



Annual Rates on Seismogenic Italian Sources with Models of Long-Term Predictability for the Time-Dependent Seismic Hazard Assessment In Italy

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The present study is carried out in the framework of the Center for Seismic Hazard (CPS) INGV, under the agreement signed in 2015 with the Department of Civil Protection for developing a new model of seismic hazard of the country that can update the current reference (MPS04-S1; zonesismiche.mi.ingv.it and esse1.mi.ingv.it) released between 2004 and 2006. In this initiative, we participate with the Long-Term Stress Transfer (LTST) Model to provide the annual occurrence rate of a seismic event on the entire Italian territory, from a $M_w 4.5$ minimum magnitude, considering bins of 0.1 magnitude units on geographical cells of $0.1^\circ \times 0.1^\circ$. Our methodology is based on the fusion of a statistical time-dependent renewal model (Brownian Passage Time, BPT, Matthews et al., 2002) with a physical model which considers the permanent effect in terms of stress that undergoes a seismogenic source in result of the earthquakes that occur on surrounding sources. For each considered catalog (historical, instrumental and individual seismogenic sources) we determined a distinct rate value for each cell of $0.1^\circ \times 0.1^\circ$ for the next 50 yrs. If the cell falls within one of the sources in question, we adopted the respective value of rate, which is referred only to the magnitude of the event characteristic. This value of rate is divided by the number of grid cells that fall on the horizontal projection of the source. If instead the cells fall outside of any seismic source we considered the average value of the rate obtained from the historical and the instrumental catalog, using the method of Frankel (1995). The annual occurrence rate was computed for any of the three considered distributions (Poisson, BPT and BPT with inclusion of stress transfer).