Determination of earthquake magnitudes using duration of high-frequency energy radiation and maximum displacement amplitudes: application to the November 12, 2017 32km S of Halabjah, Iraq earthquake

We applied the magnitude determination method of Hara (2007) to the November 12, 2017 32km S of Halabjah, Iraq earthquake (the origin time: 18:18:17 UTC; the location 34.886°N 45.941°E depth= 23.2 km after USGS). In this method, an earthquake magnitude is calculated using high-frequency energy radiation duration, the maximum displacement during high-frequency energy radiation from the arrival time of a P-wave, and the epicentral distance. The duration of high-frequency energy radiation is estimated through band-pass filtering of first arriving P-waves.

Figure 1 shows an example of measurements of high-frequency energy radiation duration. The median of the measured durations is 22.8 sec. The estimated magnitude is 7.40 which is consistent with M_{ww} 7.3 from USGS W-Phase Moment Tensor solution, and M_w 7.4 from the Global CMT solution.

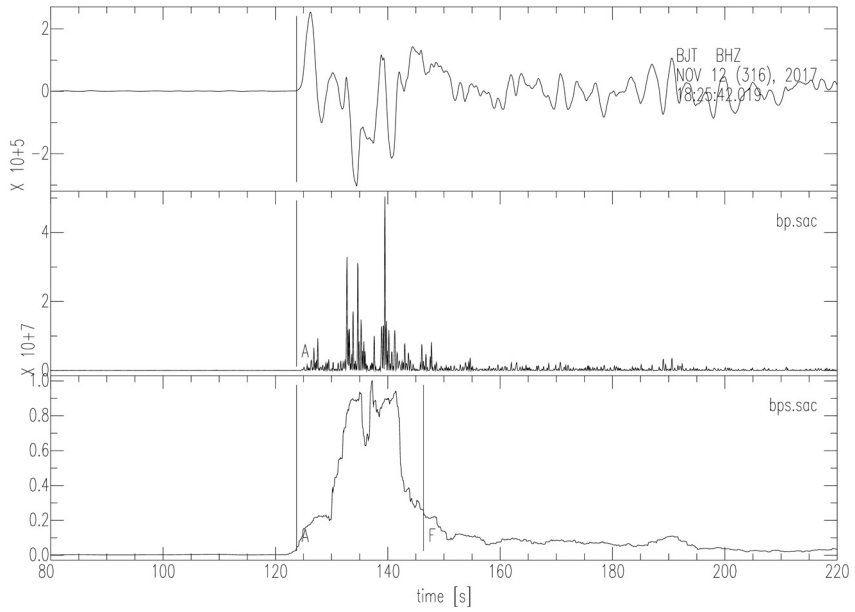

Fig. 1. An example of measurements of high frequency energy radiation duration. The upper, middle and lower traces are an observed seismogram, the squares of the band-pass (2-4 Hz) filtered seismogram, and its smoothed time series (normalized by the maximum value), respectively. “A” and “F” in the lower trace denote the arrival of P-wave and estimated end of high frequency energy radiation, respectively.

Acknowledgements

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References

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