



## PSHA IN SE- SPAIN BASED ON MACROSEISMIC SITE HISTORIES

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In many countries such as Spain the bulk of the earthquake database comprises macroseismic data and given the strict link between macroseismic intensity and damage, seismic hazard estimates in terms of intensity as the ground shaking measure are of basic importance for seismic risk assessment and emergency planning.

A probabilistic procedure specifically developed to handle macroseismic data has been applied to evaluate seismic hazard in SE-Spain (Alicante-Murcia region). The procedure is implemented in the SASHA approach (Site Approach to Seismic Hazard Assessment) and assesses seismic hazard in terms of macroseismic intensity relying on local information concerning the effects of past earthquakes documented at the site where the hazard is being computed (Albarello and Mucciarelli, 2002; D'Amico and Albarello, 2008).

The Alicante-Murcia region is located in the south-eastern area of the Iberian Peninsula, and it includes several Neogene-Quaternary basins that developed in the Betic Cordillera. Among these, the "Vega Baja" in the Alicante Province, which corresponds to the Lower Segura River Basin, and the Lorca Basin in the Murcia province. The present seismicity in the "Vega Baja" and Lorca Basin is, in general, characterised by the occurrence of moderate earthquakes, most of which have a shallow focus. The strongest events that occurred during the instrumental period reached only moderate magnitudes slightly over 5.0, although the historical seismicity recorded in the Spanish earthquake catalogue reveals the occurrence of very destructive earthquakes with maximum EMS98 intensities reaching IX-X and X. In the Vega Baja, the strongest event occurred on 21 March, 1829, and it was known as the "Torrevieja earthquake". It was the main shock in a seismic sequence of at least 42 events that occurred from 1828 to 1830, with EMS98 intensities reaching IX-X. EMS98 VIII intensities were also reported in the region in 1048, 1482 and 1673 in Orihuela, and in 1919 in Jacarilla.

On 11 May, 2011, two damaging earthquakes (Mw4.5, Mw5.2) killed nine people, injured more than 300, and produced important building damage in the city of Lorca. According to the Spanish earthquake record, in the Lorca Basin and surrounding regions, significant damaging events have also occurred in historic times, such as those in 1674 (Lorca), 1855 (Alhama de Murcia), 1911 (Lorquí) and 1948 (Cehegín). The most recent activity before the 2011 Lorca earthquakes were events of around magnitude Mw5.0 in 1999, 2002 and 2005, which produced slight damage in several localities of Murcia region.

The time period considered for the computation of the probabilistic hazard for the Vega Baja and Lorca regions was that of the Spanish earthquake catalogue, which spans from 1048 to 2012. This included 66 earthquakes above the damage threshold V-VI EMS98 (European Macroseismic Scale 1998), which provided a total of 886 geo-referenced macroseismic data points. The hazard computation was carried out according to the SASHA methodology, which is based on analysis of the site seismic history; i.e., the dataset of seismic effects (macroseismic intensities) documented during

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past earthquakes at a given locality. The nature of the intensity and the relevant uncertainty was taken in account with no assumptions on the occurrence model or seismic source geometry.

The seismic history was built for selected localities in both regions and the hazard was computed in terms of the highest intensity values,  $I_{ref}$ , and in terms of the hazard curves for each investigated site.

## REFERENCES

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