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Source parameters inversion using macroseismic data in a moderately seismic context (France)

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French metropolitan territory is characterised by slow tectonic processes and only moderate seismic activity although several strong historical events were reported. Hence, present-day seismicity may not truly reflect the underlying regional pattern of earthquakes. For seismic hazard assessment, a larger sample of seismicity covering a period much longer than the few decades of instrumental seismology is needed especially with regard to the possibly very long return periods involved in such slow tectonic processes. Historical data (e.g. distribution of intensities) contain a great deal of information that can be used to constrain the essential characteristics of the seismic source. We used a method to invert macroseismic data adapted to the French geological and seismological context. Macroseismic intensity data come from the SisFrance database (http://www.sisfrance.net), a large compilation, from 463 AD to the present day, of historical earthquakes that affected the French territory and described in terms of macroseismic scale. In order to estimate source parameters such as location, magnitude, physical dimensions and orientation of the fault of some historical earthquakes, we used an inversion method developed by Gasperini et al. (1999), coded in the program BOXER. Results of these inversions are significant against the hypothesis of uniform distribution of the data. Our aim is to define the inversion method's range of validity (distribution and quality of intensity observations, size of the event, source complexity, site effects...) using a parametric study. We test the validity and variability of solutions against variations in observations in terms of quality and quantity. This parametric study is conduced using recent earthquakes whose source parameters were well-determined by national networks, such as the 1996 Perpignan (eastern Pyrenean region, Ml=5.6) and the 2002 Lorient (southern Brittany region, Ml=5.4) events.