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A homogeneous earthquake catalogue of relocated recent shallow events of the Hellenic arc

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The aim of this study is the compilation of a new homogeneous (with respect to magnitude) catalogue for shallow (h$\leq$30km) earthquakes that have occurred along the Hellenic Arc during the period 2000-2012. The data were derived from the recordings of the permanent seismological stations of the Hellenic Unified Seismic Network (HUSN) and cover the time-period 2000-2012. The area studied is bounded by the coordinates 34.5N–37.0N and 22.0E–29E. Only data for earthquakes with $M_L \geq 3.0$ were considered, resulting in the generation of a unified database with phase readings from 13535 earthquakes. Three location algorithms were used for the initial relocation procedure, namely the HYPO71 earthquake location program (*Lee & Lahr, 1972*), the HYPOINVERSE algorithm (*Klein, 2002)* and the double-difference algorithm, HYPODD (*Waldhauser & Ellsworth, 2000*). The phase data were initially processed with both absolute location algorithms, namely HYPO71 and HYPOINVERSE algorithm, using the velocity model proposed by *Karagianni et al. (2005)*. This relocation procedure resulted in an updated dataset 12149 earthquakes, for which improved relocations could be provided. The final relocation was performed by applying the double-difference algorithm, HYPODD, using the velocity model proposed for the study area by *Karagianni et al. (2002),* as it was considered as the more representative. The above procedure allowed the relocation of 8117 earthquakes revealing, in some cases, significant differences in both the depths and the epicenters of these earthquakes, with respect to the initial (HYPO71-HYPOINVERSE) catalogue. Several reports on the magnitudes of the earthquakes of the catalogue were elaborated in order to obtain the most reliable magnitude approximation. The available estimates, derived from several centers, include magnitude values expressed in several magnitude scales. Considering the moment-magnitude scale as the most reliable one, the values of the reported magnitudes of each earthquake were converted to the respective moment magnitudes by using already published converting relations (*Papazachos et al., 2002; Scordilis, 2006*) and their weighted mean value (inversely proportional to the standard error of each calibrating relation) was taken as the moment magnitude of this earthquake. When original moment magnitudes were available, their values were adopted without any additional processing. The revised catalogue revealed a more detailed picture of the seismicity of the Hellenic Arc, allowing the identification of specific earthquake clusters and better describing the faulting structures of this seismotectonically very active and high-hazard area.

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