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Probabilistic seismic hazard assessment based on seismic potential of active faults: Example from northern Algeria

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Northern Algeria is an interplate area where the African and the Eurasian tectonic plates are converging in the NW-SE direction. Therefore, earthquakes are not distributed randomly but directly related to the activity of active faults. The seismotectonic conditions of occurrence of strong damaging earthquakes in the area are well understood following the numerous detailed studies that followed the El-Asnam October 10th , 1980 earthquake (Ms=7.3) and the Zemmouri May 1st , 2003 (Mw=6.8) earthquake. The potentially active structures consist of active folds or asymmetrical folds underlined by thrust faults. Some of the faults are blind as revealed by the Chenoua 29th , 1989 (Ms=6.0) and the Ain Temouchent 1999 (Ms=5.6) earthquakes. We applied the probabilistic approach to assess seismic hazard in the area of Mostaganem, western Algeria. The following steps are performed (i) Seismic sources are identified on the basis of field geological/geophysical investigations,(ii) Source parameters such as b-values, slip rate and maximum magnitude are assessed for each seismic source, and then given a weight in the framework of a logic tree model, (iii) Attenuation relations which fit Algerian strong motion records are used, (iv) Results are presented as annual frequencies of exceedance versus peak ground acceleration (PGA) as well as maps of hazard for different return periods. Finally, we quantified and discussed the scientific uncertainties related to the state of knowledge and the used alternative models and values.

Keywords: seismic hazard- active faults- probabilistic approach- uncertainties-Algeria