

# Determination of earthquake magnitudes using duration of high-frequency energy radiation and maximum displacement amplitudes: application to the September 28, 2018 78km N of Palu, Indonesia earthquake

We applied the magnitude determination method of Hara (2007) to the September 28, 2018 78km N of Palu, Indonesia earthquake (the origin time: 10:02:43 UTC; the location 0.178°S 119.840°E depth=10.0 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 36.9 sec. The estimated magnitude is 7.45, which is consistent with  $M_{ww}$  7.5 from USGS W-Phase Moment Tensor solution, and  $M_w$  7.6 from the Global CMT solution.

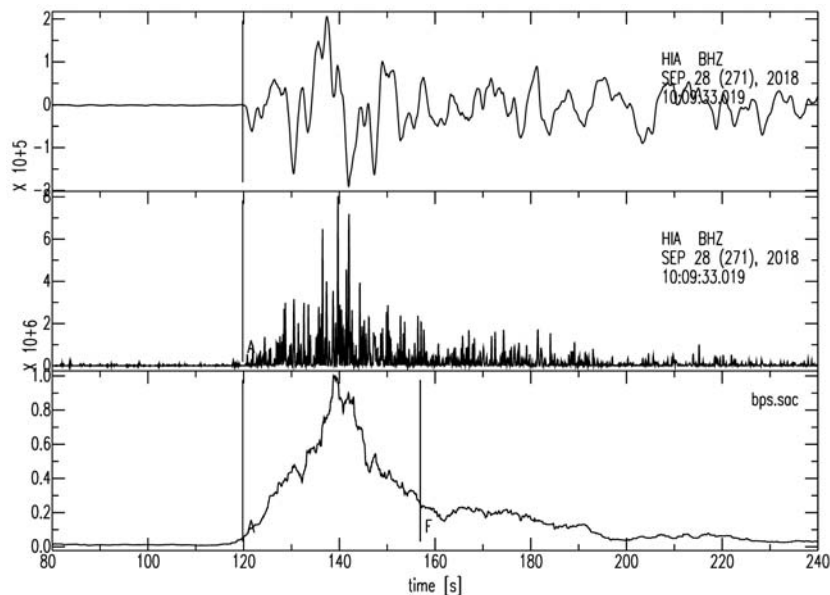


Fig. 1. An example of measurements of high frequency energy radiation duration. The upper, middle and lower traces are an observed seismogram, the squares of the band-pass (2-4 Hz) filtered seismogram, and its smoothed time series (normalized by the maximum value), respectively. “A” and “F” in the lower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

## Acknowledgements

We analyzed BHZ channel waveform data recorded at the Global Seismograph Network (GSN) stations. We retrieved the data from the IRIS DMC (Incorporated Research Institutions for Seismology, Data Management Center). We used SAC (Seismic Analysis Code) (Goldstein et al., 2003; Goldstein and Snoke, 2005) for some parts of the data analyses.

## References

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Last Updated: 2018/10/03