NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT PR0302

Port of Ponce, Puerto Rico

Introduction

Coastal Mapping Program (CMP) Project PR0302 provides highly accurate digital shoreline data for key areas of change within the port of Ponce, Puerto Rico, including Bahia de Ponce and Bahia de Guayanilla. The analysis and the digital cartographic feature file (DCFF) may be used in support of the NOAA Nautical Charting Program (NCP) as well as geographic information systems (GIS) for coastal zone management applications.

Project Design

The design of Project PR0302 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to NOAA Electronic Navigational Chart 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 satellite imagery in order to ascertain the need for more current shoreline data. Refer to the RB Memorandum dated September 17, 2003, "Results of Ponce, Puerto Rico, CSCAP Anlysis (PR0302)," for details of the chart comparison process.

Field Operations

Field operations consisted of the collection of static Global Positioning System (GPS) data as a means of enhancing the geopositioning of commercial satellite imagery. The GPS data was collected by personnel from the University of Puerto Rico at Mayaguez. A series of well-distributed ground control points were surveyed throughout the project area based on information provided by the Applications Branch (AB) of RSD. Please refer to the report, "GPS Ground Control Horizontal Accuracy," for details regarding equipment, data collection and data processing.

Georeferencing

Two QuickBird non-orthorectified panchromatic images with a spatial resolution of 60 centimeters, acquired from DigitalGlobe Inc., were georeferenced using Erdas IMAGINE 9.0 software on a Windows platform. Within IMAGINE the Raster Geometric Correction tool was used with a 1st order polynomial model. Once control points were measured in IMAGINE, the satellite imagery was resampled using the Nearest Neighbor sampling method. The RMS of the standard deviations of the residuals for measured check points were used to compute a predicted horizontal circular error (CE) of 2.0 meters for image

#1 and 2.6 meters for image #2, based on a 95% confidence level. This CE value was tripled and then added to the CE95 of the processed GPS control point data to yield a conservative predictor of the accuracy of well defined points measured during the compilation process. A georeferencing Report was written and is on file with other project data within the RSD Project Archive. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Compilation

The compilation of cartographic feature data for this project was accomplished by a member of AB in August 2006. Digital feature data was compiled in ESRI shapefile format from imagery using ESRI's ArcGIS 9.1 desktop GIS software. Feature attributes were established according to 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 cartographic features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project PR0302 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were tested to have a horizontal accuracy of 6.1 meters for image # 1 and 7.9 meters for image #2, at the 95% confidence level. This predicted accuracy of well-defined points is based on a minimum of twenty (20) check points that were compared to an independent source of higher accuracy.

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

Image #	Image Source	Source ID	Source File Name	Acquisition Date/Time	Tide Level*
1	QuickBird	000000055142_01_P001	03MAY16145553P2AS_000000055142_01_P001.tif	2003-05-16 14:55 GMT	-0.1 m
2	QuickBird	000000074464_01_P001	03AUG27144824P2AS_000000074464_01_P001.tif	2003-08-27 14:48 GMT	0.0 m

* Tide levels are expressed in meters relative to MLLW and are based on the NOS tide station at Playa de Ponce, with corrections applied from the Magueyes, Puerto Rico reference station. The approximate mean range of tide in the project area is 0.2 meters.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. QC activities for this project were finalized by September 2006. The review process also included analysis of the georeferencing results and evaluation of the identification and attribution of cartographic features according to image analysis and criteria defined in C-COAST. The quality control process concluded with an inspection of topological connectivity within the DCFF using ArcGIS 9.1. The entire suite of project products was evaluated for compliance to CMP requirements.

End Products and Deliverables

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

RSD Applications Branch Archive

- Hardcopy of the Georeferencing Report
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10612 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- Digital copy of DCFF GC10612 in ESRI shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File (CEF) in shapefile format

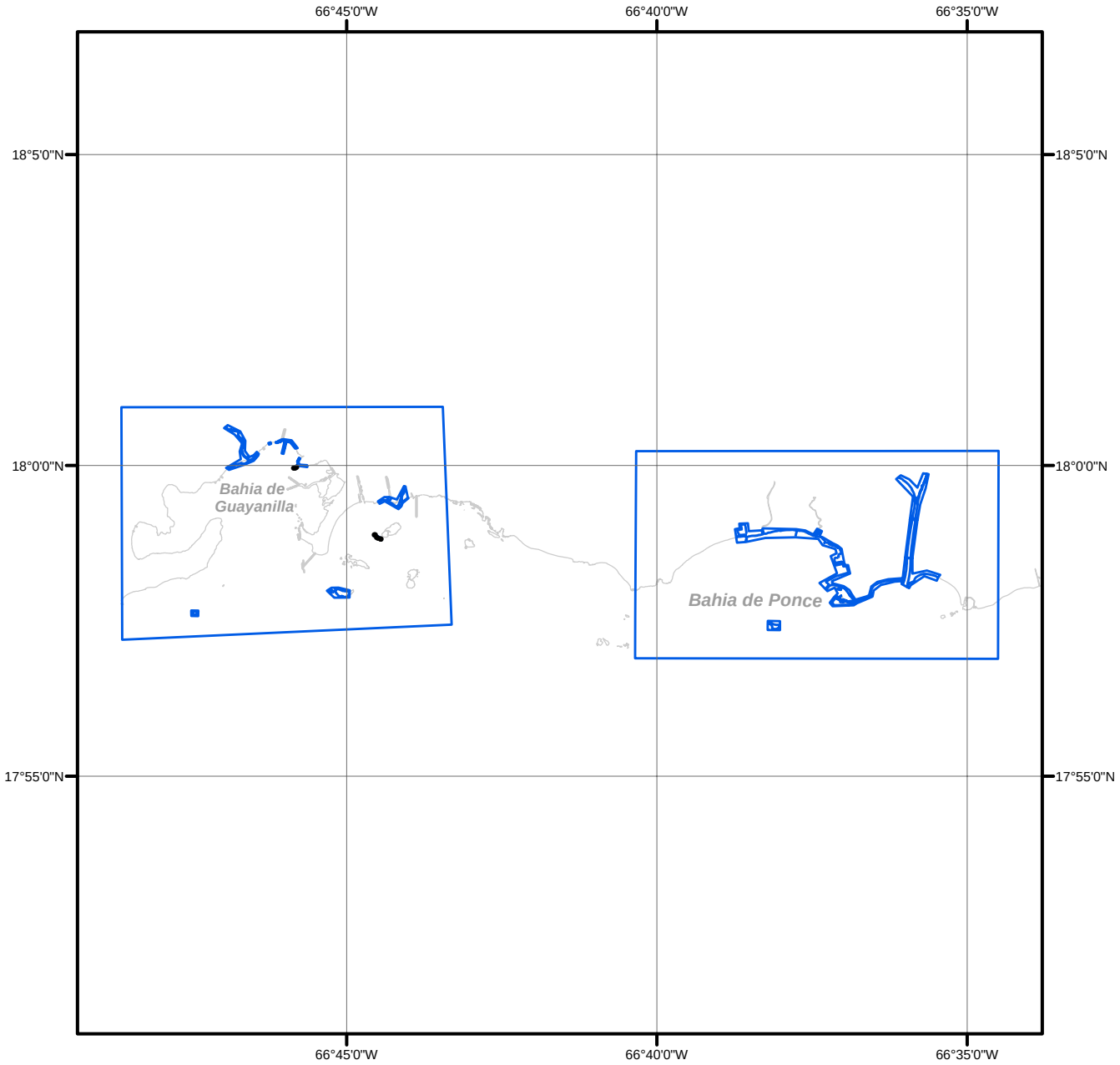
NOAA Shoreline Data Explorer

- DCFF for GC10612
- Metadata file for GC10612
- Digital copy of the PCR in Adobe PDF format

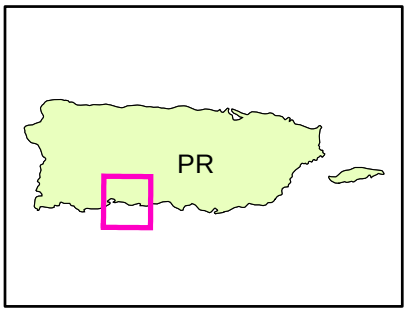
End of Report

PORT OF PONCE

PUERTO RICO



Overview



PR0302

GC10612