NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT AK2009-CS-C

Port of Valdez, Alaska

Introduction

Coastal Mapping Program (CMP) Project AK2009-CS-C provides highly accurate digital shoreline data for key areas of change within the port of Valdez, Alaska. 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 AK2009-CS-C was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for updates to the NOAA Electronic Navigational Chart (ENC) 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 imagery in order to ascertain the need for more current shoreline data. A Chart Evaluation File (CEF) was forwarded to the Applications Branch (AB) of RSD once the change analysis was complete. Refer to the CSCAP memorandum for Project AK2009-CS-C for details of the chart comparison process.

Field Operations

Quantum Spatial, Inc. (QSI) was contracted by NGS to performed field operations for project AK2009-CS-C consisting of the acquisition of aerial photographs and the surveying of ground control points (GCPs) and checkpoints (CPs). Base stations were used to support real-time kinematic survey operations.

The ground survey comprised a total of 9 GCPs and 4 CPs which were surveyed by QSI using real time kinematic and fast survey techniques. Survey field work was performed in August 2020. For further information see the Ground Survey Report on file with other project data within the RSD Electronic Data Library.

The aerial photography phase of the project was conducted by QSI and included the collection of kinematic Global Positioning System (GPS) data, Inertial Measurement Unit (IMU) data and the acquisition of aerial imagery. Digital images utilized for this project were acquired with the Cessna Conquest II (N441CJ) aircraft in August 2020 using a Vexcel UltraCam Eagle M3 digital aerial camera at a nominal altitude of 6,265 meters resulting in an approximate ground sample distance (GSD) of 0.25 meters. The imagery was acquired with 4 bands comprised of both RGB (color) and near infrared (NIR) bands, however, only the RGB bands were used. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW).

GPS Data Processing

The GPS/IMU data were processed in August 2020 by QSI personnel to yield precise camera positions in order to provide a control network necessary for aerotriangulation. A static base station was not utilized in the processing. Instead, the kinematic GPS data was processed using Applanix POSPAC Mobile Mapping Suite (MMS) (ver. 8.4) software utilizing the IN-Fusion PP-RTX processing mode, which is an implementation of Trimble's *CenterPoint RTX* GNSS correction service. 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 aerotriangulation methods were applied to establish a 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 performed by QSI personnel in October 2020 utilizing INPHO's MATCH-AT (ver. 10.1) software on a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components, and other associated peripheral devices. The images were measured and adjusted as a single block. Upon successful completion of this process, MATCH-AT provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.07 meters based on a 95% confidence level. An Aerotriangulation 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 (NAD83).

Compilation

The data compilation phase of this project was accomplished by a member of AB in February 2021. Digital feature data was compiled from the aerotriangulated imagery using the Feature Extraction software module of SOCET SET. 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 AK2009-CS-C were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.14 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is derived by doubling the circular error calculated from the aerotriangulation statistics.

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

Date	Time (UTC)	Flight Line / Photo #s	Tide Level*
21-AUG-2020	18:48 – 18:51	25-006 / 00001-00038	-0.4 m
21-AUG-2020	18:59 – 19:02	25-005 / 00039-00073	-0.3 – -0.2 m
21-AUG-2020	19:11 – 19:13	25-004 / 00074-00105	-0.1 m
21-AUG-2020	19:22 – 19:25	25-003 / 00106-00142	0.1 m

21-AUG-2020	19:33 – 19:36	25-002 / 00143-00186	0.2 – 0.3 m
21-AUG-2020	19:44 – 19:47	25-001 / 00187-00227	0.4 – 0.5 m

* Tide levels are given in meters above MLLW and are based on verified observations at the Valdez reference station (#9454240). The elevation of MHW in the project area is 3.42 meters above MLLW.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in February 2021, and 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 Esri's ArcGIS desktop GIS software (ver. 10.8.1). All project data 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:

Remote Sensing Division Electronic Data Library

- CSCAP evaluation memorandum
- Photographic Flight Report
- Ground Survey Report
- Quality Assurance Report
- Airborne Positioning and Orientation Report (APOR)
- Project database
- Aerotriangulation Report
- Project Completion Report (PCR)
- GC11711 in shapefile format
- CEF in shapefile format

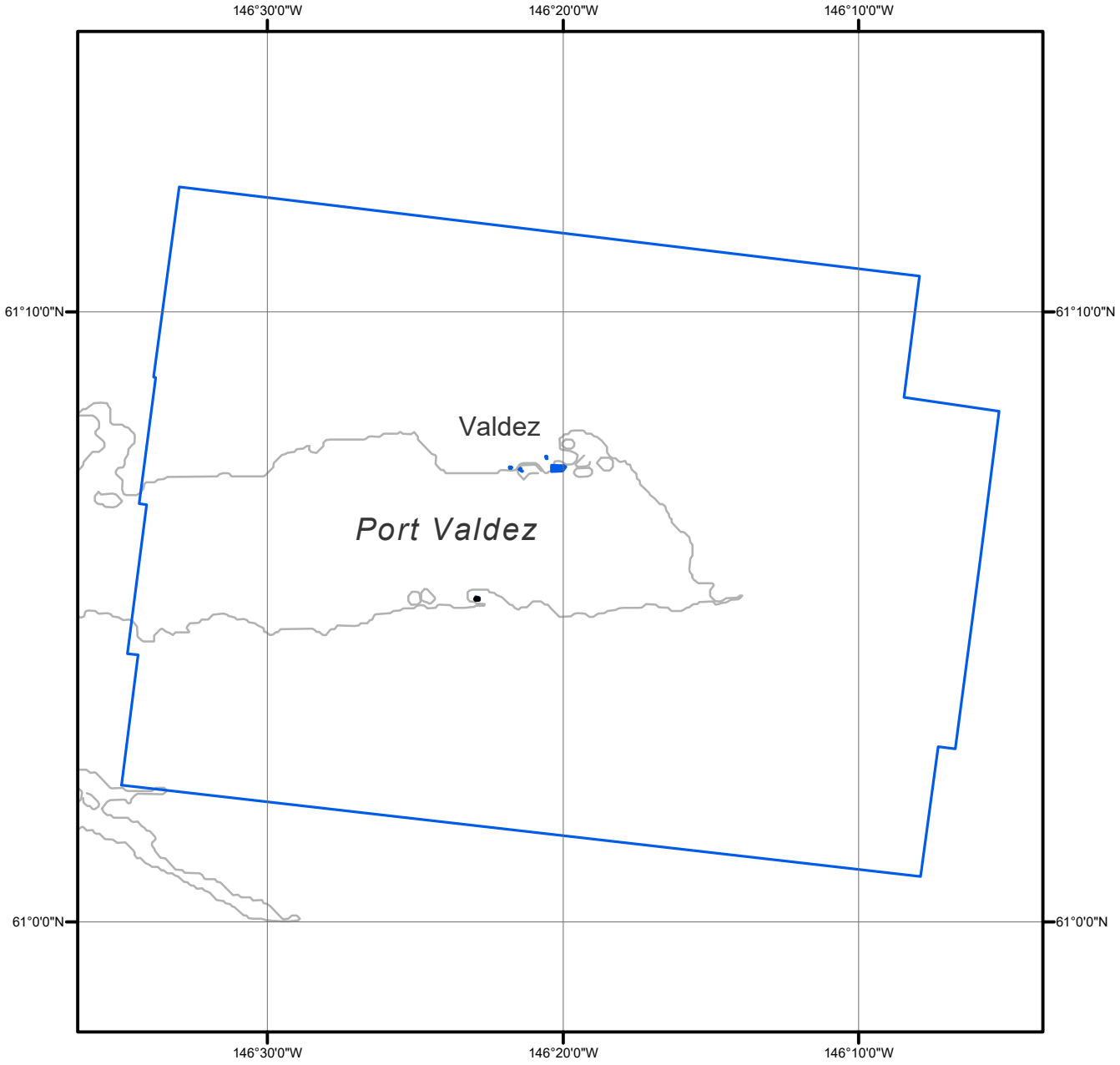
NOAA Shoreline Data Explorer

- GC11711 in shapefile format
- Metadata file for GC11711
- PCR in Adobe PDF format

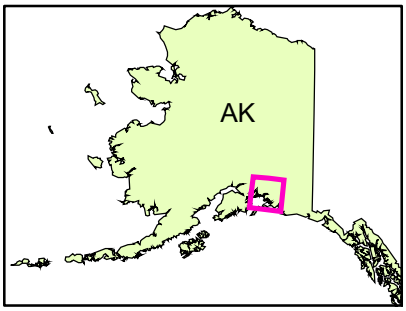
End of Report

PORT OF VALDEZ

ALASKA



Overview



AK2009-CS-C

GC11711