

THE MAKRAN EARTHQUAKE NOVEMBER 28, 1945 (MAG. 8.3) -
A 1975 FIELD APPRAISAL OF GEOLOGIC AND CULTURAL EFFECTS

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The great earthquake that hit the sparsely inhabited Makran coast of Pakistan on November 28, 1945 (3:00 AM, IST) caused loss of life and serious damage to the two fishing villages of Pasni and Ormara, disrupted communications, generated damaging tsunamis, and was accompanied by tectonic uplift and formation of mud volcano islands. One short account of the earthquake, and a description of four mud volcanoes that rose 8 to 30 meters above the Arabian Sea in water 4 to 7 fathoms deep, are the only published accounts of this earthquake.

Because of the potential for recurrence of a comparable event and the hazard to engineering structures that such an event poses, the authors have gathered additional information regarding this earthquake. The epicenter was relocated to near Pasni, based on data from seismic stations having epicentral distances of less than 100 degrees. A magnitude of 8.3 was determined from 20-second surface waves recorded by Wood-Anderson seismographs at Berkeley, California.

Information on the geologic and cultural effects of the earthquake and tsunamis was obtained in Gwadar, Pasni, and Ormara by field observations and discussions with local inhabitants. The intensity of the shock was greatest along more than 100 kilometers of the central part of the Pakistan coast. At Pasni and Ormara, which are built on beach sands, intensity probably exceeded X on the Modified Mercalli scale, and may have reached XI. Many structures collapsed or were seriously damaged.

Ground failure was substantial and ground cracks that issued water were numerous at Pasni and Ormara. A submarine slide apparently caused the shoreward part of Pasni to subside beneath the water so that the shore today is 100 or so meters inland. Shaking caused many landslides and rock falls along the steep bluffs on the headland south of Ormara. The trans-oceanic cable between India and Great Britain broke in eight places off the Makran coast. The breaks are believed to be caused by submarine landslides triggered by the earthquake.

Three tsunamis hit the Makran coast 1 1/2 to 2 hours after the earthquake, reaching a height of 7 to 10 meters at Pasni and Ormara where damage was greatest. Wave damage was reported in Karachi, and loss of life in Bombay, 365 and 1200 kilometers from the epicenter, respectively.

Though there are previous reports of 4.5 meters of uplift at Pasni, tectonic change in elevation was substantiated only in the Ormara area, where the land rose about 2 meters. Older raised beaches and marine terraces were observed along the whole Makran coast from Karachi to Jask, Iran. Radiocarbon and uranium thorium dates on shells from these beaches indicate the beaches were elevated during Pleistocene and Holocene (last 10,000 years) times, and attest to numerous past earthquakes comparable to the 1945 event. As the Makran coast of Pakistan and Iran becomes developed, the potential for damage to engineering structures from the recurrence of such earthquakes becomes significant.

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