



Preliminary results on MMPP applied to South-eastern Spain TD-PSHA

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In this work we evaluate the use of Markov-modulated Poisson Process (MMPP) in the framework of the computation of Peak Ground Acceleration (PGA) for a 475-year return period through a classical Time-Dependent Probabilistic Seismic Hazard Assessment (TD-PSHA) approach. The catalogue of Southern Spain spanning from 1970 to 2023 has been selected using several tectonic zones from the nation seismic zonation as masks for the extraction, then homogenized and declustered.

The MMPP model has been used for the computation of the seismic activity rate and has been tested with different completeness magnitudes (M_c) and number of states. Clear state transitions and coherent results (the high seismic activity rate state corresponds to periods with more high-magnitude earthquakes) can be identified for the $M_w 3.2$ M_c with two states. A set of Ground Motion Models (GMMs) has been preselected and, using accelerometric data from the region, these GMMs have been ranked and used within a logic tree. The hazard curves (at the sites of Lorca, Murcia, Granada and Vera) and the hazard maps have been computed for each MMPP state and have been compared with other studies. The results show that higher PGA values have been obtained in the provinces of Granada, Málaga, Córdoba and Sevilla compared to previous studies. The hazard curves show high Probabilities of Exceedance (PoE) for lower PGA values in the selected sites and lower PoE for the high-end ($PGA > 0.3g$) of the considered PGA range when compared with other models.

We finally explored whether the proposed scheme can also use tectonic zonation information, splitting the investigated region in sub-zones (given that enough events are selected for each zone), following the approach described in Montiel-Lopez et al. (NHES, 2025).