

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT AK9703A

SITKA NORTH, ALASKA

Introduction

Coastal Mapping Program (CMP) Project AK9703A provides a highly accurate database of new digital shoreline data of an extensive area northwest of Sitka, Alaska. Project AK9703A is a sub-project of the larger project AK9703 which provided aerial photographs of the Sitka, Alaska region. The geographic footprint of project AK9703A covers Peril Strait, Salisbury Sound, Neva Strait, Krestof Sound and the northwestern shoreline of Sitka Sound.

Successful completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric-quality aerial photographs, and a Digital Cartographic Feature File (DCFF) of the coastal zone which meets the requirements of the NOAA CMP.

The project database consists of information measured and extracted from aerial photographs and metadata related to photogrammetric compilation. Base mapping was conducted in a digital environment using stereo softcopy photogrammetry and associated cartographic practices. Project survey data is referenced to the North American Datum 1983 (NAD 83).

Project Design

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 Procedure Version III (2/01/97). The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; tide coordination; 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.

The RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system, and information on airports that may be used as a base of operation. Additional information disseminated at a briefing held for the photo mission crew included data on tide predictions, sun angle computations, flight line priorities, and geodetic control stations which could be used as GPS reference stations.

Field Operations

The photographic mission operation was conducted on August 15, 1997, September 6, 1997 and May 27, 1998 with the NOAA Cessna Citation II aircraft. Panchromatic as well as black and white infrared photographs were acquired through the use of a Wild RC-30 camera with the NOS "A" lens cone. No natural color photographs were acquired. All aerial photographs were acquired at the nominal scale of 1:40,000. Kinematic GPS data was acquired for the

panchromatic photographs as an integral part of photographic mission operations in compliance with the aforementioned Photo Mission SOP.

GPS Data Reduction

Global Positioning System (GPS) data was collected and processed to provide precise positions of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. The acquisition of a static GPS dataset of the airport reference station and airborne kinematic GPS dataset was executed in compliance with GPS Controlled Photogrammetry Field Operations Manual, a RSD operational manual. Static GPS data of the airport reference station was collected on August 17, 1997 and processed in August 1997 using NGS's OMNI software to compute fixed baseline solutions from three CORS stations. The final position of the GPS base station was the average of these three baseline solutions. The airborne kinematic data for both the first and second flights (8/15/97 & 9/6/97) were processed using Applanix POSGPS (ver. 3.00) software in January 2002. The NGS computed precise satellite ephemeris and standard meteorologic data were applied during the data reduction process. GPS data reduction was completed by RSD Applications Branch (AB) CMP project personnel in January 2002. A GPS Data Processing Report was written and is on file with other project data within the RSD AB Project Archive.

Aerotriangulation

Routine softcopy aerotriangulation 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 softcopy compilation. Eight strips of panchromatic photographs were measured and adjusted as one block. Strips 33 and 37 of the infrared photographs were measured and adjusted as one block, and strips 35 and 36 of the infrared photographs were measured and adjusted as another block. This work was initiated by the RSD AB CMP personnel in January 2002 utilizing a Digital Photogrammetric Workstation (DPW) which is a configuration of a computer processor and monitors, softcopy photogrammetry software (Socet Set ver. 4.4.0), stereo viewing equipment, and associated peripheral devices. The ORIMA (v.4.0.7.) software module was utilized for the aerotriangulation process. Upon successful completion of the aerotriangulation process, the ORIMA software provided the RMS of the standard deviations for all of the aerotriangulated ground points which were used to compute a predicted horizontal circular error of 1.5 meters for the panchromatic photographs, 1.9 meters for strips 33 and 37 of the infrared photographs, and 1.4 meters for strips 35 and 36 of the infrared photographs. All accuracies were based on a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD AB Project Archive.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, airborne GPS antenna position and offset data, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is based on the WGS 1984, and was measured in the UTM Coordinate System, Zone 8.

Compilation

The compilation phase of the project was accomplished by the RSD Applications Branch (AB) in July of 2002. Digital mapping was accomplished using a DPW in conjunction with the SocetSet Feature Extraction module. Feature identification and the assignment of cartographic codes were based on image analysis of 1:40,000 scale panchromatic and black and white infrared photographs and information extracted from the appropriate NOAA Nautical Charts. Cartographic feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST). Nomenclature was assigned to selected cartographic features to refine general classification.

Cartographic features were compiled to meet a horizontal accuracy of 3.0 meters for the panchromatic photographs, 3.8 meters for strips 33 and 37 of the infrared photography, and 2.8 meters for strips 35 and 36 of the infrared photography. All accuracies were based at the 95% confidence level. This predicted accuracy of compiled, well defined points is derived by doubling the circular error derived from aerotriangulation statistics.

The following provides information on aerial photographs used in the project completion process:

Date of Acquisition	Time(GMT) Of Acquisition	Roll Number	Photograph Numbers	Scale (Nominal)	Stage Of Tide*
08-15-97	22:51 to 23:01	97AP02	2377 thru 2398	1:40,000	1.26m
08-15-97	23:07 to 23:15	97AP02	2399 thru 2418	1:40,000	1.19m
08-15-97	23:28 to 23:32	97AP02	2419 thru 2426	1:40,000	1.05m
08-15-97	23:39 to 23:44	97AP02	2427 thru 2437	1:40,000	0.99m
08-15-97	23:48 to 23:51	97AP02	2438 thru 2447	1:40,000	0.95m
09-06-97	18:23 to 18:27	97AP05	2779 thru 2786	1:40,000	0.51m
09-06-97	18:49 to 18:52	97AP05	2787 thru 2793	1:40,000	0.59m
09-06-97	19:06 to 19:09	97AP05	2794 thru 2800	1:40,000	0.68m
05-27-98	18:50 to 18:53	98AR03	1966 thru 1973	1:40,000	-0.04m
05-27-98	18:55 to 19:00	98AR03	1974 thru 1984	1:40,000	-0.04m
05-27-98	19:05 to 19:08	98AR03	1985 thru 1990	1:40,000	0.19m
05-27-98	19:14 to 19:19	98AR03	1991 thru 1996	1:40,000	0.27m

* The "Stage of Tide" is referenced to MLLW and are based on actual observations recorded by the NOS gauge at Sitka, AK at the time of photography. The range of tide (MLLW to MHW) based on the Sitka gauge is 2.77 meters.

Final Review

The final review was completed by a senior AB CMP team member in April 2002. The DCFF was evaluated for completeness and accuracy. Data review consisted of an on-line and off-line evaluation of digital compilation and hard copy products. The on-line review comprised of reviewing stereo models on a DPW for cartographic feature codes selection, positional accuracies of features, and nomenclature. The cartographic feature attribution was judged to conform to the C-COAST specification. The offline evaluation compared hard copy plots of the project data with the largest scale nautical charts available and panchromatic and infrared photographs. A copy of NOAA nautical charts 17320 Coronation Island to Lisianski Strait, 1:217,828, 15th ed., 17323 Salisbury Sound and Peril Strait, 1:40,000, 10th ed., 17324 Sitka

Sound to Salisbury Sound, 1:40,000, 13th ed., and 17325 South and West Coasts of Kruzof Island, 1:40,000, 7th ed. were used for the chart comparison process.

Project Final Data and Products

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

RSD Applications Branch Project Archive

- Hard copy of GPS Processing Report
- Hard copy of Aerotriangulation Report
- Hard copy of the Project Completion Report (PCR)

RSD Electronic Data Library:

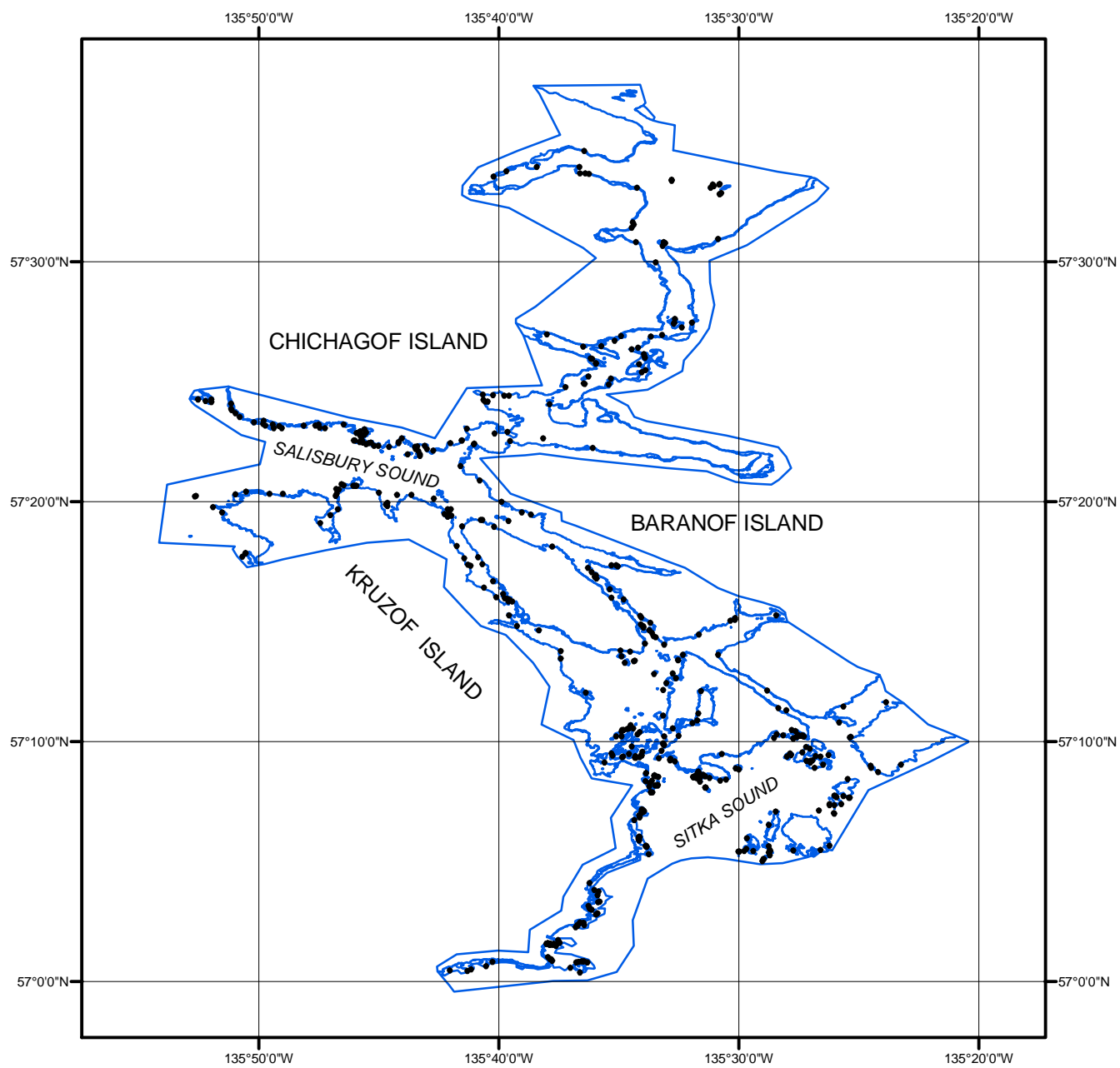
- Project Database
- DCFF: GC-10516
- Digital copy of DCFF in ESRI Shapefile format
- Digital copy of the PCR in Adobe Acrobat PDF format

NOAA Shoreline Data Explorer

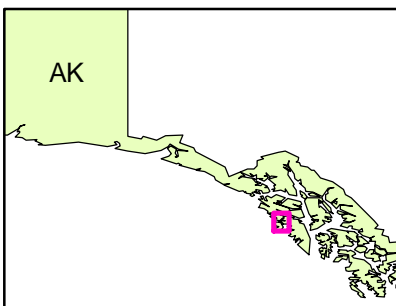
- DCFF:GC-10516
- Metadata file for GC-10516
- Digital copy of the PCR in Adobe Acrobat PDF format

End of Report

SITKA NORTH, ALASKA



Overview



AK9703A

GC10516