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An Earthquake Catalog for Seismic Hazard Assessment in Ecuador

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Abstract

Building a unified and homogeneous earthquake catalog is a preliminary step for estimating probabilistic seismic hazard in a country. Ecuador, a territory of ~600 km×500 km, is characterized by an active seismicity, both in the shallow crust and in the subduction zone. Several international and local earthquake catalogs are available, covering different time and spatial windows, characterized by different magnitude types and uncertainties. After a careful analysis of each catalog, in particular for completeness and uncertainty levels, we propose a priority scheme for merging the instrumental catalogs. Moreover, several historical earthquakes are analyzed to estimate epicentral location and magnitude, completing the solutions obtained in a previous publication. Once the historical earthquakes are appended to the instrumental catalog, the resulting catalog covers five centuries in the Cordillera region. Next, homogenization of magnitudes and removal of aftershocks is performed; different options are studied and the impact on the recurrence curve is evaluated. For the Cordillera region within −2.5° and 1° latitude, the average occurrence of an earthquake with Mw≥6.0 is 10–20 years based on the historical catalog.

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