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A new seismotectonic atlas of Switzerland: earthquake data

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A comprehensive picture of the relationship between seismicity, tectonic structure and late tectonic history is essential to our understanding of the driving mechanism behind the occurrence of earthquakes. Thus, seismotectonics is an important input to any comprehensive evaluation of seismic hazard. The objective of a seismotectonic map is to display the relevant seismological observations against a background illustrating the corresponding tectonic setting.

The last seismotectonic map of Switzerland dates back to 1978 (Pavoni and Mayer-Rosa, 1978). The seismological information contained in this map was for the most part based on observations made prior to the installation of a modern national seismic network by the Swiss Seismological Service. Meanwhile, a wealth of data has been acquired both by this national network and by several regional or local networks that have been in operation in different parts of the country for varying periods of time. So, in the context of a Seismotectonic Atlas of Switzerland launched by the Swiss Geophysical Commission, the Swiss Seismological Service has undertaken the task of compiling a new nationwide map that displays and synthesizes the currently available seismotectonic information. As background for the tectonic information we have chosen a slightly simplified version of the new digital tectonic map of Switzerland, issued recently by the Federal Office of Water and Geology. An additional map show-

ing recent faults, is on display as a separate poster in this session of the EGU 2008 Meeting (Ustaszewski & Pfiffner).

The most important seismological input besides the location and distribution of earthquake epicenters are the earthquake focal mechanisms, which give direct evidence for the style of active faulting in a given region. The new seismotectonic map is based on more than 180 high-quality earthquake focal mechanisms. These focal mechanisms are for the most part derived from traditional faultplane solutions based on first-motion polarities of the P-waves. However, for some of the stronger and more recent events, moment tensors derived from full-waveform inversions have also been used. Particular care was given to the selection of these data, making sure that the source of each focal mechanism is documented, so that their quality and reliability can be assessed by the user.

Based on a recently completed study devoted to a comprehensive analysis of the stress field in the Swiss Alps and northern Alpine foreland (Kastrup et al. 2004), the available seismological data was divided into eight different regional subsets, which differ from each other based on the predominant style of faulting or on the orientation of the principal axes of deformation. In order to visualize these differences more clearly, for each region we have plotted a rose diagram with the strike of the nodal planes of the corresponding focal mechanisms and a stereo-plot with the orientation of the P- and T-axes. One of the main goals in compiling this new map was to create a database and a mapping tool that can easily be updated as new information becomes available and that is flexible enough to be able to generate new maps meeting the needs of the user both in terms of data selection and regional focus.

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