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nationale bodenbeobachtung
observatoire national des sols
osservatorio nazionale dei suoli
swiss soil monitoring network

Soil Monitoring in Switzerland

What can be said after 30 years?

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with contributions by Daniel Wächter, Peter Schwab,
Anna Hug, Armin Keller, Reto Meuli

Conference «25 Years of Soil Monitoring
in the Czech Republic», Brno

February 2, 2017



30 years in summary...

Soil Monitoring in Switzerland

Topics

1

NABO

Nutrients (N, P, K)

Heavy metals (Cd, Cu, Zn, ...)

4

Organic pollutants

- PAH, PCB, Dioxins
- Pesticides
- Antibiotics

3

Soil organic matter

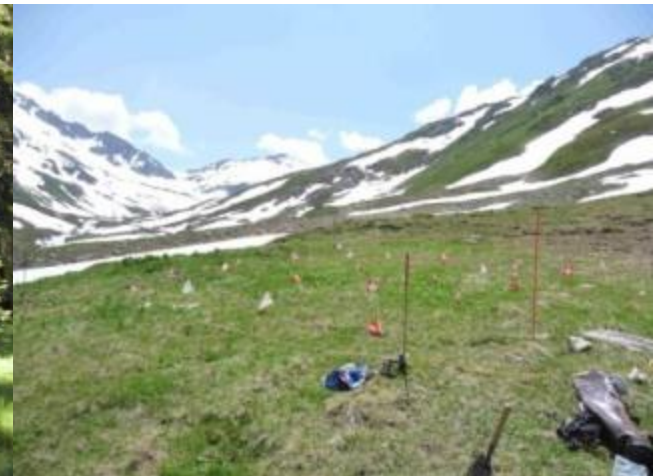
2

Soil biology

Soil physics

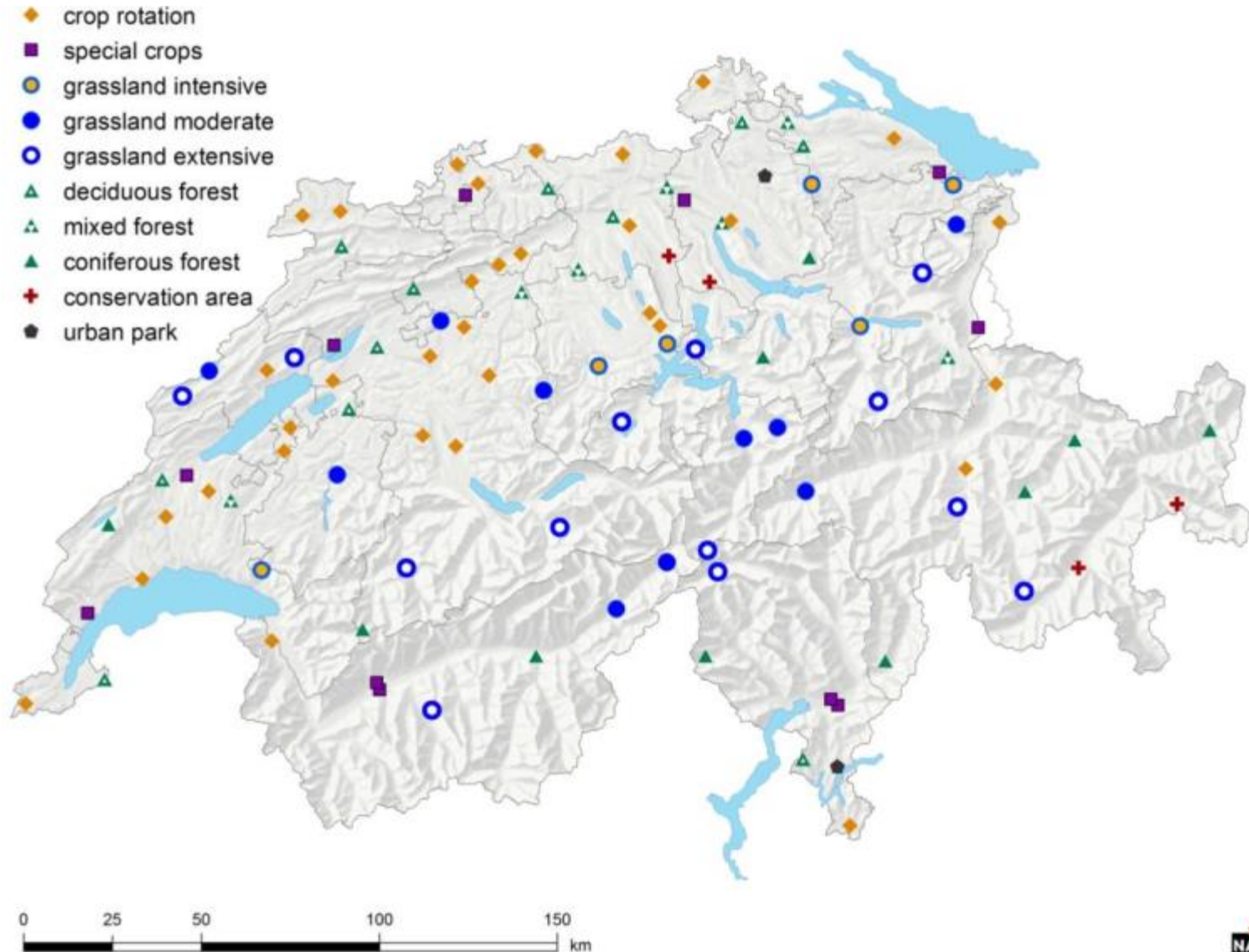
(1) NABO

Long-term monitoring sites

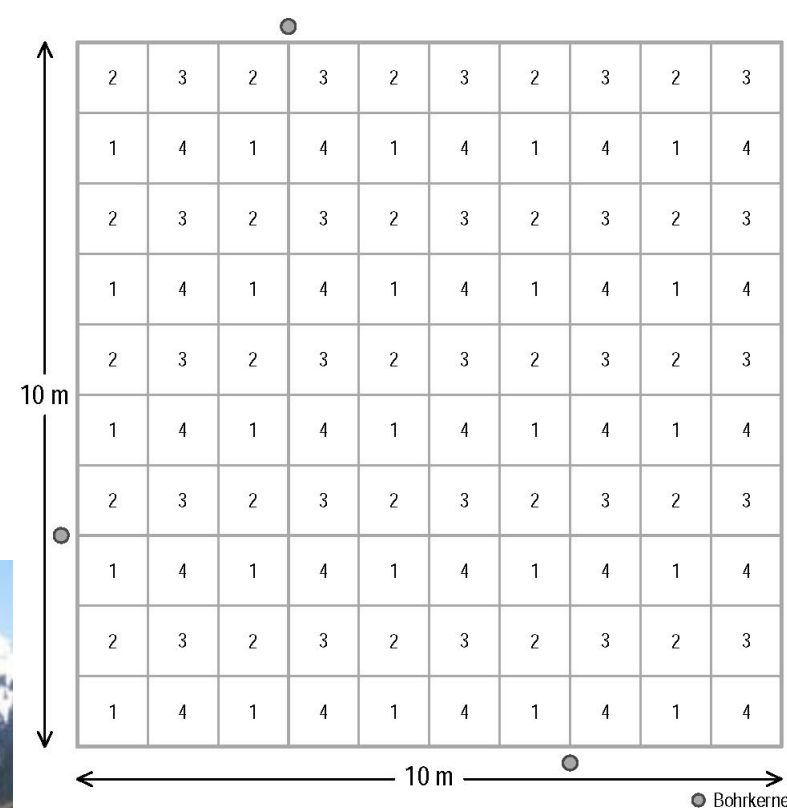


(1) NABO

Long-term monitoring sites

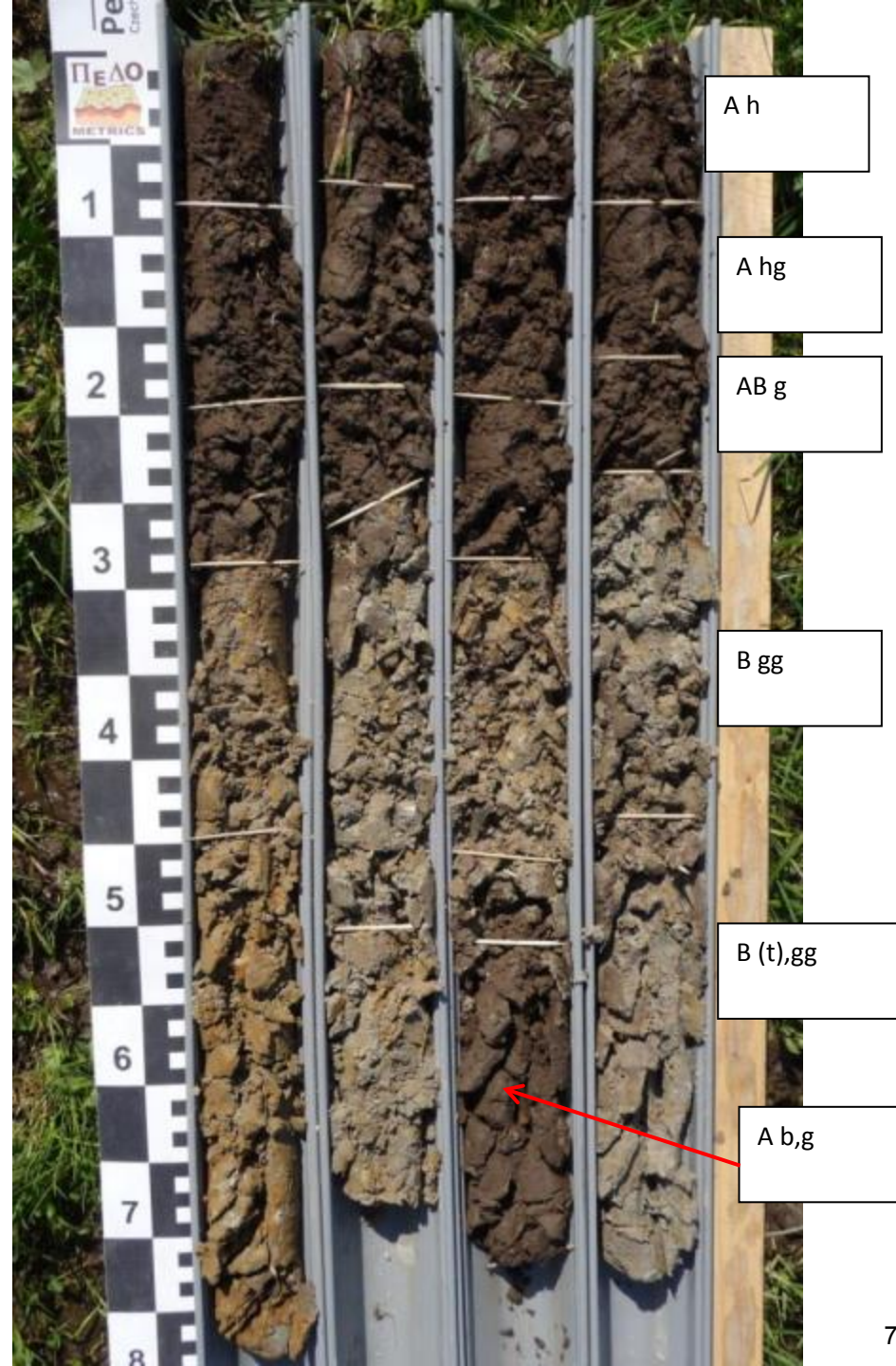


(1) NABO Sampling



(1) NABO Sampling

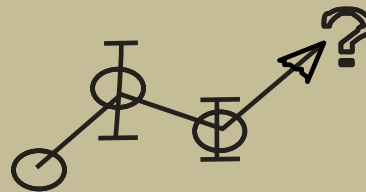
- First campaign 1985-89
- Every 5 years
- 0-20 cm: 4 composite samples
- Soil horizons: 4 soil cores (since 2004)



(1) NABO

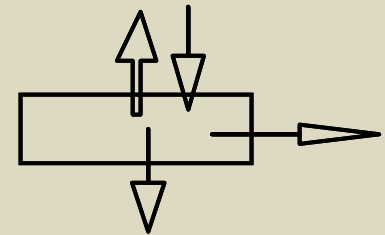
Dual approach

Monitoring

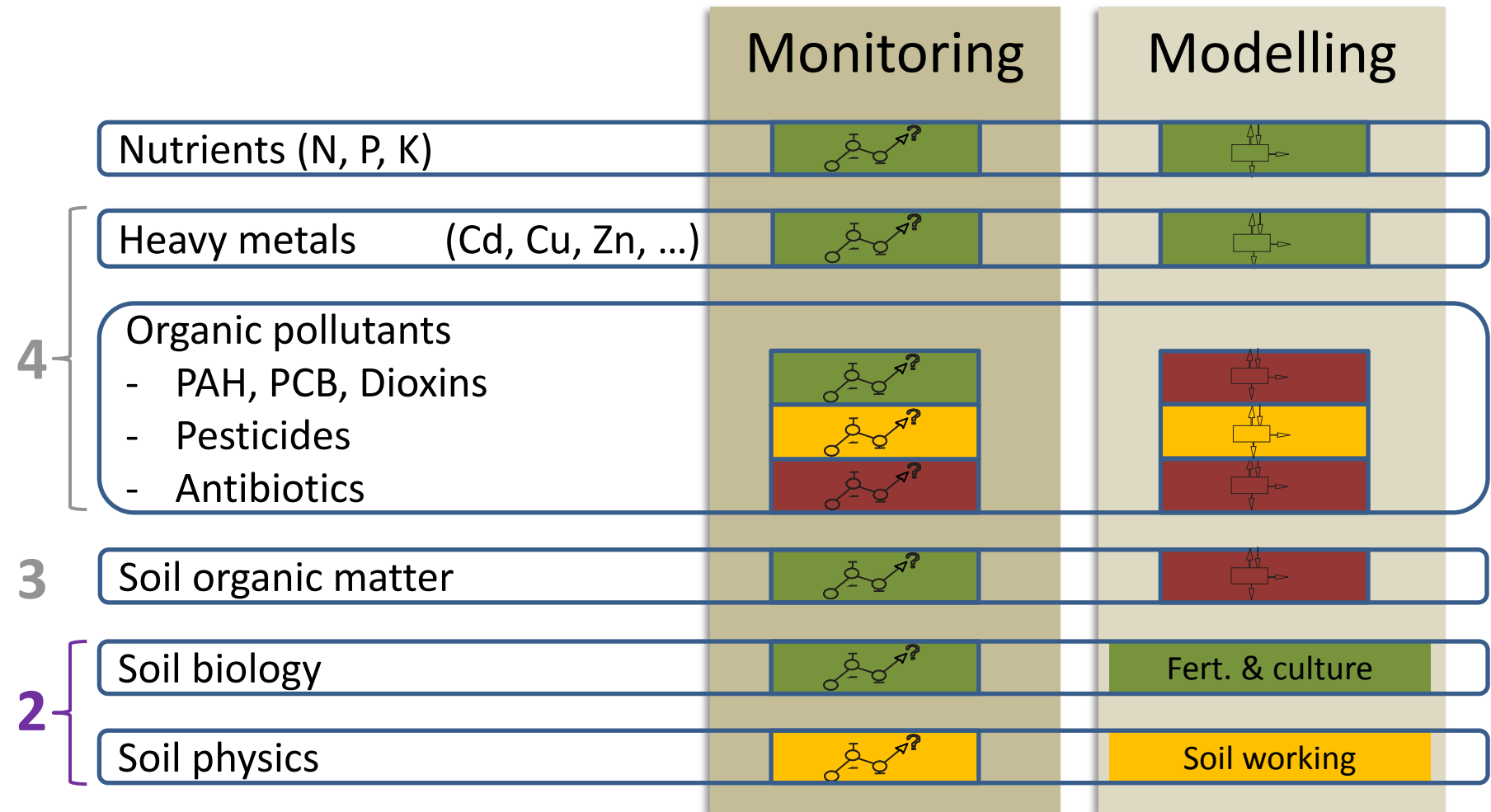


Modelling

indirect
Monitoring



(1) NABO Topics



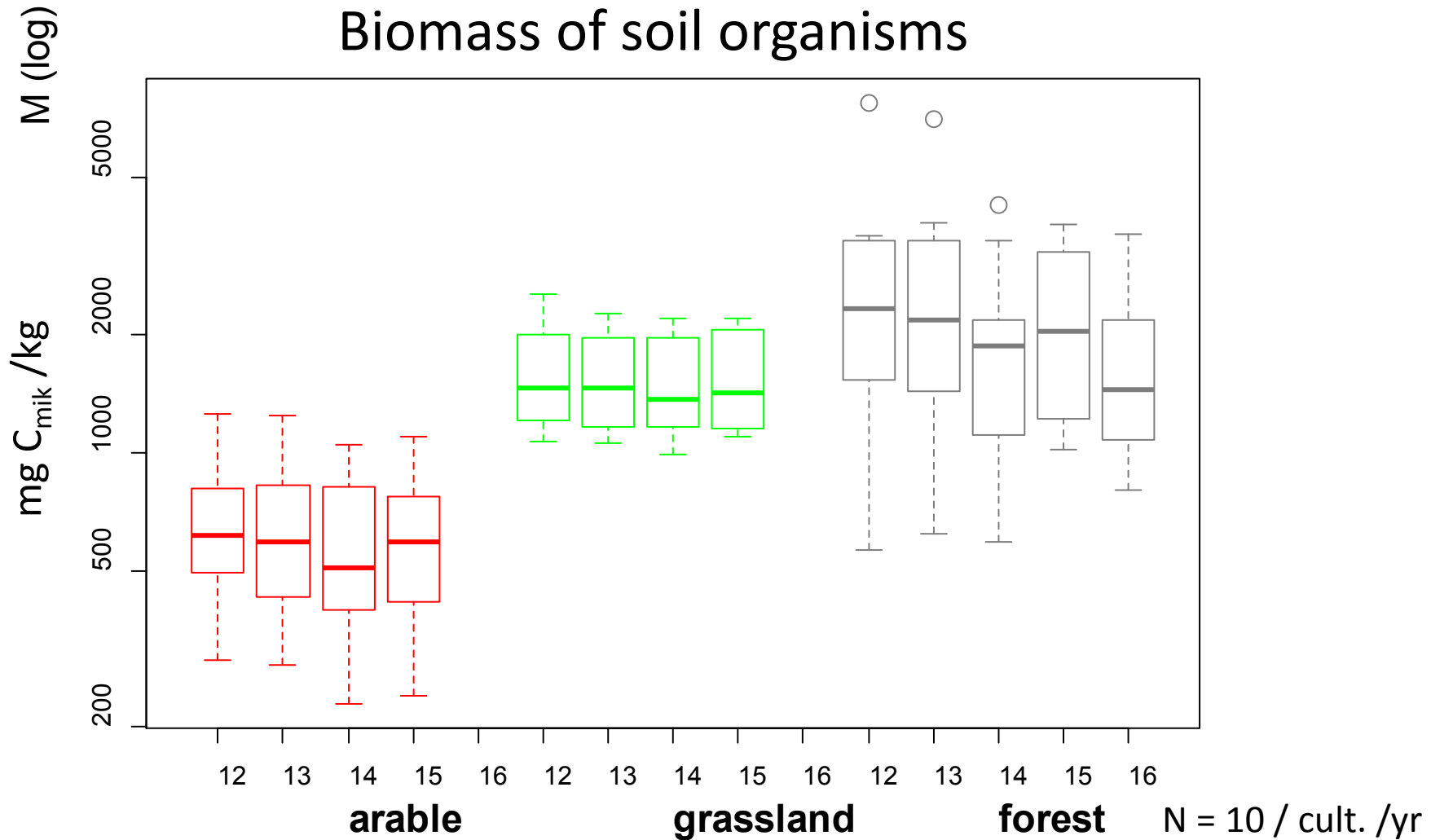
(2) Novel topics

Soil biology



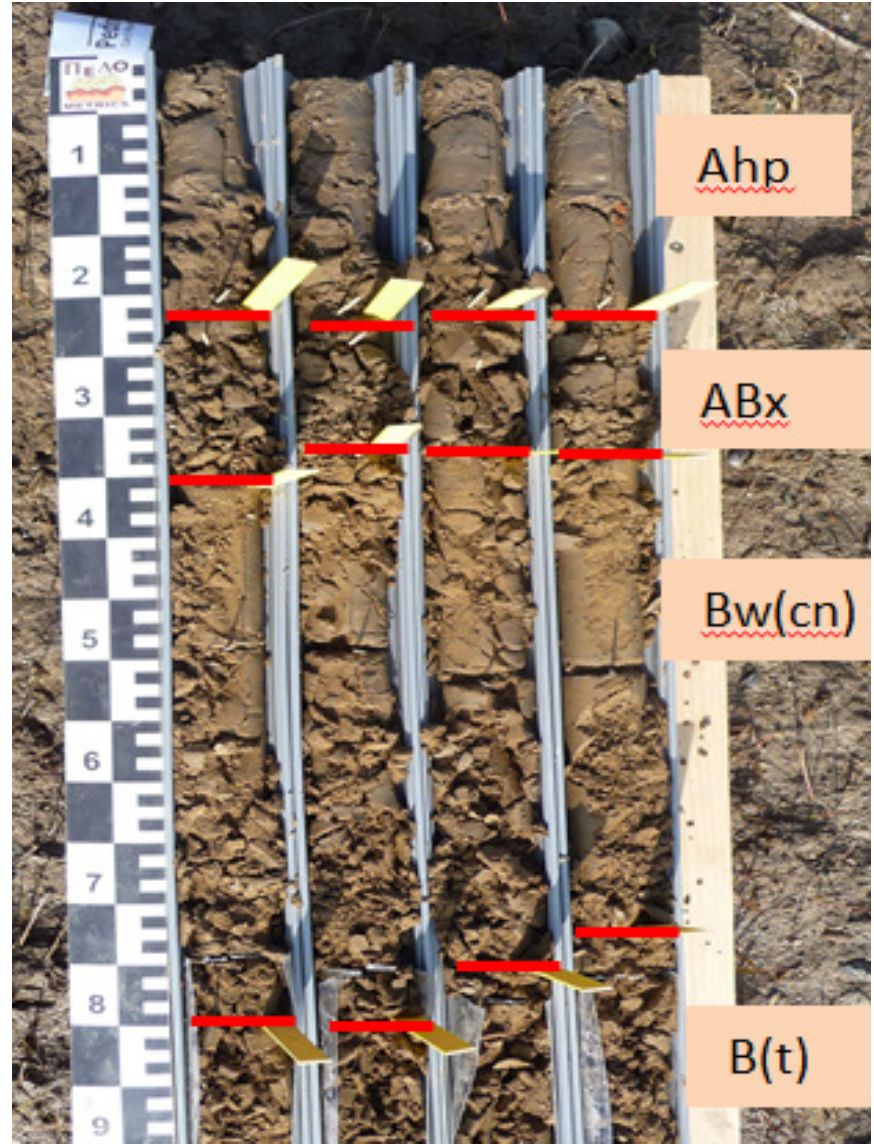
(2) Novel topics

Soil biology



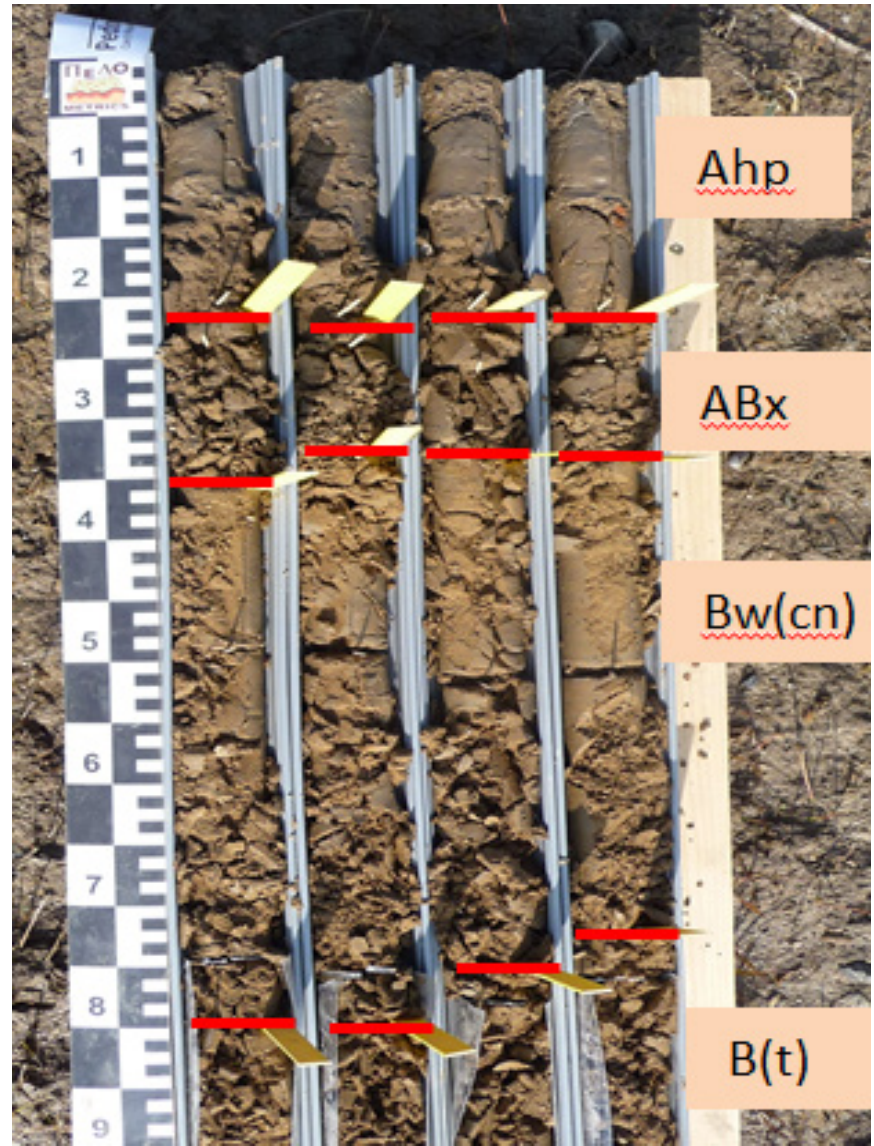
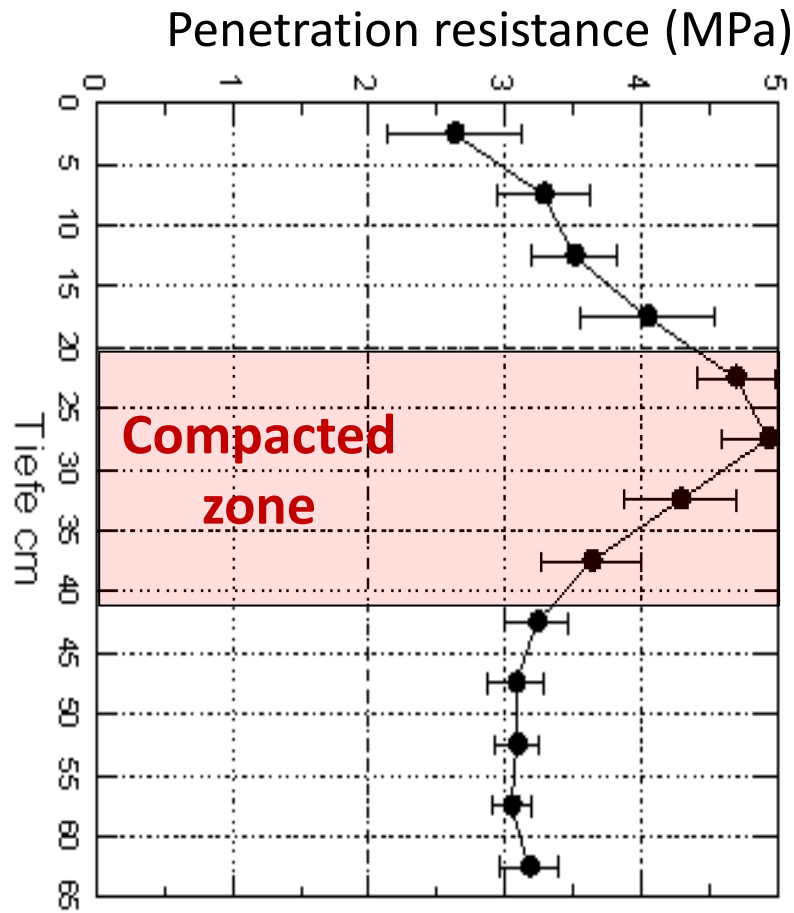
(2) Novel topics

Soil physics: compaction



(2) Novel topics

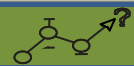
Soil physics: compaction



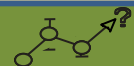
Monitoring

Modelling

Nutrients (N, P, K)

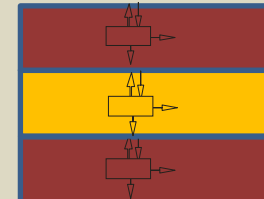


Heavy metals (Cd, Cu, Zn, ...)

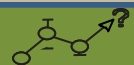


Organic pollutants

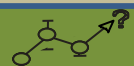
- PAH, PCB, Dioxins
- Pesticides
- Antibiotics



Soil organic matter

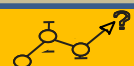


Soil biology



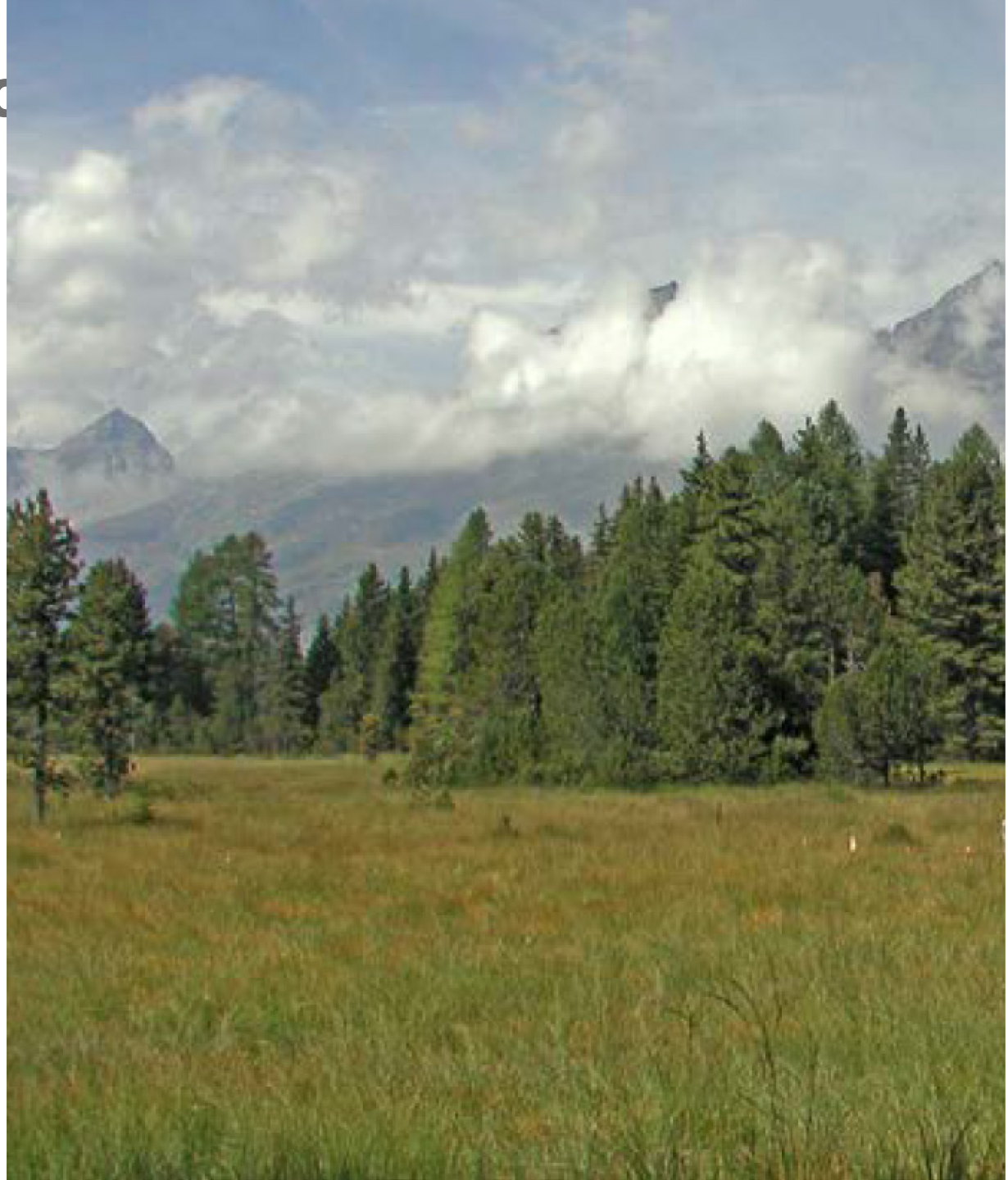
Fert. & culture

Soil physics



Soil working

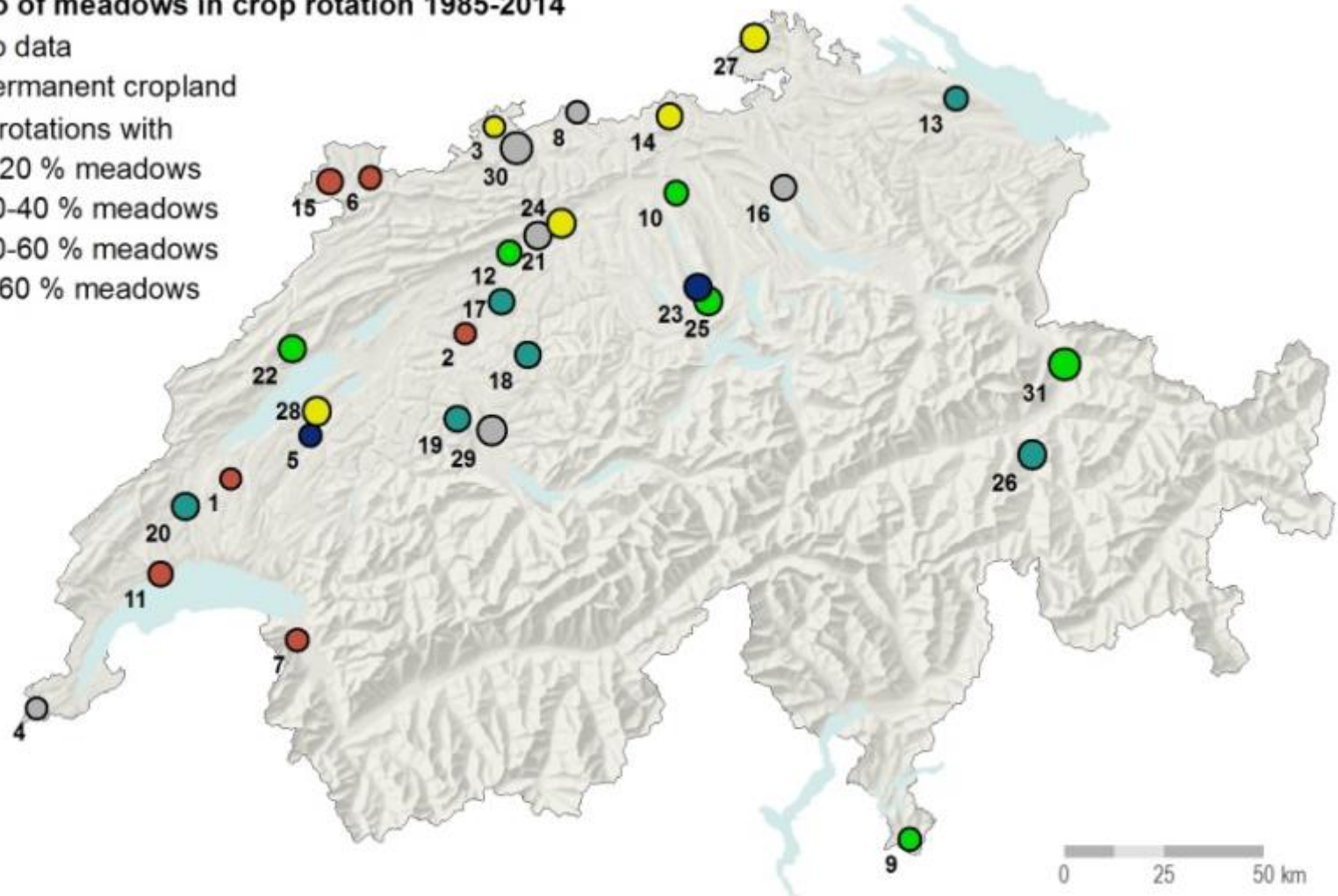
(3) Soil Organic



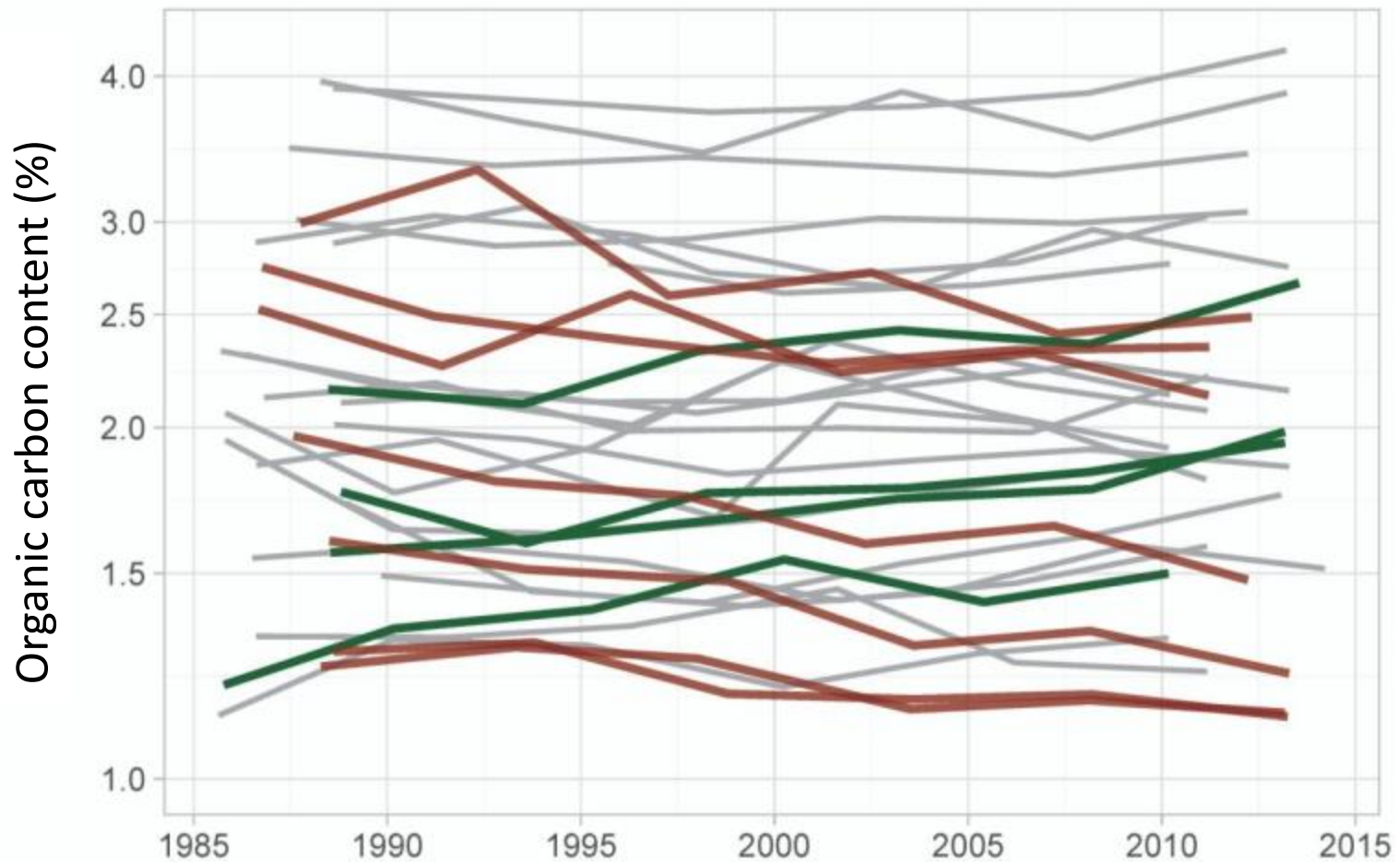
(3) Soil Organic Carbon Cropland, mineral soils

Ratio of meadows in crop rotation 1985-2014

- no data
- permanent cropland
- crop rotations with
 - < 20 % meadows
 - 20-40 % meadows
 - 40-60 % meadows
 - ≥ 60 % meadows

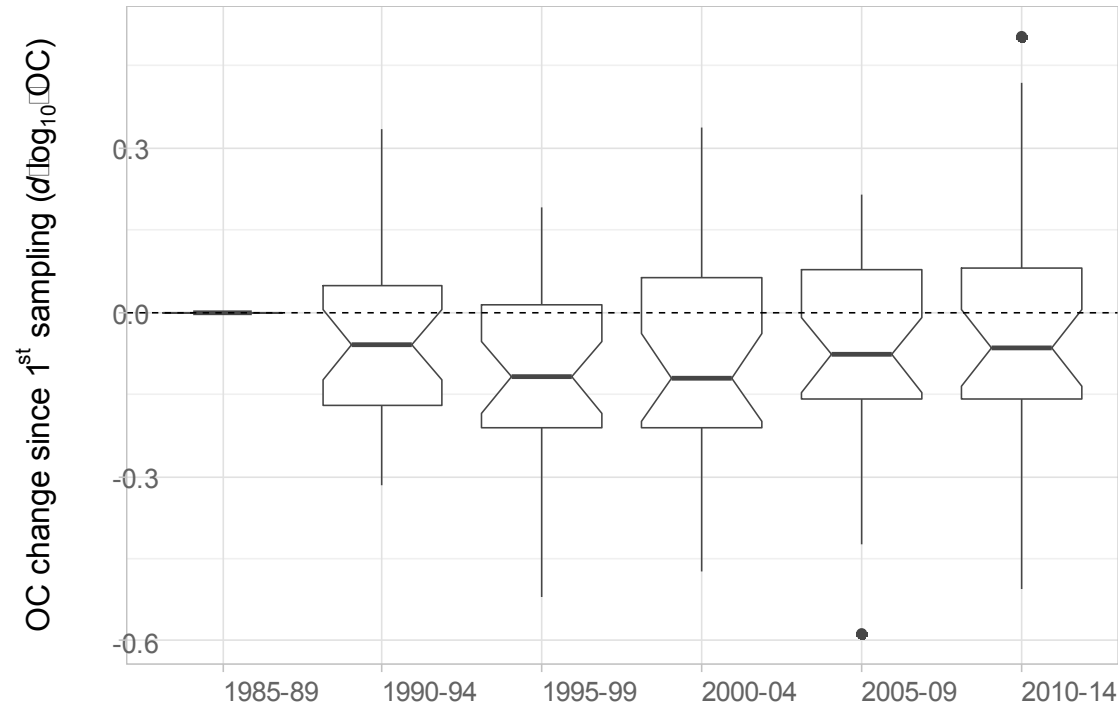


(3) Soil Organic Carbon Variability between sites



(3) Soil Organic Carbon

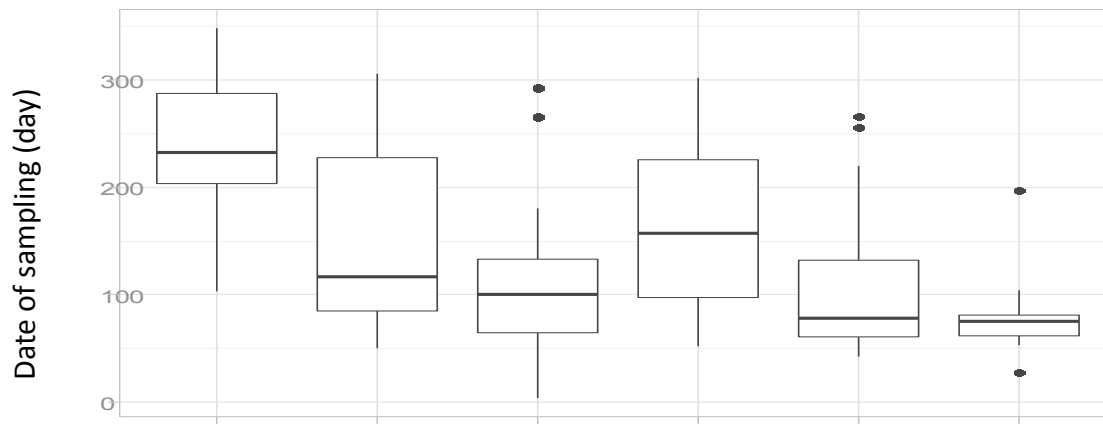
No clear trend 1990-2014



MDC (5 campaigns)

≈

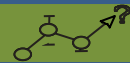
3.5 % relative
change per 10 yrs



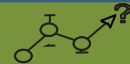
Monitoring

Modelling

Nutrients (N, P, K)

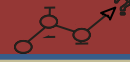
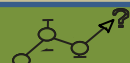


Heavy metals (Cd, Cu, Zn, ...)

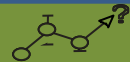


Organic pollutants

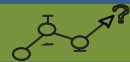
- PAH, PCB, Dioxins
- Pesticides
- Antibiotics



Soil organic matter

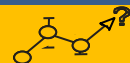


Soil biology



Fert. & culture

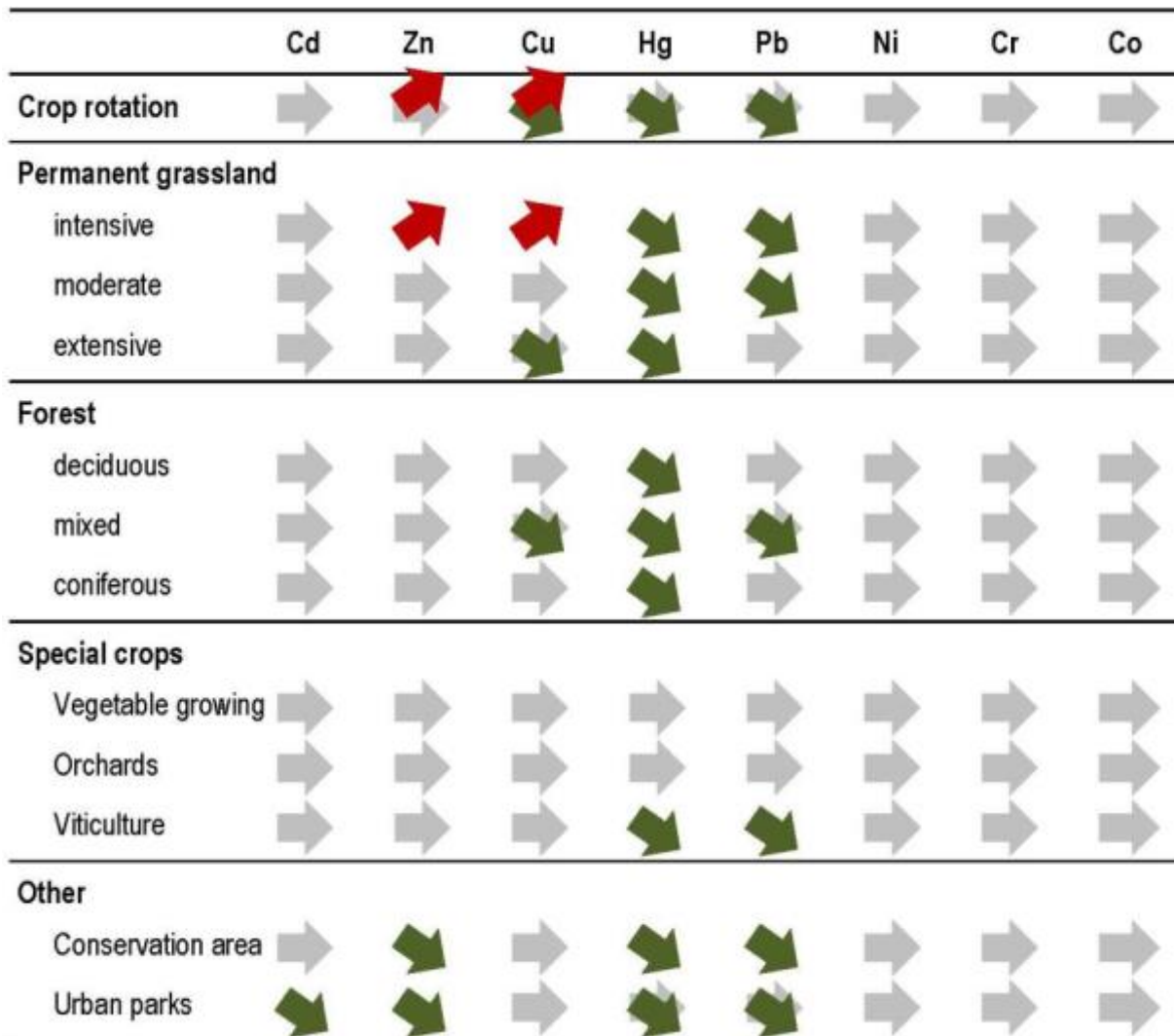
Soil physics



Soil working

(4) Pollutants

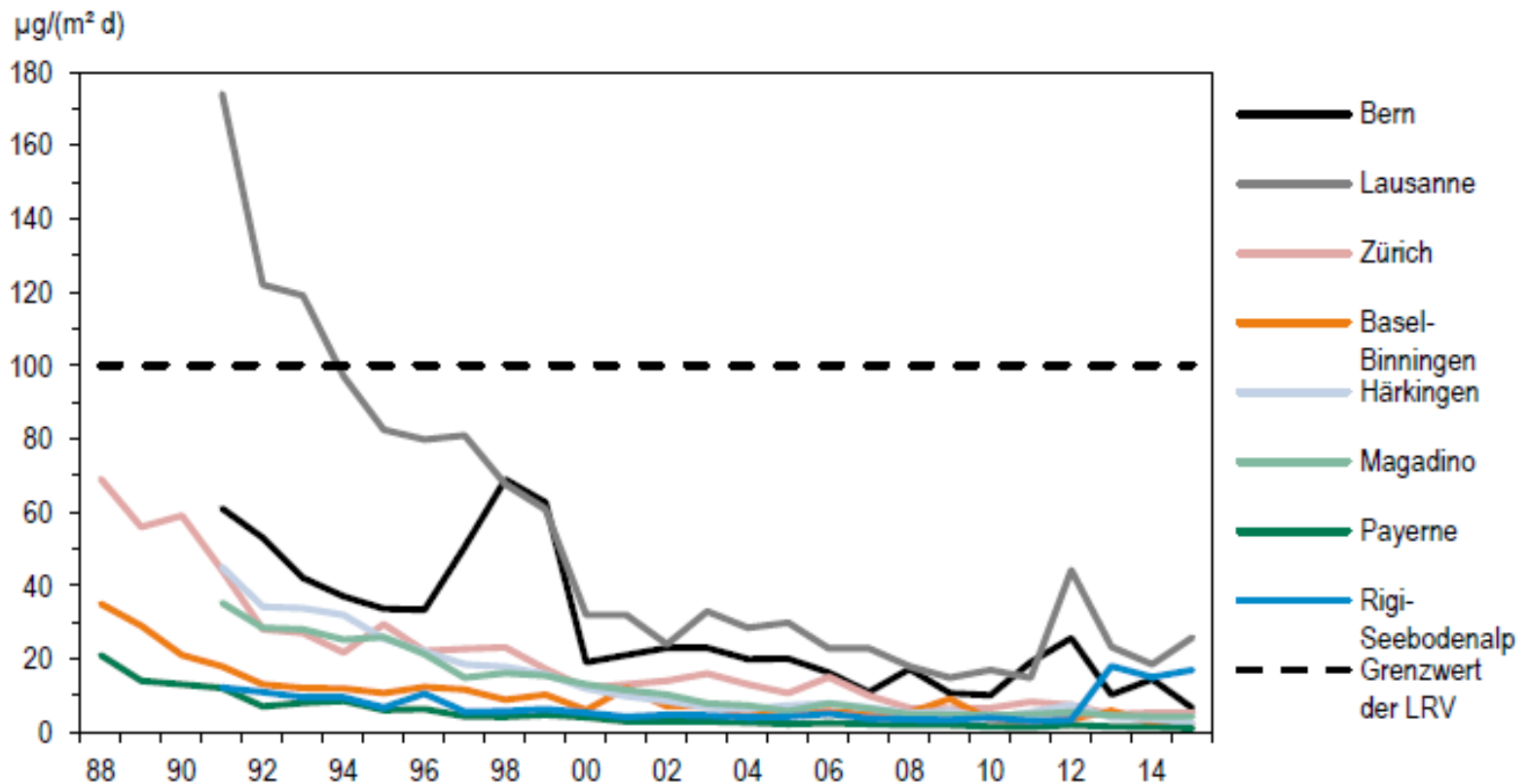
Heavy metals: Trends 1985-2009



(4) Pollutants

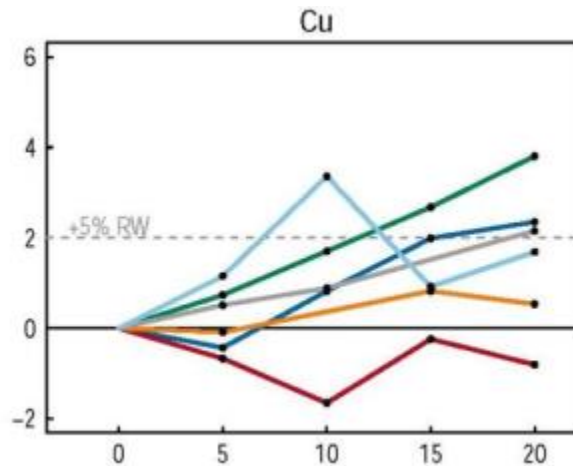
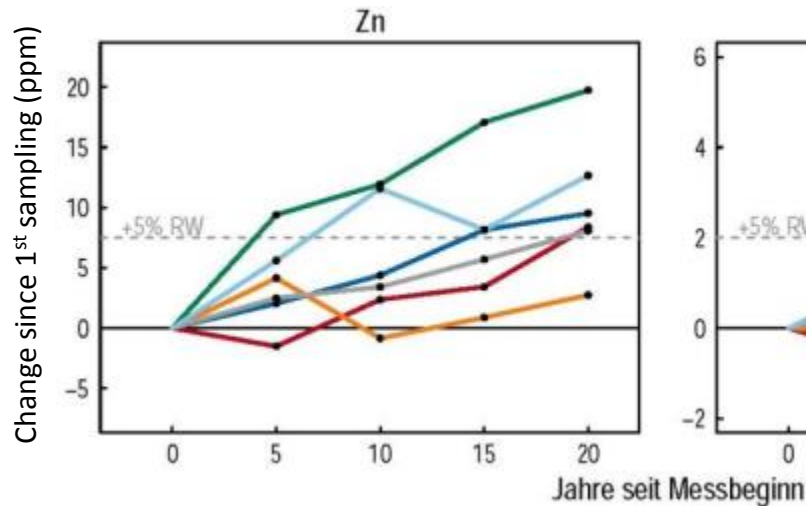
Atmospheric deposition of Pb

Abb. 44 > Blei im Staubniederschlag, Jahresmittelwerte 1988–2015



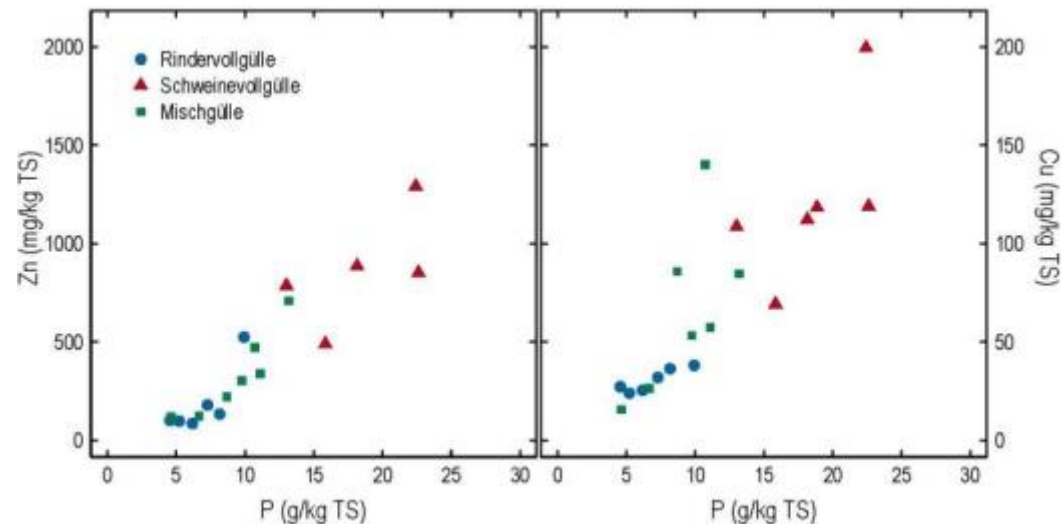
(4) Pollutants

Cu & Zn through farmyard manure



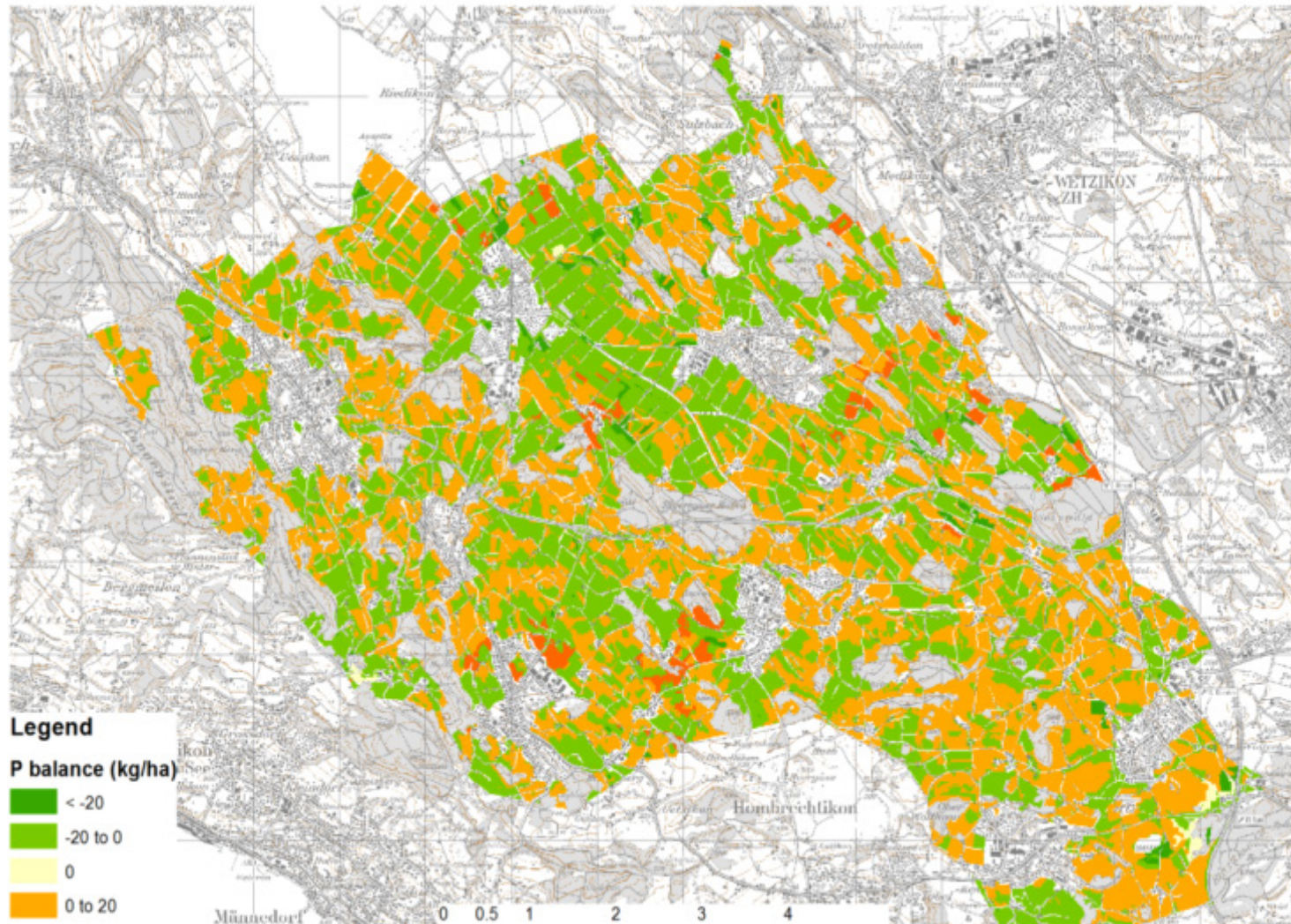
Intensively
used grassland

Concentrations in
farmyard manure



(4) Pollutants

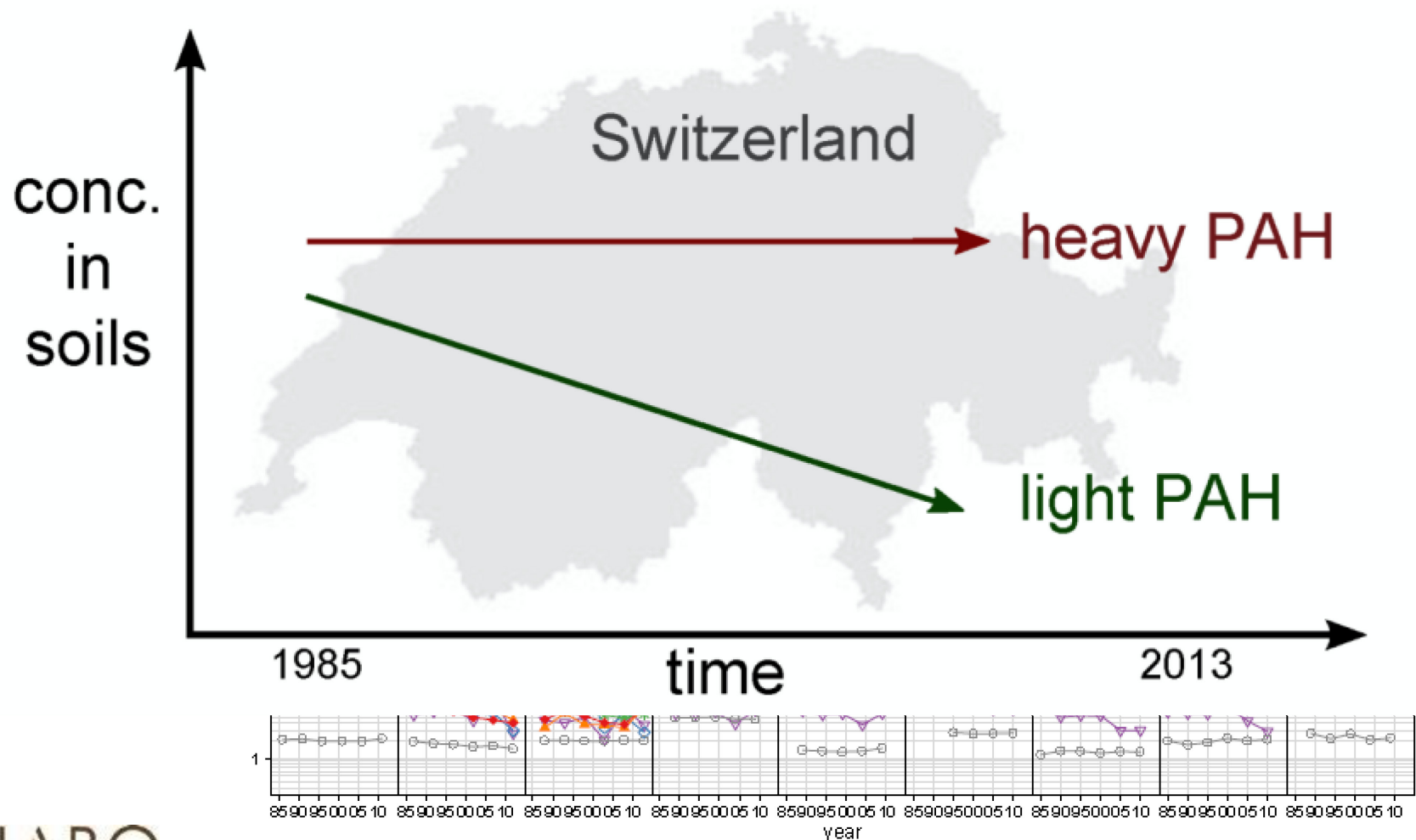
Modelling @ regional scales



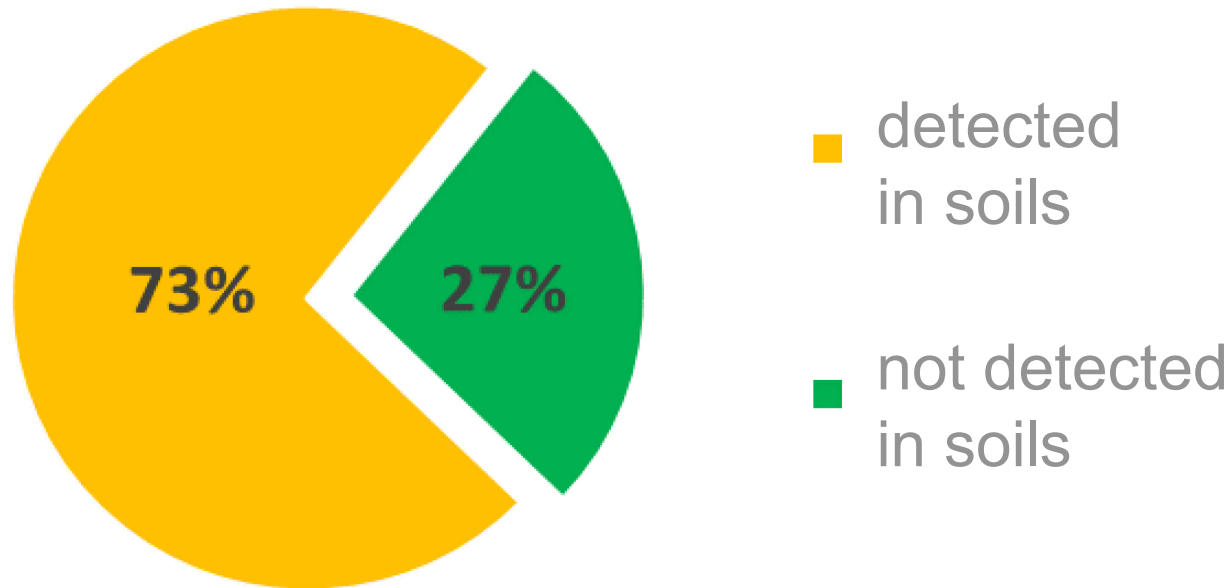
(4) Pollutants

PAH

10000	remote.75	rural.18	rural.25	rural.60	rural.62	rural.83	rural.85	rural.92



(4) Pollutants Pesticides



Pilot study (above) for few sites

Currently: screening of agricultural sites

-> presentation by D. Wächter yesterday...

(!) Conclusions & Perspectives

Past: Priorities shifted since the 1980s:
climate change/soil carbon,
soil biology, soil physics,
new groups of pollutants

Future: Where will we go?
from soil threats to soil functions,
organic pollutants (pesticides, antibiotics, ...),
prediction & modelling,
resources will be increasingly limited

(?) Questions?

Thanks for
your attention!

