



Transfrontier Macroseismology in Europe

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Macroseismic analysis of felt earthquakes is important as the perception of people can be used to analyse earthquake strong ground motions in poorly-instrumented areas. In the US, the USGS is the only institute that gathers macroseismic data through its online “Did You Feel It?” (DYFI) system allowing a homogeneous and consistent intensity assessment. In Europe, however, we face a much more complicated situation. As almost every nation has its own inquiry/inquiries in their national language(s) and both the EMSC and the USGS run an international DYFI inquiry, responses to transfrontier-felt seismic events are strongly fragmented across different institutes. To make a realistic ground motion intensity assessment, macroseismic databases need to be merged in a consistent way hereby dealing with duplicated responses, different intensity calculations and legal issues (observer’s privacy).

In this presentation, a methodology of merging macroseismic datasets is proposed. It is demonstrated how post-processing macroseismic data improves the quality of real-time intensity evaluation of new events. Instead of using irregularly-shaped, arbitrary municipal boundaries in a DYFI map, we structure the model area into 100 km² grid cells and assign an intensity value to each grid cell based on all responses of all institutes in that cell. The resulting macroseismic grid cell distribution shows a less subjective and more homogeneous intensity distribution than the classic community distribution. We will demonstrate that the grid cell intensity values are suitable for modelling the intensity decay with epicentral distance and are thus a suitable tool to construct transfrontier attenuation models.

To demonstrate the applicability of the method, several $M > 4$ earthquakes which were felt in Belgium, Germany, The Netherlands, France, Luxemburg and UK are analysed by this grid cell procedure. These are examples of successful international macroseismic data exchange between seismological institutions and should encourage other institutes to exchange macroseismic data, either in real-time or while post-processing.