Delineation and characterization of a new seismic source model for seismic hazard studies in Egypt


Abstract:

In the present study, a new seismic source model for the Egyptian territory and its surroundings is proposed. This model can be readily used for seismic hazard assessment and seismic forecasting studies. Seismicity data, focal mechanism solutions, as well as all available geological and tectonic information (e.g. active faults) were taken into account during the definition of this model, in an attempt to define zones which do not show only a rather homogeneous seismicity release, but also exhibit similar seismotectonic characteristics. This work presents a comprehensive description of the different tectonic features and their associated seismicity to define the possible seismic sources in and around Egypt. The proposed seismic source model comprises 28 seismic sources covering the shallow seismicity for the Egyptian territory and its surroundings. In addition, for the Eastern Mediterranean region, we considered the shallow seismic source zones, used in the SHARE project for estimating the seismic hazard for Europe. Furthermore, to cover the intermediate-depth seismicity, seven intermediate seismic source zones were delineated in the Eastern Mediterranean region. Following the determination of zone boundaries, a separate earthquake and focal mechanism sub-catalogue for each seismic zone was created. Seismicity parameters (b-value, activity “a-value” and maximum expected magnitude) have been computed for each source. In addition, the predominant focal mechanism solution was assigned for each source zone using the stress field inversion approach. The proposed seismic source model and its related seismicity parameters can be employed directly in seismic hazard assessment studies for Egypt.

Keywords:

Seismic source model - Seismic hazard - Seismotectonics - Focal mechanism - Stress inversion - Egypt

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