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Investigation of the stress parameter values for the stochastic simulation of shallow (h<45km) interface earthquakes of the southern Aegean Sea subduction zone

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In the present work, we examine the stress parameter values for the stochastic simulation modeling of shallow interface (h<45km) earthquakes in the southern Aegean Sea subduction zone. Using the extended-source model (EXSIM code), the stochastic stress parameter is estimated for several of these earthquakes, which are typically associated with thrust faulting. The assessment is performed using a Monte Carlo parametric search (non-linear optimization) of the stress parameter values, realized through an adapted neighborhood algorithm (Wathelet, 2008). In this approach, we estimate the stress parameter which minimizes the total root mean square (rms) misfit between observed and simulated Fourier Amplitude Spectra (FAS) for all records of each event available in the strong motion database. We also employ appropriate source and path parameters (e.g., moment magnitude, fault dimensions, high-frequency spectral attenuation, etc.), from previous works on strong-motion simulations, considering earthquakes in the range **M**4.4 to **M**6.6. For several recording stations, we employed site-specific transfer functions, derived from a generalized inversion of strong motion records, considering the seismic source and propagation path of the seismic events in terms of their frequency content (Drouet et al., 2008; Grendas et al., 2018). For the remaining stations, the assessment of site-effects on seismic motions was performed based on the Vs30 values available for all recording stations. Using these values, soil classes according to NEHRP (1994) have been assigned and we employed generic transfer functions for NEHRP site conditions A/B, C and D (together with the corresponding κ0 values), as these were available from previous work for Greece by several authors (Margaris and Boore, 1998, Margaris and Hatzidimitriou, 2002; Klimis et al., 1999, 2006). The final comparisons show that the FAS of the strong motion data can be adequately matched (in most cases) by the synthetic data from the EXSIM simulations, using stress parameter values less than 100bars. This value is quite different from results obtained for larger depth interface and inslab events of the Aegean Sea and Vrancea subduction zones (e.g., Sokolov et al., 2005; Kkallas et al., 2018), which show much larger

stress parameters (>200bar) for **M**>6 events. These findings suggest that the event hypocentral depth is a critical factor regarding the observed stress parameter affecting accordingly the seismic hazard estimation. Strong Intermediate-depth events (h>45km) require large stress parameters, while shallow interface thrust events show rather similar stress parameter values with the typical shallow back-arc normal and strike-slip events of the Aegean region. **This research is co-financed by Greece and the European Union (European Social Fund- ESF) through the Operational Programme «Human Resources Development, Education and Lifelong Learning» in the context of the project "Reinforcement of Postdoctoral Researchers - 2nd Cycle" (MIS-5033021), implemented by the State Scholarships Foundation (IKY).**