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A robust estimation of the time domain site response from coda waves.

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Several post-earthquake studies have repeatedly shown that the sub-surface geology generates local amplifications of the seismic wave field, called site effects, which are resulting in a worsening of the damages. Considering the seismic motion spectrum as the product of source, path and site effects, the classical site effects estimation methods consist of removing the source and propagation terms. These site effects are classically estimated by computing the spectral ratio ...(Borcherdt, 1970) between sediment and reference site recordings. However, for working properly, this method requires a large enough epicentral distances compared to the site-to-reference distance. Furthermore, this technique provides only a site response estimate in the frequency domain.

Using the most random part of a seismogram, i.e. its coda, a new site-to-reference deconvolution technique has been developed in order to recover the time domain response of at least the 1D site effects. The proposed algorithm consists of 3 steps. First, based on a diffusive model, the coda waves are corrected for the crustal propagation time-frequency filtering effect. Second, by removing the “random” Green function tied to the coda waves, the spectral factorization of the stationnarized coda provides a time wavelet composed of the minimum phase equivalent signal of the source function and site response. Finally, the time site response is recovered by site-to-reference deconvolution.

This technique has been tested on two M$>$5 earthquakes recorded by the French Permanent Accelerometric Network (RAP). Even for stations located several tens of kilometers away from one another, the estimated site response present a good stability in both time and frequency domains. Besides, the recovered site effects spectrum presents clearly several harmonics with a fundamental frequency similar to site reso-

nance frequency obtained by H/V ratio.

Borcherdt, R. D., (1970). Effects of local geology on ground motion near San Francisco Bay. Bulletin of the Seismological Society of America, **60**: 29-61.