Appendix F

Multibeam Echo Sounding Surveys

Introduction

Multibeam echo sounding (MBES) and side scan data from the Estero Bay to San Luis Obispo Bay nearshore region were acquired using a combination of several sonar systems (400 KHz Reson 7125, 240 KHz Reson 8101, SEA SwathPlus) aboard the *R/V Ven Tresca* by the Seafloor Mapping Lab at California State University Monterey Bay during 2007, 2009, and 2010. Figure F-1 shows the areas mapped in the 2007 (Point Buchon) and 2009 (Point Buchon to Avila Bay) surveys. The 2010 data collection focused on nearshore areas adjacent to the Rattlesnake and Olsen Faults. Prior to data collection, a series of planned survey lines were created using the survey navigation and planning software Hypack 2008 from Hypack, Inc. An Applanix POS/MV 320 v4 system with TrueHeave processing was used to provide position and attitude data during data collection and accounted for vessel motion such as heave, pitch, and roll (position accuracy ± 2m, pitch, roll and heading accuracy ±0.02°, heave accuracy ± 5% or 5cm) with input from a Cnav® enabled NAVCON 2050 GPS. KGPS altitude data were used to account for tide cycle fluctuations and sound velocity profiles were collected with an Applied Microsystems SVPlus sound velocimeter.

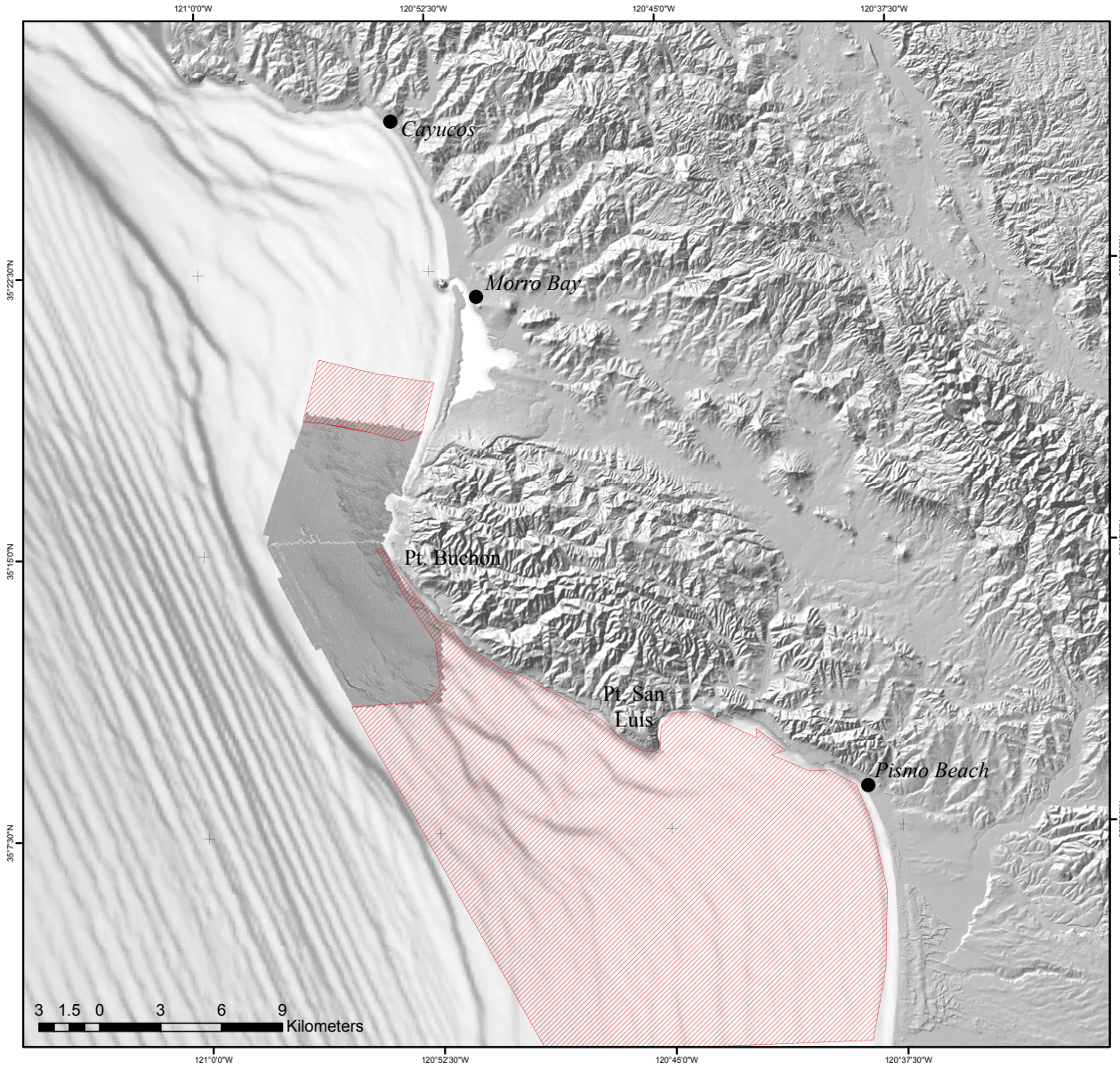
Bathymetric data were post-processed using CARIS HIPS hydrographic data cleaning system software. Applanix POSPAC software (v 4.31) was used to process the logged POS M/V files and create a Smoothed Best Estimated Trajectory (SBET) composed of an integrated inertial/GPS solution for use in horizontal and vertical positioning of sounding data. Correction for vertical oscillation due to heave and tide was accomplished using these SBET files. Final x, y, z soundings, surface models, and derived products are relative to the NAVD88 Geoid03 vertical datum. Erroneous soundings were removed in CARIS HIPS via basic filtering and detailed swath and subset cleaning; the remaining high-confidence soundings were used in surface model creation and final product generation. Soundings (x, y, z) were exported from a Swath Angle Bathymetry Associated with Statistical Error (BASE) Surface as an ASCII file with 1m (or 2m) spacing. The 1m (or 2m) decimated x, y, z ASCII text file was imported into Fledermaus Average Gridder to create digital elevation model (DEM) grid(s). The 1m (or 2m) Fledermaus grid was exported as an Arc Info ASCII raster file (.asc), which was imported into ArcGIS Spatial Analyst to generate a 1m (or 2m) bathymetry Arc Info grid. Post-survey data cleaning, BASE surface creation, and final products derived from post-processed multibeam bathymetry data were applied by the Seafloor Mapping Lab at CSUMB. Data products are presented at 1m and 2m spatial resolutions based on discrete depth ranges: 1m horizontal resolution for data from the 0-50m depth range, and 2m horizontal resolution for the full survey footprint. Vertical precision is ±10 cm.

Multibeam databases for both the 2007 Pt. Buchon and the 2009 Pt. Buchon to San Luis Obispo Bay surveys can be accessed at the CSU Sea Floor Mapping Lab Data Library http://seafloor.csumb.edu/SFMLwebDATA_c.htm. Data include grey scale and color shaded relief images, sidescan sonar, bathymetry (contours and DEM) as well as survey footprints, tracklines, and XYZ files. MBES data for the study area are shown in Plate 1 of the Shoreline Fault Zone Report at a scale of 1: 35,000, and are discussed in conjunction with the geologic interpretation of the Shoreline fault zone in Section 4 of the Shoreline Fault Zone Report. Comparison of MBES data with earlier bathymetric data

collected for the LTSP illustrate the difference improved technology and GPS navigation have made during the last two decades (see Figure F-2 and F-3).

Reference

California State University Monterey Bay Sea Floor Mapping Lab, 2009, website at http://seafloor.csumb.edu/SFMLwebDATA_c.htm (visited 12/15/2010)



Notes: Red track lines show areas where MBES data were collected in 2009. Bathymetry data for the shaded area offshore of Pt. Buchon was collected in 2007 as part of the California State Waters Mapping program. Spatial resolution in water depths less than 50 m is 1 m, and 2 m for water depths greater than 50 m.

Multibeam echo sounding (MBES) coverage of the study area

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Figure **F-1**

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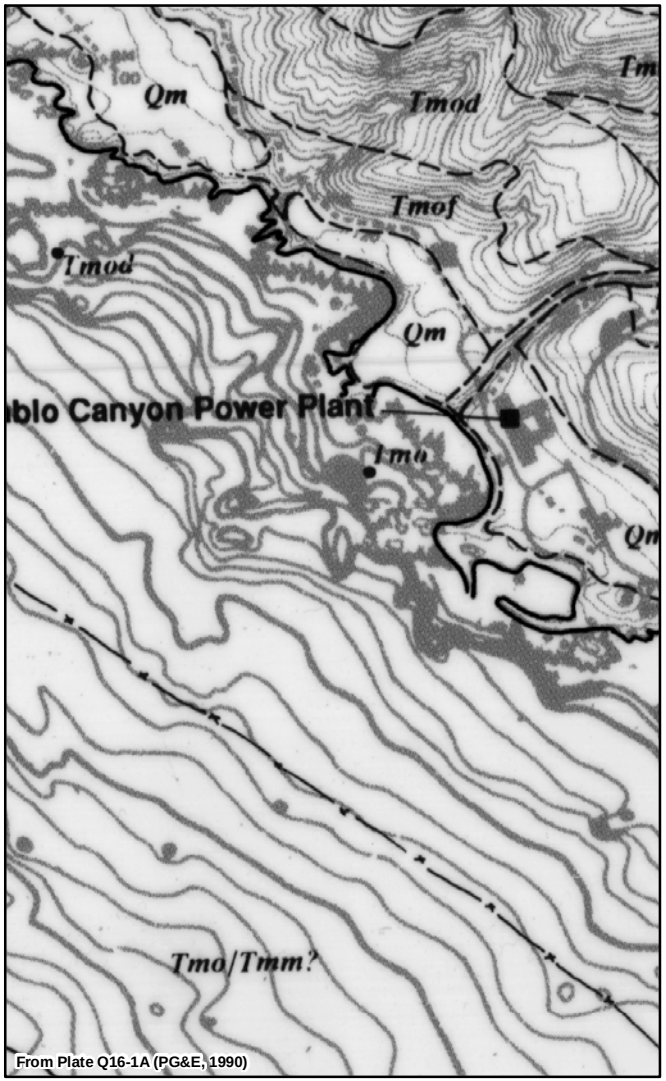

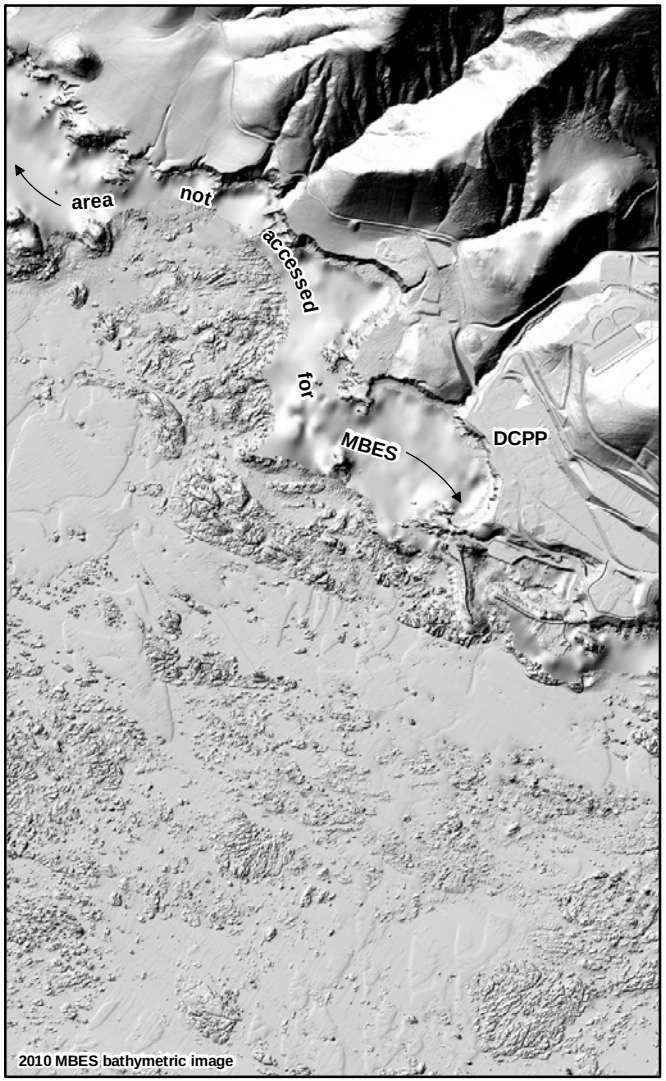

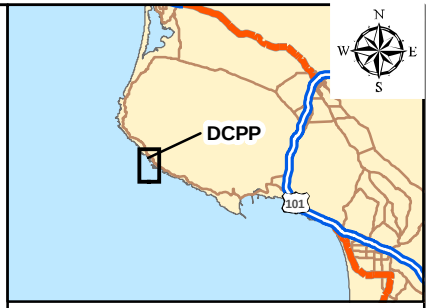

Map scale: 1:15,000
Map projection: NAD 1983, UTM Zone 10 North

0 0.1 0.2 0.3 0.4 0.5 Miles

0 0.2 0.4 0.6 0.8 Kilometers

Comparison of 1990 LTSP bathymetry with the 2009 MBES bathymetry - offshore DCPP area

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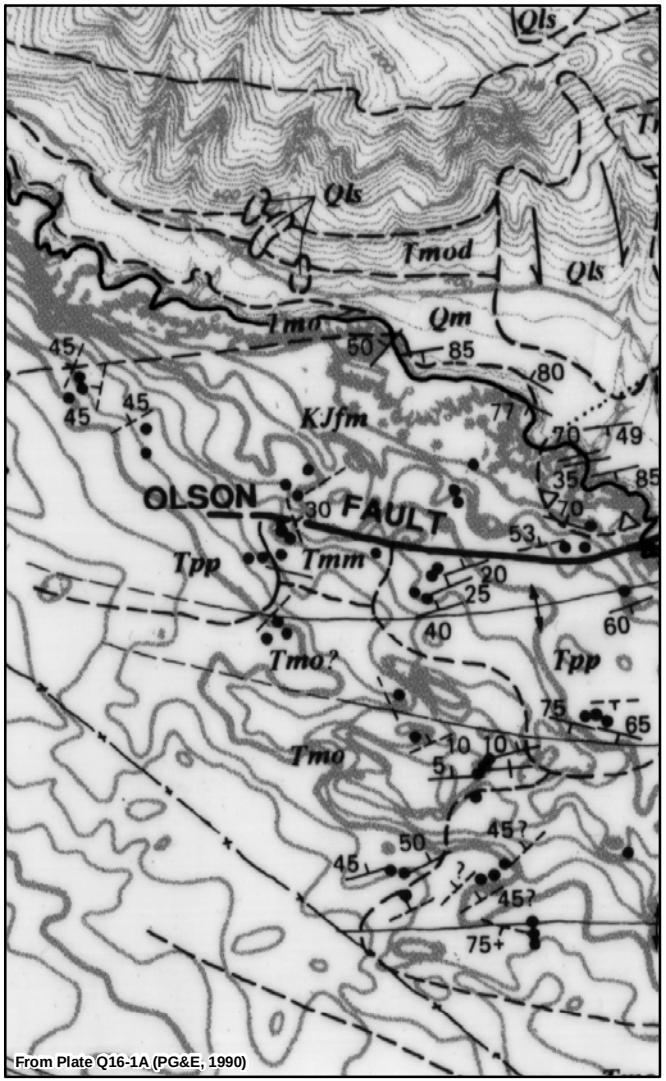
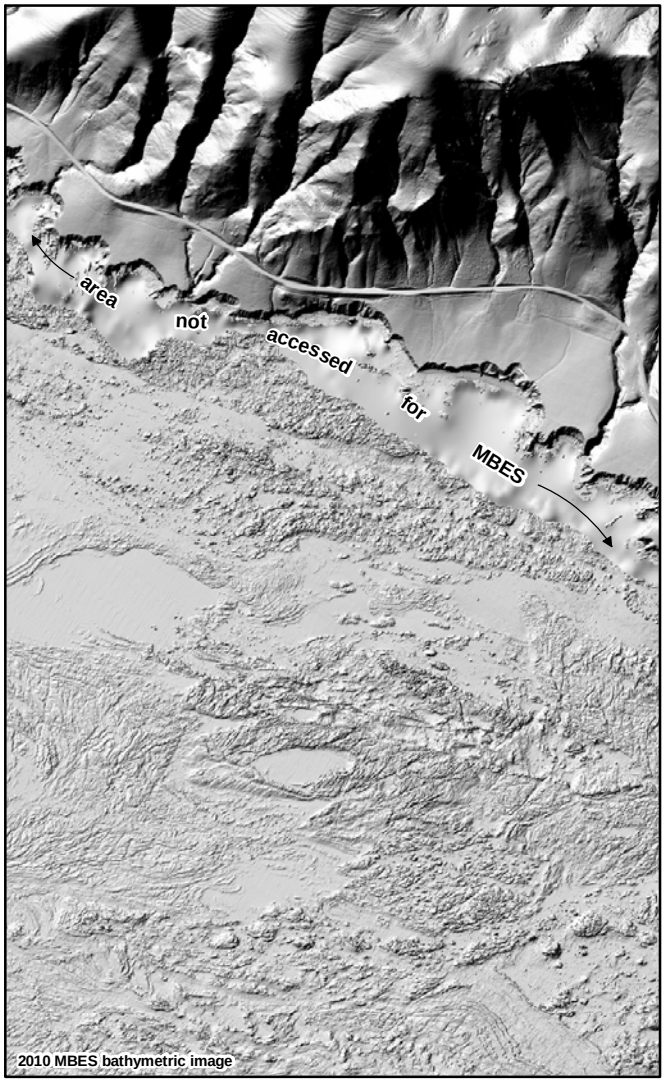
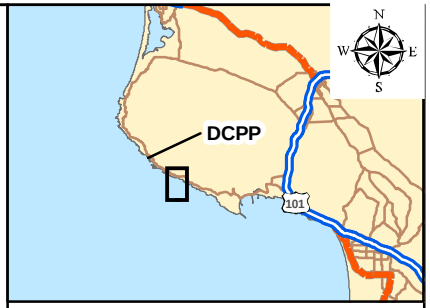


From Plate Q16-1A (PG&E, 1990)



2010 MBES bathymetric image



Map scale: 1:15,000
Map projection: NAD 1983, UTM Zone 10 North

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0 0.2 0.4 0.6 0.8 Kilometers

Comparison of 1989 LTSP bathymetry with the 2009 MBES bathymetry - offshore Olson Hill area

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