

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT AK1604-CM-N

Sitka to Halibut Point, Alaska

Introduction

Coastal Mapping Program (CMP) Project AK1604-CM-N provides highly accurate digital shoreline data for key areas of change from Sitka to Halibut Point, 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

This project was designed and planned by the Requirements Branch (RB) of the Remote Sensing Division (RSD) 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. The project was planned under the Project Identifier AK1604-CS-N, but was subsequently re-designated as AK1604-CM-N for the feature compilation phase.

Field Operations

The field operations consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted on May 19, 2016 with the NOAA King Air aircraft (N68RF). Three flight lines of natural color and near-infrared (NIR) imagery were acquired concurrently using an Applanix DSS 580/560 dual-lens camera at a nominal altitude of 7,500 feet, resulting in an approximate ground sample distance (GSD) of 0.24 meters. The NIR imagery was not used for this project. 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 Reduction

The GPS/IMU data were processed by RSD personnel to yield precise camera positions in order to provide a control network necessary for aerotriangulation. The base station's geodetic position was derived using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The kinematic GPS data was processed using Applanix POSPac MMS (ver. 7.1) in June 2016. 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 RSD AB personnel in July 2016 utilizing a photogrammetric workstation with the SOCET SET (ver. 5.6) suite of photogrammetric software. The color images were measured and adjusted as a single block using the Multi-Sensor Triangulation (MST) module of SOCET SET. Upon successful completion of this process, the triangulation software provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.43 meters based on a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD Electronic Data Library. Positional data is referenced to the North American Datum of 1983 (NAD83).

Compilation

The data compilation phase of this project was accomplished by RSD AB personnel in July 2016. In preparation, nautical chart products were compared to project imagery and a Chart Evaluation File (CEF) was created targeting new and/or changed features to be compiled. The following NOAA nautical charts were used for comparison:

- 17324, Sitka Sound to Salisbury Sound, 1:40,000 scale, 16th Ed., Mar. 2015
- 17327, Sitka Harbor and Approaches, 1:10,000 scale, 24th Ed., Jan. 2011
(Including 1:5,000 scale inset of Sitka Harbor)

During analysis it was determined that additional imagery was needed to fully cover the cruise ship port facility at Halibut Point. One pan-sharpened natural-color WorldView-3 image from DigitalGlobe, Inc., with a GSD of 0.36 meters, was obtained for this purpose.

Digital mapping from aerial imagery was accomplished using the Feature Extraction software module of SOCET SET. Mapping from satellite imagery was performed using Esri's ArcGIS desktop GIS software. Using ArcGIS, the satellite image was locally georeferenced to match features in the aerial imagery, with the accuracy based on that of the aerial imagery. Feature identification and attribution within the GC were based on image analysis of the aerial imagery and information extracted from the largest scale 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 AK1604-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 well-defined points measured during the compilation phase was derived by doubling the circular error calculated from the aerotriangulation statistics.

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

Aerial Imagery				
Date	Time (UTC)	Roll #	Strip / Photo #s	Tide Level*
5/19/2016	23:20 – 23:23	16VC60	45-002 / 14360 – 14376	1.4 m
5/19/2016	23:27 – 23:30	16VC60	45-001 / 14377 – 14394	1.4 m
5/19/2016	23:33 – 23:35	16VC60	45-003 / 14395 – 14403	1.3 m
Satellite Imagery				
Date	Time (UTC)	Source File ID		Tide Level*
6/14/2016	20:35	20160614_2035_WV3_ori_R1C1.tif		1.3 m

* Tide levels are given in meters above MLLW. For the aerial imagery the values were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations at the time of photography from various NOS gauges in the vicinity of the project. For the satellite imagery the value was based directly on the verified water level observations at the NOS gauge at Sitka. The MHW tidal datum is 2.79 meters above MLLW in the project area.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in July 2016, 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 ArcGIS 10.2.2 software. All project data was evaluated for compliance to CMP requirements.

End Products and Deliverables

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

Remote Sensing Division Electronic Data Library

- Airborne Positioning and Orientation Report (APOR)
- Aerotriangulation Report
- Project database
- Project Completion Report (PCR)
- GC11253 in shapefile format
- Chart Evaluation File in shapefile format

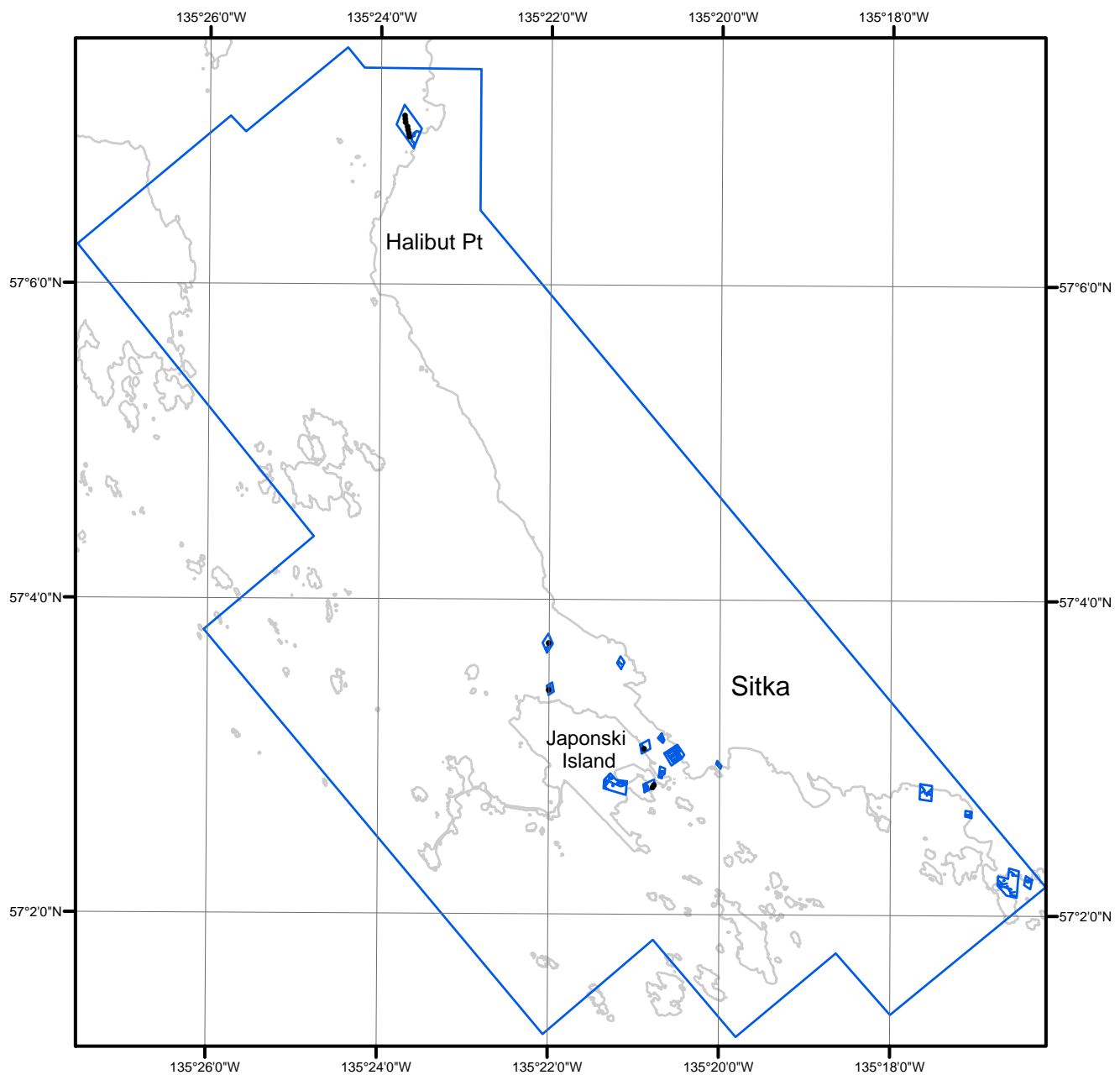
NOAA Shoreline Data Explorer

- GC11253 in shapefile format
- Metadata file for GC11253
- Digital copy of the PCR

End of Report

SITKA TO HALIBUT POINT

ALASKA



Overview



AK1604-CM-N

GC11253