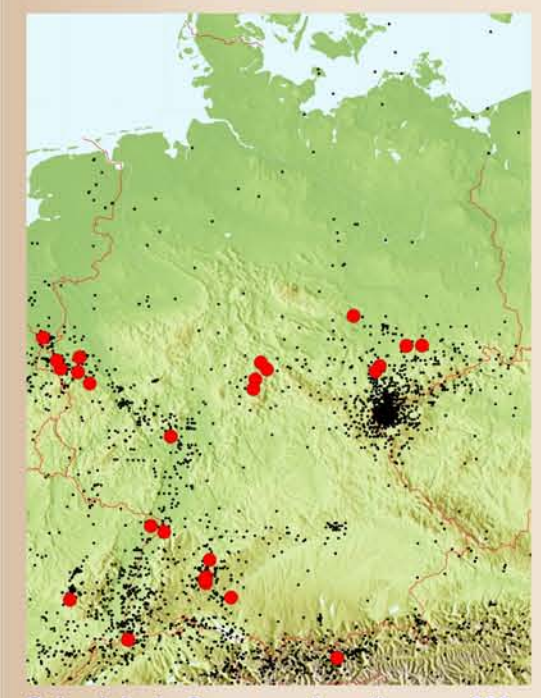
Federal Institute for Geosciences and Natural Resources
GEOZENTRUM HANNOVER

ALISE - An Alert and Information System for Earthquakes in Germany

N. Gestermann, M. Henger, G. Jahnke

Earthquakes in Germany



Seismicity in Germany since the year 800

- Damaging earthquakes of magnitude ML ≥ 5.5 or intensity ≥ VII
- Earthquakes with magnitude ML ≥ 2.5 or intensity ≥ II

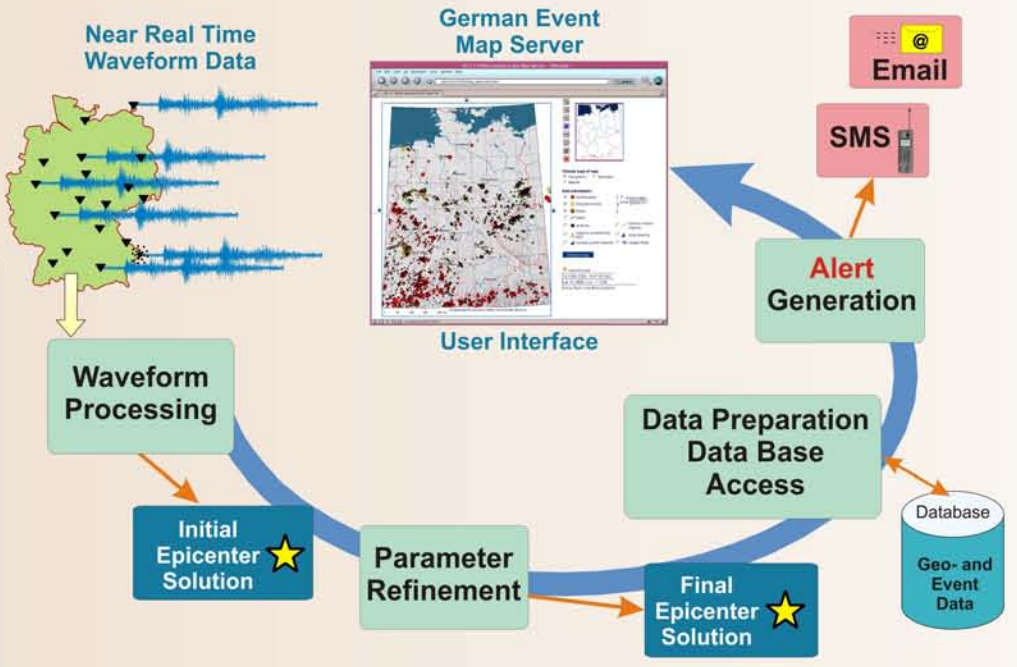
Objectives

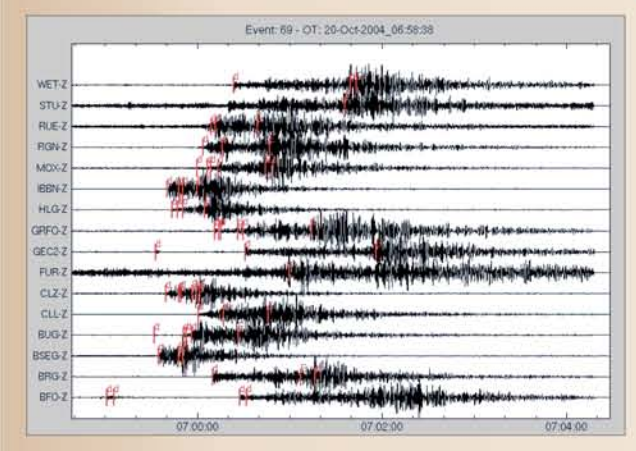
The ALISE project is aimed to provide detailed information on damaging earthquakes within Germany for advanced risk management within a few minutes after their occurrence. The system uses near-real time data from modern digital broadband seismometer stations of the German Regional Seismic Network (GRSN) and additional stations. This network is rather sparse compared with those used for similar purposes in other countries. The comparative low number of seismometer stations is compensated by elaborated data processing techniques. ALISE automatically provides conventional earthquake source parameters, such as origin time, epicenter coordinates and magnitude, as well as information on possible damage in the epicenter region. Implementation of automatic determination of an earthquake's fault plane solution is in preparation.

Seismometer Network

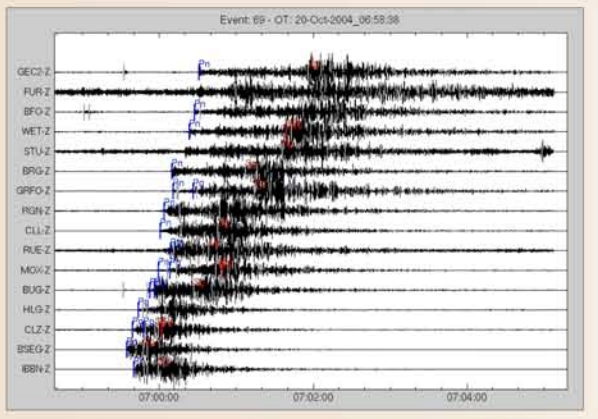
Data in near real-time is provided by the broadband seismometer stations of the extended German Regional Seismic Network (GRSN).

Main Features

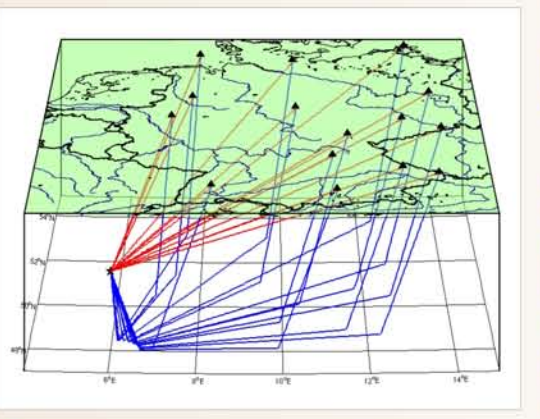


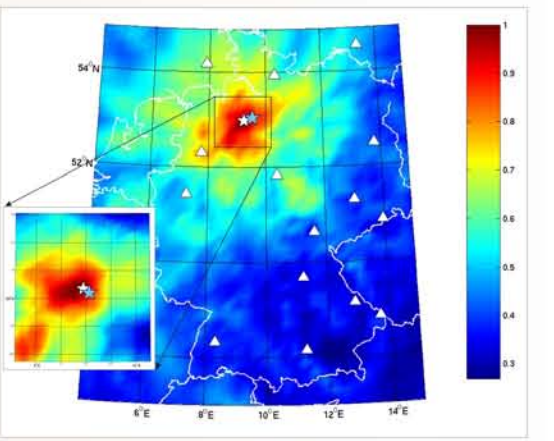


Onsets of signals are automatically picked (red lines). The whole set is a mixture of correct and invalid phase picks.



After determination of the best initial epicenter the correct phase picks in the seismograms are selected and associated with the corresponding seismic phase types (labeled Pn, Pg, Sg on the right).

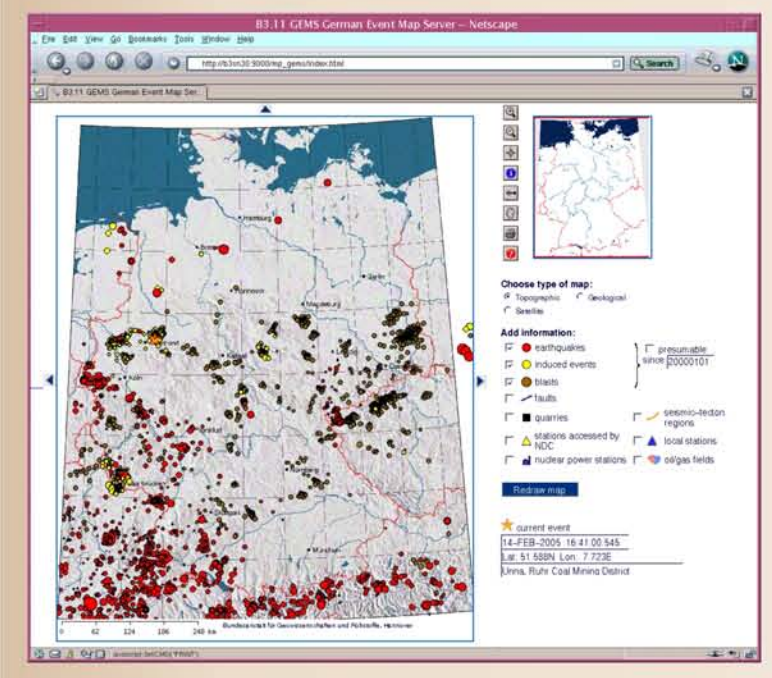


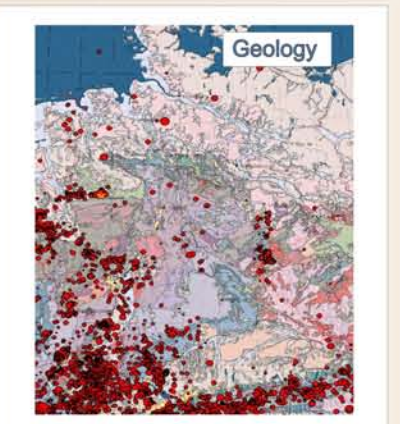


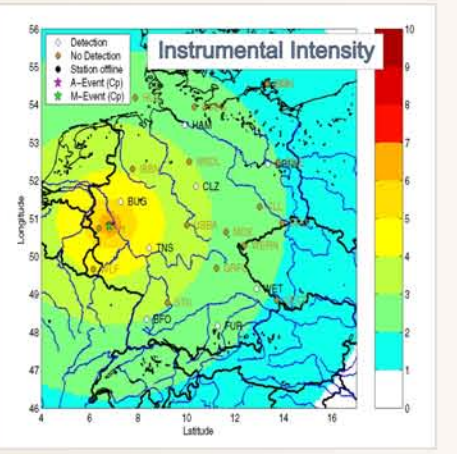
A multiphase grid-search technique is used to determine the optimum location of an earthquake source.

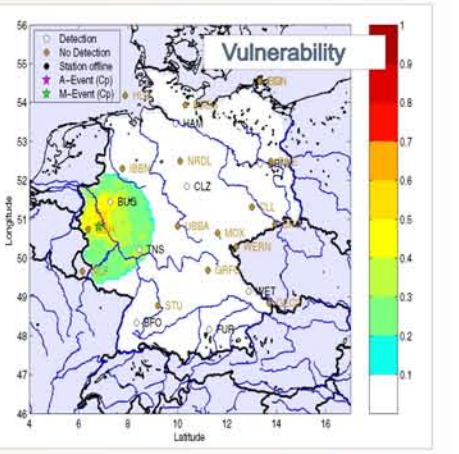
This is achieved by fitting observed and theoretical travel times of identified seismic phases. The best fit is shown on the map above. The initial epicenter solution is improved by a second refined iteration process (enlarged section) based on improved phase picks. The location error between the automatic location (white star) and the manual one (blue star) is only 6 km.

User Interface









A simple Web browser can be used to visualize the final epicenter location in combination with topographical and geological maps, as well as with satellite images. A map server connected to a comprehensive data base is providing the necessary information. Additional data, such as historical earthquakes, mines, quarries, nuclear power plants, gas and oil fields, as well as geological fault zones can be displayed. The system can easily be handled by disaster relief organisations or catastrophe management centers, if required. All this data is available within 5-10 minutes after a major earthquake.

Contact:
Federal Institute of Geosciences and Natural Resources
Stilleweg 2, D-30655 Hannover, Germany
Manfred Henger
Section B3.11 Seismology
phone : +49 511/6433133
fax : +49 511/6433663
e-mail : henger@sdac.hannover.bgr.de
http://www.seismologie.bgr.de