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Robust, an Earthquake Early Warning System in the Lower Rhine Embayment, Germany

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The Lower Rhine Embayment in western Germany is one of the most important areas of earthquake recurrence north of the Alps, facing a moderate level of seismic hazard in the European context but a significant level of risk due to a large number of important industrial infrastructures. In this context, the project ROBUST aims at designing a user-oriented hybrid earthquake early warning and rapid response system where regional seismic monitoring is combined with smart, on-site sensors, resulting in the implementation of decentralized early warning procedures.

One of the research areas of this project deals with finding an optimal regional seismic network arrangement. With the optimally compacted network, strong ground movements can be detected quickly and reliably. In this work simulated scenario earthquakes in the area are used with an optimization approach in order to densify the existing sparse network through the installation of additional decentralized measuring stations. Genetic algorithms are used to design efficient EEW networks, computing optimal station locations and trigger thresholds in recorded ground acceleration. By minimizing the cost function, a comparison of the best earthquake early warning system designs is performed and the potential usefulness of existing stations in the region is considered as will be presented in the meeting.