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A seismic risk model for Italy, Switzerland, Austria, Germany and Belgium

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We present a seismic risk model for Europe covering Belgium, Germany, Switzerland, Austria and Italy to assist insurers and re-insurers in assessing their financial risk posed by earthquakes. The seismic risk model framework has 4 components: a stochastic event set, a ground-motion model with site conditions, a set of regional vulnerability curves and a financial model. We summarize the methodology and data, focus on the seismic source model used to generate the stochastic event set and briefly discuss the key results from hazard and risk perspectives.

Our seismic source model consists of the following components: 1. Distributed seismicity, parameterized as area sources, covering the whole region under consideration; 2. Active faults, where dipping and (sub-) vertical faults are parameterized as dipping plane and line sources, respectively. Our fault model consists of main faults in Italy, based on the DISS3.2 fault database, the Upper and Lower Rhine Graben system that runs from northern Italy into eastern Belgium, and the Vienna Basin Transfer Zone, a fault system that underlies Vienna and accommodates transtensional deformation; 3. A subduction zone environment in Calabria, SE Italy, with intraslab events within the subducting slab. The intraslab events are modeled as plane sources at depth.

The fault model is based on slip rates using characteristic recurrence. The modeling of distributed and subduction zone seismicity is based on a compilation of several regional historic seismic catalogs using a Gutenberg-Richter recurrence model. The merged catalog contains about 6000 events, has an average b-value of -0.95, is complete for moment magnitudes 5 and up, and is used to compute a gridded a-value model. Our logic tree approach of the source model weighs various completeness intervals and minimum magnitudes. The complete hazard model is developed by a com-

bination of the source model with a weighted scheme of European and global ground motion models together with a detailed site classification map for Europe.

Using an economic exposure database for commercial property, examination of resulting hazard maps and of city-level hazard-curves of Rome, Milan, Zurich, Munich, Vienna and Brussels gives insight into the key drivers of risk across the region.