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Stochastic strong ground motion simulations for the intermediate-depth earthquakes of the south Aegean subduction zone

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We have employed the stochastic finite-fault modelling approach of Motazedian and Atkinson (2005), as described by Boore (2009), for the simulation of Fourier spectra of the Intermediate-depth earthquakes of the south Aegean subduction zone. The stochastic finite-fault method is a practical tool for simulating ground motions of future earthquakes which requires region-specific source, path and site characterizations as input model parameters. For this reason we have used data from both acceleration-sensor and broadband velocity-sensor instruments from intermediate-depth earthquakes with magnitude of M 4.5-6.7 that occurred in the south Aegean subduction zone. Source mechanisms for intermediate-depth events of north Aegean subduction zone are either collected from published information or are constrained using the main faulting types from Kkallas et al. (2013). The attenuation parameters for simulations were adopted from Skarladoudis et al. (2013) and are based on regression analysis of a response spectra database. The site amplification functions for each soil class were adopted from Klimis et al., (1999), while the kappa values were constrained from the analysis of the EGELADOS network data from Ventouzi et al., (2013). The investigation of stress-drop values was based on simulations performed with the EXSIM code for several ranges of stress drop values and by comparing the results with the available Fourier spectra of intermediate-depth earthquakes. Significant differences regarding the strong-motion duration, which is determined from Husid plots (Husid, 1969), have been identified between the for-arc and along-arc stations due to the effect of the low-velocity/low-Q mantle wedge on the seismic wave propagation. In order to estimate appropriate values for the duration of P-waves, we have automatically picked P-S durations on the available seismograms. For the S-wave durations we have used the part of the seismograms starting from the S-arrivals and ending at the 95%-energy limit of the Husid plots. After appropriate calibration of all parameters involved in the simulations we generated separate stochastic waveforms for both P- and S-waves, and produce the final synthetics by appropriate merging of the two stochastic waveforms. This work has been partly supported by the 3D-SEGMENTS project #1337 funded by EC European Social Fund and the Operational Programme "Education and Lifelong Learning" of the ARISTEIA-I call of the Greek Secretariat of Research and Technology.