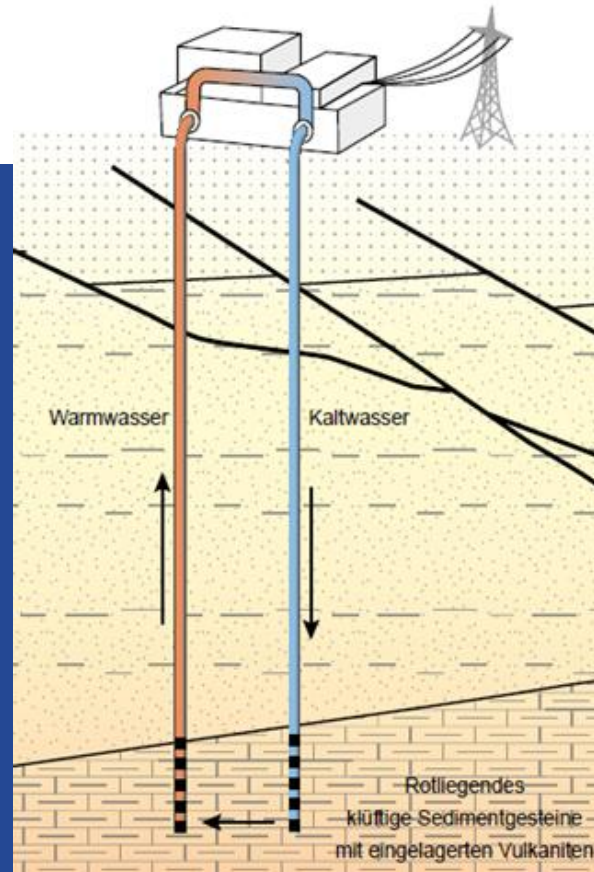
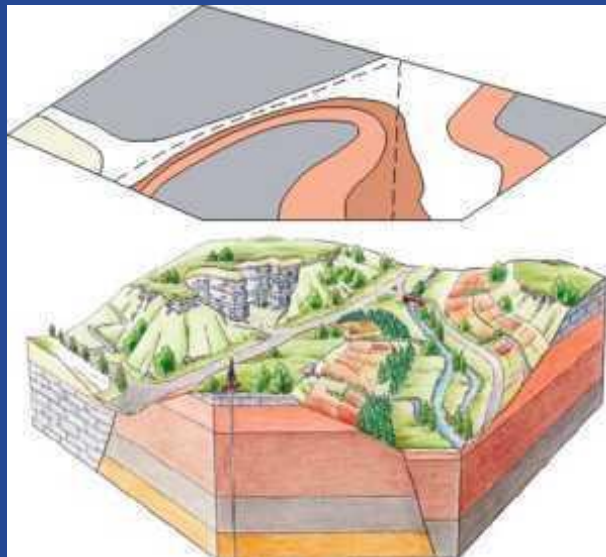
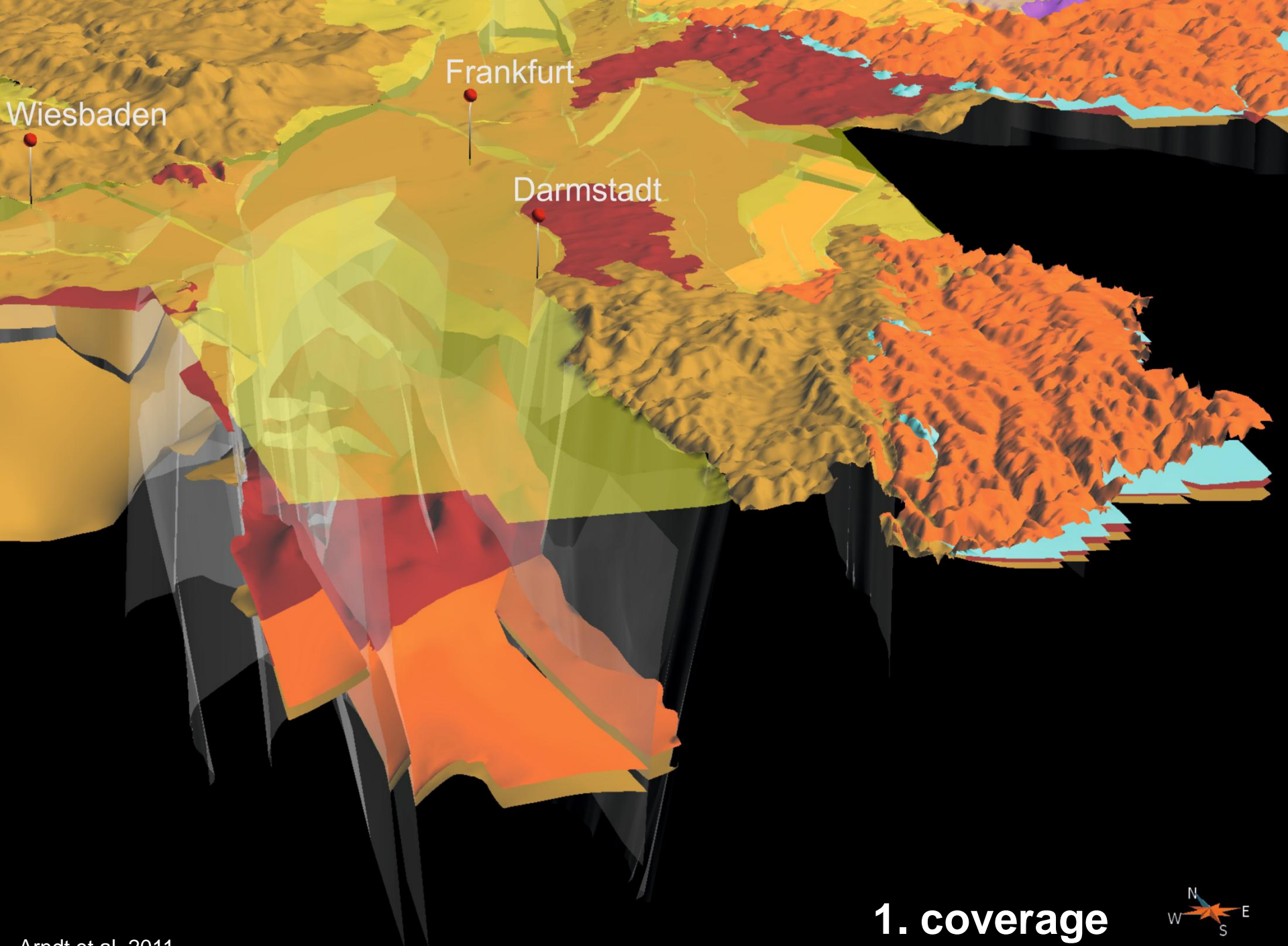




MULTI-INSTITUTIONAL CO-OPERATIONS IN GEOSCIENCES AS A KEY FOR SUPPORTING BOTH SUSTAINABLE LAND-USE MANAGEMENT AND AN EFFICIENT DAILY BUSINESS OF A GEOLOGICAL SURVEY



Why geological 3D- modelling?



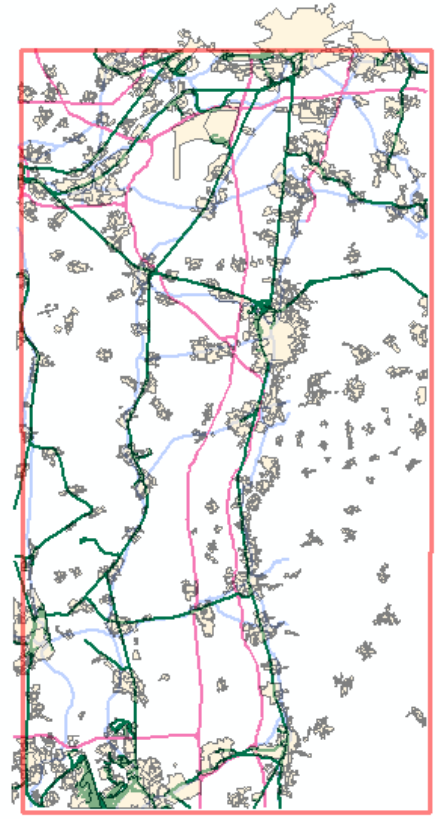
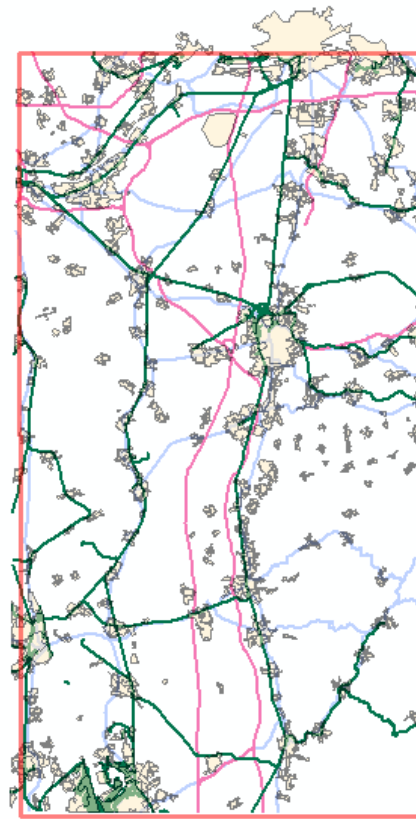
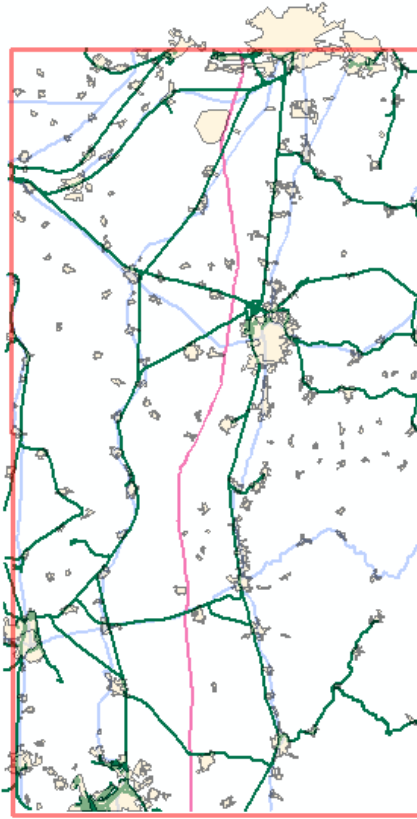
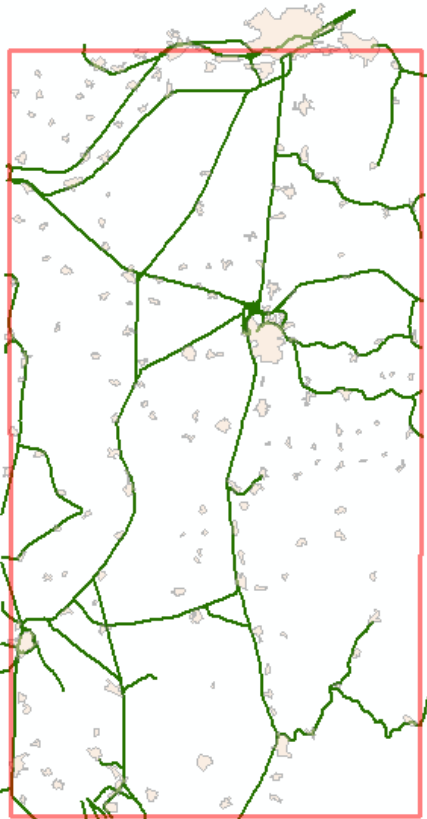
Development metropolitan region Rhein-Main

1910:
115 km²; 6,2%

1950:
186 km²; 10%

1980:
341 km²; 18,4%

2010:
445 km²; 24%



0 2 4 8 12 16
Kilometers

2. applicability

The daily business mainly is about the shallow subsurface

Groundwater



The daily business mainly is about the shallow subsurface

Shallow geothermal energy



Kochbrunnen Wiesbaden

The daily business mainly is about the shallow subsurface

Raw materials



Kieswerk

Von Norbert Will 
8.05.2007 um 14:03 Uhr, Lizenz: ©

(Fotocommunity.de)

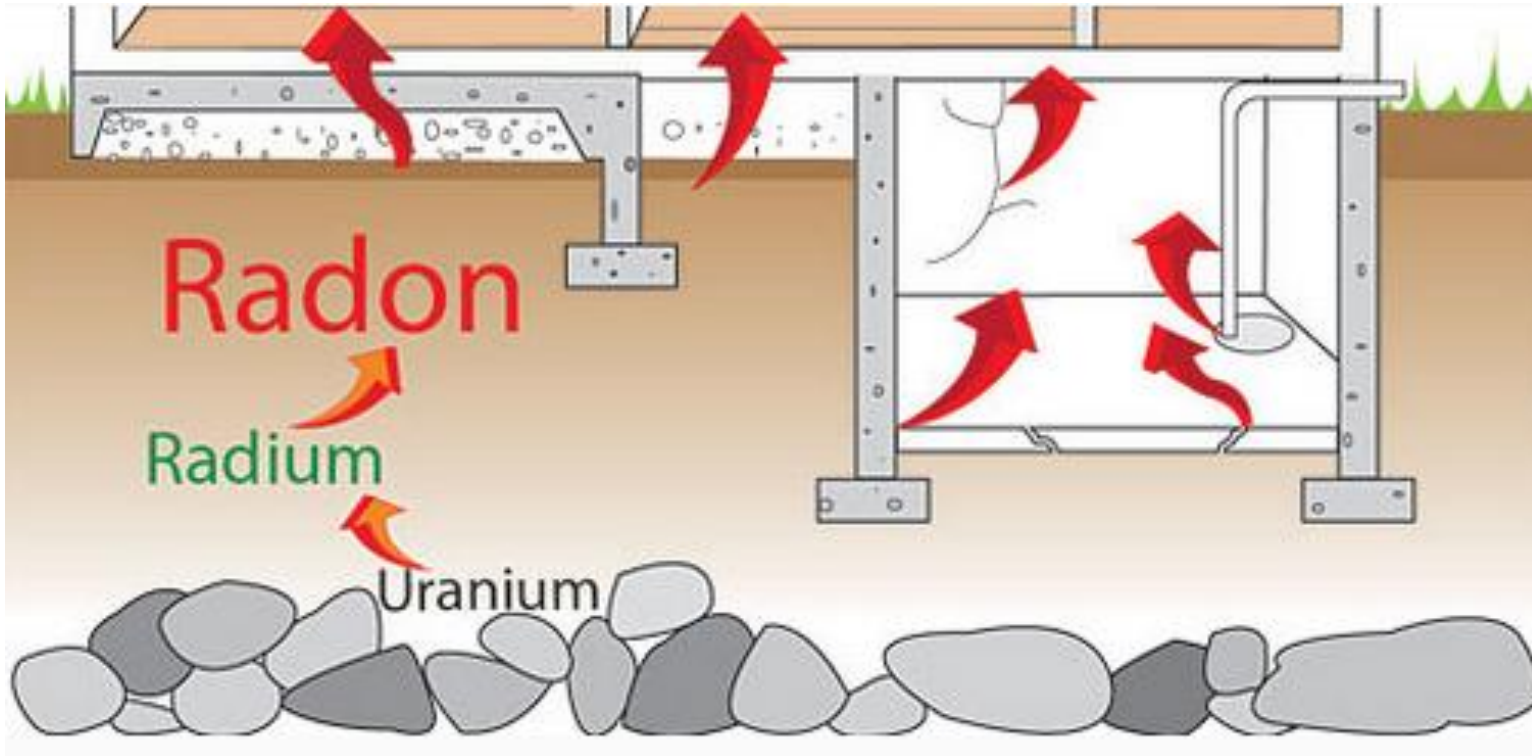
The daily business mainly is about the shallow subsurface

Contaminants



The daily business mainly is about the shallow subsurface

Soil gases



(Peoriaradon.com)

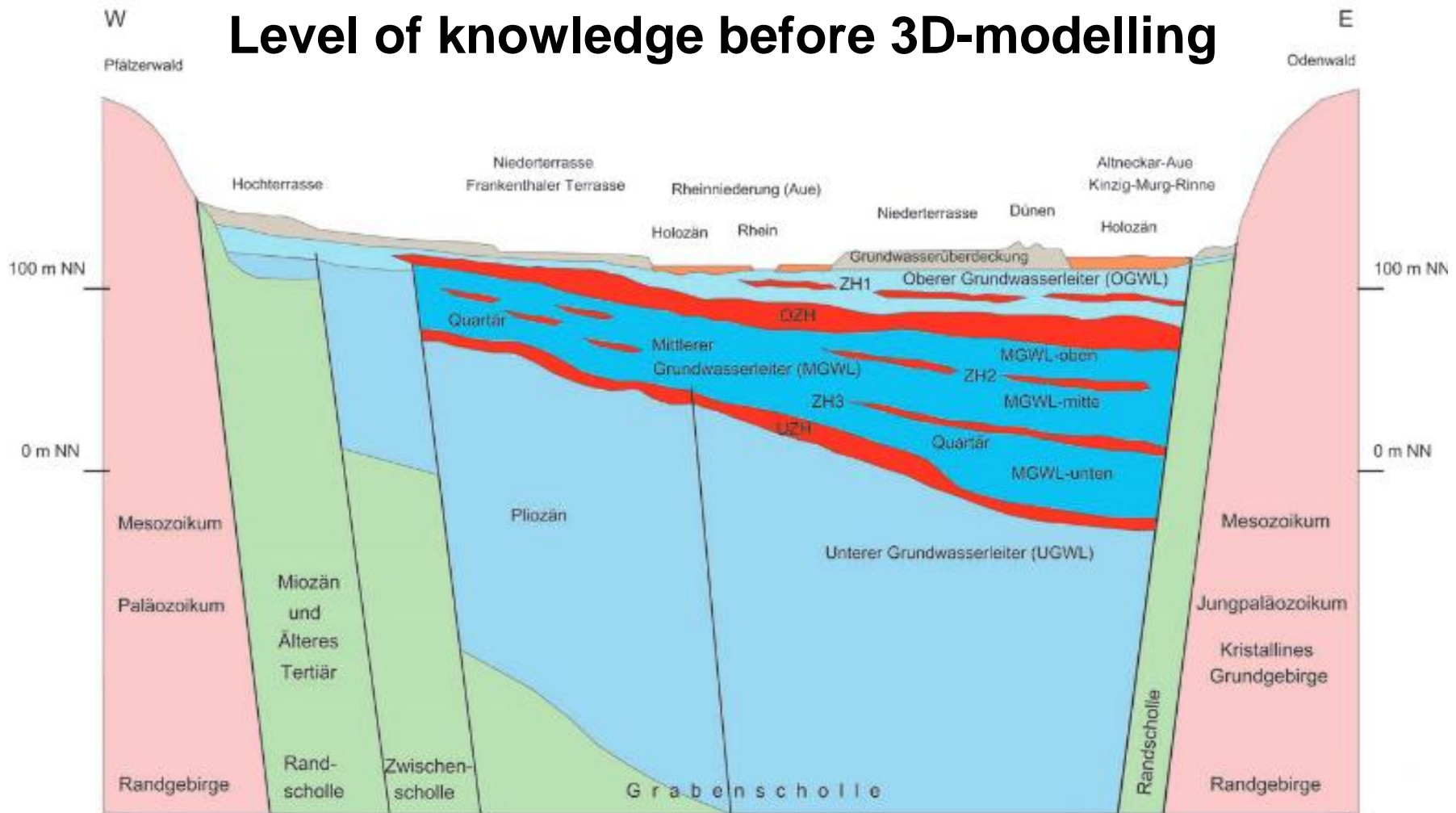
The daily business mainly is about the shallow subsurface

Settlement sensitive construction ground



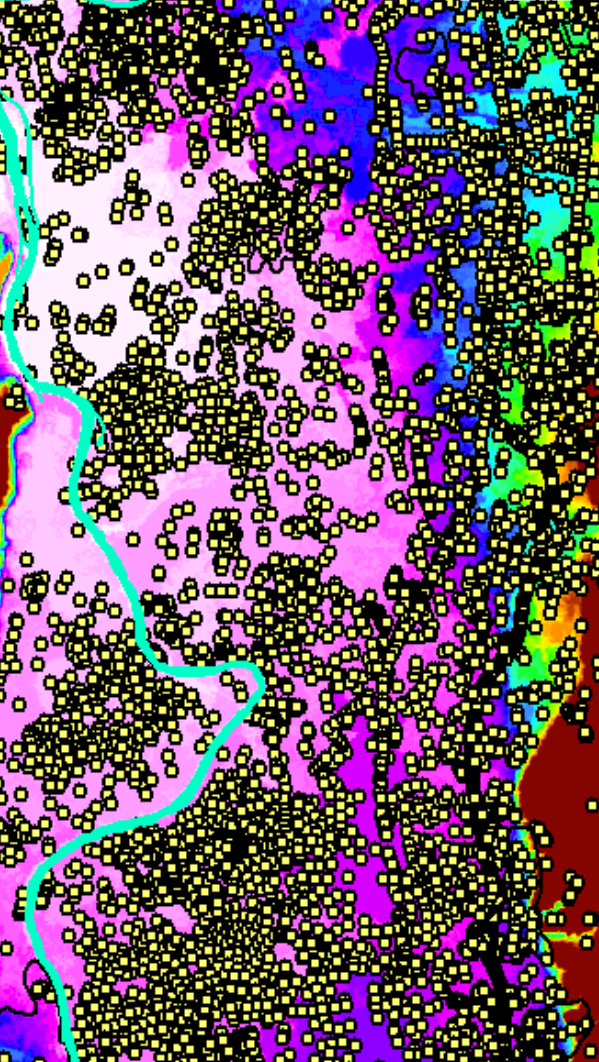
(bistum-dresden-meissen.de)

Level of knowledge before 3D-modelling

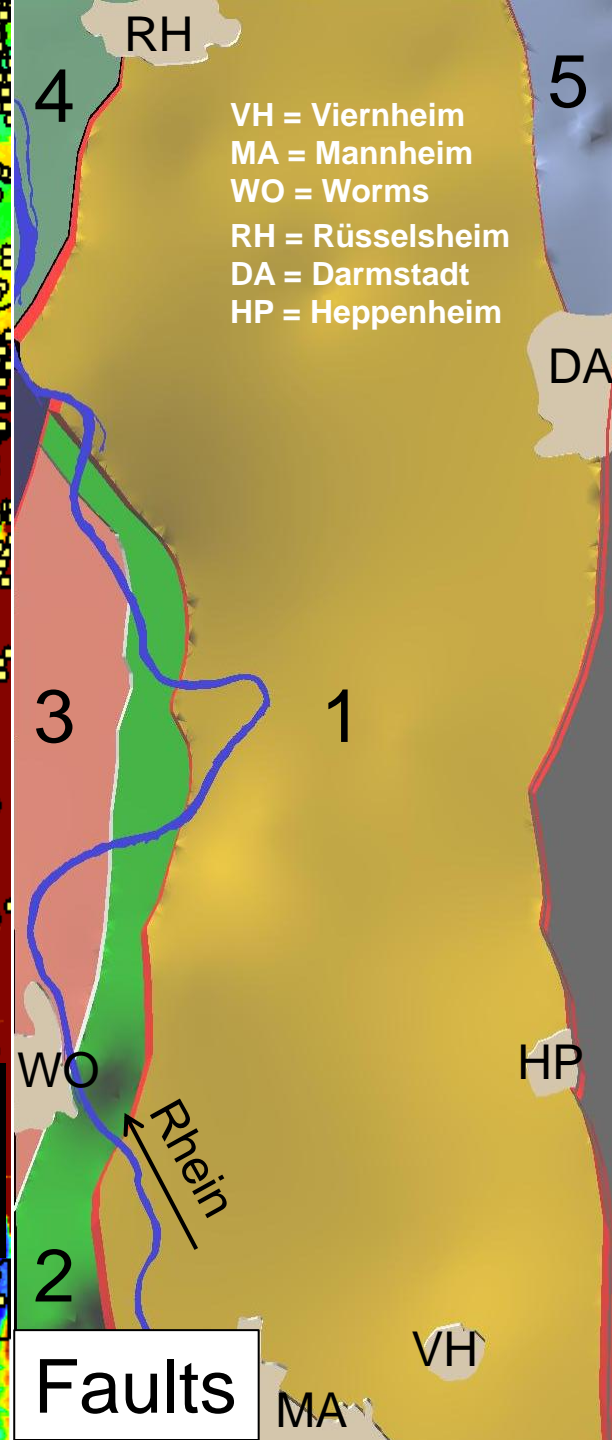
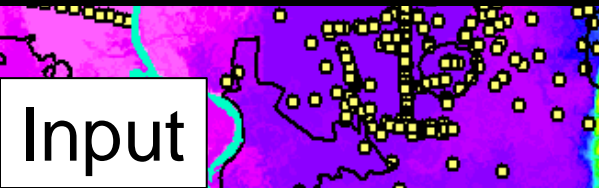


Cross section Rhein-Neckar area (Mannheim)

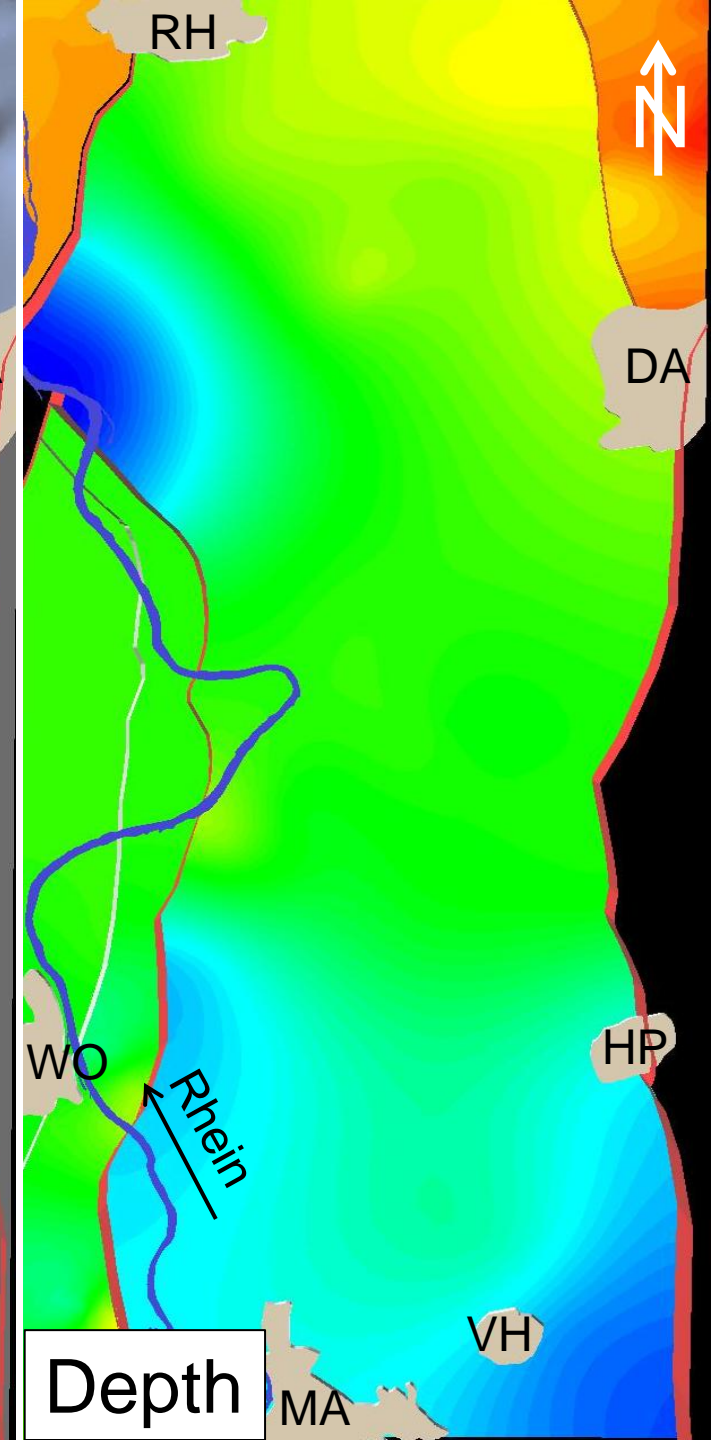
(HGK 1999)



1250 km²
 > 400 m unconsolidated
 sediments (Qt)



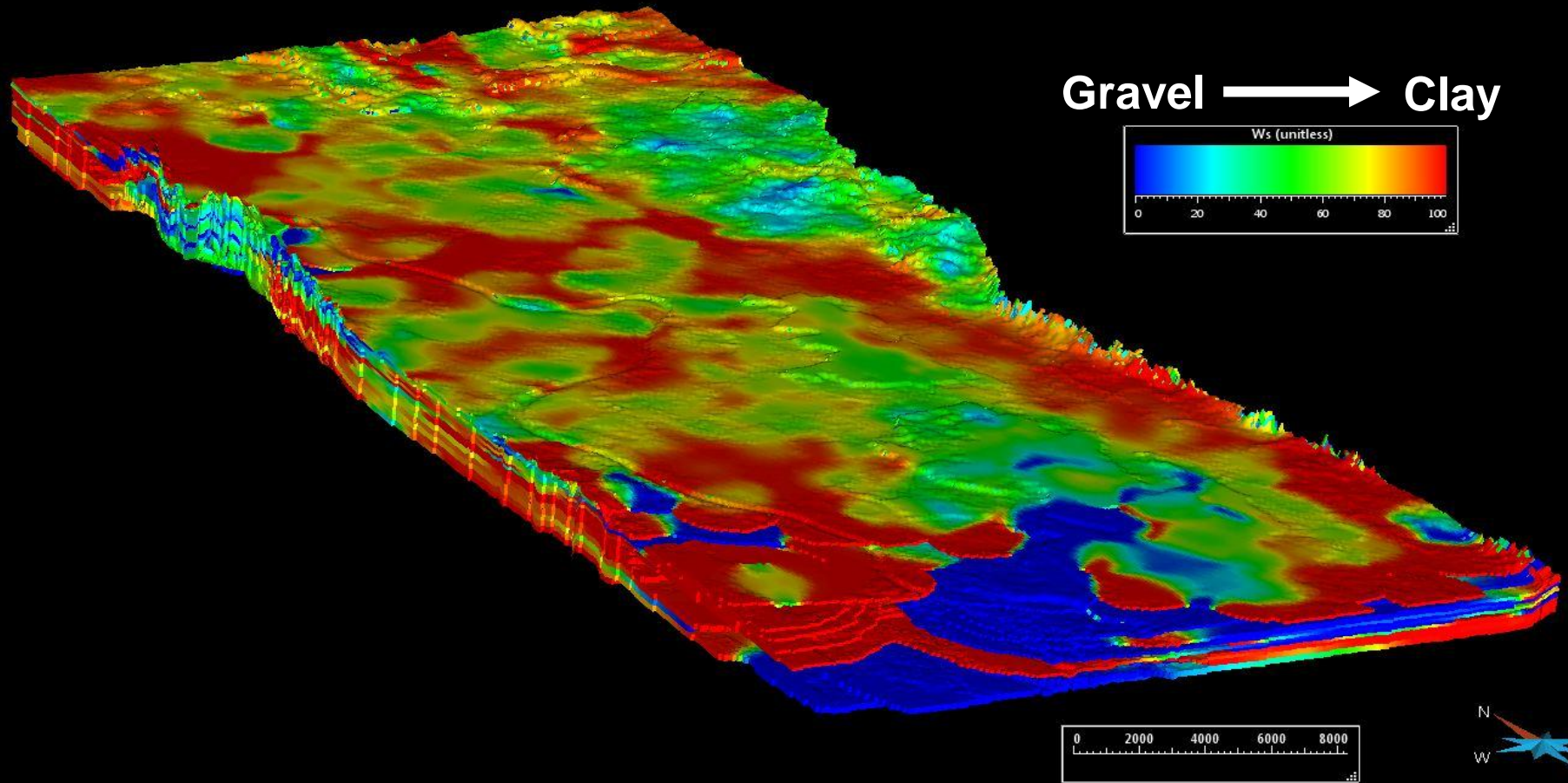
Faults



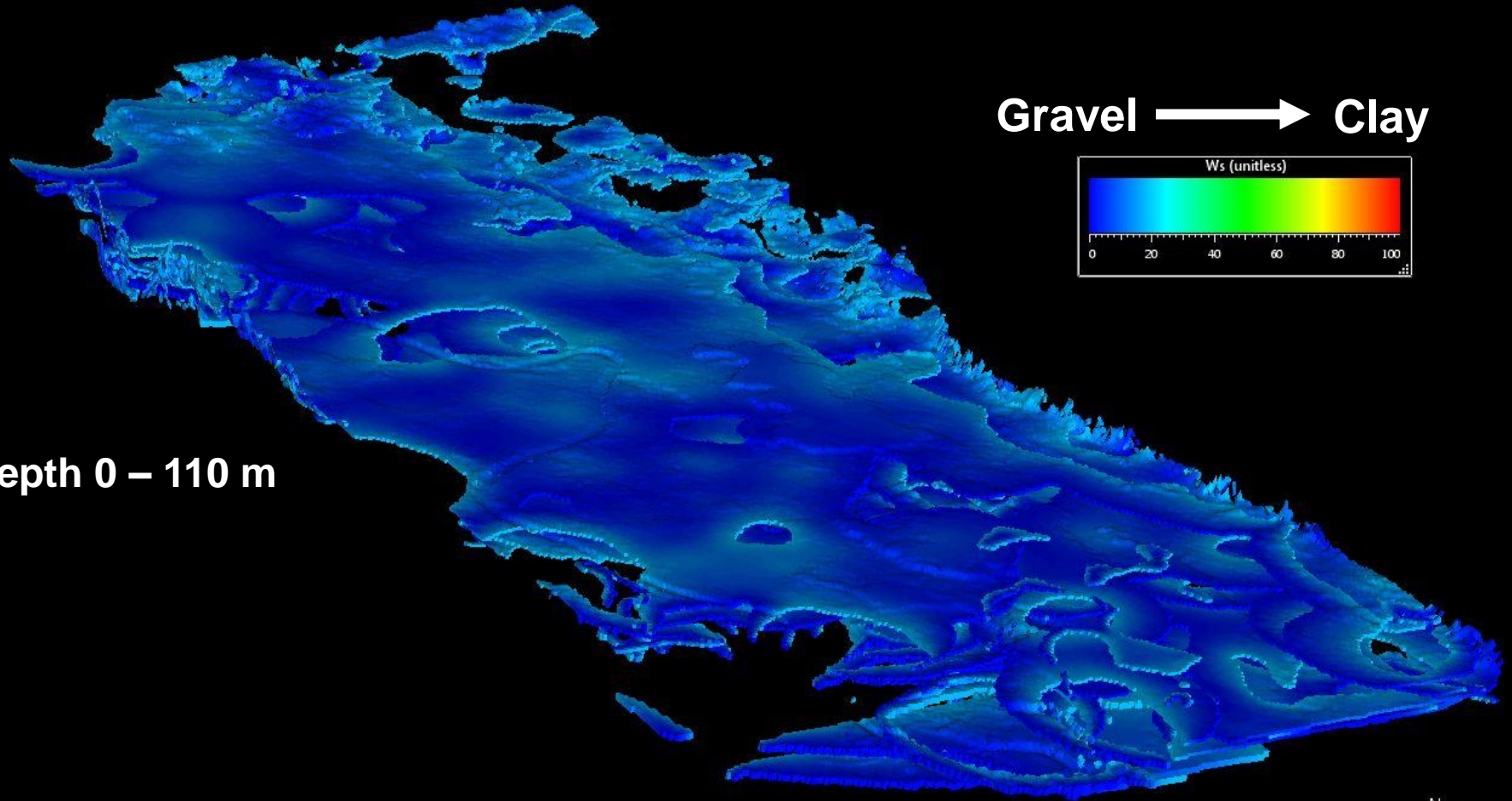
Depth



Parametrization



Appearance of sand/gravel



Depth 0 – 110 m

26 Mrd. m³ = 46,8 Mrd. tons



Questions

Questions

Groundwater

- which faults are present and/or active in the voi?
- are aquifers interacting due to faults?

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- do we have homogeneity regions (is a regionalization possible)?

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Construction

- Where do we have critical deposits?
- Where do we have ongoing surface deformation (geogenic/anthropogenic)?

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Raw materials

- do we have homogeneity regions (is a regionalization possible)?

Construction

- Where do we have critical deposits?
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Contaminants

- Where are they? How do they spread?

Questions

Groundwater

- which faults are present and/or active in the voi?
- are aquifers interacting due to faults?

Raw materials

- do we have homogeneity regions (is a ... on possible)?

Construction

- Where do we have critical ...
- Where do we have ... face deformation (geogenic/anthropogenic)

Contaminant

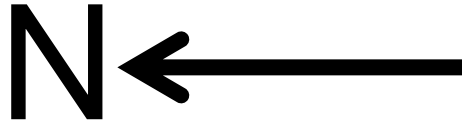
- Where ... How do they spread?

...sides

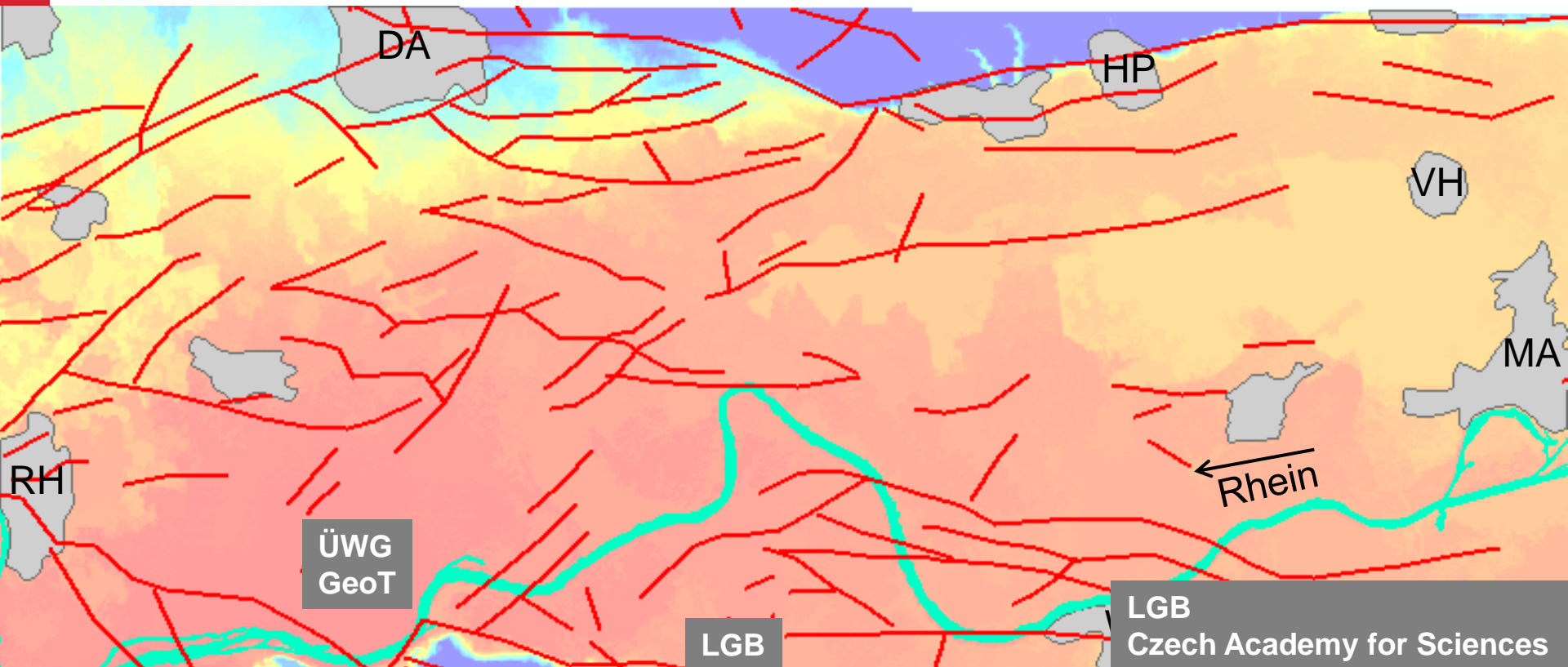
- concentration/source?

Isolated modelling turns into integrated modelling

Faults in the AOI



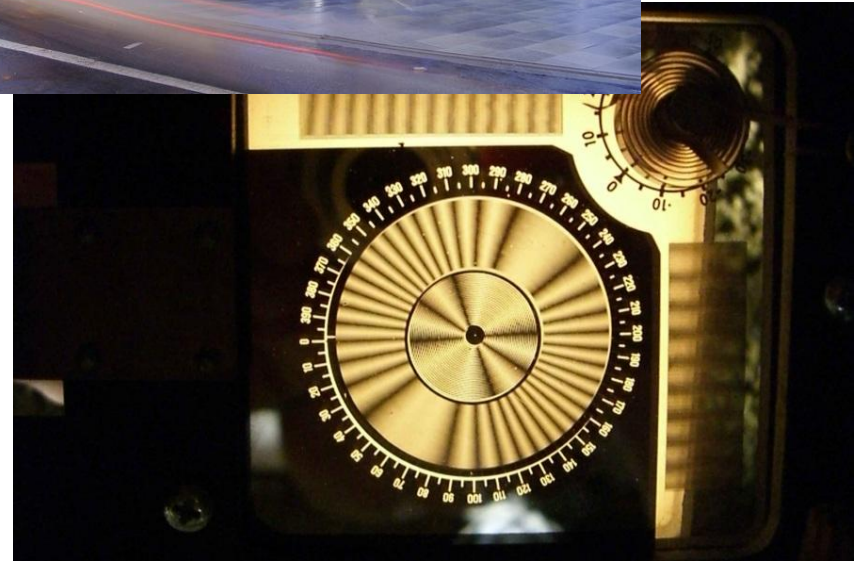
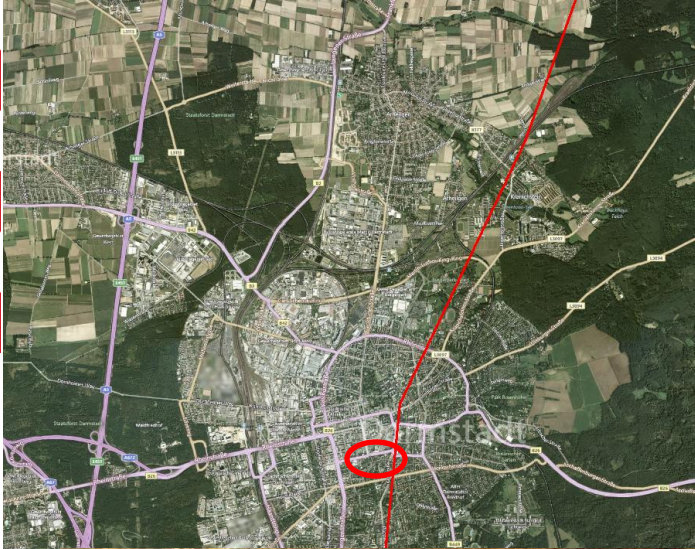
RH = Rüsselsheim VH = Viernheim
DA = Darmstadt MA = Mannheim
HP = Heppenheim WO = Worms



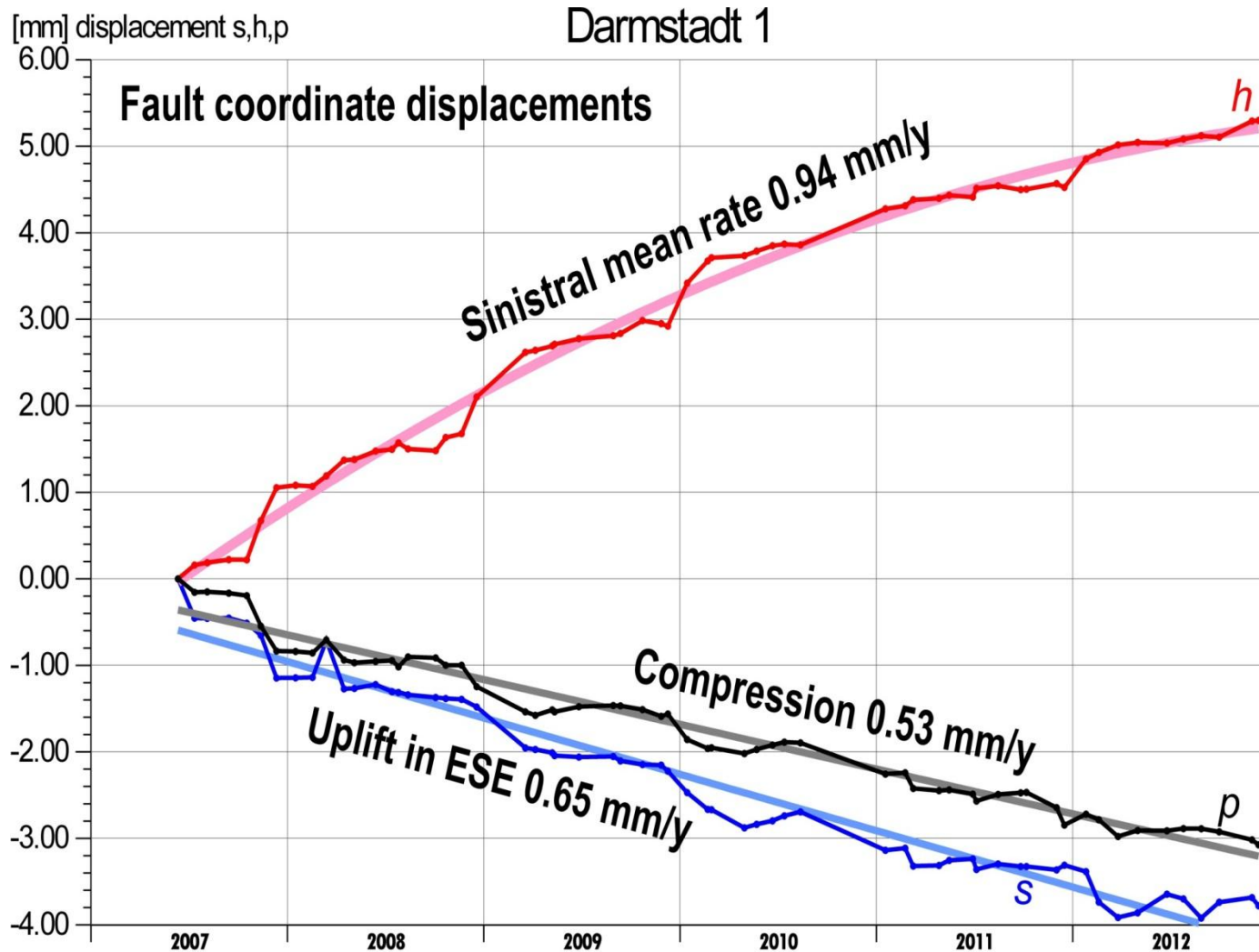
— fault

(modified after Peters 2007)

HLUG/TU-DA geology/Czech Academy of Sciences



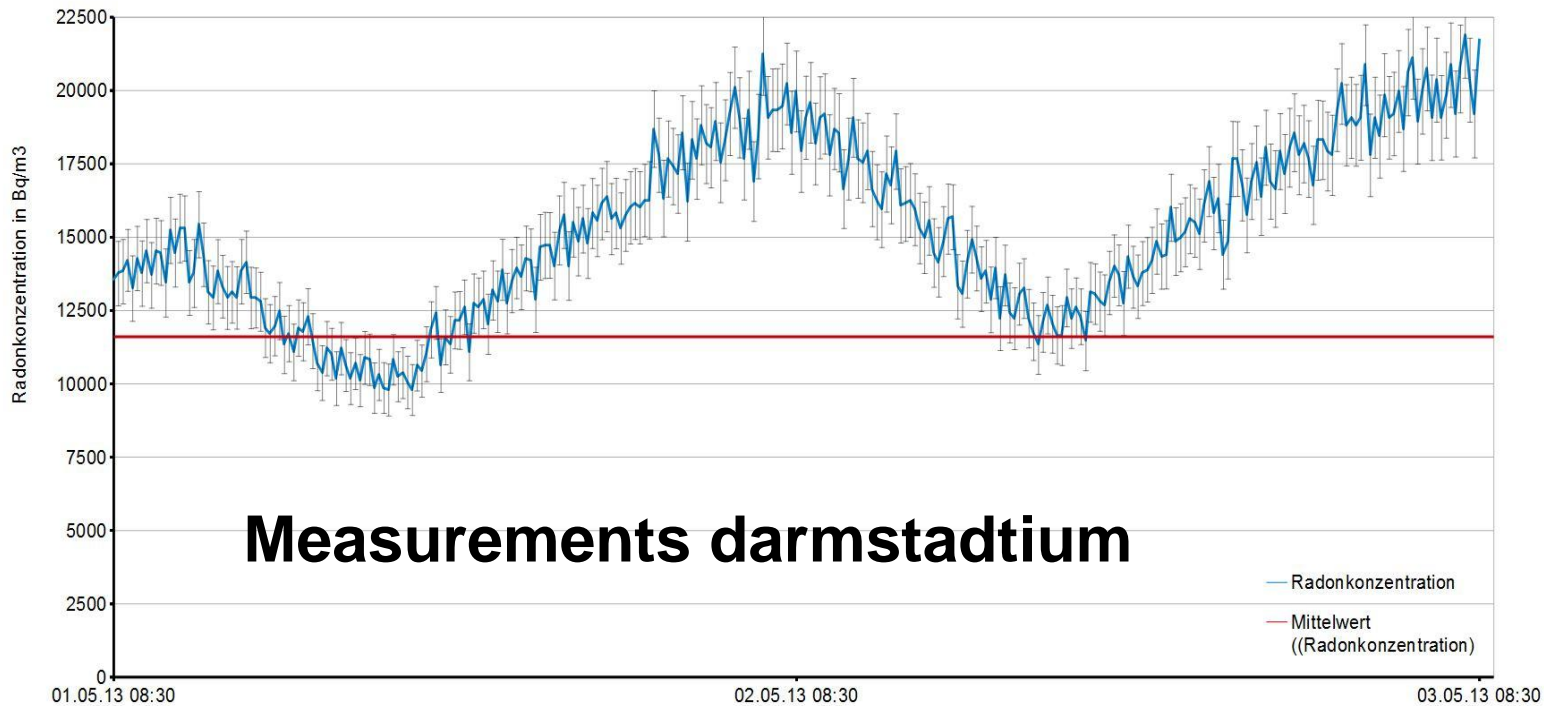
HLUG/TU-DA geology/Czech Academy of Sciences



HLUG/TU-DA geology/ÜWG

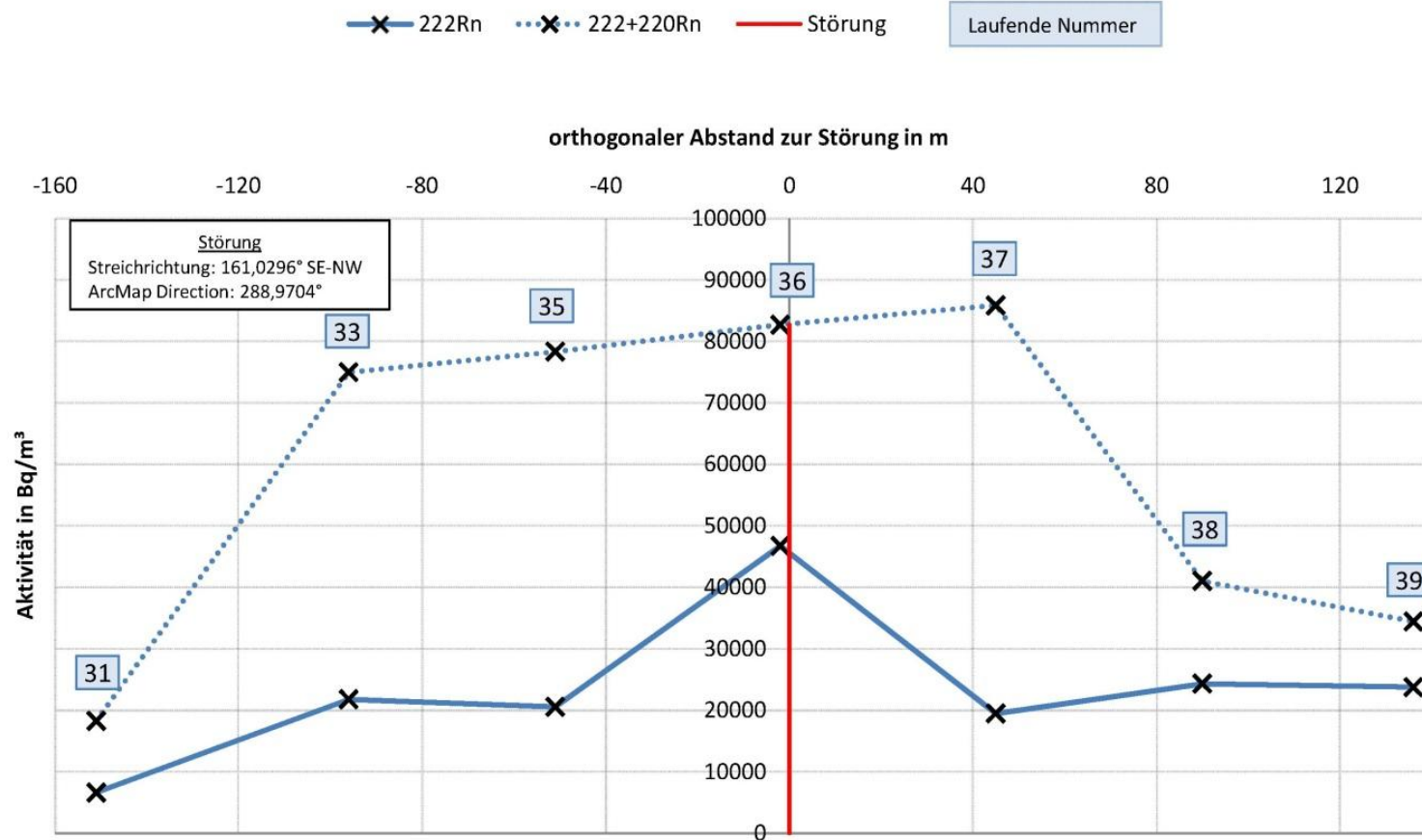
Ort	Höchstwert in Bq/m ³	Mittelwert in Bq/m ³
Störungsmessraum	21.888	11.607
Technikraum neben Störungsmessraum	9.865	6.081
Foyer an historischer Stadtmauer	187	15

Raumluftmessung Darmstadtium - Störungsmessraum

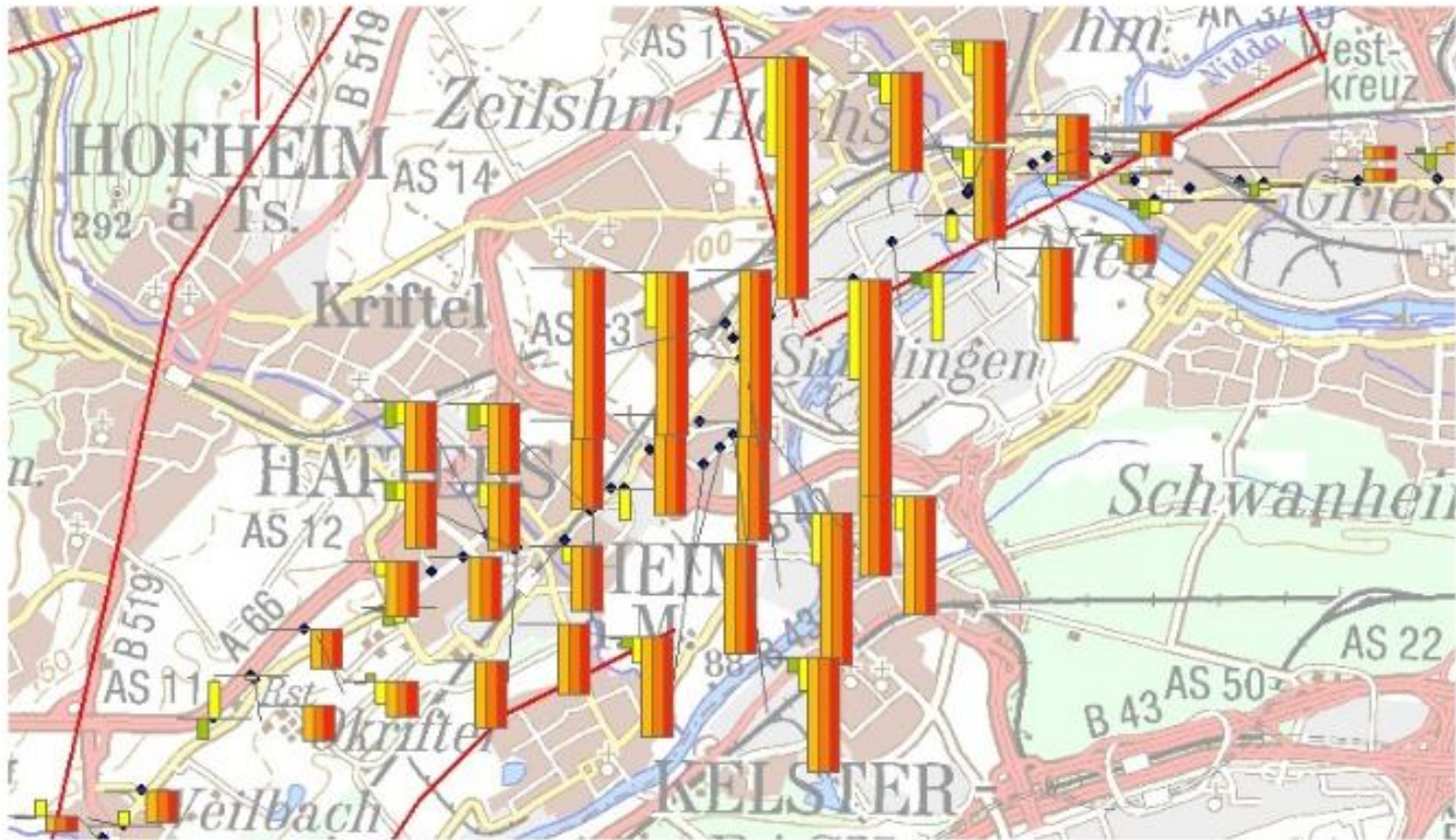


HLUG/TU-DA geology/ÜWG

Messreihe 1 Quer zu Münchweg vom 21.07 und 10.10.2012



HLUG/TU-DA geodesy/ÜWG



(Post 2013)

Subsidence of up to 10 mm/year

Questions

Groundwater

- which faults are present and/or active in the voi?
- are aquifers interacting due to faults?

Raw materials

- do we have homogeneity regions (is possible)?

Construction

- Where do we have
- Where do we have deformation (geogenic/anthropogenic)

Cont

- Where How do they spread?

Radionuclides

- Concentration/source?

**How more than 230 people at the survey
can get needed access to the content?**

Themenauswahl

- 3D Nördlicher Oberrheingraben
 - Eingangsdaten Modellierung
 - Wahrscheinlichkeitskarten
 - 0 bis 5 Meter (W) 80%
 - >5 bis 10 Meter (W) 80%
 - >10 bis 15 Meter (W) 80%
 - >15 bis 20 Meter (W) 80%
 - >20 bis 25 Meter (W) 80%
 - >25 bis 30 Meter (W) 80%
 - >30 bis 35 Meter (W) 80%
 - >35 bis 40 Meter (W) 80%

Werkzeugauswahl

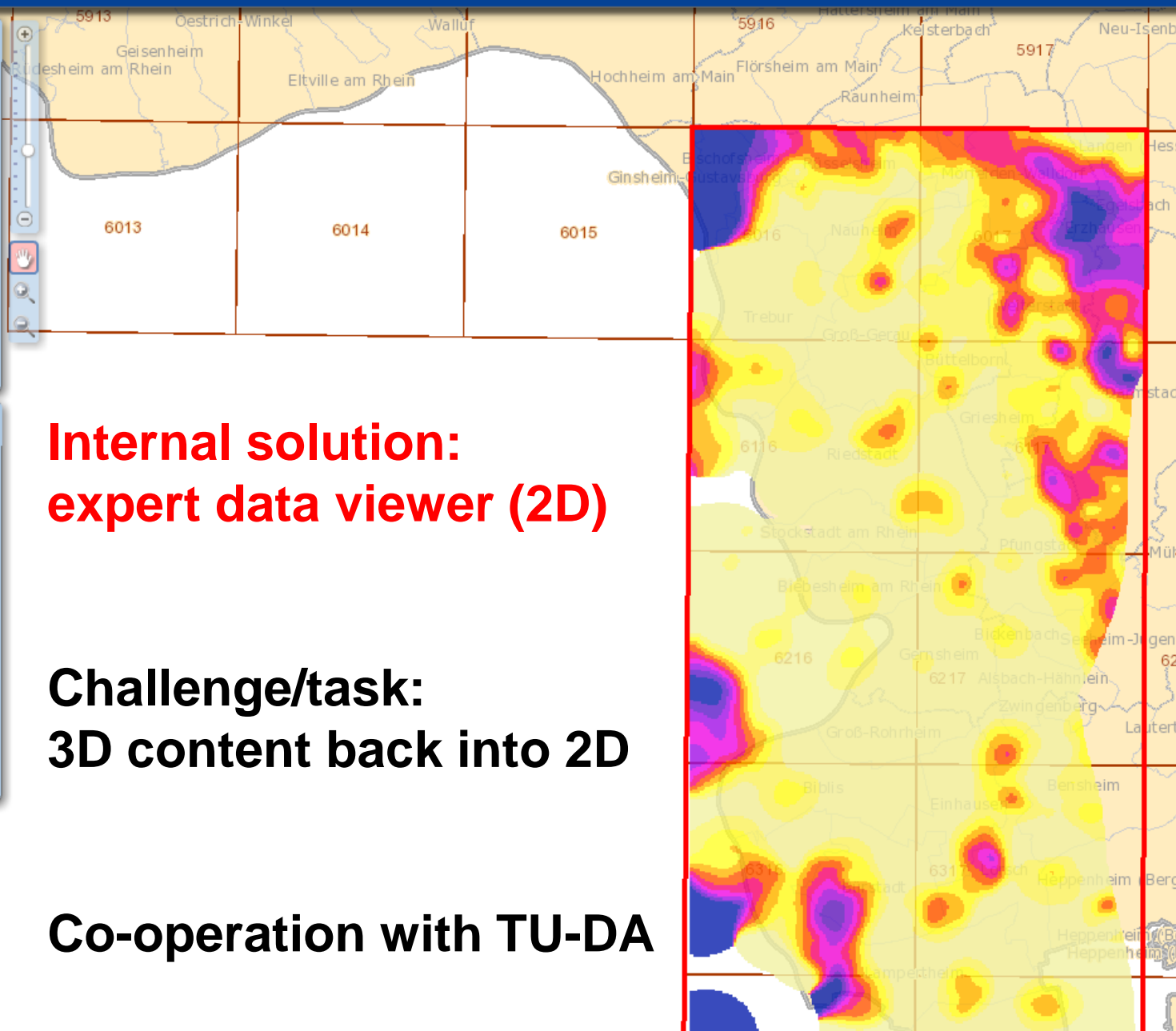
Kartenwerkzeuge



Kartensuche: Administrativ

Kreis | Gemeinde | Ort | PLZ | Straße | Hausnr.

Suche



**Internal solution:
expert data viewer (2D)**

**Challenge/task:
3D content back into 2D**

Co-operation with TU-DA

Themenauswahl

- 3D Nördlicher Oberrheingraben
 - Eingangsdaten Modellierung
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 - >15 bis 20 Meter (W) 80%
 - >20 bis 25 Meter (W) 80%
 - >25 bis 30 Meter (W) 80%
 - >30 bis 35 Meter (W) 80%
 - >35 bis 40 Meter (W) 80%

Werkzeugauswahl

Kartenwerkzeuge



Kartensuche: Administrativ

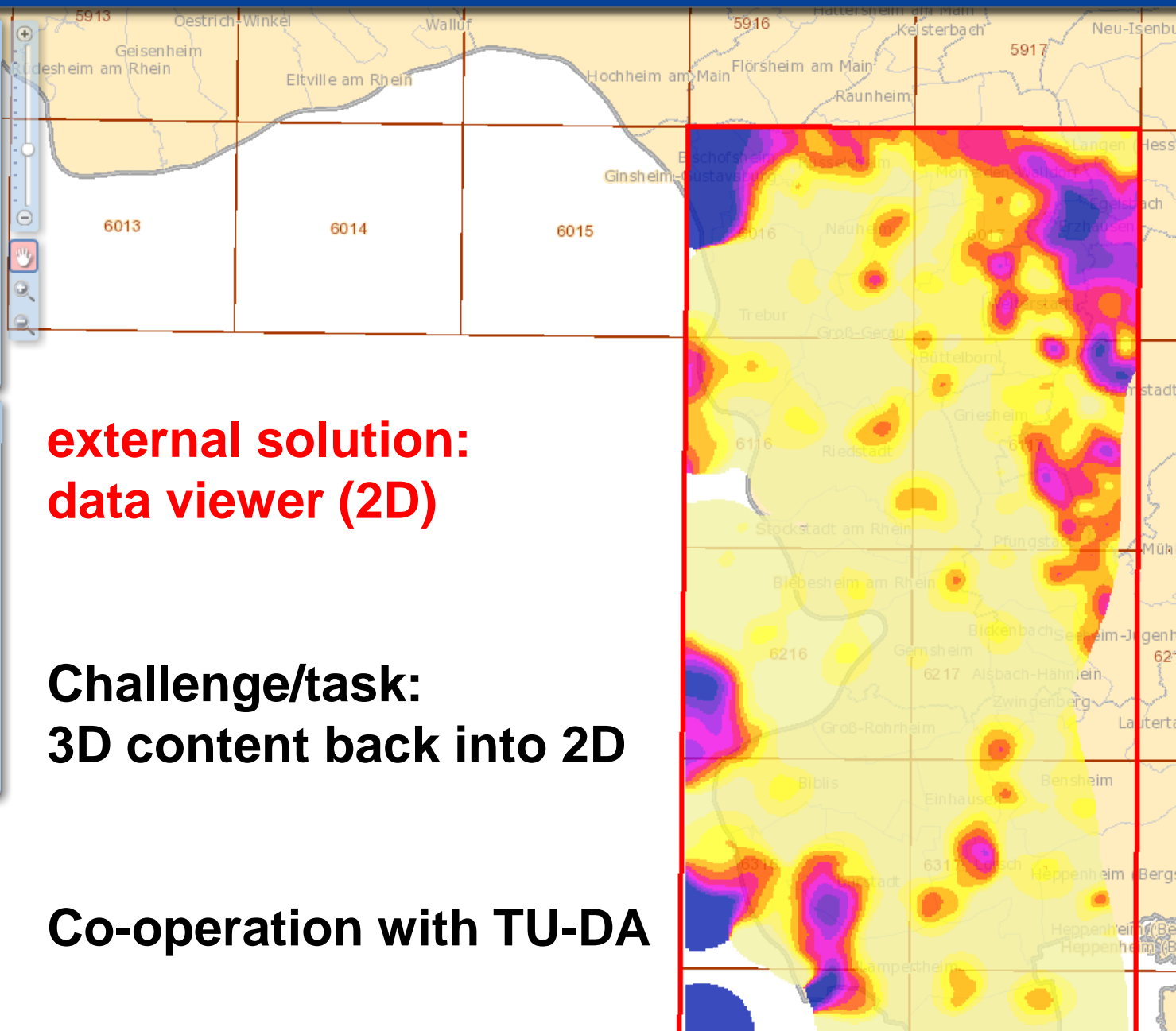
Kreis | Gemeinde | Ort | PLZ | Straße | Hausnr.

Suche

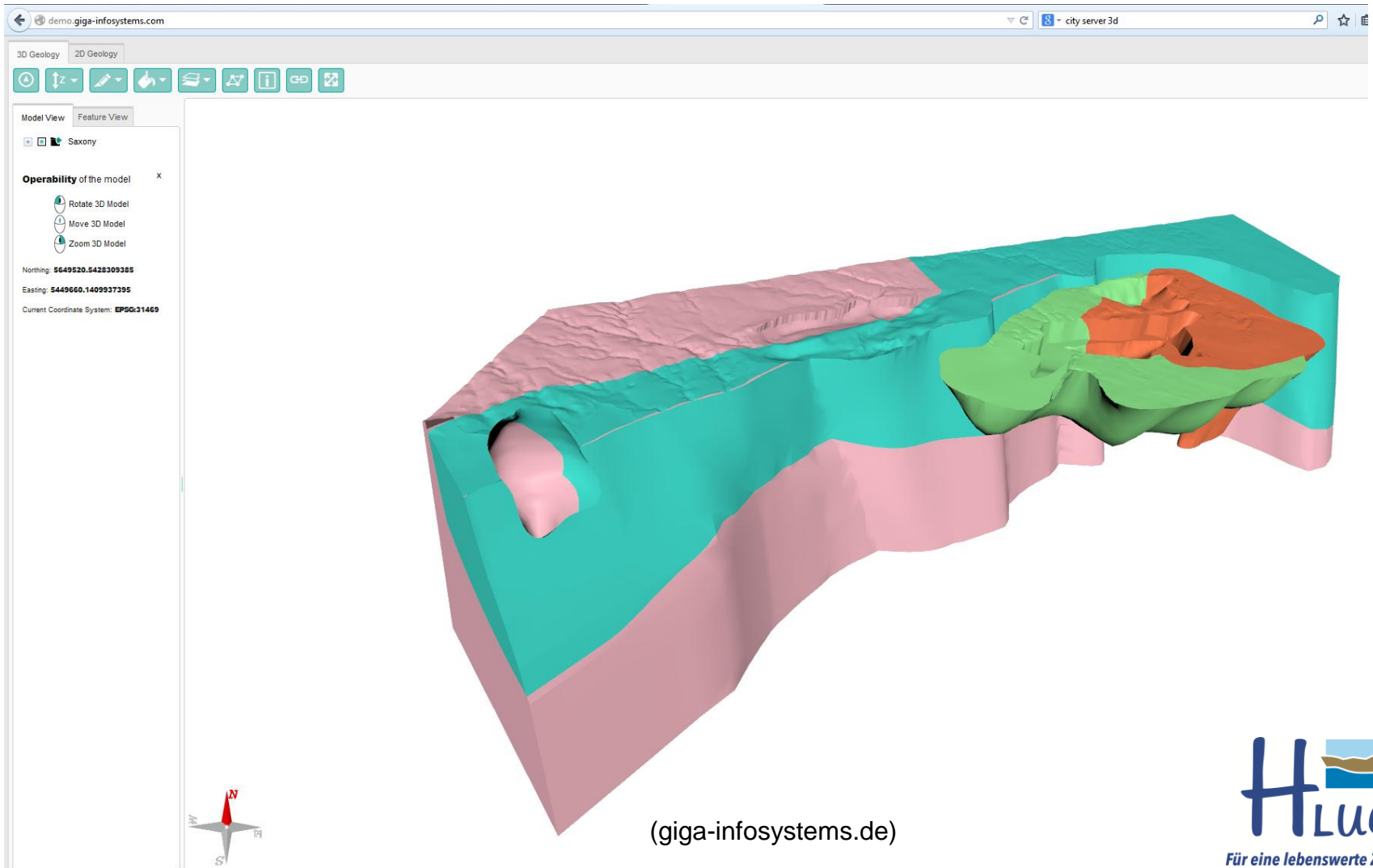
**external solution:
data viewer (2D)**

**Challenge/task:
3D content back into 2D**

Co-operation with TU-DA

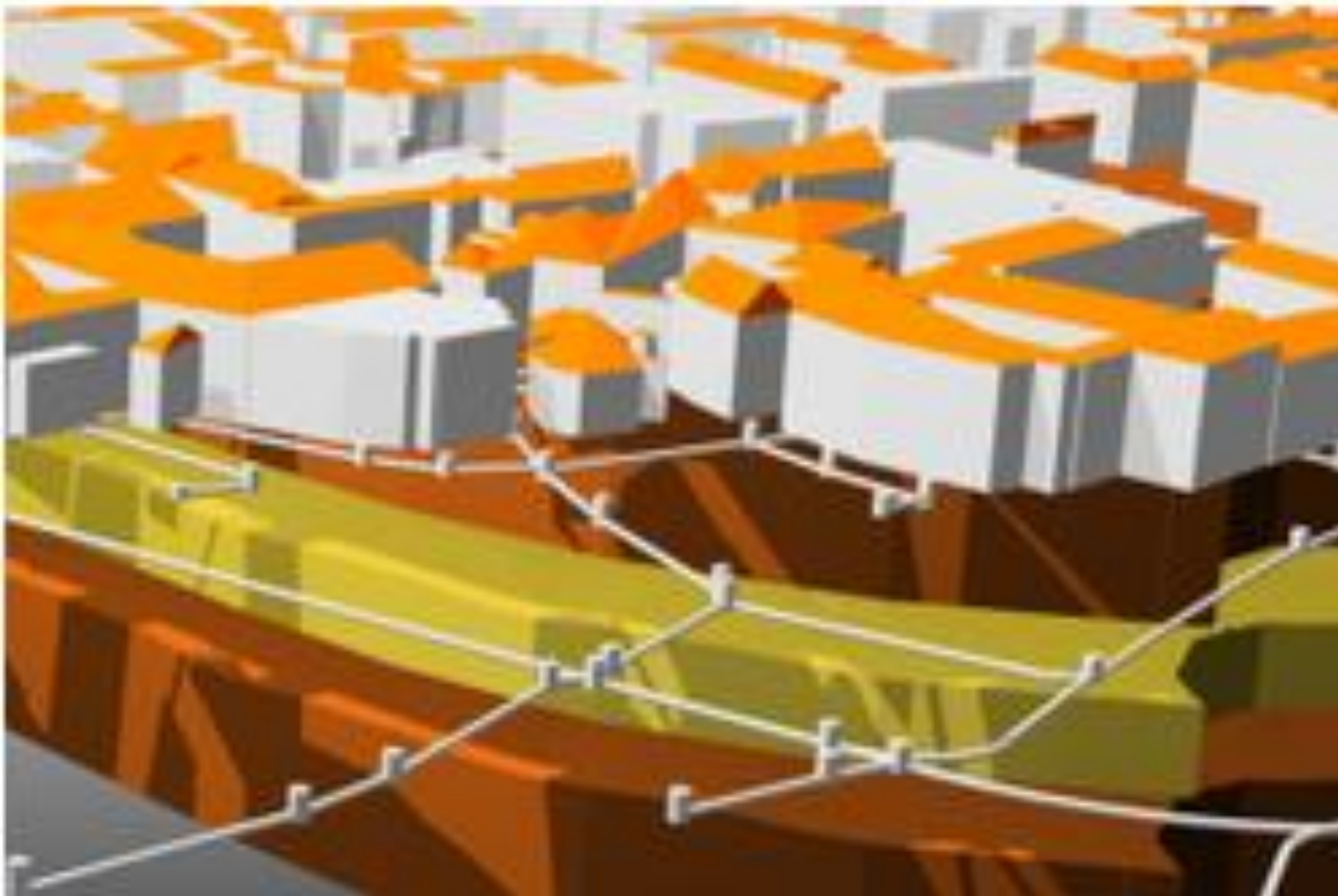


3D content goes online



(giga-infosystems.de)

Geology goes urban - HLUG/Fraunhofer IGD



(igd.de)



Evolution of 3D-modelling

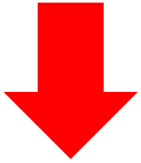


Coverage



Evolution of 3D-modelling

Coverage



isolated modelling/applicability

Evolution of 3D-modelling

Coverage



isolated modelling/applicability



integrated modelling/applicability

Evolution of 3D-modelling

Coverage



isolated modelling/applicability

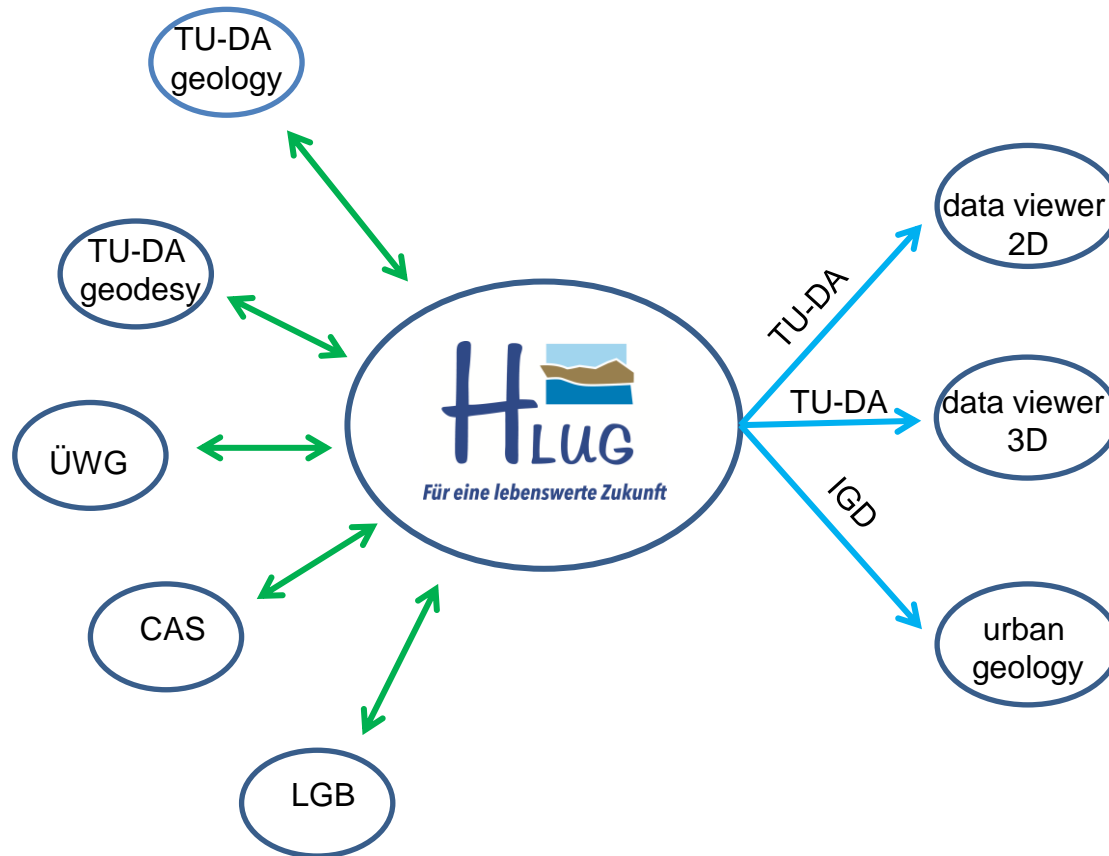


integrated modelling/applicability



increasing
need
for
co-operation

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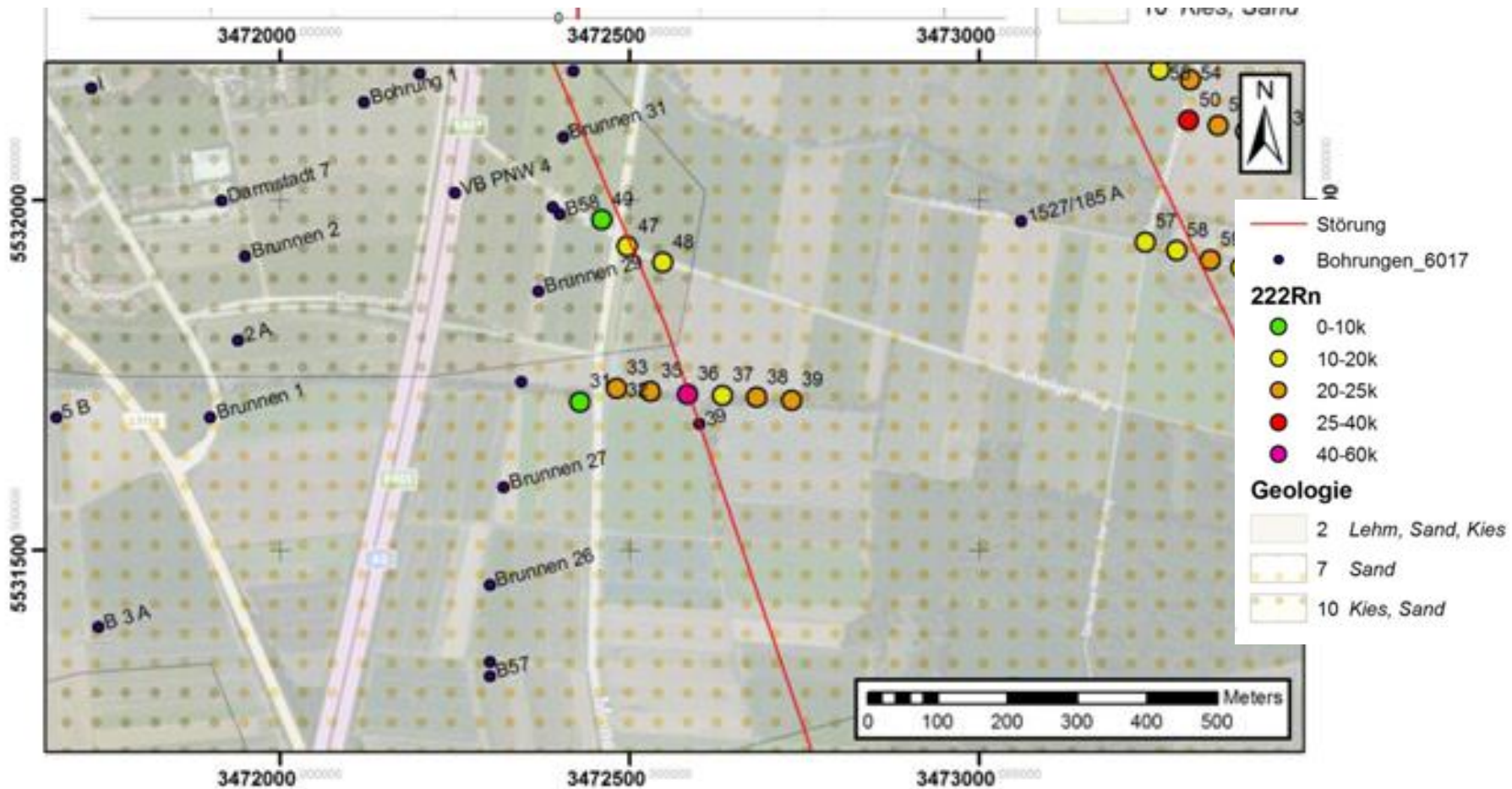
Input



Output

Thank you!!

HLUG/TU-DA geology/ÜWG



Measurements of soil gases