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Deconvolution of the Seismic Source Time Function Based on Higher Order Statistics of Regional Coda Waves

At regional distance, the assessment of the source time function of moderate magnitude events is often a difficult task due to bad knowledge of the Source-station seismic Green's function. Several studies have already demonstrated the capability of the regional coda wavefield to provide valuable information on the seismic source. Nevertheless, all the current methods are based on the use of second order statistics providing source power spectral density without any information on the phase and thus the source time function (STF). By using Higher Order Statistics, a modified version of our two step spectral factorization algorithm [Sèbe et al. 2005] of coda waves has been proposed allowing to recover the complete STF. Belonging to the class of blind deconvolution methods, this new approach performs the estimation of STF without any prior knowledge of seismic Green's function taking advantage of the stochastic nature of regional coda wavefield. This algorithm has been applied on 2 events: the Rambervillers earthquake, France, 22/02/2003, and an artificial explosion in Kambara, Kyrgyzstan, 22/12/2009. The recovered STF are in good agreement with the source obtained by empirical Green function methods or with the known source phenomenology of the artificial explosion.

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