

**Towards reliable automated estimates of earthquake source properties  
from body wave spectra**

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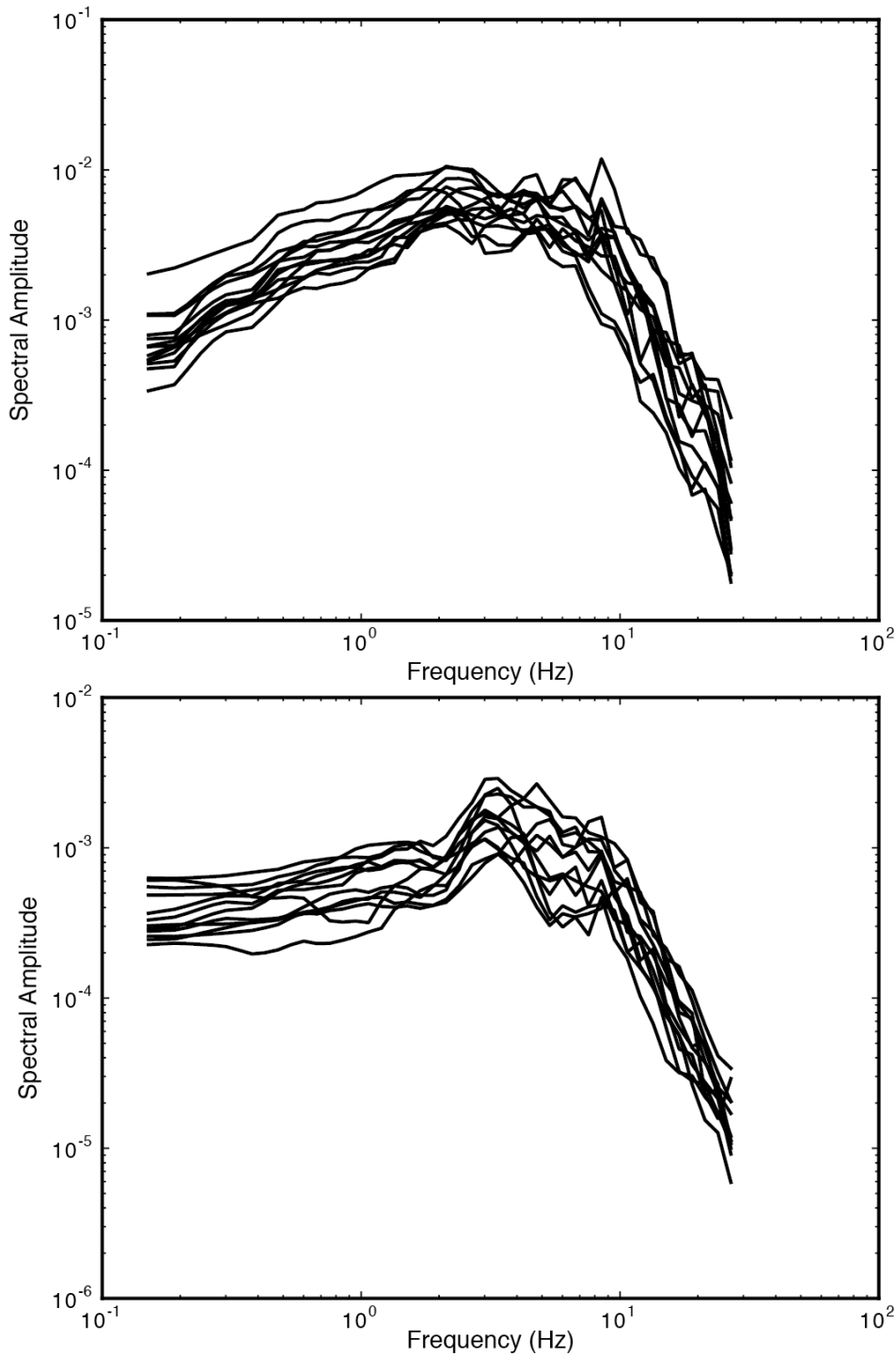
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**Introduction**

This supplementary material contains additional information related to the developed technique. A list of all of the empirical Green's function events is provided in Table S1. Figure S1 shows the variation of EGF spectra for events with different focal mechanisms. Figure S2 shows the variation of EGF seismograms for events with different focal mechanisms. Figure S3 shows the difference between using a single EGF and a stack of up to 11 EGFs, and the resulting effect on the derived spectral ratios.



**Figure S1.** Shear wave spectral variations due to radiation pattern at two stations for the SJFZ TRIF earthquake. All EGFs with S-wave picks are shown, indicating that the dominant shape of the spectrum is largely unchanged. This region has diverse focal mechanisms that can be reverse and oblique. The absolute amplitude, however, does vary as expected for a constant multiplier.

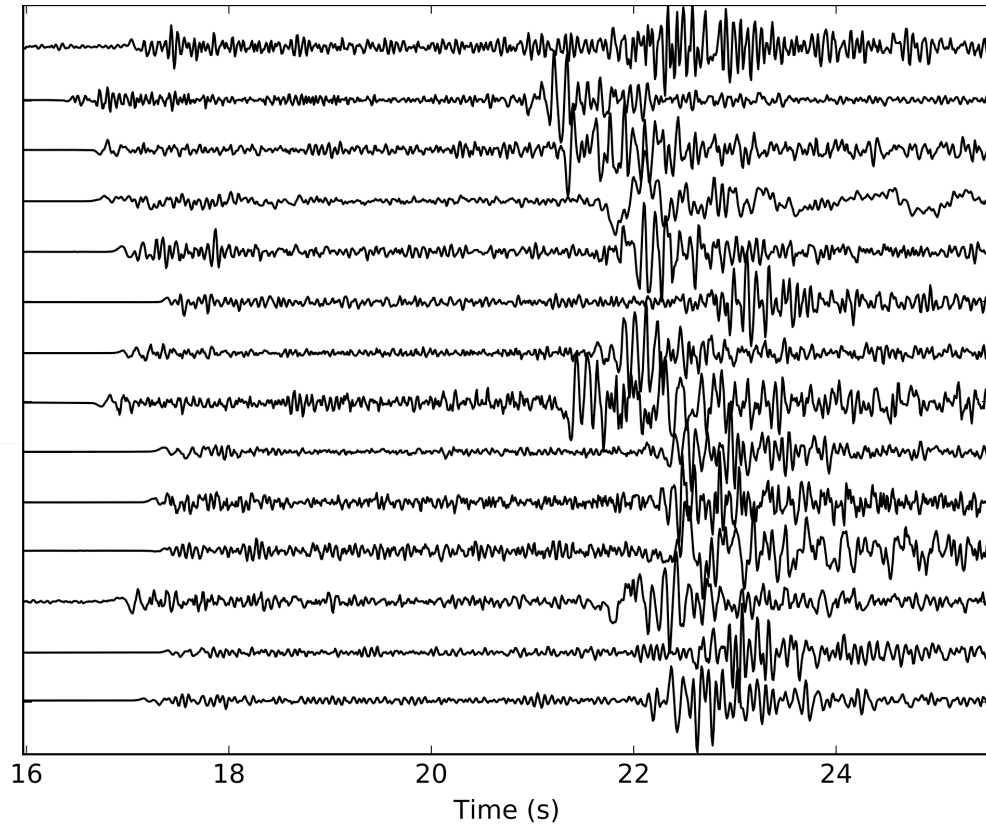
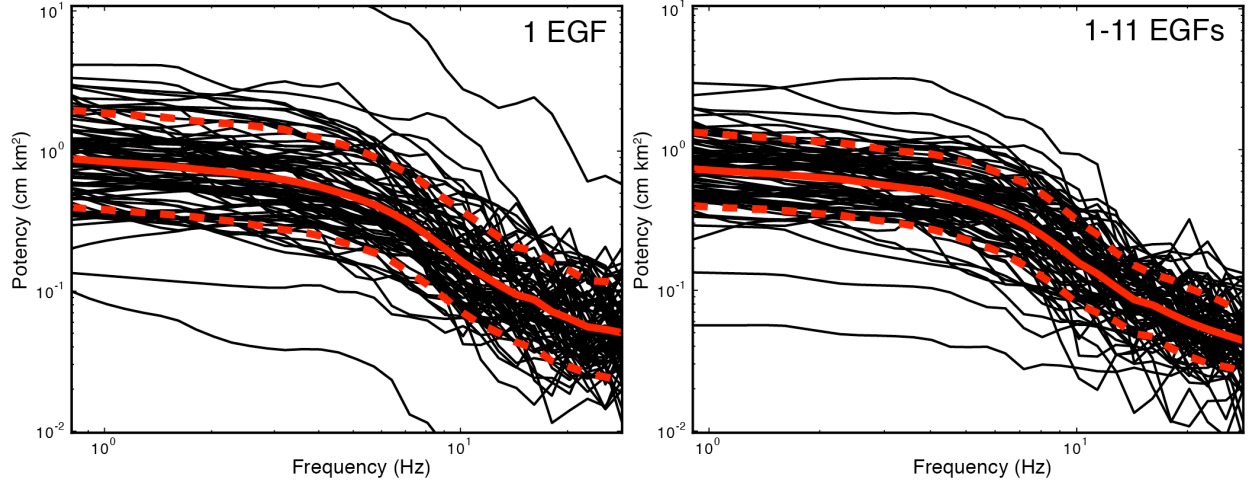


Figure S2. Vertical component seismograms corresponding to the EGF events in Fig. S1. In contrast to the spectra, significant diversity between waveforms is observed.



**Figure S3.** Comparing the effects of the number of EGFs per stack on the derived spectral ratios for the BB event. The left panel uses a single EGF per station, while the right panel uses (at different stations) between one and eleven EGFs per stack. The logarithmic standard deviation (dashed lines) is significantly lower for the stacked EGF spectral ratios than the single EGF spectral ratios.

**Table S1.** EGF events used to analyzed the five target events (Table 1).