

H13201

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H13201

LOCALITY

State(s): California

General Locality: California

Sub-locality: Santa Barbara Island

2018

CHIEF OF PARTY
Benjamin K. Evans, CDR, NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

H13201

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): **California**

General Locality: **California**

Sub-Locality: **Santa Barbara Island**

Scale: **10000**

Dates of Survey: **10/07/2018 to 10/25/2018**

Instructions Dated: **08/17/2018**

Project Number: **OPR-L397-RA-18**

Field Unit: **NOAA Ship *Rainier***

Chief of Party: **Benjamin K. Evans, CDR, NOAA**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

Remarks:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via <http://www.ncei.noaa.gov/>.

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Descriptive Report to Accompany Survey H13201

Project: OPR-L397-RA-18

Locality: California

Sublocality: Santa Barbara Island

Scale: 1:10000

October 2018 - October 2018

NOAA Ship *Rainier*

Chief of Party: Benjamin K. Evans, CDR, NOAA

A. Area Surveyed

The survey area is referred to as H13201, "Santa Barbara Island" (sheet 5) in the project instructions. The area encompasses approximately 27 square nautical miles and is located 38 miles (61 km) due west of the Palos Verdes Peninsula coast of Los Angeles County, Southern California.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
33° 34' 23.82" N 119° 7' 51.73" W	33° 26' 5.01" N 118° 57' 14.97" W

Table 1: Survey Limits

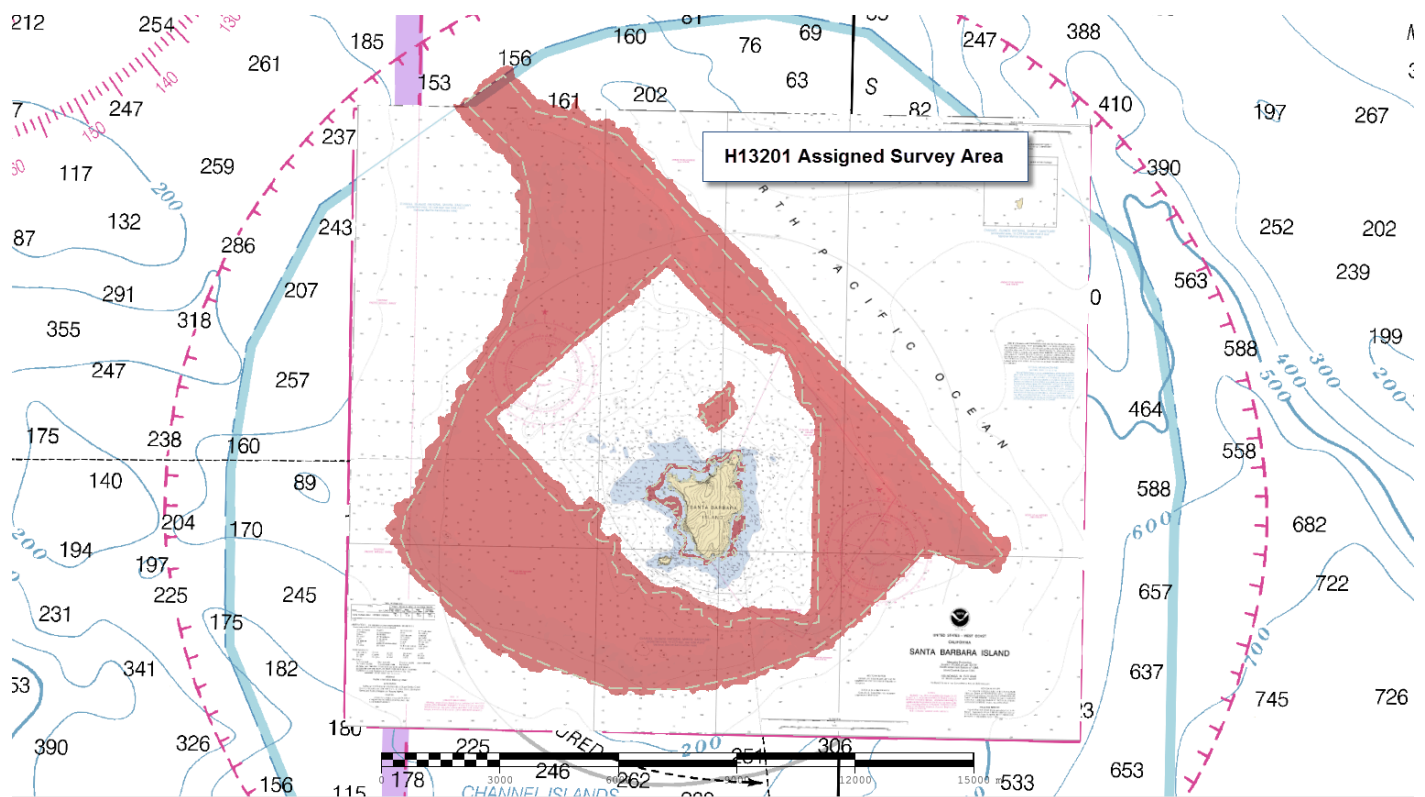


Figure 1: H13201 assigned survey area (Chart 18720).

Data were acquired within survey limits as required in the project instructions and HSSD unless otherwise noted in this report.

A.2 Survey Purpose

The waters surrounding Santa Barbara Island are highly productive and are home to recreational and commercial fishing efforts, and regularly host kayakers, surfers, sightseers, whale watchers, researchers, and Channel Islands National Park concessionaires, who all access the sanctuary via boats. Correspondingly, the abundance of sea life and aquatic habitats drive a thriving industry of recreational and commercial fishing that brings varied vessel traffic through the waters surrounding Santa Barbara Island. Much of the existing nautical chart data dates back to 1930s lead line or single beam echo sounder surveys, and the areas not surveyed to modern standards are predominantly located in the shallow waters (<40m) where vessel traffic is highest. This poses a serious risk to life, property, and the delicate ecosystem.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Pydro QC Tools 2 Grid QA was used to analyze H13201 multibeam echosounder (MBES) data density. The submitted H13201 finalized variable-resolution (VR) surface met HSSD density and full coverage requirements as shown in the histograms below.

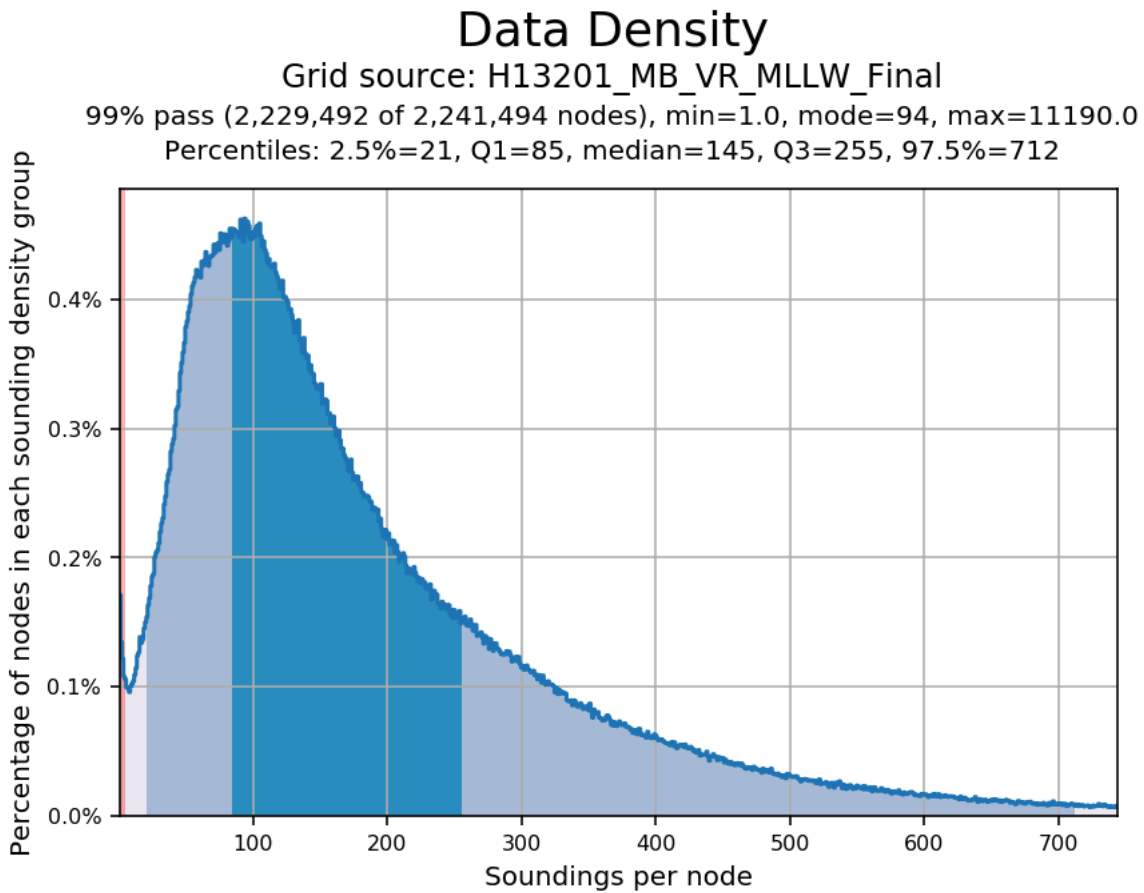


Figure 2: Pydro derived plot showing HSSD density compliance of H13201 finalized variable-resolution MBES data.

Full Coverage

Grid source: H13201_MB_VR_MLLW_Final

95% pass (2,107,687 of 2,215,791 nodes), min=0.50, mode=1.0, max=2.20

Percentiles: 2.5%=1.0, Q1=1.0, median=1.0, Q3=1.0, 97.5%=1.1

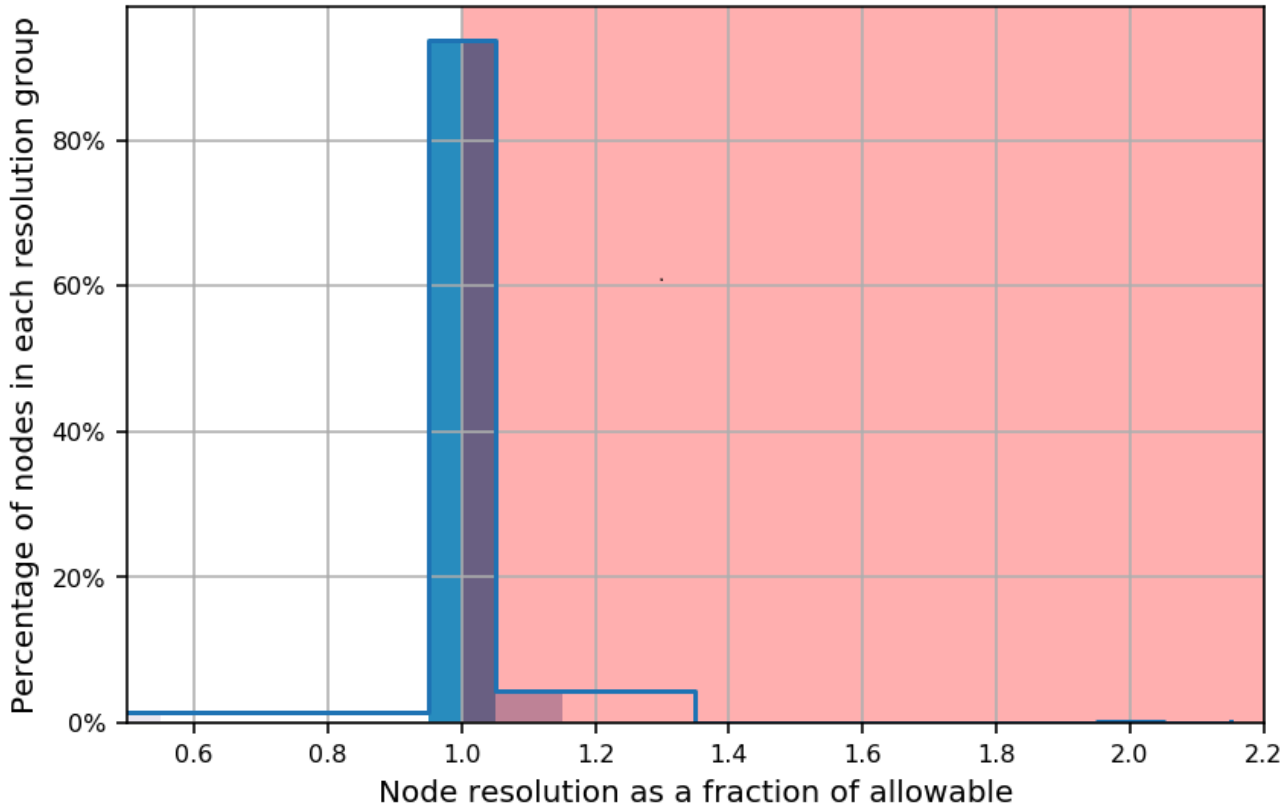


Figure 3: Pyro derived plot showing HSSD full coverage compliance of H13201 finalized variable-resolution MBES data.

A.4 Survey Coverage

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

Water Depth	Coverage Required
All waters in survey area	Complete Coverage (Refer to HSSD Section 5.2.2.3)
All waters in survey area	Acquire backscatter data during all multibeam data acquisition (Refer to HSSD section 6.2)

Table 2: Survey Coverage

Complete multibeam echosounder (MBES) coverage was acquired to the inshore limit of hydrography, the Navigable Area Limit Line (NALL) with the exception of the areas depicted in the figure below. The NALL is defined as the most seaward of the following: the surveyed 3.5-meter depth contour, the line defined by the distance seaward from observed MHW line which is equivalent to 0.8 millimeters at chart scale (the assigned sheet limits closely reflect this), or the inshore limit of safe navigation. These excepted areas are characterized as being near shore, subject to dangerous wave action or other hazards such as rocks or thick kelp.

The Pydro "Detect Holidays" program was used to scan for holidays. Five holidays were detected of which 2 appear to be false positives. The majority of these holidays occur at the edge of coverage along the northwestern side of Santa Barbara Island. These holidays are characterized as being in very nearshore rocky areas subject to heavy wave action as well as holidays on the outer edge of coverage most likely caused by lack of sounding density. It should be noted that the outer edge holidays fall within the junction area between H13201 and previous coverage of W00456.

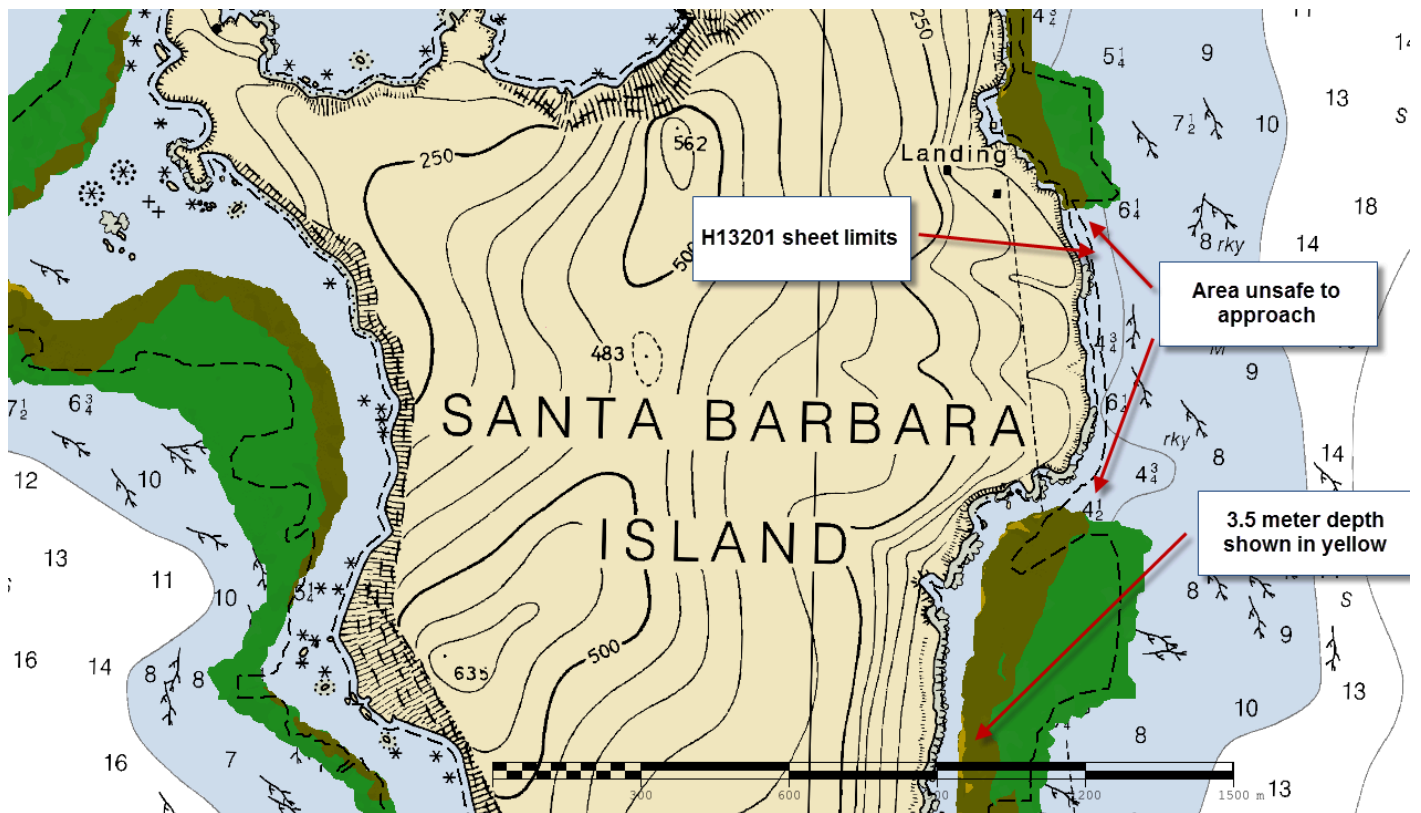


Figure 4: Examples of H13201 NALL determination: the black dashed line indicates sheet limits, the yellow area indicates where the 3.5 meter contour was reached, and the area to the east of the island was deemed unsafe to approach.



Figure 5: Example of typical H13201 nearshore holidays. Vessel track line is green.

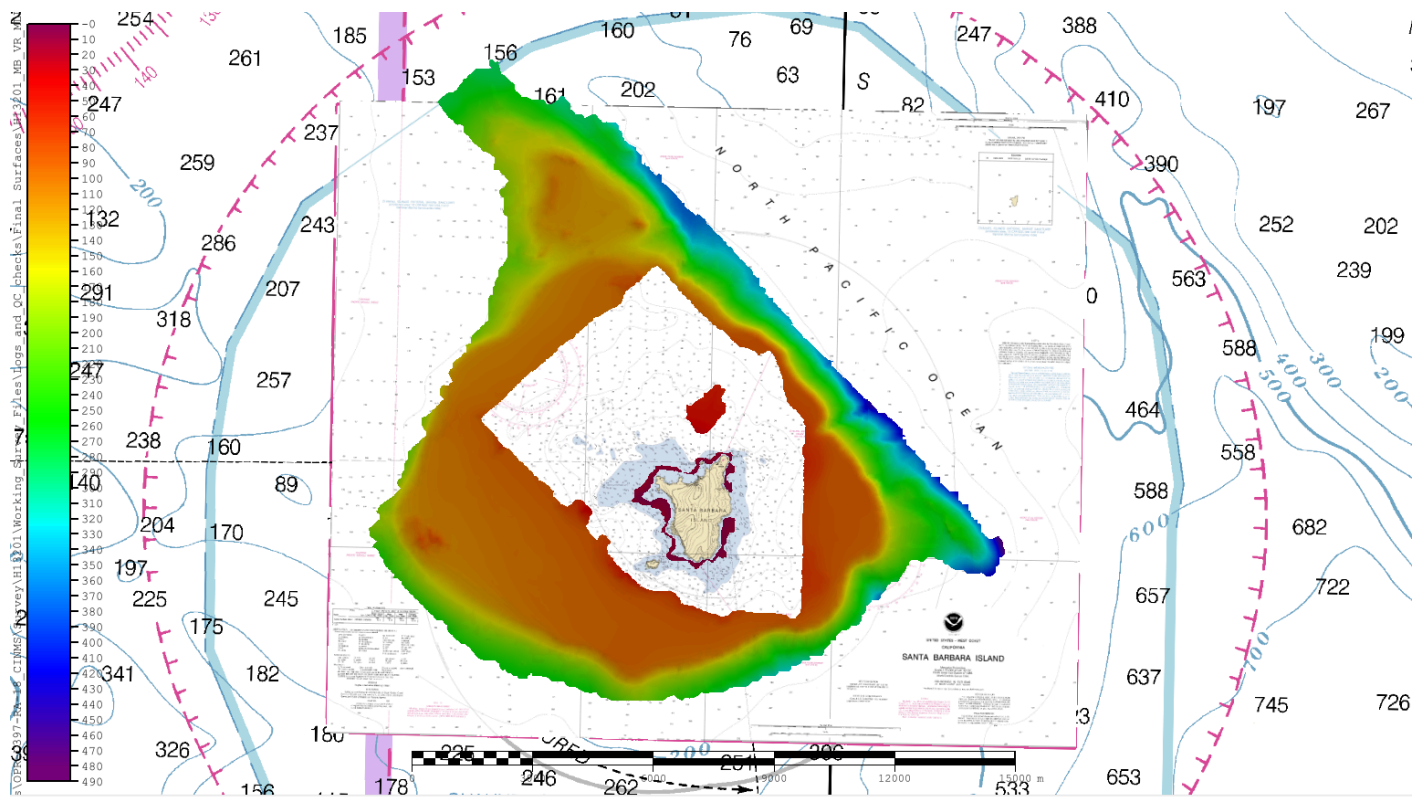


Figure 6: H13201 survey coverage (Chart 18756).

A.5 Survey Statistics

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

	HULL ID	<i>2801</i>	<i>2802</i>	<i>2803</i>	<i>2804</i>	<i>2701</i>	<i>Total</i>
LNM	SBES Mainscheme	0	0	0	0	0	0
	MBES Mainscheme	29.49	45.08	55.75	64.37	0	194.69
	Lidar Mainscheme	0	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0	0
	SBES/MBES Crosslines	11.15	5.94	3.22	3.68	0	23.99
	Lidar Crosslines	0	0	0	0	0	0
Number of Bottom Samples							0
Number Maritime Boundary Points Investigated							0
Number of DPs							0
Number of Items Investigated by Dive Ops							0
Total SNM							26.97

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/07/2018	280
10/24/2018	297
10/25/2018	298

Table 4: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

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

Hull ID	2801	2802	2803	2804	2701	1905
LOA	8.8 meters	8.8 meters	8.8 meters	8.8 meters	7.6 meters	5.7 meters
Draft	1.1 meters	1.1 meters	1.1 meters	1.1 meters	0.47 meters	0.35 meters

Table 5: Vessels Used



Figure 7: Survey launch 2801 (RA-4).



Figure 8: Shoreline verification boat 2701 (RA-2).



Figure 9: Shoreline verification skiff 1905 (RA-8).

All data for H13201 were acquired by NOAA Ship RAINIER survey launches 2801, 2802, 2803 and 2804. The vessels acquired depth soundings, backscatter imagery and sound speed profiles. Shoreline feature verification was conducted using RAINIER skiff 1905 and RAINIER jet boat 2701.

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS MV 320 v5	Positioning and Attitude System
Kongsberg Maritime	EM 2040	MBES
Sea-Bird Scientific	SBE 19plus	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 70	Sound Speed System

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 12.32% of mainscheme acquisition.

NOAA Ship RAINIER launches 2801, 2802, 2803, and 2804 acquired 23.9 nautical miles of multibeam crosslines across most depth ranges and water masses. Crosslines to the north and northwest of the island are of a less than optimal angle due to prevailing seas during acquisition. No crosslines were acquired over the nearshore areas due to hazardous sea conditions and shoaling. It should be noted that mainscheme data and crossline data were acquired on different days and with different survey launches. The hydrographer deems them adequate for verifying and evaluating the internal consistency of H13201 survey data. Analysis was performed using the "Compare Grids" function in Pydro Explorer on finalized variable-resolution surfaces of H13201 mainscheme only and crossline only data. 99.5% of nodes met allowable uncertainties. For additional results, see plots below.

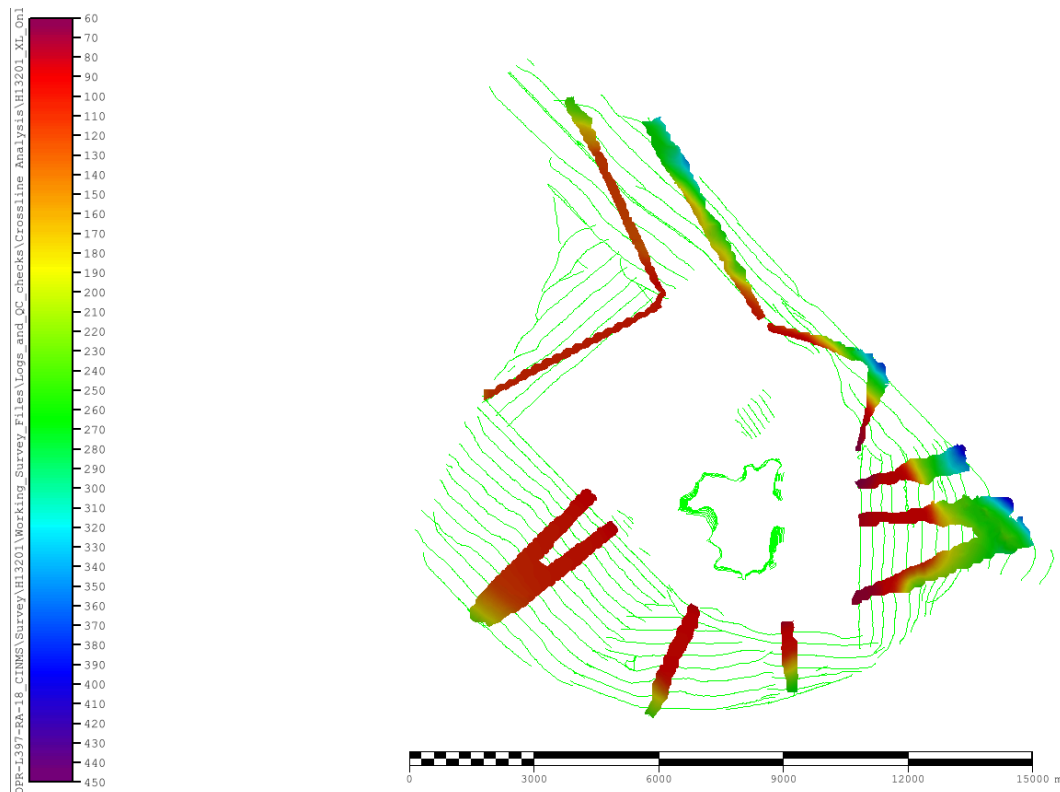


Figure 10: H13201 crossline surface overlaid on mainscheme tracklines.

Comparison Distribution

Per Grid: H13201_MS_Only_MLLW_VR_Final-H13201_XL_Only_MLLW_VR_Final_fracAllowErr.csar

99.5+% nodes pass (174595), min=0.0, mode=0.1 mean=0.1 max=2.1

Percentiles: 2.5%=0.0, Q1=0.0, median=0.1, Q3=0.1, 97.5%=0.3

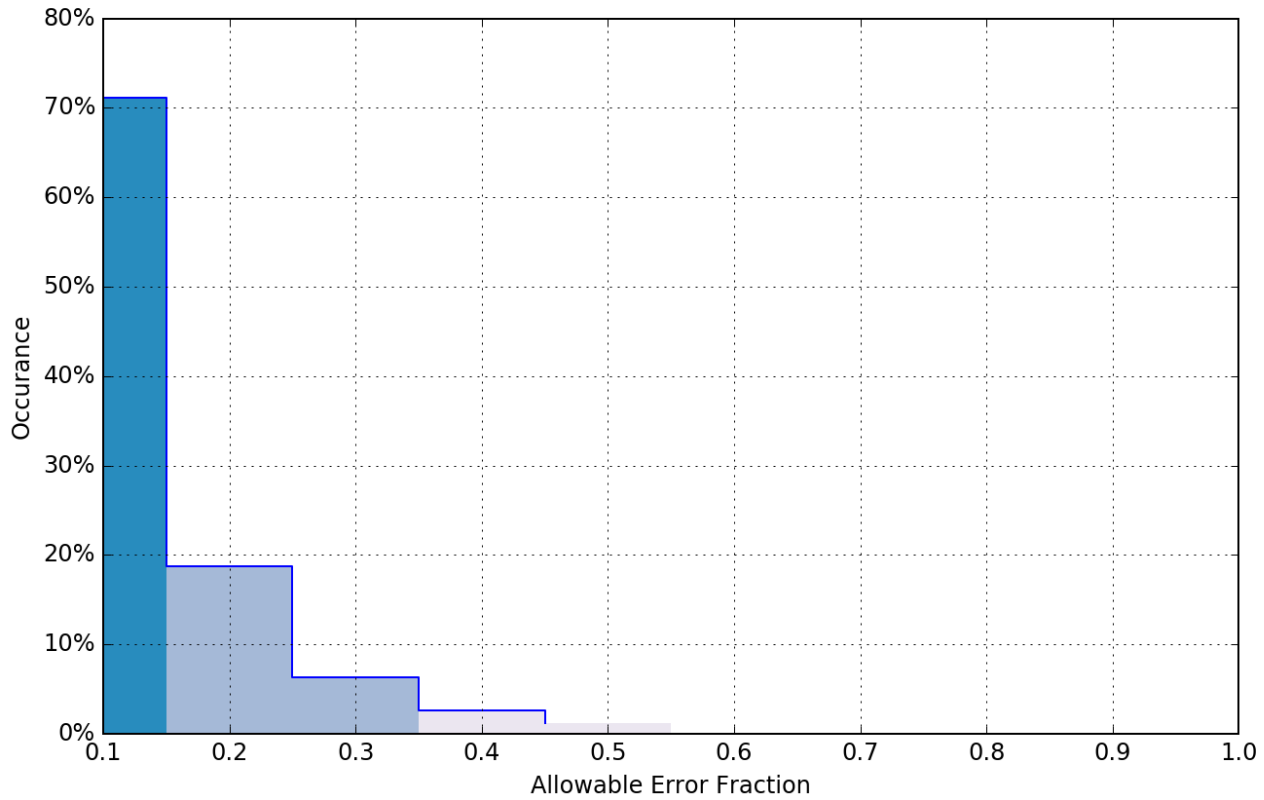


Figure 11: Pydro derived plot showing percentage pass value of H13201 mainscheme to crossline data.

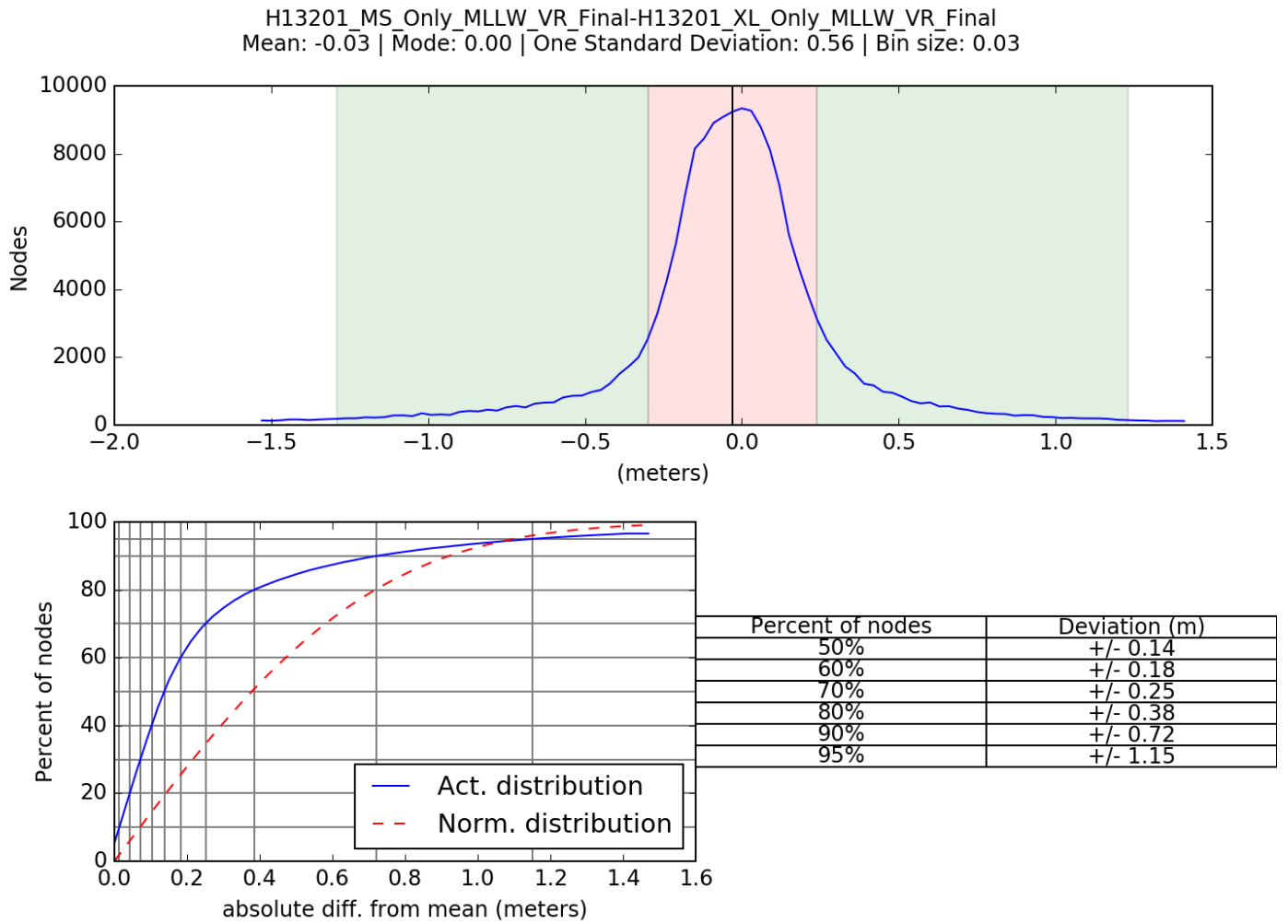


Figure 12: Pydro derived plot showing absolute difference statistics of H13201 mainscheme to crossline data.

Node Depth vs. Allowable Error Fraction

H13201_MS_Only_MLLW_VR_Final-H13201_XL_Only_MLLW_VR_Final_fracAllowErr.csar, total comparisons 174630

Failed Stats [-inf,-1): min=-2.1, 2.5%=-1.8, Q1=-1.2, mean=-1.2, median=-1.1, Q3=-1.0, 97.5%=-1.0, max=-1.0

Failed Stats (+1,+inf): min=1.0, 2.5%=1.0, Q1=1.1, median=1.2, mean=1.2, Q3=1.3, 97.5%=1.5, max=1.5

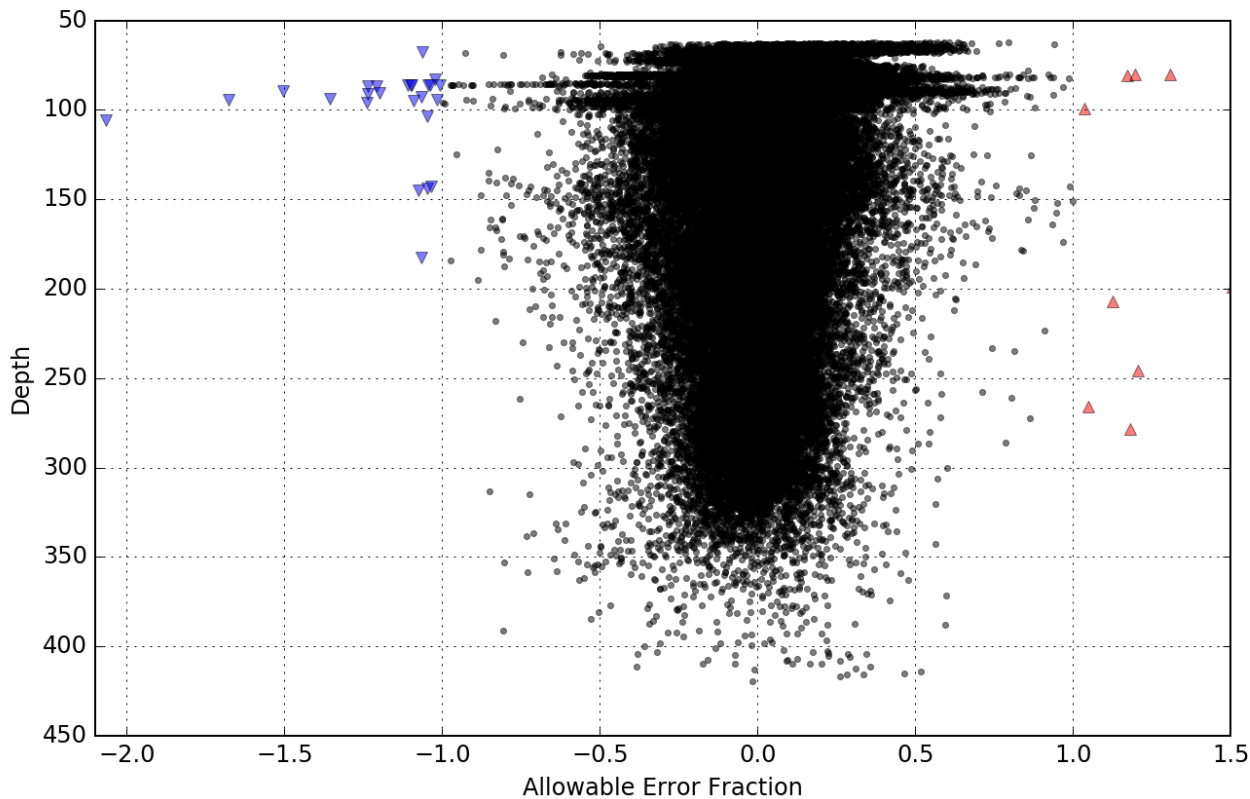


Figure 13: Pydro derived plot showing node depth vs. allowable error fraction of H13201 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0 meters	0.083 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
2801, 2802, 2803, 2804	3 meters/second	N/A meters/second	0.05 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13201 were derived from a combination of fixed values for equipment and vessel characteristics, as well as from field assigned values for sound speed uncertainties. The uncertainty value of NOAA's Vertical Datum (VDatum) transformation model was documented in metadata that accompanied the VDatum model.

In addition to the usual a priori estimates of uncertainty, some real-time and post-processed uncertainty sources were also incorporated into the depth estimates of this survey. Real-time uncertainties from Kongsberg MBES sonars were recorded and applied in post-processing. Applanix True Heave (POS) files, which record estimates of heave uncertainty, were applied during post-processing. Finally, the post processed uncertainties associated with vessel roll, pitch, yaw and position were applied in Caris HIPS using SBET and RMS files generated using POSpac MMS software.

Uncertainty values of the submitted finalized grid were calculated in Caris using "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). Grid QA v5 within Pydro QC Tools 2 was used to analyze H13201 Total Vertical Uncertainty TVU compliance; a histogram plot of the results is shown below.

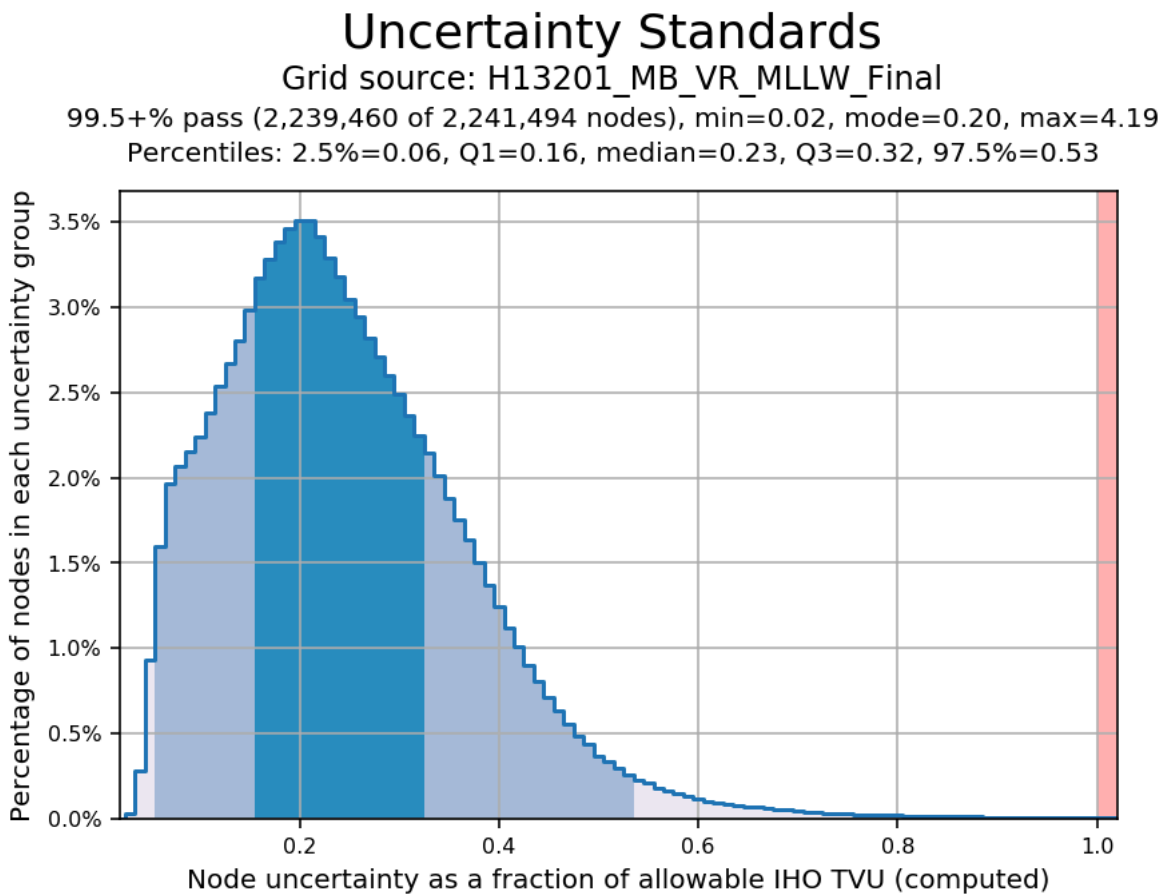


Figure 14: Pydro derived plot showing TVU compliance of H13201 finalized variable-resolution MBES data.

B.2.3 Junctions

H13201 junctions with two surveys: W00341, a survey conducted by the E/V Nautilus in 2016 and W00456, a survey conducted by R/V VenTresca in 2006. Comparisons were made using the "Compare Grids" program within Pydro Explorer. These surveys as they relate to H13201 are illustrated in the following two figures. The hydrographer recommends using H13201 data to supersede the previous data in junction areas.

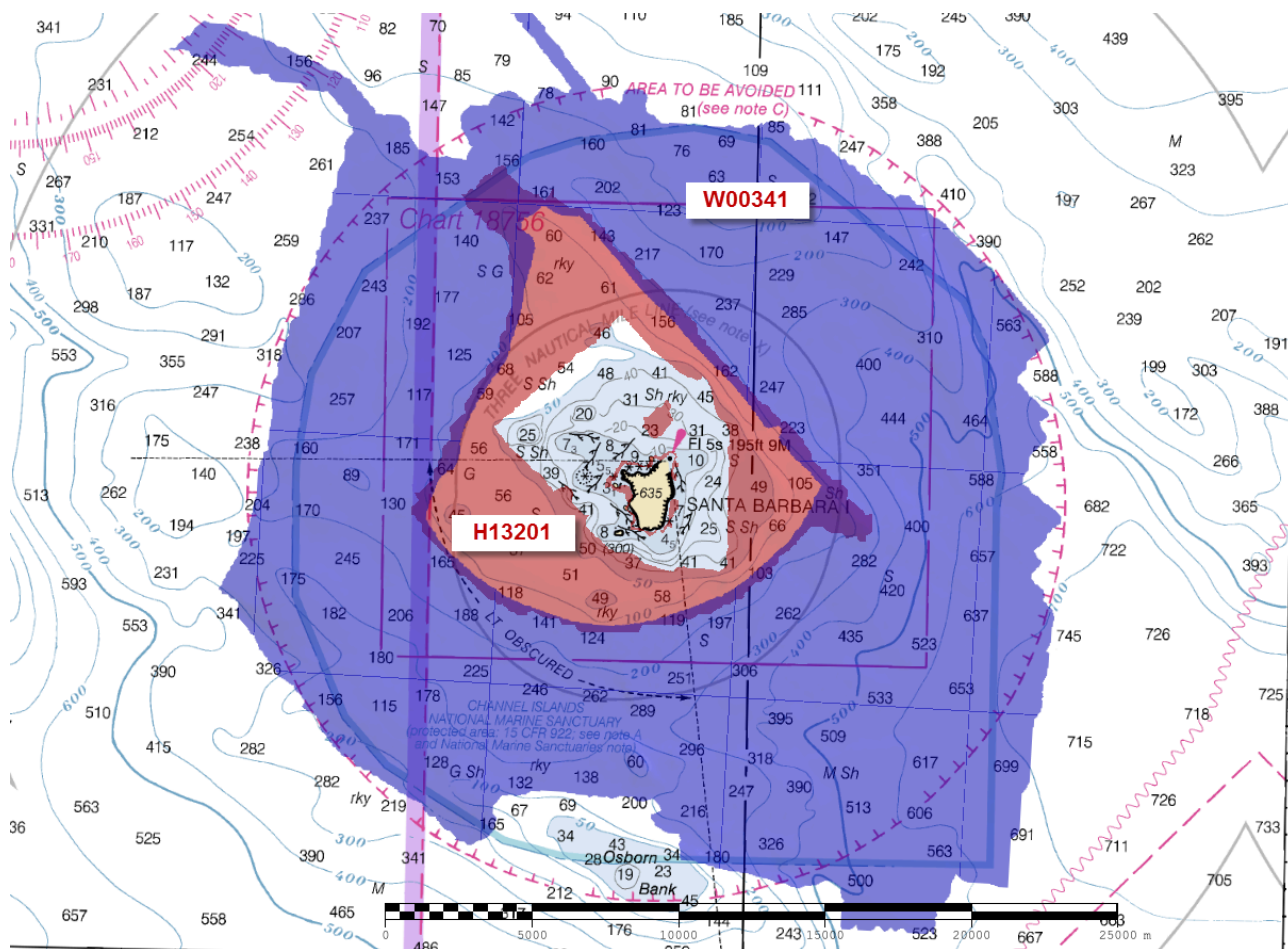


Figure 15: H13201/W00341 junction.

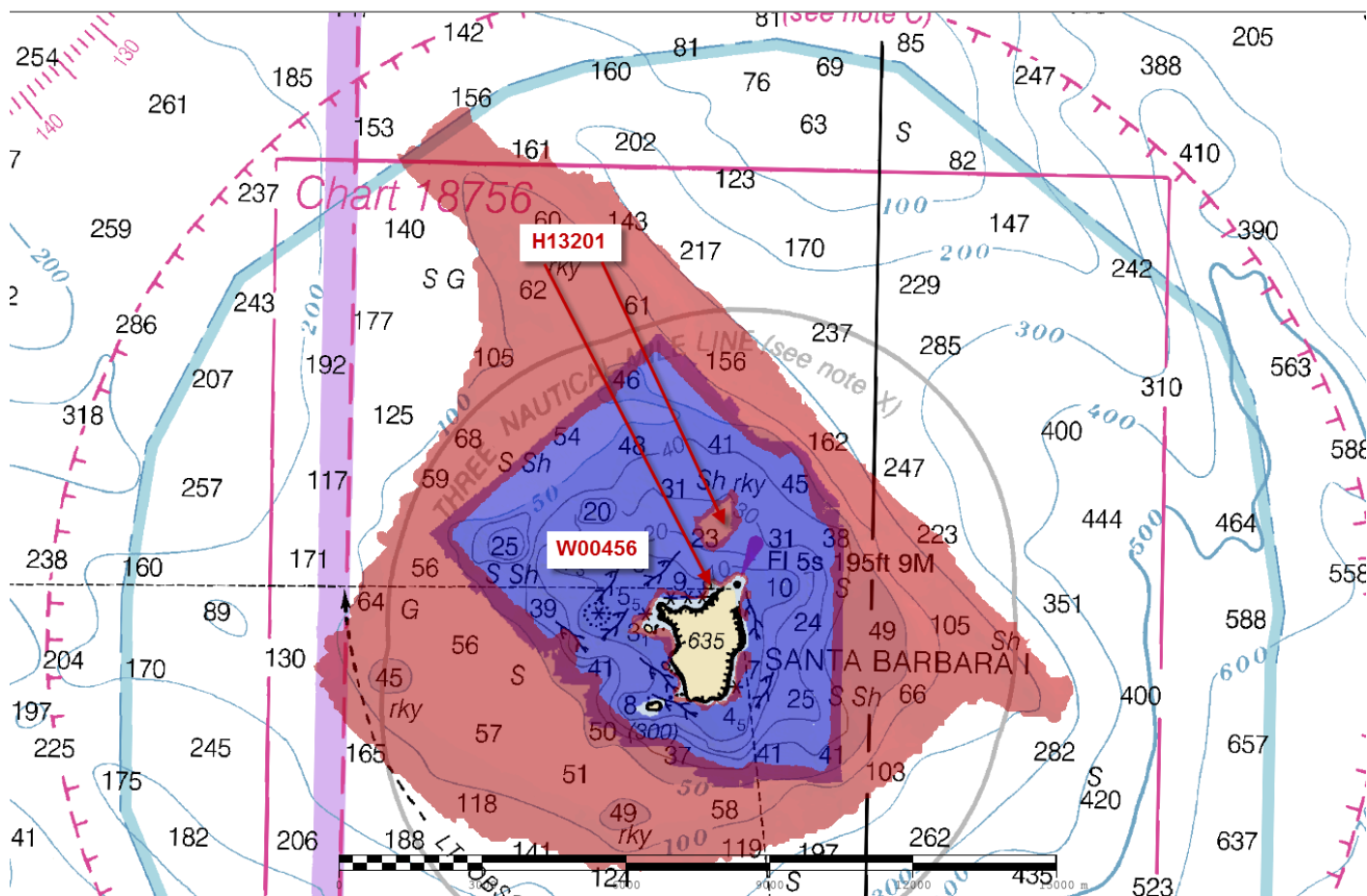


Figure 16: H13201/W00456 junction.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
W00341	1:10000	2016	E/V Nautilus	NE
W00456	1:10000	2006	R/V VenTresca	S

Table 9: Junctioning Surveys

W00341

The junction with survey W00341 encompassed approximately 7.50 square nautical miles outside of the outermost boundaries of H13201. A comparison was made between H13201 and W0034 variable-resolution surfaces using the Pydro Explorer "Compare Grids" function. The results are shown in the figures below. Additionally, the "Difference" function creates a difference surface from which statistics were derived. The computed statistics indicated the average difference in depth between H13201 and W00341 was 1.8 meters with a standard deviation of 0.9 meters.

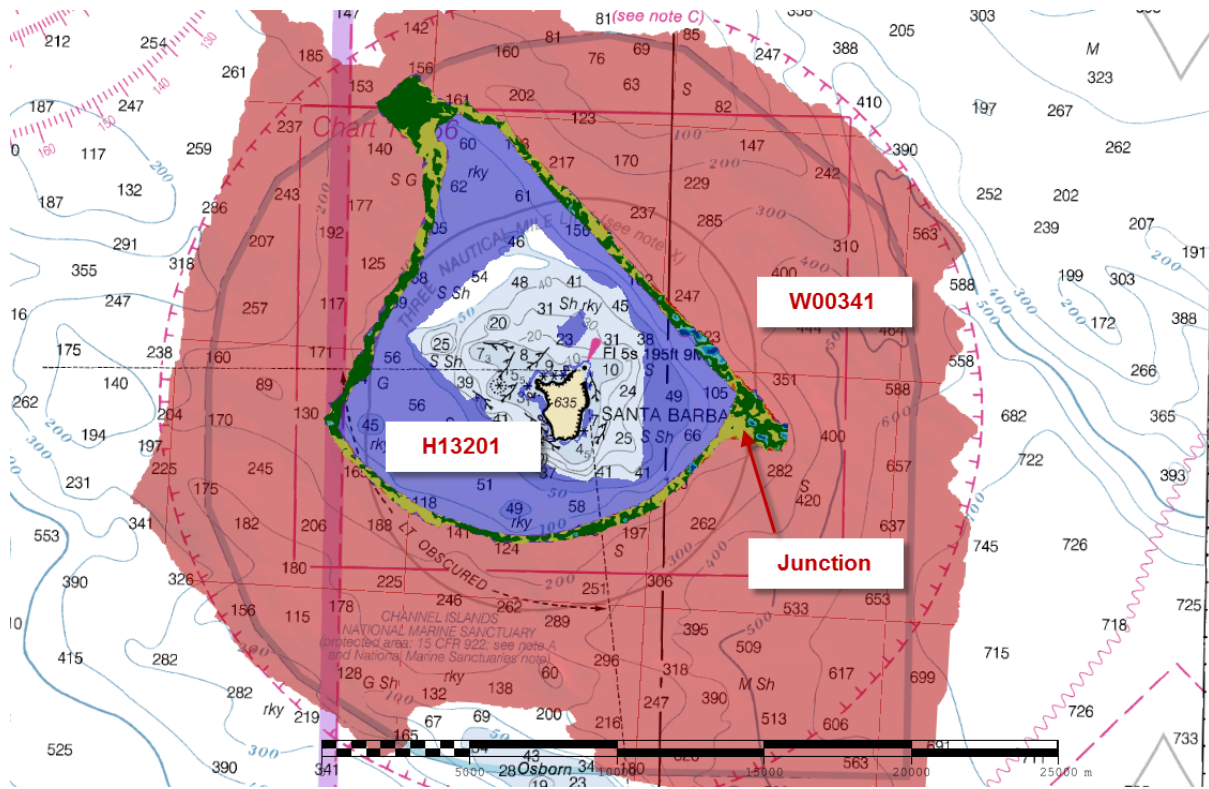


Figure 17: H13201/W00341 junction. Higher than allowable uncertainty junction nodes are shown in red, those meeting uncertainty standards are green.

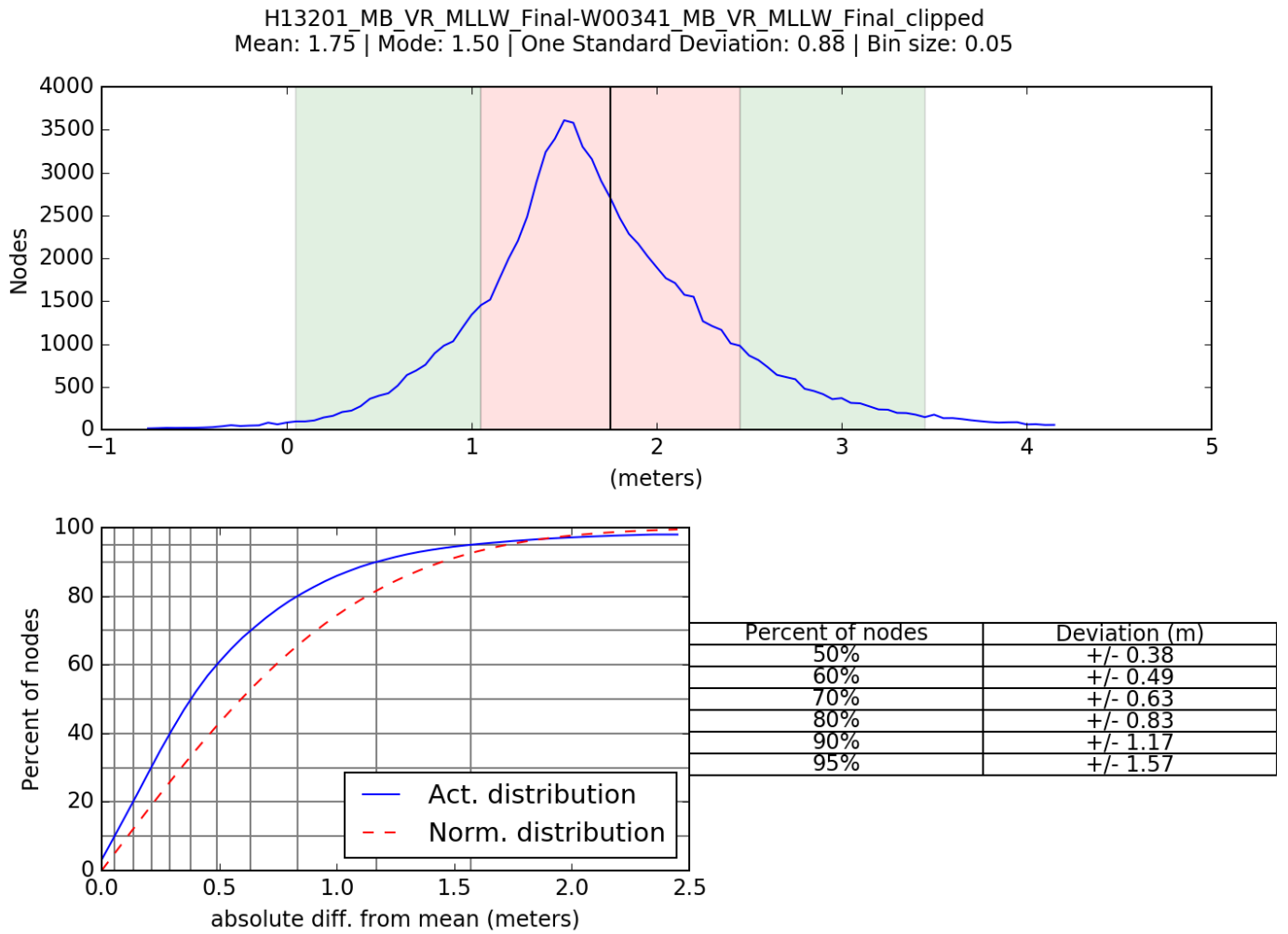


Figure 18: Pydro derived plot showing H13201/W00341 variable-resolution surface comparison statistics.

Comparison Distribution

Per Grid: H13201_MB_VR_MLLW_Final-W00341_MB_VR_MLLW_Final_clipped_fracAllowErr.csar

99.5+% nodes pass (85742), min=0.0, mode=0.3 mean=0.3 max=1.7

Percentiles: 2.5%=0.1, Q1=0.2, median=0.3, Q3=0.3, 97.5%=0.5

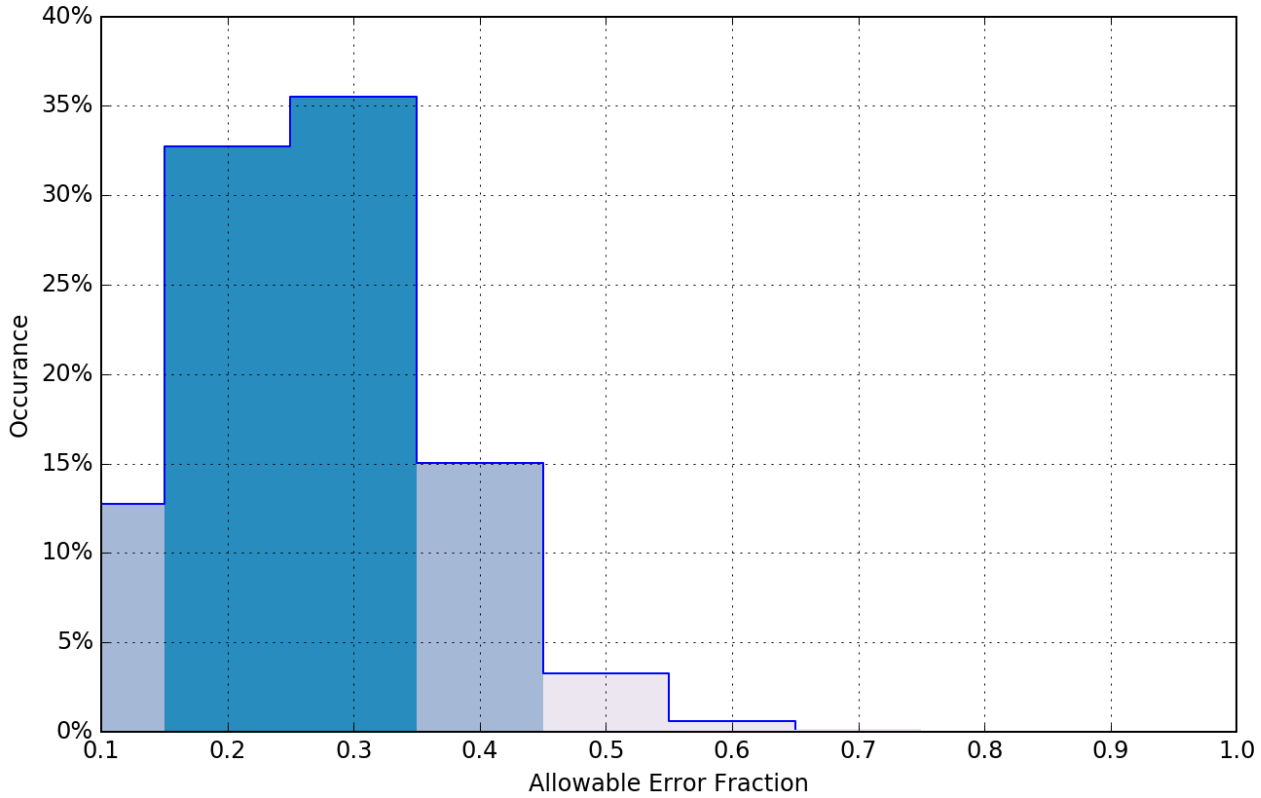


Figure 19: Pydro derived plot showing H13201/W00341 variable-resolution surface comparison statistics.

W00456

The junction with W00456 encompassed approximately 14.34 square nautical miles along the inner portion of H13201 offshore area and along the outer portion of H13201 nearshore area. A comparison was made with Pydro Explorer "Compare Grids" function using a Caris 2meter resolution csar surface and a 2 meter bag surface from W00456. The results are shown in the figures below. Additionally, the Compare Grids tool creates a difference surface, from which statistics were derived in Caris. The computed statistics indicated the average difference in depth between H13201 and W00456 was 0.51 meters with a standard deviation of 0.50 meters.

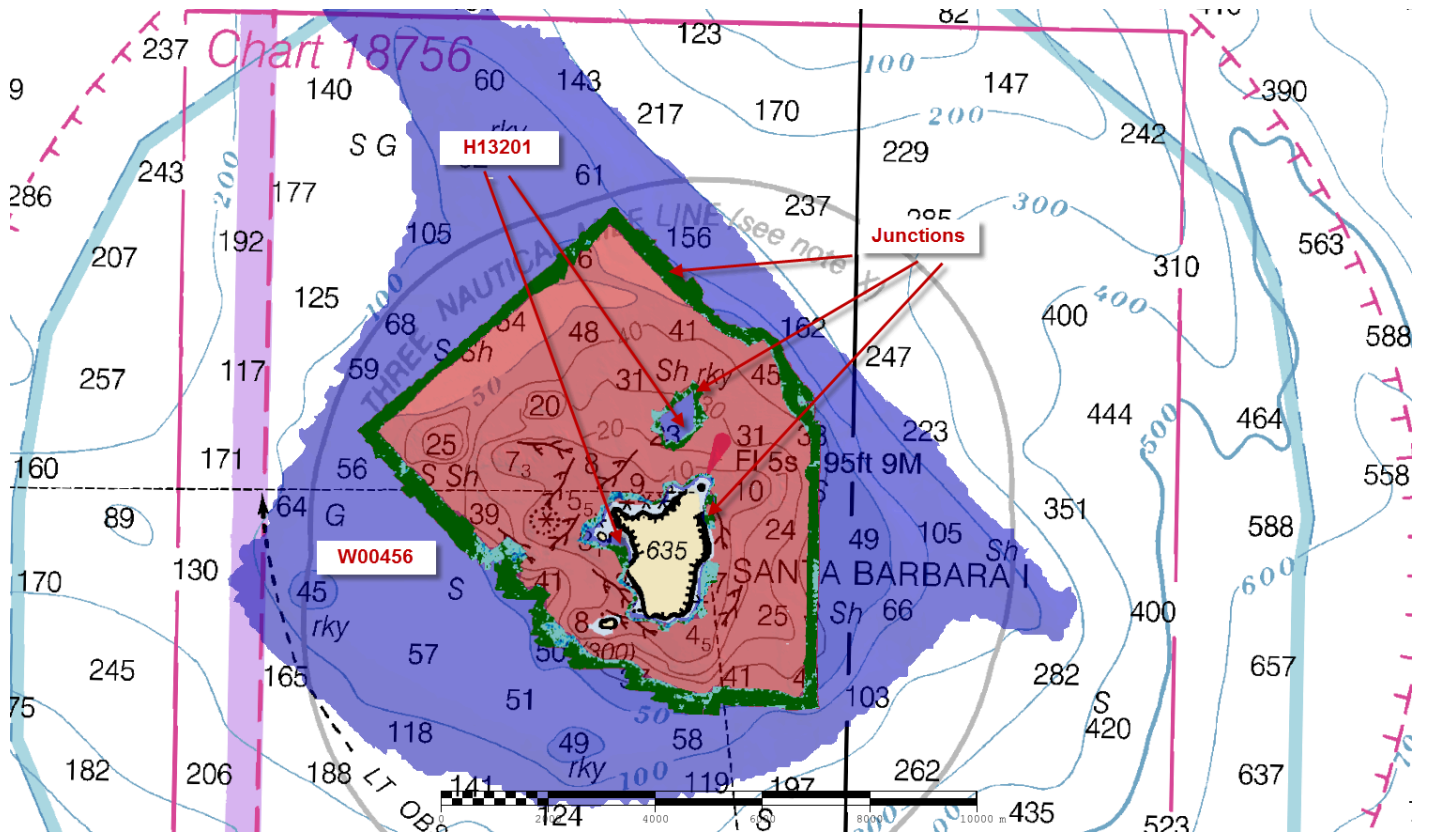


Figure 20: H13201/W00456 junction.

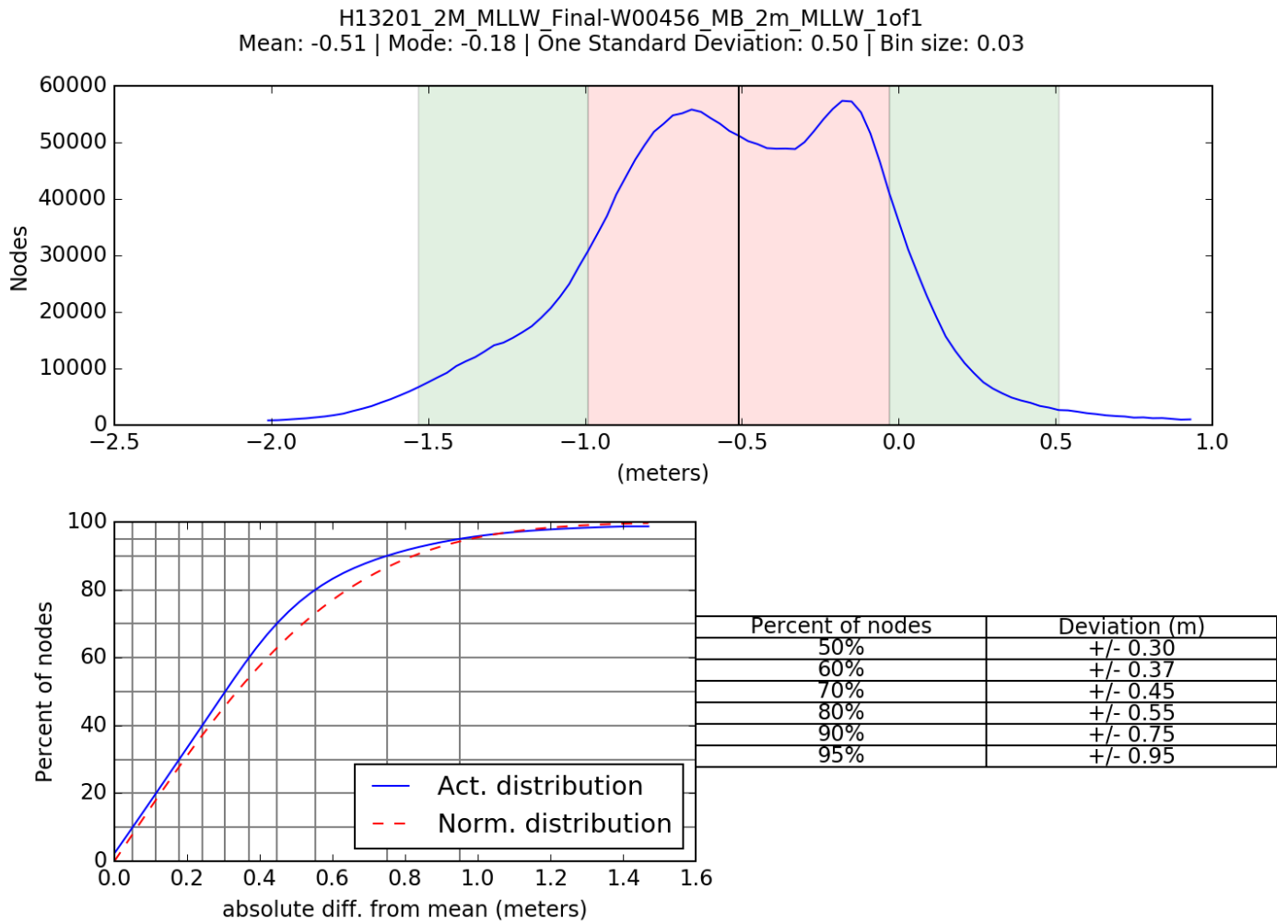


Figure 21: Pydro derived plot showing H13201/W00456 2m surface comparison statistics.

Comparison Distribution

Per Grid: H13201_2M_MLLW_Final-W00456_MB_2m_MLLW_1of1_fracAllowErr.csar

98% nodes pass (2167046), min=0.0, mode=0.1 mean=0.4 max=9.9

Percentiles: 2.5%=0.0, Q1=0.1, median=0.3, Q3=0.5, 97.5%=1.0

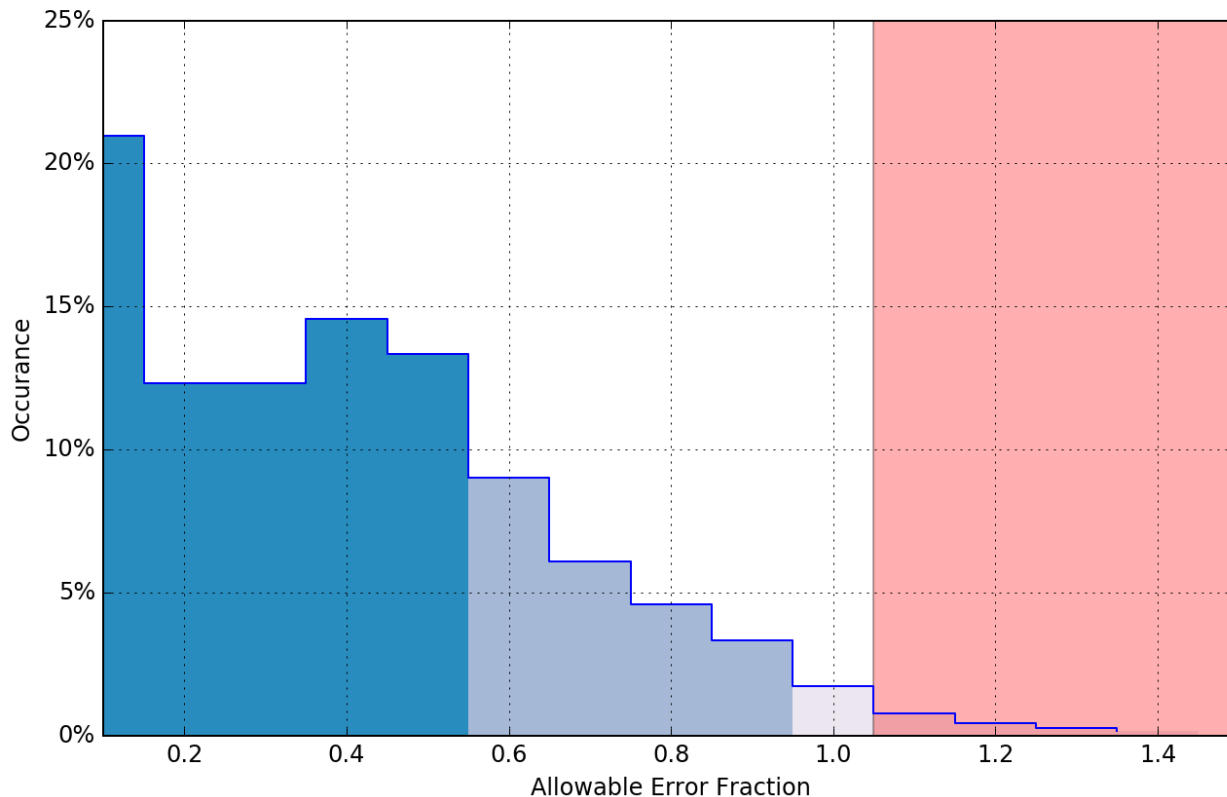


Figure 22: Pydro derived plot showing H13201/W00456 2m surface comparison statistics.

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

Survey Launch RA-4 (2801) Roll Offset Error

An intermittent roll bias was noted on some H13201 2801 MBES data. Numerous possible equipment and software related issues were investigated, however at the time of this report, a conclusive cause of the offset has yet to be determined. A value of -0.065 degrees roll was added to 2801_EM2040.hvf in order to address

this slight bias. All submitted H13201 MBES data meet HSSD specifications. TPU and crossline comparison analysis also indicates an improvement in data correlation, however visual changes in the surface are minute.

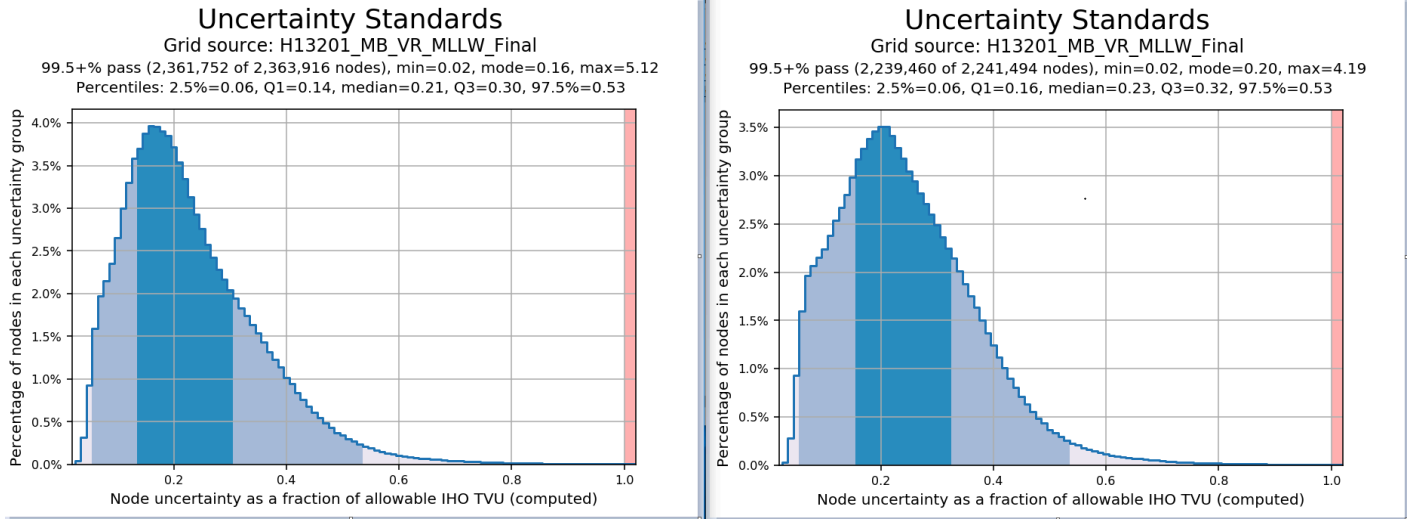


Figure 23: Pydro derived plot showing change to H13201 uncertainty after roll bias adjustment (original plot left, adjusted plot right).

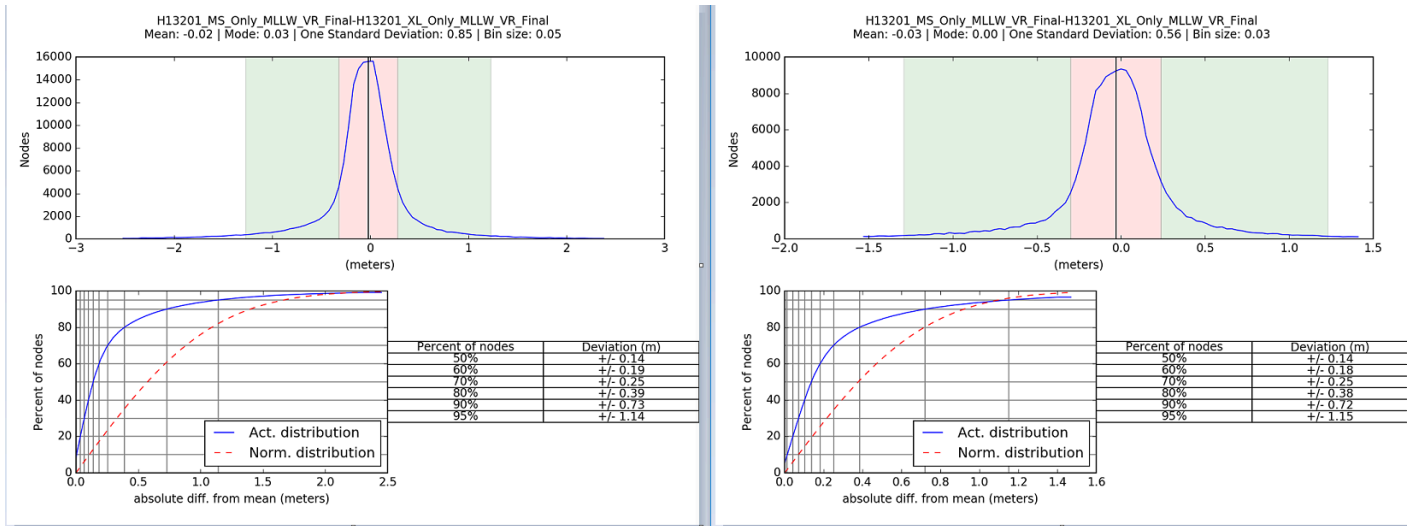


Figure 24: Pydro derived plot showing change to H13201 crossline comparison after roll bias adjustment (original plot left, adjusted plot right).

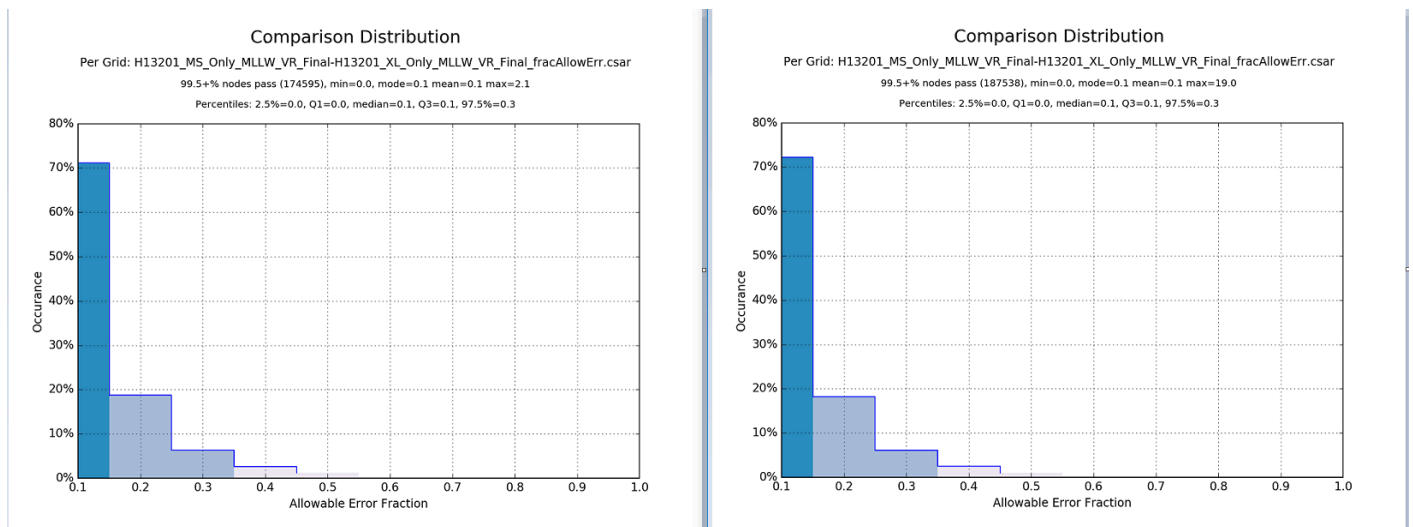
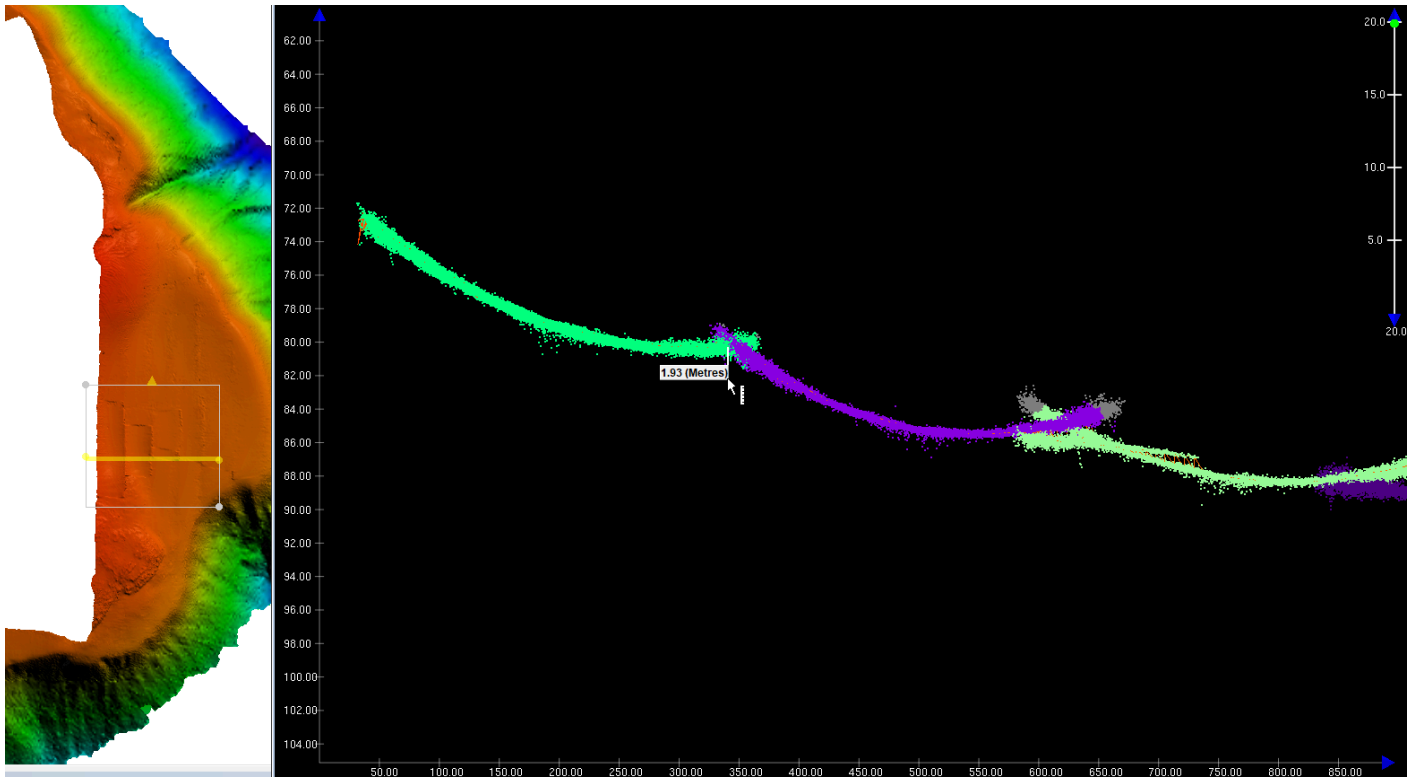


Figure 25: Pydro derived plot showing change to H13201 crossline comparison after roll bias adjustment (original plot left, adjusted plot right).

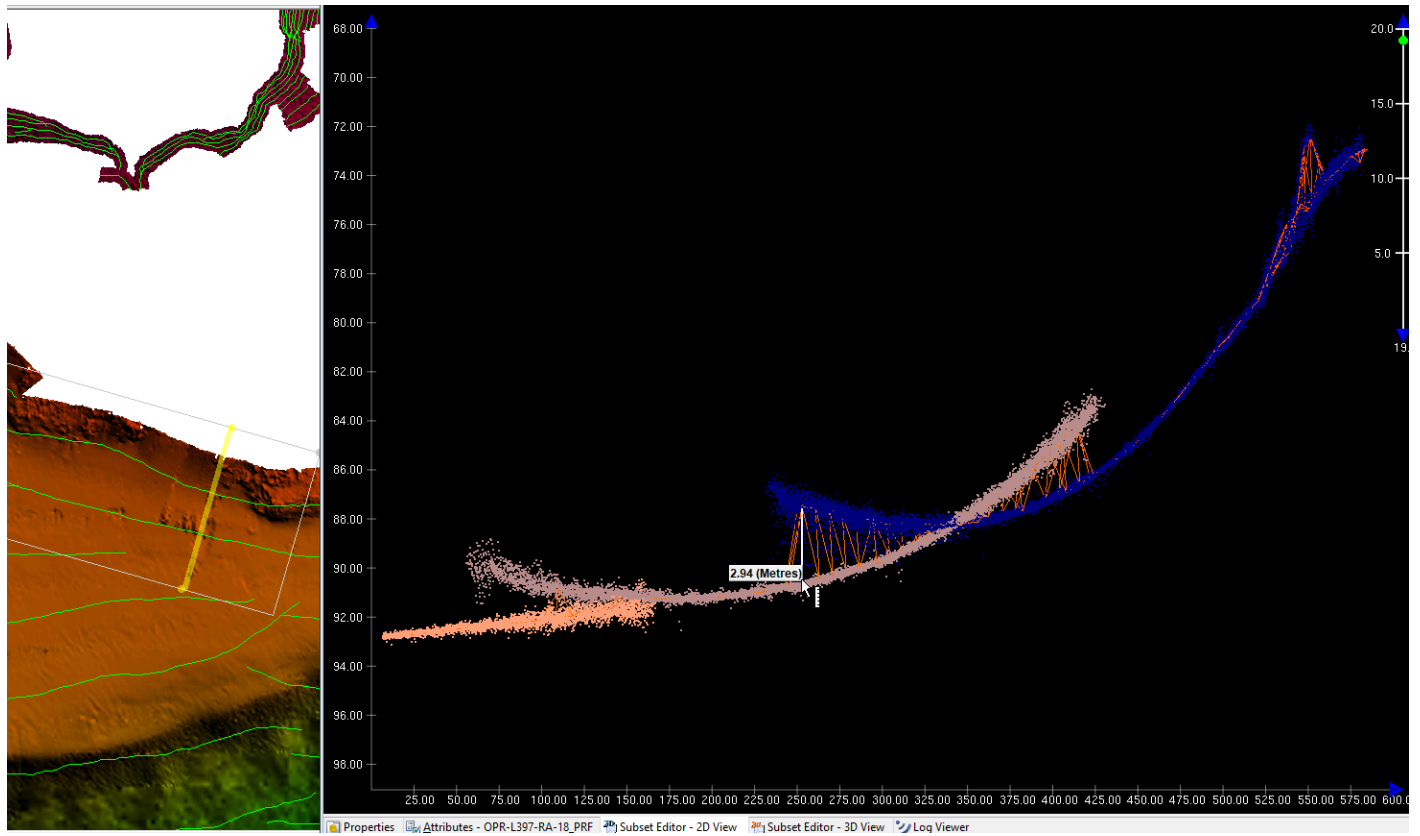
B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

During Branch review two small areas in the survey coverage show evidence of a sound speed artifact in the submitted surface. Due to the fairly deep depths in the two areas (~80-90 meters in the Southern area and ~70-80 meters in the Eastern area), no influence on surface navigation is likely. Eastern side of survey: The outer beam data is being pulled upwards by ~1-2 meters above the real seafloor, creating "smiles" in the data. At a depth of ~80 meters, this exceeds TVU limits by ~0.3-1.3 meters. Southern side of survey: Outerbeam data is being pulled upwards by ~2-3 meters above the seafloor, creating "smiles" in the data. At a depth of ~90 meters, this exceeds TVU limits by ~1-2 meters.

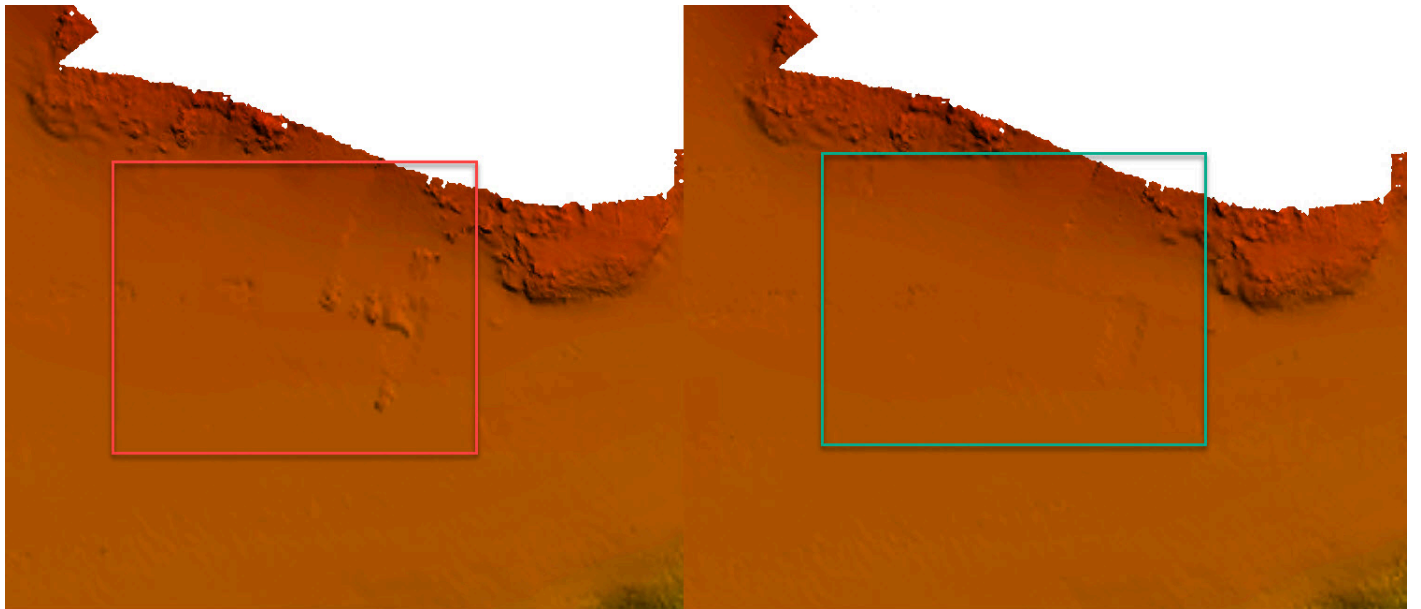


H13201 Eastern area sound speed artifact

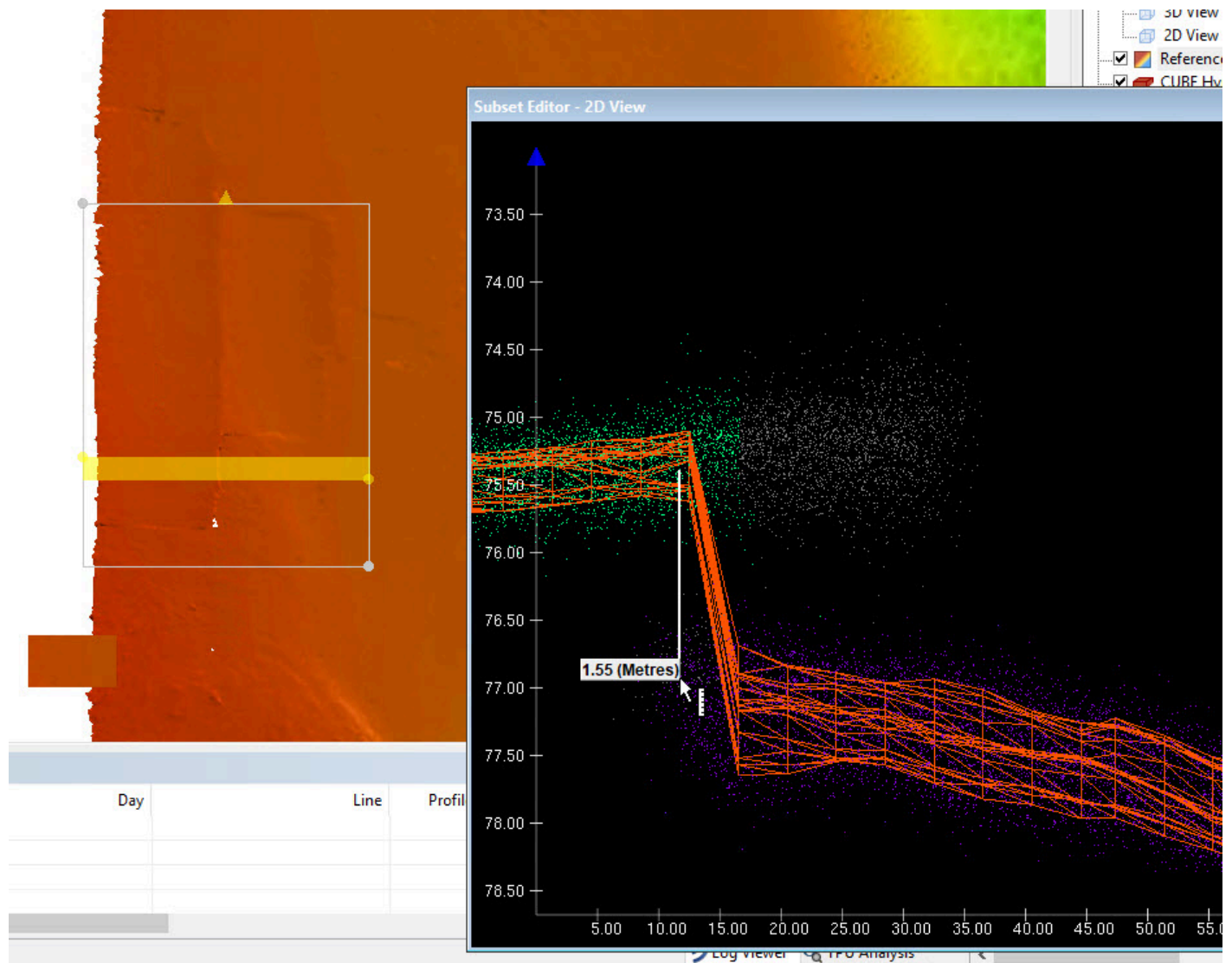


H13201 Southern area sound speed artifact

In the Southern area cleaning the "tails" off the lines affected by sound speed significantly improved the resulting surface and brought the surface in the affected locations within allowable TVU limits for the water depths. In the Eastern location significant cleaning was performed and improvement to the resulting surface is seen as well. Some "steps" remain in the surface in this area which are greater than the allowable TVU limit (1.1m) for the water depths in the area (75m). A new surface for submission was created and finalized after the cleaning effort.



H13201 Southern area before and after cleaning



H13201 Eastern area after cleaning

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Twenty four sound speed profiles were acquired for this survey at discrete locations within the survey area at least once every four hours, when significant changes to surface sound speed were observed, or when operating in a new area. Sound speed profiles were acquired using Sea-Bird Scientific SBE 19plus profilers. All casts were concatenated into a master file and applied using the "Nearest distance within time" (4 hours) profile selection method.

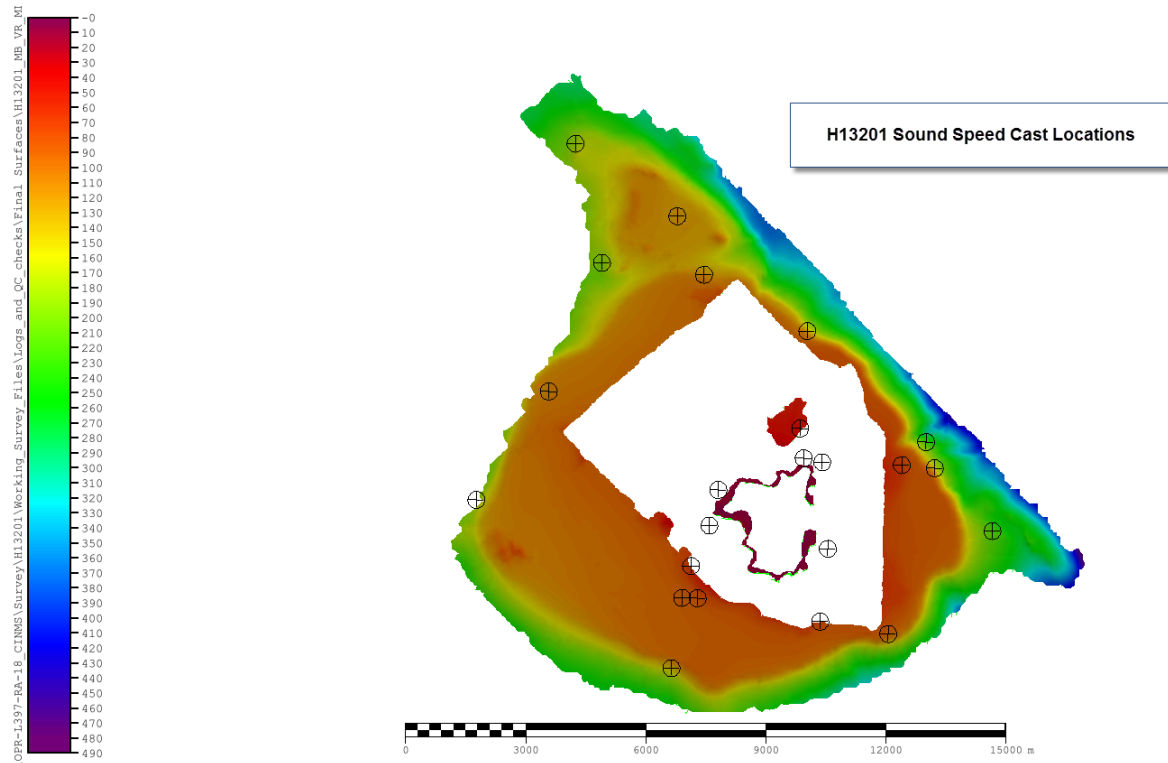


Figure 26: H13201 sound speed cast locations.

B.2.8 Coverage Equipment and Methods

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

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

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

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Raw backscatter data were acquired as .all files logged during MBES operations and subsequently processed by personnel aboard *Rainier*. The .GSF files created during processing and one backscatter mosaic per vessel per frequency has been delivered with this report. Backscatter processing procedures utilized followed those detailed in the DAPR.

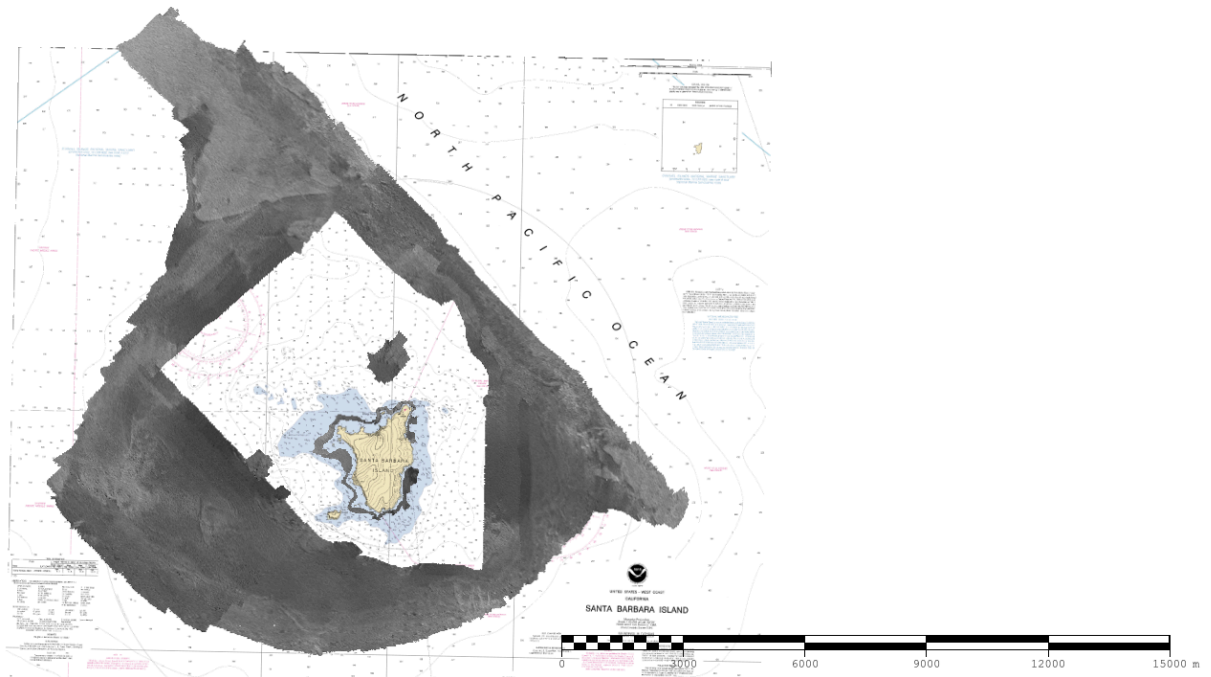


Figure 27: Overview of H13201 backscatter mosaics (18756).

B.5 Data Processing

B.5.1 Primary Data Processing Software

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

Manufacturer	Name	Version
Caris	HIPS/SIPS	10.3.3

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
QPS	Fledermaus Geocoder Tool Box (FMGT)	7.8.1

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 5.7.

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
H13201_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution	1.4 meters - 492.2 meters	NOAA_VR	Complete MBES
H13201_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution	1.4 meters - 492.2 meters	NOAA_VR	Complete MBES

Table 12: Submitted Surfaces

Submitted surfaces were generated using the recommended parameters for depth-based (Ranges) Caris variable-resolution bathymetric grids as specified in the 2018 HSSD.

Pydro QC Tools 2 "Detect Fliers" program with default settings was used to identify fliers in the data; obvious noise was rejected. Upon completion of multiple iterations of this process, "Detect Fliers" was run again resulting in 1 flier. This flier is believed to be a false positive resulting from an extremely abrupt change in depth (see image below). Results from Pydro QC tools are included in the Separates section of this report.

No soundings were designated for this survey.

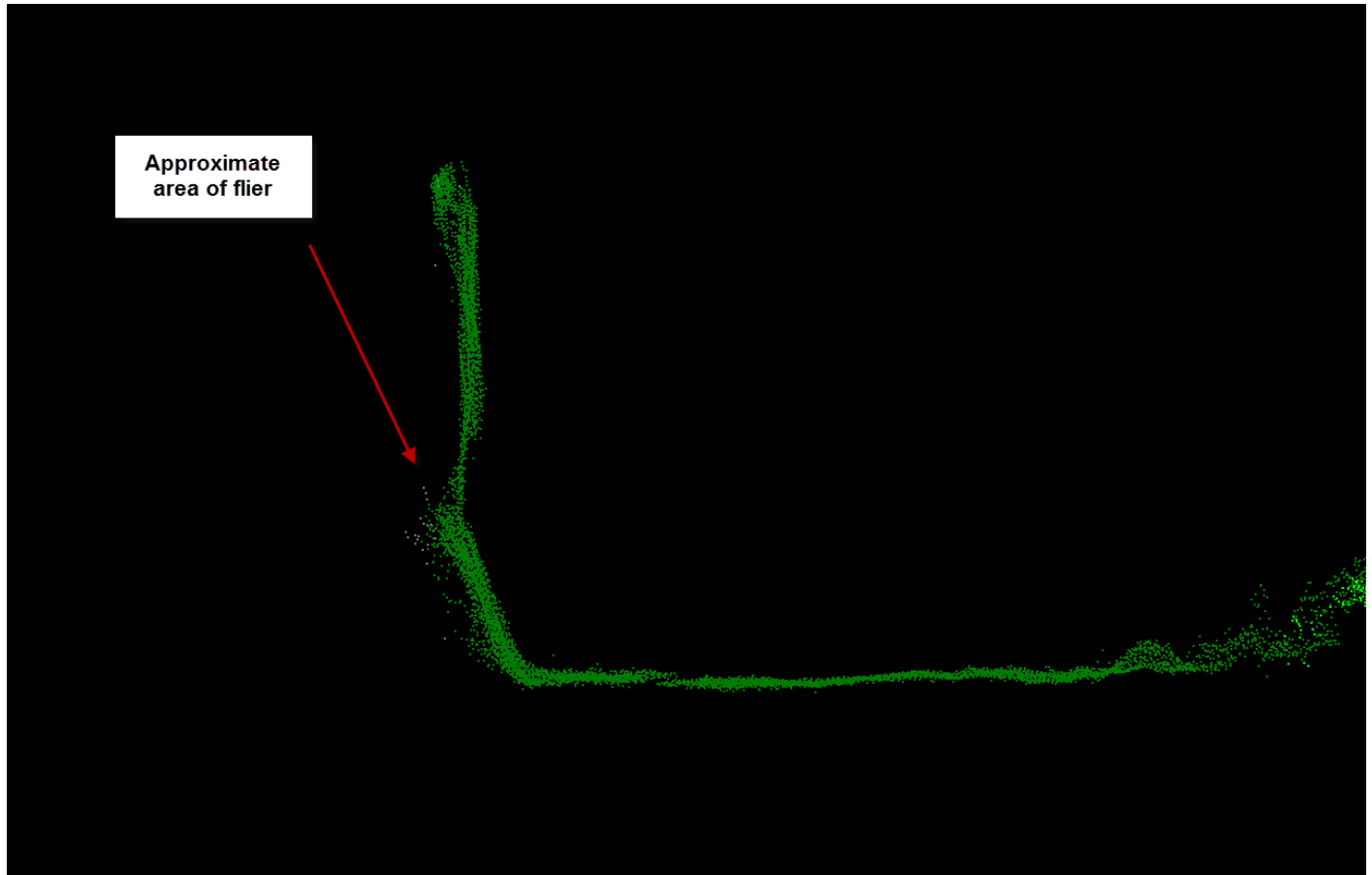


Figure 28: H13201 possible false positive flier.

C. Vertical and Horizontal Control

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

C.1 Vertical Control

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

Traditional Methods Used:

TCARI

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

Station Name	Station ID
Los Angeles, CA	9410660
Santa Monica, CA	9410840
Santa Barbara, CA	9411340
Oil Platform Harvest, CA	8411406
Port San Luis, CA	9412110
Monterey, CA	9413450

Table 13: NWLON Tide Stations

File Name	Status
H13201_Feature_Tides.tid	Final Approved

Table 14: Water Level Files (.tid)

File Name	Status
L397RA2018.tc	Final

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

A request for final approved tides was sent to N/OPS1 on 10/28/2018. The final tide note was received on 01/29/2019.

H13201 shoreline features were reduced to chart datum (MLLW) using a .tid file created in Pydro utilizing the "TCARI TID file via S-57" function, then loaded in Caris Notebook. H13201 MBES data were reduced to MLLW using ERS via VDATUM processing methods. See Supplemental correspondence regarding approval of traditional tides for use in determining feature heights.

ERS Methods Used:

ERS via VDATUM

Ellipsoid to Chart Datum Separation File:

OPR_L397_RA_18_lgECpoly_xyNAD83-MLLW_geoid12b

C.2 Horizontal Control

The horizontal datum for this project is North American Datum 1983.

The projection used for this project is Projected UTM 11N.

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control for this survey.

C.3 Additional Horizontal or Vertical Control Issues

C.3.1 SBET Processing Method

Precise Positioning-Real Time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS 8.2.1 software to produce SBETs for post-processing horizontal correction.

D. Results and Recommendations

D.1 Chart Comparison

A comparison was made between H13201 survey data and Electronic Navigational Charts (ENC) US5CA69M and US5CA75M using CUBE surfaces, selected soundings and contours created in Caris. Both charts were required to gain full coverage of the survey area for comparison.

D.1.1 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US3CA69M	1:232188	23	10/26/2017	06/06/2018	NO
US5CA75M	1:20000	8	08/25/2017	08/25/2017	NO

Table 16: Largest Scale ENCs

US3CA69M

A small portion of H13201 is covered by US3CA69M, but no contours exist in this area.

US5CA75M

ENC US5CA75M covers the vast majority of the H13201 survey area. The depth contours in the offshore portion of H13201 generally agree with the currently charted depth curves. In the nearshore portion of H13201 the 3 and 5 fathom contours generally agree where they exist on the ENC. However, the 3 and 5 fathom depth curves on the ENC are largely nonexistent. This is illustrated in the figures below.

Hydrographer recommends updating the existing 3 and 5 fathom depth curves on the ENC using the new data from H13201.

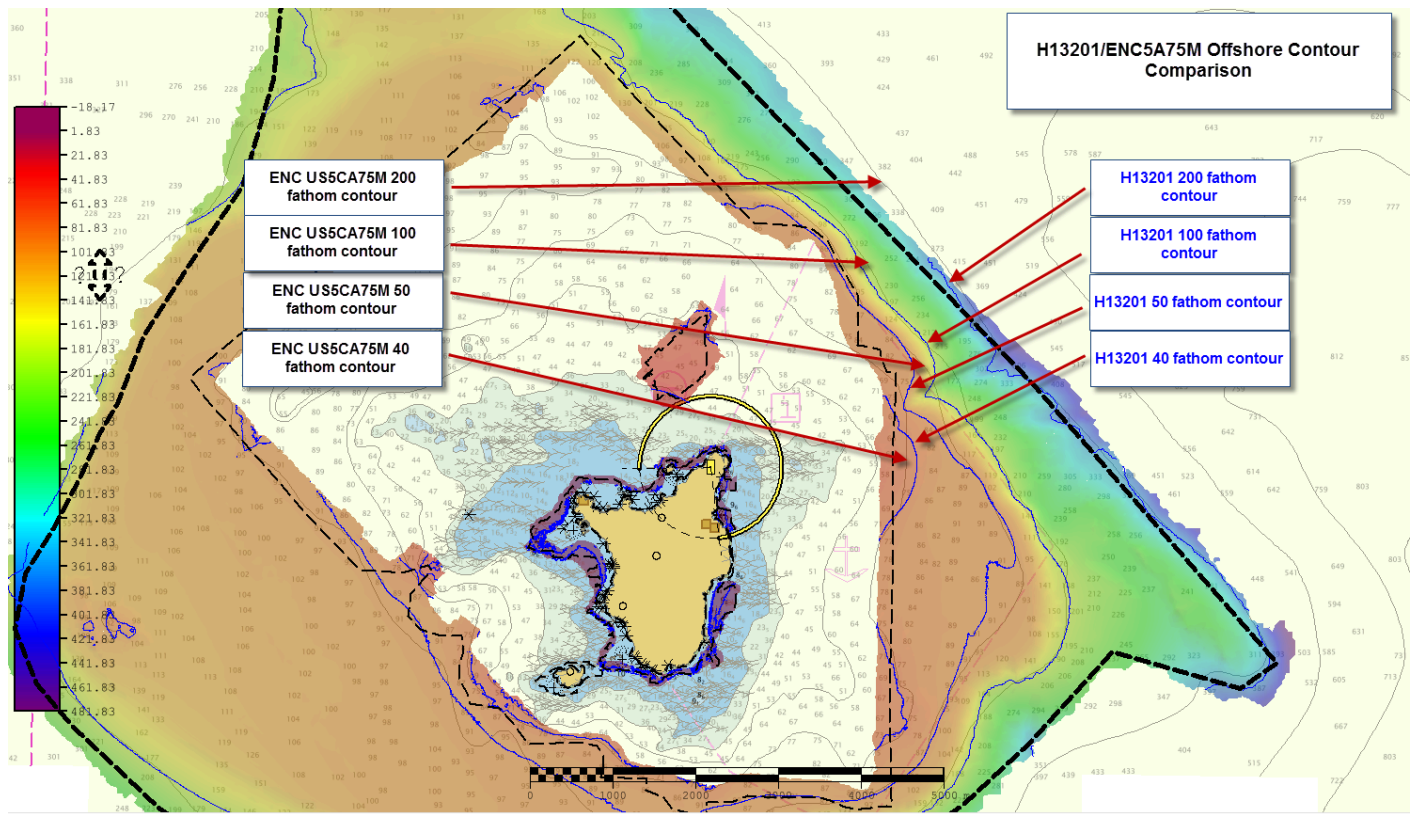


Figure 29: ENC US5CA75M overlaid with H13201 50, 100, and 200 fathom contours showing general agreement with currently charted contours on ENC.

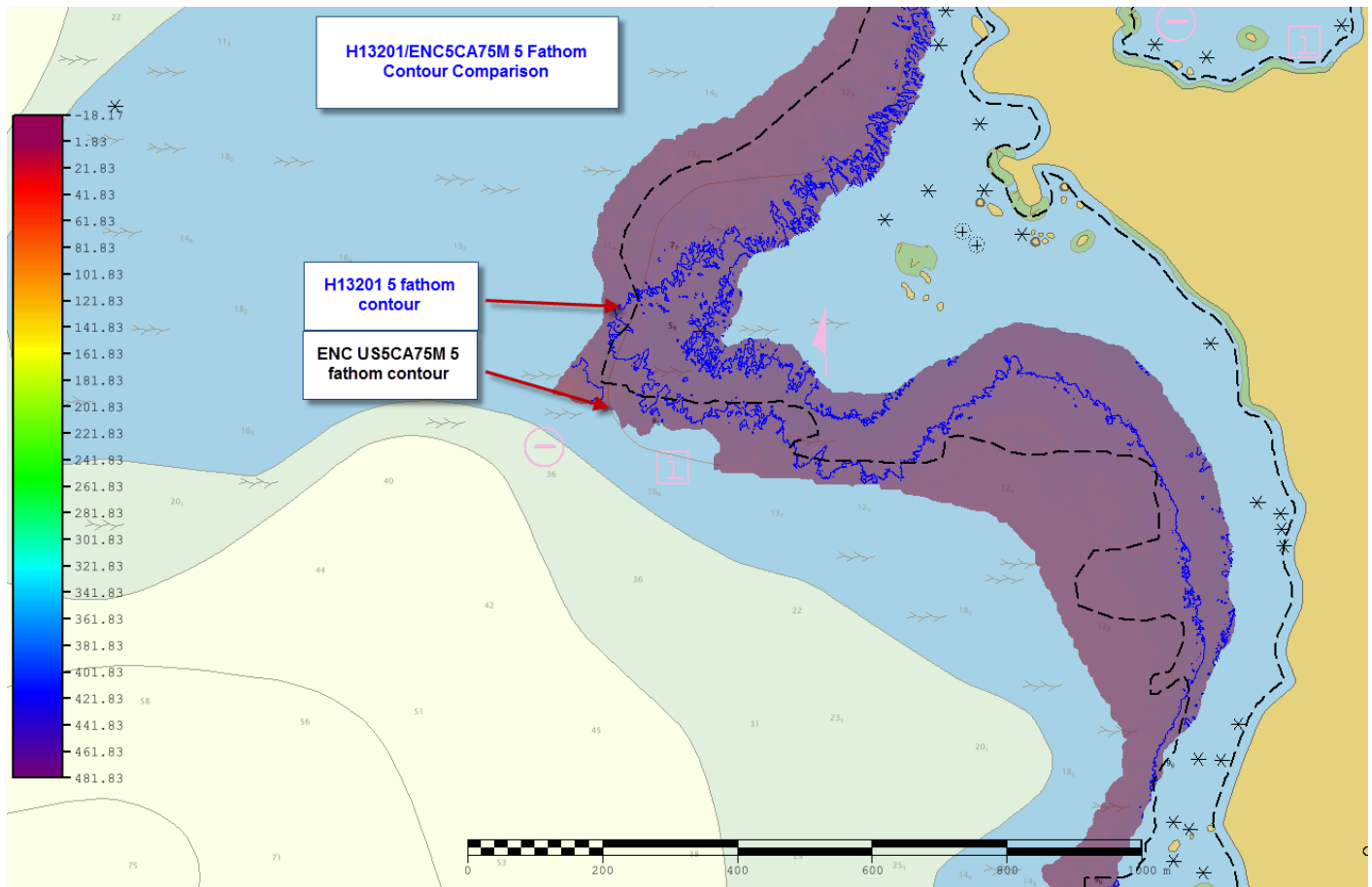


Figure 30: ENC US5CA75M overlaid with H13201 5 fathom contour showing general agreement with currently charted contours on ENC. Note the incomplete 5 fathom contour on the ENC.

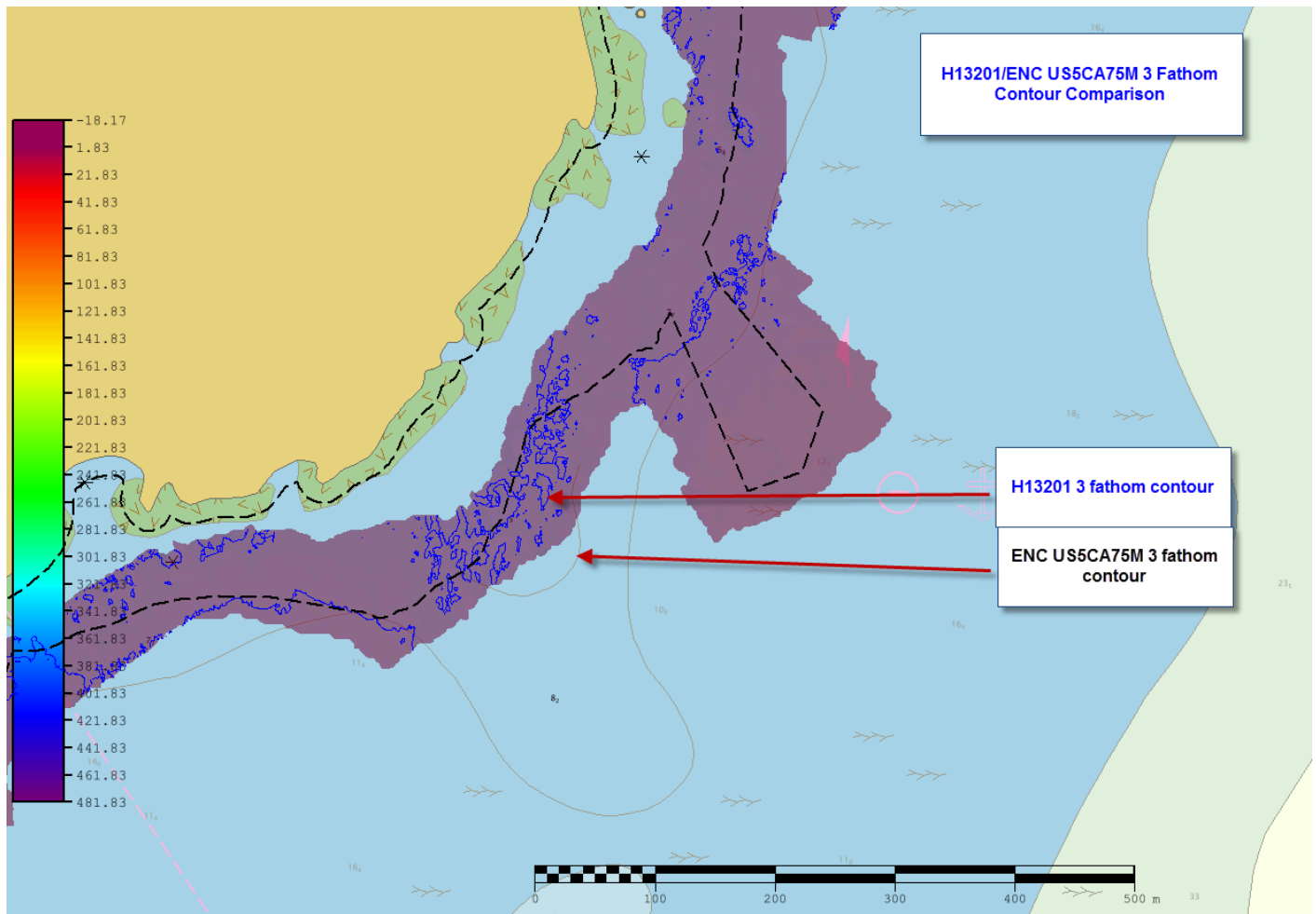


Figure 31: ENC US5CA75M overlaid with H13201 3 fathom contour showing general agreement with currently charted contours on ENC. Note the incomplete 3 fathom contour on the ENC.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

See Final Feature File for more information.

D.1.4 Uncharted Features

No new navigationally significant features were detected that were not included in the H13201 Final Feature File or elsewhere in this report.

D.1.5 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.6 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.1.7 Bottom Samples

No bottom samples were required for this survey.

D.2 Additional Results

D.2.1 Shoreline

Limited shoreline verification was conducted in accordance with applicable sections of NOAA HSSD and FPM using the Composite Source File (CSF) provided with the Project Instructions. In the field, all assigned features that were safe to approach, were addressed as required with S-57 attribution and recorded in the H13201_Final_Feature_File (FFF) to best represent the features at chart scale. This file also includes new features found in the field as well as recommendations to update, retain or delete assigned features.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

All aids to navigation in survey area are on station and serving their intended purpose.

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 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.8 Abnormal Seafloor and/or Environmental Conditions

No abnormal seafloor and/or environmental conditions exist for this survey.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendation

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

D.2.11 Inset Recommendation



No new insets are recommended for this area.

E. Approval Sheet

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

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

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys Specifications and Deliverables, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. 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.

Approver Name	Approver Title	Approval Date	Signature
Benjamin K. Evans, CDR/NOAA	Chief of Party	03/27/2019	 Digitally signed by EVANS.BENJAMIN.K.1237217094 Date: 2019.04.25 16:06:05 -07'00'
Hadley A. Owen, LT/NOAA	Field Operations Officer	03/27/2019	 Digitally signed by OWEN.HADLEY.ANNE.1410967070 DN: c=US, o=U.S. Government, ou=DOD, ou=PKI, ou=NOAA, cn=OWEN.HADLEY.ANNE.1410967070 Date: 2019.03.28 15:23:26 -07'00'
James B. Jacobson	Chief Survey Technician	03/27/2019	 JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2019.03.28 13:48:13 -07'00'
Carl R. Stedman	Sheet Manager	03/27/2019	STEDMAN.CARL.ROBERT.116 6866517 Digitally signed by STEDMAN.CARL.ROBERT.1166866517 Date: 2019.03.28 13:31:52 -07'00'

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference Station
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	Linear Nautical Miles
MBAB	Multibeam Echosounder Acoustic Backscatter
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
SSSAB	Side Scan Sonar Acoustic Backscatter
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPE	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positioning System timing message
ZDF	Zone Definition File



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

PROVISIONAL TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : December 6, 2018

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: OPR-L397-RA-2018

HYDROGRAPHIC SHEET: H13201

LOCALITY: Santa Barbara Island
California

TIME PERIOD: October 7 - October 25, 2018

TIDE STATION USED: Los Angeles, CA 9410660

Lat. 33° 43.2' N Long. 118° 16.4' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.448 meters

TIDE STATION USED: Santa Monica, CA 9410840

Lat. 34° 0.5' N Long. 118° 30.0' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.428 meters

TIDE STATION USED: Santa Barbara, CA 9411340

Lat. 34° 24.2' N Long. 119° 41.6' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.415 meters

TIDE STATION USED: Oil Platform Harvest, CA 9411406

Lat. 34° 28.1' N Long. 120° 40.9' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.373 meters

TIDE STATION USED: Port San Luis, CA 9412110

Lat. 35° 10.1' N Long. 120° 45.2' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.408 meters

TIDE STATION USED: Monterey, CA 9413450

Lat. 36° 36.3' N Long. 121° 53.3' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.412 meters



REMARKS: RECOMMENDED Grid

Please use the TCARI grid "L397RA2018.tc" as the final grid for project OPR-L397-RA-2018, H13201, during the time period between October 7 and October 25, 2018.

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).

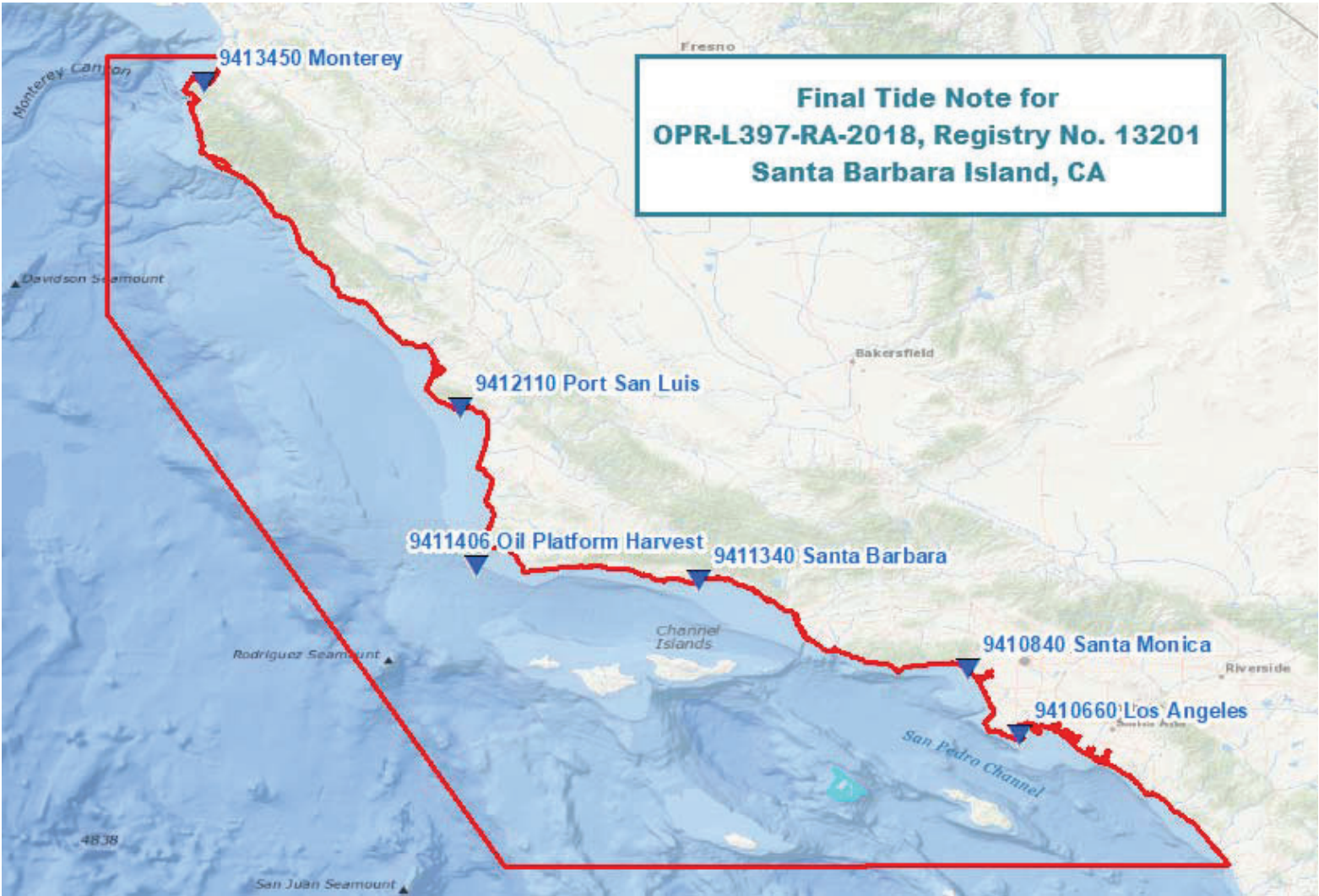
Note 2: Annual leveling for Santa Barbara, CA (9411340), Oil Platform Harvest, CA (9411406), and Monterey, CA (9413450) was not completed in FY18. A review of the verified leveling records from November 2007 - 2017 shows the tide station benchmark networks to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as final stability verification for survey OPR-L397-RA-2018, H13085. CO-OPS will immediately provide a revised Tide Note should subsequent leveling records indicate any benchmark network stability movement beyond the allowable 0.009 m tolerance.

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Date: 2018.12.12 15:46:27 -05'00'

ACTING CHIEF, PRODUCTS AND SERVICES BRANCH

**Final Tide Note for
OPR-L397-RA-2018, Registry No. 13201
Santa Barbara Island, CA**



APPROVAL PAGE

H13201

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- GeoPDF of survey products

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

Approved: _____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch