U.S. Department of the Interior
U.S. Geological Survey

Prepared in cooperation with
Scripps Institution of Oceangraphy

Scientific Investigations Map 3324
Sheet 2 of 3

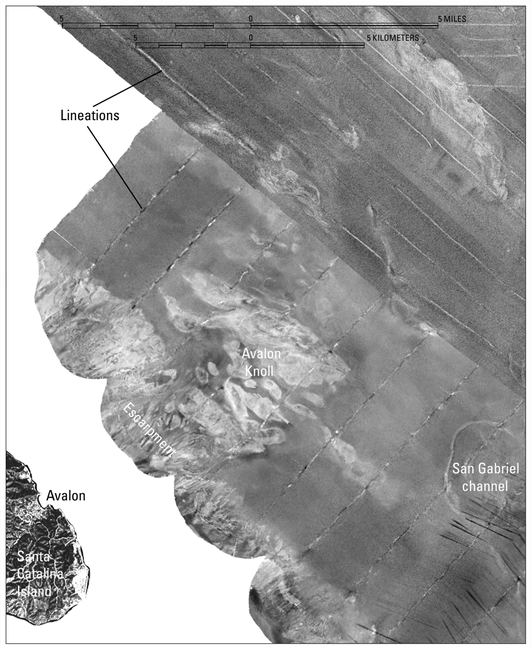


Figure 2. Acoustic-backscatter imagery of Avalon Knoll and northeast escarpment of Santa Catalina Island. Avalon Knoll has higher backscatter intensity at local bathymetric highs and lower backscatter intensity in intervening depressions. Gullies on Santa Catalina escarpment tend to have lower backscatter intensities. Sidewall of meander in San Gabriel channel is clearly indicated by higher backscatter intensity. Northwest-, northeast-, and east-west-trending linear features are data-collection and processing artifacts. White areas are gaps in data.

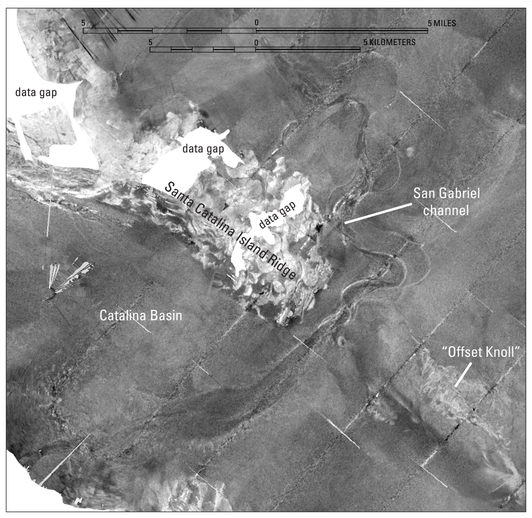


Figure 3. Acoustic-backscatter imagery near southeast edge of high-relief Santa Catalina Island ridge (see sheet 1), which has much higher backscatter intensities than that of surrounding low-relief seafloor. San Gabriel channel is clearly visible meandering between ridge and "Offset Knoll" (Ryan and others, 2012): sidewalls of main and abandoned channels are indicated by higher backscatter intensities; axial channel, which widens as it enters Catalina Basin, has lower backscatter intensity than that of surrounding seafloor. Northwest- and northeast-trending linear features are data-collection and processing artifacts. White areas are gaps in data.



Figure 4. Acoustic-backscatter imagery of part of Gulf of Santa Catalina, revealing northwest-trending ridge (a) that has higher backscatter intensity than that of surrounding seafloor. Oceanside and Carlsbad canyon-and-channel systems meander around this ridge, eventually emptying into San Diego Trough. Carlsbad channel appears to flow through small gap (b) in ridge (see also, sheet 1), creating fan deposit (c) in San Diego Trough. Likely overbank deposits (d) from Oceanside channel are visible as mixtures of low and moderate backscatter intensities. Northwest- and northeast-trending linear features are data-collection and processing artifacts.

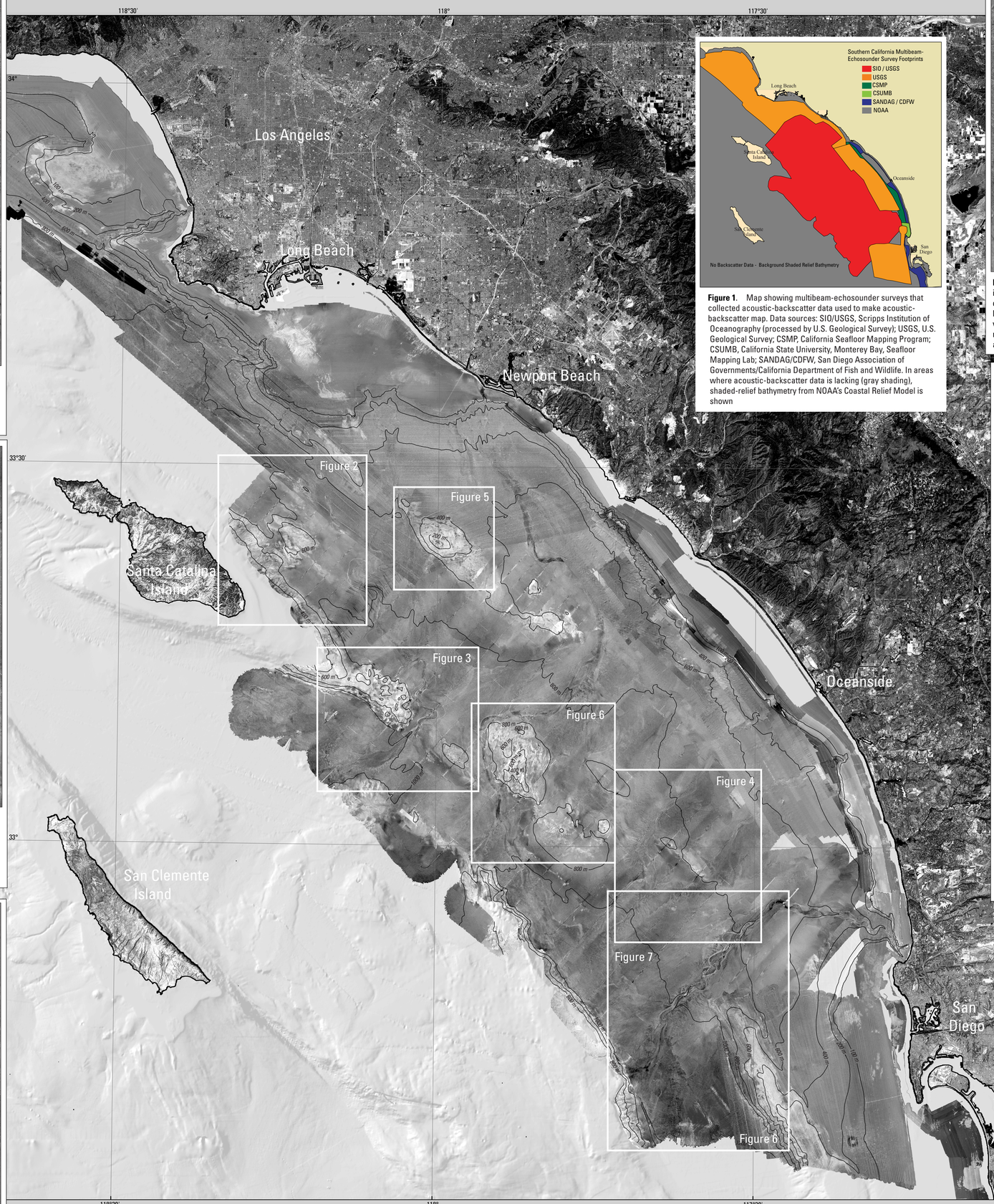


Figure 1. Map showing multibeam-echosounder surveys that collected acoustic-backscatter data used to make acoustic-backscatter map. Data sources: SIO/USGS, Scripps Institution of Oceanography (processed by U.S. Geological Survey); USGS, U.S. Geological Survey; CSMP, California Seafloor Mapping Program; CSUMB, California State University, Monterey Bay, Seafloor Mapping Lab; SANDAG/CDFW, San Diego Association of Governments/California Department of Fish and Wildlife. In areas where acoustic-backscatter data is lacking (gray shading), shaded-relief bathymetry from NOAA's Coastal Relief Model is shown

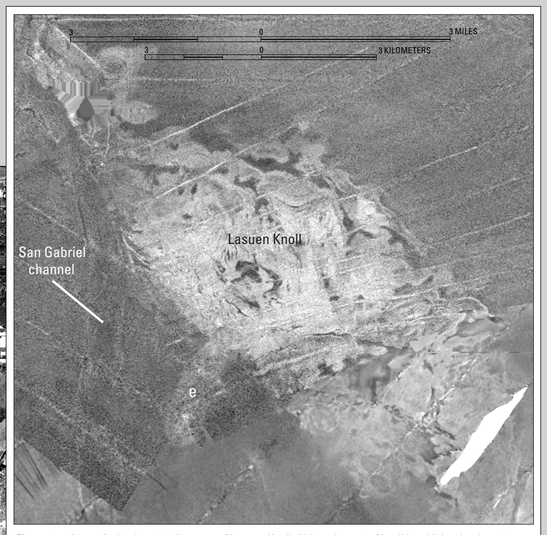


Figure 5. Acoustic-backscatter imagery of Lasuen Knoll. Although most of knoll has higher backscatter intensity than that of surrounding seafloor, small pockets of lower backscatter intensity are present at top of knoll, indicating small bathymetric depressions. Area of higher backscatter intensity (e) is small landslide deposit off southwest side of knoll. Branch of San Gabriel channel is barely perceptible in this view, as axial channel has similar backscatter intensity to that of surrounding seafloor. Northwest-, northeast-, and east-west-trending linear features are data-collection and processing artifacts. White area is gap in data.

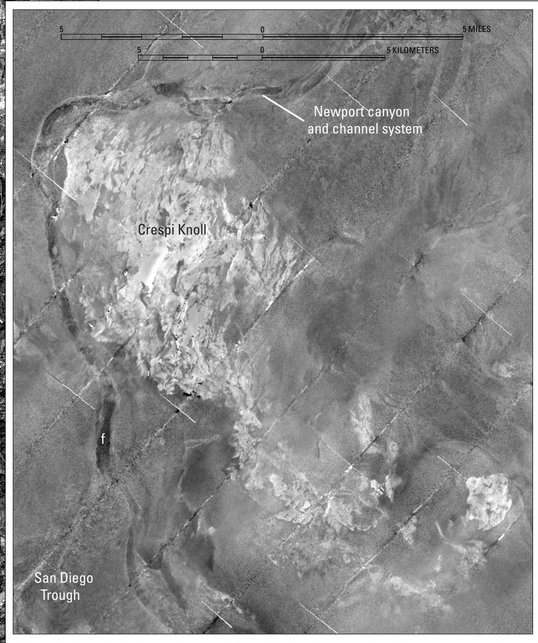


Figure 6. Acoustic-backscatter imagery of Crespi Knoll and lower reaches of Newport canyon-and-channel system as it enters San Diego Trough. Similar to Avalon and Lasuen Knolls, local bathymetric highs within Crespi Knoll have higher backscatter intensities than that of intervening bathymetric lows. Also similar to that of San Gabriel channel (see fig. 4), axial channel of Newport channel has lower backscatter intensity than that of surrounding seafloor, and some stretches of channel (f) have substantially lower backscatter intensity. Northwest- and northeast-trending linear features are data-collection and processing artifacts.

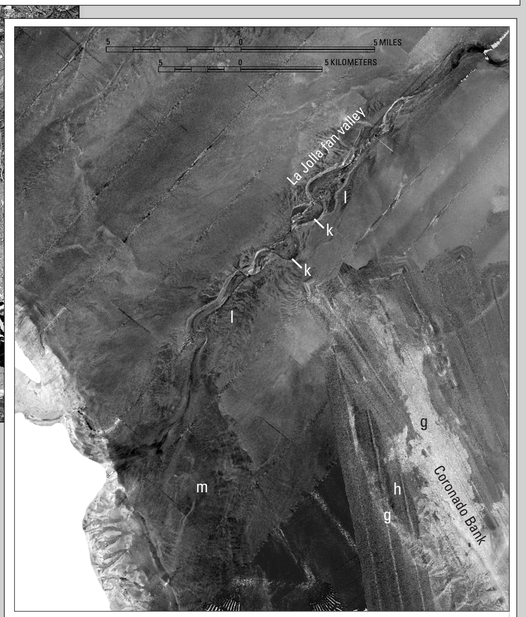


Figure 7. Acoustic-backscatter imagery of northern portion of Coronado Bank and La Jolla fan valley. Top and steeper sides of Coronado Bank (g) have higher backscatter intensity than that of surrounding low-relief seafloor, whereas less steep sections of Coronado Bank (h) have backscatter intensities that are similar to that of surrounding seafloor. La Jolla fan valley (k) is clearly defined in backscatter imagery, as steep walls of valley have higher backscatter intensity, and pockets within axial channel have very low backscatter intensity. Likely overbank deposits (l) outside of La Jolla fan valley have mixture of low and moderate backscatter intensities (see also, fig. 6). Large, lobate fan deposit (m), which has lower backscatter intensity than that of surrounding seafloor, covers floor of San Diego Trough. North-, northwest-, and northeast-trending linear features are data-collection and processing artifacts.

Onshore imagery modified from LANDSAT-8 satellite data (available from U.S. Geological Survey, Earth Explorer, at http://earthexplorer.usgs.gov/).
Offshore shaded-relief bathymetry from map on sheet 1, this report.
Universal Transverse Mercator projection, Zone 11N

NOT INTENDED FOR NAVIGATIONAL USE

12°
TRUE NORTH
GRID NORTH
APPROXIMATE MEAN DECLINATION, 2015

10 5 0 10 MILES
10 5 0 10 KILOMETERS
BATHYMETRIC CONTOUR INTERVAL 100-m intervals, 0 to 200m; 200-m intervals, 200 to 1200m
ONE MILE = 0.869 NAUTICAL MILES

CALIF.
MAP LOCATION

Map view. Acoustic-backscatter map of the inner continental borderland, southern California. In acoustic-backscatter imagery, brighter tones indicate stronger backscatter intensity, suggesting harder or coarser grained seafloor materials, whereas darker tones indicate weaker backscatter intensity, suggesting finer grained seafloor materials. Map is composite of several acoustic-backscatter images generated from different multibeam-echosounder surveys and processing techniques (see figure 1 for sources of data). White boxes show locations of figures shown on this sheet; numbers correspond to figure numbers. Northwest-, northeast-, and east-west-trending linear features are data-collection and processing artifacts.

Acoustic Backscatter

Colored Shaded Relief Bathymetry, Acoustic Backscatter, and Selected Perspective Views of the Inner Continental Borderland, Southern California

By

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Reference Cited

Ryan, H.F., Conrad, J.E., Paull, C.K., and McGann, M., 2012, Slip rate on the San Diego Trough Fault zone, inner California Borderland, and the 1986 Oceanside earthquake swarm revisited: Bulletin of the Seismological Society of America, v. 102, no. 6, p. 2300–2312.

Acoustic-backscatter imagery by Peter Dartnell, 2014.
Bathymetric contours by Peter Dartnell, 2014 (contour intervals: 1–200 m water depth, 100 m; >200 m water depth, 200 m).
GIS database and cartography by Peter Dartnell.
Edited by Kate Jacques and Taryn Lindquist
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