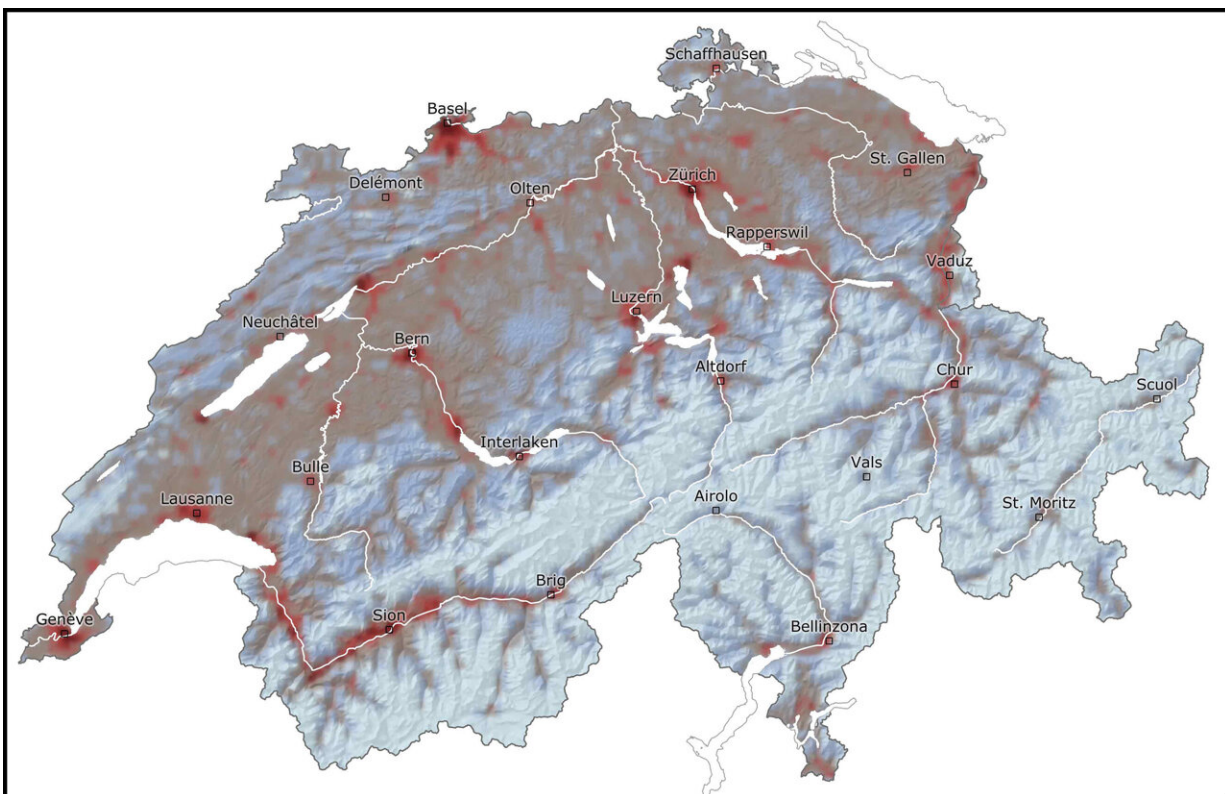


Scientists introduce new seismic risk model for Switzerland

March 7 2023, by Peter Rüegg



Earthquake risk map of Switzerland. Dark red zones: very high risk, light blue areas: very low risk. Credit: Schweizerischer Erdbebendienst SED

Imagine a magnitude 6 earthquake striking ten kilometers north-east of the city of Zurich at some point in the future. That's a massive, seriously destructive earthquake that would be felt in all of Switzerland and would

damage thousands of buildings in the canton of Zurich alone—not to mention the hundreds of possible fatalities and thousands of people made homeless, perhaps still living in emergency accommodation a year after the quake.

This scenario is not impossible, and it's not just a storyline from a disaster film. It actually comes from the new seismic [risk model](#) for Switzerland that was introduced to the public this Tuesday in Bern.

First seismic risk model generated

"Until now, we knew little about what effects earthquakes could have in Switzerland," says Stefan Wiemer, director of the Swiss Seismological Service (SED) at ETH Zurich. The SED, together with the Federal Office for the Environment and the Federal Office for Civil Protection, therefore created an [earthquake](#) risk model for the first time on behalf of the Federal Council.

The risk model shows how destructive earthquakes would affect people and buildings. The seismologists combined information about [earthquake risk](#), effects of the local substrate, [building](#) vulnerability, and affected persons and assets. The new model complements the hazard map published by the SED several years ago, which showed the potential strength and frequency of earthquakes in various locations. The seismic risk model is freely available to the public and is intended to help [government agencies](#) make informed decisions in the areas of earthquake preparedness and incident management.

Cities on the Swiss Plateau at high risk

According to the new risk model, the worst damage to buildings would occur in the cantons of Bern, Valais, Zurich, Vaud and Basel-Stadt. The

cities of Basel, Geneva, Zurich, Lucerne and Bern are at the highest risk, in that order. The earthquake hazard differs in these regions, but due to the size of these five cities, many people and assets would be affected by an earthquake. These cities also have numerous vulnerable buildings—in some cases highly vulnerable—built on a soft substrate, which intensifies seismic waves.

High damage costs expected

Based on their model calculations, the experts at the SED anticipate that destructive earthquakes in Switzerland over the next 100 years could cause economic damages of CHF 11 to 44 billion to buildings and their contents alone. Altogether, some 150 to 1,600 people could die, with approximately 40,000 to 175,000 made homeless.

Further damage and loss would come from landslides, fires and operational disruption caused by the earthquake. These are not yet accounted for in the model. It is also important to note that seismic risk is not distributed equally over time, but is instead dominated by rare, catastrophic events which usually occur without prior warning.

The new risk model also shows how historic destructive quakes would affect present-day Switzerland. The 1356 Basel earthquake would lead to some 3,000 deaths and building damage in the order of CHF 45 billion if it occurred today.

Damage scenarios for cantonal capitals

In principle, severe earthquakes can occur anywhere, so the SED is preparing a separate scenario for each canton's capital and one additional town in each canton outlining the anticipated effects of a destructive magnitude 6 quake. Earthquakes of this magnitude occur every 50 to

150 years on average in Switzerland or near the Swiss border. These 49 scenarios are intended to raise awareness among the authorities and the general population of the major risk that destructive earthquakes pose to Switzerland.

In developing the seismic risk model, the researchers focused primarily on preparing the foundational data. They simulated over three million earthquakes that could occur in Switzerland or close to the Swiss border. The two million or so residential, business and industrial buildings in Switzerland were divided into categories of vulnerability to model the possible damage that would result from earthquakes. Improved data about substrates also provided a significantly better picture of local impact.

Yet despite this improved data, remaining uncertainties in the model mean that the actual effects of an earthquake could differ substantially from the forecast scenarios. To minimize these uncertainties and improve the model's predictions, the seismologists will continue developing the seismic risk model over the next few years.

Provided by ETH Zurich

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