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

# Data Acquisition & Processing Report

*Type of Survey* Basic Hydrographic

*Project No* OPR-K354-NRT1-06

*Time Fr* September 26th to October 4th, 2006

## LOCALITY

*State* Louisiana

*General Locality* Morgan City

**2006**

## CHIEF OF PARTY

Mark J. McMann – Team Leader

**Library & Archives**

**DATE**

# Data Acquisition & Processing Report
# Title Sheet

*Project No.* OPR-K354-NRT1-06

*Date of Project Instructions:* August 24, 2006

*Vessel* NOAA Launch 1211

*Field Unit* Navigation Response Team 1

*Chief of Branch* LT Jake Yoos

*Chief of Party* Mark J. McMann – Team Leader

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# Data Acquisition and Processing Report
## For OPR-K354-NRT1-06

### NOAA Launch 1211, Navigation Response Team 1

## A. Equipment

The following sections describe major operational systems used to acquire survey data or control survey operations:

### A.1 Platform

NOAA launch 1211, a 30-foot SeaArk with an 8.5-foot beam and draft of 0.5 meters, was used to collect all survey data. Launch 1211 is equipped with a J-arm to deploy the side scan sonar. An electric winch controls the tow-fish height during side scan acquisition. The operator maintains the proper depth for the best coverage at the sonar scale. The vessel DGPS was calibrated weekly to a known GPS reference point. There were no unusual vessel configurations or problems encountered with the vessel.

Launch 1211 is equipped with a Dynapar Cable counter that measures the side scan towfish tow cable by counting revolutions of the towing block on the J-Arm. The length of cable deployed is computed automatically and output to Hypack.

Coastal Oceanographics Hypack Max is used for survey navigation, Detached Positioning (DP), and VBES data logging bathymetry. Sonar Pro was used for on line acquisition of side scan sonar. Caris was used for data processing, and MapInfo Professional, were used to support processing and plotting.

The PCs running Hypack and Sonar Pro are automatically synchronized to UTC time from the NMEA-0183 (zda) GPS messages. The time update occurs during the start and stop logging messages on the Hypack computer. The time on the Hypack computer was mistakenly set to local time. This error was noted in the Descriptive Reports for both field sheets.

### A.2 Sounding Instruments

Vertical Beam Echo Sounder

An ODOM EchotracCV Fathometer, Ser # 23021 was used to collect all echo soundings on this survey. A standard lead line calibrated in meters, was used during this survey for depth comparison checks with the echo sounder. No problems were encountered with any of the sounding equipment.

Side Scan Sonar

A Klein 3000 side scan sonar system was used throughout this survey. The Model # 3110 TPU (Topside Processing Unit) Ser# 353 and Model # 3210 Towfish Ser# 452 are part of this system. The side scan sonar equipment was used to conduct dual beam surveying and investigate AWOIS items. The system frequency used was 100 & 500 kHz. The recorder was set on one of either 50/75-meter range scales. The confidence checks were performed daily at 100kHz.

Side scan sonar lines are planned to run parallel to bottom contours, spaced in accordance with the Side Scan Sonar Manual. Lines are planned with at least 10m of overlap with adjacent swaths on either side. Range scales during acquisition are determined primarily by water depth. Vessel speed is adjusted to ensure that an object one meter in characteristic size would be detected and clearly imaged across the sonar swath. Confidence checks are performed and noted frequently to ensure this standard of resolution is met.

## A.3 Positioning and Attitude Instruments

A Trimble DGPS Beacon Receiver (S/N 0220249380) was used as the primary navigation station on launch 1211. Launch 1211 is not yet equipped with a Heave Sensor or Pos MV.

A Trimble Pathfinder ProXRS (S/N 0224010201) and antenna (S/N 0220284585) were used for all ENC high accuracy positioning and establishment of calibration points. The Trimble Pathfinder DGPS Backpack was used for collecting and processing the ENC high accuracy position data.

## A.4 Ancillary Instruments

The Instruments used for determining corrections for the speed of sound through the water column were an ODOM Digibar Ser # 98294-022806 and a Seabird-Seacat Velocity Profiler, model 19-03, Ser# 192276-287. CTD casts are downloaded and processed in the Velociwin program supplied by the Hydrographic Systems and Technology Program (HSTP). This software is also used to process diver's least depth gauge readings.

Lead Line

Leadline comparisons are conducted daily, these calibrations show that under the prevailing conditions at that time and location, Launch 1211's fathometer meets the International Hydrographic Organization "Special Order" specification for vertical soundings.

Diver Least Depth Gauge
N/A

Bottom Samples

Where required by project instructions, NRT1 personnel acquire sediment samples from the sea floor in the survey area. The primary tool for this operation is a "clamshell" style gravity-closed sediment sampler, which penetrates approximately 0.05m into the bottom.

### A.5 Data Acquisition and Processing Software

8/30/2006
NRT-1 / S-1211
**Active Software Versions**

| Name | Version | SP/HF | Remarks |
|---|---|---|---|
| Caris Hips/Sips | 6.1 | HF-13 | Processing |
| Pydro | 7.1.0{r2014_TCfix) | | Processing |
| Velocity | 8.84 | | Processing |
| MapInfo Professional | 8.5.1b | | Processing |
| Hydro_MI | 6.10.2 | | Processing |
| Vertical Mapper | 3.1.1.002 | | Processing |
| SBE Data Processing | SBEDataProcessing_Win32_V5_37e | | Processing |
| Sea-Term | Seaterm1.56 | | Processing |
| Pathfinder Office | 3.00 | | Processing |
| Digibar Pro | 2.3 | | Processing |
| Hypack | 4.2A | | Acquiring / Processing |
| Adobe | 8.0 | | Documentation |
| SonarPro | 9.6 | | Acquiring / Processing |
| Odom C/V | 3.20 | | Communication |
| TSIP Talker | 2.00 | | Communication |
| Trimble DM12/212L | 1.71 | | Acquiring (Firmware) |
| Trimble XRS Pro | 1.70 | | Acquiring (Firmware) |
| TerraSync | 2.40 HPC2000 (ARM) | | Acquiring |

Calibrations:

| | | |
|---|---|---|
| Digibar Pro | s/n: 98294 | 28Feb 2006 |
| Sea-Bird SBE 19 | s/n: 192276-287 | 03 Feb 2006 |

## B. Quality Control

### B.1 Bathymetry Data

Vertical Beam Sonar Data

Survey data for single beam and side scan sonar Hydrography is transferred to a removable hard drive on the launch and entered into the post processing system in the Office trailer. Vertical Beam sonar data is converted from Hypack format to CARIS format using the CARIS "Hypack" data converter. After conversion, the data is opened in CARIS Navigation Editor, Attitude Editor, and Single Beam Editor. Vessel navigation data is manually checked for speed jumps greater than 2 knots, which are rejected with interpolation. Attitude data (if present) are checked for errors or gaps. Sounding data are checked for irregular pings.

Final Processing of Sounding Data

Survey personnel scan raw VBES soundings in CARIS Single Beam Editor. Once VBES soundings are scanned, the raw data is corrected for sound velocity and tides then the data is merged. Sound velocity corrections, tide corrections, and merging of raw VBES data is done with CARIS HIPS software package.

### B.2 Side Scan Sonar Imagery

All side scan sonar imagery is converted from XTF formats to CARIS format using CARIS converters. After conversion, the data is opened in CARIS Navigation Editor, Attitude Editor, and Side Scan Editor. Survey personnel check vessel attitude (if present), cable out, Gyro, and sonar height. Vessel navigation data is manually checked for speed jumps greater than 2 kts. Data showing these speed jumps are rejected with interpolation. After confirming the validity of the vessel navigation, cable out, and towfish depth values, survey personnel then use the "recompute towfish navigation" function to calculate towfish position. The CARIS towfish positioning is based on a smoothed course made good value from the towing vessel.

Side scan sonar data is scanned in CARIS Side Scan Editor. Survey personnel correct errors in bottom tracking, slant range correct the imagery at default resolution and scan the data for significant contacts. Contacts deemed "significant" include, but are not limited to, contacts with a shadow indicating a contact height of 1.0 m or greater in water depths of 20m or less or contact heights 10% of the water depth in water deeper than 20m. Other contacts considered significant by NRT1 personnel include smaller contacts in particularly shoal areas or channels, cables and pipelines, and contacts of possible historical significance.

Point feature contacts are picked using CARIS "single point contacts". Larger contacts and line features are picked using CARIS "multipoint contacts". All contacts are descriptively labeled and feature codes selected if conclusive identification is possible. TIF format images of all contacts are saved. After the initial SSS imagery scan, a check scan of all data is conducted.

HSTP's Pydro software package is the primary tool for sounding and feature integration and assessment. Side scan contacts and detached positions are inserted into the Pydro Preliminary Smooth Sheet (PSS).

Coverage of 200% was obtained in the required survey areas and where AWOIS items and water depth or hazards permitted. Side scan sonar coverage was conducted to the 12-foot depth curve and single beam reduced line spacing was performed in other areas where warranted. The towfish was deployed off the starboard quarter of the vessel, which proved very stable. Distorted images caused by strong tidal currents were seen periodically.

Pydro provides five flags for categorizing features: "Significant", "Chart", "Report", "Investigate", and "DTON". In addition, pydro provides "Primary" and "Secondary" flags for grouping correlated features. After insertion, SSS features are first categorized by significance. Contacts that meet the standard of significance described in section B.2. are marked as such; those contacts which are deemed insignificant are marked "Resolved" and not investigated further. Also, multiple contacts representing the same physical feature are grouped. The contact that the hydrographer believes best represents the feature (typically, the most clear SSS image) is selected as the "Primary" contact.

Significant contacts are then reassessed to determine if additional investigation (typically VBES development) is required. After contacts are sufficiently investigated, they are further assessed to determine whether they require charting. Features that the hydrographer believes should be added or retained on the chart are marked as such. Features that will be reported in the survey Descriptive Report are flagged "Report." Features that pose a special threat to vessel traffic have their shoal soundings marked as "DTONS", and a Danger to Navigation Report is generated.

The High accuracy DGPS positions for ENC (Electronic Navigational Chart) are transferred to Trimble Pathfinder Office software on the post processing system in the Office trailer. The data points are then plotted via MapInfo and processed into shape files

for MCD. The data upon completion is posted on the FTP site for the Navigation Response Branch.

The NOS program Velocity, and MS Word was also used during survey post processing.

## C. Corrections to Echo Soundings

### C.1 Vessel Offsets and Static Draft

It is OCS and NRT1 policy that all data be acquired and logged in raw format without application of any corrections for vessel offsets, sensor alignment, sound velocity profile, or tides. These factors are logged separately or contained in the CARIS "Vessel Configuration File" (VCF), and applied in post-acquisition data processing.

The lead line for launch 1211 was calibrated using a steel tape on Aug.15, 2006 (DN: 229). No corrections were necessary.

A static draft of 0.5 meters was entered into the Caris vessel configuration file for Launch 1211. The draft was measured by subtracting the difference from a punch mark on the side of launch 1211, 0.6 meter above the transducer, to the water surface.

### C.2 Dynamic Draft

Settlement and squat measurements for launch 1211 were taken on Sept.14, 2006 (DN: 257). These measurements were conducted in Gulf Shores, AL using the level method. Settlement and squat correctors were entered into the Caris vessel configuration file for Launch 1211. There are no heave pitch and roll sensors on Launch 1211.

### C.3 Attitude and Heave

Not Applicable

### C.4 Sound Velocity Profile

Conductivity, temperature, and depth profiles are acquired using two velocity (CTD) profilers. The primary instrument used for determining corrections for the speed of sound through the water column was a Digibar-Pro, S/N 98294-022806. (last calibrated February 28, 2006). Data quality assurance tests were performed after each cast. All sonar data is processed in the CARIS HIPS and SIPS system. Processed soundings, side scan sonar contacts, dives, and DPs are inserted and analyzed in HSTP's "Pydro" software. This system is used for all feature assessment and bathymetry excessing.
"HYDRO_MI" tool is used to export all data to Mapinfo Professional GIS.

The check instrument used for determining corrections for the speed of sound through the water column was a Seabird-Seacat Velocity Profiler, model 19, S/N 287.

(last calibrated February 3, 2006) . Data quality assurance tests were performed after each cast. The calibration records are included with the HSSR for 2007.

## C.5 Water Levels

Field soundings are corrected by applying preliminary tides from NOAA/CO-OPS. The Real Time Actual 6 min Tides are downloaded from: "http://tidesandcurrents.noaa.gov/olddata", for all gauges required in the given projects defined by the ZDF file provided in the project letter, and instruction. Tide values are downloaded in blocks of data that covers the Times of Hydrography, and saved in a text file format. The MapInfo program is then used with the "HYDRO_MI" pre-Survey function, of "Create Cowlis", this function converts the text file into a Caris tide file (.tid).

Values and correctors were applied at the perspective locations of Hydrography from the Port Instructions.

## D. APPROVAL SHEET

### Data Acquisition and Processing Report
### For OPR-K354-NRT1-06

For Accompanying Surveys

The Data Acquisition and Processing Report information and all accompanying records and data are approved.

**Submitted by:** 
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2007.06.27
18:24:13 Z

**Mark J. McMann – Team Leader**
**Navigation Response Team 1**