H12759

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12759

LOCALITY

State(s):	Alaska
General Locality:	Shumagin Islands
Sub-locality:	10 NM North 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

H12759

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:	**10 NM North of Simeonof Island**
Scale:	**40000**
Dates of Survey:	**05/16/2015 to 05/25/2015**
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. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via http://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12759

Project: OPR-P183-FA-15

Locality: Shumagin Islands

Sublocality: 10 NM North 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 area is located in the Shumagin Islands with the sub-locality of 10 NM north of Simeonof Island.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
55° 12' 10.08" N 159° 14' 18.54" W	54° 59' 46.74" N 159° 5' 9.24" W

Table 1: Survey Limits

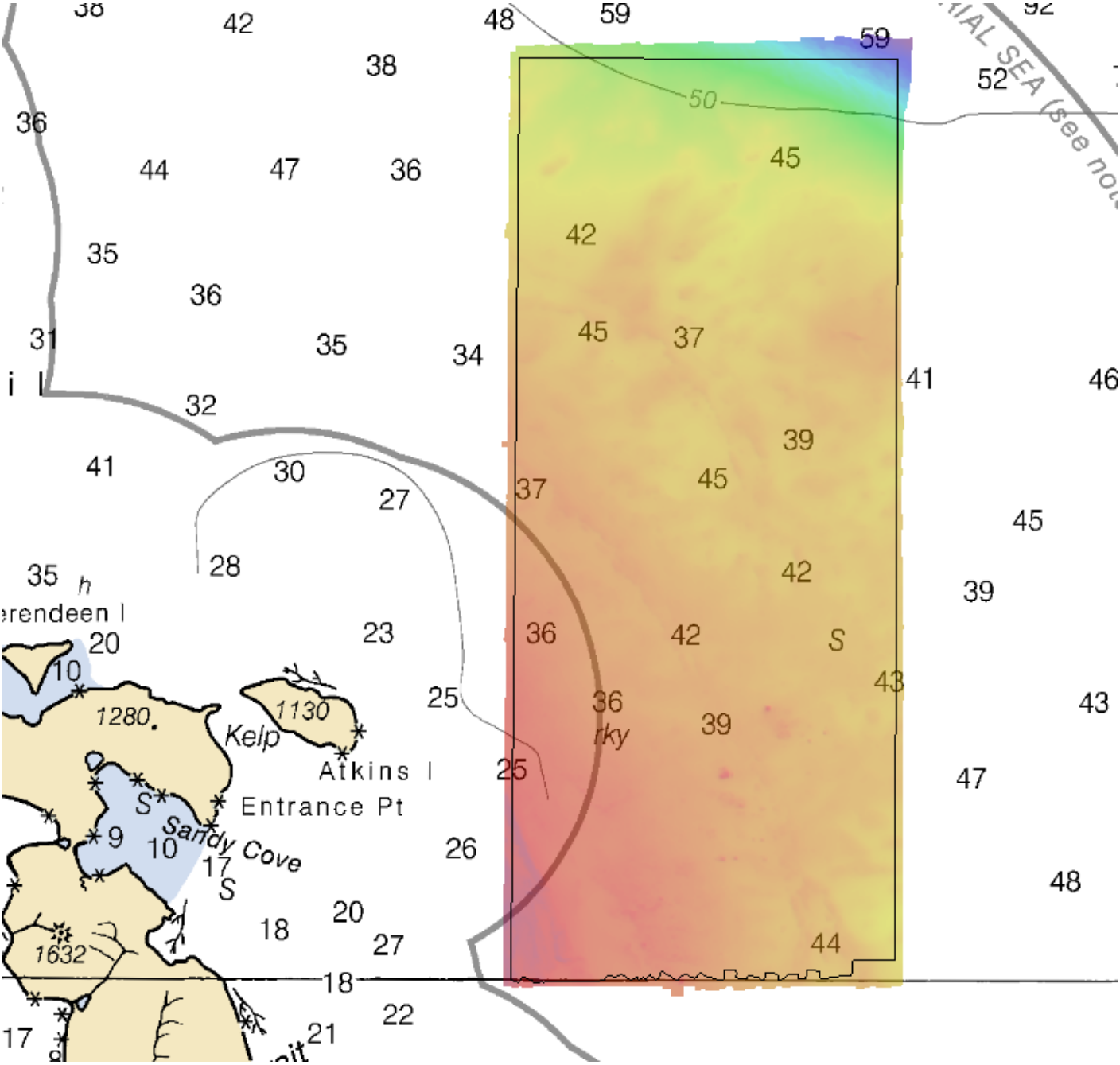


Figure 1: Survey area coverage

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 survey is to support safe navigation and to update nautical charts, the area is navigationally significant and a 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

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
All waters	Complete MBES with backscatter OR 100% SSS with concurrent set line spacing MBES with backscatter.

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

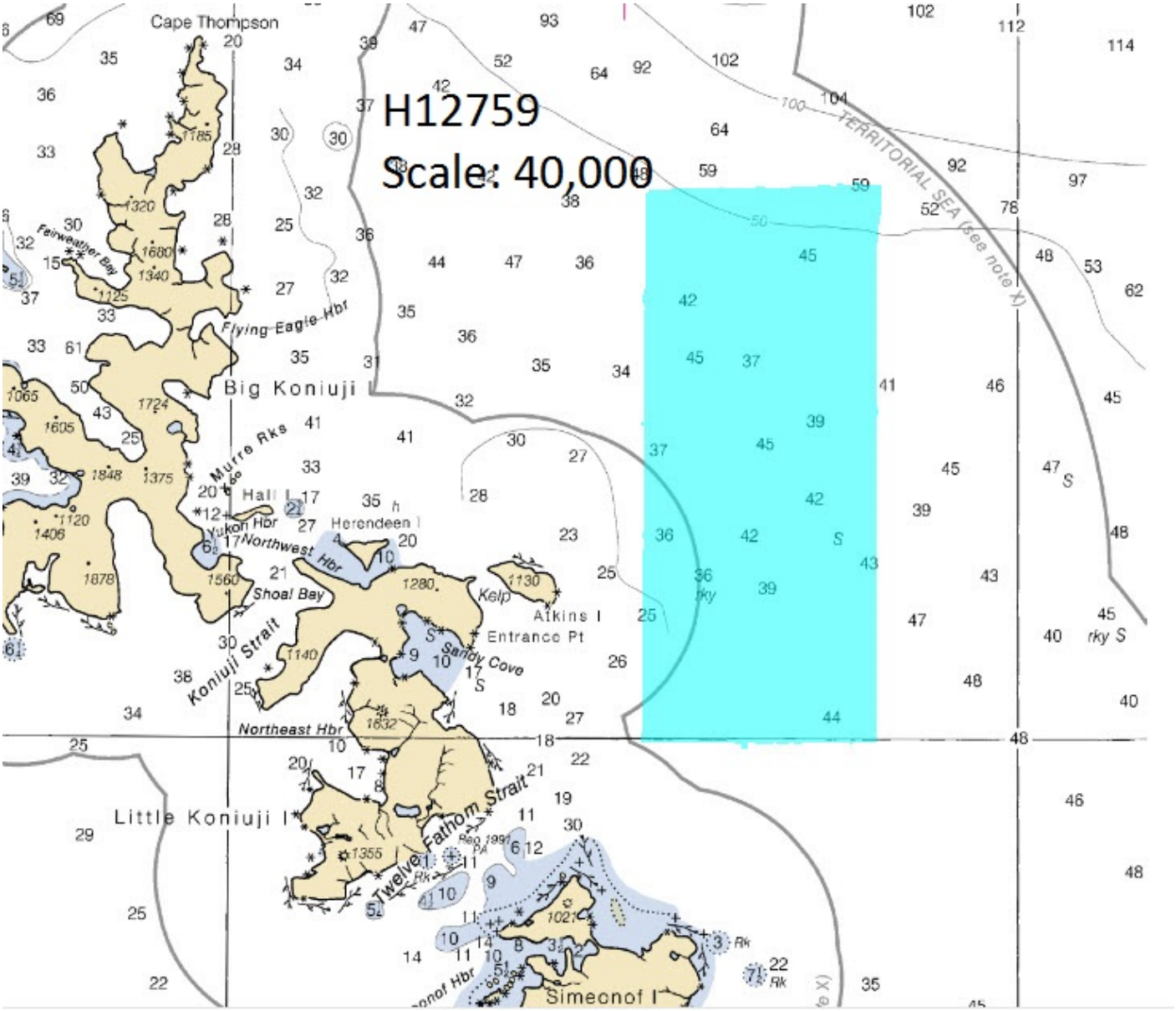


Figure 2: Survey Outline

A.5 Survey Statistics

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

	HULL ID	*S-220*	*2807*	*Total*
LNM	**SBES Mainscheme**	0	0	0
	MBES Mainscheme	457.720	3.773	461.493
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/SSS Mainscheme	0	0	0
	MBES/SSS Mainscheme	0	0	0
	SBES/MBES Crosslines	30.506	0	30.506
	Lidar Crosslines	0	0	0
Number of Bottom Samples				3
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				61.92

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/16/2015	136
05/17/2015	137

Survey Dates	Day of the Year
05/18/2015	138
05/21/2015	141
05/22/2015	142
05/23/2015	143
05/25/2015	145

Table 3: Dates of Hydrography

Survey Statistics were calculated in Pydro64.

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	*S-220*	*2807*
LOA	70.41 meters	8.64 meters
Draft	4.88 meters	1.12 meters

Table 4: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7125	MBES
Kongsberg	EM 710	MBES
Seabird	19plus	Conductivity, Temperature, and Depth Sensor
Reson	SVP70	Sound Speed System
Reson	SVP71	Sound Speed System
Applanix	POS/MV V4	Positioning and Attitude System
Brooke Ocean Technology Ltd	MVP200	Conductivity, Temperature, and Depth Sensor

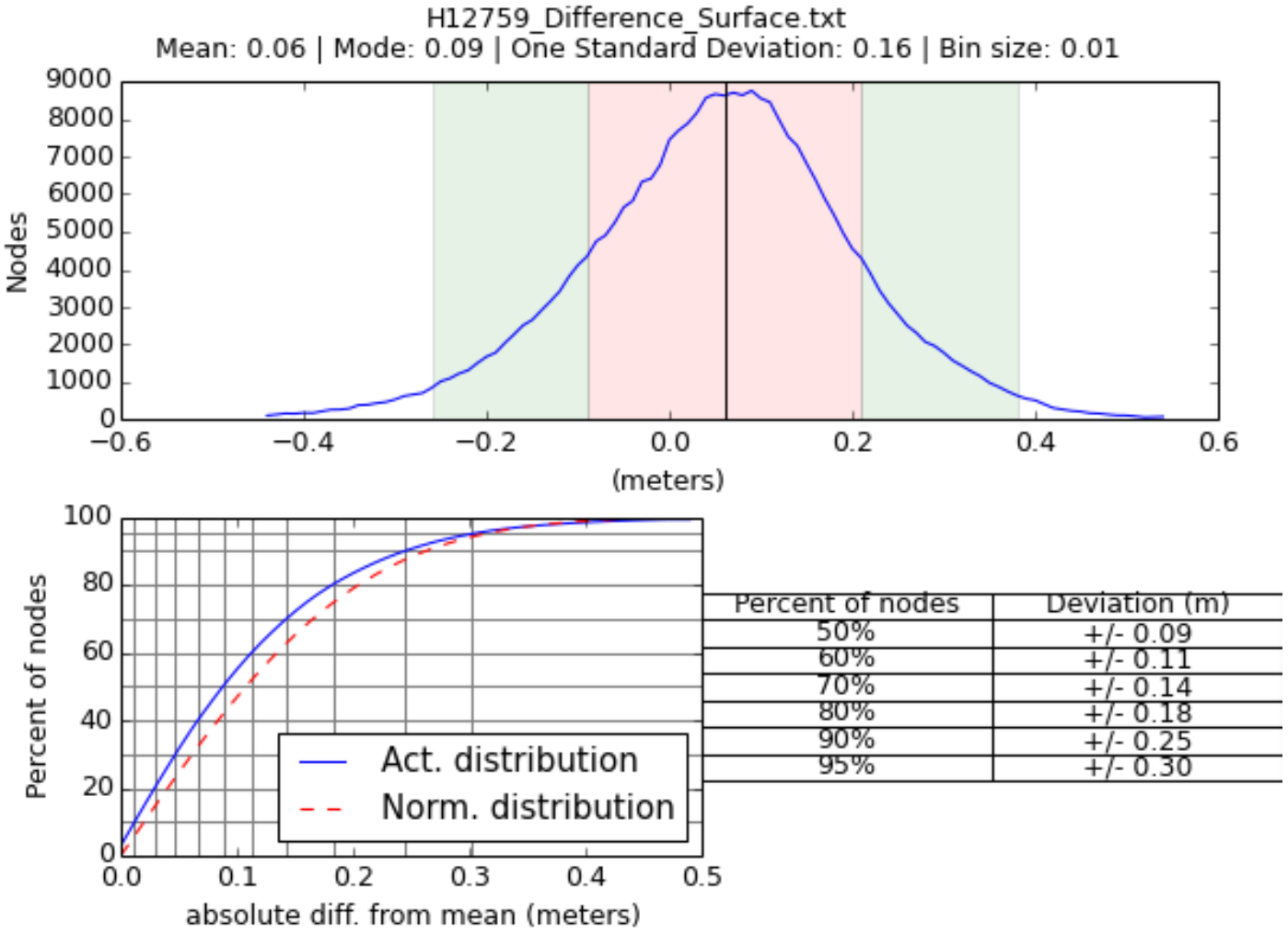
Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 6.61% of mainscheme acquisition.

Surface differencing in CARIS HIPS was used to assess crossline agreement with mainscheme lines. An 8m resolution surface with only mainscheme lines was differenced and compared to an 8m resolution surface made with only crosslines. This surface is submitted digitally in the Separates/II_Digital_Data folder. The two surfaces had a deviation of +/- 0.30m at the 95% confidence level which is within the Total Vertical Uncertainty (TVU).



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.11
70%	+/- 0.14
80%	+/- 0.18
90%	+/- 0.25
95%	+/- 0.30

Figure 3: Crossline comparison statistics

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning	Method
0.01 meters	0.08 meters	Discrete Zoning

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S-220		1 meters/second	0.5 meters/second
2807	2.0 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 and SIPS by surfacing differencing eight meter and sixteen meter combined surfaces to asses surface agreement. The junction agreement is generally within the total allowable vertical uncertainty in their common areas and depths for all surfaces. Data overlap between all surveys was achieved. See figure 4 for planned areas of overlap.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12758	1:40000	2015	NOAA Ship FAIRWEATHER	W
H12760	1:40000	2015	NOAA Ship FAIRWEATHER	E
H12780	1:40000	2015	NOAA Ship FAIRWEATHER	SE
H12474	1:40000	2015	NOAA Ship RAINIER	S

Table 8: Junctioning Surveys

H12758

The junction between Surveys H12759 and H12758 were compared using combined surfaces. The two surfaces generally agreed within 0.22m as seen in the junction surface statistics in Figure 5.

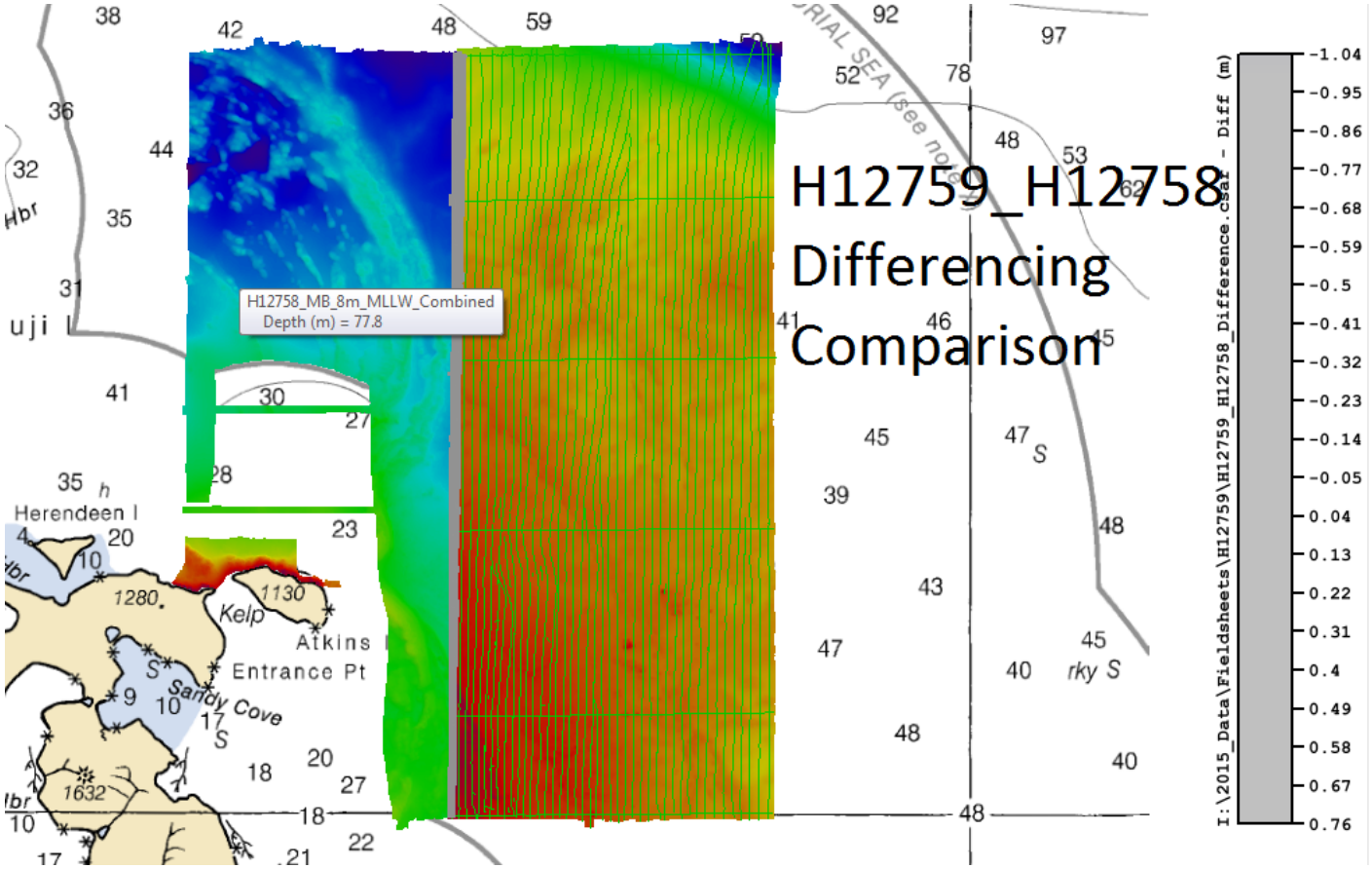
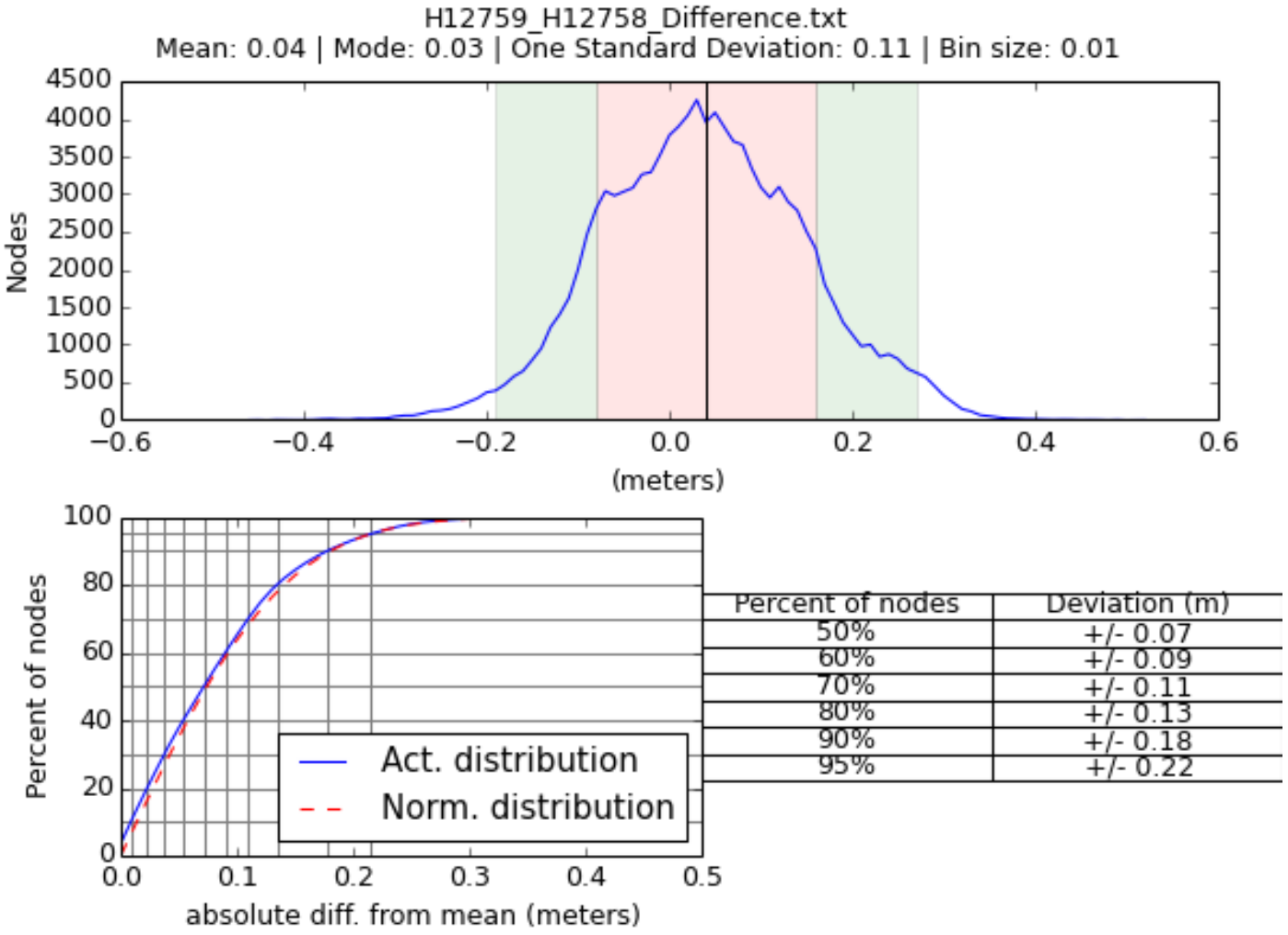


Figure 4: H12759_H12758 Differencing Surface Overview



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.09
70%	+/- 0.11
80%	+/- 0.13
90%	+/- 0.18
95%	+/- 0.22

Figure 5: Statistical Information for H12759_H12758_Difference.csar

H12760

The junction between Surveys H12759 and H12758 were compared using combined surfaces. The two surfaces generally agreed within 0.26m as seen in the junction surface statistics in Figure 7. The two surfaces were found to differ by as much as 1.5m in the northern area of the junction as seen in Figure 6.

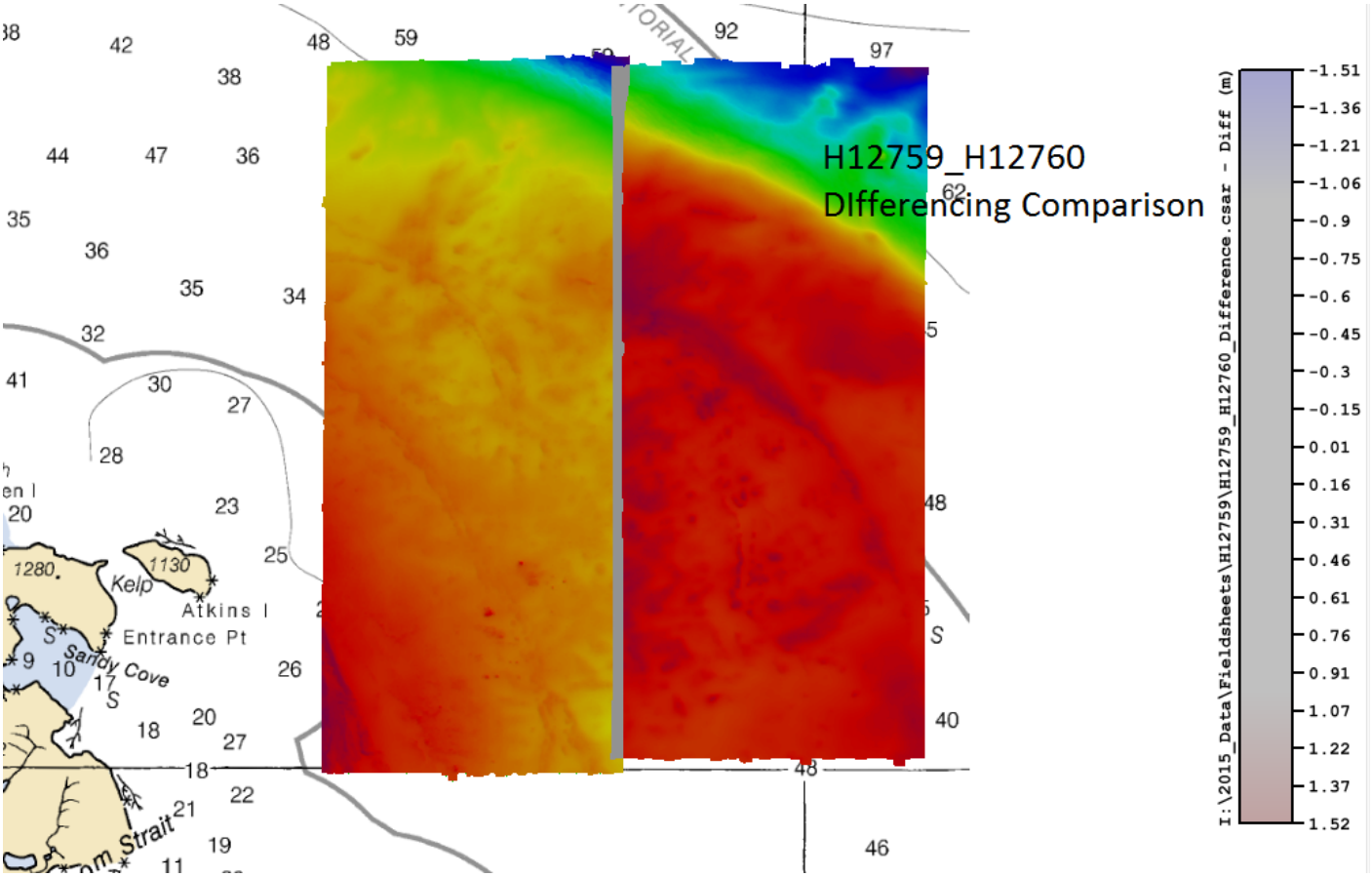
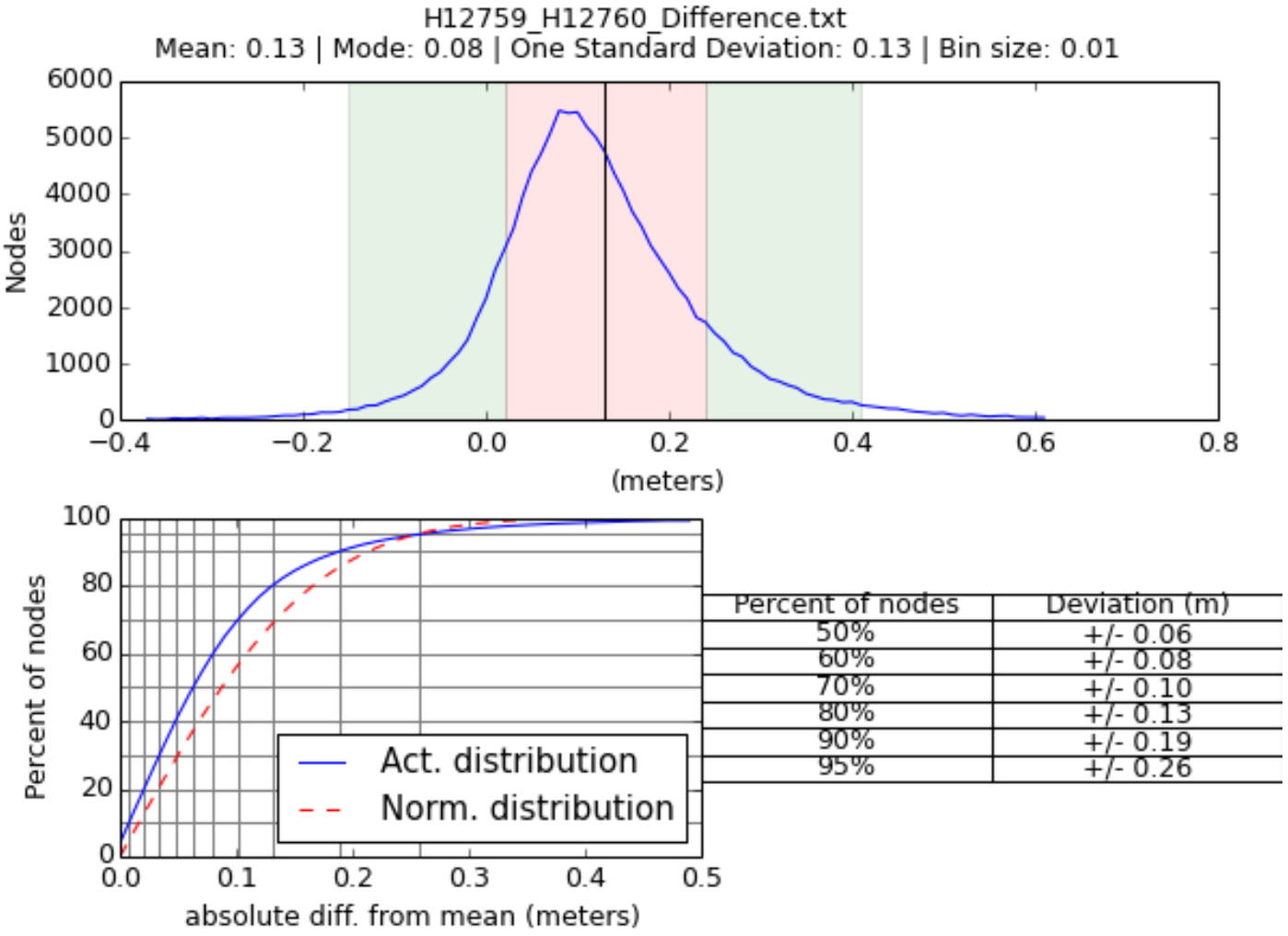


Figure 6: H12759_H12760 Differencing Surface Overview



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.08
70%	+/- 0.10
80%	+/- 0.13
90%	+/- 0.19
95%	+/- 0.26

Figure 7: Statistical Information for H12759_H12760_Difference.csar

H12780

The junction between Surveys H12759 and H12780 were compared using combined surfaces. The two surfaces generally agreed within 0.25m as seen in the junction surface statistics in Figure 9.

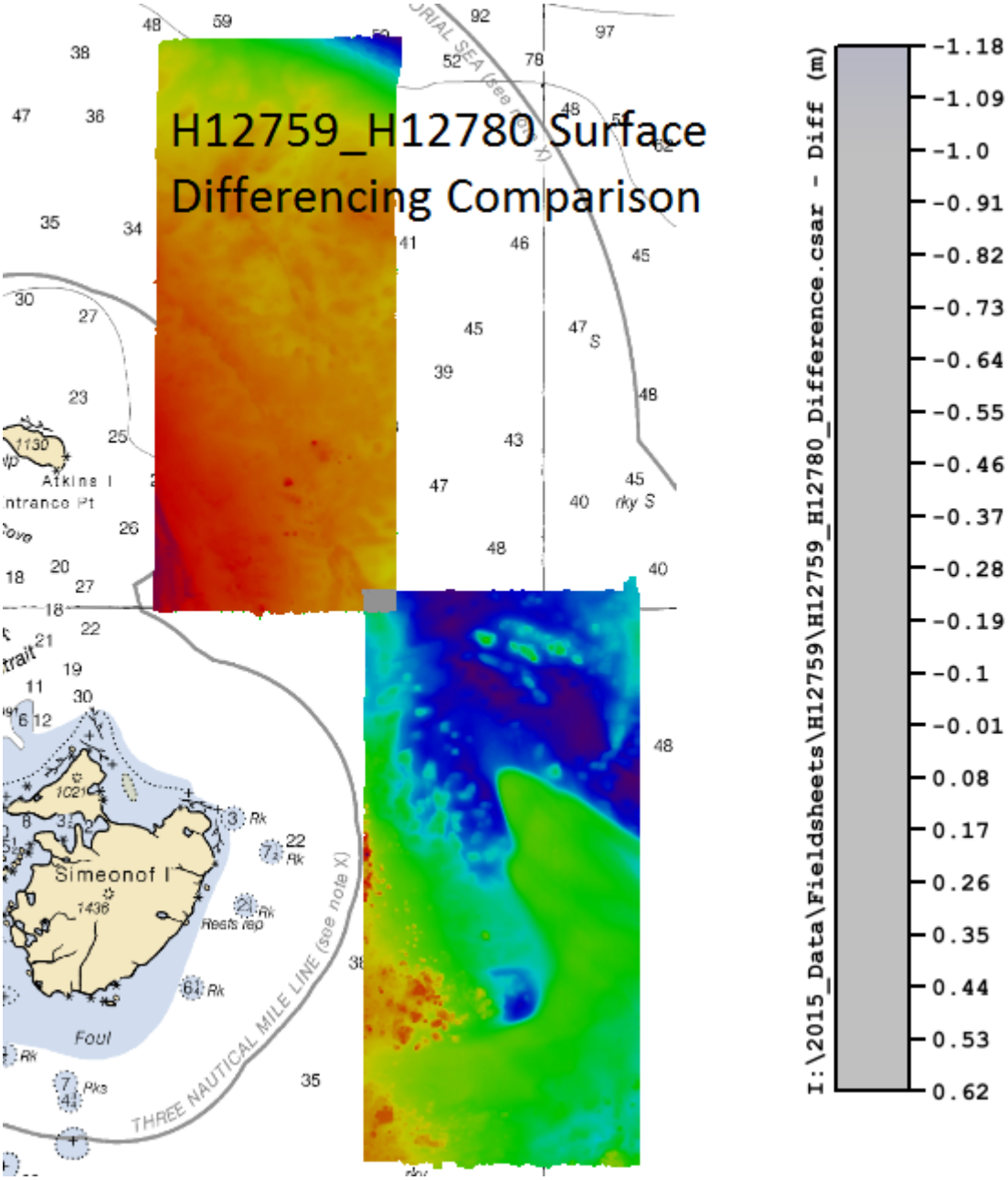
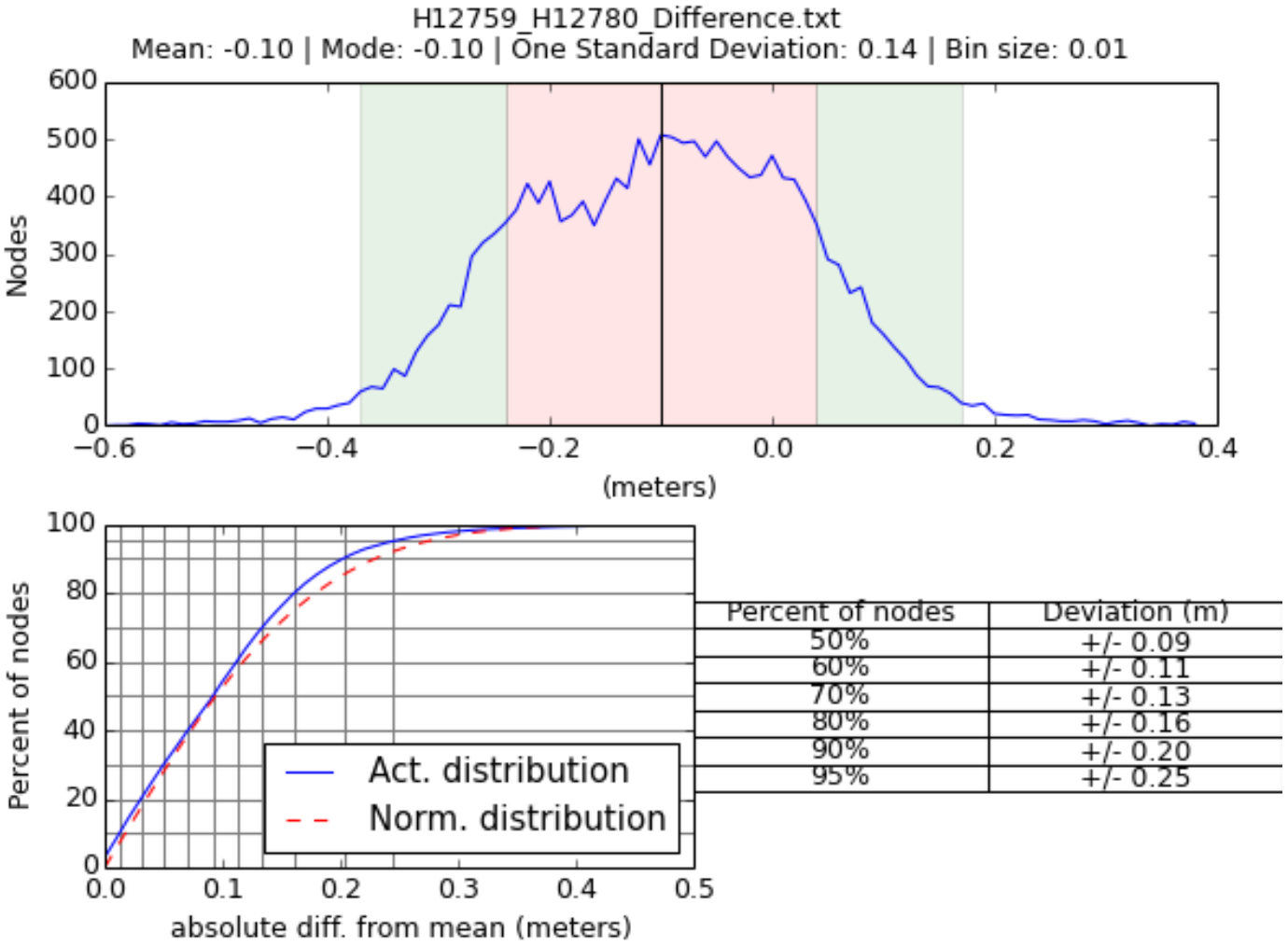


Figure 8: H12759_H12780 Differencing Surface Overview



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

Figure 9: Statistical Information for H12759_H12780_Difference.csar

H12474

The junction between Surveys H12759 and H12474 were compared using combined surfaces. The two surfaces generally agreed within 0.24m as seen in the junction surface statistics in Figure 11.

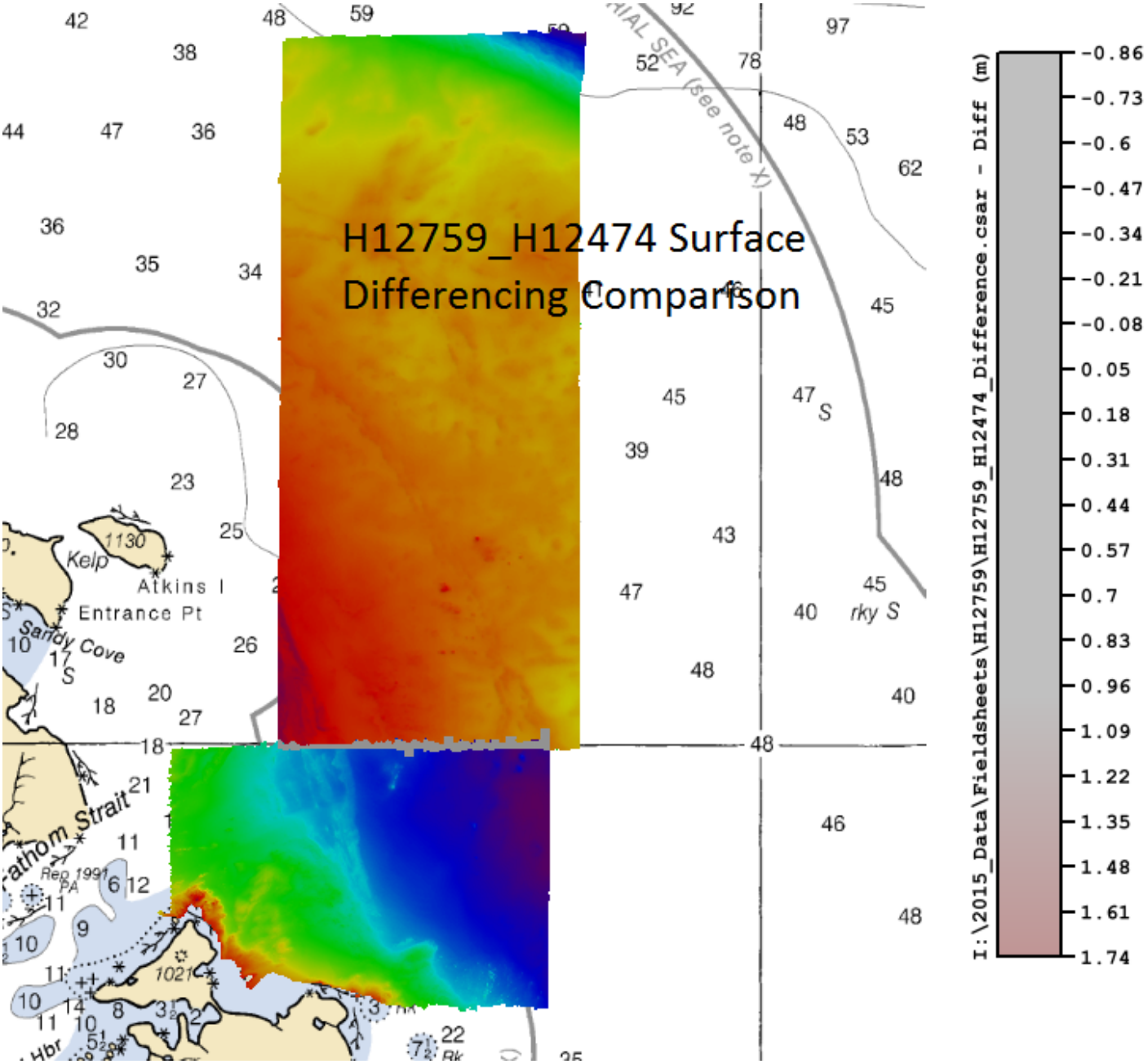
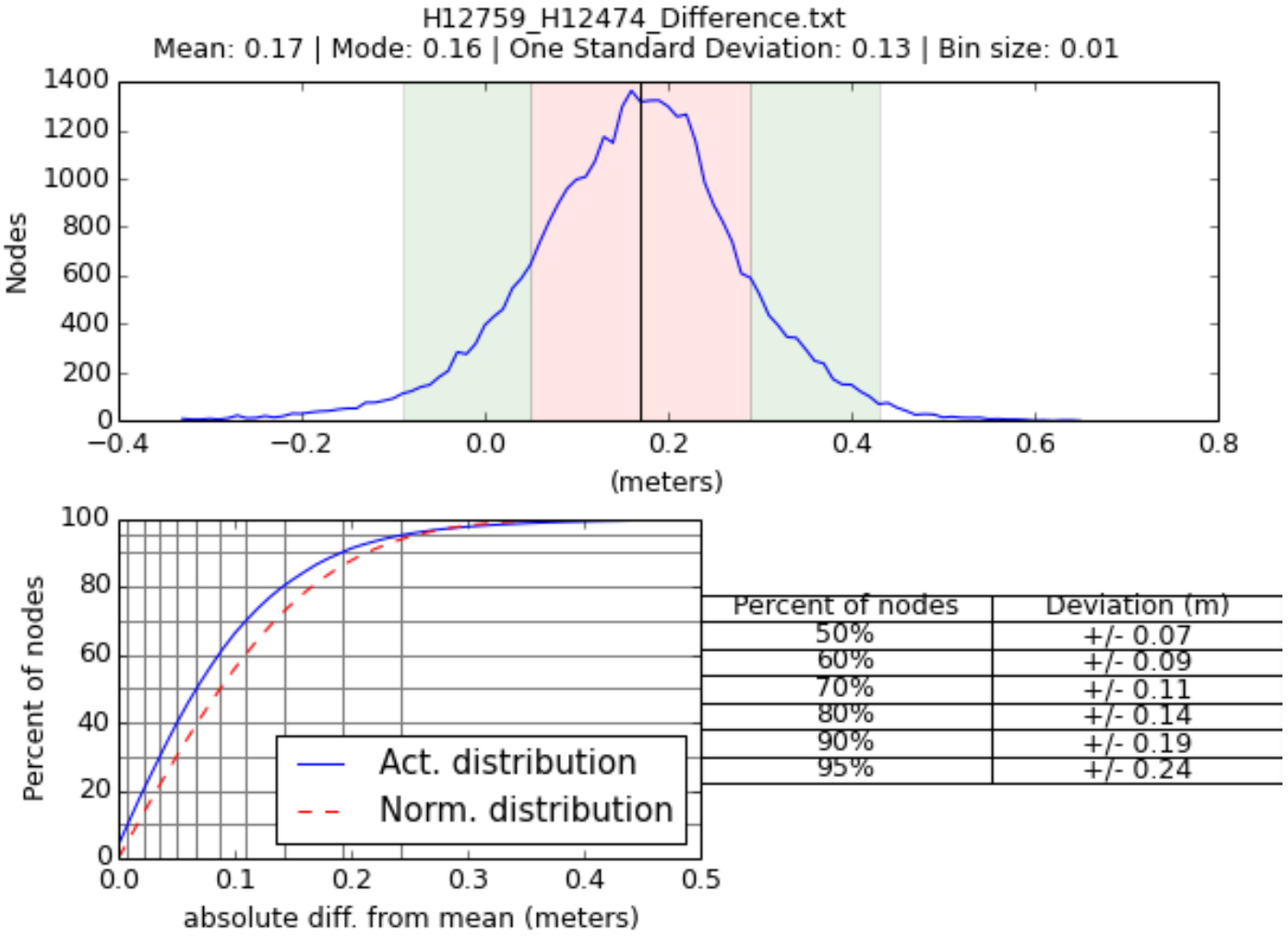


Figure 10: H12759_H12474 Differencing Surface Overview



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.09
70%	+/- 0.11
80%	+/- 0.14
90%	+/- 0.19
95%	+/- 0.24

Figure 11: Statistical Information for H12759_H12474_Difference.csar

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

Acquisition on survey H12759 occurred in foul weather, with the most notable rough weather occurring on day 136 with seas averaging 7 ft and day 142 with seas averaging 6 ft. The rough weather resulted in sonar "blow-outs." The data was examined in CARIS HIPS and SIPS and the fliers were deleted to reduce the impact on the surface.

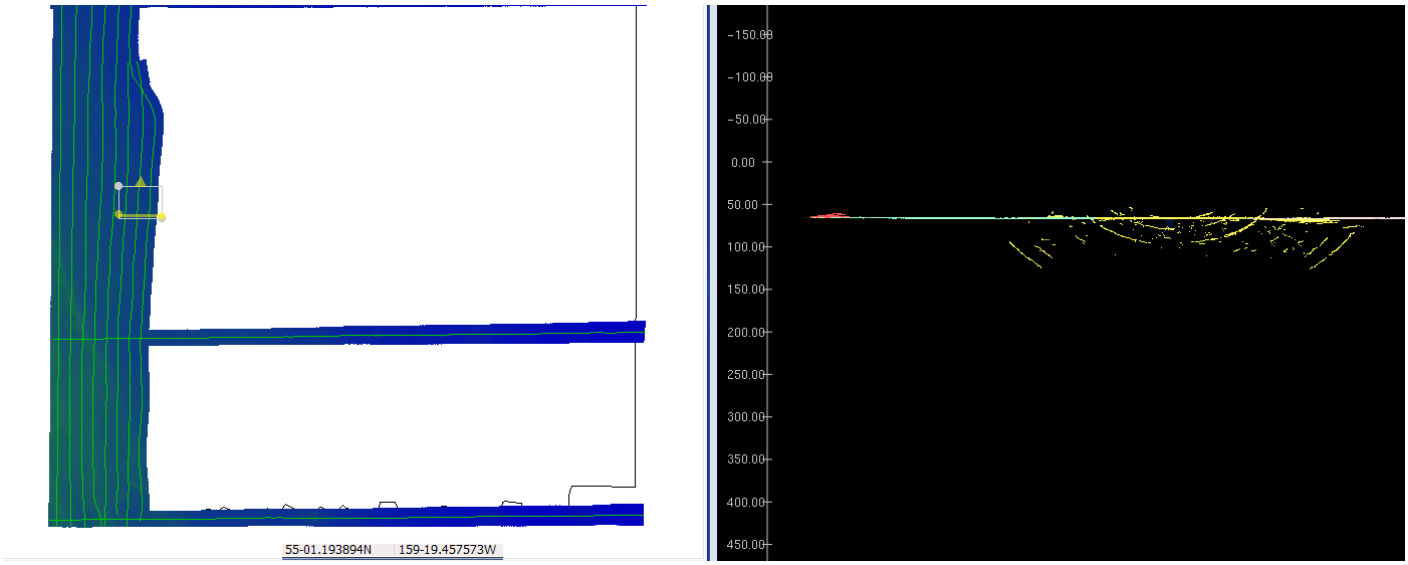


Figure 12: Day 136 sonar blowout

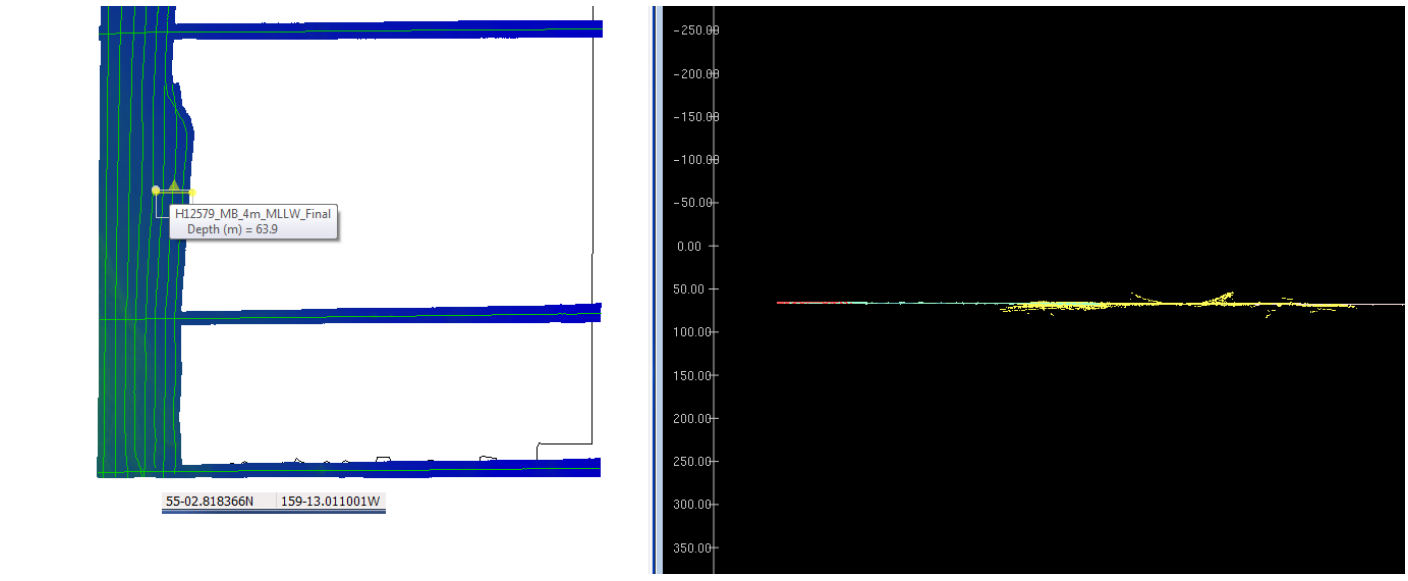


Figure 13: Day 136 sonar blowout

Sound velocity

A sound velocity offset exists in the northeastern area of the sheet. Despite this offset, the total vertical uncertainty did not exceed IHO specifications.

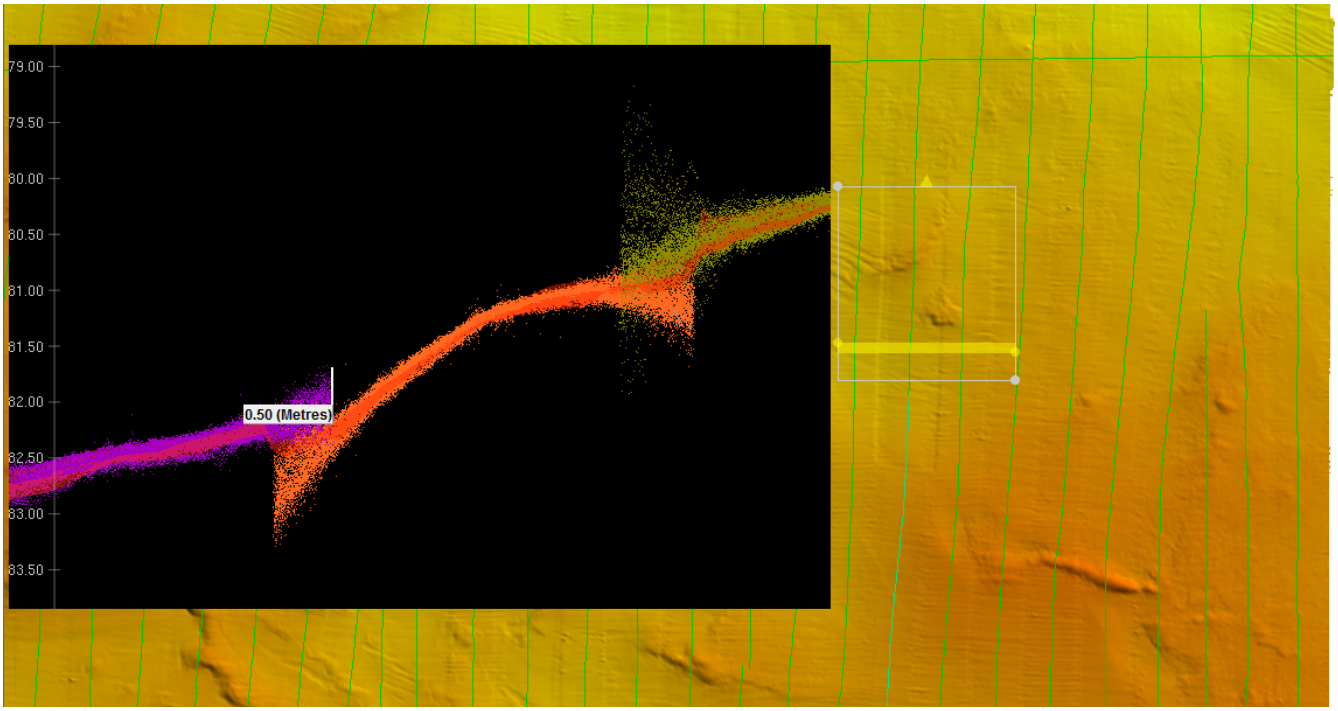


Figure 14: Sound velocity offset

Kelp

Kelp was observed both during acquisition and in the corresponding survey data, mostly in rocky areas. Figure 15 below highlights one of these areas where kelp was observed in the data. In cases where the CUBE surface correctly represented the sea floor, the data was not cleaned out.

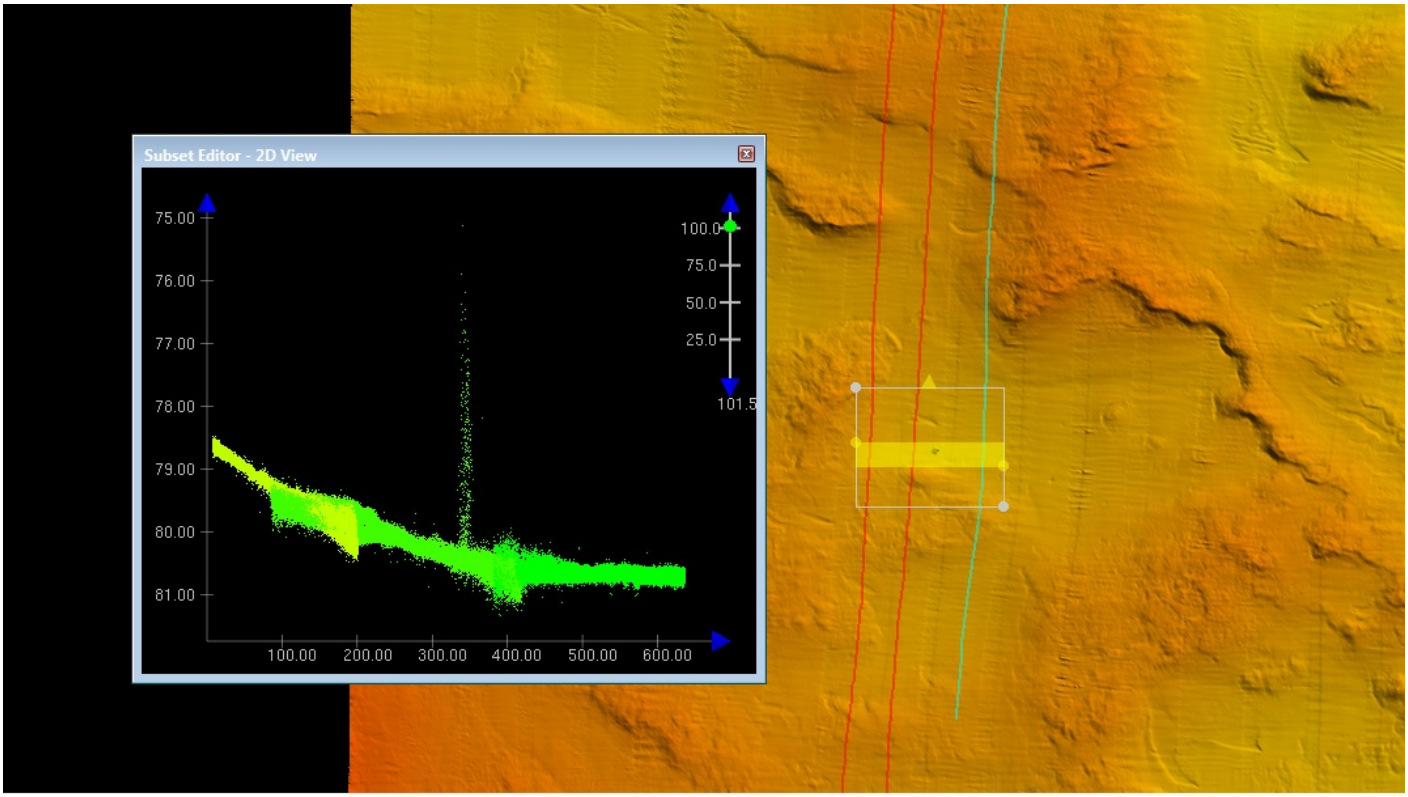


Figure 15: Kelp

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: A Moving Vessel profiler was used for Sound Speed Measurement, casts were done at a frequency of 15-30 minutes for the majority of the survey. On day 136 there was a gap where the Moving Vessel Profiler was not available due to mechanical issues at the end of the day and casts were done manually every two hours, however it did not result in any significant sound speed issues. Manual CTD casts were conducted at least every two hours during launch acquisition on day 145.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Holiday Assessment

There were no data holidays within the sheet limits of survey H12759. Holidays were assessed according to the May 2015 HSSD. See project correspondence folder for the email from HSD OPS.

B.2.10 Density

Density requirements were met with at least 99.97% of nodes containing 5 or more soundings. See Figures 17, 18, and Standard Compliance Review in Appendix II.

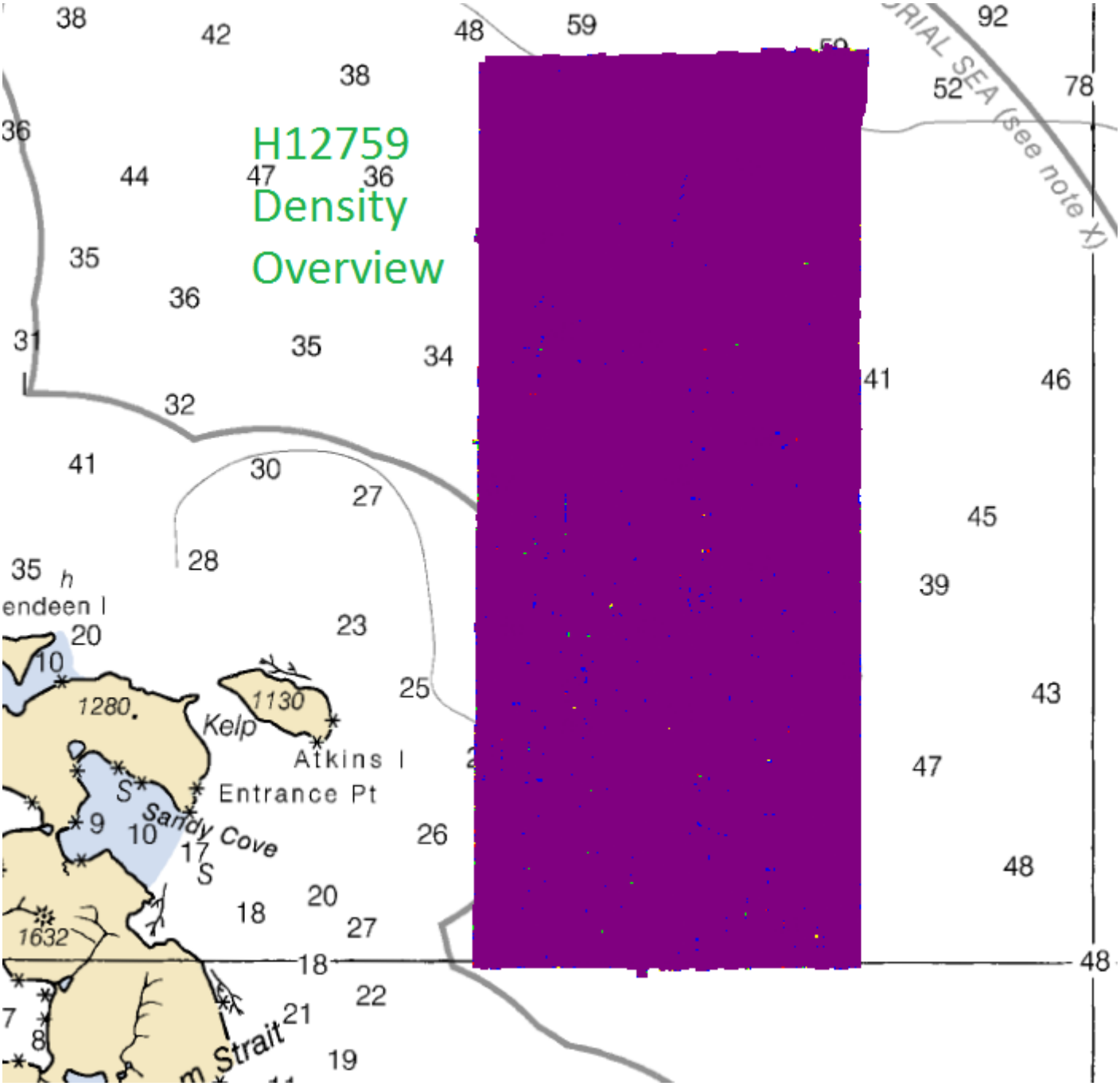


Figure 16: Overview of H12759_MB_8m_MLLW_Combined.csar density

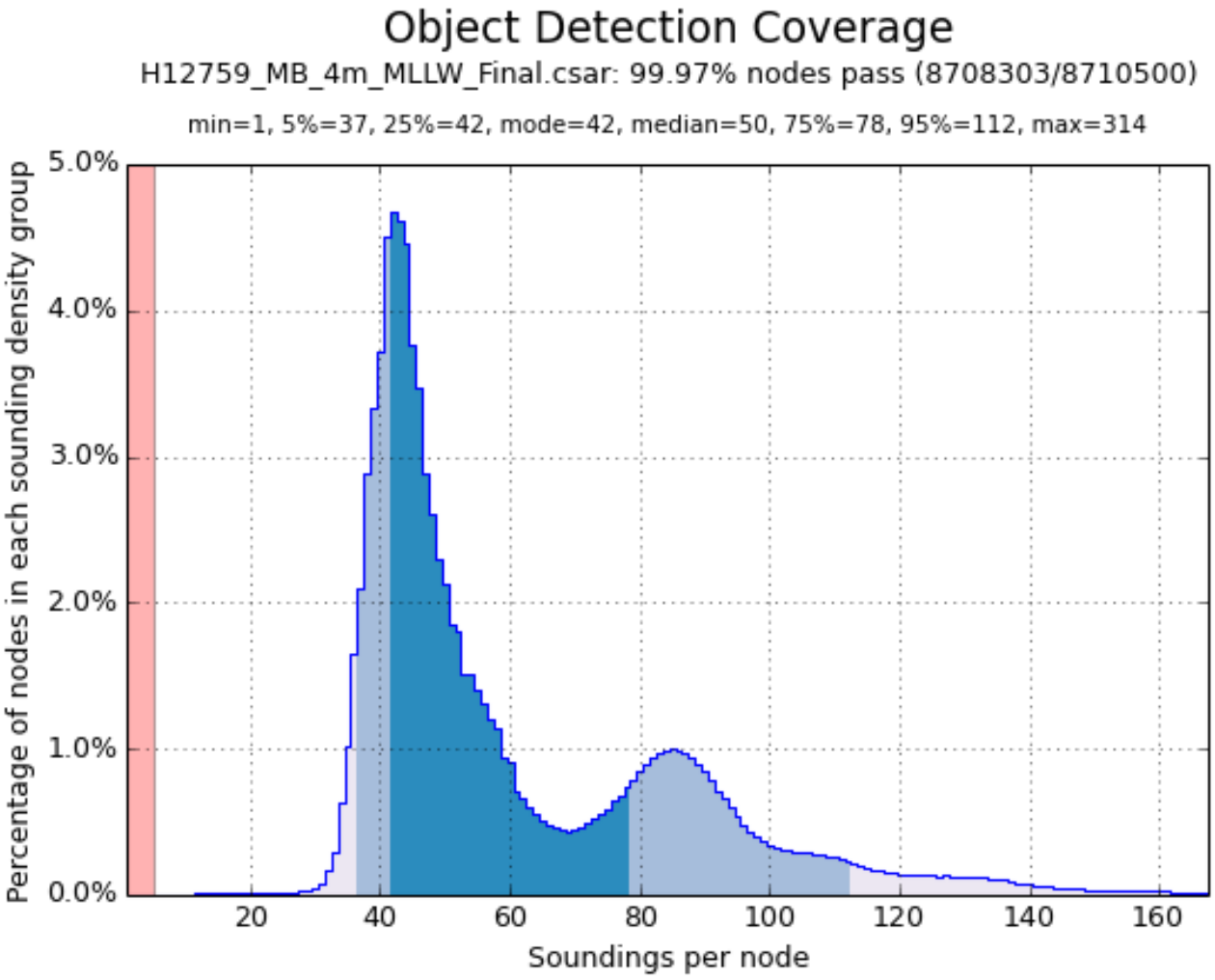


Figure 17: Statistical information for H12759_MB_4m_MLLW_Final.csar density

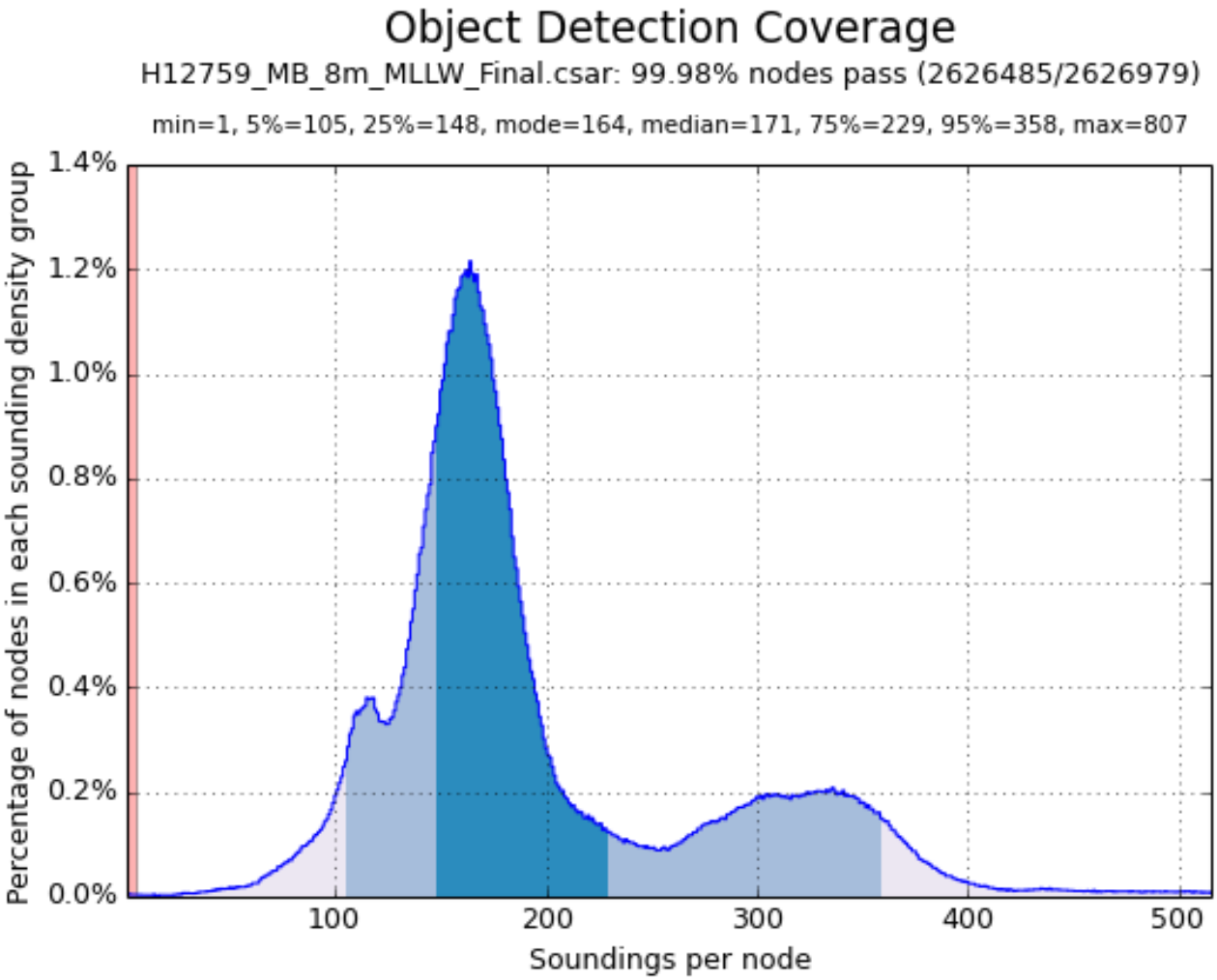


Figure 18: Statistical information for H12759_MB_8m_MLLW_Final.csar density

B.2.11 IHO Uncertainty

The data meet the accuracy specifications as stated in the NOS Hydrographic Surveys Specifications and Deliverables (HSSD) dated April 2014. It was found that 100% of nodes in the finalized 8-meter grid meet or exceed IHO specifications. It was found that 99.99% of nodes in the finalized 4-meter grid meet or exceed IHO specifications. See Figures 20, 21 and the Standards Compliance Review in Appendix II. To assess vertical uncertainty standards, a child layer titled "IHO_1" was created for the 4-meter, and the 8-meter finalized surfaces and an "IHO_2" child layer was created for the 8-meter finalized surface using the equations as stated in section B.2.1.1 of the DAPR.

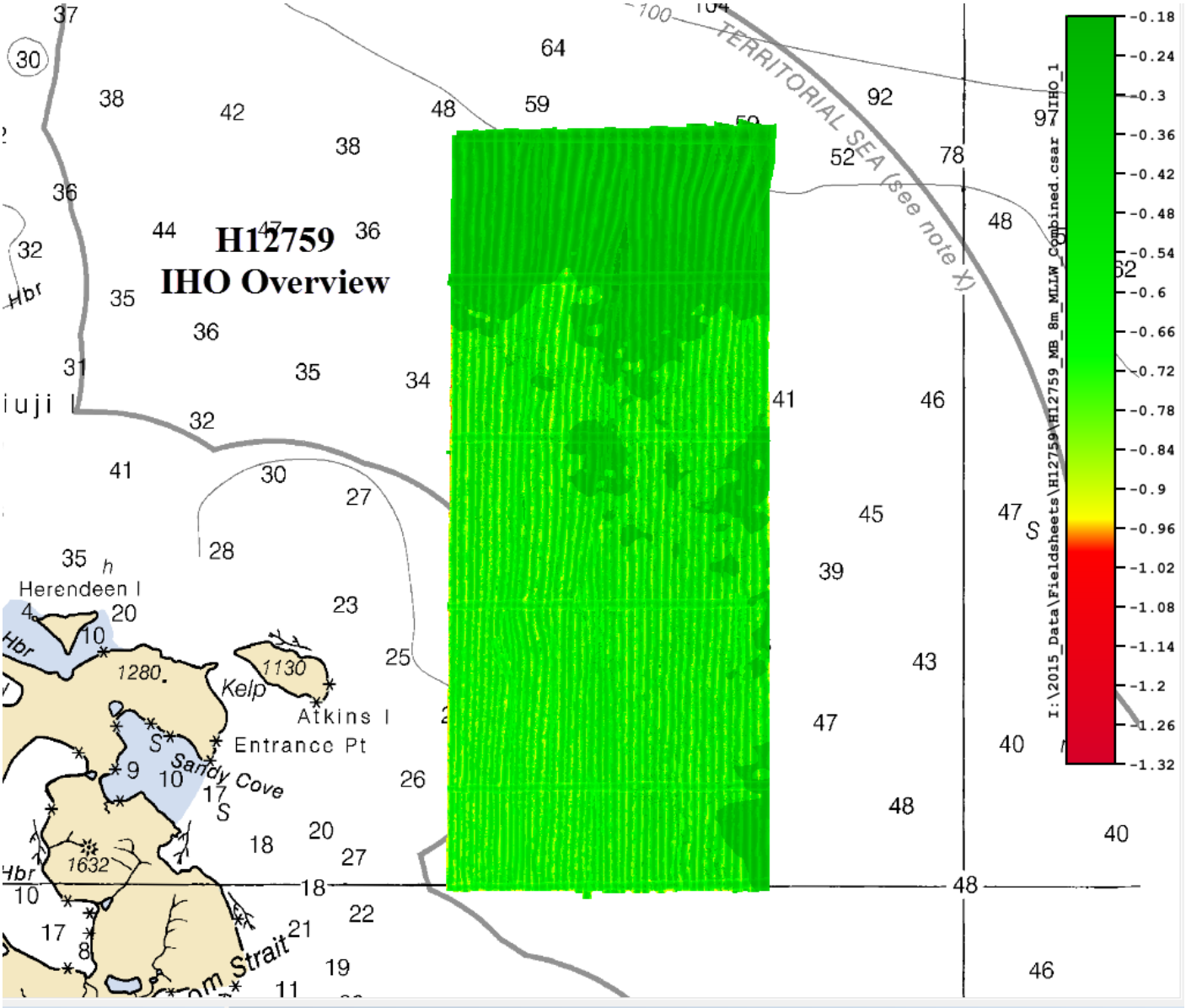


Figure 19: IHO Overview

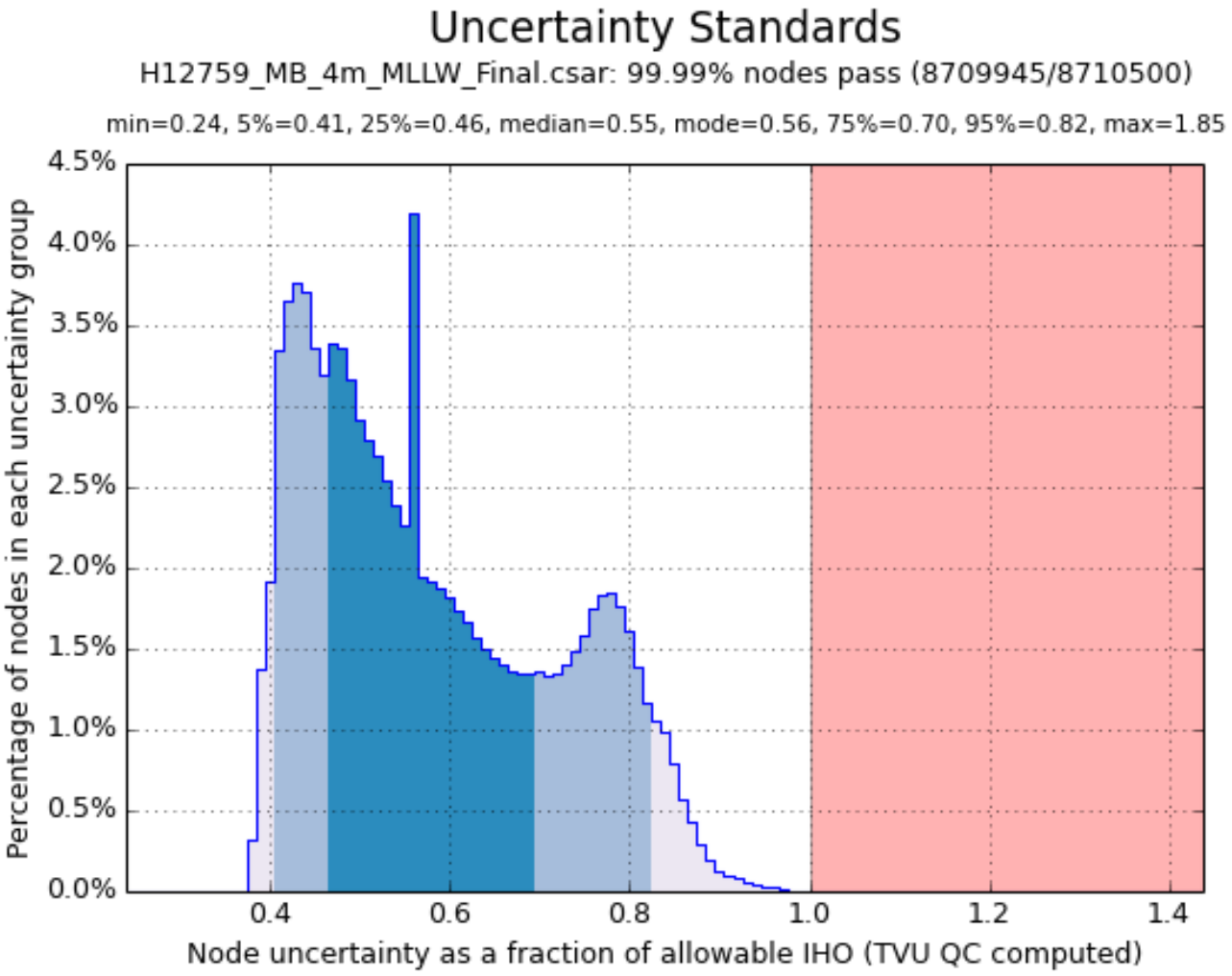


Figure 20: Statistical information for H12759_MB_4m_MLLW_Final.csar uncertainty

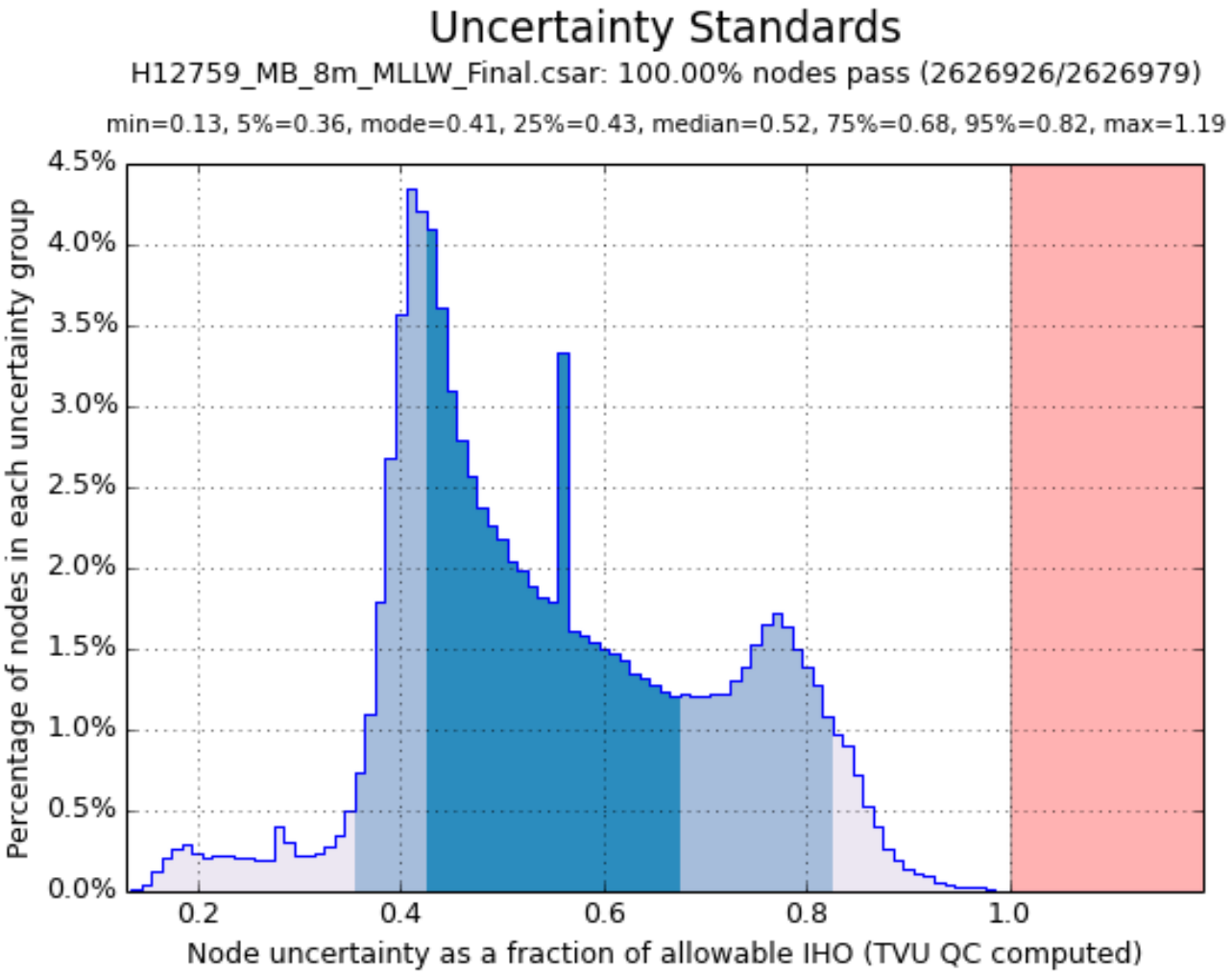


Figure 21: Statistical information for H12759_MB_8m_MLLW_Final.csar uncertainty

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 a .7k file for Reson 7125 data, and in the .all files for Kongsberg EM710 data. Backscatter data has been sent to the Processing Branch alongside this survey. One line per day of backscatter was processed in the field by the field unit.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile Version 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
H12759_MB_4m_MLLW	CUBE	4 meters	-	NOAA_4m	Complete MBES
H12759_MB_8m_MLLW	CUBE	8 meters	-	NOAA_8m	Complete MBES
H12759_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12759_MB_8m_MLLW_Final	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES
H12759_MB_8m_MLLW_Combined	CUBE	8 meters	-	NOAA_8m	Complete MBES

Table 9: Submitted Surfaces

The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE Base surfaces in survey H12759. The surfaces have been reviewed for noisy data or "fliers" and these spurious soundings have been removed when they caused the surface to be shoaler or deeper than the reliably measured seabed by a distance greater than the maximum allowable Total Vertical Uncertainty at depth. After rejecting noisy data "fliers," surfaces were recomputed to accurately represent the sea floor.

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 H12759 data log spreadsheet submitted in the Separates folder.

B.5.4 Critical Soundings

Designation of soundings followed procedures as outlined in section 5.2.1.2 of the HSSD. Survey H12759 did not require designated soundings.

B.5.5 Disabled beams during CARIS conversion

During conversion in CARIS some beams were automatically disabled causing some areas of low density. In low density areas these 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:

ERZT

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 10: NWLON Tide Stations

File Name	Status
9459450.tid	Final Approved

Table 11: Water Level Files (.tid)

File Name	Status
P183FA2015CORP_Reg.zdf	Final

Table 12: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 05/29/2015. The final tide note was received on 06/08/2015.

Preliminary zoning was accepted as final.

Non-Standard Vertical Control Methods Used:

Constant Separation

Ellipsoid to Chart Datum Separation File:

The constant separation model file was applied in accordance with the FPM. Separation model was used for the vertical transformation of ellipsoid-referenced data to MLLW and was 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.

A Constant Separation model was not used for reduction to chart datum. ERZT and the associated separation model were used.

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 4 North.

The following PPK methods were used for horizontal control:

Single Base

Vessel Kinematic data was post processed using the Applanix POSPac processing software and the Single Base method was used as described in the DAPR. Smoothed Best Estimates of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS.

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
9677	Forsman

Table 13: User Installed Base Stations

Differential correctors from the US Coast Guard beacon at Cold Bay (289kHz) were used during real time acquisition.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Cold Bay, AK (289kHz)

Table 14: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

A comparison was made between survey H12759 and chart 16540 and US3AK50M using CARIS soundings and contours layers derived from the 8 meter combined surface. The contours and soundings were overlaid on the chart to assess differences. All data from H12759 should supersede 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 15: Largest Scale Raster Charts

16540

There are a number of soundings and contours that need to be updated on chart 16540. In the southern middle area of the chart the 39 fm charted sounding has a 33 fm sounding to the east and a 32 fm sounding to the south, both approximately 1200m away as depicted in Figure 22. The 25 fm sounding on the southwest side of sheet H12759 seems to be charted approximately 8 fm shoaler than was discovered in this survey, as seen in Figure 23. The northeast corner of sheet H12759 was more than 20 fm deeper than charted, as seen in Figure 24. In the southern middle area of sheet H12759 it was discovered that the 42 fm sounding on the chart should be updated to 39 fm as seen in Figure 25. In the northwestern area of sheet H12759 there is a charted 45 fm sounding that has a 41 fm surveyed sounding to the north of it as seen in Figure 26. Figure 27 displays the 44 fm charted sounding in the southeast corner of the sheet which has surveyed soundings of 40 fm present nearby. The 50 fm contour in the northern area of sheet H12759 is generally 400m-1800m further south than charted as seen in Figure 28.

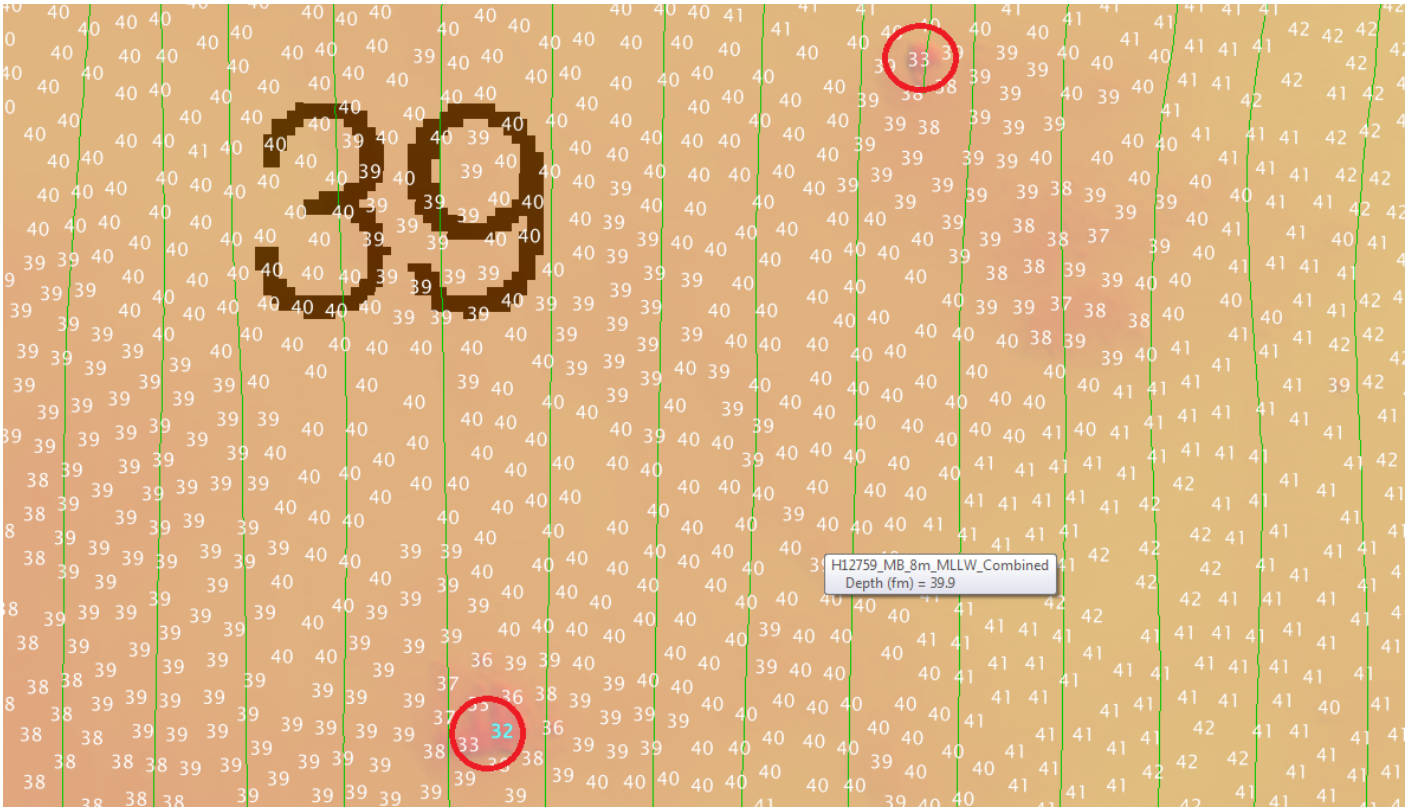


Figure 22: Sounding discrepancy 1

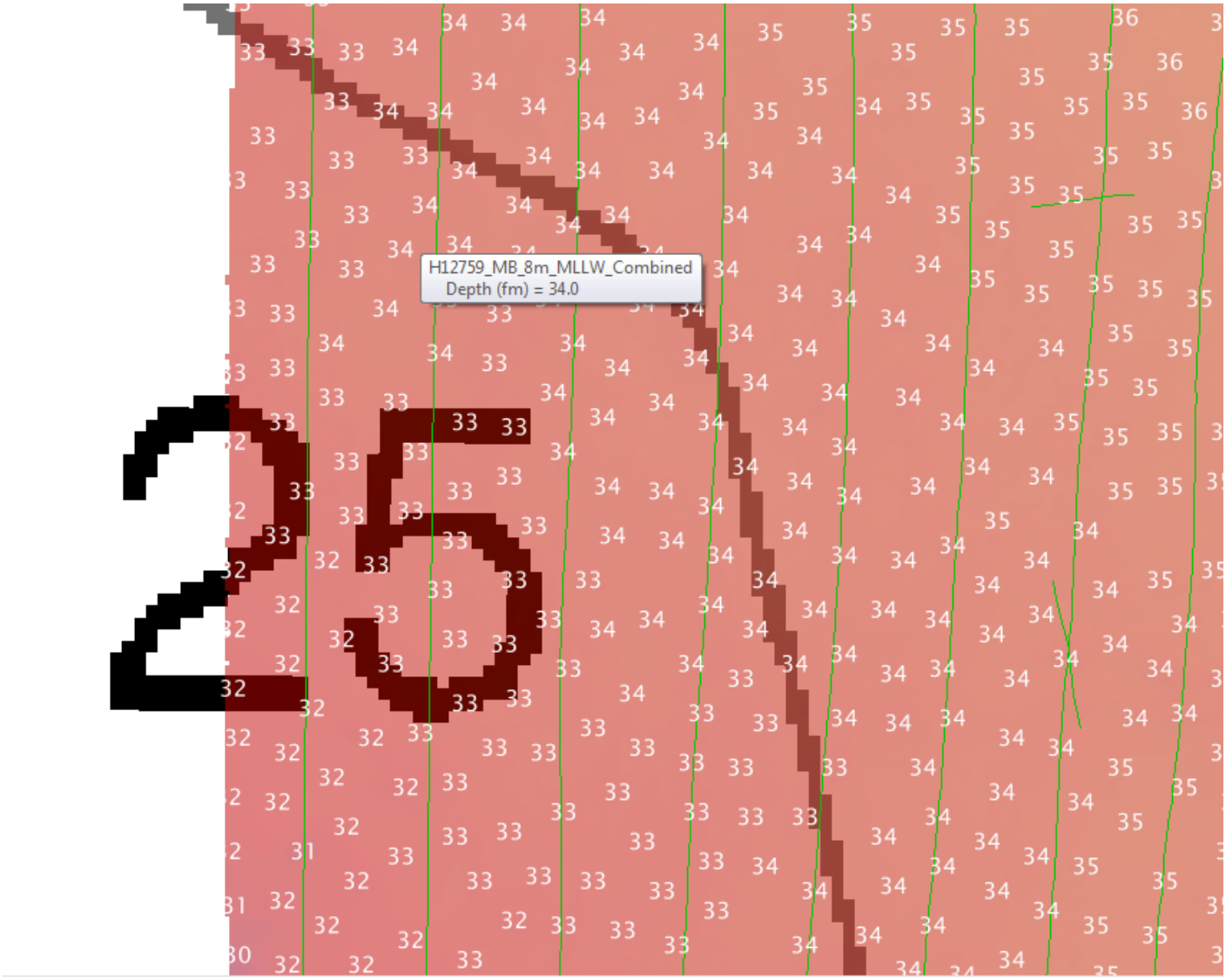


Figure 23: Sounding discrepancy 2

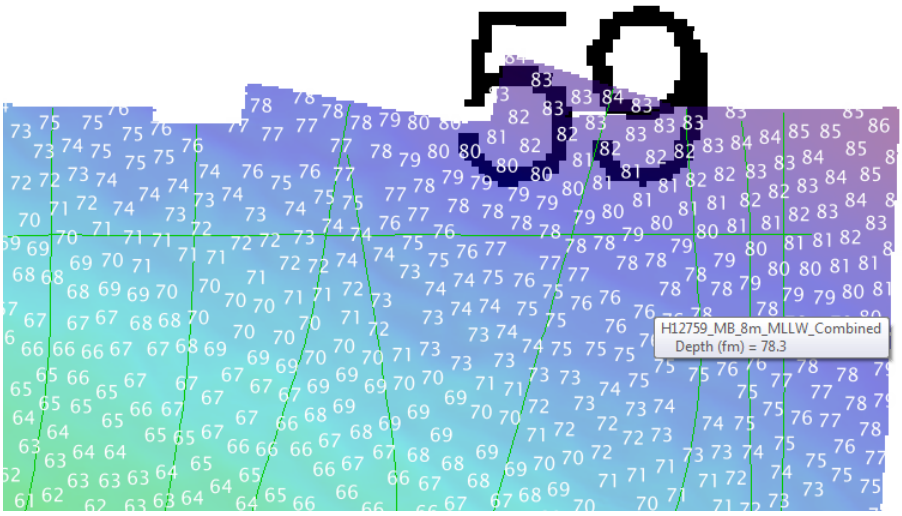


Figure 24: Sounding discrepancy 3

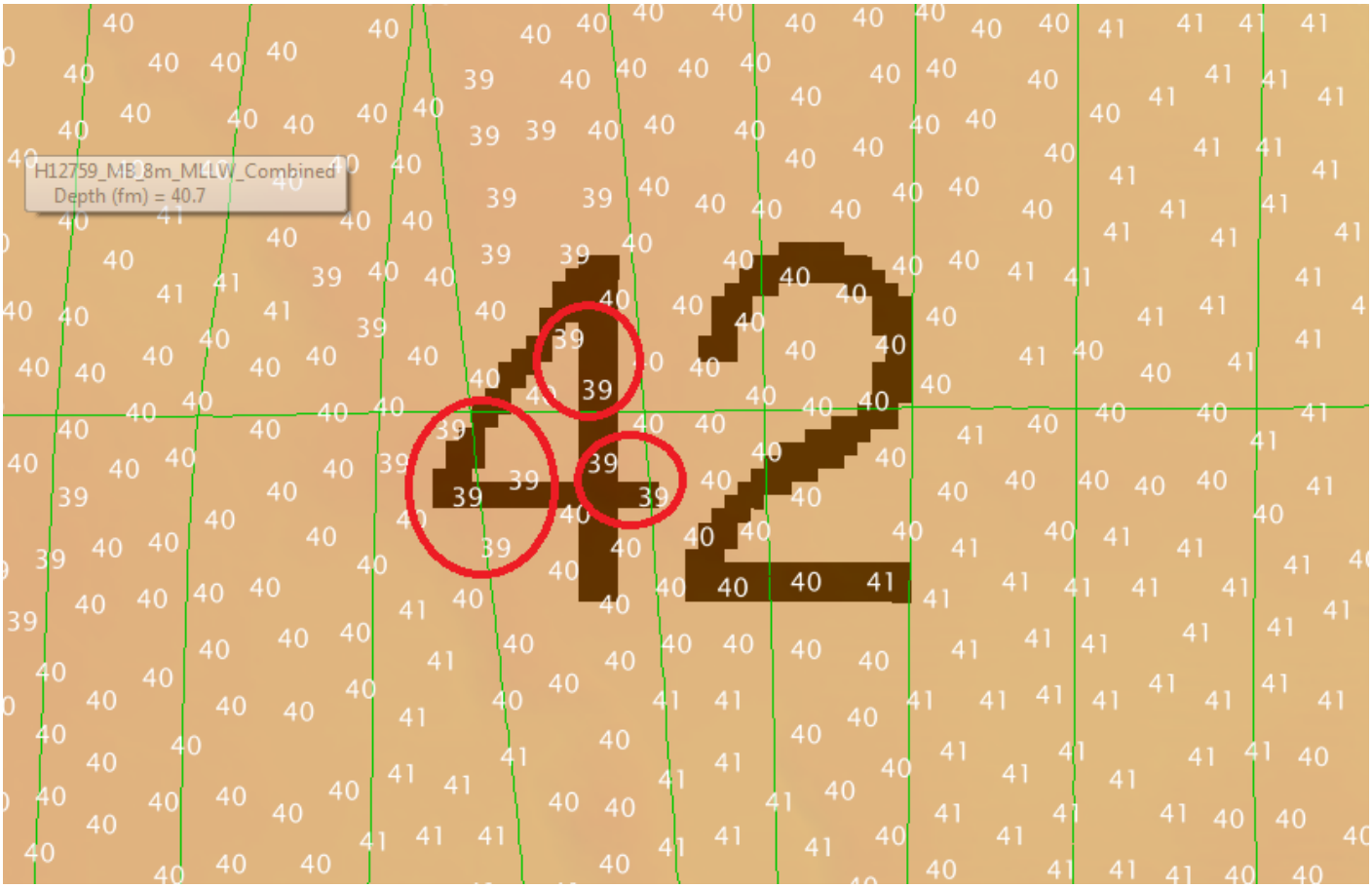


Figure 25: Sounding discrepancy 4

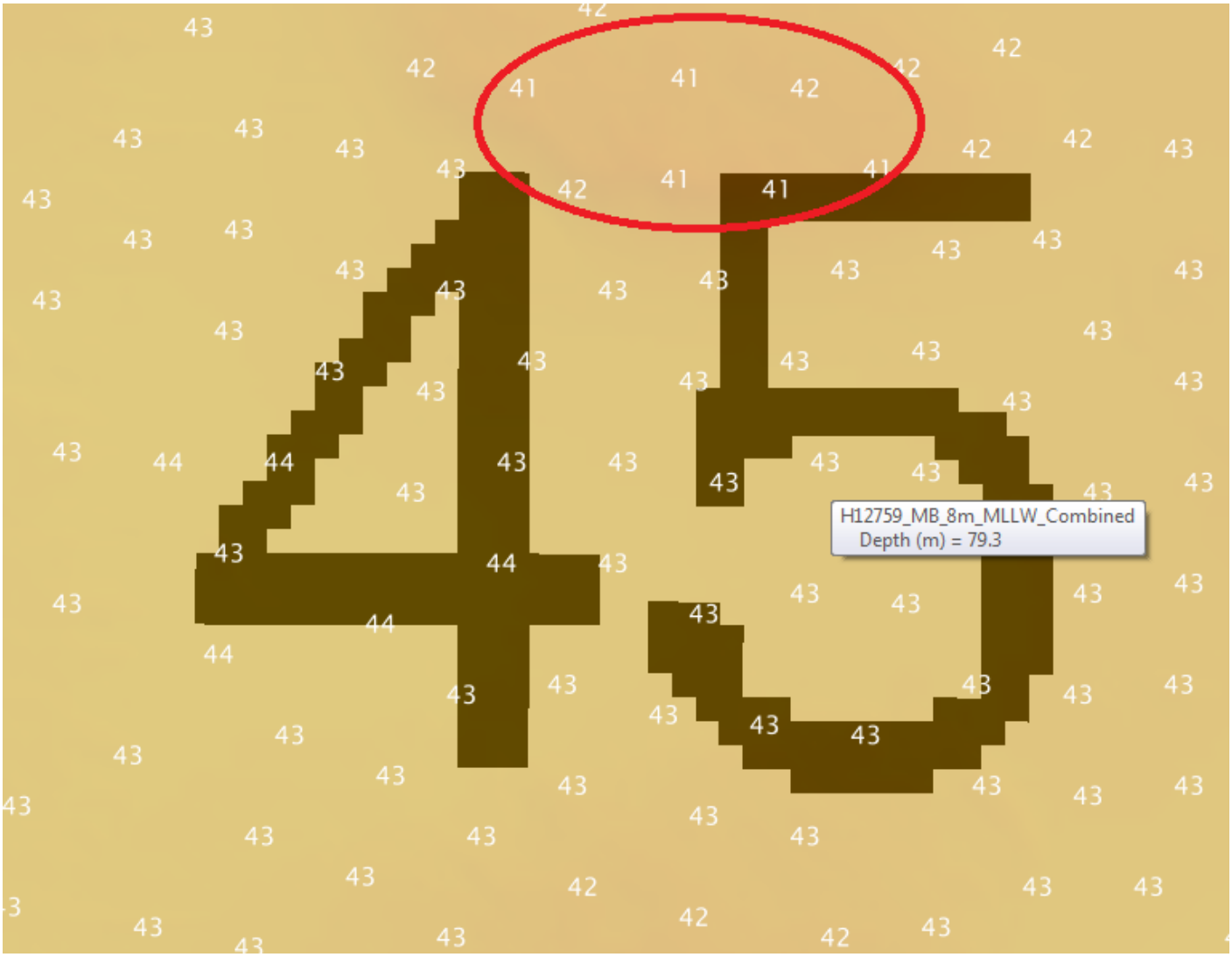


Figure 26: Sounding discrepancy 7

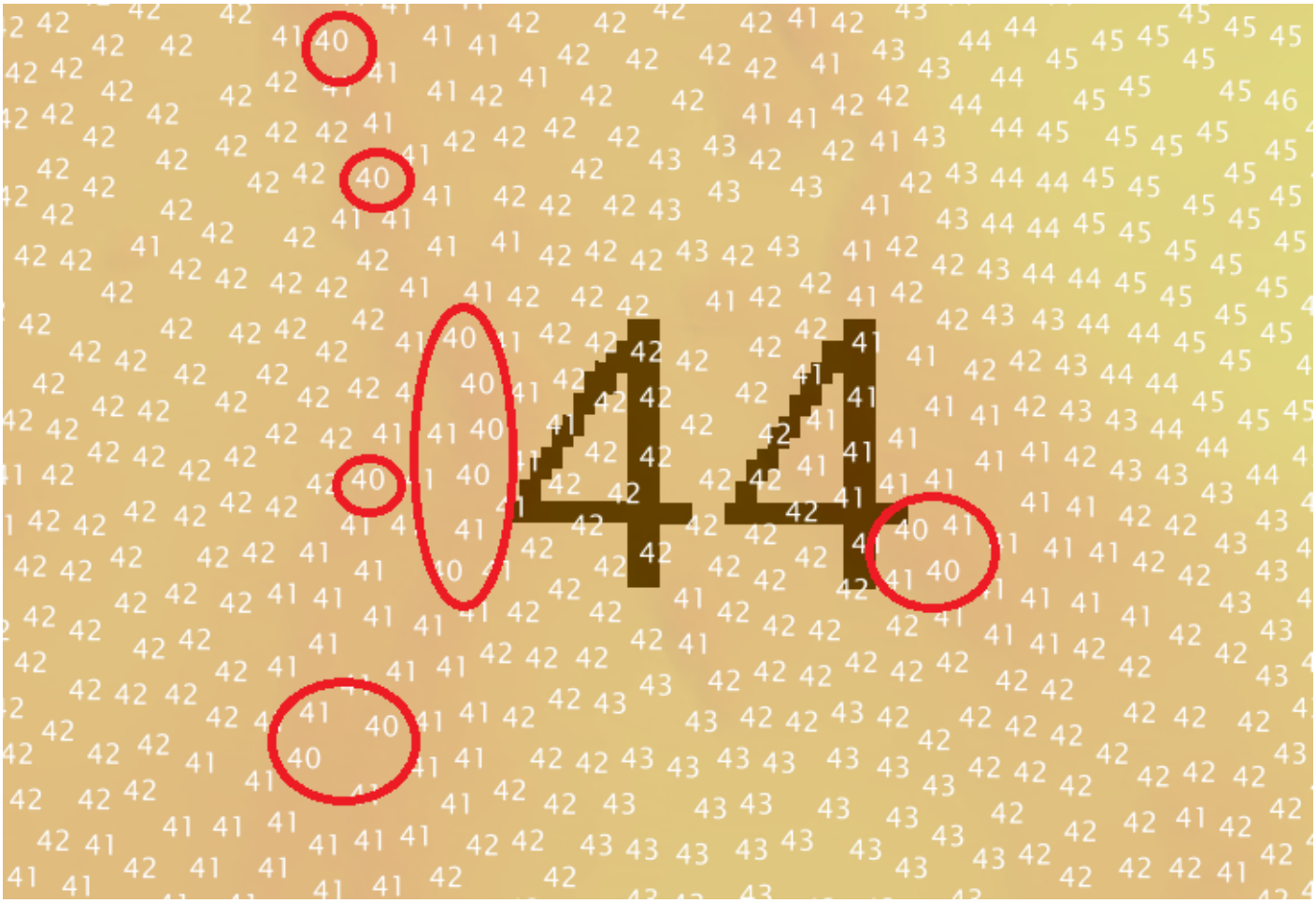


Figure 27: Sounding discrepancy 9

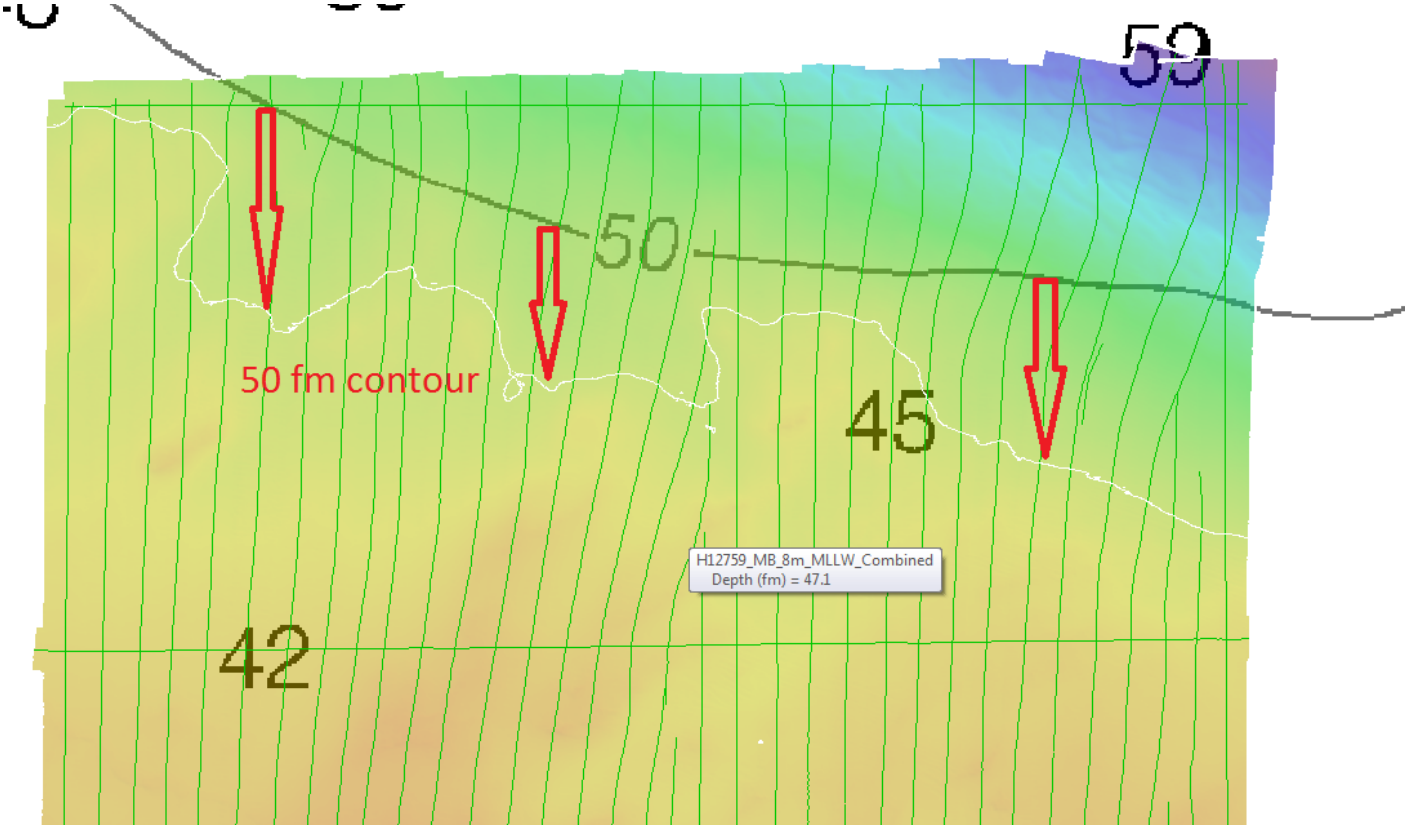


Figure 28: Contour discrepancy 1.

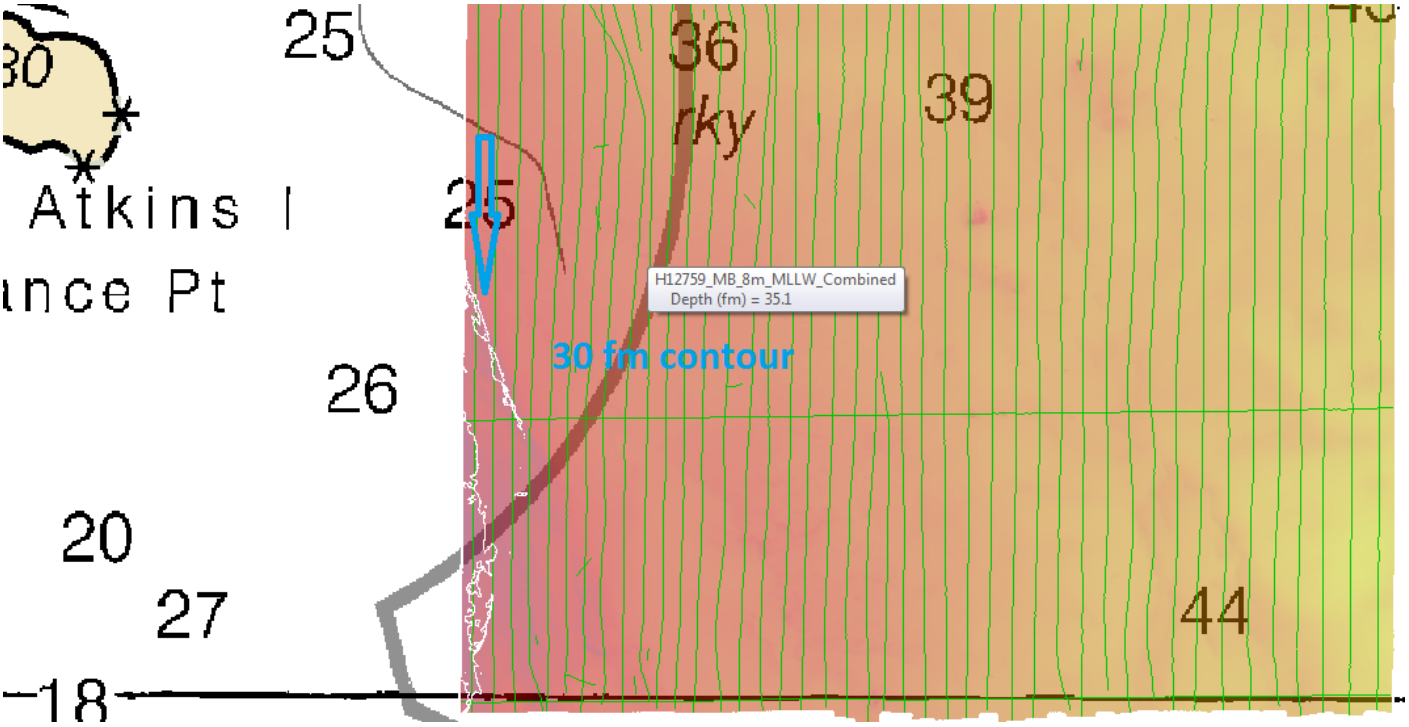


Figure 29: Contour discrepancy 2

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 16: Largest Scale ENCs

US3AK50M

This comparison agrees with Chart 16540, see discussion above.

D.1.3 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

No uncharted features exist for this survey.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 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.1.9 Bottom Samples

Three bottom samples were assigned and investigated. Bottom samples are included in the H12759 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	2015-08-27

Approver Name	Approver Title	Approval Date	Signature
CDR David J. Zezula	Chief of Party	08/24/2015	David Zezula 2015.09.04 08:16:50 -08'00'
HCST Douglas A. Bravo	Chief Survey Technician	08/24/2015	Douglas Bravo 2015.09.03 22:16:22 -08'00'
LT Ryan A. Wartick	Field Operations Officer	08/24/2015	Digitally signed by Ryan Wartick Date: 2015.09.04 07:45:07 -08'00'
LT Matthew M. Forney	Field Operations Officer	08/24/2015	Matthew Forney 2015.09.04 07:41:51 -08'00'
ENS Jason P. Baillio	Sheet Manager	08/24/2015	Digitally signed by Jason Baillio ENS/NOAA DN: cn=Jason Baillio ENS/NOAA, o=NOAA Corps, ou, email=jason.p.baillio@noaa.gov, c=US Date: 2015.09.03 21:56:49 -08'00'

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	Continually Operating Reference Staiton
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
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
HSSD	Hydrographic Survey Specifications and Deliverables

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

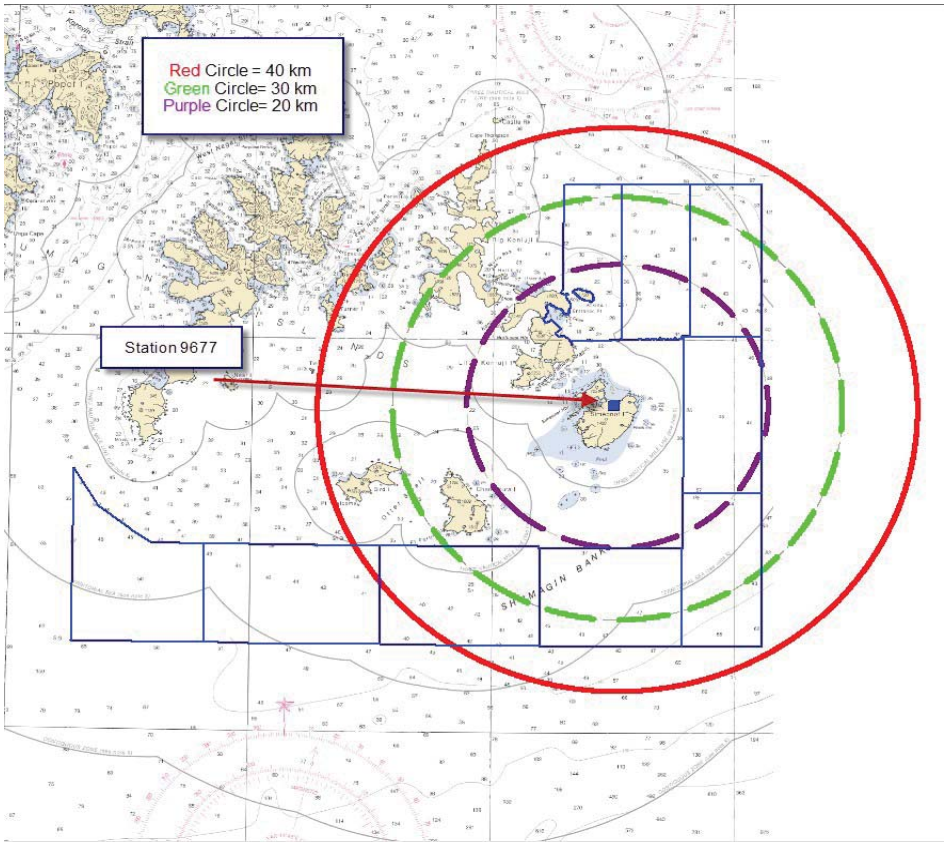
Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPE	Total Propagated 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

OPR-P183-FA-15

ERZT Evaluation – Interim Deliverable

This document is intended to satisfy the ERZT component of the Vertical Control Requirements of the Hydrographic Survey Project Instructions (PI) for OPR-P183-FA-15.

This is a comparison of the final discrete zoning and ERZT method for vertical transformation. Given that discrete tidal zoning is the conventional and accepted method, it is regarded as a baseline for this evaluation.



Procedure

The ERZT evaluation was conducted IAW the Project Instruction and additional guidance found in the Pydro 14.6 distribution (Pydro\Lib\sitepackages\HSTP\Pydro\PostAcqTools_CompareTSeries.docx)

Basic examination of the 100m resolution Separation Model derived from CARIS (OPR-P183-FA-15_ERZT_XL_Separation_Model.csar) was performed to verify the presence of artifacts, gaps and consistency.

Crossline data were referenced to MLLW via final discrete zoning and separately via application of

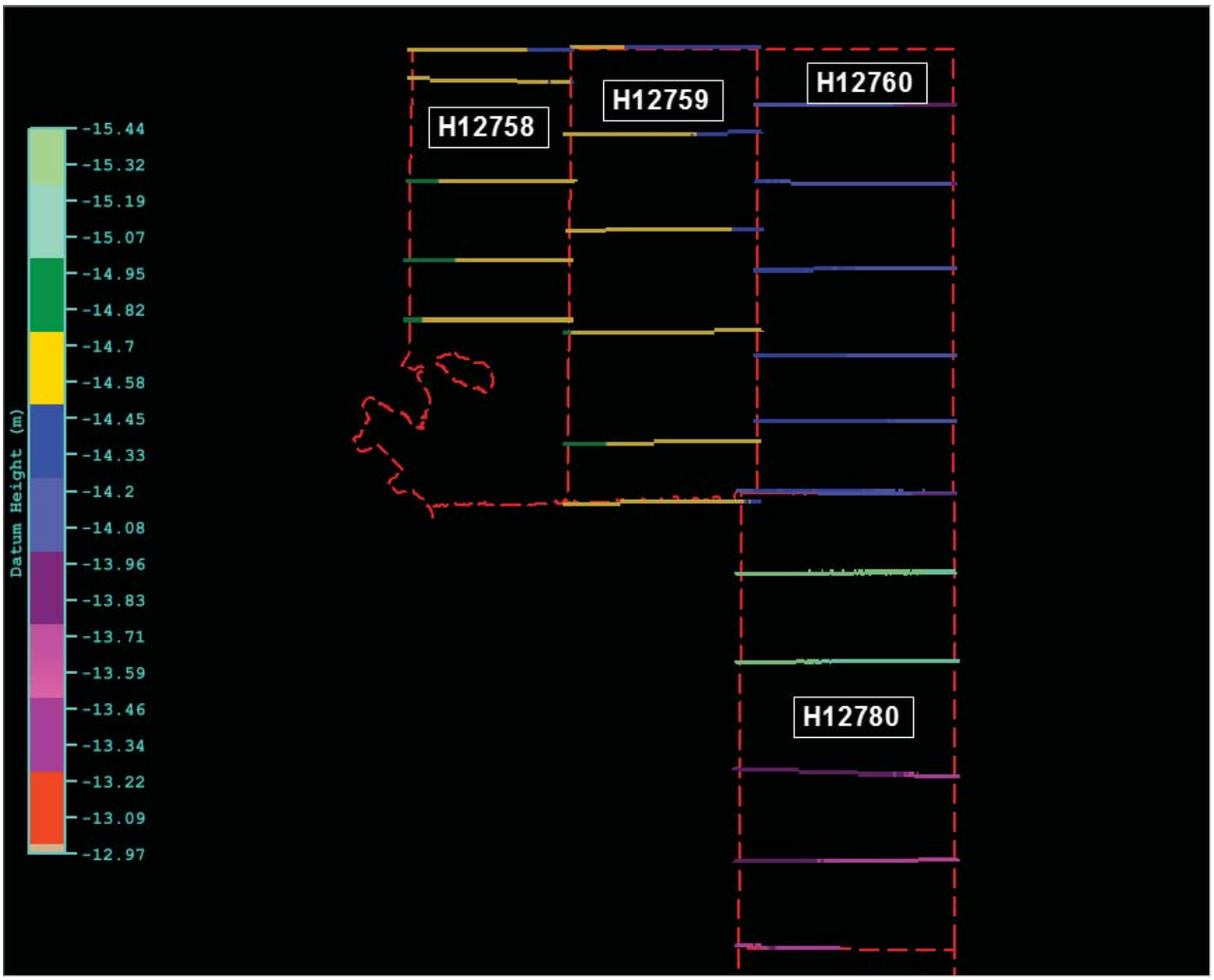
GPS Tide using created separation model (OPR-P183-FA-15_ERZT_XL_Separation_Model.csar). Time series data for the MiddlePD sensor (nadir depth) were extracted from both data sets and differenced using the Pydro PostAcq toolset. Data was gridded and difference surface between the two datasets were created as qualitative test.

Results

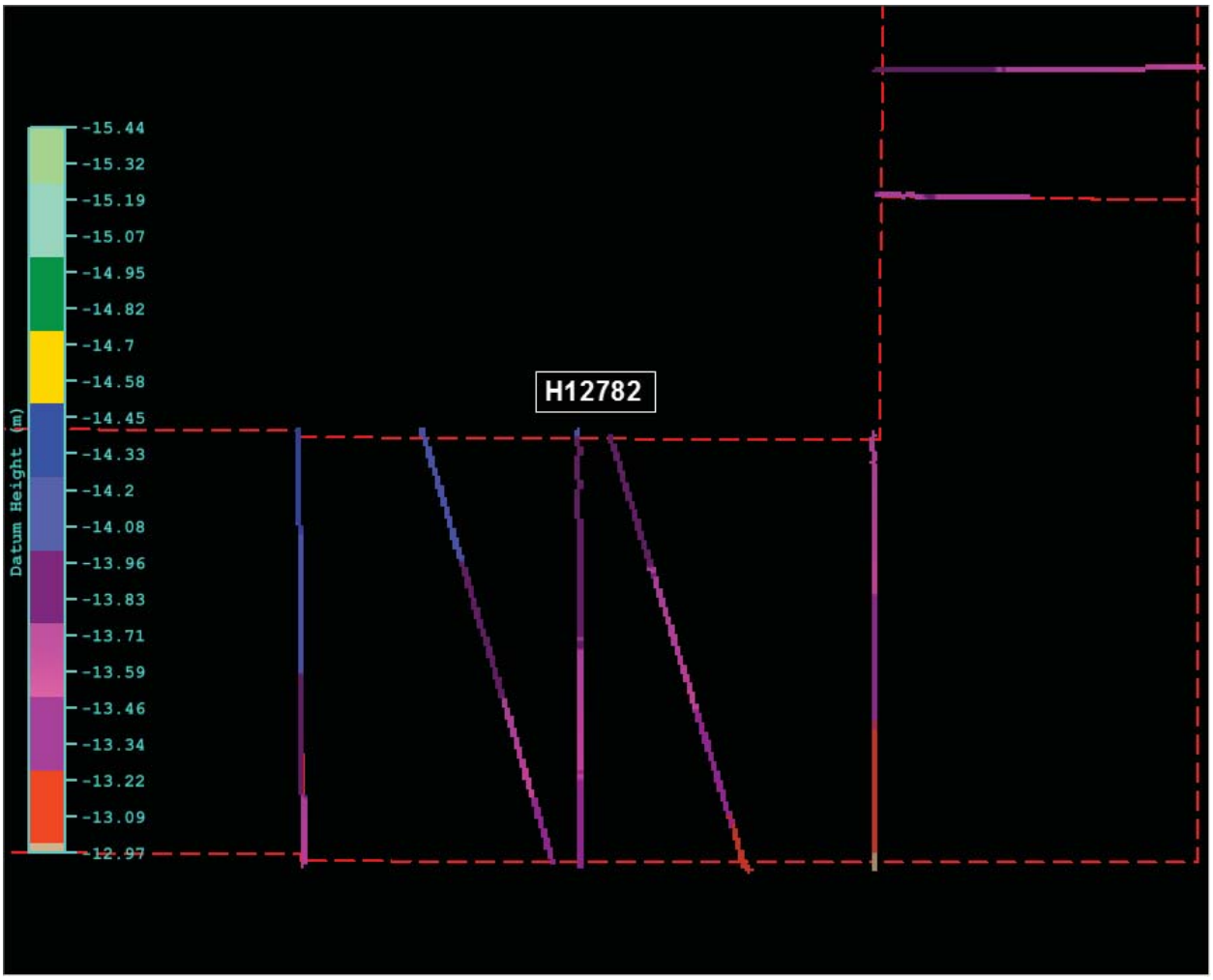
Registry Number	Vessel HVF Designation	Depth Samples	Mean Difference (m)	Standard Deviation (m)
H12758	FA_S220_EM710_2015	53575	0	0.014
H12759	FA_S220_EM710_2015	67120	-0.218	0.047
H12760	FA_S220_EM710_2015	62144	0.042	1.676
H12780		**36958**	**-0.059**	**0.02**
	FA_2805_200kHz_7125_256bms_2015	22175	0	0.014
	FA_2806_200kHz_7125_256bms_2015	5019	0	0.021
	FA_2808_200kHz_7125_256bms_2015	9764	-0.059	0.025
H12782	FA_S220_EM710_2015	50339	0.006	0.995
OPR-P183-FA-15	**Composite Result:**	**270136**	**-0.0327**	**0.3988**

Table 1: MiddlePD time series statistics (Discrete Zoned minus GPS Tide with SEP file applied).

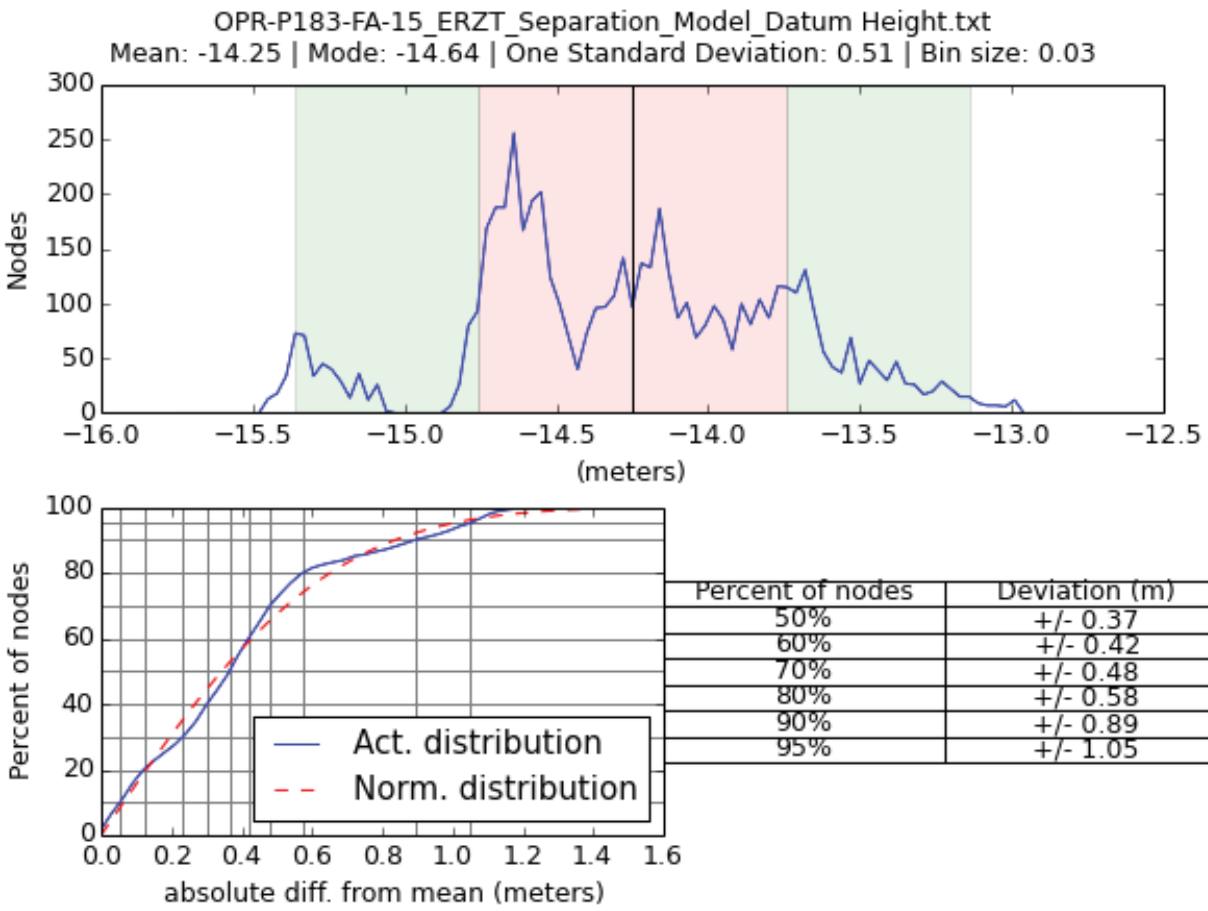
Separation model (OPR-P183-FA-15_ERZT_XL_Separation_Model.csar) does not show any gaps within the survey areas. See figure below.



OPR-P183-FA-15_ERZT_XL_Separation_Model overlaid with H12758, H12759, H12760 and H12780. Color bands correspond to 25 cm intervals.

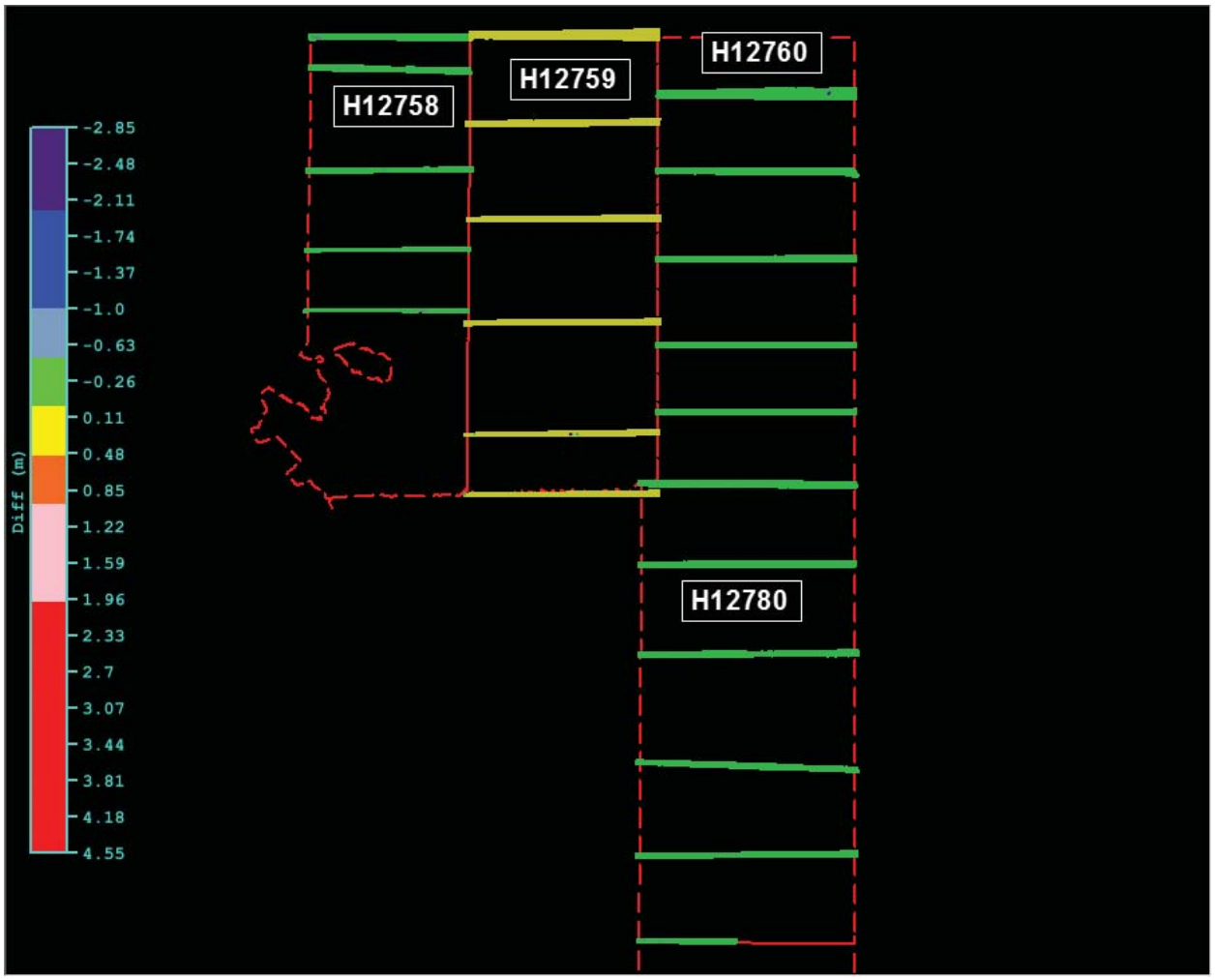


OPR-P183-FA-15_ERZT_XL_Separation_Model overlaid with H2782. Color bands correspond to 25 cm intervals.

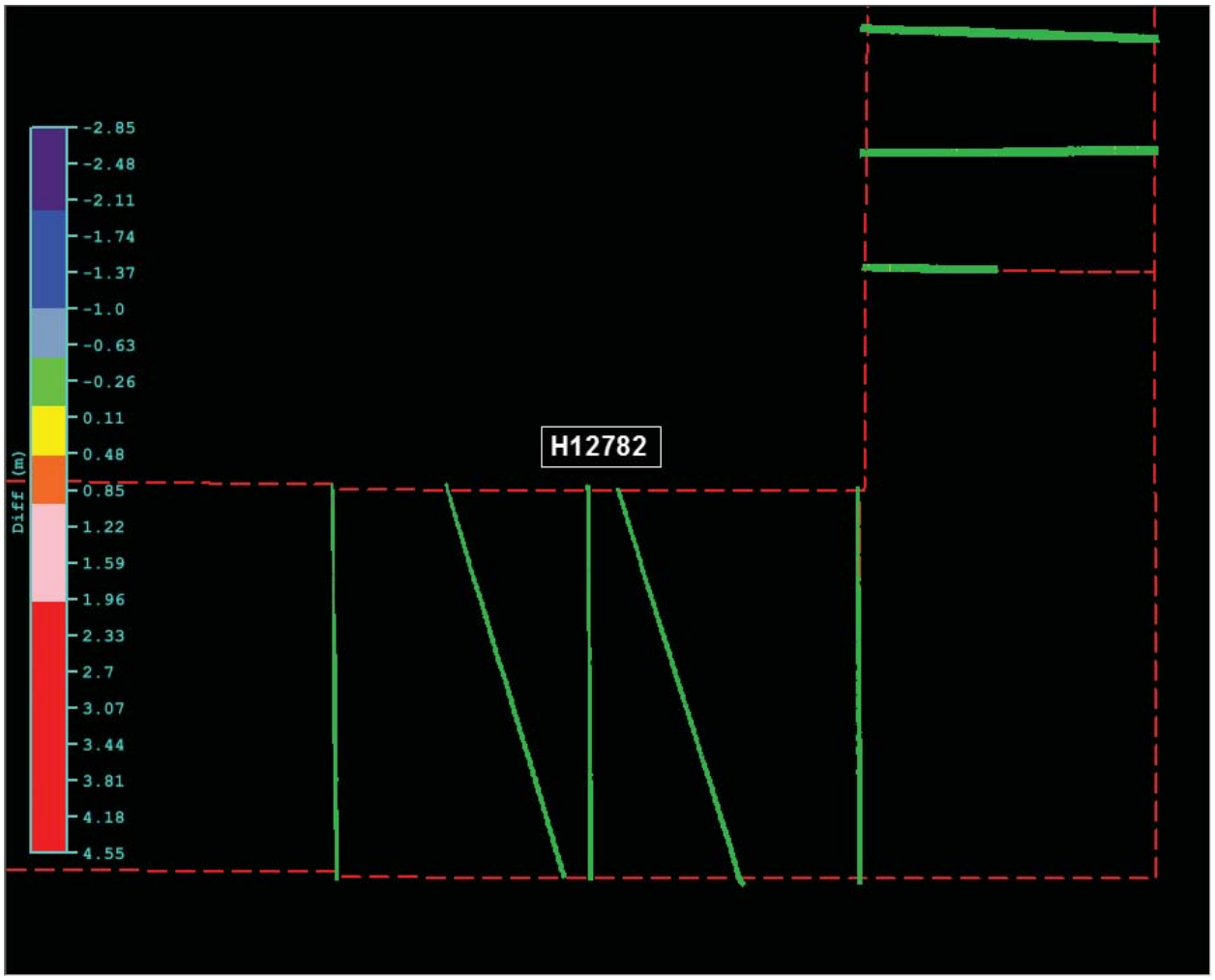


Percent of nodes	Deviation (m)
50%	+/- 0.37
60%	+/- 0.42
70%	+/- 0.48
80%	+/- 0.58
90%	+/- 0.89
95%	+/- 1.05

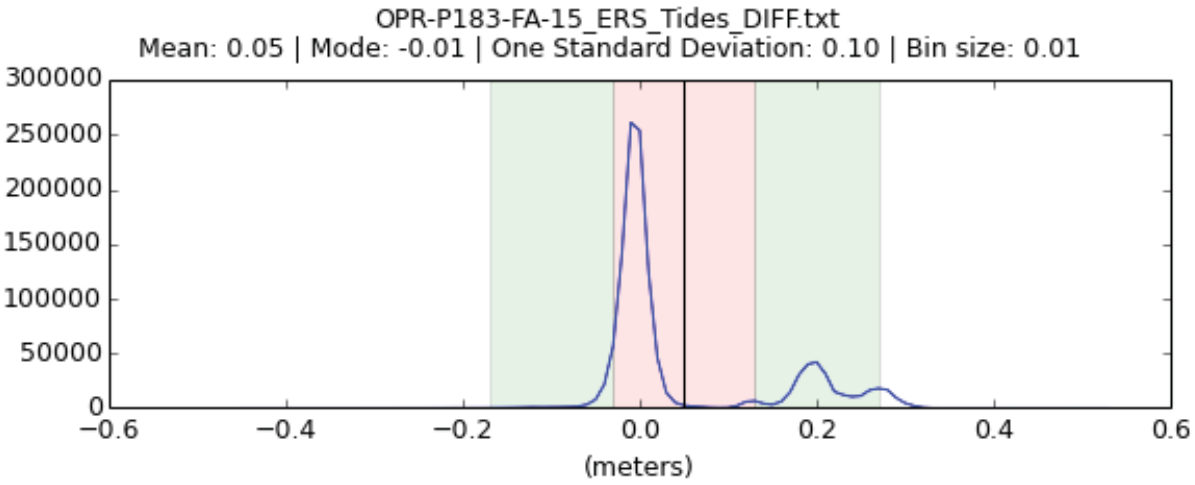
OPR-P183-FA-15_ERZT_XL_Separation_Model statistical Information

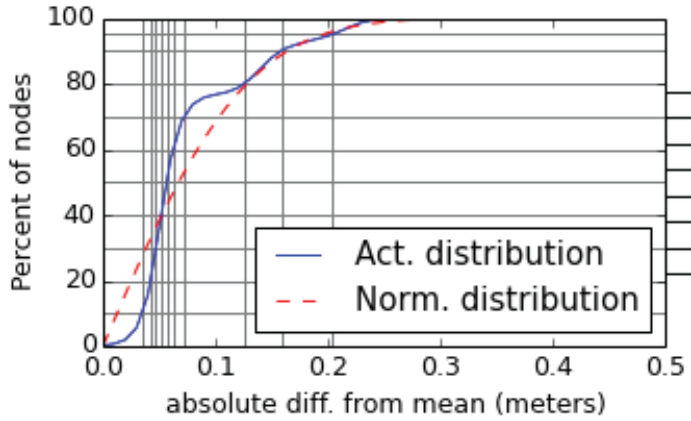


H12758, H12759, H12760 and H12780 Discrete minus ERS crossline CUBE surface.



H12782 discrete minus ERS crossline CUBE surface.





Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.06
70%	+/- 0.07
80%	+/- 0.13
90%	+/- 0.16
95%	+/- 0.20

Recommendation

This preliminary analysis show a strong agreement between the two reduction methods, and the greater internal consistency of the data transformed with the separation model created in CARIS method, the Hydrographer recommends proceeding with GPS tides applied (with separation model created in CARISe) for all data reduction on OPR-P183-FA-15, pending evaluation of the main scheme trajectories.

UNITED STATES DEPARMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : June 08, 2015

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P183-FA-2015
HYDROGRAPHIC SHEET: H12759

LOCALITY: 10 NM North of Simeonof Island, Shumagin Islands, AK
TIME PERIOD: May 16 - May 25, 2015

TIDE STATION USED: 9459450 Sand Point, AK
Lat. 55° 19.9'N Long. 160° 30.3' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.988 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-P183-FA-2015, H12759, during the time period between May 16 - May 25, 2015.

Please use the zoning file P183FA2015CORP submitted with the project instructions for OPR-P183-FA-2015. Zones SWA193 and SWA193A are the applicable zones for H12759.

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

HOVIS.GERALD.THOMAS.JR.1365860250

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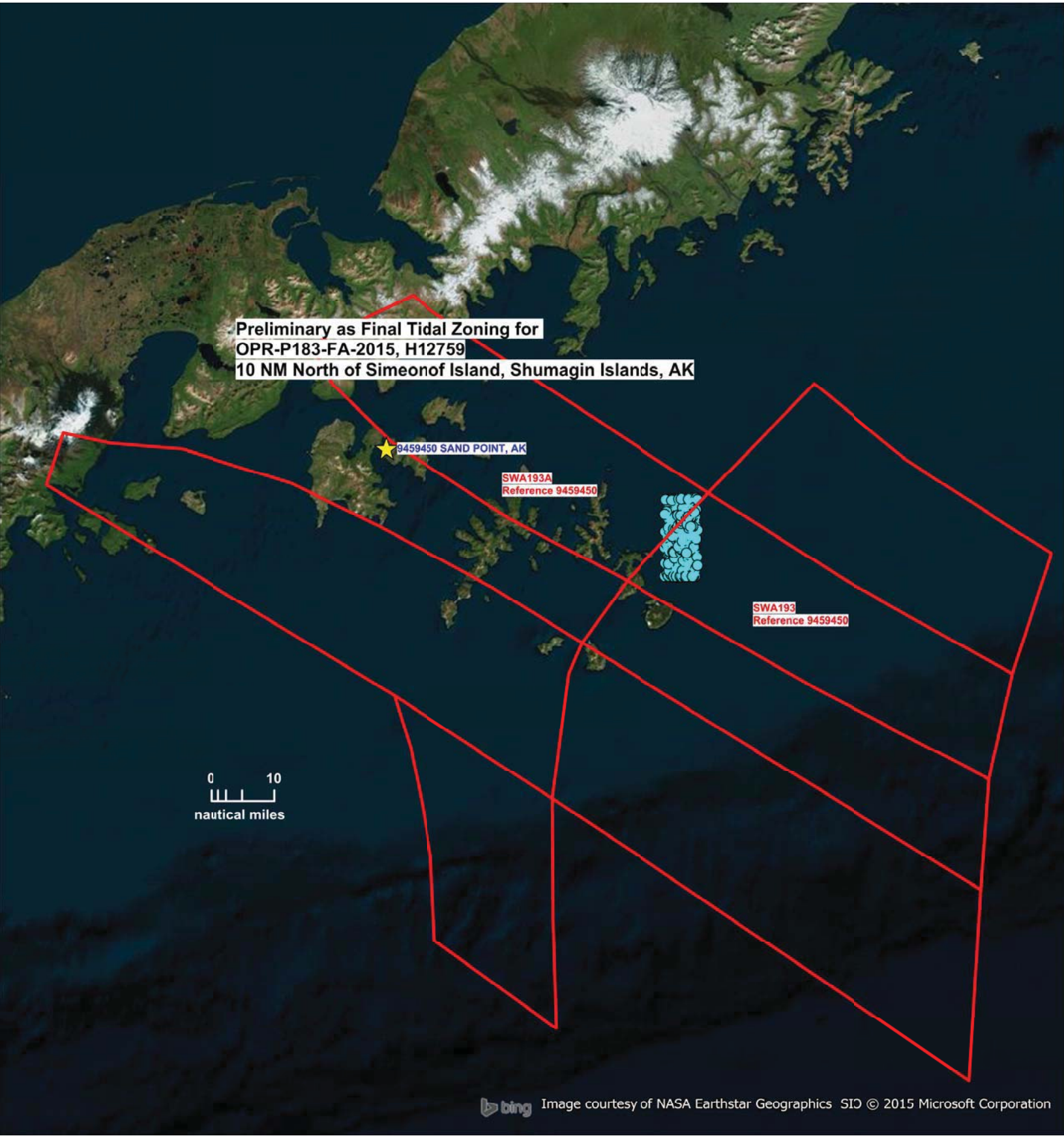
Date: 2015.06.11 18:48:05 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final Tidal Zoning for
OPR-P183-FA-2015, H12759
10 NM North of Simeonof Island, Shumagin Islands, AK
9459450 SAND POINT, AK
SWA193A
Reference 9459450
SWA193
Reference 9459450
0
10
nautical miles
bing
Image courtesy of NASA Earthstar Geographics SIO © 2015 Microsoft Corporation

APPROVAL PAGE

H12759

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

- H12759_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12759_GeoImage.pdf

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

Digitally signed by BROWN.KURT.E.1156712600
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=BROWN.KURT.E.1156712600
Date: 2016.05.02 08:46:37 -07'00'

Approved:_____

Kurt Brown
Physical Scientist, Pacific Hydrographic Branch

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

Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
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Date: 2016.05.02 10:04:38 -07'00'

Approved:_____

Peter Holmberg, NOAA
Acting Chief, Pacific Hydrographic Branch