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THE INTEGRATION OF HISTORICAL EARTHQUAKE DATA IN THE AUSTRIAN EARTHQUAKE CATALOG

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The study of earthquakes from historical sources provides important information to the development of seismic hazard studies as the required long recurrence periods are not provided by the time history of the instrumental data. For most strong earthquakes in the Eastern Alps, macroseismic data are the only information available for studying earthquake effects. Since the ‘1980s, systematic studies of historical earthquakes, leading to the quantification of earthquake effects in terms of macroseismic data points (MDPs) and focal parameters, have been carried out at the national seismological service of Austria (ZAMG). For each earthquake, the available background information (translation, interpretation and documentation of the original sources) has been evaluated to derive and corresponding intensities in terms of EMS-98.

The seismicity of Austria can be regarded as moderate, although single strong earthquakes with an intensity of degree 9 (EMS-98) are documented since 1000 AD. Six earthquakes had an intensity of degree 8 or higher, whereof the Katschberg event in 1201 and the Riederberg event in 1590, reached a value of 9 degrees. Earthquakes in Austria of 5.0 Ml have a mean return period of ten years and events of 5.5 Ml have a mean return period of thirty years. A maximum magnitude of 6.1 Ml is documented for the Katschberg event in 1201.

We applied an approach where historical data are stored together with recent macroseismic data in a database of the Austrian earthquake catalog. The Datascope database used in the routine analysis of seismic data was adapted by extending the CSS 3.0 schema. The main goal was to document methods used for the parameter calculation (e.g. reconstruction of the magnitude by Shebalin’s relationship) and to document and link the original sources of historical earthquake studies. This allows retracing changes in the historical data (e.g. fake events) and using multiple appraisals of MDPs for the same event.

An amount of about 8200 MDPs with 330 corresponding earthquakes were integrated in the Austrian earthquake catalog. We found that the use of a physical relationship between the tables using a composite key (e.g. latitude, longitude, origin time) is essential for identifying errors in the input data. However, a disadvantage is that historically based vague data can cause conflicts for the associated places (e.g. two MDPs have the same location for the same event due to rounded coordinates). One result of this work is to provide rapid information for the national civil protection in case of a damaging event. An interactive map will show the actual distribution of earthquake reports, all events of I>=6 and the distribution of historic MDPs of comparable events. Furthermore, MDPs of events located in the area of the northern Alpine foreland (Molasse zone) indicate soil amplification and attenuation effects that should be investigated and considered for seismic hazard assessment.

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