Usage of SeisComP3 on a local scale - The Hessian Earthquake Service in Germany

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The earthquake activity in the federal state of Hesse in Germany, Central Europe, is monitored by the Hessian Earthquake Service situated at the Hessian Agency of Nature Conservation, Environment and Geology in Wiesbaden. The Hessian Earthquake Service operates in total 12 short period, one broadband and three strong motion stations (all permanent stations). Additionally, seven broadband stations are temporally used in the southern part of the state of Hesse, as well as other stations of surrounding institutions. Considering all additional stations the Hessian Earthquake Service uses data of about 50 stations. The earthquake activity in the state of Hesse is mainly concentrated on the southern part of the federal state, where numerous weak earthquakes below the perception threshold are registered. In addition, however, perceptible and sometimes even damaging earthquakes remind the population that the Upper Rhine Graben has not completely come to rest tectonically.

The Hessian Earthquake Service established the usage of SeisComP3 as the basic data management and data analysis tool in 2012. Since then multiple changes have been made and implemented in the system to overcome local challenges. Data management, data examples and challenges in SeisComP3 on a local scale are shown, as well as our implemented routine procedures. Besides the standard SeisComP3 tools the Hessian Earthquake Service uses functions like scanloc (for a better detection and localization procedure) or sigma (for strong motion analysis).

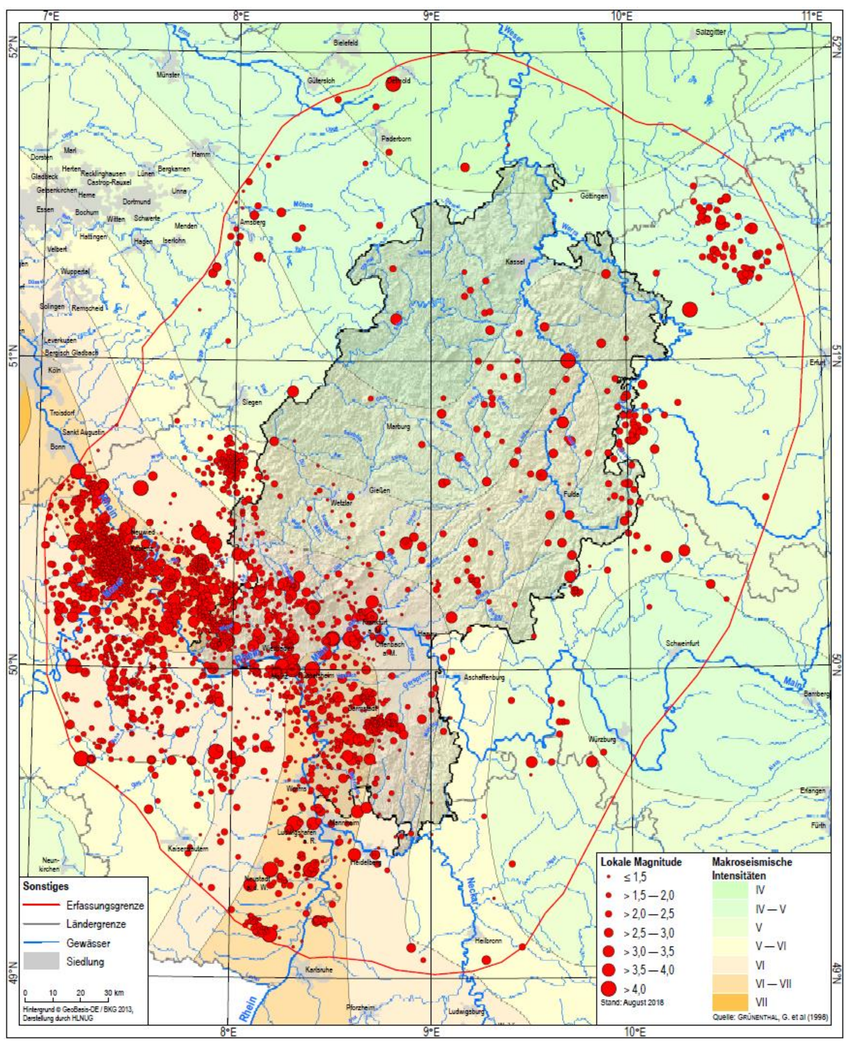

Fig. 1: Seismicity overview of the state of Hesse and surrounding areas

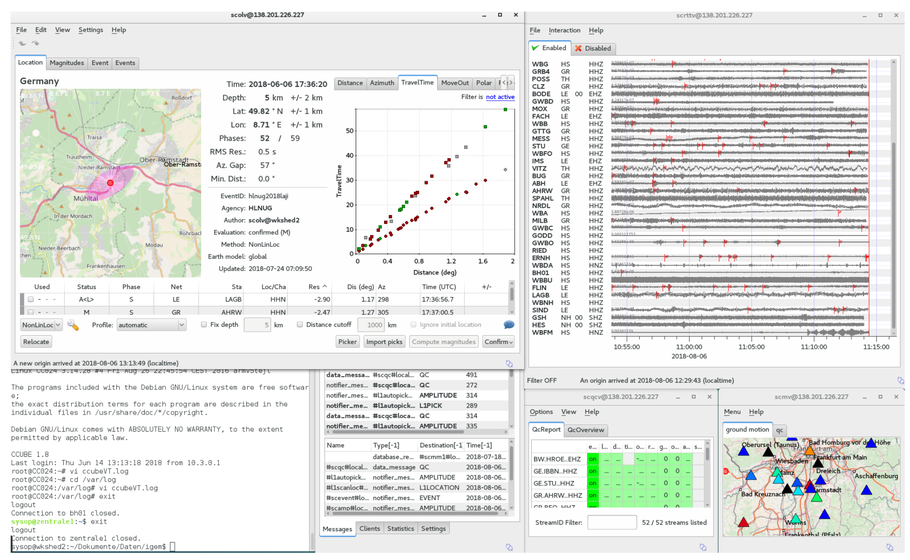

Fig. 2: Overview of a typical workplace screen at the Hessian Earthquake Service

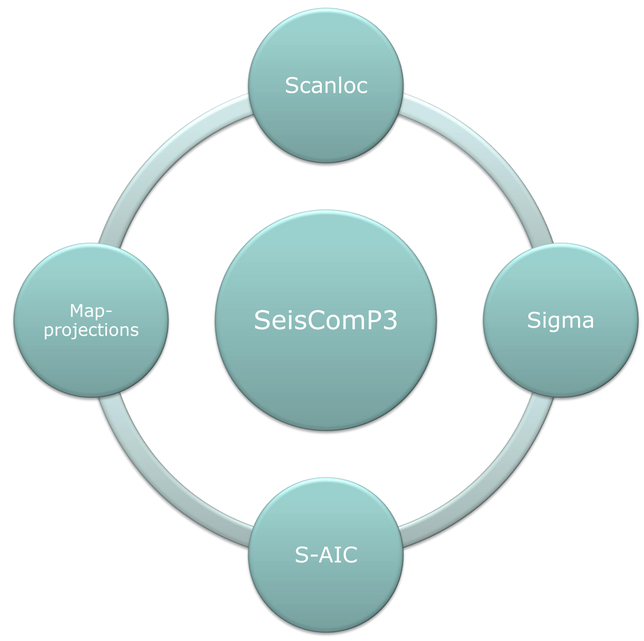

Fig. 3: Major Seiscomp3-Tools used by the Hessian Earthquake Service

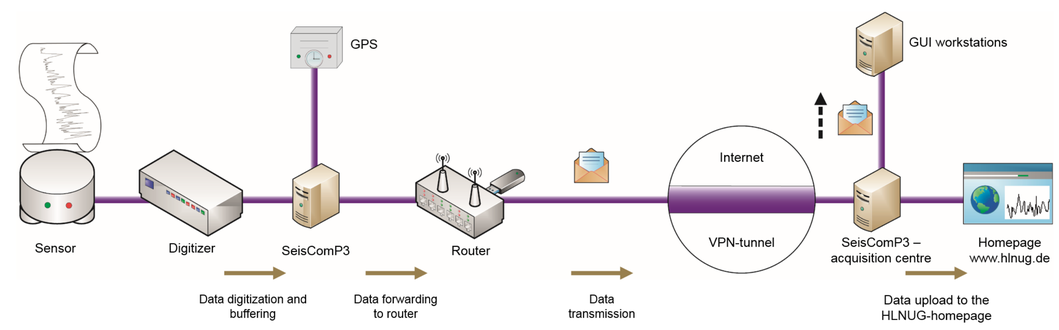

Fig. 4:Schematic overview of a data stream from a seismic station to the acquisition centre and the webpages of the Hessian Earthquake Service

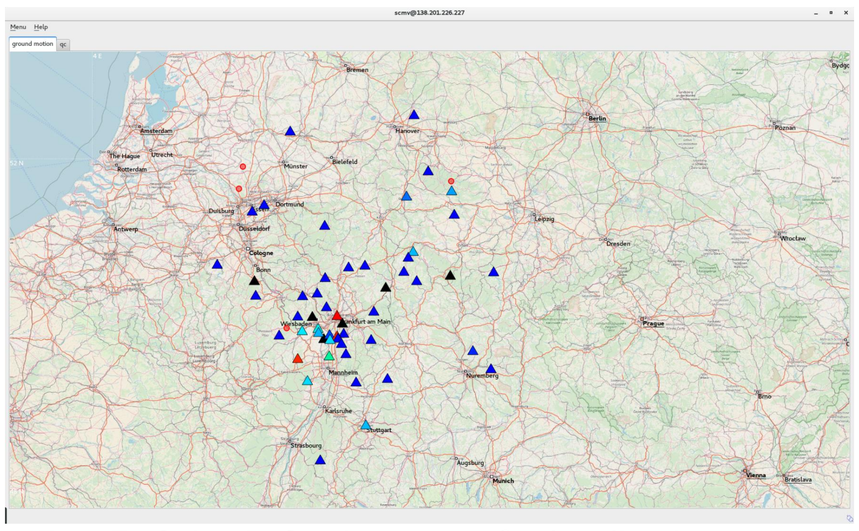

Fig. 5: Seismic Stations used for localization by the Hessian Earthquake Service

Fig. 6: Data example of a M_L = 0.6 event near the city of Wiesbaden

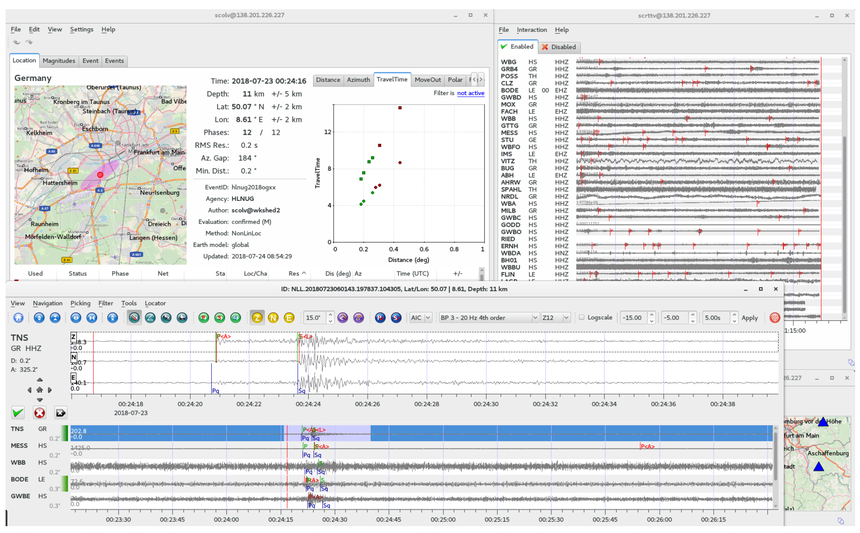

Fig. 7: Data example of a M_L = 0.4 event near the city of Frankfurt that was not automatically localized by SeisComP3

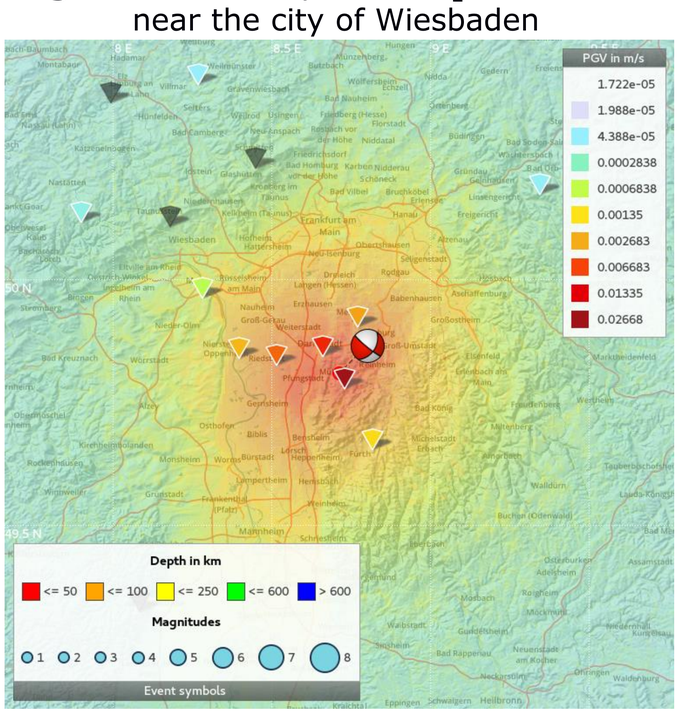

Fig. 8: Sigma heat map showing PGV-values for a M_L = 4.2 event near the city of Darmstadt

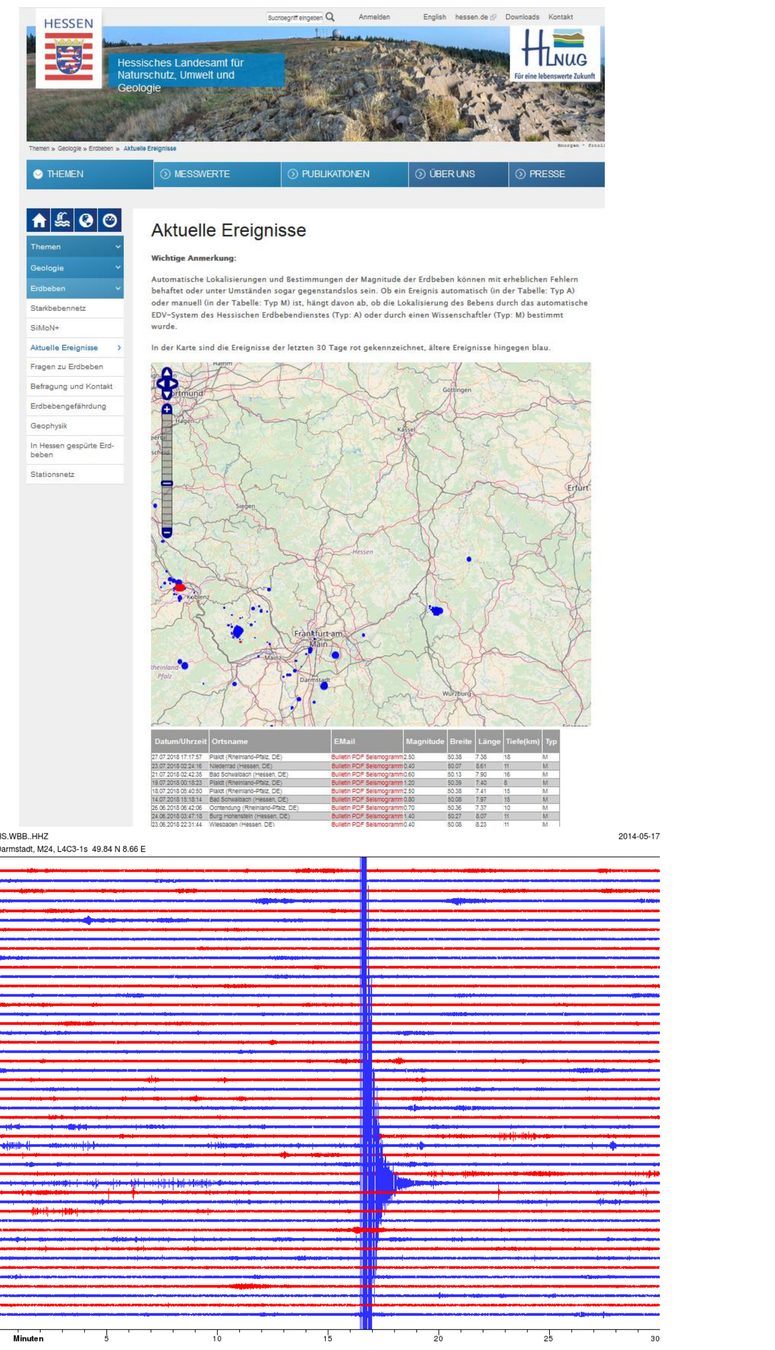

Fig. 9: Data presentation at the websites of the Hessian Earthquake Service at www.hlnug.de

Conclusions: Seiscomp3 has shown its value for the Hessian Earthquake Service and will be used in the future. The sigma tool will become more relevant in future analyses of perceptible mining induced earthquakes. Remaining challenges are the detection/localization of very small events as well as the discrimination between natural earthquakes and quarry blasts and the elimination of fake events. Recently the Hessian Earthquake Service joined the Gempa App EQInfo as a data provider.

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