CALIFORNIA GEOLOGICAL SURVEY
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STATE OF CALIFORNIA - GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY - MARY D. NICHOLS
DEPARTMENT OF CONSERVATION - DARRYL YOUNG

ABBREVIATED EXPLANATION

Approximate stratigraphic relationships only; see Map Explanation (Plate 2) for more detailed information

Holocene

- Q — Alluvium
- af — Artificial fill
- Qe — Eolian sand
- Qg — Stream gravel
- Qs — Sand
- Qd — Dune sand
- Qfl — Flood plain deposits
- Qcf — Canyon Fill (offshore)
- Qb — Basin deposits
- Qp — Patterson Alluvium

Pleistocene

- Qo — Older alluvium
- Qt — Terrace deposits
- Qmt — Marine terrace deposits
- Qf — Alluvial fan deposits
- Qfa — Fan deposits of Antioch
- Qfc — Fan deposits of Chular
- Qfp — Fan deposits of Placentia
- Qfg — Fan deposits of Gloria
- Qar — Aromas Sand (undivided)
  - Qae — Eolian facies
  - Qaf — Fluvial facies
- Qls — Landslide deposits
- Qod — Older Dune Sand
- Qtw — Terrace deposits of Watsonville terrace
- Qms — Marine sediments
- Qocf — Older canyon fill (offshore)
- Qrb — Relict beach deposits (offshore)
- Qct — Submarine canyon terrace
- Qsl — San Luis Alluvium
- Qlb — Los Banos Alluvium
- QT — Plio-Pleistocene continental deposits
- QTf — Plio-Pleistocene fluvial deposits
- QTl — Plio-Pleistocene lacustrine deposits

Pliocene

- Puc — Unnamed Pliocene continental mudstone
- Ppu — Purisima Formation
- MPe — Etchegoin Formation
- Pus — Unnamed Pliocene Continental sandstone
- Ppr — Pancho Rico Formation
- Pv — Pliocene Basaltic rocks (Coyote Volcanics)

Miocene

- Msc — Santa Cruz Mudstone
- Msm — Santa Margarita Sandstone (Mv-Basalt interbed)
- Mmy — Monterey Formation
- Mlo — Lompico Sandstone
- Mus — Unnamed Miocene sandstone
- Mv — Unnamed Miocene volcanic rocks
- Msu — Unnamed Miocene sedimentary rocks
- Msh — Organic mudstone
- Mte — Temblor
- Mlt — Lone Tree Formation
- Mvq, Mvqa, Miqa, Mvqb, Miqb, Mvqd, Miqd, Mvqr, Miqr

QUIEN SABE VOLCANICS
Mvqa - Andesitic flows and breccia
Mvqb - Basaltic flows and breccia
Mvqd - Dacite flows
Mvqr - Rhyolite flows
Miqa - Intrusive andesite
Miqb - Intrusive basalt
Miqd - Intrusive dacite
Miqr - Intrusive rhyolitic rocks

- Tv — Tertiary volcanic rocks
  Tva - Andesite
  Tvb - Basalt

Oligocene

- ɸrb — Red beds
- ɸvq — Vaqueros Sandstone
- Eɸsj — San Juan Bautista Formation
- ɸpv — Pinnacles volcanic formation
- ɸvc — Carmeloite of Lawson

Paleocene-Eocene

- Ebu — Unnamed Eocene sedimentary rocks
- Ec — Carmelo Formation
- Elm — Los Muertos Formation
- Etp — Tres Pinos Sandstone
- Ess — Arkosic sandstone
- PEu — Paleocene-Eocene sedimentary rock
- Ek — Kreyenhagen Formation
- Ed — Domengine Sandstone
- Elc — Cantua Sandstone
- TKu — Tertiary-Cretaceous sedimentary rock

Cretaceous

- Ku — Upper Cretaceous sedimentary rock
- KJf — Franciscan Complex part of KJf is melange (KJfm)
  - cg — Conglomerate
  - ss — Sandstone
  - ch — Chert
  - gs — Greenstone
- Kp — Panoche Formation
  - Kps — Sandstone
  - Kpc — Conglomerate
- KJu — Jurassic-Cretaceous sedimentary rocks
- Kgr — Granitic rocks
- Kqm — Quartz monzonite
- Kqd — Quartz diorite
- Kgd — Granodiorite

Jurassic

- um — Serpentinized ultramafic rock
- bs — Blueschist and semischist
- ls — Limestone
- gb — Gabbro
- Jhg — Hornblende Gabbro of Logan quarry
- PzMz — Prebatholithic metasedimentary rocks (Pzls - Carbonate rocks)

Coast Range Ophiolite

- Jpb — Breccia
- Jv — Volcanic rocks (greenstone)
- Jgb — Gabbro
- um — Serpentinized ultramafic rock

- msc — Schist of Sierra de Salinas

SYMBOLS

- Contact; solid where well located; dashed where approximately located or inferred; dotted where concealed; queried where uncertain.
- Fault; solid where well located; dashed where approximately located or inferred; dotted where concealed; queried where existence or continuation is uncertain. Arrows show direction of dip when known.
- Thrust fault; barbs on upper plate; solid where well located; dashed where approximately located or inferred; dashed where concealed; queried where existence or continuation uncertain. Arrow indicates direction of dip when known.
- Anticlinal fold; solid where well located; dashed where inferred; dotted where concealed; queried where existence or continuation is uncertain.
- Synclinal fold; solid where well located; dashed where inferred; dotted where concealed; queried where existence or continuation is uncertain.
- 80 — Strike and dip of stratified rocks. Number indicates dip angle in degrees when known.
- Vertical beds
- 60 — Overturned beds
- Horizontal beds
- 25 — Strike and dip of foliations
- Arrows on landslides indicate direction of movement.

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Geology Compiled 1998-2000

Topographic base from U.S. Geological Survey Monterey and Palo Alto 30'x60' quadrangles. Shaded topographic base from USGS digital elevation models. Shaded bathymetric base from Monterey Bay Aquarium Research Institute.

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SCALE 1:100,000

2 0 2 4 6 Miles

2 0 2 4 6 Kilometers

Contour Interval: 50 meters
Bathymetric Contour Interval: 500 meters

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GEOLOGIC MAP OF THE MONTEREY 30'x60' QUADRANGLE AND ADJACENT AREAS, CALIFORNIA

Compiled by
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2002
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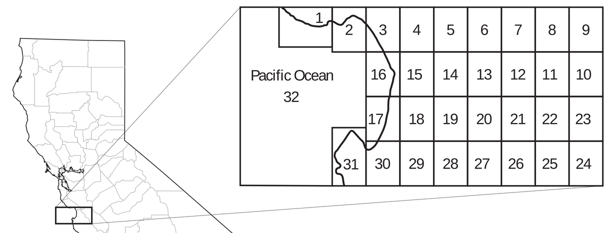
1. Department of Conservation, California Geological Survey.
2. Moss Landing Marine Laboratories and Monterey Bay Aquarium Research Institute.



ABBREVIATED INDEX TO GEOLOGIC SOURCE DATA*

1. Santa Cruz Quadrangle
Clark, J.C., 1981; Stanley, R.G., and McCaffery, Robert, 1983.

2. Soquel Quadrangle
Brabb, E.E., 1989.

3. Watsonville West Quadrangle
Brabb, E.E., 1989; Dupre, W.R., and Tinsley, J.C., III, 1980; Hall, N.T., Sarna-Wojcicki, A.M., and Dupre, W.R., 1974.

4. Watsonville East Quadrangle
Brabb, E.E., 1989; Bryant, W.A., Smith, D.P., and Hart, E.W., 1981; Dupre, W.R., and Tinsley, J.C., III, 1980; Dibblee, T.W., Jr., 1978; Hall, N.T., Sarna-Wojcicki, A.M., and Dupre, W.R., 1974; Graymer, R.W., 1997.

5. Chittenden Quadrangle
Allen, J. E., 1946; Armstrong, C.F., 1980; Bishop, C.C., 1971; Bryant, W.A., Smith, D.P., and Hart, E.W., 1981; Dibblee, T.W., Jr., and Brabb, E.E., 1980; Graymer, R.W., 1997; Wagner, D.L., 2000.

6. San Felipe Quadrangle
Armstrong, C.F. and Wagner, D.L., 1978; Bryant, W.A., Smith, D.P., and Hart, E.W., 1981; Dibblee, T.W., Jr. and Rogers, T.H., 1975; Graymer, R.W., 1997; Rogers, T.H., 1993; Rosenberg, L.I., 1998.

7. Three Sisters Quadrangle
Bryant, W.A., 1985; Osuch, L.H., 1970; Wagner, D.L., 1989.

8. Mariposa Peak Quadrangle
Drinkwater, J.L., Sorg, D.H., and Russell, P.C., 1992.

9. Los Banos Valley Quadrangle
Dibblee, T.W., Jr., 1975; Lettis, W. R., 1982.

10. Ruby Canyon Quadrangle
Dibblee, T.W., Jr., 1975.

11. Quien Sabe Valley Quadrangle
Anderson, P.C., 1983; Dibblee, T.W., Jr., 1975; Prowell, D.C., 1974.

12. Tres Pinos Quadrangle
Bryant, W.A., 1985; Dibblee, T.W., Jr., 1979.

13. Hollister Quadrangle
Dibblee, T.W., Jr., and Rogers, T.H., 1975; Rogers, T.H., 1993; Rosenberg, L.I., 1998.

14. San Juan Bautista Quadrangle
Allen, J.E., 1946; Bishop, C.C., 1971; Dibblee, T.W., Jr., 1979; Dupre, W.R., and Tinsley, J.C., III, 1980.

15. Prunedale Quadrangle
Dupre, W.R., and Tinsley, J.C., III, 1980.

16. Moss Landing Quadrangle
Dupre, W.R., and Tinsley, J.C., III, 1980.

17. Marina Quadrangle
Dupre, W.R., and Tinsley, J.C., III, 1980.

18. Salinas Quadrangle
Dupre, W.R., and Tinsley, J.C., III, 1980.

19. Natividad Quadrangle
Dupre, W.R., and Tinsley, J.C., III, 1980; Bowen, O.E., 1973; Ross, D.C., 1972.

20. Mount Harlan
Dibblee, T.W., Jr., and Ross, D.C., 1973; Ross, D.C., 1972.

21. Paicines Quadrangle
Dibblee, T.W., Jr., 1979.

22. Cherry Peak Quadrangle
Dibblee, T.W., Jr., 1979; Wilson, I.F., 1943.

23. Panoche Pass Quadrangle
Dibblee, T.W., Jr., 1979; Wilson, I.F., 1943.

24. San Benito Quadrangle
Dibblee, T.W., Jr., 1979; Enos, Paul, 1965; Wilson, I.F., 1943.

25. Bickmore Canyon Quadrangle
Dibblee, T.W., Jr., 1979; Wilson, I.F., 1943.

26. Mount Johnson
Dibblee, T.W., Jr., and Ross, D.C., 1973; Ross, D.C., 1972.

27. Gonzales Quadrangle
Dibblee, T.W., Jr., and Ross, D.C., 1973; Tinsley, J.C., III, 1975.

28. Chualar Quadrangle
Bowen, O.E., 1973; Dibblee, T.W., Jr., 1999; Tinsley, J.C., III, 1975.

29. Spreckels Quadrangle
Clark, J.C., Brabb, E.E., Dupre, W.R., and Rosenberg, L.I., 1999.

30. Seaside Quadrangle
Clark, J.C., Dupre, W.R., and Rosenberg, L.I., 1997.

31. Monterey Quadrangle
Clark, J.C., Dupre, W.R., and Rosenberg, L.I., 1997.

32. Offshore area
Continental slope and Monterey submarine canyon system:
Greene, H.G., 1977; Greene, H.G., 1999; McCulloch, D.S., and Greene, H.G., 1990.

Continental Shelf (less than 150 meter water depth):
Eittreim, S.L., Anima, R.J., and Stevenson, A.J., in press; Eittreim, S.L., Anima, R.J., Stevenson, A.J., and Wong, F.L., 2001.

*See enclosed text for complete references.