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Towards a New Harmonised Earthquake Catalogue for the Euro-Mediterranean Region

Steffi Lammers, Dietrich Stromeyer, Graeme Weatherill, Fabrice Cotton, and Gottfried Grünthal
GeoForschungsZentrum, Seismic Hazard and Risk Dynamics, Potsdam, Germany (steffi.lammers@gfz-potsdam.de)

Catalogues of seismic events known to have occurred a region are arguably the most fundamental element of any quantitative analysis of the threat posed by earthquakes to society. The applications of such a catalogue can span a wide variety of scientific and engineering domains, from seismotectonic exploration through to the analysis of seismic hazard for engineering design, for assessment of financial risk to an insurance portfolio, or even for a valuation of catastrophe bonds. Whilst seismic recording networks have been in operation for over a century, our sources of earthquake catalogues are diverse, with information coming from teleseismic bulletins, national/regional seismic networks, historical investigations and local or temporary deployments. For robust estimations of earthquake recurrence, and wider variety of other uses, it is necessary that information from these different sources be harmonised such that the estimations of magnitude are homogeneous and comparable.

As modern social, economic and physical infrastructures become more international, it is becoming increasingly important to assess seismic hazard at a multi-national level. This has been a strong motivation for recent European seismic hazard assessment initiatives, such as the 2013 European Seismic Hazard Model (ESHM2013), which is currently in the process of being updated within the Horizon 2020 SERA project. Previously, a European-Mediterranean Earthquake Catalogue (EMEC) was constructed, harmonising earthquake catalogues from across the Euro-Mediterranean region into a common catalogue of earthquakes with $M_W \geq 3.5$ (and $M_W \geq 4$ for latitudes south of 44°N) for the period 1000 AD to 2006 (Grünthal & Wahlström, 2012). This proved to be a critical data set upon which the ESHM2013 was built. As part of ongoing efforts to continually improve our estimation of seismic hazard in Europe, the EMEC catalogue is now being updated, and it is anticipated it will prove fundamental to forthcoming models of seismic hazard at both a national and European scale.

We present the current status of the work to update and extend the EMEC catalogue. This includes the addition of recent seismicity from the period 2007 to 2014, the results of ongoing research into historically reported events, and incorporation of new data from networks and sources not available at the time of the previous EMEC construction. Careful attention is paid to ensure consistency with the current EMEC catalogue, whilst still exploring the new data and gaining a deeper insight into the relations between different estimates of the size and locations of earthquakes reported by European recording agencies. Additional care is taken to identify events of anthropogenic origin, presently within Germany and its surroundings but with the intent of expanding this effort across Europe. This anthropogenic earthquake database may prove especially relevant for studies of induced seismicity. It is hoped that these new catalogues of earthquakes will continue the legacy of EMEC in providing a high-quality, authoritative sources of earthquake information for Europe and the Mediterranean.