NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT CA1206

Port of Camp Pendleton and Oceanside Harbor, California

Introduction

Coastal Mapping Program (CMP) Project CA1206 provides highly accurate digital shoreline data for key areas of change in the Del Mar Boat Basin at Camp Pendleton and Oceanside Harbor, California. 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 CA1206 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely 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 digital 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 RB CSCAP Memorandum of January 31, 2014 for details of the chart comparison process.

Field Operations

The field operations consisted of the collection of static and kinematic Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data and the acquisition of digital aerial imagery. The photographic mission operations were conducted on April 28, 2012 with the NOAA King Air 350ER (N68RF) aircraft. Two strips (50-001 and 50-002) of RGB (color) digital images were acquired with an Applanix Digital Sensor System (DSS-439) aerial camera at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 1.13 feet (0.35 meter). Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW) tide stage.

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 airborne kinematic GPS data was processed using Applanix POSPac MMS 5.4 GPS/IMU software in May 2012. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the AB Project Archive.

Aerotriangulation

The aerotriangulation (AT) phase of project completion was performed in July 2014. Routine softcopy AT 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 accomplished by a member of AB utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components, and other associated peripheral devices. The digital images were measured and adjusted as a single block using BAE Systems SOCET GXP (version 4.1.0) photogrammetric suite in conjunction with the Triangulation module. Upon completion of the AT process, the simultaneous solve tool within the Triangulation module provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.3 meters based on a 95% confidence level. An AT 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 RSD in July 2014. Digital feature data was compiled using SOCET GXP (version 4.1.0) software. Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of the digital photographs and information extracted from the appropriate NOAA nautical charts, U.S.Coast Guard Light List 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 CA1206 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.6 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 the imagery used to complete this project:

Date	Time (UTC)	Roll Number	Photo Numbers	GSD (nominal)	Tide Level*
04-28-2012	20:15 - 20:16	12NC29	8214 – 8222	0.35 m	0.6 m
04-28-2012	20:24 - 20:25	12NC29	8223 – 8231	0.35 m	0.7 m

* Tide levels are given in meters above MLLW and were calculated using the Pydro software tool with discrete tidal zoning referenced to verified water level observations at the time of photography from the NOS gauge at La Jolla, CA. The elevation of the MHW tidal datum in the project area is 1.40 meters above MLLW.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in July 2014, and included analysis of aerotriangulation results and assessment of the identification and attribution of digital feature data within the Geographic Cell (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 10.2.1 software. 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:

RSD Applications Branch Archive

- Hardcopy of the Airborne Positioning and Orientation Report (APOR)
- Hardcopy of the Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR)
- Page size graphic plot of GC11089 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC11089 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

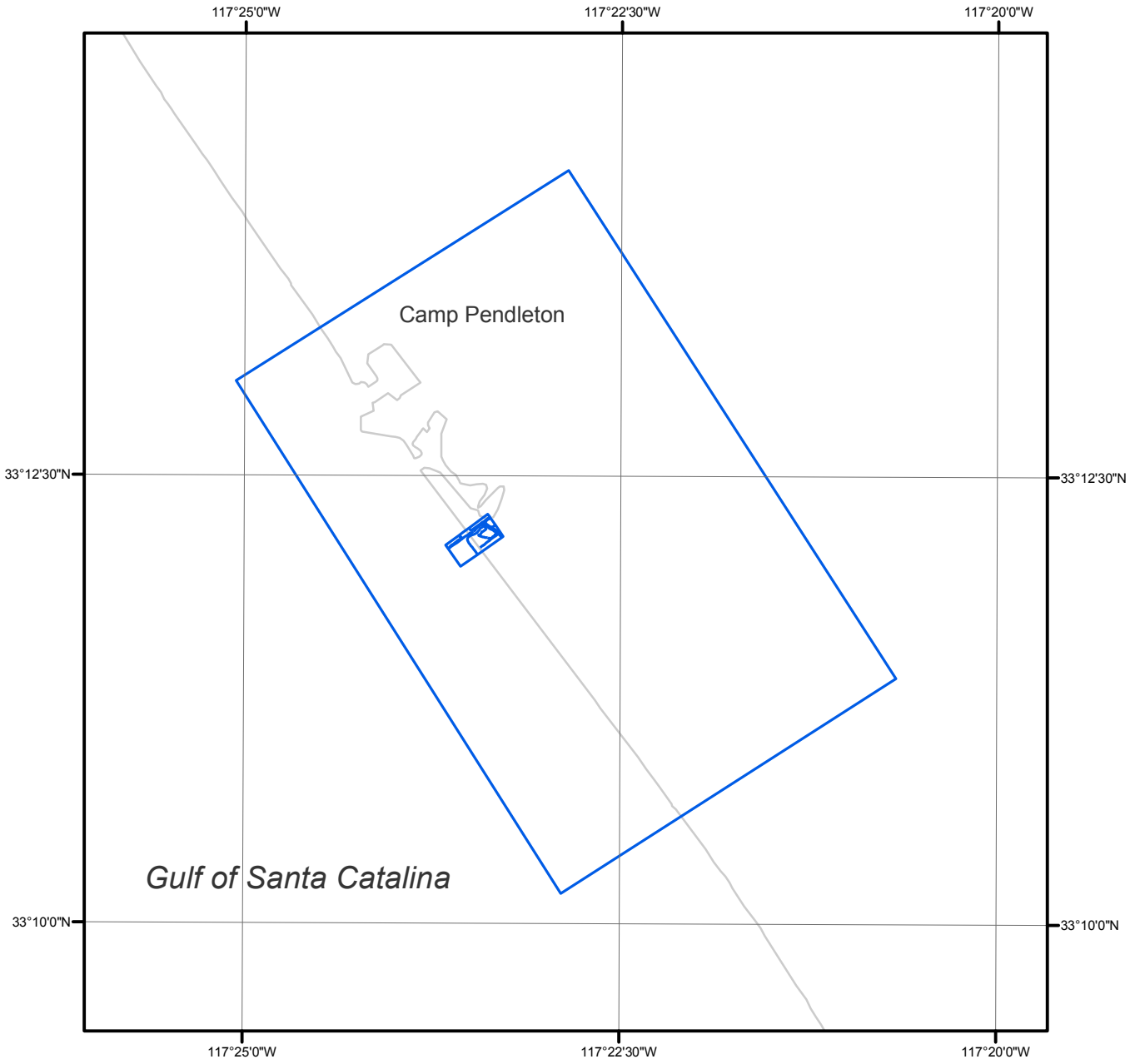
NOAA Shoreline Data Explorer

- GC11089 in shapefile format
- Metadata file for GC11089
- Digital copy of the PCR in Adobe PDF format

End of Report

PORT OF CAMP PENDLETON AND OCEANSIDE HARBOR

CALIFORNIA



Overview

CA1206

GC11089