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Development and characterization of a seismic source model for the Jalisco-Colima-Michoacán region, Western Mexico

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The Mexican subduction zone, the Gulf of California spreading center, as well as the triple junction point around the Jalisco and the Michoacán Blocks, represents the most active seismogenic belts inducing seismic hazard in the Jalisco-Colima-Michoacán region. Herein, considering such seismotectonic setting, we have developed a new seismic source model for the surrounding of this zone to be used as an input to the assessment of the seismic hazard of the region.

This new model is based on revised Poissonian earthquake (1787-2018) and focal mechanism (1963-2015) catalogs, as well as crustal thickness data and all information about the geometry of the subducting slabs. The proposed model consists of a total of 37 area sources, comprising the three different possible categories of seismicity: shallow crustal, interface subduction, and in-slab earthquakes. A special care was taken during the delimitation of the boundaries for each area source to ensure that they represent a relatively homogeneous seismotectonic region, and to include a relatively large number of earthquakes that enable us to compute, as reliable as possible, seismicity parameters.

Actually, the sources zones were delimited following the standard criteria of assessing a probabilistic seismic hazard, being characterized in terms of their seismicity parameters (annual rate of earthquakes above M_w 4.0, b -value, and maximum expected magnitude), mean seismogenic depth, as well as the predominant stress regime. The proposed seismic source model defines and characterizes regionalized potential seismic sources that can contribute to the seismic hazard at the Jalisco-Colima-Michoacán region, providing the necessary information for seismic hazard estimates.