

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT MS1101

Gulfport, Mississippi

Introduction

Coastal Mapping Program (CMP) Project MS1101 provides highly accurate digital shoreline data for key areas of change in the port of Gulfport, Mississippi. The Geographic Cell (GC) may be 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

The design of Project MS1101 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for updates to the NOAA Electronic Navigational Chart (ENC) series. Project requirements were formulated as a result of analysis conducted within the Coast and Shoreline Change Analysis Program (CSCAP), in which NOAA nautical chart products are compared to contemporary high resolution digital imagery in order to ascertain the need for more current shoreline data. Aerial photography was initially utilized for change analysis, and WorldView-2 commercial satellite imagery was later obtained from the National Geospatial-Intelligence Agency (NGA) in order to provide a newer image source for evaluation and compilation of changes. A Chart Evaluation File (CEF) was forwarded to the Applications Branch (AB) of RSD once the CSCAP analysis was complete. Refer to the RB CSCAP Memorandum of April 12, 2011 for details of the chart comparison process.

Field Operations

The field operations consisted of the collection of static and kinematic Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted on May 5, 2010 with the NOAA King Air aircraft (N68RF) as an emergency response to the Deepwater Horizon oil spill. Two strips (50-002 through 50-003) of natural color photographs were acquired between 21:29 and 21:49 (UTC) with an Applanix DSS439 medium format digital camera with a ground sample distance (GSD) of 0.35 m. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW).

GPS Data Reduction

GPS and IMU data was collected and processed to yield precise positions and orientations of camera centers for use in the aerotriangulation phase. The airborne kinematic data were collected using an Applanix POS/AV510 GPS/IMU System. This data was processed in May 2010 using POSPAC (ver. 5.3) software.

Aerotriangulation

The aerotriangulation (AT) phase of project completion was performed in April 2013. Routine softcopy AT methods were applied to establish a 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 accomplished by a member of AB utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components, and other associated peripheral devices. The digital images were measured and adjusted as a single block using BAE Systems SOCET GXP (version 4.0) photogrammetric suite in conjunction with the Triangulation software module. Upon completion of the AT process, the simultaneous solve tool within the Triangulation module provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.3 meters based on a 95% confidence level. An AT Report was written and is on file with other project data within the RSD project archive.

The commercial satellite imagery was not included in the block adjustment described above. It was determined that rigorous refinement of the vendor's georeferencing was not necessary since the imagery compared well spatially with sources of control used to check its geolocation, and since the vendor provided an acceptable accuracy assessment for their imagery. The accuracy reported by the vendor is 5.0 meters at the 90% confidence level (CE90). The reported accuracy is exclusive of viewing geometry and terrain distortions.

The project database consists of project parameters and options, camera calibration data, 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 accomplished by RSD in May 2013. Digital mapping was performed using a DPW in conjunction with a SOCET GXP (version 4.0) Feature Database. Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of the digital photographs and satellite imagery, and information extracted from the appropriate NOAA nautical charts, U.S. 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 MS1101 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Feature data compiled from the aerial imagery was compiled to meet a horizontal accuracy of 0.6 meters at the 95% confidence level. This value was derived by doubling the circular error computed from the AT statistics in order to conservatively predict the accuracy of compiled well defined points. Cartographic features extracted from the WorldView-2 image were compiled to

meet a horizontal accuracy of 5.7 meters, based on the vendor reported CE90 accuracy converted to the 95% confidence level (CE95).

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

Date	Time (UTC)	Roll Number	Line Number	Photo Numbers	GSD (nominal)	Tide Level*
5-5-10	21:29 – 21:30	10NC55	50-002	23067 - 23074	0.35 m	0.6 m
5-5-10	21:48 – 21:49	10NC55	50-003	23116 - 23123	0.35 m	0.6 m
3-15-13	16:55	13MAR15165548-P1BS-500056837120			0.5 m	0.4 m

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauge at Bay Waveland Yacht Club, MS at the time of photography. The elevation of the MHW tidal datum at the NOS gauge is equal to 0.5 m above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a member of AB. The final QC review was completed in June 2013. The review process included analysis of the AT 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 9.3.1. The entire suite of project products was evaluated for compliance to CMP requirements.

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

RSD Applications Branch Archive

- Hardcopy of the Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR)
- Page size graphic plot of GC10977 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC10977 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

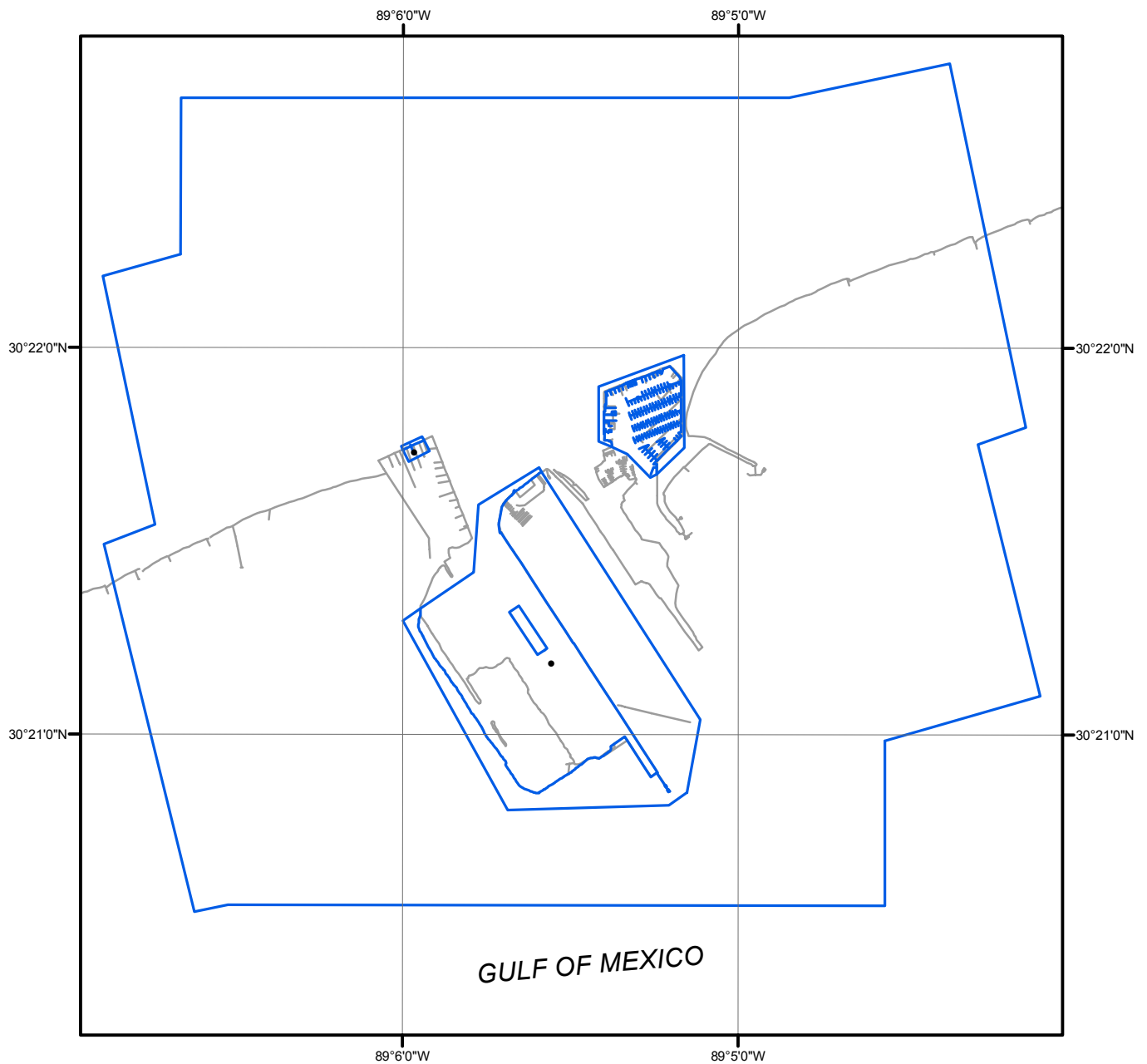
NOAA Shoreline Data Explorer

- GC10977 in shapefile format
- Metadata file for GC10977
- Digital copy of the PCR in Adobe PDF format

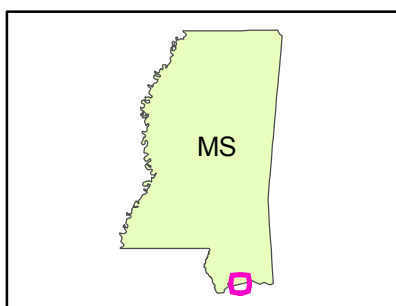
End of Report

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Overview



MS1101

GC10977