Earthquake Hazard of the Himalayan Front

TALK

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Great earthquakes of M>8 struck the Himalayan front of India and Nepal in 1897, 1905, 1934, and 1950, leaving seismic gaps between the 1934 and 1905 earthquakes and west of the 1905 shock that were only partially filled by earthquakes in 1803, 1833, 1869, and 1991. None of these great earthquakes has any documented surface rupture, although the 1905 event was accompanied by growth of folds at the Himalayan front. However, there is abundant evidence of young folding and faulting, including back-thrusting, and these structures must be the surface expression of a décollement moving unmetamorphosed strata over the Indian shield. Beneath much of the Sub-Himalaya, the décollement is too shallow and thus too weak to generate M>8 earthquakes, and the source must then be farther north, perhaps as far north as directly beneath the MCT, where the décollement may enter basement rocks. A major problem is the geological evidence for earthquake segment boundaries. These may follow Indian-shield discontinuities like the Hardwar Ridge and may be expressed at the surface by changes in tectonic style from imbricate thrusting to blind thrusting and development of duns. A second problem is the absence of evidence for great earthquakes prior to 1897. Civilized societies in the plains south of the Himalaya apparently did not record great events for the preceding 2000 years. On the other hand, the Taxila earthquake of A.D.25 in the northern Potwar Plateau of Pakistan may have been a great earthquake, and seismic risk to northern Pakistan may be as great as it is farther east despite the presence of Precambrian salt at the décollement farther south. The absence of Precambrian salt in Hazara and in ranges around the Peshawar basin suggests that the Precambrian salt basin terminates northward in the Himalayan foothills and therefore does not lessen seismic risk in Pakistan.

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