H12629

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12629

LOCALITY

State(s):	New York
General Locality:	Approaches to New York
Sub-locality:	Offshore - Vicinity of Cholera Bank

2013

CHIEF OF PARTY
LCDR Marc S. Moser, NOAA

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Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H12629

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 - Vicinity of Cholera Bank**
Scale:	**40000**
Dates of Survey:	**10/20/2013 to 11/22/2013**
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:	**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/.

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Descriptive Report to Accompany Survey H12629

Project: OPR-B310-FH-13

Locality: Approaches to New York

Sublocality: Offshore - Vicinity of Cholera Bank

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 located offshore in the Approaches to New York, comprised of the area around Cholera Bank.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
40° 26" 42.53' N 73° 40" 33.24' W	40° 18" 0.58' N 73° 28" 2.44' W

Table 1: Survey Limits

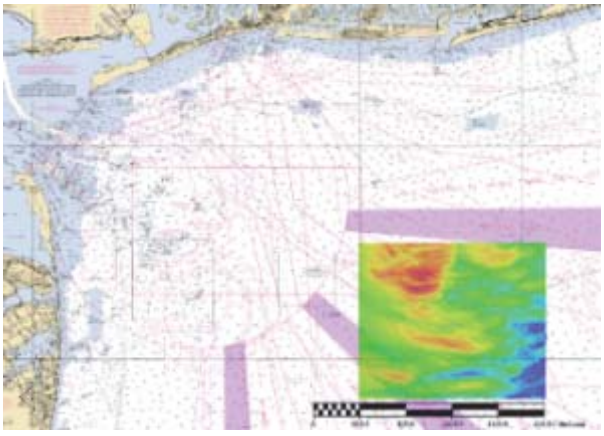


Figure 1: General locality of survey H12629

Due to time constraints the survey does not reach the assigned limit as provided from OPS. Figure 2 shows the planned sheet limits and the obtained coverage.

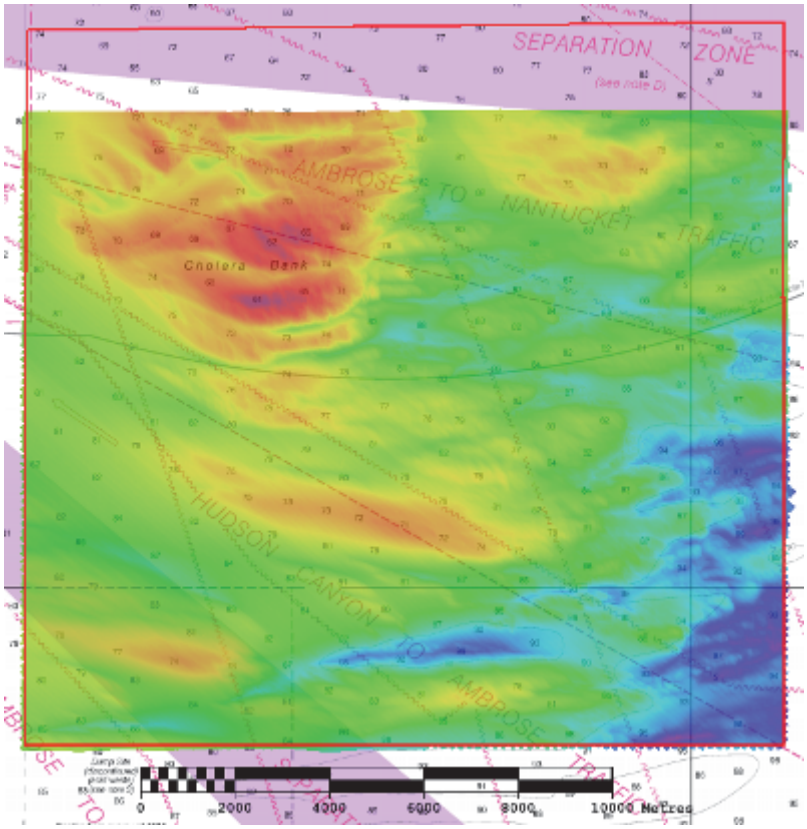


Figure 2: H12629 survey coverage compared to planned sheet limits

A.2 Survey Purpose

The primary purpose of this project is to support the safe navigation through the acquisition and processing of hydrographic data for updating National Ocean Service's (NOS) nautical charting products.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

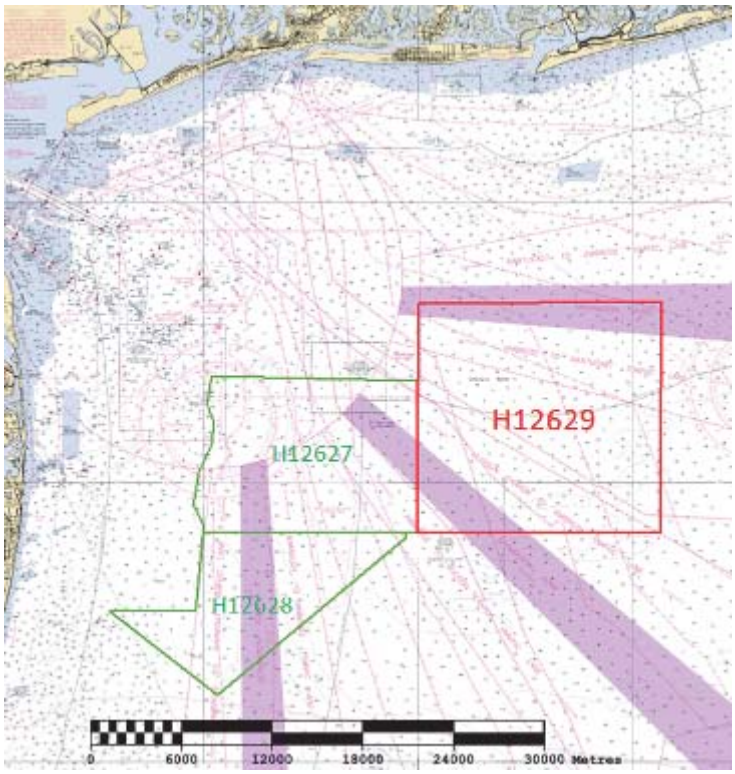


Figure 3: Survey layout of OPR-B310-FH-13

Four small holidays exist in the 1-meter surface around the vicinity of Cholera Bank. Analyses of surrounding data show that the least depths over features have been achieved and holidays do not compromise data integrity. Figure 4 shows one of the four holidays, which measures approximately 2x2 meters. The remaining three holidays are along track slivers measuring 1x5, 1x4 and 1x3 meters.

Figure 4: Two meter by two meter holiday in the vicinity of Cholera Bank

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	1028.88	1028.88
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/MBES Combo Mainscheme	0	0
	SBES/SSS Combo Mainscheme	0	0
	MBES/SSS Combo Mainscheme	0	0
	SBES/MBES Combo Crosslines	41.95	41.95
	Lidar Crosslines	0	0
Number of Bottom Samples			0
Number AWOIS Items Investigated			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Items Investigated by Dive Ops			0
Total Number of SNM			63.75

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Julian Day Number
10/20/2013	293
10/21/2013	294
11/03/2013	307
11/04/2013	308
11/05/2013	309
11/06/2013	310
11/07/2013	311
11/20/2013	324
11/21/2013	325
11/22/2013	326

Table 3: Dates of Hydrography

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 vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	*S250*
LOA	37.7 meters
Draft	3.80 meters

Table 4: Vessels Used

NOAA Ship FERDINAND R. HASSLER (S-250) acquired all data within the limits of H12629.

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7125	MBES
Applanix	POS M/V 320 V5	Positioning and Attitude System
Hemisphere	MBX-4	Positioning System
Brooke Ocean	MVP-30	Sound Speed System
AML	MicroCTD	Conductivity, Temperature, and Depth Sensor
SeaBird	45 Micro TSG	Sound Speed System
Reson	SVP 70	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 4.1% of mainscheme acquisition.

A geographic plot of crosslines is shown in Figure 5. Crosslines were filtered to remove soundings greater than 45 degrees from nadir. To evaluate crossline agreement, two 2-meter surfaces were created: one from crossline soundings, the other from mainscheme soundings. These two surfaces were differenced using CARIS HIPS and SIPS. The statistical analysis of the differences between the mainscheme and crossline surfaces is shown in Figure 6. The average difference between the surfaces is -0.05 meters with a standard deviation of 0.09 meters; 95% of all differences are less than 0.19 meters from the mean.

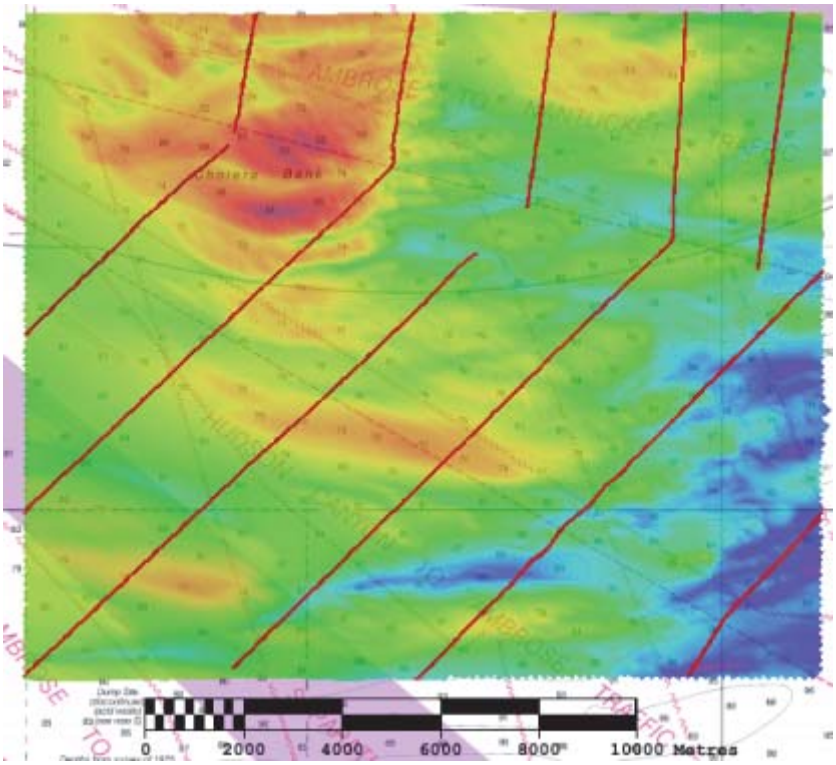


Figure 5: Location of crosslines, shown in red, and mainscheme data for H12629.

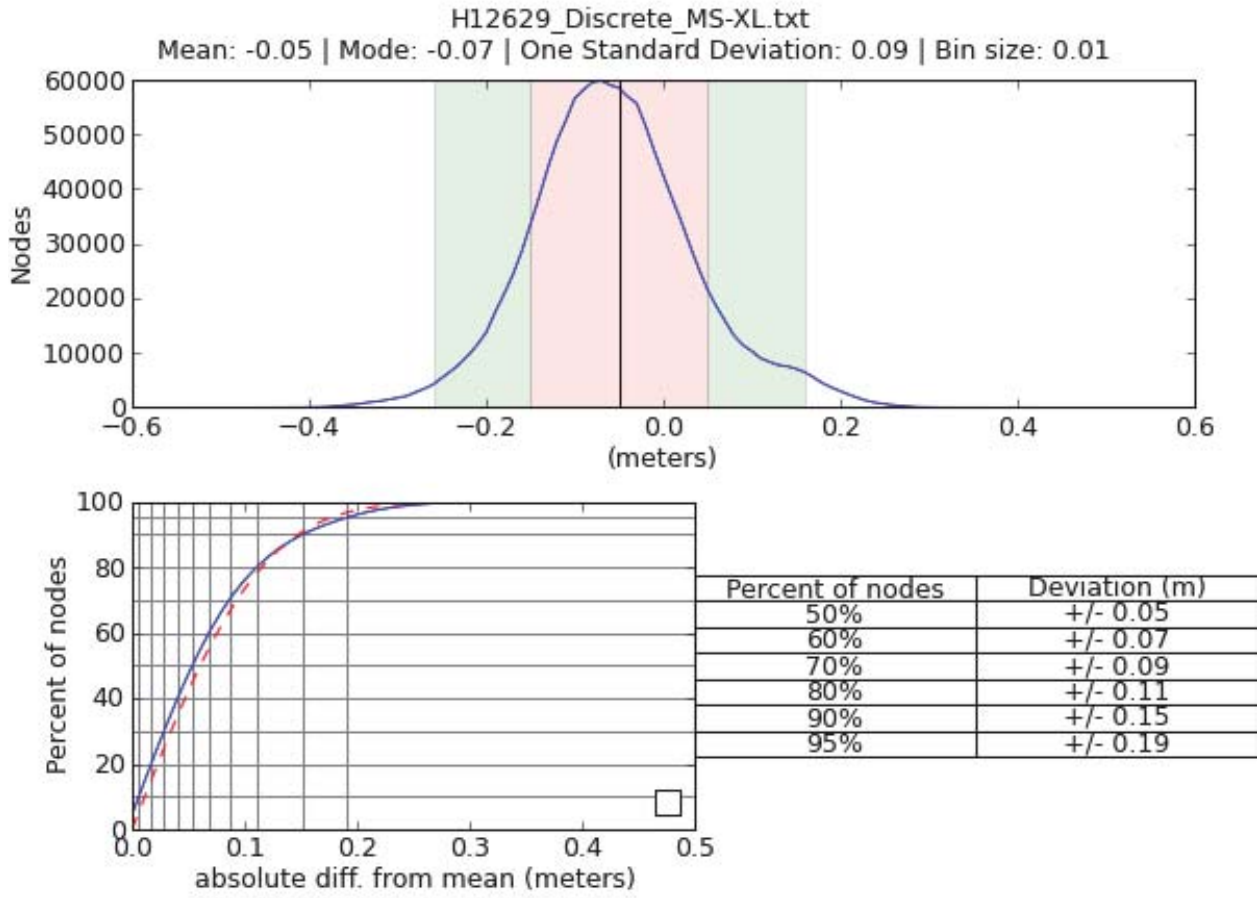


Figure 6: H12629 crossline difference statistics: mainscheme minus crossline

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01 meters	0.16 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S250 (pre Dn323)	1.0 meters/second	1.0 meters/second	2.0 meters/second
S250 (post Dn323)	1.0 meters/second	1.0 meters/second	0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values

CO-OPS provided the tidal zoning uncertainty of 0.16 meters in the Project Instructions for project OPR-B310-FH-13.

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

The areas of overlap between sheet H12629 and its junction sheets, shown in Figure 7, were reviewed in CARIS Subset Editor. The junction surfaces were subtracted from the surface of H12629 to assess sounding consistency.

Survey H12526 is listed as a junction survey with H12629. However, due to the time constraints on project resulting in not reaching the planned northern sheet extents, no overlap exists.

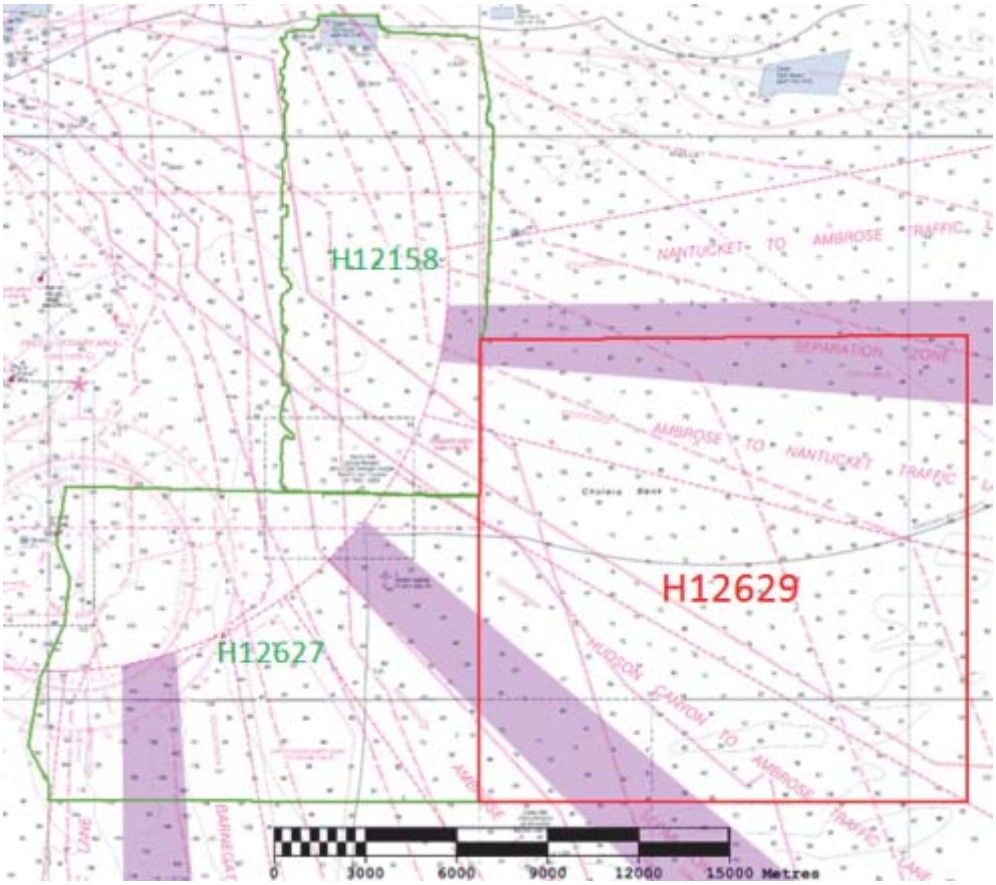


Figure 7: H12629 Junctions

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12627	1:40000	2013	NOAA Ship FERDINAND R. HASSLER	W
H12158	1:40000	2009	NOAA Ship THOMAS JEFFERSON	W

Table 8: Junctioning Surveys

H12627

This survey was assigned as a part of project OPR-B310-FH-13. The location is shown in Figure 7. Of the 400 thousand overlapping nodes from the 2-meter surfaces, the average difference is -0.08 with a standard deviation of 0.10 meters. 95% of all differences are less than 0.20 meters from the mean, as shown in Figure 8.

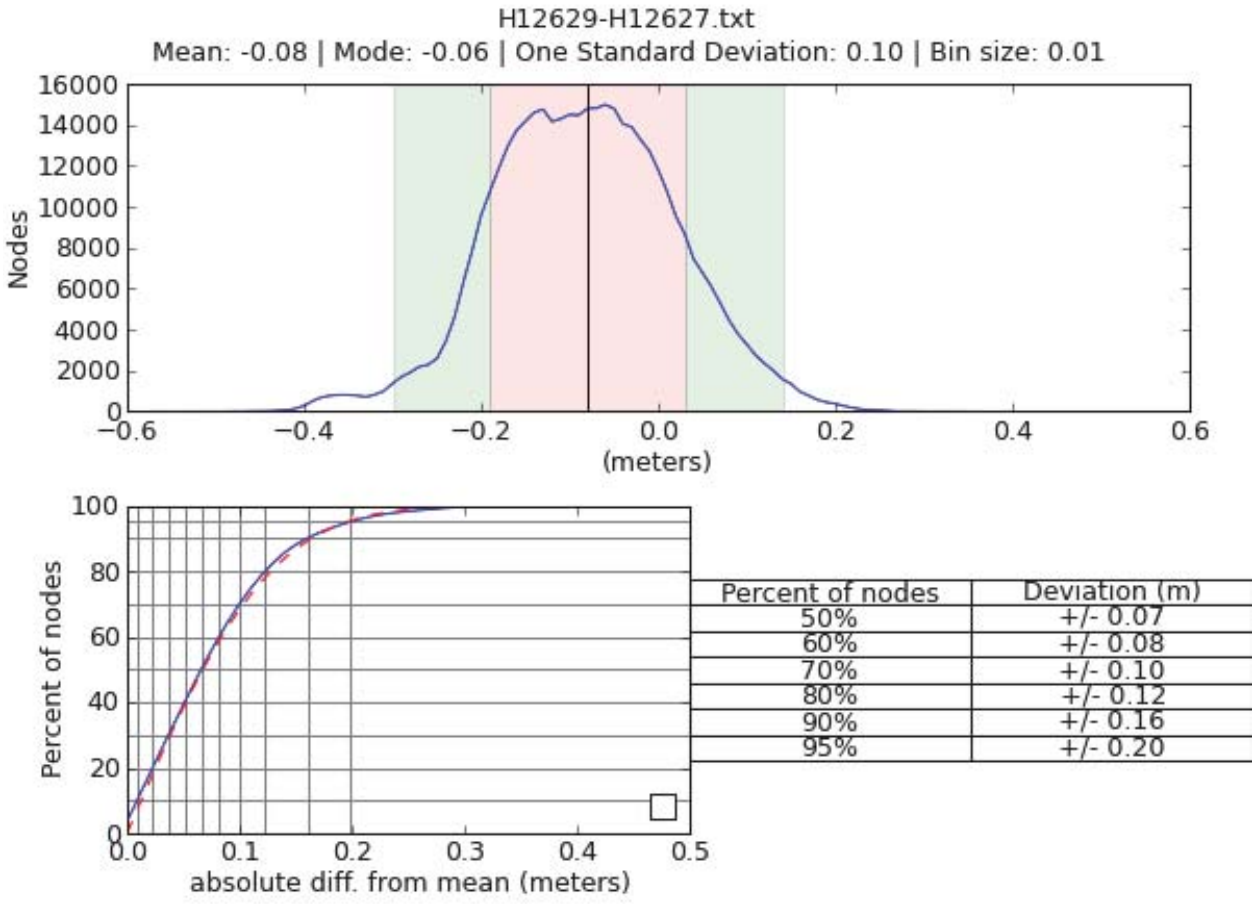
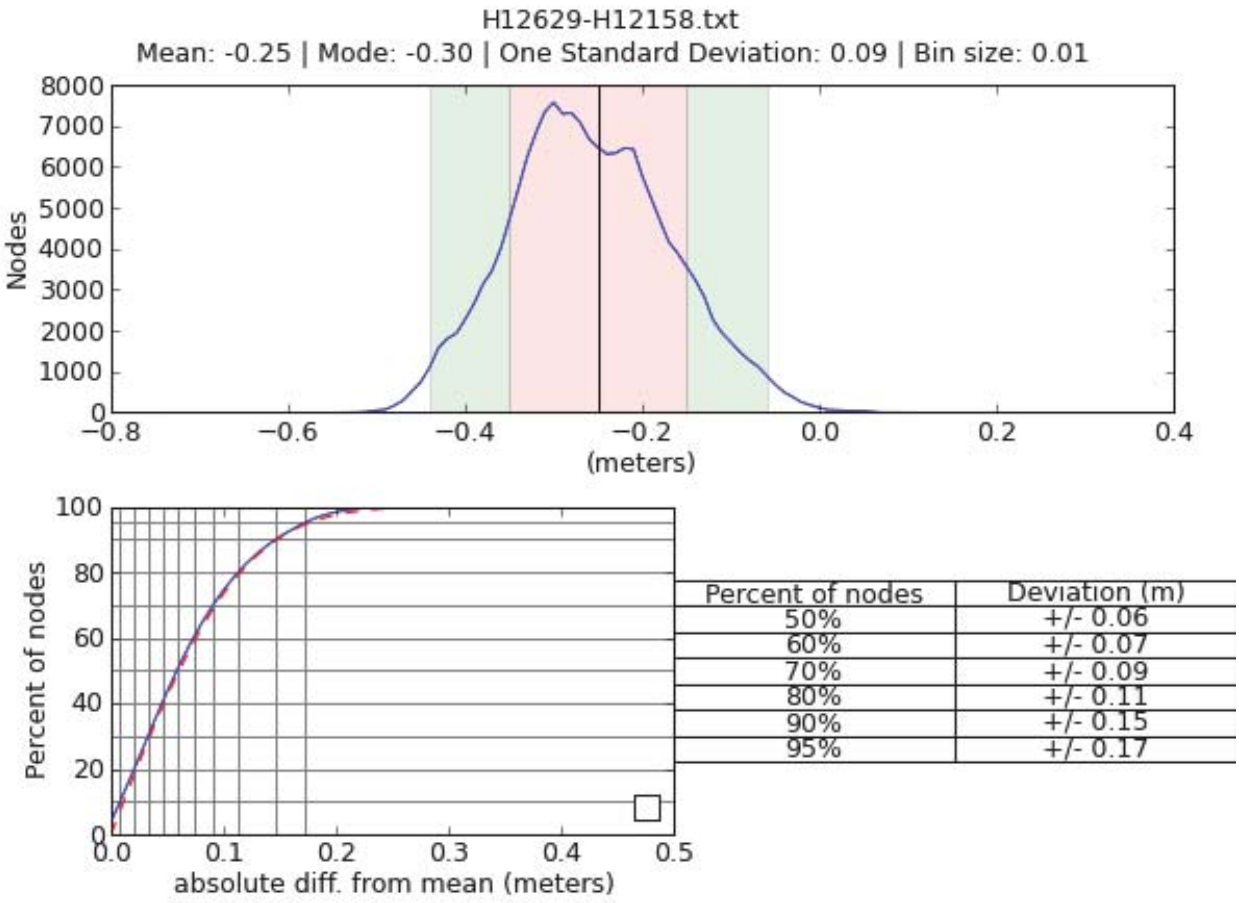


Figure 8: Differenced surface statistics - H12629 minus H12627

H12158

This survey was assigned as a part of project OPR-B310-TJ-09. The location is shown in Figure 7. Of the 169 thousand overlapping nodes from the 2-meter surfaces, the average difference is -0.25 with a standard deviation of 0.09 meters. 95% of all differences are less than 0.17 meters from the mean, as shown in Figure 9.



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.11
90%	+/- 0.15
95%	+/- 0.17

Figure 9: Differenced surface statistics - H12629 minus H12158

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 is the master unit that feeds its sound speed to the slave (port), was in error of approximately five meters per second. This error resulted in a ‘S’ shaped artifact seen on data from both port and 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 the 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.

During an extended import between the second and third leg of the project, Dn323, the surface sound speed input was changed to the SeaBird 45 Micro TSG. All data collected after Dn323 was processed using standard documented procedures.

B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: At the beginning of acquisition casts were taken approximately every 2 hours. Through the comparison of consecutive casts the sound speed was determined to be spatially correlated rather than correlated with time. Taking this into account a strategy was implemented that took casts every 15 minutes during the course of one line, with long periods (4 hours) of no casts in between. Sound speed issues are not evident in the data using either of the described methods.

The sound speed correction Nearest in Distance within Time of 3 hours was used for the entire survey with the exception of the following four lines. For these lines a a time period of 4 hours was used.

Port -
20131107_113553
20131107_122343

Starboard -
20131107_113554
20131107_122343

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 1-meter and 2-meter surfaces. For additional detail refer to the H12629_Standards_Compliance report submitted in Appendix II of this report.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

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 H12629. 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 Geo-Tiff 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 Profile 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
H12629_MB_2m_MLLW	CUBE	2 meters	19.10 meters - 31.85 meters	NOAA_2m	Complete MBES
H12629_MB_1m_MLLW	CUBE	1 meters	19.08 meters - 34.36 meters	NOAA_1m	Complete MBES
H12629_MB_2m_MLLW_Final_20plus	CUBE	2 meters	20.00 meters - 31.85 meters	NOAA_2m	Complete MBES
H12629_MB_1m_MLLW_Final_0to21	CUBE	1 meters	19.08 meters - 21.00 meters	NOAA_1m	Complete MBES

Table 10: Submitted Surfaces

Both the 1-meter and 2-meter surface depth ranges were extended for better analysis of complete coverage in the 19 to 20 meter depth range. The density of soundings support a 1-meter surface in this extended depth range.

B.5.3 Designated Soundings

Within the limits of H12629, 5 soundings are submitted with the designated flagging in CARIS HIPS and SIPS. Of these 5 soundings, 3 were designated for feature creation and 2 were to preserve the shoal depth in the finalized surfaces.

B.5.4 Rejection of data outside final survey area

Shown in Figure 10, crossline data (yellow arrows) were rejected in areas where mainscheme coverage was not obtained. The crosslines were acquired before the mainscheme lines and due to time constraints on project the assigned survey area was not fully developed. Also shown in the figure, mainscheme data logged through turns (red arrows) were rejected. These data were rejected using CARIS HIPS and SIPS Swath Editor and should not be reaccepted.

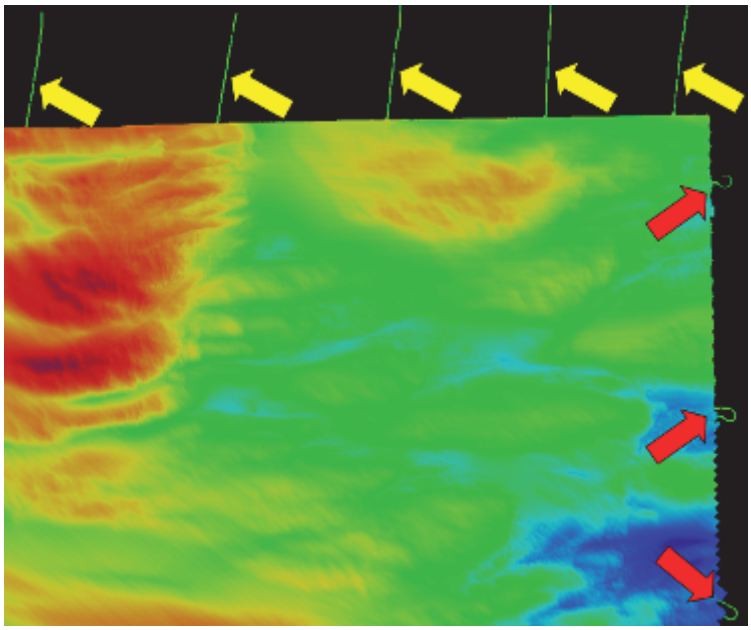


Figure 10: H12629 areas of rejected soundings

B.5.5 Total Vertical Uncertainty Analysis

A custom layer was created on 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 the nodes within survey H12629 met the vertical uncertainty standards of section 5.1.3 of the Hydrographic Surveys Specifications and Deliverables (2013). See H12629_Standards_Compliance report submitted in Appendix II of this report.

C. Vertical and Horizontal Control

All submitted data are corrected with DGPS and verified tides via discrete zoning.

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 11/23/2013. The final tide note was received on 12/13/2013.

Preliminary zoning is accepted as final zoning for project OPR-B310-FH-13, H12629, during the time period between October 20 - November 22, 2013.

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.

All data being submitted is corrected with DGPS.

The following DGPS Stations were used for horizontal control:

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

Table 14: USCG DGPS Stations

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 VDatum and SBETs

Prior to submission, all data had SBET files loaded for navigation. A VDatum evaluation was performed and submitted to OPS for approval or our recommendation. The Chief, Hydrographic Surveys Division, concurred with this recommendation. The VDatum evaluation report and resulting approval are included in Appendix II of this report.

The VDatum evaluation report was sent to OPS on 1/3/2014. The memo approving the recommendations was received on 2/28/2014.

As recommended in the VDatum evaluation, all data are reduced to MLLW using discrete zoning. Navigation data in all HDCS line folders were overwritten with the original, real-time navigation and re-processed per normal operating procedures. This effectively removed SBETs from the HDCS data.

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	12/17/2013	12/28/2013

Table 15: Largest Scale Raster Charts

12326

In general, soundings from H12629 agree within 1 to 2 feet of charted depths from RNC 12326. Surveyed contours agree strongly with charted depth curves as shown in Figure 11.

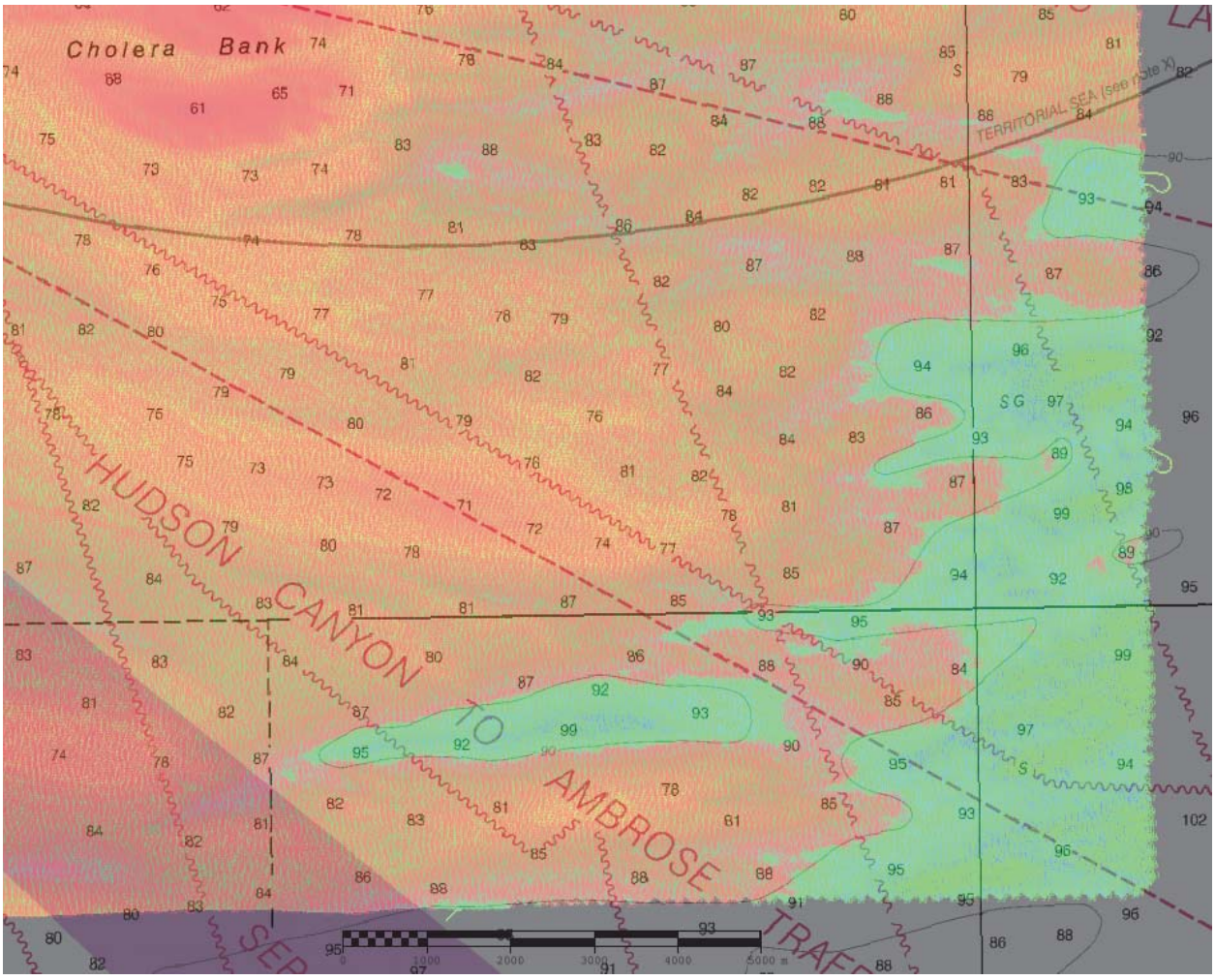


Figure 11: Soundings (red = less than 90 feet, green = greater than 90 feet) compared to charted 90-foot depth curve in the SE corner of survey H12629.

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	09/19/2013	NO
US4NY1BM	1:80000	3	09/16/2013	10/11/2013	NO

Table 16: Largest Scale ENCs

US4NY1AM

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

US4NY1BM

ENC US4NY1BM contains no soundings different than RNC 12326. See previous discussion for comparison with RNC 12326.

D.1.3 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

Charted cables were fully investigated within the limits of H12629. While no evidence of cables were found in the multibeam data, the hydrographer recommends that these be retained as charted.

D.1.6 Uncharted Features

Two of the three wrecks (H12629_1 and H12629_3) submitted in the final feature file are discussed with significant detail in the publicly available book, "Wreck Valley III" written by Capt. Dan Berg. These two wrecks are not dangerous to local navigation, are highly dispersed and should be charted accordingly.

The third wreck (H12629_2) appears to possibly be intact but does not significantly rise from the seafloor. This wreck is not a danger to local navigation and should be charted accordingly.

D.1.7 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.8 Shoal and Hazardous Features

The largest shoaling feature within H12629, Cholera Bank, is significantly shallower than its surrounding area but is accurately charted and is not a danger to navigation.

D.1.9 Channels

Both the Ambrose to Nantucket and Hudson Canyon to Ambrose traffic lanes and separation zones have accurately charted depths within the limit of H12629. During the periods of acquisition, traffic was visually following the charted patterns.

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

No aids to navigation (ATONs) exist for this survey.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2.9 Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

D.2.10 New Survey 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
OPR-B310-FH-13 Data Acquisition and Processing Report	2014-02-14
OPR-B310-FH-13 VDatum Evaluation and Deliverable Recommendation	2014-01-03
Hydrographic Survey Readiness Review Memo	2013-08-15

Approver Name	Approver Title	Approval Date	Signature
LCDR Marc S. Moser, NOAA	Chief of Party	02/28/2014	2014.02.28 16:51:44 -05'00'
LT Adam Reed, NOAA	Field Operations Officer	02/28/2014	
David T. Moehl	Senior Survey Technician	02/28/2014	

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 23, 2013

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

FROM: LCDR Benjamin K. Evans, NOAA, 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.:	H12629
State:	New York
Locality:	Approaches to New York
Sublocality:	Offshore - Vicinity of Cholera Bank

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_293	16:37:19	23:43:50
2013_294	00:00:15	00:37:02
2013_307	21:33:27	23:59:57
2013_308	00:00:02	23:59:57
2013_309	00:00:02	23:59:57
2013_310	00:00:02	23:59:57
2013_311	00:00:02	13:03:18
2013_324	10:25:51	23:59:57
2013_325	00:00:02	23:59:57
2013_326	00:00:02	20:15:56

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : December 5, 2013

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-B310-FH-2013
HYDROGRAPHIC SHEET: H12629

LOCALITY: Offshore - Vicinity of Cholera Bank, Approaches to NY
TIME PERIOD: October 20 - November 22, 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 20 - November 22, 2013.

Please use the zoning file B310FH2013CORP submitted with the project instructions for OPR-B310-FH-2013. Zones SA11, SA12, SA13, SA22 and SA23 are the applicable zones for H12629.

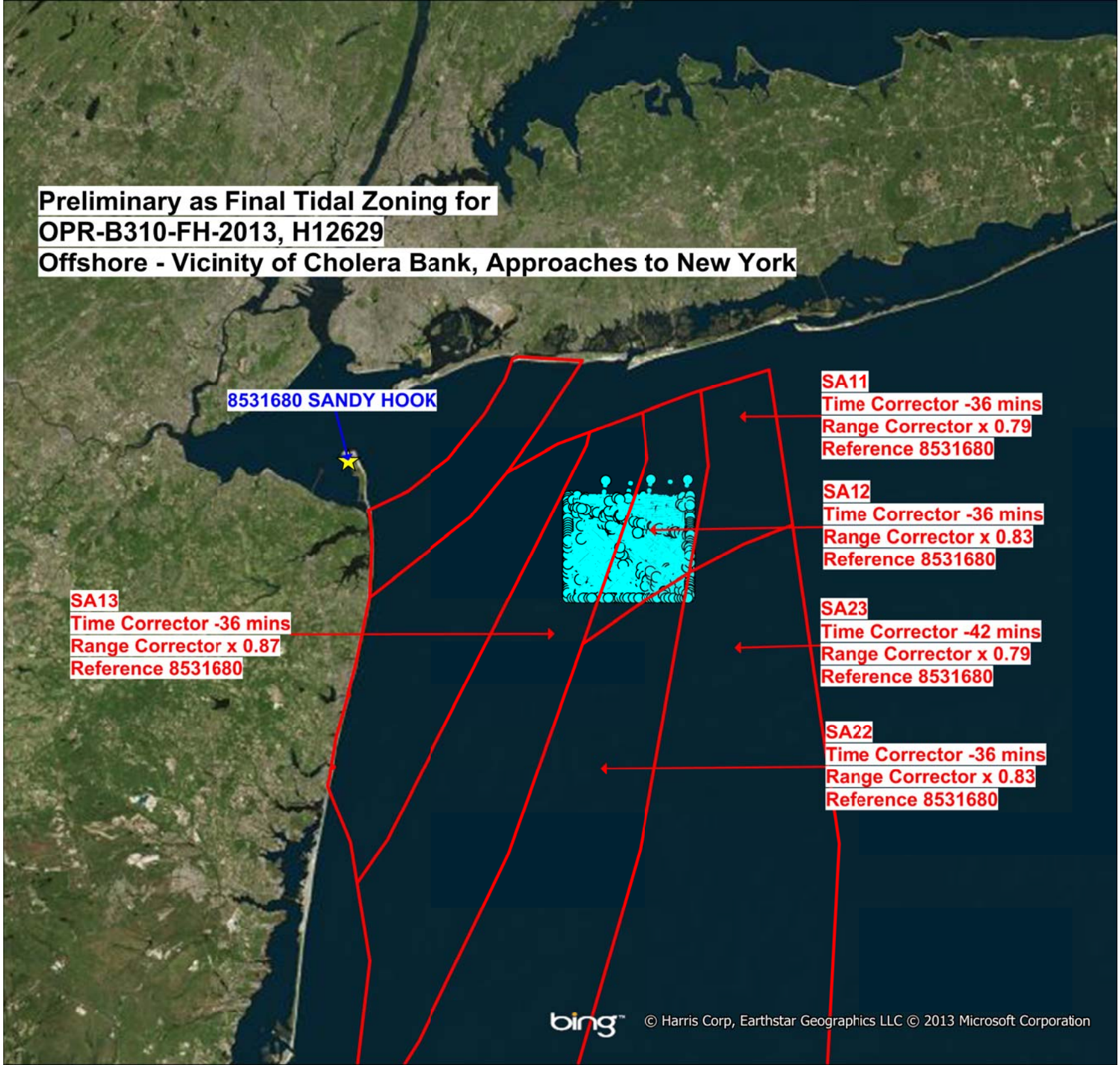
Refer to attachments for grid information.

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: 2013.12.05 11:19:53 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final Tidal Zoning for
OPR-B310-FH-2013, H12629
Offshore - Vicinity of Cholera Bank, Approaches to New York
8531680 SANDY HOOK
SA11
Time Corrector -36 mins
Range Corrector x 0.79
Reference 8531680
SA12
Time Corrector -36 mins
Range Corrector x 0.83
Reference 8531680
SA13
Time Corrector -36 mins
Range Corrector x 0.87
Reference 8531680
SA23
Time Corrector -42 mins
Range Corrector x 0.79
Reference 8531680
SA22
Time Corrector -36 mins
Range Corrector x 0.83
Reference 8531680
bing
© Harris Corp, Earthstar Geographics LLC © 2013 Microsoft Corporation

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

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

OPR-B310-FH-13; H12629

1 message

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Sat, Nov 23, 2013 at 2:02 PM
To: Final Tides - NOAA Service Account <Final.Tides@noaa.gov>, David Moehl - NOAA Federal <david.t.moehl@noaa.gov>

Good Morning,

Attached, please find the final tide request for OPR-B310-FH-13, registry H12629.
Thank you.

Kindly,
Madeleine

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

2 attachments

H12629_Final_Tide_Request.pdf
35K

H12629_Final_Tide_Request.zip
274K

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

List of Figures

List of Tables

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.

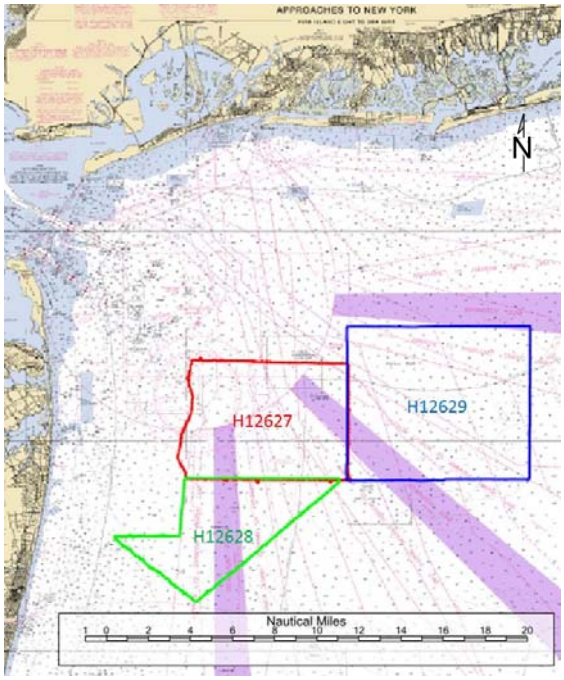


Figure 1: Sheet limits for Project OPR-B310-FH-13. Sheets H12627, H12628 and H12629 were surveyed by *Ferdinand R. Hassler*.

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.

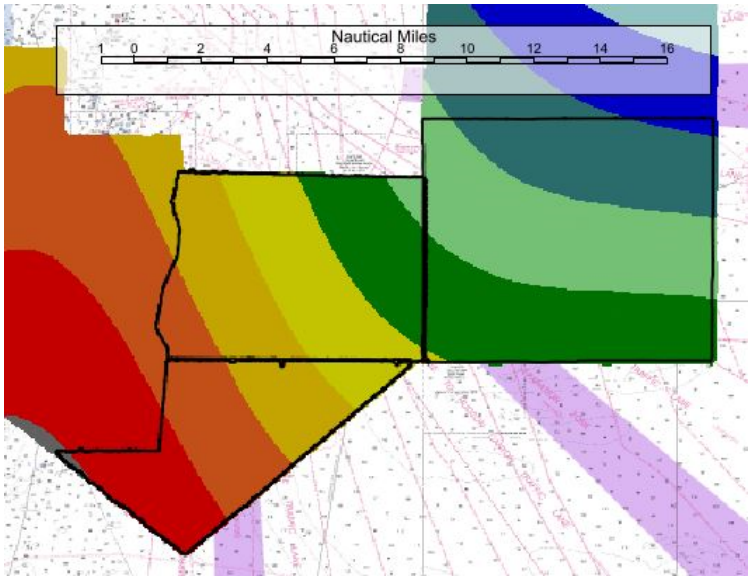


Figure 2. 2013_B310_VDatum_NAD83Ellip_MLLW.xyz separation model overlaid with H12627, H12628 and H12629 survey areas. Colored bands correspond to 10 cm intervals.

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.

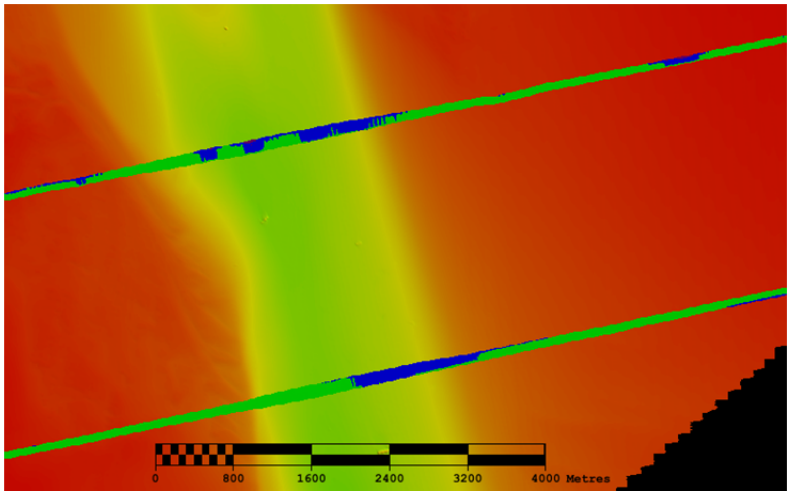


Figure 3. H12628 discrete zoned tides minus VDatum crossline CUBE surface.

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).

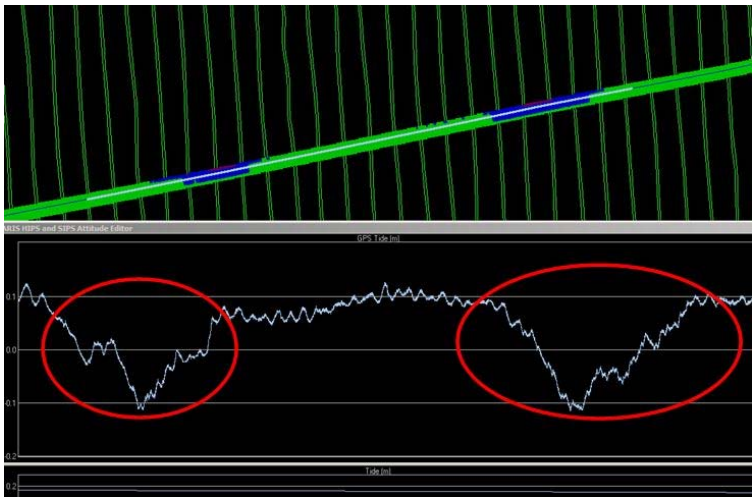


Figure 4. H12628 crossline viewed in CARIS Attitude Editor. The two areas showing divergence from zero (blue) correlate with a notable change in GPS tide (red circles).

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.

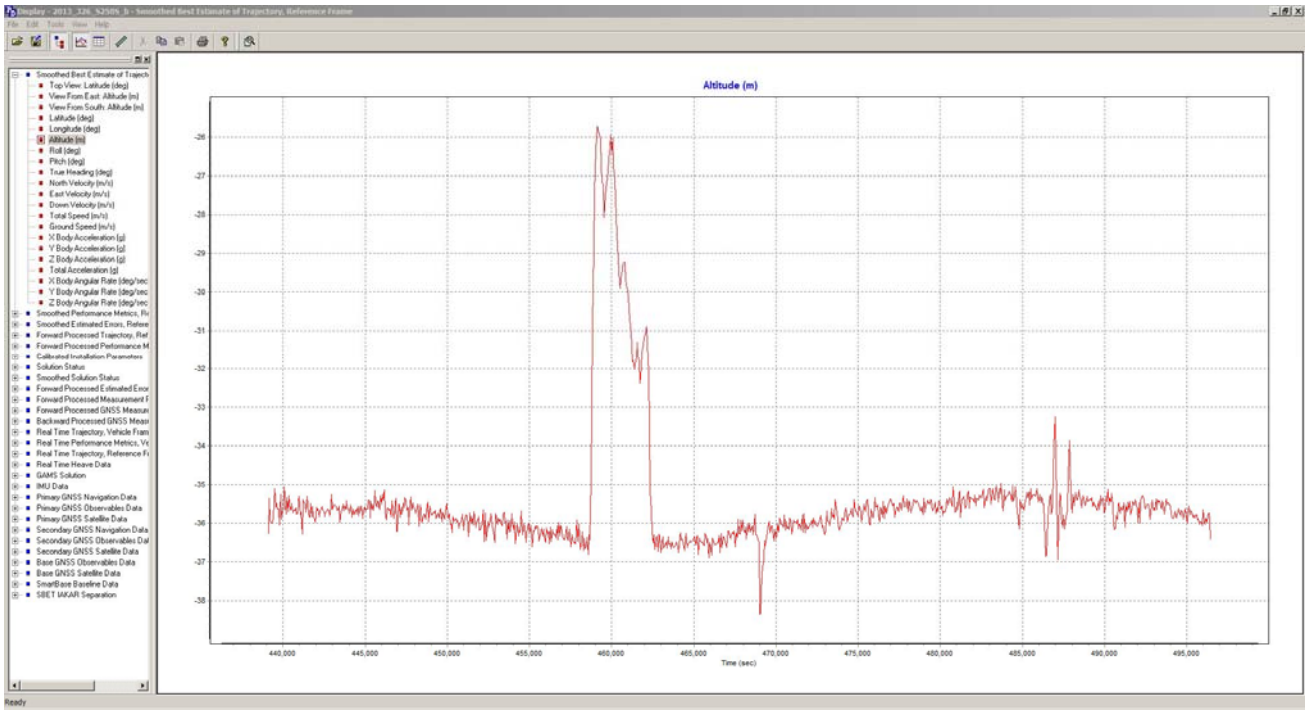


Figure 5. Altitude solution for 12 hours of acquisition on sheet H12629. Altitude changes exceed 10 meters from the perceived correct value.

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.

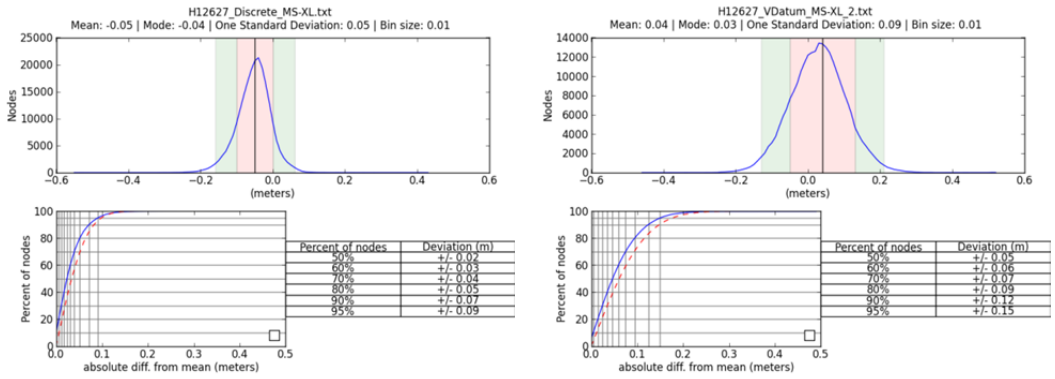


Figure 6. Distribution of differences for discrete zoning (left) and VDatum (right) for survey H12627.

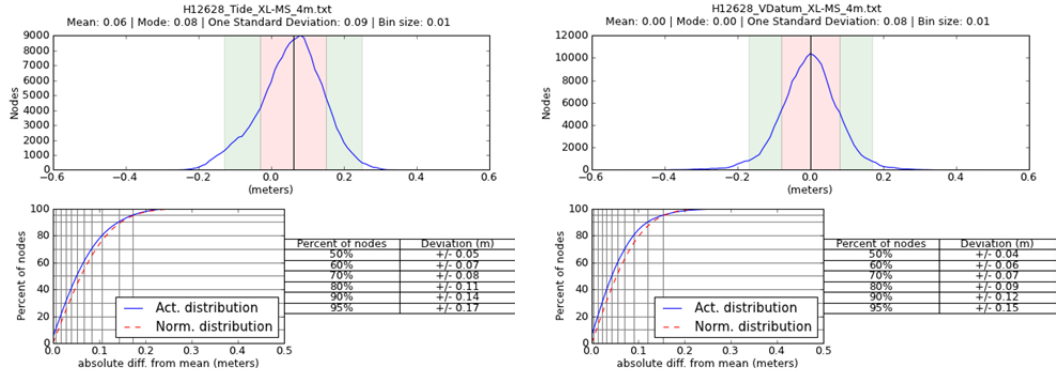


Figure 7. Distribution of differences for discrete zoning (left) and VDatum (right) for survey H12628.

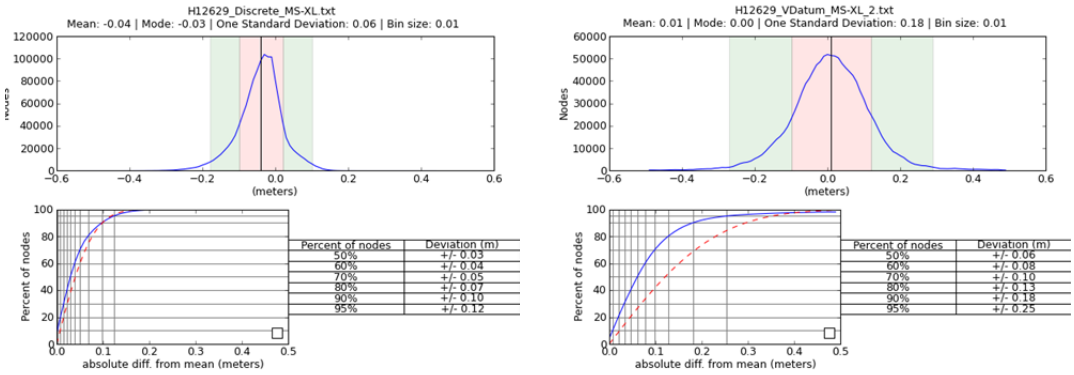


Figure 8. Distribution of differences for discrete zoning (left) and VDatum (right) for survey H12629.

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 - 0
WRECK - 2
MARITIME BOUNDARIES - 0

H12629 Feature Report

Registry Number: H12629
State: New York
Locality: Approaches to New York
Sub-locality: Offshore -- Vicinity of Cholera Bank
Project Number: OPR-B310-FH-13
Survey Dates: 10/20/13 - 11/22/13

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12326	52nd	06/01/2013	1:80,000 (12326_1)	USCG LNM: 8/5/2014 (8/19/2014) CHS NTM: None (7/25/2014) NGA NTM: 5/10/2003 (8/23/2014)
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.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	Wreck	20.00 m	40° 23' 05.8" N	073° 36' 01.7" W
1.2	Wreck	24.79 m	40° 19' 09.3" N	073° 32' 09.7" W

1 - New Features

1.1) WRECK

Survey Summary

Survey Position:	40° 23' 05.8" N, 073° 36' 01.7" W
Least Depth:	20.00 m (= 65.62 ft = 10.936 fm = 10 fm 5.62 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-326.00:00:00.000 (11/22/2013)
Dataset:	H12629_Feature_Report.000
FOID:	0_ 0000014946 00001(FFFE00003A620001)
Charts Affected:	12326_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

Wreck found with 100% MBES. Found broken and dispersed, height above seafloor not significant.

Hydrographer Recommendations

Chart shoal sounding.

Cartographically-Rounded Depth (Affected Charts):

65ft (12326_1)

10 ¾fm (12300_1, 13006_1, 13003_1)

20.0m (5161_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 3:distributed remains of wreck
	QUASOU - 6:least depth known
	SORDAT - 20131122
	SORIND - US,US,graph,H12629
	TECSOU - 3:found by multi-beam
	VALSOU - 20.000 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: Wreck found with complete coverage MBES. The feature is not hydrographically significant. Defer the final charting disposition to the AHB Compile Team.

COMPILE: Chart WRECK as surveyed.

Feature Images

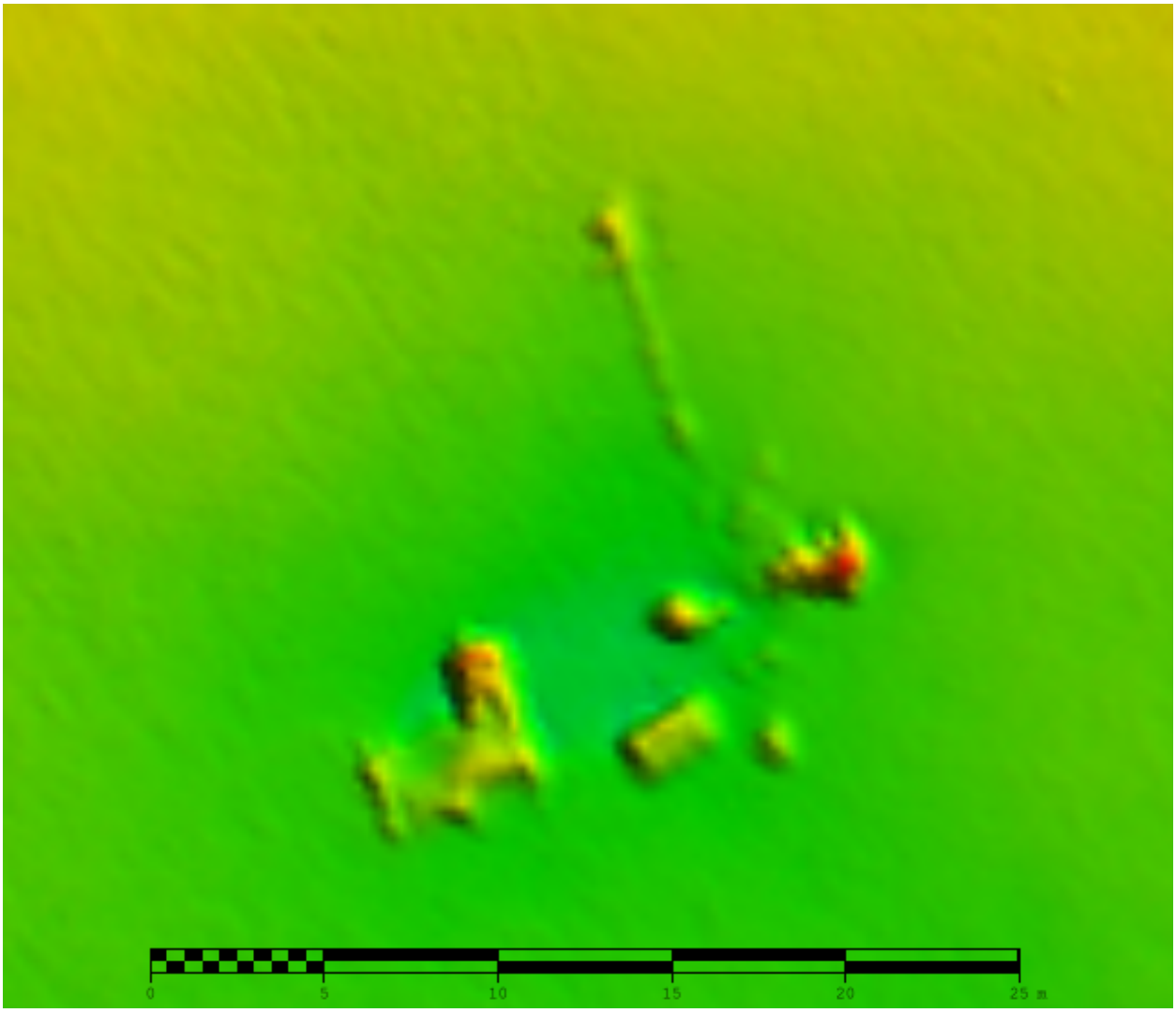


Figure 1.1.1

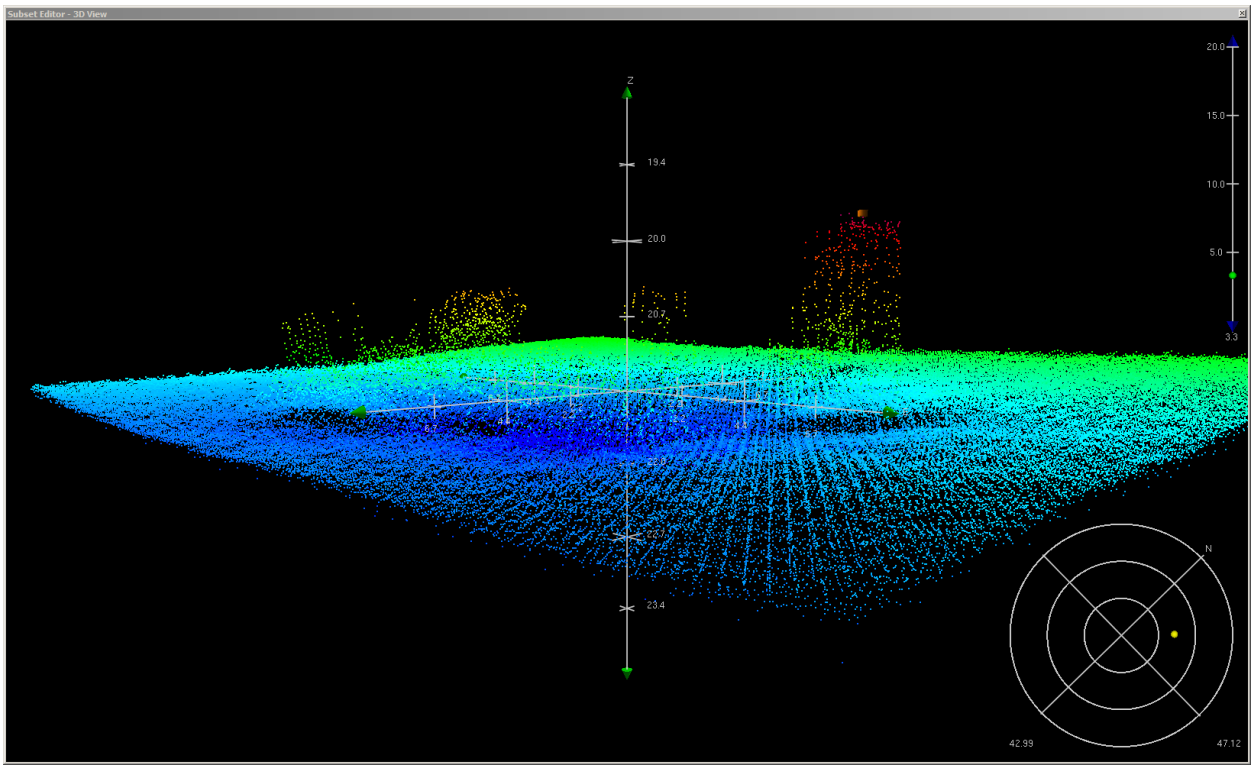

Subset Editor - 3D View
Z
19.4
20.0
20.7
23.4
20.0
15.0
10.0
5.0
3.3
N
42.99
47.12

Figure 1.1.2

1.2) WRECK

Survey Summary

Survey Position:	40° 19' 09.3" N, 073° 32' 09.7" W
Least Depth:	24.79 m (= 81.33 ft = 13.555 fm = 13 fm 3.33 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2013-326.00:00:00.000 (11/22/2013)
Dataset:	H12629_Feature_Report.000
FOID:	0_ 0000014947 00001(FFFE00003A630001)
Charts Affected:	12326_1, 12300_1, 13006_1, 5161_1, 13003_1

Remarks:

Wreck found with 100% MBES. Found broken and dispersed, height above seafloor not significant.

Hydrographer Recommendations

Chart shoal sounding.

Cartographically-Rounded Depth (Affected Charts):

81ft (12326_1)

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

25m (5161_1)

S-57 Data

Geo object 1:	Wreck (WRECKS)
Attributes:	CATWRK - 3:distributed remains of wreck
	QUASOU - 6:least depth known
	SORDAT - 20131122
	SORIND - US,US,graph,H12629
	TECSOU - 3:found by multi-beam
	VALSOU - 24.790 m
	WATLEV - 3:always under water/submerged

Office Notes

SAR: Wreck found with complete coverage MBES. The feature is not hydrographically significant. Defer the final charting disposition to the AHB Compile Team.

COMPILE: Chart WRECK as surveyed.

Feature Images

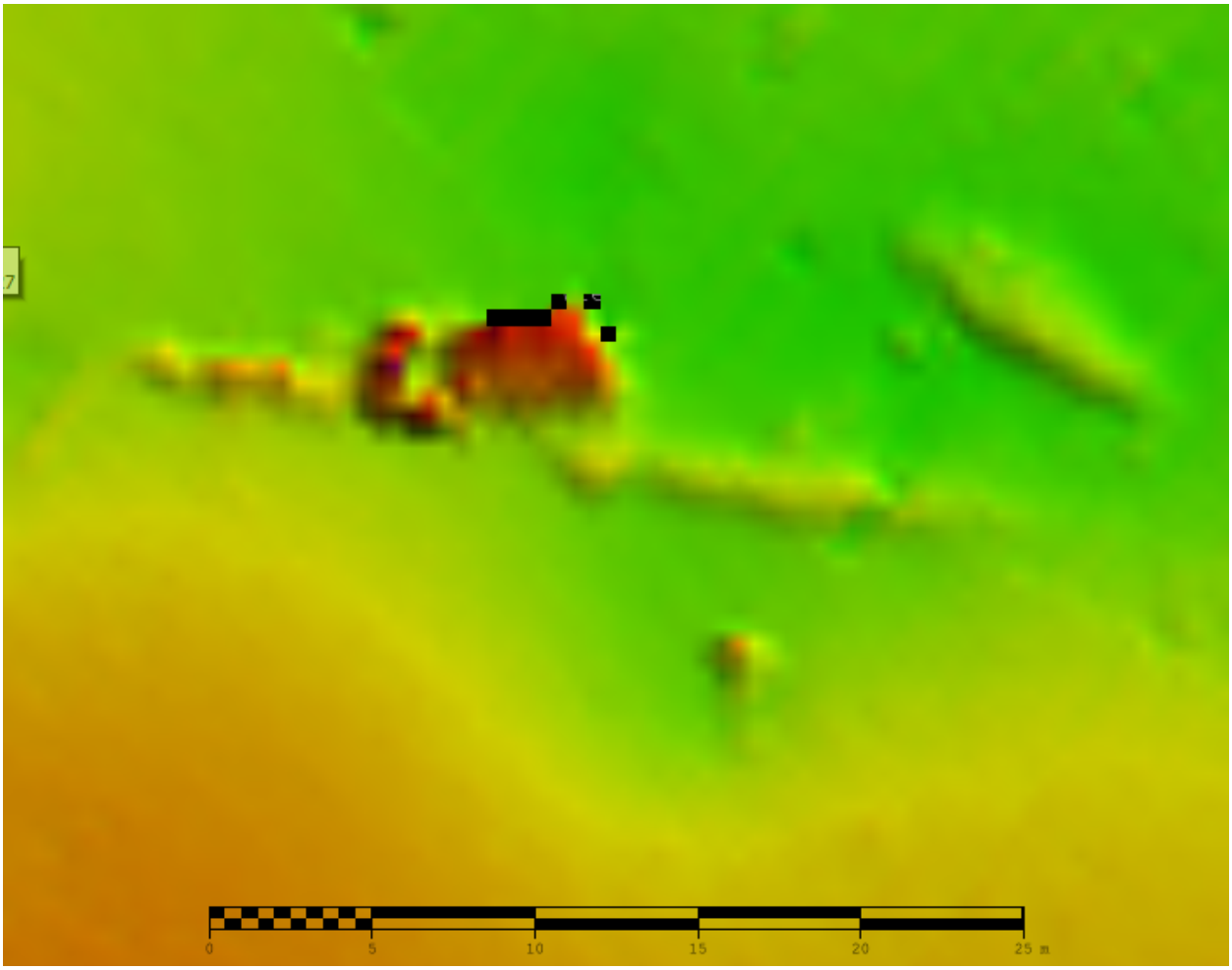


Figure 1.2.1

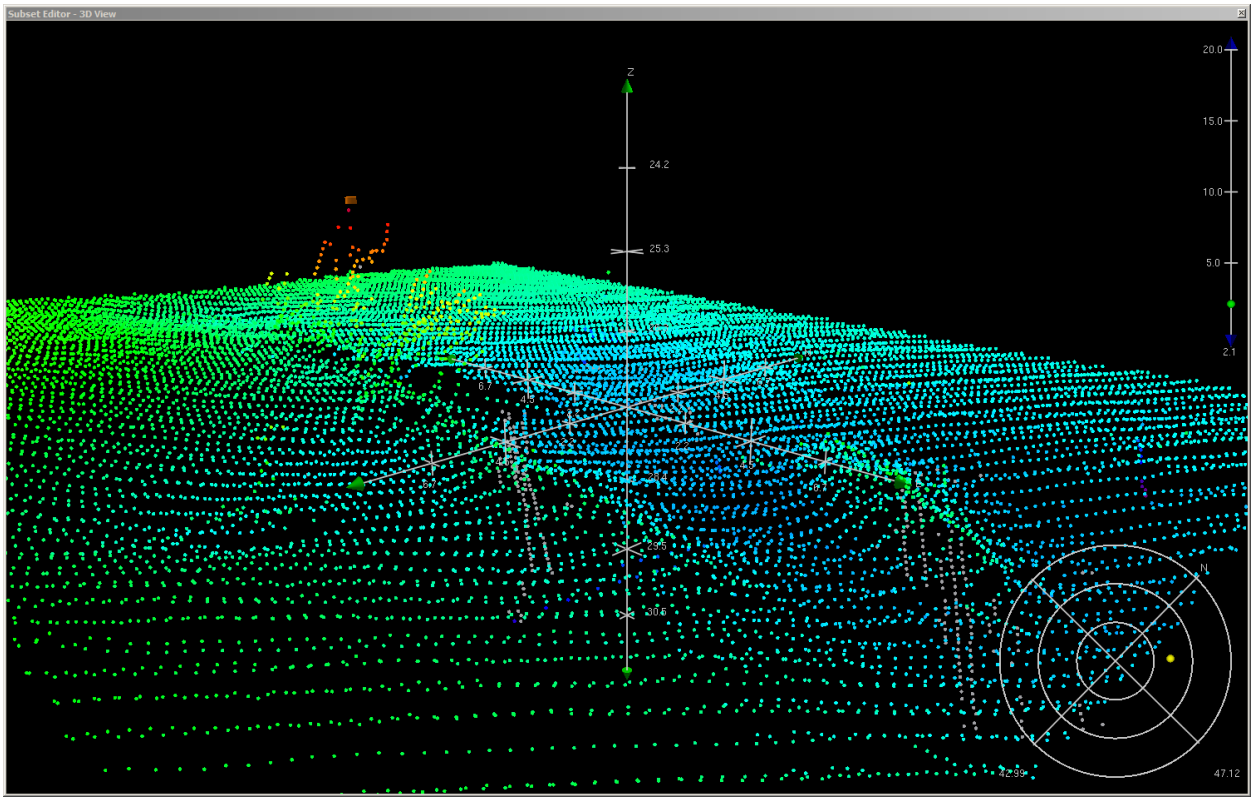


Figure 1.2.2

APPROVAL PAGE

H12629

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

- H12629_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12629_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 Matthew Jaskoski, NOAA
Chief, Atlantic Hydrographic Branch