

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT CA0402

Ports of Long Beach and Los Angeles, CA

Introduction

Coastal Mapping Program (CMP) Project CA0402 provides highly accurate digital shoreline data for key areas of change within the ports of Long Beach and Los Angeles, CA. The geographic cell (GC) may be used in support of the NOAA Nautical Charting Program (NCP) as well as geographic information systems (GIS) for coastal zone management applications.

Project Design

The design of Project CA0402 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to NOAA's Electronic Navigational Chart 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 satellite imagery in order to ascertain the need for more current shoreline data. Refer to the Long Beach, CA CSCAP Analysis Memorandum for details regarding the chart comparison process.

Field Operations

Routine CMP field operations did not apply for this project based on the origin of the project source data. Existing sources of horizontal control were used for the georeferencing process.

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 digital compilation. This work was initiated by AB personnel in October 2006 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. Twelve natural color aerial photographs from archived Project CA0102 were measured and adjusted as one block using BAE's SOCET SET[®] (version 5.3.0) suite of digital photogrammetric software. BAE's Multi-Sensor Triangulation (MST[®]) module was used to perform the aerotriangulation and evaluate the accuracy of the adjustment. Upon successful completion of the aerotriangulation process, the MST module provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point which were used to compute a predicted horizontal circular error of 1.1 meters for the entire block based on a 95% confidence level (CE95). For more information on this phase of project completion refer to the Aerotriangulation Report, which is on file with other project data within RSD's AB Project Archive.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Georeferencing

Three IKONOS non-orthorectified color images each with a spatial resolution of 62 centimeters, acquired from Space Imaging, Inc., were mosaicked into one image and georeferenced using Erdas IMAGINE 9.0 software on a Windows platform. Ground control points (GCP's), photogrammetrically measured from the aerotriangulated aerial photographs described above, were imported into IMAGINE and used to georeference the satellite imagery. Within IMAGINE, the Raster Geometric Correction tool was used with a 1st order polynomial model. The imagery was re-sampled using the Nearest Neighbor sampling method. The RMS of the residuals for measured check points was used to compute a CE95 of 0.6 meters for the satellite image. This CE value was tripled and then added to the CE95 of the source imagery given above, in order to conservatively predict the accuracy of well-defined points measured during the compilation process. A Georeferencing Report was written and is on file with other project data within the AB Project Archive.

Compilation

The compilation of cartographic feature data for this project was accomplished by a member of AB in December 2006. Digital feature data was compiled in ESRI shapefile format from imagery using ESRI's ArcGIS® version 9.1 desktop GIS software. Feature attributes were established using 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 cartographic features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project CA0402 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features extracted from georeferenced commercial satellite imagery were tested to have a horizontal accuracy of 2.9 meters at the 95% confidence level, a predicted accuracy of well-defined points based on a minimum of twenty (20) check points which were compared to an independent source of higher accuracy.

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

Image #	Image Source	Source ID	Source File Name	Acquisition Date/Time	Tide Level*
1	IKONOS	2004062618583500000011600228	po_174106_rgb_0000000.tif	2004-06-26 18:58 GMT	0.5 m
2	IKONOS	2004062618583500000011600228	po_174106_rgb_0000001.tif	2004-06-26 18:58 GMT	0.5 m
3	IKONOS	2004062618583500000011600228	po_174106_rgb_0000002.tif	2004-06-26 18:58 GMT	0.5 m

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS reference gauge at Los Angeles, CA. The elevation of MHW at Los Angeles, CA is 1.4 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in April 2007. The review process included analysis of the georeferencing results and assessment of the identification and attribution of digital feature data 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® version 9.1 desktop GIS software. The entire suite of project products 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 Project Completion Report (PCR)
- Page size graphic plot of GC10638 file contents, attached to PCR
- CSCAP evaluation minute memorandum

Remote Sensing Division Electronic Data Library

- Project database
- GC10638 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File in shapefile format

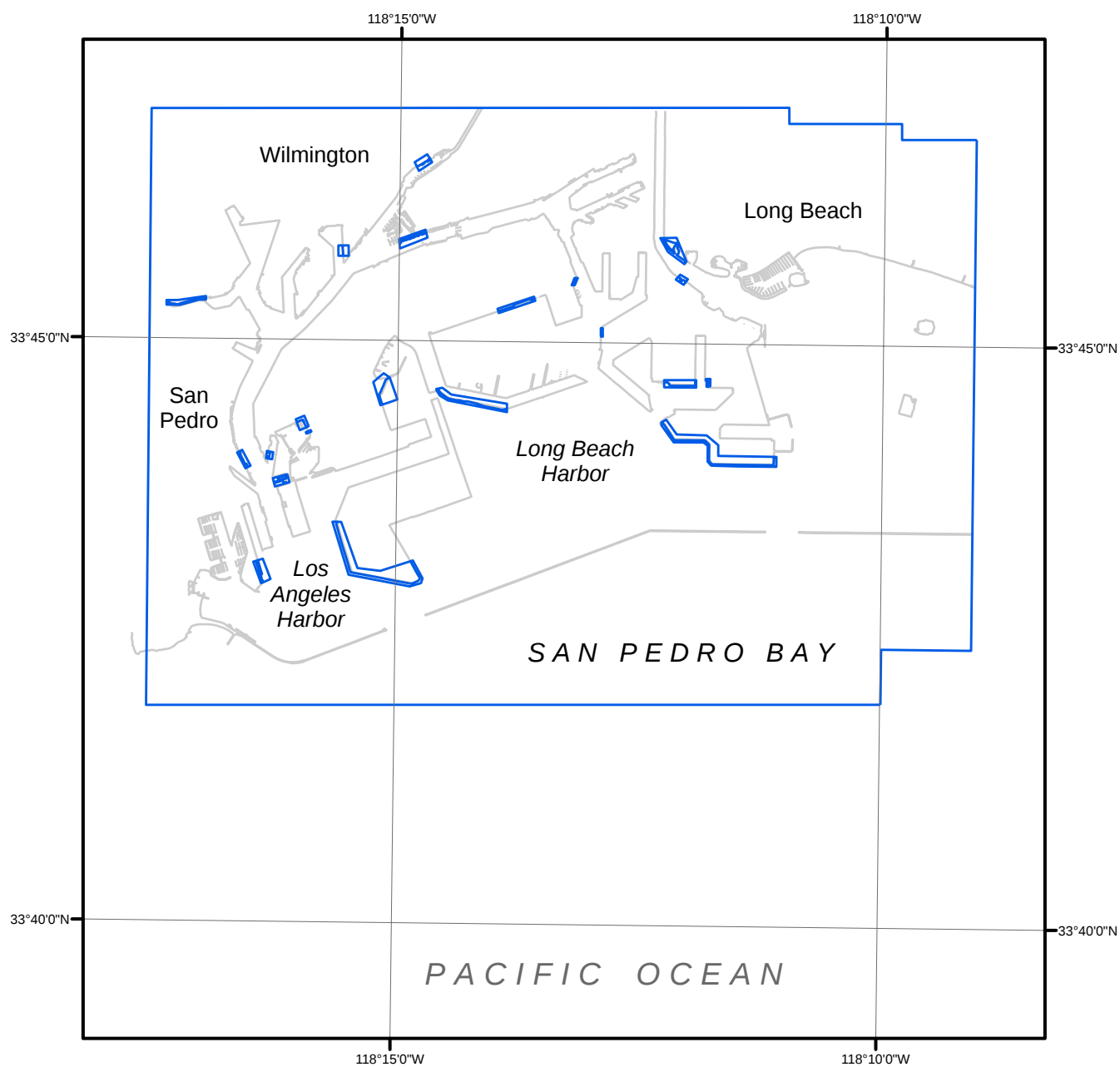
NOAA Shoreline Data Explorer

- GC10638 in shapefile format
- Metadata file for GC10638
- Digital copy of the PCR in Adobe PDF format

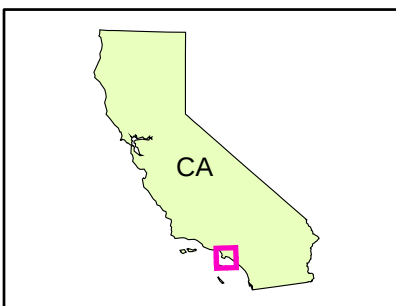
End of Report

PORTS OF LONG BEACH AND LOS ANGELES

CALIFORNIA



Overview



CA0402

GC10638