



High resolution mapping of soil geochemistry at a regional scale (Wallonia, South Belgium)

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Belgium and Wallonia





Objective (1/2)

High resolution soil geochemical map



Regulations requirement

I. soil protection

**II. agricultural use of sludge
from sewage plants**



Objective (2/2)

High resolution soil geochemical map

Soil background concentrations = local topsoil concentration
(Doesn't include geochemical anomalies and local pollution)



Zn : 120 mg/kg

Soil background concentrations :

Zn : 50 mg/kg



Data available for soil geochemical map

Soil and geological informations

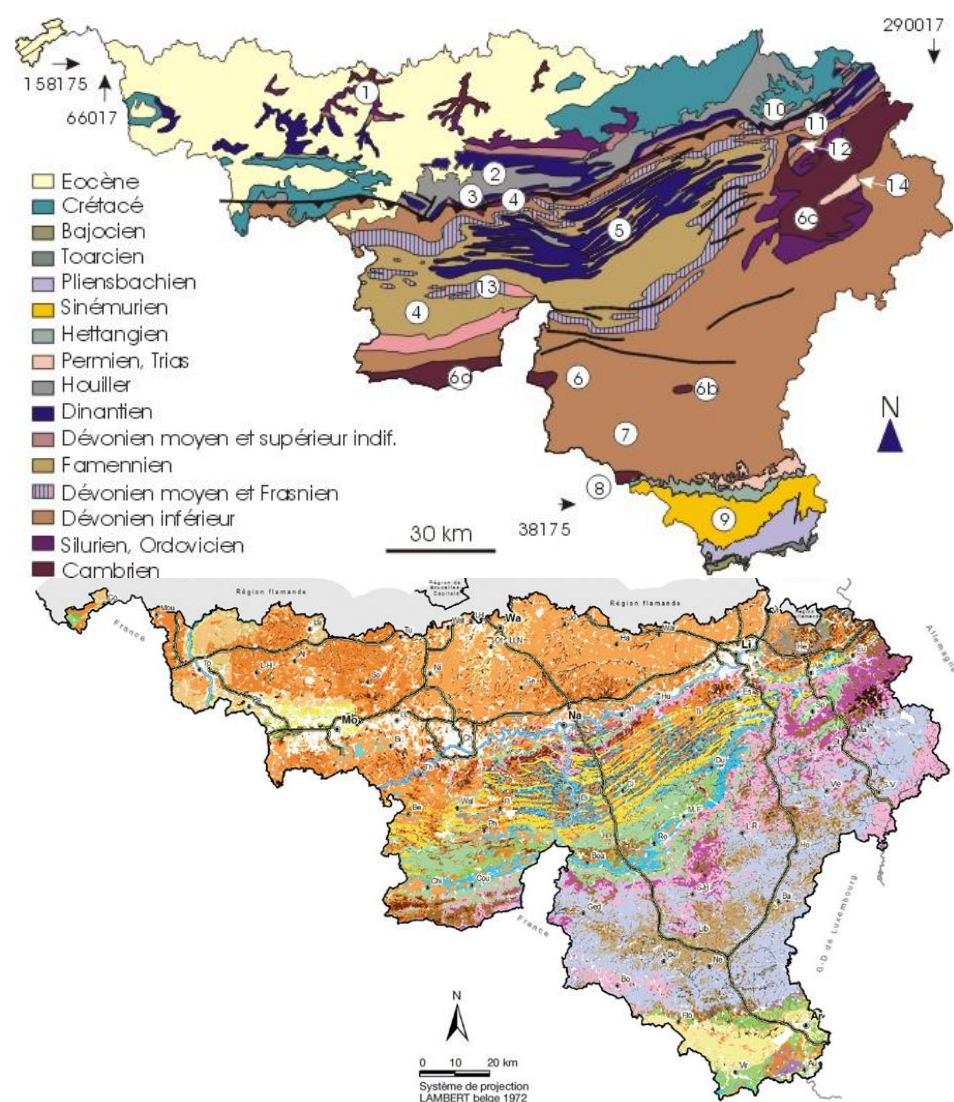
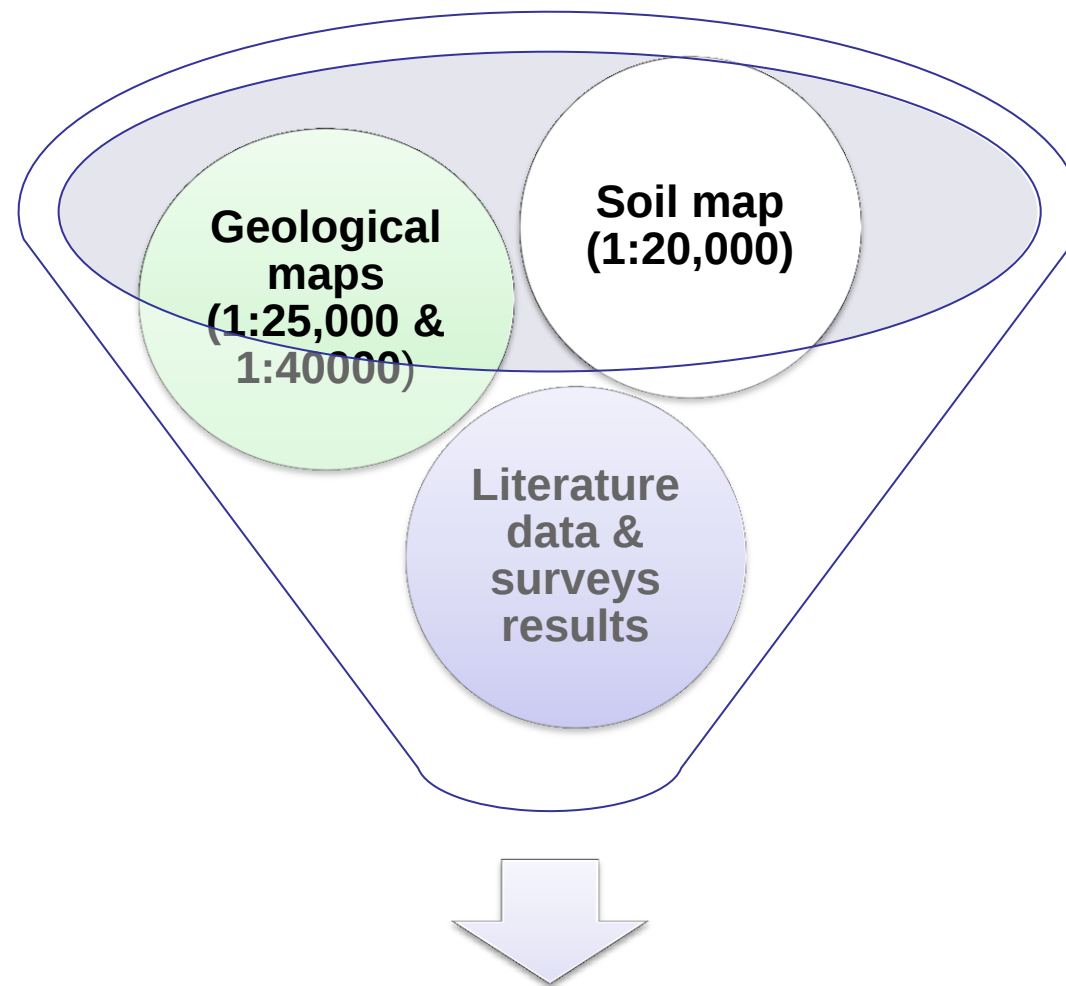


Figure 1. Carte des Principaux Types de Sols de Wallonie. Édition réduite de la carte originale à 1/250000 — Map of Main Soil Types of Wallonia. Reduced edition from the original map at 1:250,000.

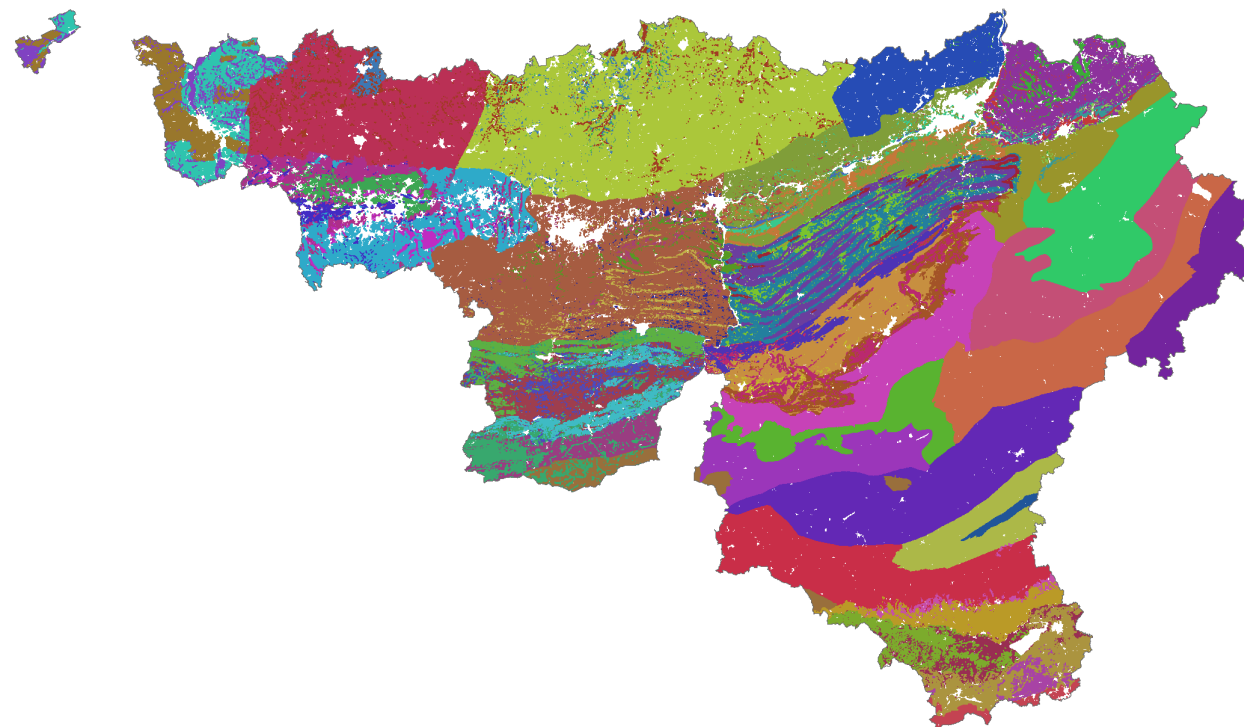
Légende — Legend : voir figure 3 de Legrain X. et al., p.691 — see figure 3 of Legrain X. et al., p.691.



Soil
geochemical
database

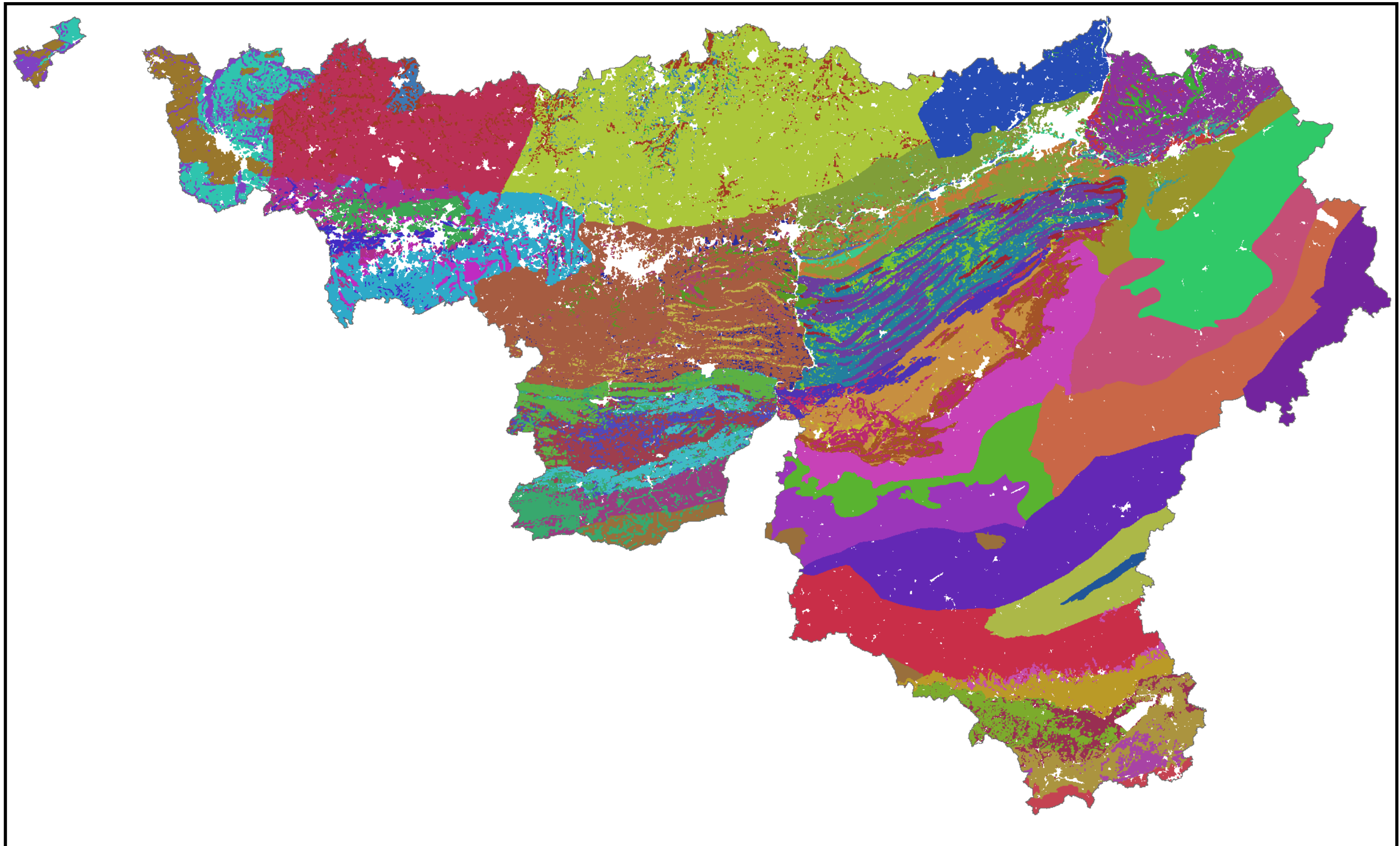


41 pedo-geochemical soil types



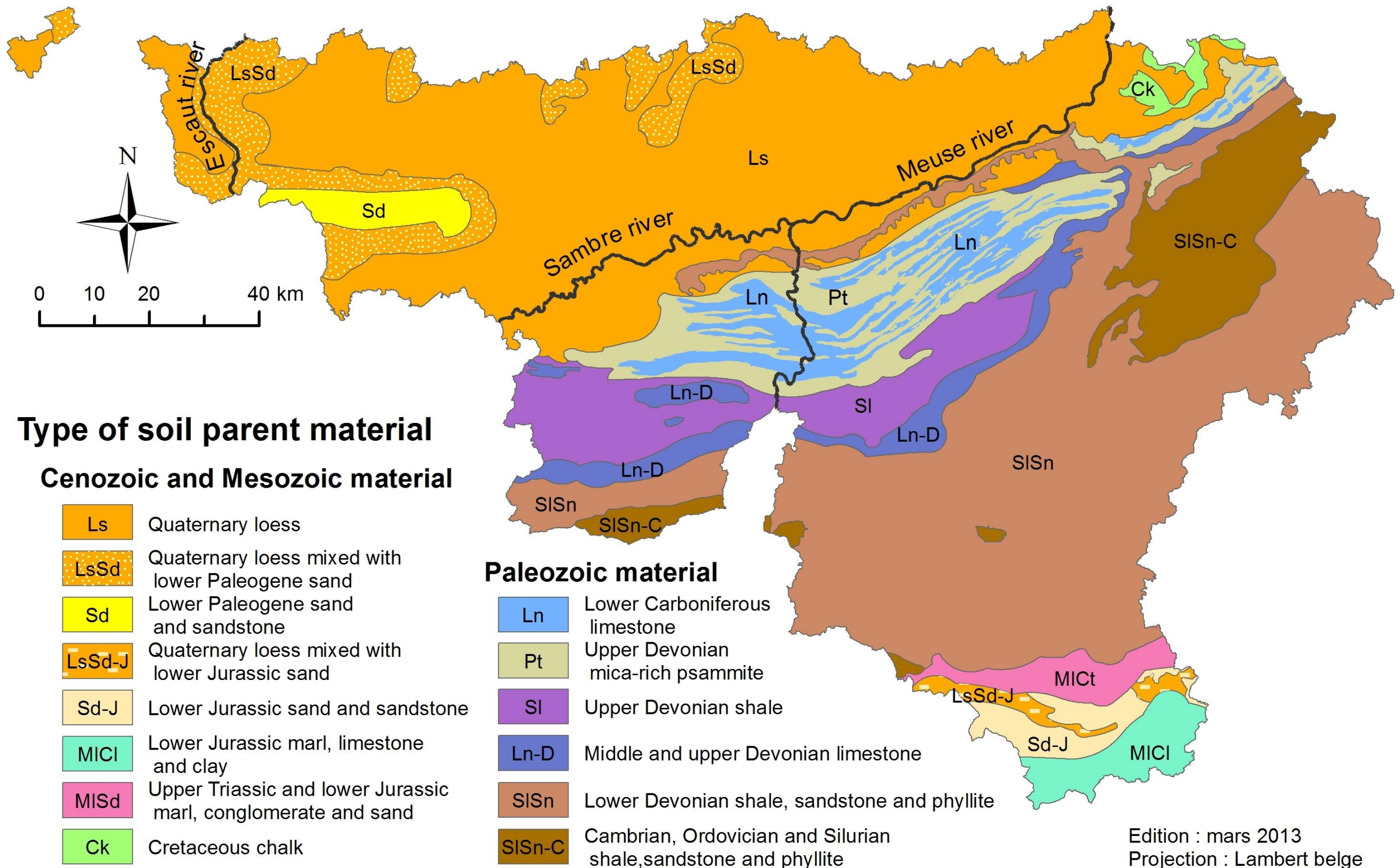


Main pedogeochemical soil types





Main pedogegeochemical soil types





Geochemical database

Origin

POLLUSOL 1

- 163 points
- 1 laboratory, 2002
- Agricultural & forest soils

Environmental
survey

Forest survey

- 560 points
- 1 laboratory, 2005 - 2012
- Forest soils

Environmental
survey

CAPASOL

- 17,500 points
- 12 laboratories, 1995 - 2012
- Agricultural soils

Environmental
regulations



Geochemical database

POLLUSOL 1

- 1 lab. :
-Agricultural soils
-Forest soils

1

2

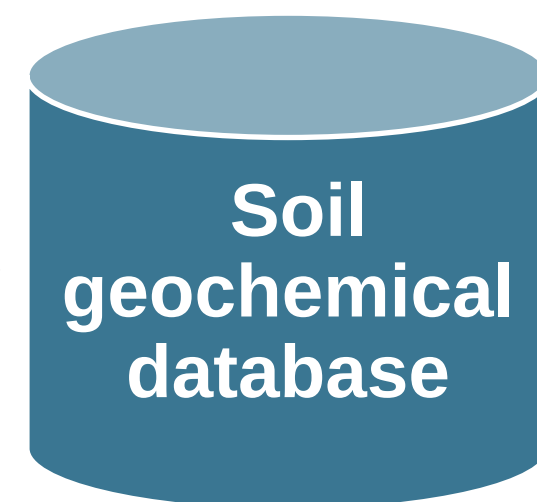
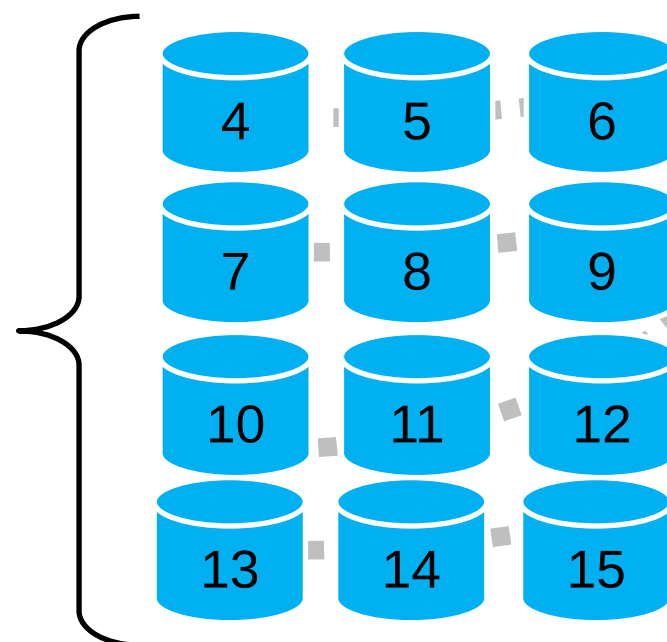
3

Forest survey

- 1 lab.
- Forest soils

CAPASOL

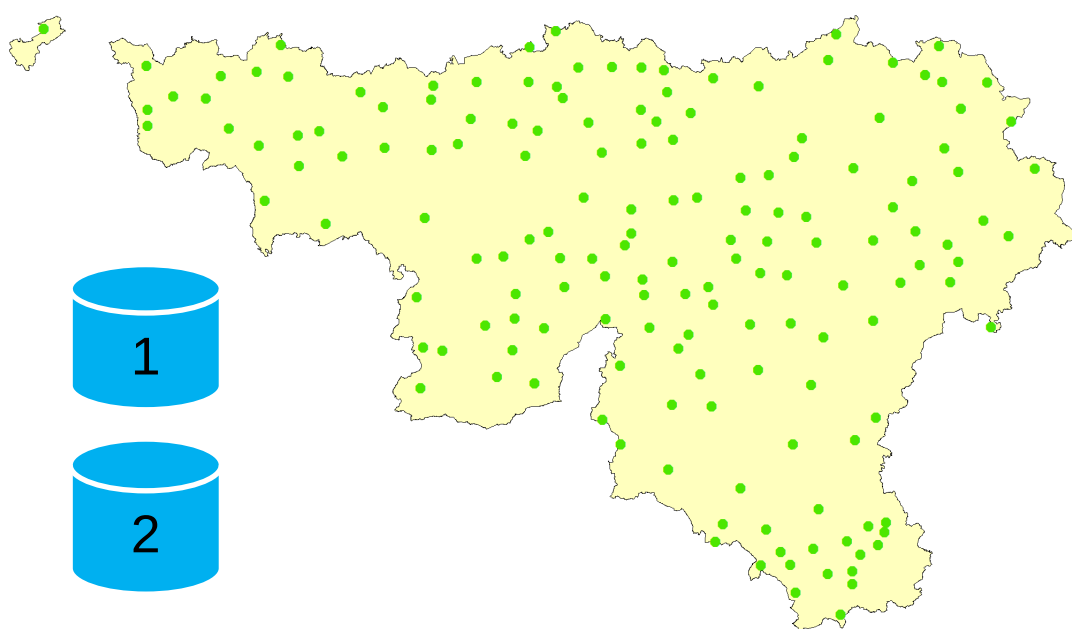
- 12 lab.
- Agricultural soils



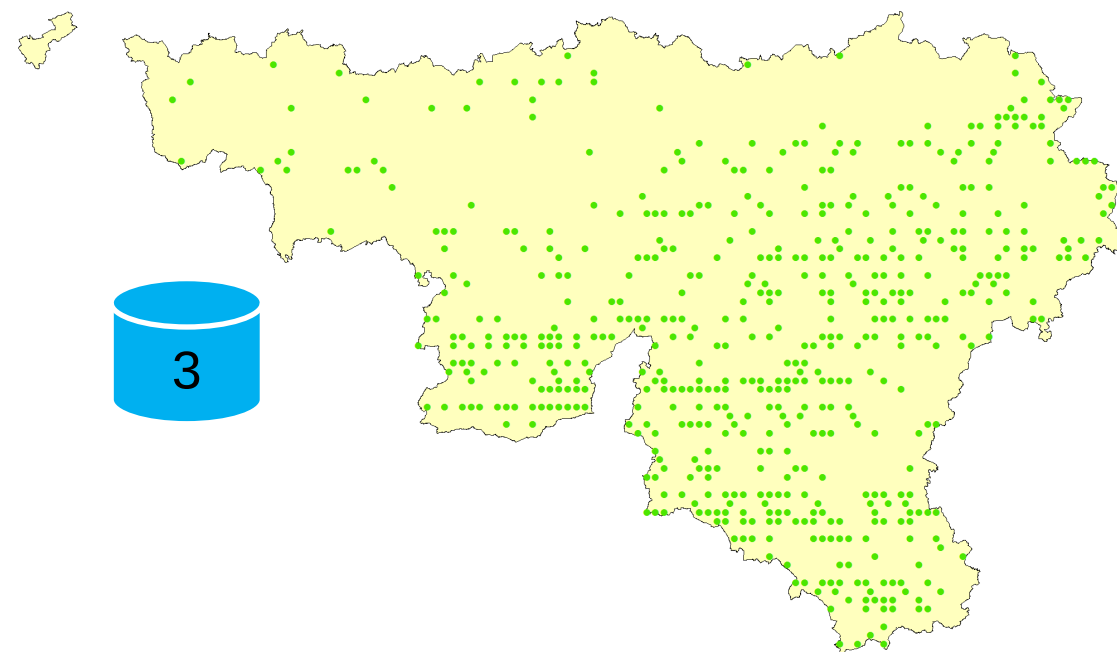


STAGE 1 : relevancy checks (1/2)

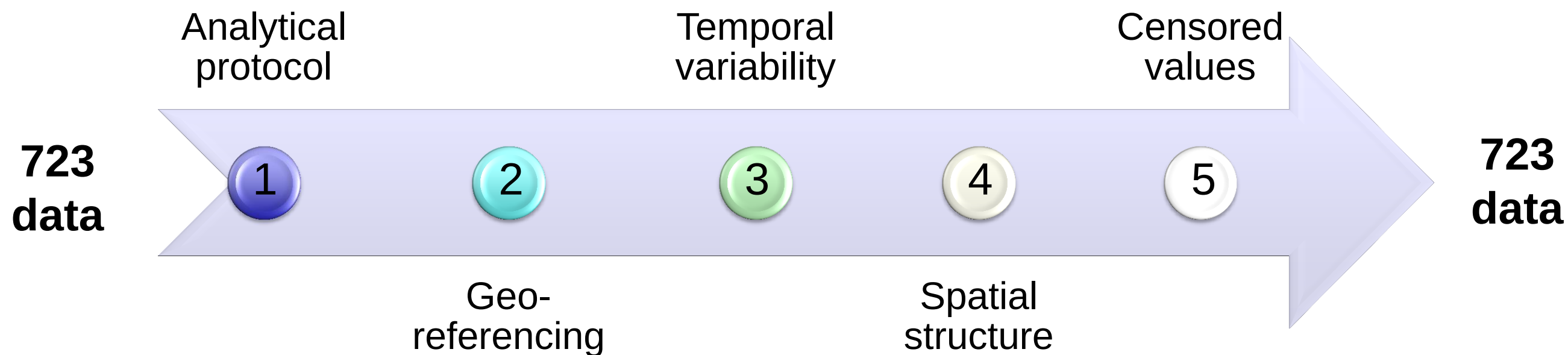
POLLUSOL 1



Forest survey



Relevancy checks

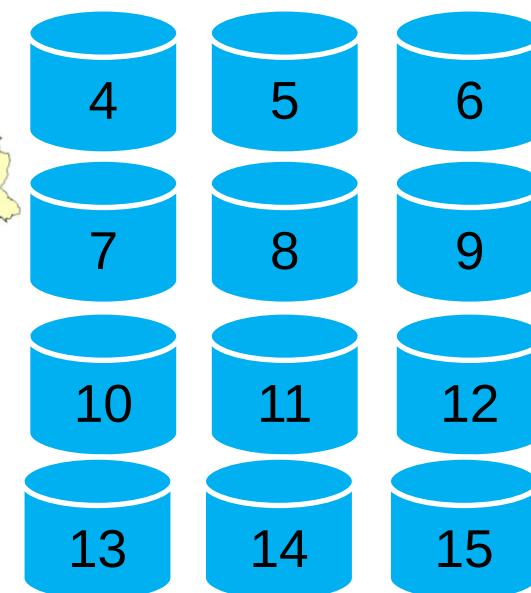
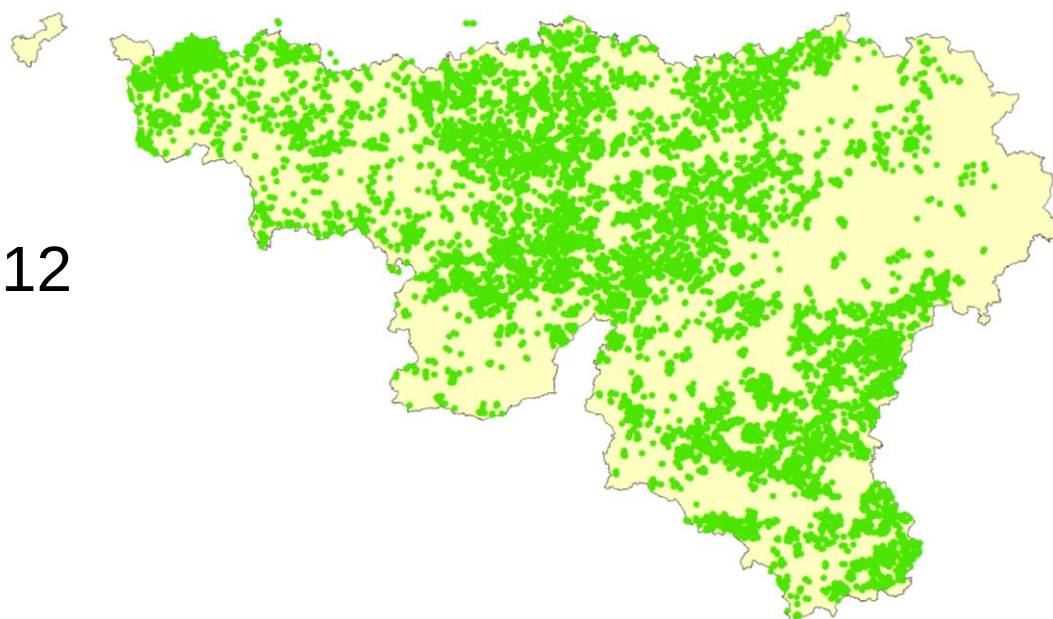




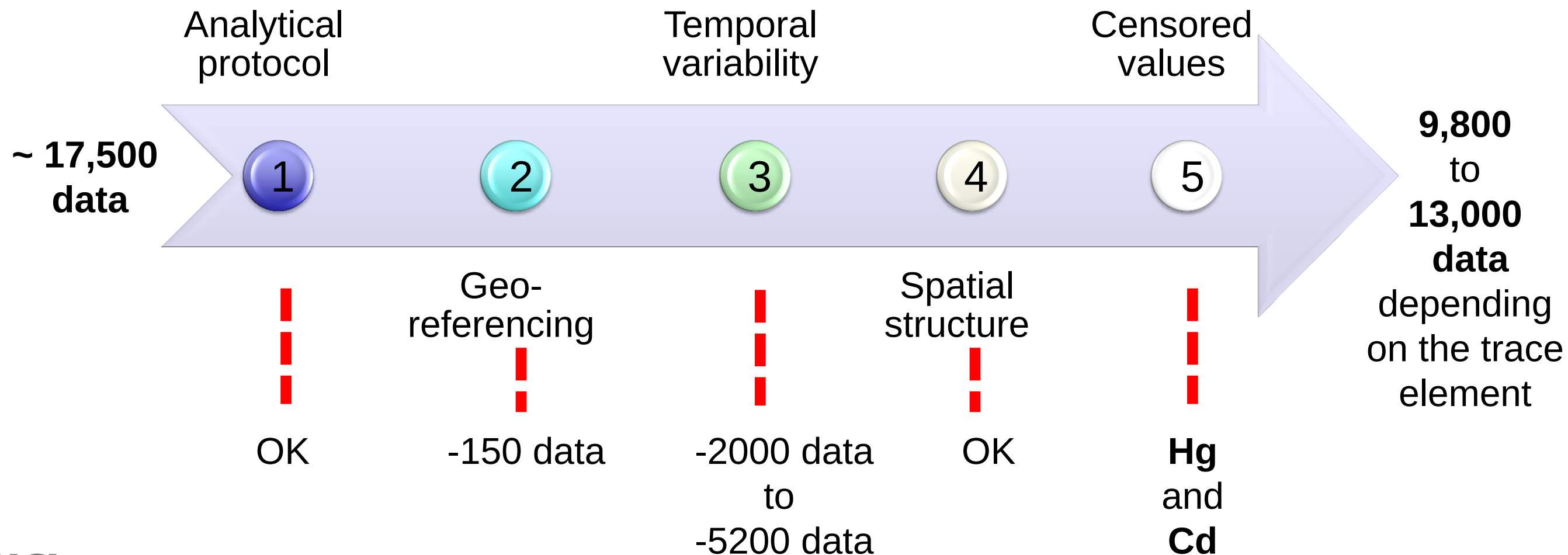
STAGE 1 : relevancy checks (2/2)

CAPASOL

- ~ 17,500 points
- 12 laboratories, 1995 - 2012
- Agricultural soils

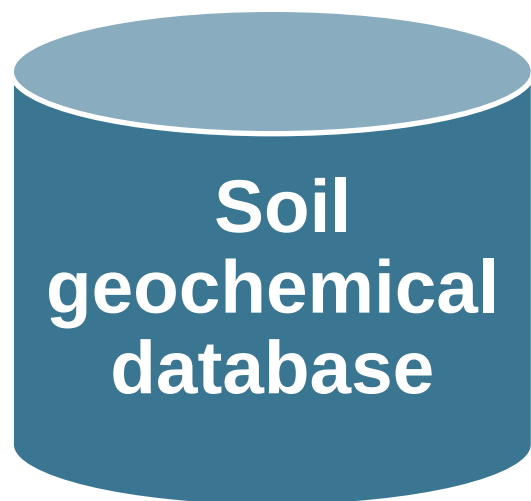


Relevancy checks



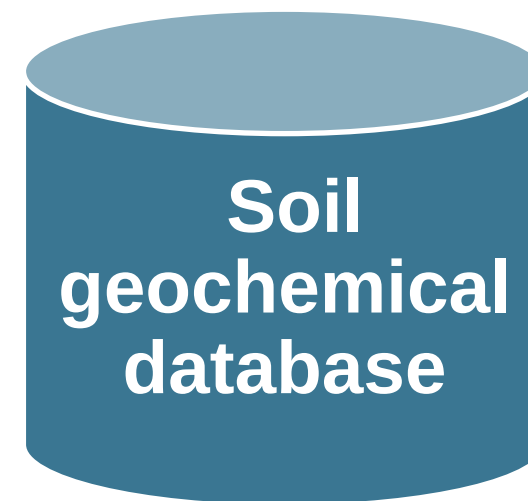
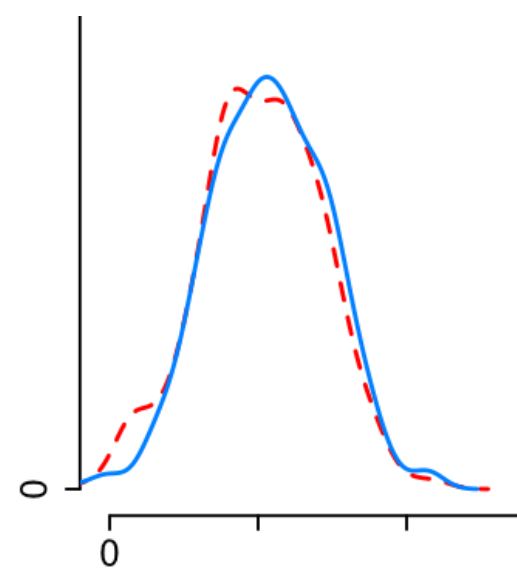
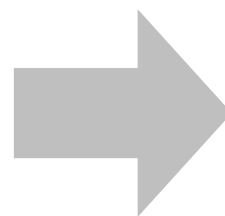
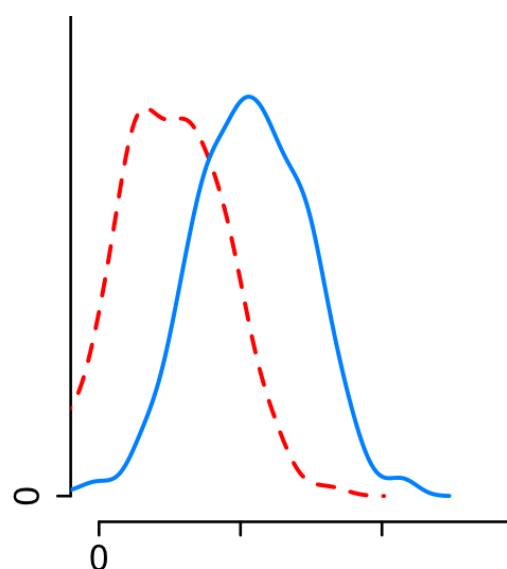


STAGE 2 : accuracy checks and bias corrections



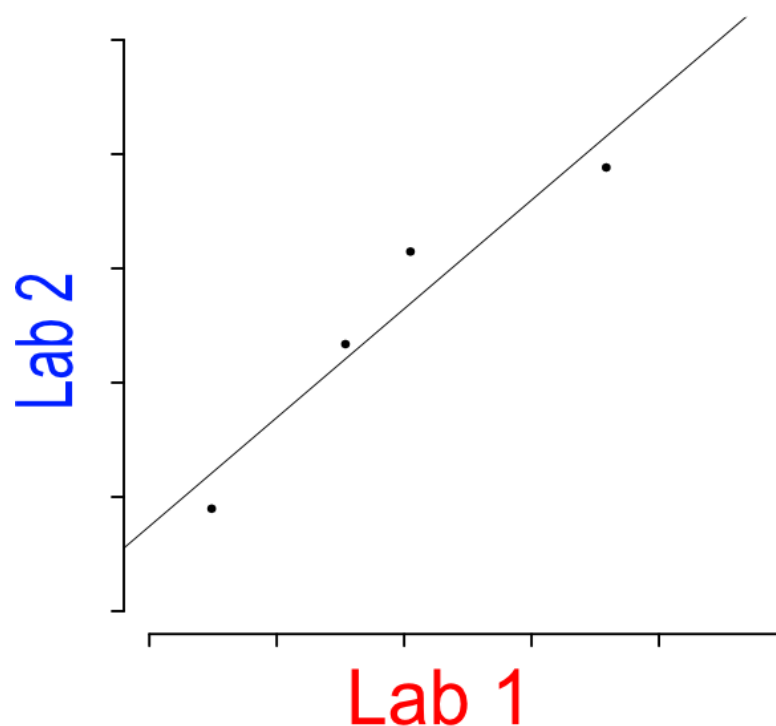
9,800 data
to
13,000 data
depending
on the trace
element

11
laboratories



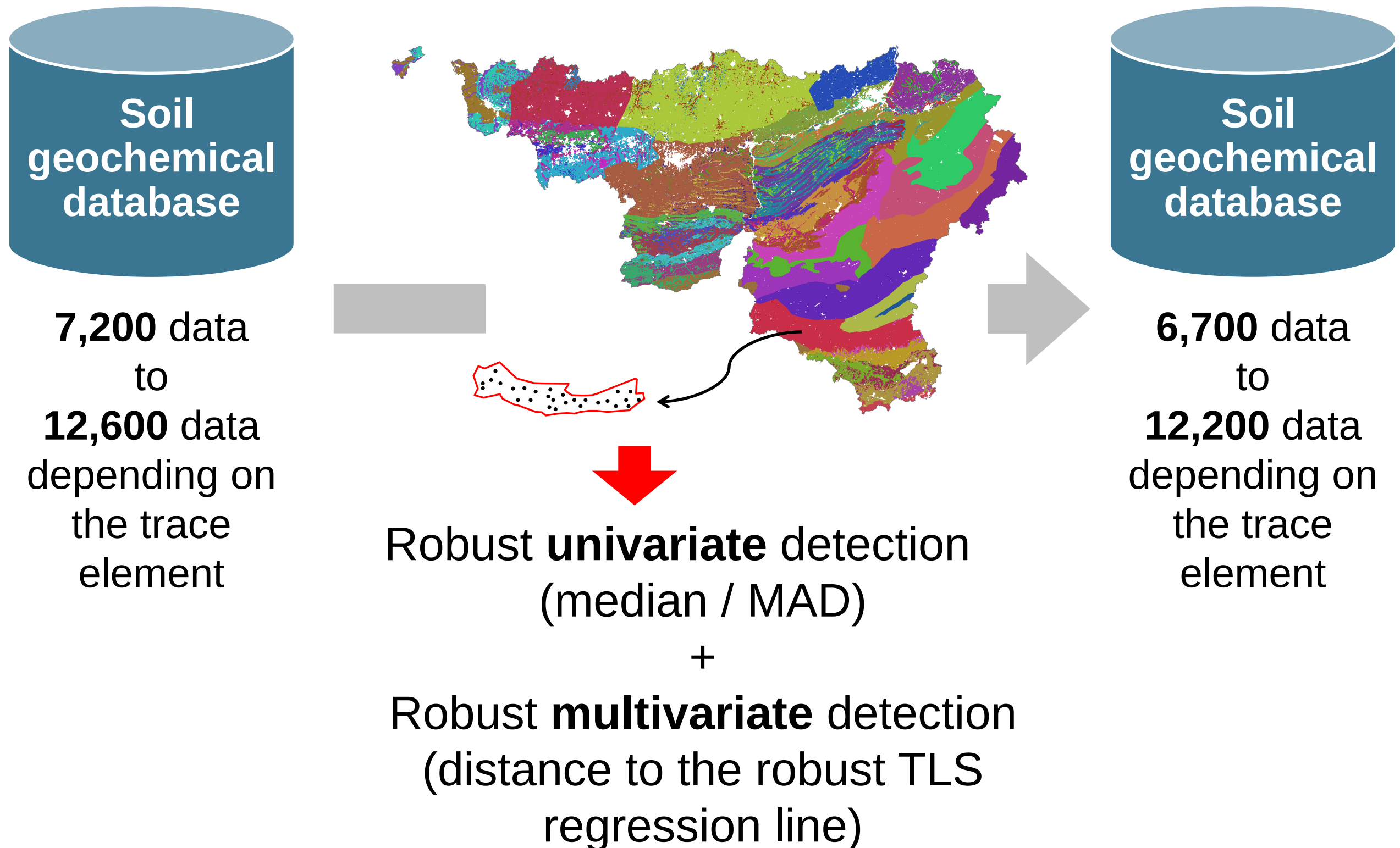
7,200 data
to
12,600 data
depending on
the trace
element

7
laboratories





Outlier detection by pedogegeochemical unit





Data available for soil geochemical map

Soil and geological informations

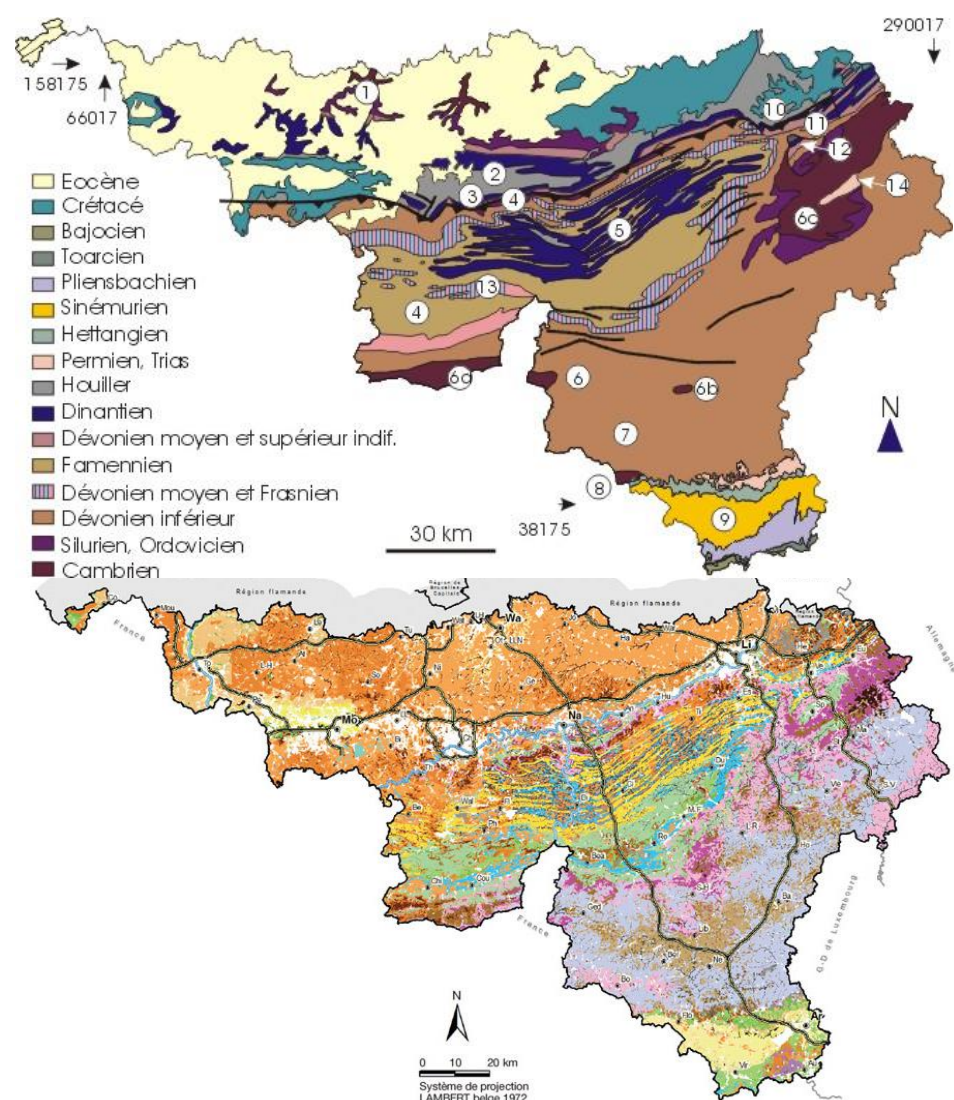


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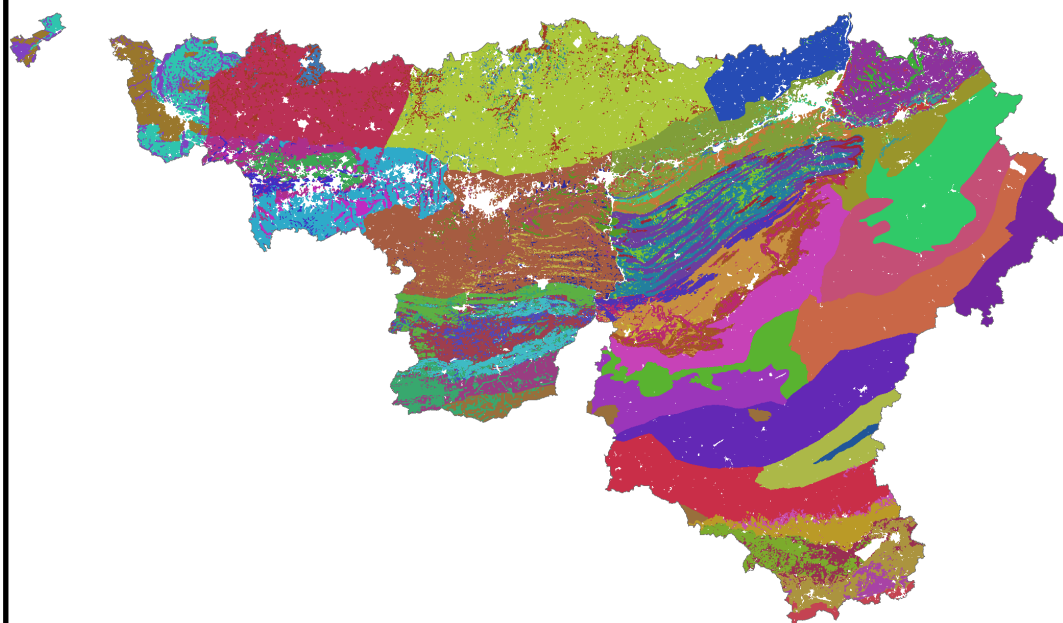


Soil
geochemical
database



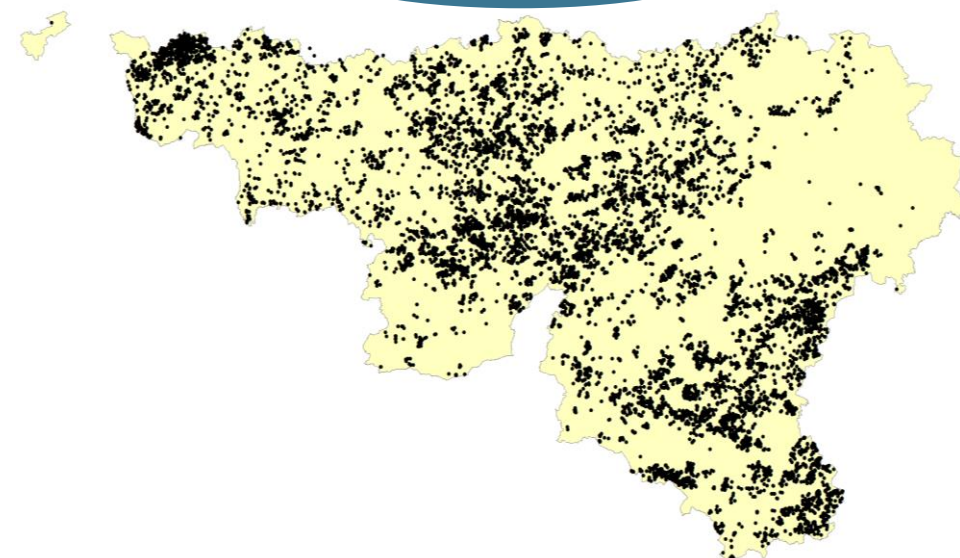
Data available for soil geochemical map

**Map of pedogeochemical
soil types**



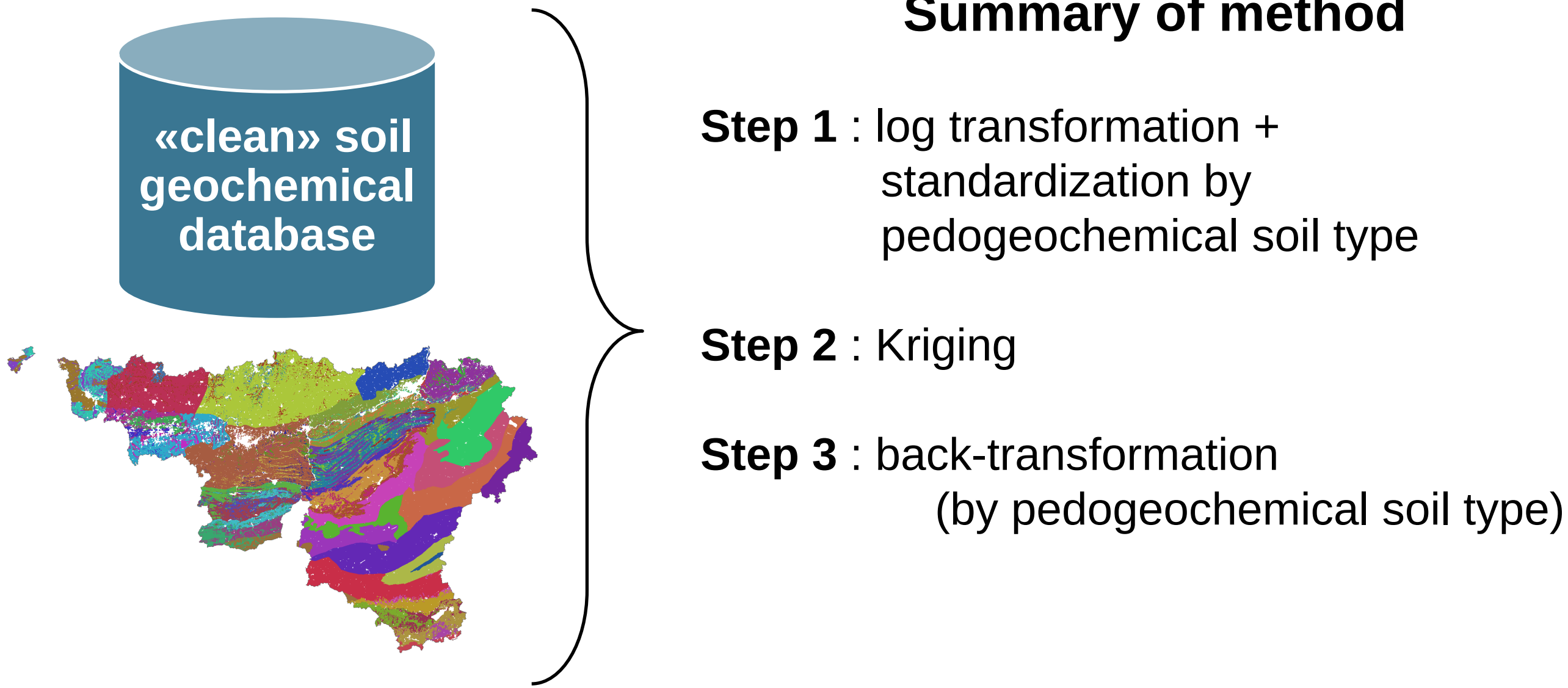
+

**Reliable soil
geochemical
database**





Predictive model of trace metals background concentrations



«clean» soil
geochemical
database

The diagram illustrates a three-step predictive model workflow. On the left, a blue cylinder represents the '«clean» soil geochemical database'. Below it is a map of the United Kingdom, color-coded to represent different pedogeochemical soil types. A large curly bracket on the right groups the three steps of the method, which are listed to the right of the map. The steps are: Step 1 (log transformation and standardization by pedogeochemical soil type), Step 2 (Kriging), and Step 3 (back-transformation by pedogeochemical soil type).

Summary of method

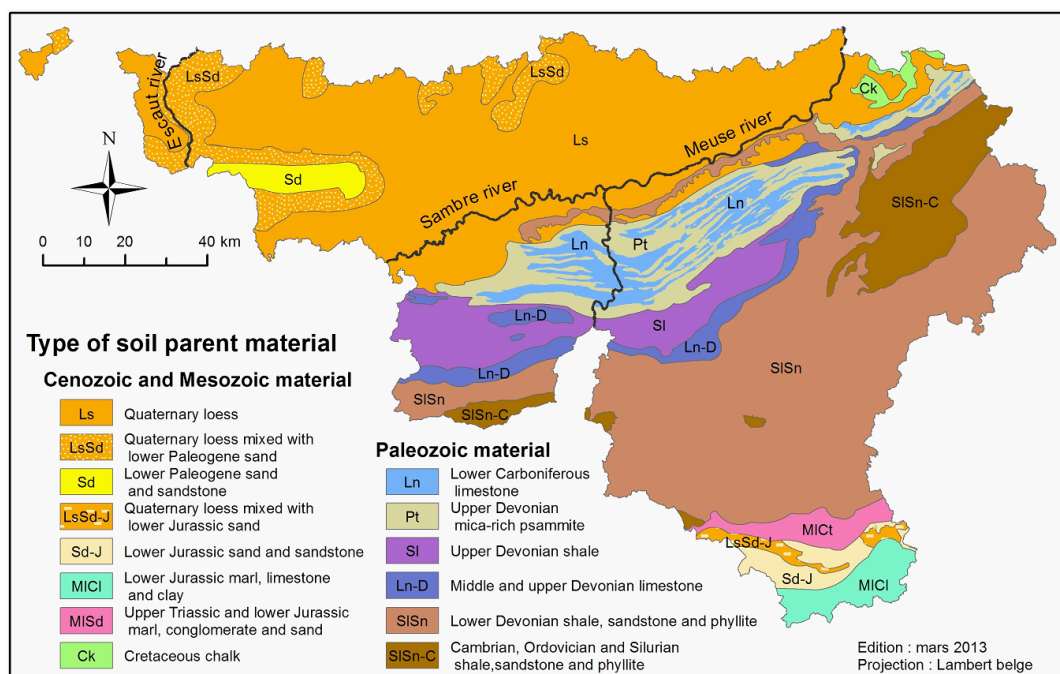
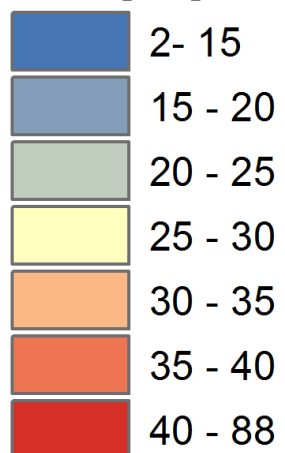
Step 1 : log transformation +
standardization by
pedogeochemical soil type

Step 2 : Kriging

Step 3 : back-transformation
(by pedogeochemical soil type)

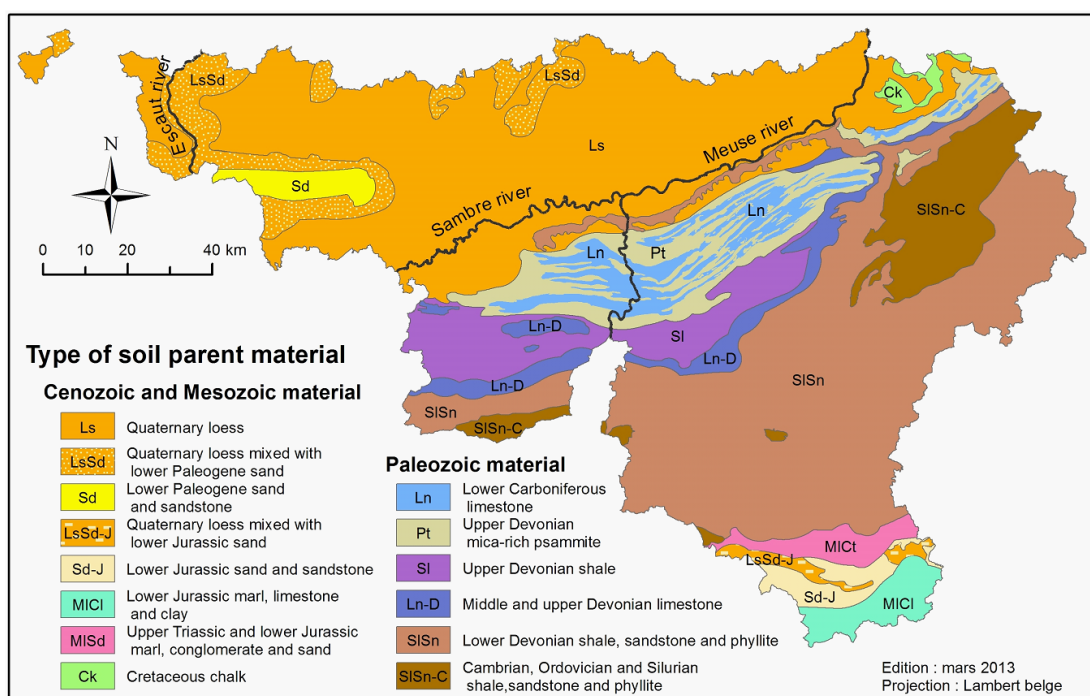
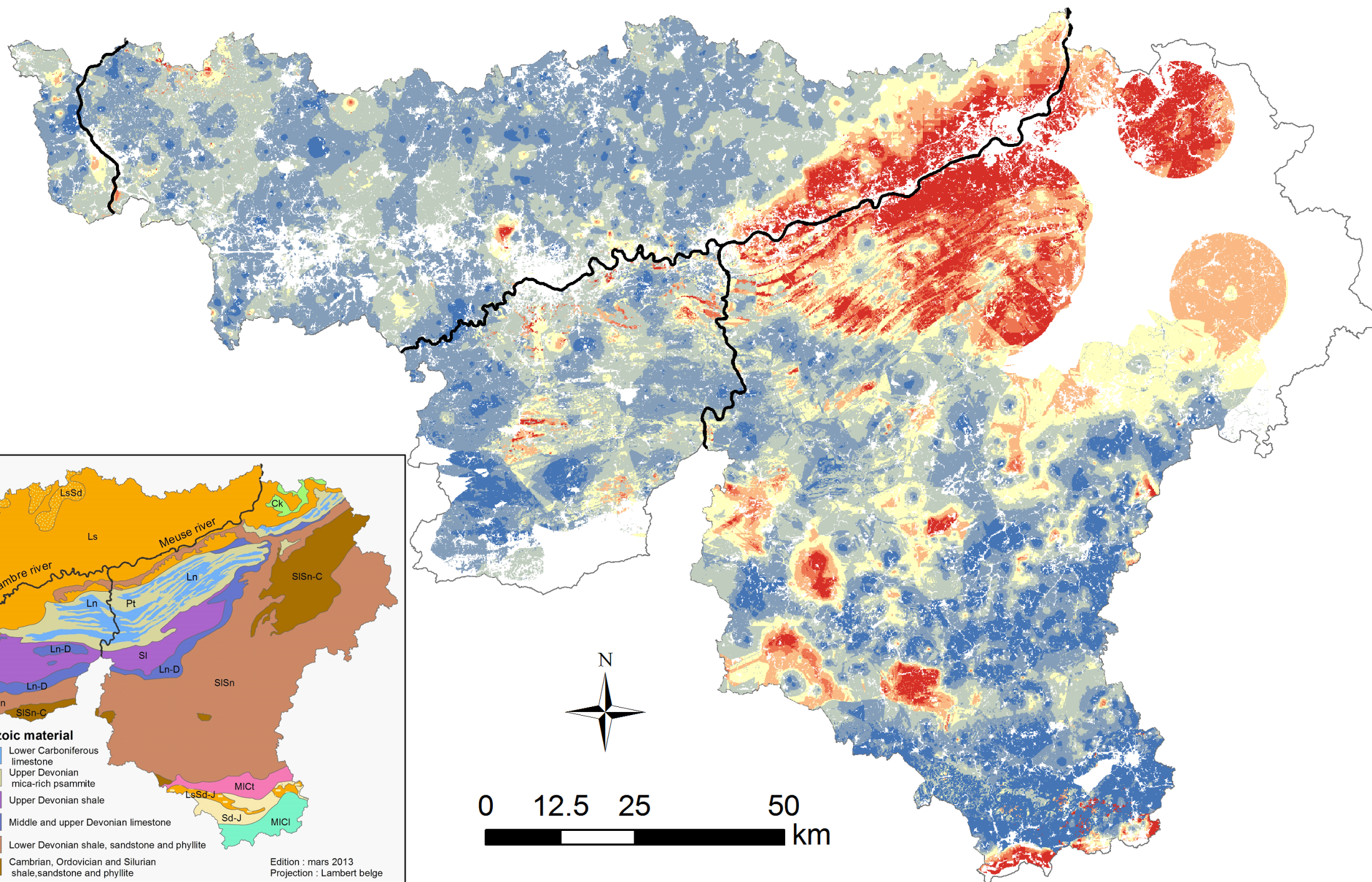
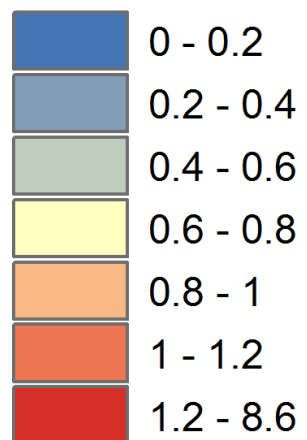


Ni (mg/kg)



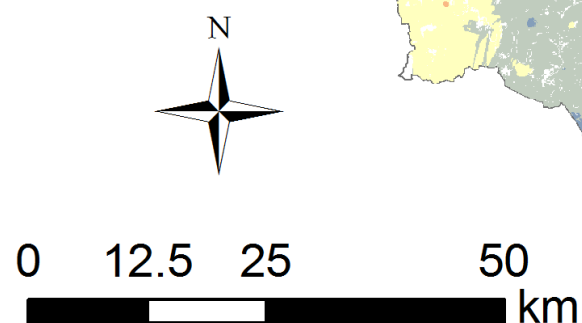
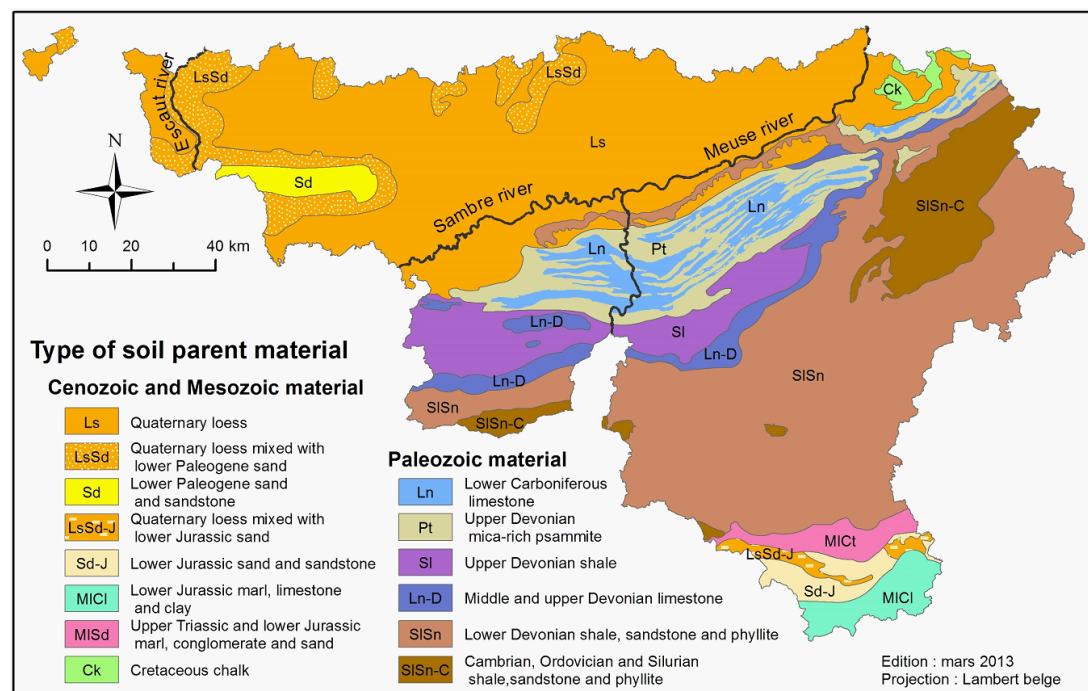
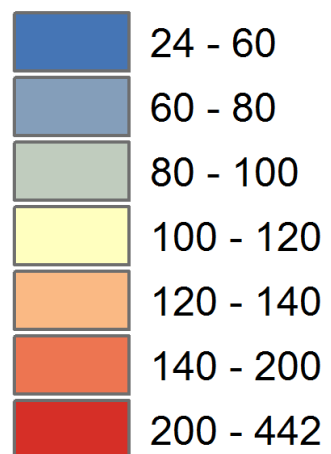


Cd (mg/kg)





Zn (mg/kg)



Thank you for your attention !

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