

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT TX0501D

Port of Lake Charles, Louisiana

Introduction

NOAA Coastal Mapping Program (CMP) Project TX0501D provides a highly accurate database of new digital shoreline data for the port of Lake Charles, Louisiana, and surrounding area. The project extends from just northeast of the city of Lake Charles, southwestward along the Calcasieu River, stretching over Prien Lake, to terminate near Vincent Landing, just to the northeast of Moss Lake. 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 TX0501D was initiated in response to concerns about the possible impacts of severe storm events on shorelines and port infrastructure within the project area, subsequent to the acquisition date of IKONOS satellite imagery used in a prior Coast and Shoreline Change Analysis Program (CSCAP) project covering the same geographic area. An outcome of the CSCAP project was a recommendation for limited compilation of new or changed features from imagery in order to update the NOAA Electronic Navigational Chart (ENC). However, due to the potential for storm damage to render the IKONOS imagery obsolete, it was determined that assessment of the port would be required using a later imagery source.

Project Design

The photographic mission requirements for this project were formulated as part of NOAA's emergency response program, specifically in response to Hurricane Rita, which made landfall near the Texas-Louisiana border on September 24, 2005. These requirements coincided with requirements for the Coast and Shoreline Change Analysis Program (CSCAP) response to the need for timely updates to the NOAA Electronic Navigational Chart (ENC) series, and therefore digital imagery products acquired for emergency response were assessed and deemed adequate to support nautical chart evaluation and correction for the project area.

Field Operations

The field operations consisted of the collection of static and kinematic Global Positioning System (GPS) data and the acquisition of digital aerial imagery. The photographic mission operations were conducted on October 5, 2005, with the NOAA Cessna Citation II aircraft. Eight strips of natural color digital images were acquired, with an approximate ground sample distance (GSD) of 0.39 meters, through the use of an Applanix Digital Sensor System (DSS) digital camera.

A base station was established at Ellington Field, Houston, 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 Reduction

GPS and IMU data was collected and processed by Remote Sensing Division (RSD) personnel to yield precise positions and orientations of camera centers as a means of rendering accurately georeferenced digital images. The static GPS base station data was processed in September 2005 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 POSGPS (ver. 4.2) software in September 2005. Refer to the *GPS-IMU Processing Report* for Project TX0501 for further information on GPS data processing.

Aerotriangulation

Routine softcopy aerotriangulation 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 initiated by RSD personnel in March 2007 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The color photographs were measured and adjusted as a single block using BAE Systems' SOCET SET (version 5.2) photogrammetric software in conjunction with the Multi-Sensor Triangulation (MST) module of aerotriangulation software. Upon successful completion of the aerotriangulation process, the MST software provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point which were used to compute a predicted horizontal circular error of 0.7 meters based on a 95% confidence level. 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 personnel in March 2007. 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 digital 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 TX0501D were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.5 meters at the 95% confidence level.

The following table provides information on aerial imagery used in the completion of this project:

Date	Time (UTC)	Roll Number	Photo Numbers	GSD (meters)	Tide Level*
10-05-05	1448 - 1514	05IC35	27912152-27913750	0.39	0.6 - 0.7

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauge at Lake Charles Tide Station (ID: 8767816) at the time of photography.

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 April 2007. The review process included analysis of aerotriangulation results and assessment of the identification and attribution of cartographic features 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 digital color photographs and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical chart was used in the comparison process:

11347, Calcasieu River and Lake, LA, 1:20,000 scale, 36th edition

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 GPS-IMU Processing Report
- Hardcopy of the Aerotriangulation Report and Accuracy Assessment
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10597 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC10597 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File in shapefile format

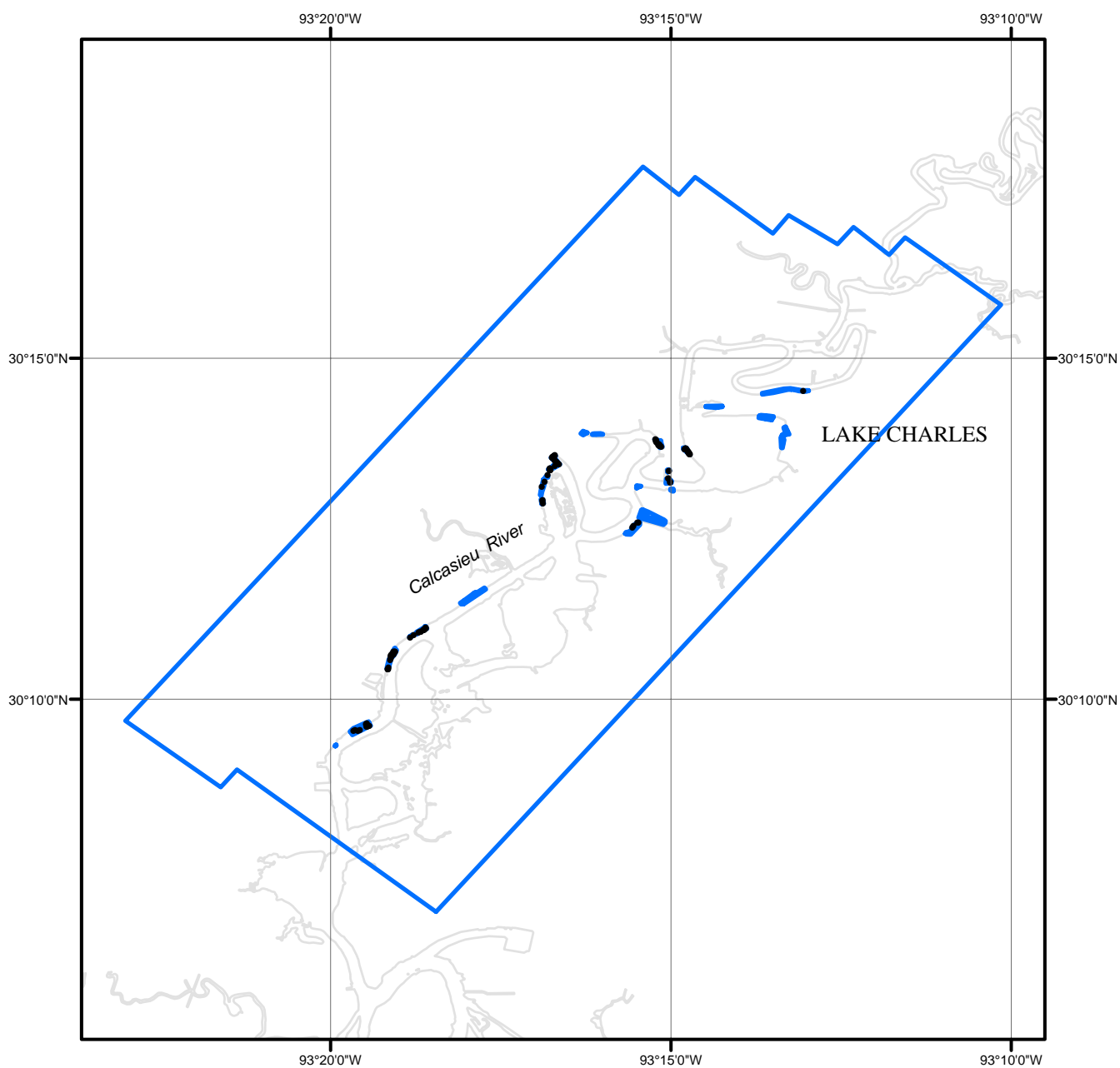
NOAA Shoreline Data Explorer

- GC10597 in shapefile format
- Metadata file for GC10597
- Digital copy of the PCR in Adobe PDF format

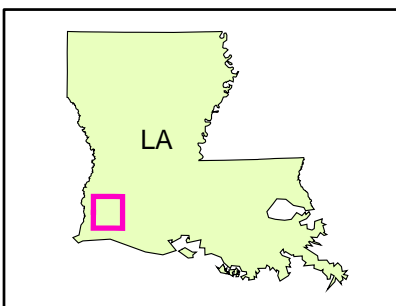
End of Report

PORT OF LAKE CHARLES

LOUISIANA



Overview



TX0501D

GC10597