



EXTENSION OF THE ISC-GEM GLOBAL INSTRUMENTAL EARTHQUAKE CATALOGUE

Dmitry A. Storchak¹, Domenico Di Giacomo², Robert E. Engdahl³, Antonio Villaseñor⁴ and James Harris⁵

The first version of the ISC-GEM Global Instrumental Earthquakes Catalogue (1900-2009) was released in 2013 (www.isc.ac.uk/iscgem/index.php) following a 27-month project funded by the GEM Foundation. The catalogue was constructed for use in global and regional seismic hazard and risk assessment. The main features of this catalogue are an improved homogeneity and accuracy of the main earthquake parameters (location and magnitude) over a 110-year period.

Due to the time and resource limitations of the original project, the ISC-GEM catalogue included only earthquakes greater than or equal to the following time-variable cut-off magnitudes: $M_s=7.5$ for earthquakes occurring before 1918; $M_s=6.25$ between 1918 and 1963; and $M_s=5.5$ from 1964 onwards. With further funding from several commercial and public bodies, we started working on a 4-year extension project, adding both recent earthquakes as well as those in the early instrumental period that fell below the original cut-off magnitude of 6.25. In this contribution we present the updated ISC-GEM catalogue that now includes several hundred earthquakes in the 2010-2011 period as well as ~4,000 additional earthquakes in the 1950-1959 period. Whilst for 2010-2011 the data was available from the ISC bulletin in an electronic format, the arrival time data for earthquakes in the 1950s had to be digitized from the printed volumes of the International Seismological Summaries (ISS, 1918-1963). The amplitude-period data were added from individual paper-based observatory bulletins in order to re-assess the magnitudes (mostly M_S), using procedures described in Di Giacomo et al. (2015a). These bulletins were sourced from the historical collections of the International Seismological Centre, British Geological Survey, Geophysical Survey of the Russian Academy of Sciences, Geophysical Institute of the Czech Academy of Sciences, School and Observatory for Earth Sciences of University of Strasbourg and the private collection of the late Nicolas Ambraseys of Imperial College.

The updated plot of the time-magnitude distribution of the ISC-GEM Main Catalogue 1900-2011 is shown in Figure 1 (for comparison with previous version see Figure 20 of Di Giacomo et al., 2015b). The earthquakes of 2010-2011 period demonstrate the same distribution we can observe in recent years and add significant recent earthquakes to the catalogue. The biggest difference with previous version occurs in the 1950s, where almost no earthquake below 6.1 was listed in the past. Both the time-frequency distribution and the annual number of events per year above 5.5 show, however, that in the 1950s the catalogue is still not as complete as in the more recent decades. This is due to the large number of earthquakes for which we found an insufficient amplitude and period information reported by seismic observatories.

¹ Dr, International Seismological Centre, Thatcham, dmitry@isc.ac.uk

² Dr, International Seismological Centre, Thatcham, domenico@isc.ac.uk

³ Dr, University of Colorado, Boulder, bob.engdahl@colorado.edu

⁴ Dr, Institute of Earth Sciences Jaume Almera, Barcelona, antonio@ictja.csic.es

⁵ Mr, International Seismological Centre, Thatcham, james@isc.ac.uk

The results of the extension project will also be helpful for regional cross-border seismic hazard studies. The ISC-GEM catalogue is based primarily on teleseismic station readings and can therefore be used as a reference for cross-checking the completeness and consistency in location and magnitude of the same earthquakes listed in various regional catalogues.

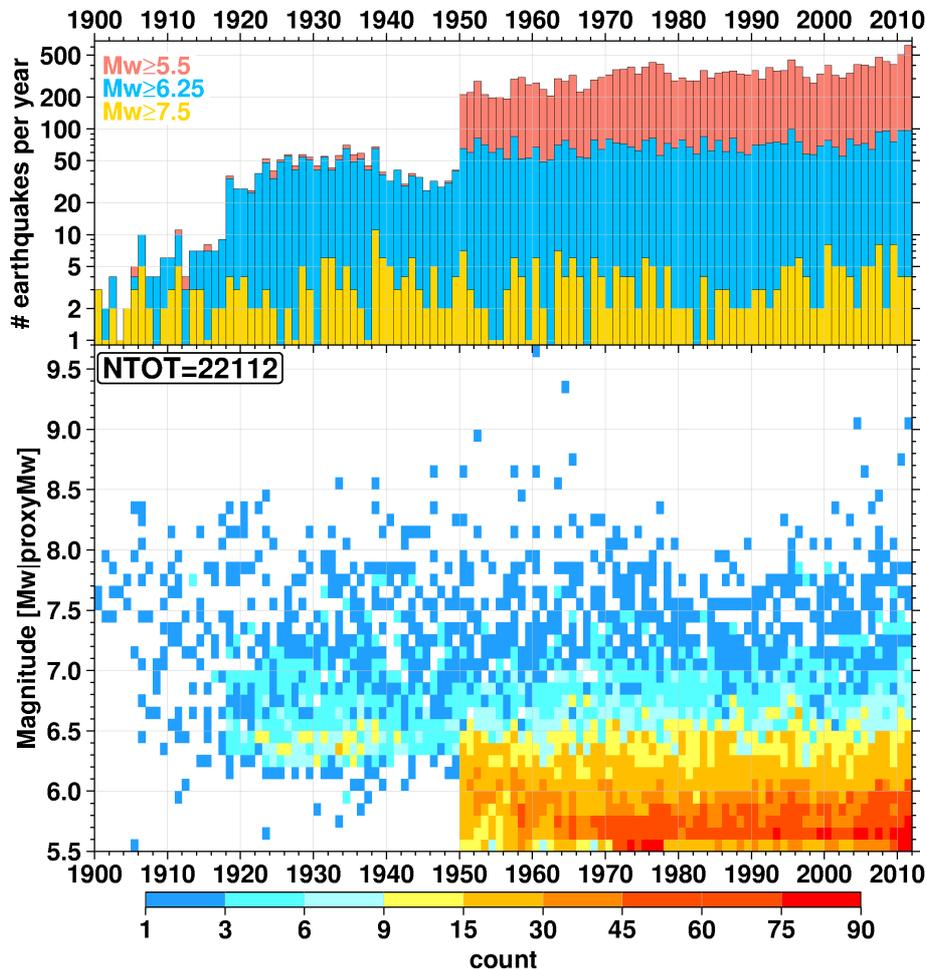


Fig. 1: Top: cumulative annual number of earthquakes with $M_w \geq 5.5$ (red), ≥ 6.5 (blue) and ≥ 7.5 (yellow); Bottom: time-magnitude distribution color-coded in cells of 0.1 M_w units for each year of the ISC-GEM main catalogue.

REFERENCES

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