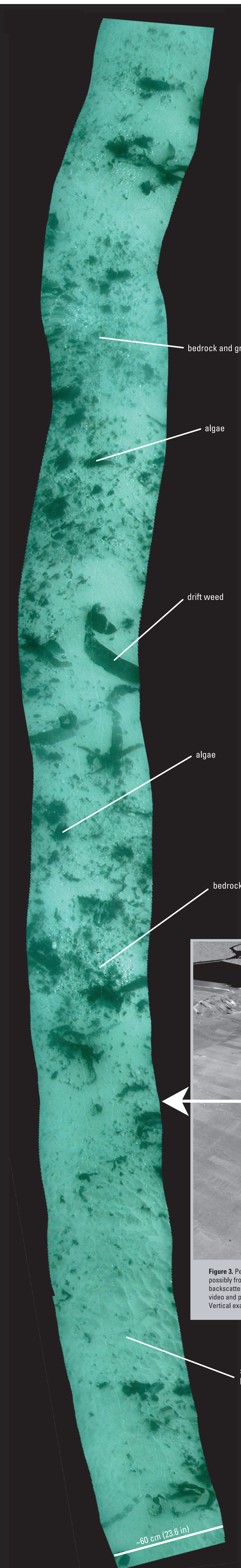


Figure 4. Video mosaic of area east of Heuneme Canyon, which reveals that seafloor is composed of thin layer of sand over bedrock and patches of gravel (see figure 3 for location). Algae are attached to harder surfaces. Video mosaic created using software developed by Dr. Yuri Rzhanov, Center for Coastal and Ocean Mapping, University of New Hampshire, through joint U.S. Geological Survey–University of New Hampshire cooperative agreement.

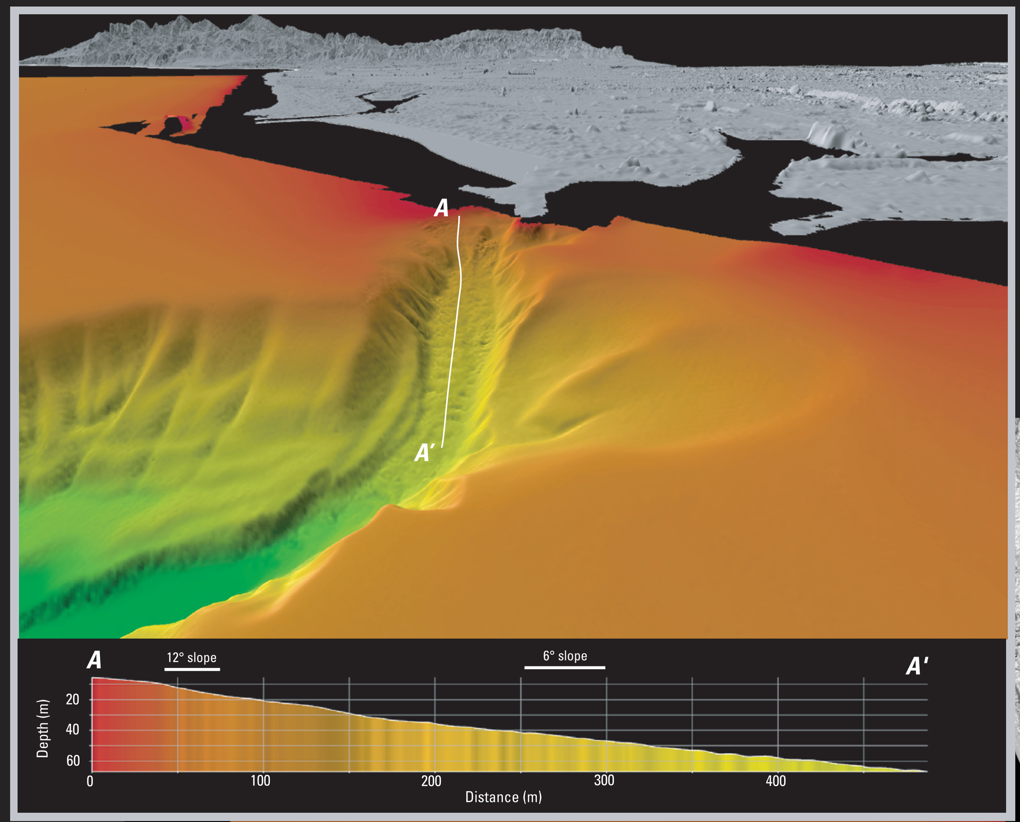


Figure 1. Perspective view to north of head of Hueneme Canyon. Below perspective view, bathymetric profile *A–A′* shows that canyon begins directly offshore, in about 5 m of water, and then drops away relatively quickly, to about 70 m deep 0.5 km offshore. Bedforms within thalweg (bottom) of canyon suggest that, in past, canyon transported sediment from shallower nearshore region to deep Santa Monica Basin to south (Warrick and Farnsworth, 2009b). More recently, however, dredging activities within and near Channel Islands Harbor pipe sediment across head of canyon and deposit it to southeast. Therefore, Hueneme Canyon probably is no longer primary sediment contributor to Santa Monica Basin. Vertical exaggeration of perspective view, 2x; distance across bottom, about 750 m.

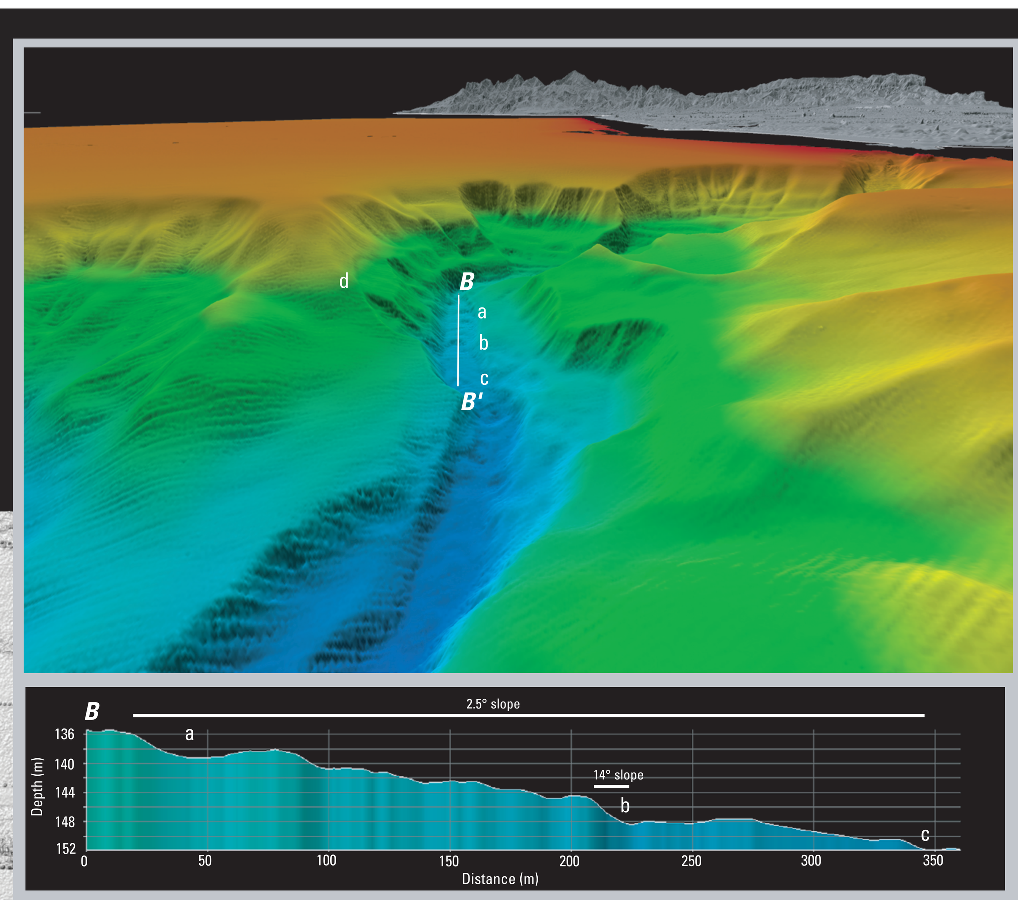
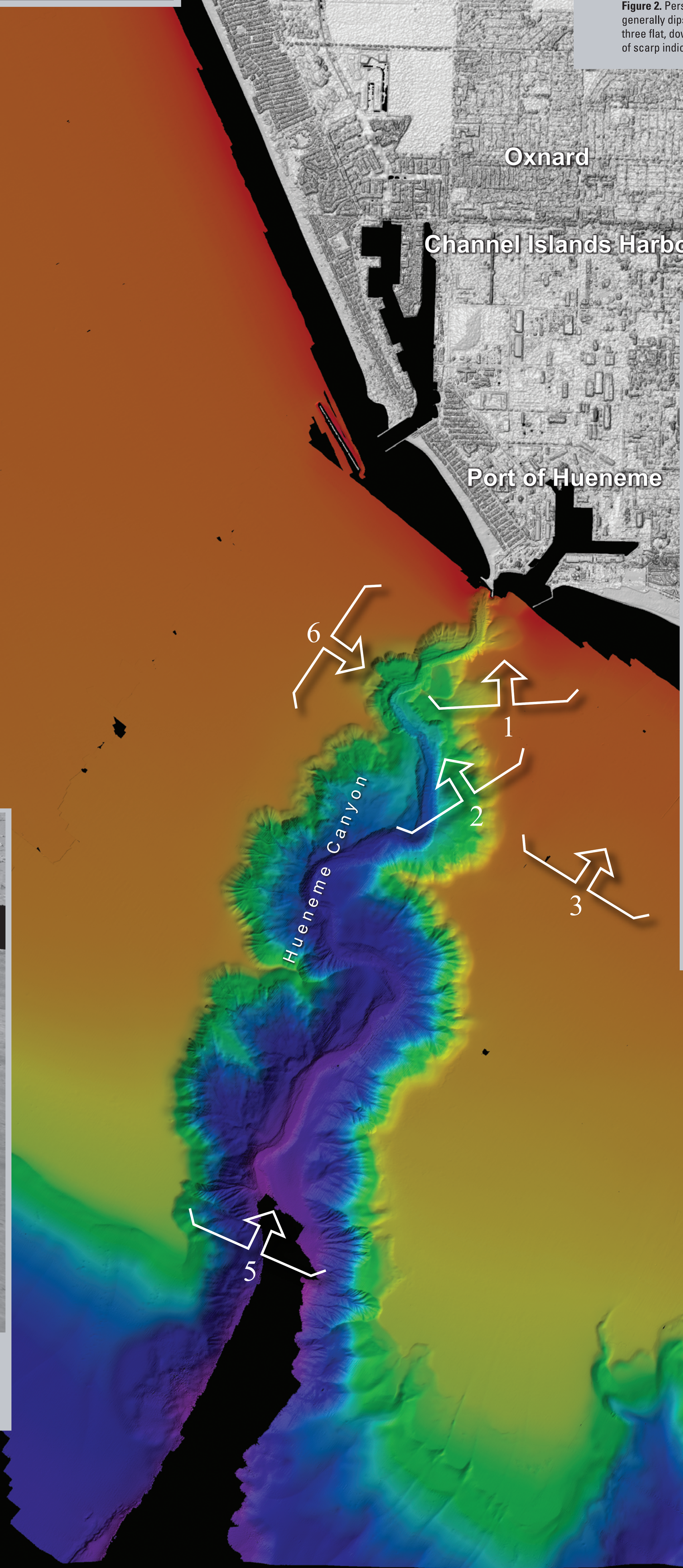


Figure 2. Perspective view to northwest of midsection of Hueneme Canyon. Below perspective view, bathymetric profile *B–B′* reveals that canyon floor generally dips about 2.5° overall in this area; however, slope is broken by series of steps that are characterized by locally steeper slopes (about 14°) and three flat, downcanyon plunge pools (a,b,c). Landslide headscarp (d) is evidence of slope failure in canyon wall; lack of obvious landslide deposit at base of scarp indicates transport of such deposits down canyon axis. Vertical exaggeration of perspective view, 2x; distance across bottom, about 750 m.



Map view. Colored shaded-relief bathymetry map of Hueneme Canyon and vicinity, generated from multibeam-echosounder and bathymetric-sidescan data. Colors show depth: reds and oranges indicate shallower areas; blues and purples, deeper areas. Illumination azimuth is 300°, from 45° above horizon. Numbered arrows show viewing directions of perspective views shown on this sheet; numbers correspond to figure numbers of views.

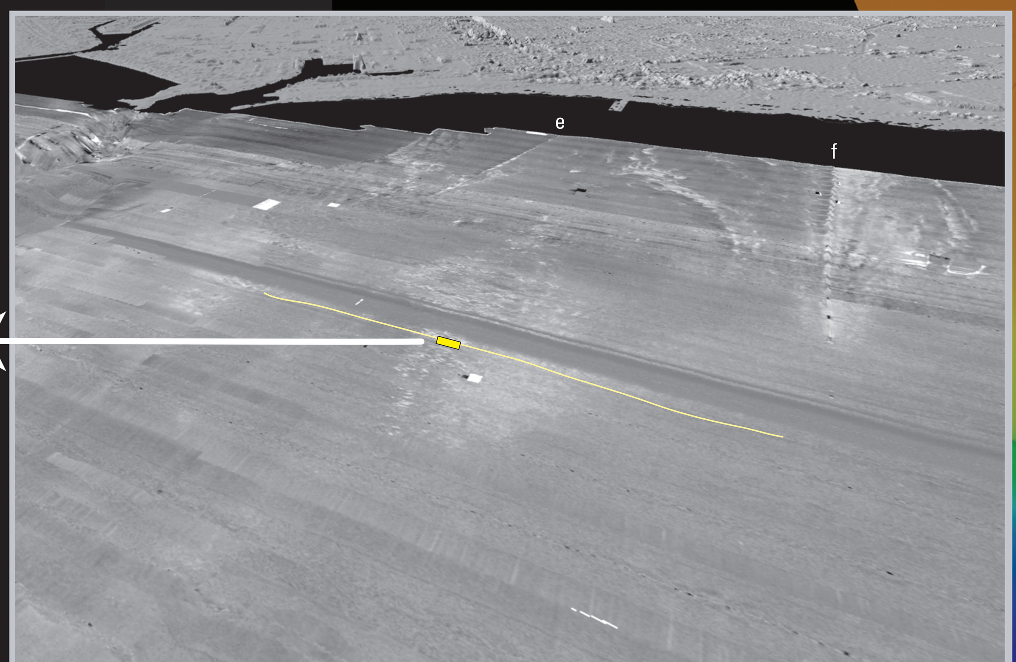


Figure 3. Perspective view to northeast of acoustic-backscatter image of area east of Hueneme Canyon: lighter tones indicate stronger backscatter intensity, possibly from rock or sands, whereas darker tones indicate weaker backscatter intensity, possibly from finer sediments. Two linear features of higher backscatter (e,f), roughly perpendicular to shoreline, are outfall pipes. Thin yellow line shows path of camera sled, towed 1 to 2 m over seafloor, that captured video and photographs. Yellow rectangle shows location of video mosaic (fig. 4) generated from video captured within region of slightly higher backscatter. Vertical exaggeration of perspective view, 2x; distance across bottom, about 1.5 km.

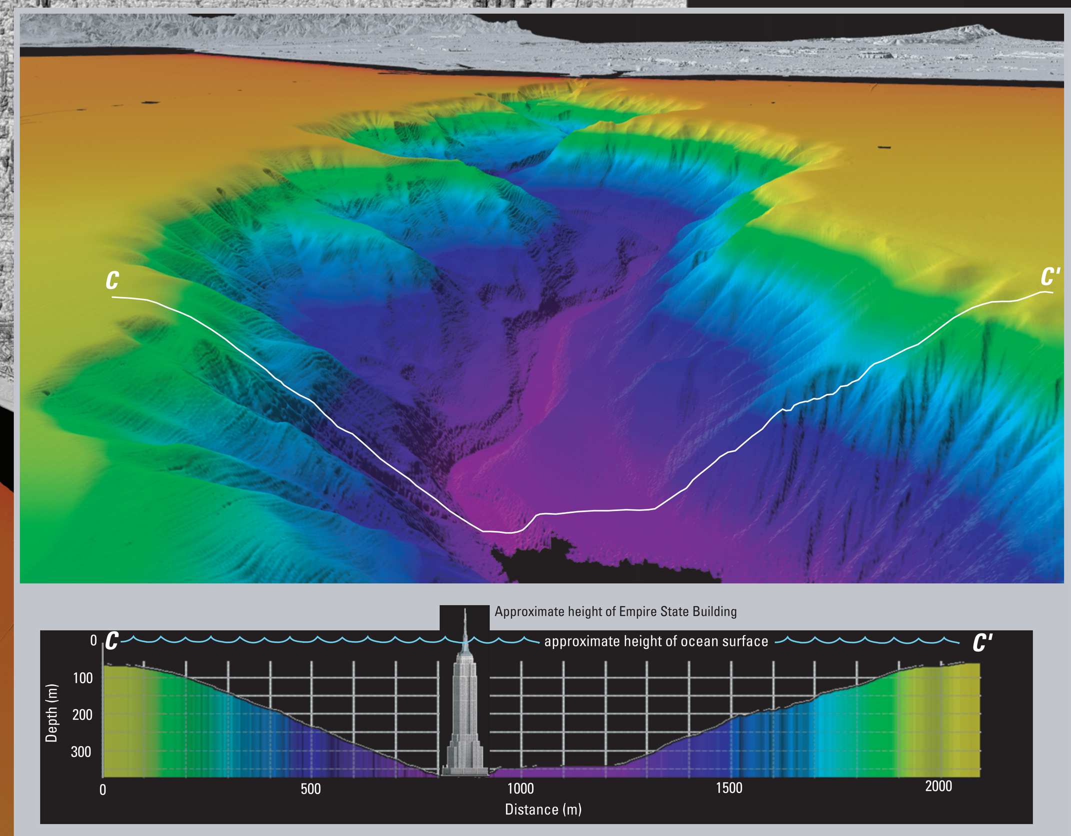


Figure 5. Perspective view to northeast over deeper section of Hueneme Canyon. Below perspective view, bathymetric profile *C–C′* crossing canyon shows that, in this area, canyon is about 2,000 m (1.2 miles) wide and about 370 m (1,214 ft) deep, almost as deep as Empire State Building in New York City is tall. Top of Empire State Building is 381 m (1,250 ft) high; tower on top of building is additional 62 m (204 ft) high. West wall of canyon (on left) has slightly steeper average slope (23°) than east wall (19°). Vertical exaggeration of perspective view, 2x; distance across bottom, about 2.2 km.

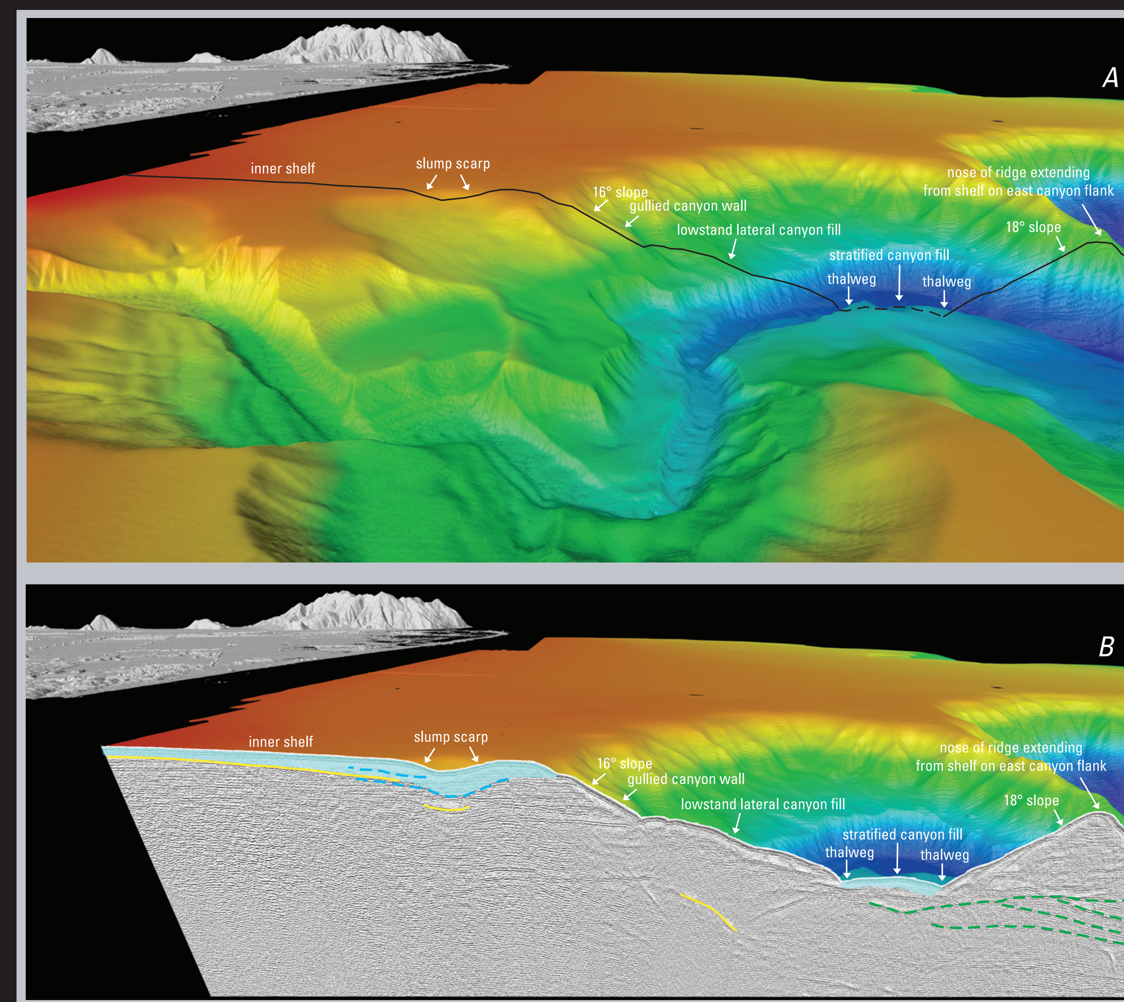


Figure 6. Perspective views to southeast over meandering upper section of Hueneme Canyon. *A*, Perspective view showing interpreted features on east wall of canyon. Black line shows location of seismic-reflection profile in *B* below; dashed where inferred behind northwest canyon wall. *B*, Same perspective view as *A*, converted to block diagram that combines bathymetry with northeast-southwest-trending seismic-reflection profile HC-21 from Sliter and others (2008). Blue shading shows inferred upper Pleistocene and Holocene (post–Last Glacial Maximum) deposits; blue dashed lines show erosional channels within, and at base of, blue-shaded unit; green dashed lines show south-dipping reflections and prominent angular unconformity; solid yellow line is seafloor multiple (see sheet 8). Vertical exaggeration of bathymetry in both views, 2x; vertical exaggeration of seismic-reflection profile, about 1.1x; base of profile, about 200 m below water surface; distance across bottom of both images, about 1 km.

DISCUSSION

Mapping California's State Waters has produced a vast amount of acoustic and visual data, including bathymetry, acoustic backscatter, seismic-reflection profiles, and seafloor video and photography. These data are used by researchers to develop maps, reports, and other tools to assist in the coastal and marine spatial-planning capability of coastal-zone managers and other stakeholders. Seafloor-character, habitat, and geologic maps are used for fisheries management, for designation of Marine Protected Areas, for monitoring of environmental change such as sea-level-rise impacts, for prediction of sediment and contaminant budgets and transport, and for assessment of earthquake and tsunami hazards. To achieve these goals, it is helpful to integrate the different datasets and then view the results in three-dimensional representations such as those displayed on this data integration and visualization sheet for Hueneme Canyon and vicinity.

The map view in the center of the sheet is similar to the colored shaded-relief bathymetry map of Hueneme Canyon and vicinity (sheet 1 of this report). Numbered arrows show viewing directions of the perspective views on this sheet (figs. 1, 2, 3, 5, 6); the numbers indicate the figure number of the perspective view.

The perspective views and bathymetric profiles in figures 1, 2, and 5 show the colored shaded-relief bathymetry of Hueneme Canyon, as viewed from the south, southeast, and southwest, respectively. These views show a few examples of the complexity of the canyon terrain and try to match the scale of the terrain with more commonly known structures.

Draping the acoustic-backscatter imagery (see sheet 3 of this report) over the bathymetry data (fig. 3) highlights the relations between the backscatter intensity and the seafloor morphology, as well as any anthropogenic influences on the seafloor.

Video-mosaic images created from seafloor digital video (fig. 4) display the geologic (rock, sand, mud) and biologic complexity of the seafloor. Whereas photographs capture high-quality snapshots of a small area of the seafloor, video mosaics can capture larger areas and, thus, can show transitional zones between different seafloor environments.

Block diagrams (fig. 6), which combine the bathymetry with seismic-reflection-profile data, help reveal the stratigraphic and structural relations between the surface and subsurface.

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Sliter, R.W., Triezenberg, P.J., Hart, P.E., Draut, A.E., Normark, W.R., and Conrad, J.E., 2008, High-resolution chirp and mini-sparker seismic-reflection data from the southern California continental shelf - Gaviota to Mugu Canyon: U.S. Geological Survey Open-File Report 2008–1246, accessed April 5, 2011, at http://pubs.usgs.gov/of/2008/1246/.

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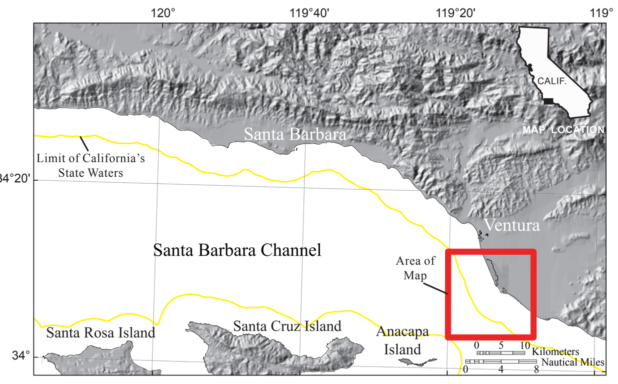
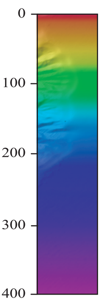


EXPLANATION

Depth (in meters) and illumination (bright areas are illuminated, facing false sun; dark areas are in shadow, facing away from false sun)



Direction of illumination from false sun—Position of false sun is at 300° azimuth, 45° above horizon [arrow included in explanation for illustration purposes only; not shown on map]

Coastal Conservancy

CALIFORNIA OCEAN PROTECTION COUNCIL

NOAA

SEAFLOOR MAPPING LAB CSU MONTEREY BAY

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

Universal Transverse Mercator projection, Zone 11N

NOT INTENDED FOR NAVIGATIONAL USE

13°

APPROXIMATE MEAN DECLINATION, 2012

MAP LOCATION

Data Integration and Visualization, Hueneme Canyon and Vicinity, California

By

Peter Dartnell

2012

Bathymetric profiles in figures 1, 2, 5, and 6 by Peter Dartnell, 2011. Acoustic-backscatter imagery in figure 3 from map on sheet 3, this report. Video-mosaic image in figure 4 by Peter Dartnell, 2010, using software developed by Dr. Yuri Rzhanov, Center for Coastal and Ocean Mapping, University of New Hampshire, through joint U.S. Geological Survey–University of New Hampshire cooperative agreement. Seismic-reflection profile in figure 6 from sheet 8, this report

GIS database and digital cartography by Nadine E. Golden and Eleyne L. Phillips

Edited by Taryn A. Lindquist

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