



## DETERMINATION OF EARTHQUAKE MAGNITUDES USING DURATION OF HIGH-FREQUENCY ENERGY RADIATION AND MAXIMUM DISPLACEMENT AMPLITUDES: APPLICATION TO THE APRIL 25, 2015 NEPAL EARTHQUAKE

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### INTRODUCTION

We applied the magnitude determination method of [1,2] to the April 25, 2015 Nepal Islands earthquake (the origin time: 06:11:26 UTC; the location 28.147°N 84.708°E depth=15 km after USGS). In this method, an earthquake magnitude,  $M$ , is calculated by the following formula:

$$M = 0.79 \log A + 0.83 \log \Delta + 0.69 \log t + 6.47$$

where  $A$  is the maximum displacement (m) during high-frequency energy radiation from the arrival time of a P-wave,  $\Delta$  is the epicentral distance (km),  $t$  is duration (s) of high-frequency energy radiation. The duration of high-frequency energy radiation is estimated by band-pass filtering of first arriving P-waves. Figure 1 shows an example of measurements of high-frequency energy radiation. The estimated duration is 56.6 sec. The estimated magnitude using the above formula is 7.78, which is consistent with  $M_{ww}$  7.8 from USGS WPhase Moment Tensor Solution and  $M_w$  7.9 from the Global CMT solution.

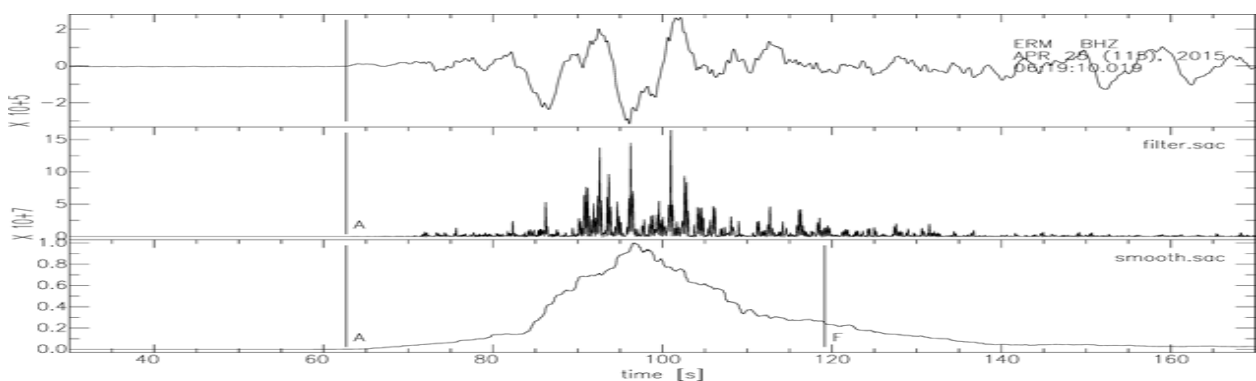


Fig. 1. An example of measurements of high frequency energy radiation. The upper, middle and lower traces are an observed seismogram, the squares of the band-pass (2-4 Hz) filtered seismogram, and its smoothed time series (normalized by the maximum value), respectively. "A" and "F" in the lower trace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



### **ACKNOWLEDGEMENTS**

We retrieved BHZ channel waveform data, recorded at the Global Seismograph Network (GSN) stations, from IRIS DMC (Incorporated Research Institutions for Seismology, Data Management Center). We used SAC (Seismic Analysis Code) [3] for seismic waveform data analyses.

### **REFERENCES**

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