

Sheikhupura (northern Punjab) earthquake of August 08, 2010: Preliminary investigation

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A shallow focus earthquake (3.8 km in depth, according to Pakistan Meteorological Department) occurred on the noon of August 08, 2010 near Sheikhupura (31° 41' 24" N, 73° 52' 48" E). This was a relatively low magnitude (ML 3.8) earthquake and no associated damage has been reported, however, the shaking has been felt in Lahore, Kasur, Gujranwala and Gujrat.

Northern Punjab plain is tectonically located to the south of the Salt Range. The area around the epicenter of the Sheikhupura earthquake is occupied by alluvium no more than 350 m thick; underneath lies a Precambrian basement that is seismically active. It is characterized by shallow focus, moderate level earthquakes caused due to steeply dipping strike-slip and extensional faulting (Kazmi and Jan, 1997). Named as the Punjab Seismic Zone, it seems to extend from the Sulaiman to Lahore and Delhi. No prominent surface structure have been reported by previous workers in this part of the Punjab Plain, except the NW-trending strike-slip faults some 160 km WNW and the EW-trending normal fault 25 km to the south of the Sheikhupura earthquake epicenter (Fig.1). The nearly EW-trending fault plane with steep dip (71° N) in the presently analyzed Focal Mechanism Solution for the earthquake is in agreement with the longitudinally EW-trending extensive lineament shown by Seeber and Armbruster (1979) in their Fig. 3.

The location of the event on the Bouguer gravity map of Kadri (1995) is shown in Fig.2. It coincides with the zone of high gravity anomaly reflecting igneous intrusions(s) or structural disturbances. We prefer to associate the Sheikhupura earthquake with the extensional faulting as indicated by the geophysical data (gravity survey), along with the focal mechanism solutions of earthquakes of the present study and those of Seeber and Armbruster (1979).

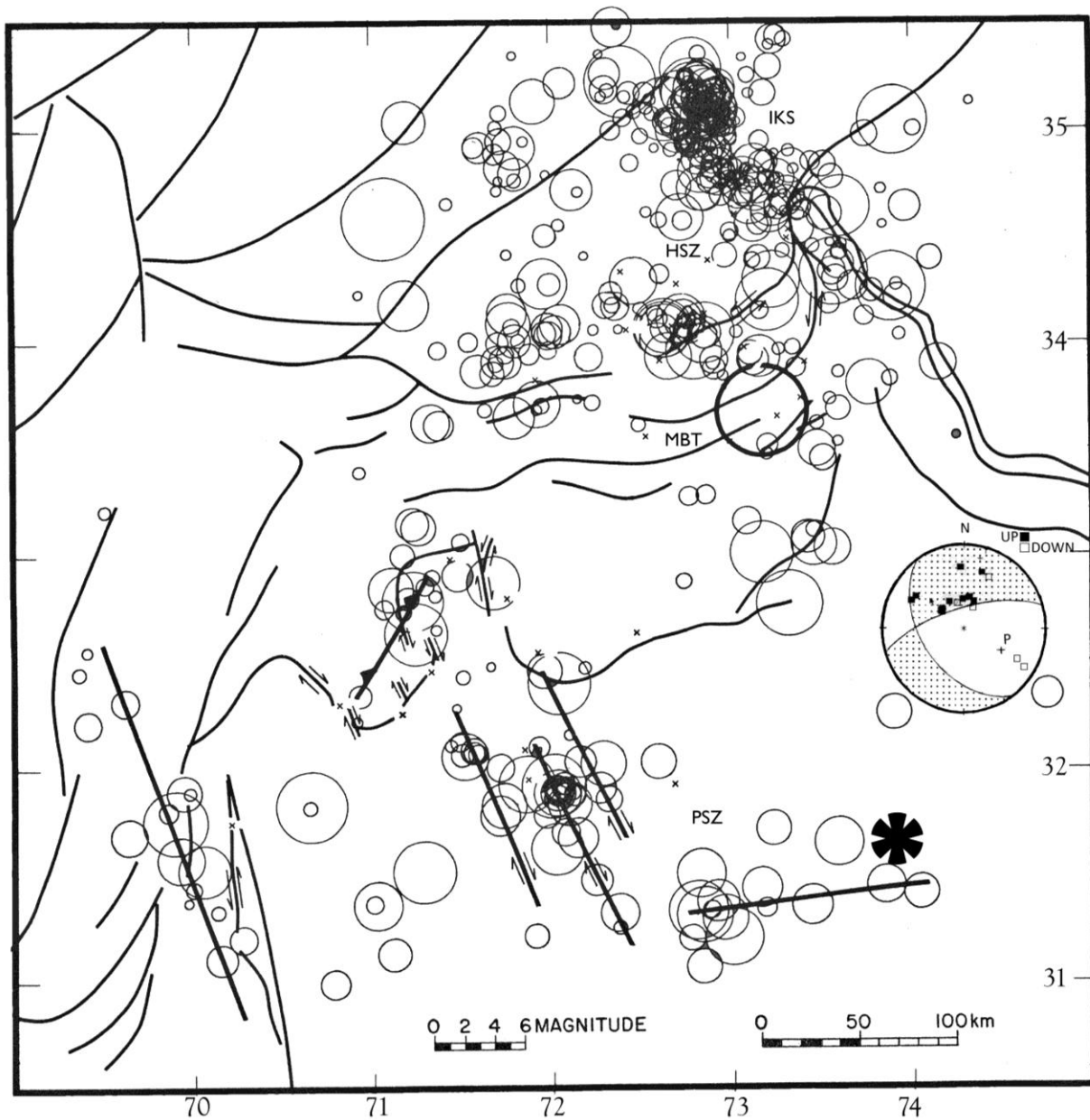


Fig. 1. Seismicity in and around Hazara Arc and northern Punjab (modified after Seeber and Armbruster, 1979), along with location (*) and Focal Mechanism Solution of the Sheikhupura Earthquake. IKS: Indus Kohistan Seismic Zone, HSZ: Hazara Lower Seismic Zone, MBT: Main Boundary Thrust, PSZ: Punjab Seismic Zone.

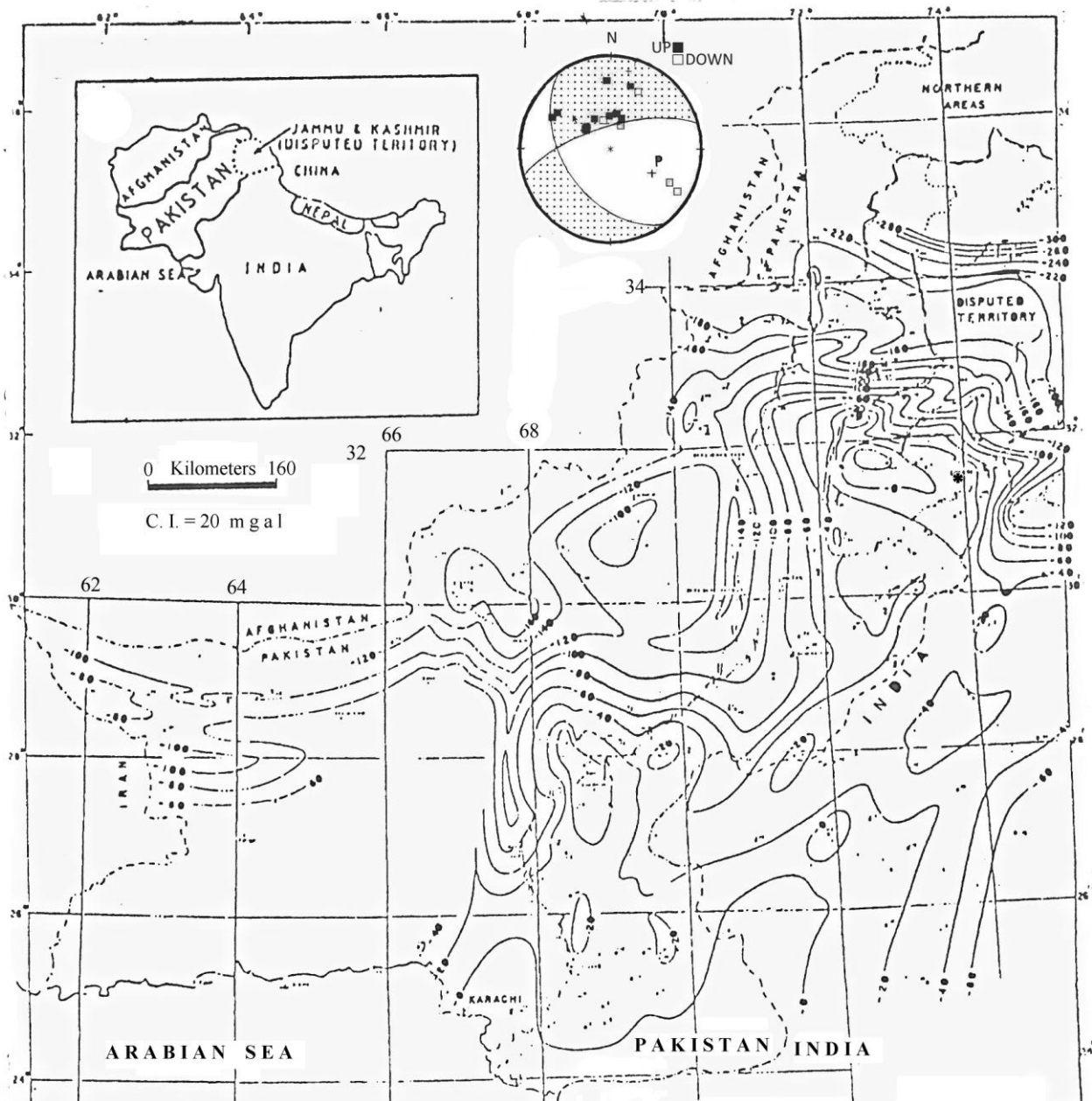


Fig. 2. Bouguer gravity Anomaly map of Pakistan (Kadri, 1995), with location (*) and Focal Mechanism Solution of the Sheikhpura Earthquake.

References

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