

**STUDY TITLE:** Multibeam Survey of the Eastern Santa Barbara Channel, California

**REPORT TITLE:** Bathymetry and Acoustic Backscatter: Outer Mainland Shelf, Eastern Santa Barbara Channel, California

**CONTRACT NUMBER:** BOEM 2012-029

**SPONSORING OCS REGION:** Pacific

**APPLICABLE PLANNING AREA(S):** Southern California

**FISCAL YEAR(S) OF PROJECT FUNDING:** 2010-2012

**COMPLETION DATE OF REPORT(s):** July 31, 2012

**COSTS:** FY2010: \$300,000; FY2011: \$0.0

**PROJECT MANAGER(S):** Guy R. Cochrane

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**KEY WORDS:** bathymetry, acoustic backscatter, seafloor, benthic habitats, mapping

**BACKGROUND:** The Bureau of Ocean Energy Management (BOEM) is interested in maps of hard-bottom habitats, particularly natural outcrops, that support reef communities in areas near oil and gas activity. In support of these efforts BOEM initiated a cooperative project with the U.S. Geological Survey (USGS) to map the outer mainland shelf in eastern Santa Barbara Channel offshore oil production platforms. This was the last remaining area to be mapped in the Channel with high-resolution mapping tools.

**OBJECTIVES:** The objectives of the project were to collect high-resolution bathymetry and backscatter data of the outer mainland shelf in the eastern Santa Barbara Channel within a region not previously mapped using modern, high-resolution mapping tools. A secondary objective was to merge the newly acquired bathymetry data with existing data to create an overall 10-m resolution Digital Terrain Model of the entire Channel, excluding the region near the northern Channel Islands where little bathymetry data exists.

**DESCRIPTION:** The U.S. Geological Survey (USGS), Pacific Coastal and Marine Science Center (PCMSC) in cooperation with the Bureau of Ocean Energy Management (BOEM) completed mapping of the outer shelf region of the eastern Santa Barbara Channel, Southern California. High-resolution bathymetry and co-registered acoustic backscatter data were collected from south of Santa Barbara to west of Oxnard, mainly seaward of the 3-nautical mile limit of California's State Waters (Fig. 1). This was the last remaining area to be mapped in the Santa Barbara Channel with high-resolution mapping tools, except for regions around the Northern Channel Islands. The USGS surveys abutted data previously collected within California State Waters by California State University, Monterey Bay, Seafloor Mapping Lab, Fugro Pelagos, and the USGS, and further offshore by the Monterey Bay Aquarium Research Institute (MBARI) and the USGS.

**SIGNIFICANT CONCLUSIONS:** The majority of the seafloor mapped over the two years consists of low-relief, low-backscatter sedimented seafloor. Towards the northwest there are two east-west trending ridges with moderate relief (Fig. 2) and higher backscatter intensities (Fig. 3). The northern ridge may be associated with the Red Mountain Fault, while the ridge to the south may be associated with the Ventura-Pitas Point fault system. There is a region between the ridges that has low relief but moderate backscatter intensities compared to the southeast. Without ground-truth information it is presumed that this region has either coarser grained sediment or is bedrock covered by a thin layer of sediment

**STUDY RESULTS:** The 2010 and 2011 USGS surveys of the outer mainland shelf in the eastern Santa Barbara Channel covered about 200 km<sup>2</sup> (76 miles<sup>2</sup>). Observed depths ranged from 15 m to 105 m. The surveys were completed over 24 days in 2010, from June 28 to July 21, and over 20 days in 2011, from July 6 to July 26. In 2010, over 104 km<sup>2</sup> (40 miles<sup>2</sup>) of seafloor were mapped in water depths ranging from 15 to 105 m. In 2011, over 95 km<sup>2</sup> (36 miles<sup>2</sup>) of seafloor were mapped in water depths ranging from 20 to 74 m. These new data can be used to help researchers, coastal-zone managers, and other stakeholders better understand the coastal environment including identifying hard-bottom substrates, such as natural outcrops that support reef communities; prediction of sediment and contaminant budgets and transport; and to assess earthquake and tsunami hazards in the region.

**STUDY PRODUCT(S):** The USGS has produced an on-line Digital Data Series that has a summary of the mapping mission, the bathymetry and acoustic backscatter data in a number of different formats, digital maps generated from the bathymetry and backscatter data, as well as Federal Geographic Data Committee (FGDC) metadata. The report is available at <http://pubs.usgs.gov/ds/702/>.

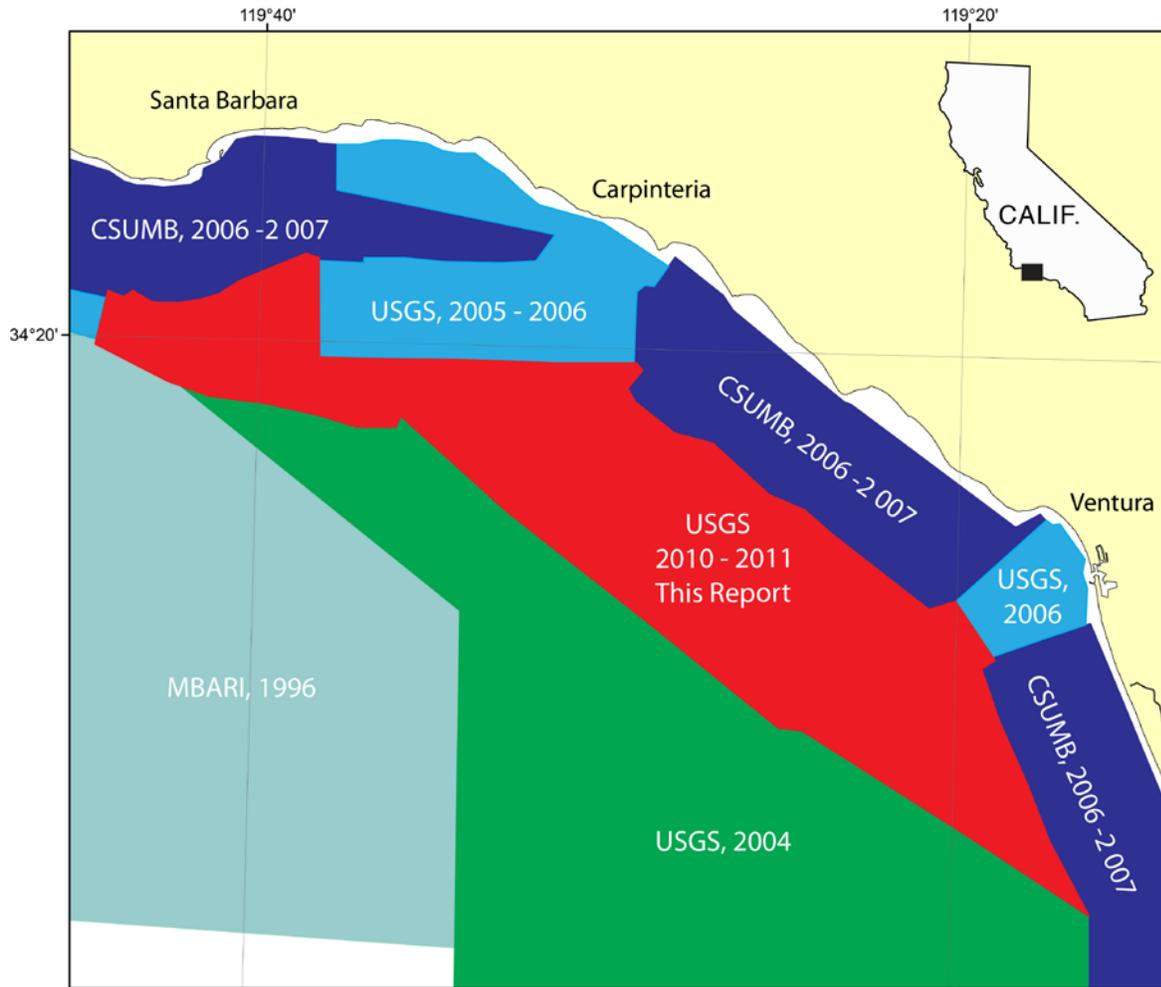


Figure 1. Location map of the 2010 and 2011 USGS mapping (colored red). Other colored polygons show previously mapped regions of the Santa Barbara Channel, including institution and year. CSUMB, California State University, Monterey Bay; MBARI, Monterey Bay Aquarium Research Institute; USGS, U.S. Geological Survey.

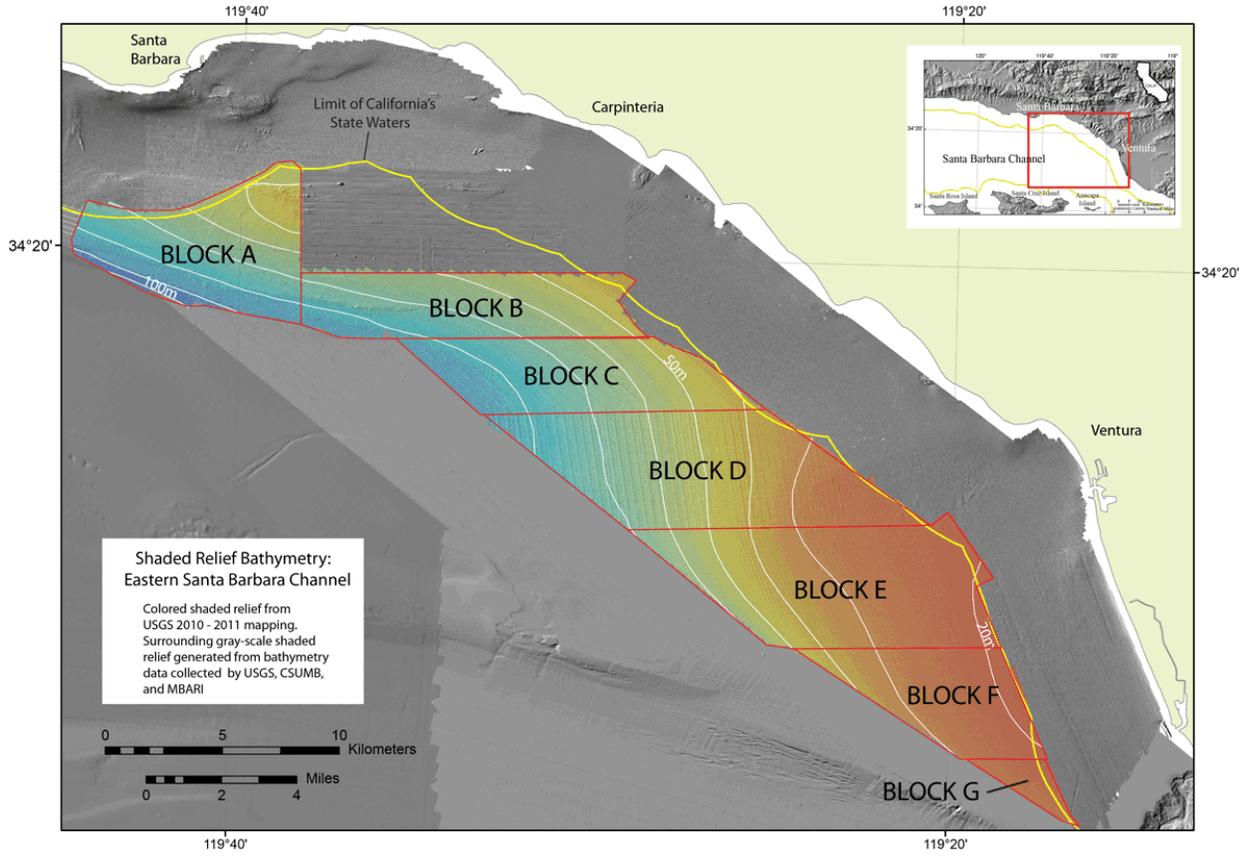


Figure 2. Plan view of shaded-relief bathymetry of the eastern Santa Barbara Channel. The 2010 and 2011 USGS-BOEM mapped area is colored for depth: reds (shallower) to blues (deeper). The surrounding gray shaded-relief bathymetry is generated from bathymetry data collected by California State University, Monterey Bay Seafloor Mapping Lab (CSUMB), the Monterey Bay Aquarium Research Institute (MBARI), and the USGS. Red outlines show the location of the individual bathymetry files (Blocks A – G) available in the Data Catalog section of the report.

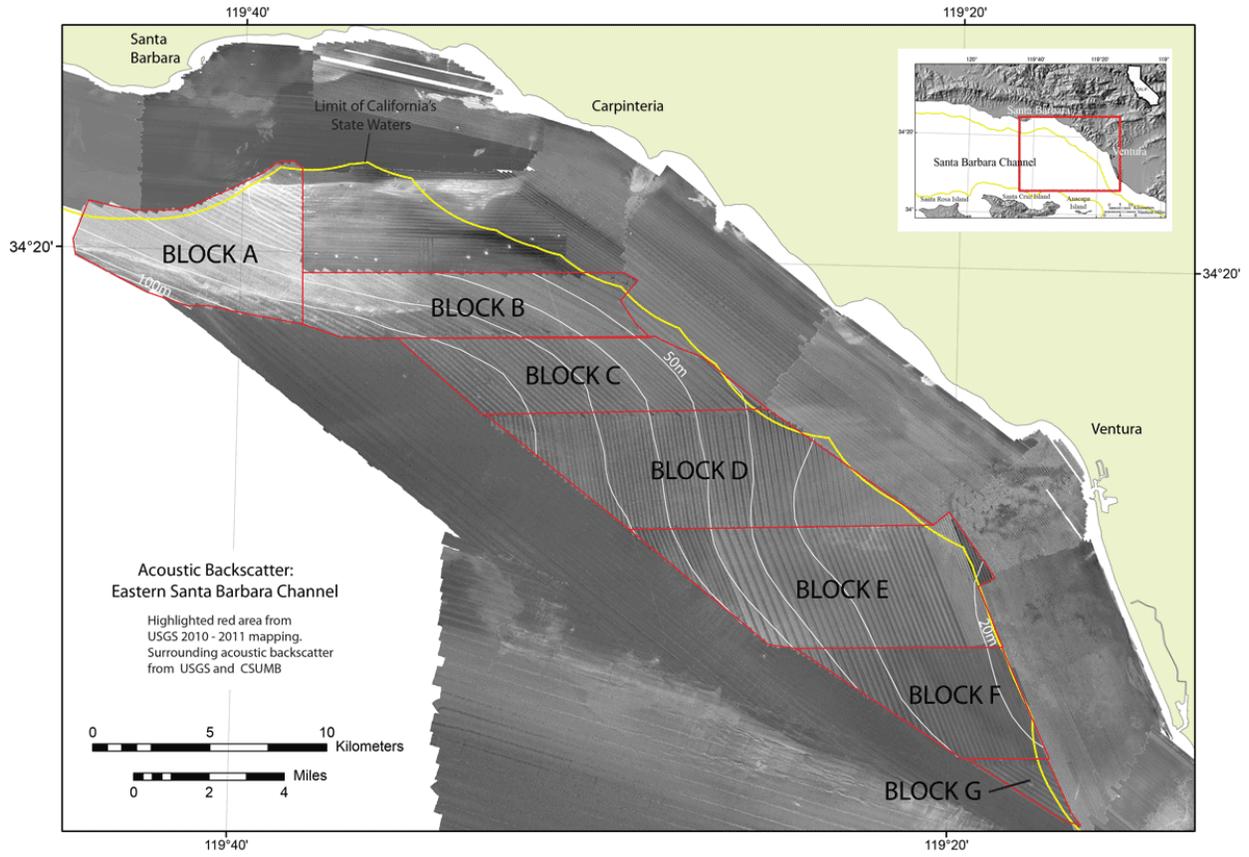


Figure 3. Normalized backscatter amplitude of the eastern Santa Barbara Channel. Red outlines show the location of the individual backscatter files (Blocks A – G) available in the Data Catalog section of the report. The surrounding backscatter imagery is from California State University, Monterey Bay; Seafloor Mapping Lab; and USGS.