

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT VI1104

Anguilla Harbor, St. Croix, U.S. Virgin Islands

Introduction

NOAA Coastal Mapping Program (CMP) Project VI1104 provides a highly accurate database of new digital shoreline data for Anguilla Harbor, including Krause Lagoon Channel and Lime Tree Bay, located on St. Croix Island, U.S. Virgin Islands. 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

This project was designed per a request from the NOAA Hydrographic Surveys Division (HSD) for shoreline data in support of HSD operations. 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 Procedures ver. II. The instructions discussed the project's purpose, geographic area of coverage, scope and priority, image requirements, flight line priority, Global Positioning System (GPS) data collection procedures and guidelines, instructions for data recording and handling, and contact and communication information. RB created a Project Layout Diagram, flight maps and input files for the aircraft flight management system.

Field Operations

The field operations consisted of the collection of static and kinematic GPS data and the acquisition of aerial imagery. The photographic mission operations were conducted from March 29th to April 2nd, 2011 with the NOAA King Air (N68RF) aircraft. Six (6) strips of natural color (RGB) digital images were acquired using an Applanix DSS-439 camera, flown at an approximate altitude of 4,500 ft. resulting in a ground sample distance (GSD) of 0.5 ft. (0.16 meters). All images were acquired at a stage of tide below MHW.

A base station was established at Henry E. Rohlsen Airport (TISX), on St. Croix, U.S. Virgin Islands, using static GPS. Airborne kinematic GPS data was collected in conjunction with an Inertial Measurement Unit (IMU) to yield precise camera positions and orientations.

GPS Data Reduction

GPS and IMU data was processed by RSD personnel to yield precise positions and orientations of camera centers as a means of rendering accurately georeferenced digital images. The GPS base station data was processed using the NGS Online Processing User Service (OPUS) software in order to compute the fixed baseline solutions from the three nearest CORS stations. The final NAD83 position reported by OPUS was the average of these three baseline solutions. The airborne kinematic data was processed using the Applanix POSGPS (ver. 5.3) software in April

2011. For additional information, refer to the Airborne Positioning and Orientation Reports (APOR) associated with VI1104.

Aerotriangulation

Softcopy aero-triangulation (AT) 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 AB personnel in June 2012 using the Multi-Sensor Triangulation (MST) module of BAE Systems SOCET SET® v. 5.5 softcopy photogrammetry suite. Upon successful completion of the AT process, the MST software provided the standard deviations of the residuals for each adjusted ground point, which were used to compute an overall predicted horizontal circular error of 0.3 meters based on a 95% confidence level for the final adjusted block of all images. An AT 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.

Compilation

The data compilation phase of the project was initiated by AB personnel in August 2012. This work was accomplished using the Feature Extraction module within BAE Systems' SOCET SET (v. 5.6) software. Feature identification and the assignment of cartographic codes were based on image analysis of the project digital images 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). Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project VI1104 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.6 meters at the 95% confidence level. The predicted accuracy of compiled, well-defined points is derived by doubling the circular error derived from aerotriangulation statistics.

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

Date	Time (UTC)	Line Number	Photo Numbers	GSD	Tide Level*
3-29-2011	14:01	122006	02675 – 02682	16 cm	0.11
3-29-2011	14:12	122005	02683 – 02687	16 cm	0.11
3-29-2011	14:19	122004	02689 – 02697	16 cm	0.11
3-29-2011	14:48	122001	02726 – 02744	16 cm	0.11
3-29-2011	14:55	122002	02745 – 02749	16 cm	0.11
3-29-2011	15:12	122002	02770 - 02775	16 cm	0.11
3-31-2011	13:18	122003	02792 – 02798	16 cm	0.05
4-2-2011	12:32	122002	03245 – 03251	16 cm	0.02

* Tide levels given in meters above MLLW and were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations at the NOS gauge in Lime Tree Bay, St. Croix, Virgin Islands. The height of the MHW tidal datum in the project area is approximately 0.21 meters 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 December 2012. The review process included 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 9.3.1 software. All project data was evaluated for compliance to CMP requirements.

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

25641 Inset, Krause Lagoon Channel, VI, 1:20,000 scale, 28th 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 Airborne Positioning and Orientation Report (APOR)
- Hardcopy of the Aerotriangulation Report and Accuracy Assessment
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10953 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

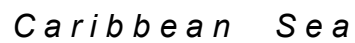
- Project database
- GC10953 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File in shapefile format

NOAA Shoreline Data Explorer

- GC10953 in shapefile format
- Metadata file for GC10953
- Digital copy of the PCR in Adobe PDF format

End of Report

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VI



GC10953

