BROADBAND DYNAMIC SOURCE MODELING CONSTRAINED BY APPARENT SOURCE SPECTRA, WITH APPLICATION TO CENTRAL ITALY

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Apparent source spectra characterize station-wise source radiation because they are free of path and site effects. The spectra can be extracted from recordings by, for example, the generalized inverse technique (GIT, Bindi et al., 2009) using a large number of records in areas densely sampled by events and stations such as Central Italy (Pacor et al., 2016). Usually, the Brune (omega-square) model is assumed to translate the apparent source spectra to the source parameters such as corner frequency and, thus, Brune stress drop.

Here, we present an ongoing development on the methodology to use GIT-derived apparent source spectra to constrain dynamic source models. Dynamic models employ friction law to describe the rupture propagation on the fault and are usually constrained only at large scales using low-frequency waveforms. On the other hand, the apparent source spectra can provide information on the high-frequency (up to 25 Hz) source radiation. For the 2016 Mw6.2 Amatrice earthquake, we compare the observed apparent source spectra with predictions from the dynamic model obtained by the low-frequency dynamic source inversion and subsequently enriched by fractal perturbations in dynamic parameters.

Furthermore, we explore the possibility of using the apparent source spectra in dynamic source inversions. However, the resolvability of various source (dynamic or kinematic) parameters solely from the amplitude spectra is enigmatic. We approach the challenge with synthetic Bayesian dynamic source inversion of apparent source spectra and inspect the variability of different source parameters and their trade-offs. The recovered source characteristics in a broad frequency range will give us valuable insight for future scenario modeling.