

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT VA1805B-CM-N

Albemarle and Chesapeake Canal North, Virginia and North Carolina

Introduction

NOAA Coastal Mapping Program (CMP) Project VA1805B-CM-N provides a highly accurate dataset of coastal feature data for the northern portion of Albemarle and Chesapeake Canal, including portions of the Southern Branch Elizabeth River and North Landing River, within Virginia and North Carolina. Project VA1805B-CM-N is a subproject of a larger project VA1805-CM-N, which covers the Dismal Swamp Canal, Albemarle and Chesapeake Canal, and portions of Currituck Sound and the Virginia/North Carolina outer coast from Sandbridge, Virginia south to Corolla Beach, North Carolina. 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) formulated photographic mission instructions for this project following standard mission guidelines. The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; Global Positioning System (GPS) data collection procedures and guidelines for both kinematic and static surveys; data recording and handling instructions; and contact and communication information. RB created a Project Layout Diagram, flight maps and input files for the aircraft's 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 November 3-16, 2018 using an Applanix Digital Sensor System (DSS) dual aerial camera system at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.32 meters for project imagery. Fifteen flight lines each of natural color and near-infrared (NIR) imagery were acquired concurrently, although only five lines of color images were utilized for this project. The aerial imagery was not acquired in coordination with local tides.

GPS Data Processing

GPS/IMU data was collected and processed by RSD personnel to yield precise positions and orientations of camera centers for use as photogrammetric control in the aerotriangulation (AT) phase of project completion. 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 in December,

2018 using POSPAC software (ver. 8.2). For further information, refer to the Airborne Positioning and Orientation Report (APOR), on file with other project data within the RSD Electronic Data Library.

Aerotriangulation

Routine softcopy 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 completed by personnel of the Applications Branch (AB) of RSD in December 2018 utilizing a softcopy photogrammetric workstation. The color images were measured and adjusted as a block using the Multi-Sensor Triangulation (MST) module of BAE Systems' SOCET SET (ver. 5.6) photogrammetric software. Upon successful completion of the AT process, the 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 0.44 meters based on a 95% confidence level. An AT Report was completed and is on file with other project data within the RSD Electronic Data Library.

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

Data compilation for this project was completed by AB personnel in April 2019. The Feature Extraction module of SOCET SET (ver. 5.6) was used to extract feature data from the imagery. Feature identification and the assignment of cartographic codes were based on image analysis of the project imagery and information extracted from the appropriate NOAA Nautical Charts 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 VA1805B-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.9 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is derived by doubling the horizontal uncertainty calculated from the AT statistics. The table below provides further information on the images used to complete this project:

Date	Time (UTC)	Roll #	Strip / Frame #s	Tide Level
11/03/2018	18:24 – 18:27	18VC74	62-006 / 20510 – 20523	0.2 m.
11/04/2018	15:58 – 16:03	18VC75	62-009 / 20799 – 20819	n/a *
11/04/2018	16:23 – 16:27	18VC75	62-008 / 20891 – 20912	n/a *

11/04/2018	16:36 – 16:41	18VC75	62-007 / 20913 – 20934	n/a *
11/04/2018	17:18 – 17:20	18VC75	62-005 / 21024 – 21033	0.0 m.
11/04/2018	17:20 – 17:23	18VC75	62-005 / 21034 – 21051	n/a *

Tide level is given in meters above MLLW and based on verified observations recorded by the NOS reference gage at Sewell Point, VA with offsets applied to the nearest substation to the project area. The height of the MHW tidal datum in the tidal portion of the project is approximately 0.93 meters above MLLW.

* Portions of the project covered by these images are considered non-tidal.

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 2019. 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 (ver. 10.6.1) 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 charts were used in the comparison process:

- 12206, Intracoastal Waterway - Norfolk to Albemarle Sound, 35th Ed., Dec. 2015
- 12207, Cape Henry to Currituck Beach Light, 24th Ed., Jul. 2014
- 12253, Norfolk Harbor and Elizabeth River, 48th 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)
- Aerotriangulation Report
- GC11470 in shapefile format
- Project Completion Report (PCR)

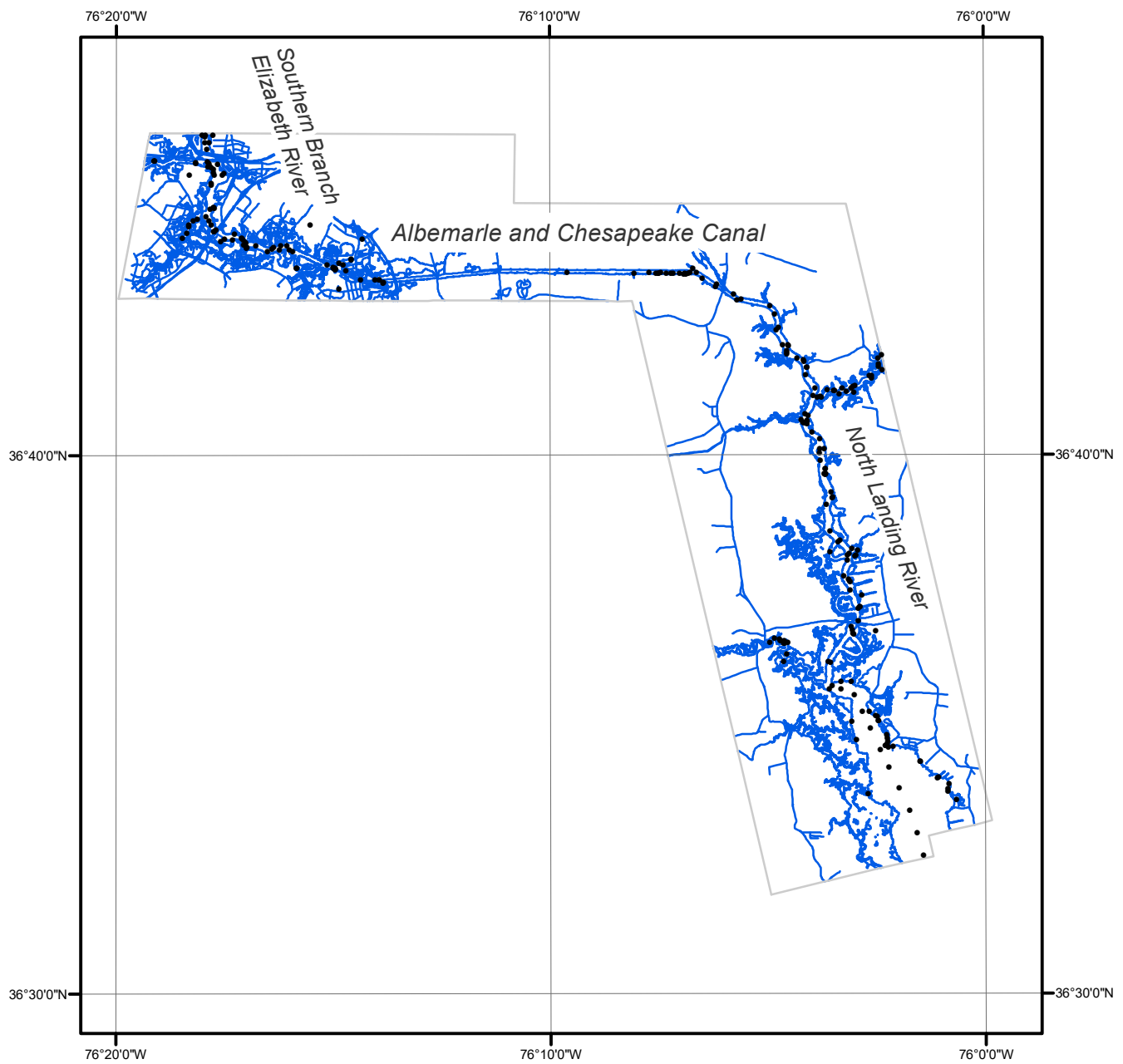
CEF in shapefile format NOAA Shoreline Data Explorer

- GC11470 in shapefile format
- Metadata file for GC11470
- PCR in Adobe PDF format

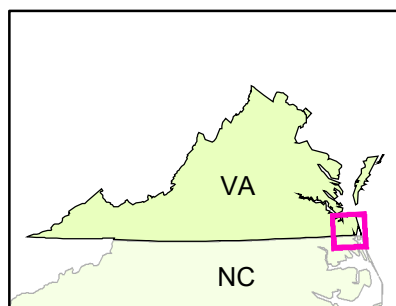
End of Report

ALBEMARLE AND CHESAPEAKE CANAL NORTH

VIRGINIA AND NORTH CAROLINA



Overview



VA1805B-CM-N

GC11470