NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT TX1405B-CM-N

Baffin Bay, Texas

Introduction

NOAA Coastal Mapping Program (CMP) Project TX1405B-CM-N provides highly accurate digital shoreline data for Baffin Bay, in Texas. TX1405B-CM-N is a subproject of a larger acquisition project, TX1405-CU-N, which covers a portion of the coast of Laguna Madre from Rocky Slough to Big Cove, 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 Requirements Branch (RB) of the Remote Sensing Division (RSD) designed Project TX1405-CU-N to support the Continually Updated Shoreline Product (CUSP), a seamless shoreline database. Photographic mission instructions were formulated following the guidelines of RSD's Photo Mission Standard Operating Procedures. The instructions discussed the project's purpose, geographic area of coverage, scope and priority, image requirements, Global Positioning System (GPS) data collection procedures and guidelines, instructions for data recording and handling, and mission communication protocols. 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, Inertial Measurement Unit (IMU) data, and the acquisition of aerial imagery. The photographic mission operations were conducted in October 2014 with the NOAA King Air aircraft. Natural color and near infrared (NIR) digital images were acquired concurrently with an Applanix Digital Sensor System (DSS) 439 aerial camera system, although the NIR images were not used in this project. All images were acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.37 meters for the project imagery.

Direct Georeferencing Data Processing

GPS/IMU data were processed by RSD personnel to yield precise camera positions and orientations for direct georeferencing (DG) of the imagery. A local GPS base station was established for use as a reference station for kinematic GPS processing operations. The position of the base station was determined using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The airborne kinematic data was processed using Applanix POSPac (ver. 6.2) software in November 2014. For further information refer to the Airborne Positioning and Orientation Report (APOR) that is on file with other project data within the RSD Electronic Data Library.

The processed GPS/IMU data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. The predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using an Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level was calculated to be 1.4 meters.

NGS third order control was used to verify the horizontal integrity of the DG data. All stereo models were examined and found to have acceptable levels of parallax for mapping purposes.

Compilation

The data compilation phase of this project was completed by a member of the Applications Branch (AB) of RSD in August 2019. The Feature Extraction module of BAE Systems' SOCET SET (ver. 5.6) photogrammetric software was used to compile feature data from imagery. 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), 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 TX1405B-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.8 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points measured during the compilation phase was derived by doubling the horizontal uncertainty calculated from the EO-TPU tool.

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

Date	Time	Roll #	Strip/Photo #s	Water Level*
16-OCT-2014	20:20 – 20:24	14NC94	53-021 / 21322 – 21349	0.03 m
16-OCT-2014	20:29 – 20:32	14NC94	53-022 / 21350 – 21370	0.03 m
16-OCT-2014	20:38 – 20:41	14NC94	53-007 / 21378 – 21394	0.03 m
16-OCT-2014	20:42 – 20:45	14NC94	53-020 / 21395 – 21413	0.03 m
16-OCT-2014	20:49 – 20:51	14NC94	50-019 / 21414 – 21429	0.03 m
16-OCT-2014	20:53 – 20:55	14NC94	53-009 / 21430 – 21446	0.03 m
16-OCT-2014	21:00 – 21:02	14NC94	53-008 / 21447 – 21464	0.03 m
16-OCT-2014	21:04 – 21:06	14NC94	53-018 / 21465 – 21480	0.03 m
16-OCT-2014	21:12 – 21:15	14NC94	53-017 / 21481 – 21499	0.03 m
16-OCT-2014	21:19 – 21:23	14NC94	53-016 / 21500 – 21522	0.03 m
16-OCT-2014	21:28 – 21:30	14NC94	53-015 / 21523 – 21540	0.03 m
16-OCT-2014	21:35 – 21:36	14NC94	53-014 / 21541 – 21548	0.03 m

16-OCT-2014	21:41 – 21:44	14NC94	53-010 / 21549 – 21573	0.03 m
16-OCT-2014	21:49 – 21:53	14NC94	53-011 / 21574 – 21598	0.03 m
16-OCT-2014	21:57 – 22:00	14NC94	53-012 / 21599 – 21618	0.03 m
16-OCT-2014	22:05 – 22:06	14NC94	53-013 / 21619 – 21626	0.03 m

* The area of Baffin Bay is considered to be non-tidal, and water levels are given in meters above Mean Sea Level (MSL), based on verified observations at the gauge at Baffin Bay (station 8776604).

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 September 2019. The review process included analysis of the DG 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 (ver. 10.7.1) 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:

- 11308, Intracoastal Waterway, Redfish Bay to Middle Ground, Side B, 26th Ed., Jan. 2017

End Products and Deliverables

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

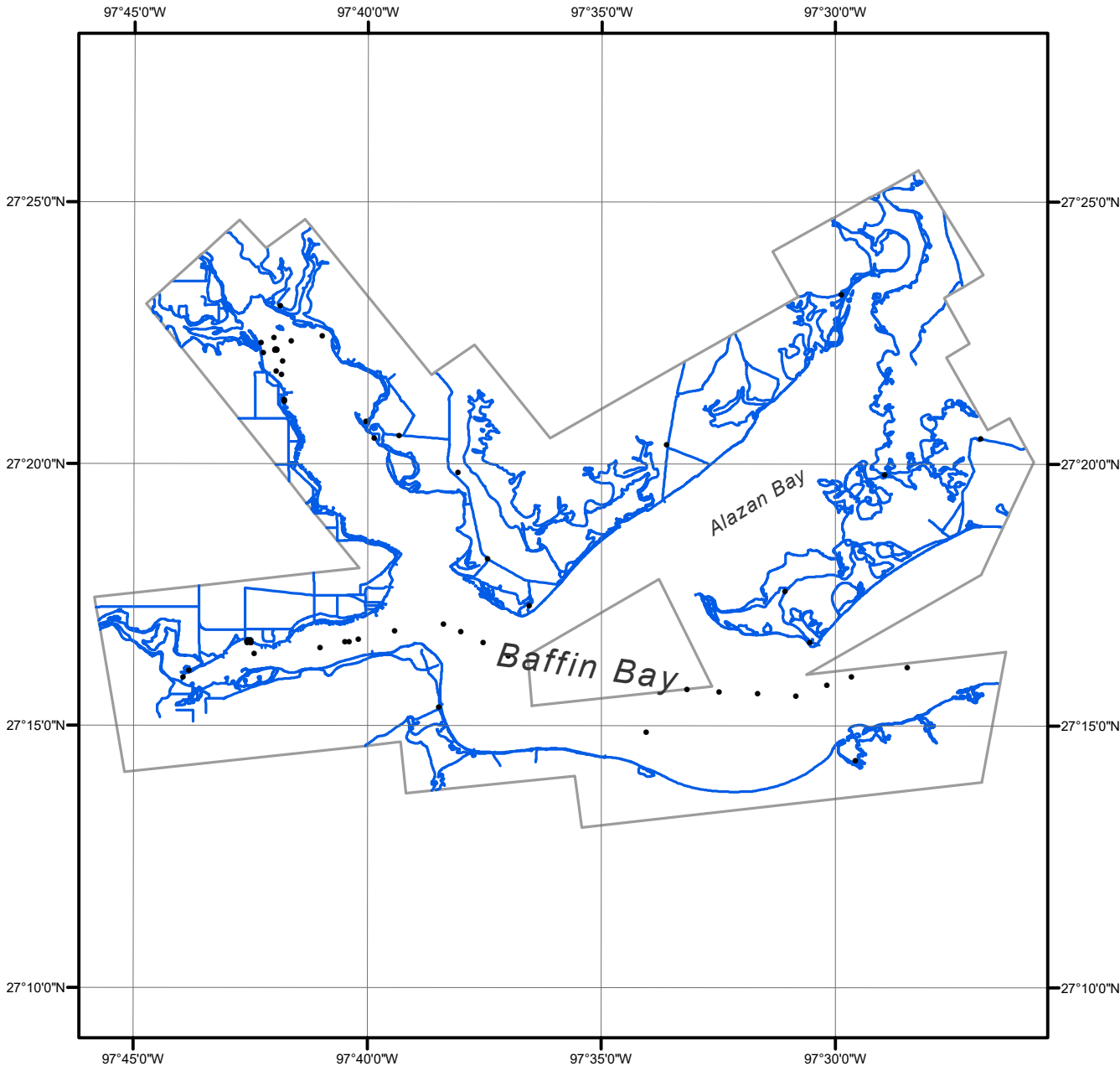**Remote Sensing Division Electronic Data Library**
- Project database
- Airborne Positioning and Orientation Report (APOR)
- GC11483 in shapefile format
- Project Completion Report (PCR)
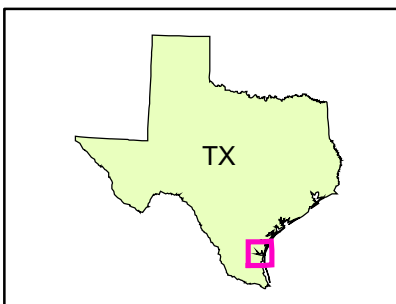- CEF in shapefile format

NOAA Shoreline Data Explorer
- GC11483 in shapefile format
- Metadata file for GC11483
- PCR in Adobe PDF format

End of Report

BAFFIN BAY

TEXAS

97°45'0"W   97°40'0"W   97°35'0"W   97°30'0"W

27°25'0"N

27°20'0"N

Alazan Bay

Baffin Bay

27°15'0"N

27°10'0"N

97°45'0"W   97°40'0"W   97°35'0"W   97°30'0"W

Overview

TX

TX1405B-CM-N

GC11483