Sea-Bird	SBE 19plus	Conductivity, Temperature, and Depth Sensor
RESON	SVP70	Sound Speed System
RESON	7125	MBES
Kongsberg	EM710	MBES
Rolls-Royce	MVP 200	Conductivity, Temperature, and Depth Sensor

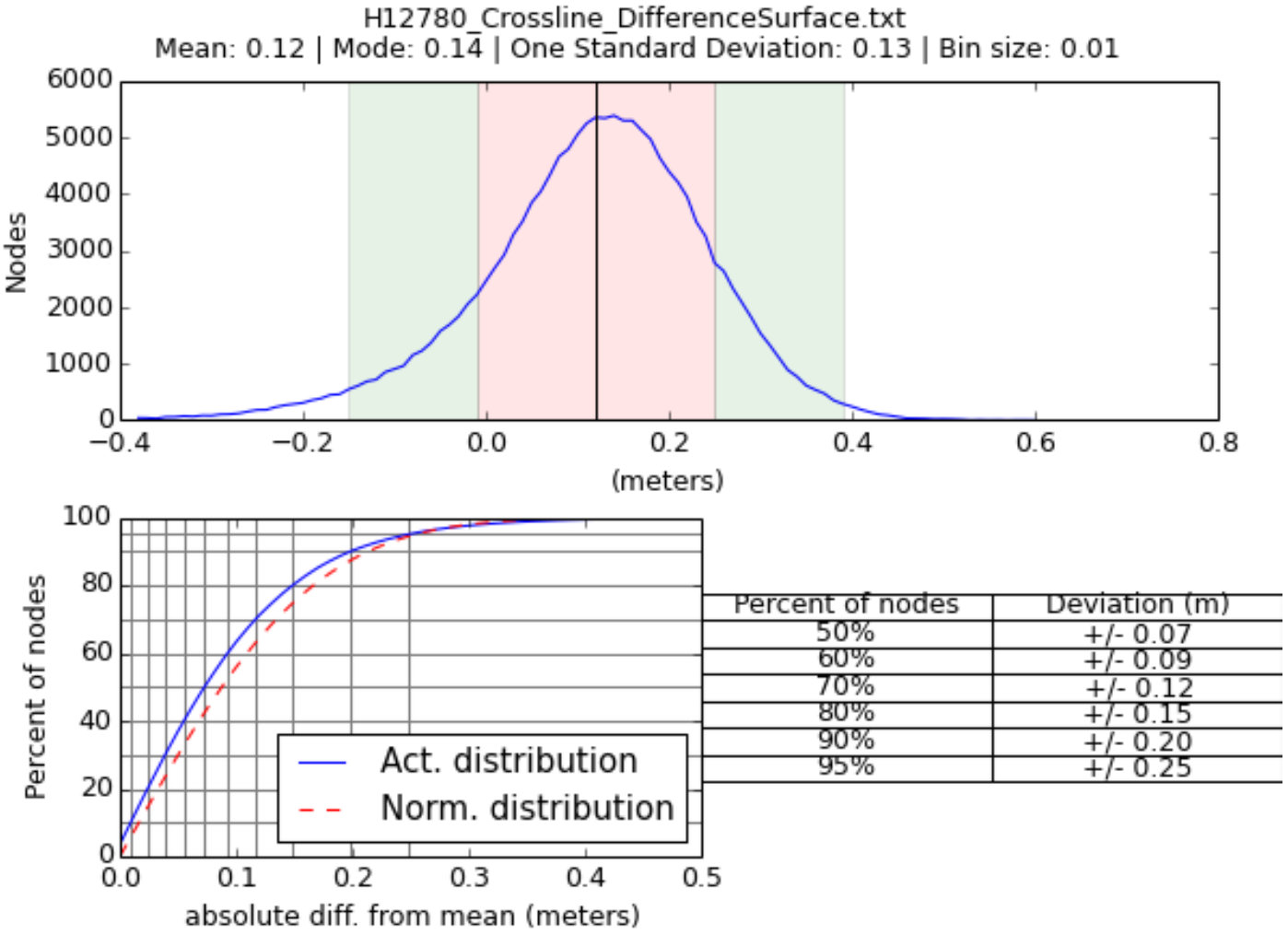
Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 5% of mainscheme acquisition.

Crosslines were collected, processed and compared in accordance with section 5.2.4.3 of the Hydrographic Surveys Specifications and Deliverables (HSSD), approved April 2014. Surface differencing in CARIS Bathy DataBASE was used to assess crossline agreement with main-scheme lines. Figure 3 depicts a difference surface between an 8-meter surface made with main scheme lines only and an 8-meter surface made with crosslines only. This difference surface is submitted digitally in the Separates II folder. The two surfaces agree within 0.5 meters, therefore crosslines agree with main scheme lines within the total allowable vertical and horizontal uncertainty in their common areas.



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.09
70%	+/- 0.12
80%	+/- 0.15
90%	+/- 0.20
95%	+/- 0.25

Figure 2: Statistical information for differences between cross lines and mainscheme

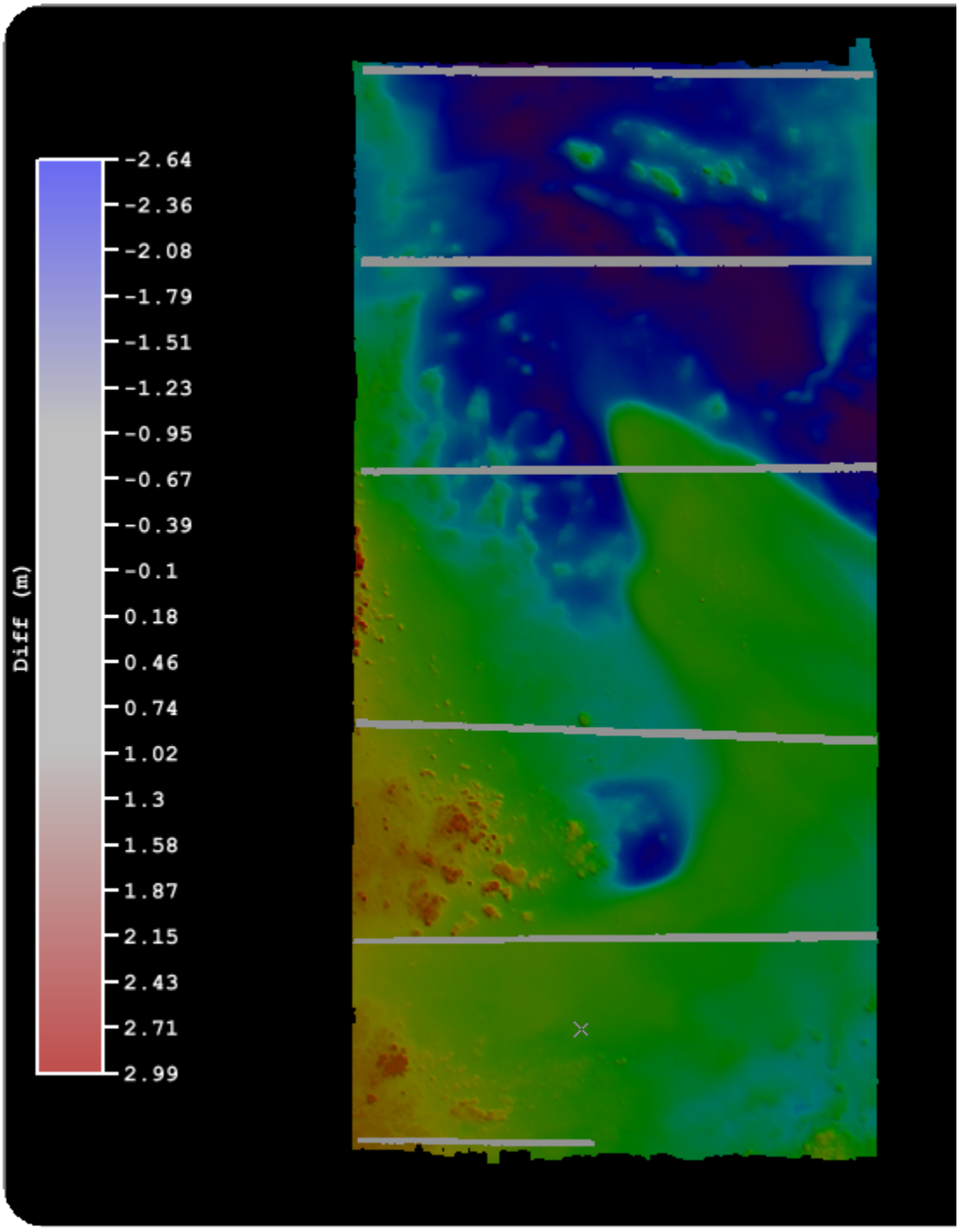


Figure 3: Graphical representation of difference between crossline and mainscheme surfaces

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01 meters	0.08 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S220		1 meters/second	0.5 meters/second
2805	2 meters/second		0.5 meters/second
2806	2 meters/second		0.5 meters/second
2808	2 meters/second		0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values

B.2.3 Junctions

The areas of overlap between surveys were reviewed in CARIS HIPS by surface differencing eight meter and 16 meter combined surfaces to assess surface agreement. Statistics were calculated in Pydro64. Adequate data overlap between all surveys was achieved.

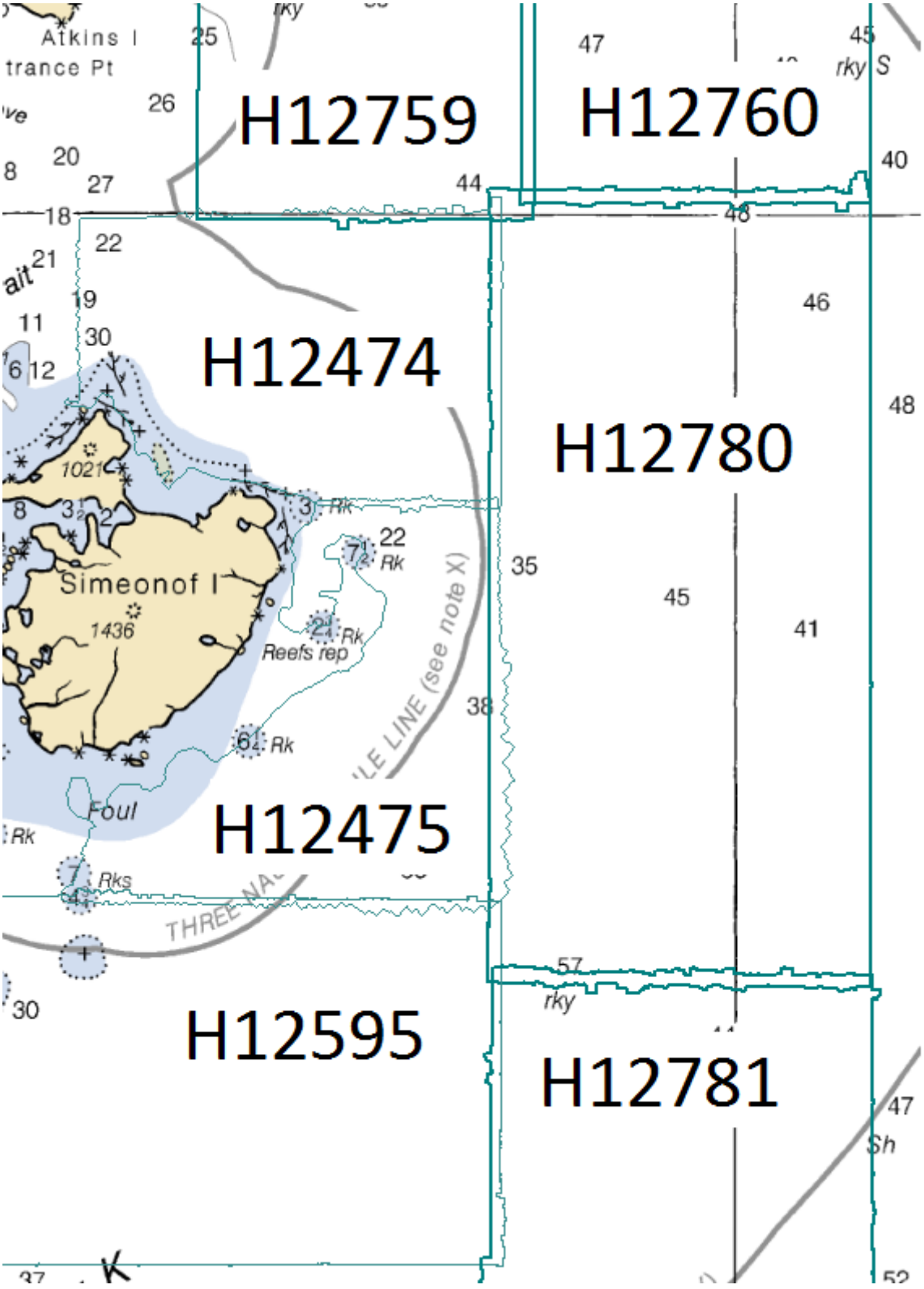


Figure 4: All survey junctions with H12780

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12759	1:40000	2015	NOAA Ship FAIRWEATHER	NW
H12760	1:40000	2015	NOAA Ship FAIRWEATHER	N
H12781	1:40000	2015	NOAA Ship RAINIER	S
H12474	1:40000	2012	NOAA Ship RAINIER	W
H12475	1:40000	2012	NOAA Ship RAINIER	W
H12595	1:40000	2013	NOAA Ship RAINIER	SW

Table 8: Junctioning Surveys

H12759

Surface differencing in CARIS HIPS was used to assess junction agreement between H12759 and H12780. The difference between surfaces was generally between 0.37 m and -0.37 m.

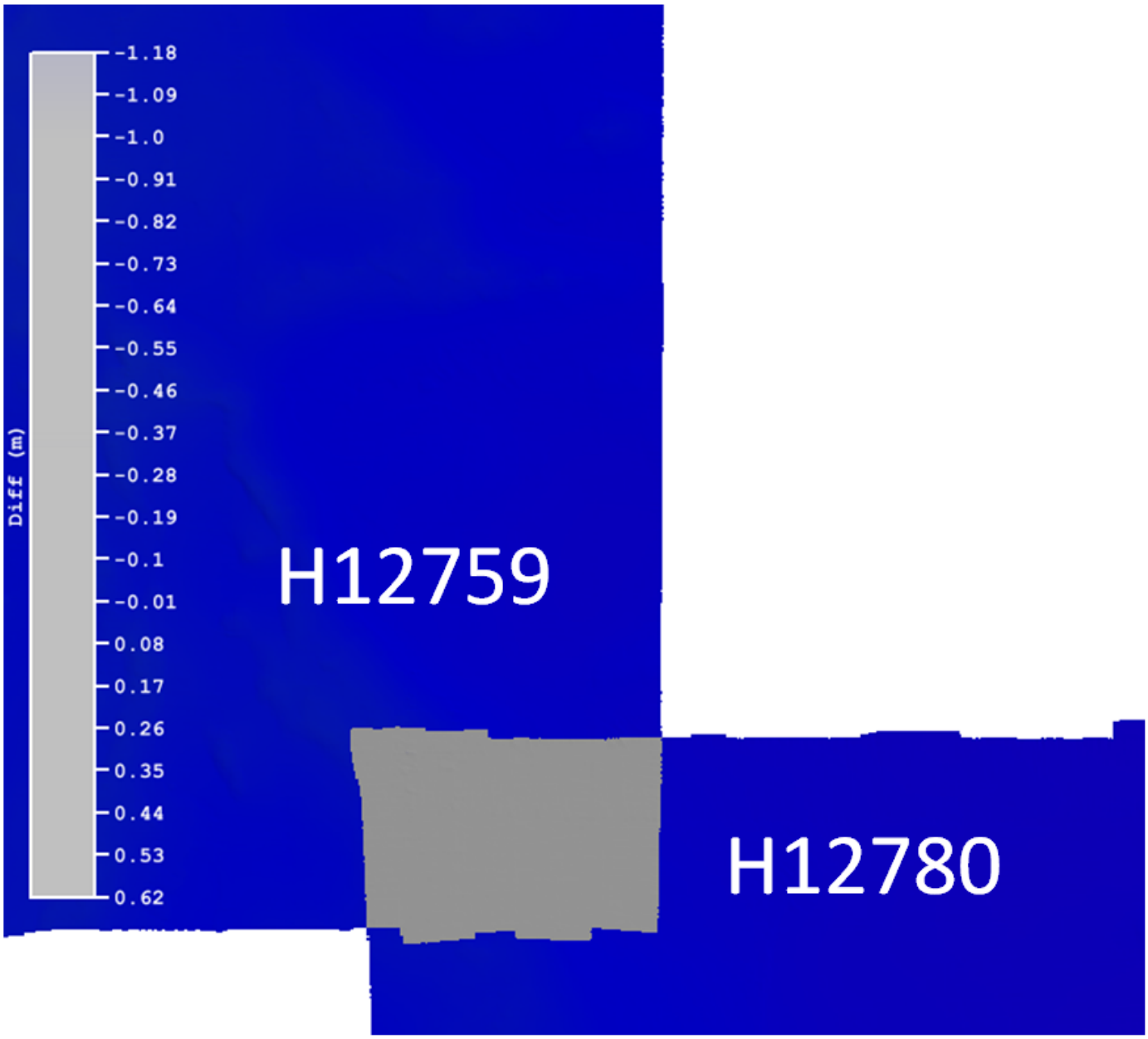
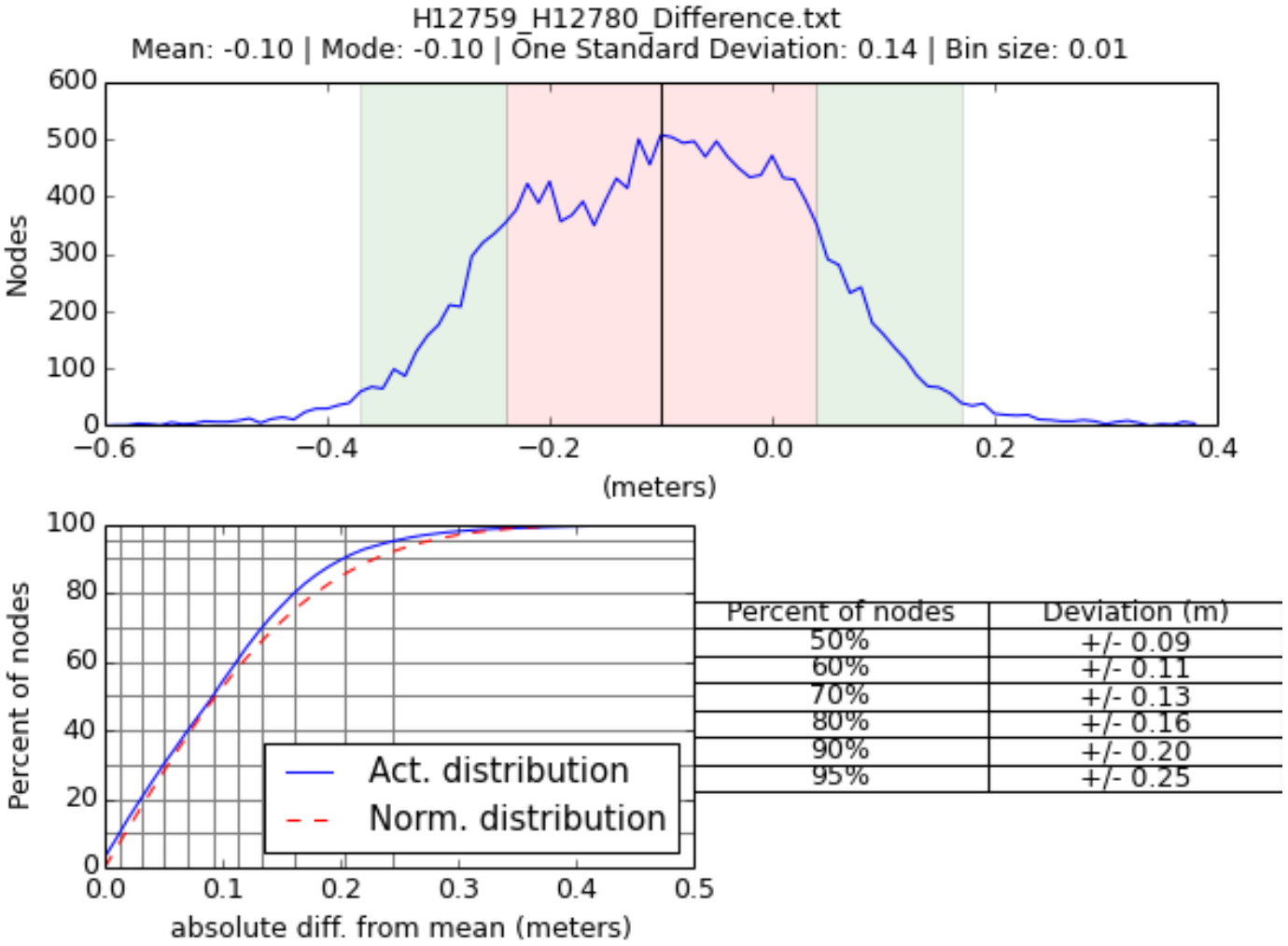


Figure 5: Graphical representation of difference between junction H12780 and H12759



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.11
70%	+/- 0.13
80%	+/- 0.16
90%	+/- 0.20
95%	+/- 0.25

Figure 6: Statistical information for junction comparison between sheet H12780 and H12759

H12760

Surface differencing in CARIS HIPS was used to assess junction agreement between H12760 and H12780. The difference between surfaces was generally between 0.24 m and -0.24 m.

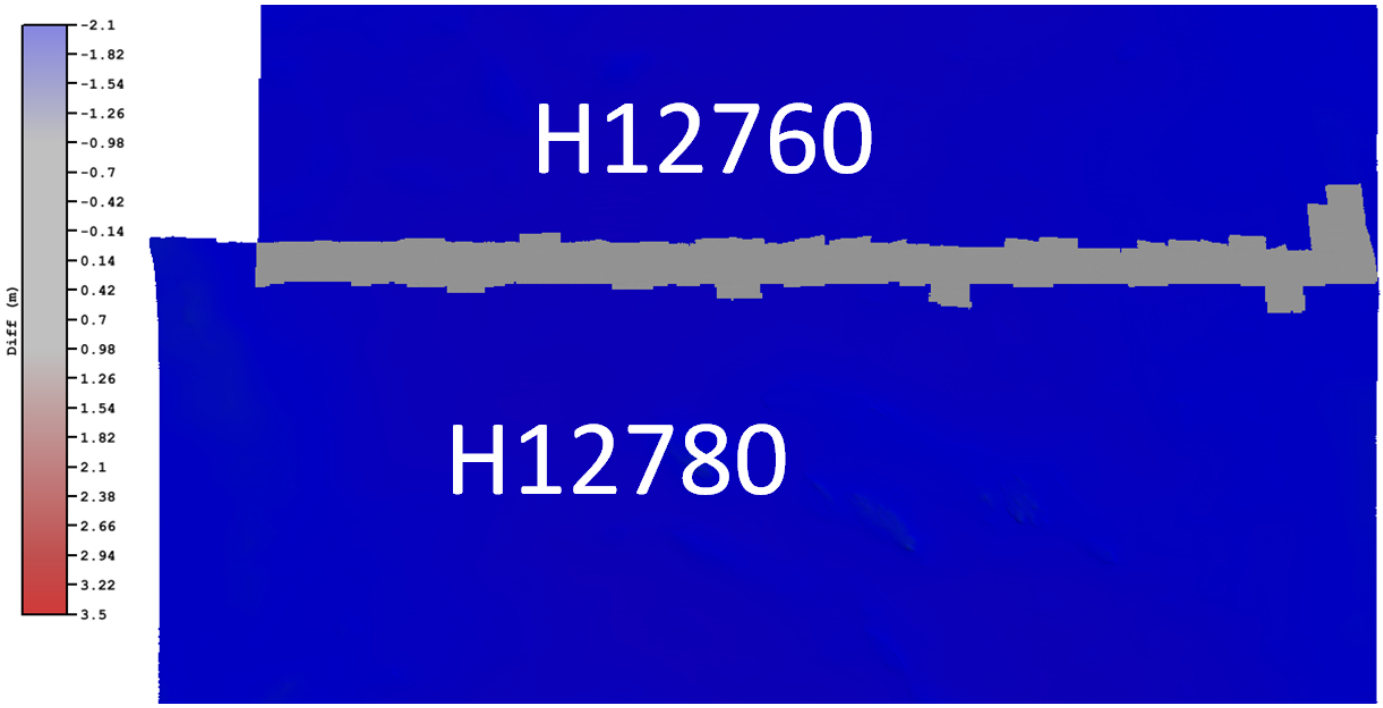
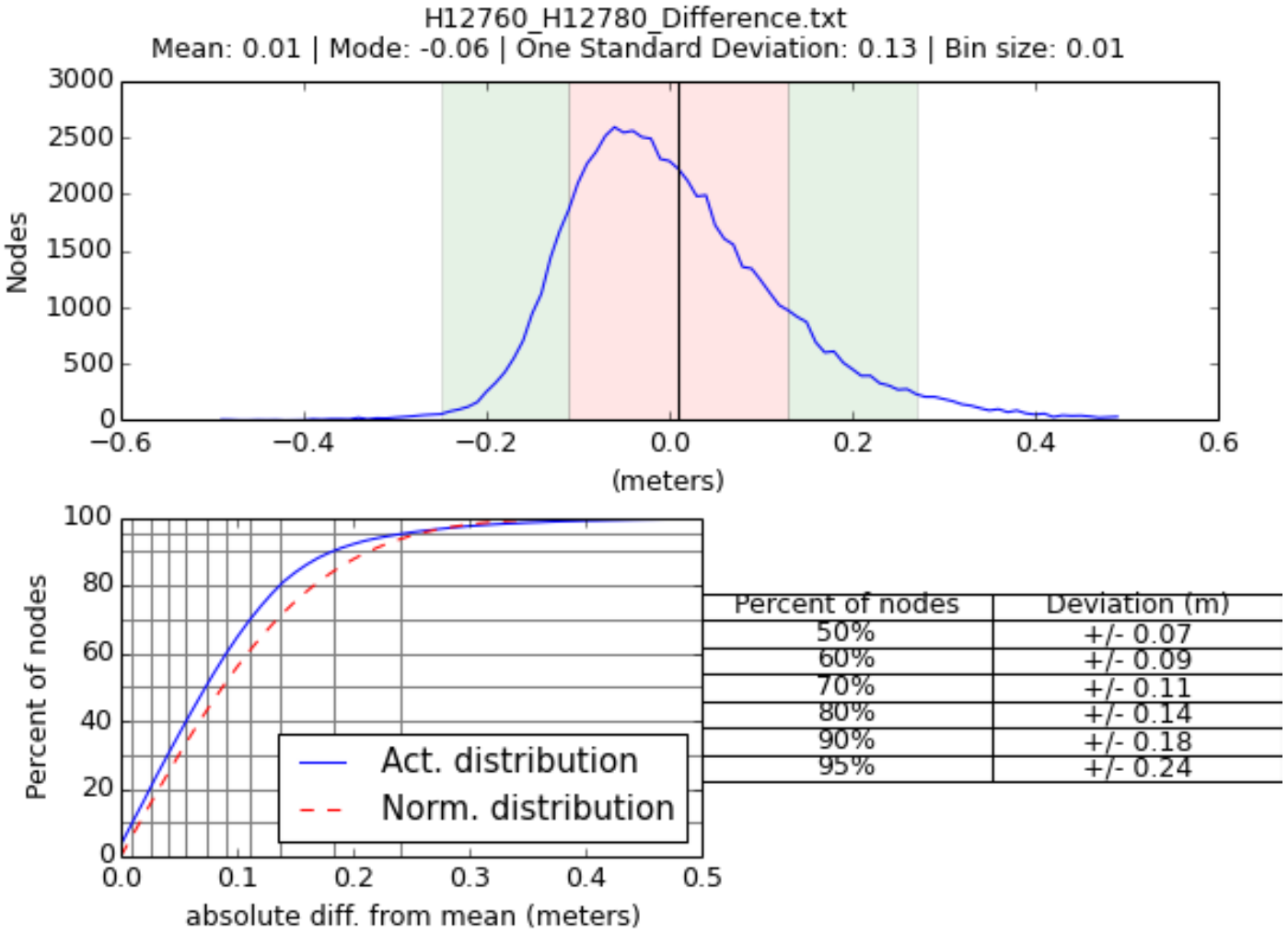


Figure 7: Graphical representation of difference between junction H12780 and H12760



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.09
70%	+/- 0.11
80%	+/- 0.14
90%	+/- 0.18
95%	+/- 0.24

Figure 8: Statistical information for junction comparison between sheet H12780 and H12760

H12781

Surface differencing in CARIS HIPS was used to assess junction agreement between H12781 and H12780. The difference between surfaces was generally between 0.30 m and -0.30 m.

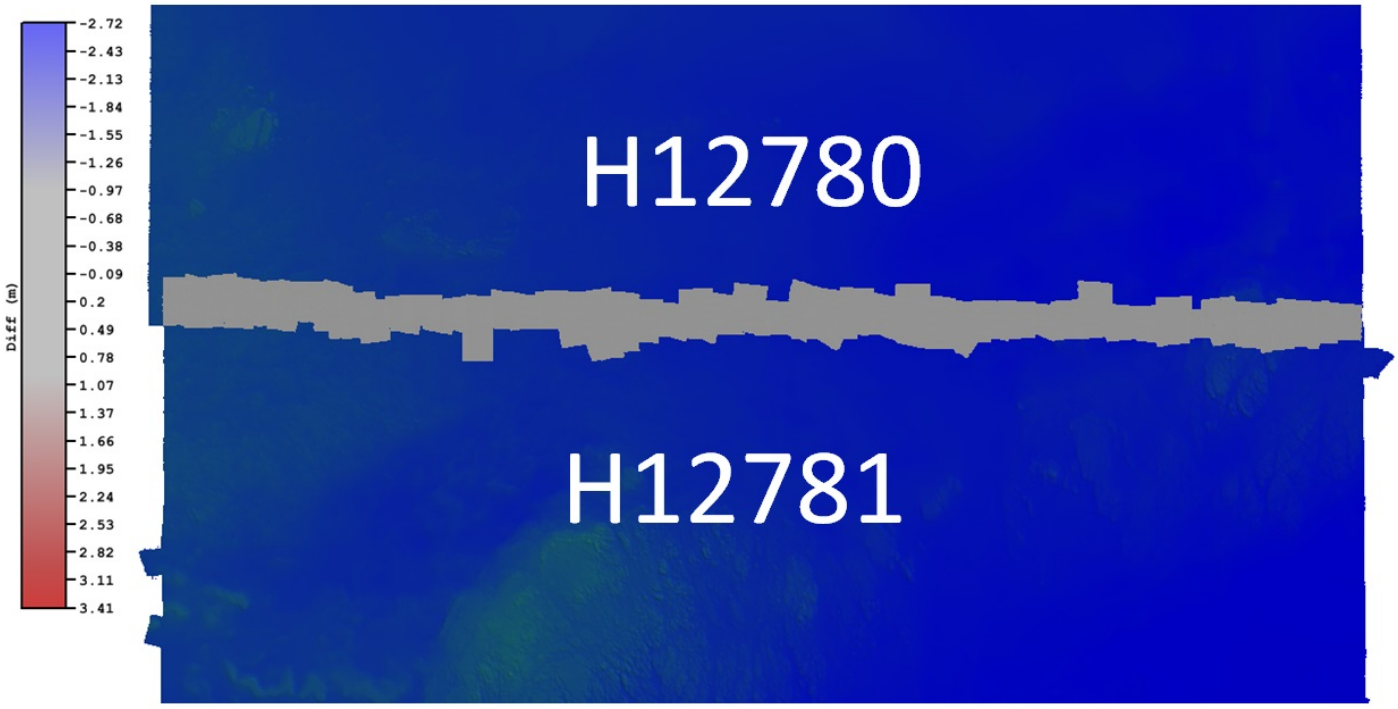
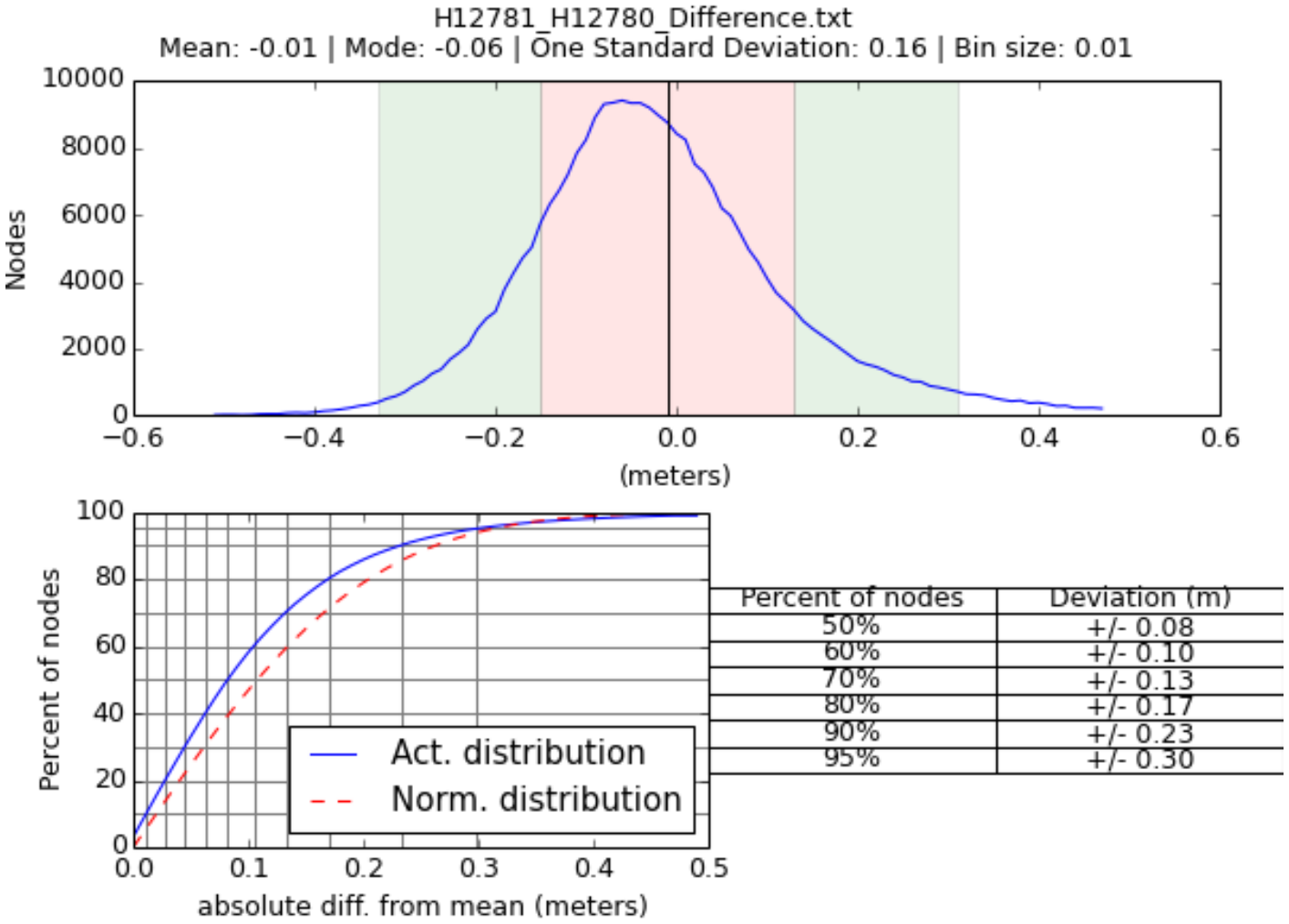


Figure 9: Graphical representation of difference between junction H12780 and H12781



Percent of nodes	Deviation (m)
50%	+/- 0.08
60%	+/- 0.10
70%	+/- 0.13
80%	+/- 0.17
90%	+/- 0.23
95%	+/- 0.30

Figure 10: Statistical information for junction comparison between sheet H12780 and H12781

H12474

Surface differencing in CARIS HIPS was used to assess junction agreement between H12474 and H12780. The difference between surfaces was generally between 0.23 m and -0.23 m.

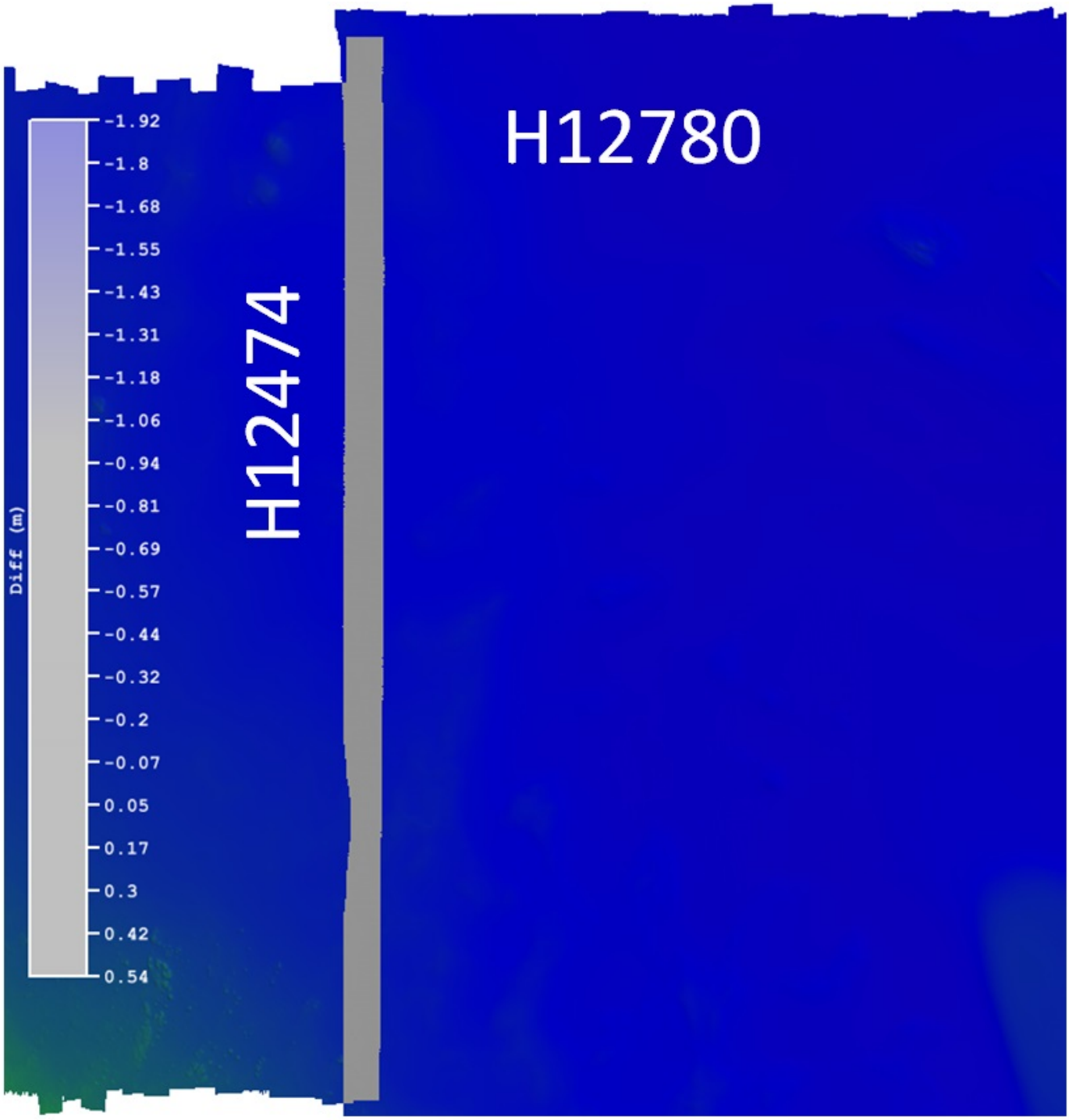
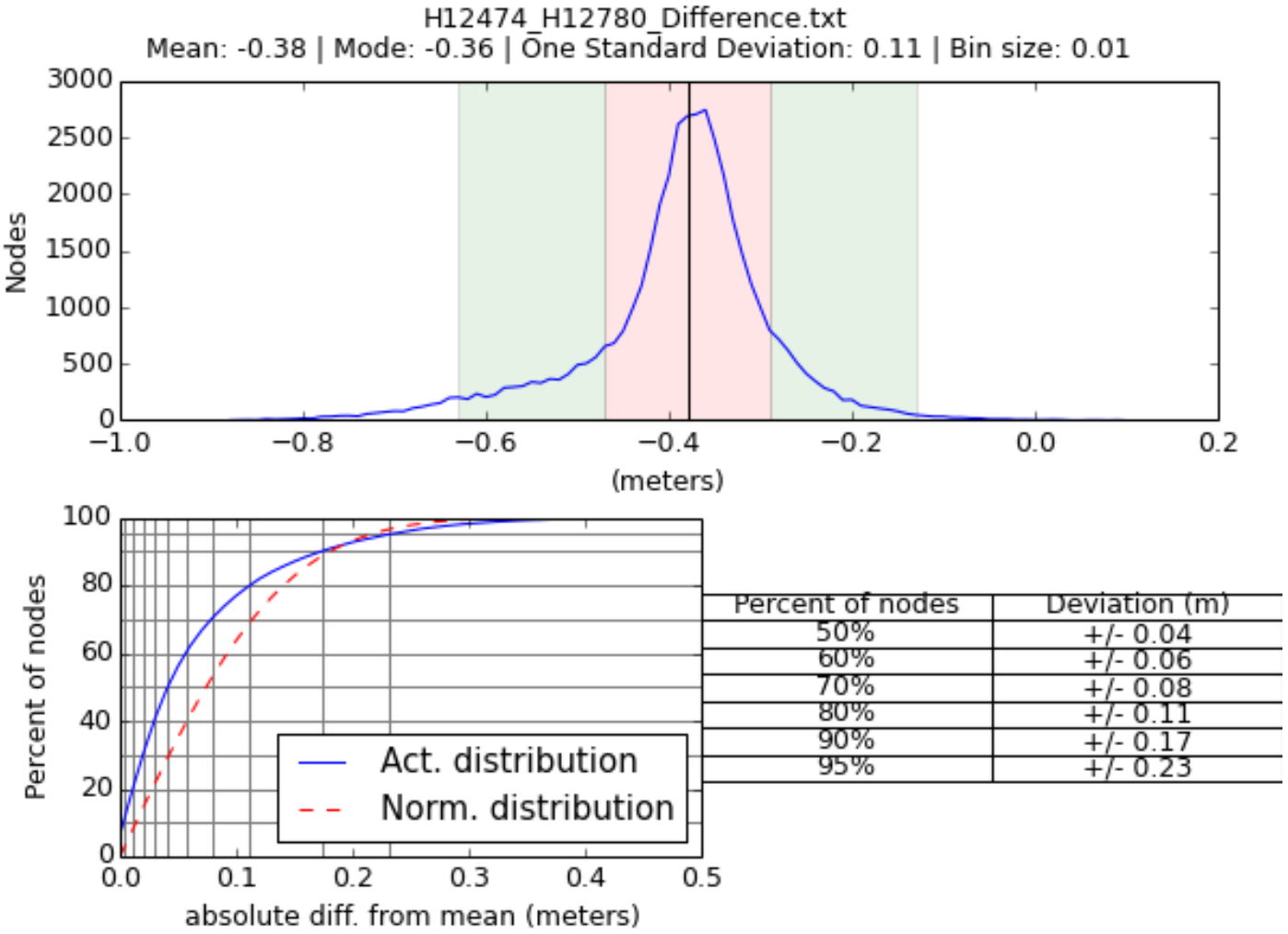


Figure 11: Graphical representation of difference between junction H12780 and H12474



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.06
70%	+/- 0.08
80%	+/- 0.11
90%	+/- 0.17
95%	+/- 0.23

Figure 12: Statistical information for junction comparison between sheet H12780 and H12474

H12475

Surface differencing in CARIS HIPS was used to assess junction agreement between H12475 and H12780. The difference between surfaces was generally between 0.36 m and -0.36 m. There were notable differences in the Northern end of the junction due to the rocky nature of the overlapping area.

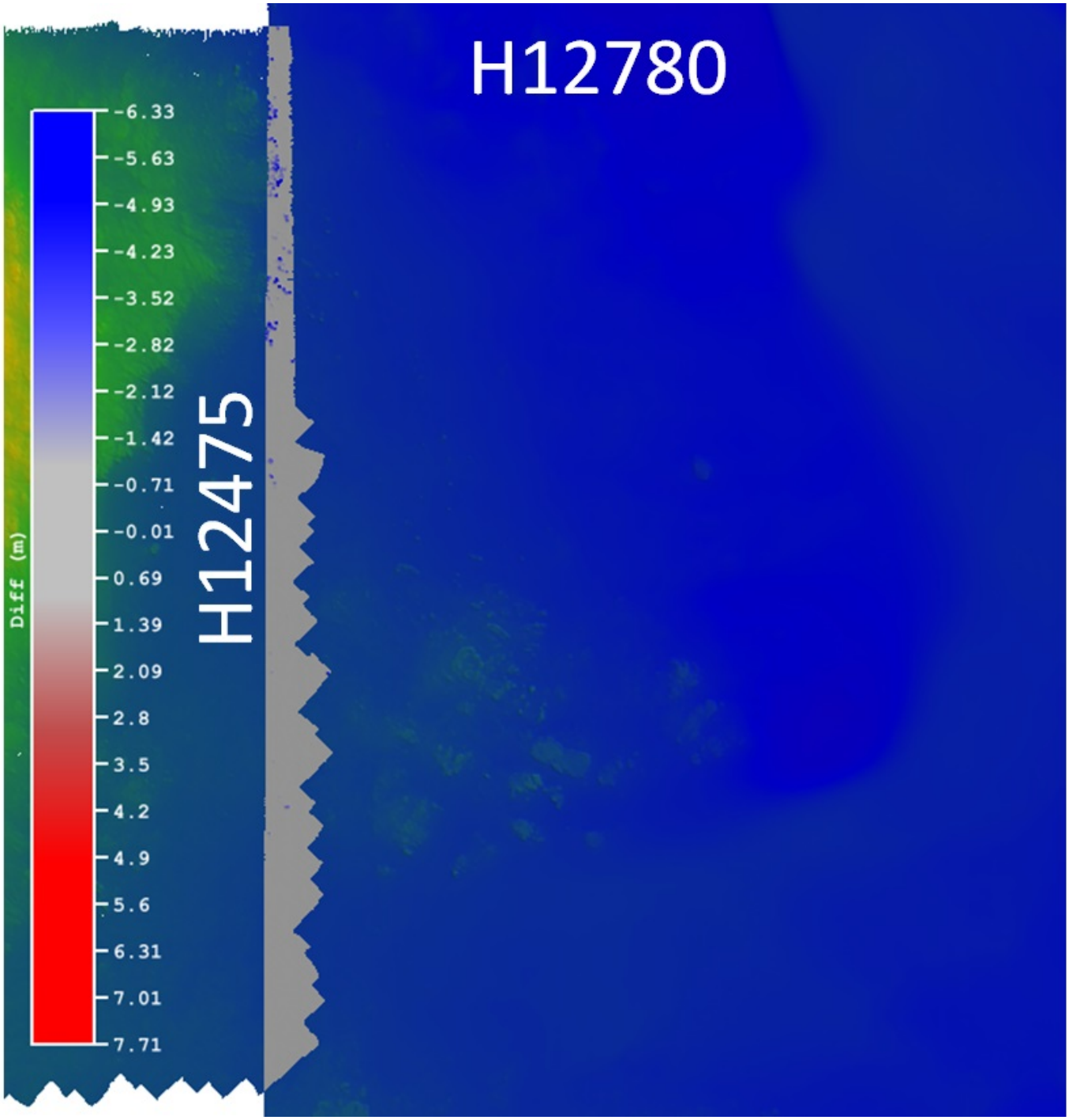
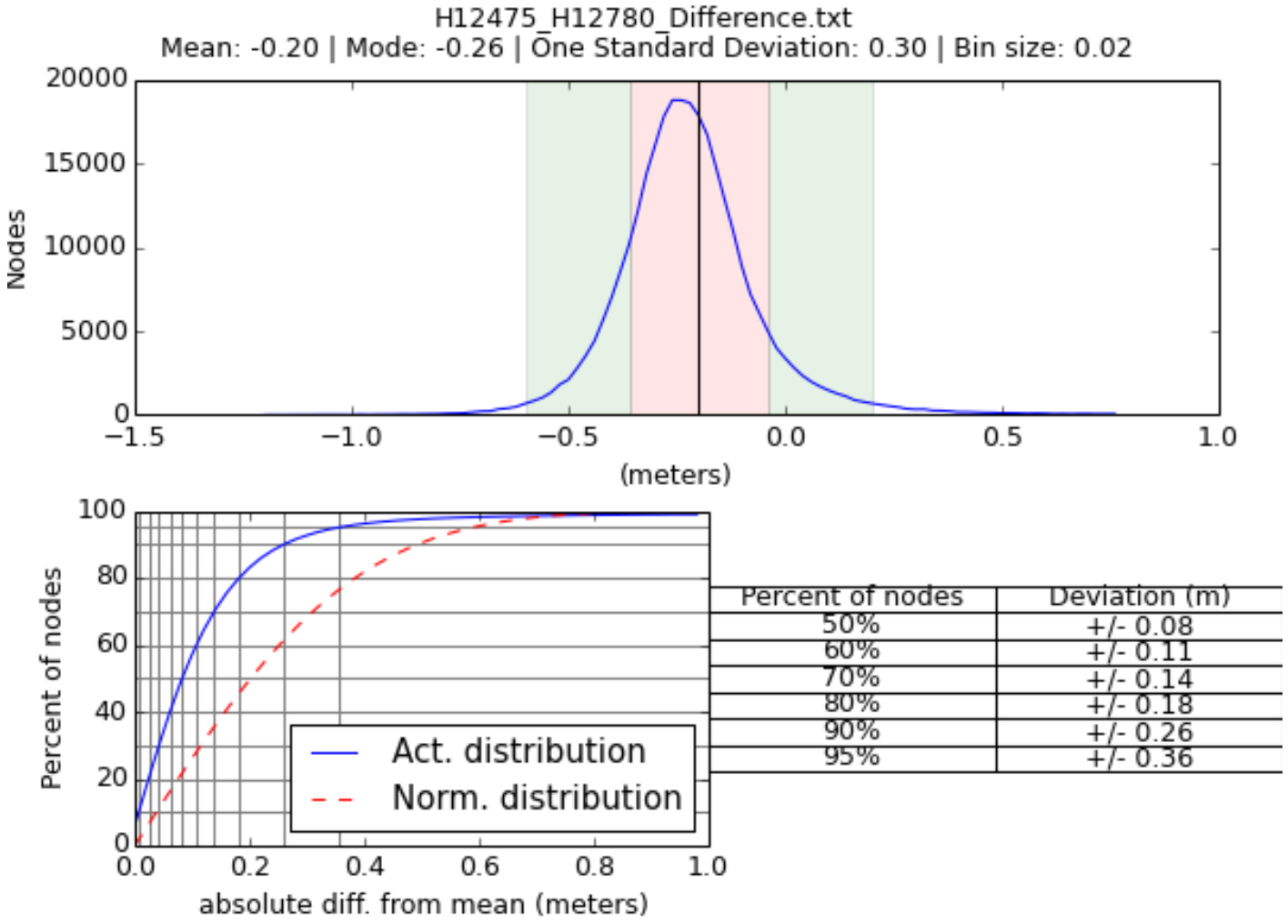


Figure 13: Graphical representation of difference between junction H12780 and H12475



Percent of nodes	Deviation (m)
50%	+/- 0.08
60%	+/- 0.11
70%	+/- 0.14
80%	+/- 0.18
90%	+/- 0.26
95%	+/- 0.36

Figure 14: Statistical information for junction comparison between sheet H12780 and H12475

H12595

Surface differencing in CARIS HIPS was used to assess junction agreement between H12595 and H12780. The difference between surfaces was generally between 0.37 m and -0.37 m.

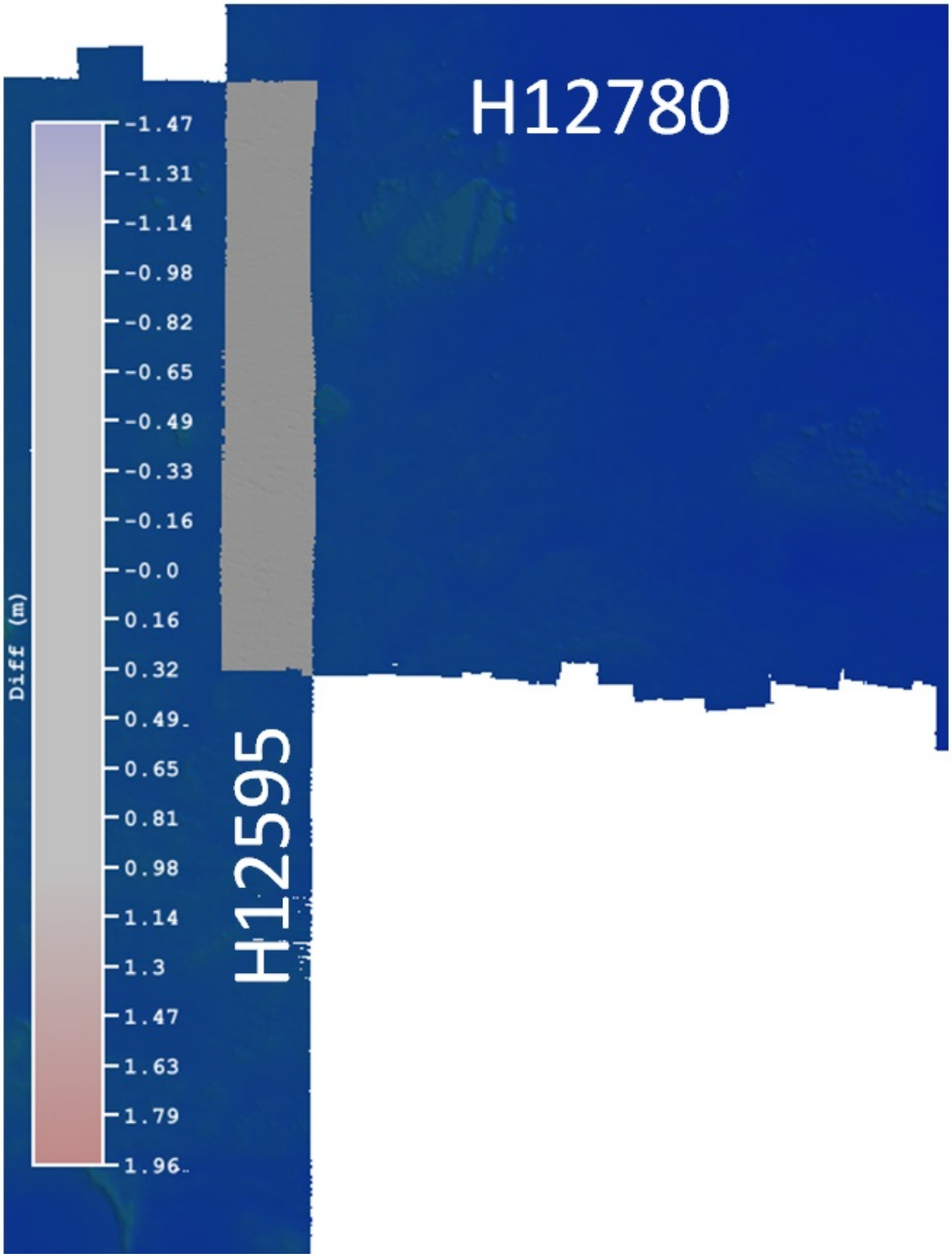
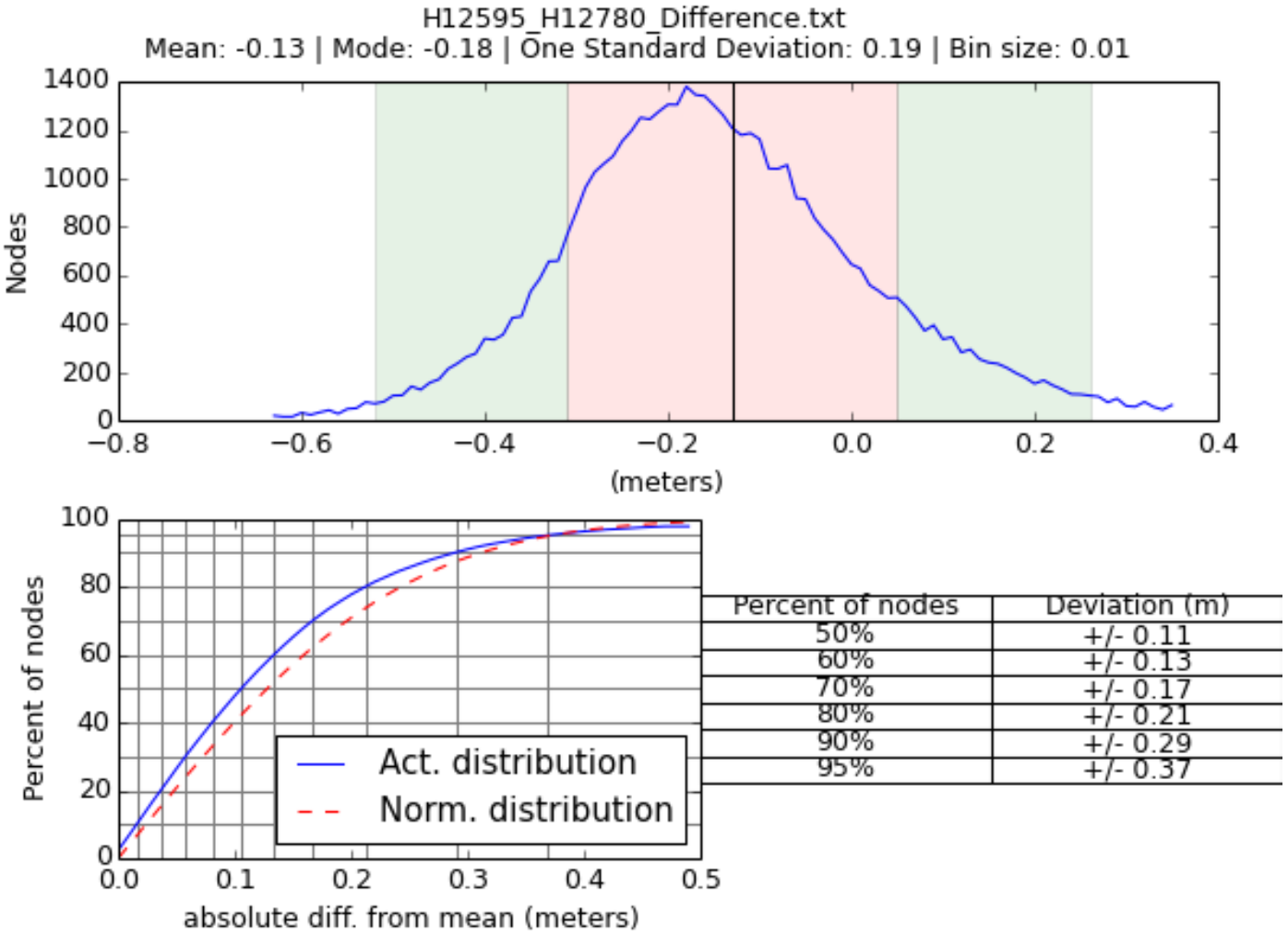


Figure 15: Graphical representation of difference between junction H12780 and H12595



Percent of nodes	Deviation (m)
50%	+/- 0.11
60%	+/- 0.13
70%	+/- 0.17
80%	+/- 0.21
90%	+/- 0.29
95%	+/- 0.37

Figure 16: Statistical information for junction comparison between sheet H12780 and H12595

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

Sea State Issues

During acquisition on H12780 multiple weather events occurred off the coast of the Shumagin Islands causing large swell conditions in the working area. All MBES data for H12780 was collected in three to six foot sea surface swells. Due to the swell, significant roll of 4 to 6 degrees with a peak magnitude of 7 degrees and with pitch and heave of 1 to 3 degrees was experienced. In some cases, the rolling pitching caused the Kongsberg EM-710 to partially lose bottom tracking. In many cases, rolls caused the Kongsberg EM-710 to periodically lose bottom tracking producing significant noise resulting in the loss of reliable soundings in the outer beams. The data was cleaned out where erroneous fliers were produced.

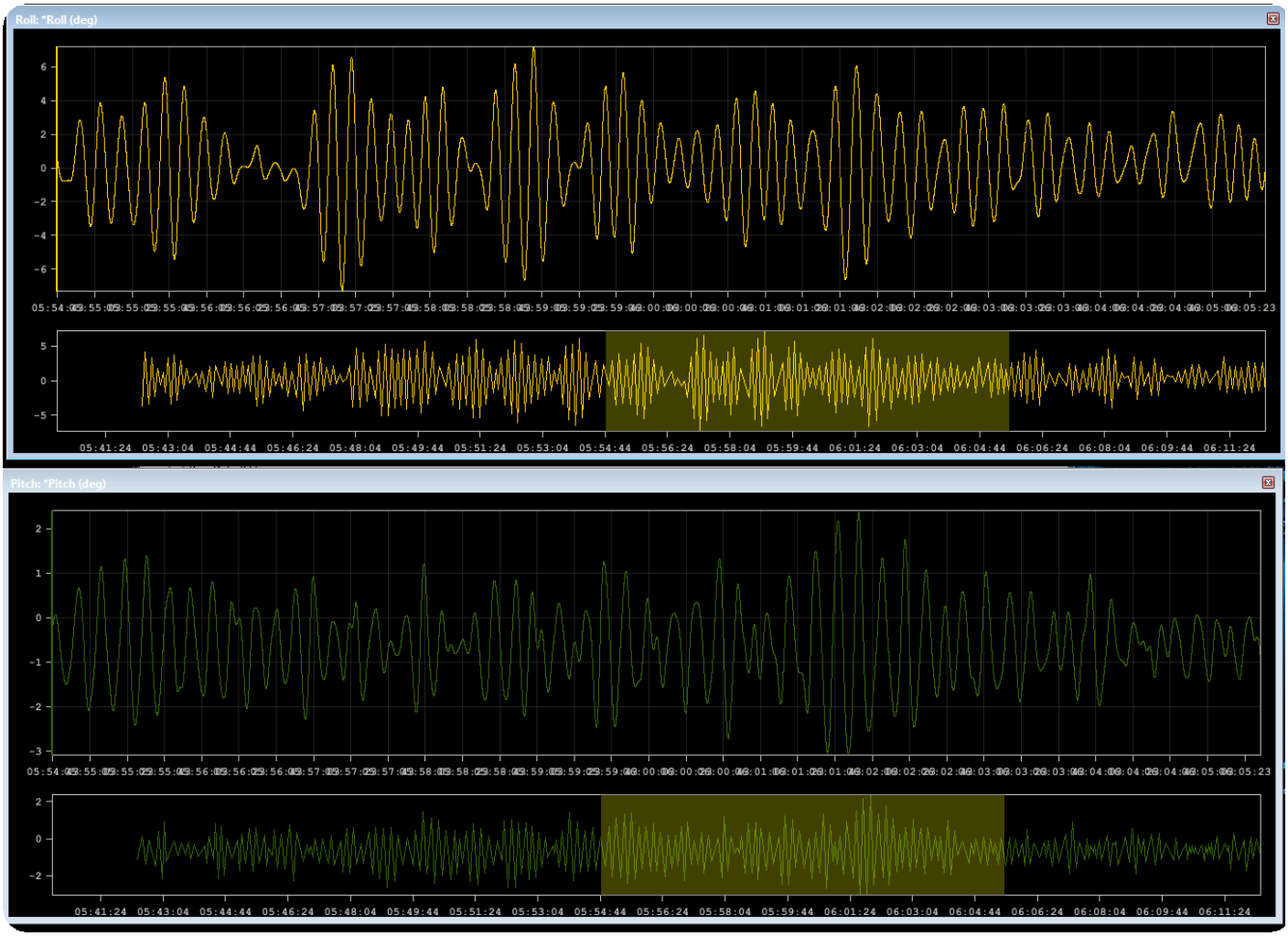


Figure 17: Pitch and Roll in Attitude Editor

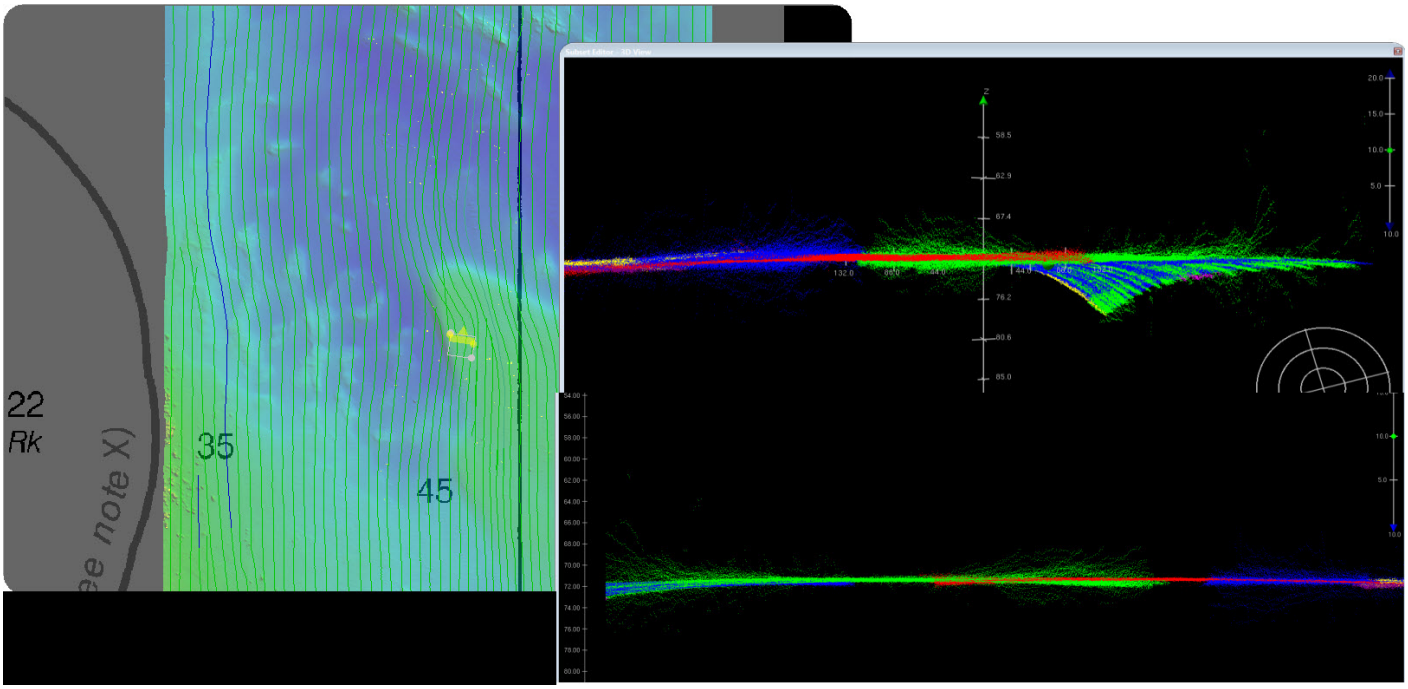


Figure 18: Pitch and Roll in Subset

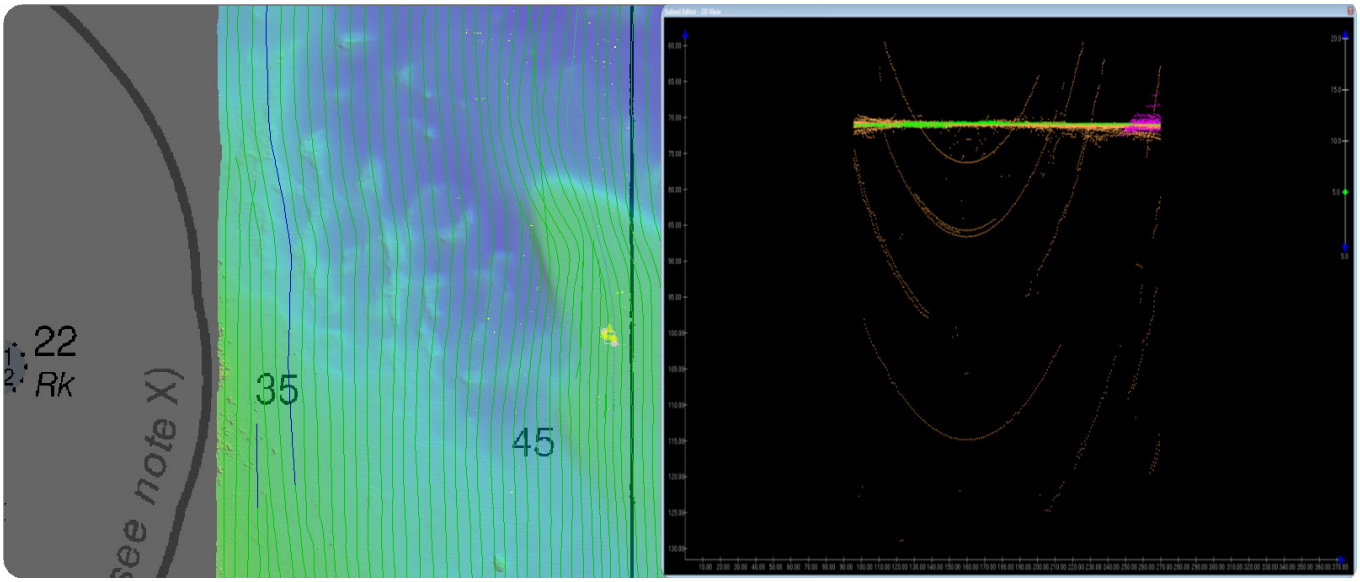


Figure 19: Blowout in Subset

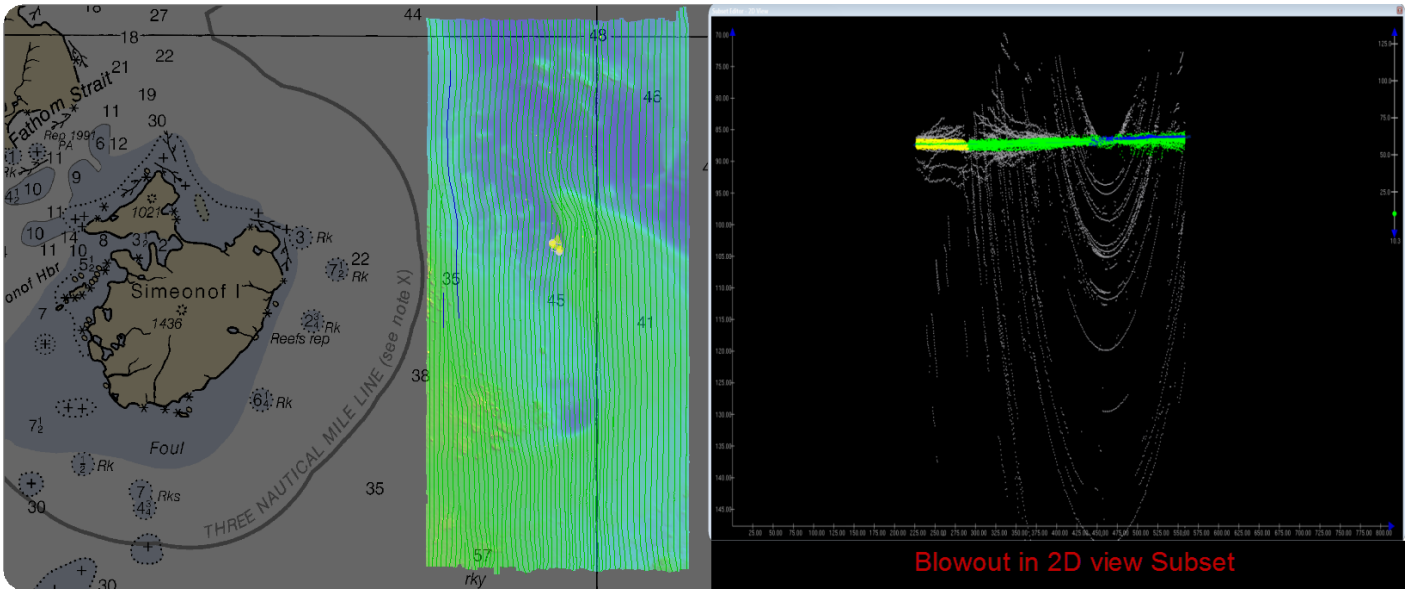


Figure 20: Blowout in Subset

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Casts were conducted every 10-20 minutes while towing the Moving Vessel Profiler during ship acquisition. During launch acquisition casts were conducted approximately ever 2 hours.

Sound speed measurements were conducted as discussed in the Data Acquisition section of the DAPR.

B.2.8 Coverage Equipment and Methods

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

B.2.9 IHO Uncertainty

It was found that 99.93% of nodes in the H12780_4m_MLLW.csar and 99.99% of nodes in the H12780_8m_MLLW_Final.csar meet or exceed IHO Order 1 specifications for all survey soundings of survey H12780. See Figures 21-23, and Standards Compliance Review in Appendix II. To assess vertical accuracy standards, a child layer titled "IHO1" was created for each of the four meter and eight meter and "IHO2" for eight meter finalized surface using the equations as stated in C.2.1 of the DAPR.

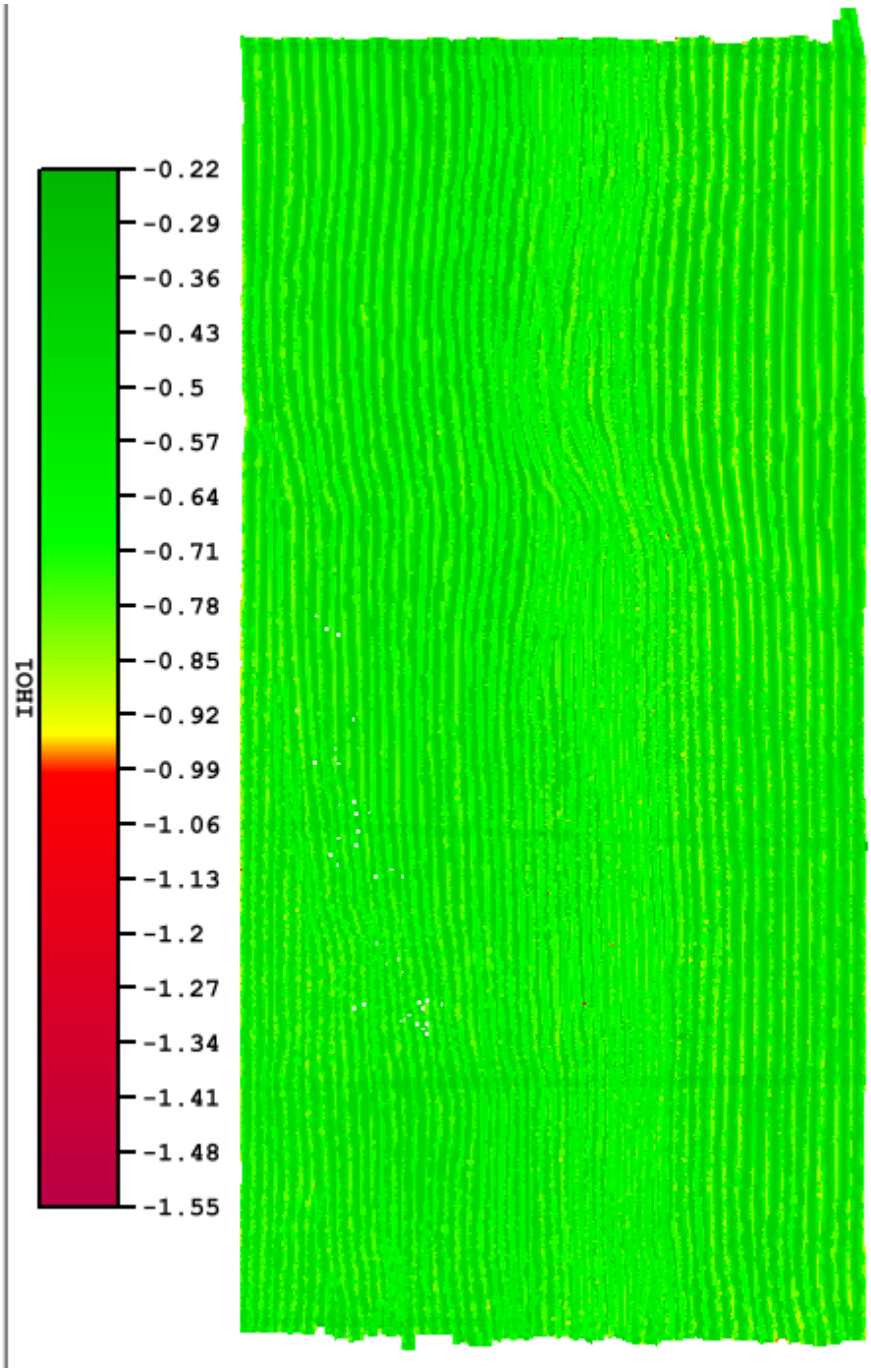


Figure 21: IHO 1 Uncertainty Layer

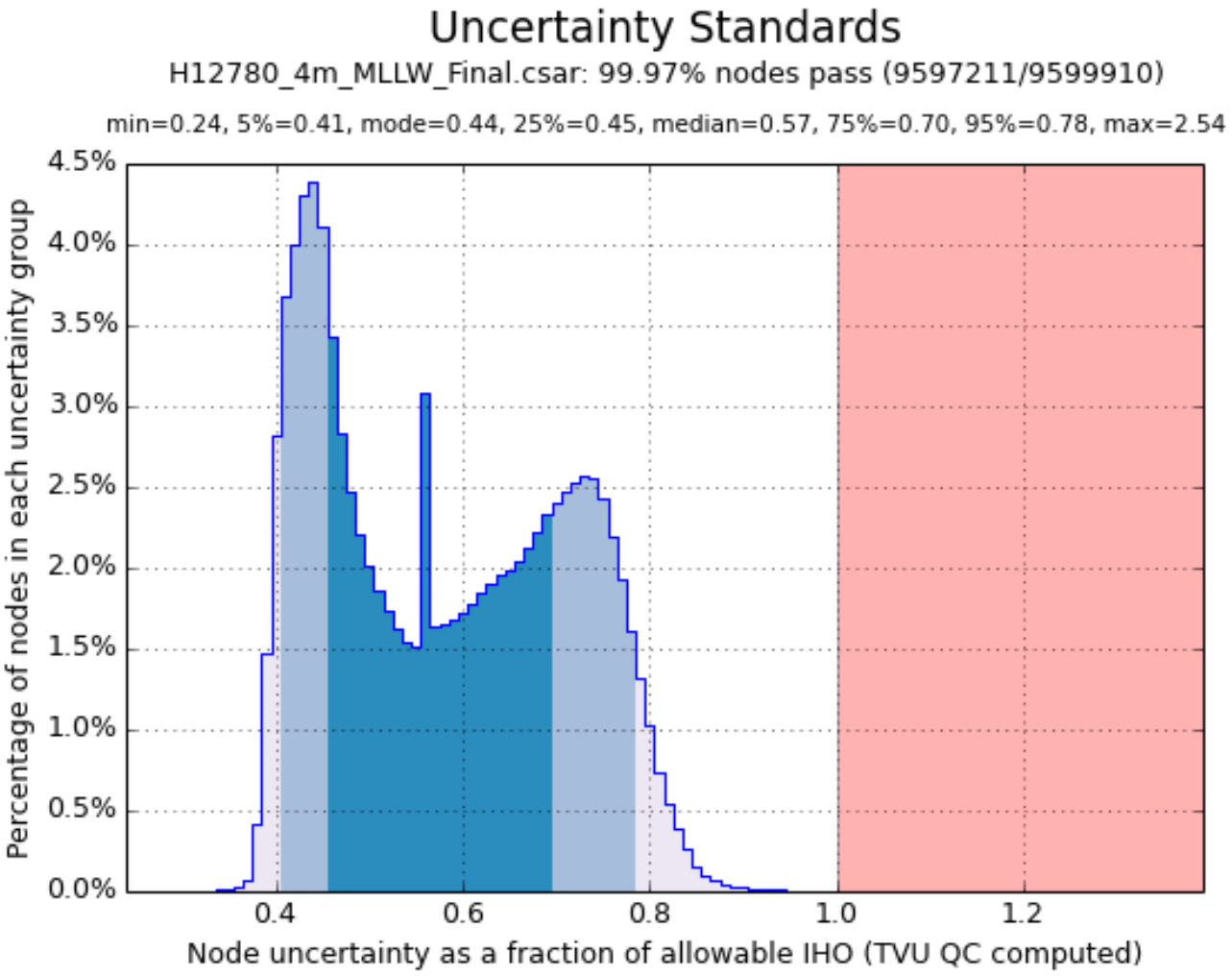


Figure 22: Uncertainty standards for 4m finalized surface

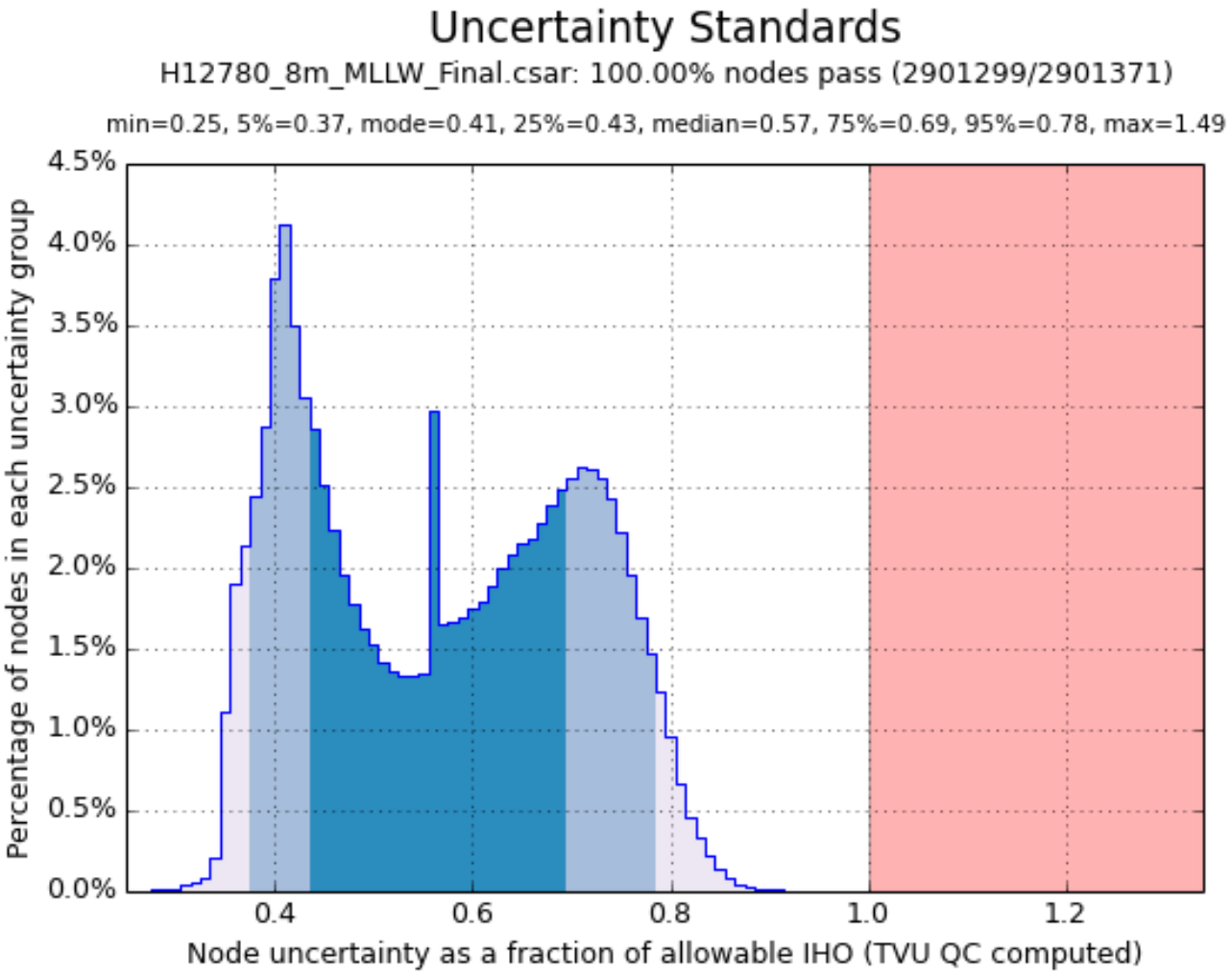


Figure 23: Uncertainty standards for 8m finalized surface

B.2.10 Density

Density requirements for H12780 were achieved with at least 99.97% of finalized surface nodes containing five or more soundings, see Standards Compliance Review in Appendix II.

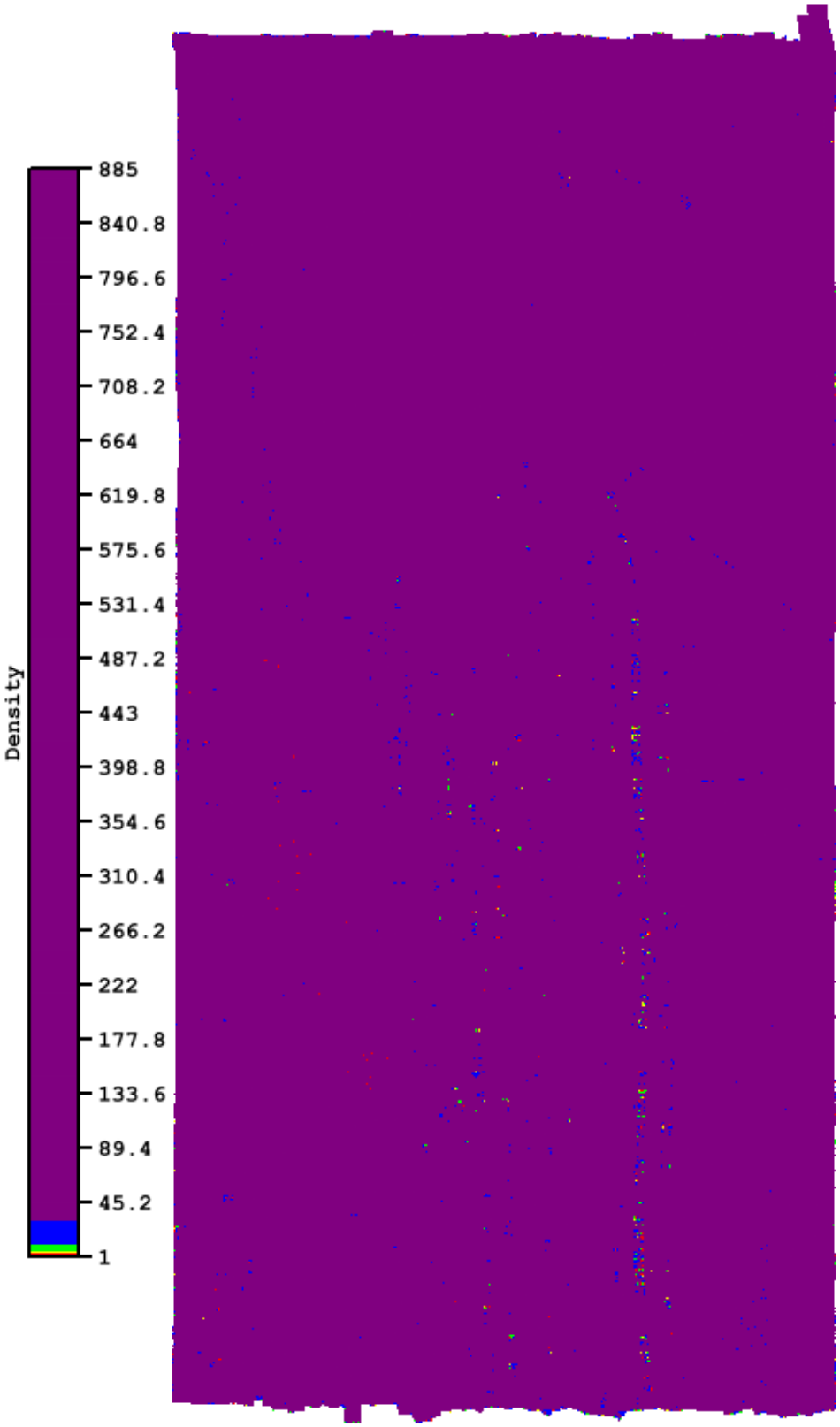


Figure 24: Density Layer

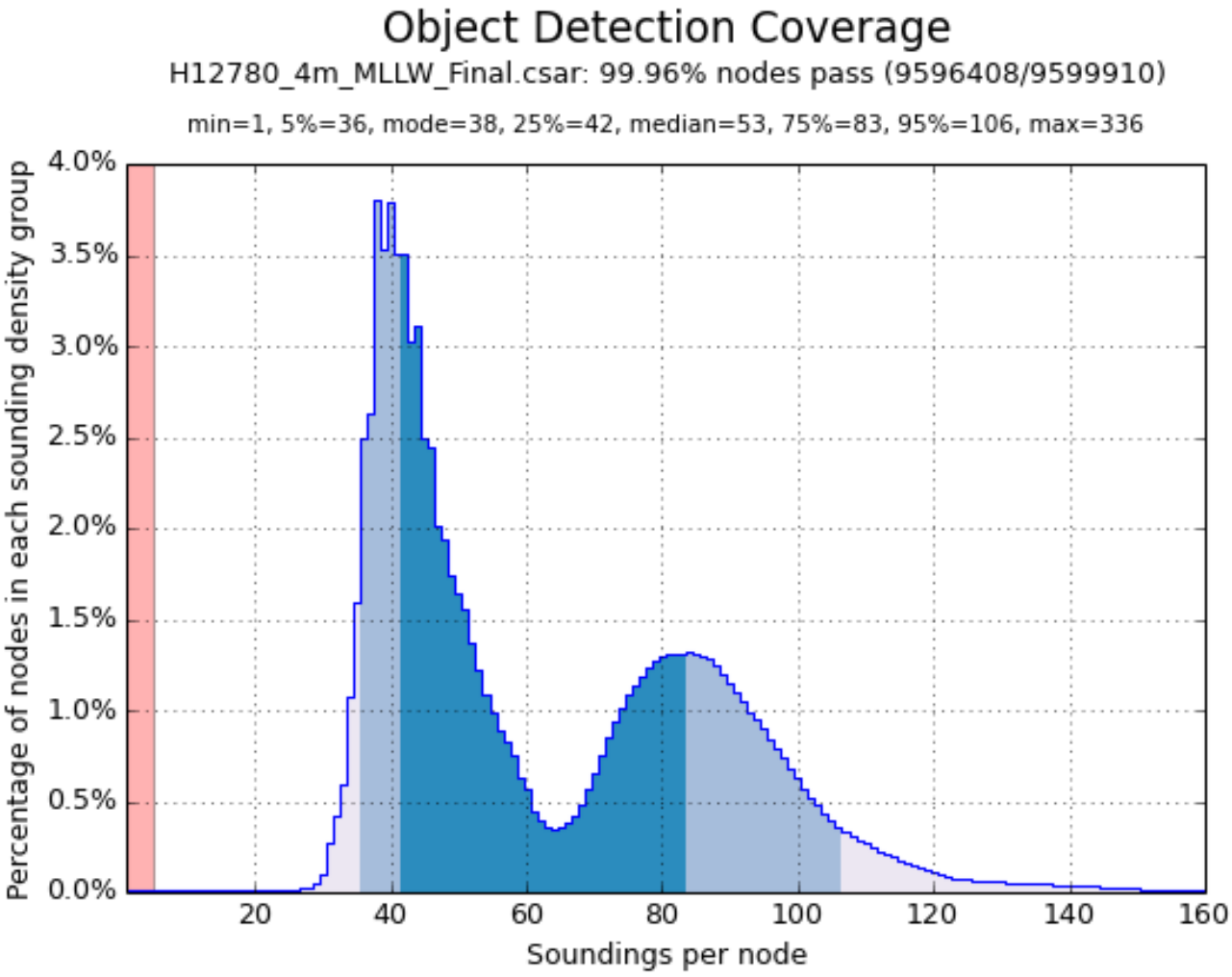


Figure 25: Object detection coverage for 4m finalized surface

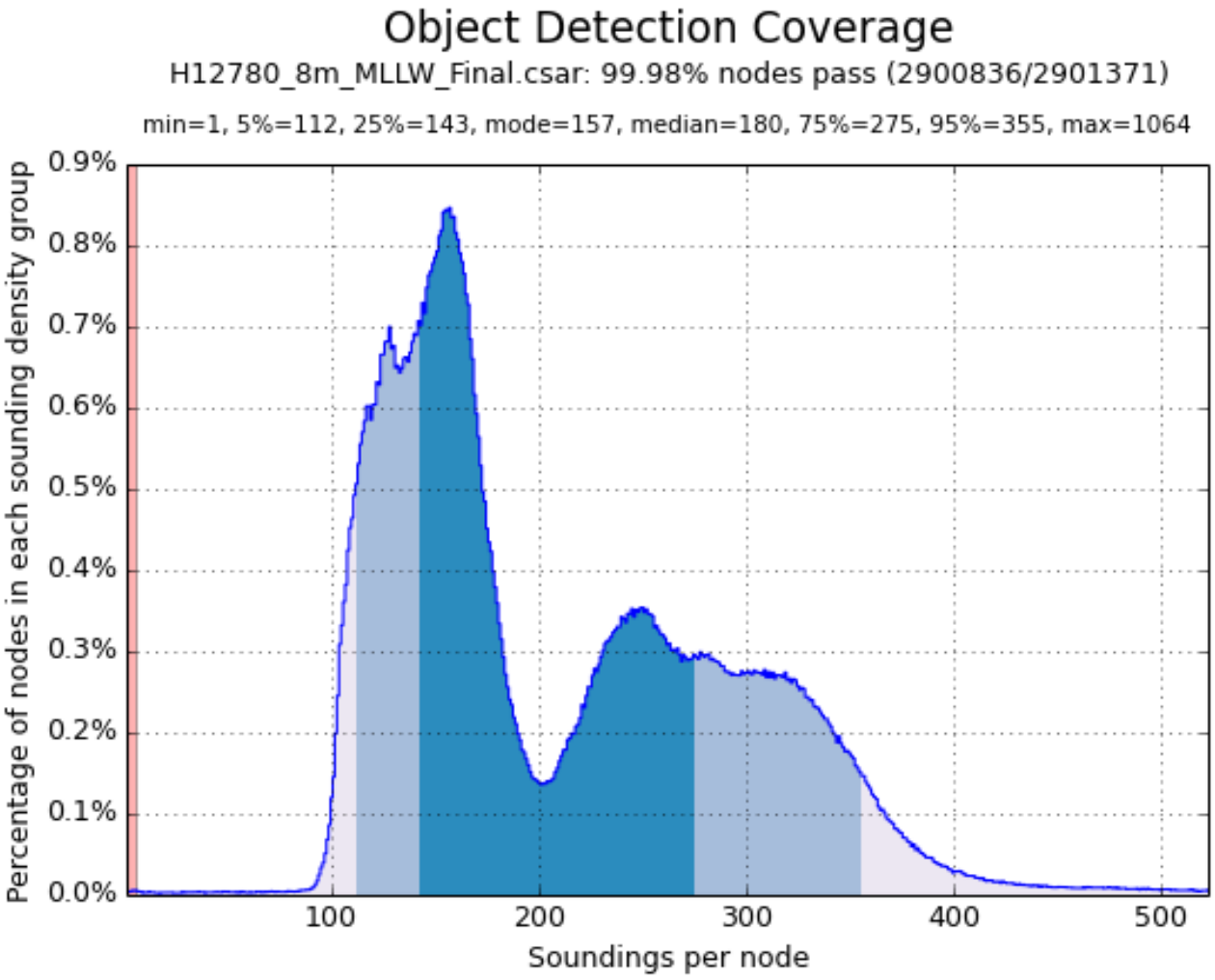


Figure 26: Object detection coverage for 8m finalized surface

B.2.11 Holiday Assessment

Survey H12780 contained no holidays. Holidays were assessed according to the May 2015 HSSD. See project correspondence folder from HSD OPS.

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 was logged as .7k file for Reson 7125 data. Kongsberg EM710 stores the backscatter data in the .all file. The data was submitted directly to NGDC to be archived and to PHB where the data will be processed. One line per day of backscatter was processed in the field by the field unit.

B.5 Data Processing

B.5.1 Software Updates

The following software updates occurred after the submission of the DAPR:

Manufacturer	Name	Version	Service Pack	Hotfix	Installation Date	Use
Caris	HIPS/SIPS	9.0.12	N/A	N/A	04/15/2015	Processing
Caris	HIPS/SIPS	9.0.13	N/A	N/A	06/17/2015	Processing
Caris	HIPS/SIPS	9.0.14	N/A	N/A	06/17/2015	Processing
Caris	HIPS/SIPS	9.0.16	N/A	N/A	07/11/2015	Processing
Caris	HIPS/SIPS	9.0.17	N/A	N/A	08/15/2015	Processing
Applanix	PosPAC	7.1	1	N/A	03/06/2015	Processing
Applanix	PosPAC	7.1	2	N/A	06/15/2015	Processing
NOAA	Pydro	14.6	N/A	N/A	07/09/2015	Processing
NOAA	Fledermaus	7.4.3	N/A	N/A	07/12/2015	Processing

Table 9: Software Updates

The following Feature Object Catalog was used: NOAA Profile V_5_3_3

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
H12780_MB_4m_MLLW	CUBE	4 meters	-	NOAA_4m	Complete MBES
H12780_MB_8m_MLLW	CUBE	8 meters	-	NOAA_8m	Complete MBES
H12780_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12780_MB_8m_MLLW_Final	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES
H12780_MB_8m_MLLW_Combined	CUBE	8 meters	-	NOAA_8m	Complete MBES

Table 10: Submitted Surfaces

The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey H12780.

The surfaces have been reviewed where noisy data, or ‘fliers’ are incorporated into the gridded solution causing the surface to be more shoal or deeper than the true seafloor. Where these spurious soundings cause the gridded surface to be shoaler or deeper than the reliably measured seabed by greater than the maximum allowable Total Vertical Uncertainty at that depth, the noisy data have been rejected and the surface recomputed.

B.5.3 Data Logs

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as final tide and sound velocity application is noted in the H12780 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

B.5.4 Critical Soundings

Designation of soundings followed procedures as outlined in section 5.2.1.2 of the HSSD.

Survey H12780 contained 38 critical soundings which were designated in CARIS HIPS. These soundings were used to draw the CUBE surface to the sounding which most accurately represented the sea floor in

cases where the surface deviated from the sounding more than the vertical IHO requirements allowed. In general, all designated soundings were found to be located in the rocky areas.

B.5.5 Diabled Beams During CARIS Conversion

During Conversion some beams were automatically disabled causing some areas of low density. It these areas rejected soundings were re-accepted. The surface accurately represents the sea-floor with no density holidays.

C. Vertical and Horizontal Control

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

C.1 Vertical Control

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

Standard Vertical Control Methods Used:

Discrete ZoningERZT

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Sand Point, AK	9459450

Table 11: NWLON Tide Stations

File Name	Status
9459450.tid	Final Approved

Table 12: Water Level Files (.tid)

File Name	Status
P183FA2015CORP_Reg.zdf	Final

Table 13: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 06/08/2015. The final tide note was received on 06/17/2015.

The ERZT model file was applied in accordance with the FPM. Separation model was used for the vertical transformation of ellipsoid-referenced data to MLLW and is applied for data submission. Soundings were merged in CARIS HIPS and SIPS using the Apply GPS Tide function, and TPU was computed with the new separation model uncertainty value. See correspondence in Appendix II for additional information on separation model use and approval.

The hydrographer was provided two vertical control assignments including the traditional tides product of surveyed soundings reduced to MLLW using .tid and .zdf files above. The hydrographer was successful in creating an ellipsoidally referenced zoned tides (ERZT) model to transform ellipsoidal survey heights to MLLW as their final vertical control product, rendering the traditional vertical control products superfluous. The ERZT surface is named OPR-P183-FA-ERZT_Separation_Model.csar
Tide file is appended to this report.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The projection used for this project is UTM Zone 4North.

The following PPK methods were used for horizontal control:

Single Base

Vessel kinematic data were post-processed using Applanix POSPac processing software and Single Base Positioning method described in the DAPR. Smoothed Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS.

For further details regarding the processing and quality control checks performed see the H12780 POSPAC Processing Logs spreadsheet located in the SBET folder with the GNSS data. See also the OPR-P183-FA-15 Horizontal and Vertical Control report, submitted under separate cover.

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
9677	Forsman

Table 14: User Installed Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Cold Bay, AK (289kHz)

Table 15: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

A comparison was performed between survey H12780 and chart 16540 using CARIS sounding and contour layers derived from the 8 meter surface. All data from H12780 should supersede previous charted data.

D.1.1 Raster Charts

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

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
16540	1:300000	13	10/2010	03/03/2015	02/14/2015

Table 16: Largest Scale Raster Charts

16540

Soundings from survey H12780 generally agreed within 2 fathoms with charted depth on chart 16540. Due to the small scale of 16540, there were not many soundings to compare. One notable exception was observed in the SW corner of the sheet over a charted 57 fathom sounding, see Figure 27.

Chart 16540 contains 30, 50, and 100 fathom contours. Sheet H12780 contains mostly depths between 50 and 100 fathoms. It is recommended to add a 40 fathom contour to accurately depict bottom contours on H12780.

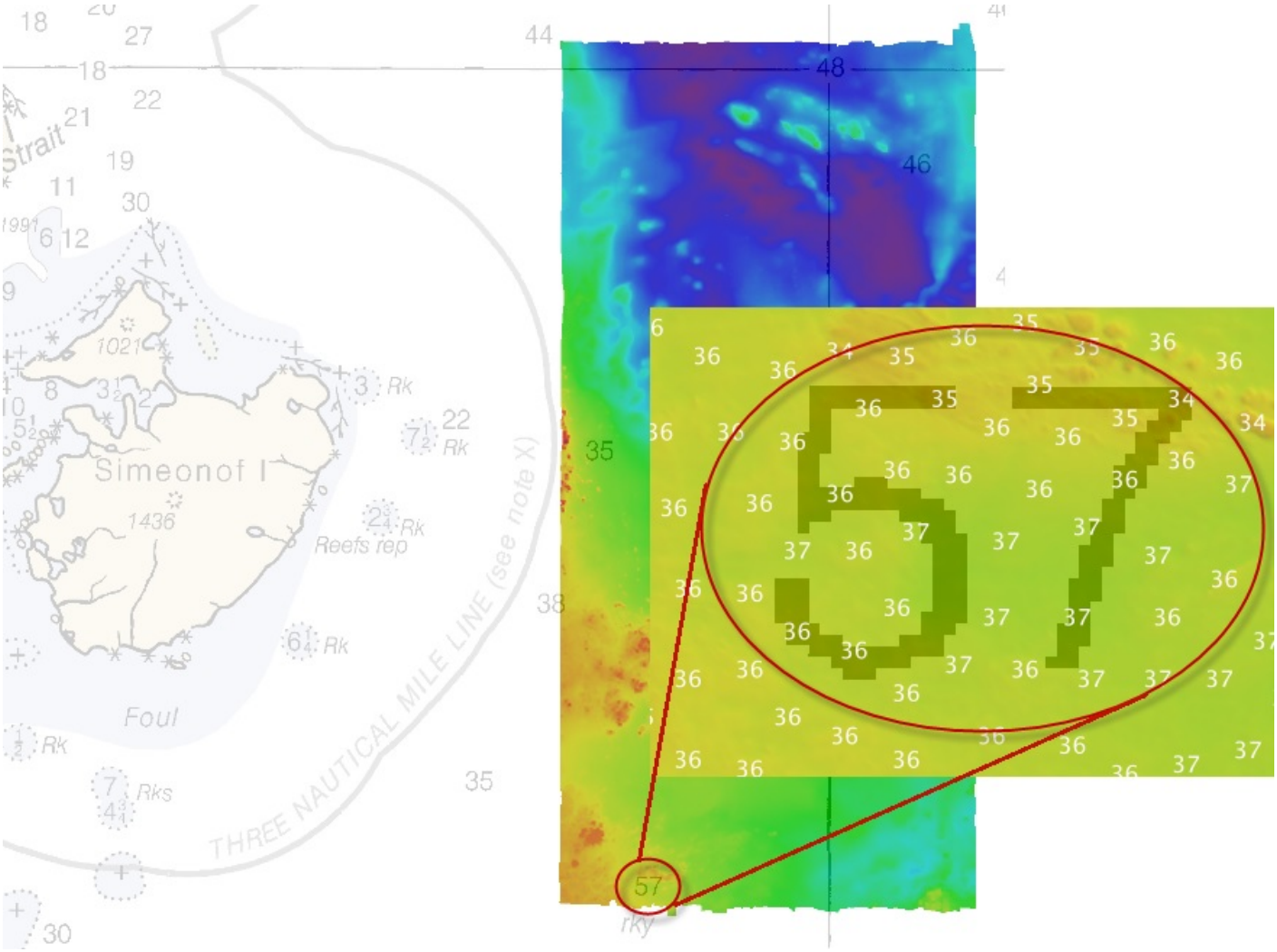


Figure 27: Disagreement with charted depths on south end of sheet H12780

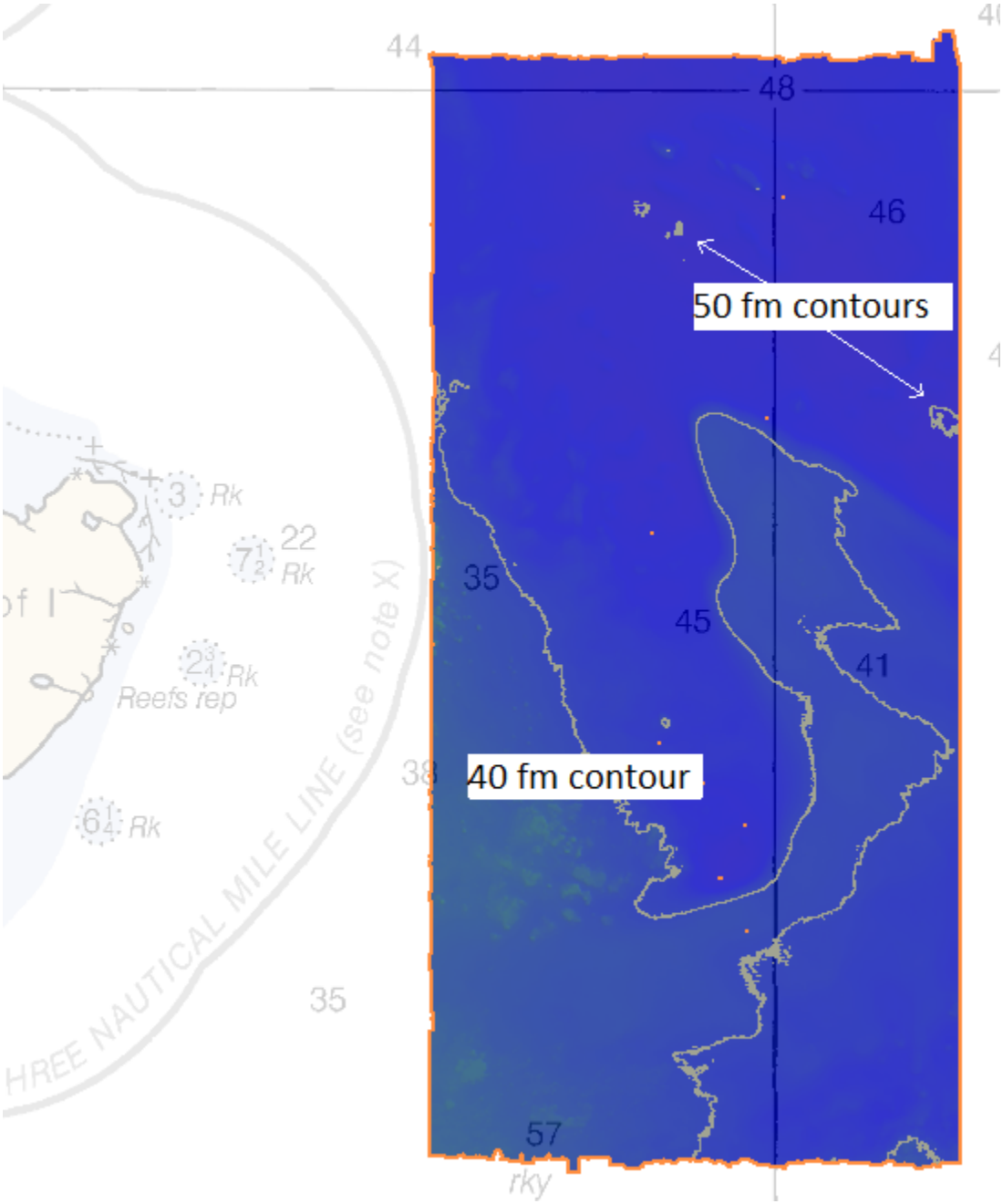


Figure 28: Depiction of 40 and 50 fathom contours on sheet H12780

D.1.2 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US3AK50M	1:300000	17	04/09/2014	04/09/2014	NO

Table 17: Largest Scale ENCs

US3AK50M

Soundings from survey H12780 generally agree within two fathoms of the soundings on chart US3AK50M. Contours in CARIS HIPS closely approximated the charted contours. See comments from Rastor Chart 16540 for more information.

D.1.3 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

No charted features exist for this survey.

D.1.6 Uncharted Features

No uncharted features exist for this survey.

D.1.7 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.8 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.9 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.1.10 Bottom Samples

Three bottom samples were assigned, investigated, and included in the H12780 Final Feature File.

D.2 Additional Results

D.2.1 Shoreline

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

D.2.2 Prior Surveys

Prior survey comparisons exist for this survey, but were not investigated.

D.2.3 Aids to Navigation

No Aids to navigation (ATONs) exist 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 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features 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 Recommendation

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

D.2.11 Inset Recommendation

No new insets are recommended for this area.

E. Approval Sheet

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2015-09-01
Horizontal and Vertical Control Report	2015-09-01
Coast Pilot Report	2015-08-25

Approver Name	Approver Title	Approval Date	Signature
CDR David J. Zezula	Chief of Party	08/31/2015	David Zezula 2015.09.04 08:19:42 -08'00'
LT Ryan A. Wartick	Field Operations Officer	08/31/2015	Digitally signed by Ryan Wartick Date: 2015.09.04 07:41:51 -08'00'
LT Matthew M. Forney	Field Operations Officer	08/31/2015	Matthew Forney 2015.09.03 13:29:26 -08'00'
HCST Douglas A. Bravo	Chief Survey Technician	08/31/2015	Douglas Bravo 2015.09.03 13:24:27 -08'00'
ENS Alisha M. Friel	Sheet Manager	08/31/2015	Alisha M. Friel 2015.09.03 08:41:52 -08'00'

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
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	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	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
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPE	Total Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPROVAL PAGE

H12780

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 NGDC for archive

- H12780_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12780_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved: Digitally signed by RAYMOND.ANNEMIEKE.S.1365883048 Date: 2016.06.21 10:37:59 -07'00'

Annie Raymond
Physical Scientist, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: Digitally signed by HOLMBERG.PETER.SCOTT.1365886101 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOLMBERG.PETER.SCOTT.1365886101 Date: 2016.06.22 13:05:32 -07'00'

Peter Holmberg
Acting Chief, Pacific Hydrographic Branch