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Source Parameter Determination Using a Spectral Decomposition Approach in the central-southern Europe

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A spectral decomposition of the Fourier amplitude spectra is applied to determine the source parameters of earthquakes (source spectral shape, stress drop) that have occurred in central-southern Europe. About 52 million waveforms recorded in the target area since the late ‘90s have been downloaded from the European Integrated Data Archive (EIDA) within the tool stream2segment (Zaccarelli et al., 2019), by using the event catalog of the International Seismic Centre (ISC) and innovative data quality assessment. A non-parametric decomposition approach in this study introduced a regionalization for the attenuation models into two spatial domains (southern and “active” Europe, northern and “stable” Europe). For each domain, a spectral attenuation with hypocentral distance model is simultaneously determined and used to remove regional specific propagation effects from the spectra of recordings. Once isolated from local site effects, the obtained source spectra of 4380 earthquakes of magnitude larger than 2.5 are fitted to a standard -model to determine the seismic moment, corner frequency and Brune stress drop. The scaling relationship, spatial variation and variability of these source parameters are finally derived and discussed.