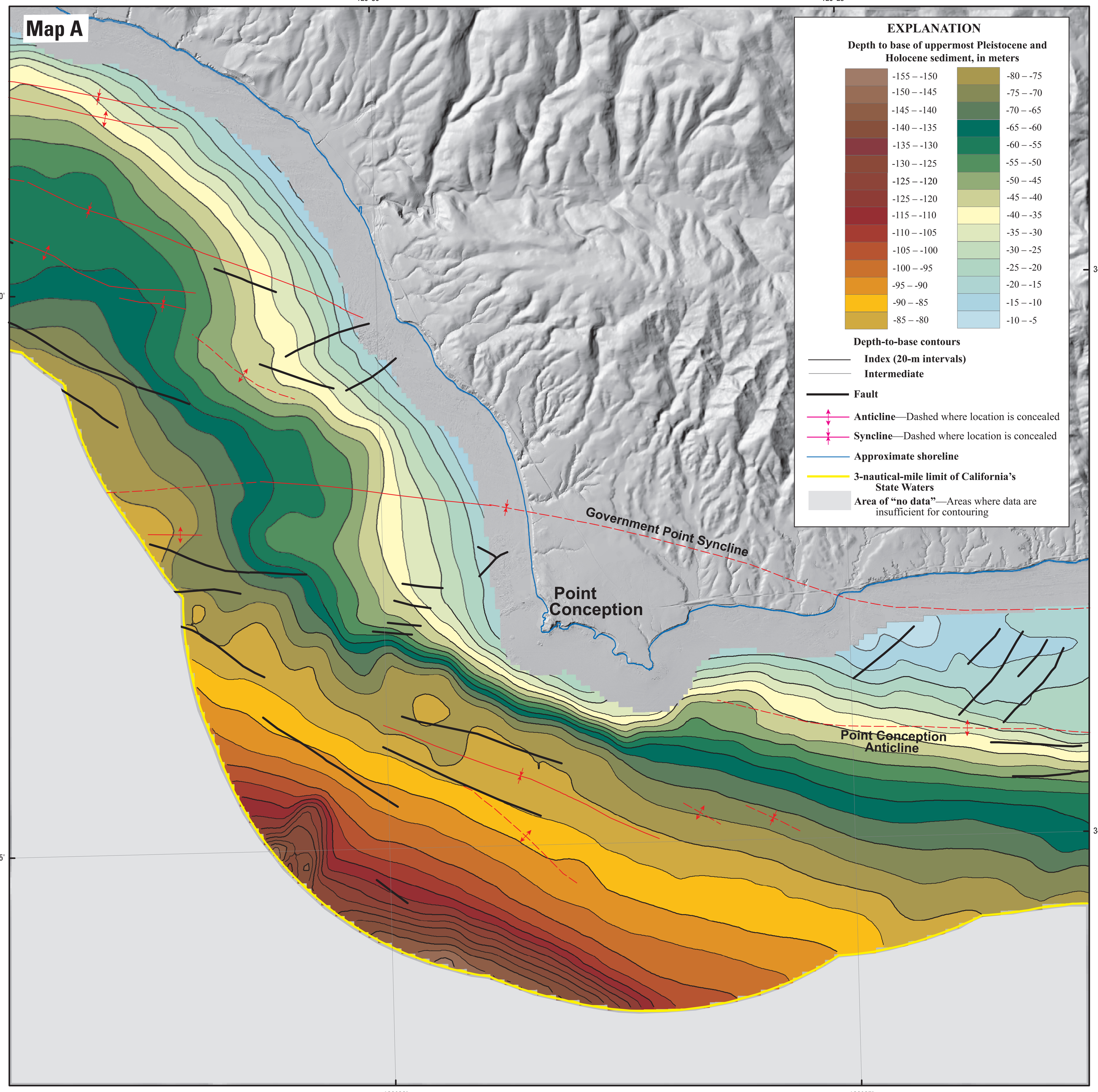
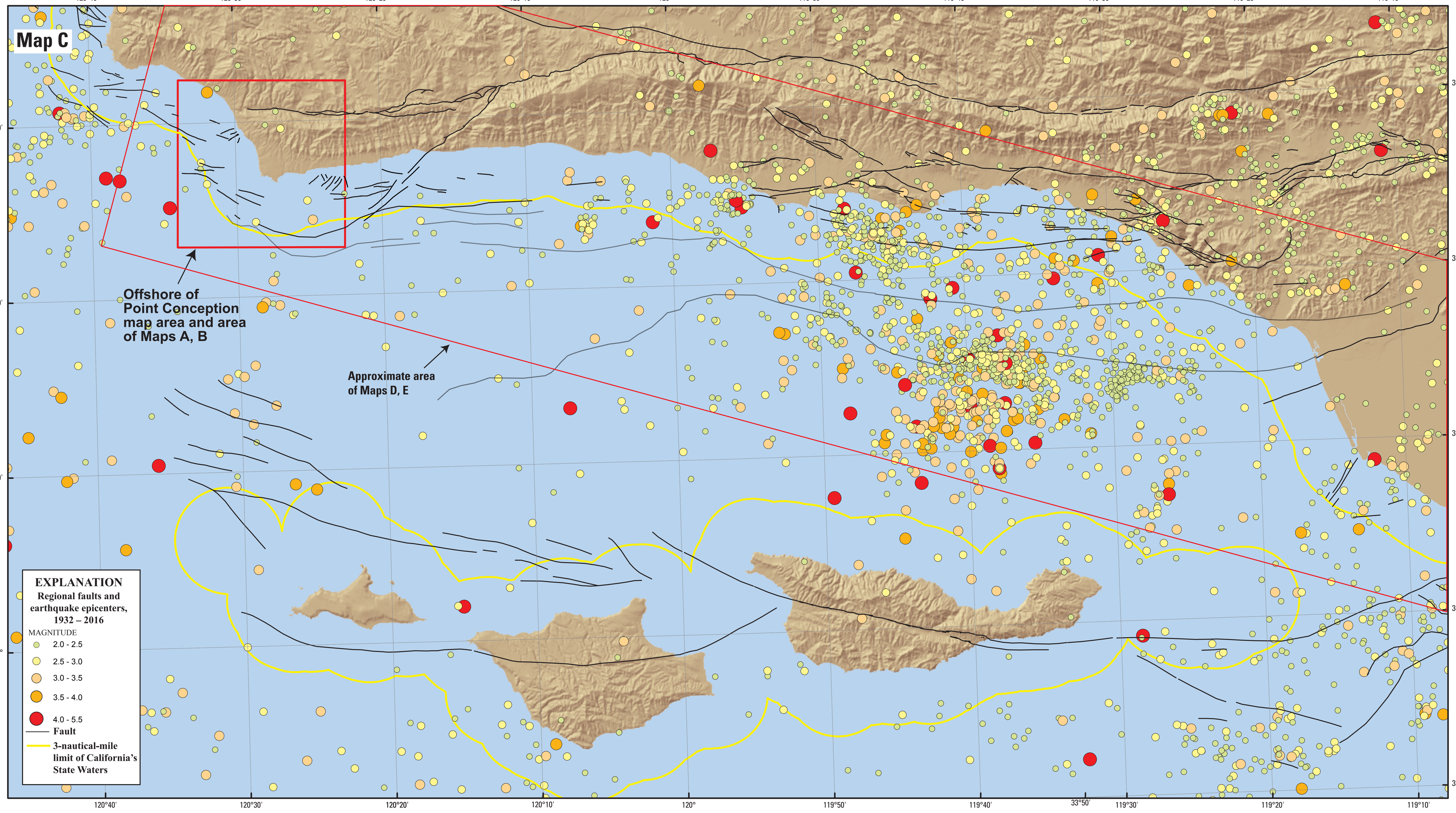
Open-File Report 2018–1024
Sheet 8 of 9
Pamphlet accompanies map





Onshore elevation data from National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management's Digital Coast (available at http://www.csc.noaa.gov/digitalcoast/data/coastallidar) and from U.S. Geological Survey's National Elevation Dataset (available at http://ned.usgs.gov/). California's State Waters limit from NOAA Office of Coast Survey

Universal Transverse Mercator projection, Zone 11N

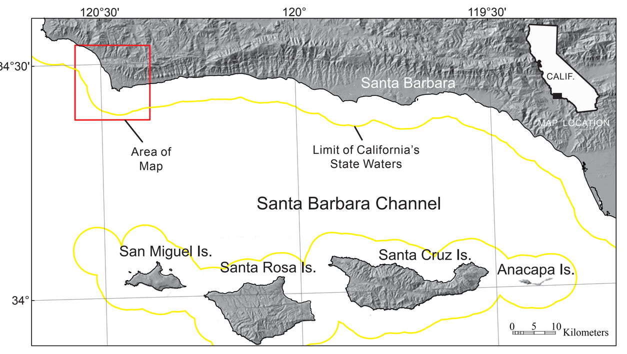
APPROXIMATE MEAN DECLINATION, 2018

SCALE 1:300 000

ONE MILE = 0.869 NAUTICAL MILES

MAP LOCATION

Compiled by Stephen R. Hartwell and Samuel Y. Johnson, 2016



DISCUSSION

This sheet includes maps that show the thickness and the depth to base of uppermost Pleistocene and Holocene (in other words, post–Late Glacial Maximum) deposits for the Offshore of Point Conception map area (Maps A, B), as well as for a larger area that extends about 130 km along the coast from Hueneme Canyon to Point Conception (Maps D, E) to establish a regional context. To make these maps, water bottom and depth to base of the uppermost Pleistocene and Holocene sediment layer were mapped from seismic-reflection profiles (sheet 7). The difference between the two horizons was exported for every shot point as XY coordinates (UTM zone 10) and two-way travel time (TWT). The thickness of the uppermost Pleistocene and Holocene unit (Maps B, E) was determined by applying a sound velocity of 1,600 m/sec to the TWT. The thickness points were interpolated to a preliminary continuous surface, overlaid with zero-thickness bedrock outcrops (see sheet 9), and contoured, following the methodology of Wong and others (2012). Data within Hueneme Canyon were excluded from the contouring because the seismic-reflection data are too sparse to adequately image the highly variable changes in sediment thickness that characterize the canyon (Maps D, E).

Several factors required manual editing of the preliminary sediment-thickness maps to make the final products. The Red Mountain Fault Zone (RMFZ), Pitas Point Fault (PPF), and Oak Ridge Fault (ORF) disrupt the sediment sequence in the region (Maps D, E). The data points also are dense along tracklines (about 1 m apart) and sparse between tracklines (1–2 km apart), resulting in contouring artifacts. To incorporate the effect of the faults, to remove irregularities from interpolation, and to reflect other geologic information and complexity, the resulting interpolated contours were modified. Contour modifications and regridding were repeated several times to produce the final regional sediment-thickness map (Wong and others, 2012). Data for the depth to base of the uppermost Pleistocene and Holocene unit (Maps A, D) was generated by adding the thickness data to water depths determined by multibeam bathymetry (see sheet 1).

South and east of Point Conception, most of the shelf is underlain by bedrock that has thin (less than 2.5 m) post-LGM sediment cover (Map B). West and northwest of Point Conception, thicker sediment (as much as 13 m) is present in the midshelf area, along the axes of the regionally extensive (22-km-long) Government Point Syncline and an unnamed syncline farther north. The post-LGM sediment unit has its maximum thickness (18 m) in the midshelf area next to a large asphalt mound (see fig. 8 on sheet 7) about 1.75 km west of Point Conception. Mean sediment thickness on the shelf in the map area is 2.6 m, and the total sediment volume on the shelf is $1{,}248\times10^6$ m^3. Small coastal watersheds that drain the western Santa Ynez Mountains are the inferred primary sediment source. The shelf in the map area also possibly receives sediment derived from the Santa Ynez River (fig. 1); however, this would require about 25 km of sediment transport southward around Point Arguello.

Five different "domains" of sediment thickness, which are bounded either by faults or by Hueneme Canyon, are recognized on the regional maps (Maps D, E): (1) north of the south strand of the Red Mountain Fault Zone; (2) between the south strand of the Red Mountain Fault Zone and the Pitas Point Fault; (3) between the Pitas Point and Oak Ridge Faults; (4) between the Oak Ridge Fault and Hueneme Canyon; and (5) southeast of Hueneme Canyon. Table 6–1 (in pamphlet) shows the area of these five domains, along with estimates of their mean sediment thicknesses and total sediment volumes. These data highlight the contrast among three general zones of sediment thickness: (1) the uplifted, sediment-poor Santa Barbara and Point Conception shelf (domain 1; mean sediment thickness of 4.2 m); (2) a transitional zone (domain 2; mean sediment thickness of 18.0 m); and (3) the subsiding, sediment-rich delta and shelf offshore of the Ventura and Santa Clara Rivers and Calleguas Creek (domains 3, 4, and 5; mean sediment thicknesses of 39.2, 38.9, and 28.3 m, respectively).

The regional pattern of faults (Minor and others, 2009; Jennings and Bryant, 2010; Johnson and others, 2017b) and earthquakes occurring between 1932 and June 14, 2016, that have inferred or measured magnitudes greater than 2.0 are shown on Map C. Although locations have been provided by the CalTech network since 1932, significantly greater precision began in 1969 with installation of a USGS seismographic network (see, for example, Lee and Vedder, 1973; Sylvester, 2001; U.S. Geological Survey, 2016). Epicentral data indicate that seismicity in the western and central Santa Barbara Channel is characterized by earthquake swarms, relatively frequent minor earthquakes, and infrequent major earthquakes.

Three significant earthquakes affected the Santa Barbara Channel area prior to 1932 (the year of the earliest earthquake in the U.S. Geological Survey [2016] catalog): in 1812, 1857 (the Fort Tejon earthquake on the San Andreas Fault), and 1925 (Stover and Coffman, 1993). Sylvester and others (1970) reported a location in the northern Santa Barbara Channel for the 1925 event (M6.3), as well as for a 1941 earthquake (~M5.5, 7/1/1941) about 7 km offshore and 15 km southeast of Santa Barbara, the largest earthquake shown on Map C. In addition, Sylvester and others (1970) documented a swarm of 62 earthquakes (M2.5–M5.2) that occurred between 6/26/1968 and 8/3/1968, which also were located 10 to 15 km south (offshore) of Santa Barbara. The largest recorded event in the Offshore of Point Conception map area (~M3.7) occurred on 9/10/2009, near the shoreline in the northwestern part of the map area (U.S. Geological Survey, 2016).

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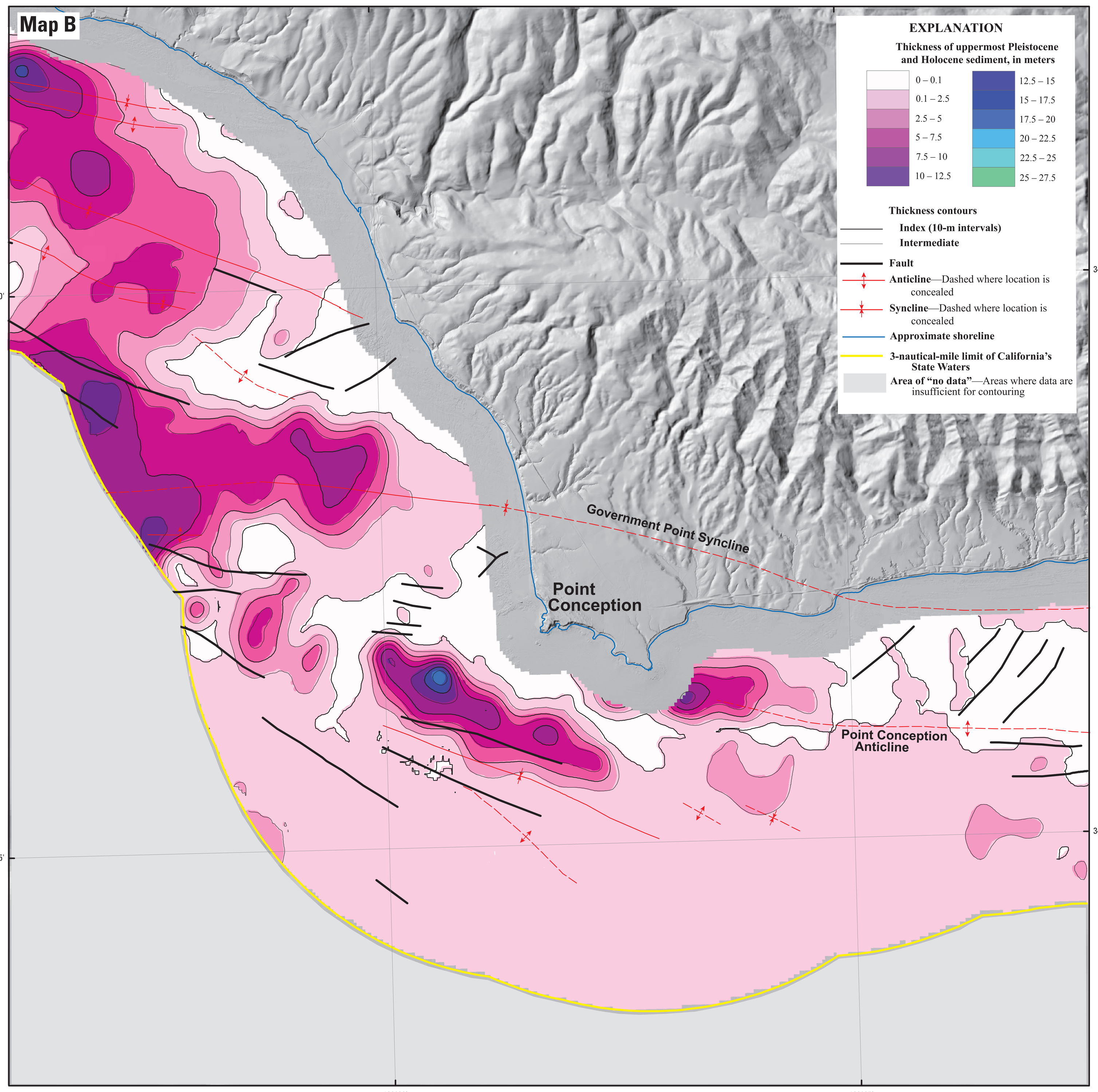

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Universal Transverse Mercator projection, Zone 10N

NOT INTENDED FOR NAVIGATIONAL USE

APPROXIMATE MEAN DECLINATION, 2018

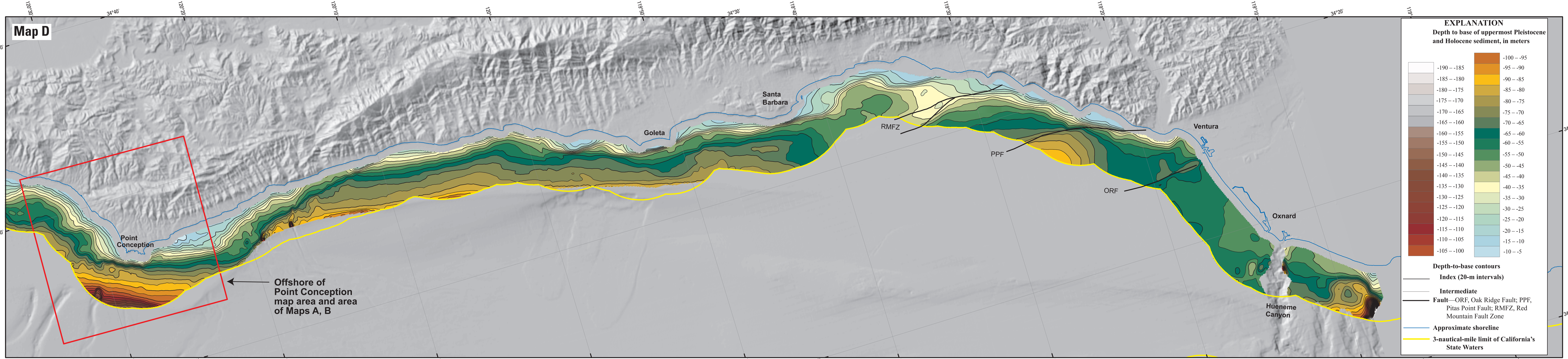
SCALE 1:50 000

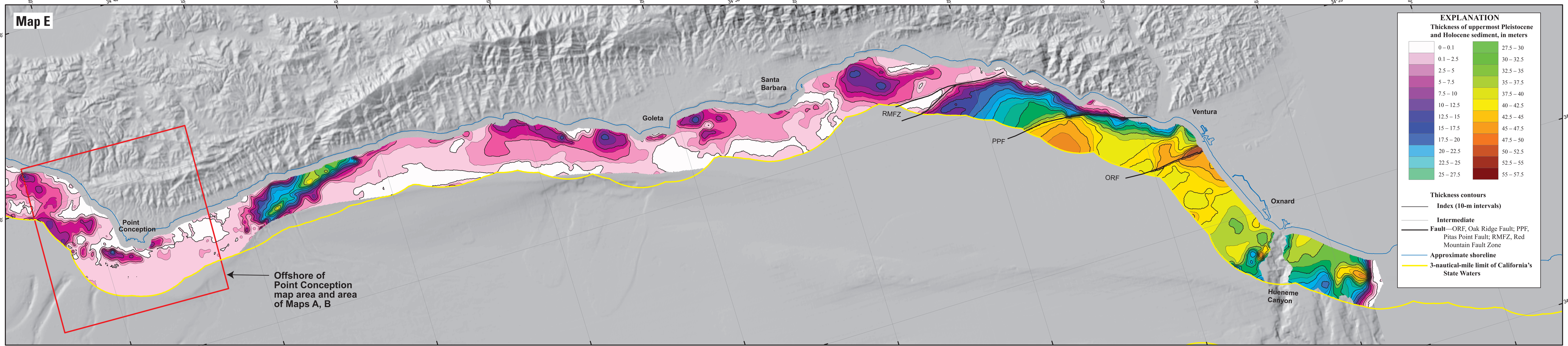
ONE MILE = 0.869 NAUTICAL MILES

MAP LOCATION

Depth and thickness mapped by Samuel Y. Johnson and Stephen R. Hartwell, 2016

GIS database and digital cartography by Stephen R. Hartwell





Onshore elevation data from National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management's Digital Coast (available at http://www.csc.noaa.gov/digitalcoast/data/coastallidar) and from U.S. Geological Survey's National Elevation Dataset (available at http://ned.usgs.gov/). Offshore shaded-relief bathymetry from data collected by Monterey Bay Aquarium Research Institute in 2002, by U.S. Geological Survey in 2006, and by California State University, Monterey Bay, Seafloor Mapping Lab in 2006–2007. California's State Waters limit from NOAA Office of Coast Survey

Universal Transverse Mercator projection, Zone 11N

NOT INTENDED FOR NAVIGATIONAL USE

APPROXIMATE MEAN DECLINATION, 2018

SCALE 1:200 000

ONE MILE = 0.869 NAUTICAL MILES

MAP LOCATION

Depth and thickness mapped by Samuel Y. Johnson, Eleyne L. Phillips, and Stephen R. Hartwell, 2010–2016

GIS database and digital cartography by Andrew C. Ritchie, Eleyne L. Phillips, Florence L. Wong, and Stephen R. Hartwell

Manuscript approved for publication February 13, 2018

Local (Offshore of Point Conception Map Area) and Regional (Offshore from Point Conception to Hueneme Canyon) Shallow-Subsurface Geology and Structure, Santa Barbara Channel, California

By
Samuel Y. Johnson and Stephen R. Hartwell
2018

Digital files available at https://doi.org/10.3133/ofr20181024

Suggested Citation: Johnson, S.Y., and Hartwell, S.R., 2018, Local (Offshore of Point Conception map area) and regional (offshore from Point Conception to Hueneme Canyon) shallow-subsurface geology and structure, Santa Barbara Channel, California, *sheet 8 in* Johnson, S.Y., Dartnell, P., Cochrane, G.R., Hartwell, S.R., Golden, N.E., Kvitek, R.G., and Davenport, C.W. (S.Y. Johnson and S.A. Cochran, eds.), California State Waters Map Series—Offshore of Point Conception, California: U.S. Geological Survey Open-File Report 2018–1024, pamphlet 36 p., 9 sheets, scale 1:24,000, https://doi.org/10.3133/ofr20181024.

ISSN 2331-1258 (online)
https://doi.org/10.3133/ofr20181024