Seismic Hazard Assessment for a Characteristic Earthquake Scenario: Probabilistic–Deterministic Method

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The objective of this paper is to analyze the seismic activity and the statistical treatment of seismicity catalog the Constantine region between 1357 and 2014 with 7007 seismic event. Our research is a contribution to improving the seismic risk management by evaluating the seismic hazard in the North-East Algeria. In the present study, Earthquake hazard maps for the Constantine region are calculated. Probabilistic seismic hazard analysis (PSHA) is classically performed through the Cornell approach by using a uniform earthquake distribution over the source area and a given magnitude range. This study aims at extending the PSHA approach to the case of a characteristic earthquake scenario associated with an active fault. The approach integrates PSHA with a high-frequency deterministic technique for the prediction of peak and spectral ground motion parameters in a characteristic earthquake. The method is based on the site-dependent evaluation of the probability of exceedance for the chosen strong-motion parameter. We proposed five sismotectonique zones. Four steps are necessary: (i) identification of potential sources of future earthquakes, (ii) assessment of their geological, geophysical and geometric, (iii) identification of the attenuation pattern of seismic motion, (iv) calculation of the hazard at a site and finally (v) hazard mapping for a region. In this study, the procedure of the earthquake hazard evaluation recently developed by Kijko and Sellevoll (1992) is used to estimate seismic hazard parameters in the northern part of Algeria.