



Transfrontier macroseismic studies of the Upper Rhine Graben

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Transfrontier macroseismic studies of the Upper Rhine Graben

49. Sitzung der AG Seismologie
in Freiburg im Breisgau
26. - 28. September 2023

Two recent earthquakes near Sierentz, France, in 2022 & 2023

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Comparative summary of the methods used to collect macroseismic data in France and Baden-Württemberg, Germany, and the results obtained in terms of macroseismic intensities for these two recent transfrontier events.

In October 2022 and June 2023 two significant earthquakes took place near Sierentz (Dep. Haut-Rhin, France) with local magnitudes of 4.8 and 3.1 at the southern end of the Upper Rhine Graben. Especially the larger earthquake was not only felt within the graben, but also along the graben shoulders Vosges and Black Forest as well as their backlands.

France

Responsability

The French Central Seismological Bureau estimates for France the intensity of the earthquake on the EMS98 scale for any earthquake of magnitude > 3.6 via its system of collecting seismic effects from the population and the authorities.

Data collection

4 levels of data collection

- **Level 1:** collection of individual testimonials with individual form (effects people, objects, furniture, constructions)
- **Level 2:** collection of effects at the scale of the municipality by communal form: town hall, gendarmerie, firefighters (effects people, objects, furniture, constructions)
- **Level 3: (not used for these earthquakes):** field survey by Macroseismic intervention group in case of significant damage to buildings, intensity >VI),
- **Level 4:** Individual building damage declaration form.

Analysis

Intensity scale used: EMS98

- IDP (Intensity Data Points) are done for municipal postal code based on local authority forms.
- The authorities' macroseismic data is supplemented by information from individual forms (if there are more than 9 forms in a municipality), and by the analysis of damage sent in by town halls (natural disaster reimbursement file) and private individuals (building damage declaration form).

1 number of forms collected

- communal forms : 234
- individual forms : 2588
- individual building damage declaration : 32
- estimated number of municipalities : 253
- only felt : 553

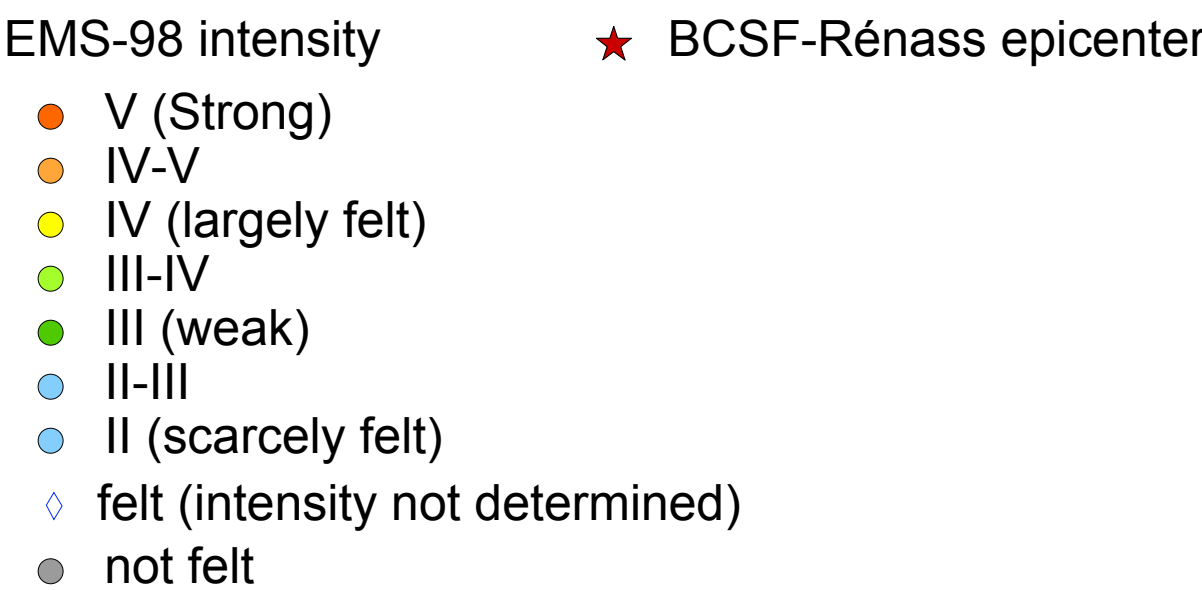
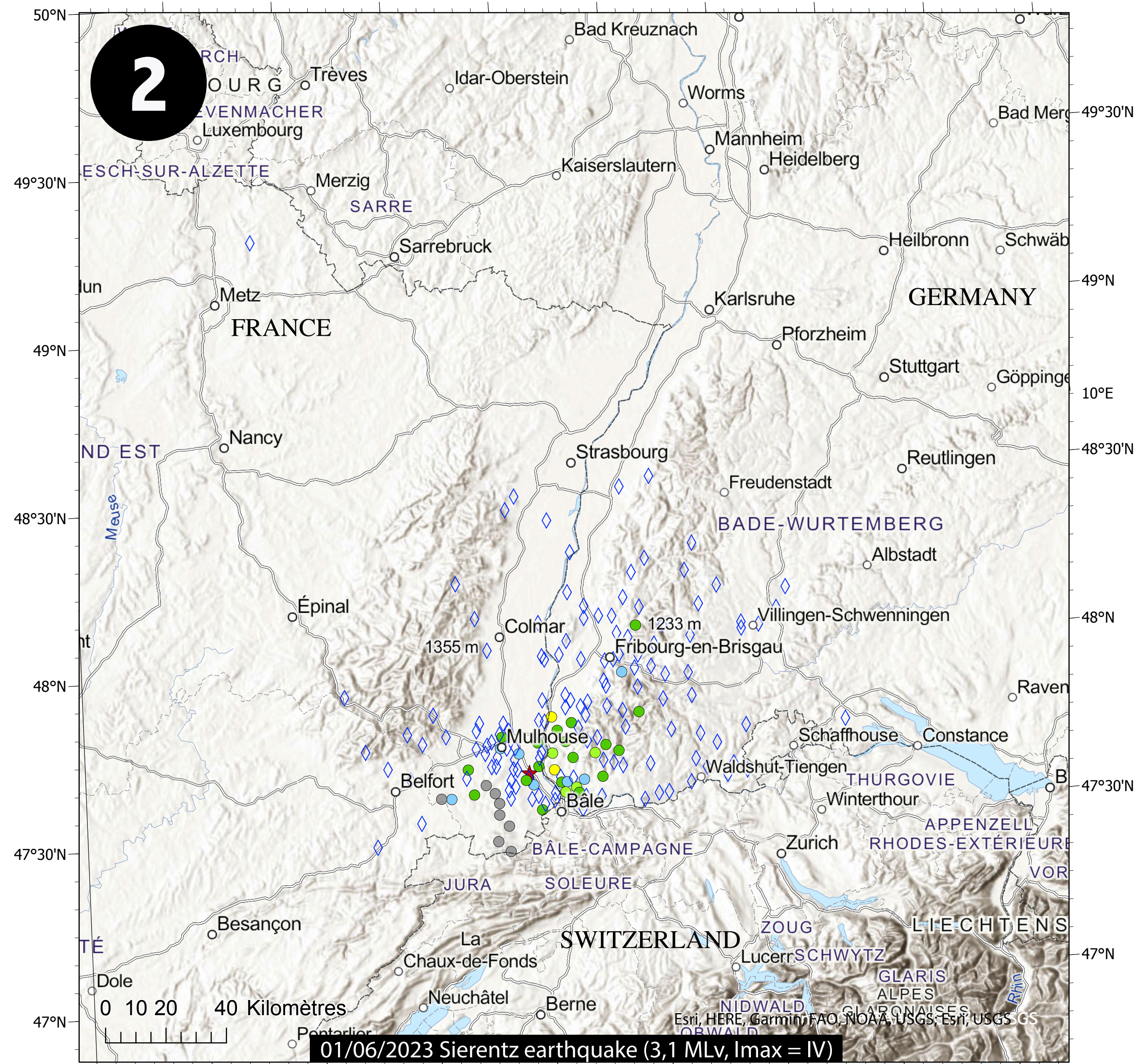
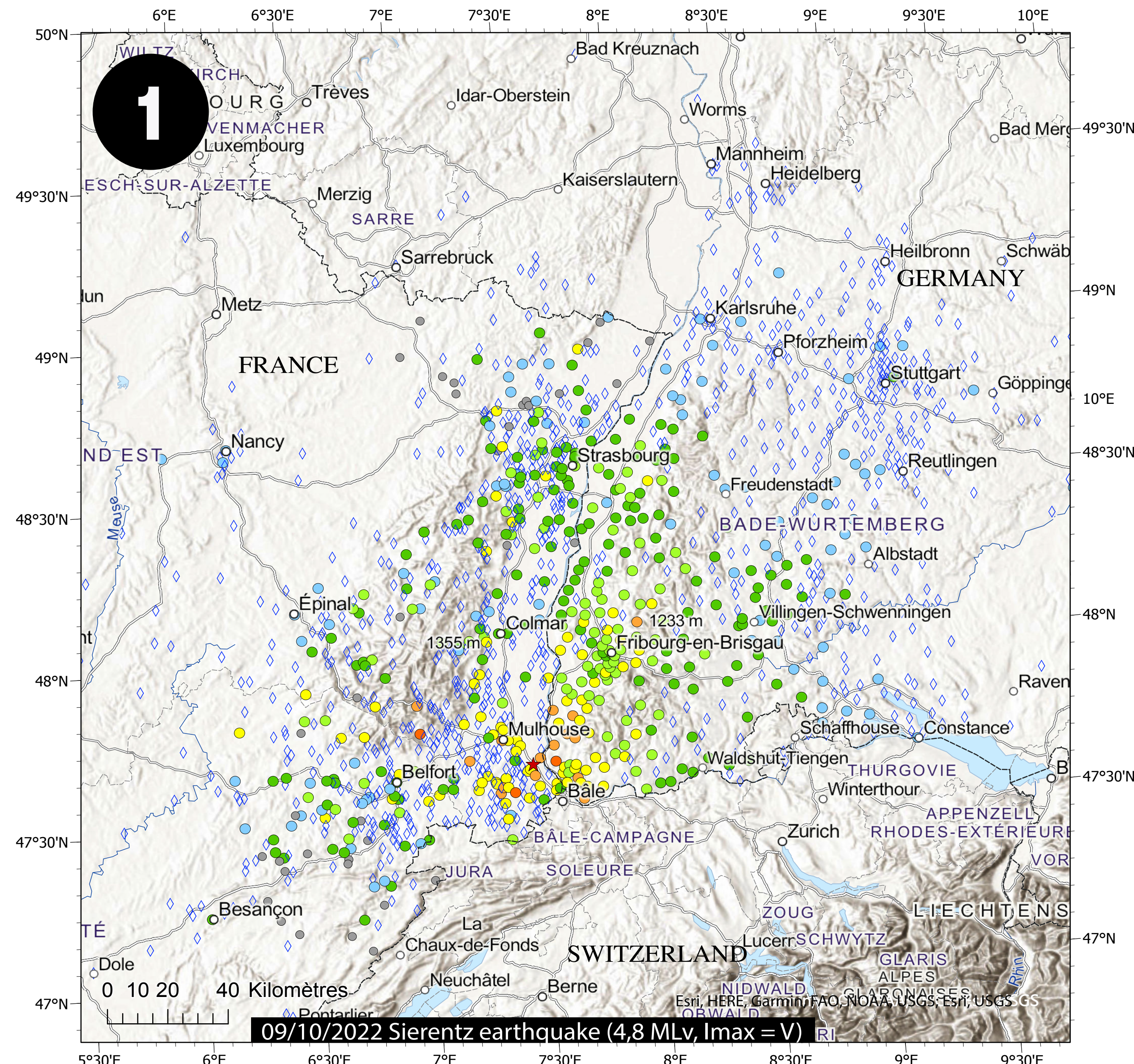
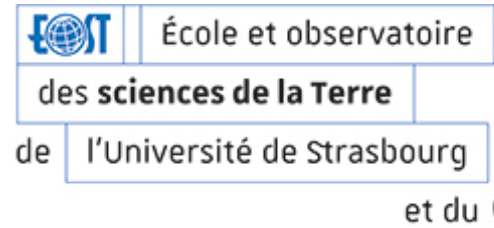
2 number of forms collected

- individual forms : 107
- communal forms : 0
- individual building damage declaration : 0
- estimated number of municipalities : 19
- only felt : 54

for more information :

www.franceseisme.fr ; renass.unistra.fr

Bureau central sismologique français,
Réseau national de surveillance sismique



Macroseismic data sources :
Bureau central sismologique français /
Réseau national de surveillance sismique ;
C.Sira, V. Mendel.

Regierungspräsidium Freiburg - Landesamt
für Geologie, Rohstoffe und Bergbau -
Landeserdbebendienst Baden-Württemberg ;
A. Brüstle & S. Stange

Cartographic background
Topographical data : Esri, USGS, CGIAR
France : ©Géofla IGN
Germany : © GeoBasis-DE / BKG 2022



Baden-Württemberg, Germany

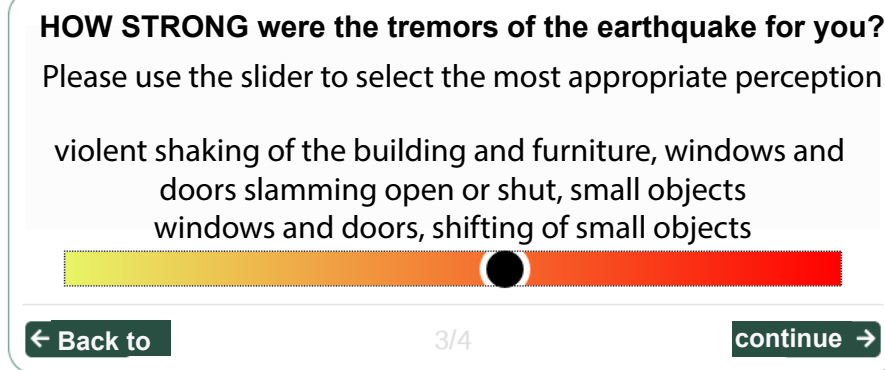
Responsability

The state seismological service of Baden-Württemberg (LED) is responsible for the surveillance of the seismic activity of the state including the documentation and analysis of observed effects to the public and the environment.

Data collection

3 levels of data collection

- **Level 1:** two-stage collection of individual testimonials with online forms of short and (optional) detailed questionnaires



- **Level 2:** sending questionnaires to communities for collection of effects at municipality scale was not applied
- **Level 3:** Classification of buildings damages was not applied

Analysis

Intensity scale used: EMS98

- IDP (Intensity Data Points) are done for postal codes with more than 15 reports, while no IDP is determined for < 5 reports. For postal codes in between IDP are determined, if the percentage of population of an postal code is > 1 permille.
- IDP are determined by evaluating short and long questionnaires
- For long questionnaires within a single postal code area all EMS-relevant phenomena are statistically analysed and an IDP value is assigned

1 number of forms collected

short questionnaires: 7779
with optional long questionnaires: 2634
numbers of postal codes: 672
only felt: 440

2 number of forms collected

short questionnaires: 593
with optional long questionnaires: 225
numbers of postal codes: 124
only felt: 84

for more information :

<https://www.lgrb-bw.de/geologischer-dienst/erdbeben>
Regierungspräsidium Freiburg - Landesamt für Geologie,
Rohstoffe und Bergbau - Landeserdbebendienst
Baden-Württemberg

