

Seismic source zone refinements of the SEISMIC RISK project in Finland

Ludovic Fülöp¹, Päivi Mäntyniemi², Niina Junno², Kati Oinonen² and Annakaisa Korja²

¹VTT Technical Research Centre, Espoo, Finland

²Institute of Seismology, University of Helsinki, Helsinki, Finland

Email: Ludovic.fulop@vtt.fi

Seismic sources need to be designed for probabilistic seismic hazard analysis (PSHA). In low-seismicity regions, it is widespread practice to design seismic source areas (SSAs) as proxies to unidentified seismogenic structures. SSAs typically assume the shapes of polygons and are defined based on geologic, geophysical and seismotectonic criteria. A challenge in this process may be that no obvious connection can be discerned between the geologic setting and observed seismicity.

The ongoing SEISMIC RISK – Mitigation of induced seismic risk in urban environments – (<https://www2.helsinki.fi/en/projects/seismic-risk>) project is conducted as cooperation between the Institute of Seismology of the University of Helsinki, VTT Technical Research Centre and the Geological Survey of Finland. The project focuses on how to evaluate, mitigate and communicate seismic hazard and risk associated with deep geothermal power plants in urban environments in Finland. One of the project aims is to create a national seismic hazard map that can be used for risk assessment of potential geothermal power plants planned in the country.

We present results from an attempt to delineate new SSAs and refine preexisting ones in the PSHA part of the project. The Finnish territory exhibits an overall low level of natural seismicity with areas of enhanced seismic activity and seismic quiescence, thus the design criteria tend to vary spatially. The sketches of the proposed zoning were drawn up in dialog between Finnish, Swedish, Norwegian, Russian and Estonian experts in early 2021. The outcome is generally aligned with, but also refines for the Nordic countries, the map of the European Seismic Hazard Model (ESHM2020).

Acknowledgement

The SEISMIC RISK project is funded by the Academy of Finland (Funding Decisions no. 337913, 338075 and 339670).