NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT FL9701
FLORIDA
MIAMI TO FORT LAUDERDALE

Introduction

Coastal Mapping Program (CMP) Project FL9701 provides a highly accurate database of new digital shoreline data along the southeast coast of Florida. The southern area coverage includes the Miami Harbor, northern Biscayne Bay, Virginia Key, and Fisher Island; the northern coverage includes Port Everglades at Fort Lauderdale.

Completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric quality aerial photographs and digital cartographic feature files (DCFF) of the coastal zone which meet the requirements of the NOAA CMP.

The project was produced under two separate task orders contracted through the St. Louis District of the U.S. Army Corps of Engineers (USACE) for EarthData International (EDI) of Maryland to perform digital photogrammetric surveys and coastal mapping. The first task order (Contract DACW43-96-D0525 task order #7), which addressed the project design, aerial photography, ground control and analytical aerotriangulation, was negotiated in 1997. The second task order (Contract DACW43-00-D0501 task order #7), which addressed feature extraction, feature attribution, topological data structure, and final review, was negotiated in 2000. For detailed instructions concerning the Scope of Work of these task orders, refer to Section I of the EDI Project Completion Report, located in the Remote Sensing Division (RSD) Applications Branch (AB) Project Archive.

Project Design

The Requirements Branch (RB) of RSD formulated the photographic mission instructions for this project following the guidelines of the Photo Mission Standard Operating Procedure Version II (7/01/93). 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. These instructions were provided to EDI personnel.

The Project Layout Diagram and flight maps were developed by EDI planning staff members and reviewed by RB and USACE St. Louis personnel. Refer to the EDI Project Completion Report for further information dealing with the project design and planning.

Field Operations

EDI photographic mission operation was conducted on January 18, 1997; February 1, 1997; February 1, 1998; and February 5, 1998. Aerial photographic coverage of the project site consisted of natural color and black & white infrared photographs at nominal scales of 1:14,400 and 1:40,000. Tide-coordinated photography was conducted at both the mean high water (MHW) and mean lower low water (MLLW) levels. Natural color and black & white infrared photographs were acquired at MHW and only black & white infrared photographs were acquired at MLLW. Additional information can be found in the EDI Aerotriangulation Report located in the RSD AB Project Archive.

GPS Data Reductions

Global Positioning System (GPS) data were collected and processed to provide precise positions of camera centers for application as photogrammetric control for the natural color photographs. During the aerial photography acquisition, two duel-frequency GPS receivers were used. One receiver was used for kinematic GPS and the second used as a base station collecting static GPS data at Fort Lauderdale Executive Airport set up on a temporary point designated "BAN". The coordinate of "BAN" was determined to have an accuracy of first order horizontally. All GPS phase data collected was post-processed with continuous kinematic survey techniques using Ashtech's PNAV software program. The results from each process were combined to yield a single fixed integer phase differential solution of the aircraft trajectory. The processing solutions were analyzed and found to be valid and correct.

Aerotriangulation

A fully analytical block and bundle adjustment was performed for the MHW color and MLLW black & white infrared photographs at both scales (1:14,400 and 1:40,000). However, EDI did not perform aerotriangulation for the MHW black & white infrared. The original task order specified a one meter accuracy for 1:2,400 scale digital orthophotographs and five meter accuracy for 1:40,000. This data was verified by RSD personnel and found to be compliant with the task order. Upon the award of the second task order, EDI staff determined the need to strengthen the original aerotriangulation solution with additional ground control prior to the collection of vectors during the compilation phase. The mensuration operations were performed on EDI instruments consisting of Wild Pug 4 point-transfer devices and Wild BC2 analytical stereoplotters. The block and bundle adjustments for this project were completed using the Interactive Simultaneous Block and Bundle Adjustment (ISBBA) package. Based on the summary statistics for all of the aerotriangulated ground point standard deviations provided by EDI, the predicted horizontal circular error at the 95% confidence level is 0.25 meters for the 1:14,000 scale adjustments and 0.50 meters for the 1:40,000 scale adjustments.

Compilation

The compilation phase of the project was accomplished by EDI personnel in December 2001. Digital mapping was performed in the softcopy environment using Z/I Imaging SSK Digital Photogrammetric Workstations (DPW). These systems are equipped with MicroStation for initial data collection and editing. Feature identification and the assignment of cartographic codes were based on image analysis of 1:14,400 and 1:40,000 scale natural color photographs

and information extracted from the appropriate NOAA Nautical Charts. Cartographic feature attribution was assigned in compliance with the National Geodetic Survey's 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 one (1) meter at the 95% confidence level for the port areas of Miami and Ft Lauderdale and five (5) meters for the open shoreline area between the two main port areas.

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

Date of Acquisition	Location of Acquisition	Film Emulsion	Photograph Numbers	Scale (Nominal)	Stage of Tide
02/01/98	Miami	Color	3810-3824	1:14,400	MHW
02/01/98	Miami	Color	3830, 3832-3845	1:14,400	MHW
02/01/98	Miami	Color	3848-3862	1:14,400	MHW
02/01/98	Miami	Color	3871-3879	1:14,400	MHW
01/18/97	Miami	B&W IR	4014-4026	1:14,400	MLLW
01/18/97	Miami	B&W IR	4034-4048	1:14,400	MLLW
01/18/97	Miami	B&W IR	4054-4066	1:14,400	MLLW
01/18/97	Miami	B&W IR	4075-4083	1:14,400	MLLW
02/01/98	Ft Lauderdale	Color	3909-3931	1:14,400	MHW
02/01/98	Ft Lauderdale	Color	3935-3957	1:14,400	MHW
02/01/98	Ft Lauderdale	Color	3961-3983	1:14,400	MHW
01/18/97	Ft Lauderdale	B&W IR	4114-4118	1:14,400	MLLW
01/18/97	Ft Lauderdale	B&W IR	4119-4131, 4133	1:14,400	MLLW
01/18/97	Ft Lauderdale	B&W IR	4140-4160	1:14,400	MLLW
01/18/97	Ft Lauderdale	B&W IR	4165-4183	1:14,400	MLLW
02/01/97	Miami	Color	6848-6864	1:40,000	MHW
02/01/97	Miami	Color	6866-6882	1:40,000	MHW
02/05/98	Miami	B&W IR	3987-4019	1:40,000	MLLW
02/05/98	Miami	B&W IR	4034-4066	1:40,000	MLLW

Final Review

The final review phase of project completion was completed by an AB CMP team member in January 2002. The digital cartographic feature files (DCFF) were 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 consisted of reviewing stereographic models utilizing a DPW for cartographic feature codes selection, positional accuracies of features, and nomenclature. The cartographic feature attribution was judged to conform to C-COAST specification. The offline evaluation process consisted of the comparison of hard copy plots of the project data with the largest scale nautical charts available and the natural color photographs.

Copies of NOAA nautical charts used for comparison and chart maintenance print purposes include:

Chart Number	Title	Scale	Edition
11466	Jupiter Inlet to Fowley Rocks	1:80,000	35th
11467	Intracoastal Waterway - West Palm Beach to Miami	1:40,000	36th
11468	Miami Harbor	1:10,000	38th
11470	Fort Lauderdale - Port Everglades	1:10,000	35th

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 EDI Aerotriangulation Report
- Hard copy of the EDI Project Completion Report
- Hard copy of the RSD Project Completion Report
- Page size graphic plot of DCFF contents

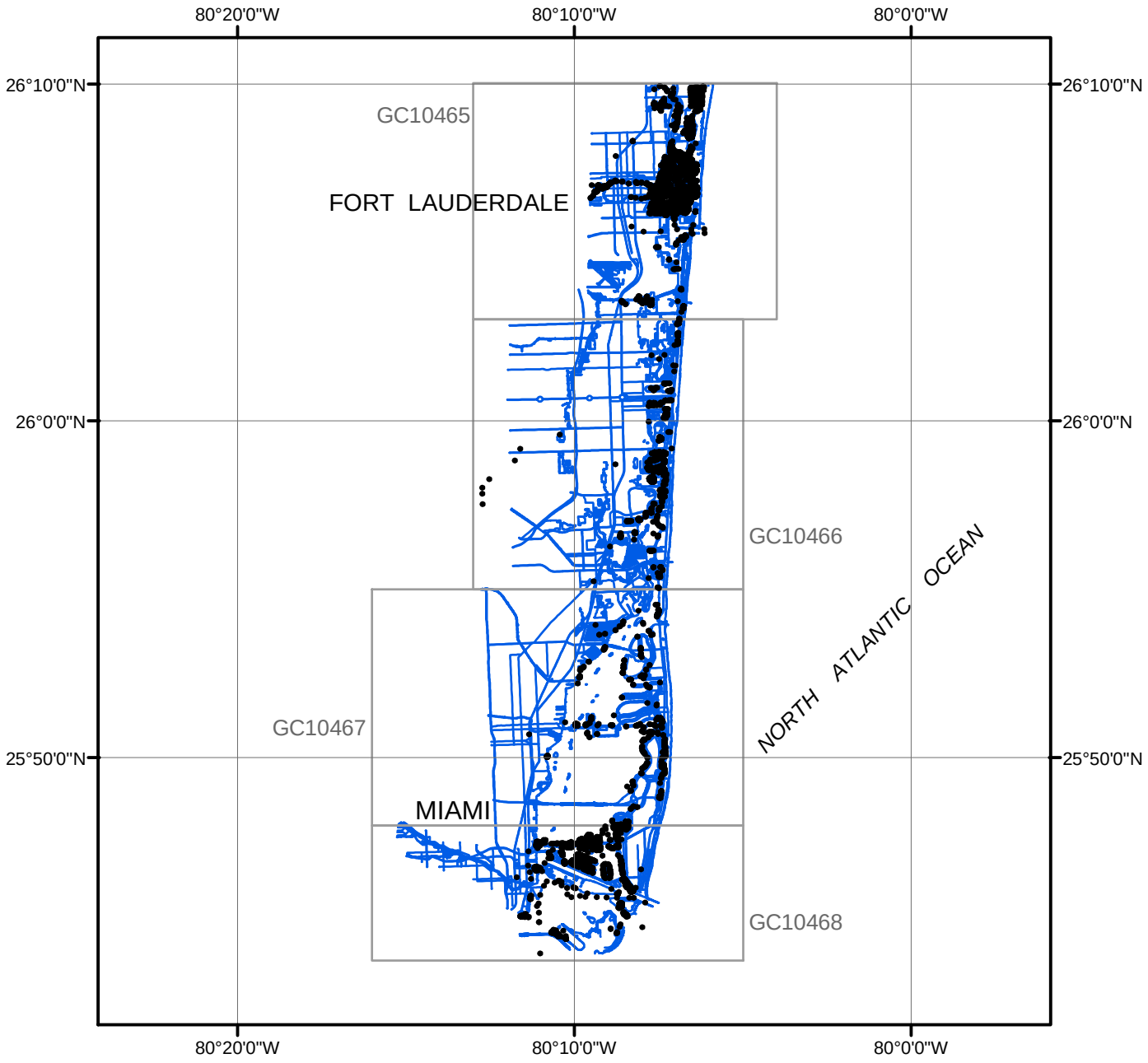
RSD Electronic Data Library:
- Project Database
- Digital copy of DCFF GC10465, GC10466, GC10467 and GC10468 in Shapefile format
- Digital copy of Project Completion Report in Adobe Acrobat (pdf) format

NOAA Shoreline Data Explorer
- DCFF: GC10465, GC10466, GC10467, GC10468
- Metadata file for GC10465, GC10466, GC10467, GC10468
- Digital copy of Project Completion Report in Adobe Acrobat (pdf) format

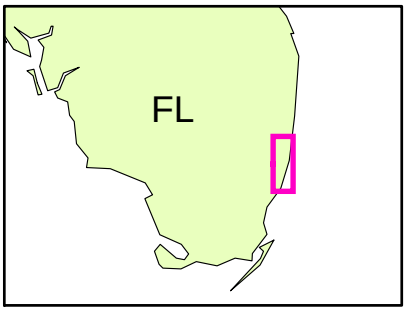
End of Report

MIAMI TO FORT LAUDERDALE

MIAMI, FLORIDA



Overview



FL9701

GC10465-10468