

DISCUSSION

This shaded-relief bathymetry map of the Offshore of Santa Cruz map area in central California was generated from bathymetry data collected by the U.S. Geological Survey (USGS) (fig. 1). Mapping was completed in 2009, using a 234-kHz SWATHplus bathymetric sidescan-sonar system. The mapping mission collected bathymetry data from about the 10-m isobath to beyond the limit of California's State Waters (note that the California's State Waters limit, which generally is 3 nautical miles [5.6 km] from shore, extends farther offshore south of Santa Cruz, so that it encompasses all of Monterey Bay).

During the mapping mission, GPS data with real-time kinematic corrections were combined with measurements of vessel motion (heave, pitch, and roll) in a CodaOctopus F180 attitude-and-position system to produce a high-precision vessel attitude packet. This packet was transmitted to the acquisition software in real time and combined with instantaneous sound-velocity measurements at the transducer head before each ping. The returned samples were projected to the seafloor using a ray-tracing algorithm that works with previously measured sound-velocity profiles. Statistical filters were applied to discriminate seafloor returns (soundings) from unwanted targets in the water column (Ristic and Arbib, 2010).

Processed soundings were exported from the acquisition or processing software as XYZ files and bathymetric surfaces. All of the surfaces were then merged into one overall 2-m-resolution bathymetric-surface model and clipped to the boundary of the map area. An illumination having an azimuth of 300° and from 45° above the horizon was then applied to the bathymetric surface to create the shaded-relief imagery. Note that the ripple patterns and parallel lines that are apparent within the map area are data-collection and -processing artifacts. These various artifacts are made obvious by the hillshading process.

Bathymetric contours were generated at 10-m intervals from the merged 2-m-resolution bathymetric surface. The merged surface was smoothed using the Focal Mean tool in ArcGIS and a circular neighborhood that has a radius of between 20 and 30 m (depending on the location). The contours were generated from this smoothed surface using the Spatial Analyst Contour tool in ArcGIS. The most continuous contour segments were preserved; smaller segments and isolated island polygons were excluded from the final output. The contours were then clipped to the boundary of the map area.

The onshore-area image was generated by applying the same illumination (azimuth of 300° and from 45° above the horizon) to 2-m-resolution topographic-lidar data from National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management's Digital Coast (available at <http://www.csc.nos.noaa.gov/digitalcoast/data/coastallidar/>) and to 10-m-resolution topographic-lidar data from the U.S. Geological Survey's National Elevation Dataset (available at <http://ned.usgs.gov/>).

REFERENCE CITED

Ritchie, A.C., Finlayson, D.P., and Logan, J.B., 2010, Swath bathymetry surveys of the Monterey Bay area from Point Año Nuevo to Moss Landing, San Mateo, Santa Cruz, and Monterey Counties, California: U.S. Geological Survey Data Series 514, available at <http://pubs.usgs.gov/ds/514/>.

EXPLANATION

Amount of illumination
Illuminated (facing false sun)

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]

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

Limit of California's State Waters

—20— **Bathymetric contour (in meters)**—Derived from modified 2-m-resolution bathymetry grid.
Contour interval: 10 m

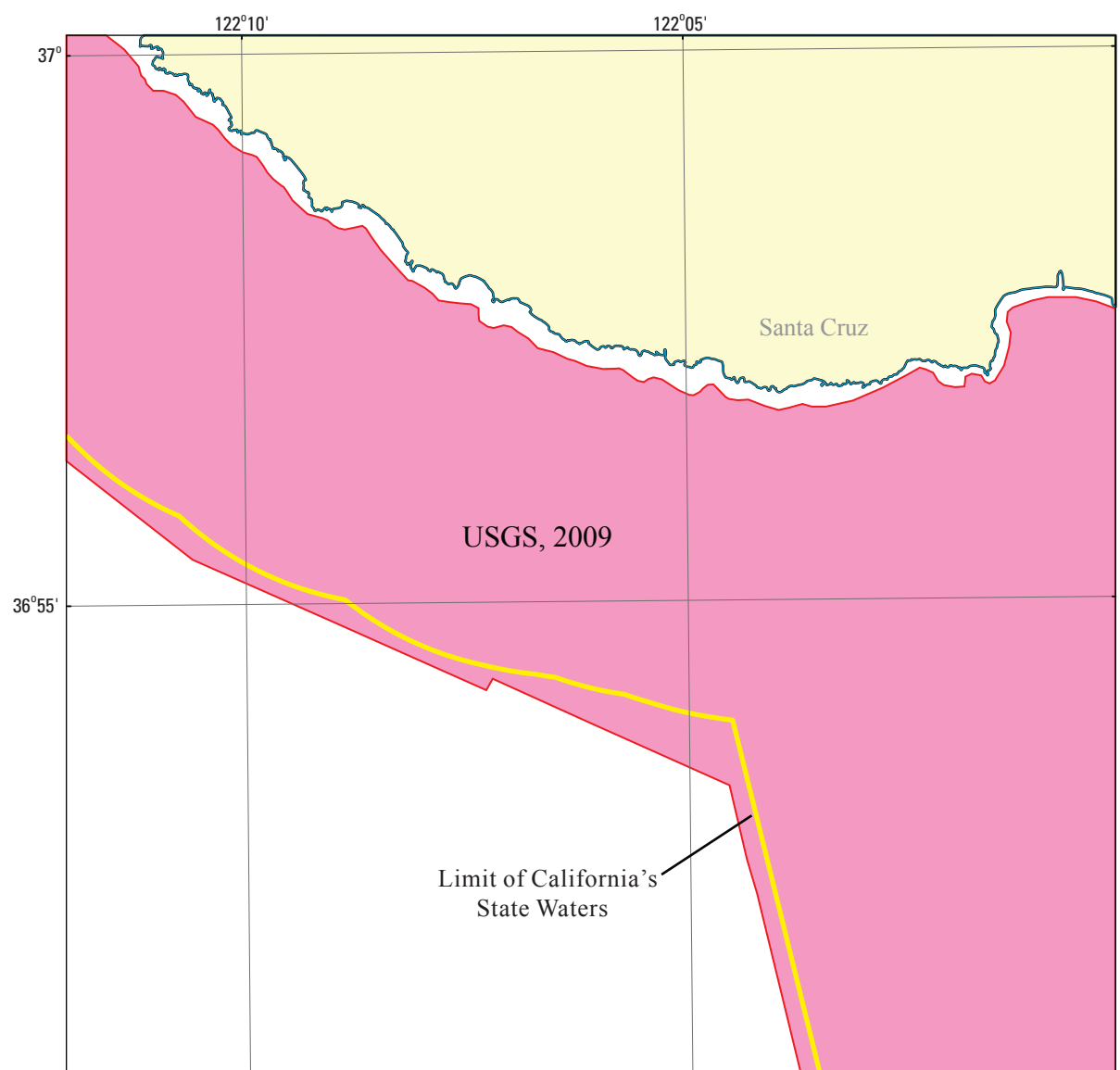


Figure 1. Map showing areas of multibeam-echosounder and bathymetric-sidescan surveys (pink shading) and onshore topographic-lidar surveys (yellow shading). Also shown are data-collecting agencies (USGS, U.S. Geological Survey) and dates of surveys if known. Yellow line shows limit of California's State Waters.



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This map was printed on an electronic plotter directly from digital files. Dimensional calibration may vary between electronic plotters and between X and Y directions on the same plotter, and paper may change size due to atmospheric conditions; therefore, scale and dimensions are approximate.

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Suggested Citation: Dartnall, P., Ritchie, A.C., and Finlayson, D.P., 2016, Shaded-relief bathymetry, offshore of Santa Cruz map area, California, about 1000–1500 m depth, *Open-File Report 2016-024*, U.S. Geological Survey, Reston, Virginia, 12 p., <https://doi.org/10.3133/ofr2016024>.

California, sheet 2 in Cochrane, E., Dartnall, P., Johnson, S.Y., Erley, M.D., Golden, N.E., Greene, H.G., Dieter, B.E., Hartwell, S.R., Rioch, A.C., Finlayson, D.P., Endris, C.A., Watt, J.T., Davenport, C.W., Sliker, R.W., Meier, K.L., and Kringsman, L.M. IGR Cochrane and S.A. Cochrane, eds.), California State Waters Map Series—Offshore of Santa Cruz, California: U.S. Geological Survey Open-File Report

2016–1024, pamphlet 40 p., 10 sheets, scale 1:24,000, <http://dx.doi.org/10.3133/ofr20161024>.

Shaded-Relief Bathymetry, Offshore of Santa Cruz Map Area, California

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2016