Intensity Prediction Equations as an intensity proxy for historical earthquakes

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Equations that predict ground-shaking distribution (Ground Motion Prediction Equations -GMPs) expressed in terms of PGA, PGV or intensity and as a function of magnitude and distance, are a key for hazard and risk assessment providing information beyond focal parameter. Real-time ShakeMaps provide a prompt assessment of the scope and impact of an event, estimation of losses by calculating the extent of the affected area, which is likely to meet the highest intensities when an earthquake occurs and therefore, decision making. GMPEs also play an important role for the development of seismic hazard maps, public information and education.

Intensity Prediction Equations (IPEs) can also be used to study historical earthquakes, where some difficulties to gather information, find testimonies or identifying marks of the event might be found.

The purpose of this work is to test the IPE for Austria with historical earthquakes and compare the results with recent earthquakes with similar epicenters to the historical ones. Therefore, three strong historical earthquakes were selected from the Austrian database, Hall in Tirol (1670 – with an epicentral intensity (I_0) of $VIII$); Wiener Neustadt (1768 – with $I_0 = VII$); and the Schwadorf earthquake (1927 – with $I_0 = VIII$). In agreement with this selection, three earthquakes with similar locations were selected in the period from January 1992 to February 2018: Schwadorf (21.11.2001 with $I_0 = V$ and local magnitude (m_l) of 3.5); Wiener Neustadt (25.07.2005 with $I_0 = V - VI$ and $m_l = 3.5$); and an earthquake in Hall in Tirol (09.08.2013 with $I_0 = V - VI$ and $m_l = 3.7$).