

ON THE SEISMIC ACTIVITY OF THE MALIBU COAST FAULT ZONE,
AND OTHER ETHICAL PROBLEMS IN ENGINEERING GEOSCIENCE

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The Malibu Coast Fault Zone (MCFZ) is a north-dipping system of thrust faults located along the south edge of the Santa Monica Mountains of southern California. The MCFZ merges eastward with the active Santa Monica, Hollywood, Raymond Hill, Sierra Madre, and Cucamonga Faults of the central Transverse Ranges. West of Point Dume, the MCFZ extends offshore to join the active Santa Cruz Island Fault.

Is the MCFZ active? Several types of data are generally considered to establish whether a fault is active, including historical records of earthquake damage, instrumentally recorded micro- and macro-seismicity, documented offset of recent surficial strata, datable Holocene offsets recognized during cross-fault trenching, and geomorphic indicators expressed on particularly weak lithologies (*e.g.*, sharp scarps in weak, unconsolidated, granular material). Active microearthquake seismicity along the MCFZ trend indicates that it is seismogenic. Focal mechanism solutions for several of these earthquakes indicate thrusting along faults with the same orientation as the MCFZ. The geomorphology of the MCFZ is consistent with the interpretation that the MCFZ is active. Scarps in unconsolidated sands along the continental shelf just south of Malibu indicate recent offset. In the Santa Monica Mountains, late Tertiary and Quaternary marine sedimentary strata are exposed on the hanging-wall side of the MCFZ, indicating active uplift of the Santa Monica Mountains. Given the other indicators of fault activity, the trench studies that must still be undertaken across the MCFZ are more likely to establish the chronology of recent displacement along the MCFZ than to indicate that the fault is not active.

It has been suggested that the MCFZ has not yet been formally recognized as an active, seismogenic fault zone because of the expected loss of property value should the MCFZ be designated an active fault. Geoscientists fear being held liable for loss of property value, even though their assessment of fault activity may be scientifically valid. What are the ethical responsibilities of geoscientists involved in seismic risk assessment along the MCFZ? Are political or financial considerations valid criteria to use in assessing the activity of a fault? These are not abstract questions of ge-ethics, because the lives and properties of countless people are potentially at risk.

Cronin V.S., 1992, On the seismic activity of the Malibu Coast Fault Fault Zone, and other ethical problems in engineering geoscience [abstract]: Geological Society of America, Abstracts with Programs, v. 24, no. 7, p. A284.