Geophysical Research Abstracts, Vol. 9, 07455, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07455

Recovering the source time function from coda waves of seismic events at regional distances using single station.

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In this present work, we are interested to separate the seismic source and the propagation effect. This estimation of the high resolution source time function (STF) will permit to understand the history of the seismic process (earthquake or explosion) and could be a new interesting step in the discrimination process. We propose a high resolution technique for estimating the source time function of a seismic event from only one record. This technique is based on the spectral factorization of the minimum phase wavelet from the most random part of a seismogram: its coda. This approach is at the opposite of the classical methods based deterministic propagation in the earth. As the coda non-stationarity is inconsistent with the classical spectral factorization theory, we develop a two-step algorithm: first, the diffuse coda field is whitened to remove the non-stationary attenuation effect; second, the minimum phase wavelet equivalent of the seismic source time function is estimated. We apply this approach on a moderate size earthquake Ml=5.4 located in the North-east of France and also to the Kursk's event recorded at regional distance. Based on the fundamental "random" character of diffusive waves, this approach opens up promising applications for new blind deconvolution methods. By provided reliable information about source time function of an earthquake such has its duration, its seismic moment and even its actual time history, this coda spectral factorization method could be an alternative to the classical empirical Green function analysis, especially for source study of small size events.