H12627

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12627

LOCALITY

State(s):	New York
General Locality:	Approaches to New York
Sub-locality:	Offshore - 14NM SE of Sandy Hook Point

2013

CHIEF OF PARTY
LCDR Marc S. Moser, NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12627**

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):	**New York**
General Locality:	**Approaches to New York**
Sub-Locality:	**Offshore - 14NM SE of Sandy Hook Point**
Scale:	**40000**
Dates of Survey:	**10/21/2013 to 11/06/2013**
Instructions Dated:	**09/19/2013**
Project Number:	**OPR-B310-FH-13**
Field Unit:	**NOAA Ship *Ferdinand R. Hassler***
Chief of Party:	**LCDR Marc S. Moser, NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Side Scan Sonar Multibeam Echo Sounder Backscatter**
Verification by:	**Atlantic 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 Geophysical Data Center (NGDC) and can be retrieved via http:// www.ngdc.noaa.gov/.

Table of Contents

A. Area Surveyed 1
A.1 Survey Limits 1
A.2 Survey Purpose 2
A.3 Survey Quality 2
A.4 Survey Coverage 3
A.5 Survey Statistics 5
B. Data Acquisition and Processing 6
B.1 Equipment and Vessels 6
B.1.1 Vessels 6
B.1.2 Equipment 8
B.2 Quality Control 8
B.2.1 Crosslines 8
B.2.2 Uncertainty 10
B.2.3 Junctions 12
B.2.4 Sonar QC Checks 25
B.2.5 Equipment Effectiveness 25
B.2.6 Factors Affecting Soundings 26
B.2.7 Sound Speed Methods 27
B.2.8 Coverage Equipment and Methods 28
B.3 Echo Sounding Corrections 28
B.3.1 Corrections to Echo Soundings 28
B.3.2 Calibrations 33
B.4 Backscatter 34
B.5 Data Processing 34
B.5.1 Software Updates 34
B.5.2 Surfaces 34
B.5.3 Designated Soundings 35
B.5.4 Rejection of Data Outside Survey Area 35
B.5.5 Total Vertical Uncertainty Analysis 36
C. Vertical and Horizontal Control 36
C.1 Vertical Control 36
C.2 Horizontal Control 37
D. Results and Recommendations 39
D.1 Chart Comparison 39
D.1.1 Raster Charts 39
D.1.2 Electronic Navigational Charts 41
D.1.3 AWOIS Items 42
D.1.4 Maritime Boundary Points 43
D.1.5 Charted Features 43
D.1.6 Uncharted Features 43
D.1.7 Dangers to Navigation 44
D.1.8 Shoal and Hazardous Features 44
D.1.9 Channels 44

D.1.10 Bottom Samples 44
D.2 Additional Results 44
D.2.1 Shoreline 44
D.2.2 Prior Surveys 44
D.2.3 Aids to Navigation 44
D.2.4 Overhead Features 44
D.2.5 Submarine Features 45
D.2.6 Ferry Routes and Terminals 45
D.2.7 Platforms 45
D.2.8 Significant Features 45
D.2.9 Construction and Dredging 45
D.2.10 New Survey Recommendations 45
D.2.11 New Inset Recommendations 45
E. Approval Sheet 46
F. Table of Acronyms 47

List of Tables

Table 1: Survey Limits 1
Table 2: Hydrographic Survey Statistics 5
Table 3: Dates of Hydrography 6
Table 4: Vessels Used 6
Table 5: Major Systems Used 8
Table 6: Survey Specific Tide TPU Values 10
Table 7: Survey Specific Sound Speed TPU Values 10
Table 8: Junctioning Surveys 12
Table 9: Calibrations not discussed in the DAPR 33
Table 10: Submitted Surfaces 34
Table 11: NWLON Tide Stations 36
Table 12: Water Level Files (.tid) 36
Table 13: Tide Correctors (.zdf or .tc) 36
Table 14: CORS Base Stations 38
Table 15: USCG DGPS Stations 38
Table 16: Largest Scale Raster Charts 39
Table 17: Largest Scale ENCs 41

List of Figures

Figure 1: H12627 survey limits 2
Figure 2: Acquired survey coverage overlaid on Chart 12326. Scale shows depths in meters 3
Figure 3: H12627 gaps in coverage of MBES data 4
Figure 4: NOAA Ship FERDINAND R. HASSLER alongside pier at Marine Operations Center - Atlantic 7
Figure 5: H12627 MBES crossline data overlaid on mainscheme lines 9

Figure 6: H12627 crossline difference statistics: mainscheme minus crosslines..... 10
Figure 7: H12627 junction overview..... 12
Figure 8: Junction between H12627 (green) and H12628 (red)..... 13
Figure 9: Differenced surface statistics, H12627 minus H12628..... 14
Figure 10: Junction between H12627 (green) and H12629 (blue)..... 15
Figure 11: Differenced surface statistics, H12627 minus H12629..... 16
Figure 12: Junction between H12627 (green) and H12036 (purple)..... 17
Figure 13: Differenced surface statistics, H12627 minus H12036..... 18
Figure 14: Area of large differences due to authorized dumping of dredged material. 19
Figure 15: Junction between H12627 (green) and H12158 (dark blue)..... 20
Figure 16: Differenced surface statistics, H12627 minus H12158..... 21
Figure 17: Junction between H12627 (green) and H12608 (tan)..... 22
Figure 18: Differenced surface statistics, H12627 minus H12608..... 23
Figure 19: Junction between H12627 (green) and H12610 (gold)..... 24
Figure 20: Differenced surface statistics, H12627 minus H12610..... 25
Figure 21: Example of rapidly changing sea floor due to active dredge dumping area. Lines are colored by day and were acquired thirteen days apart. The dredge material dump site is highlighted in light blue..... 27
Figure 22: H12627 sound speed cast locations..... 28
Figure 23: Representative line shows about a 0.21m offset from corresponding lines. 30
Figure 24: The GPS tide signal pre-interpolation shows a downward spike caused by a poor SBET solution. 31
Figure 25: Interpolation of GPS Tide in CARIS Altitude Editor. 32
Figure 26: Results after interpolation. 33
Figure 27: H12627 rejected data..... 35
Figure 28: H12627 soundings and contours overlaid on Chart 12326..... 40
Figure 29: H12627 soundings (blue) that differ by more that five feet from charted soundings..... 41
Figure 30: AWOIS item number 1554..... 42
Figure 31: AWOIS item number 1559..... 43

Descriptive Report to Accompany Survey H12627

Project: OPR-B310-FH-13

Locality: Approaches to New York

Sublocality: Offshore - 14NM SE of Sandy Hook Point

Scale: 1:40000

October 2013 - November 2013

NOAA Ship *Ferdinand R. Hassler*

Chief of Party: LCDR Marc S. Moser, NOAA

A. Area Surveyed

The survey area is referred to as Priority1: Offshore - 14NM SE of Sandy Hook Point within the Project Instructions (Figure 1).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
40° 23" 50" N 73° 50" 41' W	40° 17" 45" N 73° 39" 41" W

Table 1: Survey Limits

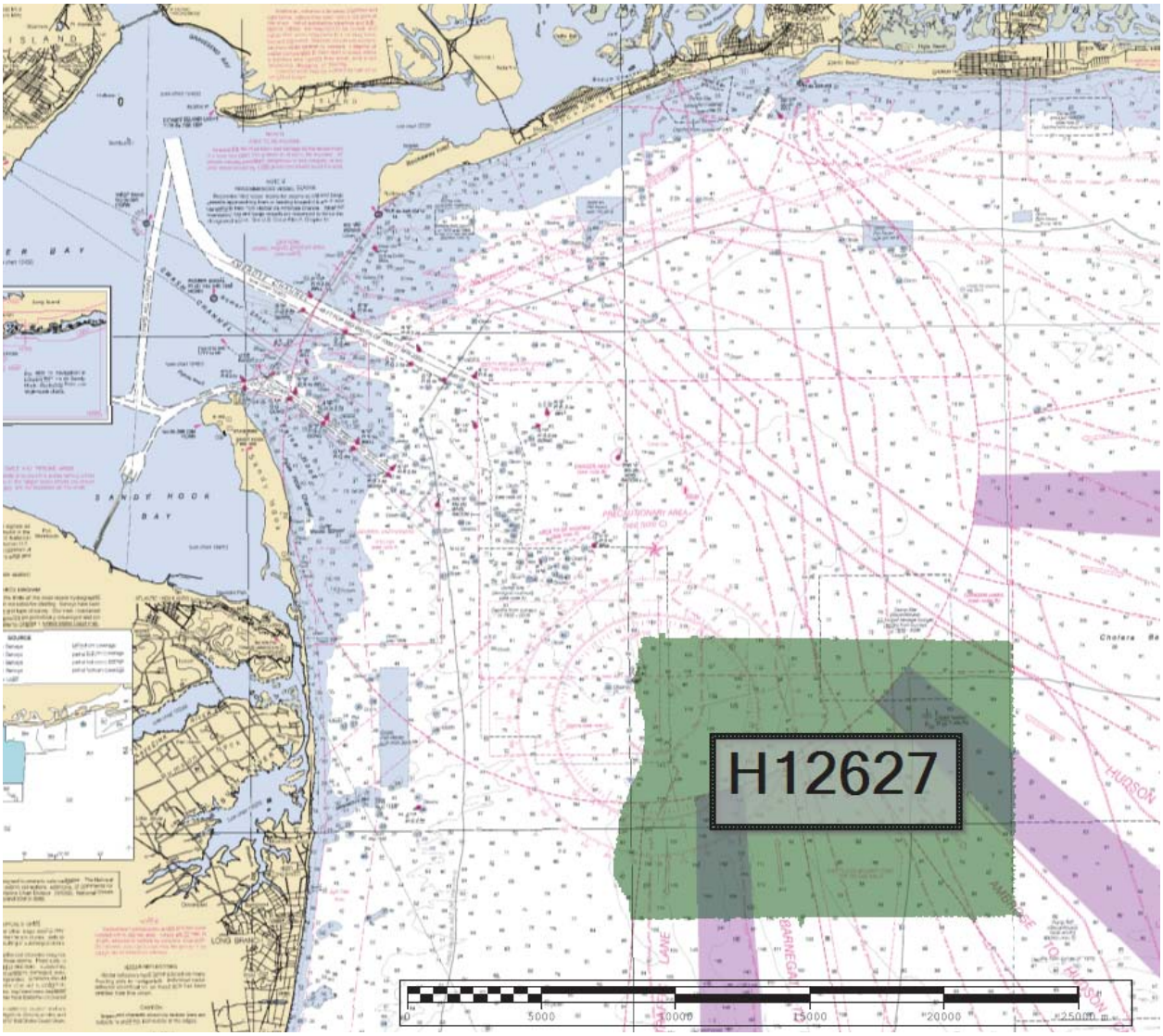


Figure 1: H12627 survey limits.

Survey Limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update the National Ocean Service nautical charting products.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

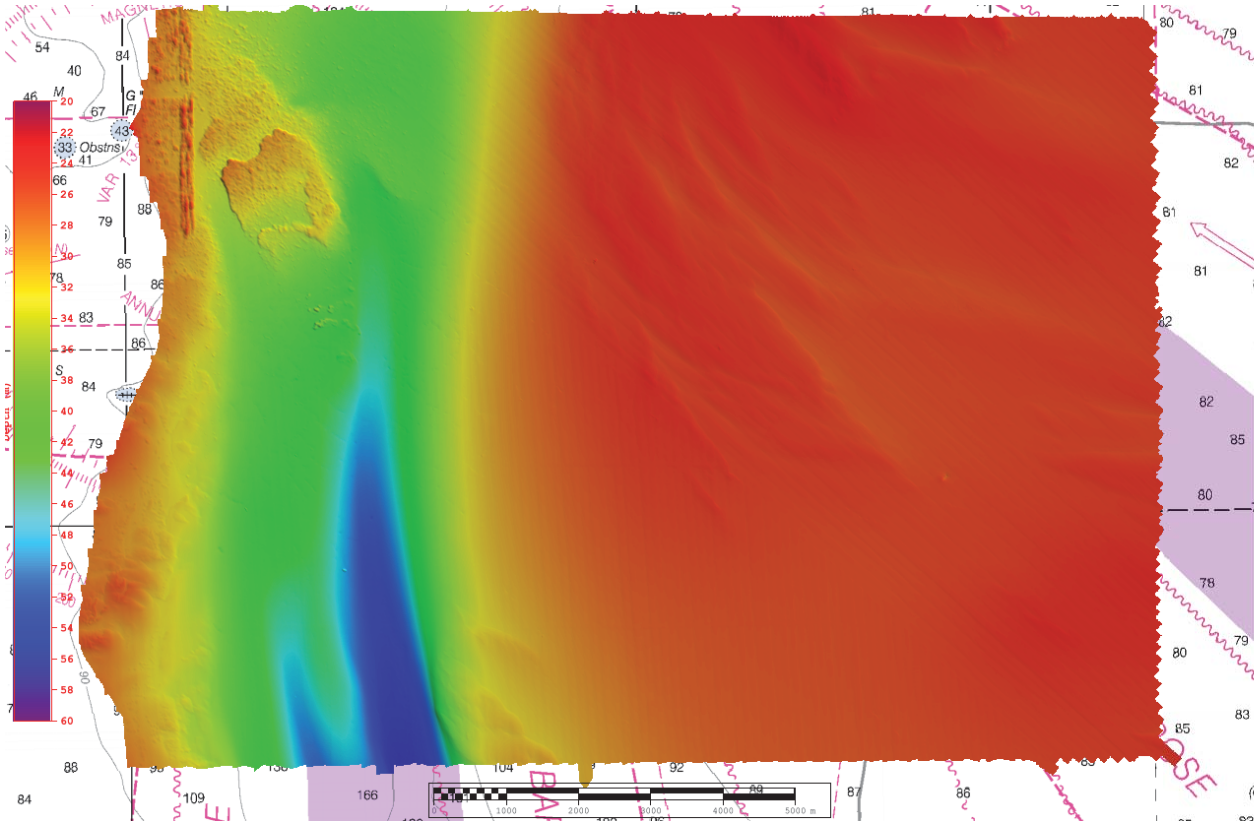


Figure 2: Acquired survey coverage overlaid on Chart 12326. Scale shows depths in meters.

Complete multibeam echosounder (MBES) coverage was achieved within the limits of hydrography as defined in the Project Instructions (Figure 2) with the following exceptions:

Five gaps in coverage exists within the sheet limits due to an insufficient overlap of MBES data. The hydrographer has reviewed the data and is confident that the gaps in coverage are insignificant (Figure 3).

Two gaps in coverage exists within the sheet limits due to starting and stopping acquisition to late or to soon, respectively. These gaps in coverage are covered by H12629 and are considered insignificant (Figure 3).

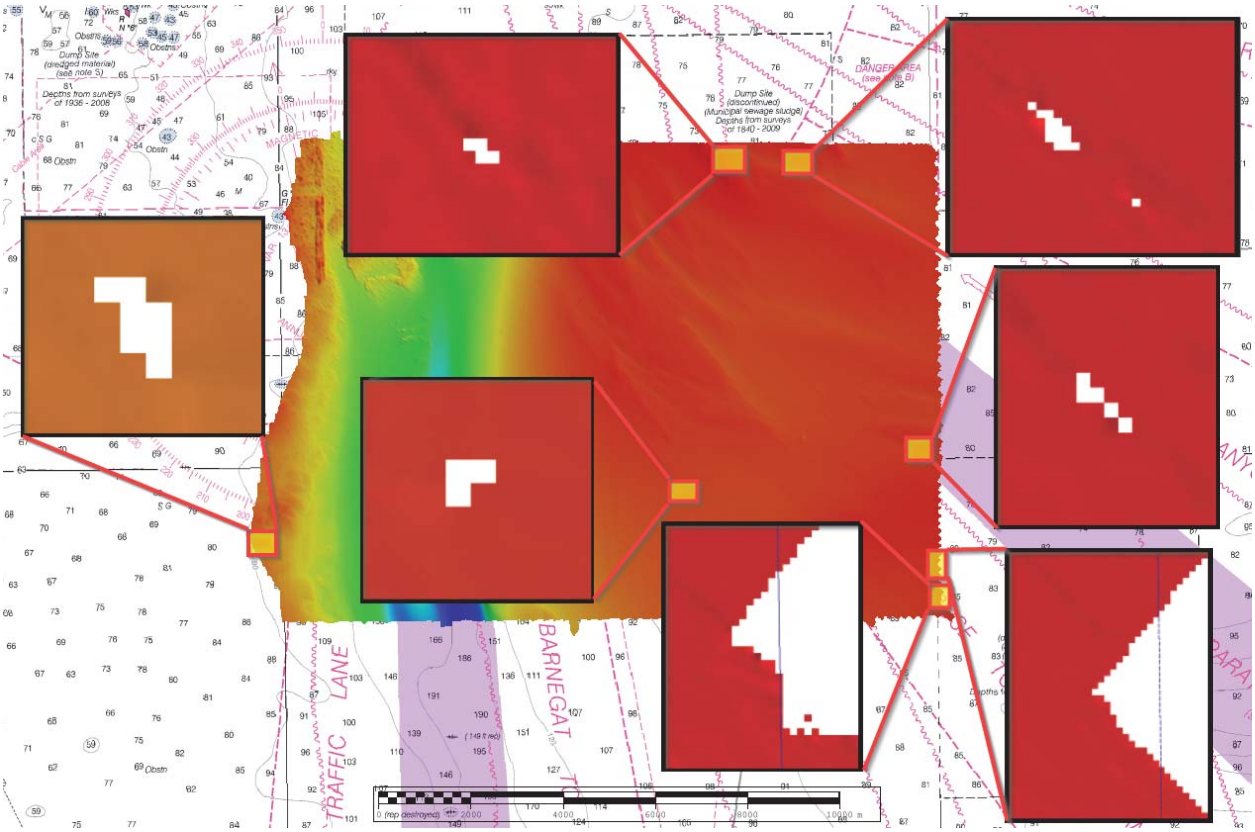


Figure 3: H12627 gaps in coverage of MBES data.

A.5 Survey Statistics

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

	Vessel	***S-250***	***Total***
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	732.4	732.4
	Lidar Mainscheme	0	0
	SSS Mainscheme	1.61	1.61
	SBES/MBES Combo Mainscheme	0	0
	SBES/SSS Combo Mainscheme	0	0
	MBES/SSS Combo Mainscheme	0	0
	SBES/MBES Combo Crosslines	27.2	27.2
	Lidar Crosslines	0	0
Number of Bottom Samples			0
Number AWOIS Items Investigated			2
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Items Investigated by Dive Ops			0
Total Number of SNM			43.3

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Julian Day Number
10/21/2013	294
10/22/2013	295
10/23/2013	296
10/24/2013	297
10/25/2013	298
10/31/2013	304
11/06/2013	310

Table 3: Dates of Hydrography

Mainscheme survey lines were run with a dual-head multibeam echosounder. Linear nautical miles for the dual-head system were calculated using statistics from the starboard head.

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 vessel, 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	***S250***
LOA	37.7 meters
Draft	3.80 meters

Table 4: Vessels Used

Figure 4: NOAA Ship FERDINAND R. HASSLER alongside pier at Marine Operations Center - Atlantic.

The vessel used for this project was the NOAA Ship FERDINAND R. HASSLER (S-250) as seen moored portside to NOAA Marine Operations Center - Atlantic in Figure 4.

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7125	MBES
Reson	SVP-70	Sound Speed System
Klein	5000 V2	SSS
Applanix	POS M/V 320 Version 5	Positioning and Attitude System
Hemisphere	MBX-4	Positioning System
Brook Ocean	MVP-30	Sound Speed System
AML	MicroCTD	Conductivity, Temperature, and Depth Sensor

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 3.7% of mainscheme acquisition.

Multibeam crosslines were acquired using the Reson 7125 on DN294. Crosslines were filtered to remove soundings greater than 45 degrees from nadir. The crossline percentage does not satisfy requirements stated in Section 5.2.4.3 of the HSSD. However, they do cross all mainscheme survey lines and, in the opinion of the hydrographer, are sufficient to evaluate the accuracy and reliability of surveyed soundings and positions. A 2-meter CUBE surface was created using the mainscheme lines, while a second 2-meter CUBE surface was created using only crosslines. These two surfaces were differenced at a 2-meter resolution (Figure 5). The statistical analysis of the differenced surface is shown in Figure 6. The average difference between the depths derived from the mainscheme and crosslines is 0.03 meters (mainscheme being deeper) with a standard deviation of 0.08 meters; 95% of all differences are less than 0.15 meters from the mean.

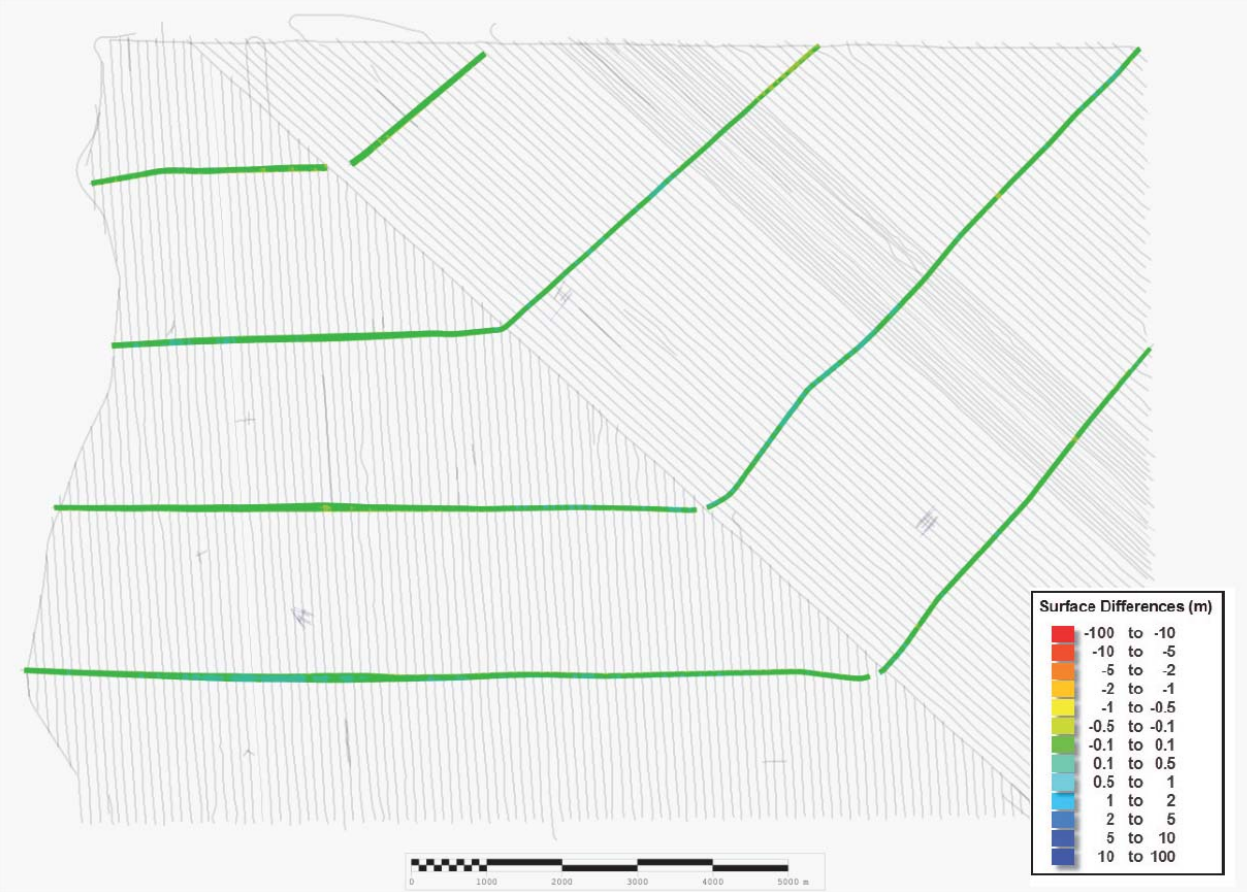


Figure 5: H12627 MBES crossline data overlaid on mainscheme lines.

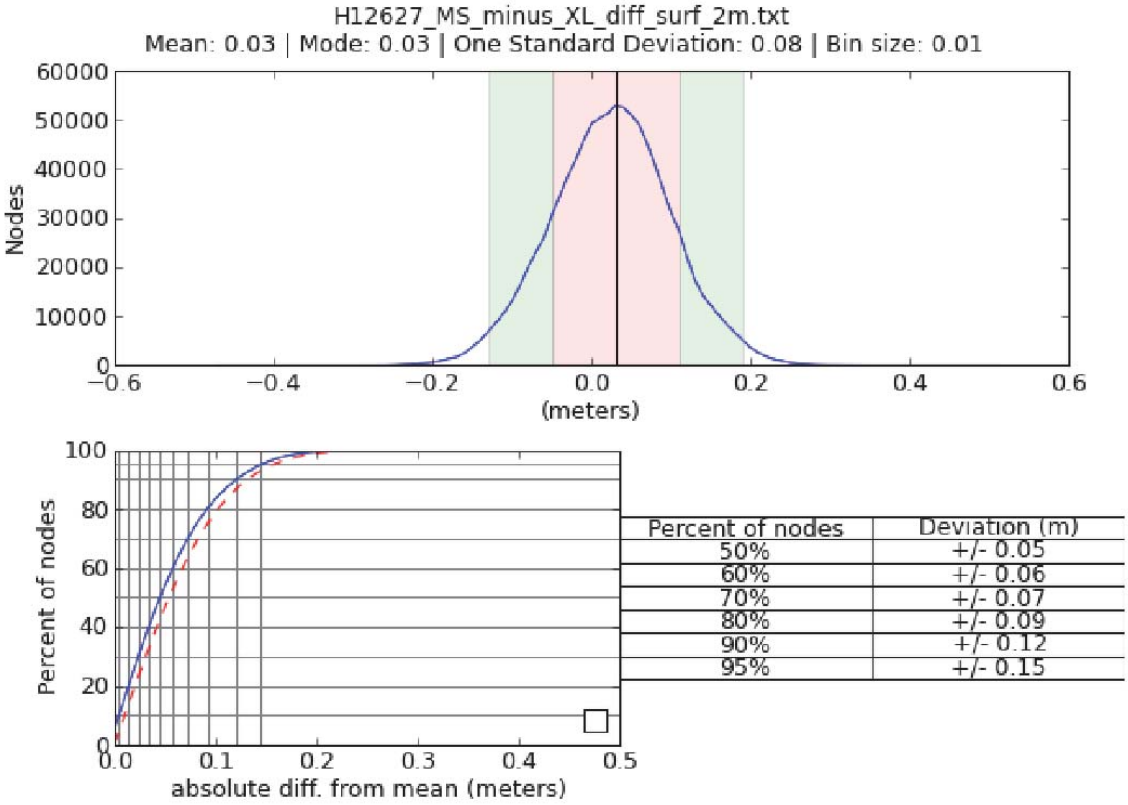


Figure 6: H12627 crossline difference statistics: mainscheme minus crosslines.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01 meters	0.16 meters
0.01 meters	0.093 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S250	1 meters/second	1 meters/second	2 meters/second

Table 7: Survey Specific Sound Speed TPU Values

A tidal zoning uncertainty of 0.16 meters was provided by CO-OPS in the OPR-B310-FH-13 Project Instructions. Seventy-one lines were corrected with zoned tides and received this uncertainty estimate. Refer to section B.3.1 for a list of lines that have been reduced to chart datum using zoned water levels.

SMRMSG files were loaded using only attitude and horizontal position uncertainties. True Heave was used for vertical uncertainty.

A VDatum uncertainty of 0.093 meters was provided by HSD in the OPR-B310-FH-13 Project Instructions. For all lines except those noted in section B.3.1, True Heave RMS records were manually deleted from CARIS HDCS folders to allow down RMS values to load from the SMRMSG files. SMRMSG files were loaded using attitude, vertical, and horizontal position uncertainties.

The surface sound speed value of 2.0 meters per second was used to account for the faulty sound speed sensor on the starboard sonar head. This issue is discussed in more detail in Section B.2.5. The value was determined after analyzing the differences between three hour averages of concurrently logged SBE 45 MicroTSG Thermosalinograph data for the entire duration of acquisition. Two meters per second is a high estimation value of the uncertainty associated with surface sound speed while remaining within the instructions of section 4.2.3.8 of the Field Procedures Manual (2013). For this project, it was found the surface sound speed was slow to change geographically and the error for using the surface sound speed obtained from the MVP (as discussed in Section B.2.5) does not exceed 2.0 m/s.

B.2.3 Junctions

Six junction comparisons were completed for H12627 (Figure 7). Two of the six surveys (H12628 and H12629) were assigned as a part of OPR-A321-FH-13, and the remaining four surveys were completed in 2009 by NOAA Ship THOMAS JEFFERSON (H12036 and H12158) and 2013 by C & C Technologies, Inc. (H12608 and H12610). The sheet limits for the C & C Technologies, Inc. surveys were modified from the original Project Instructions. These surveys were split vertically instead of horizontally, therefore H12609 does not junction with any of the data acquired for project OPR-B310-FH-13. See H12627_Request_for_junctioning_data.pdf in Appendix II for more information. The areas of overlap between sheet H12627 and its junction sheets, shown in Figure 7, were reviewed in CARIS Subset Editor. The junction surfaces were subtracted from the surface of H12627 to assess sounding consistency.

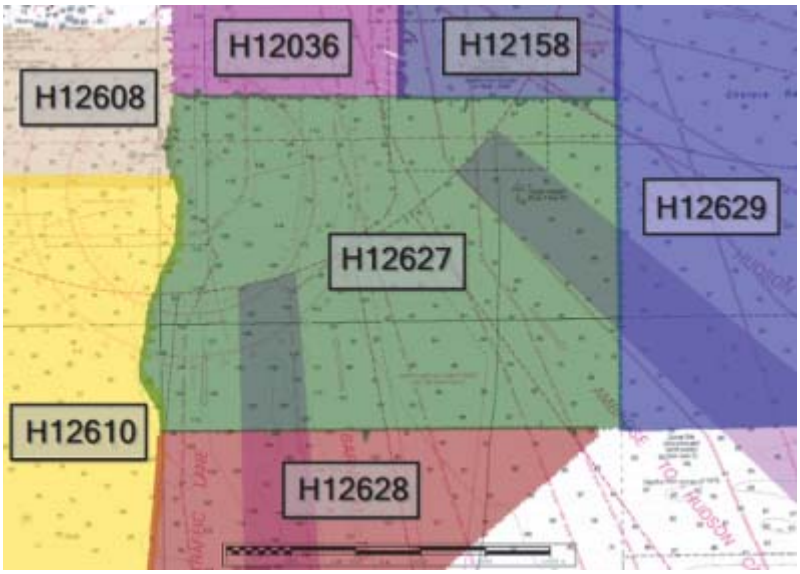


Figure 7: H12627 junction overview.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12628	1:40000	2013	NOAA Ship FERDINAND R. HASSLER	S
H12629	1:40000	2013	NOAA Ship FERDINAND R. HASSLER	E
H12036	1:40000	2009	NOAA Ship THOMAS JEFFERSON	N
H12158	1:40000	2009	NOAA Ship THOMAS JEFFERSON	N
H12608	1:10000	2013	C & C Technologies, Inc.	W
H12610	1:20000	2013	C & C Technologies, Inc.	W

Table 8: Junctioning Surveys

H12628

Overlap with survey H12628 was approximately 90 meters wide along the southern boundary of H12627 (Figure 8). Depths in the junction area range from 25 to 56 meters. A differenced surface analysis between 2-meter CUBE depth surfaces for each survey showed H12627 to be an average of 0.01 meters deeper than H12628, with a standard deviation of 0.07 meters (Figure 9). 95% of all differences are less than 0.14 meters from the mean.

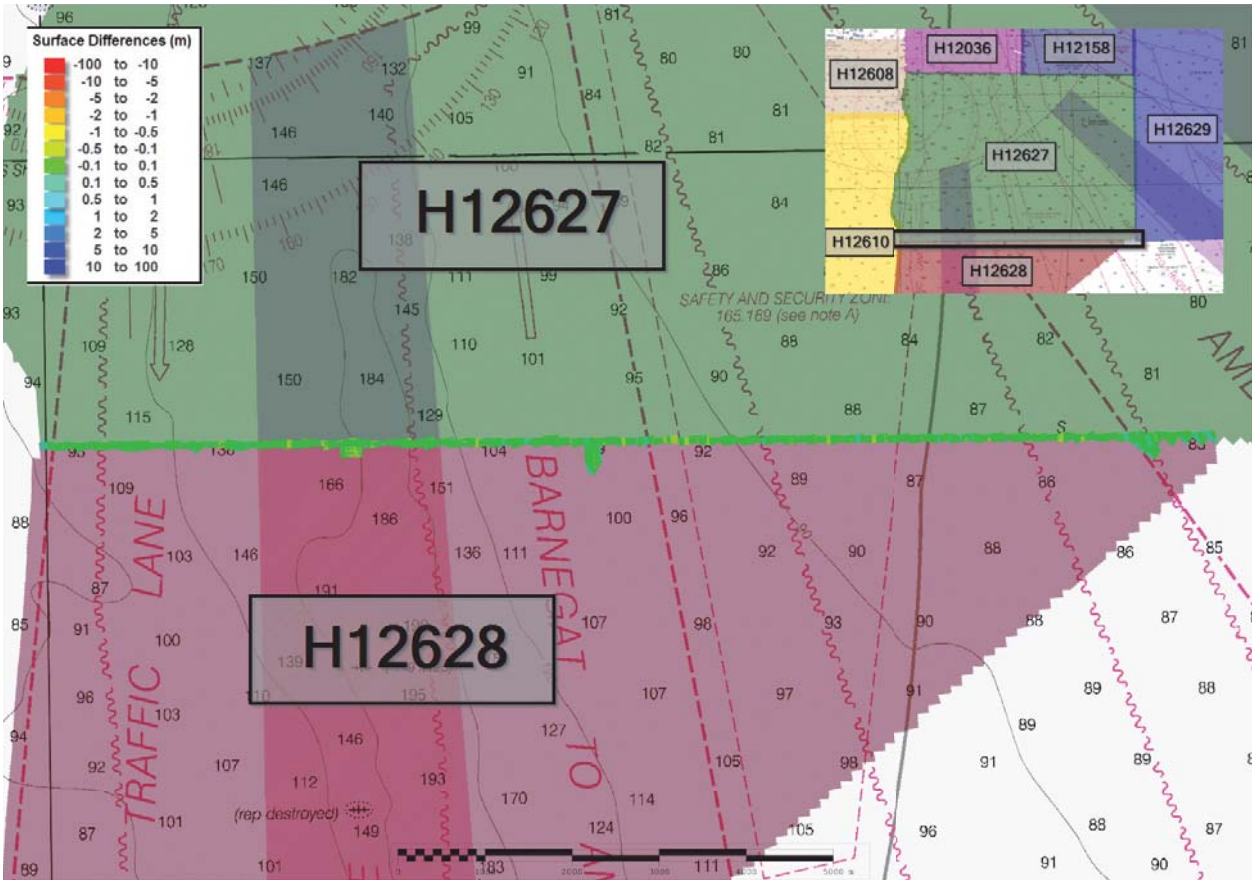


Figure 8: Junction between H12627 (green) and H12628 (red).

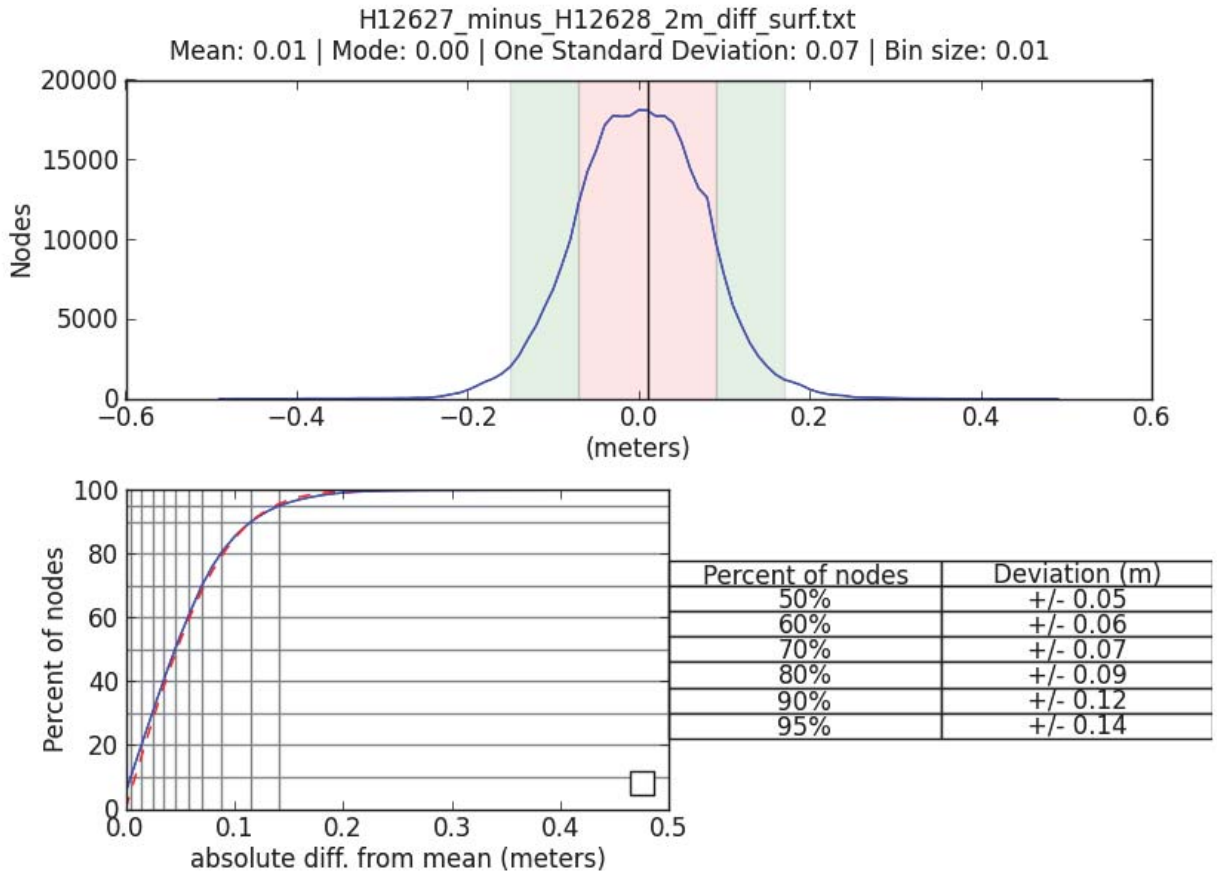


Figure 9: Differenced surface statistics, H12627 minus H12628.

H12629

Overlap with survey H12629 was approximately 100 meters wide along the eastern boundary of H12627 (Figure 10). Depths in the junction area range from 23 to 25 meters. A differenced surface analysis between 2-meter CUBE depth surfaces for each survey showed H12627 to be an average of 0.08 meters deeper than H12629, with a standard deviation of 0.10 meters (Figure 11). 95% of all differences are less than 0.20 meters from the mean.

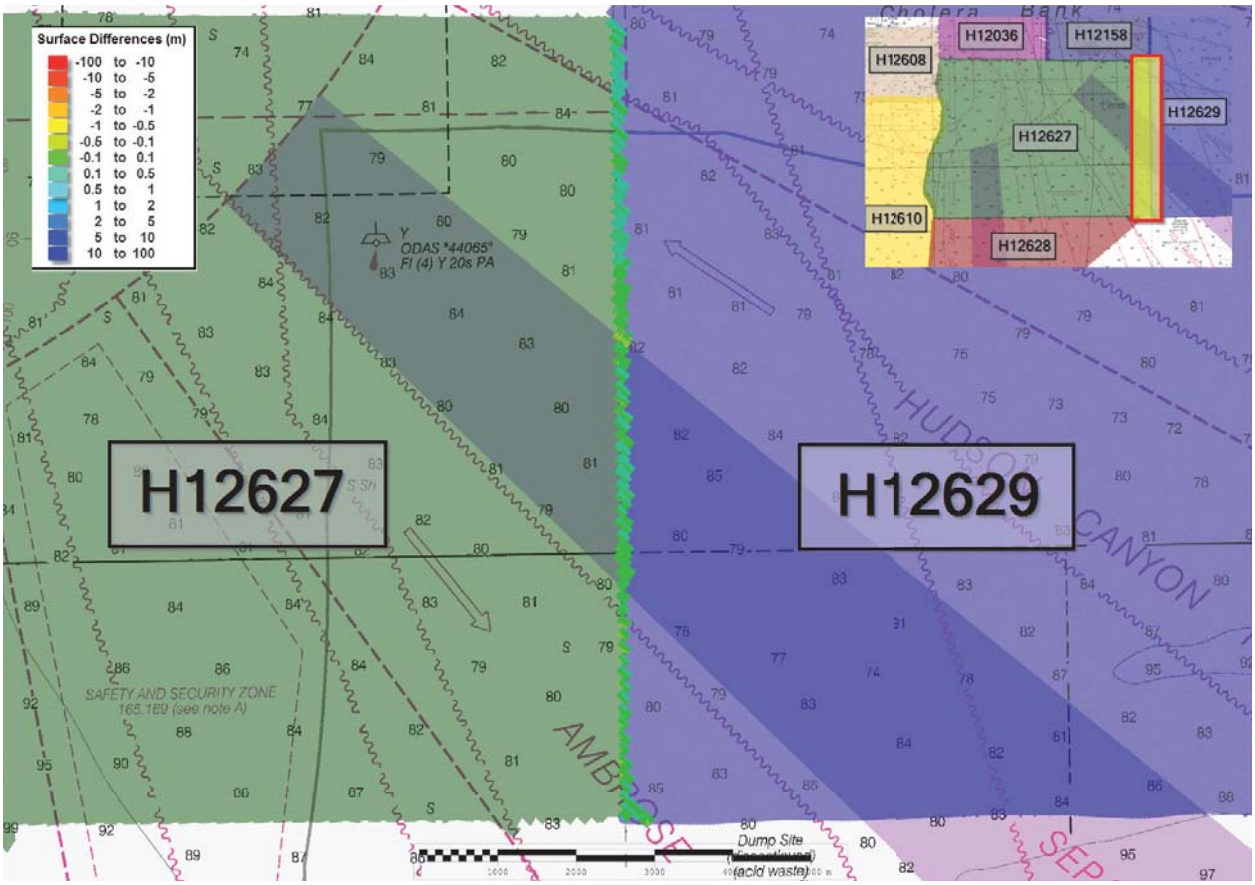
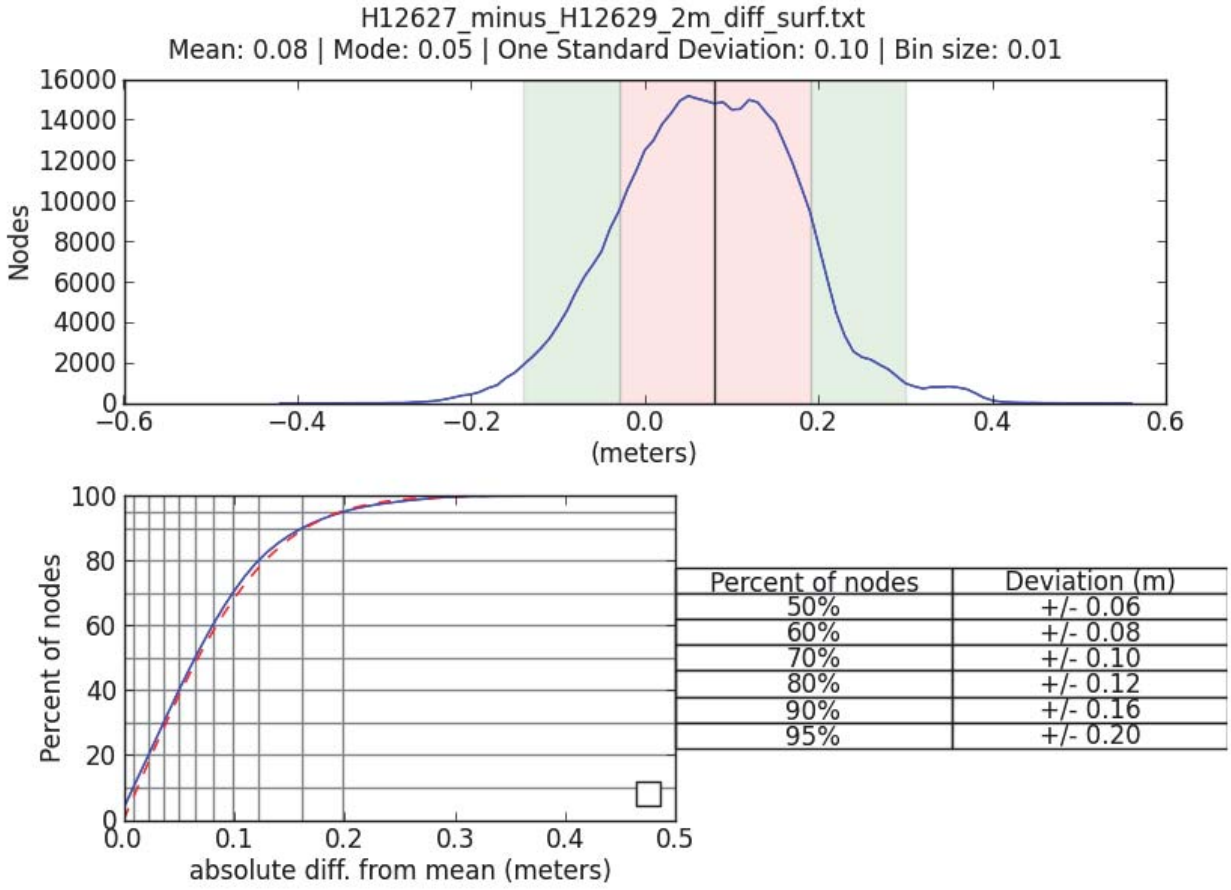


Figure 10: Junction between H12627 (green) and H12629 (blue).



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.08
70%	+/- 0.10
80%	+/- 0.12
90%	+/- 0.16
95%	+/- 0.20

Figure 11: Differenced surface statistics, H12627 minus H12629.

H12036

Overlap with survey H12036 was approximately 100 meters wide along the northern boundary of H12627 (Figure 12). Depths in the junction area range from 22 to 38 meters. A differenced surface analysis between 2-meter CUBE depth surfaces for each survey showed H12627 to be an average of 0.29 meters shallower than H12036, with a standard deviation of 0.46 meters (Figure 13). 95% of all differences are less than 0.94 meters from the mean. The large differences are due to the known authorized dumping of dredged material within the charted dredge material dump site (Figure 14) discussed in section B.2.6.

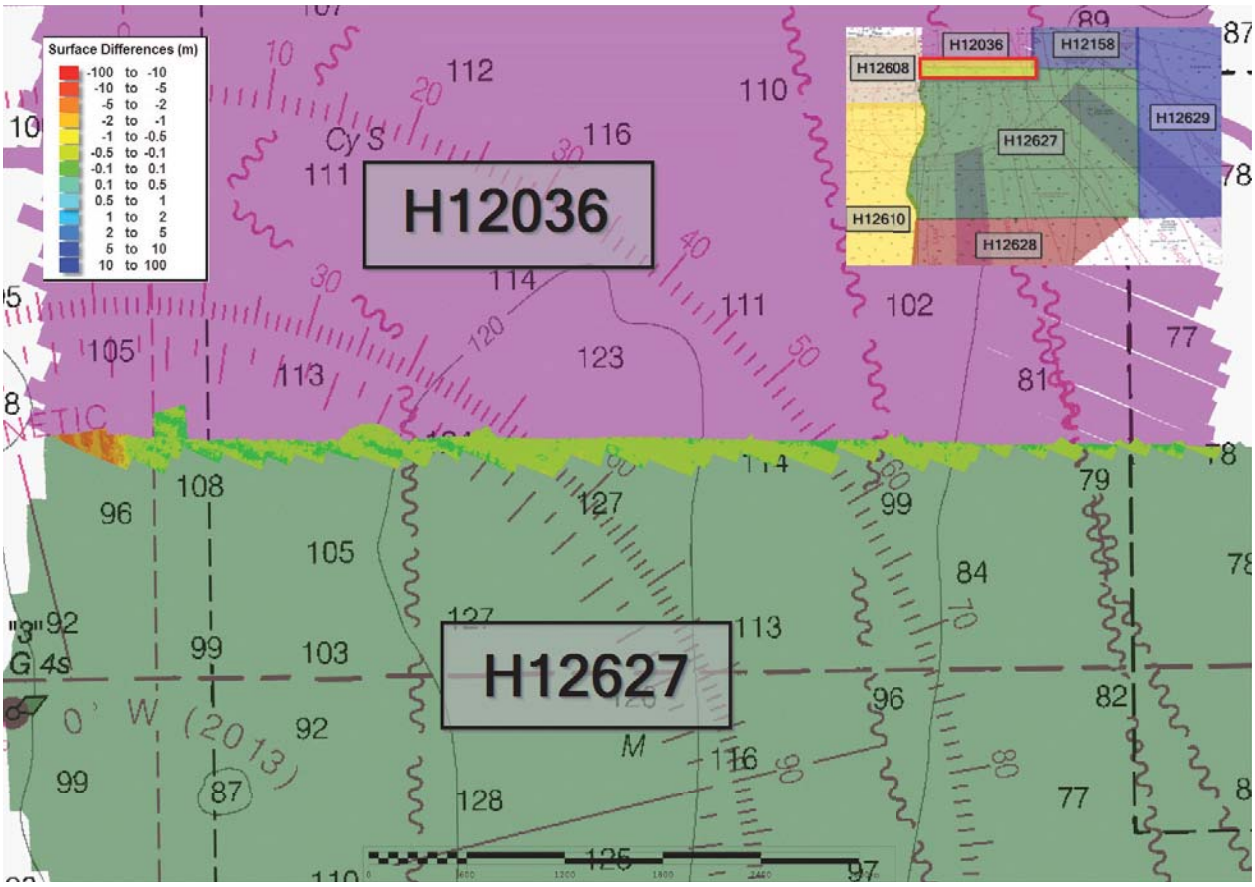
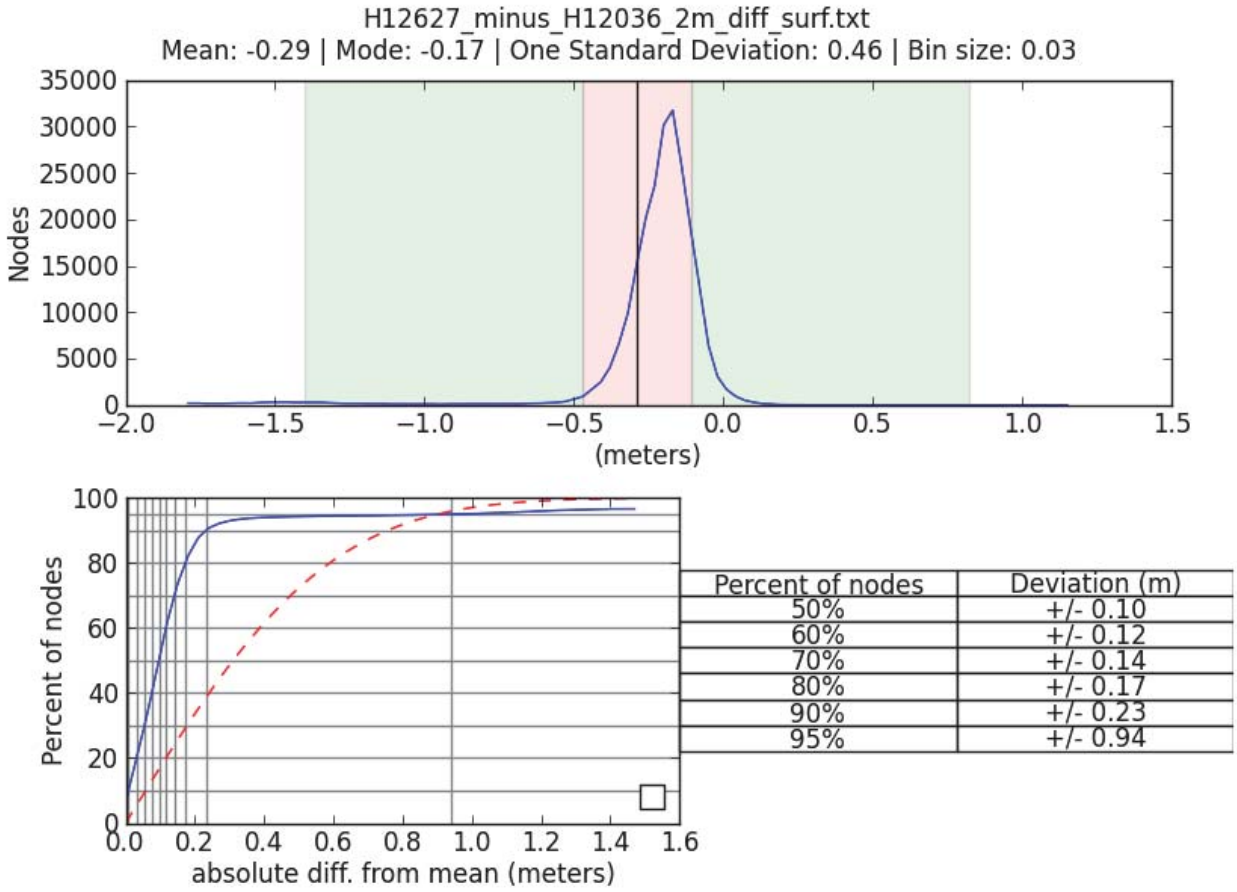


Figure 12: Junction between H12627 (green) and H12036 (purple).



Percent of nodes	Deviation (m)
50%	+/- 0.10
60%	+/- 0.12
70%	+/- 0.14
80%	+/- 0.17
90%	+/- 0.23
95%	+/- 0.94

Figure 13: Differenced surface statistics, H12627 minus H12036.

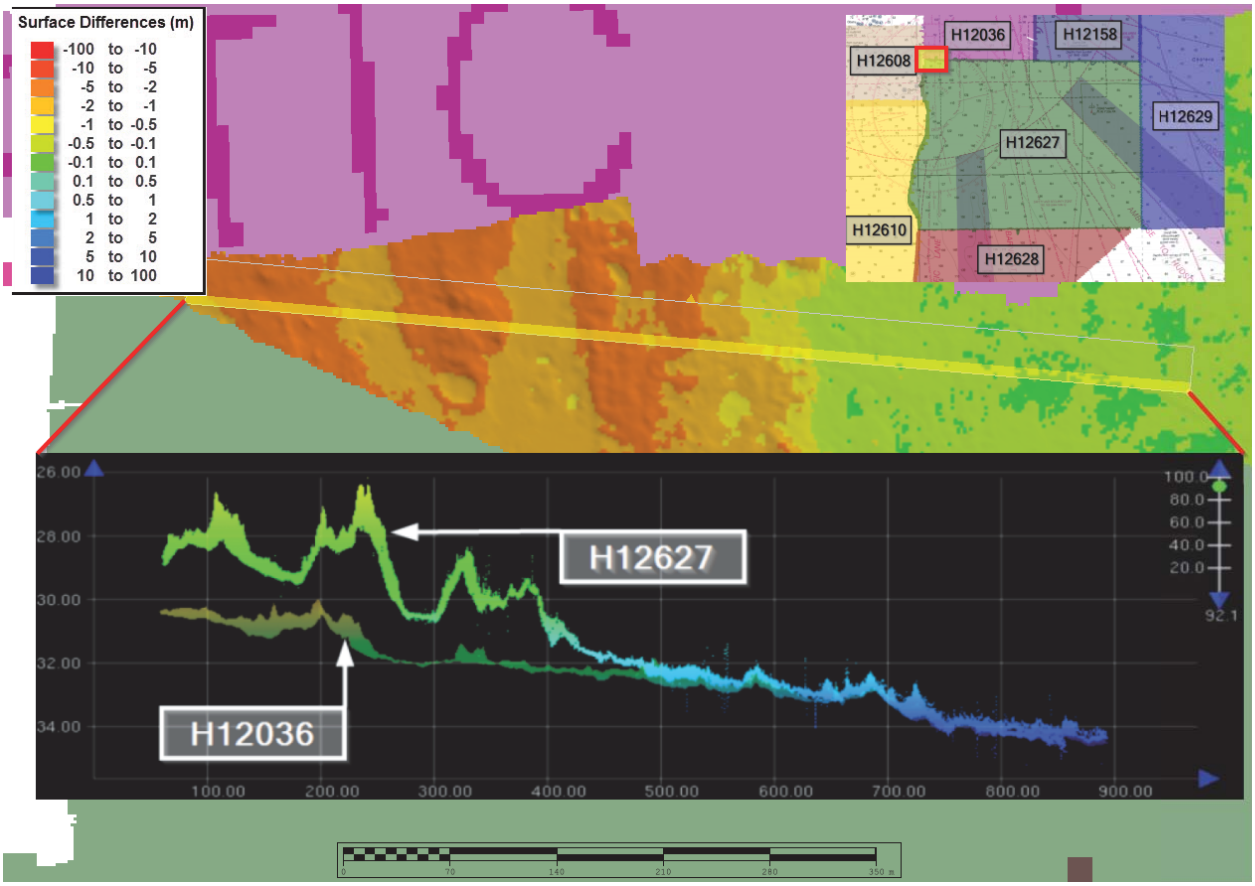


Figure 14: Area of large differences due to authorized dumping of dredged material.

H12158

Overlap with survey H12158 was approximately 100 meters wide along the northern boundary of H12627 (Figure 15). Depths in the junction area range from 22 to 25 meters. A differenced surface analysis between 2-meter CUBE depth surfaces for each survey showed H12627 to be an average of 0.13 meters shallower than H12158, with a standard deviation of 0.08 meters (Figure 16). 95% of all differences are less than 0.16 meters from the mean.

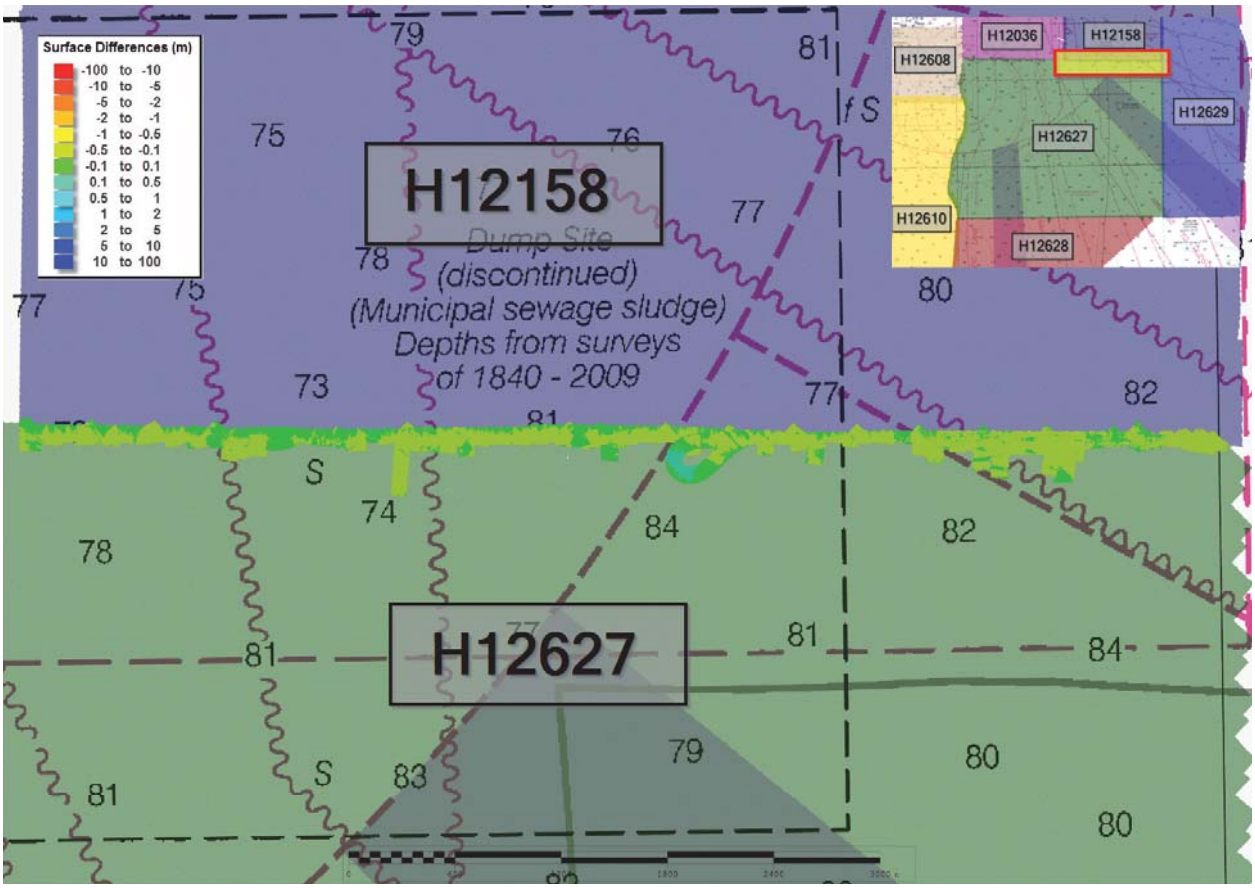


Figure 15: Junction between H12627 (green) and H12158 (dark blue).

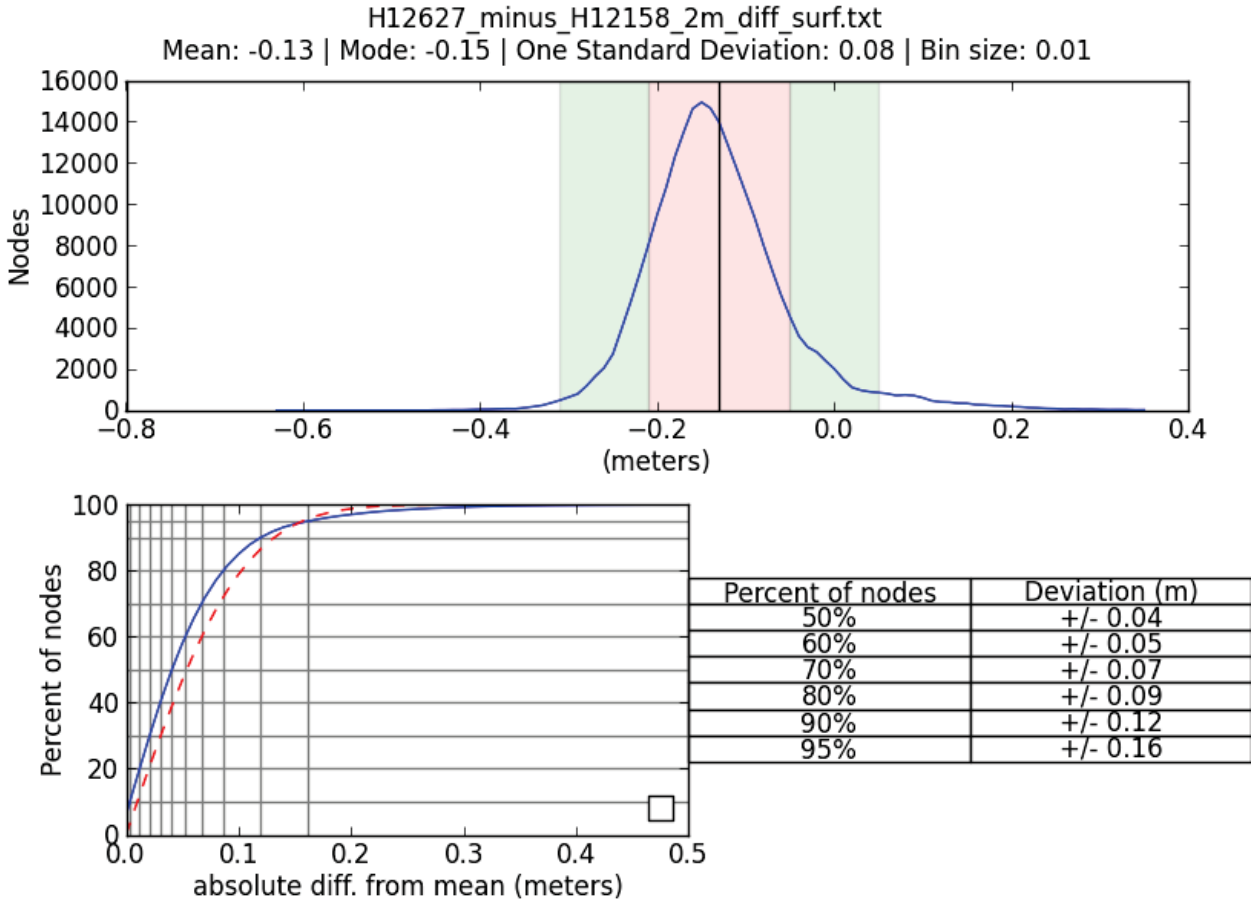


Figure 16: Differenced surface statistics, H12627 minus H12158.

H12608

Overlap with survey H12608 was approximately 200 meters wide along the western boundary of H12627 (Figure 17). Depths in the junction area range from 22 to 28 meters. A differenced surface analysis between 2-meter CUBE depth surfaces for each survey showed H12627 to be an average of 0.09 meters shallower than H12608, with a standard deviation of 0.17 meters (Figure 18). 95% of all differences are less than 0.30 meters from the mean. The large differences are due to the known authorized dumping of dredged material within the charted dredge material dump site discussed in section B.2.6.

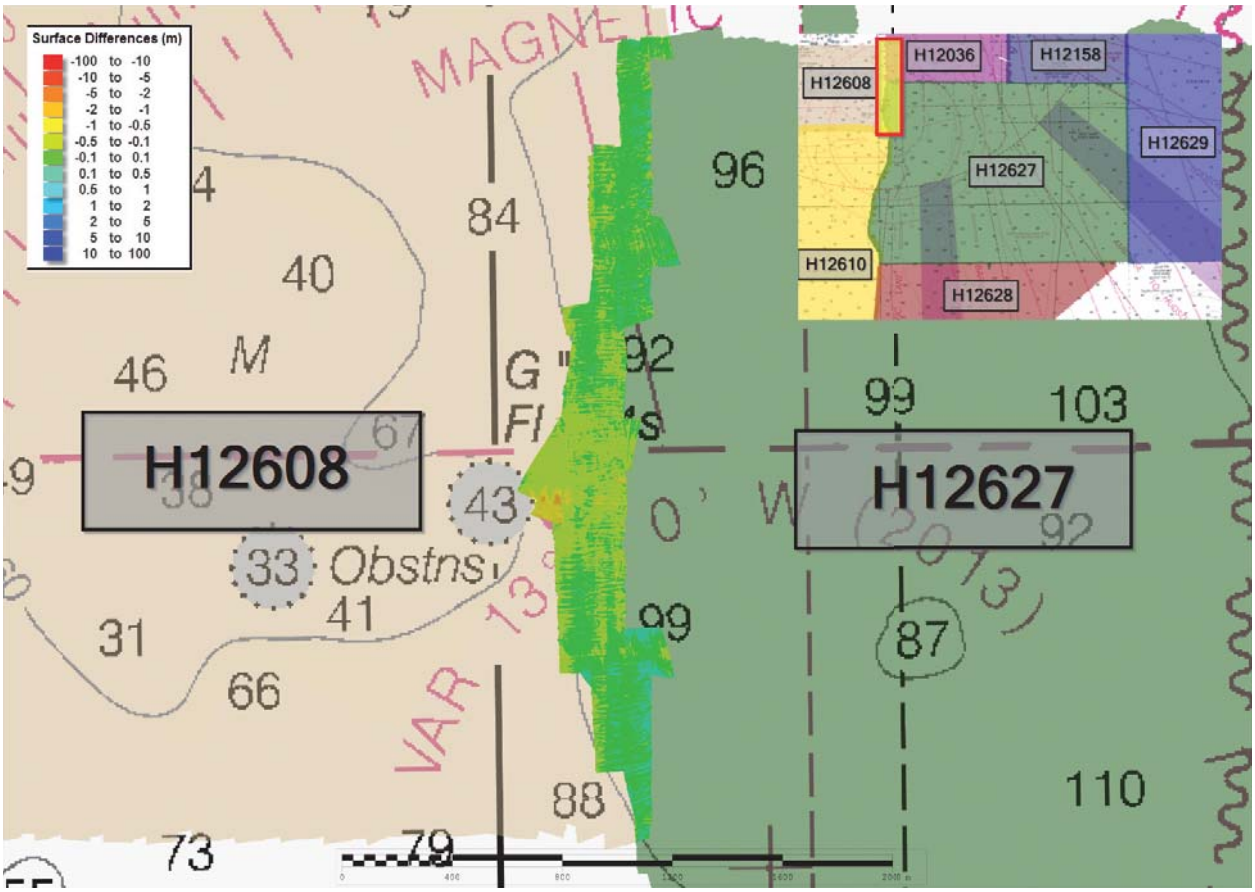
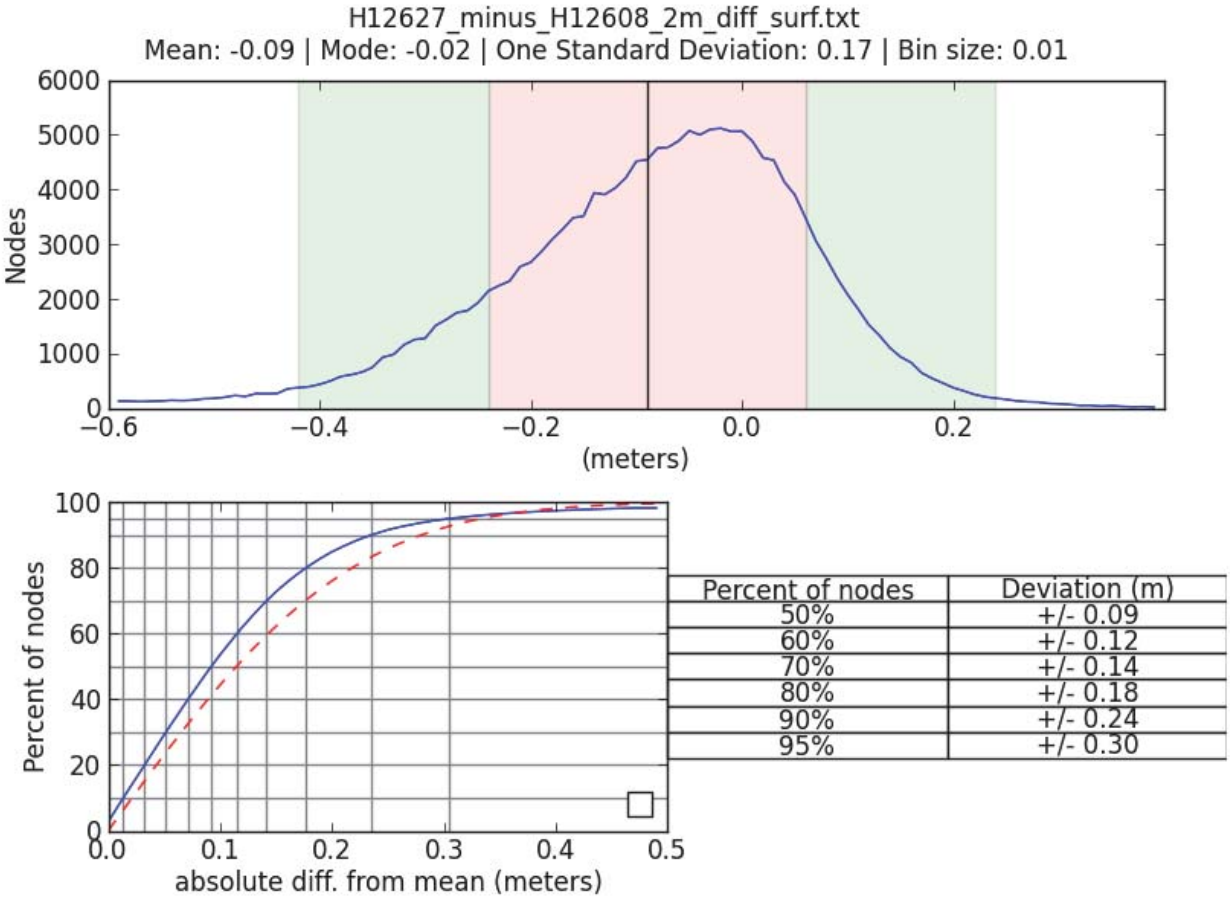


Figure 17: Junction between H12627 (green) and H12608 (tan).



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.12
70%	+/- 0.14
80%	+/- 0.18
90%	+/- 0.24
95%	+/- 0.30

Figure 18: Differenced surface statistics, H12627 minus H12608.

H12610

Overlap with survey H12610 was approximately 200 meters wide along the western boundary of H12627 (Figure 19). Depths in the junction area range from 26 to 30 meters. A differenced surface analysis between 2-meter CUBE depth surfaces for each survey showed H12627 to be an average of 0.04 meters shallower than H12610, with a standard deviation of 0.08 meters (Figure 20). 95% of all differences are less than 0.15 meters from the mean.

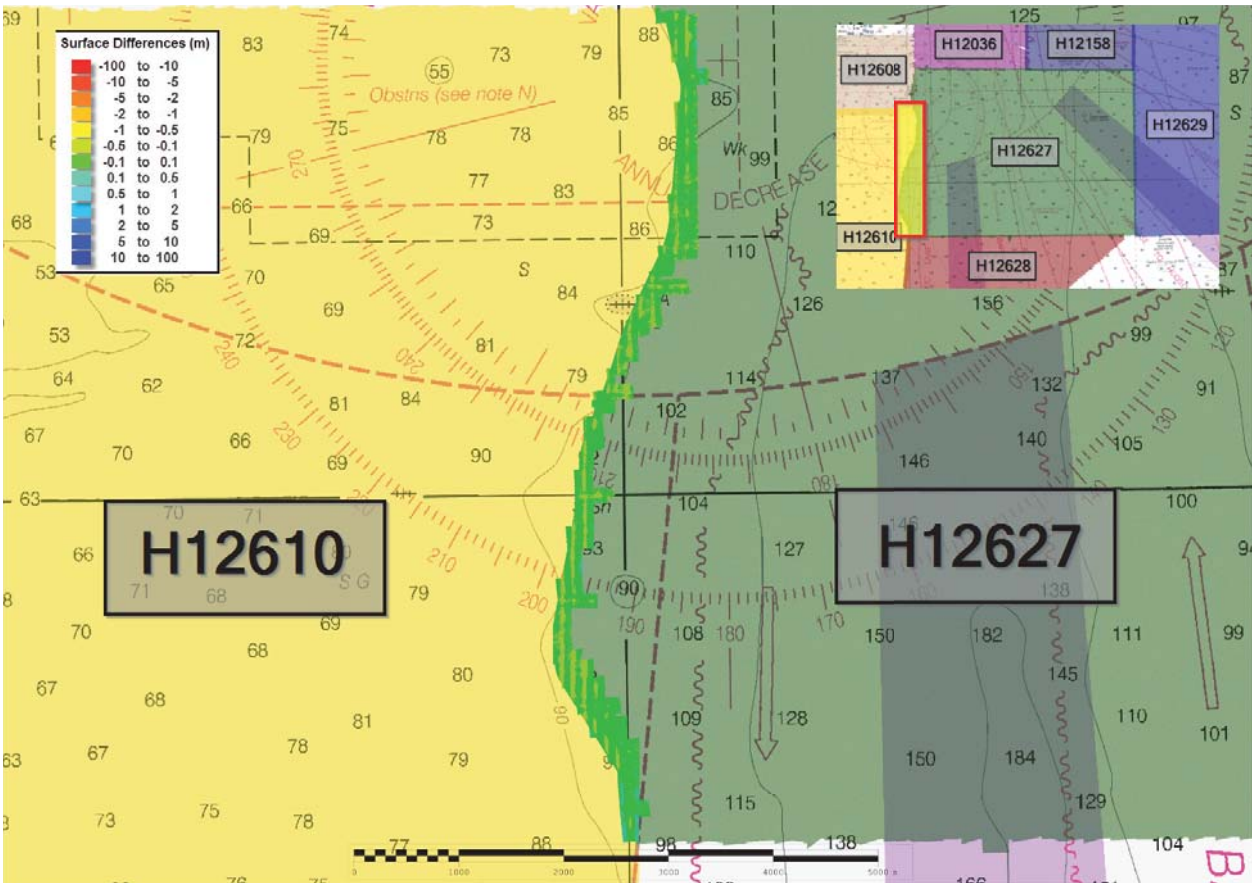


Figure 19: Junction between H12627 (green) and H12610 (gold).

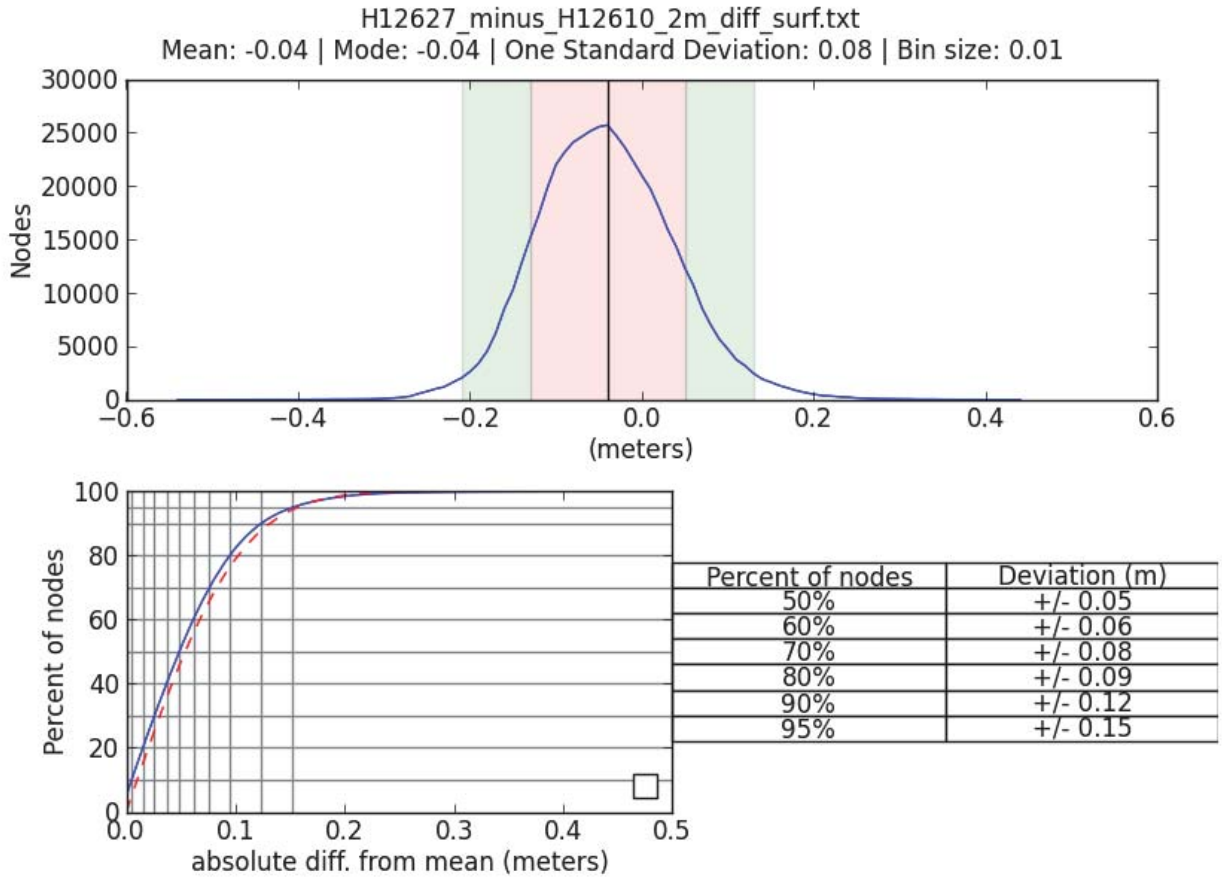


Figure 20: Differenced surface statistics, H12627 minus H12610.

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

SVP70–Surface Sound Speed

It was observed early during acquisition on OPR-B310-FH-13 that the starboard SVP-70, which was the master unit that fed sound speed data to the slave (port), was in error of approximately five meters per second. This error resulted in an 'S' shaped artifact seen in data from both port an starboard multibeam systems. The starboard SVP-70 was determined to be in error after simultaneous comparison with MVP, TSG and Port SVP-70 values. Values from these three sources all agreed within the manufacturers specified accuracies. Unfortunately, at the same time of this error, the port SVP-70 was experiencing unexplainable intermittent failures, resulting in the complete loss of sound speed values. This made switching input between SVP-70 sensors unreliable.

A solution to fix the erroneous sound speed values was researched and applied via the CARIS Sound Velocity Correction tool. Because the FERDINAND R. HASSLER routinely collects and processes bathymetric data in Reson .s7k format (7004/7006 records), the "Perform an additional recomputation of the steered beam angles based on a new surface sound speed that will be interpolated from the sound velocity profile" option was available. When checked, this option will overwrite the surface sound speed values collected real-time with values from the MVP profiles. Due to the surface sound speed being relatively constant during acquisition this tool greatly reduced the sound speed artifacts in the data.

This technique was utilized for all data within the limits of H12627.

B.2.6 Factors Affecting Soundings

Active Dredge Dumping Area

The dredge material dump site located in the northwest corner of H12627 was visually confirmed to be an active dumping area for dredged material. Data acquired separated by a large amount of time does not compare well due to the deposition of sediment over time (Figure 21). For additional detail refer to the H12627_Active_Dredge_Dumping_Area in Appendix II.

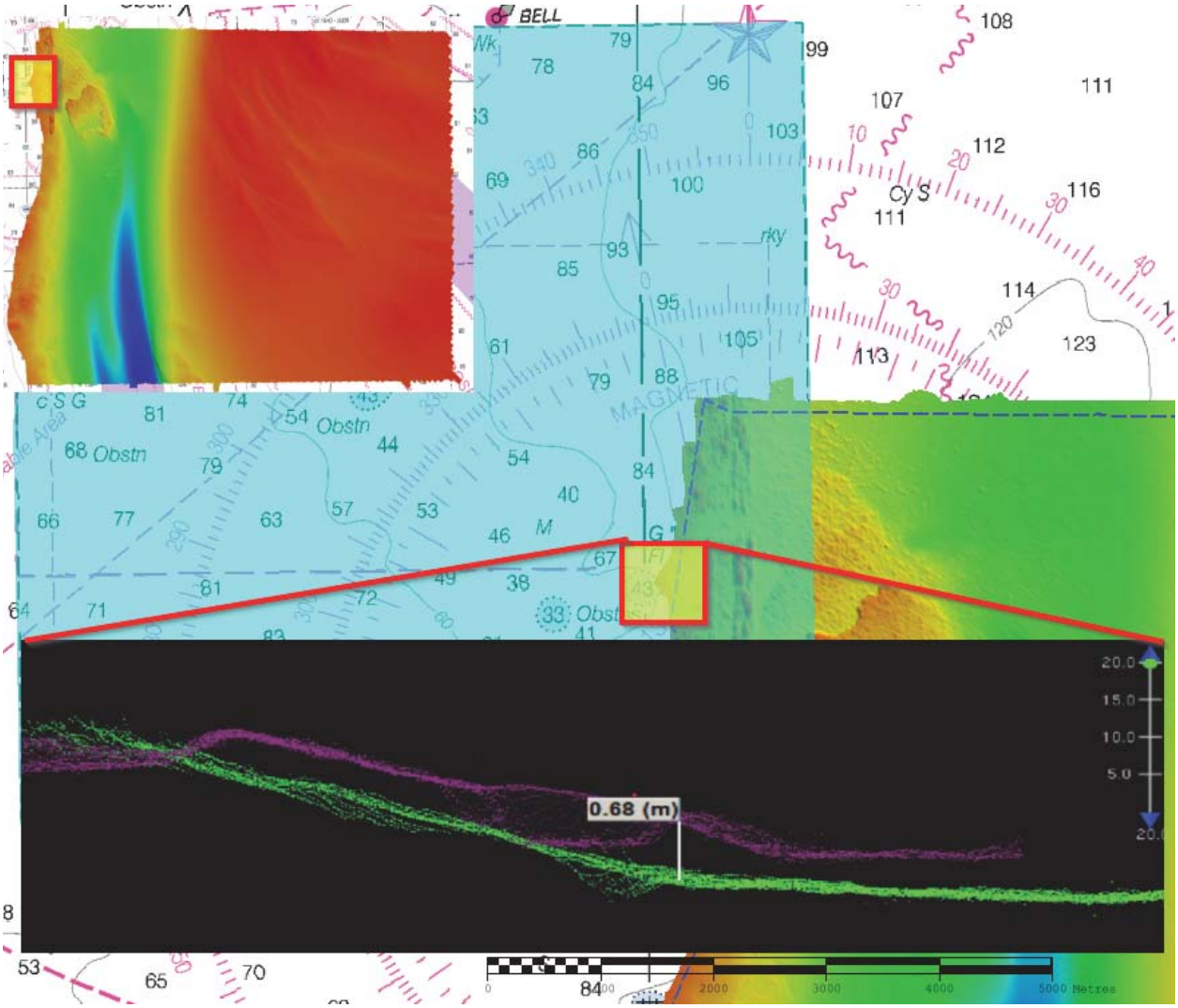


Figure 21: Example of rapidly changing sea floor due to active dredge dumping area. Lines are colored by day and were acquired thirteen days apart. The dredge material dump site is highlighted in light blue.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: MVP casts were taken approximately every hour for mainscheme acquisition. Sound speed corrections were applied with the following CARIS options selected: "Nearest in Distance Within Time" of 3 hours and "Perform an additional recomputation of the steered beam angles based on a new surface sound speed that will be interpolated from the sound velocity profile". The first mentioned CARIS selection applied the sound speed casts to lines that were nearest in distance within time within three hours of acquisition. See section B.2.5 for more information regarding the additional recomputation.

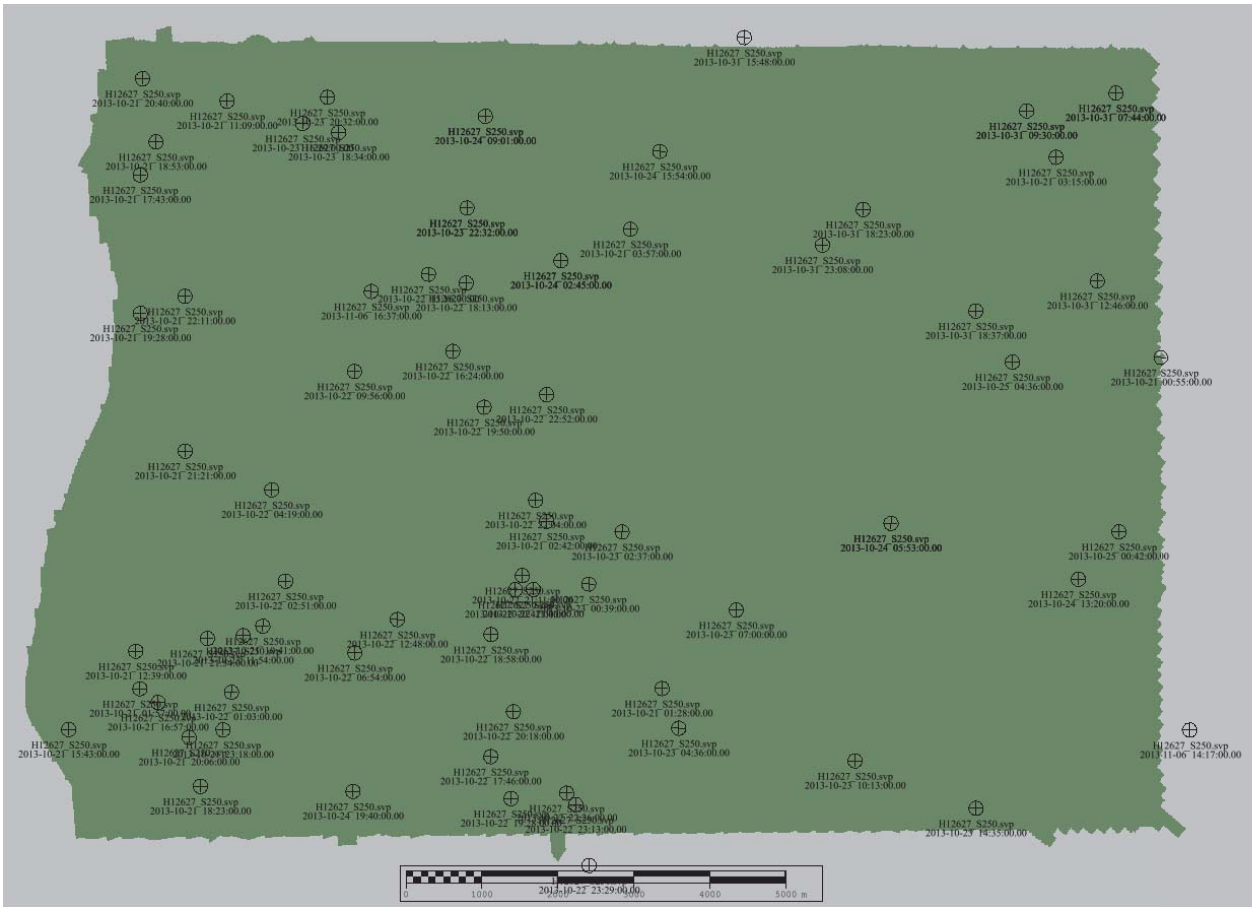


Figure 22: H12627 sound speed cast locations

B.2.8 Coverage Equipment and Methods

A density analysis was run to calculate the number of soundings per surface node. Five or more soundings per node were present in over 99.9% of the 2-meter and 4-meter surfaces. For additional detail refer to the H12627_Standards_Compliance report submitted in Appendix II of this report.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

In limited areas throughout the survey, errors in the GPS-derived vertical position solution led to vertical errors in the associated soundings. The altitude errors were located by examining the surface for areas of high standard deviation. CARIS Subset Editor and Attitude Editor were used to isolate the error in these cases to a GPS height error.

The errors are most apparent in the “GPS Tide” record generated in CARIS. The record is calculated during the “Calculate GPS Tide” process by removing the inertial generated heave record (TrueHeave) from the post-processed GPS height solution (from the applied SBET) and applying the datum-ellipsoid

transformation model. The resultant record should contain both the tidal signal and any loading or dynamic draft effects. When an apparent vertical error occurred in the corrected soundings, the GPS Tide record was examined in Altitude Editor. For anomalies of short duration (<12 minutes) which occur within the line, GPS Tide anomalies were rejected and the resultant gap was linearly interpolated. As a result, the vertical error in the corrected soundings was eliminated. Sections of the following lines were handled in this way:

Port (Total of 13 lines): 20131021_034349, 20131023_152357, 20131023_192805, 20131024_061600, 20131024_115327, 20131025_025644, 20131031_111613, 20131031_103635, 201310331_135800, 20131031_152057, 20131101_010913, 20131031_193254, 20131031_180926.

Starboard (Total of 29 lines): 20131021_034349, 20131022_133848, 20131022_174206, 20131022_192651, 20131022_192652, , 20131022_202911, 20131023_062915, 20131023_152358, 20131023_172635, 20131023_192814, 20131023_213832, 20131023_122730, 20131024_061600, 20131024_115327, 20131024_011136, 20131024_150047, 20131025_000413, 20131024_221433, 20131025_025644, 20131025_005151, 20131031_111613, 20131031_103637, 201310331_135800, 20131031_152057, 20131031_163134, 20131031_180926, 20131101_002639, 20131031_193253, 20131031_185757.

Figures 23, 24, 25, and 26 show an example of the interpolation for the port side line 20131023_172635 on Dn296.

On occasions where the anomalies were longer than 12 minutes, or at the beginning or end of a line, lines were reduced to MLLW with verified tides. The following lines were handled in this way:

Port (Total of 31 lines): 20131021_005450, 20131023_022049, 20131023_024649, 20131023_133522, 20131023_134432, 20131023_135438, 20131023_140250, 20131023_141115, 20131023_141833, 20131023_142633, 20131023_143303, 20131023_143851, 20131023_144435, 20131023_145039, 20131023_145529, 20131023_150007, 20131023_150401, 20131023_150751, 20131023_151429, 20131023_202905, 20131024_132912, 20131024_154633, 20131024_181401, 20131024_215658, 20131025_033434, 20131031_094325, 20131031_100017, 20131031_135800, 20131031_201338, 20131031_225220, 20131106_161641.

Starboard (Total of 40 lines): 20131021_005450, 20131022_133848, 20131023_013037, 20131023_015449, 20131023_022050, 20131023_024640, 20131023_064808, 20131023_070914, 20131023_072638, 20131023_074434, 20131023_083542, 20131023_133521, 20131023_134431, 20131023_135439, 20131023_140241, 20131023_141113, 20131023_141833, 20131023_142631, 20131023_143301, 20131023_143851, 20131023_144435, 20131023_145039, 20131023_145529, 20131023_150007, 20131023_150402, 20131023_150750, 20131023_151430, 20131023_202904, 20131024_122912, 20131024_154633, 20131024_181400, 20131024_205427, 20131024_215657, 20131025_033442, 20131031_094324, 20131031_100018, 20131031_135800, 20131031_201339, 20131101_010912, 20131106_161640.

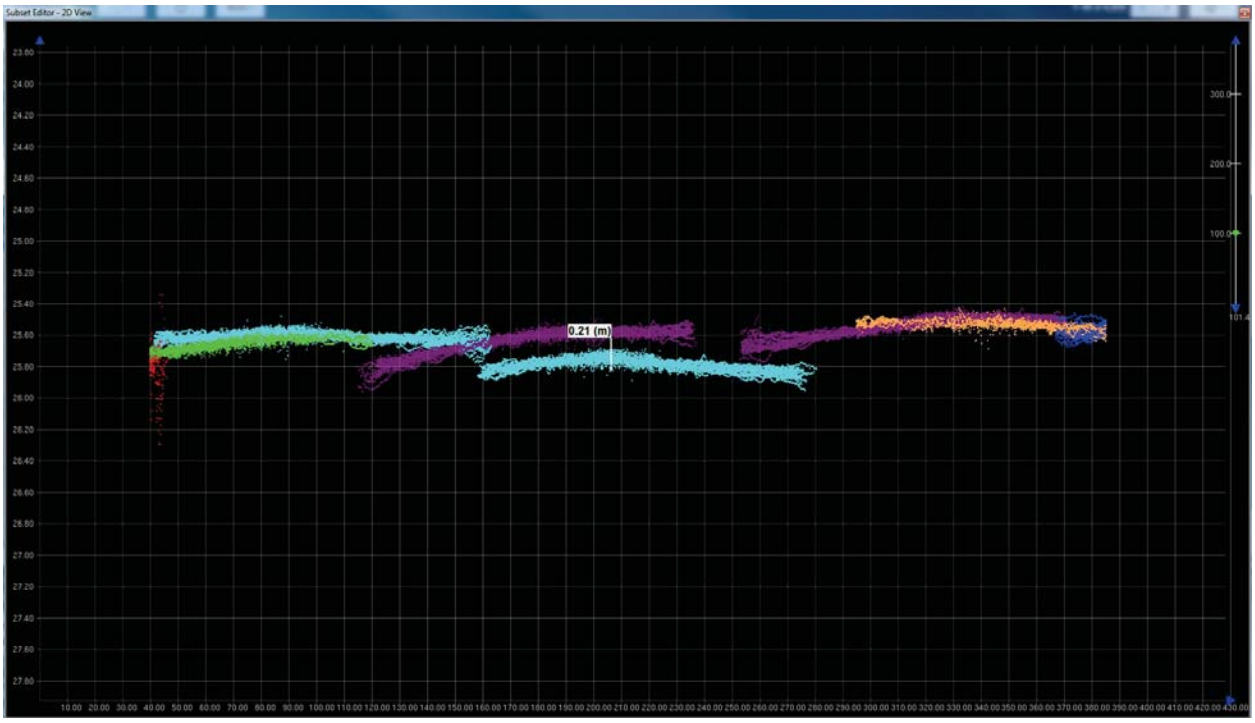


Figure 23: Representative line shows about a 0.21m offset from corresponding lines.

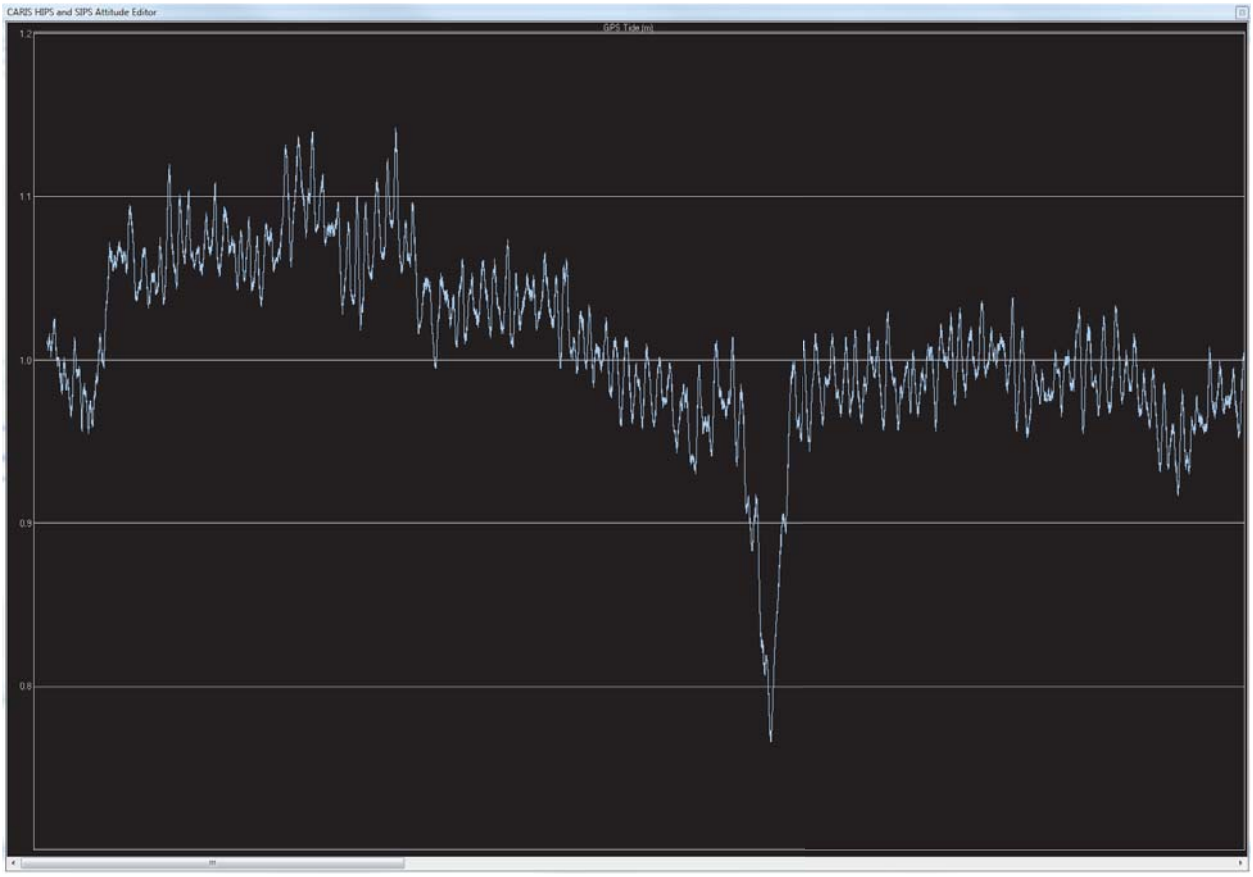


Figure 24: The GPS tide signal pre-interpolation shows a downward spike caused by a poor SBET solution.

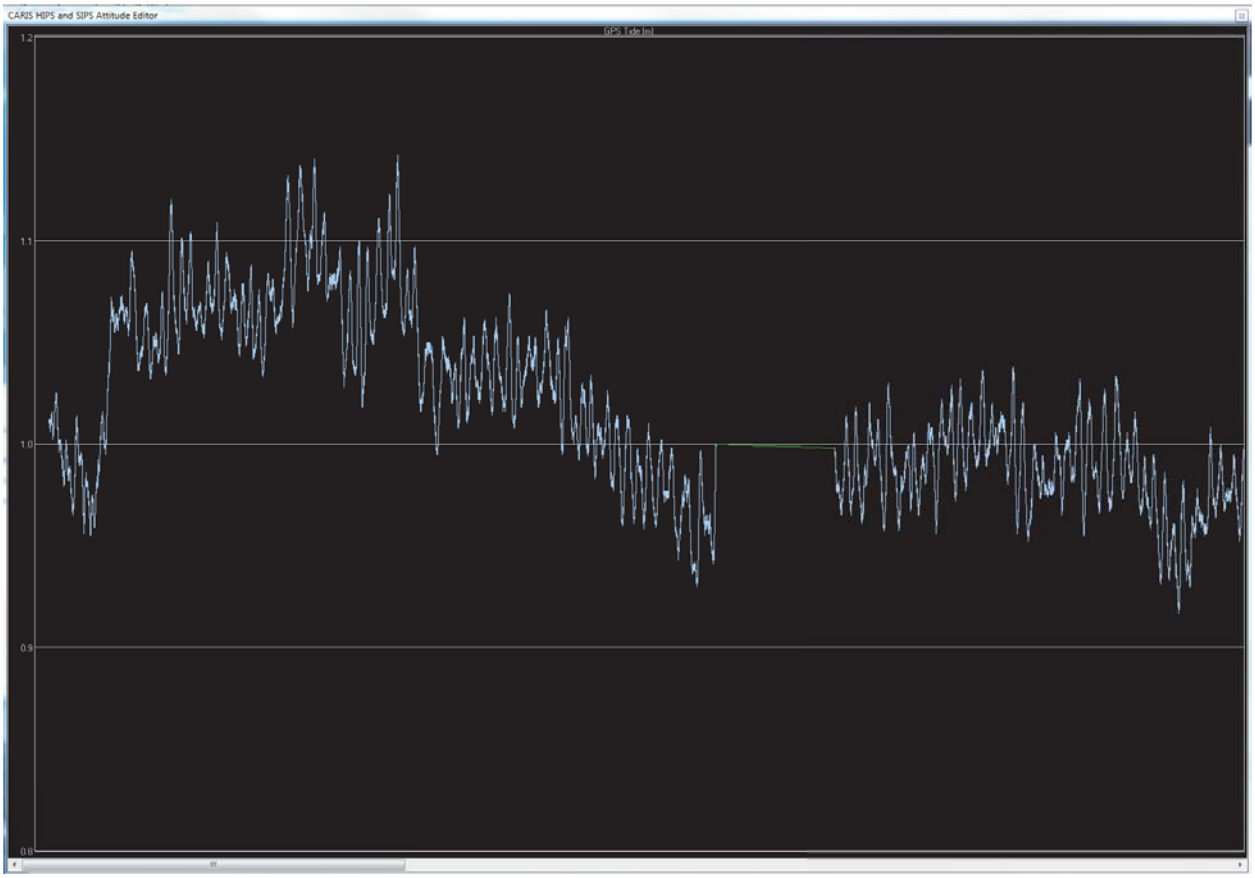


Figure 25: Interpolation of GPS Tide in CARIS Altitude Editor.

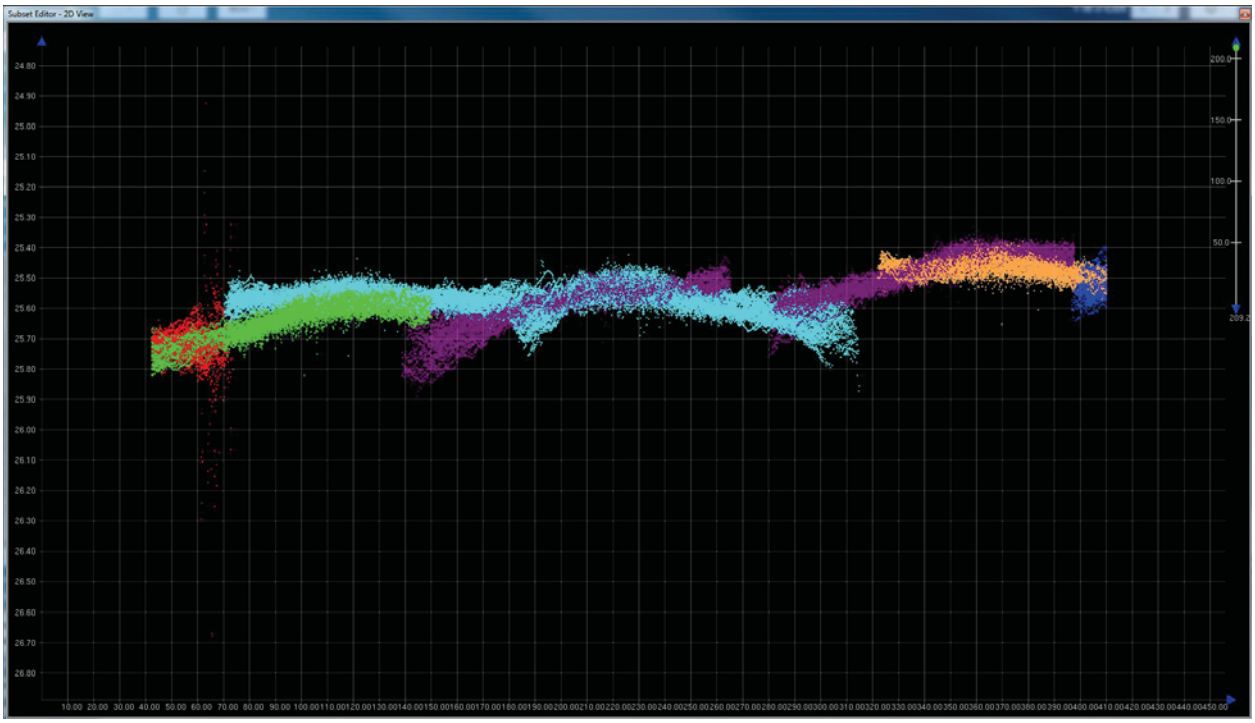


Figure 26: Results after interpolation.

B.3.2 Calibrations

The following calibrations were conducted after the initial system calibration discussed in the DAPR:

Calibration Type	Date	Reason
Abbreviated Patch Test	2013-10-24	Roll artifacts noticed in acquired bathymetry

Table 9: Calibrations not discussed in the DAPR.

Multibeam data collected during the first few days of acquisition on project OPR-B310-FH-13 contained offsets appearing to be contributed to a roll error. To determine if this was the issue an abbreviated patch test was performed, utilizing roll lines only. From analysis of these roll lines new roll values were computed and entered in the HIPS Vessel File (HVF). All data collected previous to the patch test were reprocessed using the new HVF values. There is no good explanation for the significant change in roll angle values. The FERDINAND R. HASSLER will implement new procedures after an analysis to determine the optimal frequency for conducting patch tests.

B.4 Backscatter

Backscatter was logged in the Reson datagram 7008 snippets record in the raw .s7k files. The .s7k file also holds the navigation record and bottom detections for all lines of survey H12627. The files were paired with the CARIS HDCS data, imported and processed using Fledermaus Geocoder Toolbox.

The GSF files containing the extracted backscatter are submitted with the data in this survey. The processed mosaic is saved as a GeoTiff and also submitted.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: NOAA Extended Attribute File Version 5.3.2.

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
H12627_MB_2m_MLLW	CUBE	2 meters	21.58 meters - 56.37 meters	NOAA_2m	Complete MBES
H12627_MB_4m_MLLW	CUBE	4 meters	21.58 meters - 56.37 meters	NOAA_4m	Complete MBES
H12627_MB_2m_MLLW_18to40_Final	CUBE	2 meters	21.58 meters - 40 meters	NOAA_2m	Complete MBES
H12627_MB_4m_MLLW_30plus_Final	CUBE	4 meters	30 meters - 56.37 meters	NOAA_4m	Complete MBES

Table 10: Submitted Surfaces

The standard depth thresholds established in section 5.2.2.2 of the HSSDM were modified for the finalized 4-meter surface in order to preserve a designated sounding that was outside of said thresholds. See Designated_Soundings.pdf in Appendix II for general information regarding designated soundings.

B.5.3 Designated Soundings

Fourteen soundings are submitted with the designated flagging in CARIS HIPS and SIPS within the limits of H12627. Of these fourteen soundings, eleven were designated for feature creation and three were to preserve the shoal depth in the finalized surfaces.

B.5.4 Rejection of Data Outside Survey Area

Port lines 20131023_202904, 20131024_181401, and 20131023_235959 and starboard lines 20131023_202904, 20131024_181400, and 20131024_000000 were logged through a turn due to poor acquisition techniques (Figure 27). This data was rejected to prevent gaps in coverage using CARIS HIPS and SIPS Swath Editor and should not be reaccepted.

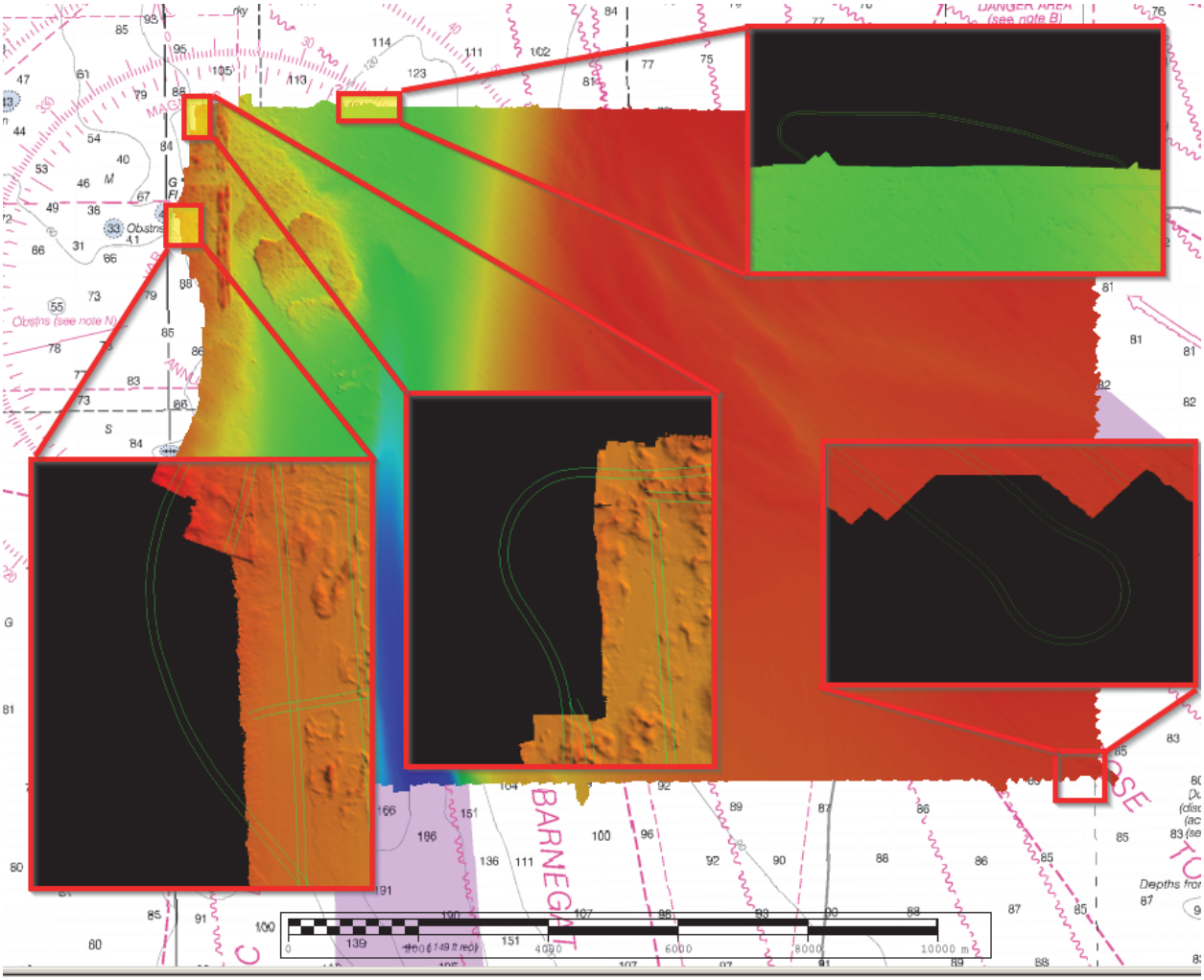


Figure 27: H12627 rejected data.

B.5.5 Total Vertical Uncertainty Analysis

A custom layer was created for all finalized surfaces showing the uncertainty of individual nodes in relation to the allowable uncertainty for their depths. This layer was exported and run through a custom Python script resulting in statistical analysis. 100% of nodes within survey H12627 met the vertical uncertainty standards of section 5.1.3 of the Hydrographic Surveys Specifications and Deliverables (2013). See H12627_Standards_Compliance report submitted in Appendix II of this report.

C. Vertical and Horizontal Control

All vertical and horizontal control activities conducted during the course of this survey are fully addressed in the following sections. Therefore, no separate HVCR is submitted.

C.1 Vertical Control

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

Standard Vertical Control Methods Used:

Discrete Zoning

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

Station Name	Station ID
Sandy Hook, NJ	8531680

Table 11: NWLON Tide Stations

File Name	Status
8531680.tid	Verified Observed

Table 12: Water Level Files (.tid)

File Name	Status
B310FH2013CORP.zdf	Final

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

A request for final approved tides was sent to N/OPS1 on 11/14/2013. The final tide note was received on 11/27/2013.

Preliminary zoning is accepted as the final zoning for project OPR-B310-FH-13, H12627, during the time period between October 21 - November 6, 2013. See tide note included in Appendix I of this report.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2013_B310_VDatum_NAD83Ellip_MLLW.xyz

H12627 is referenced to MLLW by ellipsoidal methods using the Ellipsoid to Chart Separation File, with exceptions of the lines discussed in Section B.2 which were reduced to chart datum using zoned water levels.

Per the Project Instructions, a VDatum evaluation was performed and submitted to HSD prior to H12627 final processing. The VDatum evaluation report was sent to OPS on 1/3/2014. The memo approving the recommendations was received on 2/28/2014. Based on this evaluation, the hydrographer recommended VDatum for final datum reduction. The Chief, Hydrographic Surveys Division, approved the use of VDatum for H12627. See Appendix II for correspondence associated with this decision.

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 18N.

The following PPK methods were used for horizontal control:

Smart Base

All data submitted with H12627 have SBETs and SMRMSGs applied for post-processed position/attitude and associated uncertainty values, respectively. Lines referenced to MLLW listed in section B.3.1 have SMRMSG but only use horizontal positioning and attitude uncertainty values. DGPS was used only for real time horizontal control.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
MORICHES 6 East Moriches, NY	MOR6
MORICHES 5 East Moriches, NY	MOR5
QUEENS Queens, NY	NYQN
BROOKLYN PIER Brooklyn, NY	NYBR
NEPTUNE TOWNSHIP Neptune Township, NJ	NJNT
NJOC Toms River, NJ	NJOC
NEW YORK WAAS 1 New York, NY	ZNY1
SANDY HOOK 5 Sandy Hook, NJ	SHK5
MILLSBORO Millsboro, DE	DEMI
CENTRAL ISLIP Central Islip, NY	NYCI
R STOCKTON COLL Galloway Township, NJ	NJGT
RIVERHEAD Riverhead, NY	NYRH
MIDDLE TOWNSHIP Middle Township, NJ	NJCM
NJDY Dayton, NJ	NJDY

Table 14: CORS Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Moriches, New York (293 kHz)
Sandy Hook, New Jersey (286 kHz)

Table 15: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

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
12326	1:80000	52	06/2013	01/07/2014	01/11/0014

Table 16: Largest Scale Raster Charts

12326

A comparison was performed with Chart 12326 (1:80,000) using a CARIS sounding layer based on the 2m surface and contour layer based on a 50m generalized surface from H12627. Both soundings and contours were overlaid on Chart 12326 (Figure 28). All charted depths compare to within five feet of H12627 data with exception of five soundings located in the proximity of the dredge material dumping area in the northwest corner of H12627. All five soundings are deeper than the current charted depths (Figure 29). It should be noted that all soundings for H12627 are deeper than the dangerous/non-dangerous threshold of 60 feet. It is recommended that H12627 data supersede all charted depths.

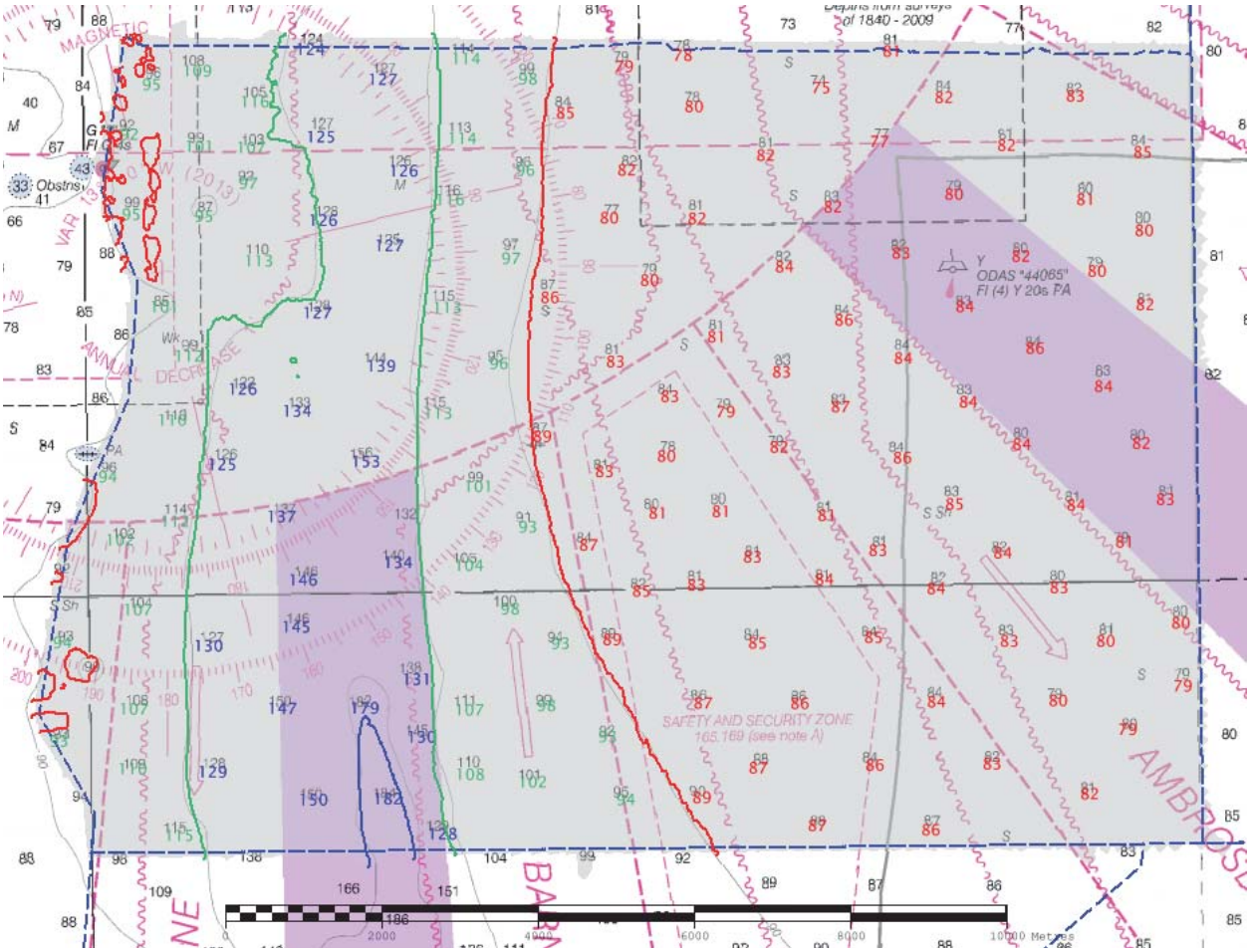


Figure 28: H12627 soundings and contours overlaid on Chart 12326.

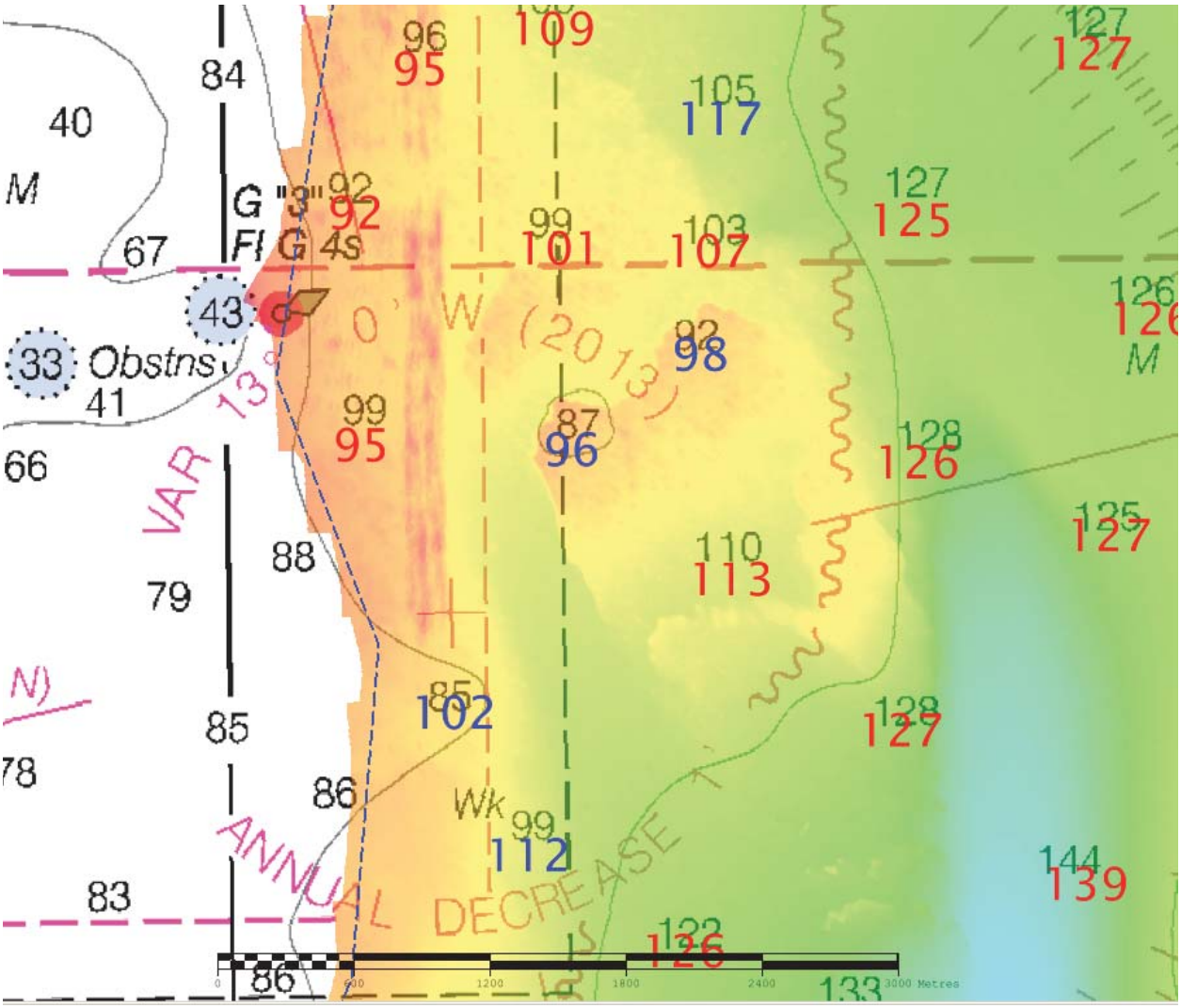


Figure 29: H12627 soundings (blue) that differ by more that five feet from charted soundings.

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?
US4NY1AM	1:80000	27	09/19/2013	01/29/2014	YES

Table 17: Largest Scale ENCs

US4NY1AM

ENC US4NY1AM contains no soundings different than RNC 12326. See previous discussion for comparison with RNC 12326.

D.1.3 AWOIS Items

Number of AWOIS Items Addressed:2
Number of AWOIS Items Not Addressed:0

AWOIS item number 1554, the wreck of ASFALTO and tug RELIANCE, is charted in survey area of H12627 (Figure 30). The 329 foot ASFALTO was a steamboat in tow of tug RELIANCE. The ship struck a submerged object on the bed of the ocean and sank. The wreck is charted as a sunken wreck and not dangerous to surface navigation. The wreck was found by MBES approximately 300 meters to the southwest.

AWOIS item number 1559 is charted as a wreck with a least depth of 99 feet (Figure 31). The 468 GT cargo ship was sunk on 1/11/1942. The wreck was found by MBES and positioned correctly. The assigned features were addressed as required in the H12627 Final Feature File.

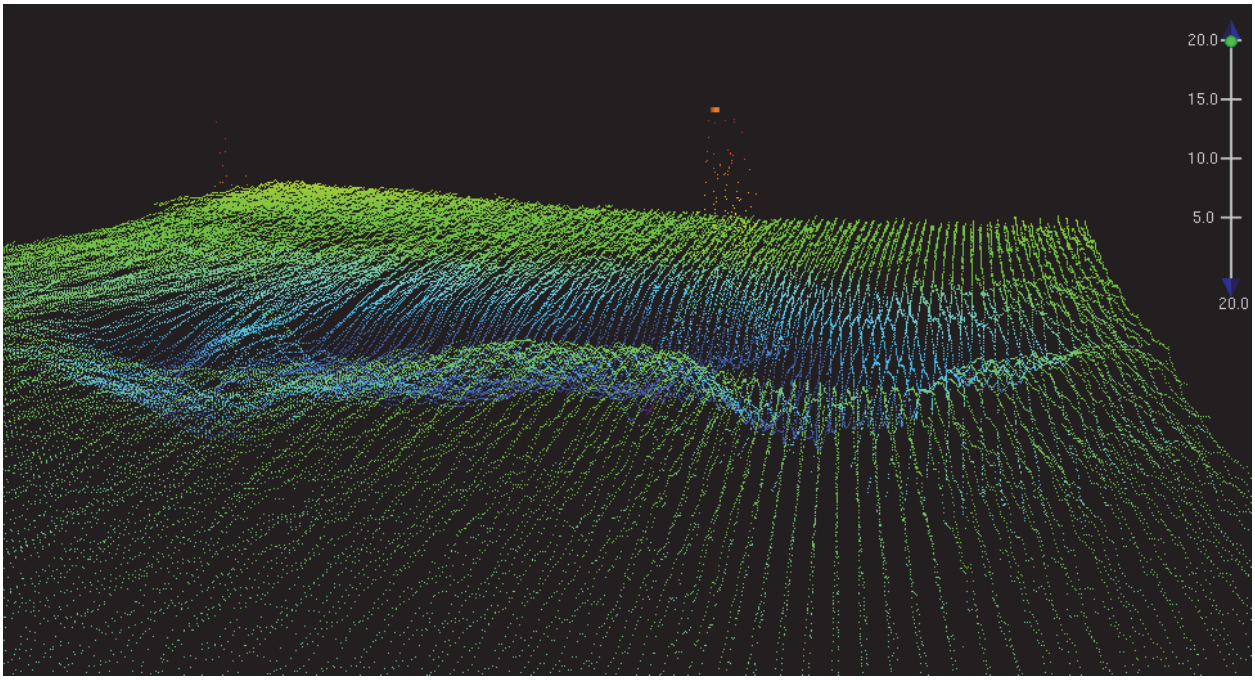


Figure 30: AWOIS item number 1554.

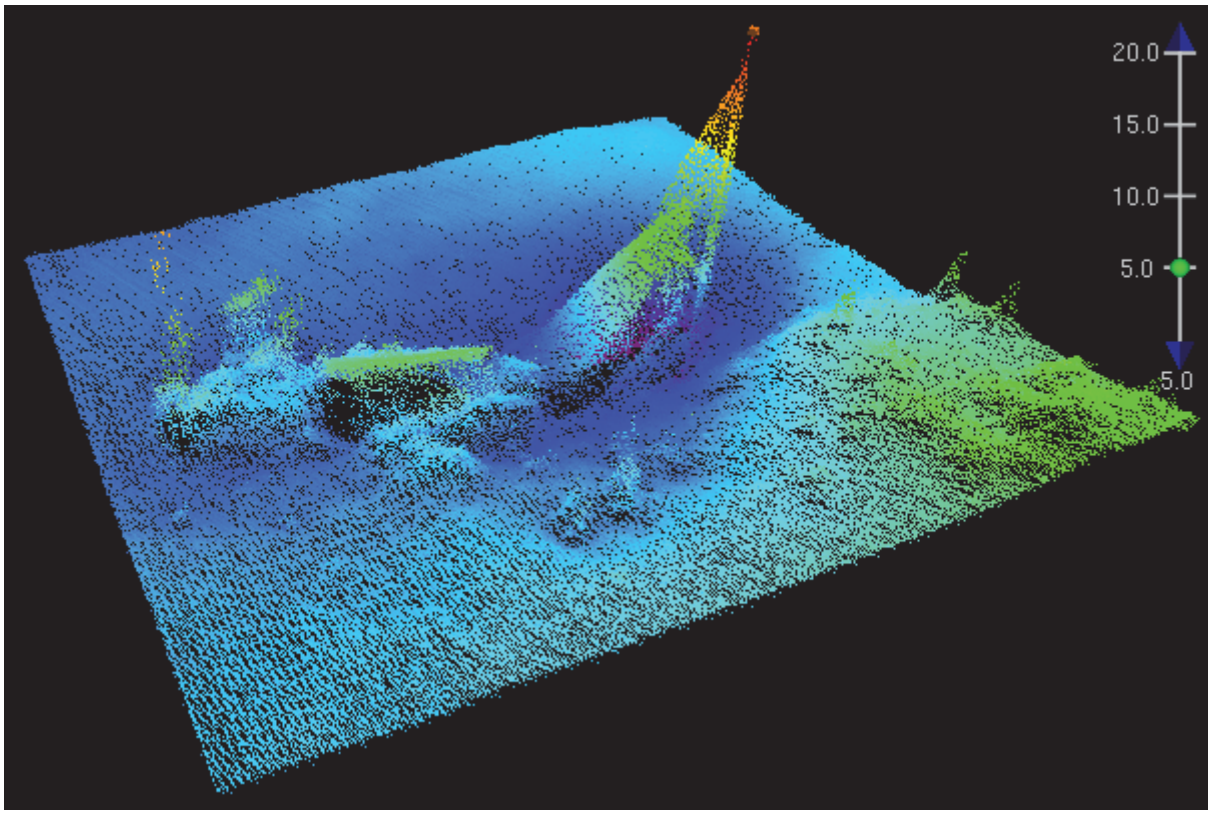


Figure 31: AWOIS item number 1559.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

There were two (2) charted wrecks that were found within the limits of hydrography of H12627. These wrecks were also assigned AWOIS items and were addressed in section D.1.3. Additionally, there is a charted obstruction area in the northwest corner of H12627. This area contains subsurface hydro acoustic arrays and fish pots that occasionally surface for retrieval. While no evidence of subsurface hydro acoustic arrays or fish pots were found in the multibeam data or sightings of any surface retrieval operations witnessed during acquisition, the hydrographer recommends that the obstruction area be retained as charted. All features were also addressed as required in the H12627 Final Feature File.

D.1.6 Uncharted Features

There were nine (9) uncharted features that were found within the limits of hydrography of H12627. The features were addressed as required in the H12627 Final Feature File.

D.1.7 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.8 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.9 Channels

The traffic lanes to and from Barnegat, Ambrose, and Hudson Canyon were found to be accurately charted to within three feet. It should be noted that no attribution for controlling depths could be found for these traffic lanes.

D.1.10 Bottom Samples

No bottom samples were required for this survey.

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

Aids to navigation (ATONs) exist for this survey and were investigated. All ATONS were found to be on station and deemed to be serving their intended purpose.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

Charted cables were fully investigated within the limits of H12627. While no evidence of cables were found in the multibeam data, the hydrographer recommends that these be retained as charted.

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

An active dredge dumping area exists in the northwest corner of H12627. For additional detail refer to the section B.2.6.

D.2.10 New Survey Recommendations

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

D.2.11 New Inset Recommendations

No new insets are recommended for this area.

E. Approval Sheet

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

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

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys 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	2014-02-14
VDatum Evaluation	2014-01-03
Hydrographic Systems Readiness Review Memo	2013-08-15

Approver Name	Approver Title	Approval Date	Signature
LCDR Marc S. Moser, NOAA	Chief of Party	02/28/2014	2014.03.05 16:08:46 -05'00'
LT Adam Reed, NOAA	Field Operations Officer	02/28/2014	
LTJG John R. Kidd, NOAA	Sheet Manager	02/28/2014	2014.02.28 21:24:06 Z

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
TPU	Total Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPENDIX I

TIDES AND WATERLEVELS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Ship FERDINAND R. HASSLER (MOA-FH)
29 Wentworth Road
New Castle, NH 03854

November 14, 2013

MEMORANDUM FOR: Gerald Hovis, Chief, Products and Services Branch, N/OPS3

FROM: LCDR Benjamin K. Evans, NOAA Ship FERDINAND R. HASSLER (MOA-FH)

SUBJECT: Request for Approved Tides/Water Levels

Please provide the following data:

1. Tide Note
2. Final zoning in MapInfo and .MIX format
3. Six Minute Water Level data (Co-ops web site)

Transmit data to the following:

Atlantic Hydrographic Branch (N/CS33)
439 West York St
Norfolk, VA 23510

NOAA Ship Ferdinand R. Hassler
29 Wentworth Road
New Castle, NH, 03854
ATTN: Operations Officer

These data are required for the processing of the following hydrographic survey:

Project No.:	OPR-B310-FH-13
Registry No.:	H12627
State:	New York
Locality:	Approaches to New York
Sublocality:	Offshore- 14NM SE of Sandy Hook Point

Attachments containing:

1) an Abstract of Times of Hydrography,
2) digital MID MIF files of the track lines from Pydro

cc: N/CS33

Year_DOY	Min Time	Max Time
2013_294	00:54:50	23:58:05
2013_295	00:00:06	23:54:28
2013_296	00:00:02	23:59:57
2013_297	00:00:02	23:59:30
2013_298	00:04:17	06:01:37
2013_304	07:04:17	23:56:50
2013_305	00:00:24	01:48:39
2013_310	15:21:50	18:55:01

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 19, 2013

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-B310-FH-2013
HYDROGRAPHIC SHEET: H12627

LOCALITY: Offshore - 14NM SE of Sandy Hook Point, Approaches to NY
TIME PERIOD: October 21 - November 6, 2013

TIDE STATION USED: 853-1680 Sandy Hook, NJ
Lat. 40° 28.0'N Long. 74° 0.5' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.492 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-B310-FH-2013, during the time period between October 21 - November 6, 2013.

Please use the zoning file B310FH2013CORP submitted with the project instructions for OPR-B310-FH-2013. Zones SA2, SA13 and SA14 are the applicable zones for H12627.

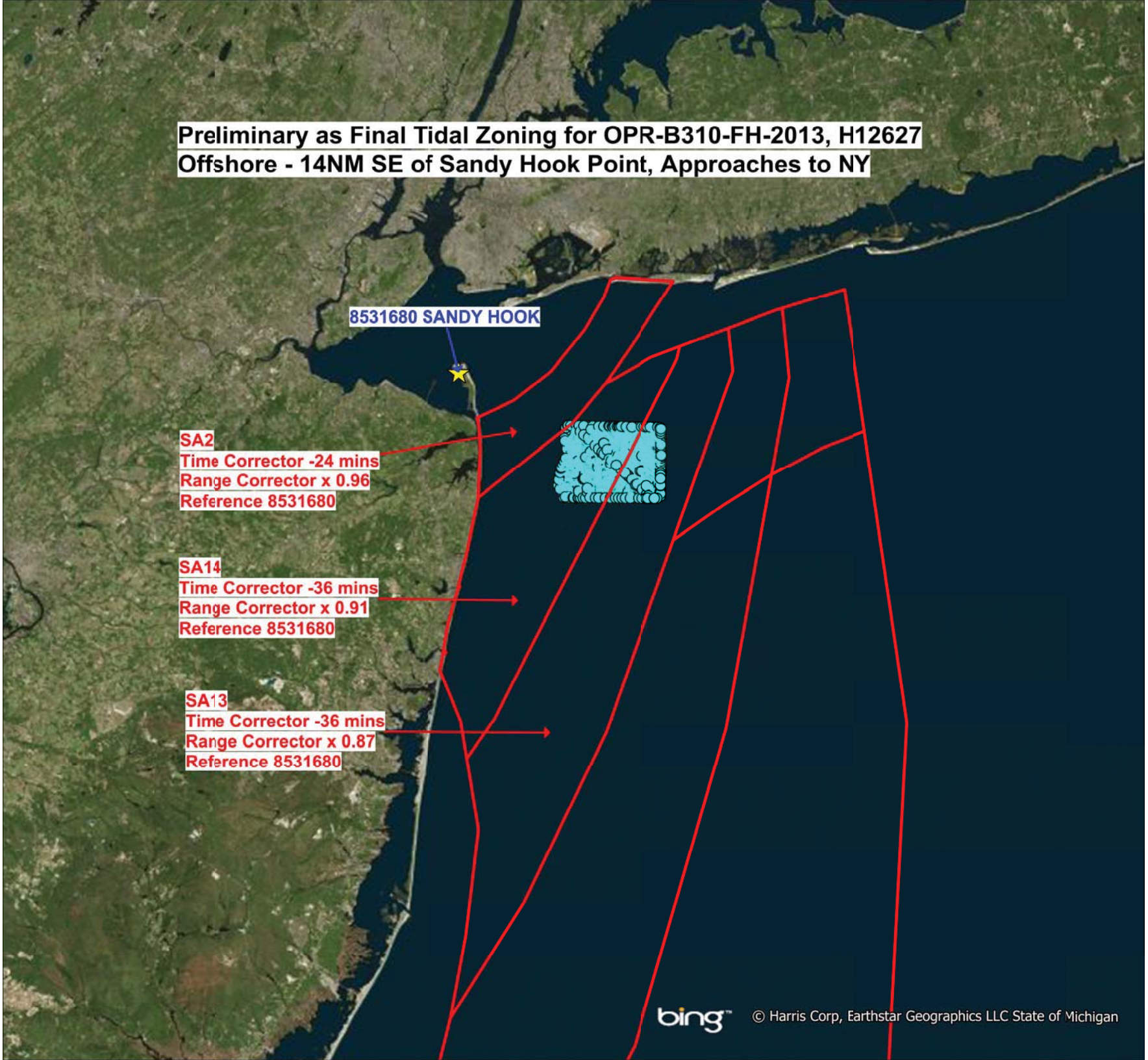
Refer to attachments for grid information.

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).

HOVIS.GERALD.THOMAS.1365860250

Digitally signed by HOVIS.GERALD.THOMAS.1365860250
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.1365860250
Date: 2013.11.22 12:00:47 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final Tidal Zoning for OPR-B310-FH-2013, H12627
Offshore - 14NM SE of Sandy Hook Point, Approaches to NY
8531680 SANDY HOOK
SA2
Time Corrector -24 mins
Range Corrector x 0.96
Reference 8531680
SA14
Time Corrector -36 mins
Range Corrector x 0.91
Reference 8531680
SA13
Time Corrector -36 mins
Range Corrector x 0.87
Reference 8531680
bing
© Harris Corp, Earthstar Geographics LLC State of Michigan

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

John Kidd - NOAA Federal <john.kidd@noaa.gov>

Fwd: OPR-B310-FH-13, active dredging

David Moehl - NOAA Federal <david.t.moehl@noaa.gov> Fri, Dec 27, 2013 at 5:15 PM
To: John Kidd - NOAA Federal <john.kidd@noaa.gov>

FYI for sheet H12627. This will need to be printed to pdf and included in Appendix II. Should probably reference in DR as well.

------- Forwarded message -------
From: **OPS.Ferdinand Hassler - NOAA Service Account** <ops.ferdinand.hassler@noaa.gov>
Date: Tue, Nov 12, 2013 at 7:20 PM
Subject: Fwd: OPR-B310-FH-13, active dredging
To: "CO.Ferdinand Hassler - NOAA Service Account" <co.ferdinand.hassler@noaa.gov>, David Moehl - NOAA Federal <david.t.moehl@noaa.gov>, Adam Reed - NOAA Federal <adam.reed@noaa.gov>, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Good Afternoon,
Please see Brent's email below regarding the dredge materials dumped within H12627. Direction is to mention the spoils in the DR but otherwise treat the data as you normally would. Hopefully the Army Corps is submitting their chart updates.
Thank you.
V/r,
Madeleine

Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
29 Wentworth Road
New Castle, NH, 03854

------- Forwarded message -------
From: **Brent Pounds - NOAA Federal** <brent.pounds@noaa.gov>
Date: Tue, Nov 12, 2013 at 4:46 PM
Subject: Re: OPR-B310-FH-13, active dredging
To: "OPS.Ferdinand Hassler - NOAA Service Account" <ops.ferdinand.hassler@noaa.gov>
Cc: Corey Allen - NOAA Federal <corey.allen@noaa.gov>

All,

I've spoke with John Tavolaro from USACE New York District and he said that the dredge material being disposed of in this dumping area is from USACE projects. This dredge dumping ground is used almost continuously as the primary offshore disposal area for projects in the port. USACE tracks the dumping activity and resurveys the area about once a year. As I understand it, they don't see much shoaling in this dumping site due to sediment transport. In any case, I would suggest just submitting the data as normal with a note about it in the DR, but no special actions required by the ship. I will follow up with MCD to ensure that they are getting the data from the yearly USACE surveys for updating purposes.

V/R,
-Brent

LCDR Brent Pounds, NOAA
Navigation Manager, Northeast Region
Office of Coast Survey
Navigation Services Division
28 Tarzwell Drive
Narragansett, RI 02882
Tel: 401-782-3252
Cel: 401-545-0174
Fax: 401-782-3292
nauticalcharts.noaa.gov

On Thu, Oct 31, 2013 at 5:50 PM, OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> wrote:

> Good Evening,
> Thanks for looking into this Sirs. I mistakenly said dredges, while we actually have the names of the tugs bringing out the spoils. These are the Sarah Dann and the Katherine.
> I found this for the Sarah Dann:
> http://www.marinetraffic.com/ais/shipdetails.aspx?&mmsi=303029000
> Have fun in NYC!
> Very respectfully,
> Madeleine
>
> Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
> 29 Wentworth Road
> New Castle, NH, 03854
>
> On Thu, Oct 31, 2013 at 2:43 PM, Corey Allen - NOAA Federal <corey.allen@noaa.gov> wrote:
>
> > Brent,
> > It can wait till next week, and thanks for your support.
> >
> > FH,
> > Please pass along that info re: dredges to Brent to help guide his conversations.
> >
> > Corey
> >
> > On Thu, Oct 31, 2013 at 10:29 AM, Brent Pounds - NOAA Federal <brent.pounds@noaa.gov> wrote:
> >
> > > Corey,
> > >
> > > I can look into this. The dredges are likely under contract to USACE, who is doing a considerable amount of dredging for the 50-ft deepening project and Sandy clean-up, or, if not, they will have a USACE permit. I have a meeting down in New York next Wednesday and will get a chance to discuss this with John Tavolaro from USACE New York District and I can provide more information then; unless this is pressing, then I can give him a call now. I would expect that this charted dumping site will be very active for the next few years with the deepening project being finished up and facilities also deepening their berths to 50-ft. There are at least three active USACE projects going on right now (Sandy Hook Channel, Kill Van Kull, and Port Jersey) with more to come.
> > >
> > > If the ship can provide the names of the dredges, that would be helpful in tracking down the project.
> > >
> > > V/R,
> > > -Brent

--
LCDR Brent Pounds, NOAA
Navigation Manager, Northeast Region
Office of Coast Survey
Navigation Services Division
28 Tarzwell Drive
Narragansett, RI 02882
Tel: 401-782-3252
Cel: 401-545-0174
Fax: 401-782-3292
nauticalcharts.noaa.gov

On Wed, Oct 30, 2013 at 5:40 PM, OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> wrote:

> Hello Again,
> I should add, the dredges do not appear to be going in to any other sections of the survey grounds.
> Thanks.
> V/r,
> Madeleine
>
> Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
> 29 Wentworth Road
> New Castle, NH, 03854
>
> On Wed, Oct 30, 2013 at 8:50 PM, Corey Allen - NOAA Federal <corey.allen@noaa.gov> wrote:
>
> > Brent,
> > Thoughts on how to proceed? If FH forwarded on contact info for the dredge company, would you be game for investigating a little further the extents and timeline for their dredge operations?
> >
> > Corey
> >
> > ---------- Forwarded message ----------
> > From: **OPS.Ferdinand Hassler - NOAA Service Account** <ops.ferdinand.hassler@noaa.gov>
> > Date: Wed, Oct 30, 2013 at 4:00 PM
> > Subject: OPR-B310-FH-13, active dredging
> > To: Corey Allen - NOAA Federal <Corey.Allen@noaa.gov>
> > Cc: David Moehl - NOAA Federal <david.t.moehl@noaa.gov>, Adam Reed - NOAA Federal <adam.reed@noaa.gov>
> >
> > Good Afternoon Sir,
> > The *Hassler* has conducted six days of survey on the Approaches to NY, starting with sheet H12627. There was active dredge spoil dumping in the NW corner of this sheet. Below, please find a screen shot of the 1m surface (10x vertical exaggeration) on Chart 12326.
> >
> > We departed Woods Hole today for our second leg on this work. Is there anything in particular you would like us to do? We have names of the dredges but do not know specifically what they are dumping.
> >
> > Thank you.
> > Very respectfully,
> > Madeleine

Inline image 1

Inline image 2

Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
29 Wentworth Road
New Castle, NH, 03854

–
J. Corey Allen
Operations Branch Team Lead
Hydrographic Surveys Division
Office of Coast Survey, NOAA
Corey.Allen@noaa.gov
301.713.2777 x119 (Office)
301.717.7271 (Cell)

--
J. Corey Allen
Operations Branch Team Lead
Hydrographic Surveys Division
Office of Coast Survey, NOAA
Corey.Allen@noaa.gov
301.713.2777 x119 (Office)
301.717.7271 (Cell)

--
David Moehl
Hydrographic Senior Survey Technician
NOAA Ship *Ferdinand R. Hassler*

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov>

OPR-B310-FH-13; H12627 & H12628

1 message

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Fri, Nov 15, 2013 at 8:50 PM

To: Final Tides - NOAA Service Account <Final.Tides@noaa.gov>, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>, David Moehl - NOAA Federal <david.t.moehl@noaa.gov>, Adam Reed - NOAA Federal <adam.reed@noaa.gov>

Good Afternoon,
Attached, please find final tides requests for OPR-B310-FH-13, registries H12627 & H12628.
Thank you kindly.

Regards,
Madeleine

Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
29 Wentworth Road
New Castle, NH, 03854

4 attachments

H12627_Final_Tide_Request.pdf
35K

H12627_Final_Tide_Request.zip
196K

H12628_Final_Tide_Request.pdf
34K

H12628_Final_Tide_Request.zip
155K

---------- Forwarded message ----------
From: **Lijuan Huang - NOAA Affiliate** <lijuan.huang@noaa.gov>
Date: Wed, Nov 27, 2013 at 3:05 PM
Subject: Final Tide Notes for OPR-B310-FH-2013, H12627 and H12628
To: "CO.Ferdinand Hassler - NOAA Service Account" <co.ferdinand.hassler@noaa.gov>, "OPS.Ferdinand Hassler - NOAA Service Account" <ops.ferdinand.hassler@noaa.gov>
Cc: "_NOS.CO-OPS.HPT" <nos.coops.hpt@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Abigail Higgins - NOAA Federal <abigail.higgins@noaa.gov>

DATE: 11/27/2013

MEMORANDUM FOR: LCDR Benjamin K. Evans
Commanding Officer, NOAA Ship Ferdinand Hassler

FROM: Gerald Hovis
Chief, Products and Services Branch, N/OPS3

SUBJECT: Delivery of Tide Requirements for Hydrographic Surveys

This is notification that the preliminary zoning is accepted as the final zoning for survey project OPR-B310-FH-2013, H12627 and H12628 from October 21 to November 6, 2013. The accepted reference station for registry Nos. H12627 and H12628 is Sandy Hook, NJ (8531680). Included with this memo are the Tide Notes in .PDF format, stating the preliminary zoning has been accepted as the final zoning.

John Kidd - NOAA Federal <john.kidd@noaa.gov>

Request for junctioning data

Nicole Kuenzel <nicole.kuenzel@cctechnol.com> Mon, Jan 6, 2014 at 9:35 PM
Reply-To: nicole.kuenzel@cctechnol.com
To: John Kidd - NOAA Federal <john.kidd@noaa.gov>
Cc: tara.levy@cctechnol.com, Lucy Hick - NOAA Federal <lucy.hick@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Melissa Sampson - NOAA Federal <melissa.r.sampson@noaa.gov>

Good Afternoon,

We have generated 2 meter BASE surfaces of all of H12610 and the eastern portion of H12608. These are preliminary grids; we're still in the process of reviewing the data. In contrast to the Junction image, H12609 and H12610 were split vertically instead of horizontally. H12610 should cover everything on the eastern margin. If there is anything that is not covered along the southern margin, please let us know and we can do a small grid of H12609 as well.

We have included the .csar and .csar0 files and the data is located:

ftp://ftp.cctechnol.com/pub/outgoing/OPR-C319-KR-13_Junctions_01-06-2014.zip

Let us know if there are any other files you may require.

Thank-you,
Nikki

On 1/6/2014 8:25 AM, John Kidd - NOAA Federal wrote:
[Quoted text hidden]

--
Nicole Kuenzel
Geoscientist
C&C Technologies, Inc.
Lafayette, LA, USA, 70508
email: nicole.kuenzel@cctechnol.com
337-210-0000 (Ext. 3537)

David Moehl - NOAA Federal <david.t.moehl@noaa.gov>

OPR-B310-FH-13, Survey Outline

2 messages

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Sat, Nov 23, 2013 at 7:22 PM

To: _NOS OCS Survey Outlines <survey.outlines@noaa.gov>
Cc: David Moehl - NOAA Federal <david.t.moehl@noaa.gov>, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>, "NAV.Ferdinand Hassler - NOAA Service Account" <NAV.Ferdinand.Hassler@noaa.gov>, Adam Reed - NOAA Federal <adam.reed@noaa.gov>

Good Afternoon,
Attached, please find survey outlines for project OPR-B310-FH-13, H12627 & H12619. We will send you the final outline shortly.
Thank you.
Kindly,
Madeleine

Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
29 Wentworth Road
New Castle, NH, 03854

2 attachments

H12629_Survey_Outline.000
4K

H12627_Survey_Outline.000
170K

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Mon, Nov 25, 2013 at 6:23 PM

To: _NOS OCS Survey Outlines <survey.outlines@noaa.gov>
Cc: Adam Reed - NOAA Federal <adam.reed@noaa.gov>, "NAV.Ferdinand Hassler - NOAA Service Account" <NAV.Ferdinand.Hassler@noaa.gov>, David Moehl - NOAA Federal <david.t.moehl@noaa.gov>, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Good Afternoon,
Attached, please find the final survey outlines for project OPR-B310-FH-13 registry H12628.
Thank you.
Kindly,
Madeleine

Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
29 Wentworth Road
New Castle, NH, 03854

[Quoted text hidden]

H12628_SurveyOutline.000
11K

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Marine and Aviation Operations
NOAA Ship *Ferdinand R. Hassler* (S-250)
Box 638, New Castle, NH 03854

January 3, 2014

MEMORANDUM FOR: Jeffrey Ferguson
Chief, Hydrographic Surveys Division

FROM: Lieutenant Commander Marc S. Moser, NOAA
Commanding Officer

SUBJECT: OPR-B310-FH-13 VDatum Evaluation and Deliverable Recommendation

Ferdinand R. Hassler personnel conducted a comparison of VDatum based Ellipsoid Referenced Survey (ERS) versus discrete tidal zoning vertical transformation techniques using crossline data per the Hydrographic Survey Project Instructions (PI). In addition we conducted comparisons using the difference between crosslines and mainscheme to give a better recommendation on internal consistency. While there are differences between the two data reduction methods, there is no justification to disprove or suspect the VDatum separation model. Results and analysis of the comparison are in the attached report.

Ship personnel experienced problems in reliably processing the vessel trajectory relative to the ellipsoid. We recommend that H12627 and H12628 be submitted as hybrid surveys with the majority of data reduced by VDatum and H12629 be submitted using discrete zoned tides exclusively.

It is understood that upon review of this report, a determination will be made for the final vertical transformation technique to be used to create the final deliverables.

Attachment

Table of Contents

1.0 Introduction……2

2.0 Procedure……2

3.0 Results……3

3.1 VDatum Model Accuracies……3

3.2 Data Internal Consistency……5

4.0 Discussion……6

5.0 Recommendation……7

List of Figures

Figure 1. Sheet layout for OPR-B310-FH-13……2

Figure 2. OPR-B310-FH-13 sheet layout with gridded VDatum separation model……3

Figure 3. H12628 discrete zoned minus VDatum crossline CUBE surface……4

Figure 4. H12628 crossline viewed in CARIS Attitude Editor……4

Figure 5. Altitude solution for ½ day of acquisition on sheet H12629……5

Figure 6. Distribution of differences for discrete zoning and VDatum for survey H12627……6

Figure 7. Distribution of differences for discrete zoning and VDatum for survey H12628……6

Figure 8. Distribution of differences for discrete zoning and VDatum for survey H12629……6

List of Tables

Table 1. Results of Pydro PostAcq Tools script run on OPR-B310-FH-13……3

Table 2. Difference statistics for mainscheme minus crossline data……5

Table 3. Recommended MLLW reduction methods for OPR-B310-FH-13 data……7

1.0 Introduction

This document is an interim report describing methods and results for the vertical datum analysis component of the vertical control requirements stated in the Hydrographic Survey Project Instructions for OPR-B310-FH-13 Approaches to New York (September 19, 2013). The project includes hydrographic surveys H12627, H12628, and H12629. The Project Instructions require the field unit to recommend the final vertical transformation technique after analyzing crossline data. The recommendations and supporting data included in this report are intended for use by the Hydrographic Surveys Division (HSD) to support the final decision on the use of ellipsoidally-referenced survey (ERS) methods in lieu of traditional tides for final water level correctors for the OPR-B310-FH-13 surveys.

The basis of this analysis is a comparison of discrete tidal zoning and Vertical Datum Transformation (VDatum) as methods for vertical control. Because discrete tidal zoning is the conventional and accepted method, it is regarded as a baseline for this evaluation.

2.0 Procedure

The VDatum evaluation was conducted according to the instructions in Appendix 1 of the project instructions. Additional guidance found in the Pydro distribution (Pydro\Lib\site-packages\HSTP\Pydro\PostAcqTools_CompareTSeries.docx) and followed for the direct comparison of data.

Project crossline data was reduced to Mean Lower Low Water (MLLW) via conventional discrete tidal zoning. The same set of crossline data was reduced using VDatum. Time series data for the nadir depth was extracted from both data sets and differenced using the Pydro PostAcq toolset.

In addition, CARIS surfaces of crossline and mainscheme data were analyzed in both discrete zoning and VDatum methods. This analysis was used to evaluate the internal consistency of data and detect any spatial patterns in the difference that may have suggested inconsistencies in the VDatum model.

Survey limits for the areas used in this assessment are shown in Figure 1.

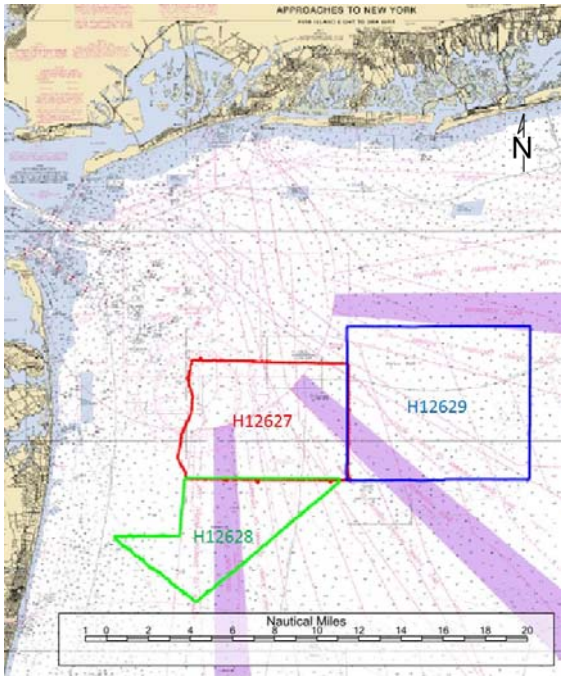


Figure 1: Sheet limits for Project OPR-B310-FH-13. Sheets H12627, H12628 and H12629 were surveyed by *Ferdinand R. Hassler*.

3.0 Results

This report will answer three questions:

- Is the VDatum model correct in the geographic location of this project?
- Is the internal consistency of the data improved by ERS methods?
- What method of vertical control is appropriate for specific surveys?

3.1 VDatum Model Accuracies

To analyze the VDatum model, the ellipsoid to MLLW .xyz separation file provided by HSD Operations was rendered as a surface. This was examined to assess the overall slope of the model within the survey area, and thus the magnitude of vertical error resulting from any horizontal offset. The surface was also inspected for errors that could be the result of inconsistencies within the VDatum model. This surface is shown in Figure 2.

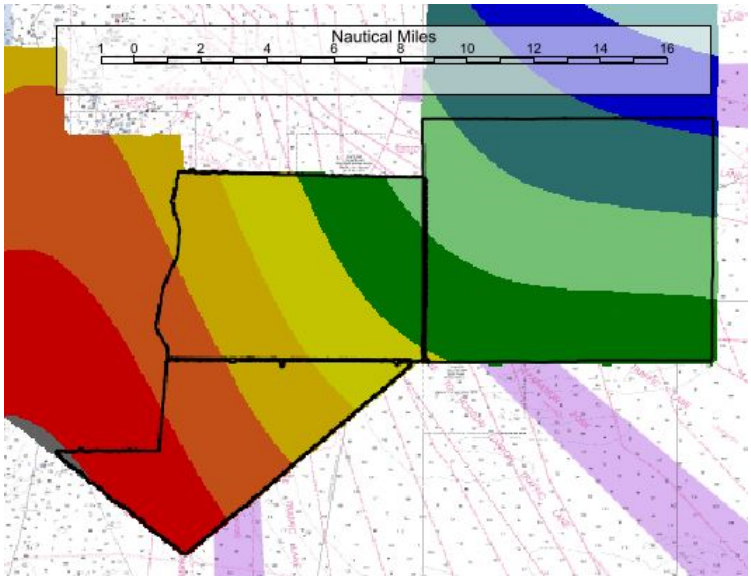


Figure 2. 2013_B310_VDatum_NAD83Ellip_MLLW.xyz separation model overlaid with H12627, H12628 and H12629 survey areas. Colored bands correspond to 10 cm intervals.

As illustrated in Figure 2, the separation model is free of gaps and anomalies within the survey limits for OPR-B310-FH-13 (black outlines). Overall, the model appears adequate for use within the limits of the project.

In accordance with Appendix I of the Project Instructions, Pydro's Post Acquisition Tool utility was used to compare the nadir depths from crossline data corrected with VDatum and with zoned tides. The results of this analysis are shown in Table 1.

Sheet	Sonar Head	Mean	95% of nodes
H12627	Port	0.096	0.104
	Starboard	0.044	0.133
	Average	0.070	0.129
H12628	Port	0.006	0.137
	Starboard	-0.050	0.149
	Average	-0.023	0.155
H12629	Port	0.024	0.165
	Starboard	-0.053	0.333
	Average	-0.015	0.274

Table 1. Results of Pydro PostAcq Tools script run on OPR-B310-FH-13

The average differences of the nadir depths from crosslines range from 0.096 to -0.053 meters. These differences may arise from several different sources including: poor vertical GPS solutions, poor zoning model, errors in dynamic draft values and loading errors.

Water depths within the boundaries of this comparison range from 18 to 66 meters. The total allowable vertical uncertainty in this depth range is between 0.55 and 0.99 meters at 95% confidence, accounting for all errors. Of this total uncertainty, approximately 0.16 meters is budgeted for water level corrections. When adding the average and 95% of nodes values, the nadir crossline comparison exceeds the water level correction uncertainty budget on all sheets.

The statistics obtained for the nadir crossline comparisons alone cannot validate the VDatum model. Additional statistical analyses were performed with a differenced surface (discrete tides minus VDatum). This surface was created to examine spatial trends in the data. The crossline surfaces contain data from both port and starboard sonar heads. An image of the resulting surface for H12628 overlaid on the BASE surface is shown in Figure 3. The crossline surface is displayed with a color range file. Green indicates 'zero' (-0.01 to 0.01 m), blue displays divergence from zero (-0.2m to -0.01 and 0.01 to 0.2 m) and magenta is a further divergence from zero outside of the uncertainty budget for water level correction.

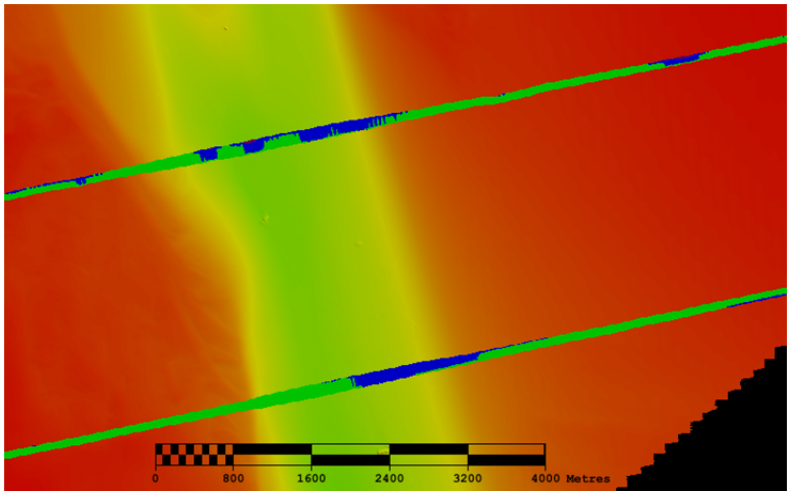


Figure 3. H12628 discrete zoned tides minus VDatum crossline CUBE surface.

No spatial trend is visible in the differenced crosslines. Rather, the differences appear to be random in location and of short (less than 10 minute) duration. Viewed in CARIS Attitude Editor, it is apparent that a suspect GPS tide solution correlates with these divergences from zero (Figure 4).

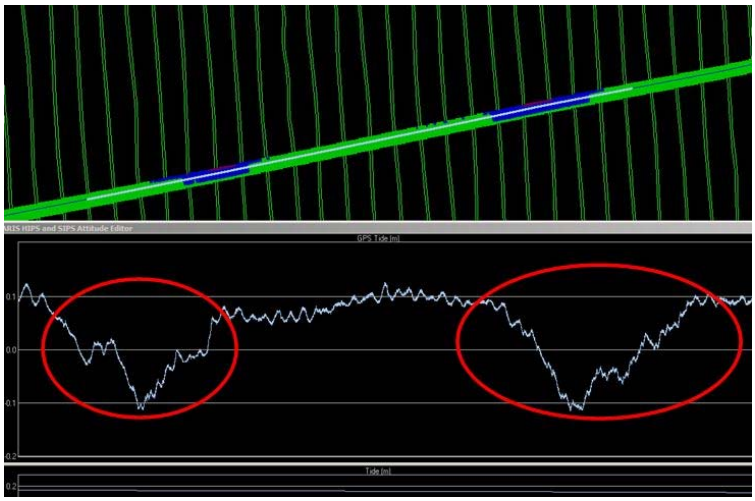


Figure 4. H12628 crossline viewed in CARIS Attitude Editor. The two areas showing divergence from zero (blue) correlate with a notable change in GPS tide (red circles).

The smooth best estimate of trajectory (SBET) contained unrealistic vertical anomalies throughout project OPR-B310-FH-13. Some GPS solutions have altitude spikes that separate from their probable correct value by 10 meters (Figure 5). The hydrographer believes these altitude spikes are responsible for higher statistical deviation between VDatum and zoned tides.

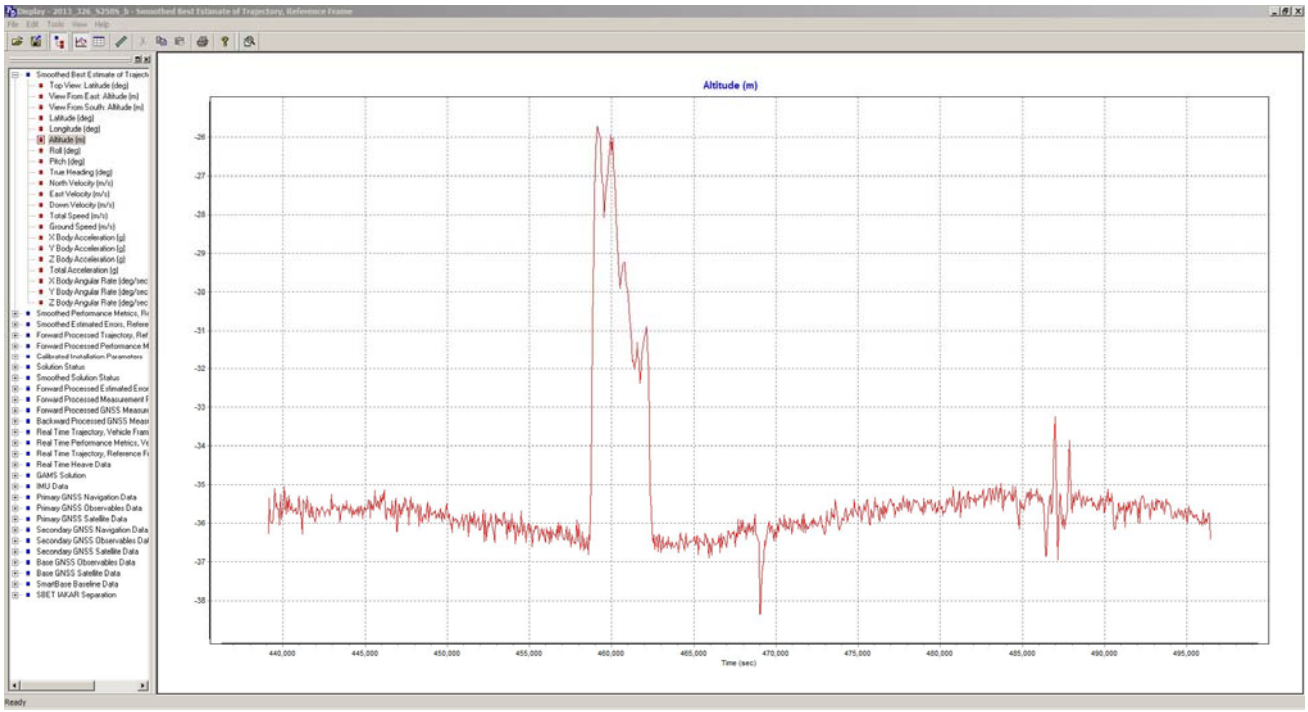


Figure 5. Altitude solution for 12 hours of acquisition on sheet H12629. Altitude changes exceed 10 meters from the perceived correct value.

Before this analysis was conducted some of these large vertical anomalies were interpolated using CARIS Attitude Editor. However, additional time will need to be spent by sheet managers insuring that these vertical anomalies are identified before final survey submittal. The reason for these large vertical separations is unknown. More research, time and effort will need to be allocated which goes beyond the scope of this report.

3.2 Data Internal Consistency

To analyze the internal consistency of ERS methods a crossline analysis was completed over the entire sheet for both discrete zoning and VDatum. The results of these differences are summarized in Table 2.

Sheet	Method	Mean	St.Dev.	95% of nodes
H12627	Discrete Zoning	-0.05	0.05	0.09
	VDatum	0.04	0.09	0.15
H12628	Discrete Zoning	-0.06	0.09	0.17
	VDatum	0.00	0.08	0.15
H12629	Discrete Zoning	-0.04	0.06	0.12
	VDatum	0.01	0.18	0.25

Table 2. Difference statistics for mainscheme minus crossline data.

The results show that VDatum provides the best mean difference value in all three surveys. However, the standard deviation is larger for the VDatum surfaces for two sheets (H12627 and H12629). This is likely attributed to the vertical anomalies discussed previously in this report. No interpolation was performed for survey H12629, but the reported statistics excluded approximately twenty survey lines which showed the worst post-processed solutions. Even without including these lines,

there is still much greater standard deviation when reduced with VDatum. Conversely, survey H12628 has fewer vertical anomalies than other sheets during OPR-B310-FH-13 and thus, a lower standard deviation when reduced by VDatum. Figures 6 through 8 show the distribution of differences for the three surveys.

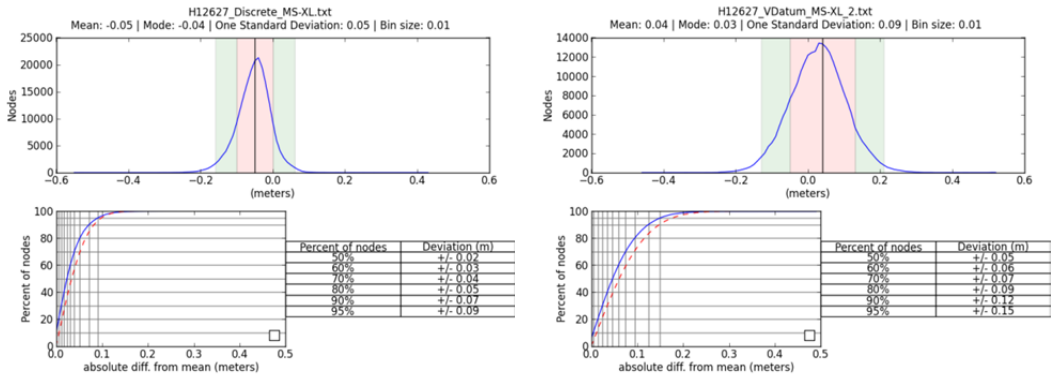


Figure 6. Distribution of differences for discrete zoning (left) and VDatum (right) for survey H12627.

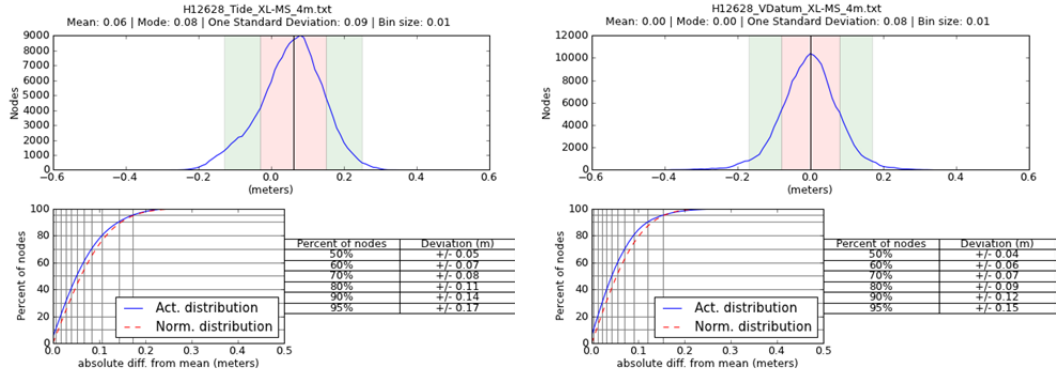


Figure 7. Distribution of differences for discrete zoning (left) and VDatum (right) for survey H12628.

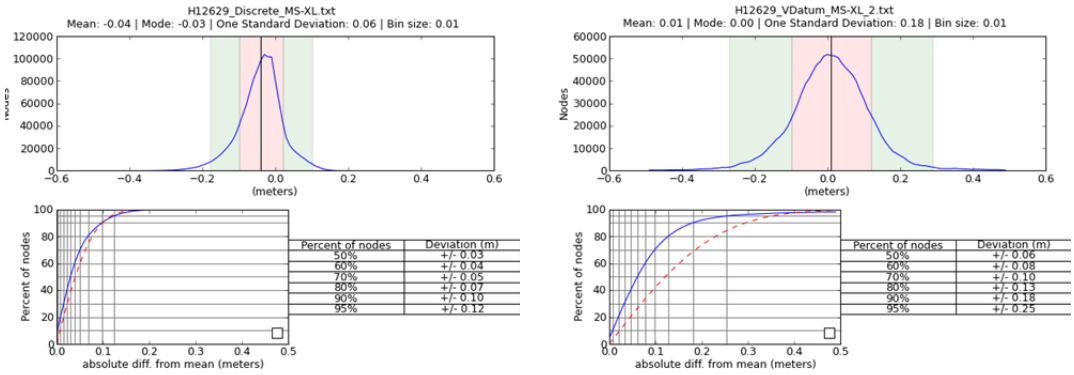


Figure 8. Distribution of differences for discrete zoning (left) and VDatum (right) for survey H12629.

4.0 Discussion

The comparison between discrete tides and VDatum indicates that the VDatum model for this area accurately reduces the data to MLLW. In addition, the average internal consistency between surfaces reduced with VDatum is better than with discrete zoned tides applied. The hydrographer believes the VDatum model for this area to be accurate.

However, post-processed solutions were not consistently accurate for the entirety of OPR-B310-FH-13. After SBET application, several lines exhibited unrealistic vertical offsets during periods of low positional accuracy. The absence of good vertical solutions for the entirety of the project negatively affected the overall statistical agreement.

In the end, MLLW correctors reduced by VDatum eliminate several sources of vertical errors that can be attributed to traditional tide models and ship water line estimators, such as dynamic draft. An ERS approach is therefore desired when possible. However, ERS and VDatum require good vertical position solutions to be effective. If a survey contains excessive poor post-processed position solutions, it will be necessary to reduce with discrete zoned tides. As such, the application of VDatum should be performed on a sheet by sheet basis. The hydrographer is confident that the VDatum model in this geographic location is valid and should be used if reliable post-processed vertical solutions are available.

5.0 Recommendation

For surveys H12627 and H12628, the comparison between VDatum and discrete zoning is close to the acceptable range of uncertainty. Isolated areas of poor post-processed position data will need to be interpolated with CARIS Attitude Editor or reduced with discrete zoned tides resulting in the submission of a hybrid survey.

In the case of H12629, poor post-processed position data were prevalent, thus VDatum is not a valid solution. It is recommended that discrete zoned tides be used exclusively to reduce data within the sheet limits of H12629.

Table 3 summarizes the recommendations for OPR-B310-FH-13.

Sheet	Recommended Method	Reasoning
H12627	VDatum	Interpolation improves internal consistency, minimal lines will need to be reduced via discrete zoning
H12628	VDatum	Interpolation improves internal consistency, few vertical anomalies, minimal lines will need to be reduced via discrete zoning
H12629	Discrete Zoning	Interpolation required on vertical solutions would be labor-intensive as vertical anomalies are present in approximately half of the data, discrete zoning is within acceptable uncertainty

Table 3. Recommended MLLW reduction methods for OPR-B310-FH-13 data.

We further recommend this VDatum model be considered for use with future surveys in the area.

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

February 27, 2014

MEMORANDUM FOR: LCDR Marc S. Moser, NOAA
Commanding Officer, NOAA Ship *Ferdinand Hassler*

FROM: Jeffrey Ferguson
Chief, Hydrographic Surveys Division

SUBJECT: Vertical Datum Transformation Technique,
OPR-B310-FH-13, Approaches to New York, NY

Hydrographic surveys H12627 & H12628 are approved for vertical reduction to chart datum, Mean Lower Low Water (MLLW), using the NOAA Vertical Datum Transformation (VDatum) (http://vdatum.noaa.gov) derived separation (SEP) model.

Approval of VDatum, in lieu of the NOAA Center for Operational Oceanographic Products and Services (CO-OPS) discrete zoning package as per the Project Instructions, is based on your recommendation and the review of comparison results you included in your attached email from January 3, 2014.

The results of the data analysis show that ellipsoidally referenced survey (ERS) techniques with VDatum 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 that were developed and approved as part of the CSDL Ellipsoidally Referenced Survey (ERS) project. These procedures and deliverables were recently added to the April 2013 edition of 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 or prior survey data 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 VDatum 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 inaccurate.

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

APPENDIX III

FEATURES REPORT

DTONS - 0
AWOIS - 2
WRECKS - 3 (see also AWOIS section)
MARITIME BOUNDARIES - 0

H12627 Feature Report

Registry Number: H12627
State: New York
Locality: Approaches to New York
Sub-locality: 14 NM SE of Sandy Hook Point
Project Number: OPR-B310-HF-13
Survey Dates: 10/21/2013 - 11/06/2013

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12326	52nd	06/01/2013	1:80,000 (12326_1)	USCG LNM: 9/9/2014 (9/16/2014) CHS NTM: None (8/29/2014) NGA NTM: 5/10/2003 (9/20/2014)
12300	47th	05/01/2008	1:400,000 (12300_1)	[L]NTM: ?
13006	34th	05/01/2007	1:675,000 (13006_1)	[L]NTM: ?
5161	13th	10/01/2003	1:1,058,400 (5161_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

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

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	WRECK	Wreck	38.12 m	40° 20' 07.3" N	073° 48' 51.1" W	---
1.2	WRECK	Wreck	30.82 m	40° 19' 39.0" N	073° 47' 54.5" W	---
1.3	WRECK	Wreck	24.70 m	40° 20' 18.1" N	073° 41' 59.0" W	---
2.1	AWOIS #1559	Wreck	30.34 m	40° 21' 43.7" N	073° 49' 04.3" W	1559
2.2	AWOIS #1554	Wreck	27.73 m	40° 20' 54.2" N	073° 46' 08.5" W	1554

1 - New Features

1.1) WRECK

Survey Summary

Survey Position:	40° 20' 07.3" N, 073° 48' 51.1" W
Least Depth:	38.12 m (= 125.08 ft = 20.847 fm = 20 fm 5.08 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-310.00:00:00.000 (11/06/2013)
Dataset:	H12627_Features.000
FOID:	0_ 0000685647 00001(FFFE000A764F0001)
Charts Affected:	12326_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

WRECKS/remrks: New wreck found by MBES.

Hydrographer Recommendations

Chart new wreck.

Cartographically-Rounded Depth (Affected Charts):

125ft (12326_1)

21ft (12300_1, 13006_1, 13003_1)

38m (5161_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 1:non-dangerous wreck
	QUASOU - 6:least depth known
	SORDAT - 20131106
	SORIND - US,US,graph,H12627
	TECSOU - 3:found by multi-beam
	VALSOU - 38.125 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: New wreck found with depths within range of surrounding charted depths. Defer the final charting disposition to AHB Compile Team.

COMPILE: Chart wreck as surveyed.

Feature Images

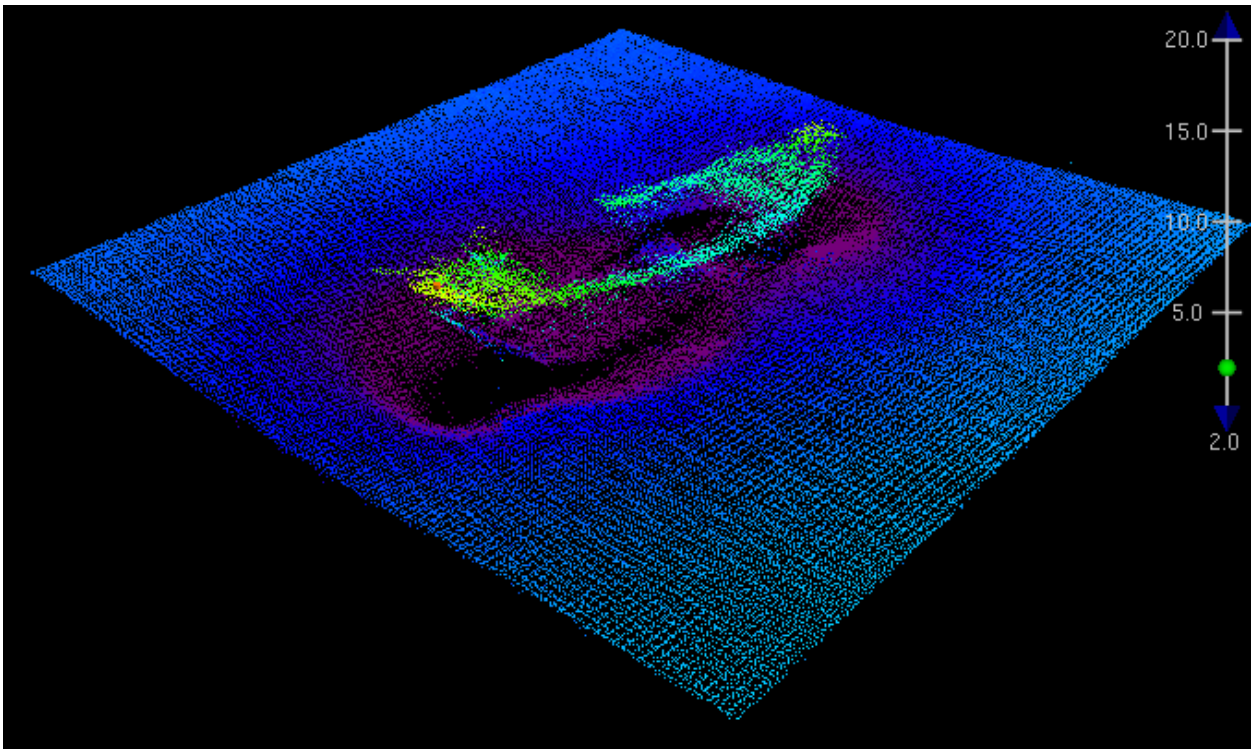


Figure 1.1.1

1.2) WRECK

Survey Summary

Survey Position:	40° 19' 39.0" N, 073° 47' 54.5" W
Least Depth:	30.82 m (= 101.10 ft = 16.850 fm = 16 fm 5.10 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-310.00:00:00.000 (11/06/2013)
Dataset:	H12627_Features.000
FOID:	0_ 0000685649 00001(FFFE000A76510001)
Charts Affected:	12326_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

WRECKS/remrks: New wreck found by MBES.

Hydrographer Recommendations

Chart new wreck.

Cartographically-Rounded Depth (Affected Charts):

101ft (12326_1)

17ft (12300_1, 13006_1, 13003_1)

31m (5161_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 1:non-dangerous wreck
	QUASOU - 6:least depth known
	SORDAT - 20131106
	SORIND - US,US,graph,H12627
	TECSOU - 3:found by multi-beam
	VALSOU - 30.815 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: New wreck found at 40.327494N, 73.798483W with MBES and SSS. The feature has the appears of a barge; the shape is rectangulare and measures approximately 40m long by 20m wide. Defer the final charting disposition to AHB Compile Team.

COMPILE: Chart wreck as surveyed.

Feature Images

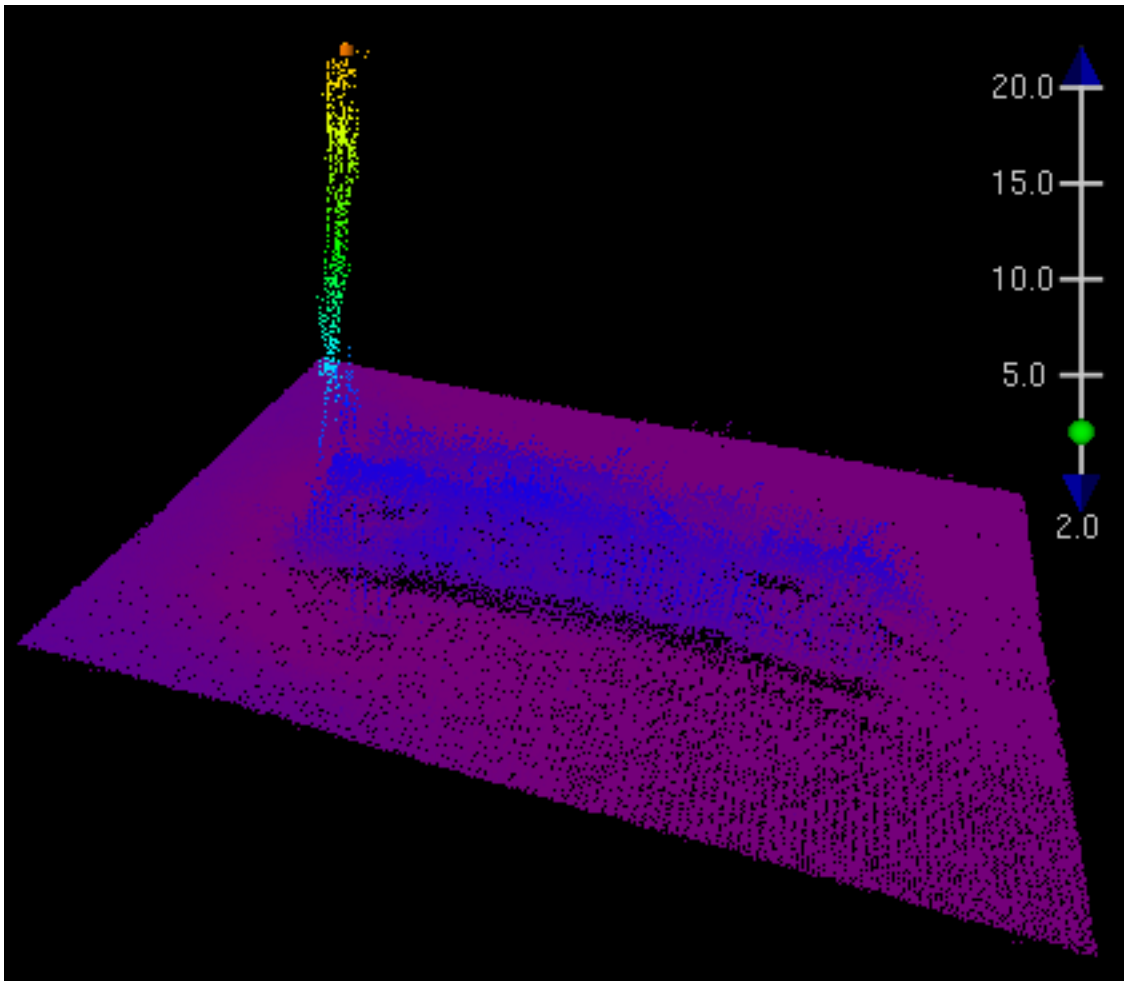


Figure 1.2.1

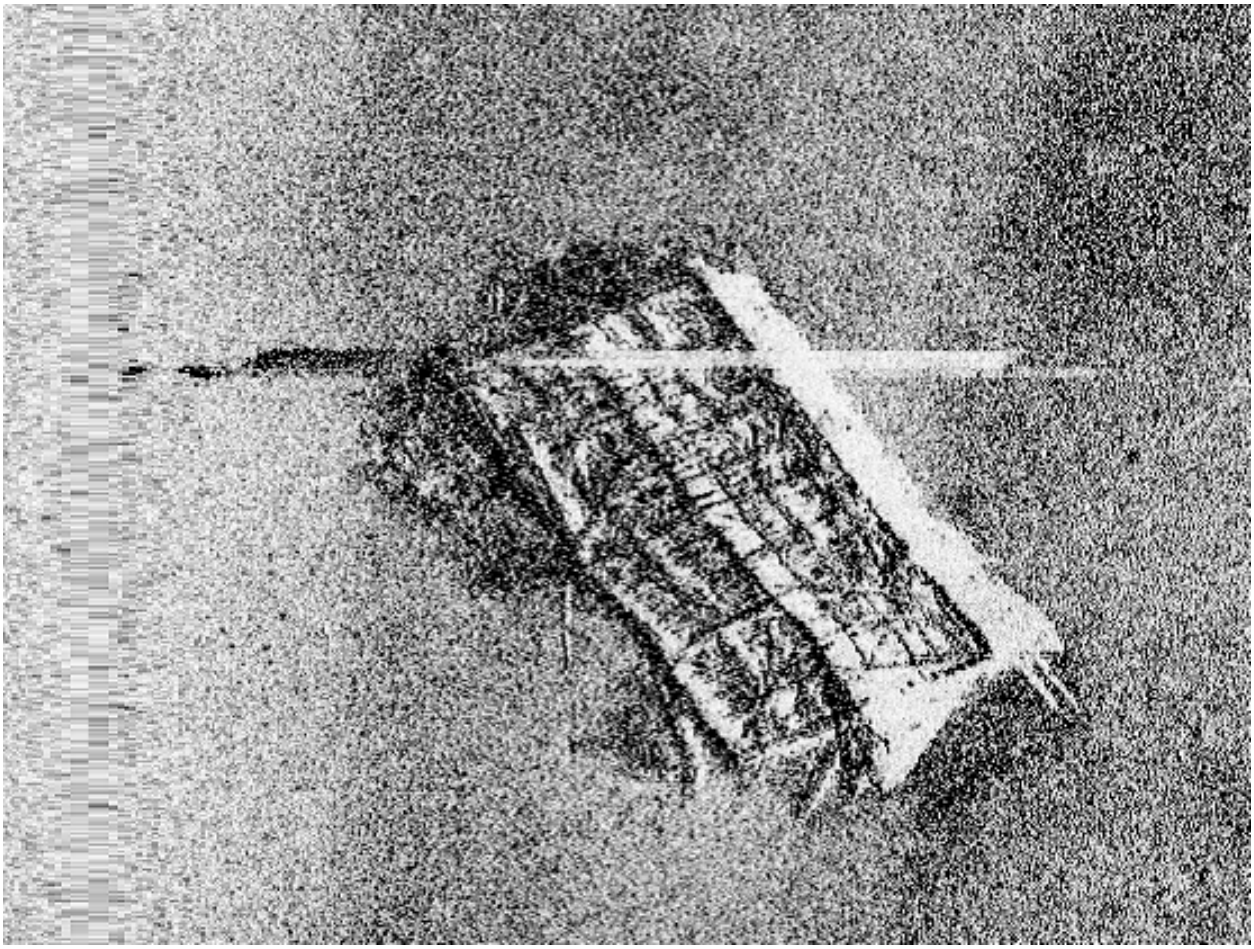


Figure 1.2.2

1.3) WRECK

Survey Summary

Survey Position:	40° 20' 18.1" N, 073° 41' 59.0" W
Least Depth:	24.70 m (= 81.02 ft = 13.503 fm = 13 fm 3.02 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-310.00:00:00.000 (11/06/2013)
Dataset:	H12627_Features.000
FOID:	0_ 0000685648 00001(FFFE000A76500001)
Charts Affected:	12326_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

WRECKS/remrks: New wreck found by MBES.

Hydrographer Recommendations

Chart new wreck.

Cartographically-Rounded Depth (Affected Charts):

81ft (12326_1)

13ft (12300_1, 13006_1, 13003_1)

24m (5161_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 1:non-dangerous wreck
	QUASOU - 6:least depth known
	SORDAT - 20131106
	SORIND - US,US,graph,H12627
	TECSOU - 3:found by multi-beam
	VALSOU - 24.695 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: New wreck found at 40.338350N, 73.69971W with MBES and SSS. Wreck is located in a sea floor depression and appears to be deteriorated. Defer the final charting disposition to AHB Compile Team.

COMPILE: Chart wreck as surveyed.

Feature Images

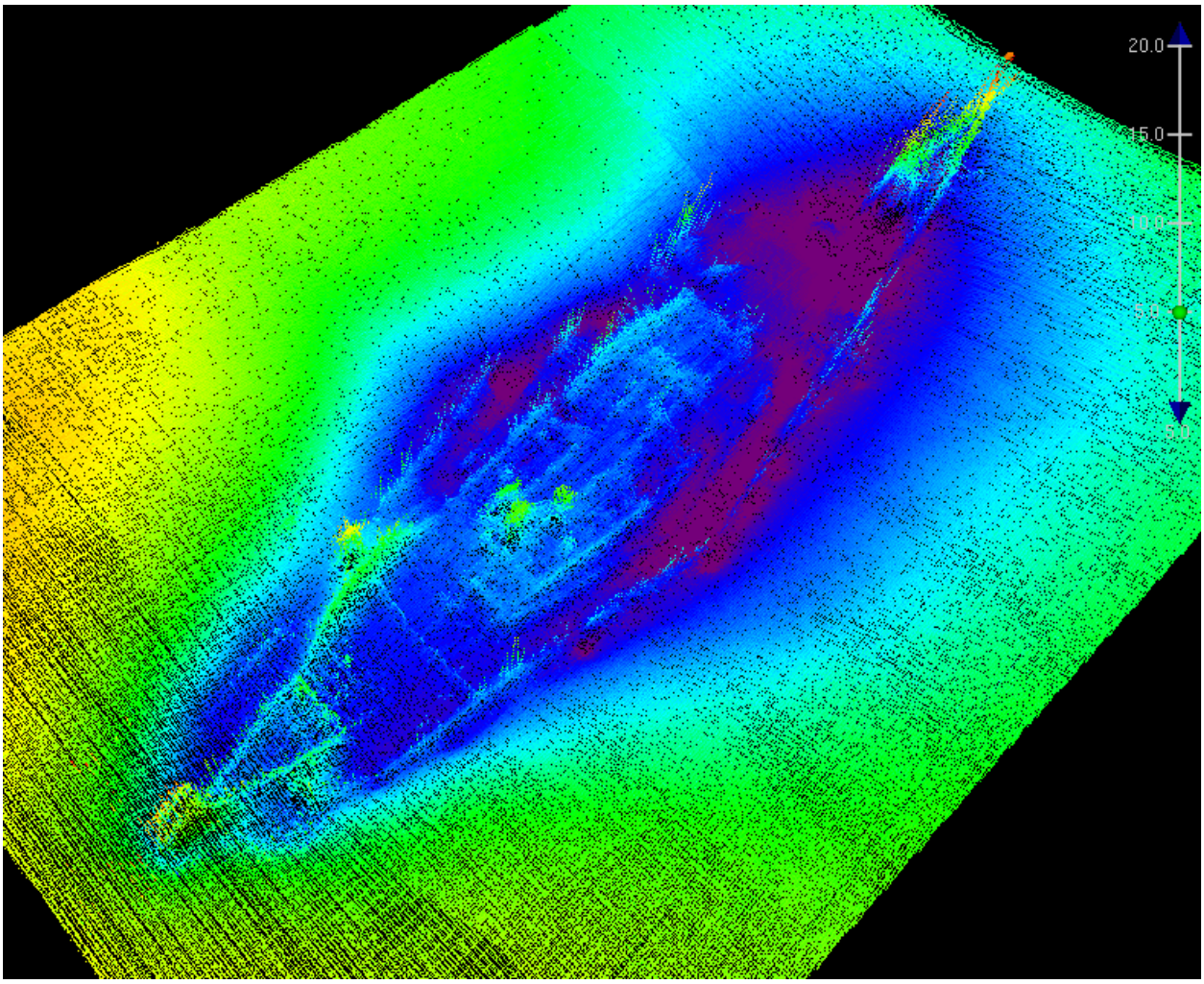


Figure 1.3.1

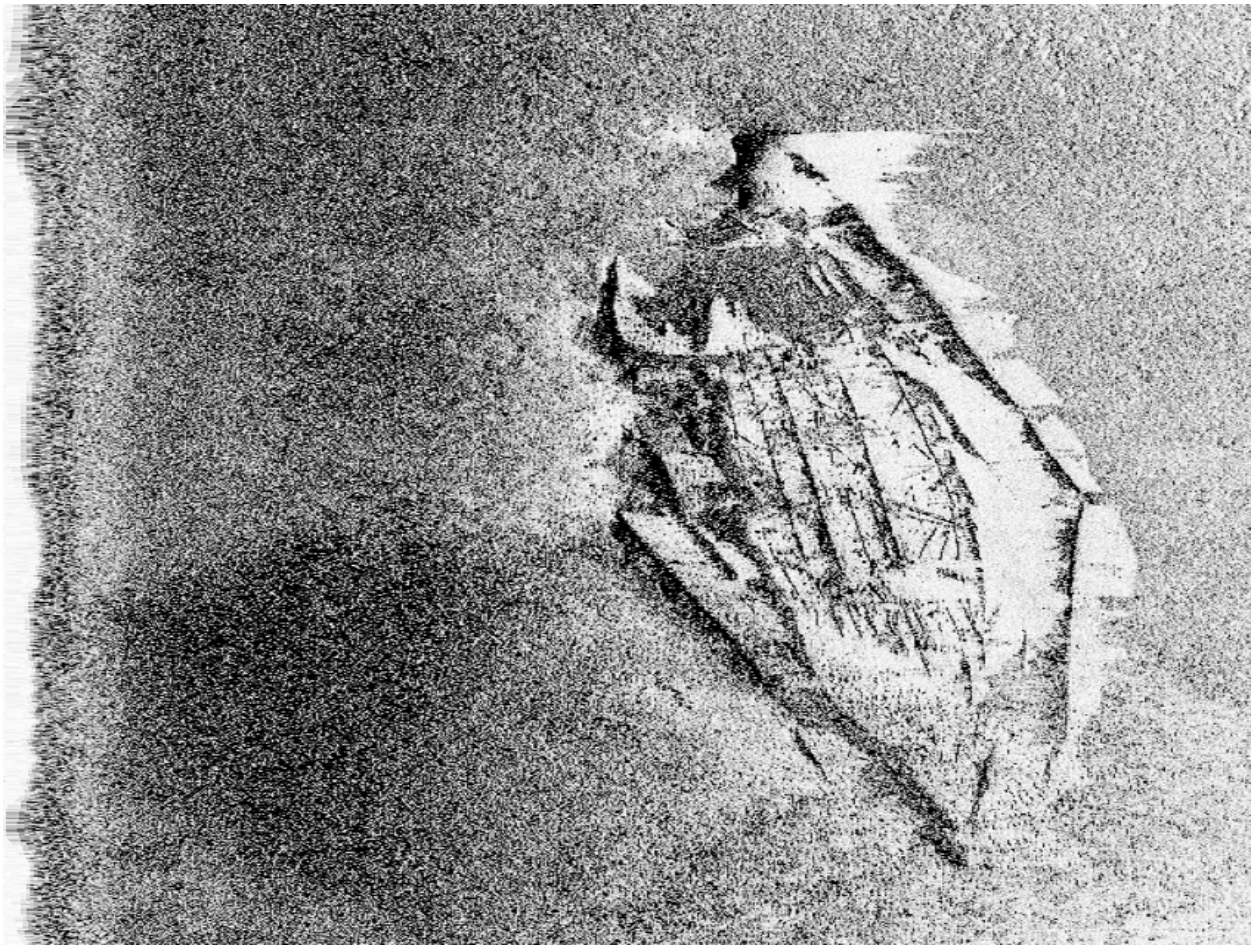


Figure 1.3.2

2 - AWOIS Features

2.1) AWOIS #1559

Feature for AWOIS Item #1559

Search Position:	40° 21' 43.7" N, 073° 49' 04.3" W
Historical Depth:	30.34 m
Search Radius:	[unknown]
Search Technique:	Type: CONTINENT, Itemstatus: COMPLETED, Searchtype: INFORMATION, Technique:
Technique Notes:	

History Notes:

History

HISTORY NM10/43 H10750/97-- OPR-C399-RU; SIDE SCAN SONAR LOCATED SUNKEN WRECK. ì ECHO SOUNDER LD OF 99 FEET IN LAT. 40-21-43.919N LONG. ì 73-49-04.264W. EVALUATOR RECOMMENDS DELETING CHARTED ì NON-DANGEROUS SUNKEN WRECK AND CHARTING A 99 WK AS SURVEYED. (UP ì 12/3/98 SJV) DESCRIPTION 24 NO. 362; CARGO 468 GT SUNK 1/11/42 BY MARINE CASUALTY; POSITION ACCURACY WITHIN ONE MILE. 27 NO. 660; SUNK BEFORE WWII; LOCATED BY THIRD NAVAL DISTRICT HQ. 195 LORAN-C RATES PROVIDED BY MR. RICHARD TARACKA GREENWICH POLICE DEPT. TEL. NO. 203-622-8020; 9960-X 26884.7 9960-Y 43637.4. (ENT 4/90 MSM)

Survey Summary

Survey Position:	40° 21' 43.7" N, 073° 49' 04.3" W
Least Depth:	30.34 m (= 99.55 ft = 16.592 fm = 16 fm 3.55 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-310.00:00:00.000 (11/06/2013)
Dataset:	H12627_Features.000
FOID:	0_ 0000685651 00001(FFFE000A76530001)
Charts Affected:	12326_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

WRECKS/remrks: AWOIS #1559 - wreck found with 100% MBES.

Hydrographer Recommendations

Update AWOIS item.

Cartographically-Rounded Depth (Affected Charts):

99ft (12326_1)

16ft (12300_1, 13006_1, 13003_1)

30m (5161_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 1:non-dangerous wreck
	QUASOU - 6:least depth known
	SORDAT - 20131106
	SORIND - US,US,graph,H12627
	TECSOU - 3:found by multi-beam
	VALSOU - 30.343 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: AWOIS 1559 was verified using complete coverage MBES. Defer the final charting disposition to AHB Compile Team.

COMPILE: AWOIS 1559 located with new depth and position. Chart wreck as surveyed.

Feature Images

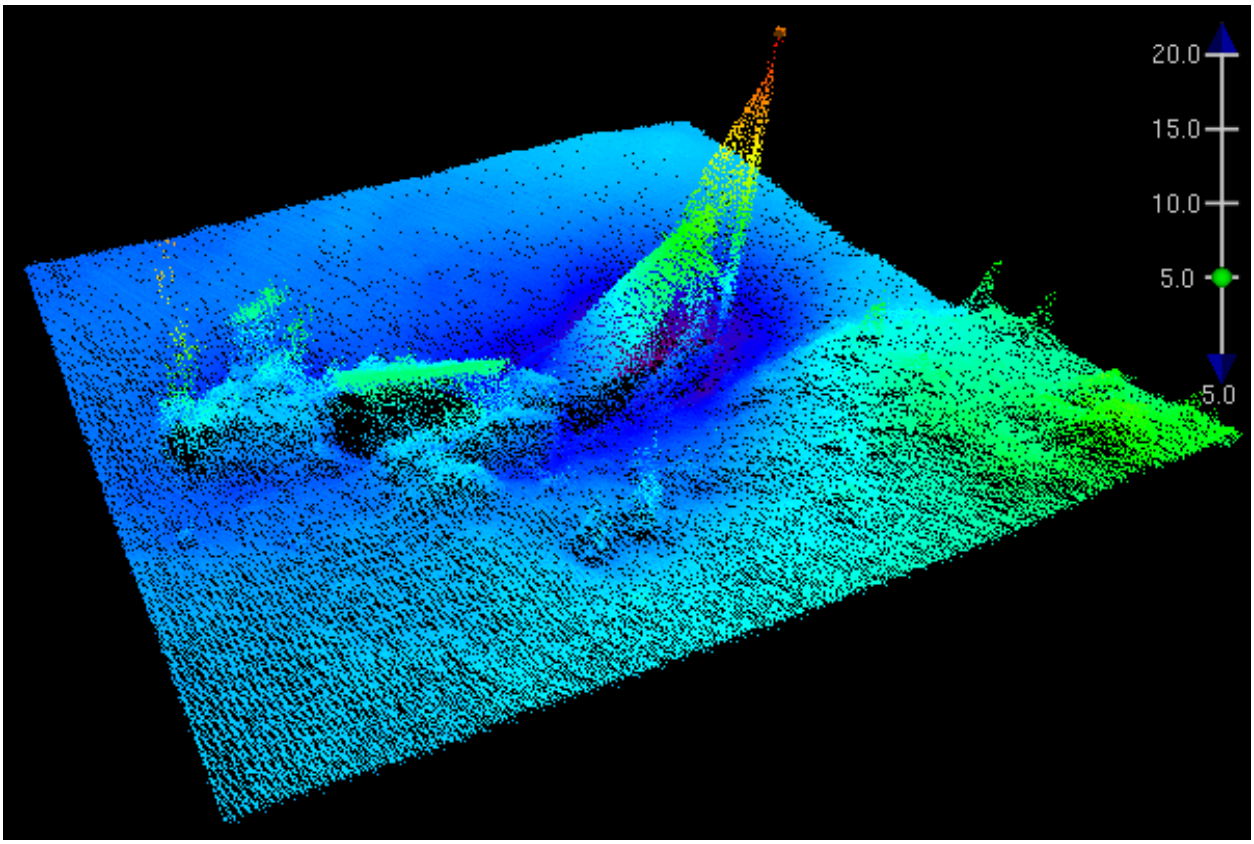


Figure 2.1.1

2.2) AWOIS #1554

Feature for AWOIS Item #1554

Search Position:	40° 20' 54.2" N, 073° 46' 08.5" W
Historical Depth:	27.73 m
Search Radius:	[unknown]
Search Technique:	Type: ASFALTO, Itemstatus: COMPLETED, Searchtype: INFORMATION, Technique:
Technique Notes:	

History Notes:

History

" HISTORY CL203/32--DOC STEAMBOAT INSPECTION SERVICE; ACCIDENT REPORT; BARGE ASFALTO ì IN TOW OF TUG RELIANCE STRUCK SOME SUBM OBJECT ON BED OF OCEAN AND SANK; ì ORIGINALLY NOT CHARTED BECAUSE POSITION IS TOO UNCERTAIN; REP POSITION IS ì LAT 40-21N LONG 73-46W; SHOALEST DEPTH AT REP POSITION IS 78 FEET. CL347/58--CGS; MEMO FROM CHIEF CHARTING DIVISION ESTABLISHING NEW POLICY ì CONCERNING CHARTING OF WKS; WK ADDED TO CHARTS THROUGH NAVY WRECK LISTS. ì (ENTERED MSM 4/87) DESCRIPTION 24 NO.1356; BARGE; SUNK 1932; POSITION ACCURACY WITHIN 1 MILE; REPORTED ì THROUGH CGS SURVEY 1932. 195 LORAN C RATES PROVIDED BY MR. RICHARD TARACKA GREENWICH ì CT. POLICE DEPARTMENT TEL NO 203-622-8020; 9960-X 26831.2 ì 9960-Y 43620.8; ITEM IDENTIFIED AS ""N.W. IRMAC"" ALSO POSITIONED ì AT THESE RATES. (ENTERED MSM 4/90) "

Survey Summary

Survey Position:	40° 20' 54.2" N, 073° 46' 08.5" W
Least Depth:	27.73 m (= 90.97 ft = 15.162 fm = 15 fm 0.97 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-310.00:00:00.000 (11/06/2013)
Dataset:	H12627_Features.000
FOID:	0_ 0000685650 00001(FFFE000A76520001)
Charts Affected:	12326_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

WRECKS/remrks: AWOIS# 1554 - Repositioned wreck.

Hydrographer Recommendations

Chart repositioned AWOIS wreck.

Cartographically-Rounded Depth (Affected Charts):

91ft (12326_1)

15ft (12300_1, 13006_1, 13003_1)

27m (5161_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 1:non-dangerous wreck
	QUASOU - 6:least depth known
	SORDAT - 20131106
	SORIND - US,US,graph,H12627
	TECSOU - 3:found by multi-beam
	VALSOU - 27.729 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: AWOIS 1554 located with new position. Delete charted position and chart per survey. Although this feature is associated with AWOIS 1554, current bathymetry data does not indicate nor is the feature interpreted as a wreck. Current survey data indicates a sea floor depression with two mounds rising abive the sea floor within the limits of the depression. Defer final charting disposition to AHB Compile Team.

COMPILE: AWOIS 1554 located with new depth and position. Chart wreck as surveyed.

Feature Images

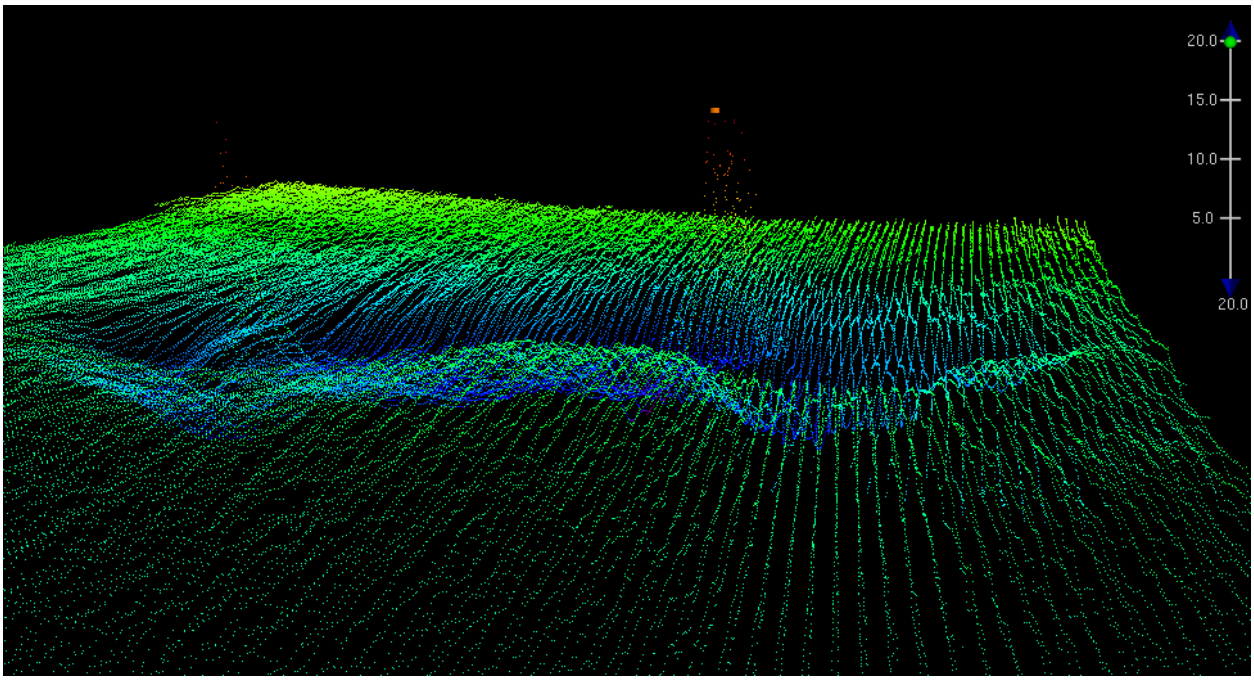


Figure 2.2.1

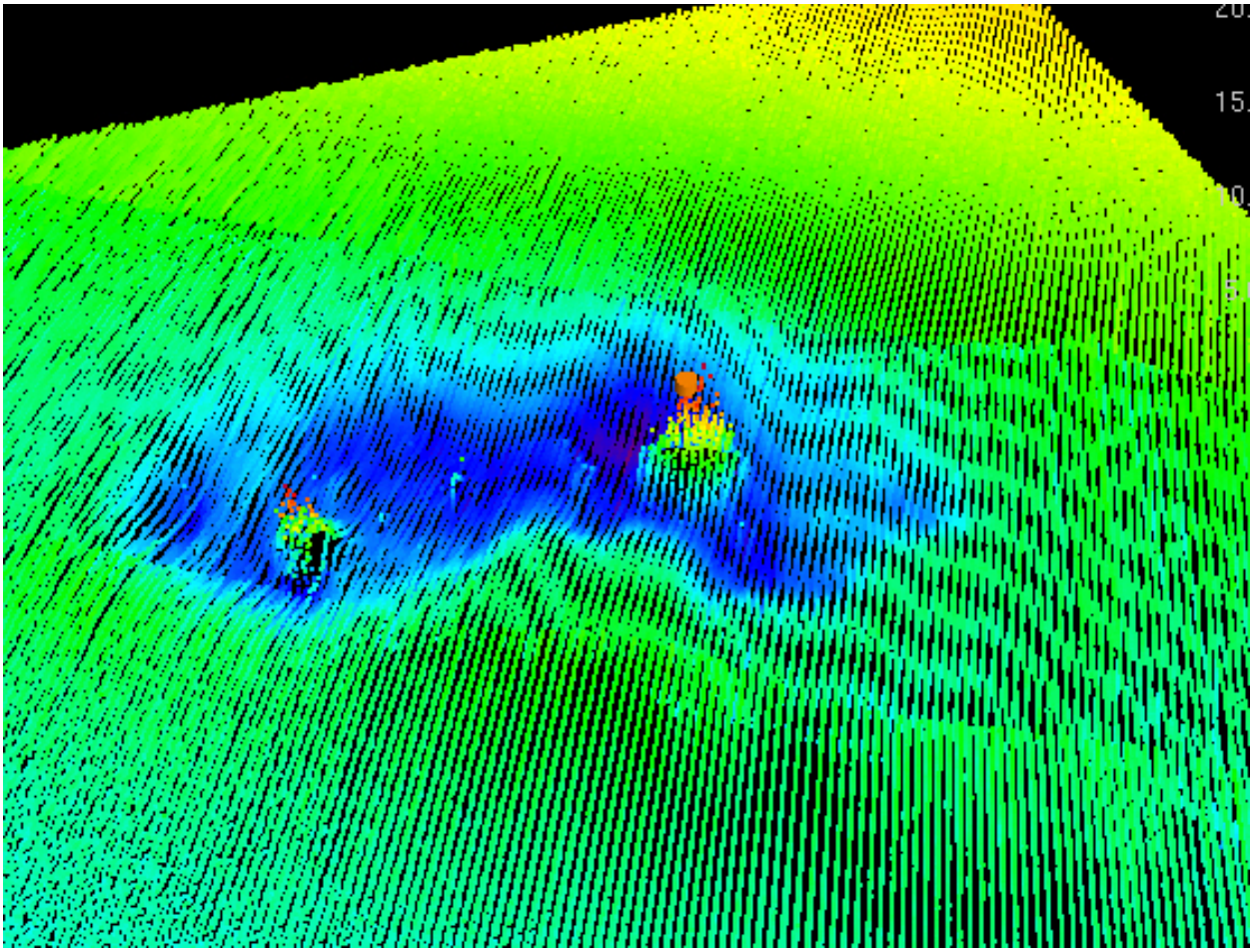


Figure 2.2.2

APPROVAL PAGE

H12627

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

- H12627_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12627_GeoImage.pdf

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

Approved: _____

Lieutenant Commander Matthew Jaskoski, NOAA
Chief, Atlantic Hydrographic Branch