NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT MS0602

Port of Pascagoula, Mississippi

Introduction

NOAA Coastal Mapping Program (CMP) Project MS0602 provides a highly accurate database of new digital shoreline data for a portion of Mississippi Sound, including the port of Pascagoula and the Pascagoula River, from Singing River Island in the south, to Moss Point and the Escatawpa River in the north.

Successful completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric-quality aerial photographs, and digital feature data of the coastal zone which complements the Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications.

The project database consists of information measured and extracted from aerial photographs and metadata related to photogrammetric compilation. Base mapping was conducted in a digital environment using stereo softcopy photogrammetry and associated cartographic practices.

Project Design

The Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the photographic mission instructions for this project following the guidelines of the Photo Mission Standard Operating Procedure Version II. The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; Global Positioning System (GPS) 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 data and the acquisition of aerial photographs. The photographic mission operations were conducted on January 29, 2007, with the NOAA Cessna Citation II (N52RF) aircraft. Two strips of natural color photographs and two strips of black and white infrared photographs were collected in coordination with the MLLW tide level. Both sets of images were acquired through use of a Wild RC-30 camera with the NOS "A" lens cone at the nominal scale of 1:30,000.

A base station was established at the Pensacola Regional Airport (KPNS) using static GPS. Airborne kinematic GPS data was collected in conjunction with Inertial Measurement Unit (IMU) data to determine precise camera positions and orientations. GPS data collection operations were conducted in accordance with the GPS Controlled Photogrammetry Field Operations Manual.

GPS Data Reduction

The GPS/IMU data was processed to provide precise positions of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. The static GPS base station data was processed in February 2007 using the NGS Online Processing User Service (OPUS) software to compute fixed baseline solutions from three CORS stations. The final NAD83 position reported by OPUS was the average of these three baseline solutions. The airborne kinematic data was processed using Applanix POSPac (ver. 4.3) software in March 2007. An Airborne Positioning and Orientation Report was written and is on file with other project data within the RSD Applications Branch (AB) Project Archive.

Aerotriangulation

Routine softcopy aerotriangulation methods were applied to establish the network of precise camera positions and other control for mapping, and to provide model parameters and orientation elements required for digital compilation. This work was initiated by RSD personnel in July 2008 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The color photographs and black and white infrared photographs were measured and adjusted as one block using BAE Systems' SOCET SET (version 5.3) photogrammetric software. The Multi-Sensor Triangulation (MST) module, within SOCET SET, was used for the aerotriangulation portion of the project. Using the root mean square (RMS) from the standard deviations of all image points, the 95% confidence circle for the project was calculated to be 0.9 meter. An Aerotriangulation Report was written and is on file with other project data within the RSD Project Archive.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Compilation

The data compilation phase of this project was initiated by RSD in July 2008. Digital mapping was performed using a DPW in conjunction with the SOCET SET Feature Extraction software module. Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of the 1:30,000 scale photographs and information extracted from the appropriate NOAA nautical charts, US Coast Guard Light List and other ancillary sources. Feature attribution 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 MS0602 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.7 meters at the 95% confidence level. This predicted accuracy of compiled, well defined points is computed by doubling the circular error derived from aerotriangulation statistics.

The following table provides information on the photographs used in project completion:

Date	Time (UTC)	Roll Number	Photo Numbers	Scale (nominal)	Tide Level*
1/29/07	16:29 – 16:31	07AR01	045 – 050	1:30,000	-0.1 m
1/29/07	16:37 – 16:39	07AR01	051 – 056	1:30,000	-0.1 m
1/29/07	18:16 – 18:18	07ACN01	134 – 139	1:30,000	0.0 m
1/29/07	18:24 – 18:26	07ACN01	140 – 145	1:30,000	0.0 m

*****NOTE: Tide levels are given in meters above MLLW and are based on actual verified observations at the Pascagoula NOAA Lab station (ID: 8741533). The elevation of the MHW tidal datum in Pascagoula is equal to 0.4 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. Final QC review was completed in August 2008, including analysis of aerotriangulation results 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 9.1 software. All project data was evaluated for compliance to CMP requirements.

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

11374, ICW, Dauphin Island to Dog Keys Pass, 1:40,000 scale, 34th ed.
11375, Pascagoula Harbor, 1:20,000, 36th ed.

End Products and Deliverables

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

RSD Applications Branch Archive

- Hardcopy of the Airborne Positioning and Orientation Report (APOR)
- Hardcopy of the Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10721 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC10721 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

NOAA Shoreline Data Explorer

- GC10721 in shapefile format
- Metadata file for GC10721
- Digital copy of the PCR in Adobe PDF format

End of Report

PORT OF PASCAGOULA

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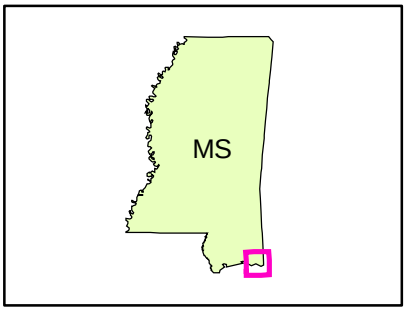
Overview



MS0602

GC10721