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

Data Acquisition and Processing Report

Type of Survey Hydrographic

Field No. M-J911-OPS

Registry No. F00588

LOCALITY

State Mississippi / Alabama

General Locality Mobile Bay

Sublocality Grand Bay

2010

CHIEF OF PARTY

Paul Turner, NOAA

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DATE

APPENDICES

INTRODUCTION

This hydrographic project was completed as specified by the Hydrographic Survey Letter Instructions M-J911-OPS-10 Mobile Bay Collaborative Survey, signed April 2, 2010. This Data Acquisition and Processing Report includes project level information common to Sheet 2 F00588 – Grand Bay, AL/MS with the general locality of Mobile Bay, AL.

Survey specific details will be listed in the Descriptive Report as needed. Unless otherwise noted, the acquisition and processing procedures used and deliverables produced are in accordance with the *NOAA Hydrographic Survey Specifications and Deliverables Manual (HSSDM) April 2009,* the *Field Procedures Manual (FPW), April 2009,* and *Hydrographic Surveys Technical Directives (HTD) 2009-2.*

A EQUIPMENT

Descriptions of the equipment systems used during project M-J911-OPS-10, including hardware and software used for data acquisition, data processing, and horizontal and vertical control operations are listed below.

1.0 HARDWARE

1.1 HARDWARE Systems Inventory

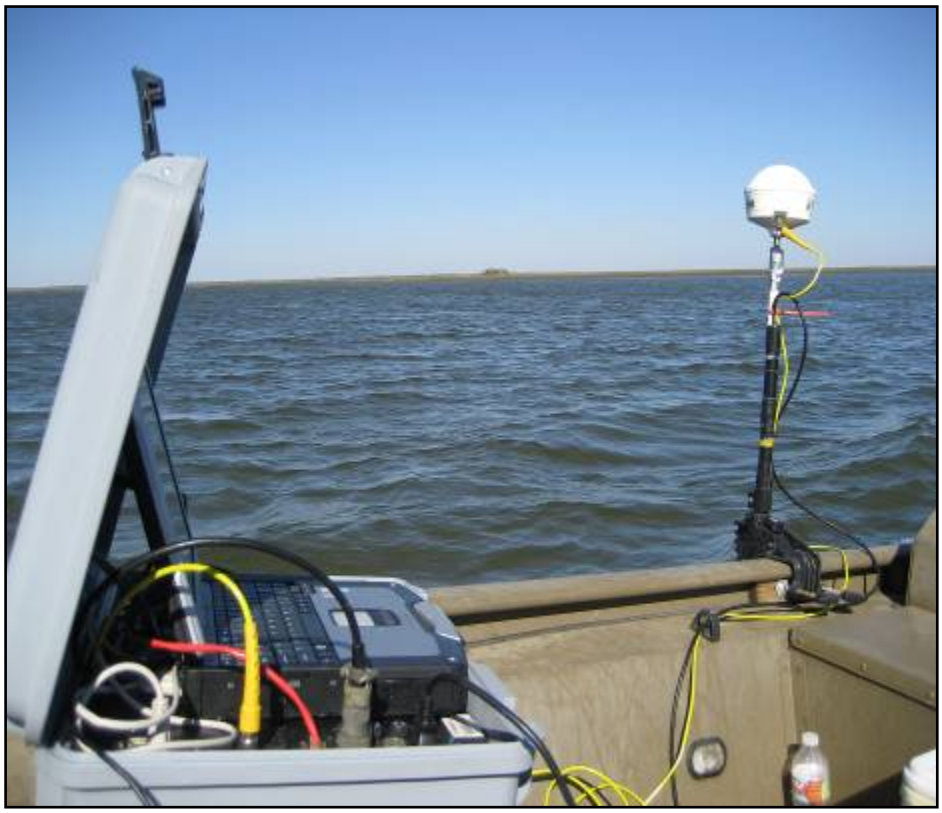
Information on the hardware used during project M-J911-OPS-10 is described in the following section (1.2 – 1.6).

1.2 ODOM ECHOTRAC Single Beam Echosounder (SB) and Mounting Procedures

The R/V Grand Bay was outfitted by Office of Coast Survey personnel with a Teledyne Odom ECHOTRAC CVM Single Beam Sonar System. The ODOM ECHOTRAC CVM is a portable, rugged, and weatherproof – dual frequency single beam sonar system with a built-in Wide Area Augmentation System (WAAS) enabled Starlink Invicta 210 GPS receiver and Raven MBA-2GPS antenna. A single frequency 200kHz Odom SMBB200-9 transducer was utilized in lieu of a dual frequency sonar in order to reduce overall size and weight. A Panasonic Tough Book CF-30 laptop was used as the acquisition computer.

Two separate Teledyne Odom ECHOTRAC CVM Single Beam Sonar Systems were used during this project as a result of a malfunctioning GPS unit in the first system. On Friday April 23rd, the GPS unit failed to properly communicate with the ODOM system and the acquisition software (Hypack). As a result, the Navigation Services Division provided the field team with a spare, identical Teledyne Odom ECHOTRAC CVM Single Beam Sonar System except with a Trimble DSM 232 GPS Receiver. The system was integrated and mounted onto the survey launch and the HVF file was updated to reflex the adjustment in the GPS antenna height.

The National Estuarine Research Reserve (NERR) – Grand Bay provided the Vessel of Opportunity, R/V Grand Bay, a 16ft x 5ft Yamaha G3 aluminum skiff which served as the survey launch for this project. The Odom single beam sonar system was rigidly pole mounted and attached to the starboard side of the vessel utilizing an articulating arm as shown below:



The pole mount was secured to the gunwale of the vessel using hand tightened thumb screws displayed in the image(s) above. The mounting pole was constructed of a heavy grade composite material and ran through the fitted opening of the mount and secured in place with an additional hand tightened thumb screw. Once mounted, the arm and mount remained in the same location for the duration of the project.

1.3 Manual Sounding Equipment – Lead Lines

The Lead Line utilized during survey operations for M-J911-OPS-10 Mobile Bay Collaborative Survey was temporarily borrowed from NOAA's Office of Coast Survey, Navigation Services Division, Navigation Response Team 1 (NRT1).

On Feb 3rd, 2010, the graduation marks of the lead line labeled NRT1_LL were checked. The calibration of the lead line was recorded in the **Lead Line & Sounding Pole Calibration Report** located in Appendix 3 of the 2010_OPS_DAPR_Grand_Bay report.
A sounding system comparison was conducted on **November 11th, 2010** onboard R/V Grand Bay. A lead line draft measurement was compared to the echosounder draft. The results of the comparison were compiled in the **Lead Line and Sounding Systems Comparison** table located in Appendix 3 – Reports and Memo's of the 2010_OPS_DAPR_Grand_Bay report.

1.4 Positioning, Heading, and Attitude Equipment

The Odom Echotrac CVM was initially equipped with an internal Starlink Invicta 210 WAAS enabled GPS receiver and Raven MBA-2 external antenna. The Starlink Invicta 210 GPS receiver malfunctioned and was replaced with a Trimble DSM 232 Modular GPS receiver on April 26th, 2010 (DN116). Positioning was output from the CVM via a RS232 serial NMEA GGA and VTG messages at 1Hz. Heading was derived in *CARIS* based on vessel position and timestamp of the NMEA positioning messages. The vessel was not equipped with an attitude sensor.

1.5 ODOM DIGIBAR SVP Probe

An ODOM Digibar Velocity Probe served as the main sound velocity profiler (s/n 98527-020610) and was used to acquire all sound velocity data during the project. The Digibar was last calibrated in Feb 2010 and the calibration report is located in the **Digibar Calibration Report** located in Appendix 3 of the 2010_OPS_DAPR_Grand_Bay report.

1.6 Water Level Gauges

No water level gauges were installed by NOAA personnel. See the Tide Requirements document (J911OPS2010.doc) included with the project data for further information on stations and tide requirements.

2.0 Software

2.1 Data Acquisition Software

2.1.1 *HYPACK –*

All data were acquired using *HYPACK* version 2009A during survey operations. *HYPACK* accepted a serial NMEA input for positioning and an ethernet input for depth from the ODOM Echotrac CVM. Julian Day was used as the file extension for raw singlebeam data.

2.2 Data Processing Software

2.2.1 NOAA Hydrographic Systems and Technology Programs (HSTP) Software

Sound velocity data was processed with Velocwin, in-house software produced and maintained by NOAA's Hydrographic Systems and Technology Programs (HSTP) Division.

2.2.2 *CARIS*

CARIS HIPS and SIPS 7.0 was used to process all single beam data including data conversion, filtering, tide correcting, merging, and cleaning. CARIS HIPS was also used to calculate the Total Propagated Error (TPE) used to produce Bathymetry Associated with Statistical Error (BASE) surfaces.

2.2.3 *MapInfo*

MapInfo Professional, Version 10.5 was used to review tables and workspaces associated with assigned project files received from the Hydrographic Surveys Division (HSD). *MapInfo* was used to create the survey line plans for pre-survey planning and to produce scaled plots for public relation purposes and project reporting.

3.0 Vessel

The R/V Grand Bay was the only vessel used during survey operations for M-J911-OPS-10 Mobile Bay Collaborative Survey, F00588 Grand Bay. The vessel is a 16ft. aluminum-hulled skiff, borrowed from the Grand Bay National Estuarine Research Reserve for the purpose of this survey.

4.0 Data Acquisition

4.1 Horizontal Control

WAAS GPS was the sole method of positioning used during the project.

4.2 Single Beam Echosounder and Data Acquisition

All single beam data were acquired using the *HYPACK* acquisition software. The data were monitored in real-time using the data display window and the on-screen displays for ODOM ECHOTRAC single beam. The bottom tracking, power setting, and gain were adjusted directly using the *ODOM ECHOTRACK* controller to ensure the best data quality. Additionally, the vessel speed was adjusted as necessary to ensure the required along track coverage in accordance with the HSSDM and FPM. The vessel speed generally ranged from four to five knots and the survey areadepths ranged from .3 - 11 meters.

4.3 Shoreline Verification

Shoreline verification was not required for this project.

5.0 Bottom Sample Acquisition

Bottom samples were not required for this project.

B QUALITY CONTROL

1.0 Uncertainty Modeling

The following TPE values for tide and sound velocity were used during this project:

TPE Type	Value Used	Comments
Tide Value Measured	0.10	RSS of error estimates associated with each six minute tidal value.
Tide Value Zoning	0.20	1 sigma value derived from J911OPS2010 tide document.
Sound Speed Value Measured	4 m/s	Estimated error for ODOM DIGIBAR PRO
Sound Speed Value Surface	0.00	Sound speed velocity corrections were used at the transducer face.

Uncertainty values relating to vessel and survey systems were entered into the HIPS Vessel File (HVF). Uncertainty values for tide and sound velocity were entered during the *CARIS* Compute TPE process.

2.0 Data Processing and Review

Raw *HYPACK* single beam files were converted to *CARIS* HDCS format. Sound velocity and water-level data were then applied to all lines, the lines merged. Once lines were merged, Total Propagated Error (TPE) was computed.

Vessel heading, attitude, and navigation data were reviewed in HIPS Navigation and Attitude Editor. Where necessary, fliers or gaps in heading, attitude, or navigation data were manually rejected or interpolated for small periods of time.

There is currently an unresolved *CARIS* error in regards to processing the Navigation data which inhibits *CARIS* from displaying the Navigation data for each line as being examined, from within the query window. Please refer to the CARIS help desk ticket: 00902820.

Single beam data were reviewed and edited in HIPS Single Beam Editor and all fliers were rejected.

A single Uncertainty Generated 4m Base Surface at IHO S-44 Order 1a was created using the parameters specified in the file associated with the grid resolution.

C. CORRECTIONS TO ECHO SOUNDINGS

1.0 Vessel HVF

A *CARIS* HIPS Vessel File (HVF) was created for singlebeam data. The singlebeam HVF was used to define the R/V Grand Bay equipment uncertainty and vessel offsets, the values entered in this file were applied during post-processing.

The HVF is included in APPENDIX 2 in the 2010_OPS_DAPR_Grand_Bay report.

2.0 Vessel Offsets

The phase center of the transducer for the R/V Grand Bay was used as the reference point (RP) for MJ911-OPS-10, F00588. All sensor offset measurements were made with a steel measuring tape, refer to the *CARIS* HIPS Vessel File (HVF) for the vessel offsets.

2.1 Dynamic Draft

Dynamic draft observations were conducted for the R/V Grand Bay on April 20th, 2010 in the Bayou Heron along the Mississippi/Alabama boarder using the optical analysis method. Settle and squat values were entered into the dynamic draft table of the *CARIS* HVF.

Date of Measure:	**4/20/2010**			
Speed (m/s)	**Measurement 1 (ft)**	**Measurement 2 (ft)**	**Measurement 3 (ft)**	**Average (ft)**
0	6.88	6.84	6.81	6.843333333
1	6.85	6.83	6.79	6.823333333
2	6.84	6.84	6.78	6.82
3	6.79	6.69	6.66	6.713333333

Dynamic Draft	
Draft (m)	Speed (m/s)
2.085848	0
2.079752	1
2.078736	2
2.046224	3

3.0 Patch Test

A patch test was not conducted for M-J911-OPS-10.

4.0 Attitude

Not Applicable for M-J911-OPS-10.

5.0 Sound Velocity

An ODOM Digibar Velocity Probe served as the main sound velocity profiler (s/n 98527-020610) and was used to acquire all sound velocity data during this project. Sound velocity profiles from the DIGIBAR Probe were downloaded using Velocwin software which was used to create a .svp file. The sound velocity profiles were applied to the singlebeam data during *CARIS* post processing.

Six sound velocity casts was conducted during this project.

6.0 Water Level

The vertical datum for this project is Mean Lower-Low Water (MLLW). Predicted water level correctors from the primary tide station at Pascagoula, MS (874-1533) were downloaded from the CO-OPS website and used for water level corrections during the course of the project.

The files for the relevant days were concatenated into a tide file using *CARIS* FetchTides v2.5 download utility. Water level data in the .tid file were applied to the data using the zone definition file (J911OPS2010CORP.zdf). The tides file was applied to the single beam data during *CARIS* post processing.

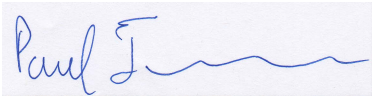
The Descriptive Report will indicate the source of final approved water levels and the date they were applied to the data.

See the Tide Requirements document (MJ911OPS2010.doc) included with the project data for further information on stations and tide requirements.

D Approval Sheet

As project leader, I have ensured that standard field surveying processing procedures used during this project is in accordance with the Field Procedures Manual (April 2009) and the NOS Hydrographic Surveys Specifications and Deliverables Manual (2009) and all relevant Technical Directives issued through April 2010. All departures from these standard practices are described in this Data Acquisition and Processing Report and/or the relevant Descriptive Report.

I acknowledge that all of the information contained in this report is complete to the best of my knowledge.



Approved and Forwarded: _____

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