

Quick report of earthquake ($M_w7.5$) on 16th April, SE Iran

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Summary

On 16th April at about 15:15 local time (10:45 GMT), Iran has been struck by its most massive earthquake for recent 50 years, with tremors felt across Pakistan, Oman and UAE [1]. The epicenter of this earthquake located in Makran subduction zone (south east of Khash city which has population of about 180000 at 28.106°N, 62.053°E) in the non-residential area of Sistan-Baluchestan province in Iran. Sistan-Baluchestan with an area of ~ 180000km² and population of 2.4 million is one of the sparse provinces of Iran from the point of view of population. Moment tensor solution of Tehran Geophysics Institute relates that there was a normal faulting at depth of ~ 80km ($M_w\sim 6.5$; $M_0=2.050e+020$ Nm) [2;3]. While CMT catalogue (Harvard university) and NEIC (USGS) describe depth of quake was around 50km [4;5]. Figure 1 indicated detailed information of earthquake mechanisms [3]. According to the report of Sistan-Baluchestan's governor, there was 1 killed and 5 injured in Iran but number of dead people in Pakistan raised up to 35 and more than 1000 mud and sun-dried brick houses were collapsed (Figure 2)[6;7;1]. Many buildings in Karachi (largest city of Pakistan) evacuated by urgent report [1]. Taftan is an semi-active volcano situated in Sistan-Baluchestan province near Khash city experienced 2 major aftershocks with magnitude of 4.1 and 4.2 at depth of 80km which can induce it for a probable activity in the future[7].

Tectonic settings and background

The Makran zone of Iran and Pakistan poses strong variation of seismicity between western and eastern segments and it has one of the largest forearcs in the world [8]. An event similar of size and mechanisms of 16th April, 2013 was occurred on 18th April 1983 around 30 years ago near the same location (Figure 3) [9]. A chain of volcanoes span from 59°E to 63°E approximately 300km of north of shoreline. The recent earthquake was the second major earthquake in entire Makran region since great Makran mega quake ($M\sim 8$) in 1945 after 68 years.

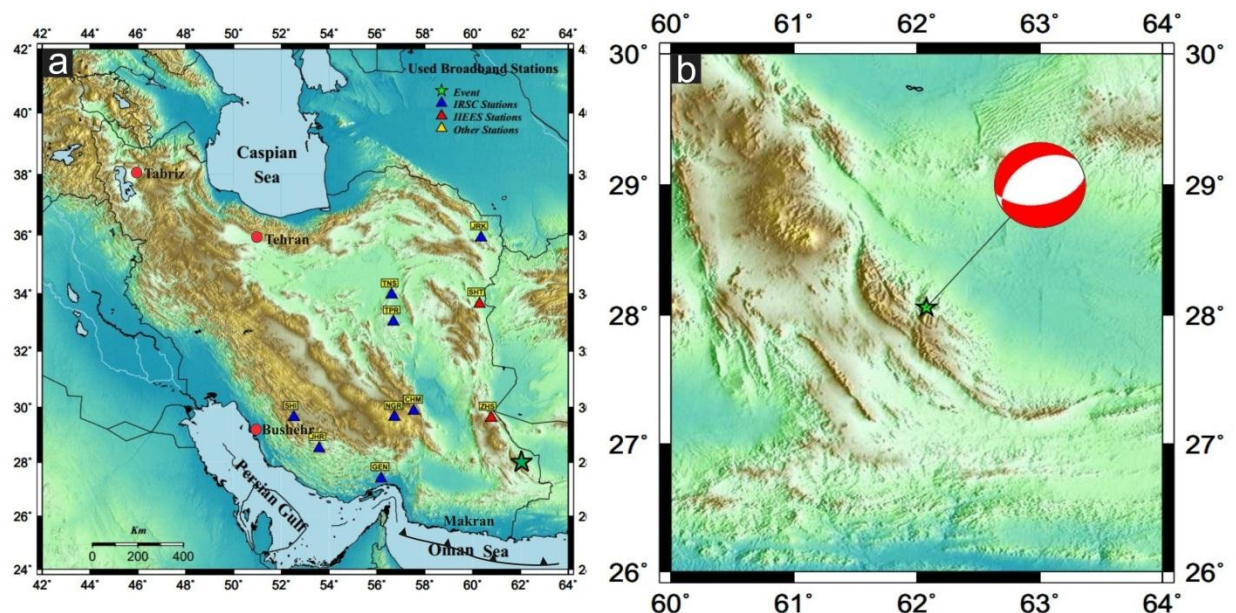


Fig. 1. a: Dispersion of broadband stations of IIEES (International Institute of Earthquake Engineering and Seismology) and IRSC (Iranian Seismological Center) of University of Tehran. b: Focal mechanisms of 16th April earthquake, 2013.



Fig. 2. a: Out of plane collapse of unreinforced masonry wall. b: Established tents of Iran Red Crescent near damaged people [6].

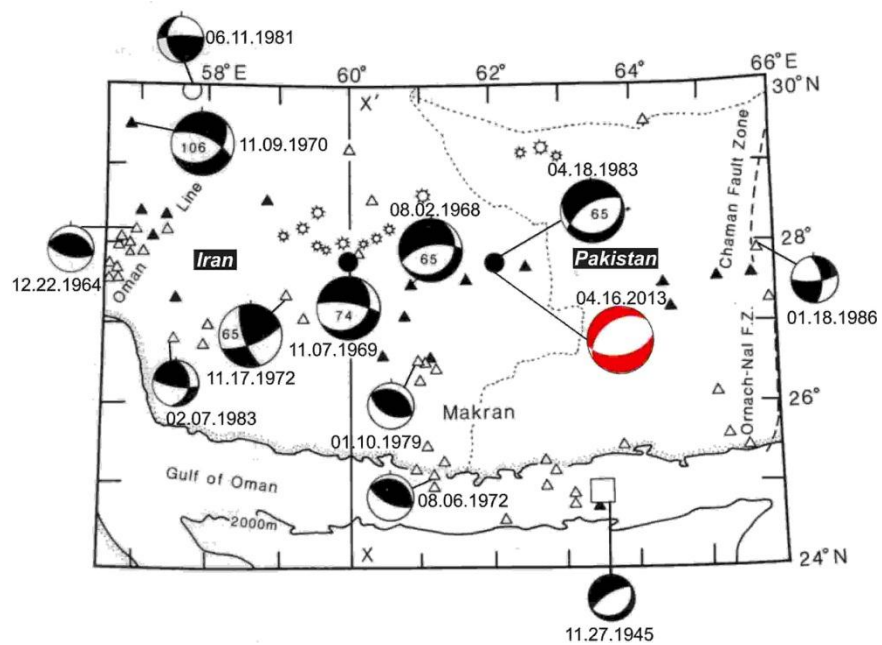


Fig. 3. Focal mechanisms of earthquakes ($M > 4$) of Makran region in the recent decades. Location of volcanoes are shown by spokes [9].

References

- [1] <http://www.bbc.co.uk/news/world-middle-east-22168202>
- [2] <http://www.iiees.ac.ir/english/>
- [3] <http://irsc.ut.ac.ir/>, Moment tensor solution, Hypocenter location (IRSC)
- [4] <http://www.globalcmt.org>
- [5] <http://earthquake.usgs.gov/earthquakes/eventpage/usb000g7x7#summary>
- [6] <http://www.farsnews.com/plarg.php?nn=408484&st=808858>
- [7] <http://www.mehrnews.com/detail/News/2034169>
- [8] Byrnet D., Syigs L.; 1992. Great thrust earthquakes and aseismic slip along the plate boundary of the Makran subduction zone. *Journal of Geophysical Research*, Vol 97, 449-476.
- [9] Laane. J, Chen W., The Makran earthquake of 1983 April 18: A possible analogue to the Puget Sound earthquake of 1965?; 1986. *Geophysical Journal of International*, 98, 1-9.