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CURRENT ENVIRONMENTAL RESEARCH and FOCI FOR THE NEXT CENTURY

Assessment of earthquake hazard for major engineering projects: the probable versus the determinable

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Major engineering projects are often faced with the challenge of developing rational seismic design criteria for proposed high-risk structures and site activities. Criteria depend on the apparent seismic potential for the specific site and the consequences of failure for different project components. Often geological contributions consist of minor field reconnaissance, collection and assessment of published literature on structural geology, and installation of a microseismic station.

Seismic records are examined probabilistically and extrapolated to obtain estimates of ground motion design parameters covering a range of recurrence for specific magnitude events. This method is often favoured to establish seismotectonic zones when events are attributed to a broad class of features over a large area, rather than an individual lineament. While probabilistic analysis is useful when supported by several centuries of recorded earthquake data, inaccuracies occur in determination of events of low probability or of long return periods. Unfortunately, these are often the higher magnitude events.

Determinations of vertical or horizontal displacement of a specific fault, is often considered the best indication of seismic potential and indication of a maximum capable fault. Even when the fault is buried, ground mapping and the examination of deformation structures occurring in surficial sediments can identify underlying active faults, and can be crucial in dating movement and estimating event recurrence. Other than drilling and repeated seismic occurrences, identification of deformation structures in surficial sediments can indicate underlying blind faults; and is the only method to distinguish long return, large magnitude events. While seldom conducted, geological mapping is also crucial to determining the susceptibility of geological materials to seismic focussing; as experienced in the Mexico City, 1985 event.