VIRTUAL 37th
General Assembly of the European Seismological Commission
ESC2021 19-24 September 2021

ESC IUGG IASPEI International Association of Seismology and Physics of the Earth's Interior

HELLENIC REPUBLIC National and Kapodistrian University of Athens EST. 1837

Video screen size

Session 17: Crowdsourcing and macroseismology
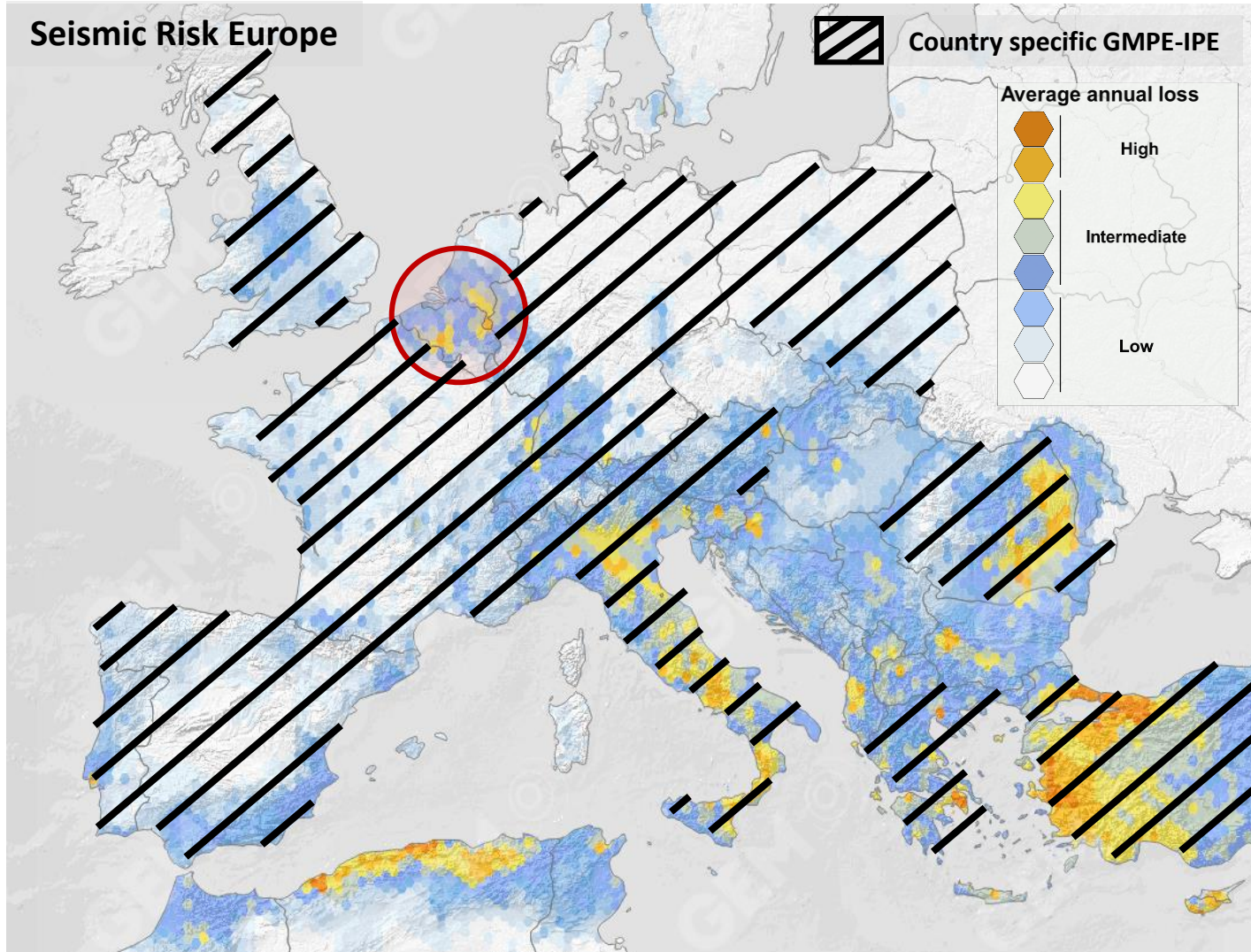*23rd of September 2021*

The complexity of modelling anisotropic intensity attenuation in Belgium

BEN NEEFS[1,2], Koen Van Noten[1], Thierry Camelbeeck[1]

[1]Royal Observatory of Belgium, Seismology-Gravimetry section
[2]Université catholique de Louvain

ROYAL OBSERVATORY OF BELGIUM

SEISMOLOGY GRAVIMETRY

UCLouvain
École polytechnique de Louvain

GCE

Video screen size

Seismic Risk Europe

Country specific GMPE-IPE

Average annual loss

High

Intermediate

Low

Silva et al. (2018). Global Earthquake Model (GEM) Seismic Risk Map.

Highest seismic risk in Northwestern Europe

Belgian Ground motion attenuation characteristics?

PhD!

Belgian Intensity Prediction Equation (IPE)
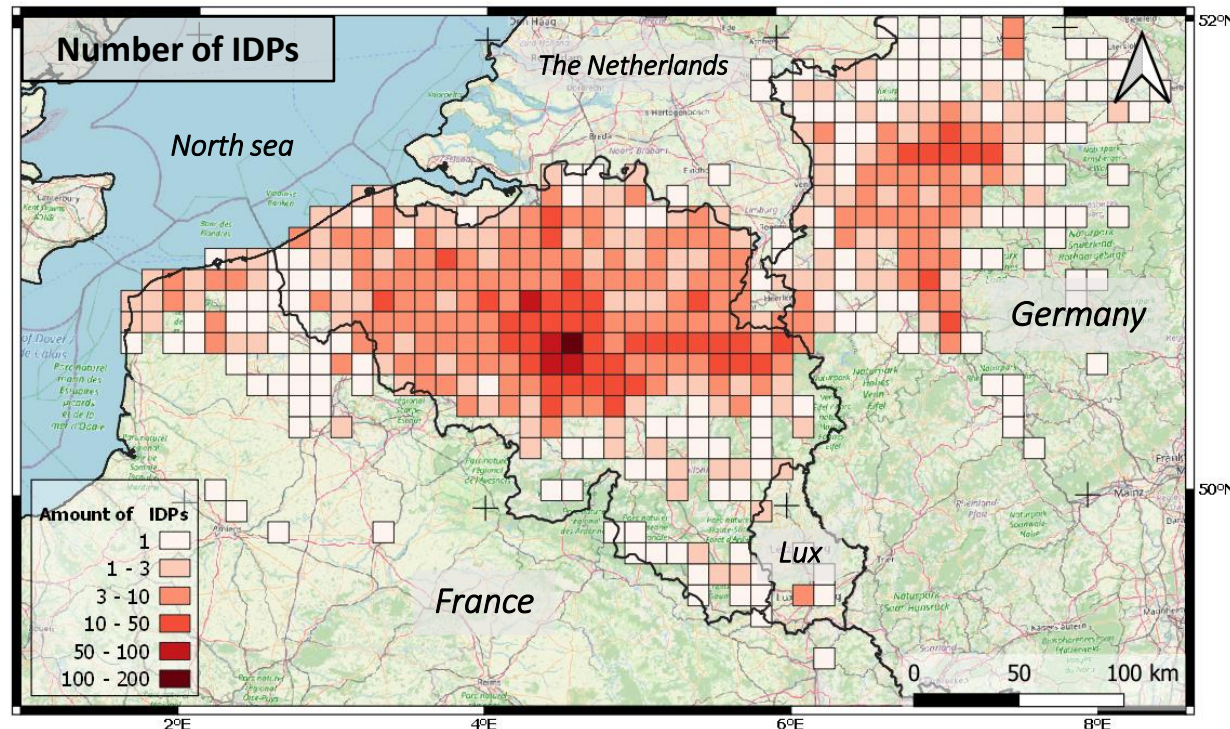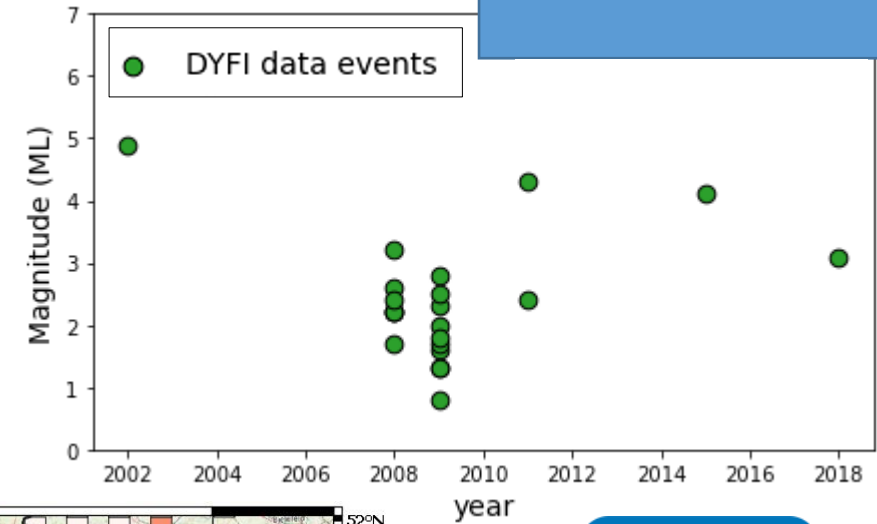
Macroseismic intensity data & homogenization

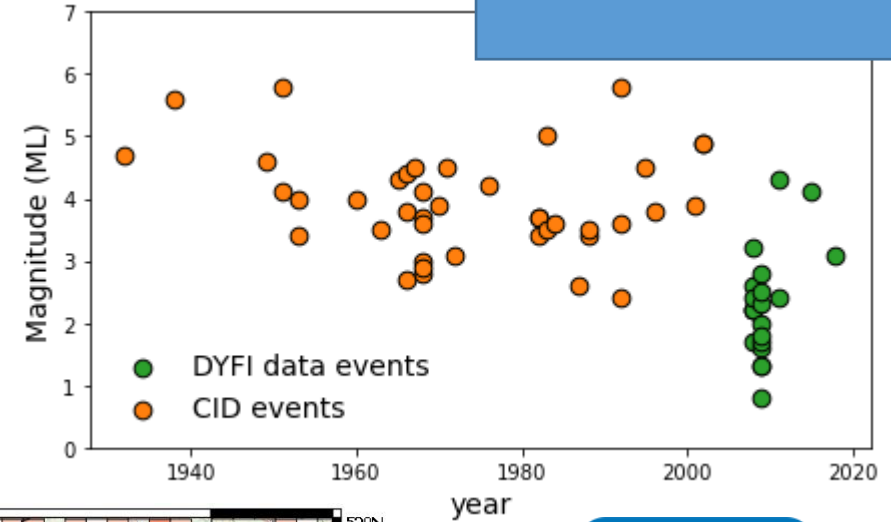**This presentation**

Video screen size

macroseismic intensity data types

"Did You Feel It?"
Intensity Data
DYFI
Since 2002

Note: Only data of selected events is shown
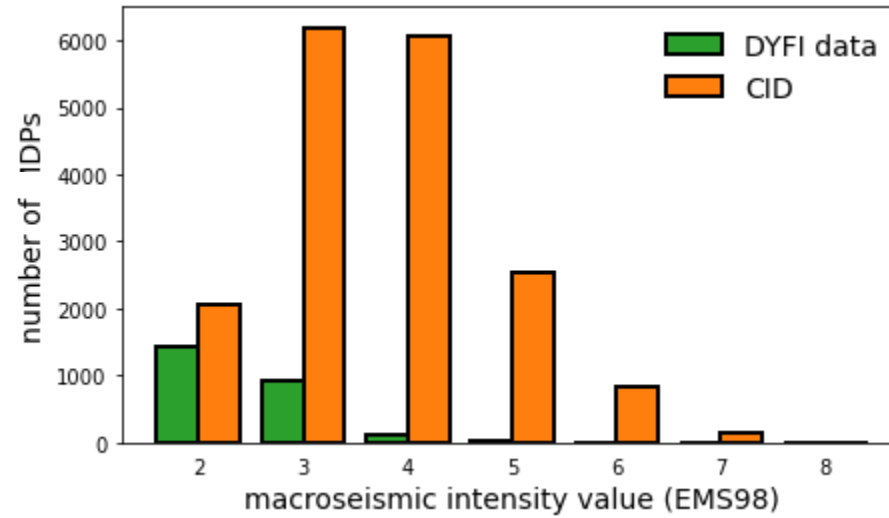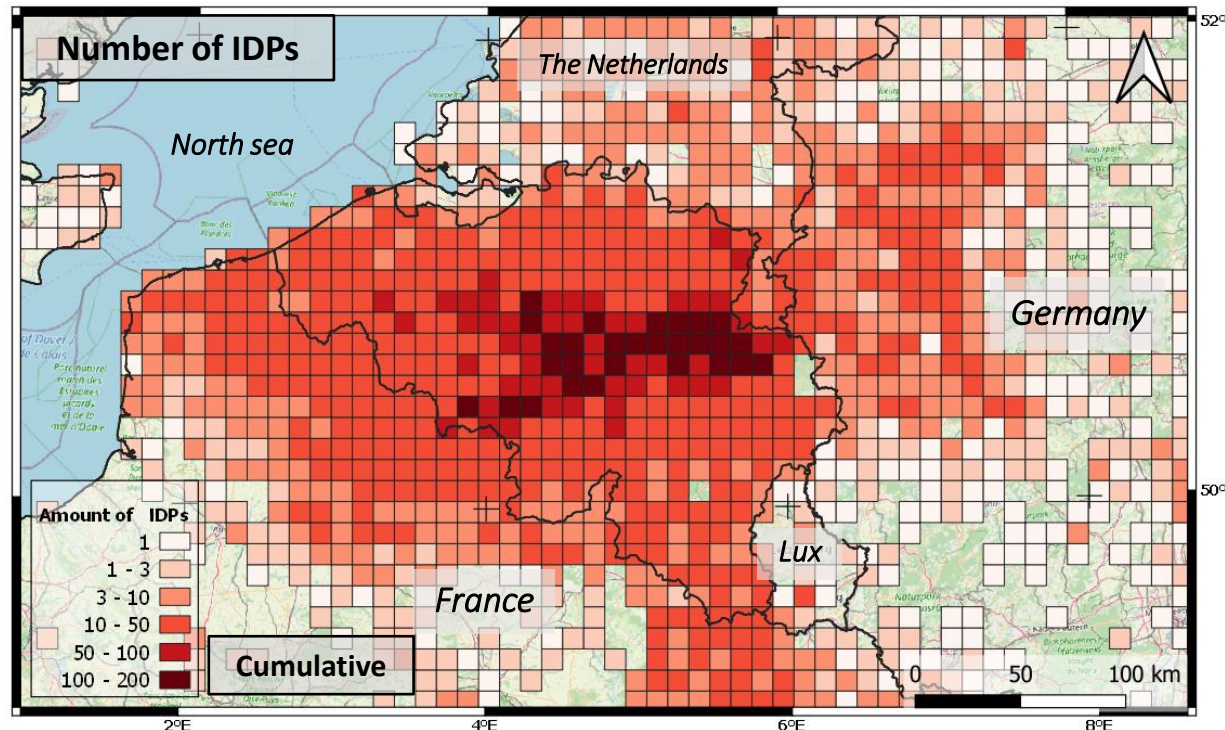
Virtual ESC conference 2021

Video screen size

macroseismic intensity data types

"Did You Feel It?" Intensity Data **DYFI** Since 2002
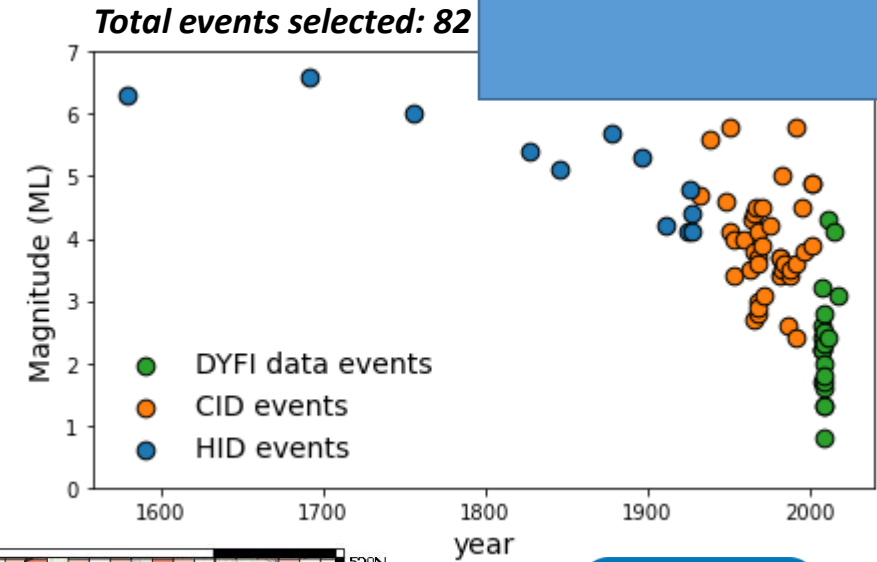
Communal Intensity Data **CID** Since 1932

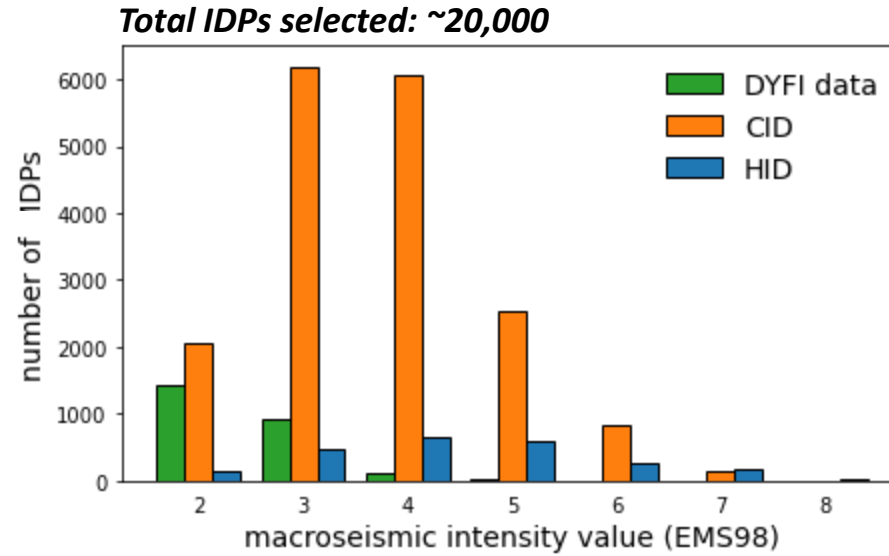*Note: Only data of selected events is shown*
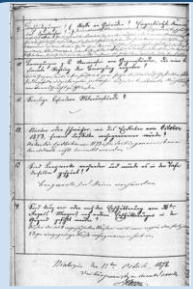
Virtual ESC conference 2021
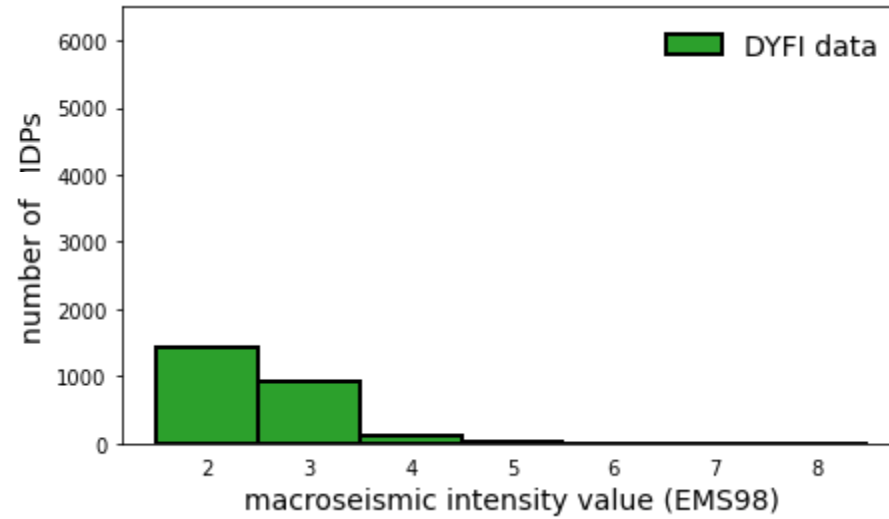
Video screen size

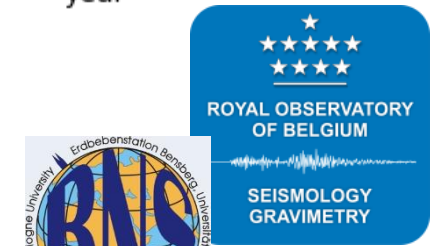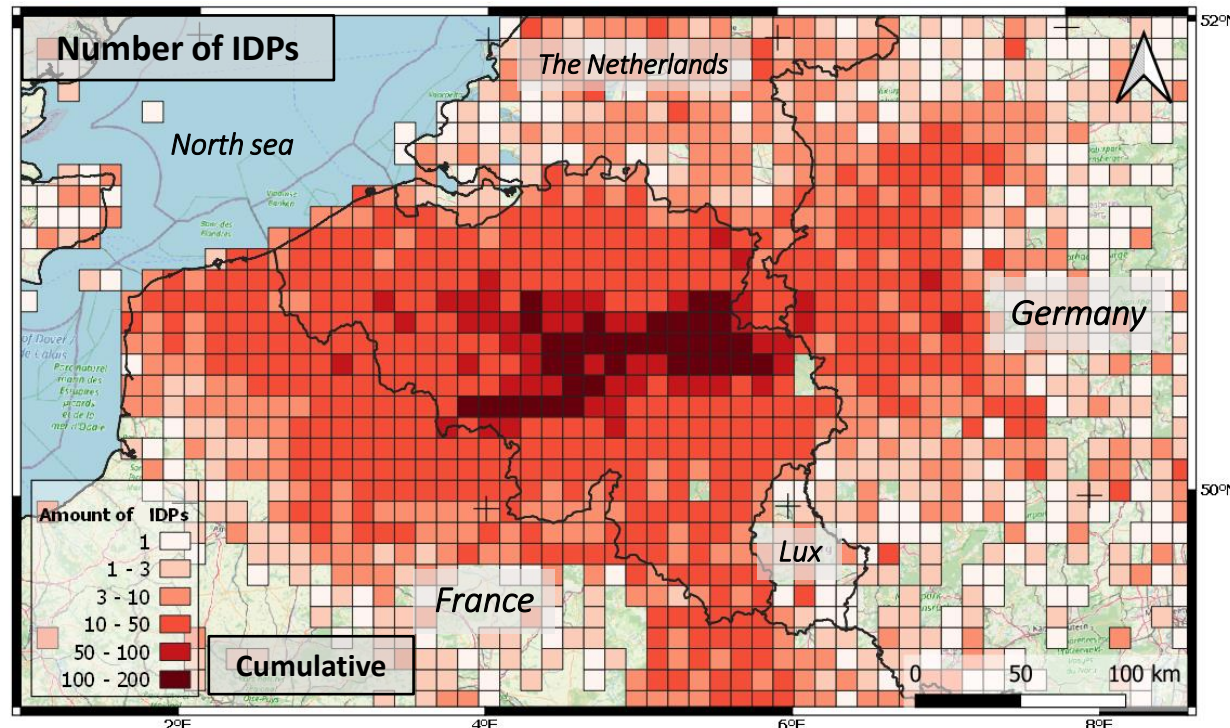**macroseismic intensity data types**

"Did You Feel It?" Intensity Data **DYFI** Since 2002

Communal Intensity Data **CID** Since 1932
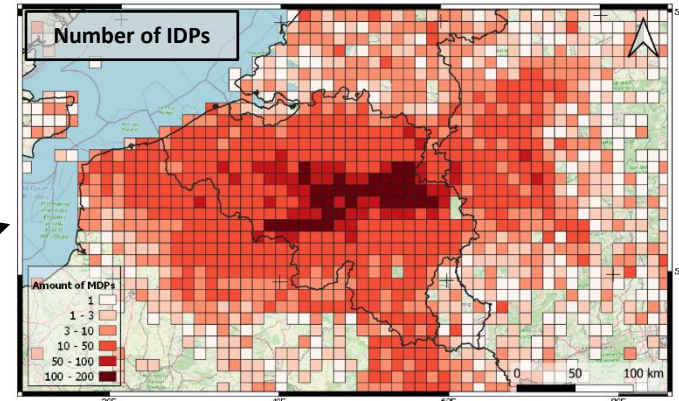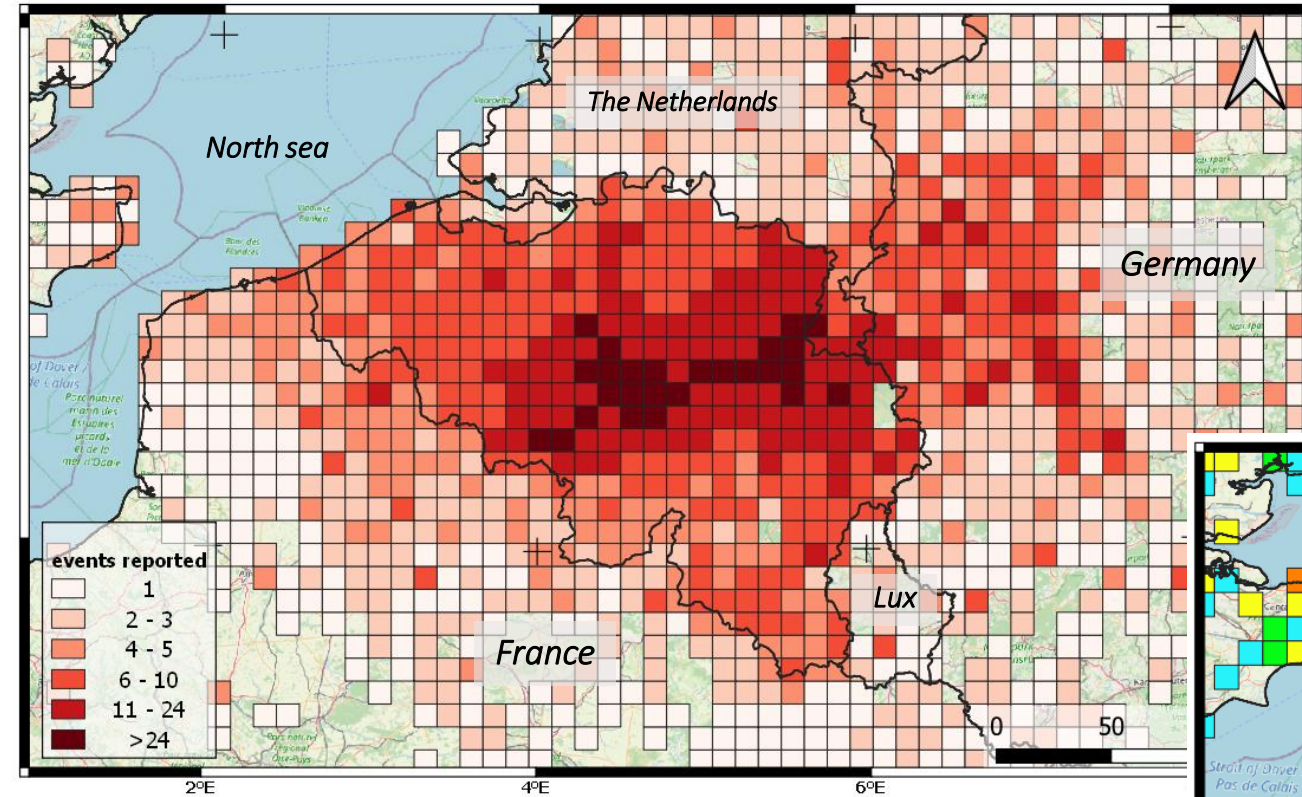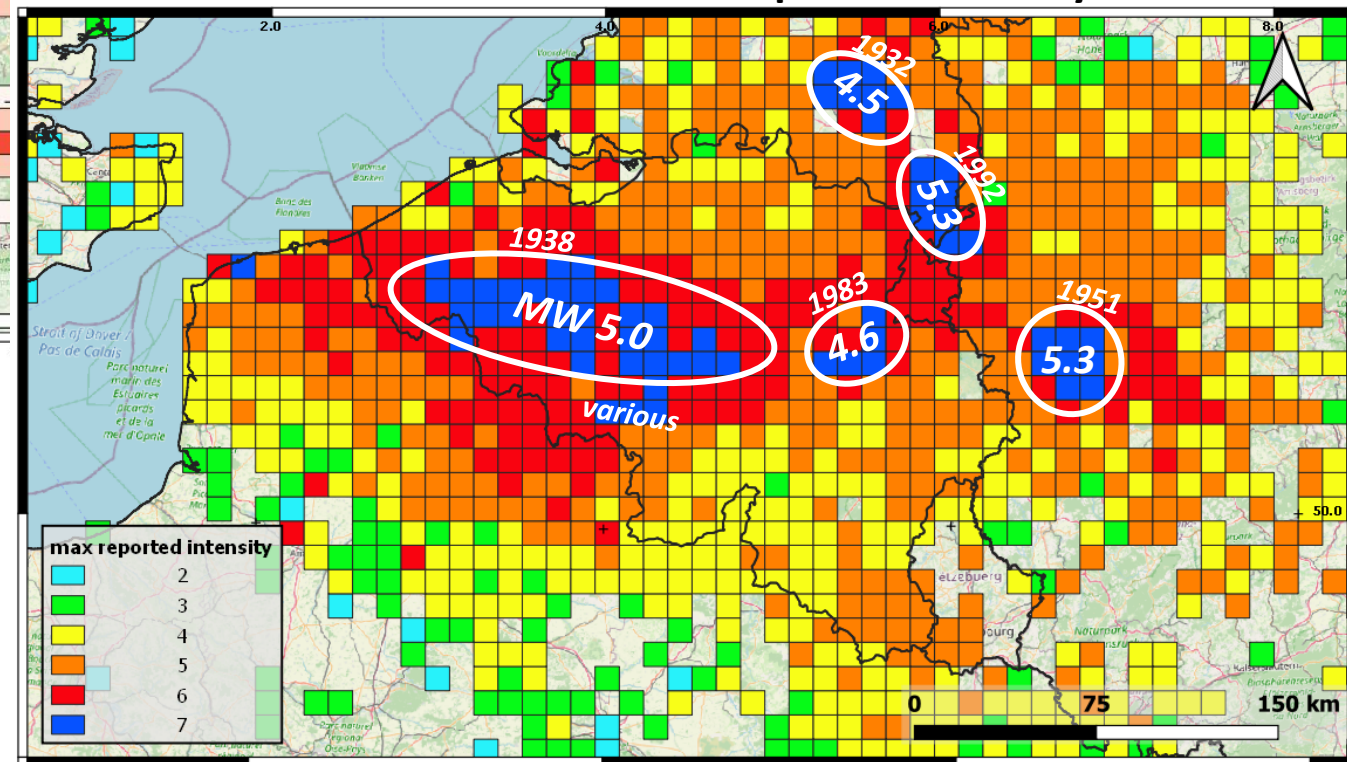
Historical Intensity Data **HID** 801-1932

Total IDPs selected: ~20,000

Total events selected: 82

Number of IDPs

The Netherlands

North sea

Germany

Lux

France

Amount of IDPs
1
1 - 3
3 - 10
10 - 50
50 - 100
100 - 200
Cumulative

0   50   100 km

ROYAL OBSERVATORY OF BELGIUM
SEISMOLOGY GRAVIMETRY

BCSF RENASS

brgm
MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET SOLIDAIRE
edf
IRSN SISFRANCE

Note: Only data of selected events is shown   *Virtual ESC conference 2021*

Number of events reported

Video screen size

Maximal reported intensity in database

1932-present

4/8   *Note: Only data of selected events is shown*   *Virtual ESC conference 2021*

Video screen size

2002 Eschweiler-Alsdorf event MW 4.6

Intensity
- 2
- 3
- 4
- 5
- 6
- 7

☆ Epicenter
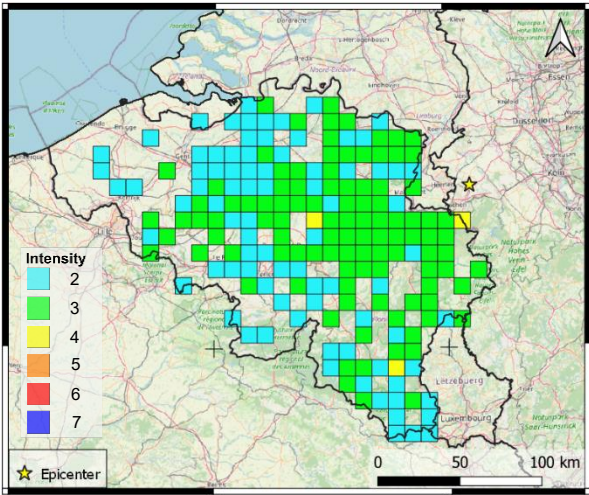
CID - Communal intensity data

☆ Epicenter
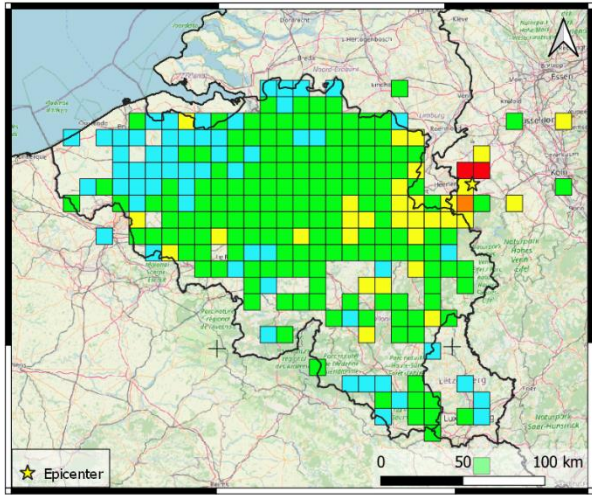
DYFI – Online questionnaire

II   III   IV   V   VI   VII

North sea

The Netherlands

France

Germany

Lux

1932 Uden event Ms 4.5

Before 1977

Post 1977

~2400 communes

Communes
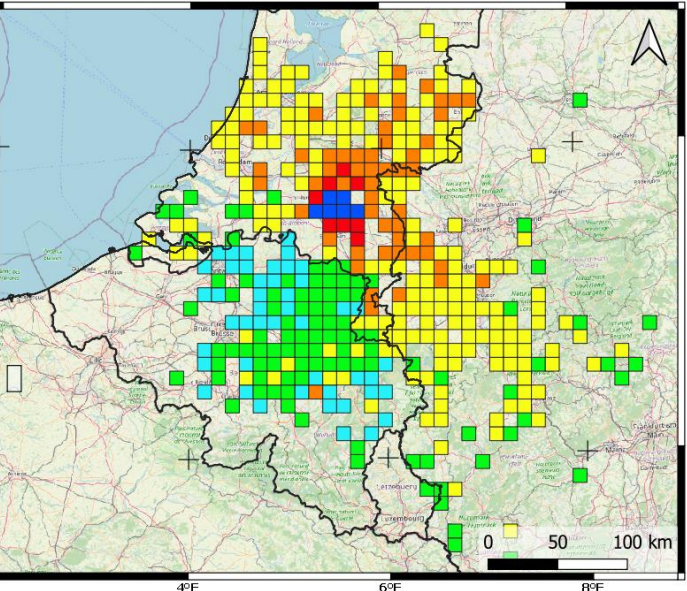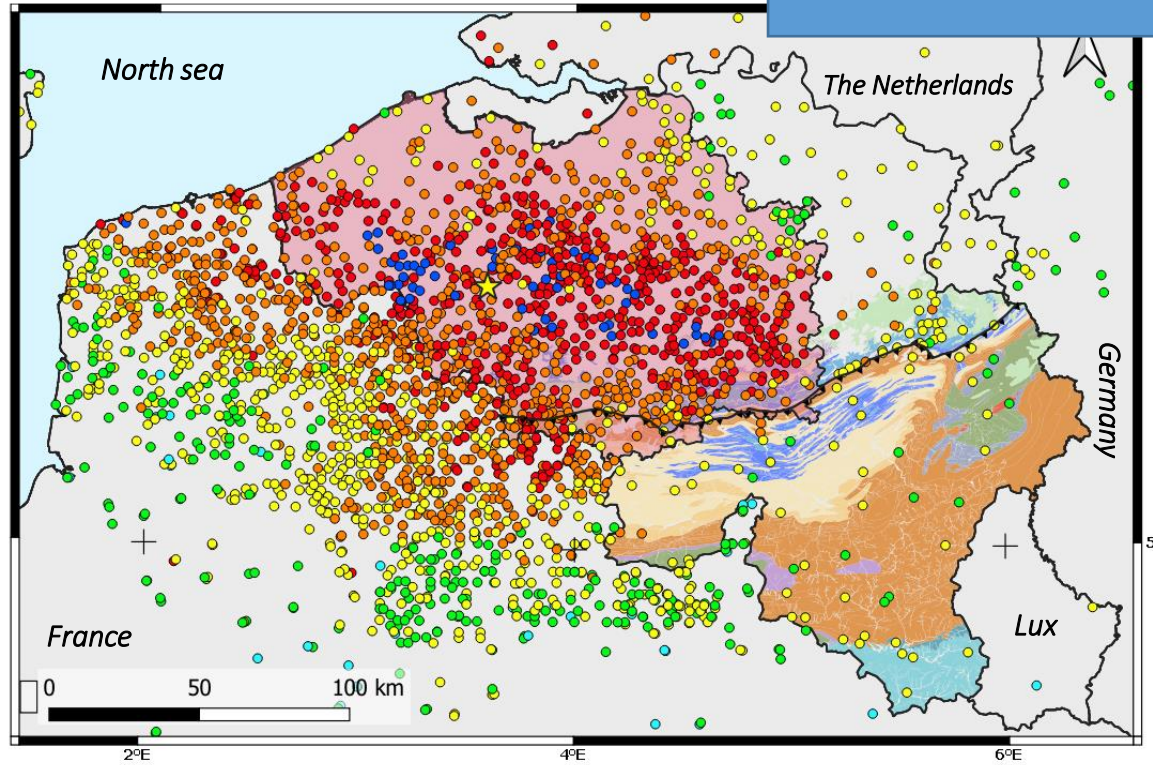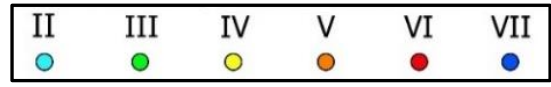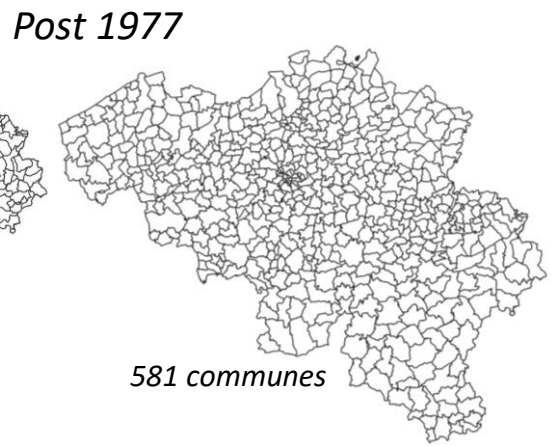
581 communes

1938 event MW 5.0

- Limited questions
- Individual letters
- Various intensity computations

Virtual ESC conference 2021

Video screen size

Intensity attenuation in Belgium

Anisotropy!

- Brabant Massif intensity decay NEN-SWS orientation
- Brabant Massif intensity decay WNW-ESE orientation

II   III   IV   V   VI   VII

North sea

Intensity VII
Intensity VI

The Netherlands

Germany

France

Lux

50°N

2°E   4°E   6°E

0   50   100 km

1938 event MW 5.0

SSW   *NNE*

0 m
100 m
200 m

Sediments

Brabant Massif
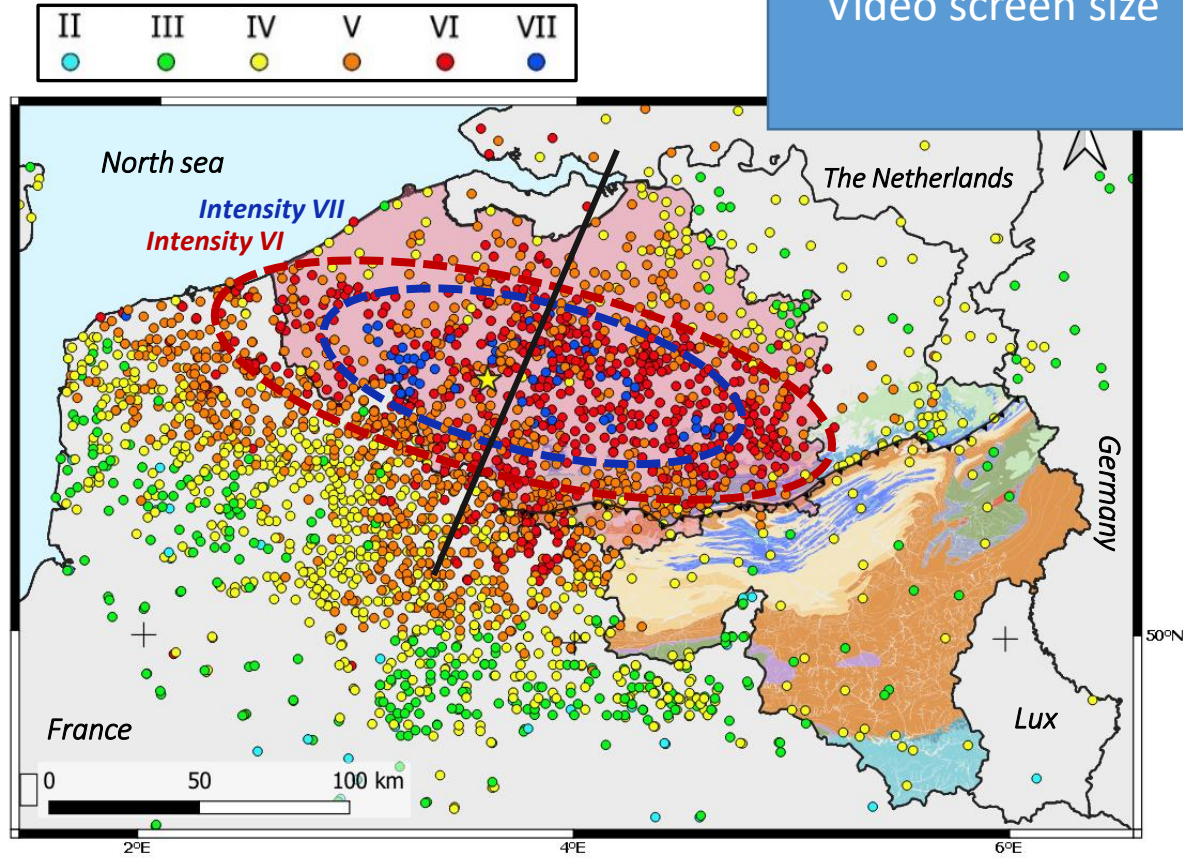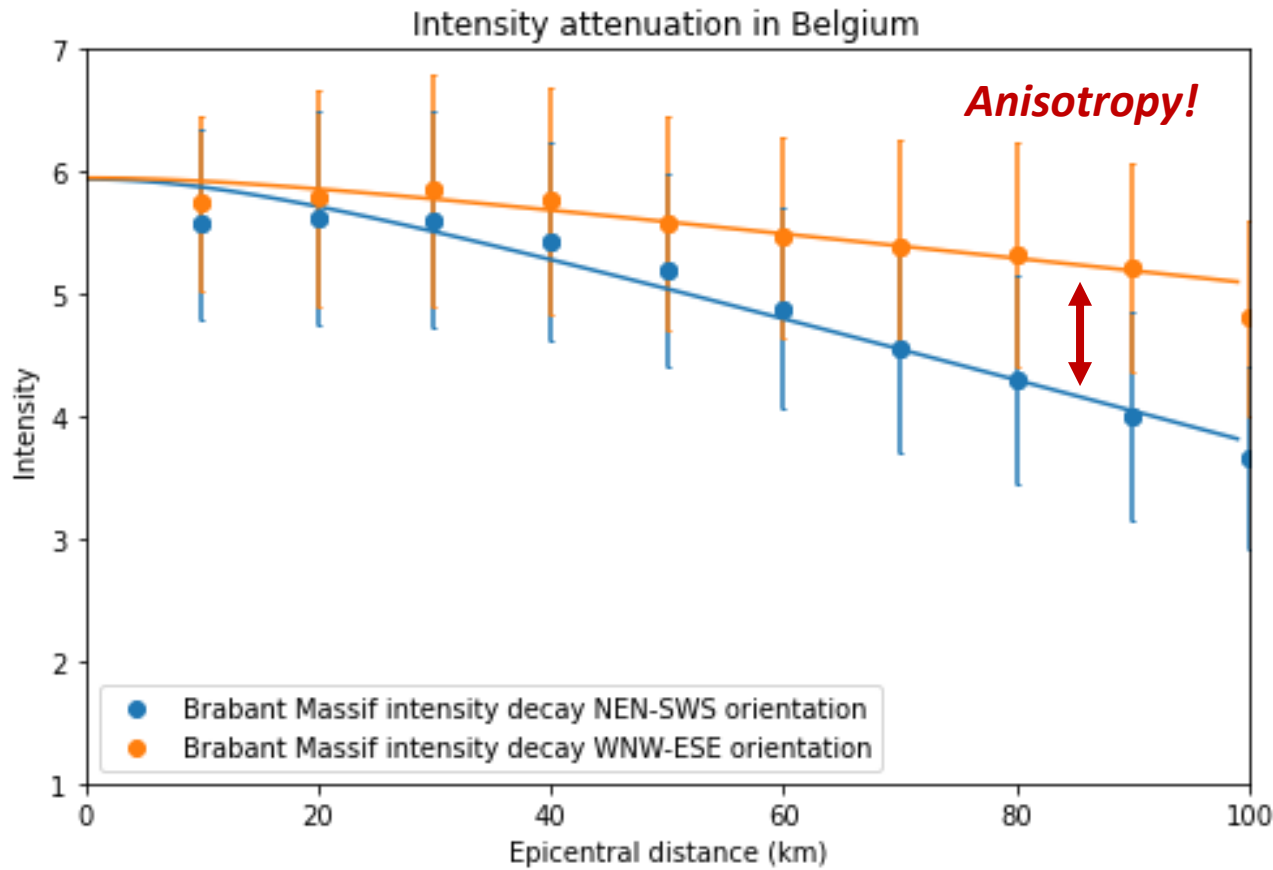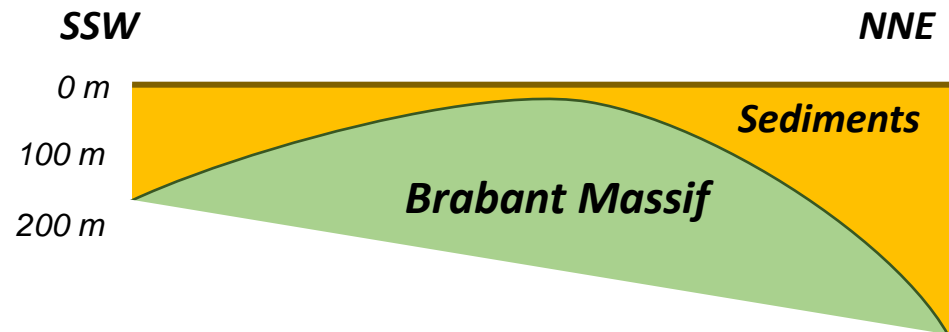
General IPE equation:

$$I = I_0 - a \log \sqrt{\frac{R^2 + Z^2}{Z^2}} - b \sqrt{R^2 + Z^2} - Z \; \boxed{- c \, dD}$$
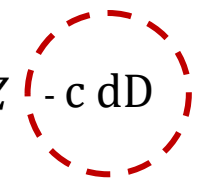
Video screen size

Virtual ESC conference 2021

Video screen size
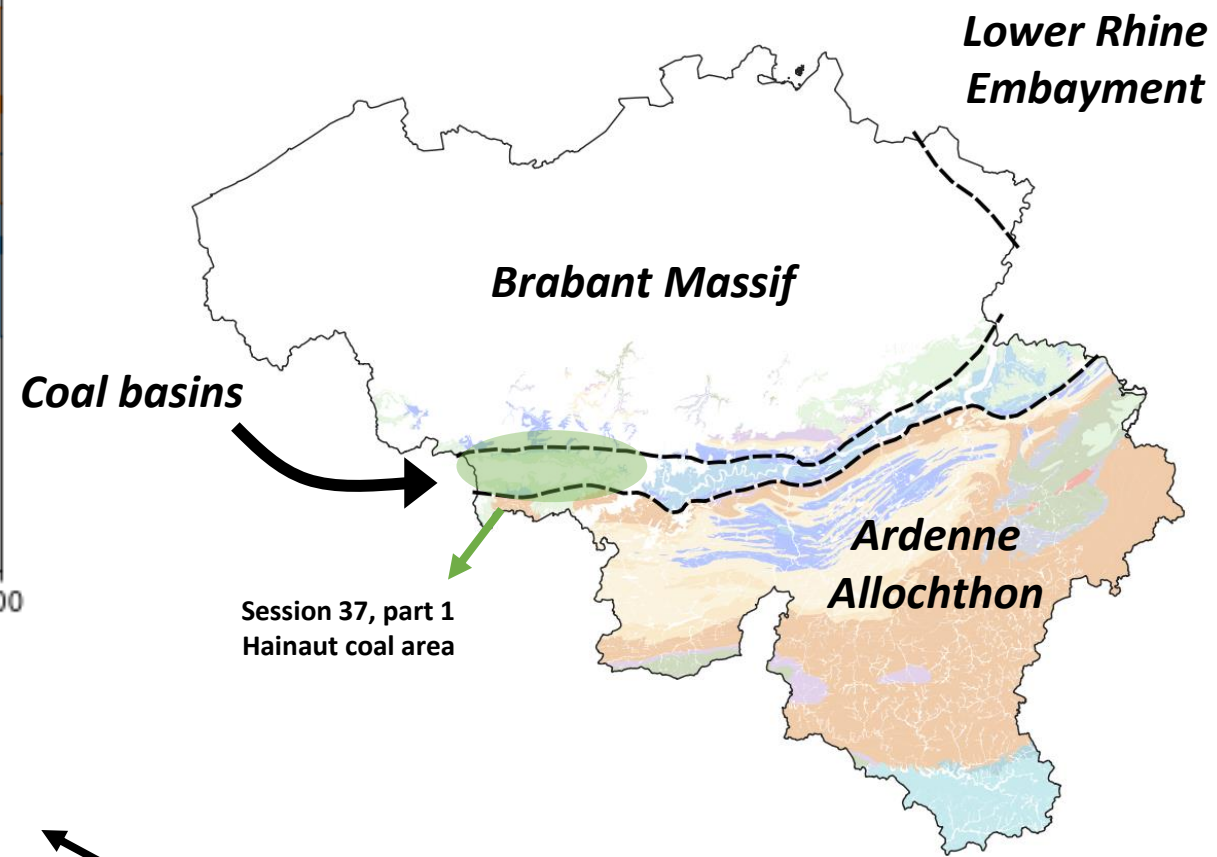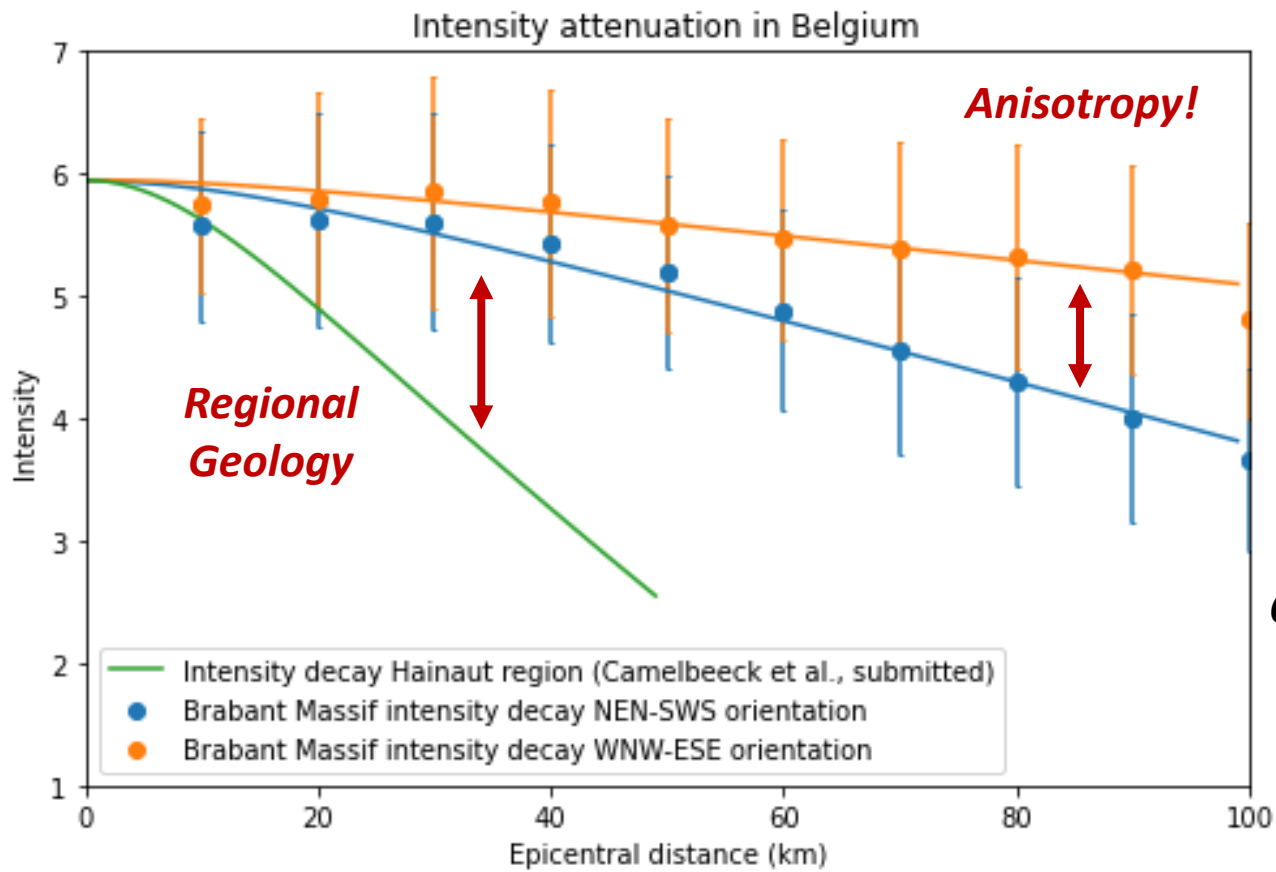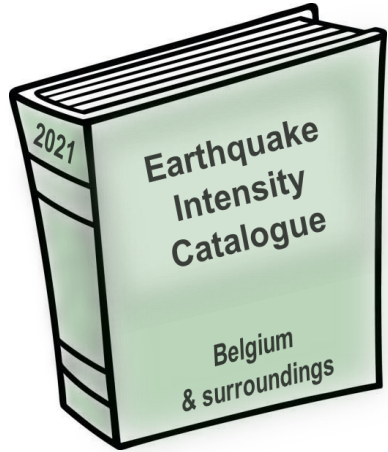
Harmonized Earthquake
Intensity Catalogue

Ben.Neefs@seismology.be

anisotropic
IPE
modelling

Top 10
tips!

2021

Earthquake
Intensity
Catalogue

Belgium
& surroundings
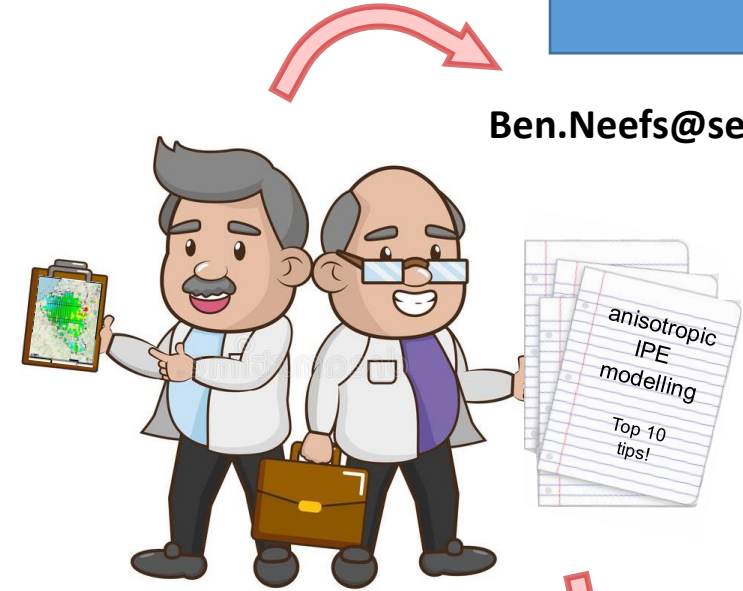
**Regional Intensity
attenuation modelling**

Belgian Intensity
Prediction Equation

$$I = I_0 - a \log \sqrt{\frac{R^2+Z^2}{Z^2}} - b \sqrt{R^2 + Z^2} - Z - c \, dD$$

Virtual ESC conference 2021