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# Use of historical earthquake records for seismic hazard assessment of regions with low b values

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The Gutenberg-Richter b value and maximum magnitude (Mmax) are important parameters for calculation of potential seismic hazards. The global instrumental observation of seismic events began in early 1900s, which may be too short to account for seismicity with recurrence intervals of hundreds or thousands years. This is particularly true in intraplate regions where strain accumulation rates are low. Historical earthquake records may be useful to complement the instrument seismicity records. Historical records are based on the description of seismic damages with inherent uncertainty in actual epicenters and magnitudes. We propose a method based on probabilistic analysis to determine the epicenters of historical events considering the current instrumental seismicity with an idea that the spatial distribution of earthquakes is consistent with time as long as the tectonic environment remains invariant. The locations of historical epicenters are determined probabilistically considering the most damaged locations and the instrumental seismicity. The magnitudes of historical events are calculated by a magnitude-intensity relationship. We apply the method to Korean historical records that are composed of 2185 historical earthquake records during 2-1904. The b value of the historical events is found to be 0.73. The maximum magnitude based on historical earthquakes is estimated to be about 7.5, which is much greater than the observed maximum magnitude of instrumental seismicity (5.3). This approach may be useful for seismic hazard analysis for events with long recurrence intervals.