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A large-scale location of earthquakes in Greece and the surrounding areas using the Double-Difference Method and a three-dimensional velocity model

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Precise earthquake locations are needed for seismotectonic and seismic hazard studies, as well as basic seismological research. As existing catalogues do not fully satisfy this need, they must be revised by a more advanced location method. In this study we used the double-difference earthquake location method to locate a large set of earthquakes in Greece and the surrounding areas. All available arrival time data for the area (ISC, etc), together with data from the archives of the seismological network of the University of Thessaloniki were merged into a single phase arrival list and a single preliminary catalogue was calculated. The events in the preliminary catalogue were then relocated using a double-difference algorithm. The algorithm was based on the freely distributed computer program hypoDD (Waldhauser 2001), with additional modifications, most notably the incorporation of a three-dimensional velocity model, which has been determined by earlier tomographic studies. In many cases, mostly events which are spatially isolated or contain phase picks with large errors, the relocation process cannot be completed. In these cases, the hypocentral parameters of the preliminary catalogue are kept. Every event in the new catalogue is labeled according to the method that was used for its location.