



Management of contaminated soils in urban areas in the Ore Mountains (Germany)

Soil Contamination Maps

Dr. Thomas Hertwig, Dr. Karl-Otto Zeißler (Beak)
Dr. Ingo Müller (LfULG)

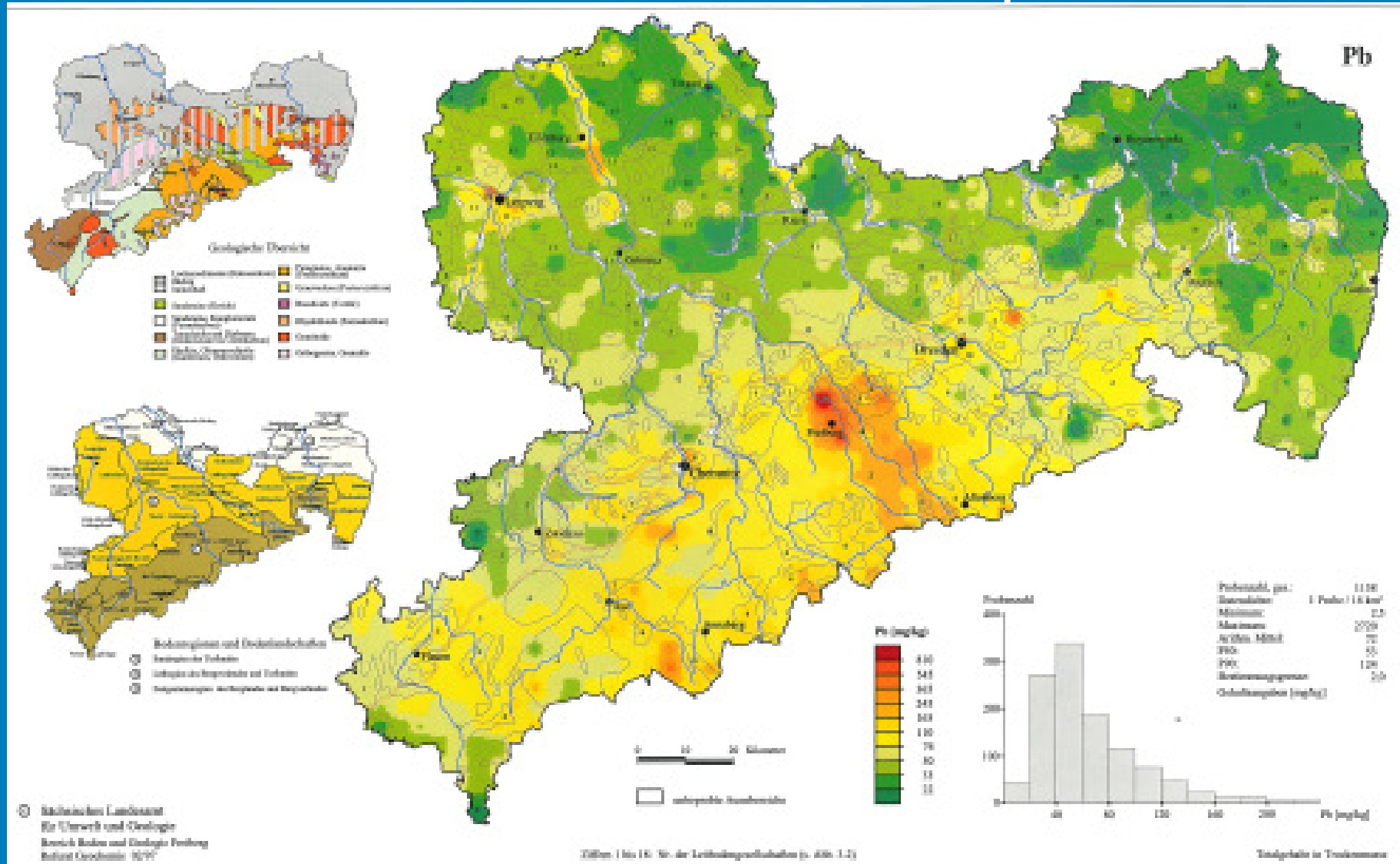


Saxon State Office for
Environment, Agriculture and
Geology

24.09.2010

beak
CONSULTANTS

Soil contamination Maps



Laws and Regulations

- BBodSchG - German Soil Protection Law (§ 12 (10))
- BBodSchV – German Soil Protection Act
- SächsABG – Saxonian Waste Management and Soil Protection Law (§ 9)



Landesamt für Natur,
Umwelt und Verbraucherschutz
Nordrhein-Westfalen



Leitfaden zur Erstellung digitaler Bodenbelastungskarten

Teil II: Siedlungsbereiche

LANUV-Arbeitsblatt 1



Das Lebensministerium

Leitfaden

Erstellung digitaler Bodenbelastungs-
karten zur flächenhaften Darstellung
und Beurteilung von Schadstoffen in
sächsischen Böden

Stand 05/2007

Materialien zum Bodenschutz

Sächsisches Landesamt für Umwelt und Geologie

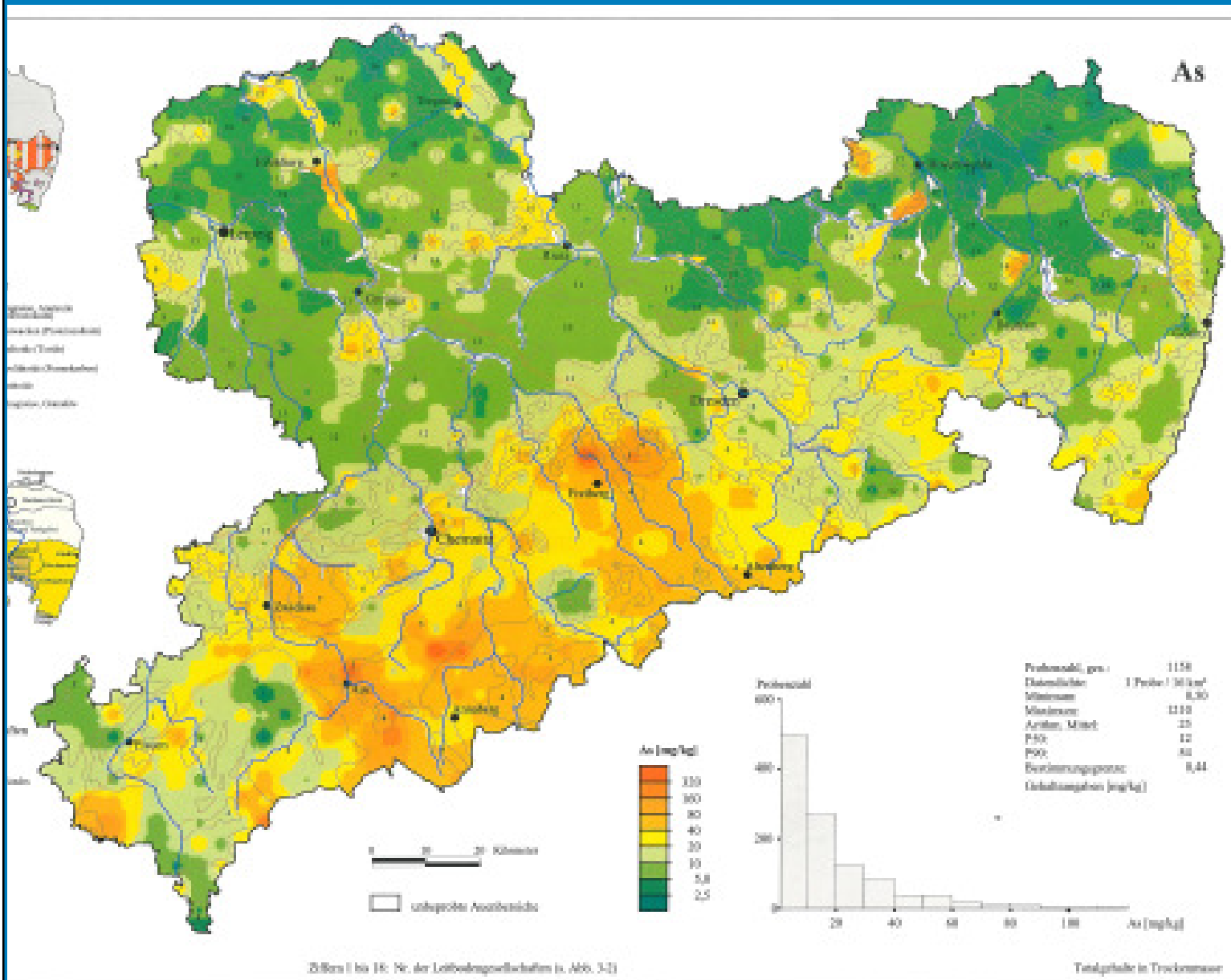
Zur Webenstraße 11

Freistaat  Sachsen

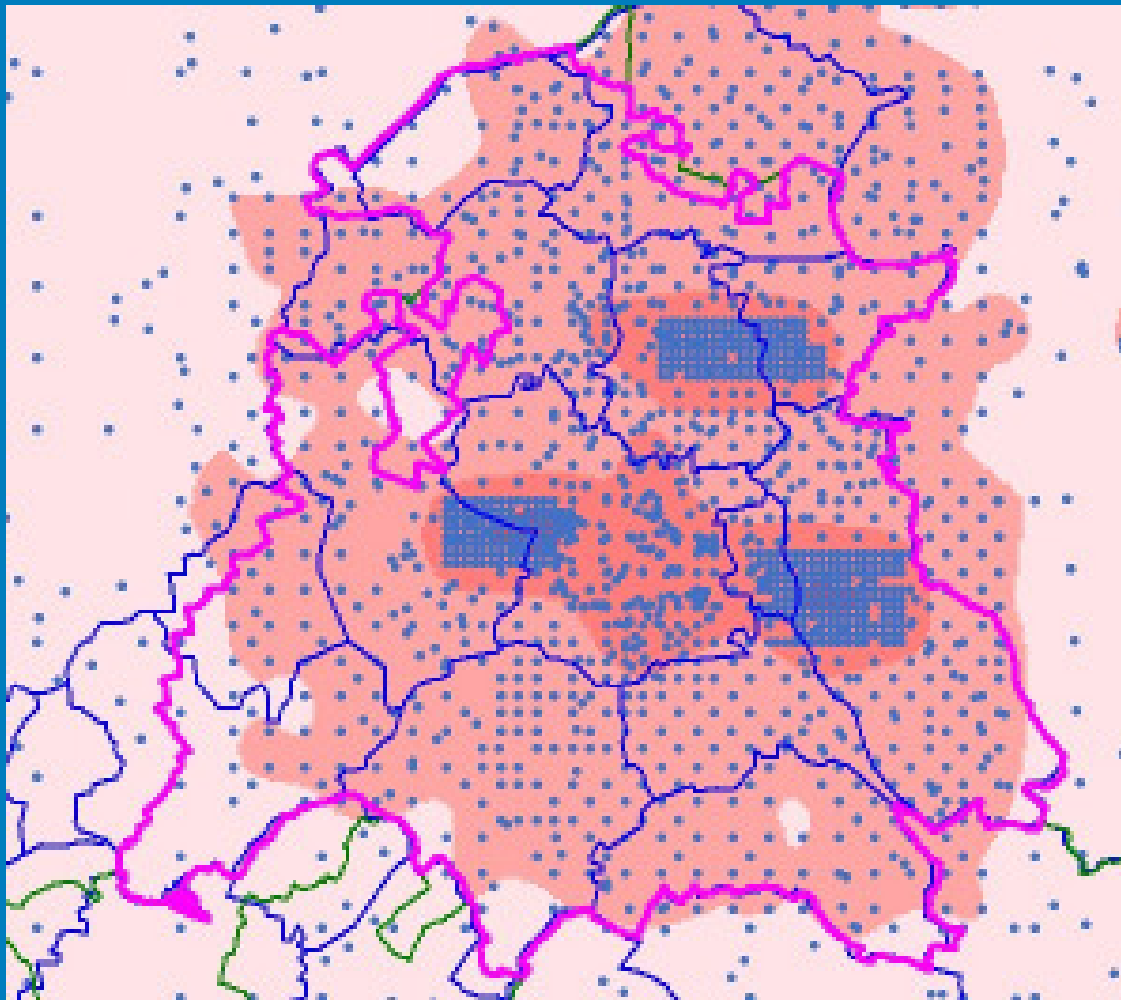


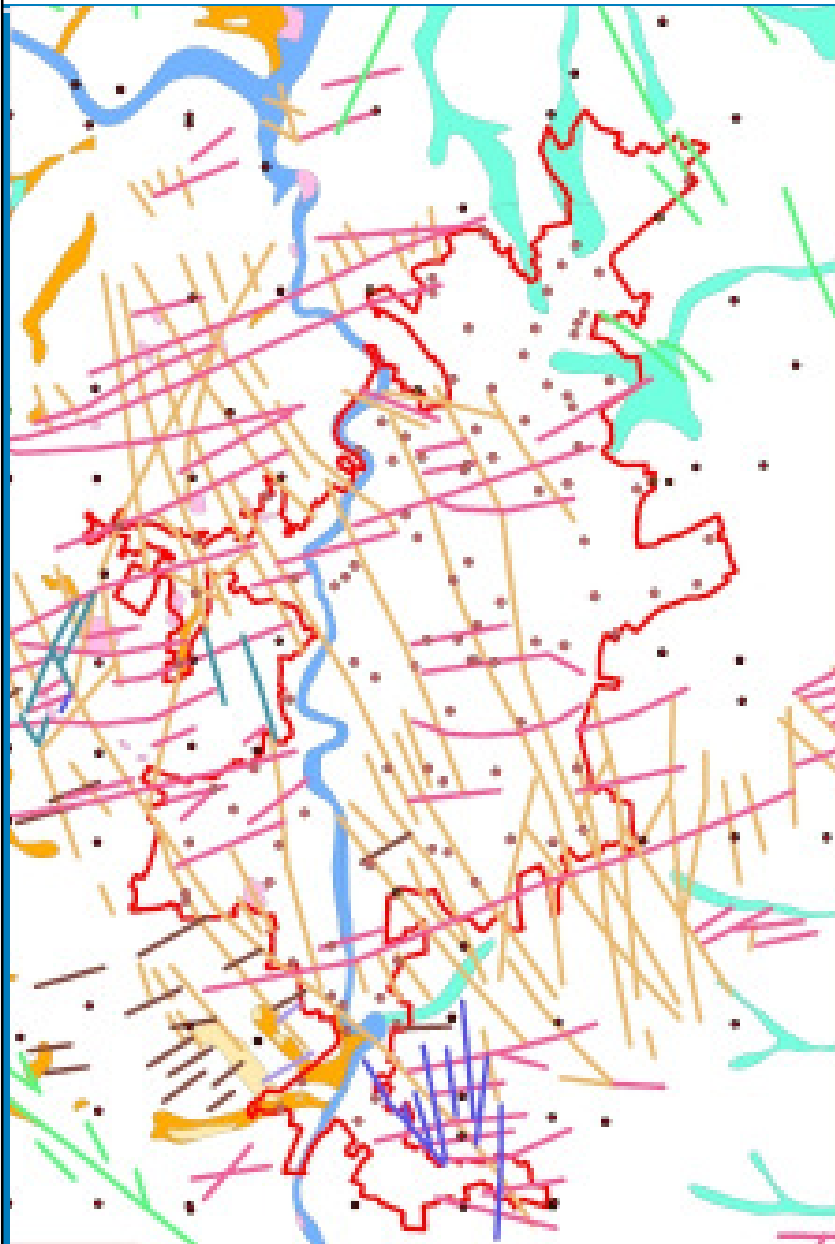
beak
CONSULTANTS

Test Areas in Ore Mountains



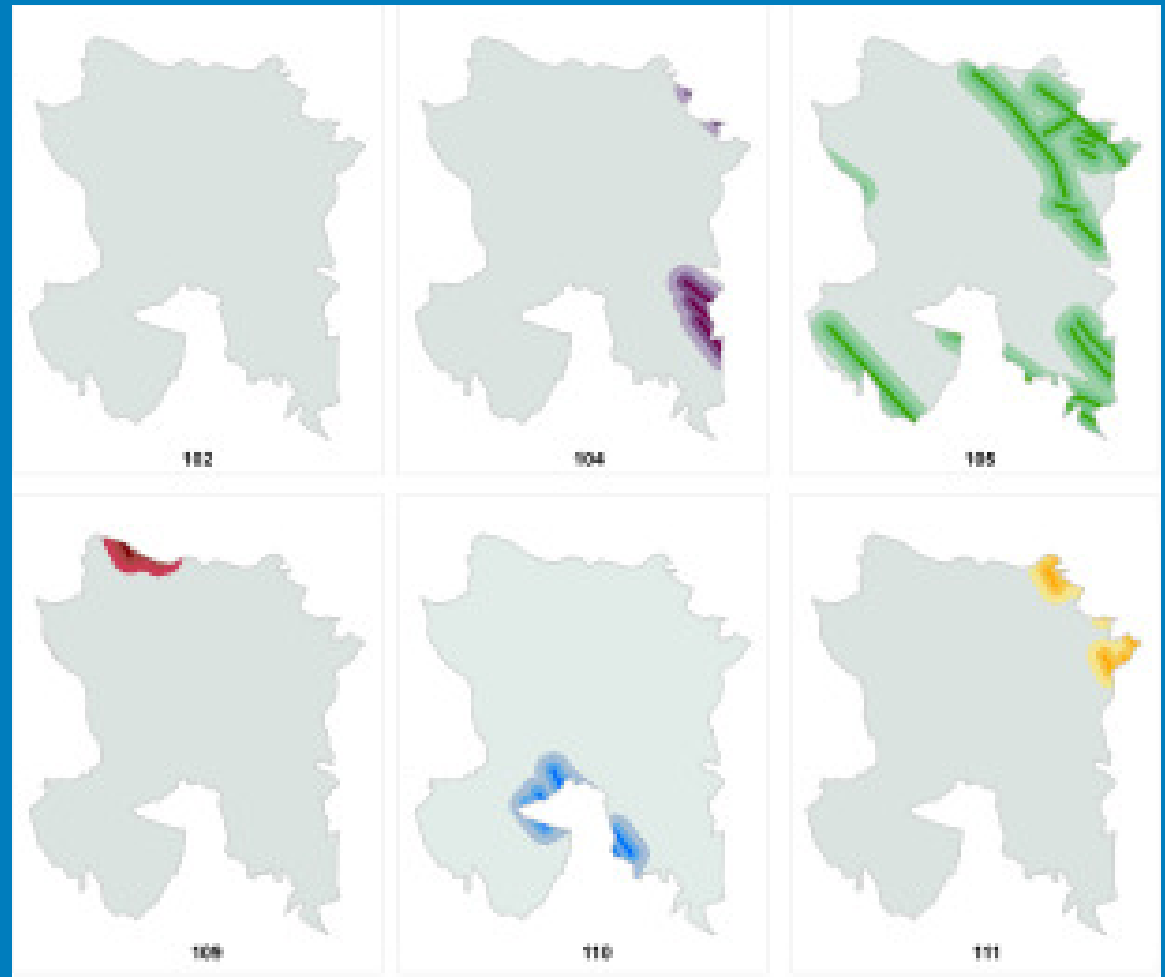
Soil samples

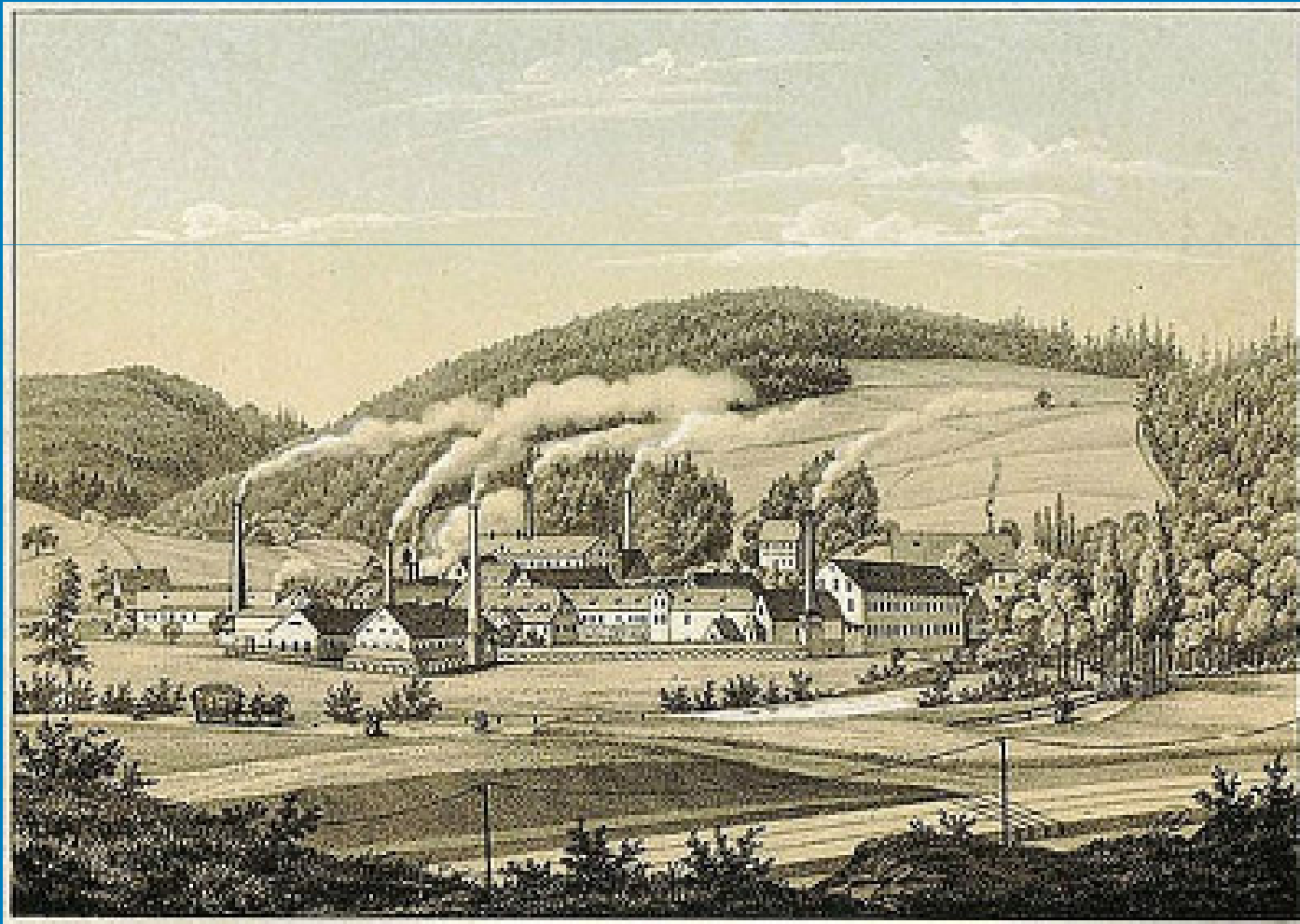




Annaberg

Aue





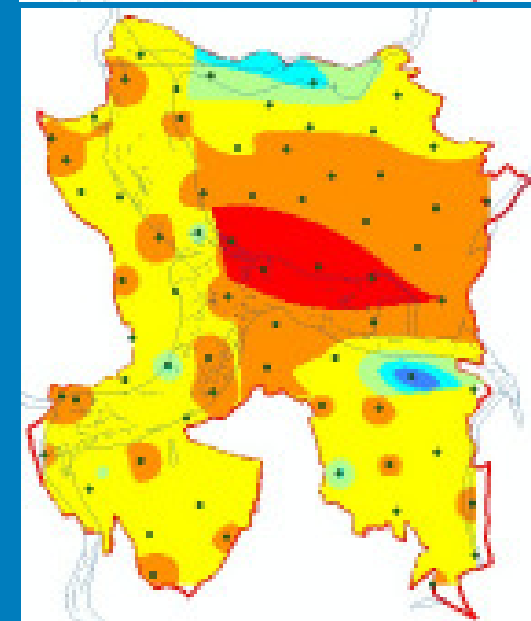
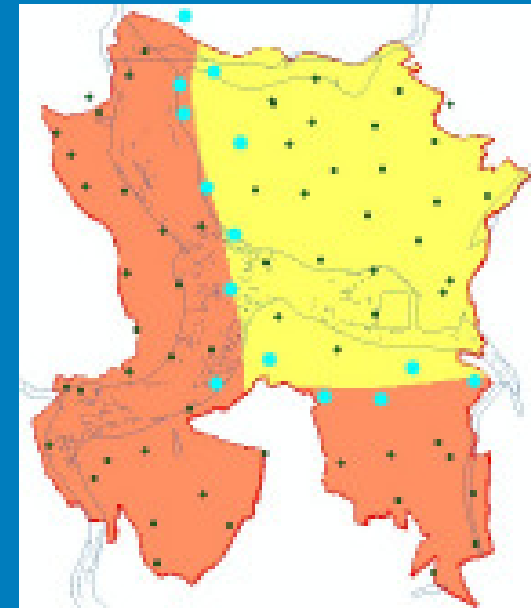
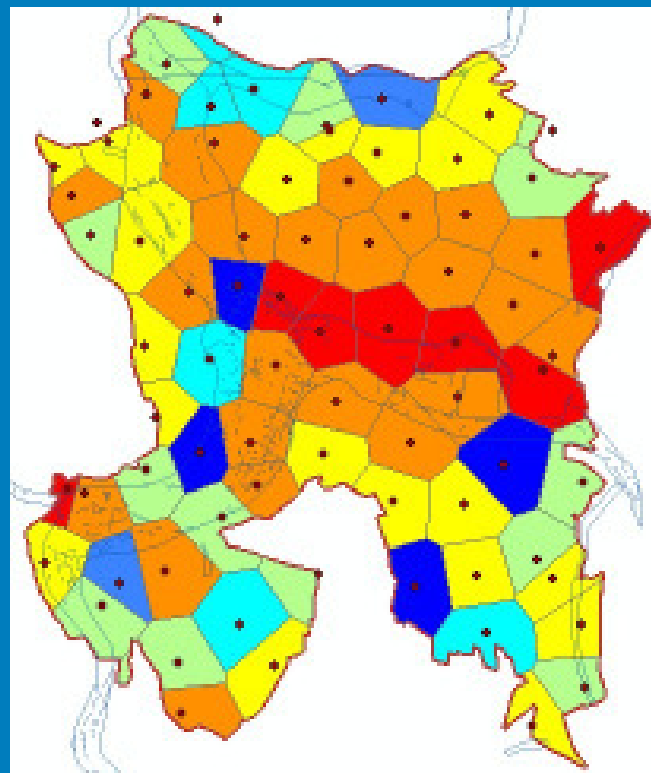
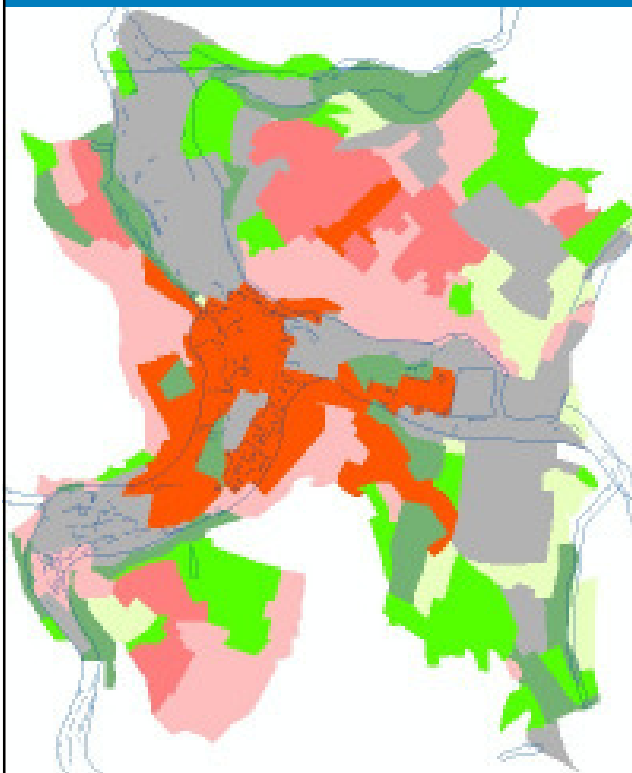
Aue

Three Approaches for Soil Contamination Mapping in Urban Areas

- immission-based approach
- substrate-based approach
- spatial-analytic approach

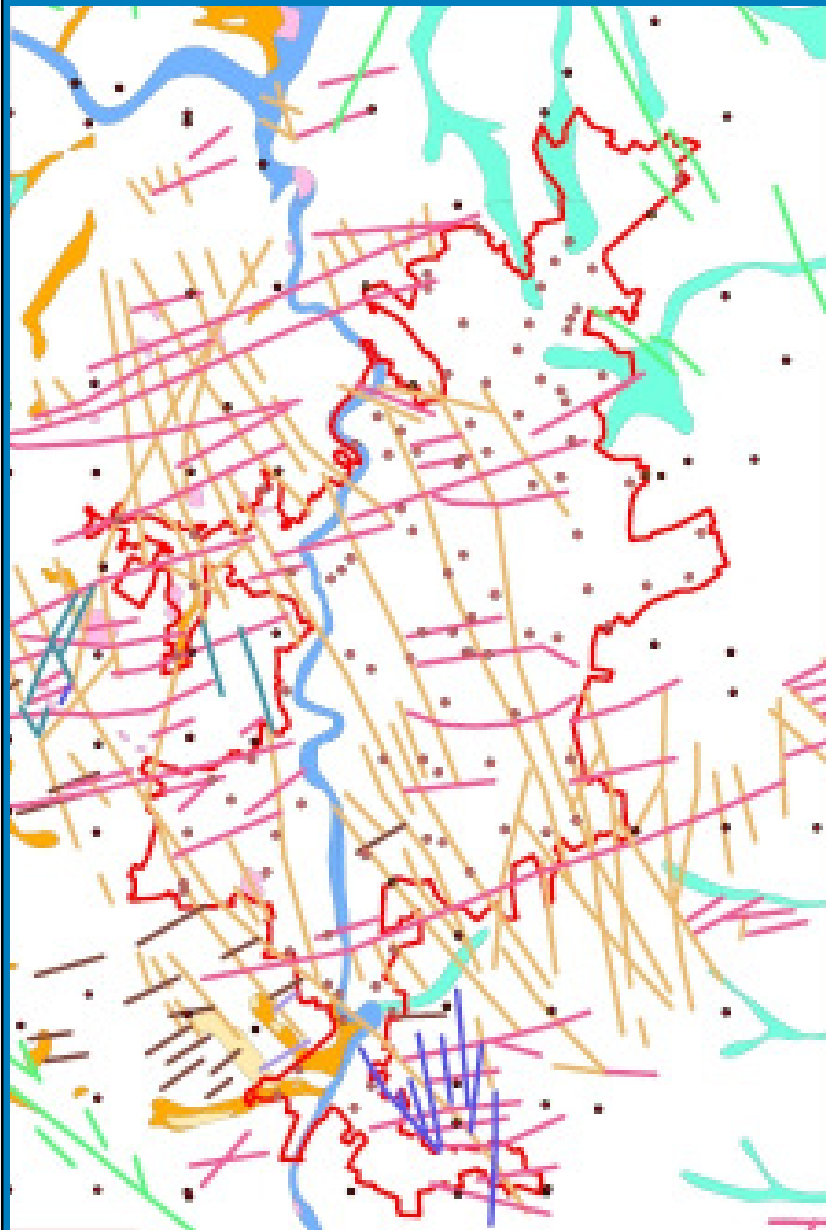


immission-based



- FE
- GA
- GL
- IG
- WG_BL
- WG_EHB
- WG_RH

- CDKW_A_N_VOR
CD_KW
- 0,050000 - 0,100000
 - 0,100001 - 0,200000
 - 0,200001 - 0,300000
 - 0,300001 - 0,500000
 - 0,500001 - 0,900000
 - 0,900001 - 2,000000
 - 2,000001 - 4,200000

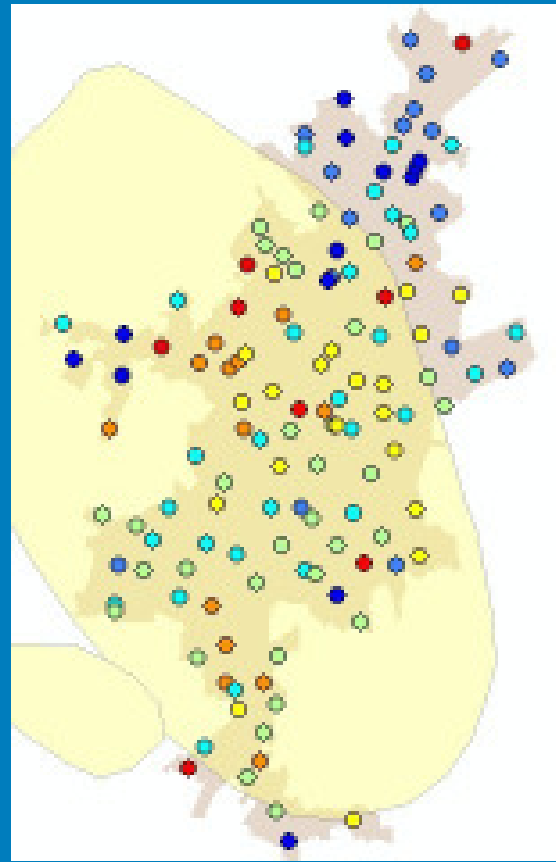


Geologie

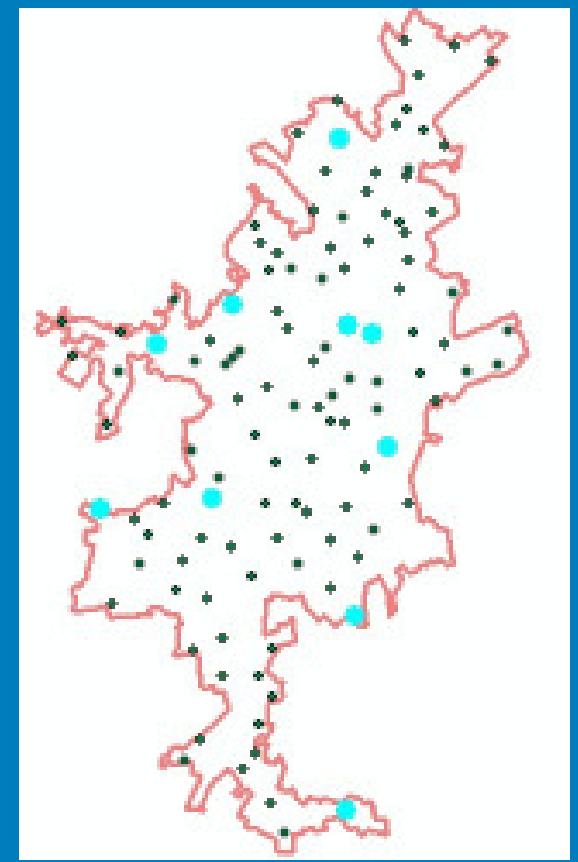
Bodengeologie

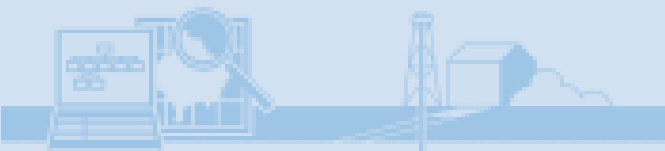
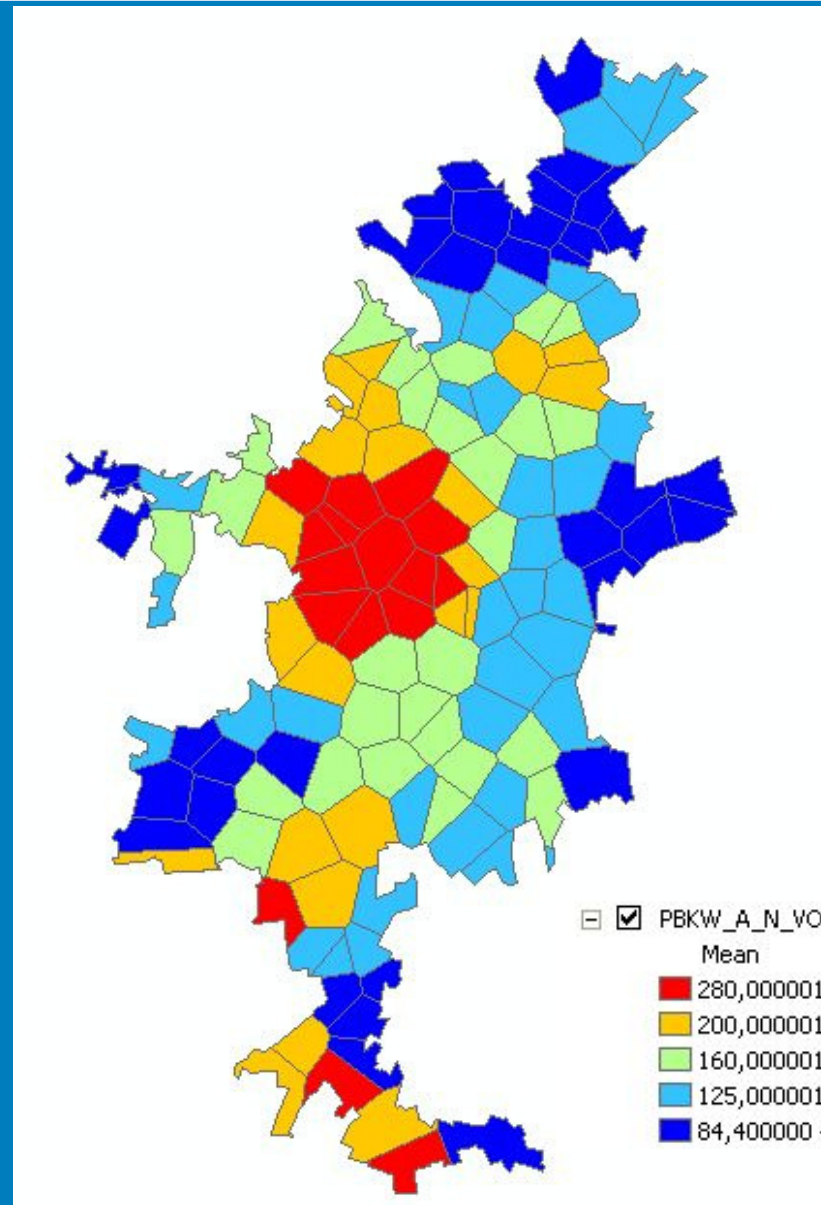
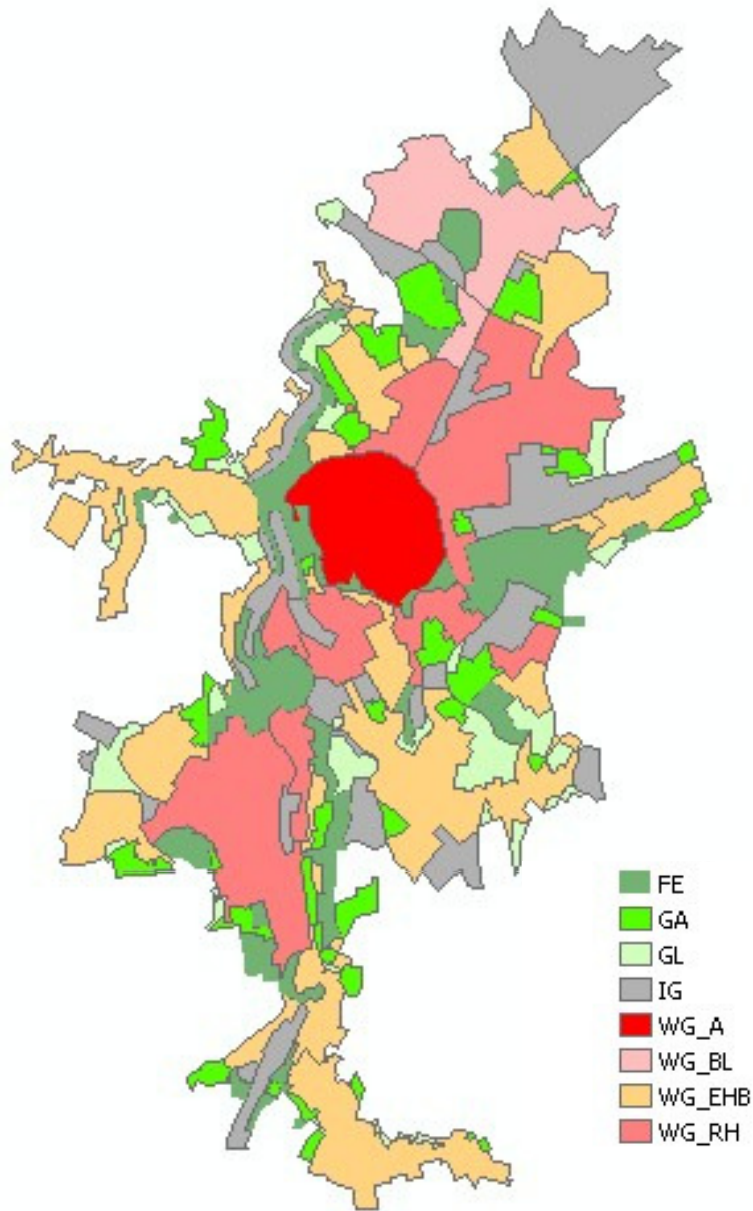
Proben mit Schlackebestandteilen

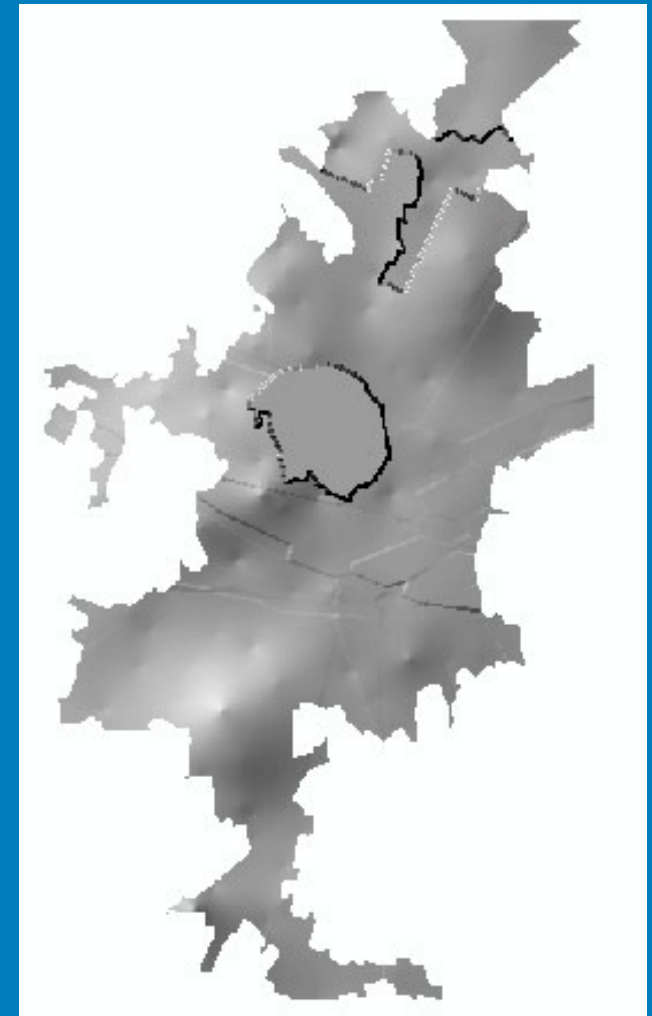
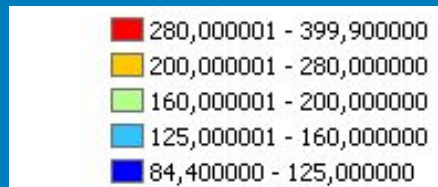
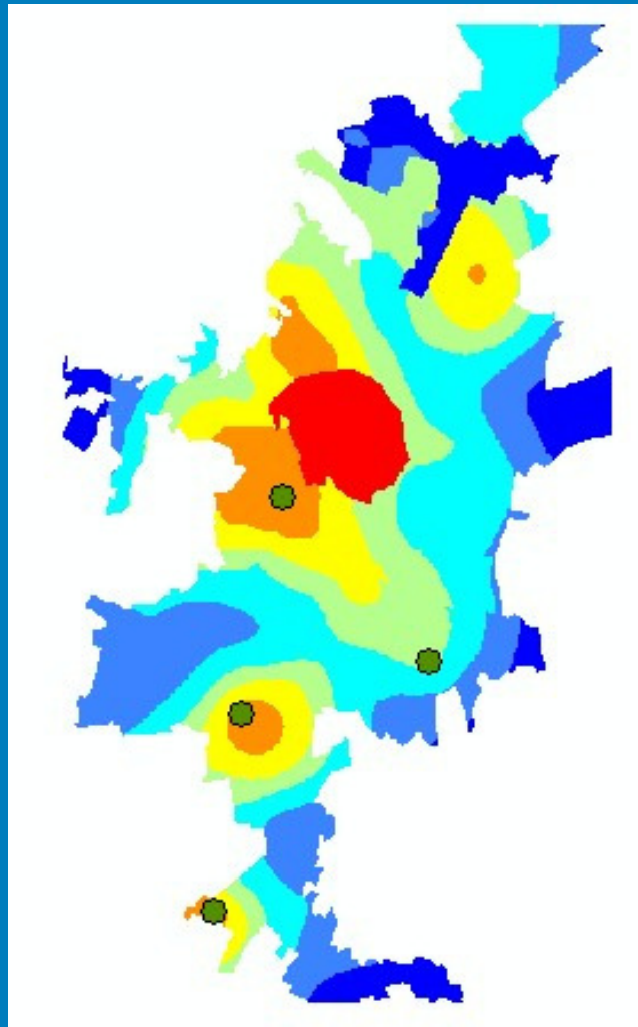
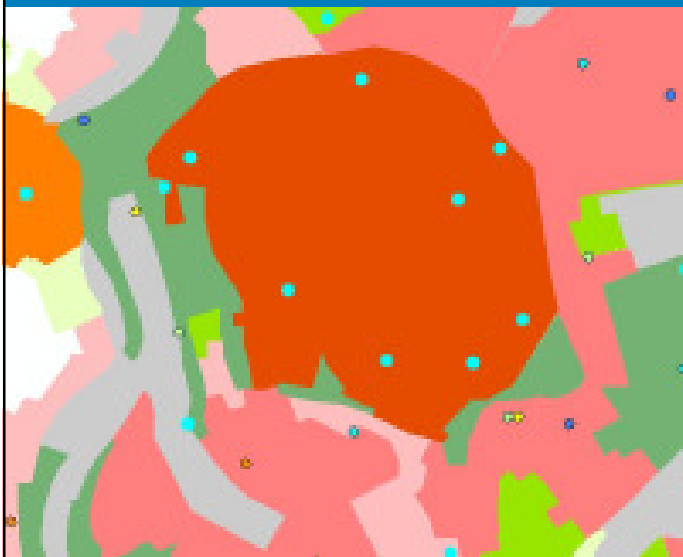
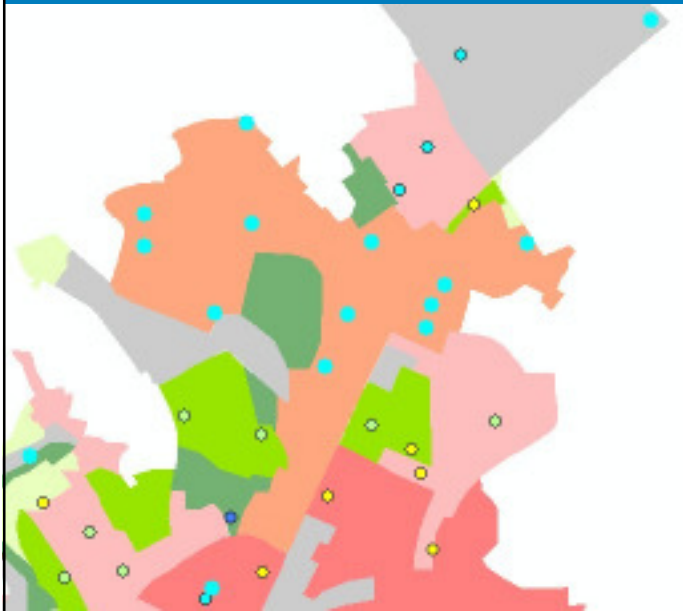
anthropogene Auffülle



Interpolation





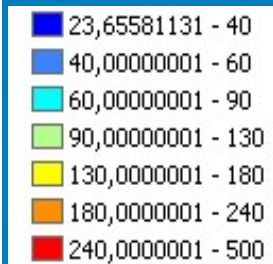
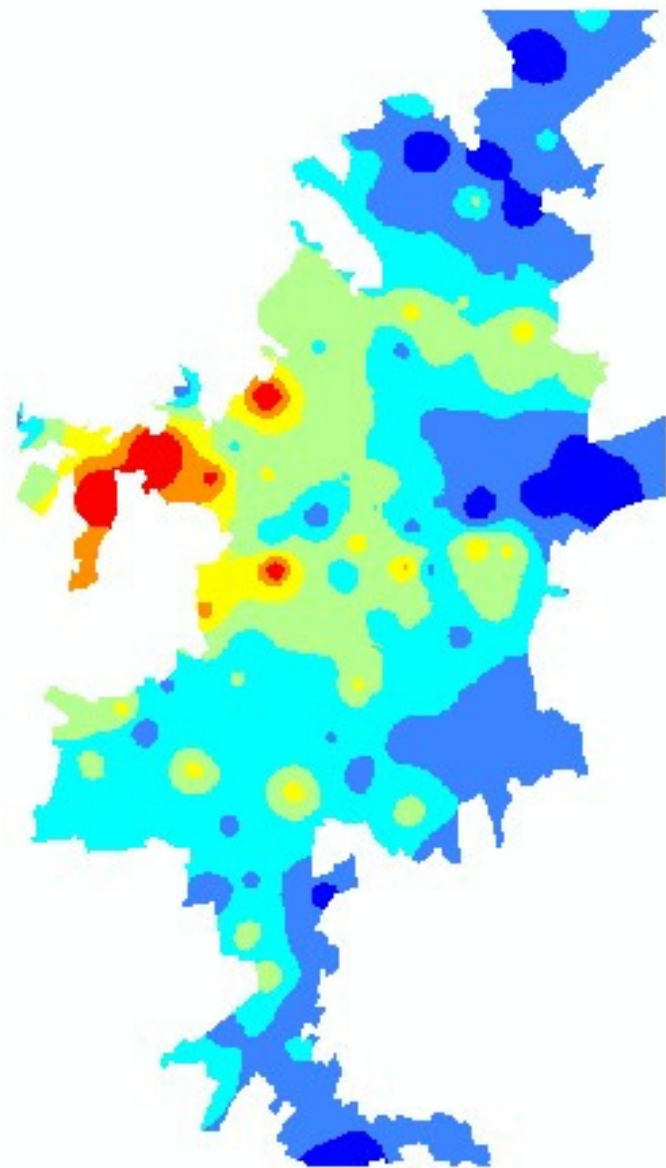


Statistic Methods

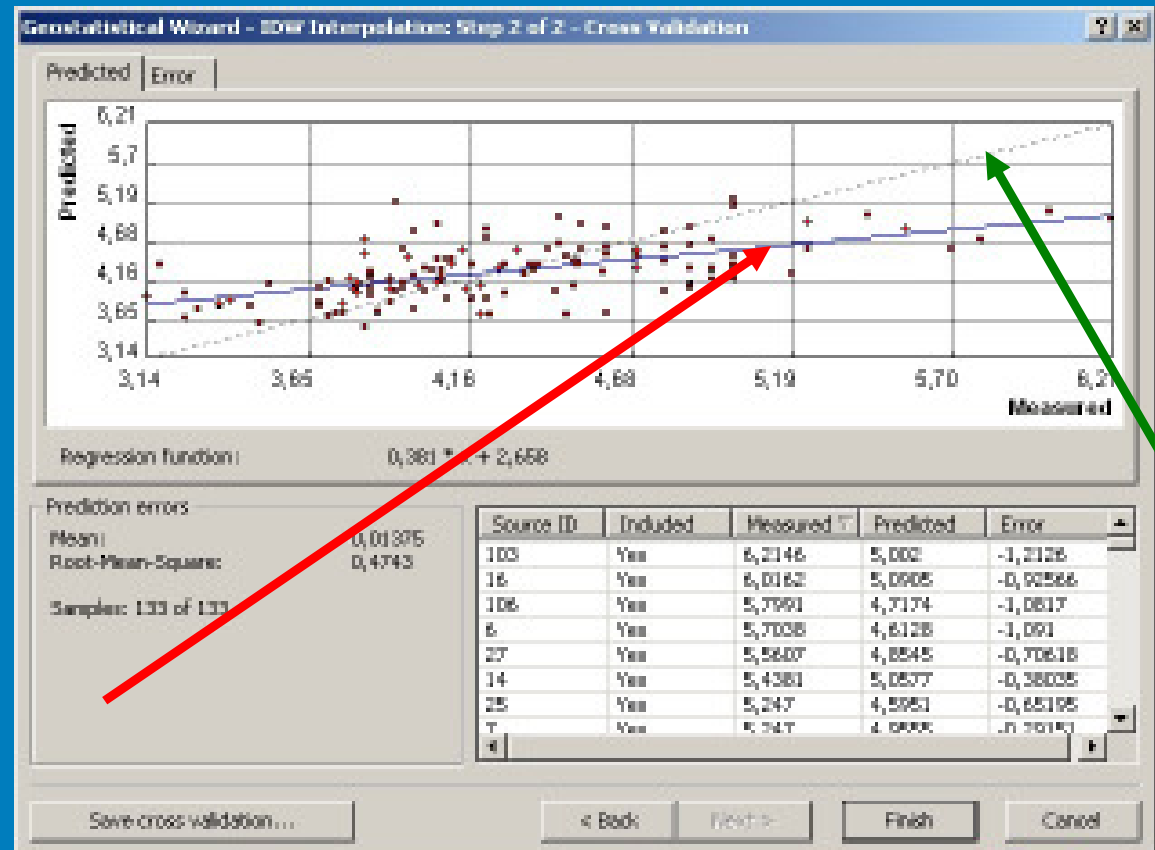
- Voronoi-Mosaik
- Inverse Distance Weighting (IDW)
- Ordinary and Universal Kriging (OK, UK)
- artificial intelligence (artificial neural networks)**
(advangeo®)



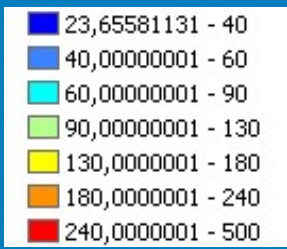
Interpolation - IDW



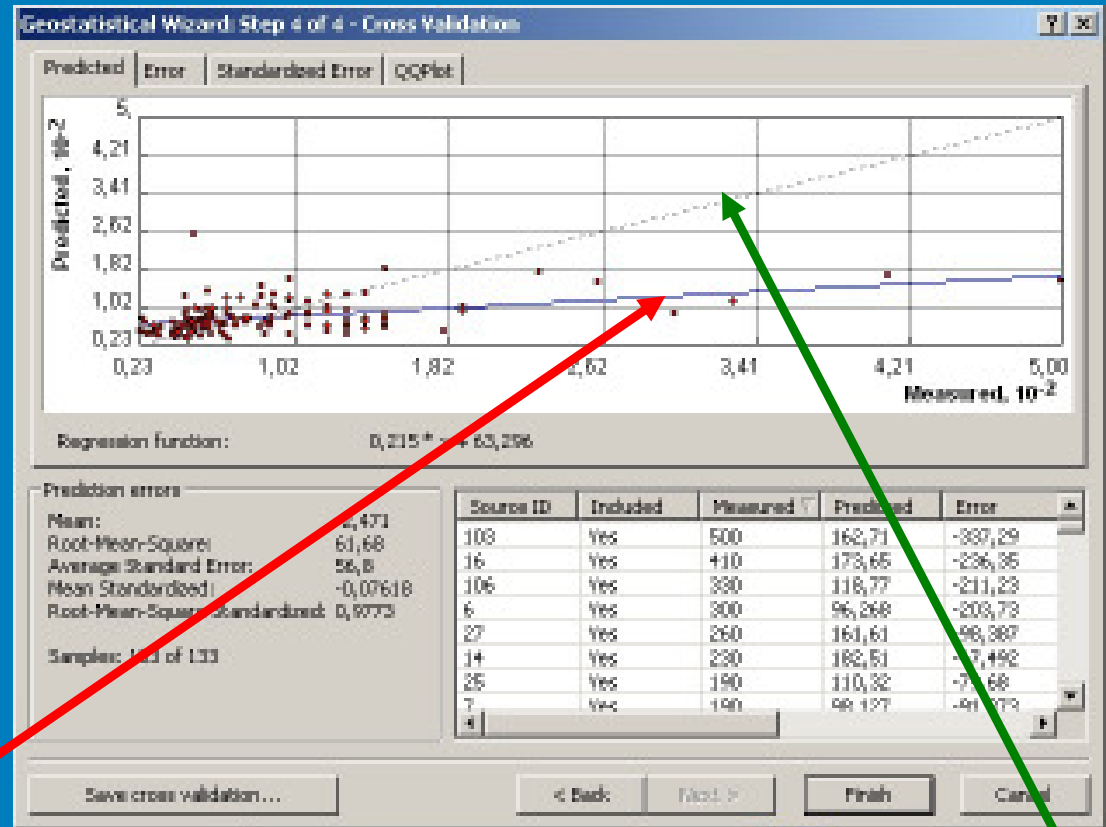
As [ppm]



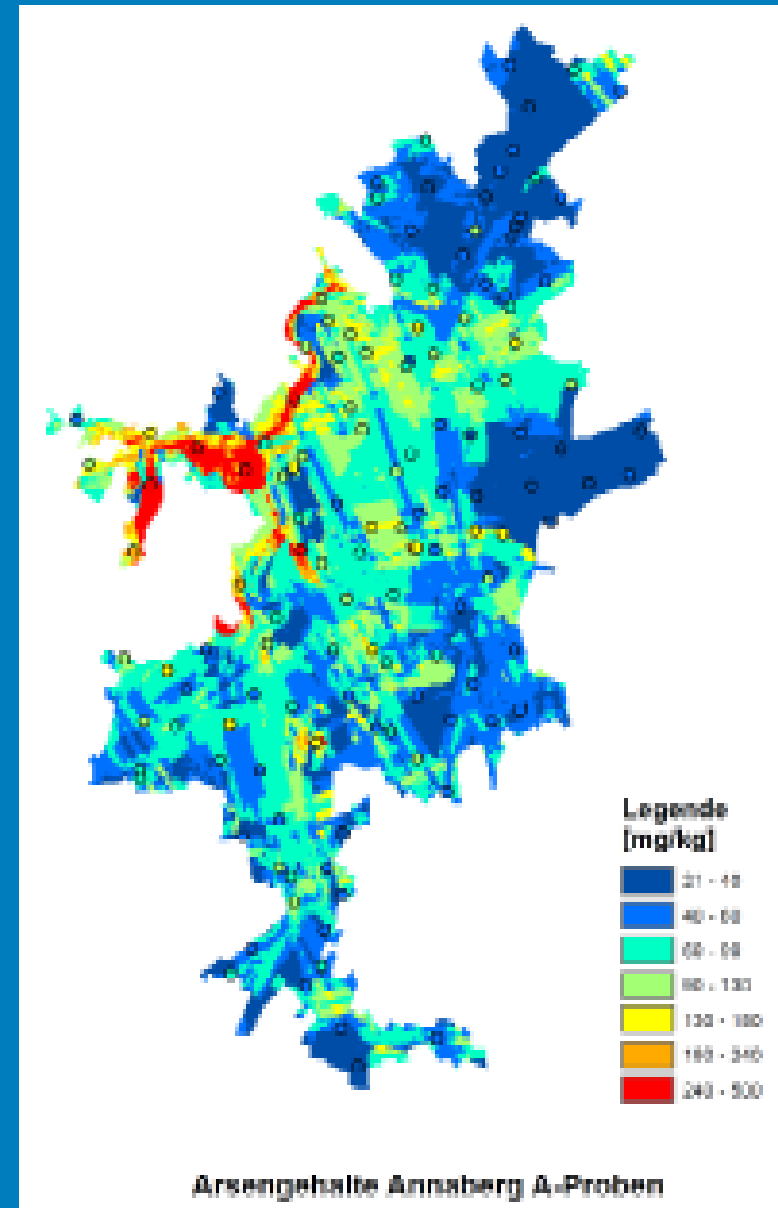
Interpolation - OK

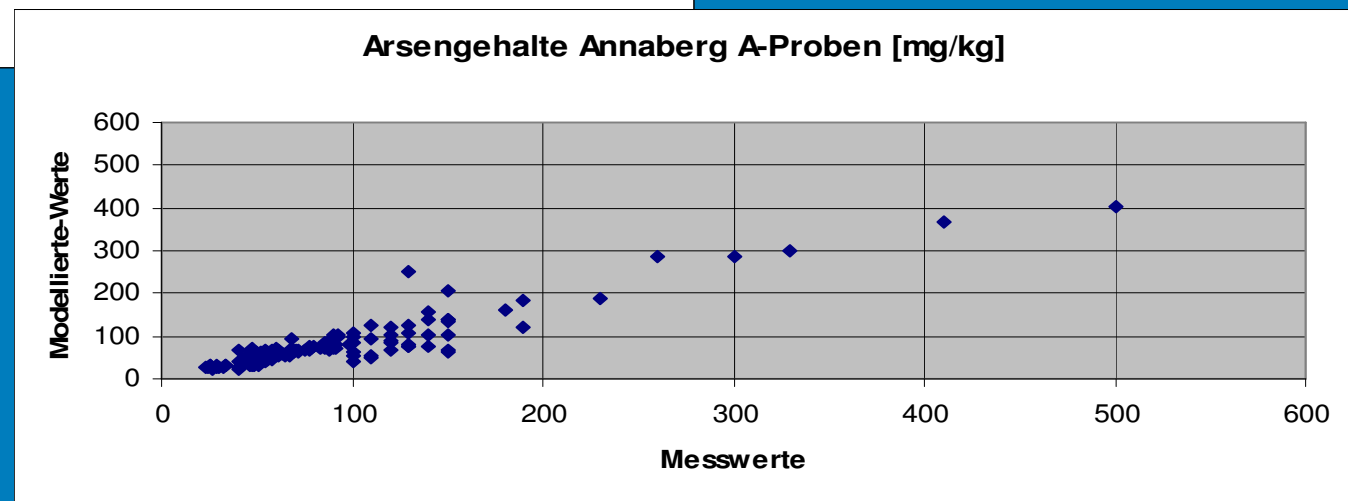
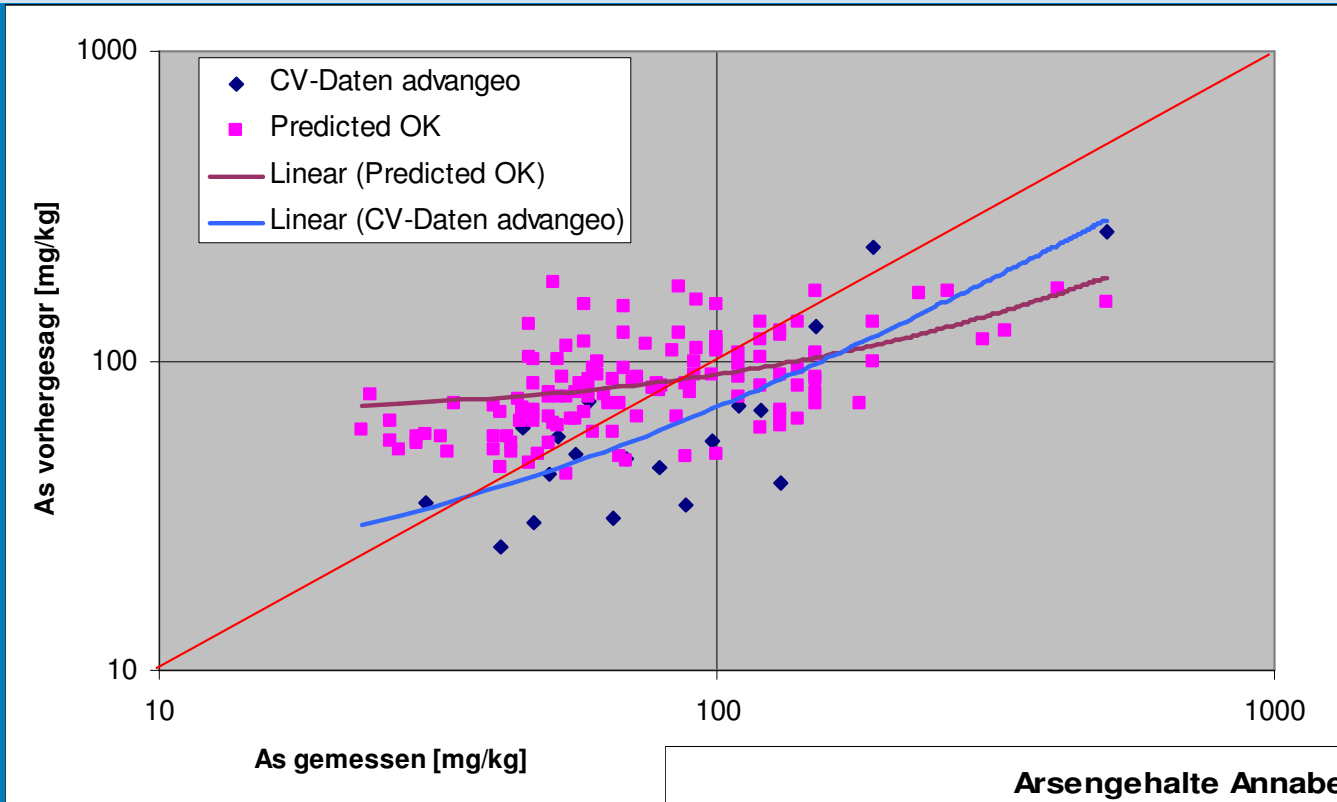


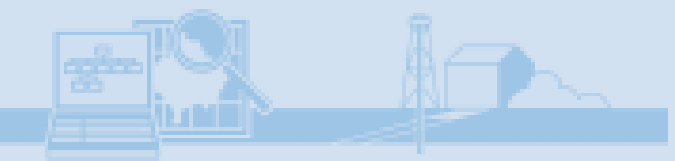
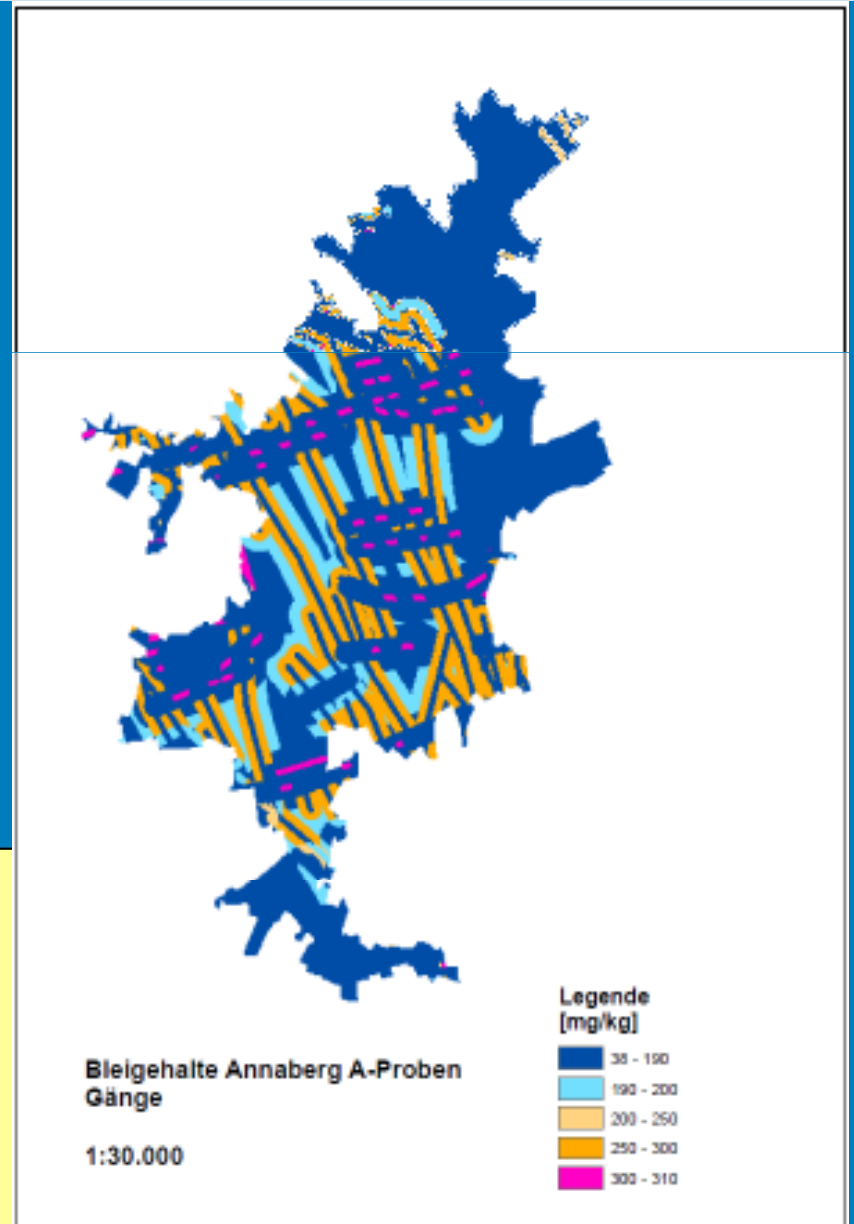
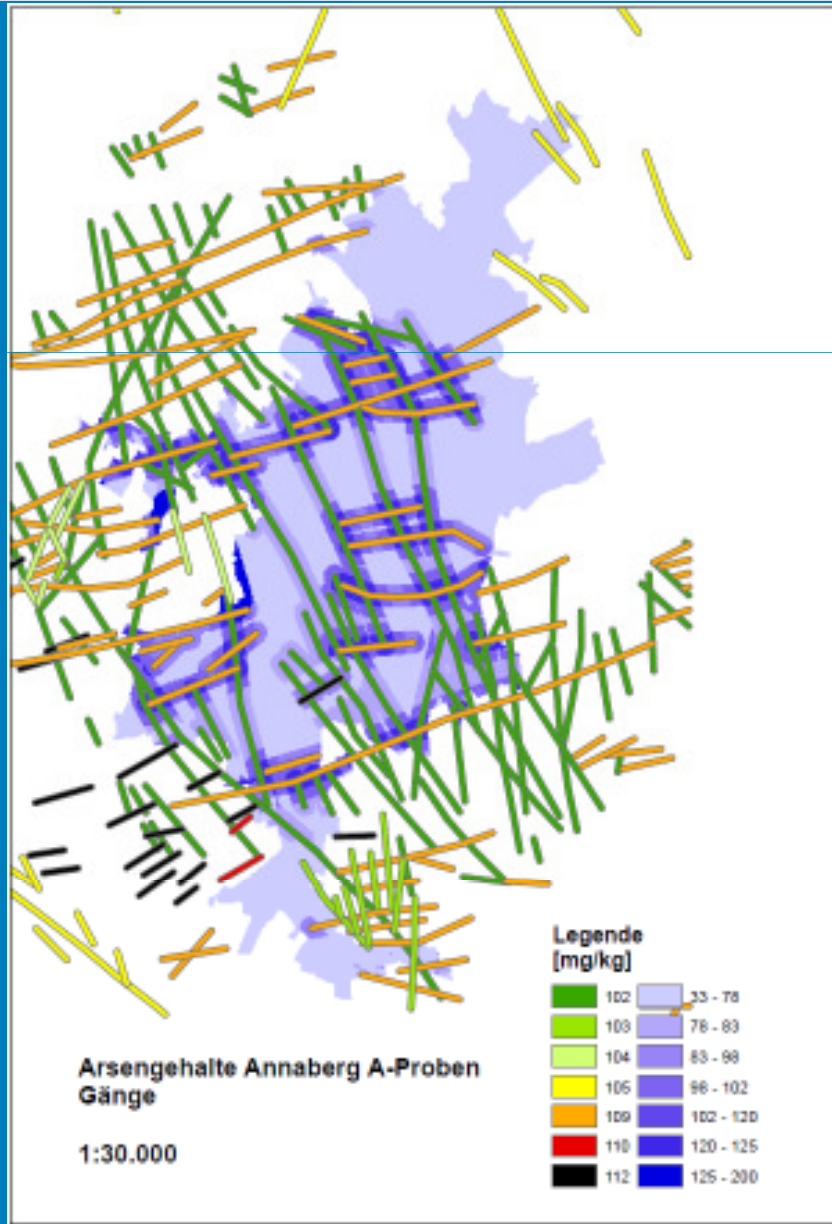
As [ppm]

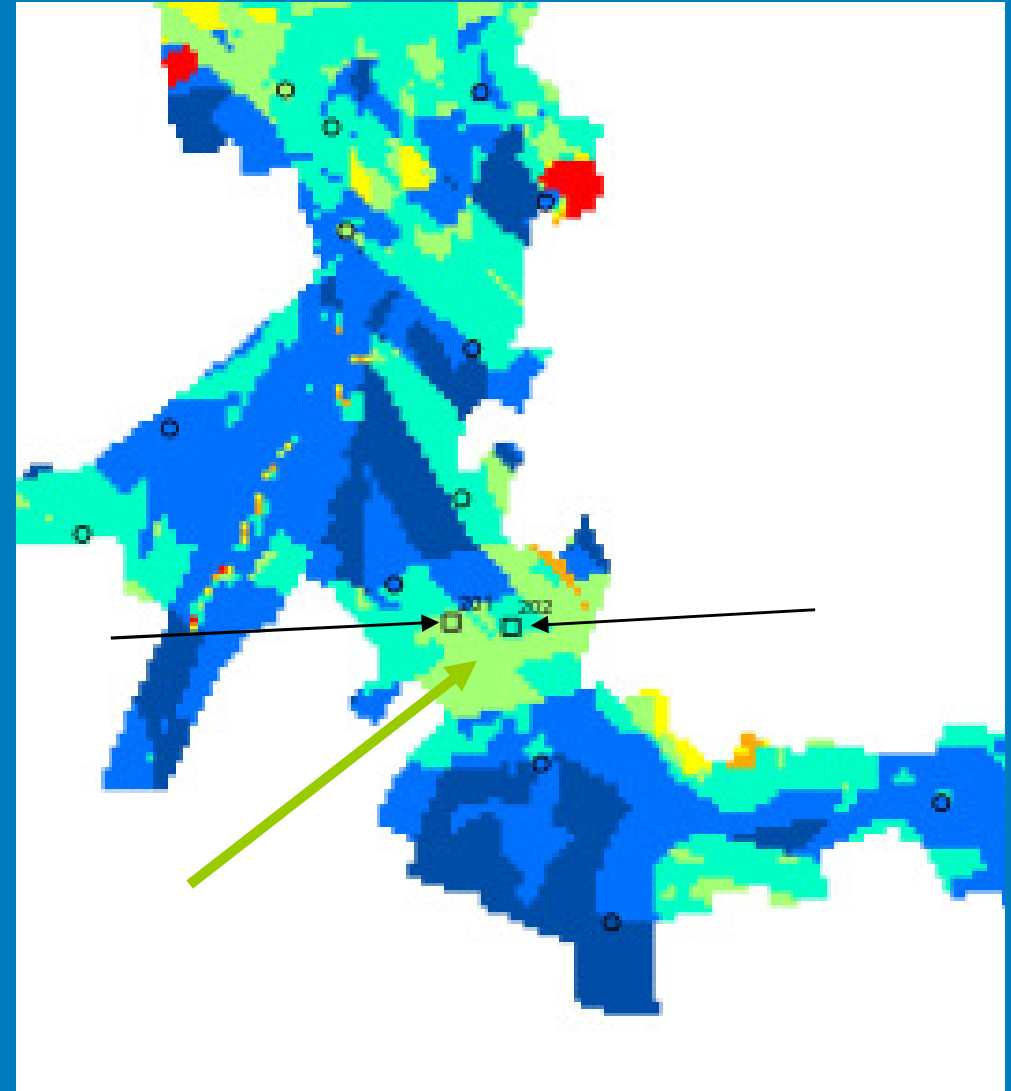
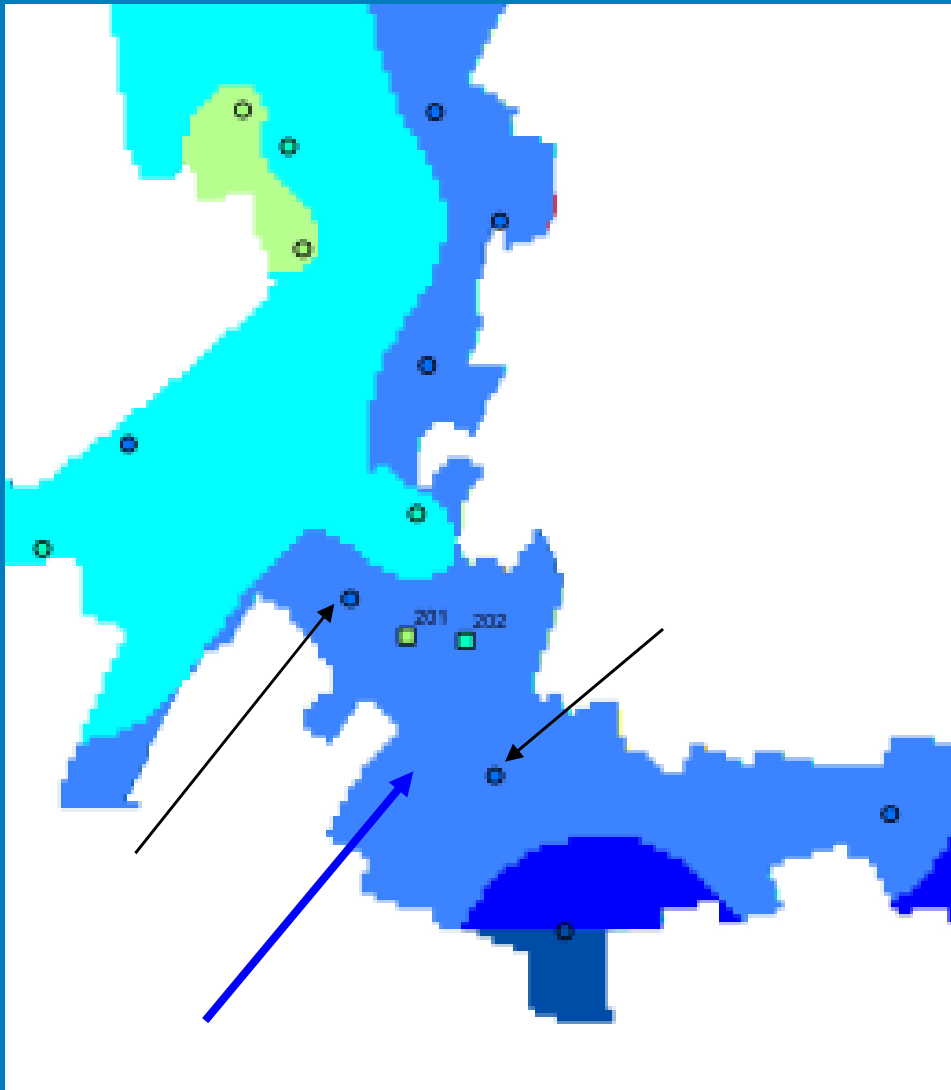


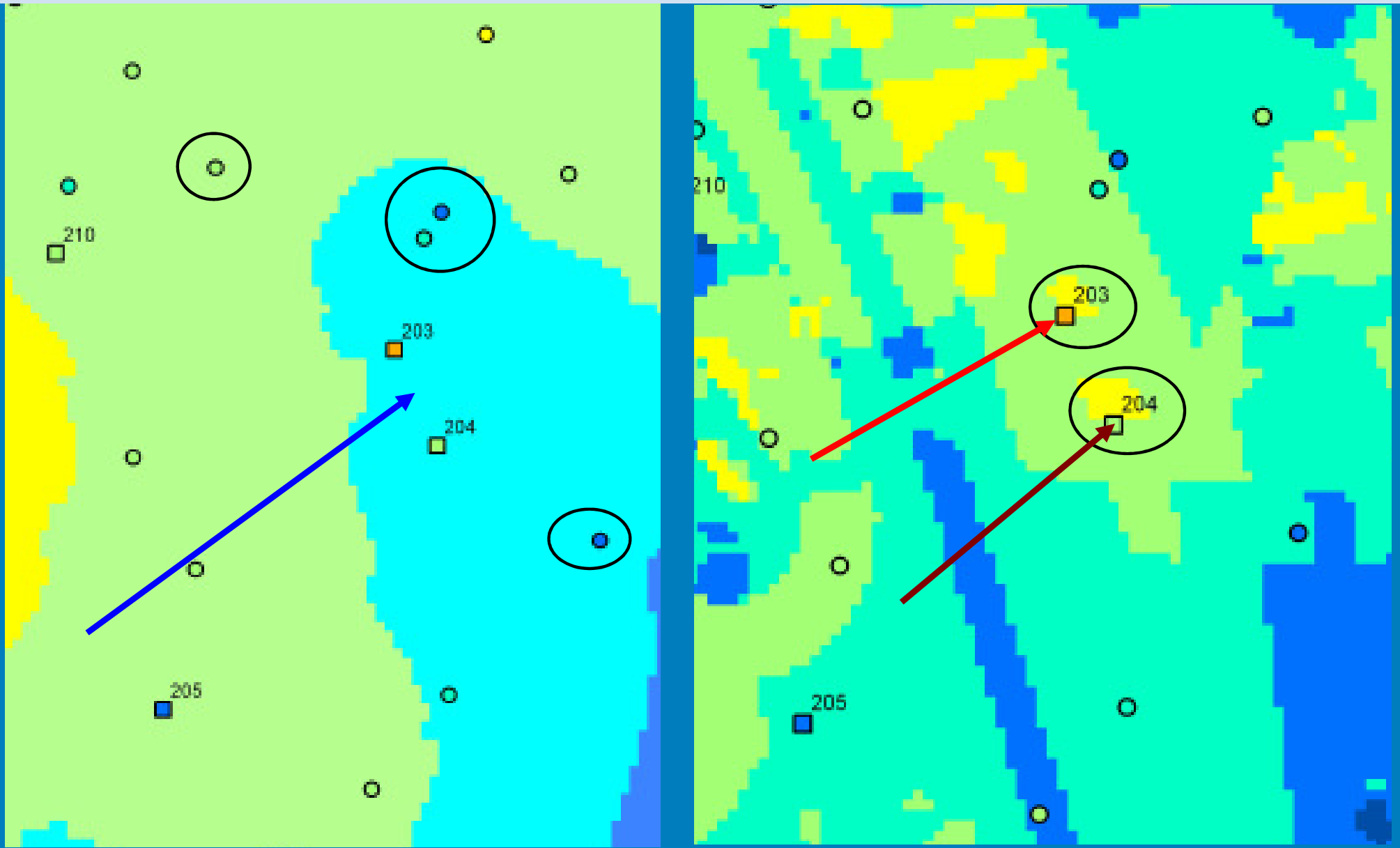
- ore veins (7 formations)
- landuse (9 classes)
- summarised ore deposit area
- samples with slag components
- DTM digital terrain model











Advangeo

knowledge-based data modelling

prediction of events and phenomena with spatial relations

- soil sample concentration
- mineral occurrences and ore deposits
- kinds of erosion
- soil characteristics (moisture, ...)
- ...
- ...



