H12913

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12913

LOCALITY

State(s):	Alaska
General Locality:	South Coast of Kodiak Island
Sub-locality:	Natalia Bay

2016

CHIEF OF PARTY
CDR Mark Van Waes, NOAA

LIBRARY & ARCHIVES

Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H12913

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:	**South Coast of Kodiak Island**
Sub-Locality:	**Natalia Bay**
Scale:	**40000**
Dates of Survey:	**07/16/2016 to 07/31/2016**
Instructions Dated:	**04/21/2016**
Project Number:	**OPR-P335-FA-16**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**CDR Mark Van Waes, 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 H12913

Project: OPR-P335-FA-16

Locality: South Coast of Kodiak Island

Sublocality: Natalia Bay

Scale: 1:40000

July 2016 - July 2016

NOAA Ship *Fairweather*

Chief of Party: CDR Mark Van Waes, NOAA

A. Area Surveyed

This survey area is located along the South Coast of Kodiak Island, AK, within the sub-locality of Natalia Bay.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
57° 5' 28.4" N 153° 29' 57.72" W	57° 0' 15.11" N 153° 19' 10.75" W

Table 1: Survey Limits

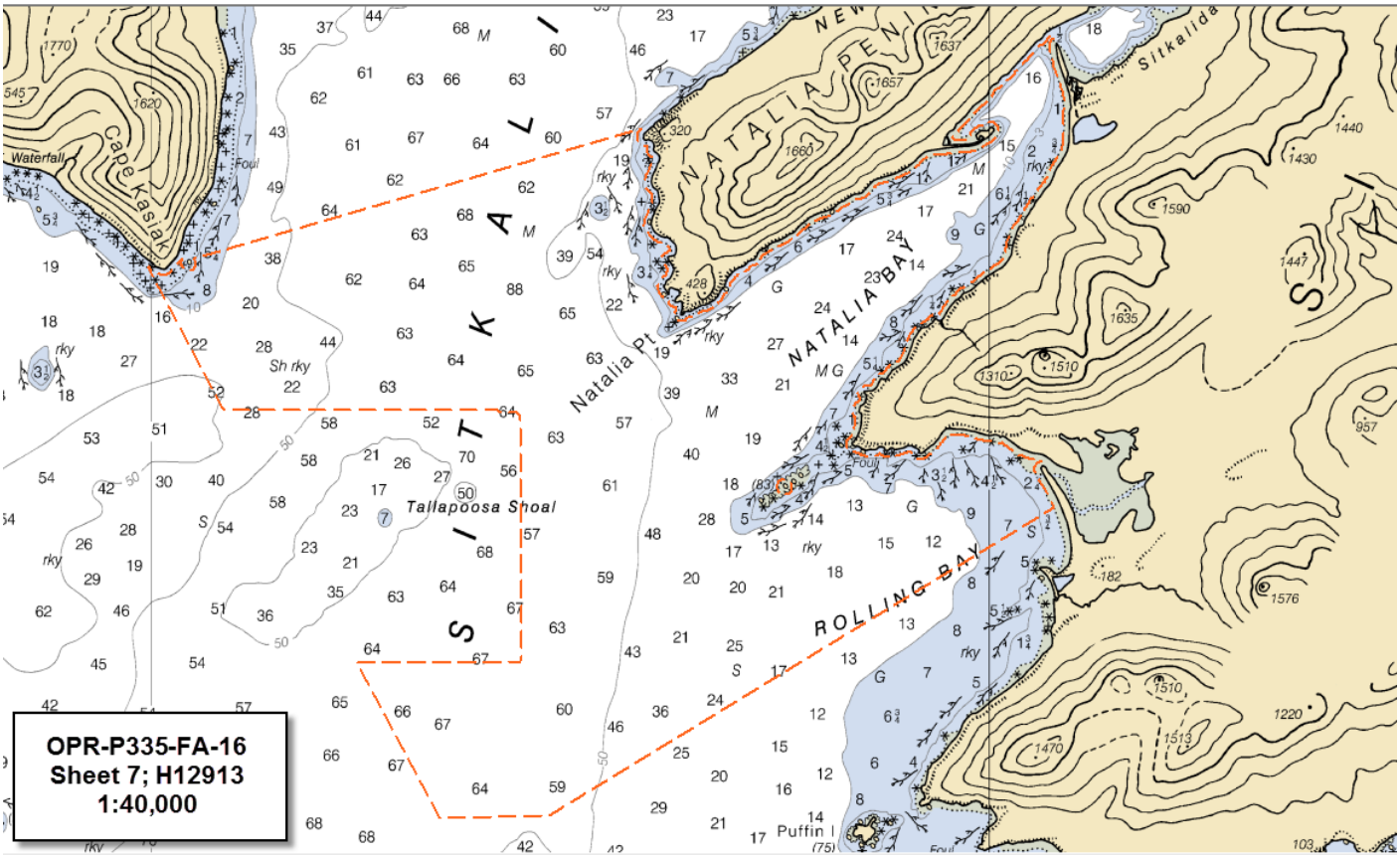


Figure 1: H12913 sheet limits overlaid onto Chart 16592

Data were acquired to the survey limits in accordance with the requirements in the Project Instructions and the March 2016 NOS Hydrographic Surveys Specifications and Deliverables (HSSD) as shown in Figure 1. In all areas where the 4 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 maneuvering the survey vessel in close proximity to the steep and rocky shoreline (Figure 2), or kelp (Figure 3).

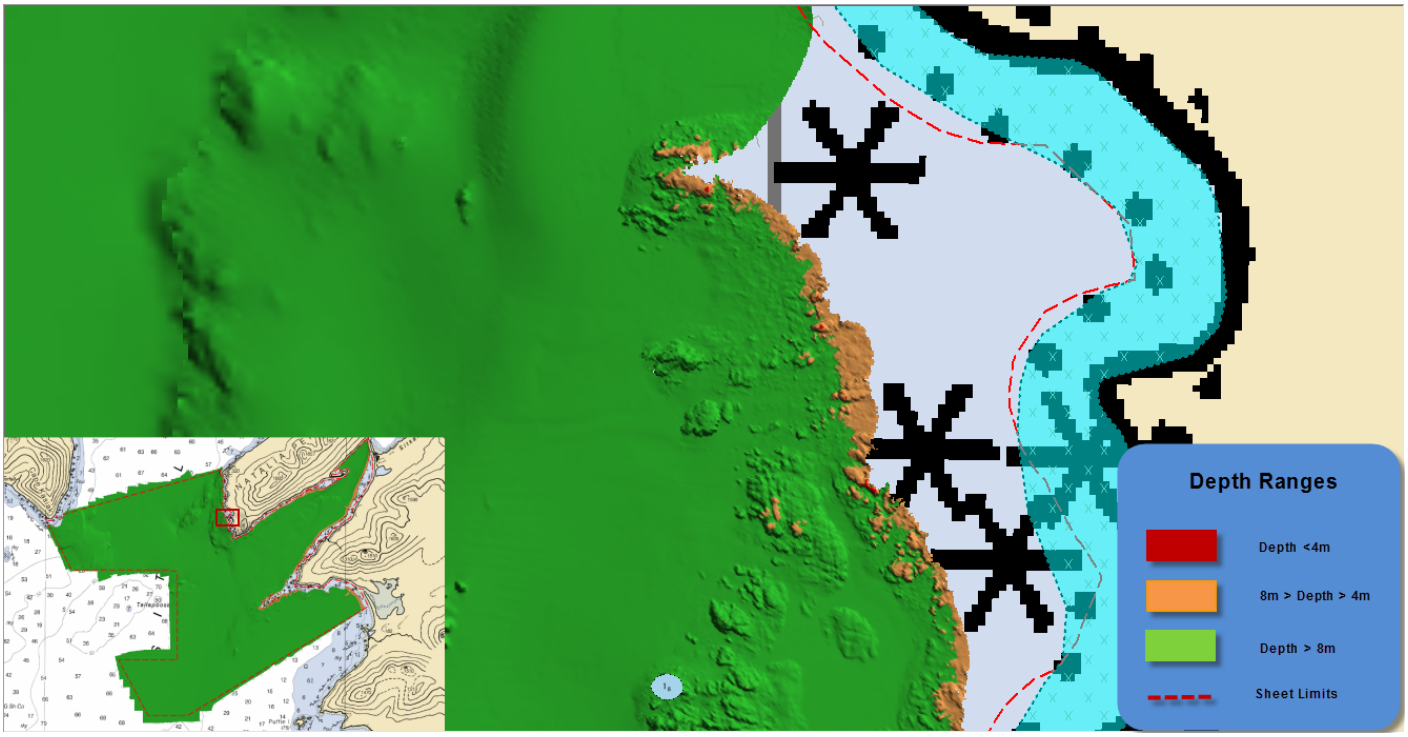


Figure 2: Area where the NALL was redefined due to the presence of rocks

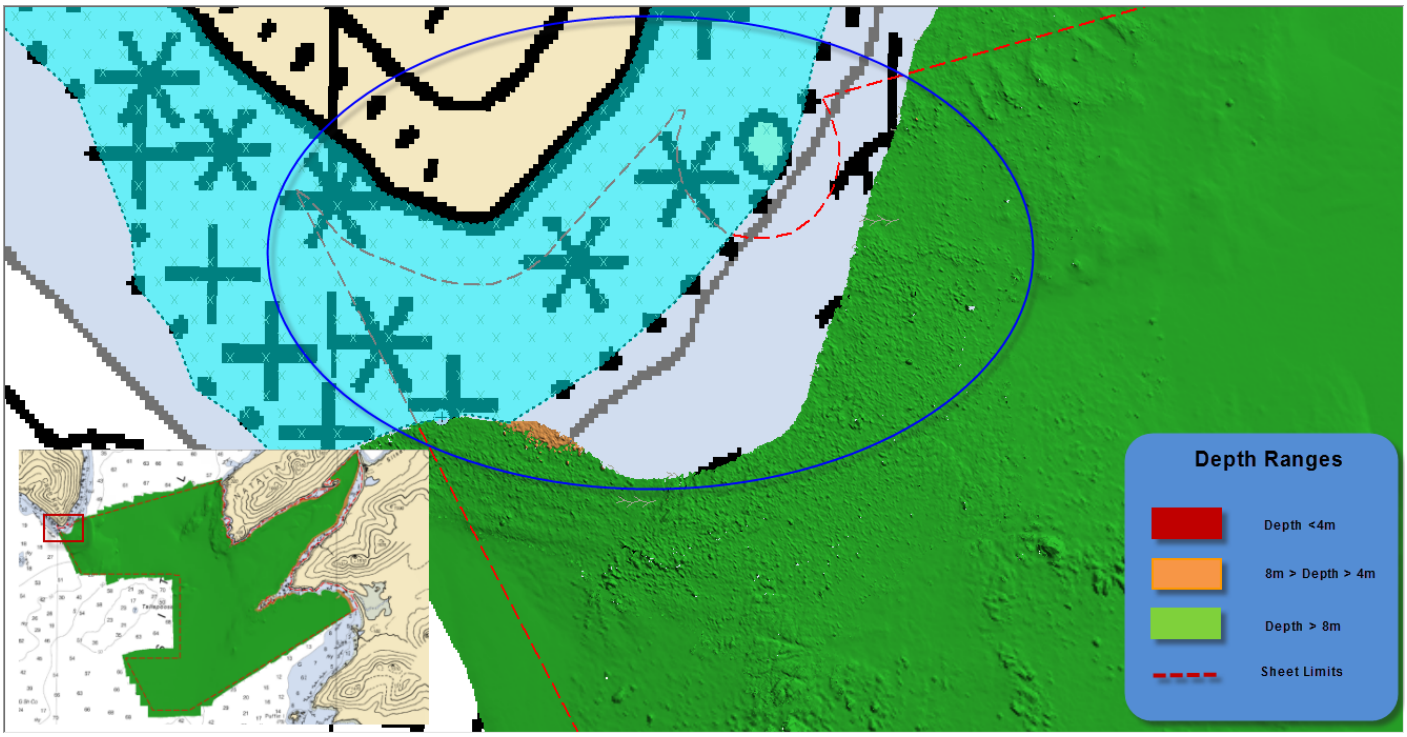


Figure 3: Area where the NALL was redefined to to the presence of kelp

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. This survey area addresses approximately 21 SNM of navigationally significant waters. This survey also supports seismic research for tsunami risk analysis by the United States Geological Survey (USGS) and Alaska Department of Fish and Game (ADF&G).

This survey area addresses approximately 14 SNM, not 21 SNM as stated above.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H12913 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as required by the March 2016 Hydrographic Surveys Specifications and Deliverables (HSSD). This includes NOAA allowable uncertainty (see Section B. 2. 10), and density requirements (see Section B.2.11). Additional compliance statistics can be found in the Standards and Compliance Review located in Appendix II of this report.

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 accomplished using either: A) Complete coverage MBES depth and backscatter data, or B) 100% SSS coverage with concurrent set line spacing MBES depth and backscatter data. Refer to HSSD Section 5.2.2.2

The entirety of H12913 was acquired with complete MBES coverage with backscatter, meeting the requirements listed above and in the HSSD. See Figure 4 for an overview of coverage.

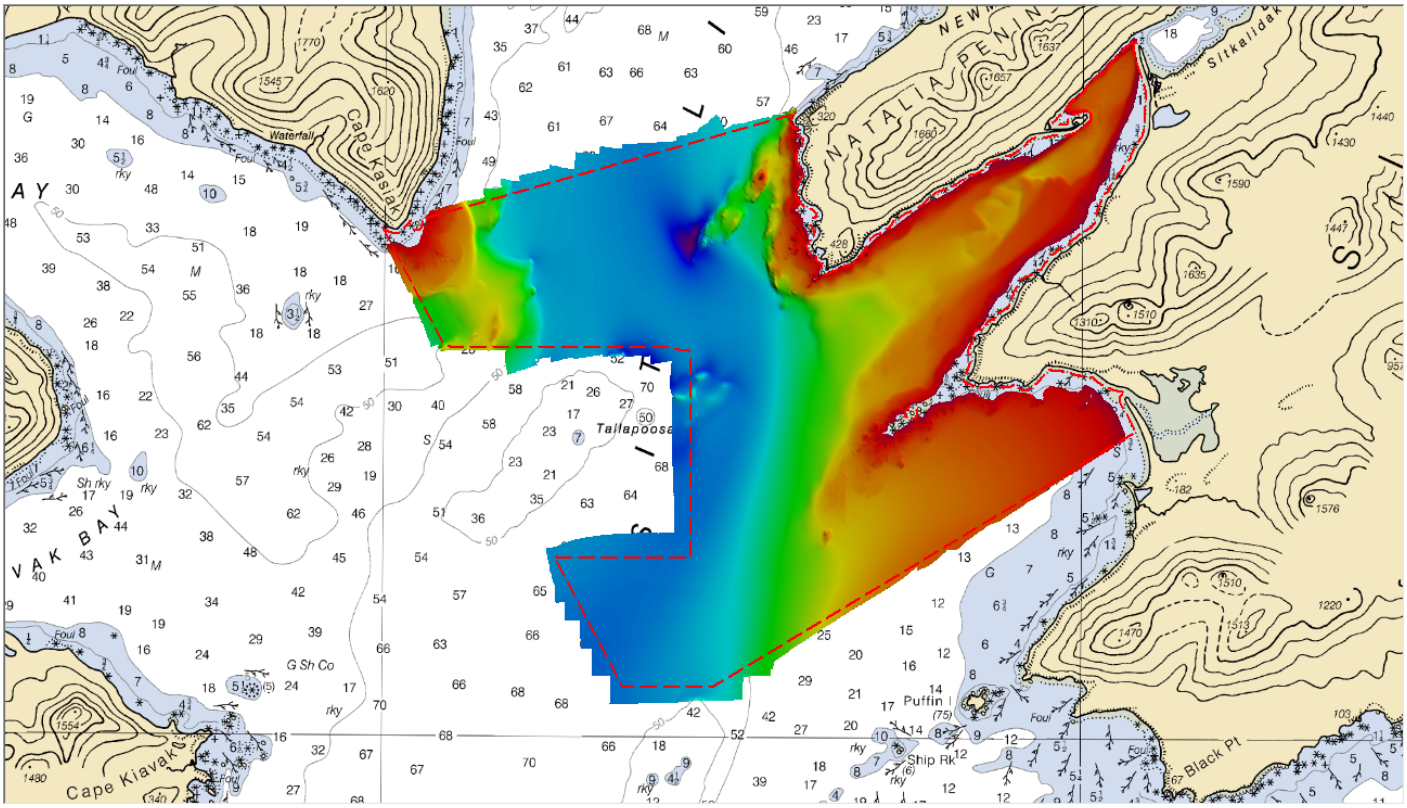


Figure 4: H12913 Survey coverage (4m surface) overlaid onto Chart 16592

A.5 Survey Statistics

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

	HULL ID	*2805*	*2806*	*2807*	*2808*	*S220*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0	0	0
	MBES Mainscheme	29.95	62.11	68.84	31.06	42.01	233.97
	Lidar Mainscheme	0	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0	0
	SBES/MBES Crosslines	0	2.42	1.71	0	0	4.13
	Lidar Crosslines	0	0	0	0	0	0
Number of Bottom Samples							2
Number Maritime Boundary Points Investigated							0
Number of DPs							0
Number of Items Investigated by Dive Ops							0
Total SNM							14.09

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/16/2016	198
07/26/2016	208

Survey Dates	Day of the Year
07/31/2016	213

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the OPR-P335-FA-16 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*	*S220*
LOA	8.64 meters	8.64 meters	8.64 meters	8.64 meters	70.4 meters
Draft	1.12 meters	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
Kongsberg	EM710	MBES
RESON	7125	MBES
Applanix	POS/MV V4	Positioning and Attitude System
Rolls Royce	MVP 200	Conductivity, Temperature, and Depth Sensor
RESON	SVP 70	Sound Speed System
RESON	SVP 71	Sound Speed System
Seabird	19plus	Conductivity, Temperature, and Depth Sensor

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 1.77% of mainscheme acquisition.

Due to equipment malfunction, Fairweather was forced to halt operations and leave the survey area before the acquisition of the required 4% of crosslines could be completed. The crosslines that were collected (1.77% of mainscheme acquisition) were processed and compared in accordance with Section 5.2.4.3 of the HSSD, and show an exceedingly high level of agreement with the mainscheme surface. To evaluate crosslines a 4 meter CUBE surface composed of strictly mainscheme lines and a 4 meter surface composed of strictly crosslines was created. From these two surfaces, a difference surface (mainscheme - crosslines = difference surface) was generated at a 4 meter resolution (Figure 5), and is submitted in the Separates II Digital Data folder. Statistics show the mean difference between the depths derived from mainscheme and crosslines was -0.06 meters (with mainscheme being shoaler) and 95% of nodes fall within 0.20 meters (Figure 6). For the respective depths, the difference surface was compared to the allowable NOAA accuracy standards (Figure 7). In total, 99.81% of the depth differences between H12913 mainscheme and crossline data were within allowable NOAA uncertainties (Figure 8).

To assure the data acquired by S220 agreed with the data collected by the survey launches in areas not covered by crosslines, areas of overlap between the ship and survey launches 2806, 2807, and 2808 were assessed by creating a 4 meter surface composed of strictly launch data and a 4 meter surface composed

of strictly ship data (Figure 9). Statistics show that the mean difference between depths derived from these surfaces was 0.05 meters (with S220 being deeper) and 95% of nodes fall within 0.35 meters (Figure 10). For the respective depths, the difference surface was compared to the allowable NOAA accuracy standards (Figure 11). In total, 99.89% of the depth differences between H12913 S220 and survey launch data were within allowable NOAA uncertainties (Figure 12). The high level agreement between this difference surface, as well as the difference surface generated between mainscheme and crosslines, suggests that there are no significant systematic errors or blunders in the surveying systems, and the accuracy and reliability of surveyed soundings and positions are adequately verified. See Figure 13 for a spatial overview of the difference surfaces discussed above. This analysis was submitted to the Project Manager, and a waiver of the 4% crossline requirement was granted by HSD OPS. See Appendix II for a record of this correspondence.

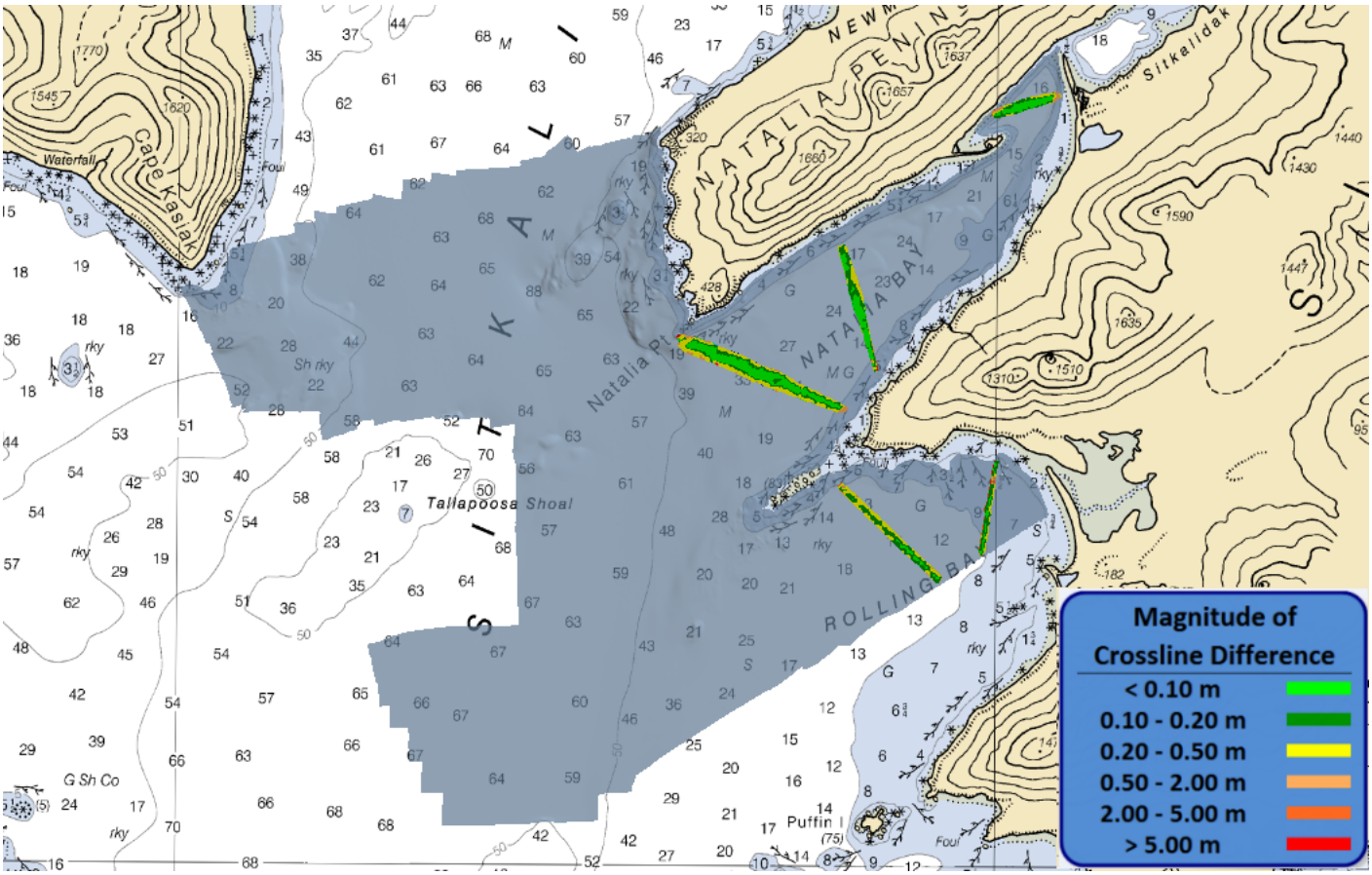
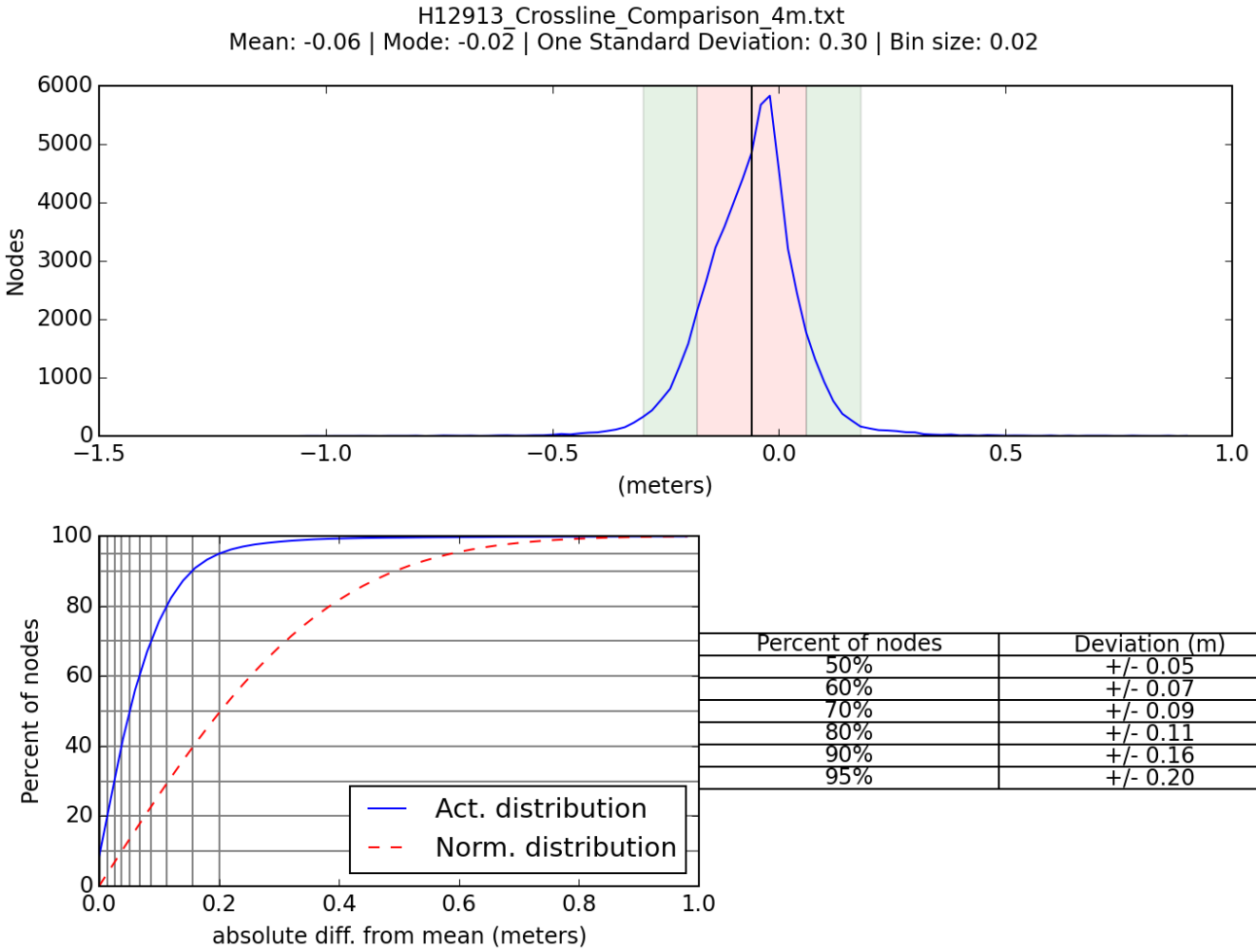


Figure 5: Overview of H12913 crosslines



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

Figure 6: H12913 crossline and mainscheme difference statistics

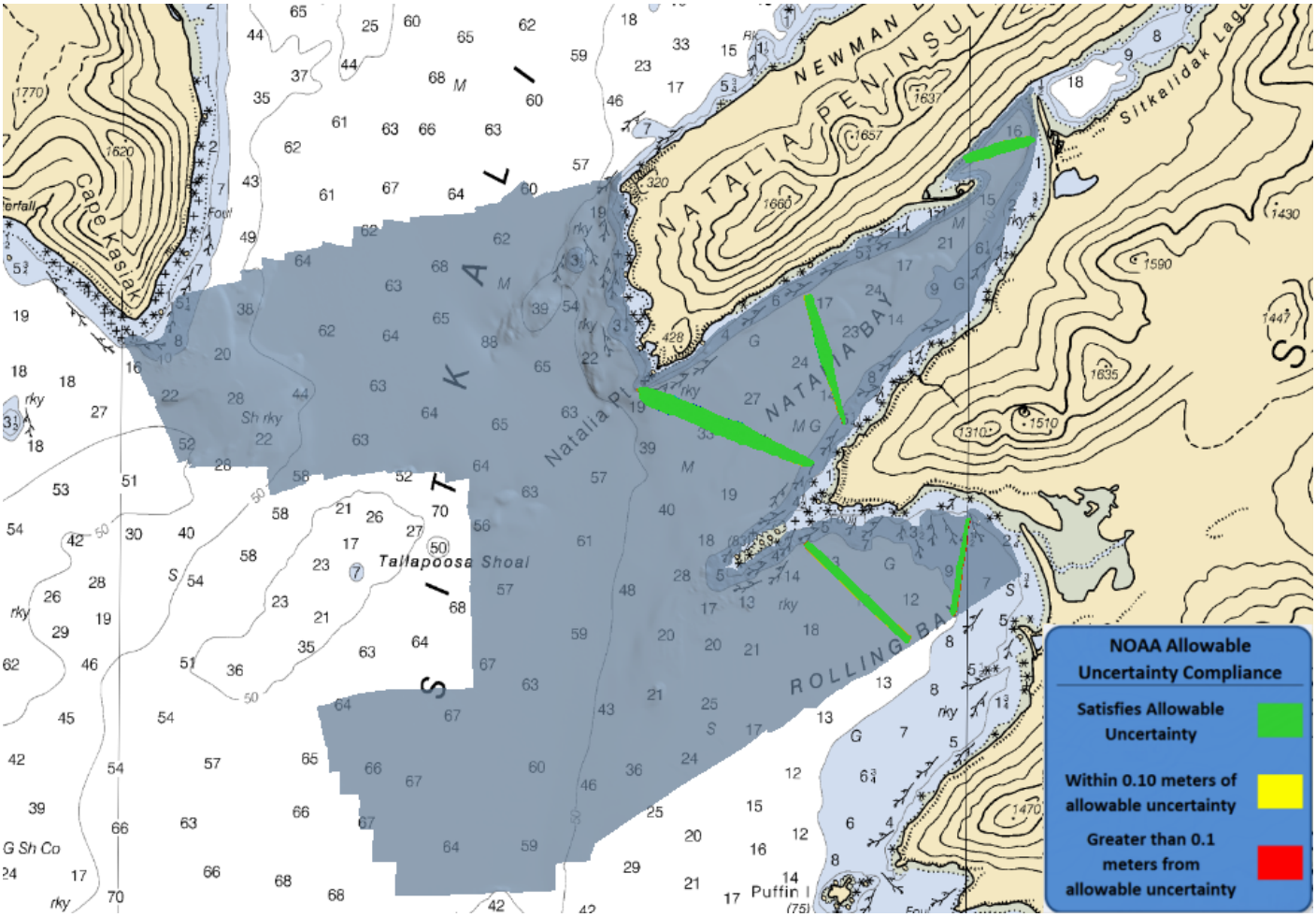


Figure 7: Depth differences between H12913 mainscheme and crossline data as compared to NOAA allowable uncertainty standards for the associated depths

H12913 Crossline Differencing NOAA Allowable Uncertainty

Total Nodes	Passed Nodes	Failed Nodes
58,704	58,631	113
Percentage Nodes Passed		99.808
Percentage Nodes Failed		0.192

Figure 8: Crossline surface statistics showing percentage of nodes meeting NOAA allowable uncertainty

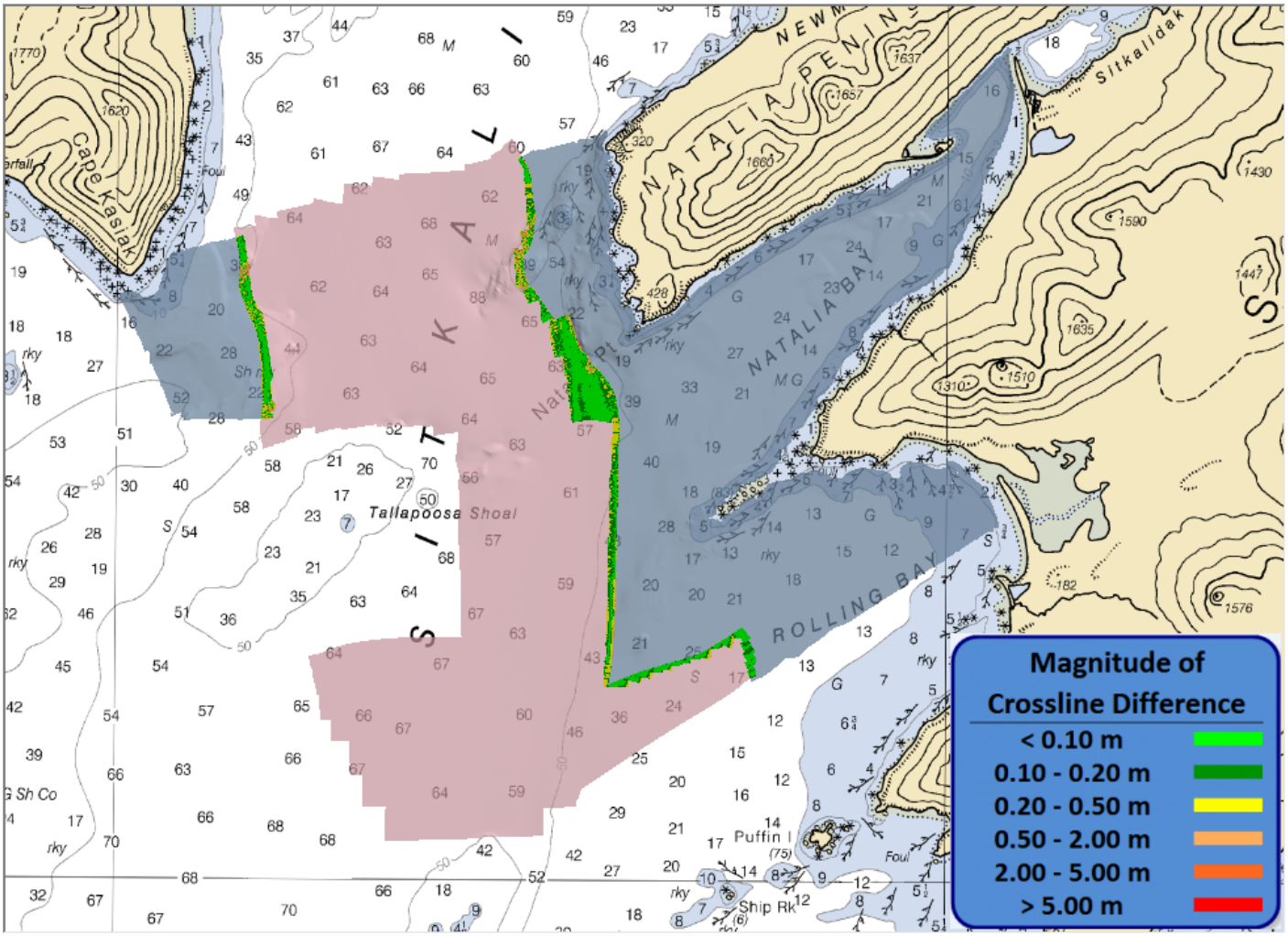
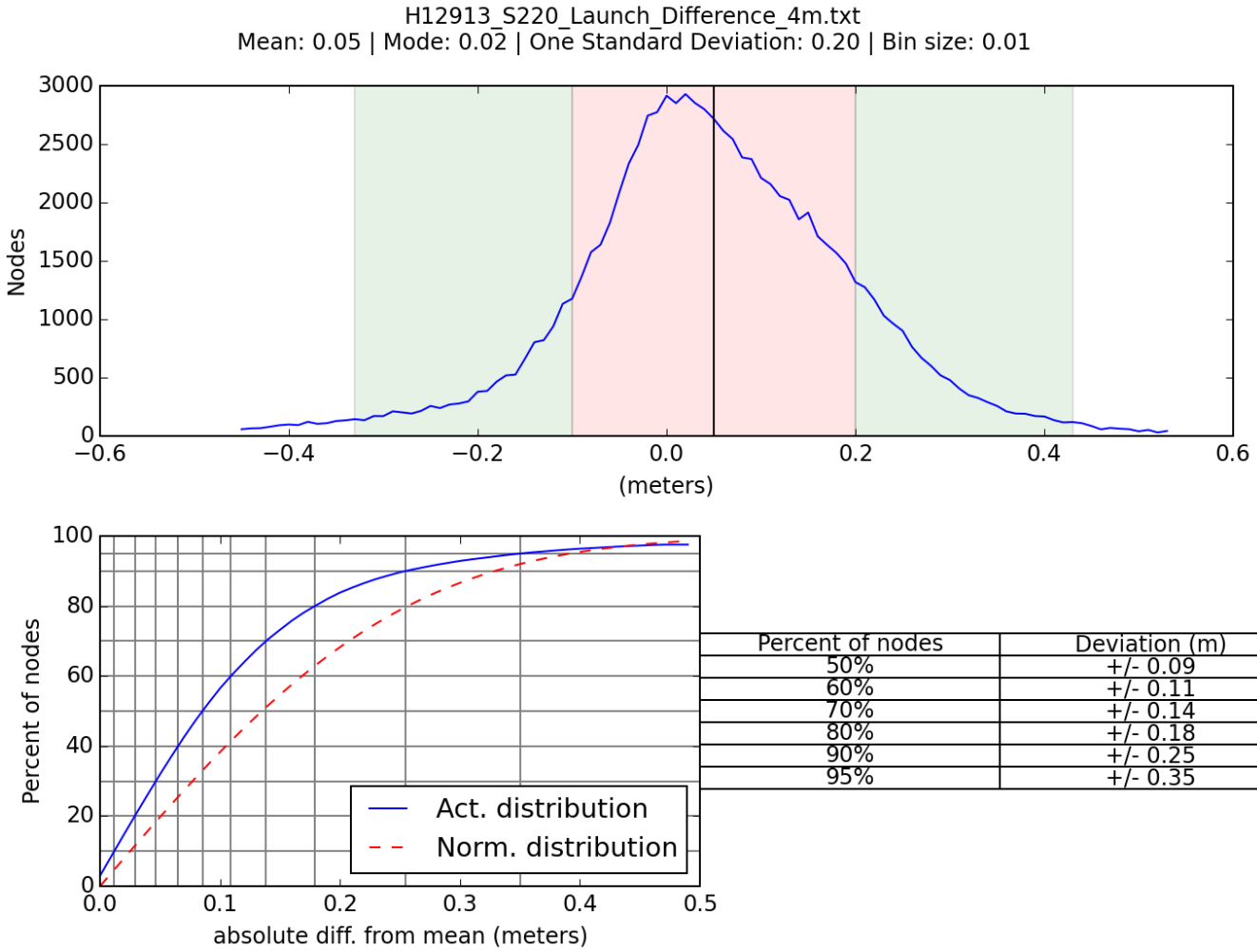


Figure 9: Difference surface between S220 (in pink) and survey launches (in blue)



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.11
70%	+/- 0.14
80%	+/- 0.18
90%	+/- 0.25
95%	+/- 0.35

Figure 10: H12913 S220 and survey launch difference statistics

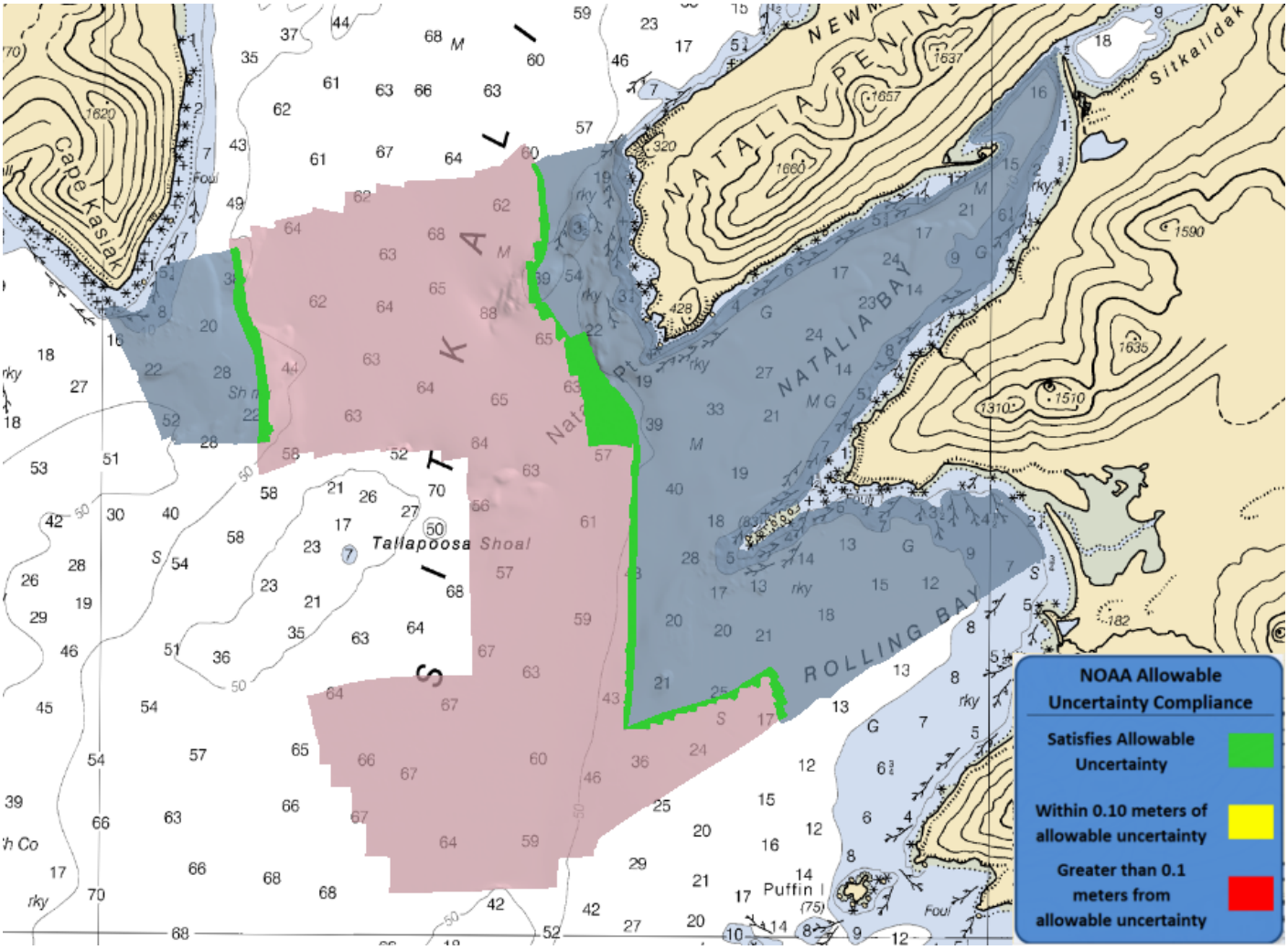


Figure 11: Depth differences between H12913 S220 and survey launch data as compared to NOAA allowable uncertainty standards for the associated depths

H12913 S220 and Launch Differencing NOAA Allowable Uncertainty

Total Nodes	Passed Nodes	Failed Nodes
91,389	91,287	102
Percentage Nodes Passed		99.888
Percentage Nodes Failed		0.112

Figure 12: Statistics showing percentage of nodes meeting NOAA allowable uncertainty for the S220 and survey launch difference surface

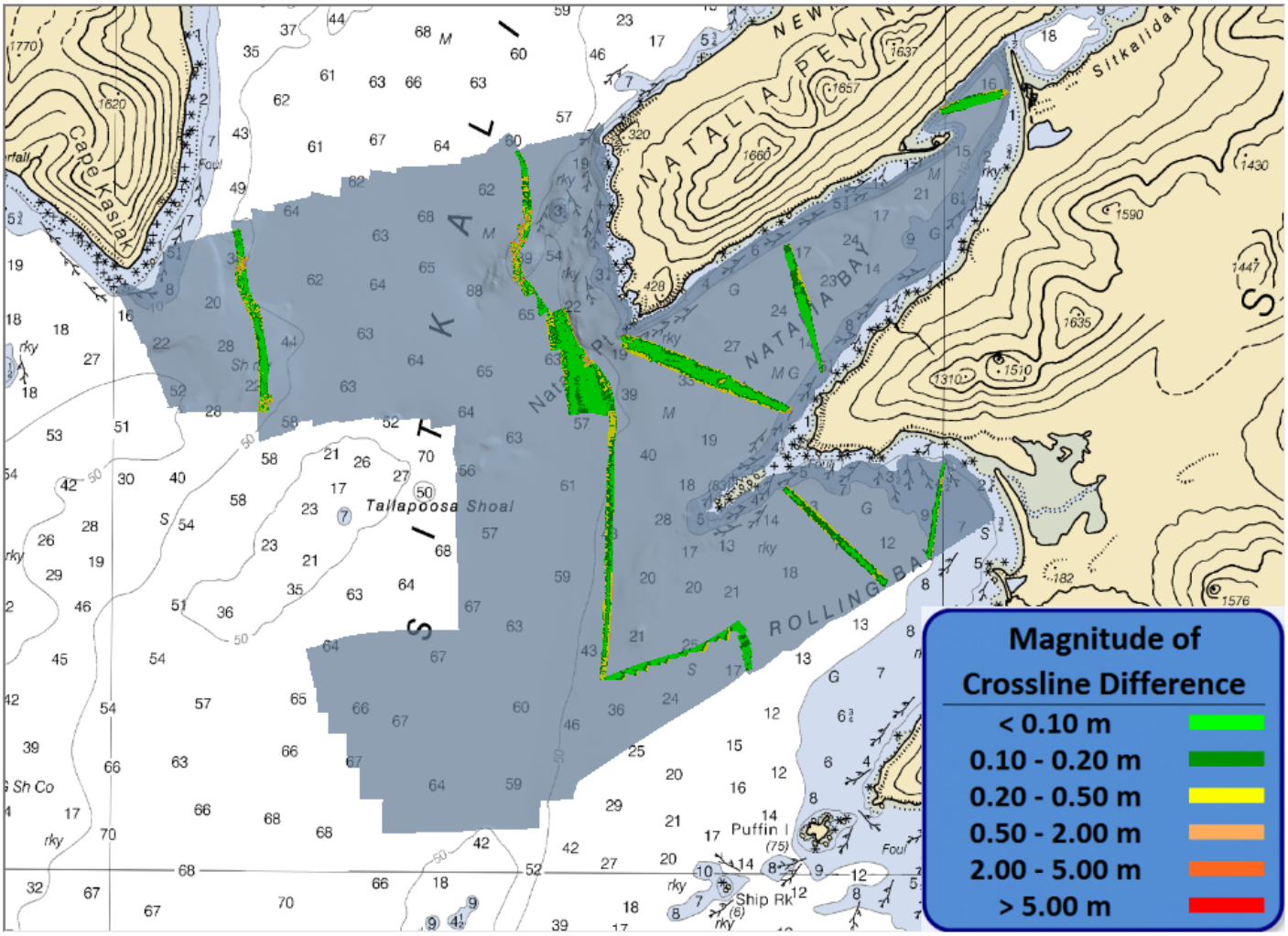


Figure 13: H12913 spatial overview of crossline comparison with additional quality control

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning	Method
0 meters	0 meters	TCARI
0 meters	0.02 meters	ERS via PMVD

Table 6: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
2805	2 meters/second	N/A meters/second	0.5 meters/second
2806	2 meters/second	N/A meters/second	0.5 meters/second
2807	2 meters/second	N/A meters/second	0.5 meters/second
2808	2 meters/second	N/A meters/second	0.5 meters/second
S220	N/A meters/second	1 meters/second	0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values.

In addition to the usual a priori estimates of uncertainty provided via device models for vessel motion and PMVD, real-time and post-processed uncertainty sources were incorporated into the depth estimates of survey H12913. Real-time uncertainties were provided via EM710 and Reson 7125 MBES data, Applanix Delayed Heave RMS, and TCARI tides. Following post-processing of vessel motion, real-time 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

H12913 junctions with one adjacent survey from this project, H12911, and one survey from a prior project, H11338, as shown in Figure 14. Data overlap between H12913 and each junctioning survey was achieved. These areas of overlap were reviewed in CARIS HIPS and SIPS through surface differencing to assess surface agreement. The multibeam data were also examined in CARIS Subset Editor for consistency and agreement. The junctions with H12913 meet the NOAA allowable uncertainty in their areas of overlap. For all junctions with H12913, a negative difference indicates H12913 was shoaler and a positive difference indicates H12913 was deeper than the junctioning survey.

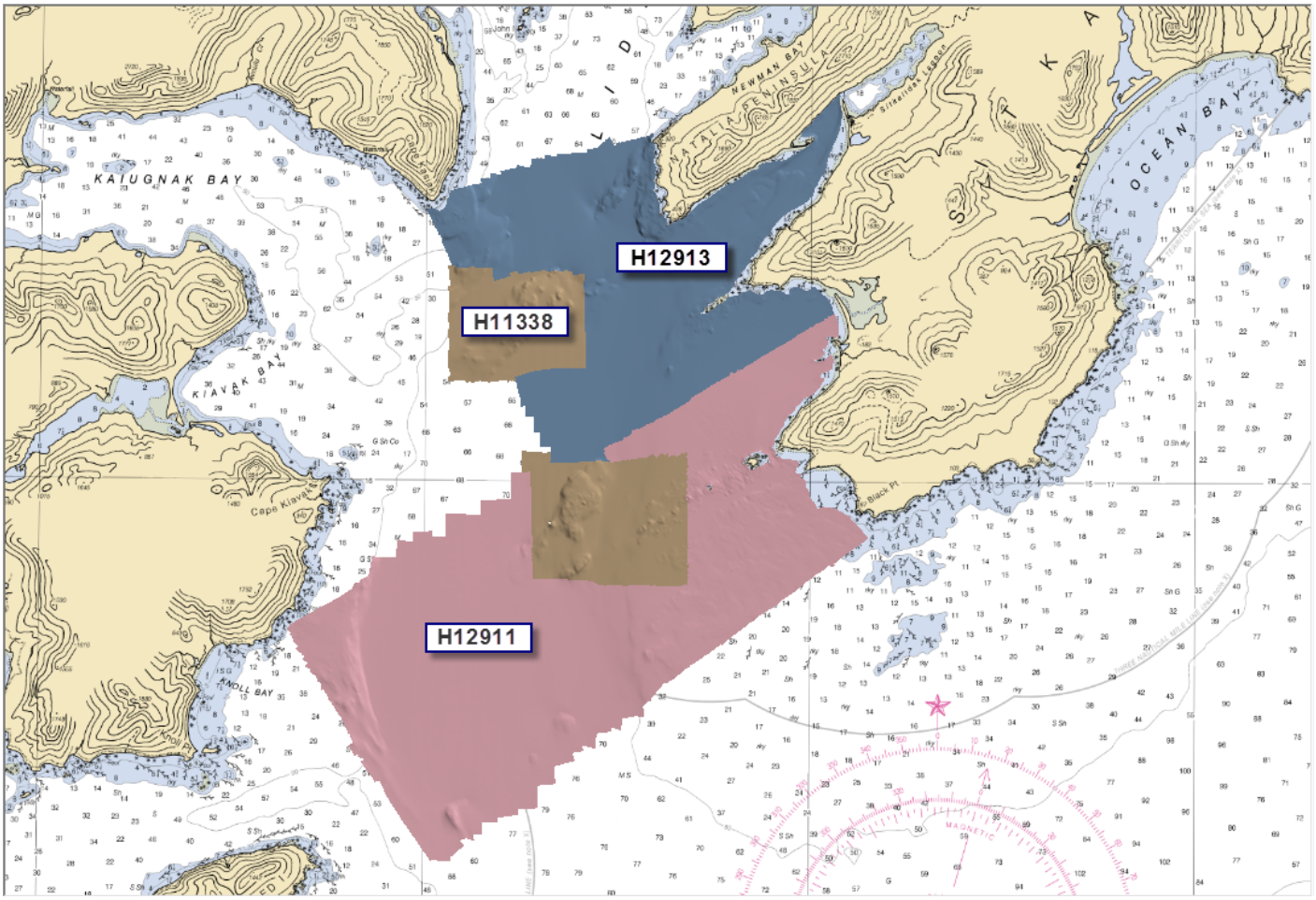


Figure 14: Overview of H12913 junction surveys

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12911	1:40000	2016	NOAA Ship FAIRWEATHER	S
H11338	1:10000	2004	NOAA Ship RAINIER	W

Table 8: Junctioning Surveys

H12911

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between H12913 and H12911. For comparison purposes, an 8 meter surface was generated for H12913 to match the resolution of the data provided from H12911. A detailed graphical overview can be seen in Figure 15. The statistical analysis of the difference surface shows a mean of -0.92 meters with 95% of all nodes having a maximum deviation of +/- 0.71 meters, as seen in Figure 16. In addition, a comparison surface was created between the

difference surface and the NOAA allowable uncertainty (Figure 17). It was found that 100% of nodes are within NOAA allowable uncertainty (Figure 18).

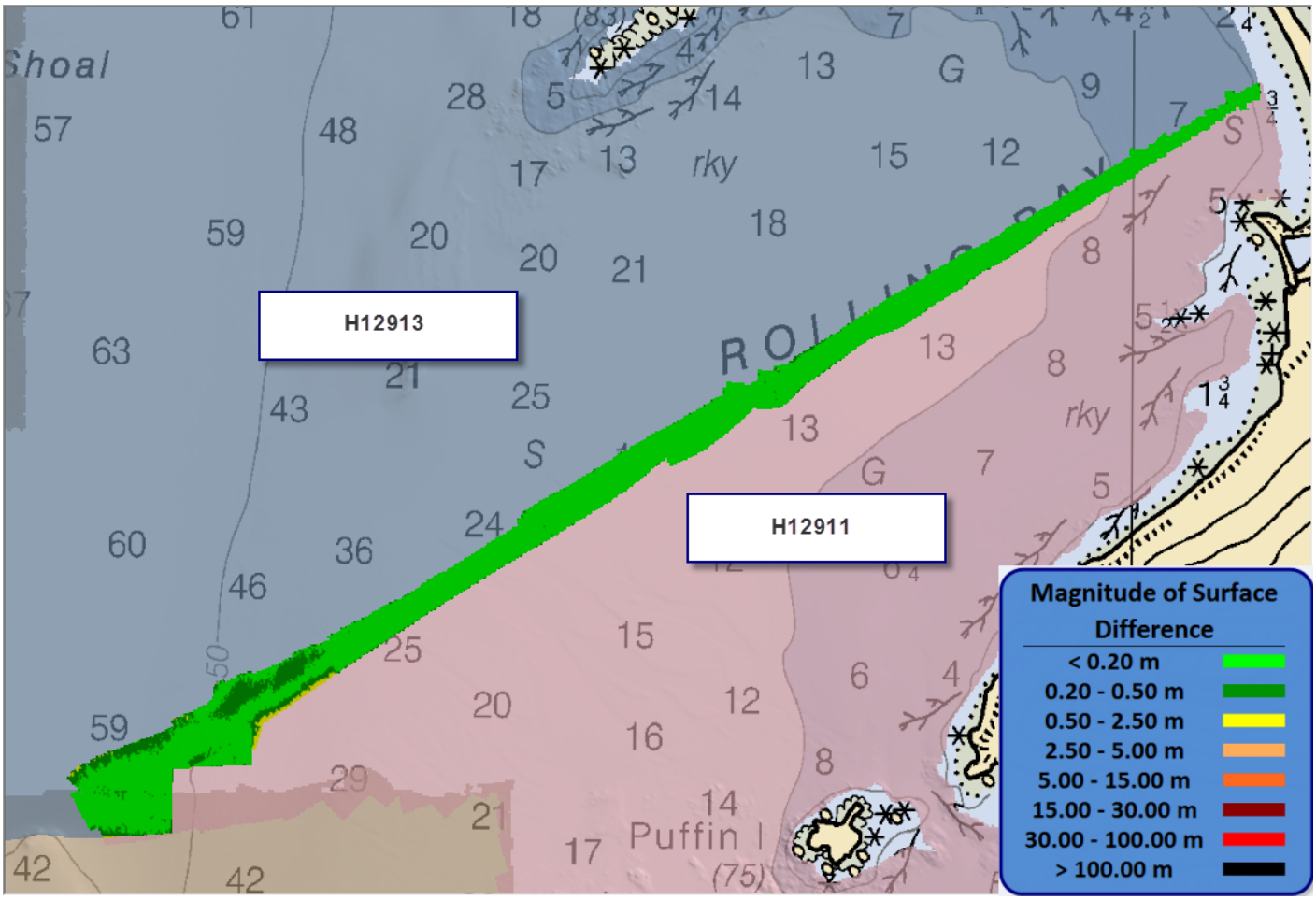
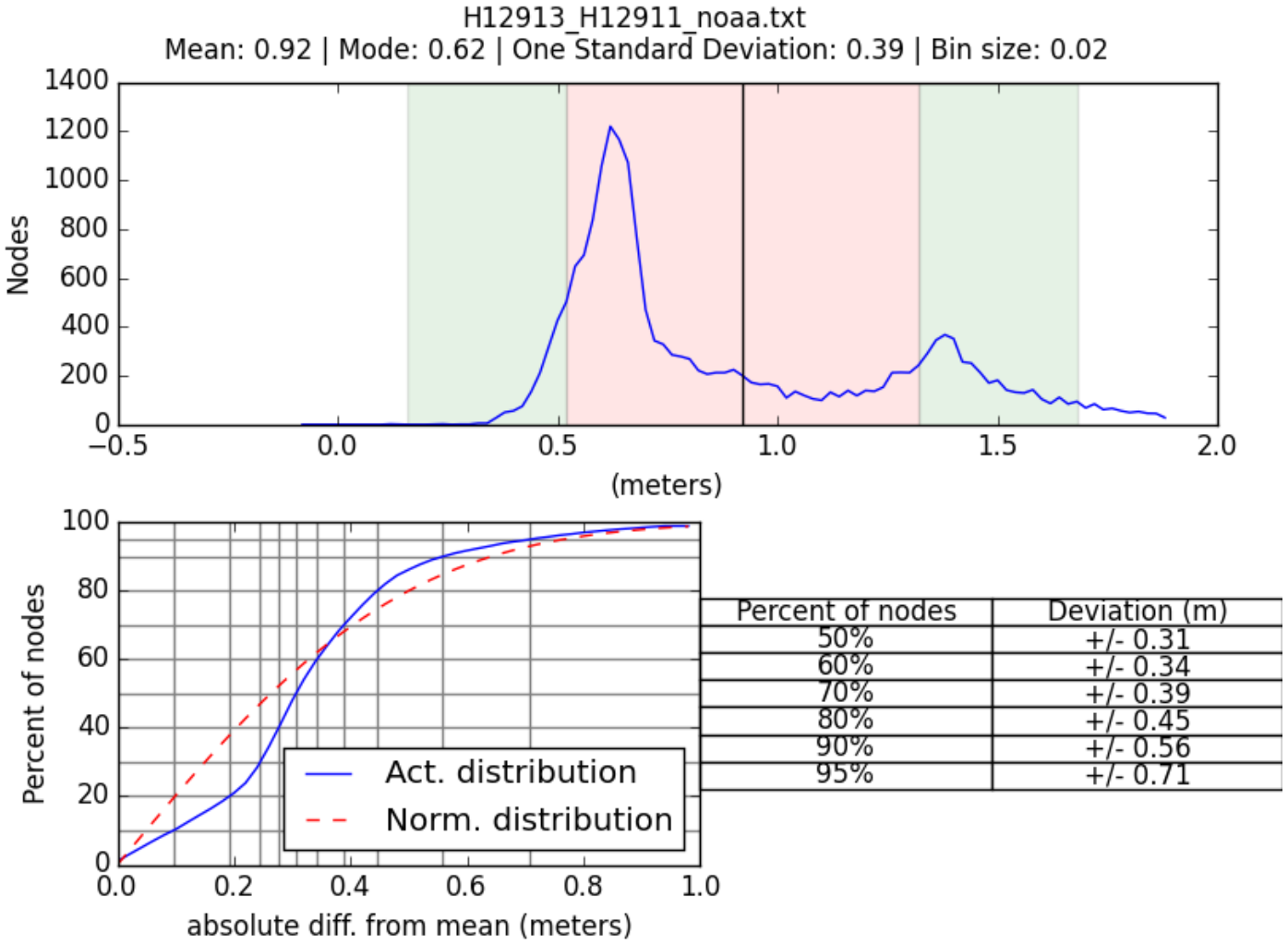


Figure 15: Difference surface between H12913 and H12911



Percent of nodes	Deviation (m)
50%	+/- 0.31
60%	+/- 0.34
70%	+/- 0.39
80%	+/- 0.45
90%	+/- 0.56
95%	+/- 0.71

Figure 16: Difference surface statistics between H12913 and H12911 (8 meter surface)

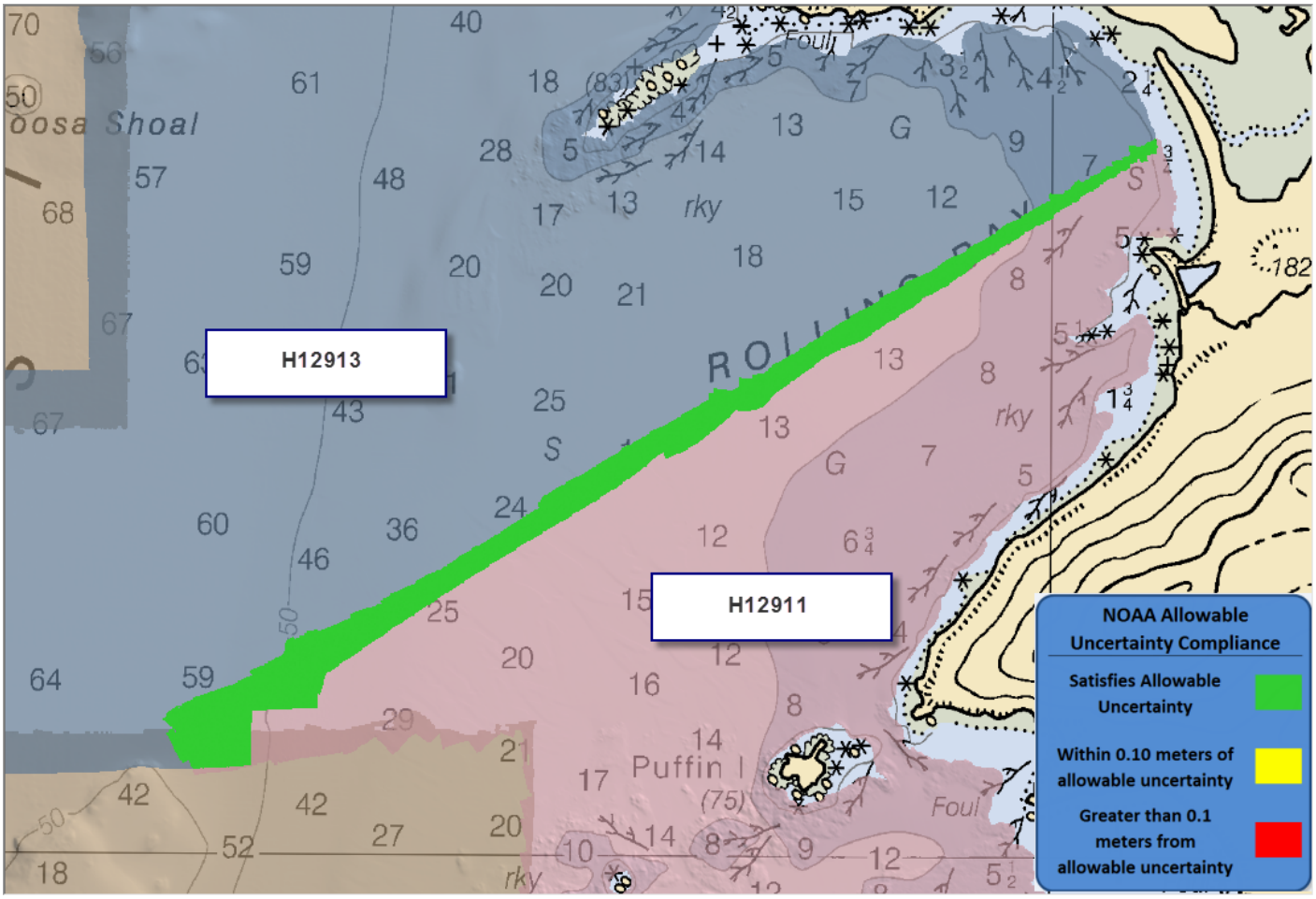


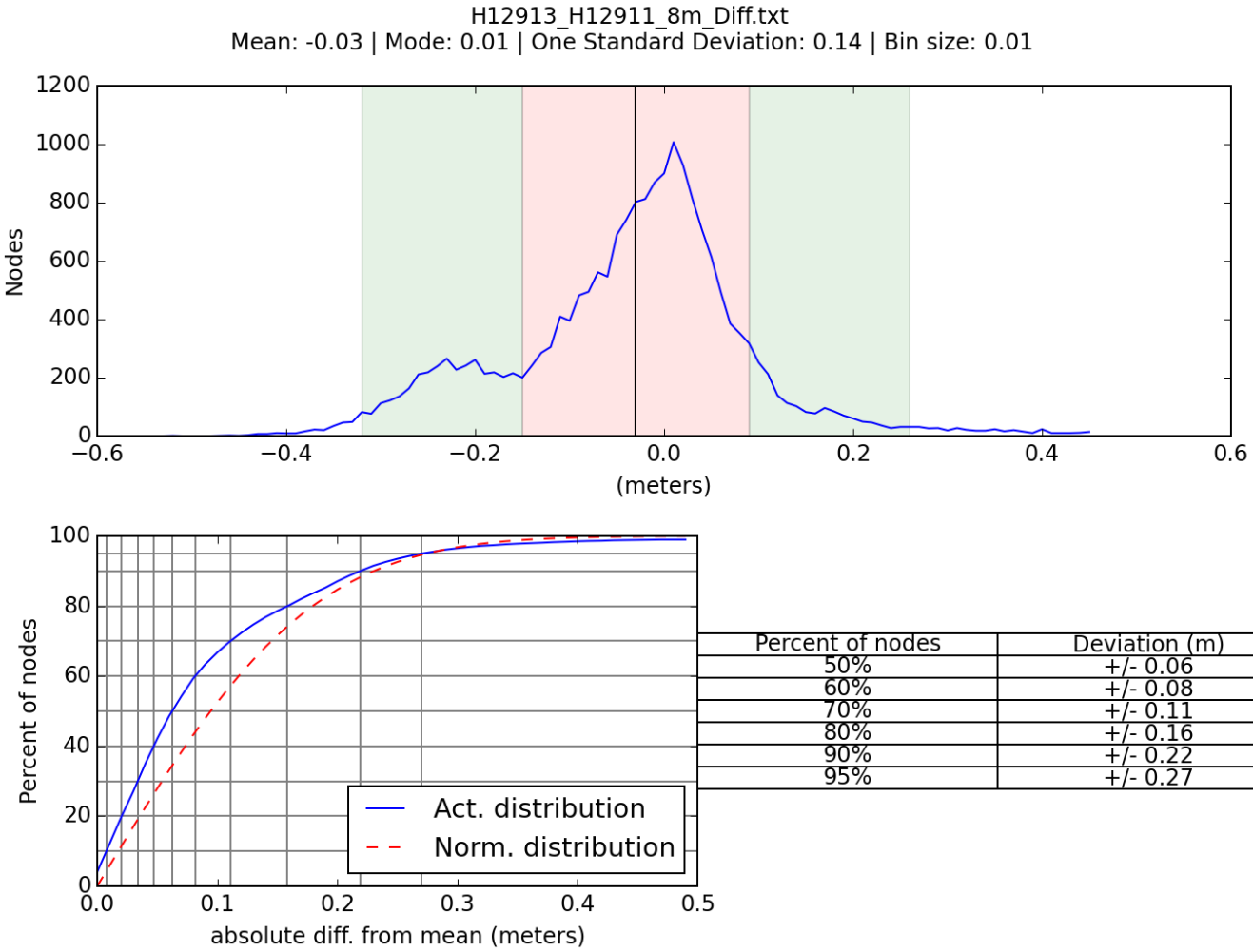
Figure 17: Difference surface compliance between H12913 and H12911 with regard to NOAA allowable uncertainty

H12913 Junction Differencing with H12911 NOAA Allowable Uncertainty

Total Nodes	Passed Nodes	Failed Nodes
19,773	19,773	0
Percentage Nodes Passed		100.00%
Percentage Nodes Failed		0.00%

Figure 18: Difference surface statistics between H12913 and H12911 showing percentage of nodes meeting NOAA allowable uncertainty

The graphical output in Figure 16 above is from the difference surface compared to the NOAA allowable uncertainty, it does not describe the differences between the two surfaces. The difference surface statistics between H12913 and H12911 are shown below. The mean difference between the two surfaces is -0.03 meters with 95% of all nodes having a maximum deviation of +/-0.27 meters.



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.08
70%	+/- 0.11
80%	+/- 0.16
90%	+/- 0.22
95%	+/- 0.27

Difference surface statistics between H12913 and H12911

H11338

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between H12913 and H11338 (Figure 19). For comparison purposes, a 10 meter surface was generated for H12913 to match the resolution of the data provided from H11338. For gridding at the 10 meter node size, the CUBE parameters remained the same as the defined NOAA resolutions with the exception that "Capture_Distance_Min" was adjusted to be (1/sqrt(2)) * 10 m = 7.07 m, as this is the only parameter which changes among the standard resolutions. The statistical analysis of the difference surface shows a mean of -0.20 meters with 95% of all nodes having a maximum deviation of +/- 0.82 meters, as seen in Figure 20. In addition, a comparison surface was created between the difference surface and the NOAA allowable uncertainty (Figure 21). It was found that 99.84% of nodes are within NOAA allowable uncertainty (Figure 22).

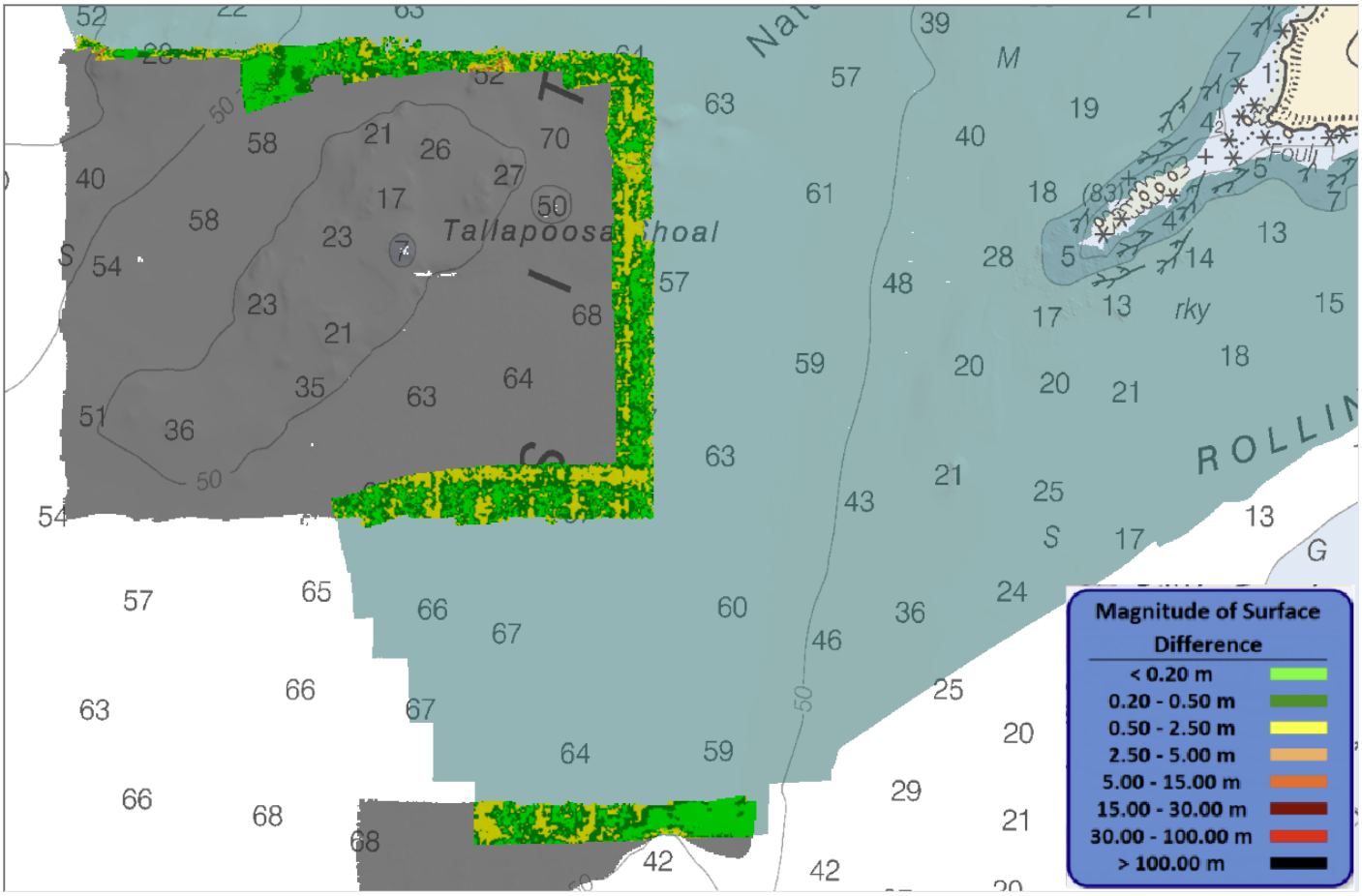
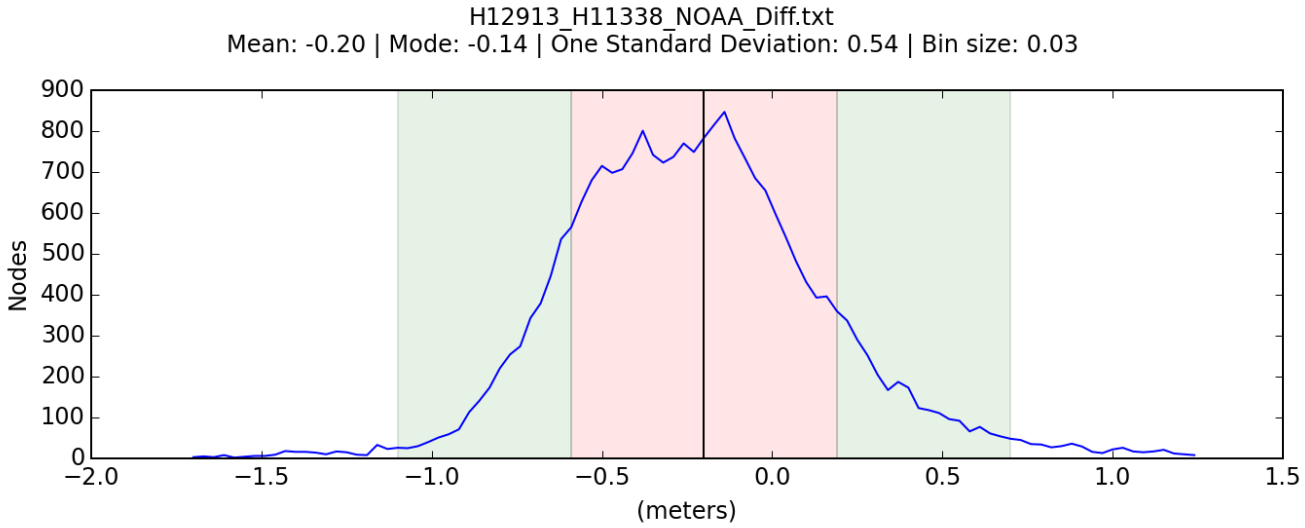
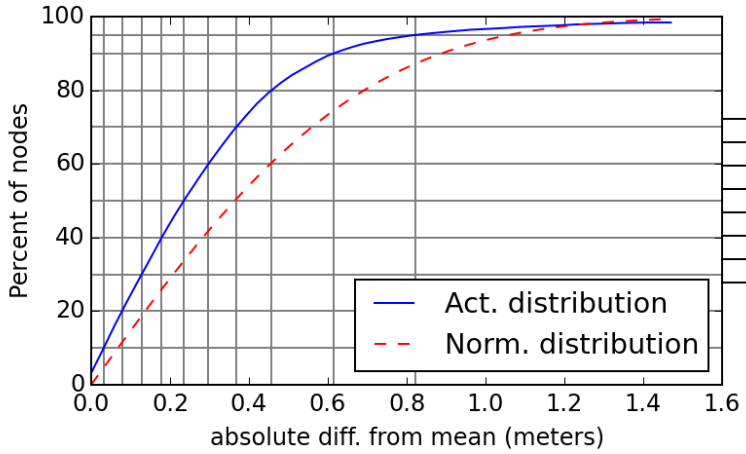


Figure 19: Difference surface between H12913 and H11338





Percent of nodes	Deviation (m)
50%	+/- 0.23
60%	+/- 0.30
70%	+/- 0.37
80%	+/- 0.46
90%	+/- 0.61
95%	+/- 0.82

Figure 20: Difference surface statistics between H12913 and H11338 (10 meter surface)

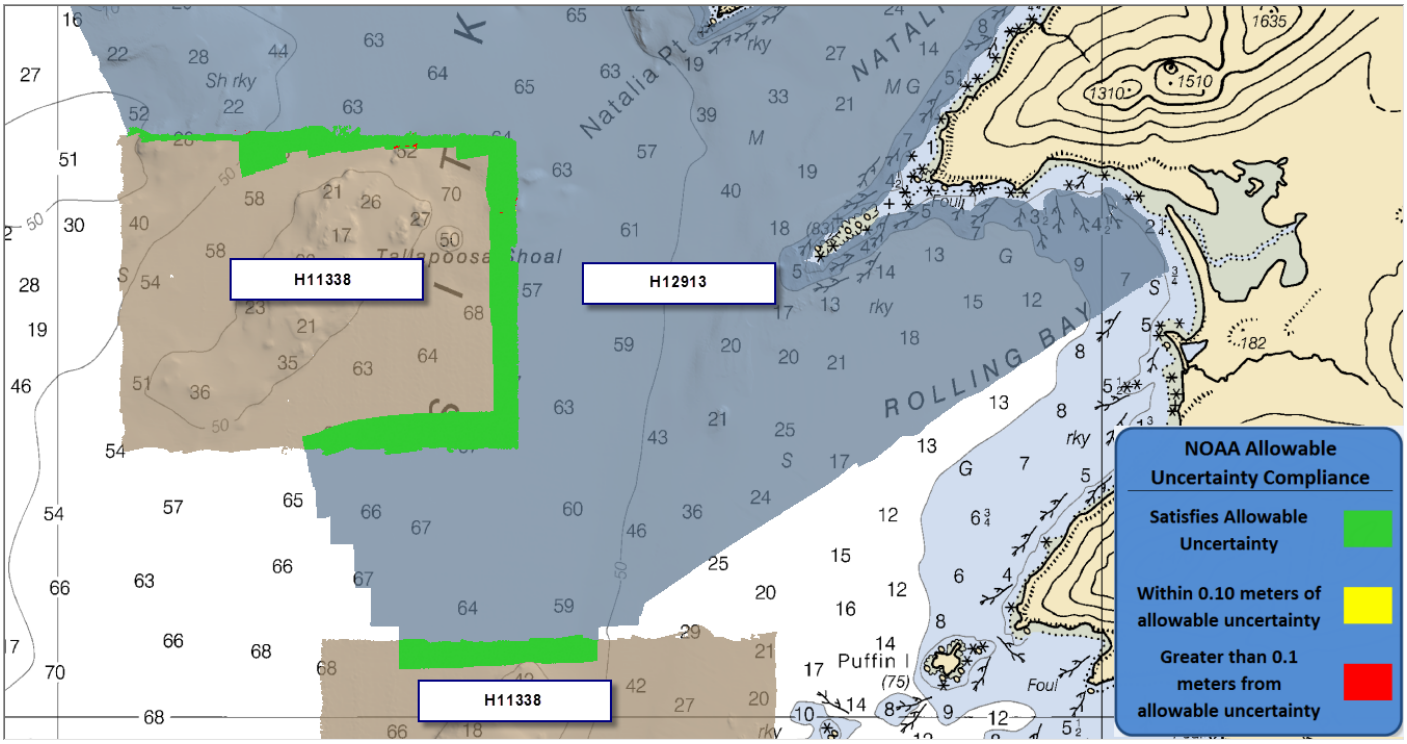


Figure 21: Difference surface compliance between H12913 and H11338 with regard to NOAA allowable uncertainty

H12913 Junction Differencing with H11338 NOAA Allowable Uncertainty

Total Nodes	Passed Nodes	Failed Nodes
24,412	24,372	40
Percentage Nodes Passed		99.84%
Percentage Nodes Failed		0.16%

Figure 22: Difference surface statistics between H12913 and H11338 showing percentage of nodes meeting NOAA allowable uncertainty

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

Sea Grass and Kelp

Kelp and sea grass were present throughout the survey area and at times, indistinguishable from the seafloor (Figure 23). In areas where they were distinguishable, the soundings on the vegetation were rejected to enable more accurate representation of the true seafloor. Where vegetation was indistinguishable all soundings were retained. Furthermore, in some areas patches of dense kelp prohibited safe navigation of the survey vessels. The limits of these areas were then used to define the NALL (Figure 24). Documentation can be found in the vessel boat sheets, which are located in the Separates I Digital Data folder.

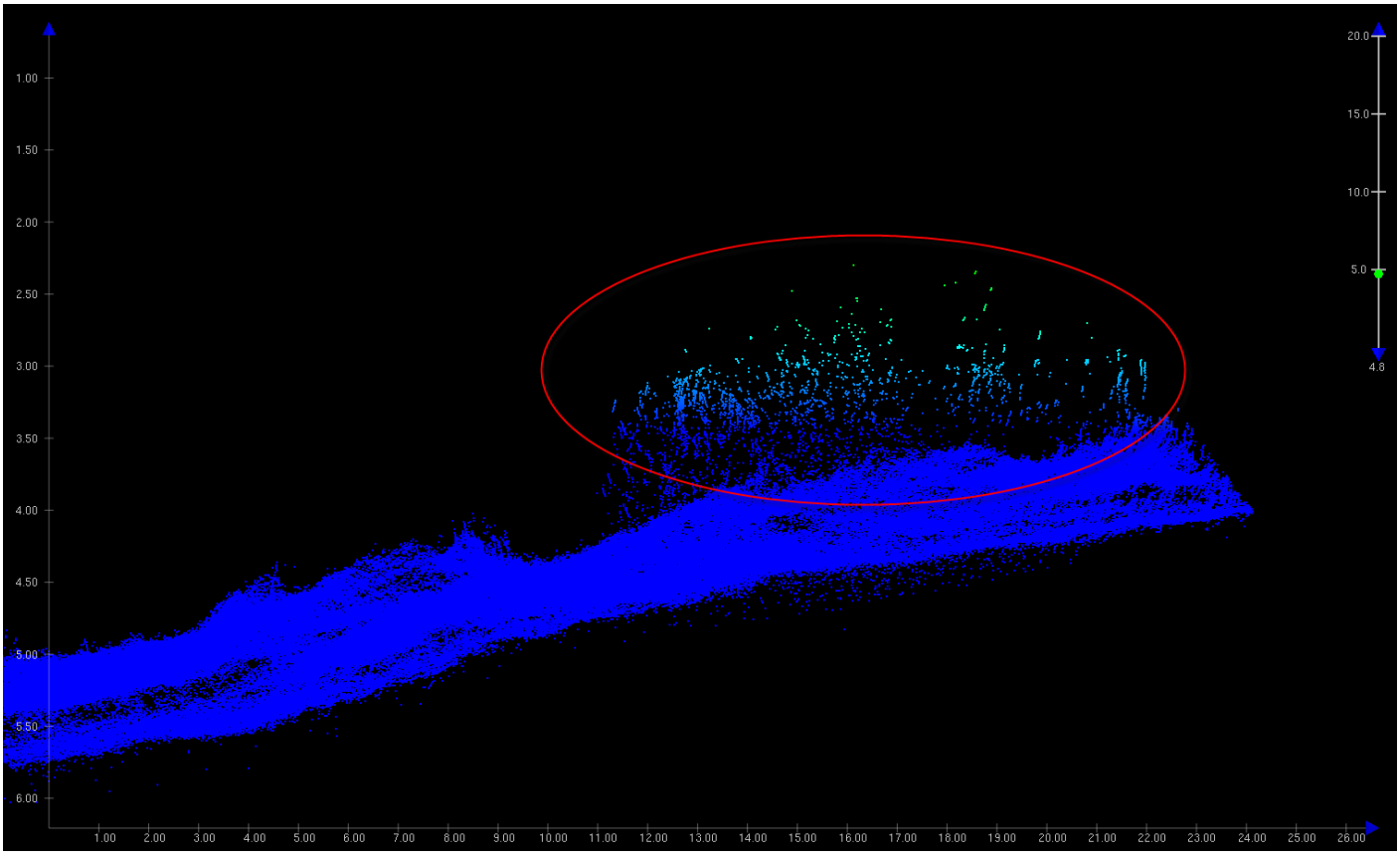


Figure 23: H12913 area where seagrass affected soundings

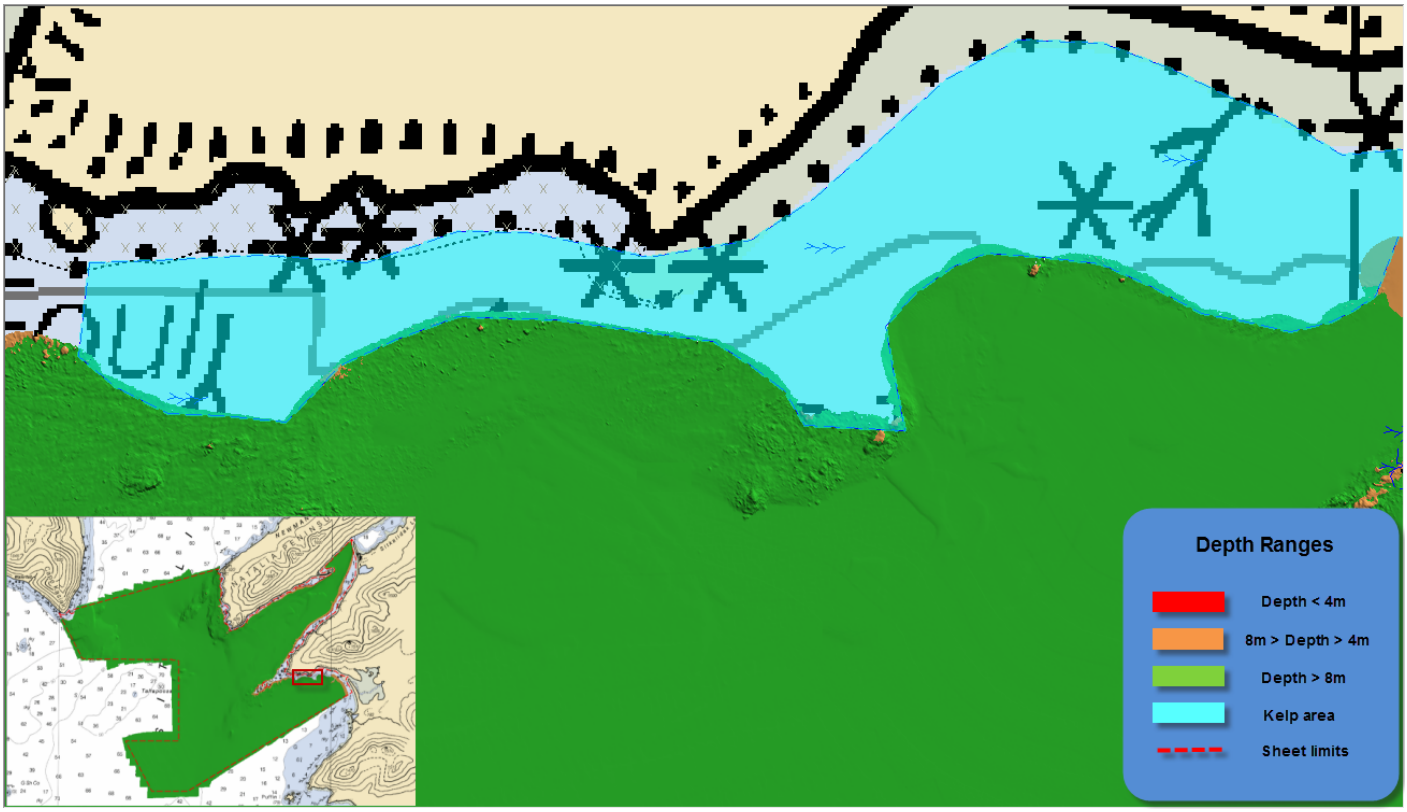


Figure 24: H12913 area where kelp redefined the NALL

Sound Speed

Throughout the survey area of H12913 there are instances of minor vertical offsets that appear to be due to changes in sound speed. These offsets are found primarily in the southern portion of the survey, highlighted in Figure 25, and are generally due to the swath bending downwards, or "frowning." Examination in Subset Editor in CARIS HIPS and SIPS showed the magnitude of these offsets to be within the HSSD specifications for sound speed uncertainty for their respective depths, with a negligible impact on the Finalized CUBE surface. See Figure 26 for a graphical representation of sound speed influence.

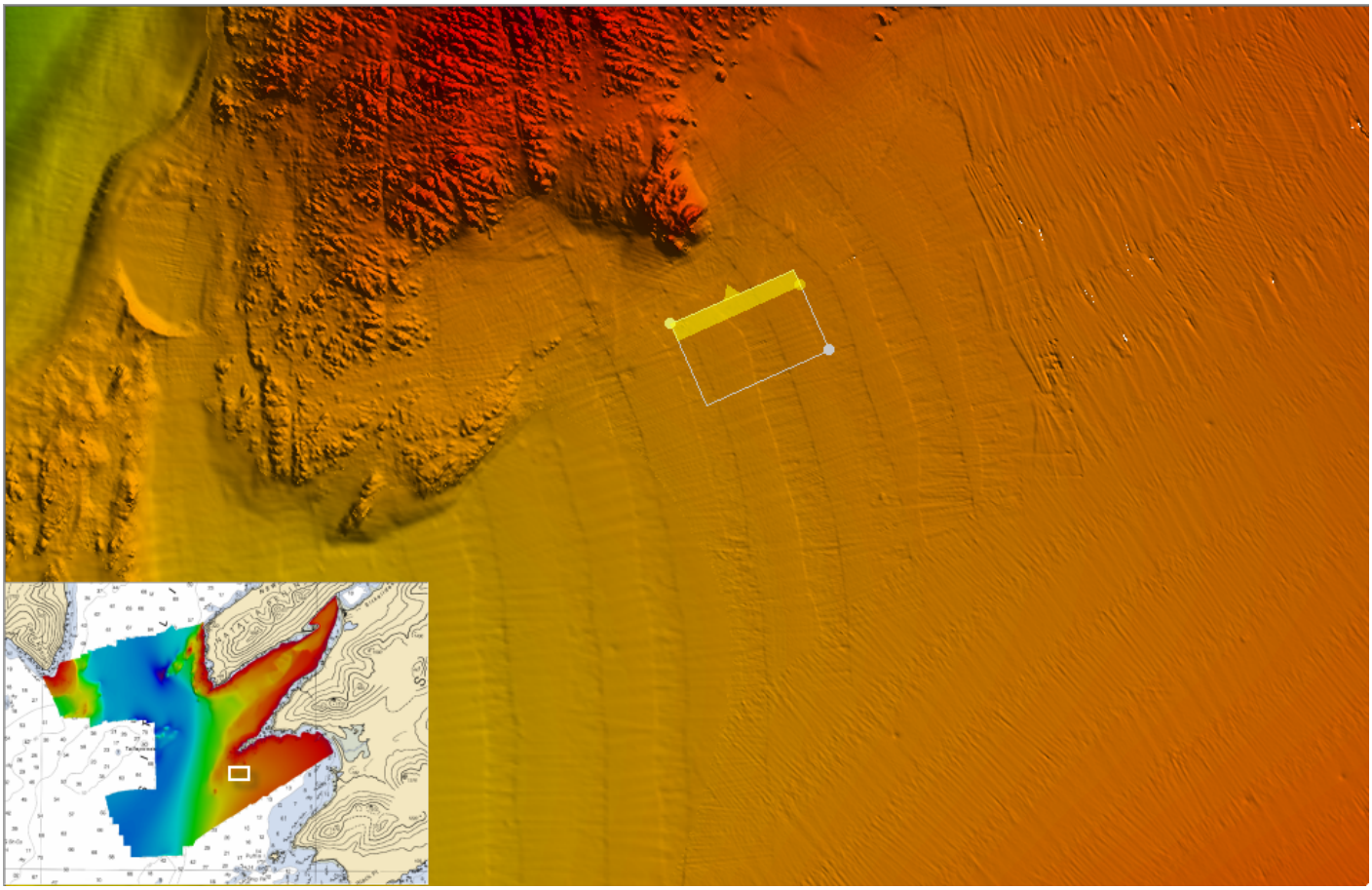


Figure 25: H12913 area of vertical offsets due to sound speed influence (10x vertical exaggeration)

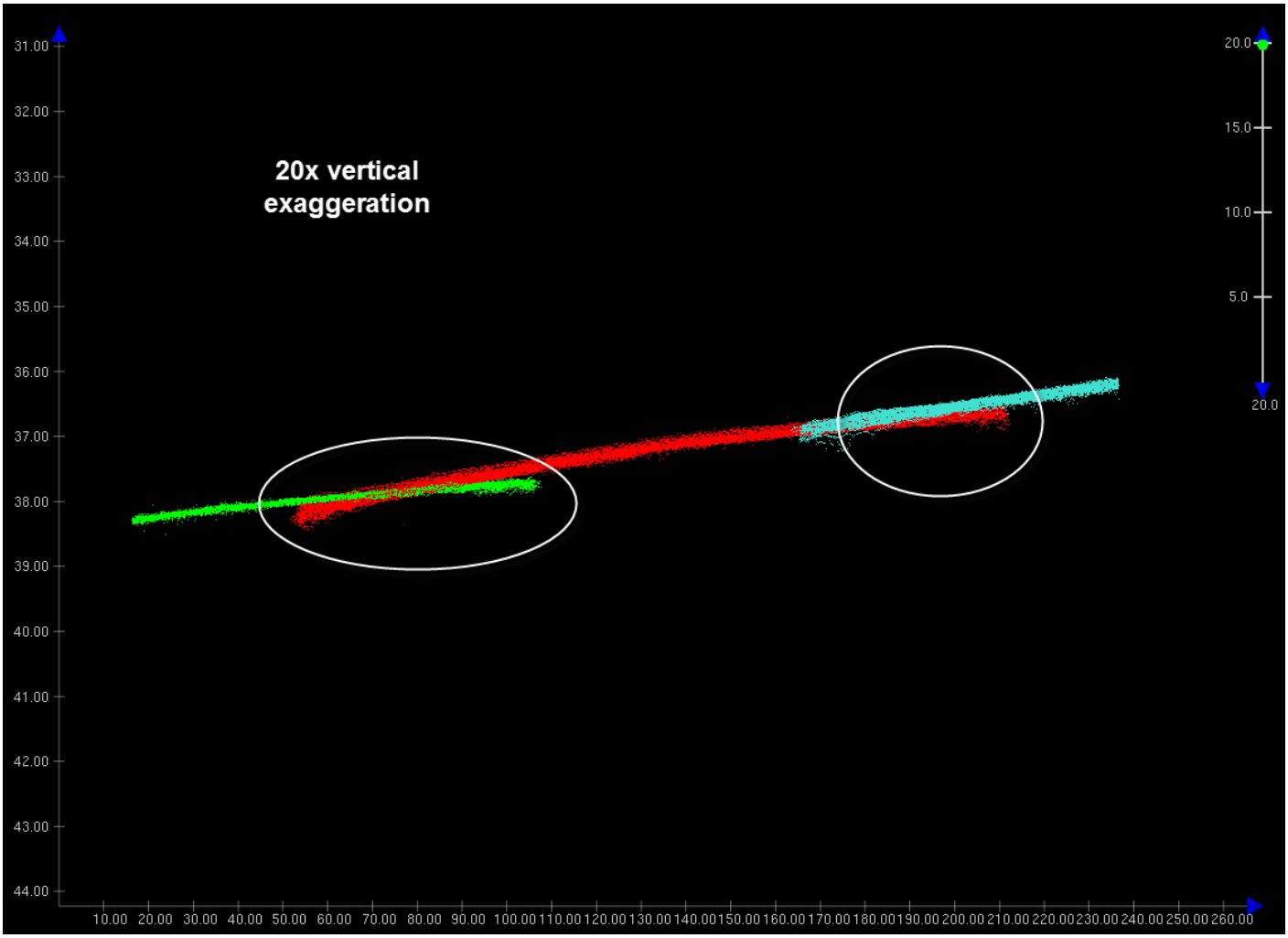


Figure 26: H12913 subset of data "frowning" due to sound speed issues

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 often in areas where the influx of freshwater had an effect on the speed of sound in the water column, and when there was a change in surface sound speed greater than two meters per second. MVP casts on S220 were conducted at an average interval of 32 minutes as recommended by Pydro's CastTime software, which determines optimum cast frequency based on the observed sound speed variations from previous casts. 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

H12913 data were reviewed in CARIS HIPS and SIPS for holidays in accordance with Section 5.2.2.3 of the HSSD. One holiday that meets the 3 by 3 node definition was identified via Pydro QC Tools Holiday Finder tool. This tool automatically scans finalized surfaces for holidays as defined in the HSSD, and was run in conjunction with a visual inspection of all surfaces by the Hydrographer. The holiday is due to acoustic shadowing from a rock in a downward sloping area as seen in Figure 27. This shadow is the result of a lack of coverage on the "back" side of the rock due to a rapid rise and successive drop in the sea floor in conjunction with poor geometry from the sonar head. The area was investigated in CARIS Subset Editor to verify that least depth was found (Figure 28).

Although numerous apparent holidays were flagged by Holiday Finder, all others not previously addressed were examined and determined to be either outside of the sheet limits (Figure 29), or areas where an adjoining finalized surface covered the gap. An example of an apparent holiday in the 4 meter finalized surface due to the area being shoaler than the depth range for the 4 meter surface and therefore covered by the 2 meter finalized surface is shown in Figure 30.

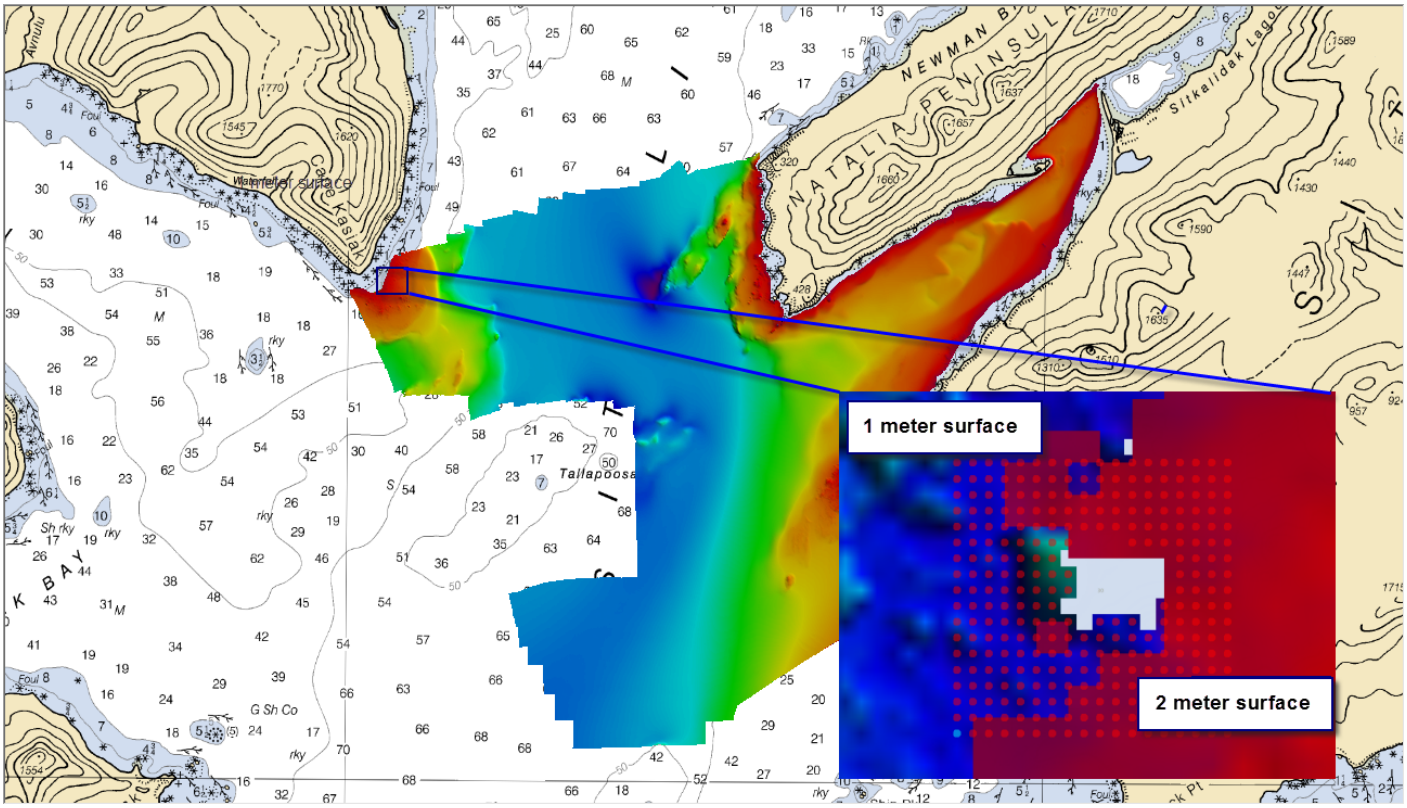


Figure 27: H12913 holiday due to acoustic shadowing

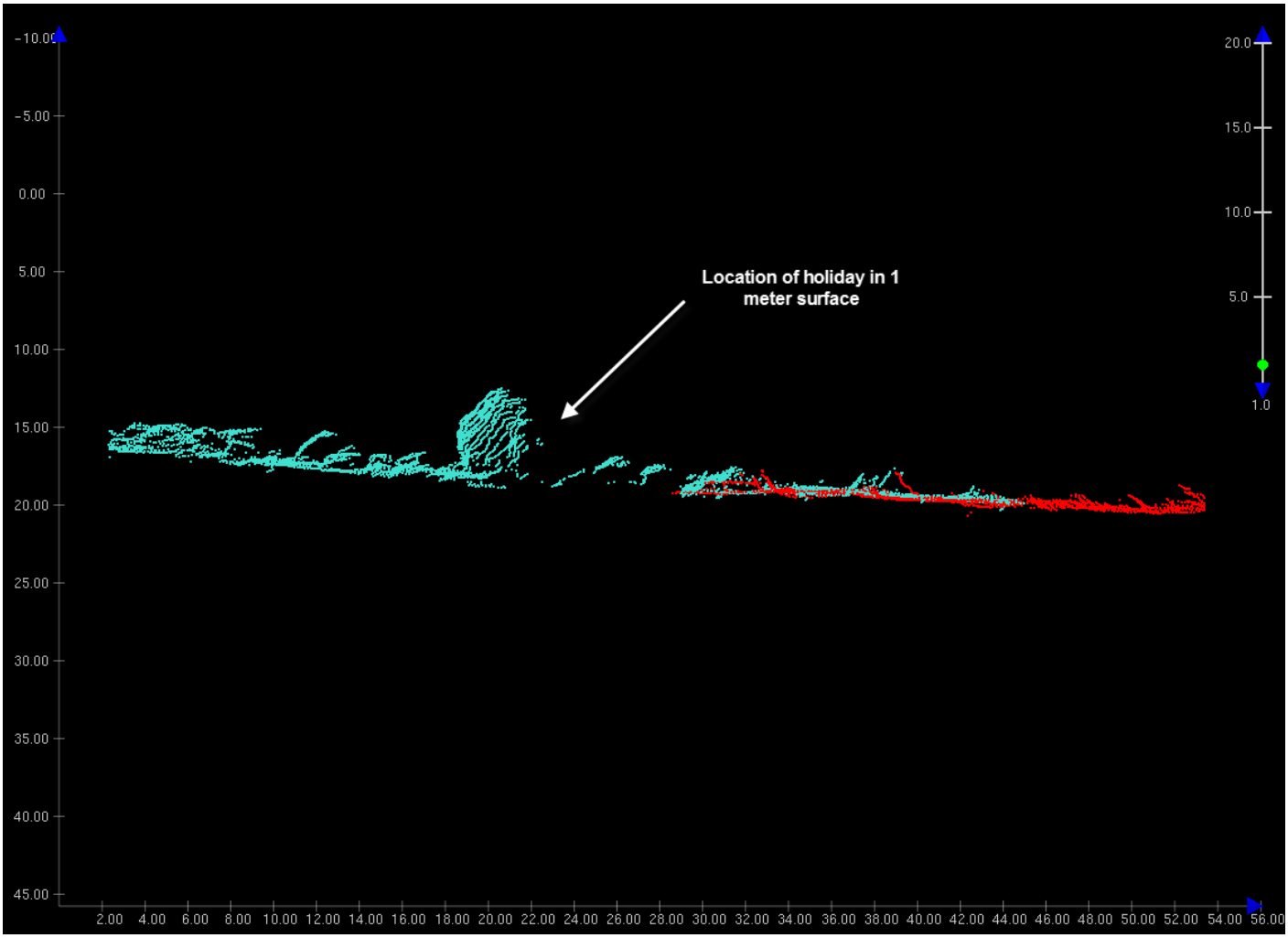


Figure 28: Acoustic shadow holiday viewed in CARIS HIPS and SIPS Subset Editor

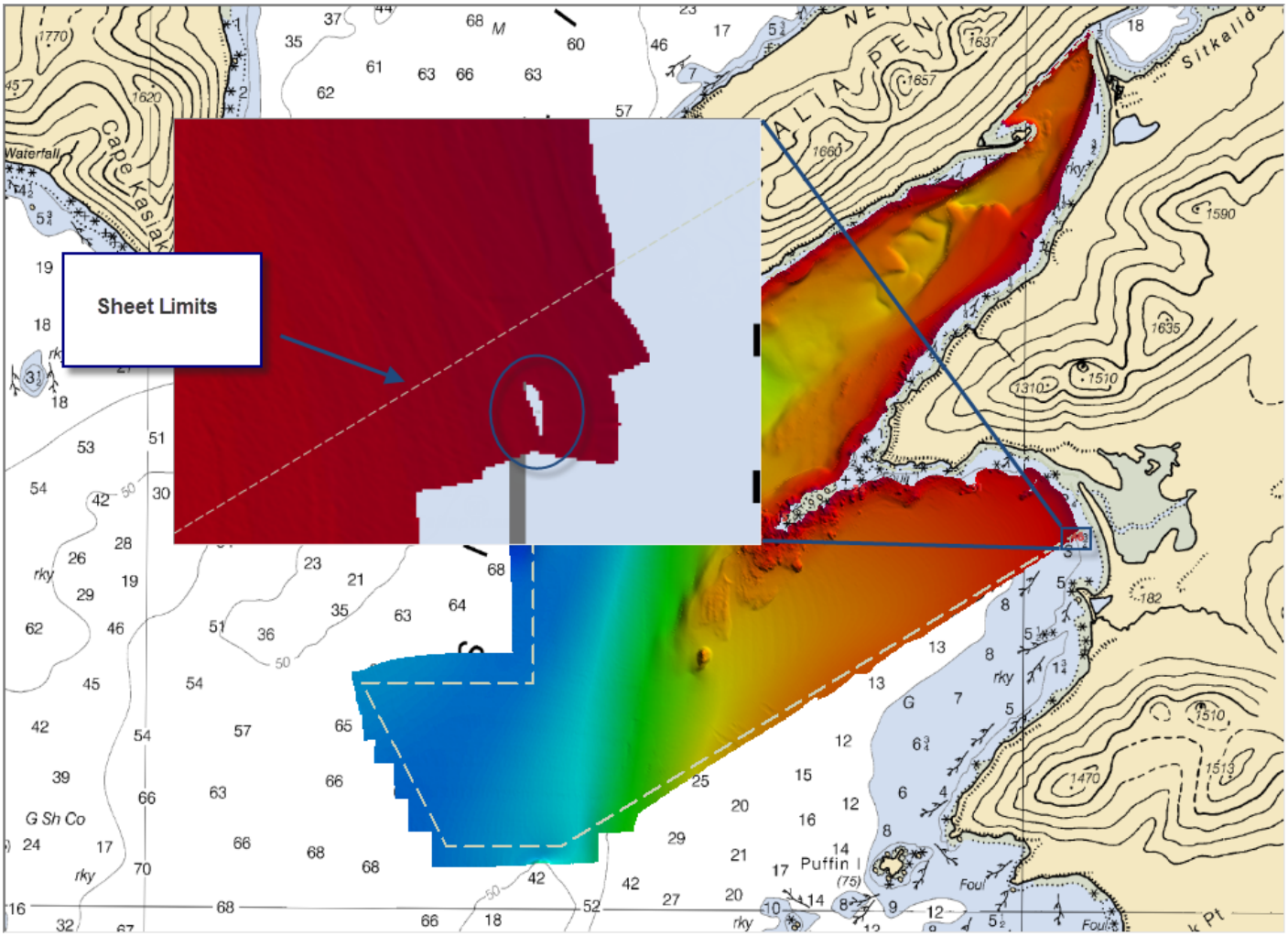


Figure 29: H12913 apparent holiday outside of the sheet limits

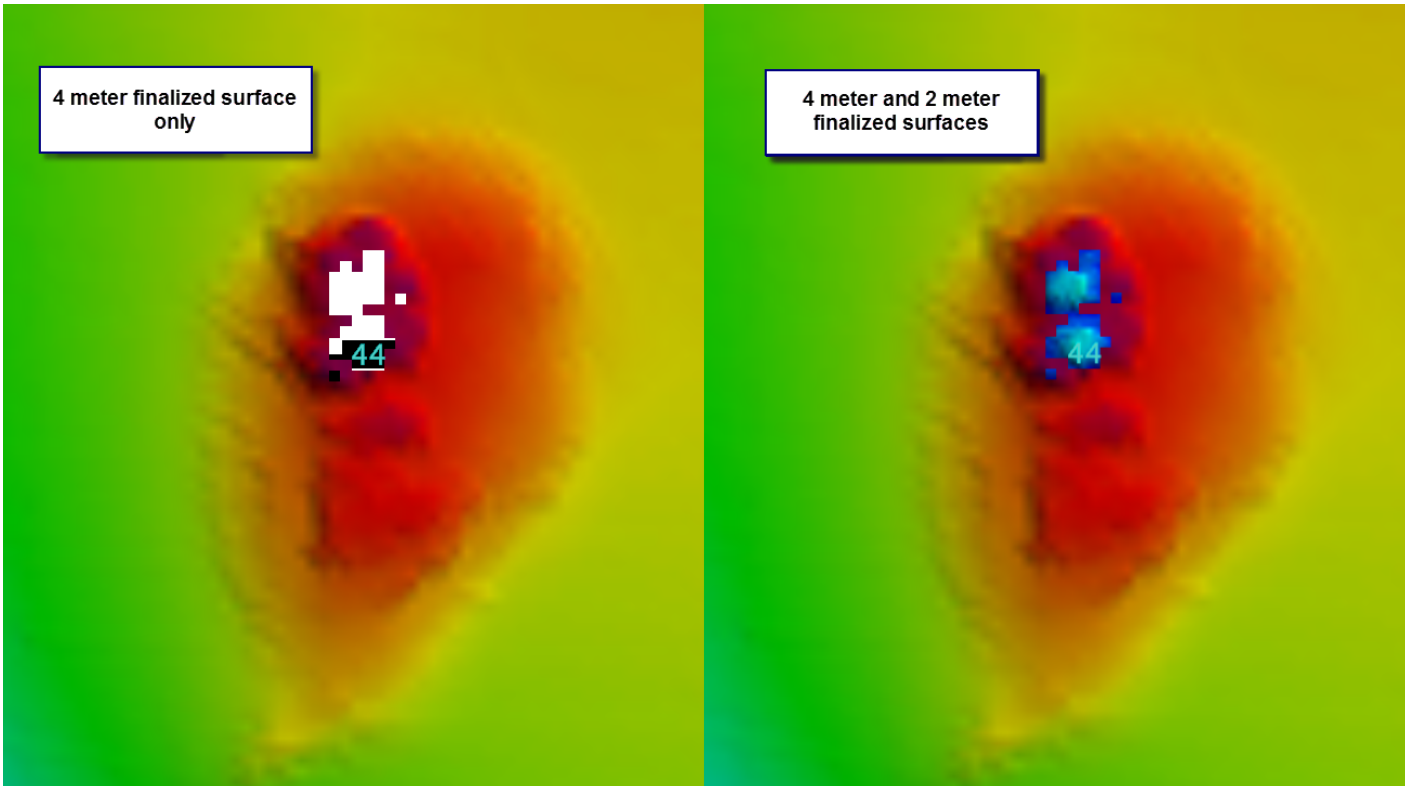
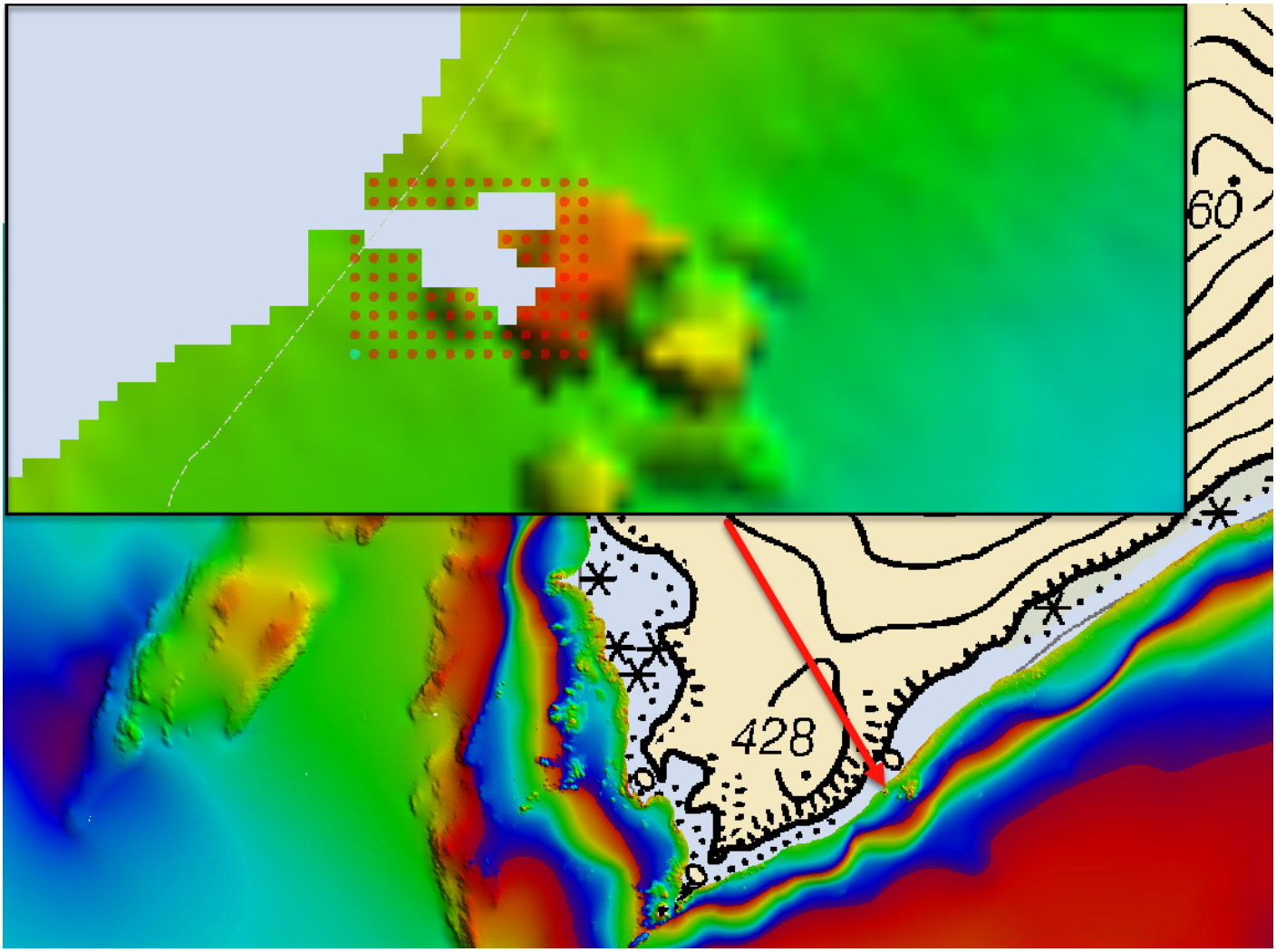


Figure 30: Example of an apparent holiday covered by an adjacent finalized surface

One additional holiday exists in the 1-meter surface due to acoustic shadowing and is located on the northwest side of Natalia Bay.



Holiday due to acoustic shadowing in Natalia Bay

B.2.10 NOAA Allowable Uncertainty

To verify that all data meet the accuracy specifications as stated in HSSD Section 5.1.3, a child layer titled "NOAA_Allowable_1" was created for each of the 1 meter, 2 meter, and 4 meter (36-100 meters) surfaces, and "NOAA_Allowable_2" for the 4 meter (100-170 meters) surface using the equations stated in Section C. 2.1 of the DAPR. These surfaces were then analyzed using the Pydro QC Tools Grid QA feature to determine what percentage of each surface meets specifications. Figure 31 shows an overview of the NOAA Allowable Uncertainty layers for all surfaces. Figure 32 shows the corresponding statistics for each individual surface.

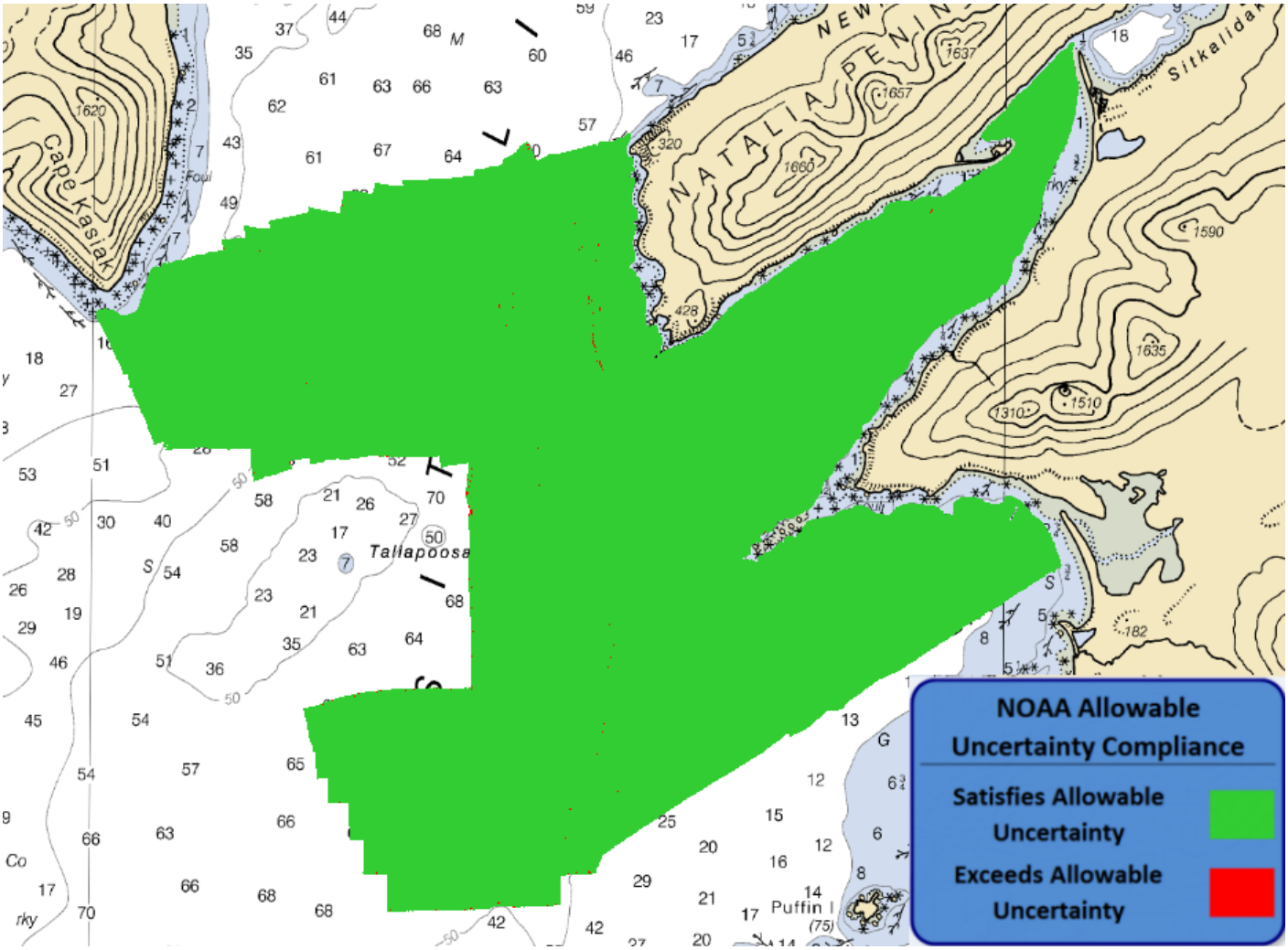


Figure 31: H12913 NOAA Allowable Uncertainty overview

H12913 NOAA Allowable Uncertainty

	Total Nodes	Passed Nodes	Percent Pass
1m	4,121,182	4,117,257	99.90%
2m	2,581,708	2,580,097	99.94%
4m	2,265,748	2,264,176	99.93%
	Total Nodes		8,968,638
	Total Nodes Pass		8,961,530
	Total Percent Pass		99.92%

Figure 32: H12913 NOAA Allowable Uncertainty Statistics

B.2.11 Density

Finalized surfaces were analyzed via the Pydro QC Tools Grid QA feature, and the results are shown in Figure 33 below. Density requirements for H12913 were achieved with at least 99.86% of finalized surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3. The few nodes that did not meet density requirements are due to sparse data in the outer beams, especially near steep slopes and rocky areas where acoustic shadowing occurred, and at the edges of the survey limits as visualized in Figure 34. For individual graphs (per surface) of density requirements, see the Standards and Compliance Review located in Appendix II.

Graphs are attached.

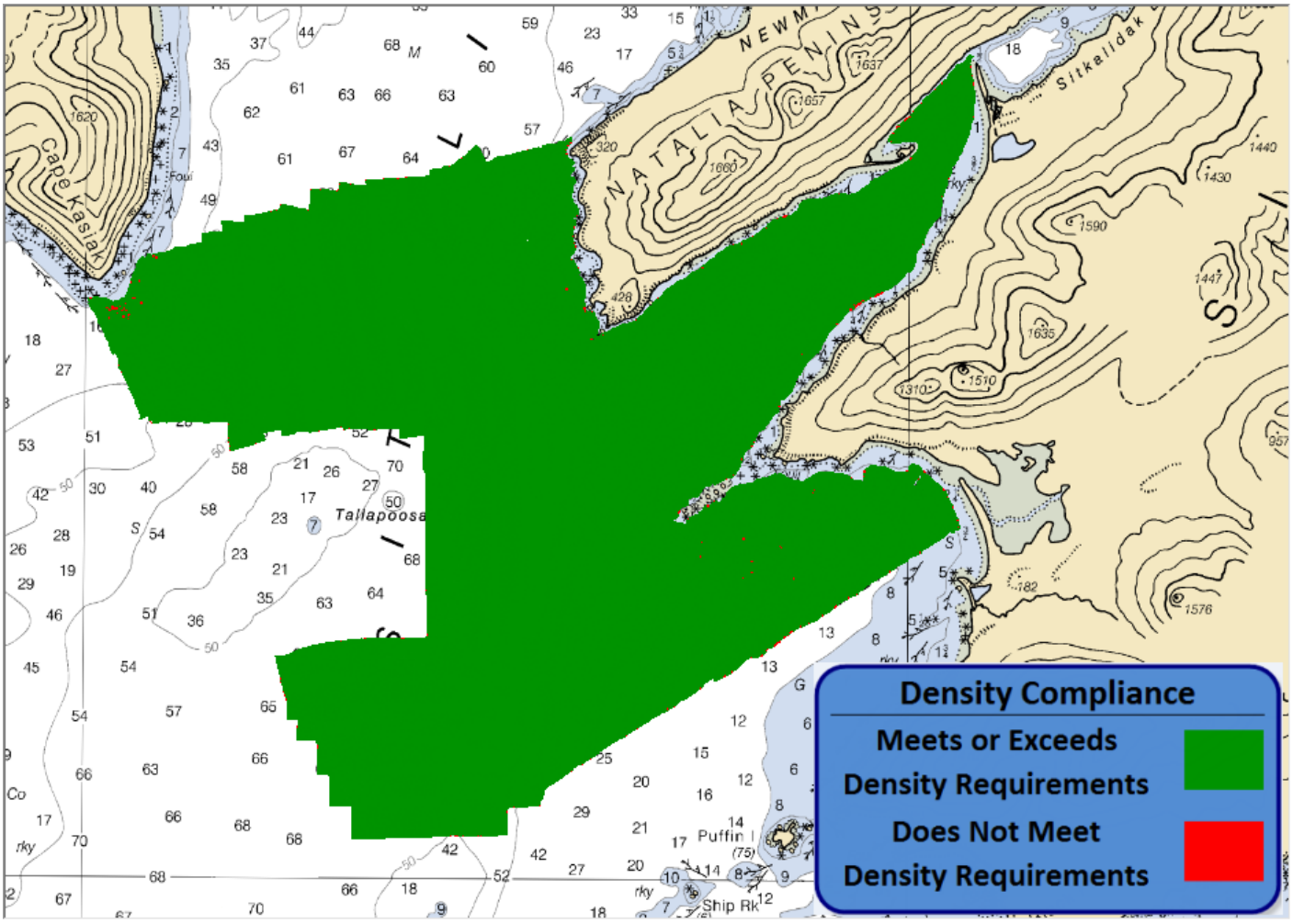


Figure 33: H12913 density overview

H12913 Density Statistics

	Total Nodes	Passed Nodes	Percent Pass
1m	4,121,182	4,115,289	99.86%
2m	2,581,708	2,581,104	99.98%
4m	2,265,748	2,263,470	99.90%
	Total Nodes		8,968,638
	Total Nodes Pass		8,959,863
	Total Percent Pass		99.90%

Figure 34: H12913 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 logged as .7k files for Reson 7125 data. The Kongsberg EM710 stores the backscatter data in the .all file. The data have been sent to the Pacific Hydrographic Branch for processing. One line per vessel per day of acquisition was processed by the field unit for quality control.

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	9.1

Table 9: Primary bathymetric data processing software

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

Manufacturer	Name	Version
QPS	Fledermaus FMGT	7.5.3

Table 10: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Extended Attribute Files version 5.4

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
H12913_MB_1m_MLLW	CUBE	1 meters	-	NOAA_1m	Complete MBES
H12913_MB_2m_MLLW	CUBE	2 meters	-	NOAA_2m	Complete MBES
H12913_MB_4m_MLLW	CUBE	4 meters	-	NOAA_4m	Complete MBES
H12913_MB_1m_MLLW_Final	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12913_MB_2m_MLLW_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12913_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 170 meters	NOAA_4m	Complete MBES

Table 11: Submitted Surfaces

The NOAA CUBE parameters mandated in the HSSD dated May 2016 were used for the creation of all CUBE surfaces in Survey H12913, with the exception of the 4 meter surface. Examination of the data revealed that data density and quality supported the extension of the 4 meter surface to 170 meters,

eliminating the necessity of the the creation of lower resolution surfaces for H12913. A waiver to extend the 4 meter surface depth range and not submit an 8 meter or 16 meter surface was granted by the Hydrographic Survey Division Operations Branch, and is located in Appendix II. All data within the extended 4 meter surface meet or exceed coverage requirements as defined by the HSSD, including density and NOAA allowable uncertainty.

All 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 were rejected and the surface recomputed.

Flier Finder v3, part of the QC Tools package within Pydro, was used to assist the search for spurious soundings following gross cleaning. Flier Finder was run multiple times for each surface, reducing the flier height value for each consecutive run. This allowed Flier Finder to accurately and quickly identify gross fliers, but as the flier height was reduced the effectiveness of the tool diminished. With smaller heights, Flier Finder began to incorrectly flag dynamic aspects of the seafloor such as steep drop offs and rocky areas as fliers resulting in hundreds of false positives. At this point, the hydrographer ceased using the tool and returned to manual cleaning for these dynamic regions of the seafloor.

The waiver to extend the 4m surface is attached.

B.5.3 Data Logs

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as tide and sound speed application are noted in the H12913 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

B.5.4 Designated Soundings

H12913 contains one designated sounding used to represent a DTON. See Section D.1.6 for more information.

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.

Traditional Methods Used:

TCARI

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

Station Name	Station ID
Alitak	9457804
Kodiak Island	9457292

Table 12: NWLON Tide Stations

The following subordinate water level stations were established for this survey:

Station Name	Station ID
Offshore Sitkalidak Island GPS Buoy	945AAAA
Offshore Geese Islands GPS Buoy	945BBBB

Table 13: Subordinate Tide Stations

File Name	Status
9457292.tid	Verified Observed
9457804.tid	Verified Observed

Table 14: Water Level Files (.tid)

File Name	Status
P335FA2016_Verified.tc	Preliminary

Table 15: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 10/27/2016. The final tide note was received on 12/02/2016.

Initial reduction of acquired data to MLLW was accomplished via traditional tidal means using the Tidal Constituent and Residual Interpolation (TCARI) grid provided by HSD-OPS. Following the successful

application of SBETs and computation of an Ellipsoidally Referenced Zone Tide (ERZT) separation model, ERS methods were used for reducing data to MLLW.

As ERS methods were successful for the reduction to MLLW, final tides were not necessary for H12913. Processing was completed prior to receiving final tides, and therefore a waiver was obtained from HSD-OPS for the submission of H12913 without final tides applied. The correspondence has been included in Appendix II, accompanying this report.

Final tide note is attached.

ERS Methods Used:

ERS via Poor Mans VDATUM

Ellipsoid to Chart Datum Separation File:

P335FA2016_PMVD_UTM-NAD83-5N_WGS84-MLLW_Composite

ERS methods were used as the final means of reducing H12913 to MLLW for submission. Data were initially reduced via traditional tidal means until an ERZT separation model could be calculated. This empirically derived model was then checked for consistency and compared to the Poor Man's VDatum (PMVD) separation model provided with the Project Instructions. The PMVD separation model was then vertically shifted such that the average difference between these two separation models is zero. This vertical shift de-biases the PMVD separation model, correcting for local offsets that cannot be effectively modeled by the PMVD. In areas where the PMVD model did not have sufficient coverage, such as near shore areas, the ERZT separation model was appended to the PMVD model to create the composite ERZT/PMVD separation model listed above and used to reduce H12913 to MLLW. For further information see the ERS Capability Memo, submitted under separate cover.

C.2 Horizontal Control

The horizontal datum for this project is World Geodetic System of 1984 (WGS84).

The projection used for this project is UTM Zone 5 North.

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 Position 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.

For further details regarding the processing and quality control checks performed, see the H12913 POSPac Processing Logs spreadsheet located in the Separates folder. See also the OPR-P335-FA-16 Horizontal and Vertical Control Report (HVCR), submitted under separate cover.

Hydrographic Technical Directive (HTD) 2016-3, which revises the horizontal datum requirement to NAD83, was released prior to acquisition for OPR-P335-FA-16. The field unit conferred with HSD-OPS and a waiver was received to maintain WGS84 as the datum for submission. This correspondence has been included in Appendix II.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
AC34	Old Harbor

Table 16: CORS Base Stations

Differential correctors from the US Coast Guard beacon at Kodiak (313 kHz) were used in real-time for acquisition when not otherwise noted in the acquisition logs, and were the sole method of positioning of detached positions (DP) and bottom samples.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Kodiak, AK (313kHz)

Table 17: USCG DGPS Stations

The waiver to use WGS84 as horizontal datum is attached.

D. Results and Recommendations

D.1 Chart Comparison

A comparison was performed between survey H12913 and Chart 16592, as well as ENC US4AK5NM, using CARIS HIPS and SIPS sounding and contour layers derived from the 4 meter combined surface. The contours and soundings were overlaid on the charts to assess differences between the surveyed soundings and charted depths. ENCs were compared to a 4 meter combined grid by extracting all soundings from the

chart and creating an interpolated TIN surface which could be differenced with the combined surface from H12913.

All data from H12913 should supersede charted data. In general, surveyed soundings agree with the majority of charted depths. A full discussion of the disagreements follows below.

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
16592	1:80728	11	07/2014	09/10/2016	02/20/2016

Table 18: Largest Scale Raster Charts

16592

The charted soundings and contours of Chart 16592 are identical to those found on ENC US4AK5NM. As such, all discussions regarding comparisons between surveyed soundings and charted depths are covered under the ENC US4AK5NM discussion below.

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?
US4AK5NM	1:80728	10	08/19/2016	08/19/2016	NO

Table 19: Largest Scale ENCs

US4AK5NM

Soundings from H12913 are in general agreement with charted depths on ENC US4AK5NM, with most depths agreeing within 2 fathoms as shown in Figure 35. To more accurately visualize trends within these differences, a 4 meter TIN surface was interpolated from the ENC sounding layer. This surface was then differenced with a corresponding 4 meter combined surface from H12913, and is visualized in Figure 36. In this difference surface red colors indicate H12913 was shoaler than the ENC US4AK5NM, green colors

indicate agreement, and blue colors indicate H12913 was deeper than ENC US4AK5NM. The area of largest variation is the northern portion of the survey, where the sounding spacing of the prior surveys was insufficient to capture depth variations due to limitations of the TIN creation algorithm. Soundings were visually inspected with an average difference between 1 and 2 fathoms.

Contours from H12913 are in general agreement with charted contours on ENC US4AK5NM, with a tendency of being inshore of the charted contours, as shown in Figure 37. The largest discrepancy is found in the southeast portion of H12913, where the surveyed 5 fathom contour extends around an area that has been designated as a new kelp area (Figure 38). The Hydrographer recommends the addition of 20 fathom and 30 fathom contours to the chart in an effort to provide necessary detail to the mariner where the deeper areas within H12913 begin to shoal (Figure 39).

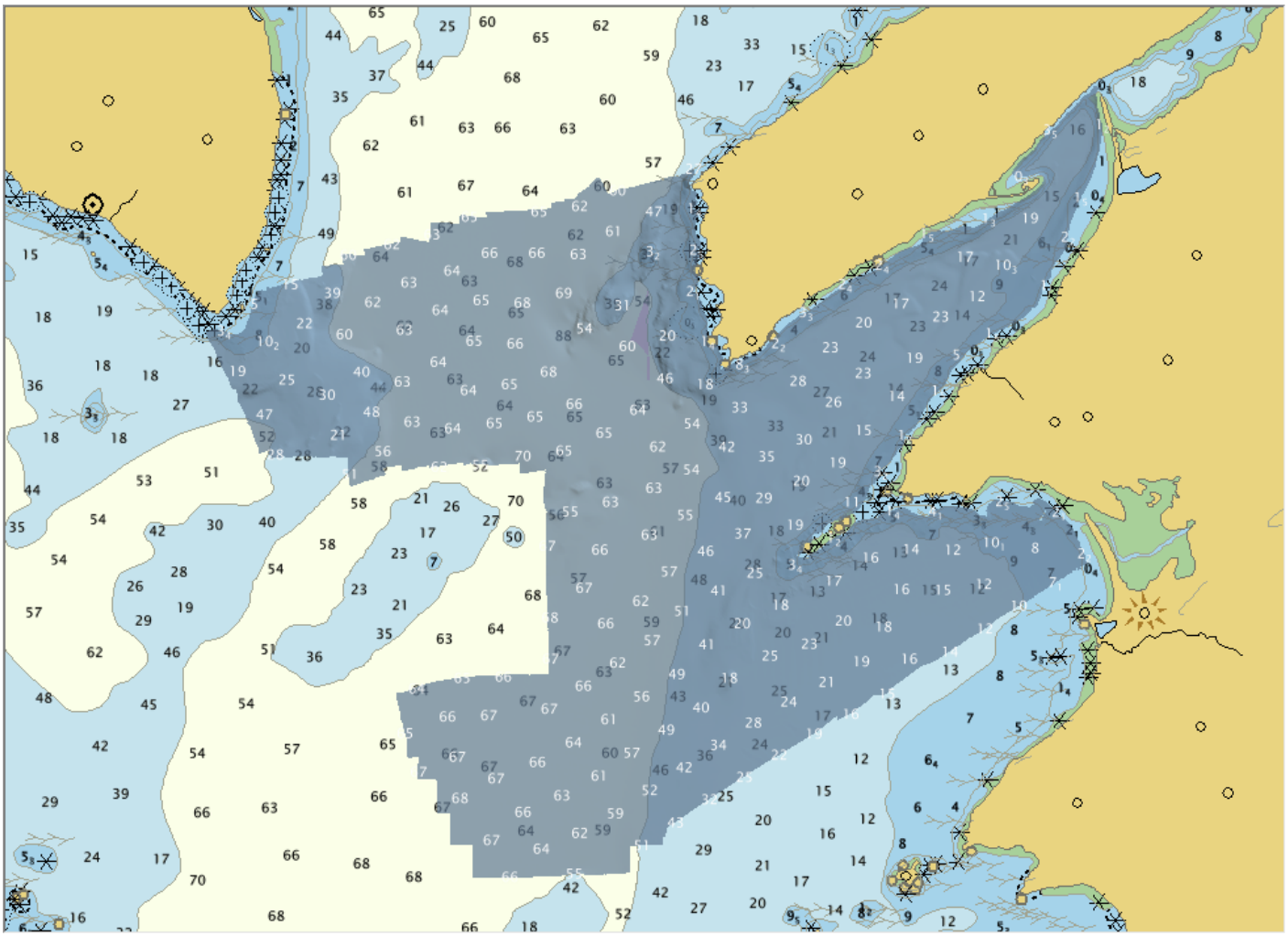


Figure 35: Overview of H12913 generated soundings in white overlaid onto ENC US4AK5NM, with ENC depths shown in black

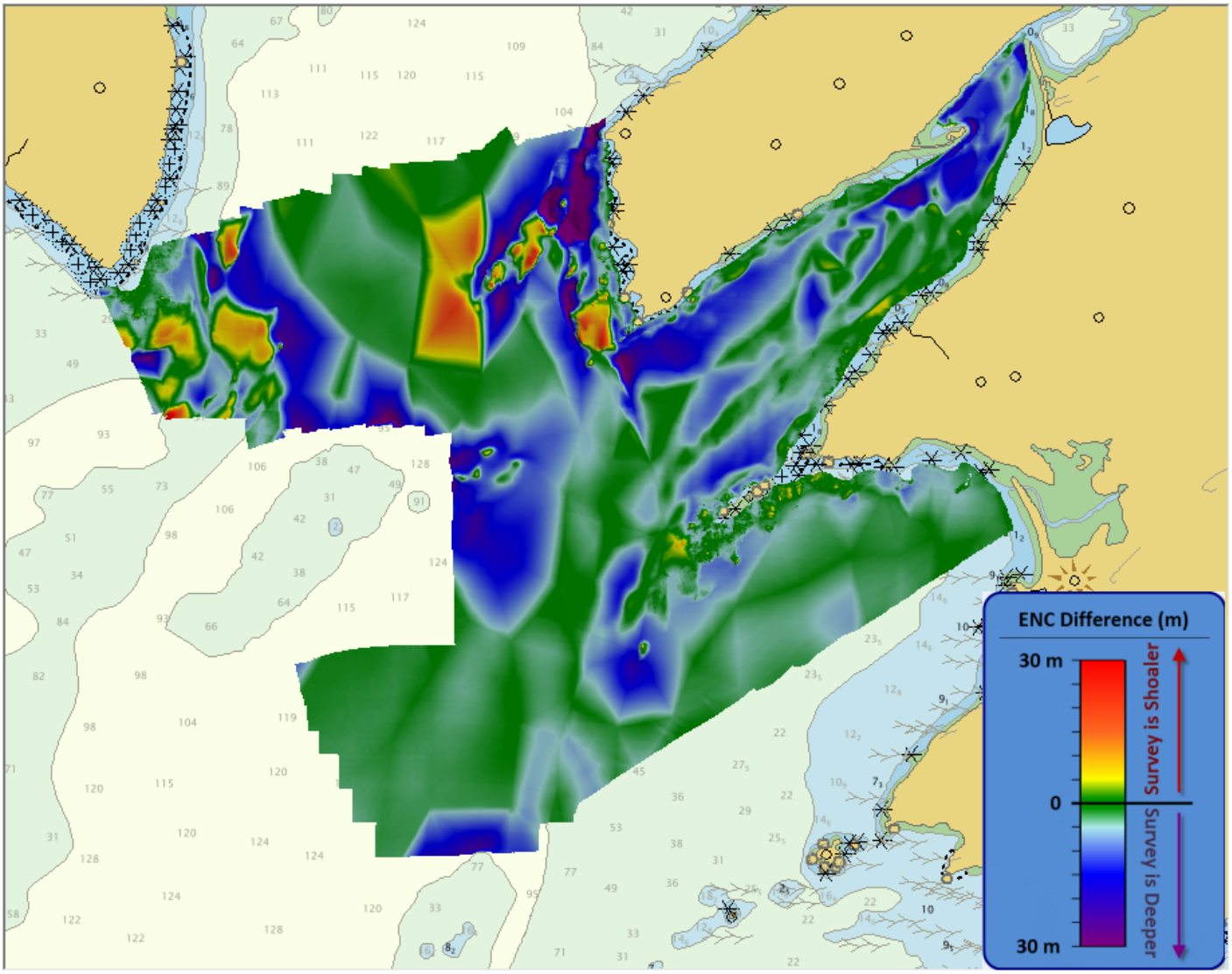


Figure 36: Difference surface between H12913 and interpolated TIN surface from US4AK5NM

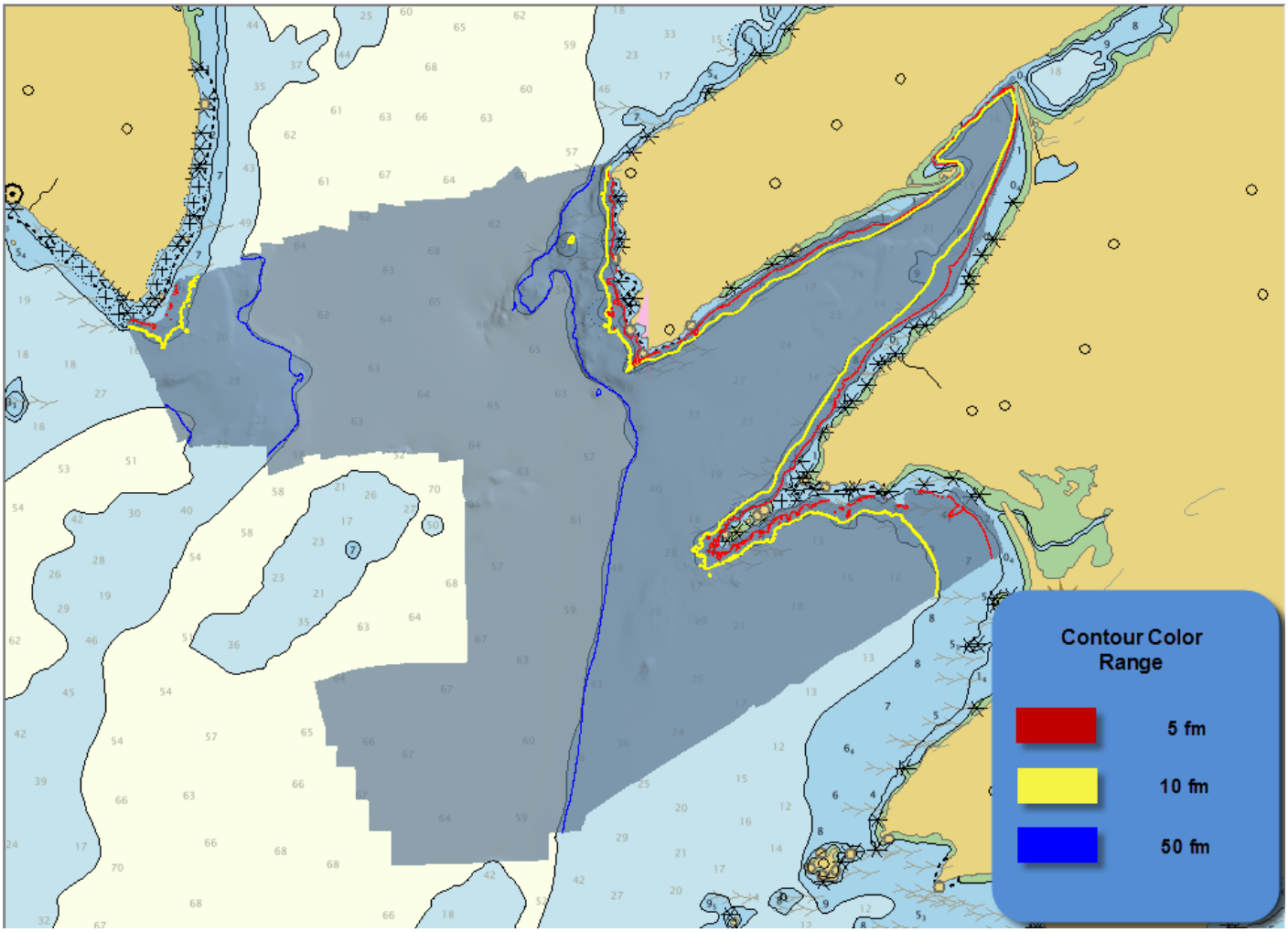


Figure 37: Overview of H12913 contours

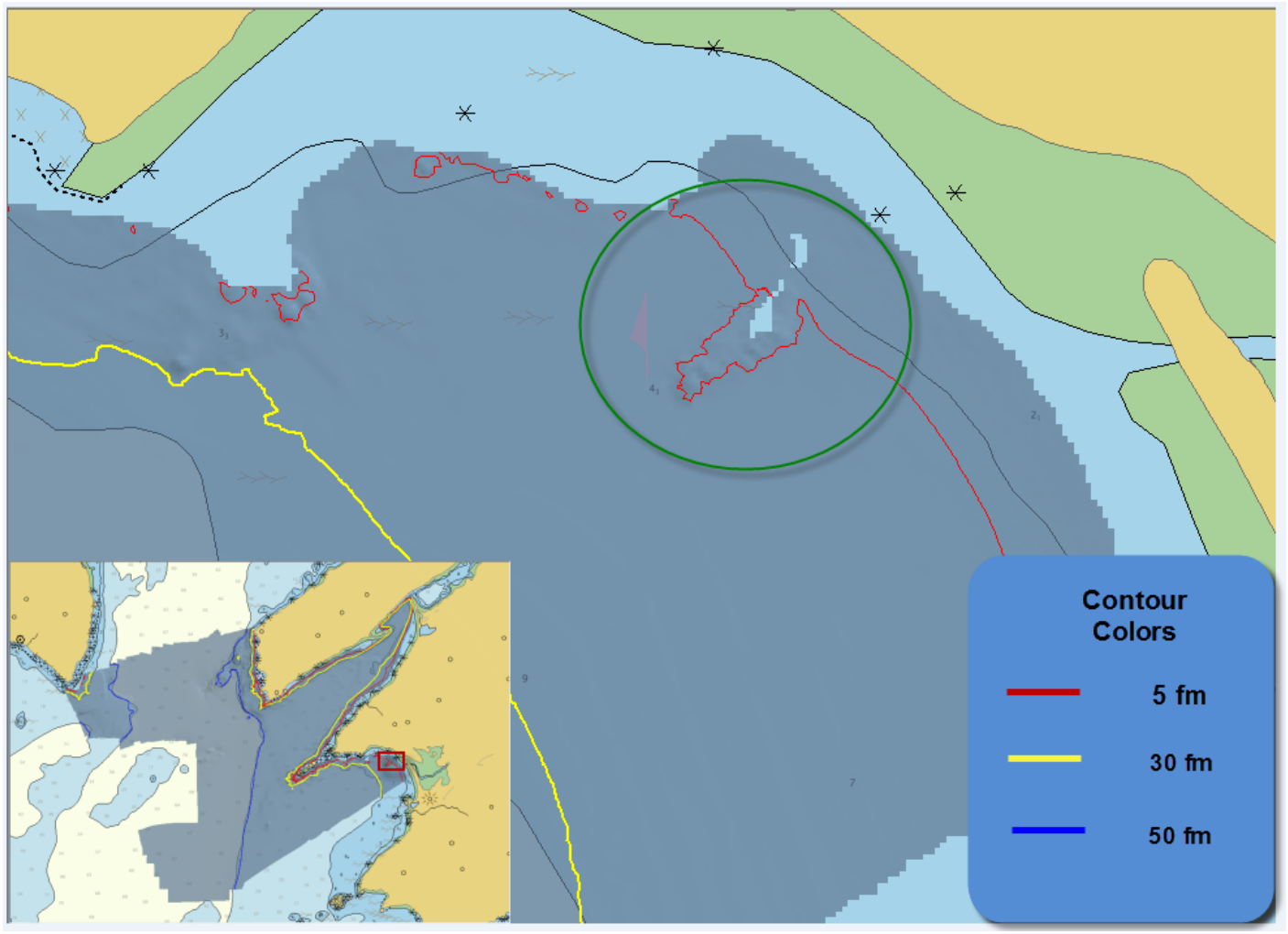


Figure 38: Contour discrepancy in southeast portion of H12913

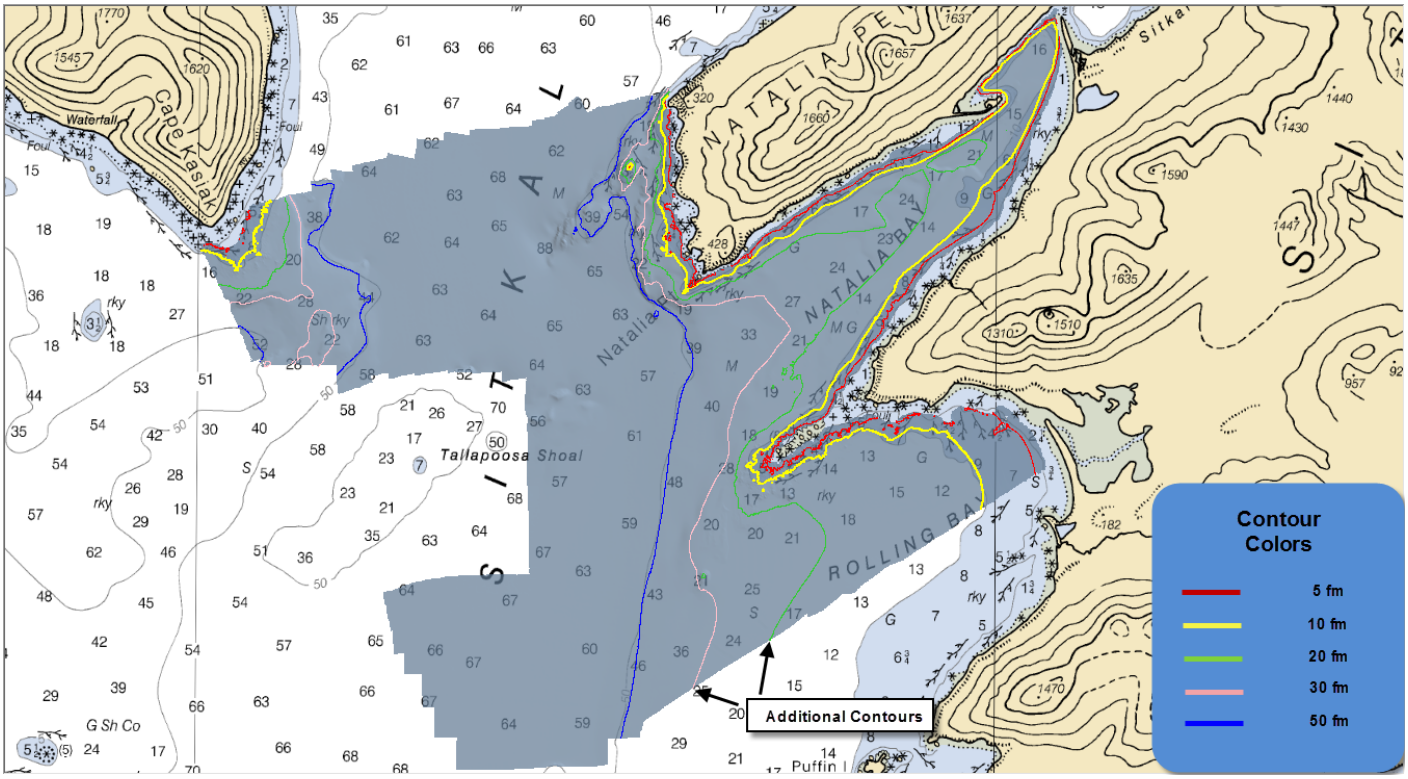


Figure 39: Proposed addition of 20 fathom and 30 fathom contours

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

H12913 has 5 new features that are included in the H12913 Final Feature File. Of these features, there are 2 new Seabed Areas, 1 new Underwater Rock that is submitted as a DTON, and 2 new Kelp area features.

D.1.6 Dangers to Navigation

The following DTON reports were submitted:

DTON Report Name	Date Submitted
H12913 Danger to Navigation Report	2016-08-05

Table 20: DTON Reports

One Danger to Navigation Report, with one identified danger was submitted on 08/05/2016. The danger is a rocky protrusion from the seafloor with a least depth of 0.98 fathoms in the area of a charted 3.25 fathom sounding, located west of Natalia Peninsula (Figure 40). The DTON Report is included in Appendix II of this report.

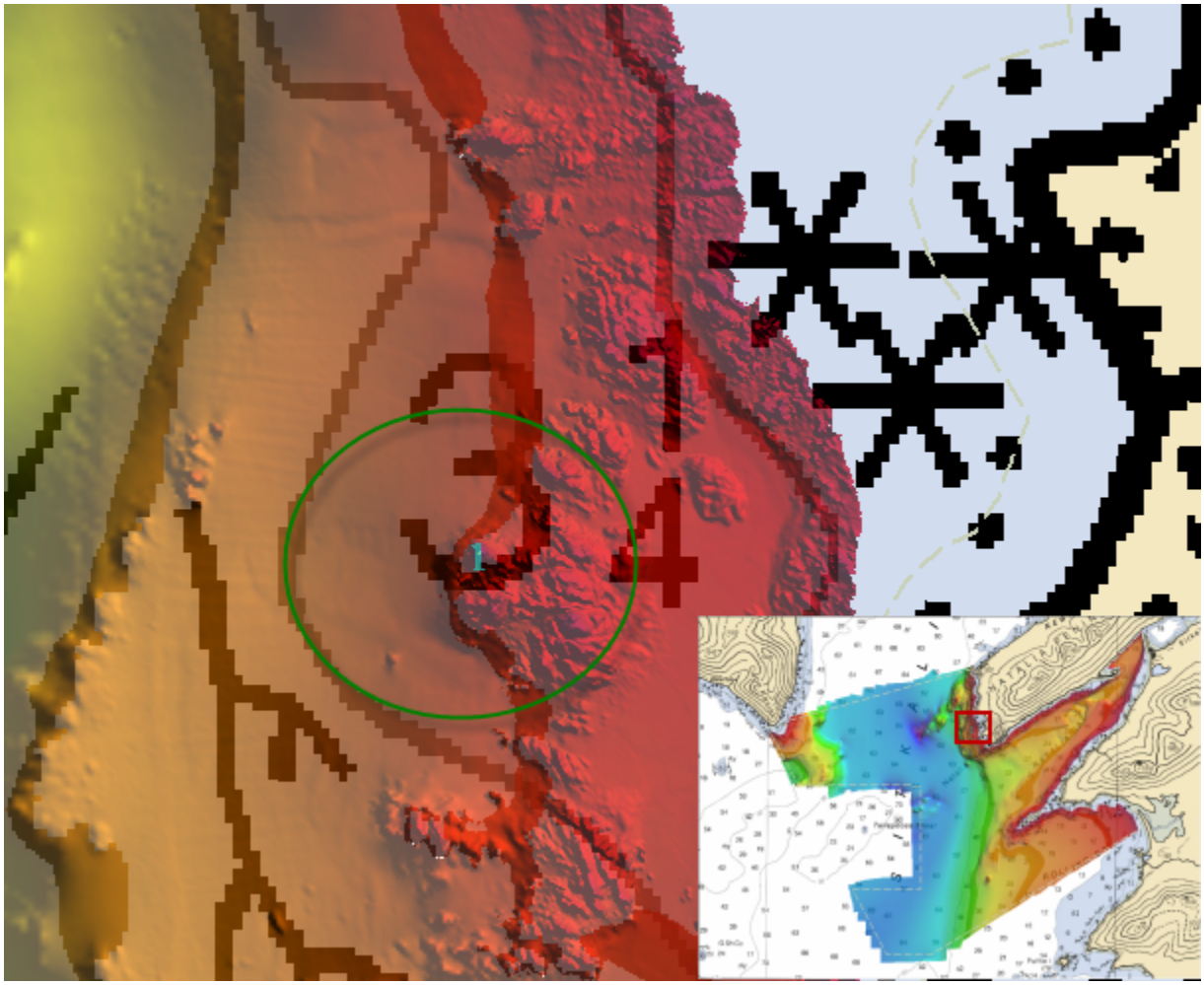


Figure 40: Overview of DTON found west of Natalia Peninsula in H12913

The DTON was submitted with a data gap at/near the shoal point, resulting in failure to reliably capture the least depth of the rock. Rock should be charted with an depth of 'Unknown' and not 0.98fm as stated above. A red lined DTON Report is appended.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey other than those addressed in the Dangers to Navigation section above.

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

Two bottom samples were acquired in accordance with the Project Instructions for survey H12913. Both bottom samples were entered in the H12913 Final Feature File. See Figure 41 for a graphical overview of sample locations.

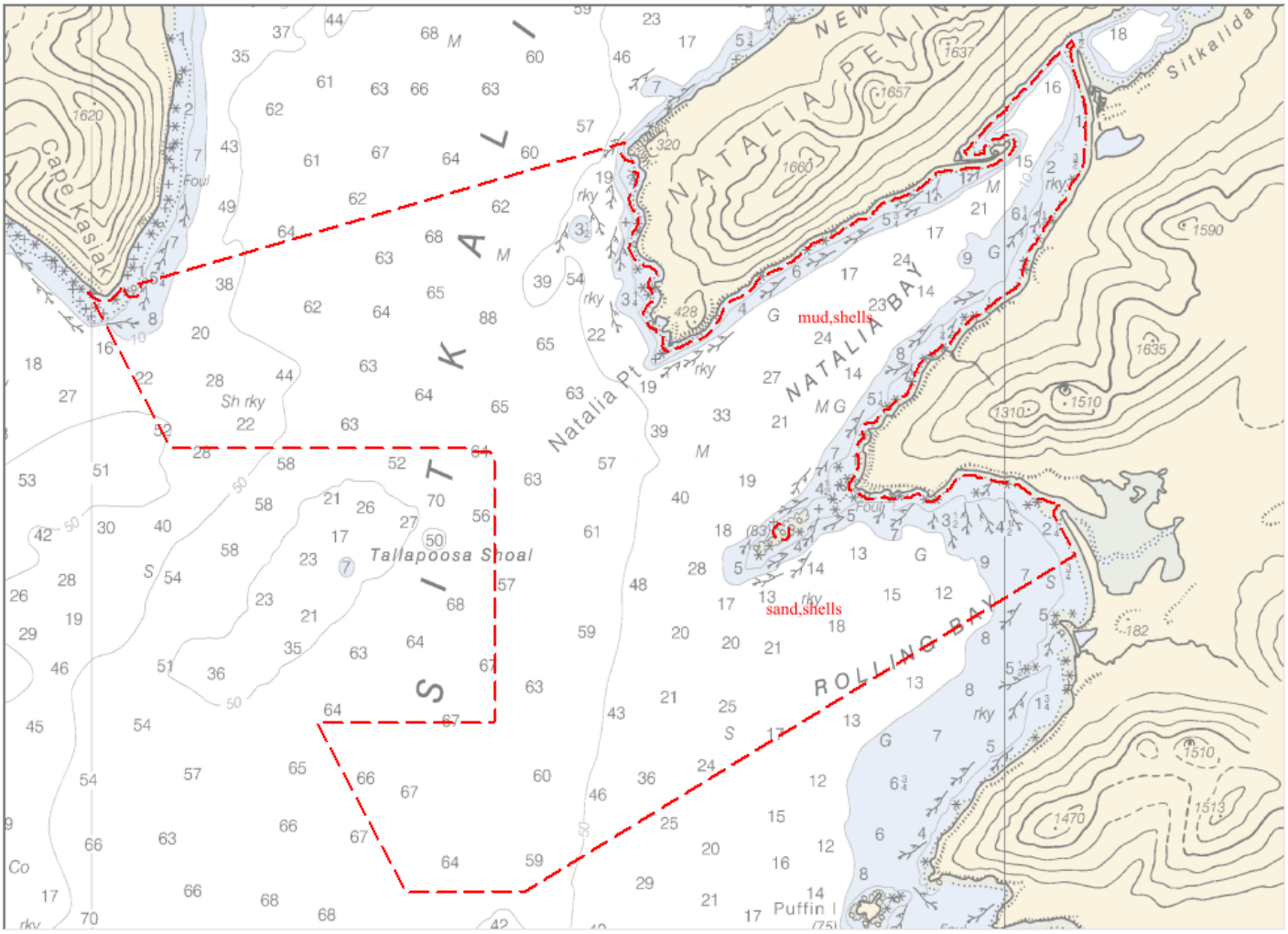


Figure 41: H12913 Bottom sample locations

D.2 Additional Results

D.2.1 Shoreline

H12913 survey limits extended to the NALL (see Section A.1) and all features within these limits were addressed and attributed in the H12913 Final Feature File. All features inshore of the NALL were attributed in the Final Feature File with the description of “Not Addressed” and remarks of “Retain as charted, not investigated due to being inshore of NALL” as per HSSD Section 7.3.1. Annotations, information, and

diagrams collected on DP forms and boat sheets during field operations are scanned and included in the Separates I Detached Positions folder.

D.2.2 Prior Surveys

No prior survey comparisons were assigned for this survey.

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 Specifications and Deliverables, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives, except as noted in this Descriptive Report. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required unless otherwise noted herein.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2016-11-08
Horizontal and Vertical Control Report	2016-11-14
Coast Pilot Report	2016-11-10

Approver Name	Approver Title	Approval Date	Signature
CDR Mark Van Waes, NOAA	Chief of Party	11/28/2016	VAN WAES.MARK.1240076329 2016.11.28 09:01:34 -08'00'
LT Bart Buesseler, NOAA	Field Operations Officer	11/23/2016	Digitally signed by BUESSELER.BART.OWEN.1396600559 Date: 2016.11.23 11:57:43 -08'00'
HCST Douglas Bravo	Chief Survey Technician	11/23/2016	Douglas Bravo 2016.11.23 19:04:38 -08'00'
HST Sam Candio	Sheet Manager	11/23/2016	Digitally signed by Sam Candio DN: cn=Sam Candio, o=NOAA Ship Fairweather, ou=HAST, email=samuel.candio@noaa.gov, c=US Date: 2016.11.23 10:31:38 -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

H12913 Feature Report

Registry Number: H12913
State: Alaska
Locality: South Coast of Kodiak Island
Sub-locality: Natalia Bay
Project Number: OPR-P335-FA-16
Survey Date: 07/31/2016

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16592	10th	12/01/2004	1:80,728 (16592_1)	[L]NTM: ?
16580	14th	01/01/2008	1:350,000 (16580_1)	[L]NTM: ?
16013	30th	07/01/2006	1:969,761 (16013_1)	[L]NTM: ?
531	24th	07/01/2007	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	1.84 m	57° 03' 54.2" N	153° 24' 08.6" W	---

1 - Dangers To Navigation

1.1) 0_ 0000000613 00001 / Feature_Report_Office.000

DANGER TO NAVIGATION

Survey Summary

Survey Position:	57° 03' 54.2" N, 153° 24' 08.6" W
Least Depth:	1.84 m (= 6.03 ft = 1.005 fm = 1 fm 0.03 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2016-213.00:00:00.000 (07/31/2016)
Dataset:	Feature_Report_Office.000
FOID:	0_ 0000000613 00001(FFFE000002650001)
Charts Affected:	16592_1, 16580_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

UWTROC/remrks: New rock is DTON

Feature Correlation

Source	Feature	Range	Azimuth	Status
Feature_Report_Office.000	0_ 0000000613 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart new rock

Arithmetically-Rounded Depth (Unit-wise Affected Charts):

1fm (16592_1, 16580_1, 16013_1, 530_1)

1fm 0ft (531_1)

1.8m (500_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 1:depth known
	SORDAT - 20160731
	SORIND - US,US,graph,H12913
	TECSOU - 3:found by multi-beam

VALSOU - 1.838 m

WATLEV - 3:always under water/submerged

Office Notes

Office Note: Do not concur with depth listed. A data gap larger than 3m across exists over the top of the feature reducing confidence the least depth was obtained. Rock should be charted with depth unknown.

Feature Images

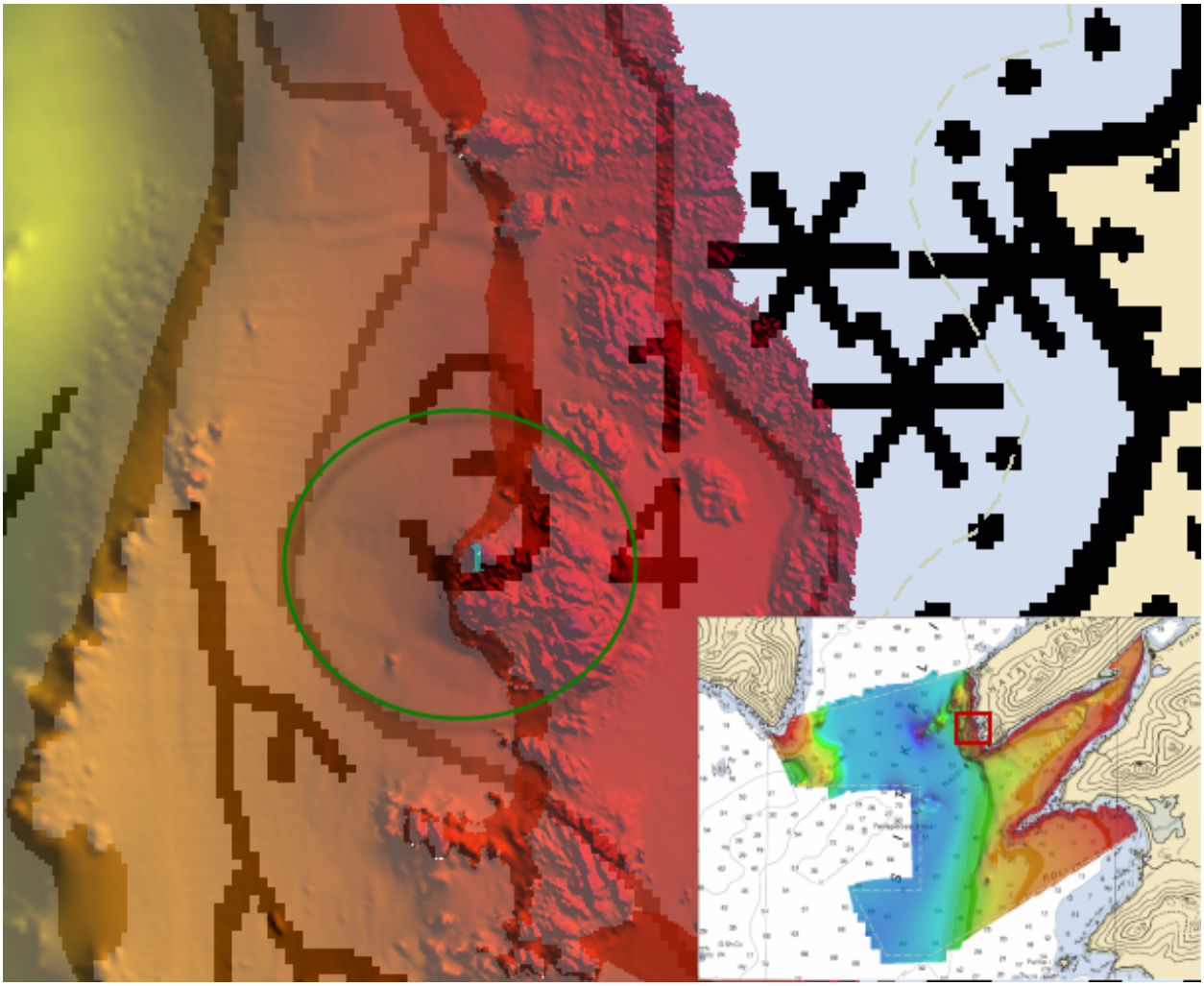


Figure 1.1.1

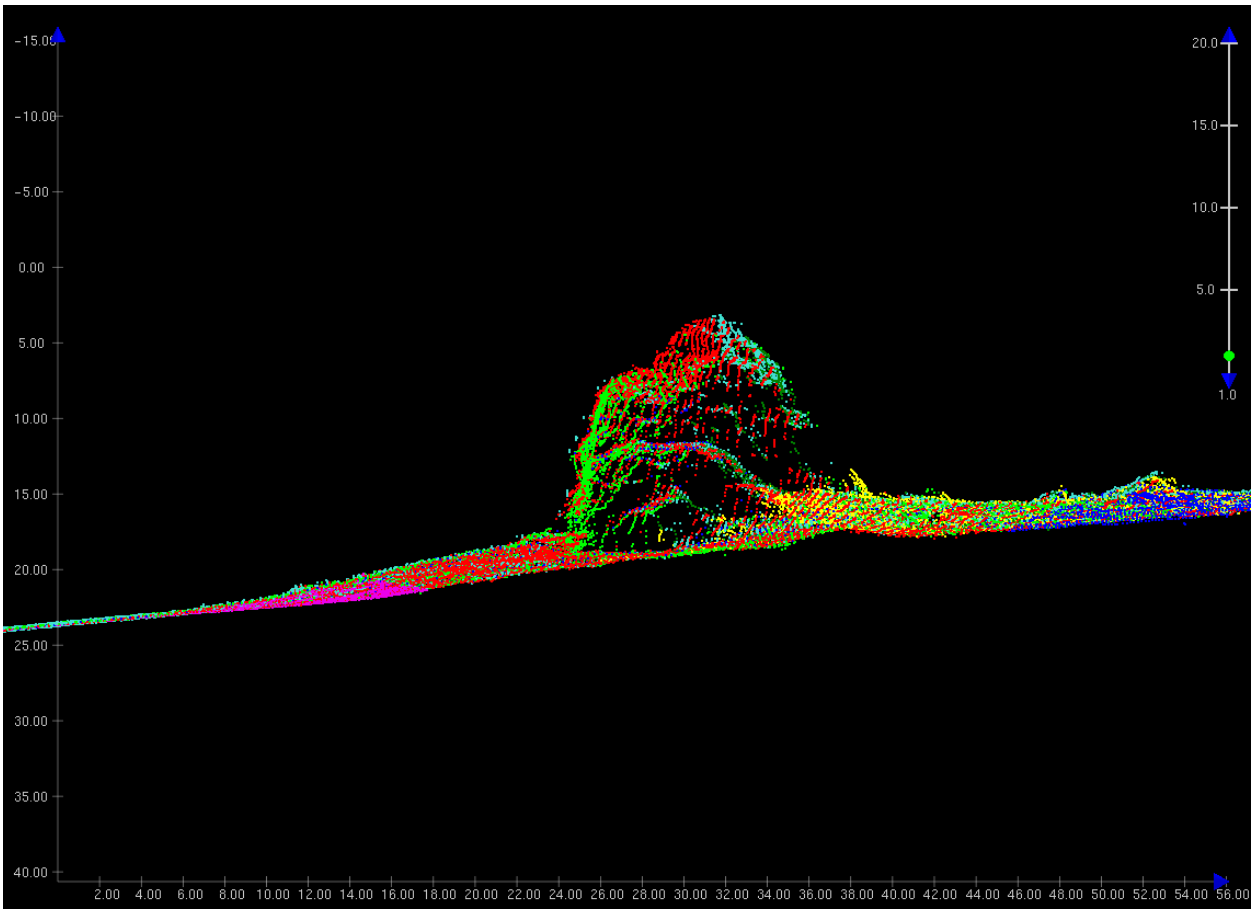

-15.00
-10.00
-5.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00 18.00 20.00 22.00 24.00 26.00 28.00 30.00 32.00 34.00 36.00 38.00 40.00 42.00 44.00 46.00 48.00 50.00 52.00 54.00 56.00
20.0
15.0
10.0
5.0
1.0

Figure 1.1.2

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : December 2, 2016

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P335-FA-16
HYDROGRAPHIC SHEET: H12913

LOCALITY: Natalia Bay, South Coast of Kodiak Island
TIME PERIOD: July 16 to August 1, 2016

TIDE STATION USED: Kodiak Island, AK 9457292
Lat. 57° 43.8′ N Long. 152° 30.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.400 meters

TIDE STATION USED: Alitak, AK 9457804
Lat. 56° 53.8' N Long. 154° 14.9' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.311 meters

Tide STATION USED: Sitkalidak Island GPS Tide Buoy, AK 9457512
Lat. 56° 57.9′ N Long. 153° 15.1' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.307 meters

Tide STATION USED: Geese Island GPS Tide Buoy, AK 9457726
Lat. 56° 35.7′ N Long. 153° 59.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.483 meters

REMARKS: RECOMMENDED GRID
Please use the TCARI grid "P335FA2016Final.tc" as the final grid for project OPR-P335-FA-16, during the time period between July 16 to August 1, 2016.

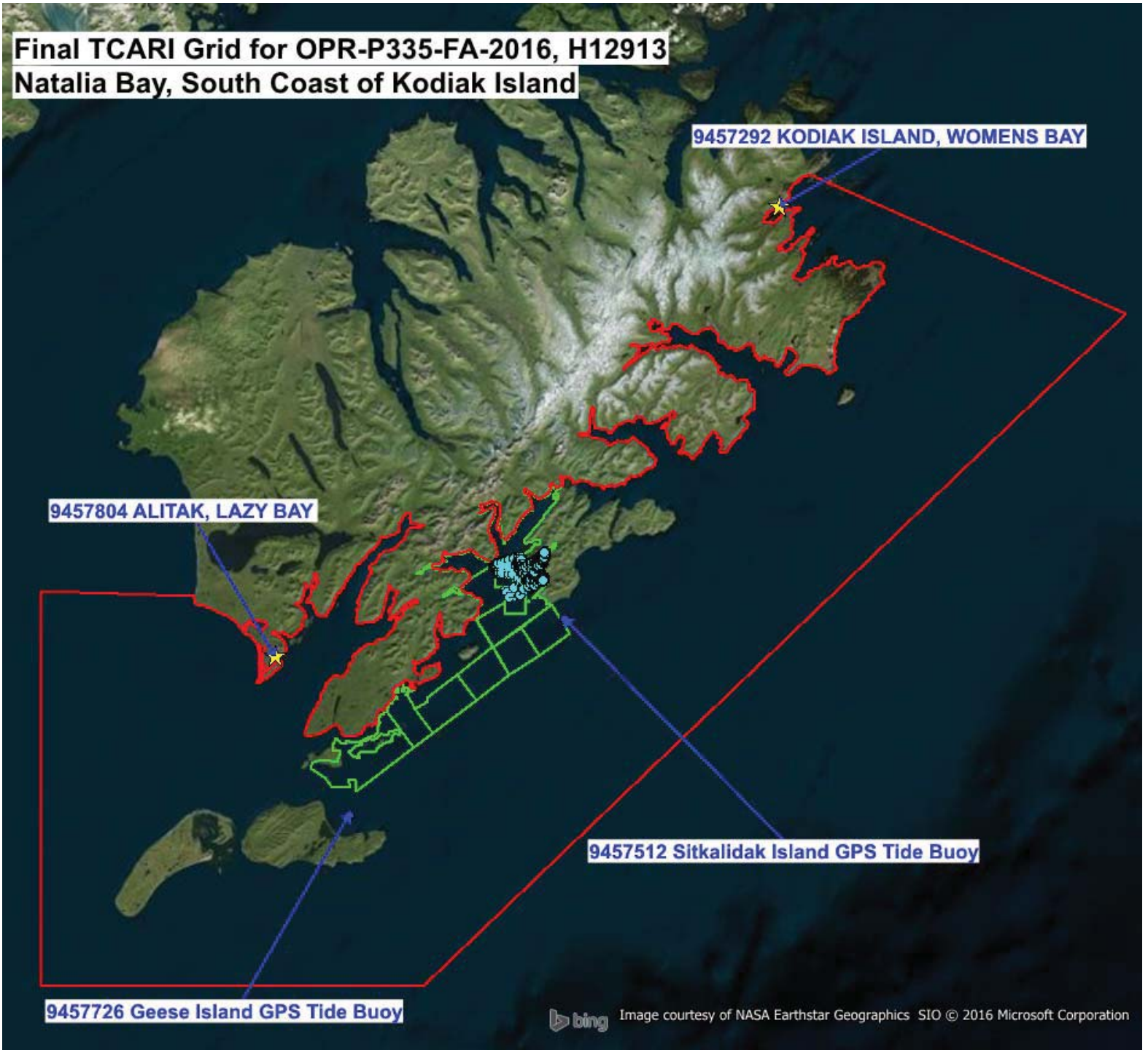
Refer to attachments for grid information.

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).

BURKE.PATRICK.B.1365830335

Digitally signed by BURKE.PATRICK.B.1365830335
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=BURKE.PATRICK.B.1365830335
Date: 2016.12.02 14:44:15 -05'00'

CHIEF, OCEANOGRAPHIC DIVISION


Final TCARI Grid for OPR-P335-FA-2016, H12913
Natalia Bay, South Coast of Kodiak Island
9457292 KODIAK ISLAND, WOMENS BAY
9457804 ALITAK, LAZY BAY
9457512 Sitkalidak Island GPS Tide Buoy
9457726 Geese Island GPS Tide Buoy
bing
Image courtesy of NASA Earthstar Geographics SIO © 2016 Microsoft Corporation

Fwd: Re: Final Tides for South Kodiak Island

1 message

FA OPS <ops.fairweather@noaa.gov> Wed, Nov 9, 2016 at 2:18 PM
To: Damian Manda <Damian.Manda@noaa.gov>, Lander Verhoef <Lander.Verhoef@noaa.gov>, Tyler Fifield <tyler.p.fifield@noaa.gov>, Jeffrey Douglas <jeffrey.douglas@noaa.gov>, Hannah Marshburn - NOAA Federal <Hannah.Marshburn@noaa.gov>, Samuel Candio - NOAA Federal <samuel.candio@noaa.gov>
Cc: CST Fairweather <chiefst.fairweather@noaa.gov>

South Kodiak Sheet Managers,

Please include the following email correspondence in Appendix II of your DR. This serves as our waiver for submitting these surveys to PHB without final tides applied. Please let me know if you have any questions.

Very Respectfully,

LT Bart Buesseler, NOAA

-------- Forwarded Message --------
Subject: Re: Final Tides for South Kodiak Island
Date: Wed, 09 Nov 2016 15:07:39 -0800
From:CO Fairweather (CDR Mark Van Waes) <co.fairweather@noaa.gov>
To: Russell Quintero - NOAA Federal <russell.quintero@noaa.gov>
CC: Ben Evans <benjamin.k.evans@noaa.gov>, Richard T Brennan <Richard.T.Brennan@noaa.gov>, FA OPS <ops.fairweather@noaa.gov>, ChiefST.Fairweather <chiefst.fairweather@noaa.gov>, Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>

Great. Thanks Russ!

Mark

On 11/9/2016 14:48, Russell Quintero - NOAA Federal wrote:

> Mark,
>
> As per our previous discussion, with the approved ERS capability memo, there's no reason to delay submission while waiting on tides. PHB has said they are fine with applying that when it is available.
>
> Consider that requirement waived, and include this email in your correspondence folder.
>
> V/r,
> Russ
>
> On Wednesday, November 9, 2016, CO Fairweather (CDR Mark Van Waes) <co.fairweather@noaa.gov> wrote:
>> Russ,
>>
>> We've received the ERS Capability Approval Memo that Katy sent us on 11/7. Is there any further waiver/statement required for us to submit the SKI surveys without final tides, or are we good to go on that?
>>
>> Thanks,
>> Mark
>>
>> On 11/4/2016 12:14, CO Fairweather (CDR Mark Van Waes) wrote:
>>> Roger. Thank you both for the quick response. We have our ERS report and memo being finalized and will submit it today. We are indeed confident in our reduction of the data to chart datum via ERS, so there should be no re-processing.
>>>
>>> Thanks,
>>> Mark
>>>
>>> On 11/4/2016 11:03, Russell Quintero - NOAA Federal wrote:
>>>> CDR Van Waes,
>>>>
>>>> As CDR Evans spoke to, an ERS capability memo should be sent to Ops after completion of acquisition, at which point a final determination will be made for how to reduce the data to chart datum.
>>>>
>>>> Katy, the PM for this project has reached out to CO-OPS on the state of final tides. They have the data and are reviewing it.
>>>>
>>>> She has not, however, yet received the ERS capability memo from FA for this project.
>>>>
>>>> Once she has that memo, if all looks good, since PHB doesn't mind applying it later, I'm happy to include a waiver of final tides with our response so you can move the survey along asap.
>>>>
>>>> V/r,
>>>> Russ
>>>>
>>>> On Friday, November 4, 2016, Ben Evans <benjamin.k.evans@noaa.gov> wrote:
>>>>> Mark,
>>>>>
>>>>> That's great news that those surveys are just about ready to go! It's also a great example of how ERS methods will start saving us time.
>>>>>
>>>>> The point of applying final tides in the field is to avoid duplicative re-computation of grids at the branch, re-checking for the inevitable fliers which crop up when new CUBE solutions are generated, and the potential for changed attribution on features (rocks bumping up to islets and vice-versa, etc.). However, if in this case FA is confident that you have successfully reduced to chart datum through ERS methods, we would not be re-processing here and there is no reason to wait.
>>>>>
>>>>> Was an Ops-approved ERS capability memo required for this project? If so, does that require final tides for the comparison? If not, and Ops has approved your ERS approach, I think PHB would be happy to take the surveys and receive final tides later.
>>>>>
>>>>> (To be clear, though, this represents a deviation from the HSSD, and therefore Ops has the final say.)
>>>>>
>>>>> Ben
>>>>>
>>>>> On 11/4/2016 09:13, CO Fairweather (CDR Mark Van Waes) wrote:
>>>>>> Ben, Russ,
>>>>>>
>>>>>> We are reviewing and preparing for submission our surveys from OPR-P335-FA-16, South Kodiak Island. We have not, however, received the final tides data for them. This delay, should we continue to wait for the data, will prevent us from meeting the 120-day submission timeframe.
>>>>>>
>>>>>> Strictly speaking, final tides are not needed for this survey. We employed ERS methods and therefore do not require final tide data, though we would normally have applied the final tides to our data for completeness.
>>>>>>
>>>>>> How would HSD like for us to proceed? Should we submit the survey data without final tides? Or should we wait for the tide data and request a waiver of the 120-day requirement?
>>>>>>
>>>>>> Thanks,
>>>>>> Mark
>>>>>
>>>>> --
>>>>> CDR Ben Evans, NOAA
>>>>> Chief, Pacific Hydrographic Branch (N/CS34)
>>>>> NOAA Office of Coast Survey
>>>>> 7600 Sand Point Way NE
>>>>> Seattle, WA 98115
>>>>> (206) 526-6835
>>>>
>>>> --
>>>> Lieutenant Russell Quintero, NOAA
>>>> Chief, Hydrographic Surveys Division Operations Branch
>>>> National Oceanic & Atmospheric Administration
>>>> 1315 East-West Hwy, SSMC3 6217
>>>> Silver Spring, MD 20910
>>>> Cell: 970-481-2030

--
Lieutenant Russell Quintero, NOAA
Chief, Hydrographic Surveys Division Operations Branch
National Oceanic & Atmospheric Administration
1315 East-West Hwy, SSMC3 6217
Silver Spring, MD 20910
Cell: 970-481-2030

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Coast Survey
Silver Spring, Maryland 20910-3282

October 20, 2016

MEMORANDUM FOR: Commander Mark Van Waes, NOAA
Commanding Officer, NOAA Ship *Fairweather*

FROM: Lieutenant Russell Quintero, NOAA
Chief, Hydrographic Surveys Division

SUBJECT: OPR-P335-FA-16 ERS Capability Memorandum, South Coast of Kodiak Island

Hydrographic surveys H12896, H12897, H12898, H12910, H12911, and H12913 of OPR-P335-FA-16 South Coast of Kodiak Island are approved for vertical reduction to chart datum, Mean Lower Low Water (MLLW), using the NOAA's composite Poor Man's VDatum (PMVD) as developed in conjunction with HSTB.

Approval composite PMVD, in lieu of the NOAA Center for Operational Oceanographic Products and Services (CO-OPS) TCARI tides package or ERZT tides package as per the Project Instructions, is based on your recommendation and the review of comparison results you included in your attached email from November 4, 2016.

The results of the data analysis show that ellipsoidally referenced survey (ERS) techniques with the composite PMVD used as the vertical datum reducer meet or exceed horizontal and vertical specifications for hydrographic surveys.

The comparison techniques are in line with the procedures outlined in the NOS Hydrographic Surveys Specifications and Deliverables document.

You shall include a description of your ERS processing procedures and the comparisons you conducted between ERS and traditional tides in the appropriate Descriptive Report (DR), Horizontal and Vertical Control Report and/or Data Acquisition and Processing Report. As appropriate in the DR, document specific vessel day(s) or line(s) that have not been processed using ERS techniques as the vertical reducer to MLLW, where discrete zoning provides better results and/or where vertical uncertainties of your post processed vertical positional data are out of the range determined by the HSSD 2016.

Include this memo in the supplemental correspondence Appendix of the DR.

Subject: Re: Waiver request for crossline requirement - H12913
From: "CO Fairweather (CDR Mark Van Waes)" <co.fairweather@noaa.gov>
Date: 11/28/2016 10:38
To: FA OPS <ops.fairweather@noaa.gov>

-------- Forwarded Message --------
Subject: Re: Waiver request for crossline requirement - H12913
Date: Mon, 28 Nov 2016 13:26:52 -0500
From: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>
To:CO Fairweather (CDR Mark Van Waes) <co.fairweather@noaa.gov>

CDR Van Waes,
HSD OPS conducted a review of the crosslines completed and the additional work to further QC the survey area for sheet H12913 for OPR-P335-FA-16. After the review and a discussion of the situation with HSD OPS Lieutenant Chief Russell Quintero, HSD OPS agrees to grant a waiver for the requirement to collect at least 4% of mainscheme hydrography as required by the HSSD 2016. We are confident that between the crosslines that were completed and the additional qc analysis conducted by the *Fairweather*, that the survey sheet H12913 was spatially and temporally represented, and that the analysis was sufficient to prove there were no systematic errors in the surveying systems and that the survey soundings collected are accurate and reliable. Please include this correspondence for the waiver in your final DR.

Thank you,
Katy Pridgen

Kathryn "Katy" Pridgen
Physical Scientist
NOAA-HSD OPS
301-713-2702 ext 178
kathryn.pridgen@noaa.gov

On Mon, Nov 21, 2016 at 10:02 PM, CO Fairweather (CDR Mark Van Waes) <co.fairweather@noaa.gov> wrote:

> Katy,
>
> (This waiver request is an update reflecting the recently-approved 4m surface depth range extension.)
>
> I am requesting a waiver of the crossline requirement for survey H12913 in project OPR-P335-FA-16. During the project, the ship suffered a casualty to its propulsion system, requiring an emergency shipyard repair period. At the conclusion of the repair, in consultation with HSD, it was decided that the ship would not continue working on the South Kodiak Island project, and instead proceed to its next project area. As a result, we were unable to complete acquisition of crosslines totaling 4% of mainscheme hydrography as required by the HSSD. Only 1.74%

crosslines were acquired.

In order to compensate for this reduced crossline coverage, we have performed additional quality control on the survey data. In addition to processing the acquired crosslines in accordance with HSSD 5.2.4.3 (which showed a high level of agreement with the mainscheme data— 99.81% are within NOAA allowable uncertainties), we analyzed areas where the ship data and launch data overlapped, comparing a 4-meter surface of launch data to a 4-meter surface of ship data. The mean difference between the surfaces was 0.05 meters, with the ship being deeper, and 95% of all nodes fall within 0.35 meters. In total, 99.89% of the depth differences between the launch data and ship data were within NOAA allowable uncertainties.

Considering the above, which is documented in detail in the Descriptive Report, I am confident that there are no systematic errors in the surveying systems, and that the accuracy and reliability of the surveyed soundings and positions are adequately verified. Thus I believe we have met the intent of the crossline requirement, despite not meeting the letter of the specification.

Please let me know if you have any questions.

Thank you,
Mark

--

CDR Mark Van Waes, NOAA
Commanding Officer, NOAA Ship Fairweather (S-220)
2002 SE Marine Science Drive, Newport, OR 97365
907.254.2836 CO cell | 907.254.2842 Ship cell |
541.867.8919 VOIP

Re: Hydrographic Technical Directive 2016-3: Horizontal Datums for hydrographic surveys

Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> Fri, Jul 22, 2016 at 8:13 AM
To: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Cc: Eric Berkowitz - NOAA Federal <eric.w.berkowitz@noaa.gov>, Richard Brennan - NOAA Federal <Richard.T.Brennan@noaa.gov>, Lorraine Robidoux - NOAA Federal <lorraine.robidoux@noaa.gov>, John Nyberg - NOAA Federal <John.Nyberg@noaa.gov>, Mike Aslaksen - NOAA Federal <mike.aslaksen@noaa.gov>, Samuel Greenaway <Samuel.Greenaway@noaa.gov>, Russell Proctor - NOAA Federal <russell.proctor@noaa.gov>, _OMAO MOP CO Rainier <CO.Rainier@noaa.gov>, _OMAO MOP CO Fairweather <co.fairweather@noaa.gov>, "CO.Thomas Jefferson - NOAA Service Account" <co.thomas.jefferson@noaa.gov>, "CO.Ferdinand Hassler - NOAA Service Account" <co.ferdinand.hassler@noaa.gov>, "Evans, Rod E." <RHODRI.E.EVANS@leidos.com>, George Reynolds <ggr@oceansurveys.com>, Andrew Orthmann <aorthmann@terrasond.com>, Arthur Wright <artw@wassoc.com>, David Neff <david@etracinc.com>, "Millar, David FPI" <dmillar@fugro.com>, Deam Moyles <dmoyles@fugro.com>, Jon Dasler <jld@deainc.com>, Tara Levy <tlevy@oceaneering.com>, _NOS OCS HSD OPS <hsd.ops@noaa.gov>, _NOS OCS HSD AHB <nos.ahb.allpersonnel@noaa.gov>, _NOS OCS HSD PHB <nosphb@noaa.gov>, "ops.fairweather" <ops.fairweather@noaa.gov>, "OPS.Rainier" <ops.rainier@noaa.gov>, "OPS.Thomas Jefferson - NOAA Service Account" <OPS.Thomas.Jefferson@noaa.gov>, "OPS.Ferdinand Hassler - NOAA Service Account" <OPS.Ferdinand.Hassler@noaa.gov>, _OMAO MOP ChiefST Fairweather <chiefst.fairweather@noaa.gov>, Chief ST Rainier <ChiefST.Rainier@noaa.gov>, "ChiefST.Thomas Jefferson - NOAA Service Account" <chiefst.thomas.jefferson@noaa.gov>, "ChiefST.Ferdinand Hassler - NOAA Service Account" <chiefst.ferdinand.hassler@noaa.gov>, Chief NRB OCS - NOAA Service Account <chief.nrb.ocs@noaa.gov>, Christopher Hare - NOAA Federal <Christopher.Hare@noaa.gov>, Megan Greenaway - NOAA Federal <Megan.Greenaway@noaa.gov>

Greetings folks,

My apologies if I've induced a datum-related panic throughout the fleet - I should have provided a little more clarifying language.

First of all: relax! Don't cease acquisition, don't reconfigure your base stations, don't start transforming your data, don't reprocess all your SBETs.

The moral of the story is that HSD is fine with whichever horizontal datum you choose (NAD83 or WGS84), all we ask is that you document which datum was used. If you've already acquired half of a sheet in WGS84, then continue to do so, document the datum within your metadata and the Descriptive Report -- there isn't a need for HSD to issue any waiver to the HSSD because you're following the HSSD as written at the time of the issuance of your Project Instructions. All of AHB and PHB are CC'd on this email chain -- no field unit will get a demerit for submitting in one datum versus another. If you've completed one sheet of a project in WGS84 and would like to continue the rest of the project in WGS84 - go for it (in fact, for the purposes of DAPR documentation, I suspect the branches would prefer that).

Some of you may wonder why we made this change mid-season -- if you're one of those people, read the next three sentences (if you aren't, have a great weekend and remember to document your datums). The reason we made the change in language is strictly to satisfy an administrative requirement. As a civilian federal agency, we in the Office of Coast Survey could not publish an official technical specification that was in direct conflict with the Office of Management and Budget Circular A-16. The government is a little sensitive when it comes to having conflicting requirements out in the public space; as such, we were legally obliged to clean up the language.

We're only a few years away from the next realization of NAD83 which will be functionally indistinguishable from WGS84; so, eventually, these differences will truly be imperceptible.

Remember: relax, keep doing what you're doing, and document what you did.

Very respectfully,
~~ michael.gonsalves, LCDR/NOAA
HSD Operations Branch, Chief

On Thu, Jul 21, 2016 at 5:09 PM, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> wrote:

> Greetings,

The attached Hydrographic Technical Directive (HTD) provides a revision to the horizontal datum requirement, as stated in the 2016 Hydrographic Surveys Specifications and Deliverables. This HTD changes the requirement from WGS84 to NAD83, which brings us into compliance with other civilian federal agencies (see the document for further details).

If there are any questions or concerns about meeting this specification, please consult with your HSD Project Manager or Contracting Officer's Representative.

Very respectfully,
~~ michael.gonsalves, LCDR/NOAA
HSD Operations Branch, Chief

Samuel Candio - NOAA Federal <samuel.candio@noaa.gov>

Waiver request for surface coverage - H12913

6 messages

CO Fairweather (CDR Mark Van Waes) <co.fairweather@noaa.gov> Fri, Nov 18, 2016 at 9:19 PM
To: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>
Cc: Russell Quintero - NOAA Federal <Russell.Quintero@noaa.gov>, FA OPS <ops.fairweather@noaa.gov>, "ChiefST.Fairweather" <chiefst.fairweather@noaa.gov>, Samuel Candio <Samuel.Candio@noaa.gov>

Katy,

I am requesting a waiver of the surface coverage requirement for survey H12913 in project OPR-P335-FA-16. Specifically, we would like to extend the depth range covered by the 8 meter surface to 170 meters (as opposed to the 160 meter limit established by HSSD 5.2.2.3).

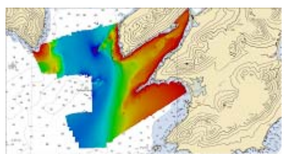
There is a very small area of the survey that extends just below 160 meters, shown just off Natalia Peninsula in the attached graphic. Extending the 8 meter surface to cover the depths to 170 meters will eliminate the need to have a separate surface for this small area. The 8 meter surface meets all density and uncertainty requirements for the extended depths.

Please let me know if you have any questions.

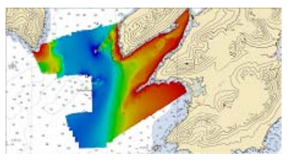
Thank you,
Mark

–
CDR Mark Van Waes, NOAA
Commanding Officer, NOAA Ship Fairweather (S-220)
2002 SE Marine Science Drive, Newport, OR 97365
907.254.2836 CO cell | 907.254.2842 Ship cell | 541.867.8919 VOIP

2 attachments



H12913_8m_extended.png
726K



H12913_8m_standard.png
726K

Russell Quintero - NOAA Federal <russell.quintero@noaa.gov> Sat, Nov 19, 2016 at 5:27 AM
To: "CO Fairweather (CDR Mark Van Waes)" <co.fairweather@noaa.gov>
Cc: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>, FA OPS <ops.fairweather@noaa.gov>, "ChiefST.Fairweather" <chiefst.fairweather@noaa.gov>, Samuel Candio <Samuel.Candio@noaa.gov>

CDR Van Waes,

Katy probably won't get back to you until Monday, but I don't see a problem granting this.

Out of curioisity, having just seen some of the VR grids of FA data near Prince of Wales Island that go deeper than that, would extending your 4m surface be free of holidays down to 170? If yes, I'd be willing to entertain that waiver in lieu of this one and save you one more surface...

V/r,
Russ
[Quoted text hidden]

–
Lieutenant Russell Quintero, NOAA
Chief, Hydrographic Surveys Division Operations Branch
National Oceanic & Atmospheric Administration
1315 East-West Hwy, SSMC3 6217
Silver Spring, MD 20910
Cell: 970-481-2030

CO Fairweather (CDR Mark Van Waes) <co.fairweather@noaa.gov> Sat, Nov 19, 2016 at 10:14 AM
To: Russell Quintero - NOAA Federal <russell.quintero@noaa.gov>
Cc: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>, FA OPS <ops.fairweather@noaa.gov>, "ChiefST.Fairweather" <chiefst.fairweather@noaa.gov>, Samuel Candio <samuel.candio@noaa.gov>

Russ,

Thank you for the offer. We're looking at the option to drop the 8 meter surface and extend the 4 meter. Our initial examination appears that it would be more efficient, meet requirements, and greatly reduce the number of false-positive fliers (most of which were along the 4/8 meter junction. Will get back to you with a revised waiver request as applicable should we decide to go that route.

Best,
Mark
[Quoted text hidden]

CO Fairweather (CDR Mark Van Waes) <co.fairweather@noaa.gov> Sun, Nov 20, 2016 at 9:48 AM
To: Russell Quintero - NOAA Federal <russell.quintero@noaa.gov>
Cc: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>, FA OPS <ops.fairweather@noaa.gov>, "ChiefST.Fairweather" <chiefst.fairweather@noaa.gov>, Samuel Candio <samuel.candio@noaa.gov>

Russ,

We have reviewed the data and have determined that the 4 meter surface, when extended to a depth of 170 meters, meets all specifications and requirements. As such for H12913 I request a waiver to submit the 4 meter surface, extended to a depth of 170 meters, in lieu of the 8 and 16 meter surfaces otherwise specified in the HSSD.

Please let me know if you have any questions.

R,
Mark

On 11/19/2016 5:27, Russell Quintero - NOAA Federal wrote:
[Quoted text hidden]

Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov> Mon, Nov 21, 2016 at 7:17 AM
To: _OMAO MOP CO Fairweather <co.fairweather@noaa.gov>, Russell Quintero - NOAA Federal <russell.quintero@noaa.gov>, FA OPS <ops.fairweather@noaa.gov>, "ChiefST.Fairweather" <chiefst.fairweather@noaa.gov>, Samuel Candio <Samuel.Candio@noaa.gov>

CDR Van Waes,
HSD OPS grants a waiver of the surface coverage requirement for survey H12913 in project OPR-P335-FA-16, South Coast of Kodiak Island. Specifically this waiver allows the *Fairweather* to supersede the HSSD 2016 requirements and allows the *Fairweather* to extend the 4m surface to a depth of 170m, instead of a 8m or 16m surface as specified HSSD 5.2.2.3, to cover the survey area. We are granting this wavier with the understanding that the 4m surface extending to 170m depth will still meet all specification and requirements as listed in the HSSD 2016. Please include this correspondence of the wavier in your DR. Let me know if you have any further questions.

Thank you
Katy Pridgen

Kathryn "Katy" Pridgen
Physical Scientist
NOAA-HSD OPS
301-713-2702 ext 178
kathryn.pridgen@noaa.gov

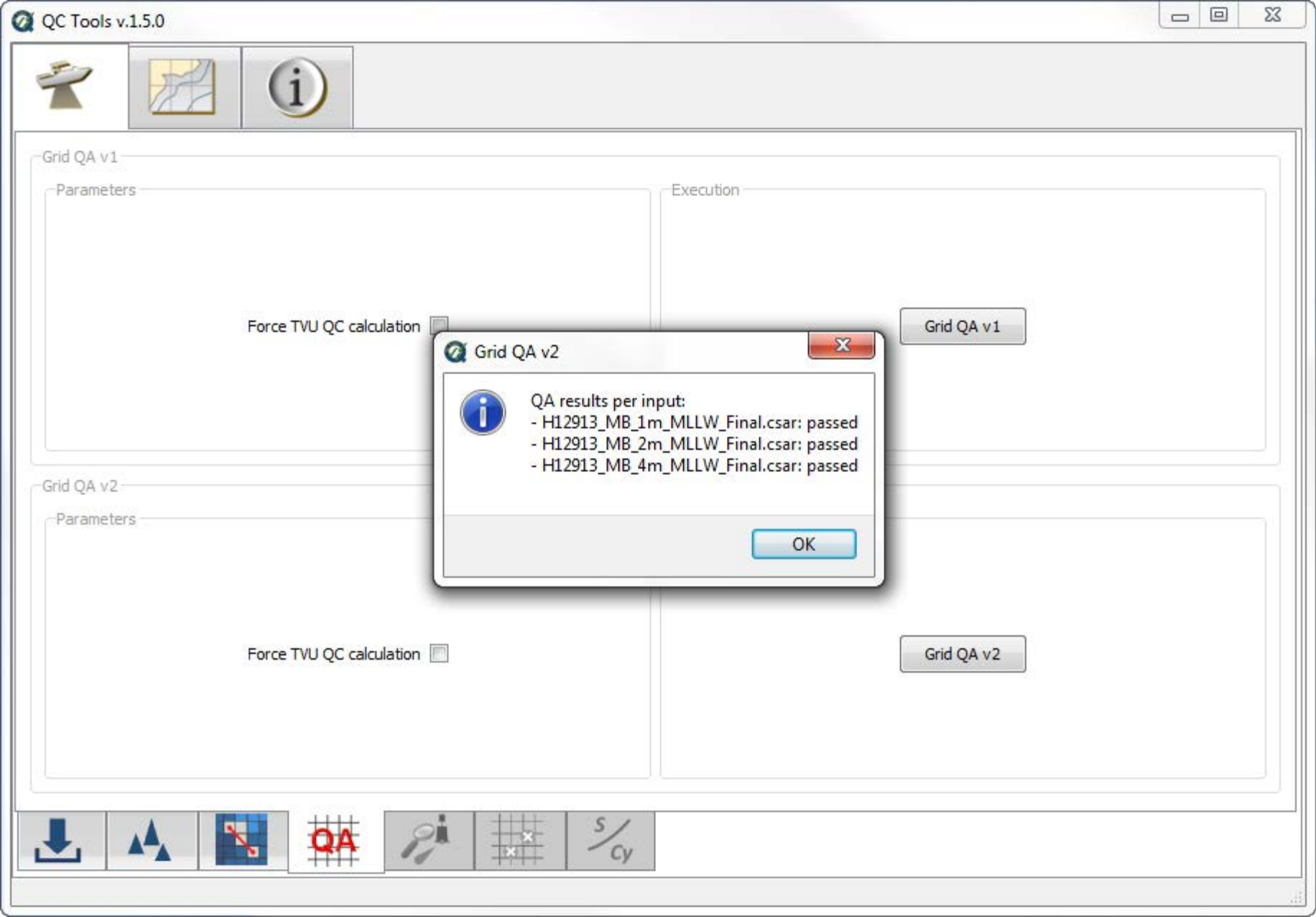
On Mon, Nov 21, 2016 at 8:29 AM, Russell Quintero - NOAA Federal <russell.quintero@noaa.gov> wrote:

> Katy,
>
> Please send the standard waiver language granting this request.
>
> Thanks,
> Russ
>
> Lieutenant Russell Quintero, NOAA
> Chief, Hydrographic Surveys Division Operations Branch
> National Oceanic & Atmospheric Administration
> 1315 East-West Hwy, SSMC3 6217
> Silver Spring, MD 20910
> Cell: 970-481-2030
>
> [Quoted text hidden]

CO Fairweather (CDR Mark Van Waes) <co.fairweather@noaa.gov> Mon, Nov 21, 2016 at 8:05 AM
To: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>, Russell Quintero - NOAA Federal <russell.quintero@noaa.gov>, FA OPS <ops.fairweather@noaa.gov>, "ChiefST.Fairweather" <chiefst.fairweather@noaa.gov>, Samuel Candio <samuel.candio@noaa.gov>

Thanks Katy!

Best,
Mark
[Quoted text hidden]

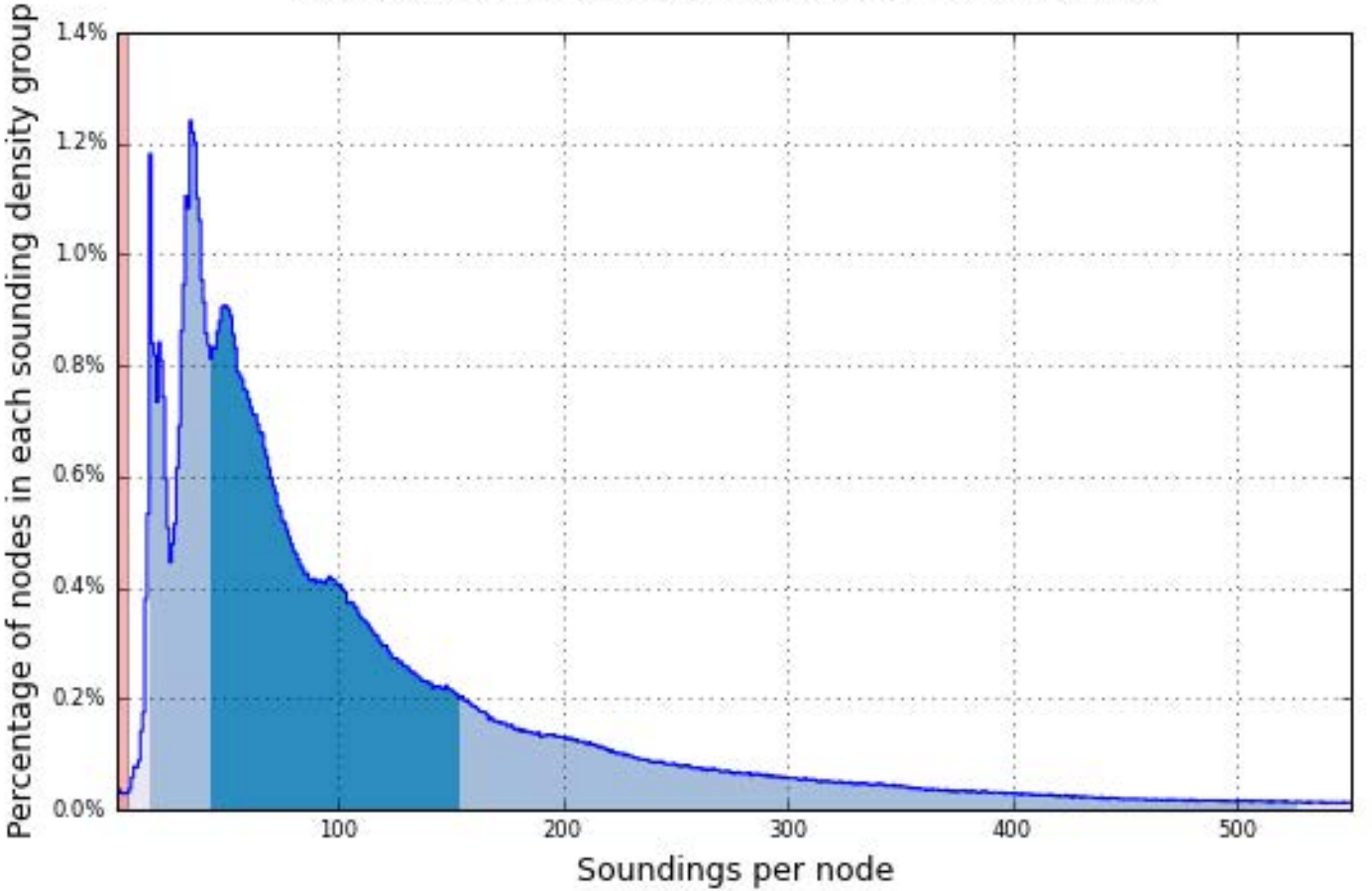

QC Tools v.1.5.0
Grid QA v1
Parameters
Execution
Force TVU QC calculation
Grid QA v1
Grid QA v2
QA results per input:
- H12913_MB_1m_MLLW_Final.csar: passed
- H12913_MB_2m_MLLW_Final.csar: passed
- H12913_MB_4m_MLLW_Final.csar: passed
OK
Grid QA v2
Parameters
Force TVU QC calculation
Grid QA v2
QA
S
Cy

Object Detection Coverage

Grid source: H12913_MB_1m_MLLW_Final.csar

99.5+% pass (4,115,289 of all nodes), min=1.0, mode=34, max=6015.0

Percentiles: 2.5%=16, Q1=43, median=77, Q3=153, 97.5%=527

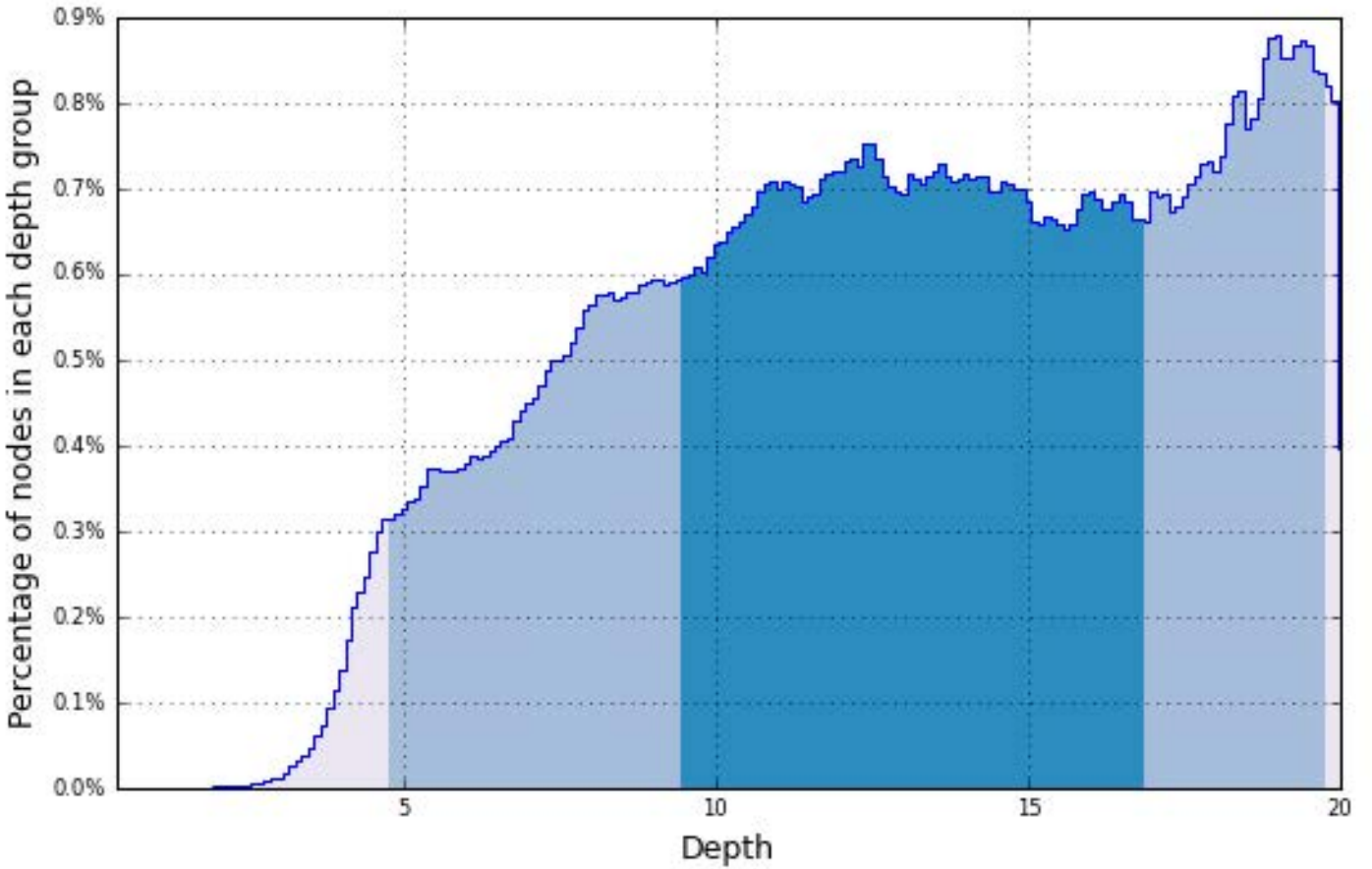


Depth Distribution

Grid source: H12913_MB_1m_MLLW_Final.csar

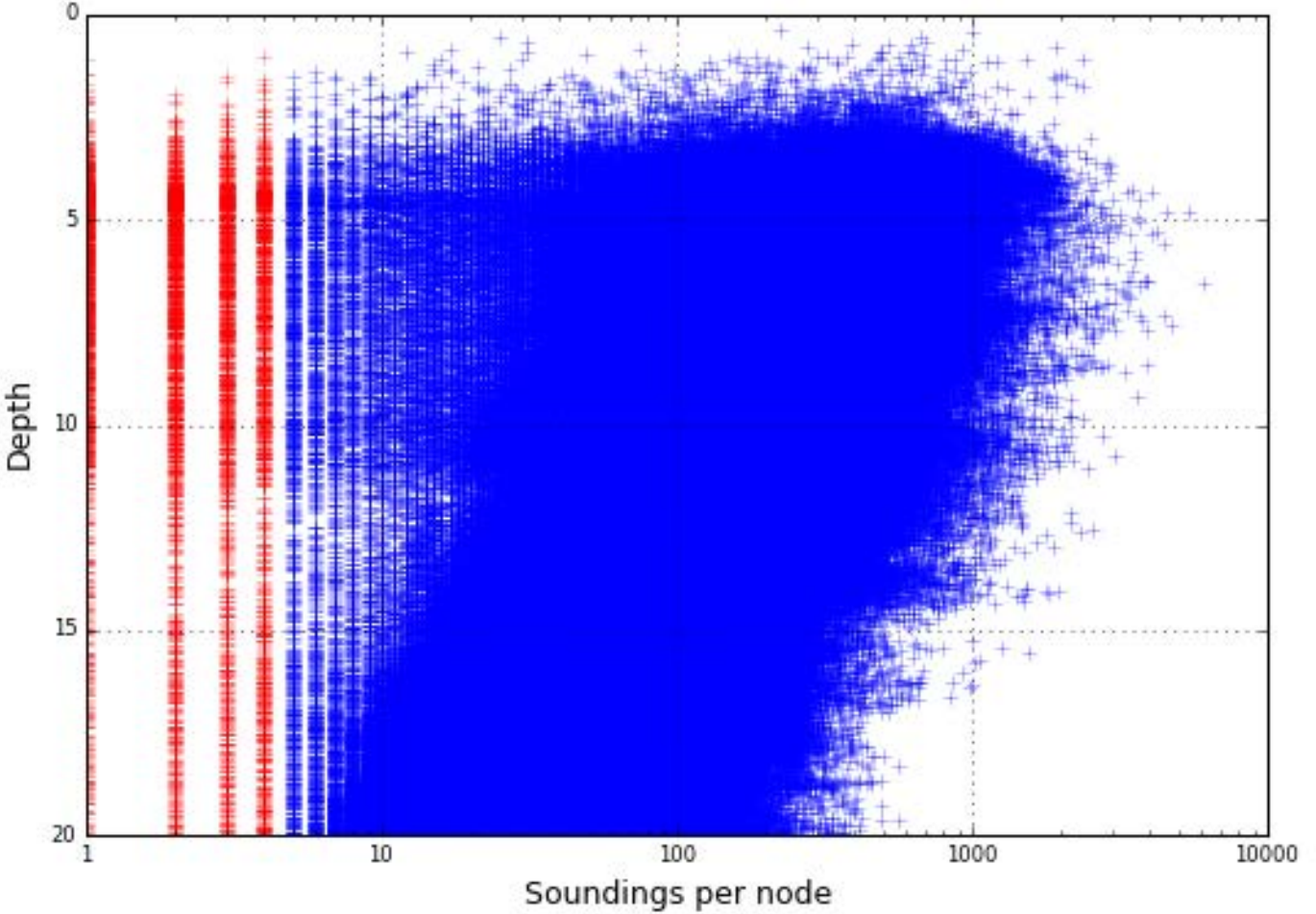
Total nodes: 4,121,182, min=0.36, mode=19.0, max=20.00

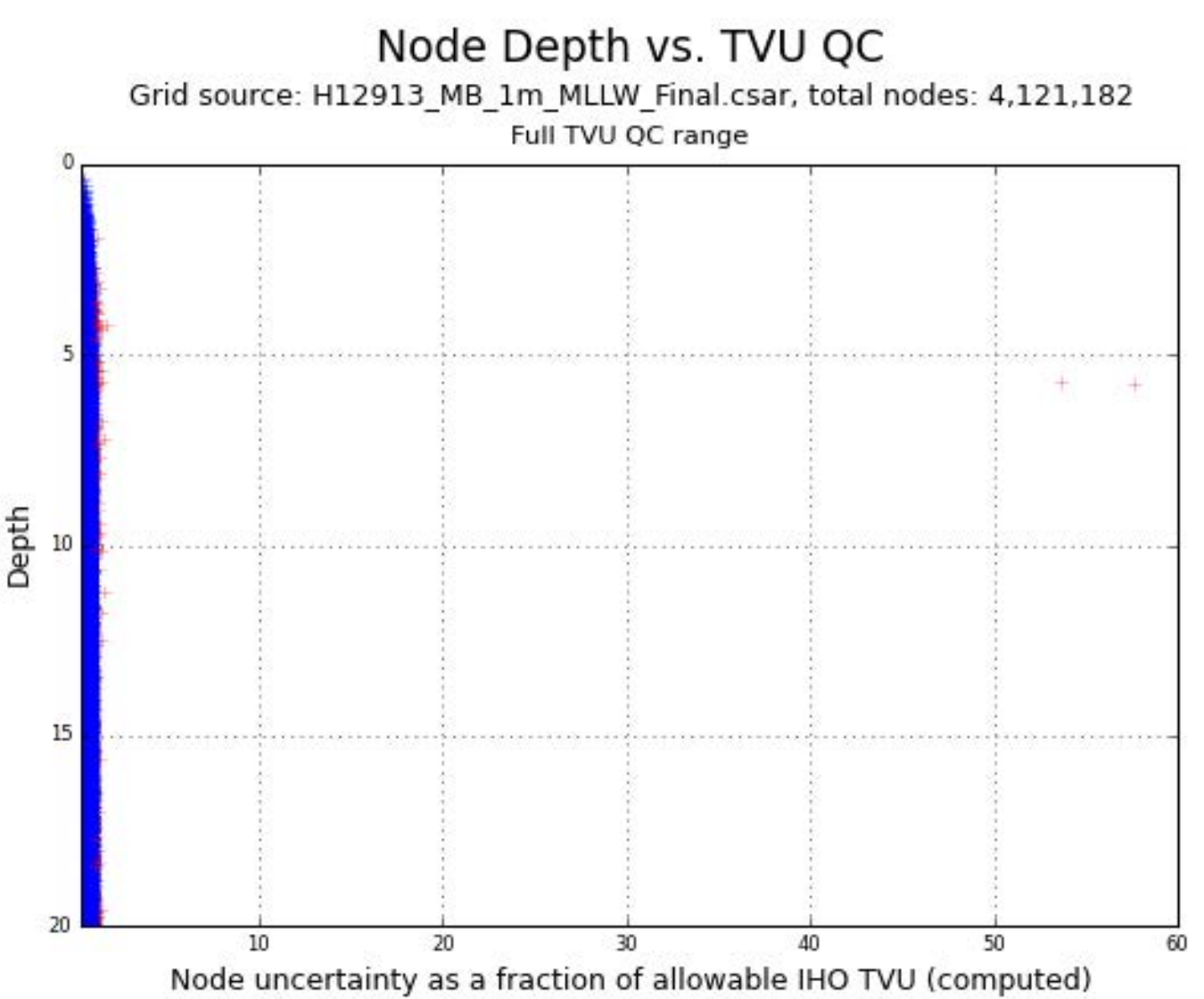
Percentiles: 2.5%=4.8, Q1=9.5, median=13.2, Q3=16.8, 97.5%=19.7

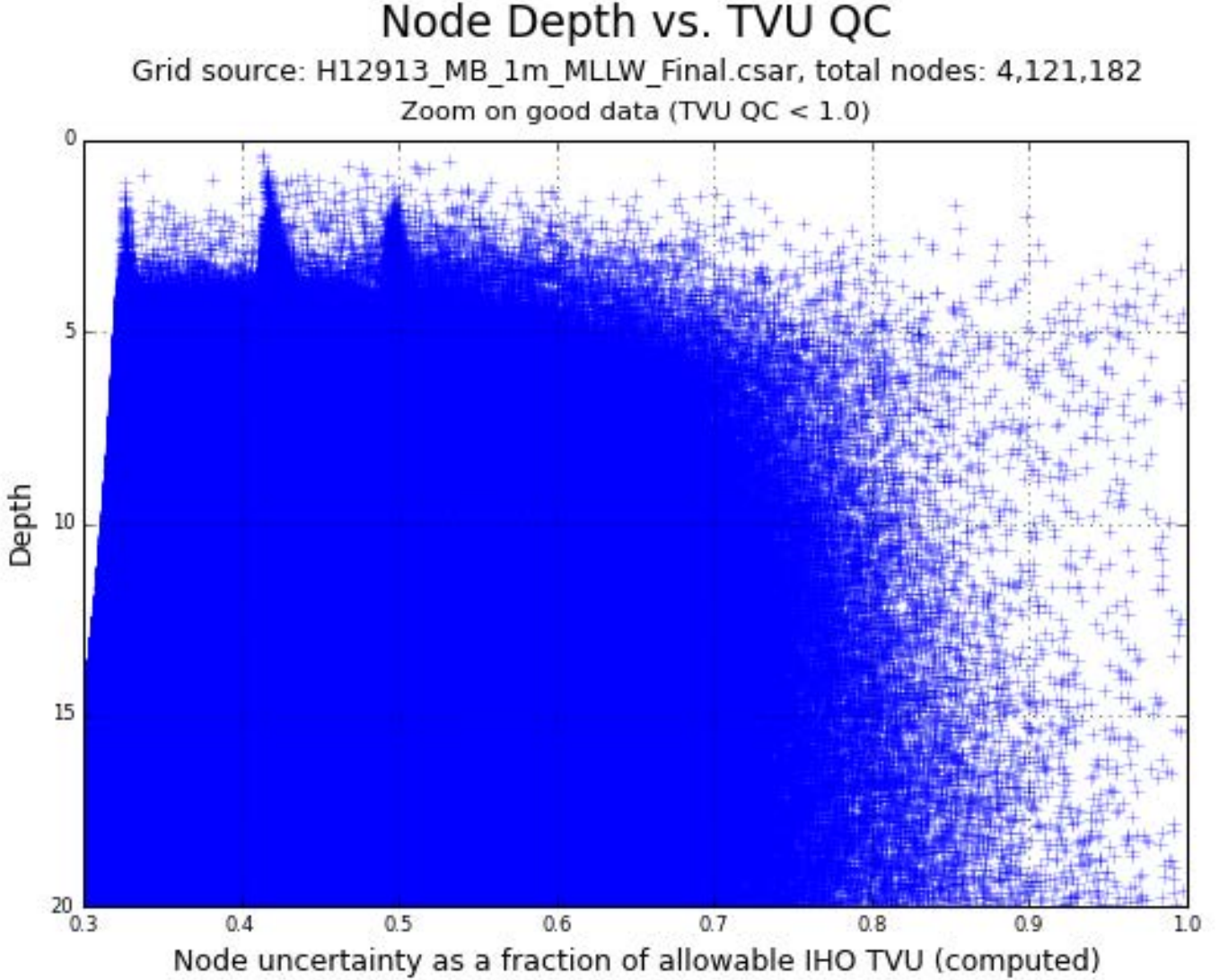


Node Depth vs. Sounding Density

Grid source: H12913_MB_1m_MLLW_Final.csar, total nodes: 4,121,182




Node Depth vs. TVU QC
Grid source: H12913_MB_1m_MLLW_Final.csar, total nodes: 4,121,182
Full TVU QC range
Depth
0
5
10
15
20
10
20
30
40
50
60
Node uncertainty as a fraction of allowable IHO TVU (computed)

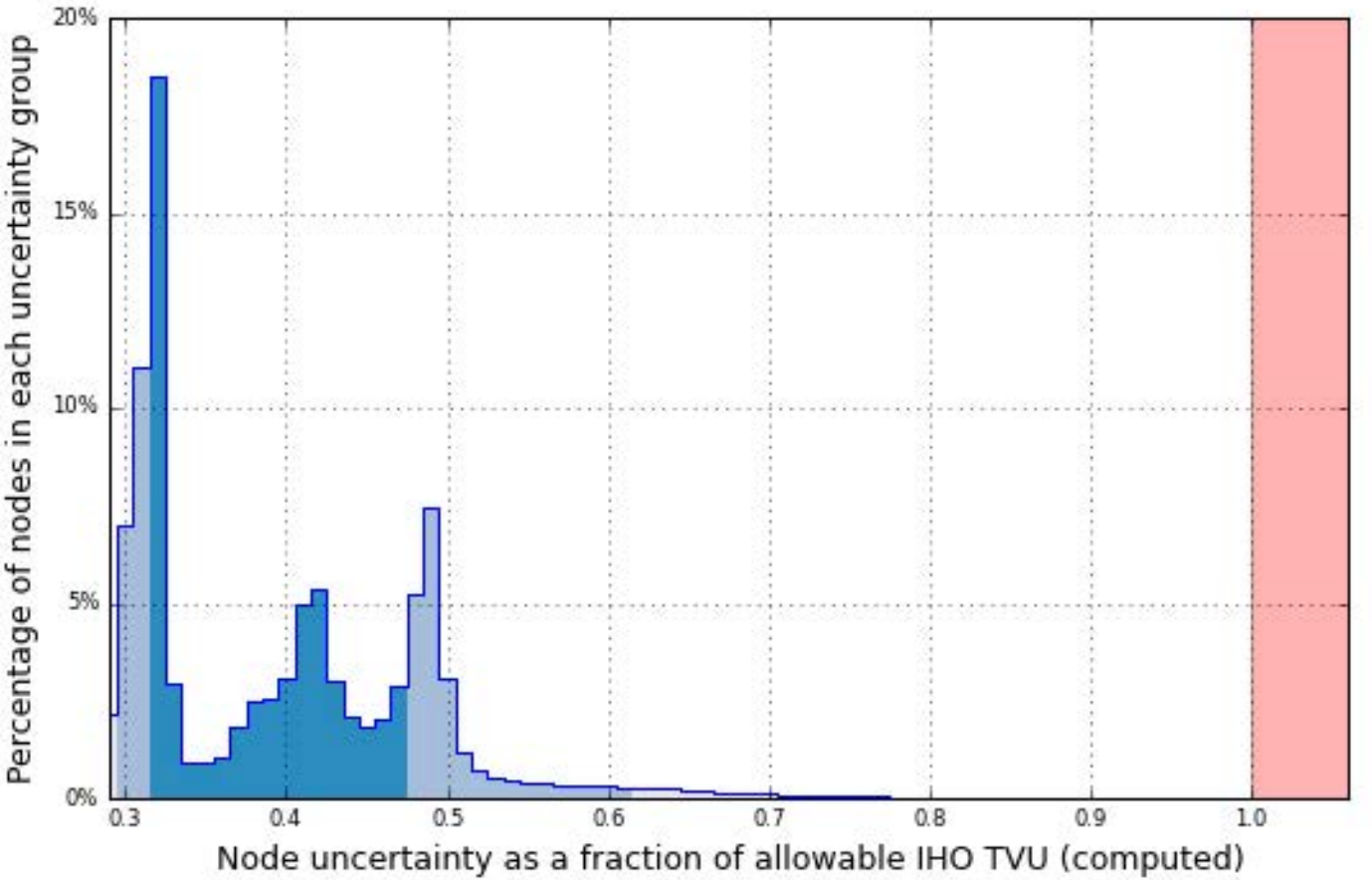

Node Depth vs. TVU QC
Grid source: H12913_MB_1m_MLLW_Final.csar, total nodes: 4,121,182
Zoom on good data (TVU QC < 1.0)
Depth
0
5
10
15
20
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Node uncertainty as a fraction of allowable IHO TVU (computed)

Uncertainty Standards

Grid source: H12913_MB_1m_MLLW_Final.csar

99.5+% pass (4,121,032 of all nodes), min=0.29, mode=0.32, max=57.59

Percentiles: 2.5%=0.30, Q1=0.32, median=0.39, Q3=0.47, 97.5%=0.61

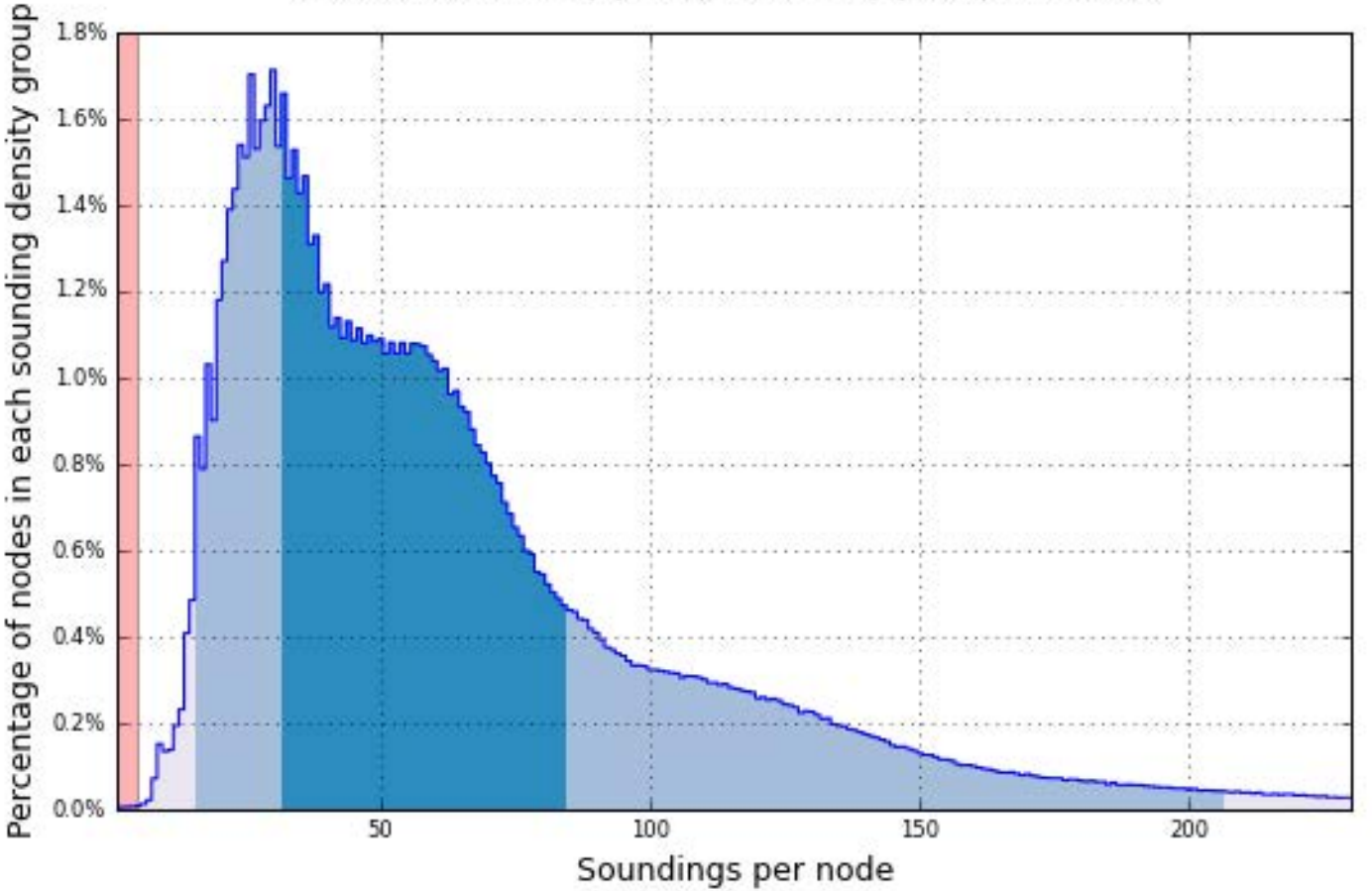


Object Detection Coverage

Grid source: H12913_MB_2m_MLLW_Final.csar

99.5+% pass (2,581,104 of all nodes), min=1.0, mode=30, max=1530.0

Percentiles: 2.5%=16, Q1=32, median=53, Q3=84, 97.5%=206

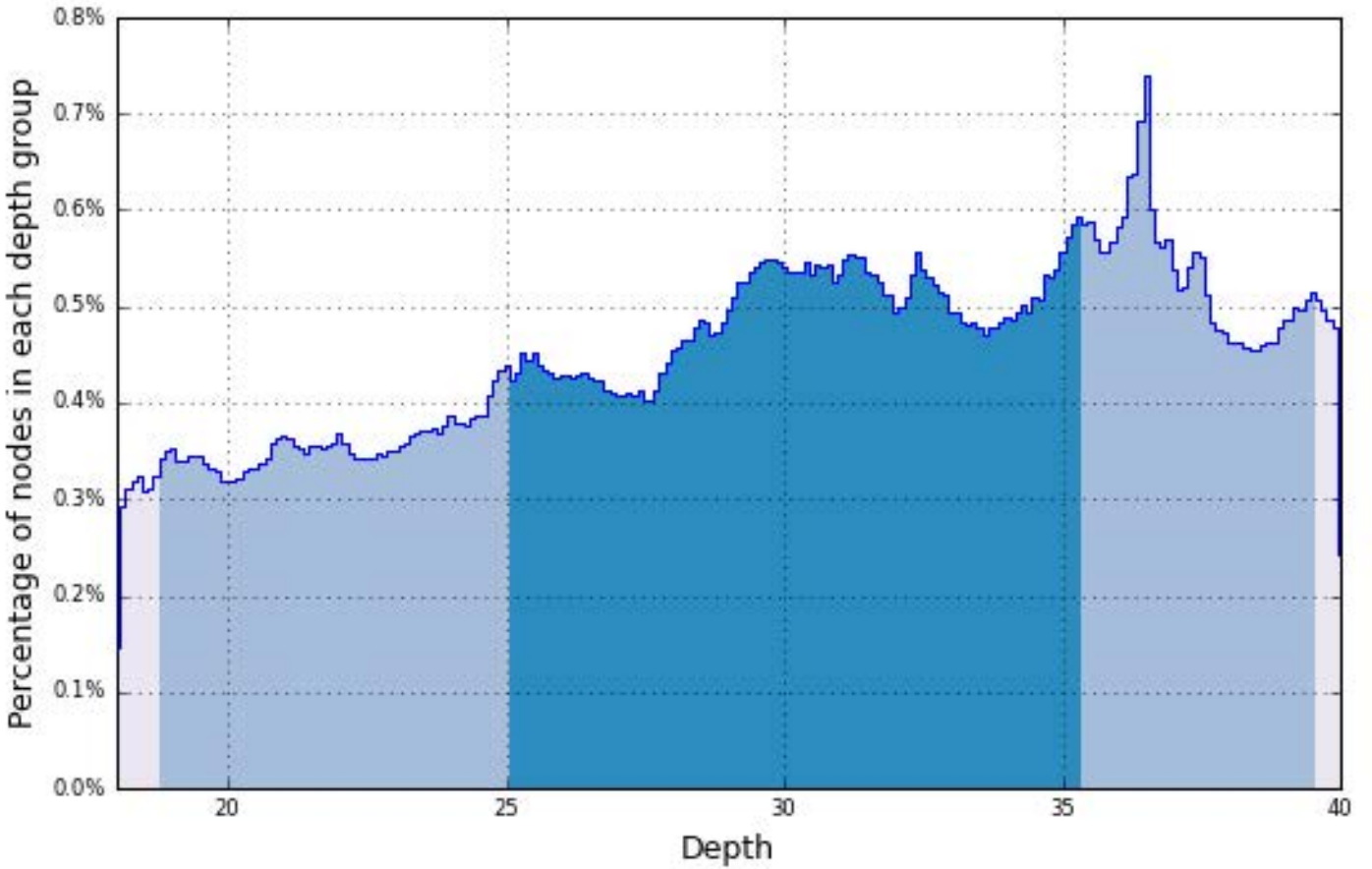


Depth Distribution

Grid source: H12913_MB_2m_MLLW_Final.csar

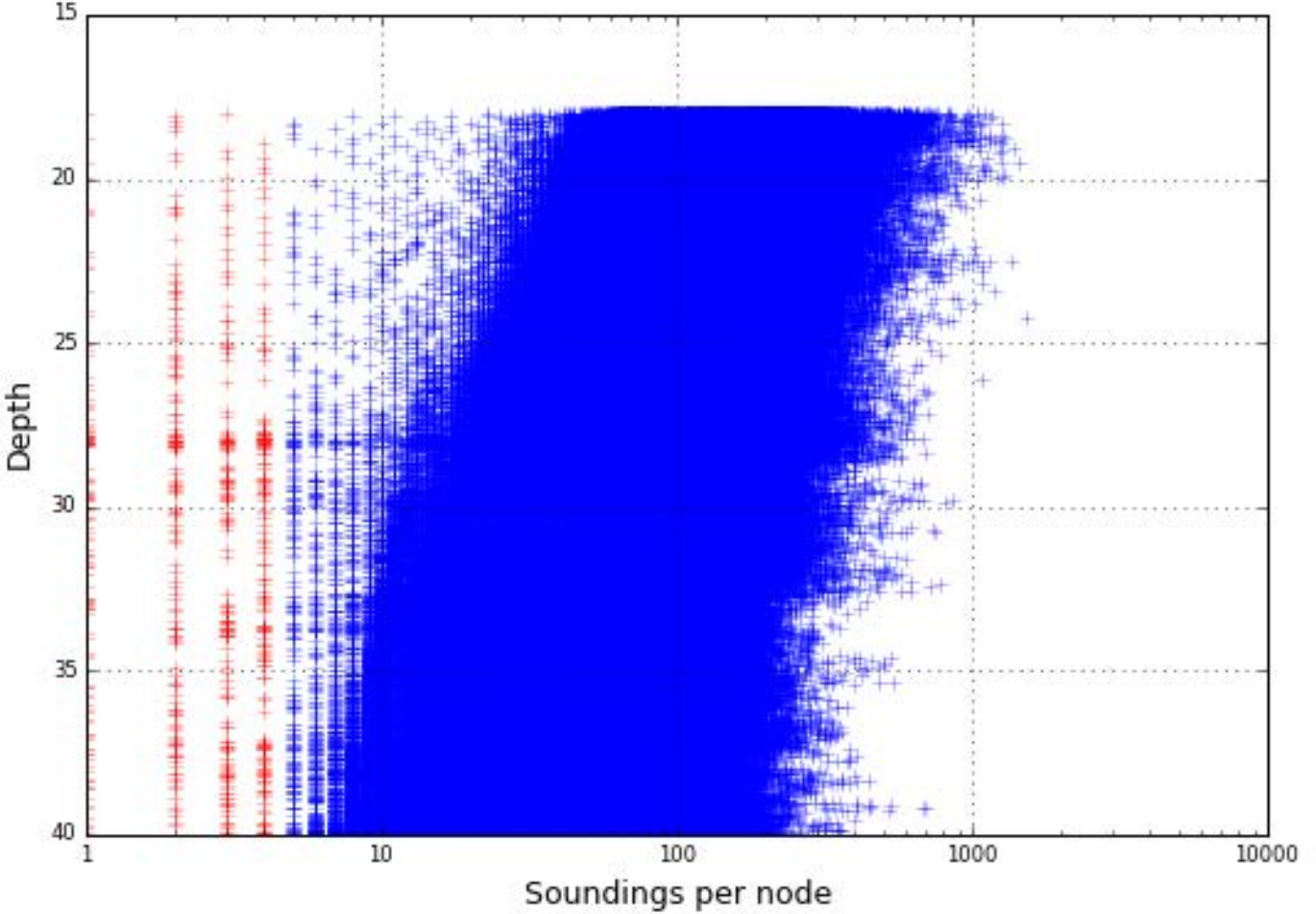
Total nodes: 2,581,708, min=18.00, mode=36.5, max=40.00

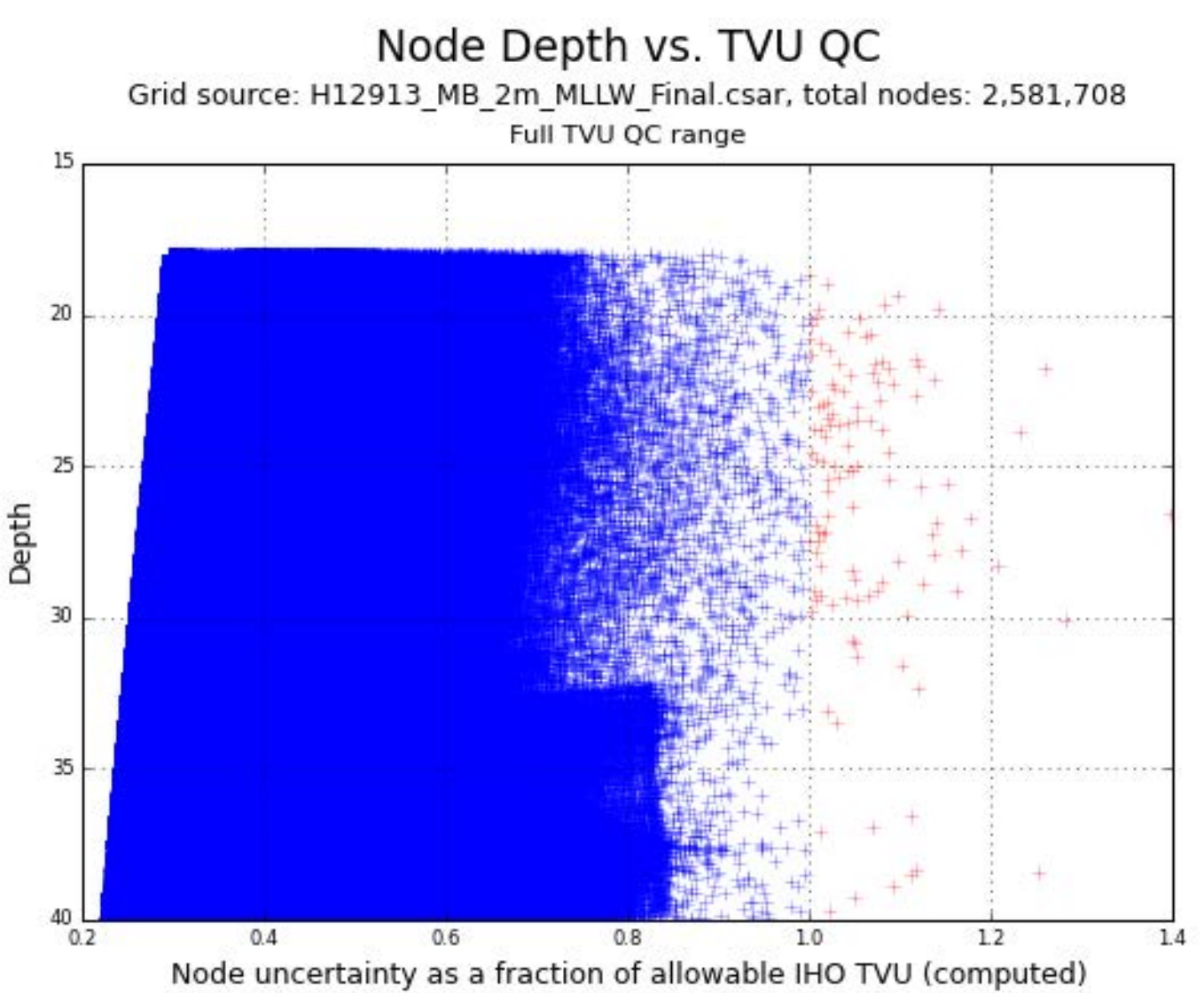
Percentiles: 2.5%=18.8, Q1=25.1, median=30.5, Q3=35.3, 97.5%=39.5

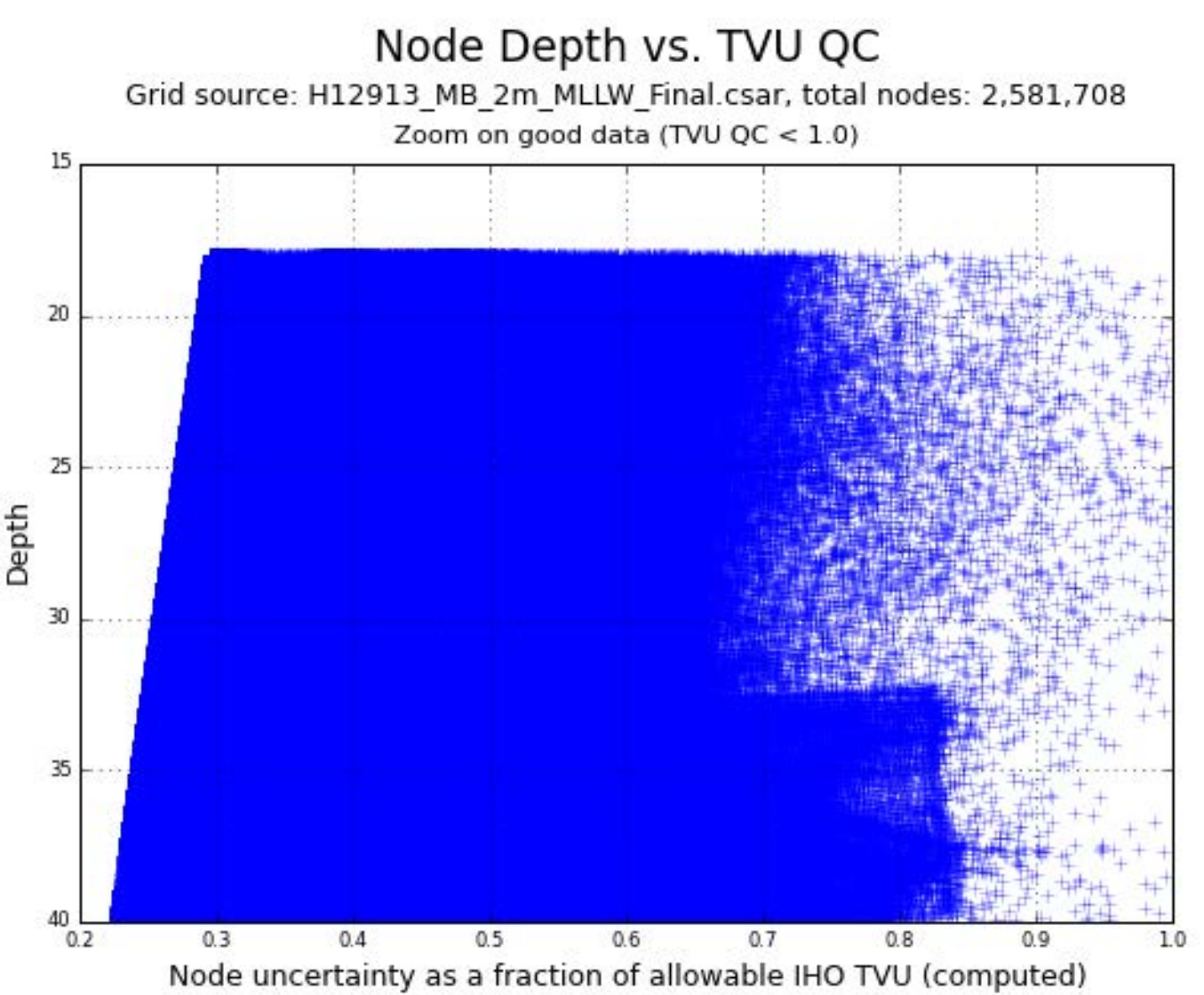


Node Depth vs. Sounding Density

Grid source: H12913_MB_2m_MLLW_Final.csar, total nodes: 2,581,708




Node Depth vs. TVU QC
Grid source: H12913_MB_2m_MLLW_Final.csar, total nodes: 2,581,708
Full TVU QC range
Depth
15
20
25
30
35
40
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Node uncertainty as a fraction of allowable IHO TVU (computed)

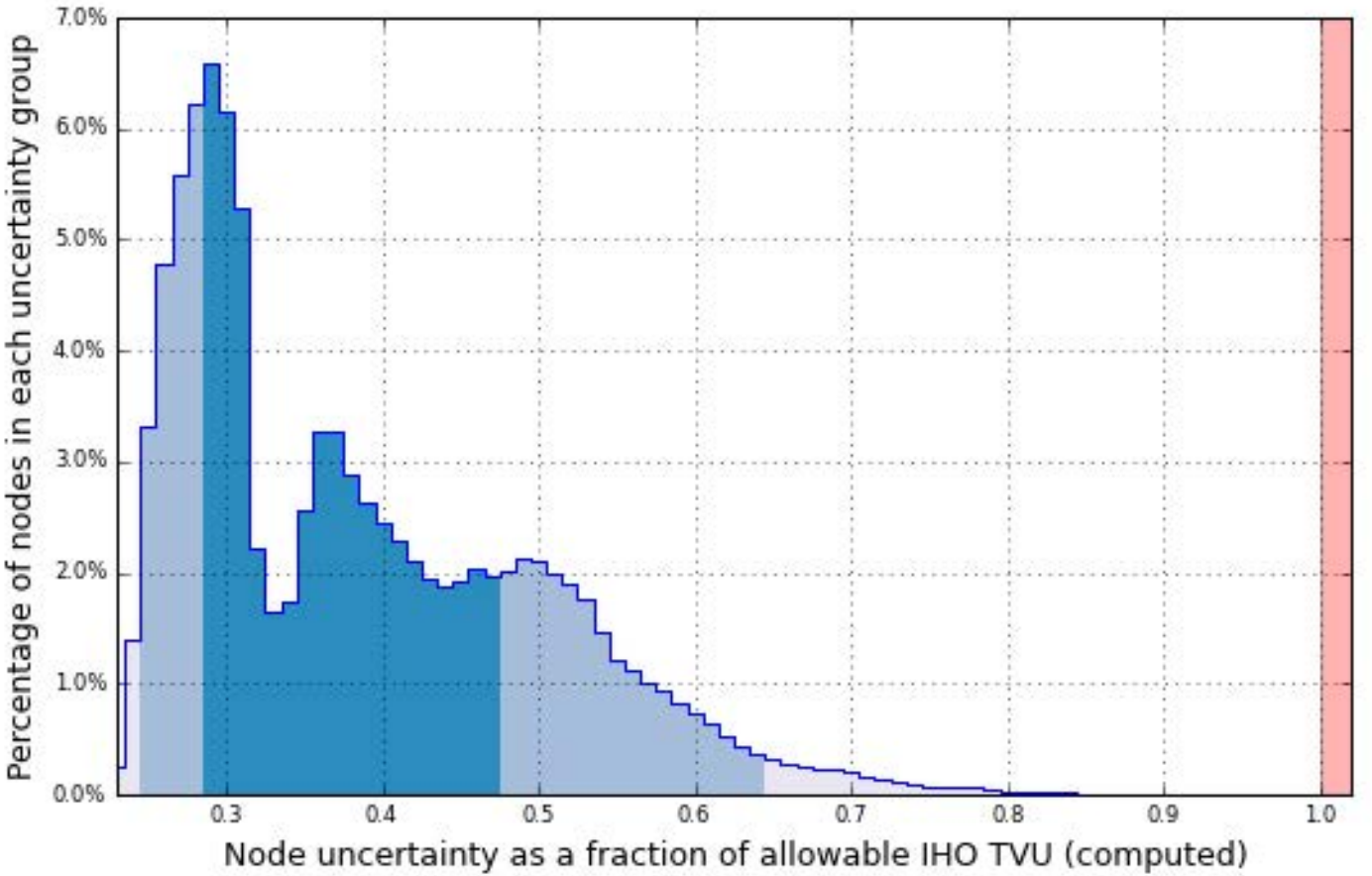

Node Depth vs. TVU QC
Grid source: H12913_MB_2m_MLLW_Final.csar, total nodes: 2,581,708
Zoom on good data (TVU QC < 1.0)
Depth
15
20
25
30
35
40
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Node uncertainty as a fraction of allowable IHO TVU (computed)

Uncertainty Standards

Grid source: H12913_MB_2m_MLLW_Final.csar

99.5+% pass (2,581,593 of all nodes), min=0.23, mode=0.29, max=1.40

Percentiles: 2.5%=0.25, Q1=0.29, median=0.36, Q3=0.47, 97.5%=0.64

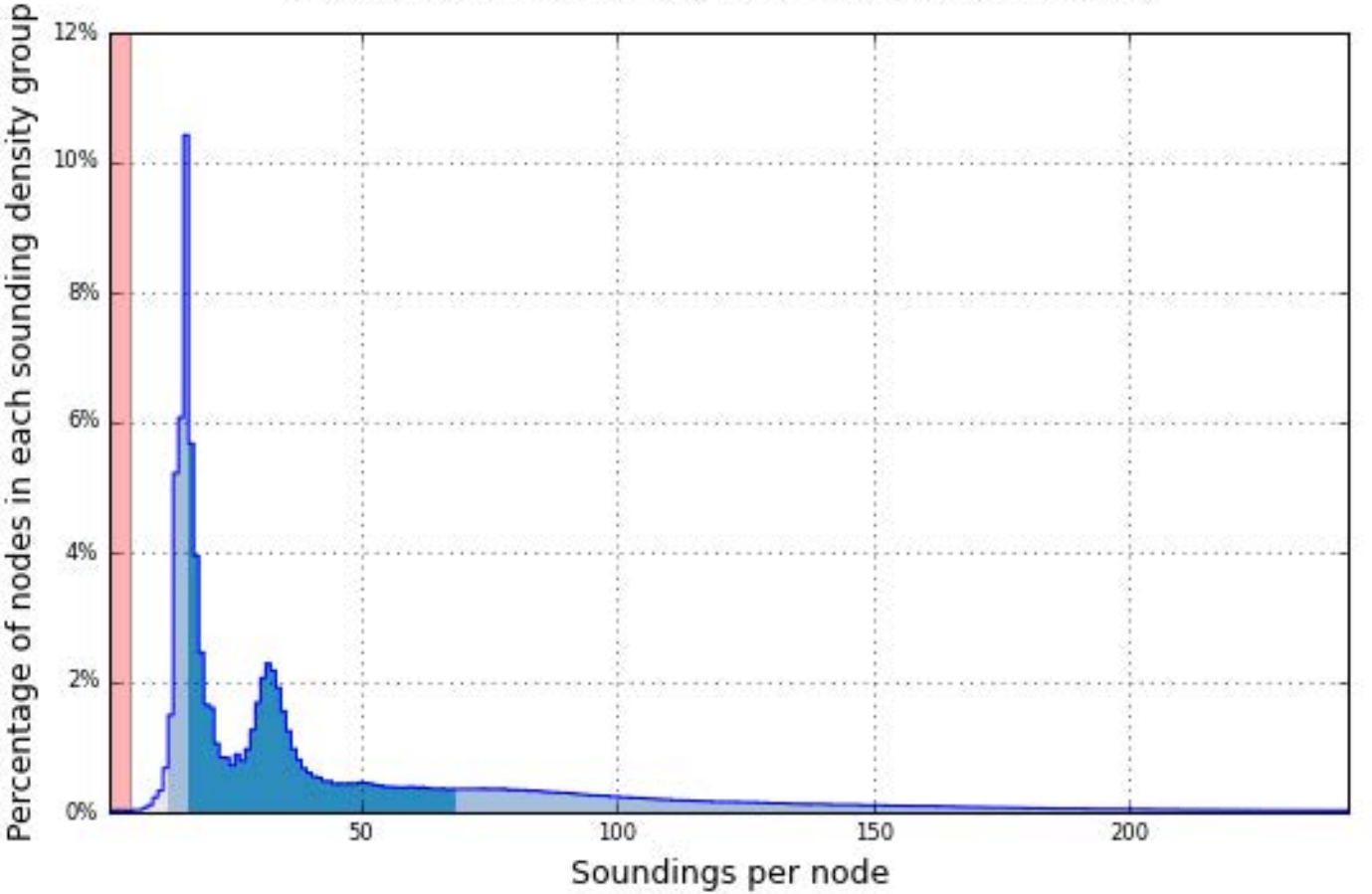


Object Detection Coverage

Grid source: H12913_MB_4m_MLLW_Final.csar

99.5+% pass (2,263,470 of all nodes), min=1.0, mode=16, max=1453.0

Percentiles: 2.5%=13, Q1=17, median=31, Q3=68, 97.5%=223

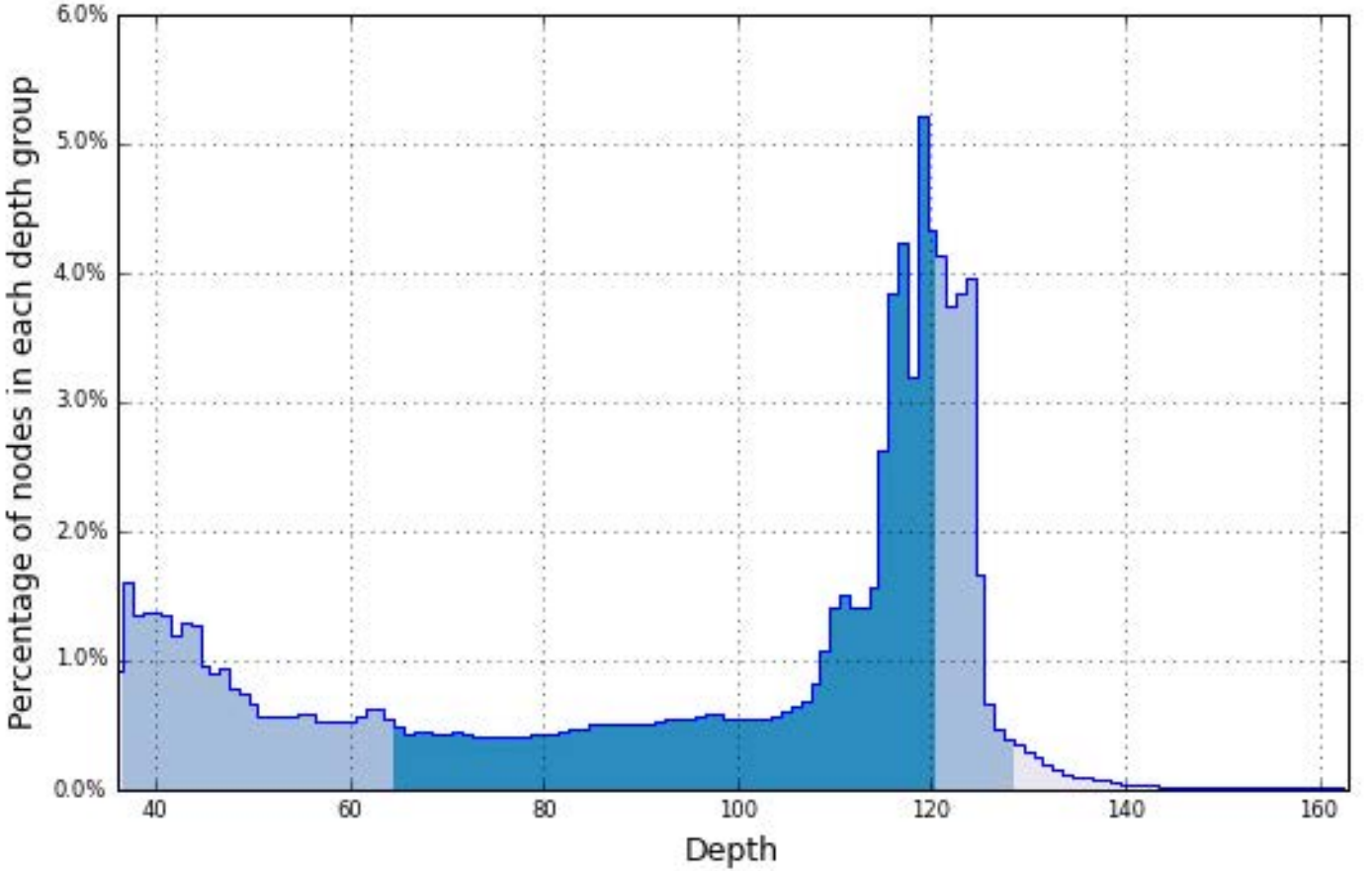


Depth Distribution

Grid source: H12913_MB_4m_MLLW_Final.csar

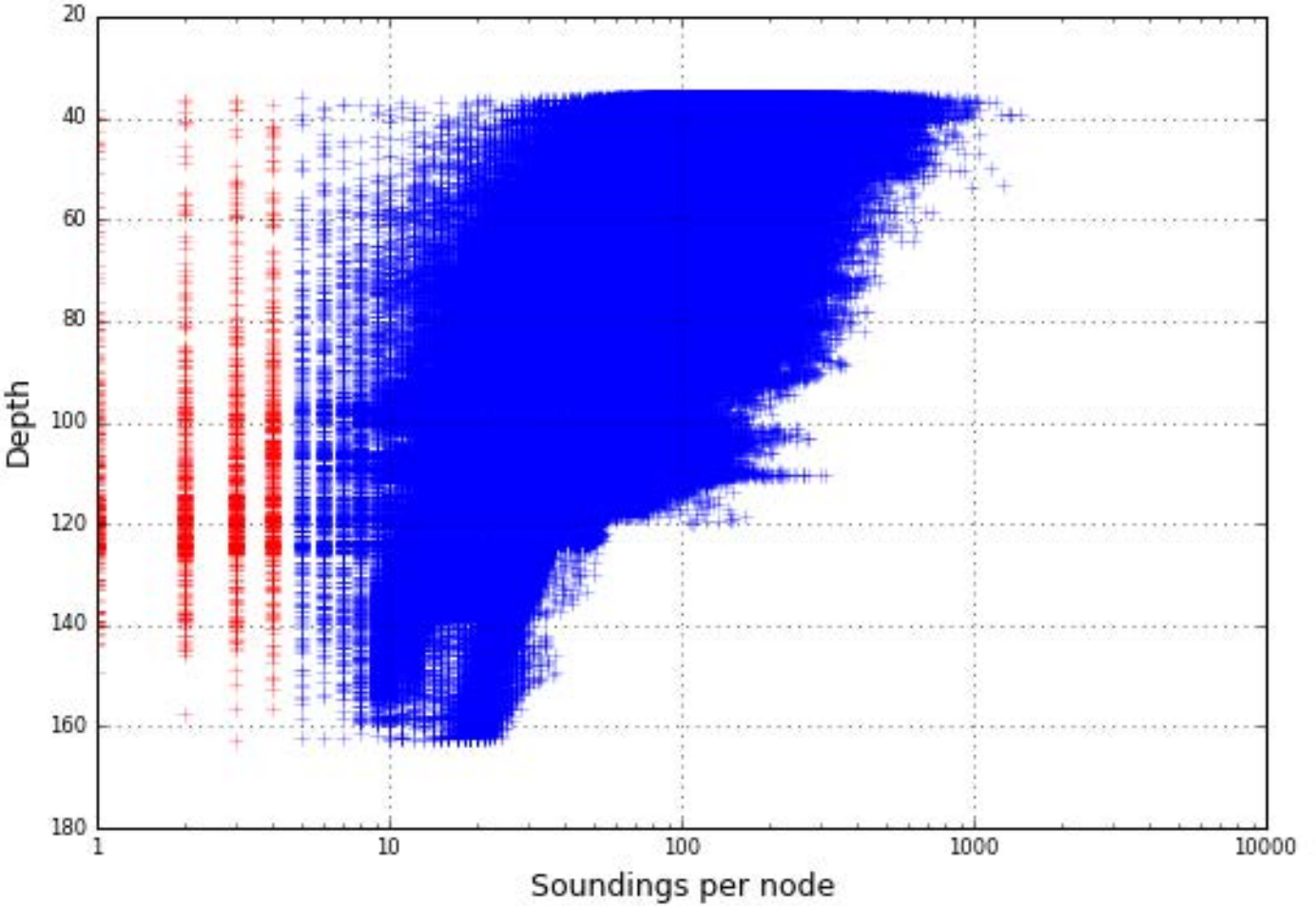
Total nodes: 2,265,748, min=36.0, mode=119, max=162.6

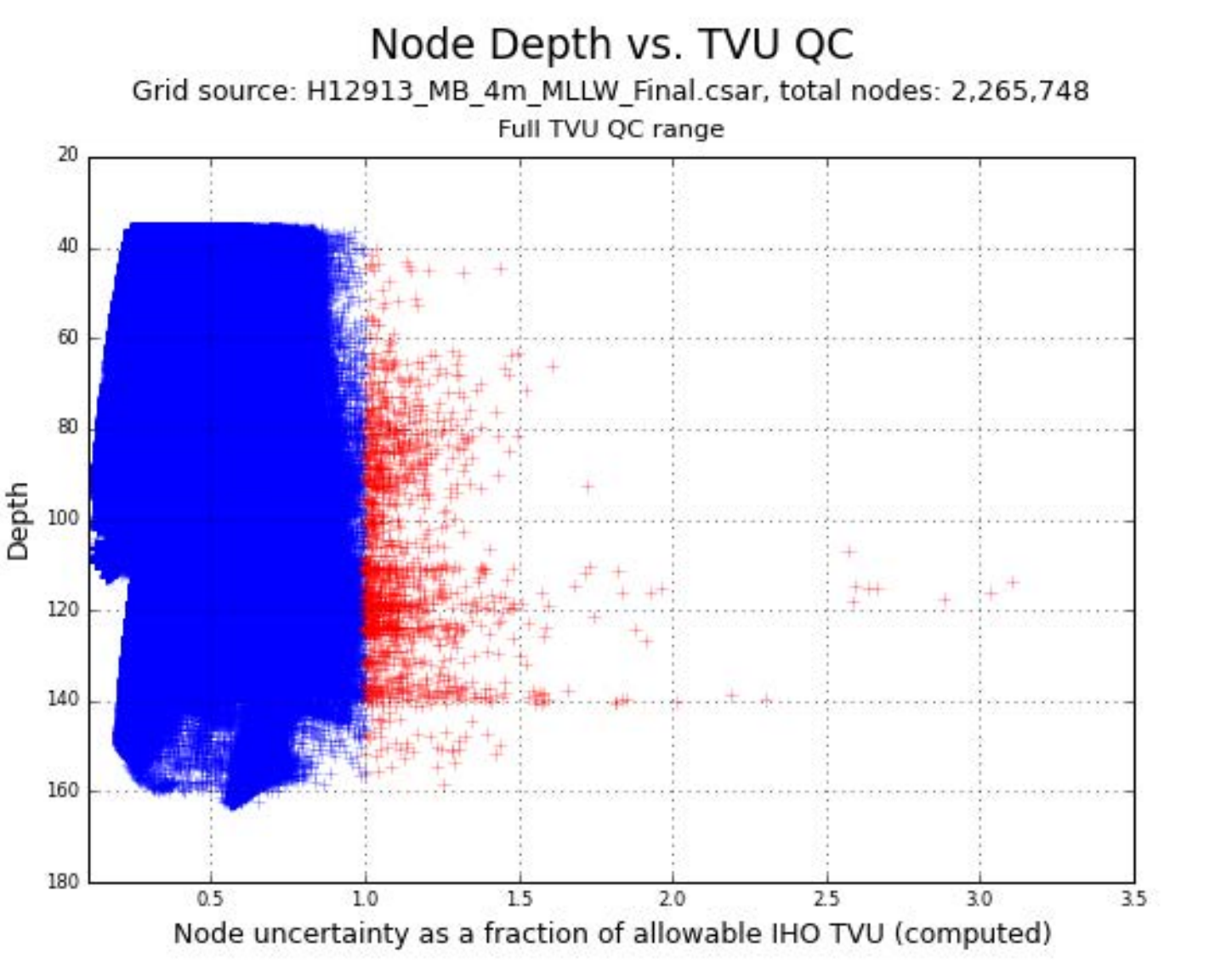
Percentiles: 2.5%=37, Q1=65, median=111, Q3=120, 97.5%=128

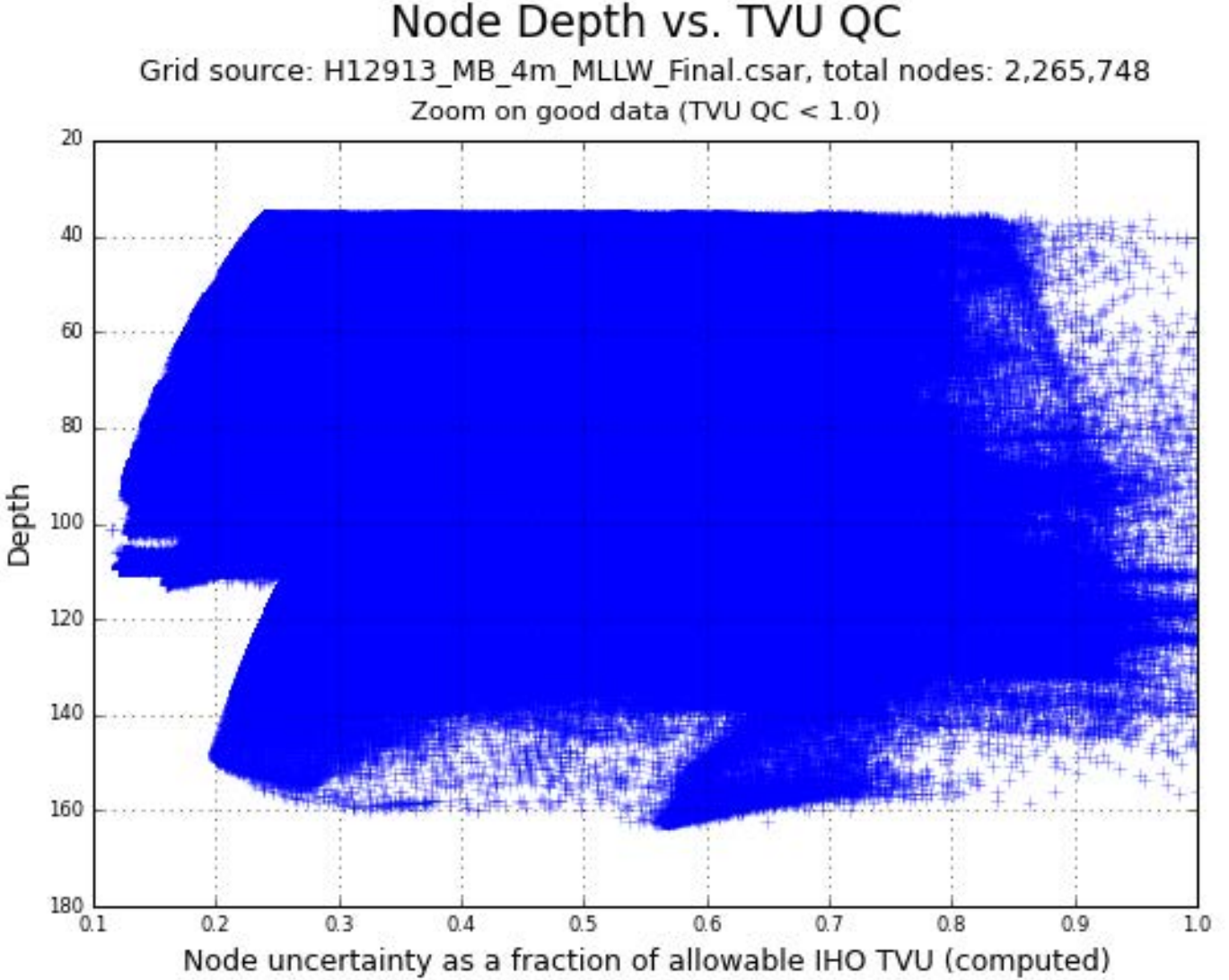


Node Depth vs. Sounding Density

Grid source: H12913_MB_4m_MLLW_Final.csar, total nodes: 2,265,748




Node Depth vs. TVU QC
Grid source: H12913_MB_4m_MLLW_Final.csar, total nodes: 2,265,748
Full TVU QC range
Depth
20
40
60
80
100
120
140
160
180
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Node uncertainty as a fraction of allowable IHO TVU (computed)

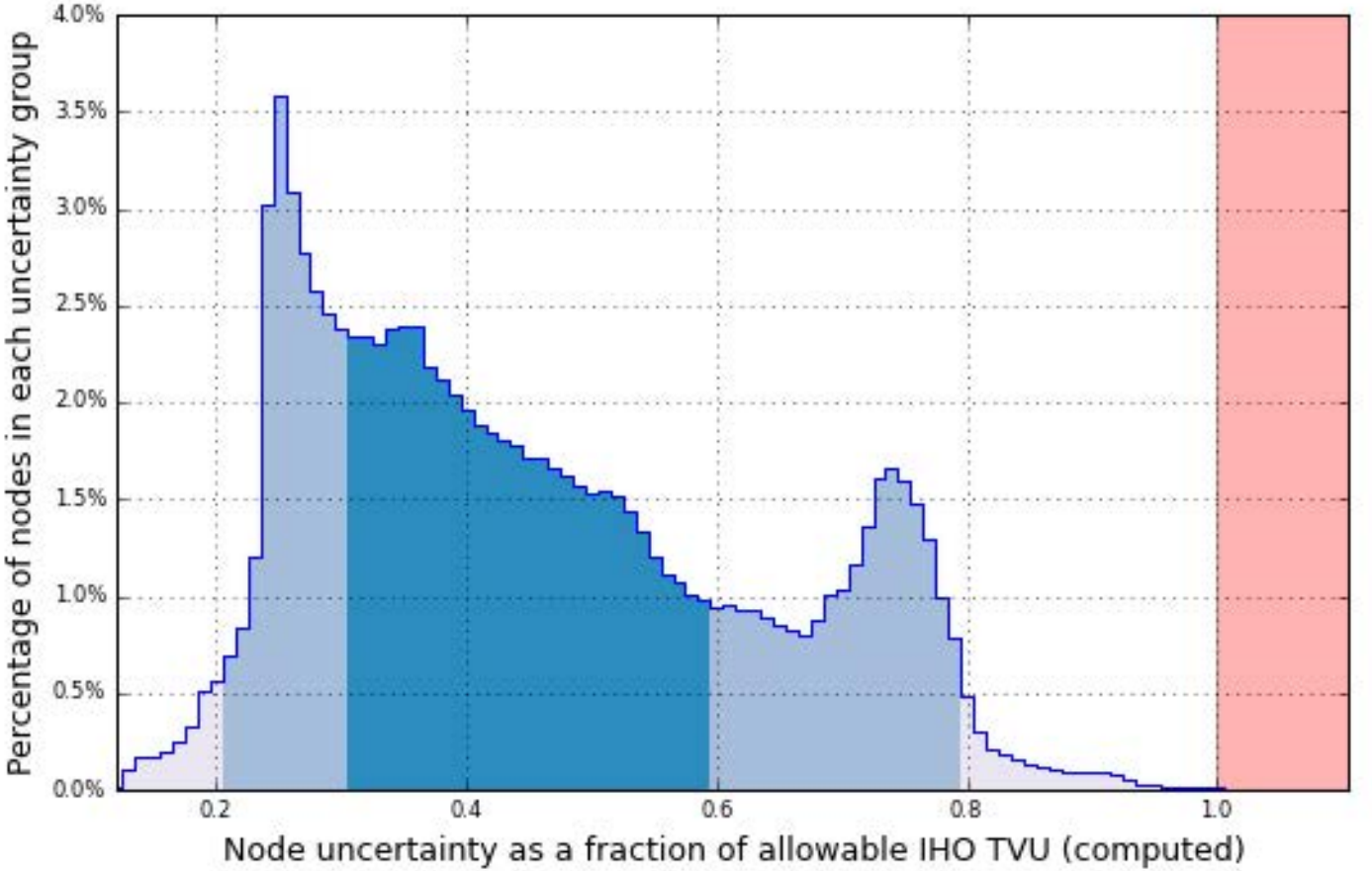

Node Depth vs. TVU QC
Grid source: H12913_MB_4m_MLLW_Final.csar, total nodes: 2,265,748
Zoom on good data (TVU QC < 1.0)
Depth
20
40
60
80
100
120
140
160
180
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Node uncertainty as a fraction of allowable IHO TVU (computed)

Uncertainty Standards

Grid source: H12913_MB_4m_MLLW_Final.csar

99.5+% pass (2,264,179 of all nodes), min=0.12, mode=0.25, max=3.10

Percentiles: 2.5%=0.21, Q1=0.31, median=0.42, Q3=0.59, 97.5%=0.79



APPROVAL PAGE

H12913

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

- H12913_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12913_GeoImage.pdf

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

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: 2017.07.14 13:28:35 -07'00'

Approved:_____

Pete Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

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

Digitally signed by LINDER.CECELIA.C.1365836732
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=LINDER.CECELIA.C.1365836732
Date: 2017.07.17 10:55:12 -07'00'

Approved:_____

Cecelia Linder
Acting Chief, Pacific Hydrographic Branch