NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT TX1101

Port of Houston, Texas

Introduction

NOAA Coastal Mapping Program (CMP) Project TX1101 provides a highly accurate database of new digital shoreline data for the Port of Houston, including the upper Galveston Bay, Texas. 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 TX1101 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to NOAA's 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 CSCAP analysis memo for the Port of Houston, Texas for details regarding the chart comparison process.

Field Operations

Routine CMP field operations did not apply for this project based on the origin of the project source data. Existing sources of horizontal control were used for the georeferencing process.

Georeferencing

Four WorldView panchromatic images with a spatial resolution of 0.5 meters were used in this project. Due to the limited extent of available ground control, only three images could be georeferenced. However, DigitalGlobe provided an acceptable accuracy assessment for their imagery. Thus for the fourth image, the accuracy reported by the vendor at the 90% confidence level (CE90), was converted to CE95 for standard CMP reporting purposes.

The georeferencing phase was accomplished using Erdas IMAGINE 9.3 software on a Windows platform. GCPs were photogrammetrically measured from previously aerotriangulated images, then imported into IMAGINE and used to georeference the satellite imagery. Within IMAGINE the Raster Geometric Correction tool was used with a 1st order polynomial model. The satellite imagery was resampled using the Nearest Neighbor sampling method. The RMS of the residuals for measured check points was used to compute a circular error at the 95% confidence level (CE95) for each of the

georeferenced images: 0.4 meters for image #1; 0.2 meters for image #3, and 0.4 meters for image #4. These CE values were tripled and then added to the CE95 of the source imagery from which the control points were extracted, in order to conservatively predict the accuracy of well-defined points measured during the compilation process. For more information on this phase of project completion, see the Georeferencing Report. Positional data is based on the UTM Coordinate System (Zone 15), and referenced to the North American Datum of 1983.

Compilation

The data compilation phase of this project was accomplished by RSD in May 2011. Digital feature data was compiled in ESRI shapefile format from imagery using ESRI's ArcGIS 9.3 desktop GIS software. 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 cartographic features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project TX1101 were determined according to standard Federal Geographic Data Committee (FGDC) practices. For the images that were georeferenced, cartographic features were tested to have horizontal accuracies at the 95% confidence level: 2.7 meters for image #1; 2.2 meters for image #3; and 2.8 meters for image #4. This predicted accuracy of well-defined points is based on a minimum of twenty (20) check points for each image, that were compared to an independent source of higher accuracy. For the image that was not georeferenced (image #2), cartographic features were compiled to meet a horizontal accuracy of 5.7 meters at the 95% confidence level.

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

Image #	Image Source	Source File Name	Acquisition Date/Time	Tide Level*
#1	WorldView-1	09oct16172628-p1bs-052365508010_01_p003_rpc.tif	2009-10-16, 17:26 GMT	0.2
#2	WorldView-1	09oct16172630-p1bs-052365508010_01_p004_rpc.tif	2009-10-16, 17:26 GMT	0.2
#3	WorldView-2	10sep30170743-p1bs-052409327010_01_p003_rpc.tif	2010-09-30, 17:07 GMT	0.5
#4	WorldView-2	10sep30170806-p1bs-052409327010_01_p017_rpc.tif	2010-09-30, 17:08 GMT	0.5

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS tide gauge at Houston, Texas at the time of imagery acquisition. The elevation of the MHW tidal datum at Houston 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. The final QC review was completed in July 2011. The review process

included analysis of the georeferencing 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. 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 GC10876 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC10876 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File (CEF) in shapefile format

NOAA Shoreline Data Explorer

- GC10876 in shapefile format
- Metadata file for GC10876
- Digital copy of the PCR in Adobe PDF format

End of Report

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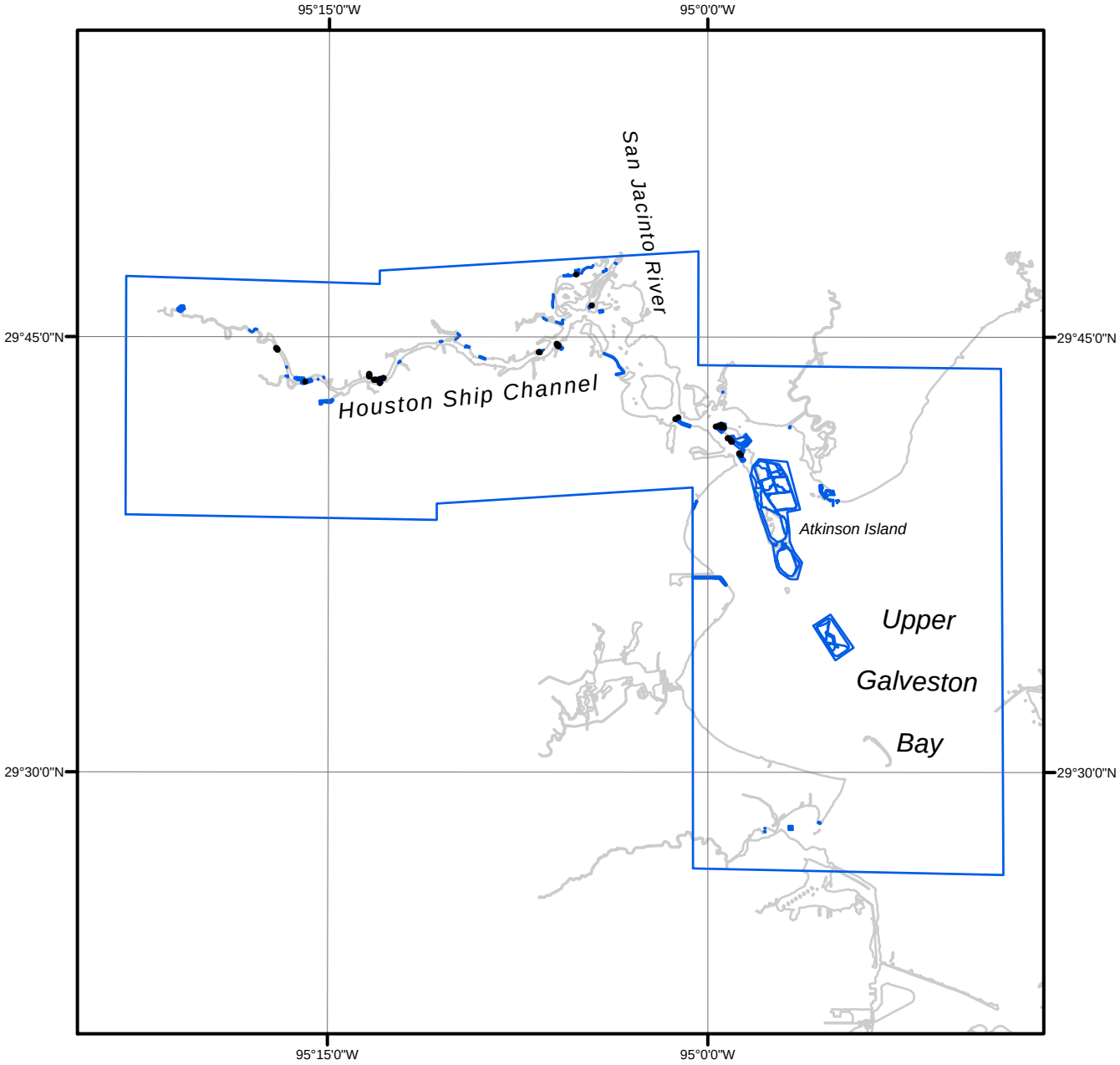
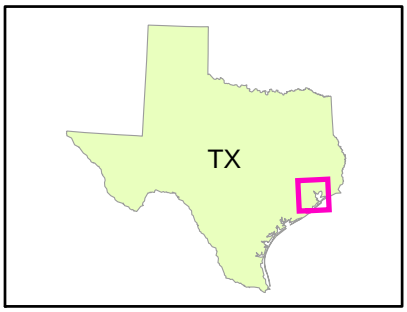


Overview



TX1101

GC10876