U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

SCIENTIFIC INVESTIGATIONS MAP 3001
Pamphlet accompanies map

Figure 1. Generalized index map of the southwestern part of California showing the location of the Santa Barbara coastal plain region and nearby major western faults.

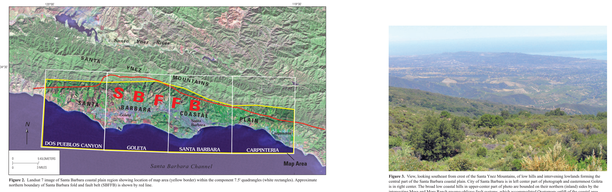


Figure 2. Landsat 7 image of Santa Barbara coastal plain region showing location of map area (yellow border) within the component 7.5′ quadrangles (white rectangles). Approximate northern boundary of Santa Barbara fold and fault belt (SBF) is shown by red line.

Figure 3. Sparkleff exposure near Santa Barbara Point, looking northwest, of southwest- (left-) dipping, subaerium and siliceous shale of the lower part of the Miocene Monterey Formation (Tmb), which in turn is unconformably overlain by flat-lying, upper Pleistocene (~ 70 ka) marine-terrace sand and gravel (Qmtd). The Monterey rocks here contain calcareous nannofossils of the early middle Miocene zone CN 4 (lower middle Miocene) and benthic foraminiferal assemblages indicative of the upper Saucesian and (or) Relizian benthic foraminifer zones of Kennedy and Garrison (1975). The Monterey rocks have undergone intense tectonic deformation recorded in the Monterey rocks in the area cliffs near Santa Barbara, including the northeast-striking reverse fault (highlighted) and southeast-strand slip visible in photograph, and numerous satellite minor faults and folds. The exposed marine terrace, provides evidence of a protracted episode of late Holocene(?) through Pleistocene transgression in the region.

Figure 5. View, looking southeast from east of the Santa Ynez Mountains, of low hills and intervening lowlands forming the central part of the Santa Barbara coastal plain. City of Santa Barbara is in left center part of photograph and easternmost Goleta Valley is in the right center. The Mesozoic(?) and Cenozoic sedimentary rocks of the Santa Ynez Mountains are cut by the intersecting Mesa and Mesa Ranch reverse-oblique fault systems, which accommodated Quaternary uplift of the coastal area. The Santa Ynez foothills that span across the middle part of photograph and the steeper mountain flank in the foreground are underlain by moderately south-dipping Tertiary sedimentary rocks cut by numerous northwest-striking faults.

Figure 4. View, looking southeast from flank of Santa Ynez Mountains, of downtown Santa Barbara (white buildings) situated on the central part of the Santa Barbara coastal plain. Santa Barbara Channel lies between the mainland and Santa Cruz Island, which is the largest of the Channel Islands. Prominent topographic lineament in the middle ground is the Mesa fault zone, which is concealed Mesa fault lies along the base of "La Mesa" coastal hills just beyond downtown to right center part of photograph. The lower wooded area between downtown and the base of the Santa Ynez mountain flank is Mission Ridge, a complexly faulted anticlinal upwarp that has deformed Pleistocene(?)and younger deposits (Qmt). The Santa Ynez mountain flank in the foreground is underlain by a steeply overturned homoclinic of Tertiary sedimentary rocks.

Figure 5. View, looking northwest from Goleta Valley of steep southern flank (the distance) and foothills (middle distance) of the Santa Ynez Mountains. Sandstone highcrags visible on mountain flank in distance consist of moderately to steeply south-dipping panels of Paleocene(?) and Eocene sandstone of the Matilija Sandstone and Juncal Formation. Foothills are underlain by Tertiary and Mesozoic(?) rocks and complex Neogene and Quaternary slip history. Note that many low ridges in foothills are capped by flat-lying geomorphic surfaces at one or more distinct elevations. These surfaces may represent relict older Pleistocene(?) uplifted alluvial or marine terraces.

Figure 6. Digital Elevation Model (DEM) shaded-relief image of the Santa Barbara coastal plain map area as viewed from the south and illuminated from northwest. Northern boundary of geologic map area flows from the south and illuminated from northwest. Northern boundary of geologic map area flows from 10-meter resolution elevation data, 2002.

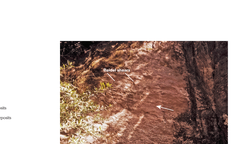


Figure 10. View, looking northwest, of moderately (35–18°) southeast-dipping Pleistocene sediments exposed in large cut bank of Maria Ygnacia Creek just south of Cathedral Oaks Road in northern Goleta Valley. Site rocks are left (in sunlight) are bedded sandstones (locally conglomeratic), siltstones, and mudstones that are mapped as the Pleistocene(?) nonmarine sediments of the Goleta Valley area (map unit Qoal) and stand deposits (Qstd) (in shadow). Site rocks are either in depositional or fault contact with marine rocks of the middle to lower Pleistocene Rincon Formation (Qpr) and Pleistocene(?) nonmarine sediments (Qoal). The site is more than may represent an appreciable Santa Barbara section that is transitional into the nonmarine alluvial deposits (Qoal), or they may be a western outlier of the Pleistocene(?) Goleta Valley section. Although the site rocks are dominantly nonmarine, clastic sequences observed throughout the coastal plain area are inferred to record middle to late Pleistocene uplift and erosion of the Santa Ynez Mountains and concomitant encroachment of shelf alluvial detritus into a retreating marine basin. Width of view ~2 meters.

Figure 8. View, looking east, of young oblique-reverse fault exposed in sea cliff at Loon Point (between Goleta and Carpinteria). Fault juxtaposes moderately southeast-dipping Pleistocene(?) nonmarine sediments (map unit Qoal) and overlying older alluvial (Qoal and ~10 ka marine-terrace deposits (Qmt) over Pleistocene probable Santa Barbara Formation marine deposits (Qsbf?) and overlying Qbk and Qmt deposits. Note that strata in hanging wall block are tilted more steeply than those in footwall. Although the exposed fault zone contains highly brecciated rocks, the fault zone is not a wide, elongated fault zone of fault gouge (compare to photo of Santa Barbara coastal plain includes several northwest-trending marine terraces that are similarly undercut by young anticlinal upwarps and partly buried oblique and reverse faults of the potentially active Santa Barbara fold and fault belt.

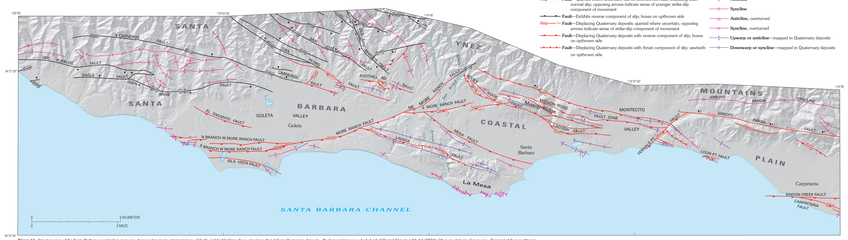


Figure 11. Structure map of the Santa Barbara coastal plain map area showing kinematic interpretations of faults and highlighting those structures that deform Quaternary deposits. Background image is shaded-relief Digital Elevation Model (DEM) (30-m resolution) of map area, illuminated from northwest.

EXPLANATION

(Note: Some fault and fold segments shown on structure map are concealed by upper Pleistocene and Holocene deposits)

Fault—Queried where uncertain; ball on downthrown side, indicating older normal dip; opposing arrows indicate sense of younger strike-slip component of movement

Fault—Exhibits reverse component of slip; hours on upthrown side

Fault—Displacing Quaternary deposits; queried where uncertain, opposing arrows indicate sense of younger strike-slip component of movement

Fault—Displacing Quaternary deposits with reverse component of slip; hours on upthrown side

Fault—Displacing Quaternary deposits with thrust component of slip; sawteeth on upthrown side

Anticline

Syncline

Anticline, overturned

Syncline, overturned

Upwarp or anticline—mapped in Quaternary deposits

Downwarp or syncline—mapped in Quaternary deposits

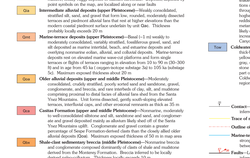
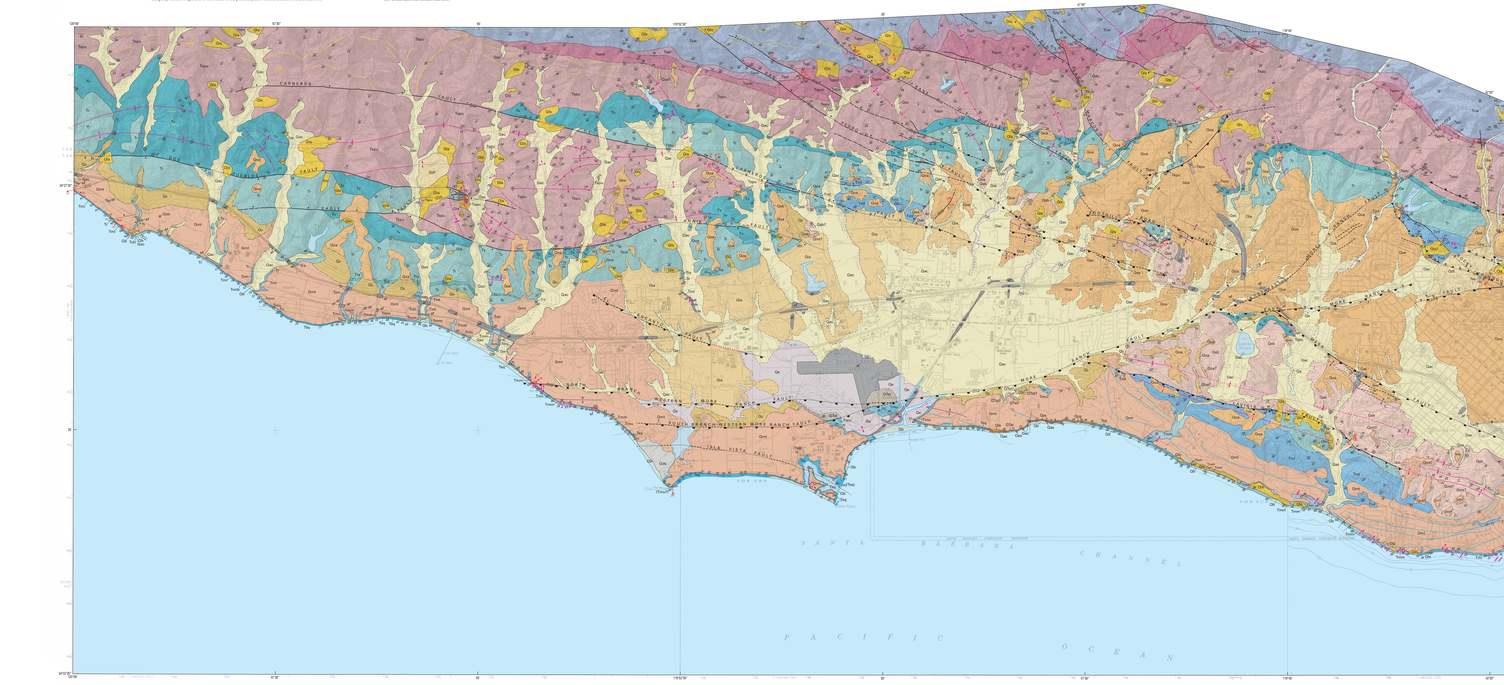


Figure 12. View, looking southeast, of fault surface exposed in small cliff face in conglomeratic sedimentary rocks of the lower unit of the Sespe Formation (Tsgl) in upper San Reque Creek drainage on flank of Santa Ynez Mountains. Fault strikes northeast (230°) and dips 70° to the southeast. Fault is characterized by a narrow zone of fault gouge. Fault juxtaposes a Paleocene(?) (based on lithostratigraphic correlation) and Eocene(?) (based on biostratigraphic correlation) sandstone (Tsgl) against (with the relative orientations of sand) indicates Rodeo shear surface (labeled) indicate that this fault is a normal strike-slip fault. Arrow points to slickenlines on fault surface. Fault is cut by a 1.5-m-wide zone of cataclasite (fault gouge). Small exposure throughout the map area to help characterize the kinematics of both map-scale and smaller faults.


CARNERO
FAULT
ELLWOOD
MESA
FAULT
ELLWOOD
SHORE
FAULT
GOLETA
FAULT
MISSION
RIDGE
FAULT
EDISON
FAULT
SAN
MARCOS
FAULT
MESA
FAULT
SAN
JACINTO
FAULT
SAN
JOSE
FAULT
SAN
YSIDRO
FAULT
SANTA
BARBARA
HARBOR
Stearns Wharf
Santa Barbara Municipal Airport
Goleta Slough
Goleta Point
Ellwood Point
Coal Oil Point
Isla Vista
Goleta Beach County Park
Sperling Preserve County Park
Coal Oil Point Reserve
Devereux Slough
Devereux Point
Coleman Beach County Park
Isla Vista Beach County Park
Campus Point
Sands Beach
Coal Oil Point
Point Pedernales
Naples Point
Haskells Beach
Tecolote Point
Bacon Point
Arroyo Quemado
Refugio State Beach
Refugio Point
Refugio Beach
Refugio Creek
Tajiguas Creek
Tajiguas Beach
Tajiguas Point
Gaviota State Park
Gaviota Beach
Gaviota Point
Gaviota Creek
Alegria Canyon
Arroyo Hondo
Arroyo Hondo Beach
Arroyo Hondo Point
Cañada Del Cementerio
Cañada Del Cementerio Beach
Cañada Del Cementerio Point
Cañada Del Cementerio Creek
Cañada Del Cementerio Canyon
Cañada Del Cementerio Mouth
Cañada Del Cementerio Fault
Cañada Del Cementerio Anticline
Cañada Del Cementerio Syncline
Cañada Del Cementerio Overturned Anticline
Cañada Del Cementerio Overturned