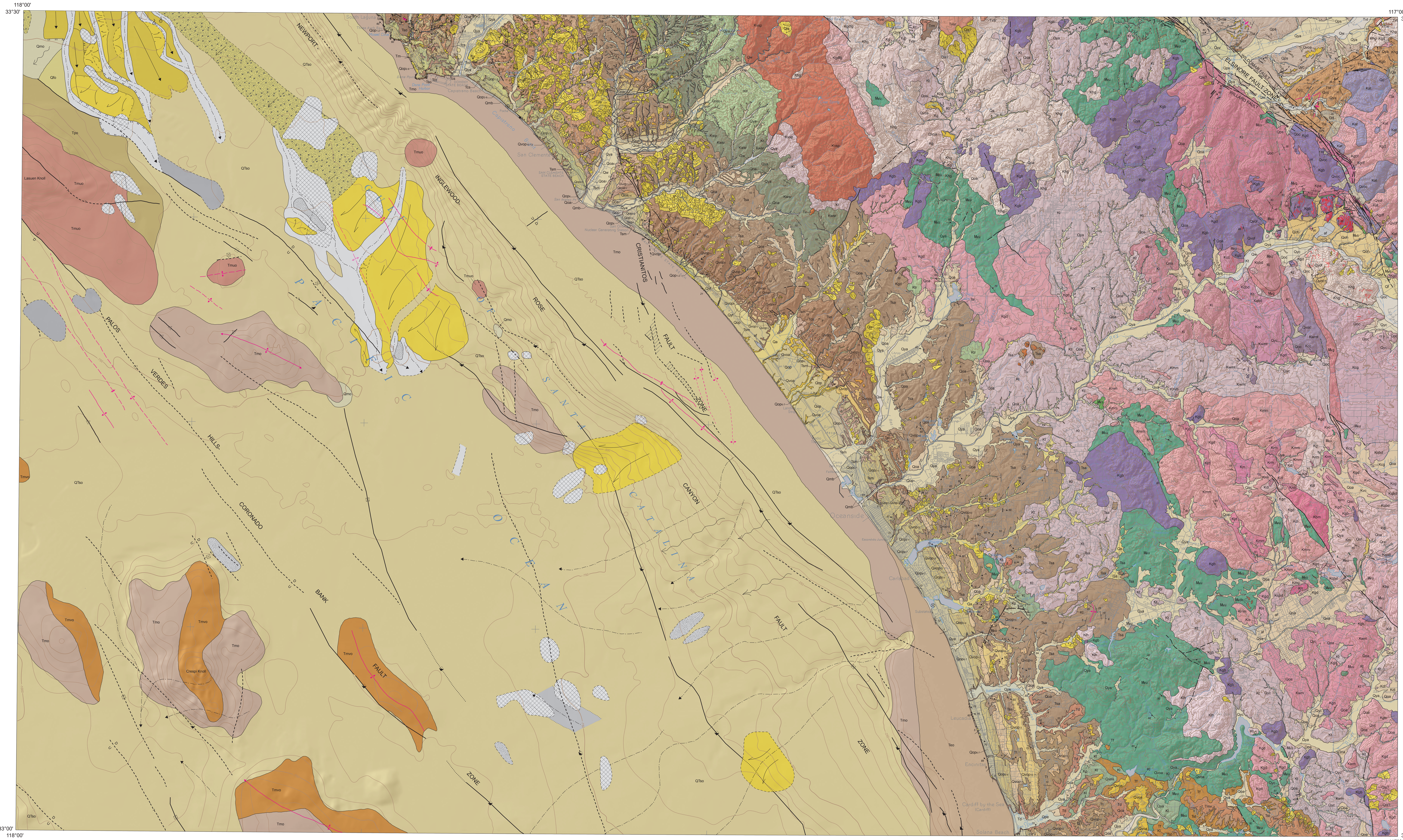
CALIFORNIA GEOLOGICAL SURVEY
JOHN G. PARRISH, Ph.D., STATE GEOLOGIST

STATE OF CALIFORNIA - ARNOLD SCHWARZENEGGER, GOVERNOR
THE RESOURCES AGENCY - MIKE CHRISMAN, SECRETARY
DEPARTMENT OF CONSERVATION - BRIDGETT LUTHER, DIRECTOR



Geology compiled 2002-2004

ABBREVIATED EXPLANATION

Approximate stratigraphic relationships only;
see pamphlet and CMU (Plate 2) for more detailed information

MODERN SURFICIAL DEPOSITS

Holocene

- af — Artificial fill (late Holocene)
- Qw — Wash deposits (late Holocene)
- Qf — Alluvial fan deposits (late Holocene)
- Qa — Alluvial flood-plain deposits (late Holocene)
- Qls — Landslide deposits, undivided (Holocene and Pleistocene)
- Qmb — Marine beach deposits (late Holocene)
- Qpe — Paralic estuarine deposits (late Holocene)
- Qmo — Undivided marine deposits in offshore region (late Holocene)
- Qfo — Marine fan deposits (late Holocene)

YOUNG SURFICIAL DEPOSITS

- Qyf — Young alluvial fan deposits (Holocene and late Pleistocene)
- Qya — Young alluvial flood-plain deposits (Holocene and late Pleistocene)
- Qyc — Young colluvial deposits (Holocene and late Pleistocene)
- Qyv — Young alluvial valley deposits (Holocene and late Pleistocene)

OLD SURFICIAL DEPOSITS

Pleistocene

- Qof — Old alluvial fan deposits, undivided (late to middle Pleistocene)
  - Qof_2 — Unit 2
  - Qof_1 — Unit 1
- Qoa — Old alluvial flood-plain deposits, undivided (late to middle Pleistocene)
  - Qoa_7 — Unit 7
  - Qoa_6 — Unit 6
  - Qoa_5 — Unit 5
  - Qoa_{2-6} — Unit 2-6
  - Qoa_{1-2} — Units 1-2
- Qoc — Old colluvial deposits (late to middle Pleistocene)
- Qop — Old paralic deposits, undivided (late to middle Pleistocene)
  - Qop_7 — Unit 7
  - Qop_6 — Unit 6
  - Qop_4 — Unit 4
  - Qop_3 — Unit 3
  - Qop_1 — Unit 1
  - Qop_{6-7} — Units 6-7
  - Qop_{4-6} — Units 4-6
  - Qop_{2-4} — Units 2-4
  - Qop_{1-2} — Units 1-2
  - Qop_{7-8} — Units 7-8
  - Qop_{2-6} — Units 2-6
  - Qop_1-$Qvop_{13}$ — Units Qop_1 -$Qvop_{13}$

VERY OLD SURFICIAL UNITS

- Qvof — Very old alluvial fan deposits (middle to early Pleistocene)
- Qvoa — Very old alluvial flood-plain deposits, undivided (middle to early Pleistocene)
  - $Qvoa_{13}$ — Unit 13
  - $Qvoa_{12}$ — Unit 12
  - $Qvoa_{11}$ — Unit 11
- Qvoc — Very old colluvial deposits, undivided (middle to early Pleistocene)
- Qvop — Very old paralic deposits, undivided (middle to early Pleistocene)
  - $Qvop_{13}$ — Unit 13
  - $Qvop_{12}$ — Unit 12
  - $Qvop_{11}$ — Unit 11
  - $Qvop_{10}$ — Unit 10
  - $Qvop_9$ — Unit 9
  - $Qvop_8$ — Unit 8
  - $Qvop_7$ — Unit 7
  - $Qvop_5$ — Unit 5
  - $Qvop_4$ — Unit 4
  - $Qvop_3$ — Unit 3
  - $Qvop_2$ — Unit 2
  - $Qvop_1$ — Unit 1
  - $Qvop_{11-12}$ — Units 11-12
  - $Qvop_{10-11}$ — Units 10-11
  - $Qvop_{9-10}$ — Units 9-10
  - $Qvop_{8-9}$ — Units 8-9
  - $Qvop_{7-8}$ — Units 7-8
  - $Qvop_{2-3}$ — Units 2-3
  - $Qvop_{10-13}$ — Units 10-13

SEDIMENTARY AND VOLCANIC BEDROCK UNITS

- Qps / Qpf — Pauba Formation (early Pleistocene)
  - Qps - sandstone facies
  - Qpf - fanglomerate facies
- Qd — Dripping Springs Formation (early Pleistocene)
- QTso — Undivided sediments and sedimentary rocks in offshore region (Holocene, Pleistocene, Pliocene and Miocene)

Pliocene

- Tta — Temecula Arkose (late Pliocene)
- Tn — Niguel Formation (late Pliocene)
- Tpo — Undivided sedimentary rocks in offshore region (Pliocene)
- Tcs / Tct — Capistrano Formation (early Pliocene and late Miocene)
  - Tcs - siltstone facies
  - Tct - turbidite facies

Miocene

- Tsm — San Mateo Formation (early Pliocene and late Miocene)
- Tvsr — Santa Rosa basalt of Mann (1955) (late Miocene)
- Tda — Dacite stock (Miocene)
- Tv — Volcanic rocks, undivided (Miocene)
- Tvt — Basalt of Temecula area (Miocene)
- Tm — Monterey Formation (middle and late Miocene)
- Tso / Tsoss — San Onofre Breccia (middle Miocene)
  - Tso - breccia
  - Tsoss - sandstone
- Tto — Topanga Formation (middle Miocene)
- Tmo — Undivided sedimentary rocks in offshore region (Miocene)
- Tmvo — Undivided volcanic rocks in offshore region (Miocene)
- Tmuo — Undivided volcanic and sedimentary rocks in offshore region (Miocene)—Tmo or Tmvo

Oligocene

- Tsv — Sespe and Vaqueros Formations, undivided (early Miocene, Oligocene and late Eocene)

Eocene

- Trm — Sandstone of Redonda Mesa (Paleogene)
- Tmv — Mission Valley Formation (middle Eocene)
- Tst — Stadium Conglomerate (middle Eocene)
- Tf — Friars Formation (middle Eocene)
- Tt — Torrey Sandstone (middle Eocene)
- Td — Delmar Formation (middle Eocene)
- Tsa — Santiago Formation (middle Eocene)
- Teo — Undivided Eocene rocks in the offshore area (Eocene)

Paleocene

- Tsi — Silverado Formation (Paleocene)

Cretaceous

- Kp — Point Loma Formation (Upper Cretaceous)
- Kwp / Kwsr — Williams Formation (Upper Cretaceous)
  - Kwp - Pleasants Sandstone Member
  - Kwsr - Schulz Ranch Sandstone Member
- Kl — Lusardi Formation (Upper Cretaceous)
- Ktr — Trabuco Formation (Upper Cretaceous)

UNNAMED CRETACEOUS ROCKS OF THE PENINSULAR RANGES BATHOLITH

- Kgp — Granite pegmatite dike (mid-Cretaceous)
- Kg — Granite, undivided (mid-Cretaceous)
- Kmg — Monzogranite, undivided (mid-Cretaceous)
- Kgd — Granodiorite, undivided (mid-Cretaceous)
- Kgdfg — Granodiorite (fine-grained), undivided (mid-Cretaceous)
- Kt — Tonalite, undivided (mid-Cretaceous)
- Kqbd — Quartz-bearing diorite, undivided (mid-Cretaceous)
- Kd — Diorite, undivided (mid-Cretaceous)
- Kgb — Gabbro, undivided (mid-Cretaceous)
- Khg — Heterogeneous granitic rocks (Cretaceous)

NAMED CRETACEOUS ROCKS OF THE PENINSULAR RANGES BATHOLITH

- Kdl — Granite of Dixon Lake (mid-Cretaceous)
- Kbp — Granite of Bottle Peak (mid-Cretaceous)
- Kis — Granite of Indian Springs (mid-Cretaceous)
- Klh — Leucogranodiorite of Lake Hodges (mid-Cretaceous)
- Kvc — Monzogranite of Valley Center (mid-Cretaceous)
- Kmm — Monzogranite of Merriam Mountain (mid-Cretaceous)
- Kwm — Granodiorite of Woodson Mountain (mid-Cretaceous)
- Kjd — Granodiorite of Jesmond Dean (mid-Cretaceous)
- Kbm — Granodiorite of Burnt Mountain (mid-Cretaceous)
- Km — Granodiorite of Mountain Meadows (mid-Cretaceous)
- Krr — Granodiorite of Rimrock (mid-Cretaceous)
- Ki — Granodiorite of Indian Mountain (mid-Cretaceous)
- Kr — Granodiorite of Rainbow (mid-Cretaceous)
- Kpa — Granodiorite of Pala (mid-Cretaceous)
- Kgdf — Granodiorite, undivided within the Elsinore Fault Zone (mid-Cretaceous)
- Kcg — Tonalite of Cole Grade (mid-Cretaceous)
- Kcc — Tonalite of Couser Canyon (mid-Cretaceous)
- Krm — Quartz-bearing diorite of Red Mountain (mid-Cretaceous)
- Kat — Gabbro of the Agua Tibia Mountains (mid-Cretaceous)
- Kwmt — Gabbro of Weaver Mountain (mid-Cretaceous)
- Kgbf — Gabbro, undivided within the Elsinore Fault Zone (mid-Cretaceous)
- Kvsp — Santiago Peak Volcanics (Cretaceous)

PREBATHOLITHIC AND SYNBATHOLITHIC METAMORPHIC ROCKS

Jurassic

- Mzu — Metasedimentary and metavolcanic rocks, undivided (Mesozoic)
- Mzd — Metavolcanic dikes (Mesozoic)
- Mzg — Metagranitic rocks (Mesozoic)
- Mzq — Quartzite and quartz conglomerate (Mesozoic)
- Mzs — Schist with minor amphibolite and marble (Mesozoic)

ONSHORE MAP SYMBOLS

- Contact - Contact between geologic units; generally approximately located; dotted where concealed.
- Fault - Solid where accurately located; dashed where approximately located; dotted where concealed. U = upthrown block, D = downthrown block. Arrow and number indicate direction and angle of dip of fault plane.
- Anticline - Solid where accurately located; dotted where concealed.
- Syncline - Solid where accurately located; dotted where concealed.
- Kgp - Granite pegmatite dike.
- Closed depression - Closed depression in Elsinore fault zone.
- Landslide - Arrows indicate principal direction of movement. Queried where existence is questionable.

Strike and dip of beds
- Inclined
- Overturned
- Vertical
- Horizontal

Strike and dip of igneous foliation
- Inclined
- Vertical

Strike and dip of igneous joints
- Inclined
- Vertical

Strike and dip of metamorphic foliation
- Inclined

Strike and dip of sedimentary joints
- Vertical

OFFSHORE MAP SYMBOLS

Contacts

- Contact - All contacts are extrapolated from a combination of seismic reflection data, samples and bathymetry, and are approximate in location.

Faults

- Fault - Solid where well defined; short dash where inferred; dotted where concealed; queried where uncertain. Where fault offsets sea floor, age symbol is shown on bar on downthrown side. Where age was determined, age symbol is shown astride fault and relative offset if known is shown by "D" and "U" on downthrown and upthrown sides. Ages of faults are indicated as follows:
  - ☒ cuts strata of Holocene age
  - ☐ cuts strata of Pleistocene age
  - ◪ cuts strata of Quaternary age
  - △ cuts Miocene or older strata
- Fault zone - Area of extensively sheared rock within a zone defined by multiple faults.

Folds

- Anticline - Dashed where inferred. Solid arrow indicates direction of axial plunge.
- Syncline - Solid where well defined, dashed where inferred.

Major Structural Features

- Structural High - Dashed line is approximate axis of elongated bedrock highs depicted from deep (>2 sec.) seismic reflection data.

Channels

- Active - Dash-dot line marks axis, arrow indicates direction of paleo-sediment transport.
- Filled - Dash-dot line marks axis, arrow indicates direction of paleo-sediment transport. Channel boundary solid where well defined, dashed where inferred.
- Buried - Dash-dot line marks axis, arrow indicates direction of paleo-sediment transport. Channel boundary dotted.

Levees

- Levees - Solid where well defined, dashed where inferred.

Landslides

- Creep - Solid where well defined, dashed where inferred.
- Creep (noted on single survey line) - Arrow indicates apparent direction of sediment movement.
- Slump - Solid where well defined, dashed where inferred. Arrows indicate direction of movement.
- Slump Scarp - Solid where well defined, dashed where inferred.
- Erosional scarp - Solid where well defined. Generally associated with active channels.
- Block Glide - Solid where well defined, dashed where inferred. Arrow indicates direction of movement.
- Sediment Flow - Solid where well defined, dashed where inferred. Arrow indicates direction of movement.

Gas

- Oil and/or gas seep
- Area of acoustic anomaly (possibly indicating trapped shallow gas) - Solid where well defined, dashed where inferred.

Base Map

Onshore base (hypsography, hydrography, and transportation) from U.S.G.S. digital line graph (DLG) data, Oceanside 30' x 60' metric quadrangle. Shaded topographic base from U.S.G.S. digital elevation models (DEM's). Offshore bathymetric contours and shaded bathymetry from N.O.A.A. single and multibeam data. Projection is UTM, zone 11, North American Datum 1927.

SCALE 1:100,000

2 0 2 4 6 Miles

2 0 2 4 6 Kilometers

Contour Interval: 50 meters (approximately 164 feet)
Bathymetric Contour Interval: 50 meters (approximately 164 feet)

MN
13°
231 MILS
APPROXIMATE MEAN DECLINATION, 2007

This map was funded in part by the U.S. Geological Survey National Cooperative Geologic Mapping Program, STATEMAP Award no. 01NQAG0092.

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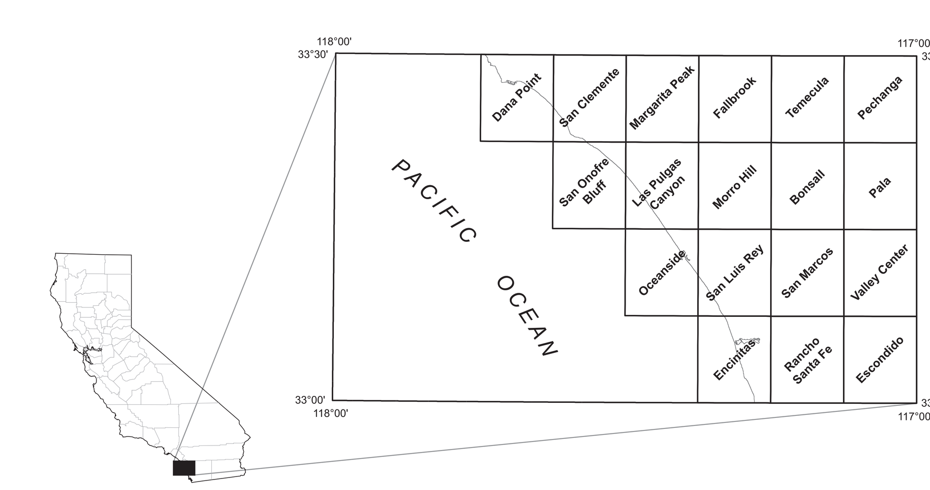
GEOLOGIC MAP OF THE OCEANSIDE 30' × 60' QUADRANGLE, CALIFORNIA

Compiled by
Michael P. Kennedy[1] and Siang S. Tan[1]
2007
Digital preparation by
Kelly R. Bovard[2], Rachel M. Alvarez[2], Michael J. Watson[2], and Carlos I. Gutierrez[1]

1. Department of Conservation, California Geological Survey
2. U.S. Geological Survey, Department of Earth Sciences, University of California, Riverside



ABBREVIATED INDEX TO GEOLOGIC SOURCE DATA

(Primary compilation sources shown in bold type)

See pamphlet for complete citation

Bonsall Quadrangle
Larsen, 1948; **Tan, 2000a**; Weber, 1963.

Dana Point Quadrangle
Edgington, 1974; Kern, 1996a; Kern and others, 1996; Morton and Miller, 1981; Tan, 1984; **Tan, 1999a**; Tan and Weber, 1984; Vedder, 1975.

Encinitas Quadrangle
Kern, 1996a; Tan, 1986; **Tan and Kennedy, 1996**; Tan and Giffen, 1995; Wilson, 1972.

Escondido Quadrangle
Kennedy and Peterson, 1975; Larsen, 1948; Tan and Giffen, 1995; **Tan and Kennedy, 1999**; Weber, 1963.

Fallbrook Quadrangle
Tan, 2000b; Larsen, 1948; Weber, 1963.

Las Pulgas Canyon Quadrangle
Boss and others, 1958; Craig, 1984; Cranham and others, 1994; Ehlig and Farley, 1976; Kern, 1996a; Kern, 1996b; **Kennedy, 2001**.

Margarita Peak Quadrangle
Boss and others, 1958; **Tan, 2001a**; Larsen, 1948.

Morro Hill Quadrangle
Boss and others, 1958; Elliot, 1985; Larsen, 1948; **Tan, 2001b**; Weber, 1963.

Oceanside Quadrangle
Kern, 1996a; **Tan and Kennedy, 1996**; Tan and Giffen, 1995; Weber, 1982.

Pala Quadrangle
Hanley and Jahns, 1950; Irwin and Greene, 1970; Jahns and Wright, 1951; **Kennedy, 2000a**; Larsen, 1948.

Pechanga Quadrangle
Hanley and Jahns, 1950; Irwin and Greene, 1970; Jahns and Wright, 1951; Kennedy, 1977; **Kennedy, 2000b**; Larsen, 1948.

Rancho Santa Fe Quadrangle
Larsen, 1948; Nordstrom, 1970; Tan, 1987; Tan and Giffen, 1995; **Tan and Kennedy, 1996**; Weber, 1963.

San Clemente Quadrangle
Blanc and Cleveland, 1968; Boss and others,1958; Ehlig and Farley, 1976; Kern, 1996a; Kern, 1996b; Morton and Miller, 1981; **Tan, 1999b**; Tan and Weber, 1984; Vedder, 1975.

San Luis Rey Quadrangle
Tan and Kennedy, 1996; Tan and Giffen, 1995; Weber, 1982; Wilson, 1972.

San Marcos Quadrangle
Herzig, 1991; **Tan and Kennedy, 1996**; Larsen, 1948; Tan and Giffen, 1995; Weber, 1963, 1982.

San Onofre Bluff Quadrangle
Boss and others, 1958; Ehlig and Farley, 1976; Kern, 1996a; Kern, 1996b; **Tan, 1999c**.

Temecula Quadrangle
Kennedy, 1977; Larsen, 1948; Mann, 1955; **Tan and Kennedy, 2000**.

Valley Center Quadrangle
Kennedy, 1999; Larsen, 1948; Merriam, 1953.

Offshore Region
Clarke and others, 1987; Ryan and others, in preparation; Ryan and others, in review.