

Neotectonics of the Greater Monterey Area, California*

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Abstract

The greater Monterey area is situated within the complexly deformed Salinian block between the active San Andreas Fault to the northeast and the active offshore San Gregorio Fault to the southwest. Field mapping and subsurface analyses reveal that faults of the offshore Monterey Bay zone continue onshore as the Seaside, Ord Terrace, and Chupines faults that extend southeastward to the Laguna Seca area.

Late Pleistocene terrace deposits and Holocene colluvium are locally offset by thrust faults near Monterey and by through-going, near-vertical faults in Carmel and in Carmel Valley. Radiocarbon dating indicates movement along the Tularcitos Fault within the past 7,780 years, along the Sylvan Thrust within the past 4,890 years, and probable movement along the Hatton Canyon Fault within the past 2,080 years. The Garrapata Fault to the south trends on land N 55° W, where it vertically offsets the lowest marine terrace by 1.7 m. Inland this fault locally juxtaposes along a near-vertical shear zone granitic rock with four colluvial units, the two youngest of which yield radiocarbon dates of 1,200+60 and 9,750+60 ybp, suggesting recurrence intervals on the order of thousands of years.

Although earthquake focal mechanisms are poorly constrained, they suggest right-lateral strike slip movement on northwest trending vertical faults. Field mapping, drill hole data, and focal mechanisms suggest that the shorter, discontinuous thrust faults splay off of the longer, through-going strike-slip faults.

Selected Reference

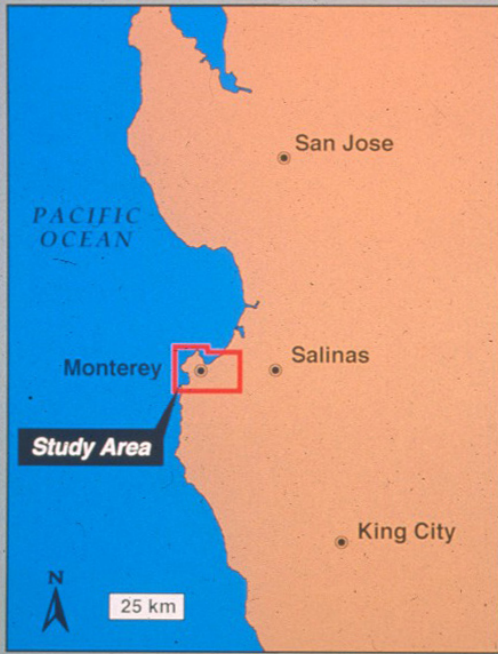
Dibblee, T.W., Jr., and J.C. Clark, 1973, Geologic map of the Point Sur 15-minute quadrangle, Monterey County, California: U.S. Geological Survey Open-File Report 74-1021, scale 1:62,500.

NEOTECTONICS OF THE GREATER MONTEREY AREA, CALIFORNIA

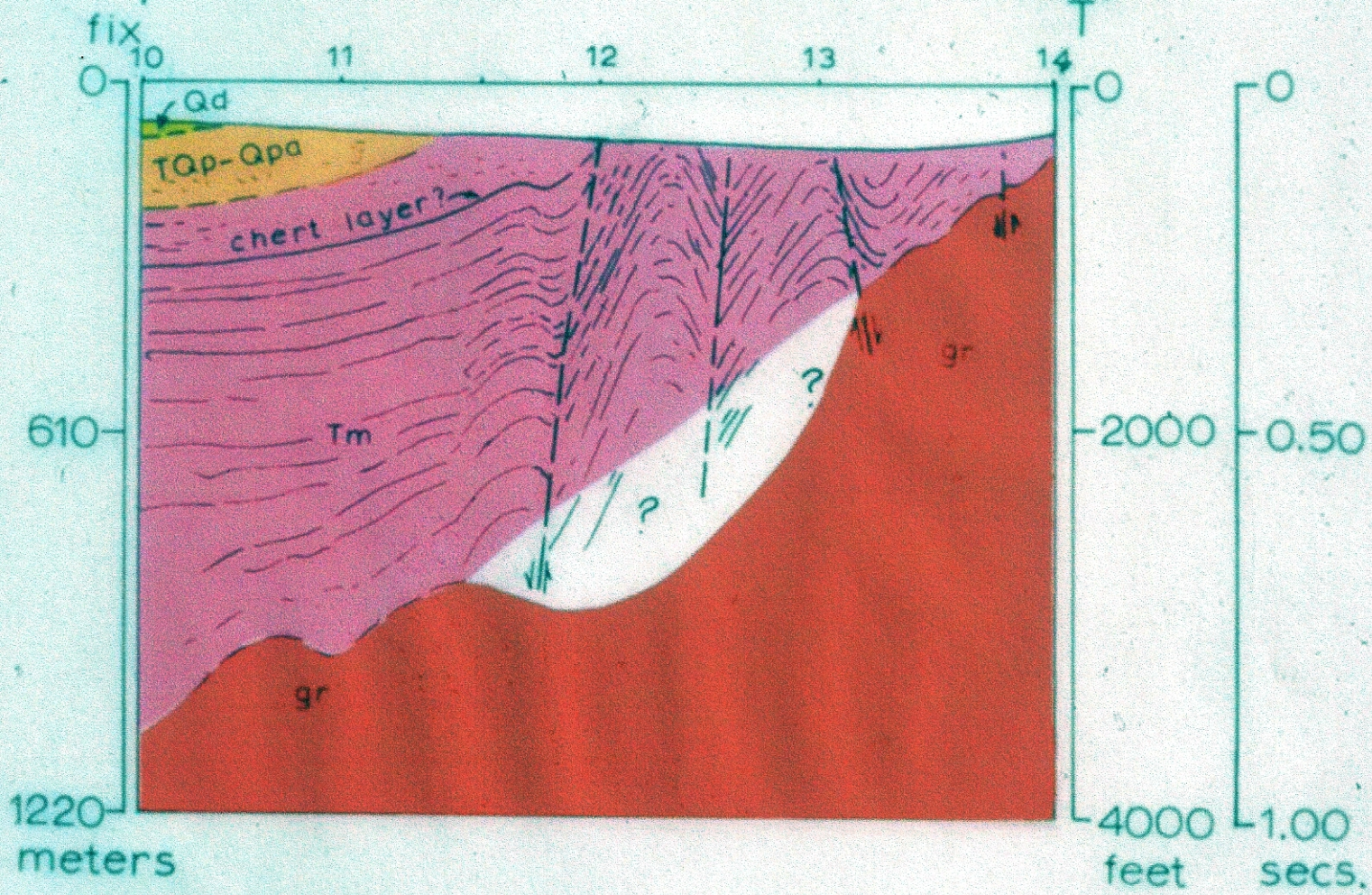
CLARK, JOSEPH C., IUP, Geoscience
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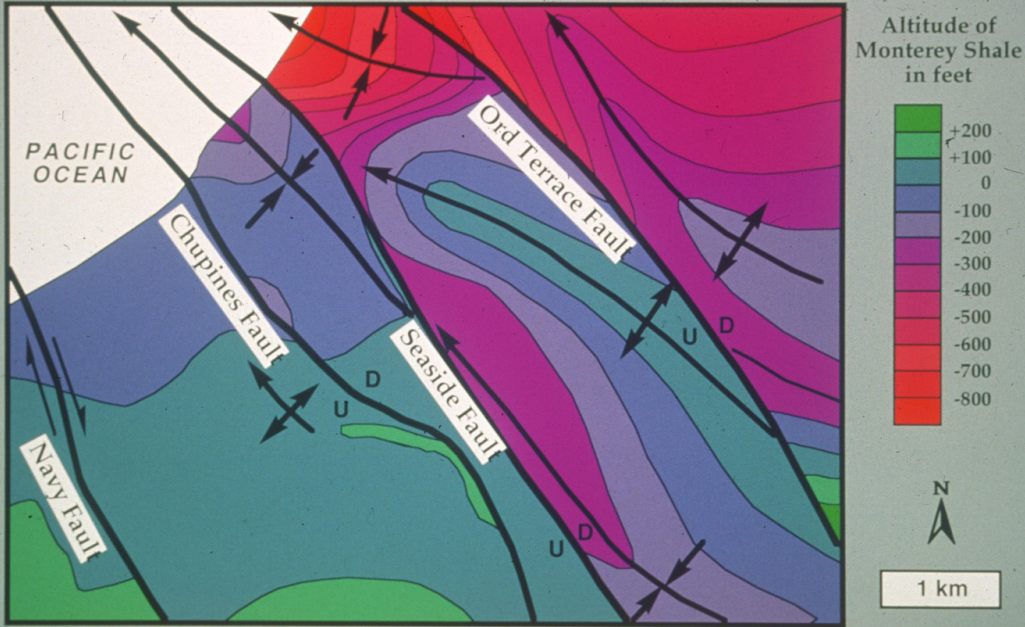
and

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Greater Monterey
Study Area



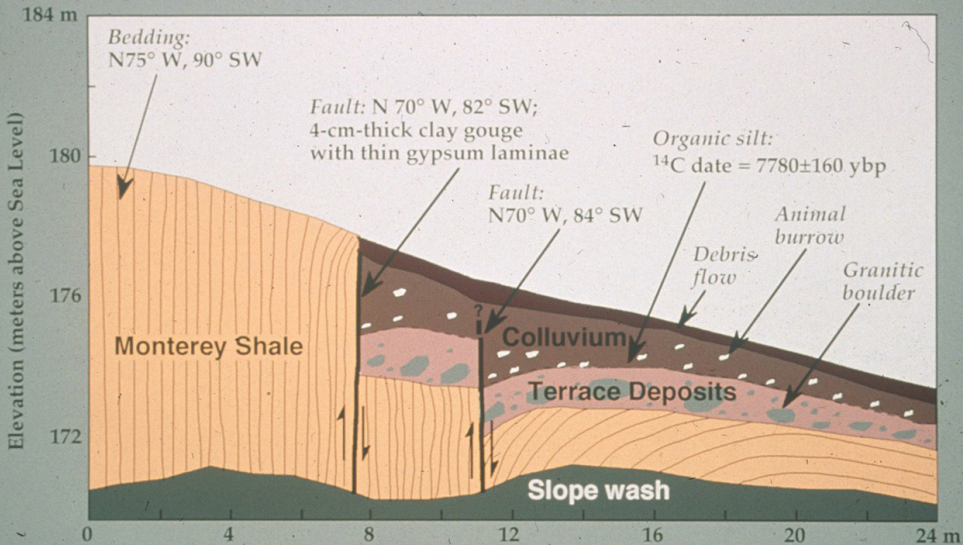


Subsurface Structure Contour Map, NW Quarter of Seaside Quadrangle





N80°W



Tularcitos Fault, Carmel Valley Road



Elevation (meters above Sea Level)

172 m

^{14}C date = 2080 ± 40 ybp

Bentonite
beds

S12°W

GEOLOGIC UNITS:

Monterey Shale

Fluvial terrace
deposit

Colluvium

Soil

170

gravelly
sand

168

Fault: N88°E, 74°SE

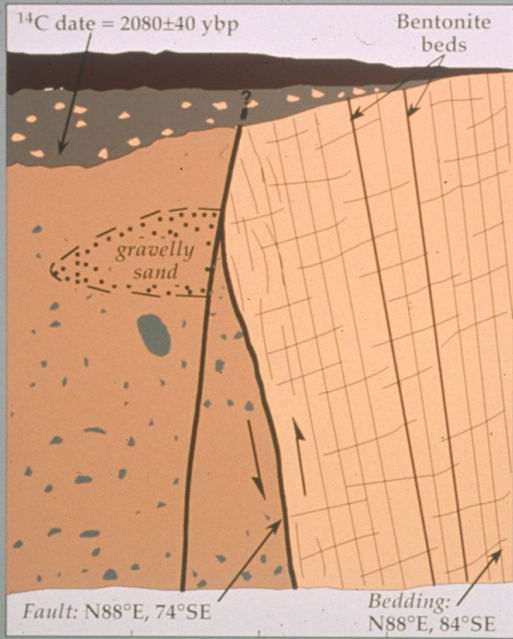
Bedding:
N88°E, 84°SE

Hatton Canyon Fault,
Pacific Meadows

0

2

4 m

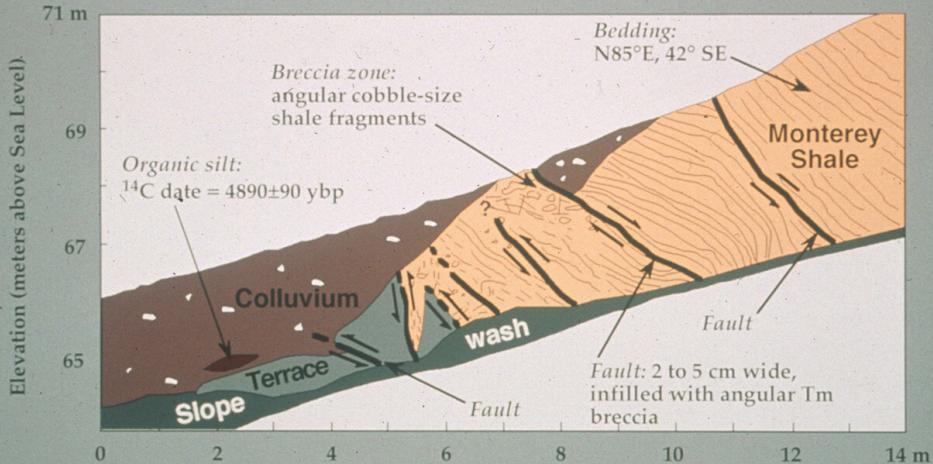




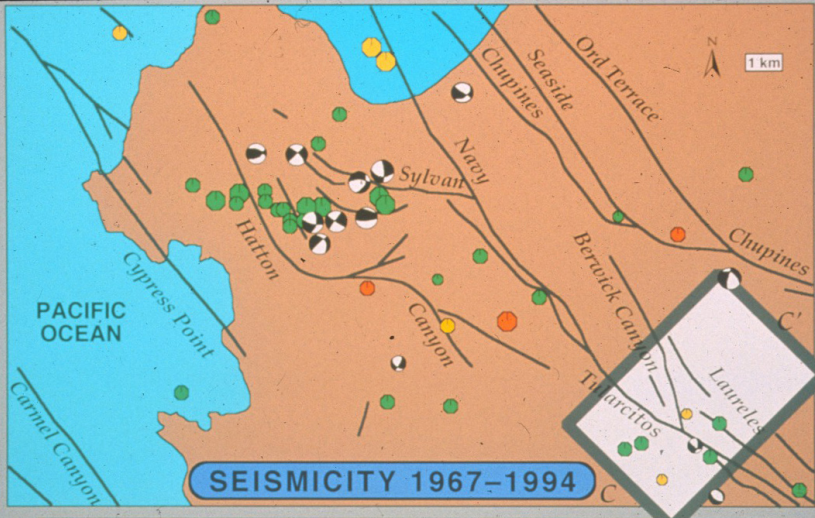




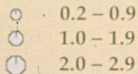
N20°W



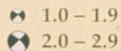
Sylvan Thrust Fault, La Mesa School



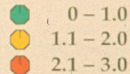
Epicenter
Magnitude

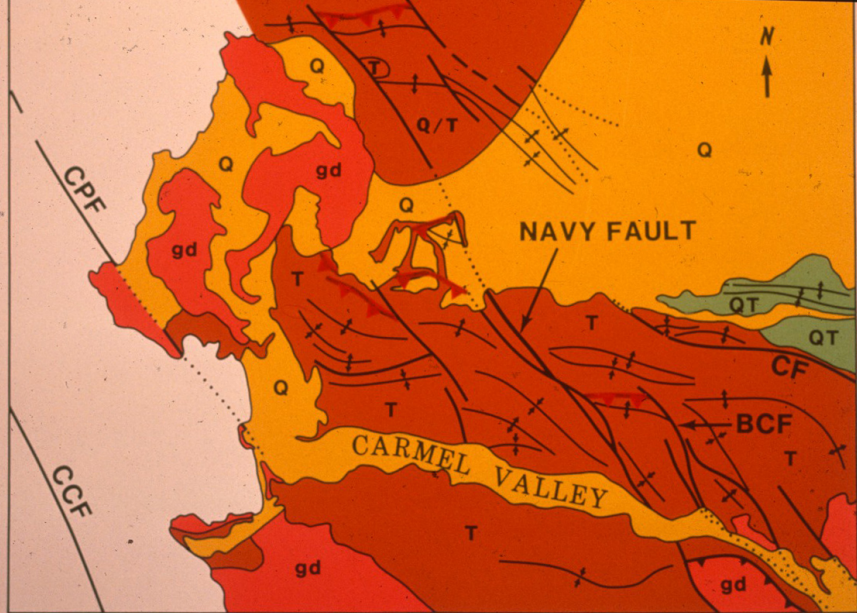


Fault Plane
Solution

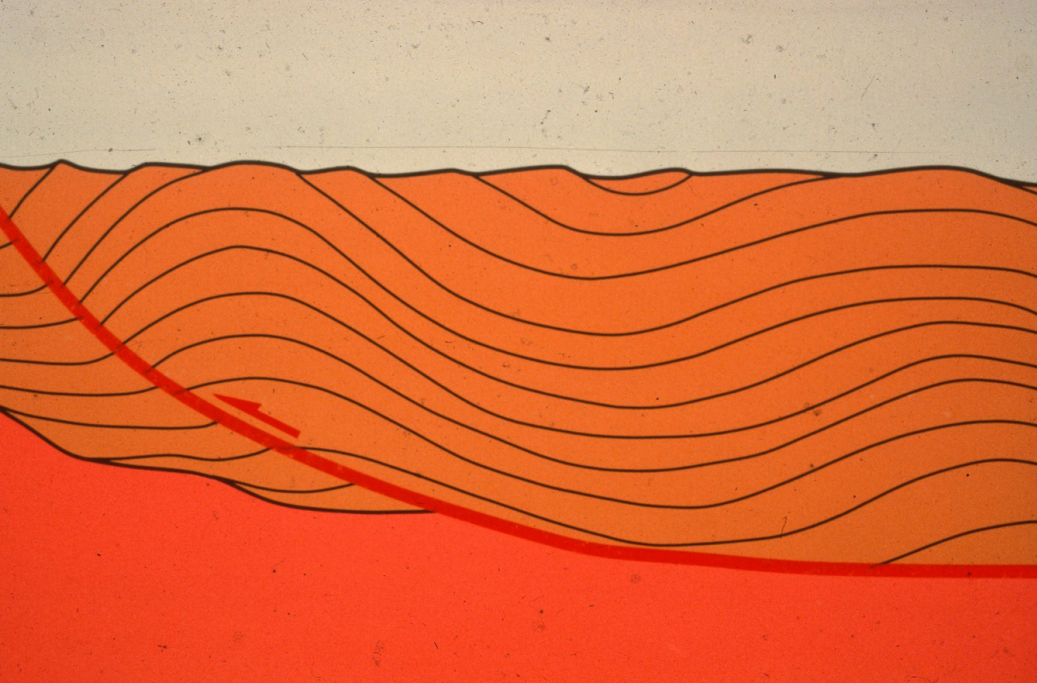


Horizontal Error In
Hypocenter Location (km)

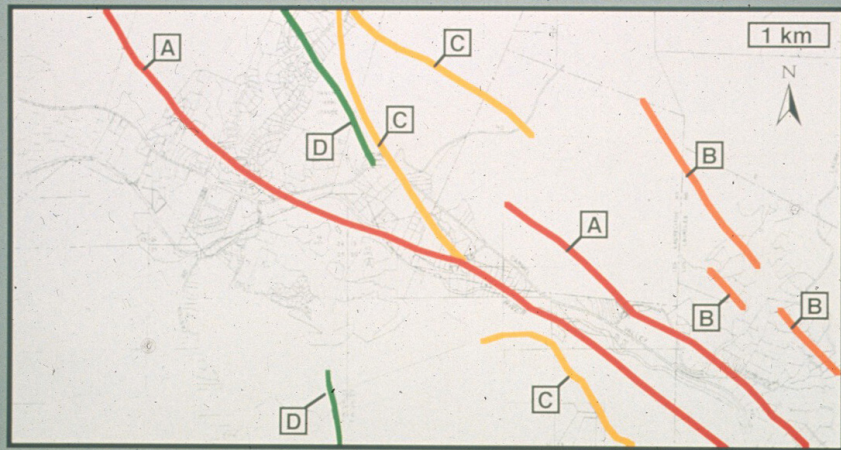








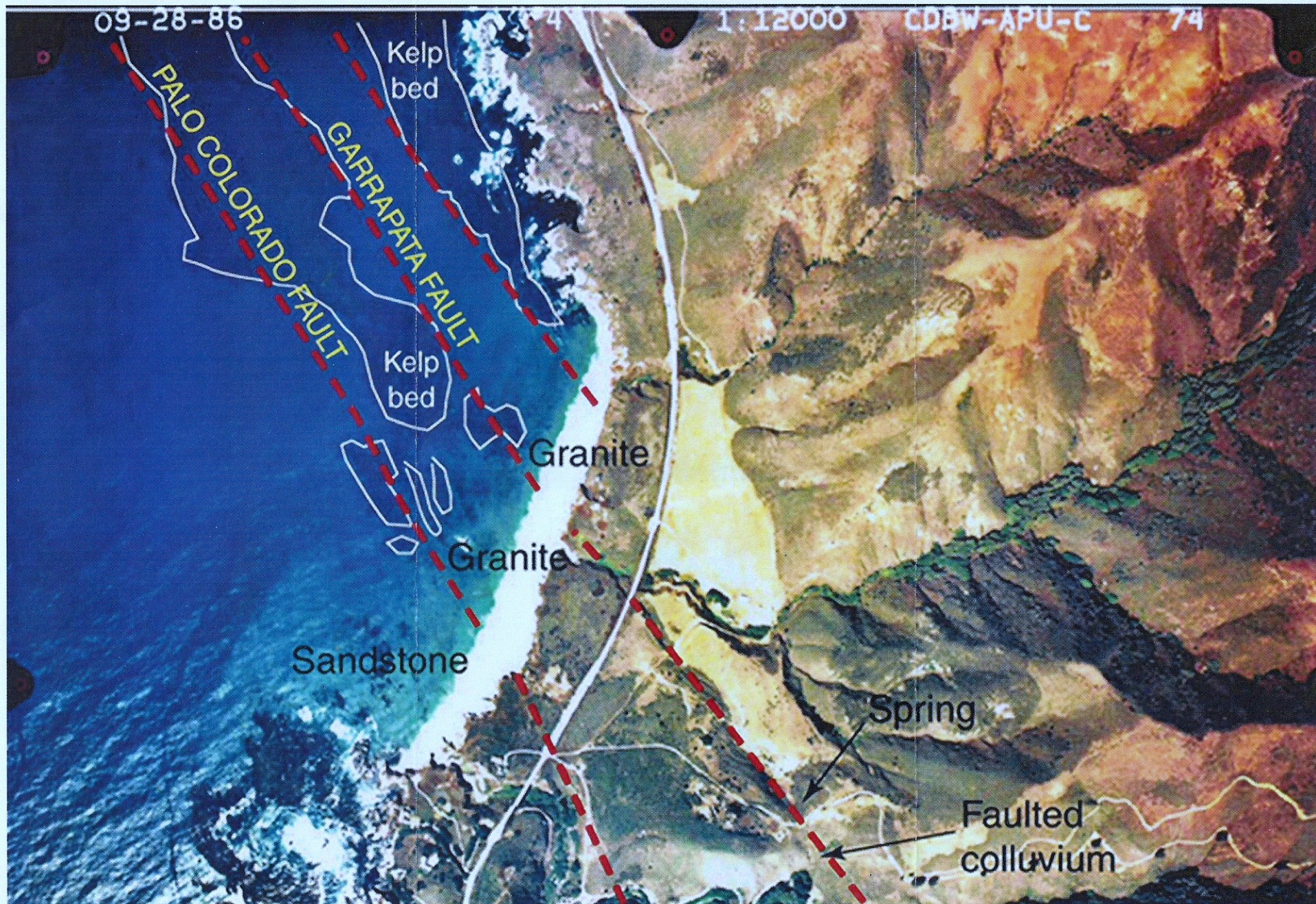
FROM Dibblee, T.W., Jr. & Clark, J.C., 1973, as modified by J.C. Clark, 1987

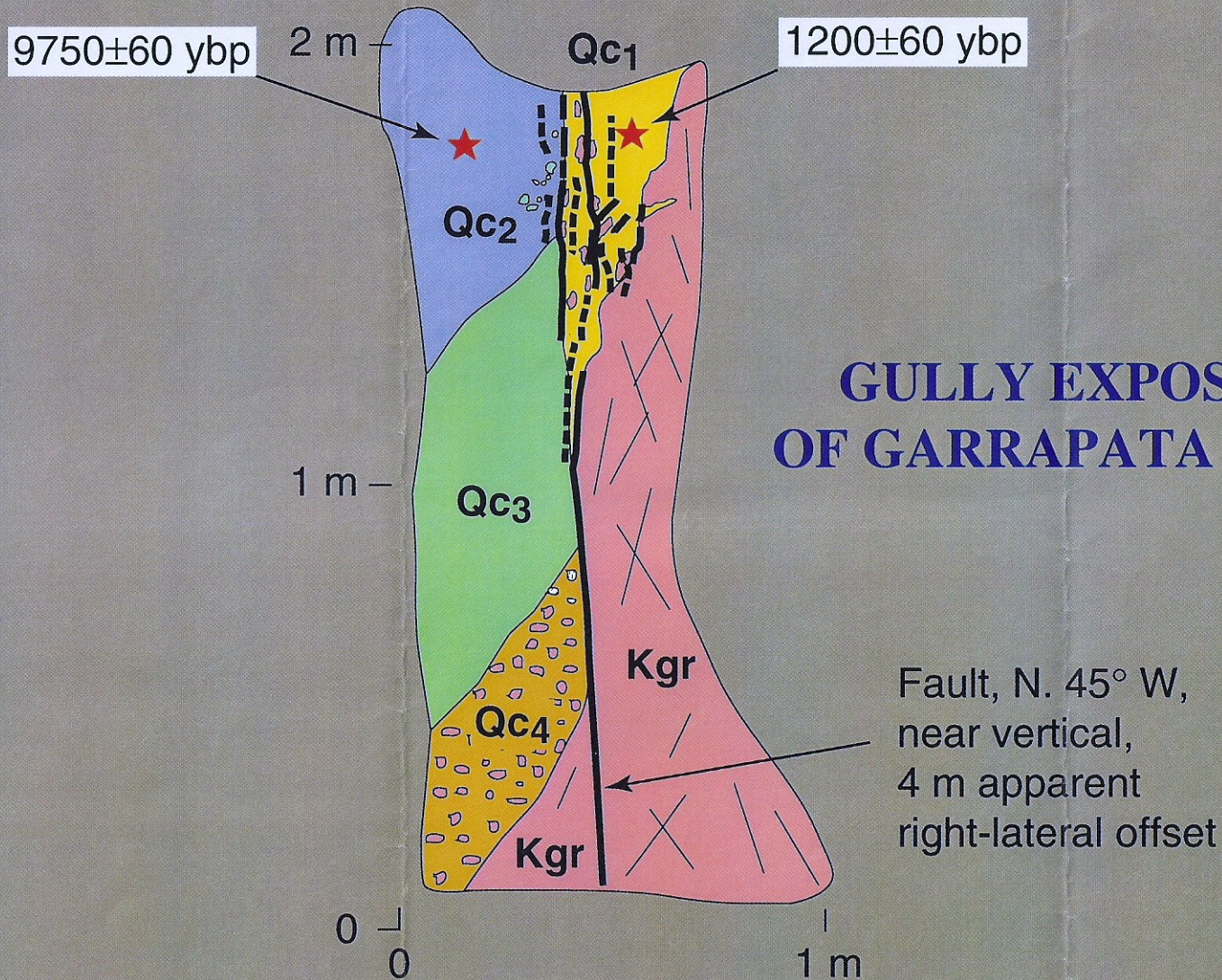


Relative Fault Hazard Map, South Half of Seaside Quadrangle



- | | | |
|--|------------------------|------------------------------|
|  | Zone A—Greatest Hazard | (10,000 years to present) |
|  | Zone B | (125,000 to 10,000 years) |
|  | Zone C | (1,600,000 years to present) |
|  | Zone D—Least Hazard | (older than 1,600,000 years) |





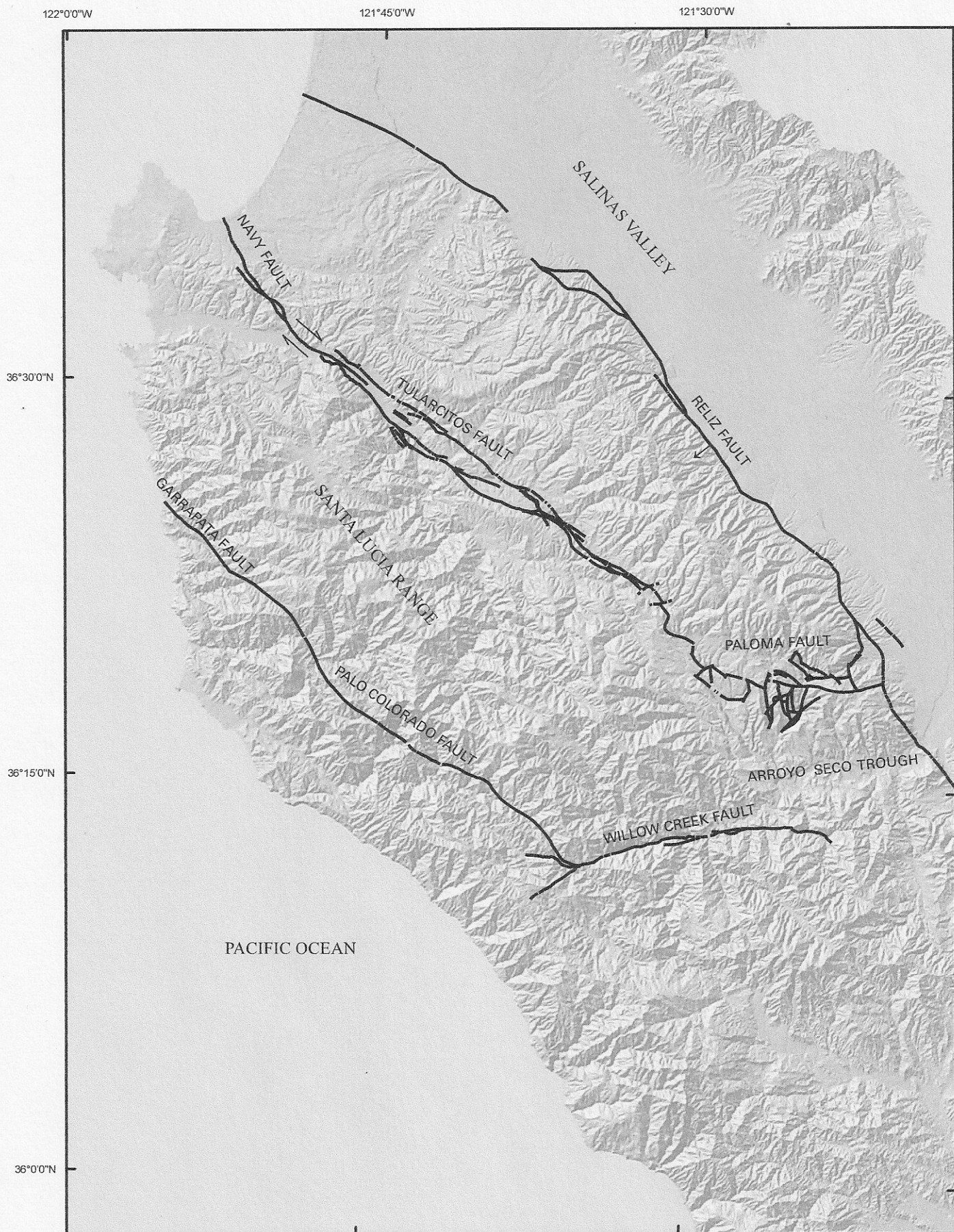


Figure 1. Map showing major faults, northern Santa Lucia Range, Monterey County, California