Conference Poster

Historical-critical re-integration of the SED’s annual reports into the earthquake catalog of Switzerland (ECOS)
An interdisciplinary approach to a 'dark age' of earthquake documentation

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Chances and pitfalls

Due to the use of a single intensity scale (Rossi-Forel) in a period spanning from the early 1880s into the 1910s this dataset might be considered as one of the most temporally extended stock of rather homogenous macroseismic data. Since most of the primary data was lost with the disposal of a large part of the historical archive of the Swiss Seismological Service (1975-77), Annual Reports remain our only direct access to the macroseismic investigations performed in Switzerland between 1880 and 1971.

State of integration into ECOS

In the historical-critical compilation of the catalogue versions ECOS-32 and ECOS-39, the series of Annual Reports was assumed to have been adequately integrated in the original parametric catalogue version that had been compiled for the first Swiss Seismic Hazard map in the mid-1970s. For pragmatic reasons this earlier period of systematic scientific earthquake observation in Switzerland has thus been addressed in depth and the reassessment process has mainly been limited to the complete invension of the demolition-year sequences with an assumed epicentral intensity of more than 5 (EMS-98) in ECOS-99.

Spot Test: 1800–1900

In the reassessment of events with a maximum intensity of 5 EMS-98 or 12 IV in the period 1800–1900 we have, however, realized that the wealth of macroseismic data gathered in the annuals is in fact not completely integrated in ECOS.

Moreover, from a methodological perspective, a significant part of the parametric information inherited from the catalogue version compiled in the 1970s in questionation as the original information concerning an event was neither documented nor reproducible and was at least incomplete or irreproducible as a key criterion for qualitative research. Another important issue worth regard to the data inherited from the 1970s catalogue version is the parameterization process. Whereas the events re-averaged in ECOS-32 and ECOS-99 were subject to a calibrated parameterisation process based on their macroseismic fidelity, the magnitudes of not yet revised events is based on a conversion from epicentral intensity.

Quality control of the current integration

Empirically, a considerable part of the current catalogue data for the period of 1880 to 1971 eventually assessed in the 1970s proved to be inconsistent with the critical examination of the information documented in the annual reports.

Case Example – EQ 1880/01/07, Grison

The Grison earthquake of January 7th 1880 is one of the first events studied in detail by the SEC. It is instructive as a case example not only because different forms of representations of EQ information are used but also because it reveals a number of methodological problems involved in the critical re-integration of the Annual Report’s wealth of information in ECOS.

Appraisal of certainty

The important differences in the distribution of the appraisal of certainty values evaluating the reliability of an event described really did take place and really was due to the application of the format and really was due to the inclusion of a large number of slight aftershocks. Compared to historical-critical standards, there was a tendency to overestimate the certainty of smaller events in the current integration of the Annual Reports.

Conclusion & Outlook

Intensity distribution

Intensity values (epicentral as well as local) were only defined for a relatively small fraction of the events listed in the annuals. It is unclear, how the epicentral intensity of events with originally undefined intensity values were assigned in the former integration of the Annual Reports. As a result of a manual reproduction process, these parameters are to be regarded as very doubtful. The distribution of intensities, originally defined by the SEC, is smoother in EMS-98 by the scheme used in the compilation of ECOS-99 reveals a possible overrepresentation of intensity XI events. This may be due to scale-conversion issues or to the application of the definitions of the R-F-Scale by the SEC itself.