

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT AL0903A-CM-N

Northern Mobile Bay, Tensaw River to Montrose, Alabama

Introduction

Coastal Mapping Program (CMP) Project AL0903A-CM-N provides highly accurate digital shoreline data for northern Mobile Bay from the Tensaw River southward to Montrose, Alabama, including Chacaloochee Bay and the Apalachee River. Project AL0903A-CM-N is a subproject of a larger acquisition project, AL0903-CM-N, designed to provide coverage of the entire northern portion of Mobile Bay. The Geographic Cell (GC) maybe used in support of the NOAA Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications.

Project Design

Photographic mission instructions for AL0903-CM-N were formulated by the Requirements Branch (RB) of the Remote Sensing Division (RSD) following the guidelines of RSD's Photo Mission Standard Operating Procedures. The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; Global Positioning System (GPS) and Inertial Measurement Unit (IMU) data collection procedures and guidelines for both kinematic and static surveys; data recording and handling instructions; and contact and communication information. RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system.

Field Operations

The field operations consisted of the collection of static and kinematic GPS/IMU data and the acquisition of digital aerial imagery. Aerial survey operations were conducted on October 16, 2012 and January 4, 2014 with the NOAA King Air aircraft (N68RF), consisting of the acquisition of sixteen strips of natural color and near-infrared (NIR) imagery acquired concurrently using an Applanix DSS-439 dual camera system. All imagery was acquired at a nominal altitude of 10,000 feet for an approximate ground sample distance (GSD) of 0.35 meters. For subproject AL0903A-CM-N, color and NIR imagery from nine flight lines (279 total images) were used. All imagery acquisition was coordinated to coincide with the local Mean Lower Low Water (MLLW) tide level.

Direct Georeferencing Data Processing

GPS/IMU data were processed by RSD personnel to yield precise camera positions and orientations for direct georeferencing (DG) of the imagery. A local GPS base station was established for use as a reference station for kinematic GPS processing operations. The position of the base station was determined using the NGS Online Processing User

Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The October 2012 airborne kinematic data was processed using Applanix POSPAC (ver. 5.4) software in November 2012 and the January 2014 data was processed using Applanix POSPAC (ver. 6.2) software in January 2014. For further information refer to the Airborne Positioning and Orientation Report (APOR) that is on file with other project data within the RSD Electronic Data Library.

The processed GPS/IMU data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. The predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using an Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainties at the 95% confidence level for both collection dates were calculated to be 1.4 meters

Two NGS third order geodetic control points (“BG4144” and “BH1980”) were used to verify the horizontal integrity of the DG data. All stereo-models were examined and found to have acceptable levels of parallax for mapping purposes.

Compilation

The data compilation phase of this project was initiated by personnel of RSD’s Applications Branch (AB) in December 2016. Digital feature data was compiled using a Windows-based stereo enabled workstation with the SOCET SET (ver. 5.6) Feature Extraction software module. Feature attribution within the GC was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST), which provides the definition and attribution scheme for the full range of cartographic features pertinent to the CMP. Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project AL0903B-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.8 meters at the 95% confidence level. This value was derived by doubling the imagery accuracy computed from the EO-TPU tool in order to conservatively predict the accuracy of compiled well defined points.

The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Color Imagery		Infrared Imagery		Tide Level*
		Roll	Images	Roll	Images	
10-16-2012	14:44 – 14:46	12NC82	29227 – 29240	12NR65	16008 – 16021	0.1 m
10-16-2012	15:01 – 15:05	12NC82	29275 – 29300	12NR65	16056 – 16081	0.1 m
10-16-2012	15:19 – 15:20	12NC82	29324 – 29332	12NR65	16105 – 16113	0.1 m
10-16-2012	15:26 – 15:29	12NC82	29333 – 29350	12NR65	16114 – 16131	0.1 m
10-16-2012	15:35 – 15:37	12NC82	29371 – 29383	12NR65	16152 – 16164	0.1 m

10-16-2012	15:42 – 15:44	12NC82	29384 – 29402	12NR65	16165 – 16183	0.1 m
10-16-2012	15:51 – 15:52	12NC82	29421 – 29433	12NR65	16202 – 16214	0.1 m
1-04-2014	17:31 – 17:34	14NC01	00013 – 00031	14NR01	00013 – 00031	-0.1 m
1-04-2014	17:39 – 17:40	14NC01	00039 – 00046	14NR01	00039 – 00046	-0.1 m

* Tide levels are given in meters above MLLW and were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations at NOS gauges. The height of the MHW tidal datum in the project area varies between 0.45 – 0.49 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in May 2017. The review process included analysis of the DG data and assessment of the identification and attribution of digital feature data within the GC according to image analysis and criteria defined in C-COAST. The quality control process concluded with an inspection of topological connectivity within the GC using ArcGIS 9.4.1. The entire suite of project products was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with source imagery and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical chart was used in the comparison process:

- 11376, Mobile Bay, 1:80,000, 58th Ed., Nov. 2015

End Products and Deliverables

The following specifies the location and identification of the products generated during the completion of this project:

Remote Sensing Division Electronic Data Library

- Airborne Positioning and Orientation Report (APOR)
- Project Completion Report (PCR)
- Project database
- GC11297 in shapefile format
- CEF in shapefile format

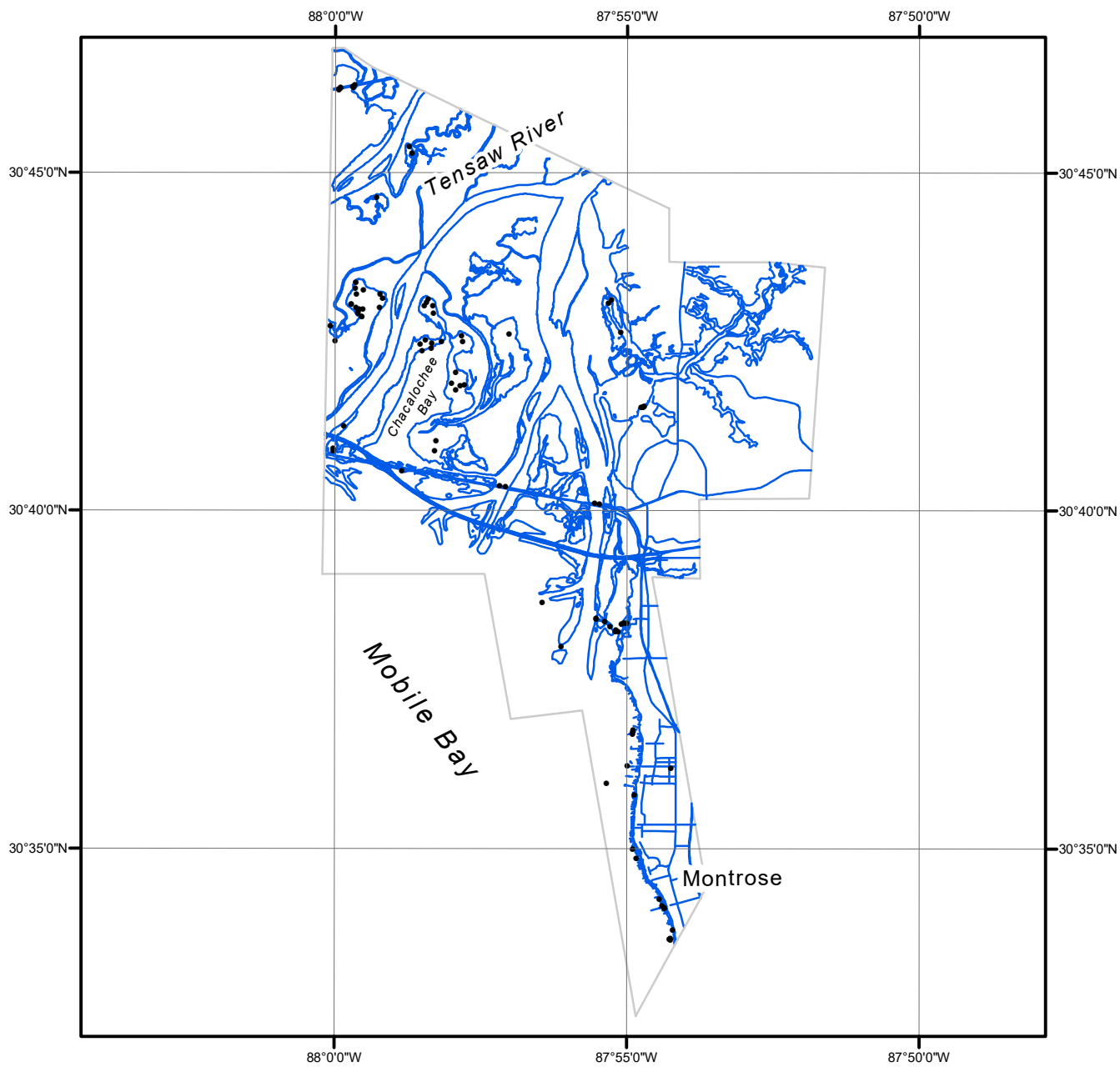
NOAA Shoreline Data Explorer

- GC11297 in shapefile format
- Metadata file for GC11297
- PCR in Adobe PDF format

End of Report

NORTHERN MOBILE BAY, TENSAW RIVER TO MONTROSE

ALABAMA



Overview



AL0903A-CM-N

GC11297