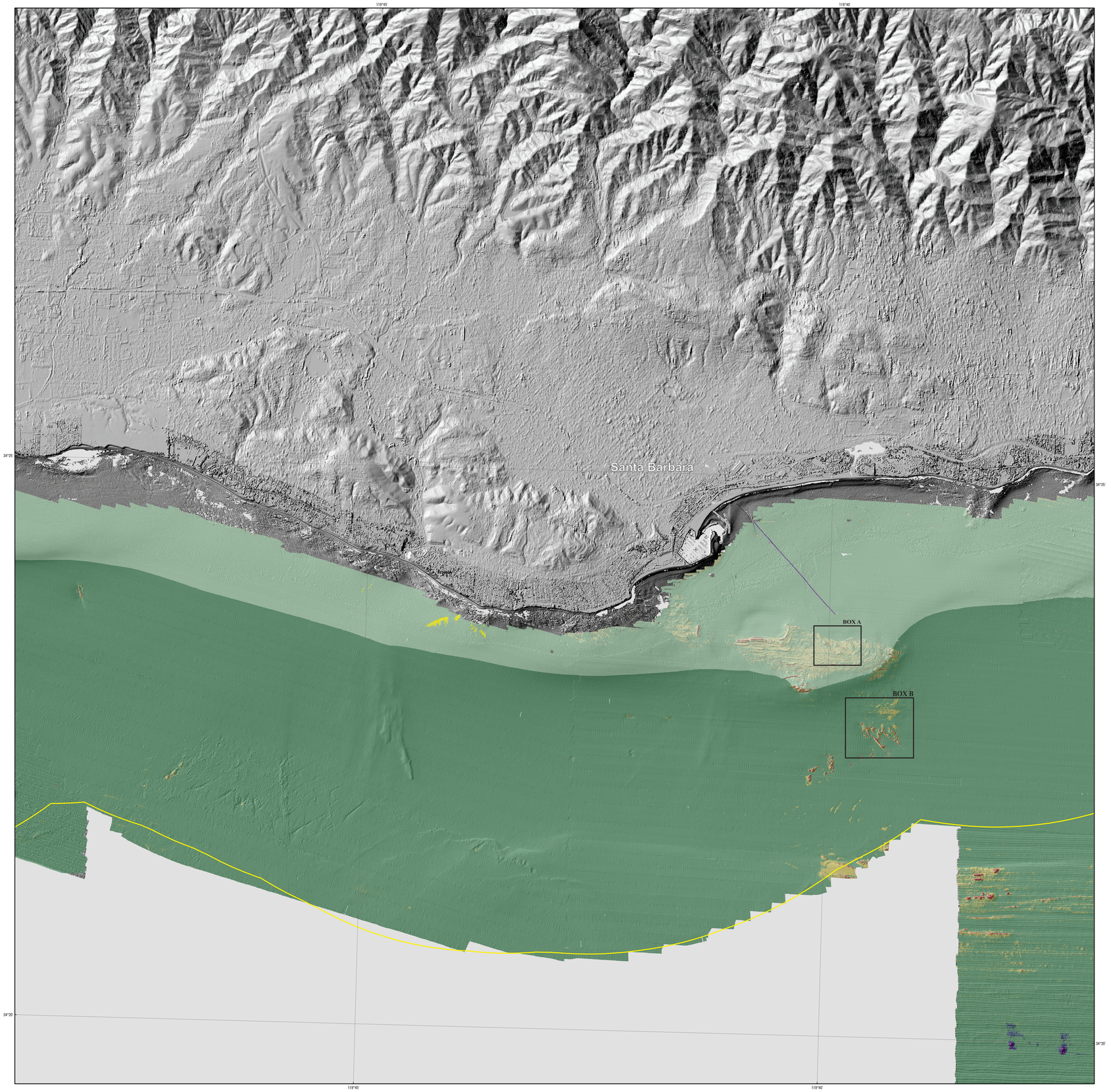

Onshore elevation data from NOAA Coastal Services Center (data collected by EarthData International in 2002-2003) and from U.S. Army Corps of Engineers (data collected by Fugro Pelagos in 2009). Offshore shaded-relief bathymetry from map on sheet 2, this report. California's State Waters limit from NOAA Office of Coast Survey

Universal Transverse Mercator projection, Zone 11N

NOT INTENDED FOR NAVIGATIONAL USE

12½°
APPROXIMATE MEAN DECLINATION, 2013

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

BATHYMETRIC CONTOUR INTERVAL 10 METERS

ONE MILE = 0.869 NAUTICAL MILES

CALIF

MAP LOCATION

Seafloor character mapped by Eleyne L. Phillips, 2011
GIS database and digital cartography by Eleyne L. Phillips and Mercedes D. Erdey
Edited by Taryn A. Lindquist
Manuscript approved for publication December 12, 2013

Seafloor Character, Offshore of Santa Barbara Map Area, California

By
Eleyne L. Phillips, Mercedes D. Erdey, and Guy R. Cochrane

2013

DESCRIPTION OF MAP UNITS

DEPTH ZONE 2—INTERTIDAL TO 30 METERS WATER DEPTH

SLOPE CLASS 1—0 TO 5 DEGREES

- **Fine- to medium-grained smooth sediment**—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed
- **Mixed smooth sediment and rock**—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock
- **Medium- to coarse-grained sediment**—Very high backscatter, low rugosity; typically medium- to coarse-grained sediment, with varying amounts of shell hash; in scour depressions
- **Rock and boulder, rugose**—High backscatter, high rugosity; typically boulders and rugose bedrock
- **Rugged anthropogenic material**—High backscatter, high rugosity; related to development by humans
- **Smooth, hard anthropogenic material**—High backscatter, low rugosity; related to development by humans

DEPTH ZONE 3—30 METERS TO 100 METERS WATER DEPTH

SLOPE CLASS 1—0 TO 5 DEGREES

- **Fine- to medium-grained smooth sediment**—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed
- **Mixed smooth sediment and rock**—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock
- **Rock and boulder, rugose**—High backscatter, high rugosity; typically boulders and rugose bedrock
- **Rugged anthropogenic material**—High backscatter, high rugosity; related to development by humans
- **Smooth, hard anthropogenic material**—High backscatter, low rugosity; related to development by humans

EXPLANATION OF MAP SYMBOLS

- **Area of "no data"**—Areas near shoreline not mapped owing to insufficient high-resolution seafloor mapping data; areas beyond 3-nautical-mile limit of California's State Waters were not mapped as part of California Seafloor Mapping Program
- **3-nautical-mile limit of California's State Waters**

DISCUSSION

This seafloor-character map of the Offshore of Santa Barbara map area in southern California was produced using video-supervised, maximum-likelihood classification of the bathymetry and backscatter (intensity of return) signals from sonar systems (a summary of the video data collected for the purpose of supervising the classification is shown on sheet 6). Rugosity (a GIS-derived characterization of roughness) and backscatter intensity were used as variants in the classification. The interpreted classifications were then draped over shaded-relief bathymetry (see sheet 2).

The substrate classes mapped in this area have been divided into the following California Marine Life Protection Act depth zones: Depth Zone 2 (intertidal to 30 m), and Depth Zone 3 (30 to 100 m). In addition, the following slope class is represented on this map (Coastal and Marine Ecological Classification Standard slope zone is shown in parentheses): Slope Class 1, 0° to 5° (flat). Depth Zone 1 (intertidal), Depth Zones 4 and 5 (greater than 100 m), and Slope Classes 2 to 4, greater than 5° (sloping to vertical), are not present in this map area.

Fine- to medium-grained smooth sediment (sand and mud) makes up 98.0 percent (110.0 km^2) of the map area: 24.3 km^2 is in Depth Zone 2, and 85.7 km^2 is in Depth Zone 3. Mixed smooth sediment (sand and gravel) and rock (sediment typically forming a veneer over bedrock, or rock outcrops with little to no relief) make up 1.7 percent (1.9 km^2) of the map area: 1.0 km^2 is in Depth Zone 2, and 0.9 km^2 is in Depth Zone 3. Rock and boulder, rugose (rock outcrops and boulder fields having high surficial complexity) makes up 0.2 percent (0.2 km^2) of the map area: 0.1 km^2 is in Depth Zone 2, and 0.1 km^2 is in Depth Zone 3. Medium- to coarse-grained sediment, present only in Depth Zone 2, makes up less than 0.1 percent (<0.1 km^2) of the map area. Rugged anthropogenic material makes up 0.1 percent (0.1 km^2) of the map area: less than 0.1 km^2 is both in Depth Zone 2 and in Depth Zone 3. Smooth, hard anthropogenic material makes up less than 0.1 percent (<0.1 km^2) of the map area: less than 0.1 km^2 is both in Depth Zone 2 and in Depth Zone 3 (table 1).

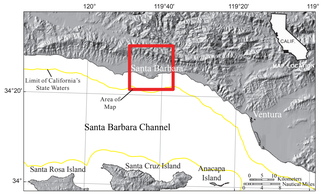

Table 1. Coverage of classified seafloor, in square kilometers (sq km) and percent of total area, broken into California Marine Life Protection Act Depth Zones 2 and 3.

	Total		Depth Zone 2 (water depth 0–30 m)		Depth Zone 3 (water depth 30–100 m)	
	percent	sq km	percent of total	sq km	percent of total	sq km
Fine- to medium-grained smooth sediment	98.0	110.0	21.7	24.3	76.3	85.7
Mixed smooth sediment and rock	1.7	1.9	0.9	1.0	0.8	0.9
Rock and boulder, rugose	0.2	0.2	0.1	0.1	0.1	0.1
Medium- to coarse-grained sediment	<0.1	<0.1	<0.1	<0.1	0.0	0.0
Anthropogenic (rugged)	0.1	0.1	<0.1	<0.1	<0.1	<0.1
Anthropogenic (smooth, hard)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

BOX A

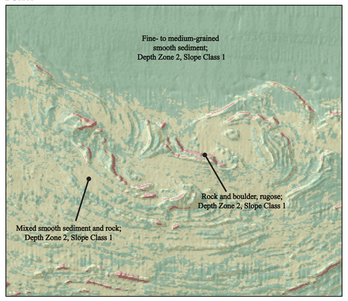

Figure 1. Detailed view of substrate classes mapped offshore, southeast of Santa Barbara (see Box A, on map, for location; see also, fig. 2 on sheet 4): Depth Zone 2 (intertidal to 30 m), and Slope Class 1 (0°–5°). Fine- to medium-grained smooth sediment is shown in shades of green; mixed smooth sediment and rock is shown in shades of tan; and rock is shown in shades of pink.

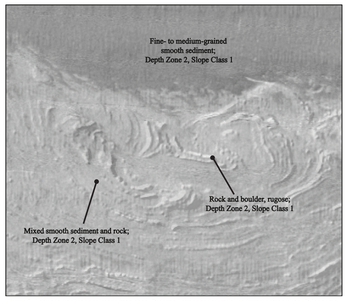

Figure 2. Acoustic-backscatter image (see sheet 3) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 1 (Box A on map). Brighter areas indicate coarse-grained, rough, or hard seafloor; darker areas indicate unconsolidated (loosely packed) sediment. Interpreted substrate classes from figure 1 included for comparison.

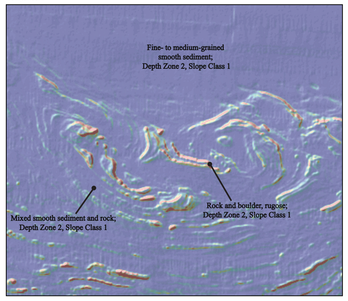

Figure 3. Rugosity (characterization of roughness derived from bathymetry) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 1 (Box A on map). Rugosity values are displayed in muted "rainbow" color spectrum that ranges from purple (low rugosity) through green (medium rugosity) to red (high rugosity). Areas of high slope are indicated by high-rugosity values (red); areas of low slope, by medium- to low-rugosity values (green to purple). Interpreted substrate classes from figure 1 included for comparison.

BOX B

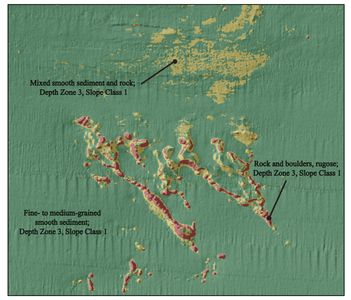

Figure 4. Detailed view of substrate classes mapped further offshore, southeast of Santa Barbara (see Box B, on map, for location): Depth Zone 3 (30 to 100 m), and Slope Class 1 (0°–5°). Fine- to medium-grained smooth sediment is shown in shades of green; mixed smooth sediment and rock is shown in shades of tan; and rock is shown in shades of pink.

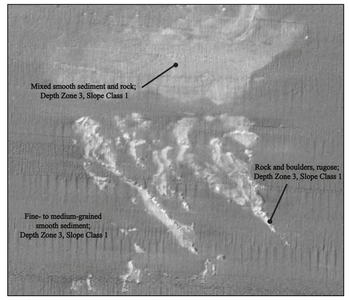

Figure 5. Acoustic-backscatter image (see sheet 3) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 4 (Box B on map). Brighter areas indicate coarse-grained, rough, or hard seafloor; darker areas indicate unconsolidated (loosely packed) sediment. Interpreted substrate classes from figure 4 included for comparison.

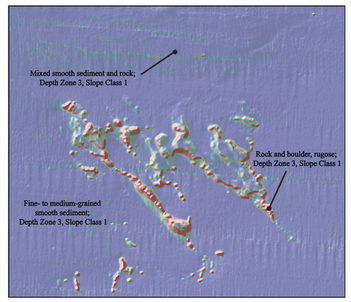

Figure 6. Rugosity (characterization of roughness derived from bathymetry) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 4 (Box B on map). Rugosity values are displayed in muted "rainbow" color spectrum that ranges from purple (low rugosity) through green (medium rugosity) to red (high rugosity). Areas of high slope are indicated by high-rugosity values (red); areas of low slope, by medium- to low-rugosity values (green to purple). Interpreted substrate classes from figure 4 included for comparison.

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