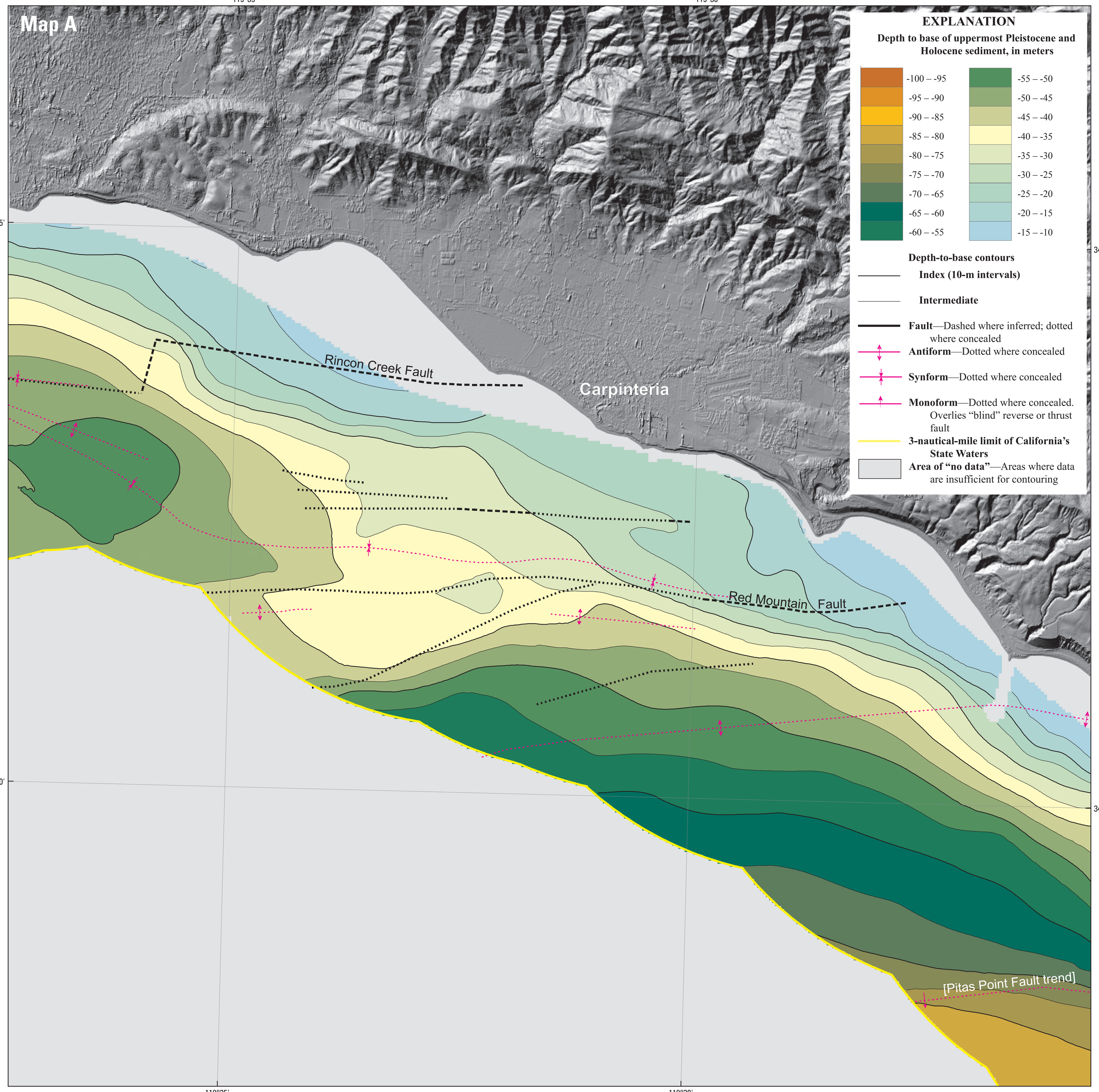
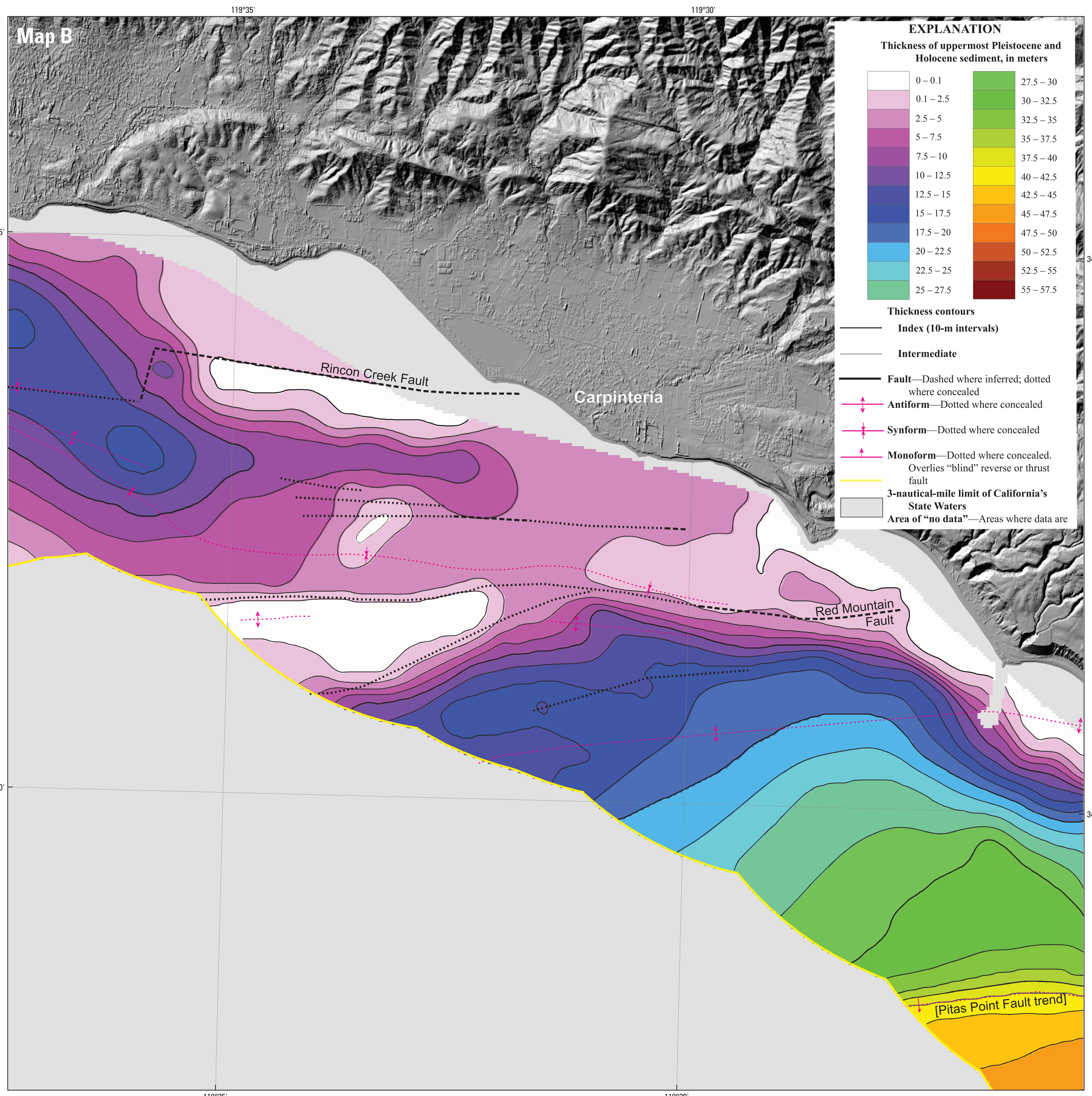
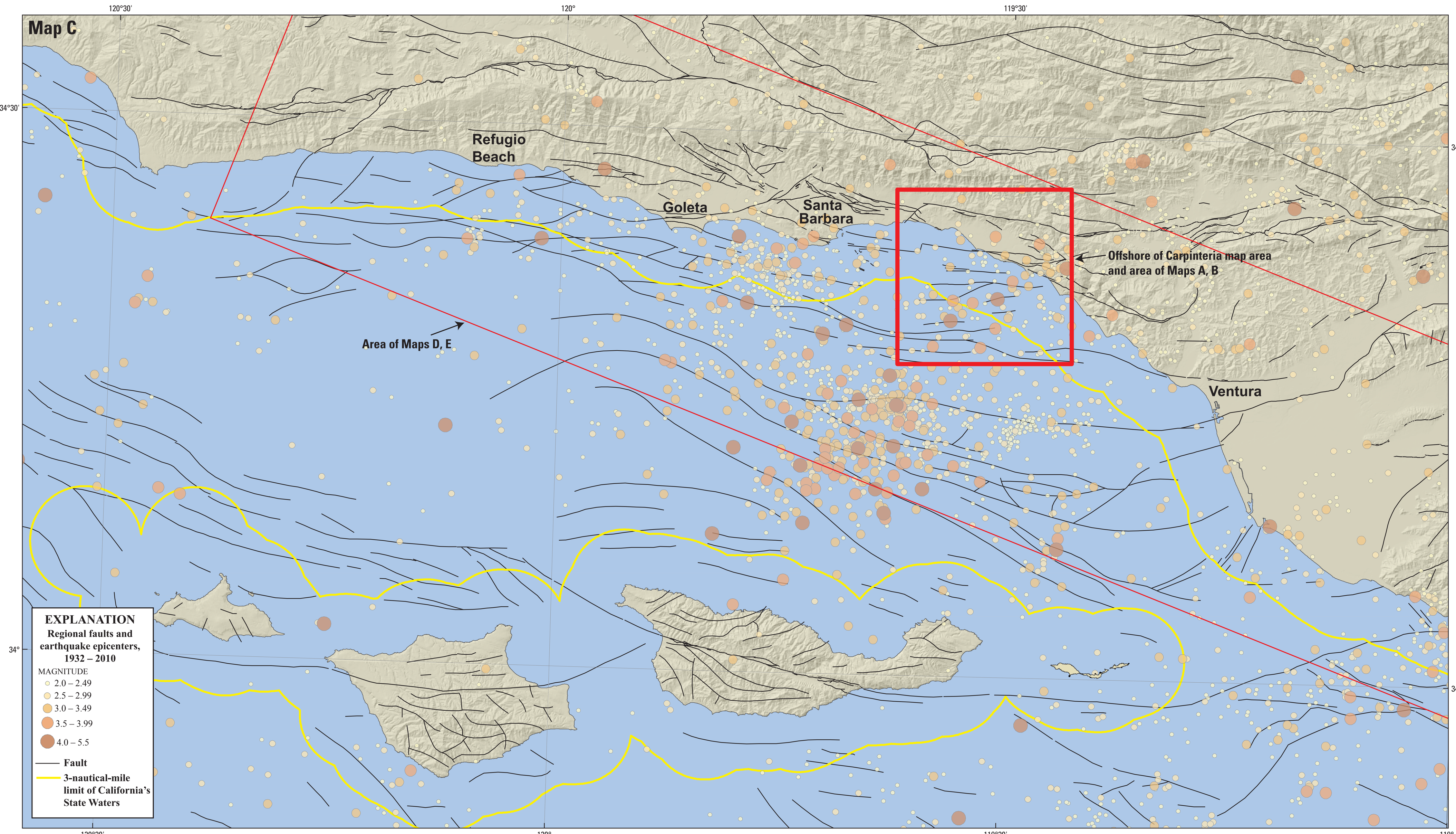




Onshore elevation data from NOAA Coastal Services Center (data collected by EarthData International in 2002-2003). California's State Waters limit from NOAA Office of Coast Survey
Universal Transverse Mercator projection, Zone 11N

SCALE 1:50 000

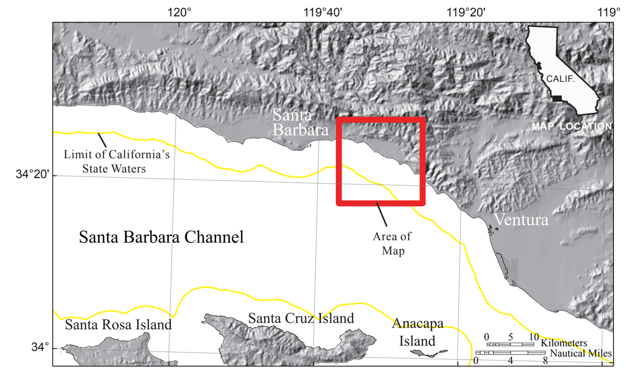
Depth and thickness mapped by Samuel Y. Johnson and Eleyne L. Phillips, 2010-2011
GIS database and digital cartography by Eleyne L. Phillips, Andrew C. Ritchie, and Florence L. Wong



Onshore elevation data from NOAA Coastal Services Center (data collected by EarthData International in 2002-2003) and from National Elevation Dataset, 2011. California's State Waters limit from NOAA Office of Coast Survey
Universal Transverse Mercator projection, Zone 11N

SCALE 1:300 000

Compiled by Andrew C. Ritchie and Samuel Y. Johnson, 2011



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 Carpinteria map area (Maps A, B), as well as for a larger area that extends about 115 km along the coast from Hueneme Canyon to Refugio Beach (Maps D, E) to establish a regional context. To make these maps, water bottom and depth to base of the post–Last Glacial Maximum horizons were mapped from seismic-reflection profiles. The difference in the two horizons was exported for every shot point as XY coordinates (UTM zone 11) and two-way travel time (TWT). The thickness of the post–Last Glacial Maximum 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 (sheet 10 of this report), and contoured (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 A, B, D, E).

Several factors required manual editing of the preliminary 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 to determine the depth to base of the post–Last Glacial Maximum unit was similarly processed and contoured. However, this preliminary data set was set aside in favor of a surface determined by subtracting the modified thickness data from multibeam bathymetry collected separately (see sheet 1). The depth of this surface in the Hueneme Canyon to Refugio Beach area ranges from 12 to 190 m (Map D; see also, Wong and others, 2012).

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) Refugio Beach to the south strand of the Red Mountain Fault Zone (RMFZ); (2) between the south strand of the Red Mountain Fault Zone and the Pitas Point Fault (PPF); (3) between the Pitas Point Fault and Oak Ridge Fault (ORF); (4) between the Oak Ridge Fault and Hueneme Canyon; and (5) south of Hueneme Canyon. These data highlight the contrast among three general zones of sediment thickness: (1) the uplifted, sediment-poor Santa Barbara shelf (domain 1; mean sediment thickness of 3.5 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 39.3, 38.9, and 28.3 m, respectively).

In the Offshore of Carpinteria map area, sediment thickness ranges from 0 to 47 m, with a mean thickness of 12.7 m. The thickest sediment accumulation (mean thickness, 44.0 m) is south of the north-dipping Pitas Point Fault. Sediment thins markedly (from 40 to 5 m; mean thickness, 19.2 m) from south to north in the uplifted and tilted zone between the Pitas Point Fault and the south strand of the Red Mountain Fault Zone. Sediment is much thinner north of the south strand of the Red Mountain Fault Zone (mean thickness, 5.1 m) where the thickest accumulations are present in a gentle trough between the uplifts associated with the Red Mountain and Rincon Creek Faults (see fig. 1 on sheet 8). The origin of this trough could be either structural or erosional (or both); although it is spatially related to a broad syncline (see figs. 1, 2 on sheet 8), it also could represent the axis of a lowstand paleodrainage system.

The regional pattern of faults and of earthquakes occurring between 1932 and 2010 that have inferred or measured magnitudes greater than 2.0 is shown on Map C. Fault locations are based on our mapping within California's State Waters and on a generalized compilation of mapping from Heck (1998), Minor and others (2009), and Jennings and Bryant (2010). Earthquake data are from the Southern California Earthquake Catalog (Southern California Earthquake Data Center, 2010). Although earthquake locations have been determined by the CalTech network since 1932, significantly greater precision began in 1969 with installation of a U.S. Geological Survey (USGS) seismographic network (Lee and Vedder, 1973; Southern California Earthquake Data Center, 2010). Epicentral data indicate that recent seismicity in the eastern and central Santa Barbara Channel is characterized by earthquake swarms, relatively frequent minor earthquakes, and infrequent major earthquakes.

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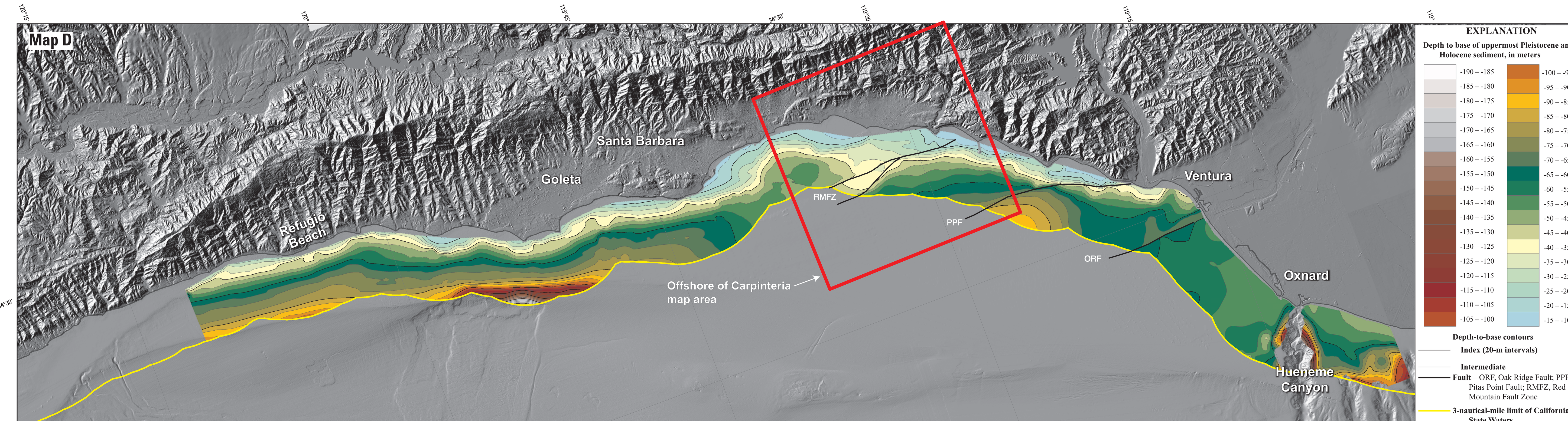

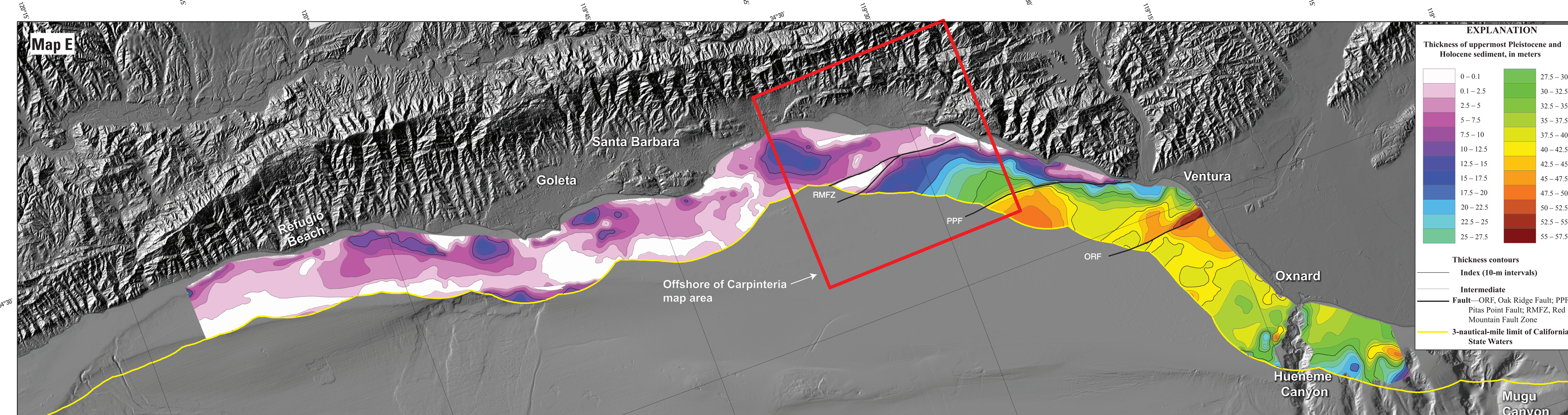

Onshore elevation data from NOAA Coastal Services Center (data collected by EarthData International in 2002-2003). Shaded-relief bathymetry from data collected by Monterey Bay Aquarium Research Institute in 1998, by U.S. Geological Survey in 2006, by California State University, Monterey Bay, Seafloor Mapping Lab in 2006-2007, and by Fugro Pelagos for U.S. Army Corps of Engineers in 2009; data compiled in NOAA Tsunami Inundation Project 1/3 arc-second DEMs for Santa Barbara, CA (Carignan and others, 2009), and Santa Monica, CA (Caldwell and others, 2010). California's State Waters limit from NOAA Office of Coast Survey
Universal Transverse Mercator projection, Zone 11N
NOT INTENDED FOR NAVIGATIONAL USE

SCALE 1:200 000

Depth and thickness mapped by Samuel Y. Johnson and Eleyne L. Phillips, 2010-2011
GIS database and digital cartography by Andrew C. Ritchie, Eleyne L. Phillips, and Florence L. Wong
Edited by Taryn A. Lindquist
Manuscript approved for publication June 13, 2013

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

By
Samuel Y. Johnson, Eleyne L. Phillips, Andrew C. Ritchie, Florence L. Wong, Ray W. Sliter, Amy E. Draut, and Patrick E. Hart
2013

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