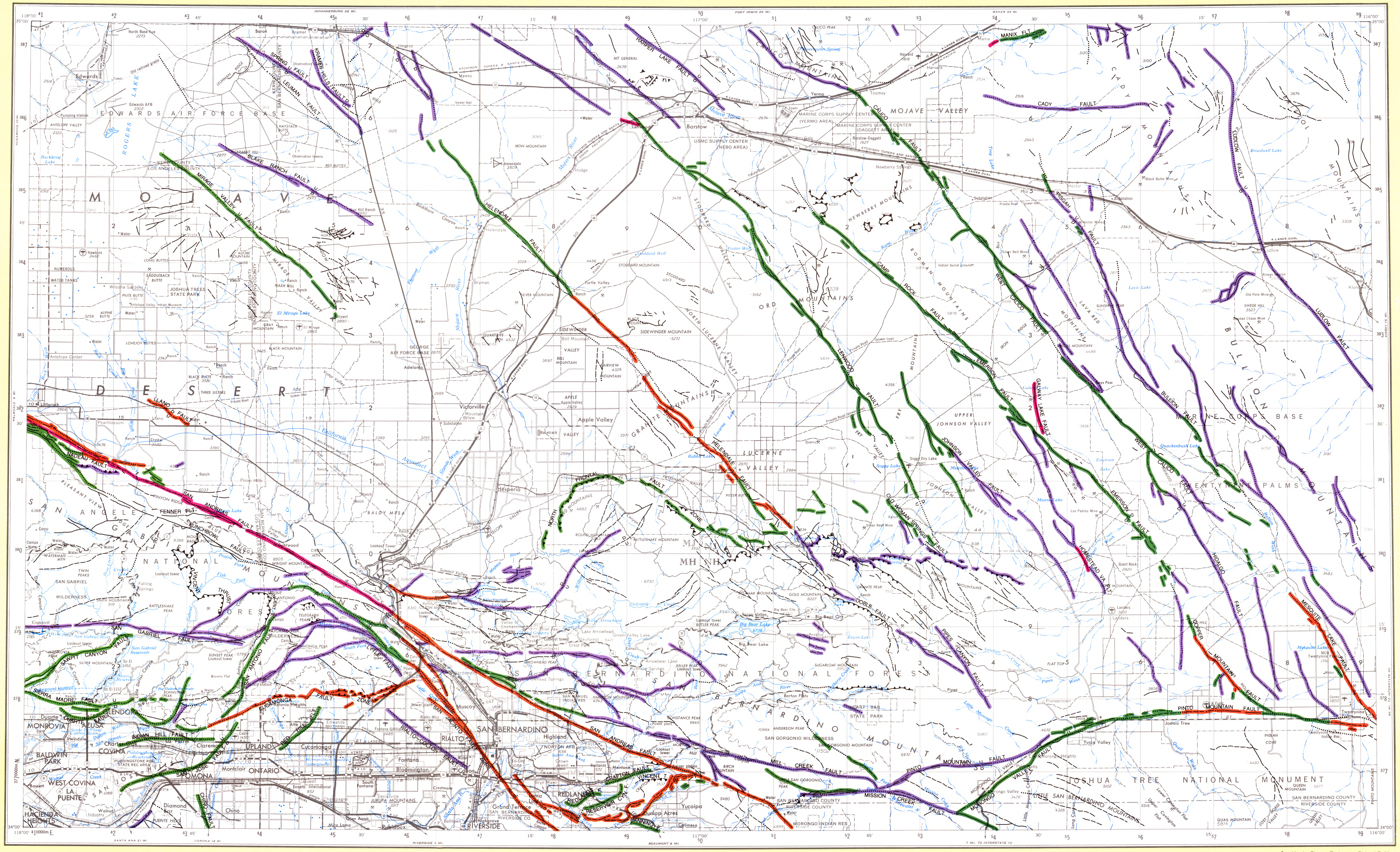
DIVISION OF MINES AND GEOLOGY LIBRARY



Graphics by Eleanor Taylor and Richard R. Moar

Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION
Quaternary	Late Quaternary	Holocene – Historic	200	(red-violet line)		Displacement during historic time (e.g. San Andreas fault 1857). Includes areas of known fault creep.
		Holocene	10,000	(orange line)		Displacement during Holocene.[1]
		Pleistocene	700,000	(green line)		Faults showing evidence of displacement during late Quaternary time.[2, 3]
	Early Quaternary	Pleistocene	2,000,000	(purple line)		Quaternary (undifferentiated) faults-most faults in this category show evidence of displacement during the last 2,000,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.
Pre-Quaternary	Pliocene / Miocene		5,000,000	(black line)		Faults showing evidence of no displacement during Quaternary time or faults without recognized Quaternary displacement.

FOOTNOTES

[1] Geomorphic evidence for Holocene faulting includes: sag ponds, or the following features in Holocene deposits: offset stream courses, linear scarps, and triangular faceted spurs.

[2] Geomorphic evidence for late Quaternary faulting includes such features as offset stream courses, linear scarp, shutterridges, and triangular faceted spurs.

[3] Faulting may be younger but lack of younger overlying deposits precludes more accurate age classification.

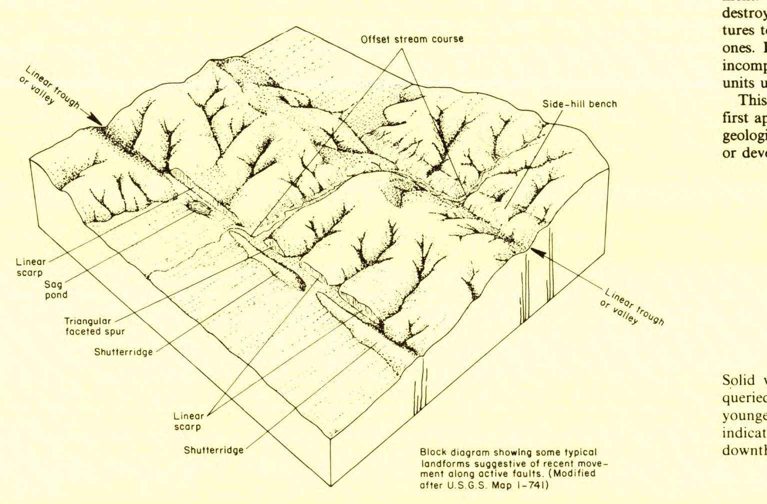
RECENCY OF FAULTING

This map is a synthesis of data from a large body of literature, published and unpublished, regarding faulting in the eastern Transverse Ranges and a part of the Mojave Desert, California. The faults shown are identical to those on the accompanying Geologic Map of the San Bernardino Quadrangle; however, the purpose of the fault map is to depict what is known about the recency of displacement along these structures. Future studies may find additional faults, require relocation of faults, or, in some cases, change the age classification as shown here.

The age classifications are determined by examining geologic evidence indicating the youngest faulted unit and the oldest unfaulted unit along each fault or fault segment. If Quaternary displacement is indicated, the fault is classified into one of the three categories within Quaternary time (Holocene, late Quaternary, Quaternary undifferentiated). Faults with reported surface rupture during historic time are so designated. Faults having evidence indicating no displacement in Quaternary time are classified as pre-Quaternary. If the fault has insufficient evidence to allow classification, it is also grouped with the pre-Quaternary faults.

The reliability of the age designations on this map may be limited by several factors. First, much of the data used to classify faults on this map were not based on studies specifically directed to the determination of recency of fault displacement. Second, important fault-related, geomorphic features may have been destroyed by natural or human activities. Third, fault-related geomorphic features tend to be preserved longer in dry climates than similar features in wet ones. Fourth, geologists may differ in their interpretations after examining incomplete geologic evidence for recency of faulting. Fifth, the ages of the rock units used to classify the faults may not be known accurately.

This is a small scale (1:250,000) regional map and should be used only as a first approximation of potential hazard due to faulting in an area. A detailed geologic investigation should be the basis of any site-specific study for planning or development purposes.



Block diagram showing some typical landforms suggestive of recent movement along active faults. (Modified after U.S.G.S. Map I-741)

FAULT MAP SYMBOLS

U D — ? — ? ....

Fault

Solid where well located; dashed where approximately located or inferred; queried where continuation or existence uncertain; dotted where concealed by younger rocks. Barbs indicate thrust fault (barbs on upper plate). Arrows indicate relative or apparent direction of movement. U, upthrown side and D, downthrown side (relative or apparent).

VTF

VTF

Vincent Thrust fault. An inactive, early Cenozoic, thrust fault marking the boundary between Pelona Schist below and Precambrian to Mesozoic mylonitic rocks above (barbs on upper plate).

Compilation References

Allen, C.R., St. Amand, P., Richter, C.F., and Nordquist, J.M., 1965, Relationship between seismicity and geologic structure in the southern California region: Seismological Society of America Bulletin, v. 55, no. 4. (Southern extent of 1857 surface rupture along San Andreas fault.)

Bryant, W.A., 1986, Pinto Mountain, Mesquite Lake, Copper Mountain and related faults, southern San Bernardino County: California Division of Mines and Geology Fault Evaluation Report, FER-181, 28 p. (unpublished file report).

Chase, E.D., Geotechnical study for parts of the City of La Verne: Leighton and Associates unpublished report, October 1980. (Faults in north La Verne area.)

Church, J.P., Castle, R.O., Clark, M.M., and Morton, D.M., 1974, Continuing crustal deformation in the western Mojave Desert: Geological Society of America Abstracts with Programs, Annual Meeting Miami Beach, Florida, p. 687-688. (Creep on Lenwood fault.)

Hill, R.L., Treiman, J.A., Given, J.W., Pechmann, J.C., McMillan, J.R., Ebel, J.E., 1980, Geologic study of the Homestead Valley earthquake swarm of March 15, 1979: California Geology, v. 33, no. 3, p. 60-67. (Homestead Valley fault.)

Hill, R.L., and Beeby, D.J., 1977, Surface faulting associated with the 5.2 magnitude Galway Lake earthquake of May 31, 1975, Mojave Desert: Geological Society of America Bulletin, v. 88, p. 1378-1384. (Galway Lake fault.)

Morton, D.M., Rodriquez, E.A., Obi, C.M., Simpson, R.W., and Peters, T.P., 1983, Mineral resource potential map of the Cucamonga Roadless Areas: U.S. Geological Survey Miscellaneous Field Studies Map MF-1646A, scale 1:31,680. (Cucamonga fault.)

Morton, D.M., Miller, F.K., and Smith, C.C., 1980, Photo-reconnaissance maps showing young looking fault features in the southern Mojave Desert, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1051, sheets 1-7, scale 1:24,000.

Richter, C.F., 1958, Elementary seismology: W.H. Freeman and Company, p. 516-518. (Historic rupture on Manix fault.)

Smith, D.P., 1977, Northeast-trending faults, Redlands-Yucaipa area, California: California Division of Mines and Geology Fault Evaluation Report, FER-45.

Weldon, R.G., Meisling, K.E., Allen, C.R., and Sieh, K.E., 1981, Neotectonics of the Silverwood Lake area, San Bernardino County: California Department of Water Resources, unpublished report. (Faults in western San Bernardino Mountains.)

Ziony, J.I., Wentworth, C.M., Buchanan-Banks, J.M., and Wagner, H.C., 1974, Preliminary map showing recency of faulting in coastal southern California: U.S. Geological Survey Miscellaneous Field Studies Map MF-585, sheet 2. (Faults southwest of San Andreas fault.)

Ziony, J.I., Personal communication, May 1983.

Other Fault References

Guptill, P., Collins, D., Sugiura, R., and Birkhahn, P., 1979, Quaternary deformation along the Llano fault, southern Antelope Valley, California *in* Geological Society of America Abstracts with Programs prepared for Cordilleran Annual meeting, v. 11, no. 3, p. 81.

Hope, Roger A., 1969, Map showing recently active breaks along the San Andreas and related faults between Cajon Pass and Salton Sea, California: U.S. Geological Survey Open File Map, Sheet 1, Strips A, B and C and Inset 1.

Ross, Donald C., 1969, Map showing recently active breaks along the San Andreas fault between Tejon Pass and Cajon Pass, southern California: U.S. Geological Survey Map I-553, Strips C, D and E.

Sharp, Robert V., 1972, Map showing recently active breaks along the San Jacinto fault zone between the San Bernardino area in Borrego Valley, California: U.S. Geological Survey Map I-675, Sheet 1, Strips A and B.

Sieh, K.E., 1978, Slip along the San Andreas fault associated with the great 1857 earthquake: Bulletin of the Seismological Society of America, v. 68, no. 5, pp. 1421-1448.

Base Map

Prepared by the U.S. Army Topographic Command (KCLD), Washington, D.C. Compiled in 1957 by photogrammetric methods and from United States quadrangles, 1:20,000, 1:24,000, 1:25,000, 1:48,000, 1:50,000, 1:62,500, and 1:125,000, 1952-55. Map field checked 1958. Revised in 1969 by the U.S. Geological Survey from aerial photographs taken 1968.

Area covered by dashed light-blue pattern is subject to controlled inundation.

Certain land grant names and boundaries are omitted to avoid congestion.

Minor corrections and additions to culture by California Division of Mines and Geology 1983.

Scale 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometers

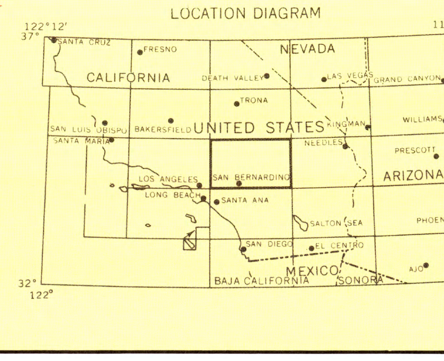
5 0 5 10 15 Nautical Miles

TRANSVERSE MERCATOR PROJECTION

BLACK NUMBERED LINES INDICATE THE 10,000 METER UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 11

1965 MAGNETIC DECLINATION FROM TRUE NORTH VARIES FROM 15½° (280 MILS) EASTERLY FOR THE CENTER OF THE WEST EDGE TO 15° (270 MILS) EASTERLY FOR THE CENTER OF THE EAST EDGE

LOCATION DIAGRAM



MAP SHOWING RECENCY OF FAULTING, SAN BERNARDINO QUADRANGLE, CALIFORNIA, 1:250,000

Compilation by Edward J. Bortugno

Published 1986

(Second printing, 1998)