Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

NABO
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?

Andreas Gubler, andreas.gubler@agroscope.admin.ch

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

Agroscope


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

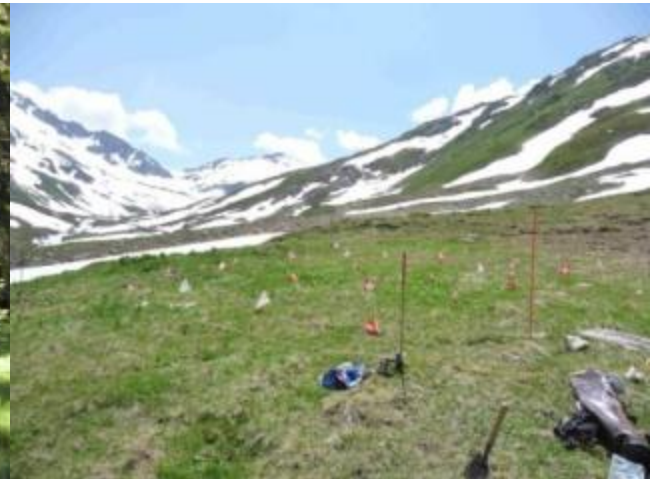
Soil biology

Soil physics

(1) NABO
Long-term monitoring sites





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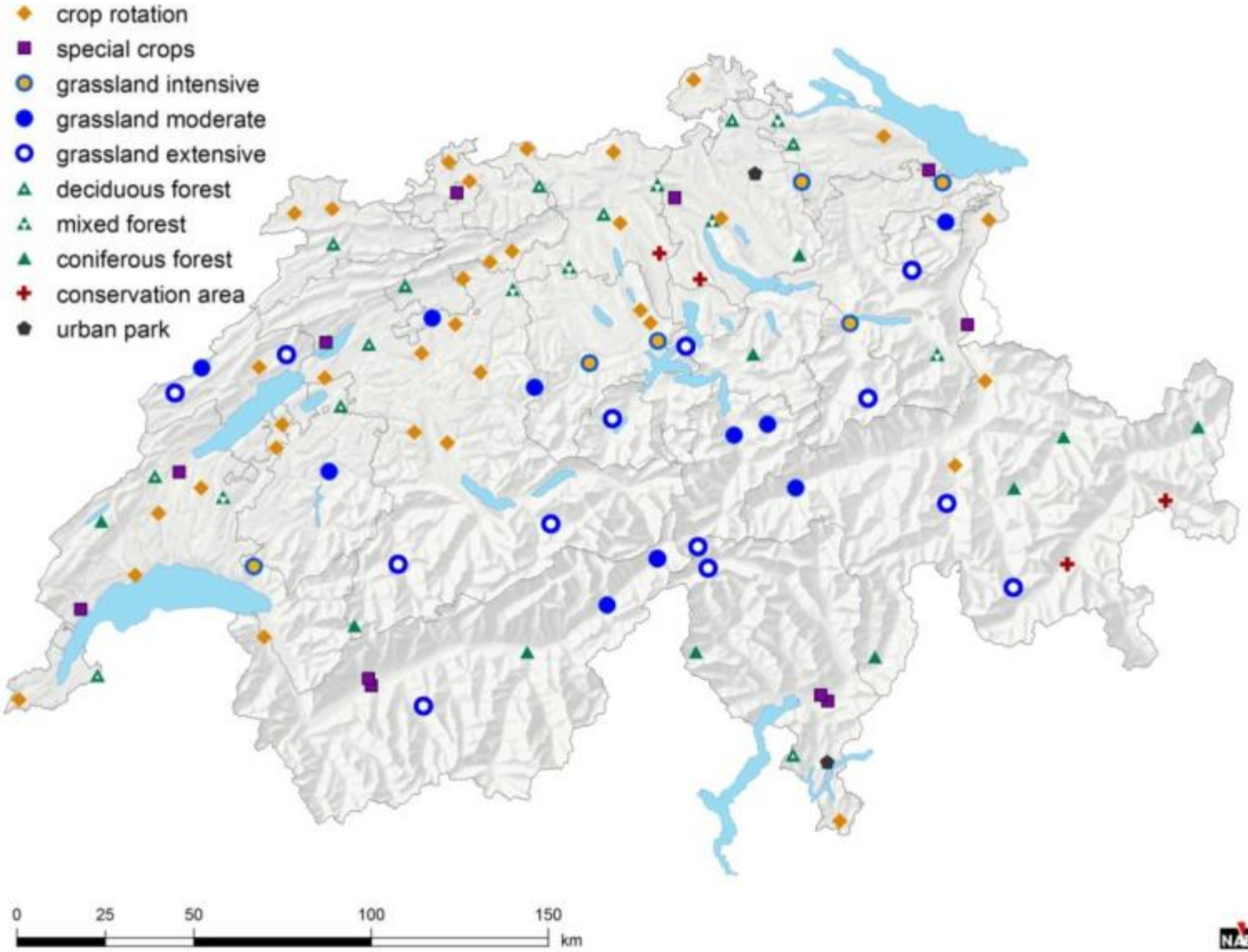
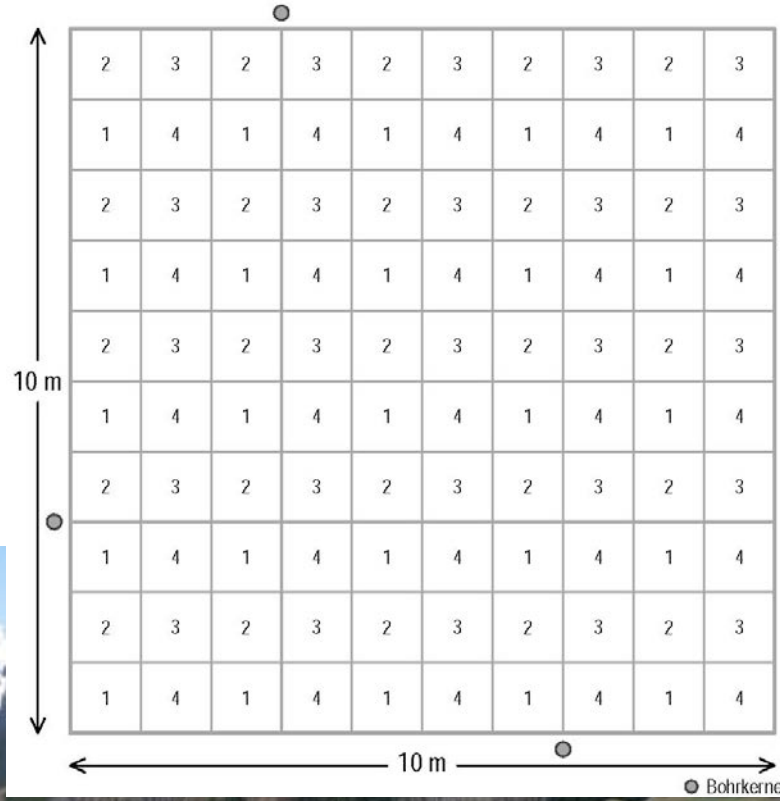
(1) NABO

Long-term monitoring sites



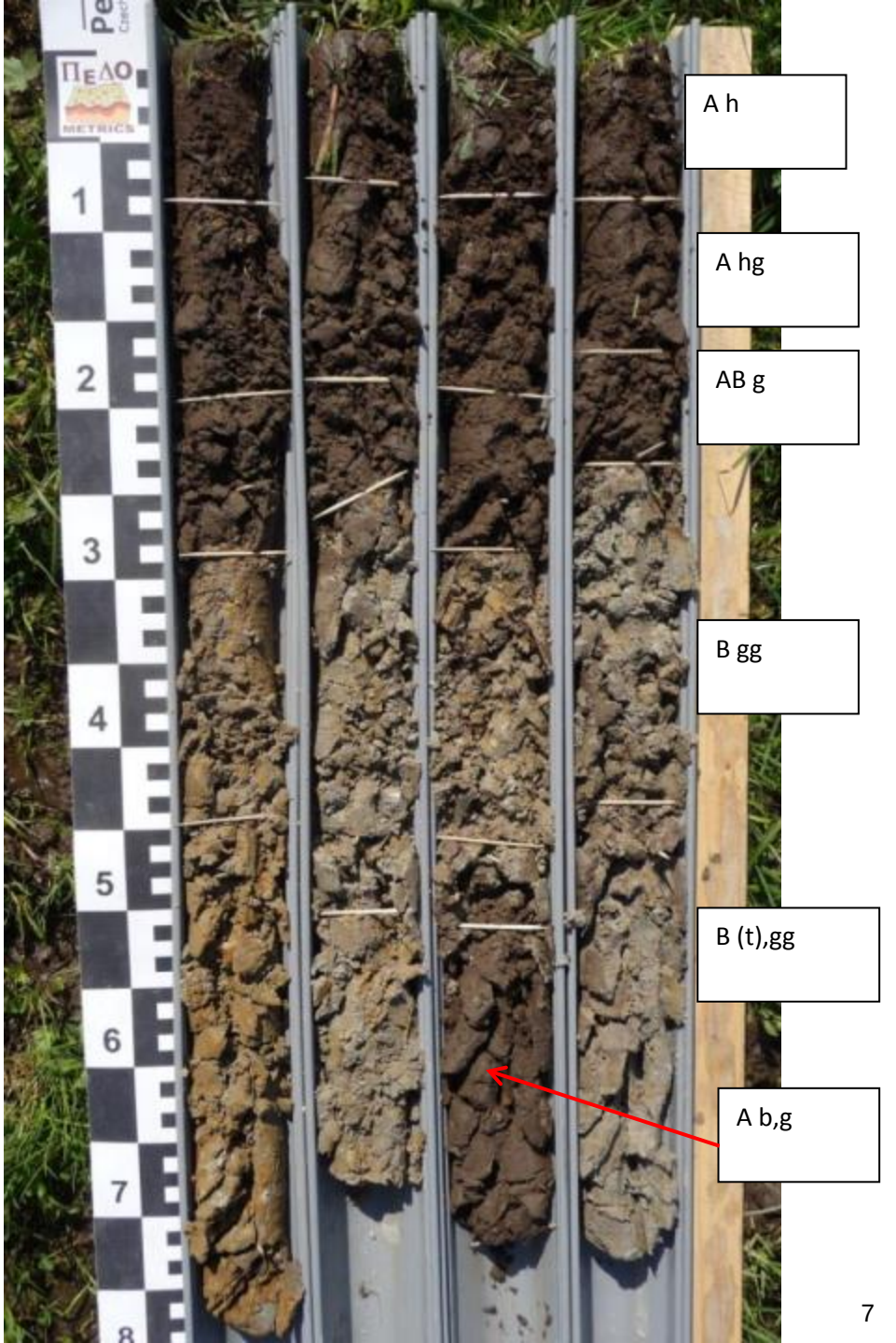
(1) NABO
Sampling



(1) NABO
Sampling

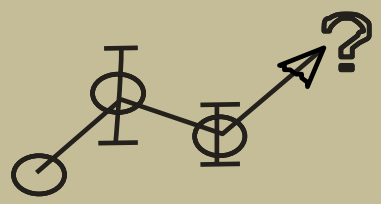
- First campaign
  1985-89
- Every 5 years

- 0-20 cm: 4 composite samples
- Soil horizons: 4 soil cores (since 2004)



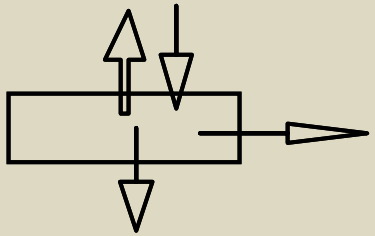
(1) NABO
Dual approach

Monitoring

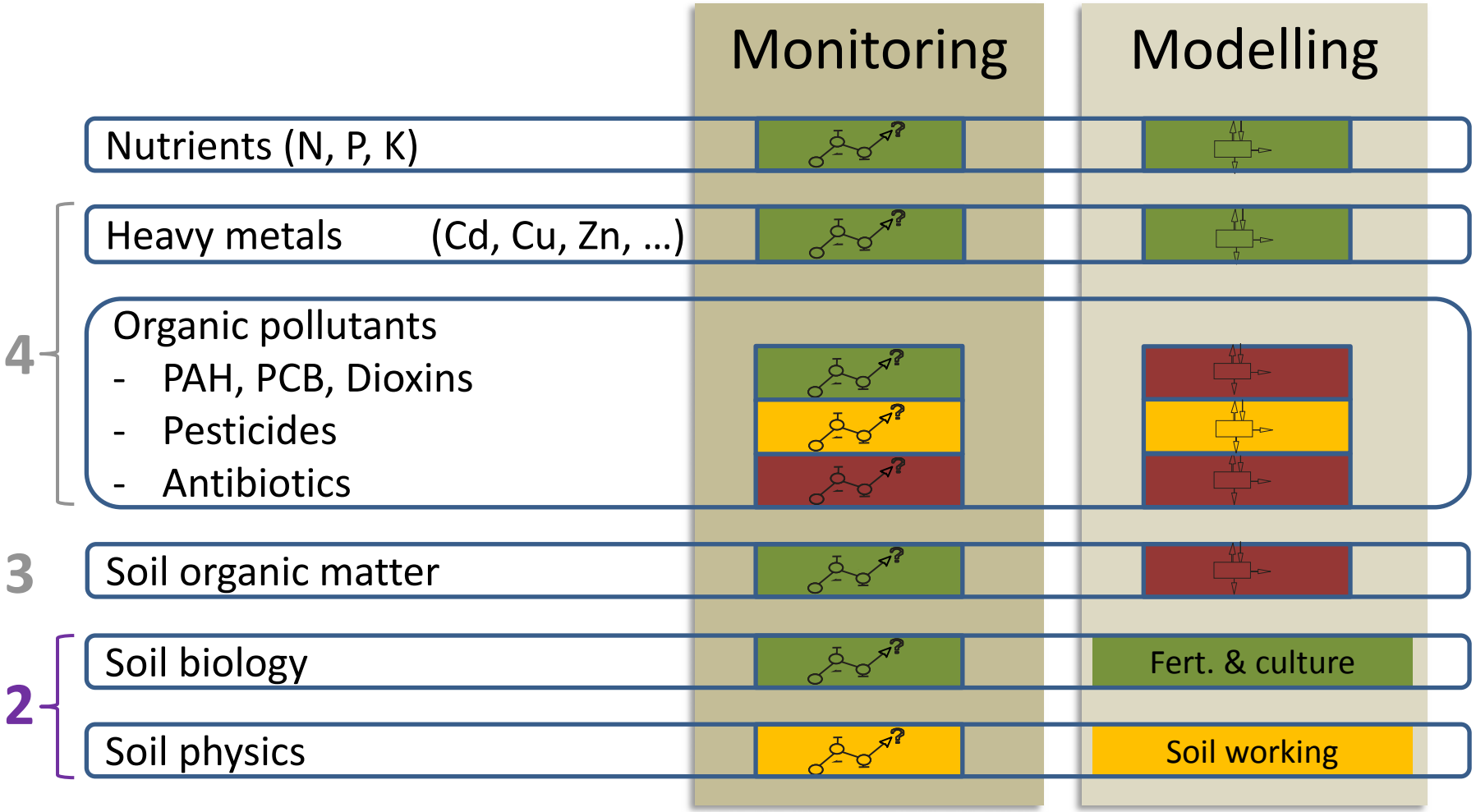


Modelling

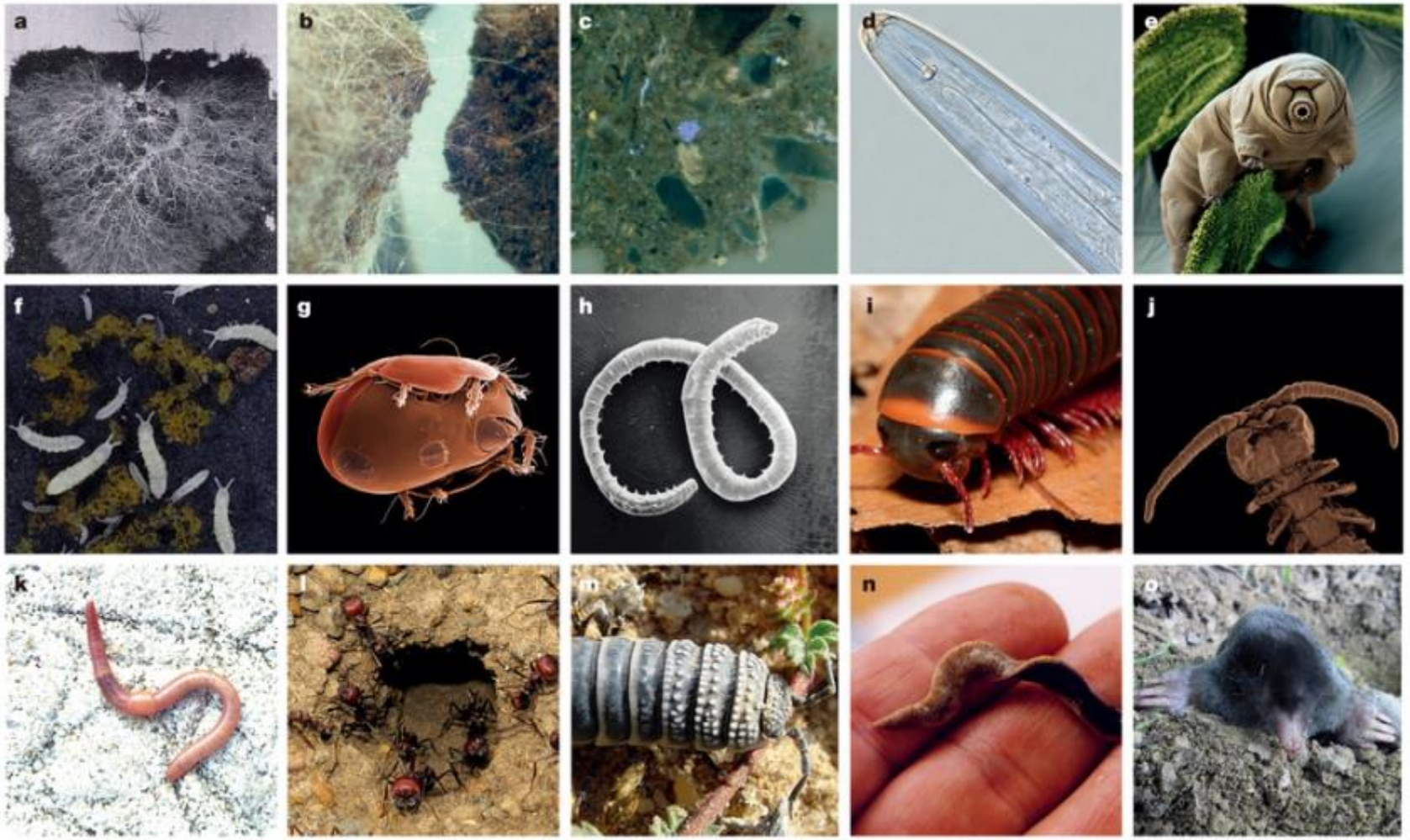
indirect Monitoring



(1) NABO
Topics



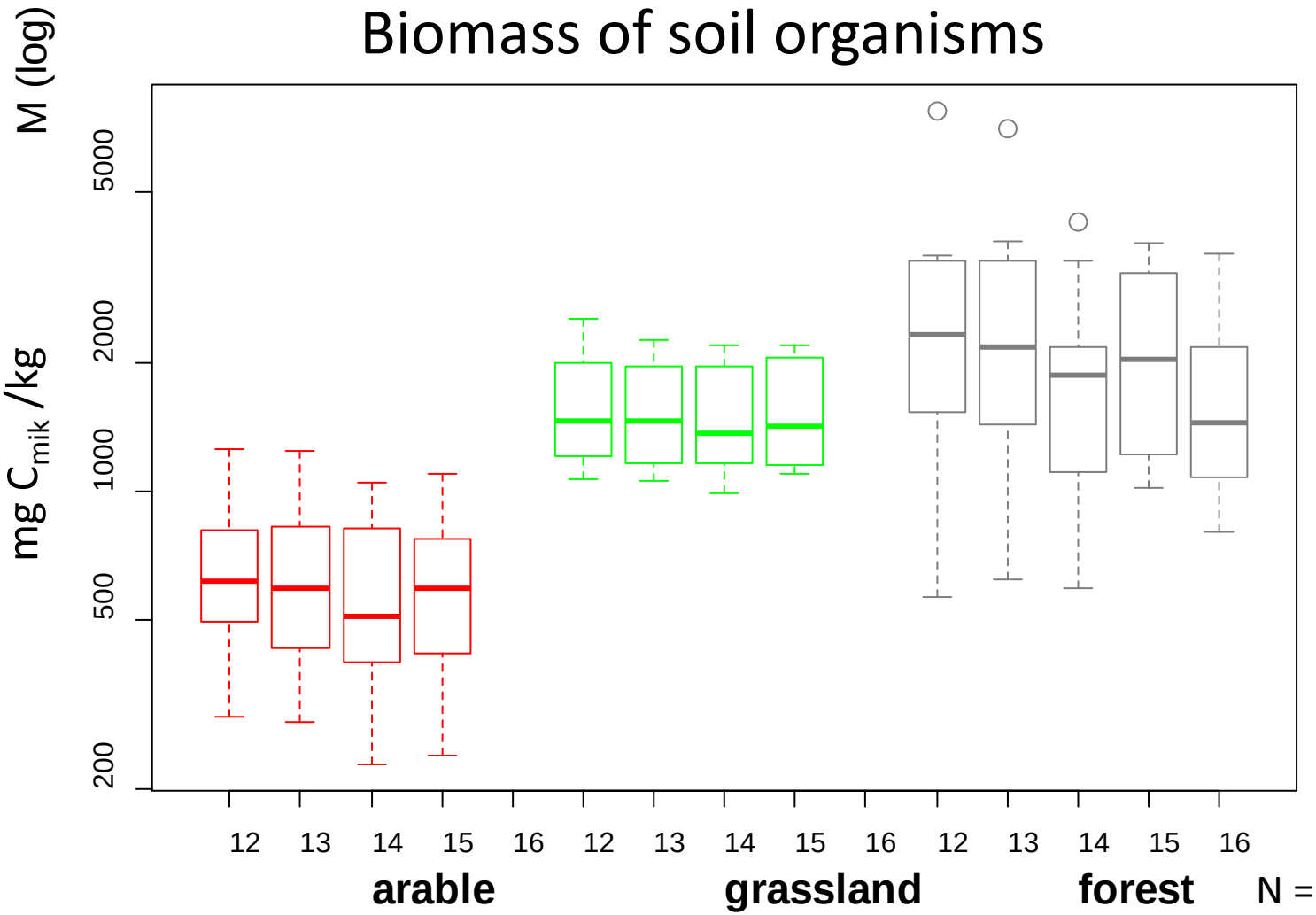
(2) Novel topics
Soil biology



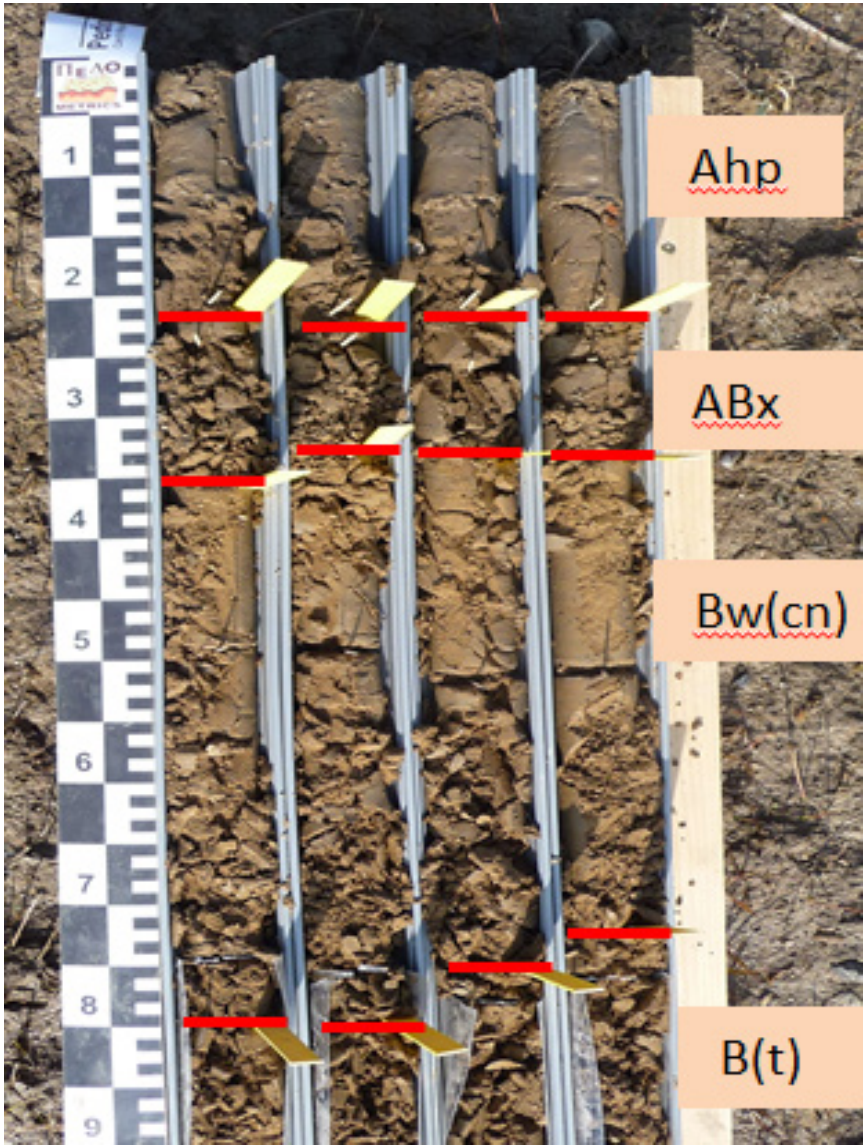
European Soil Biodiversity Atlas 2010

NABO

(2) Novel topics
Soil biology



(2) Novel topics
Soil physics: compaction



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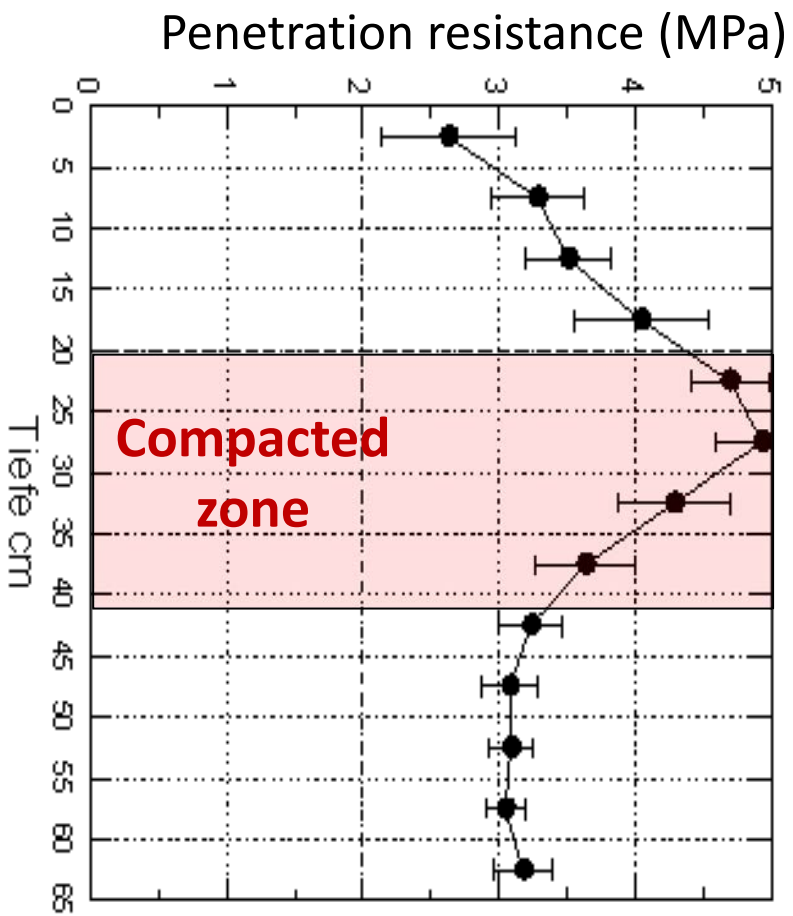
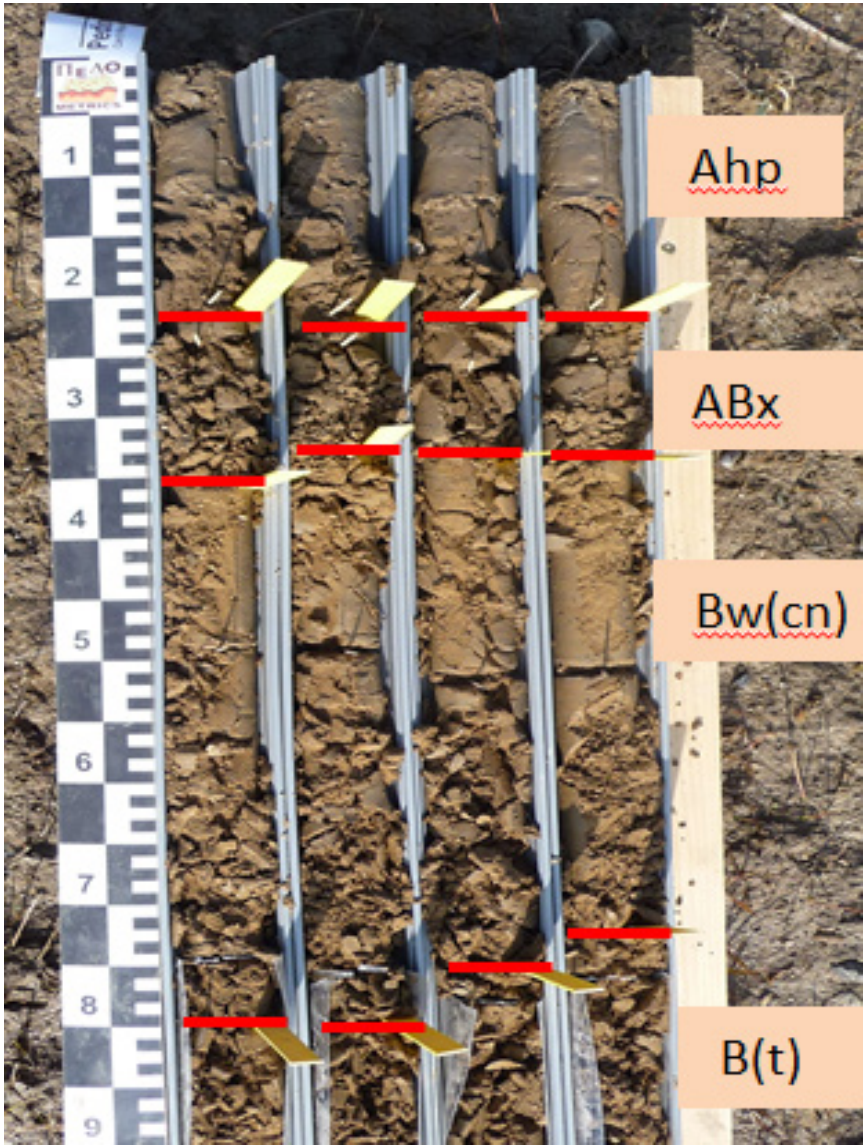
(2) Novel topics

Soil physics: compaction





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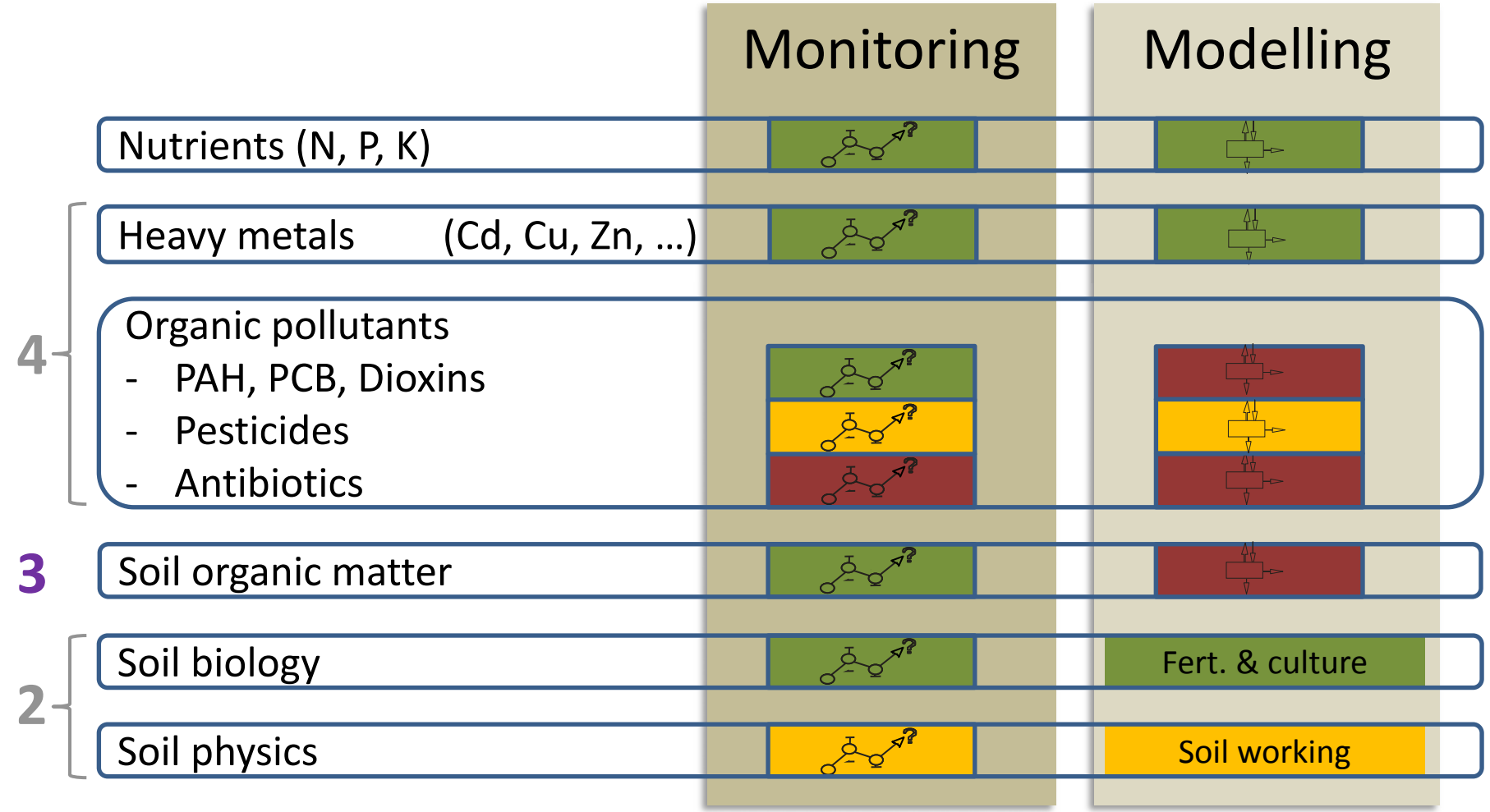
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Soil biology
Fert. & culture
Soil physics
Soil working
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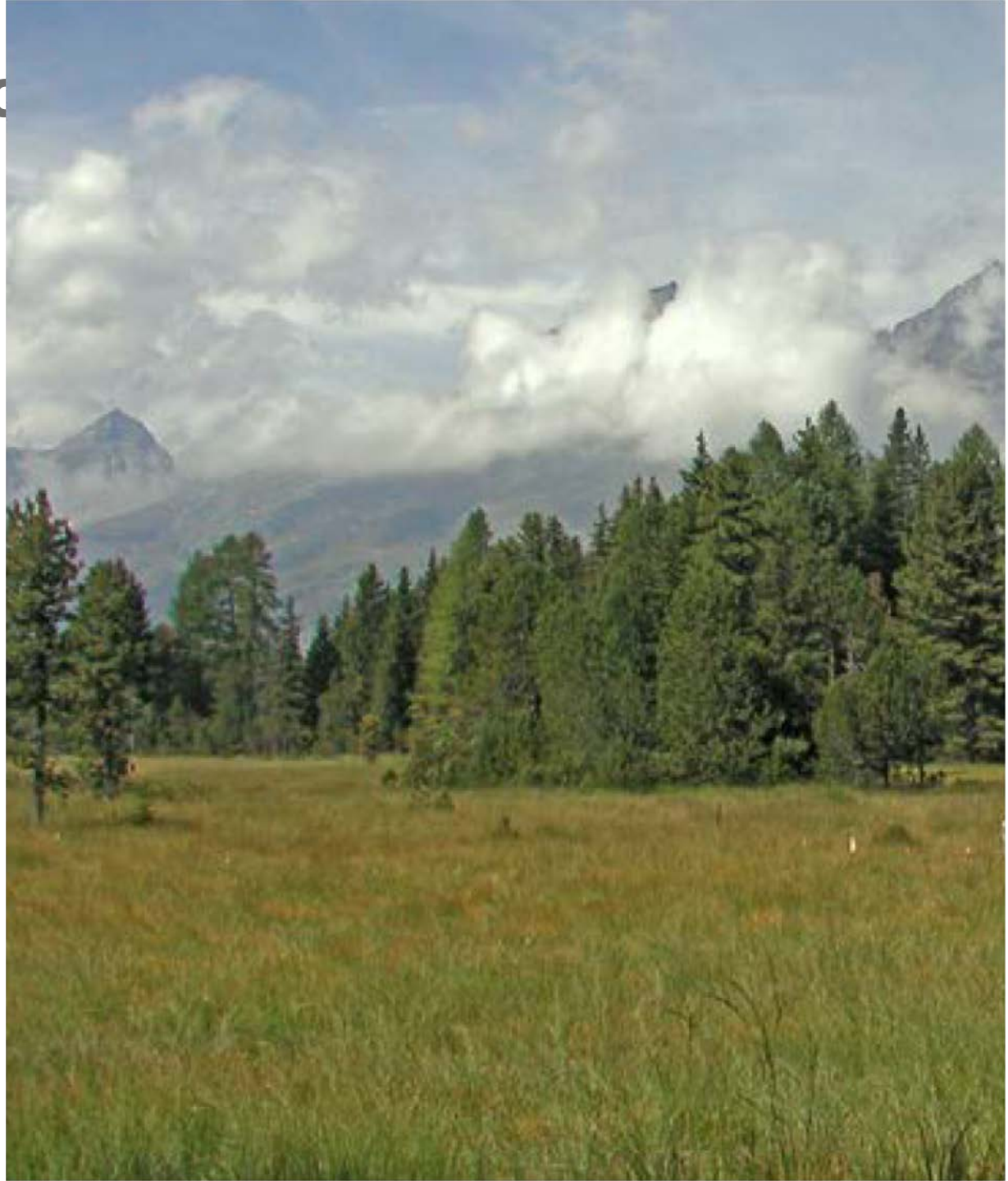
NABO

(3) Soil Organic



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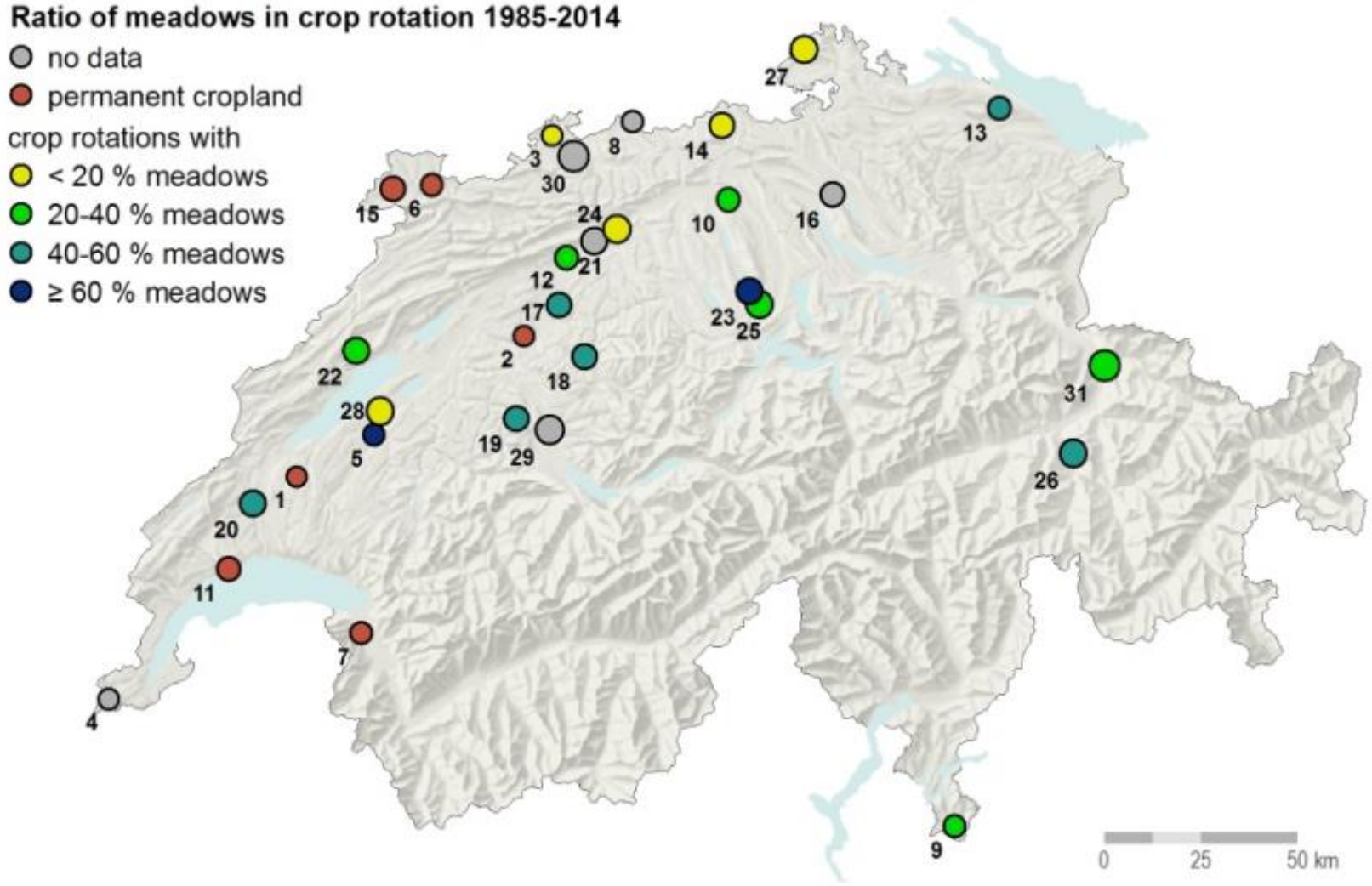
(3) Soil Organic Carbon
Cropland, mineral soils



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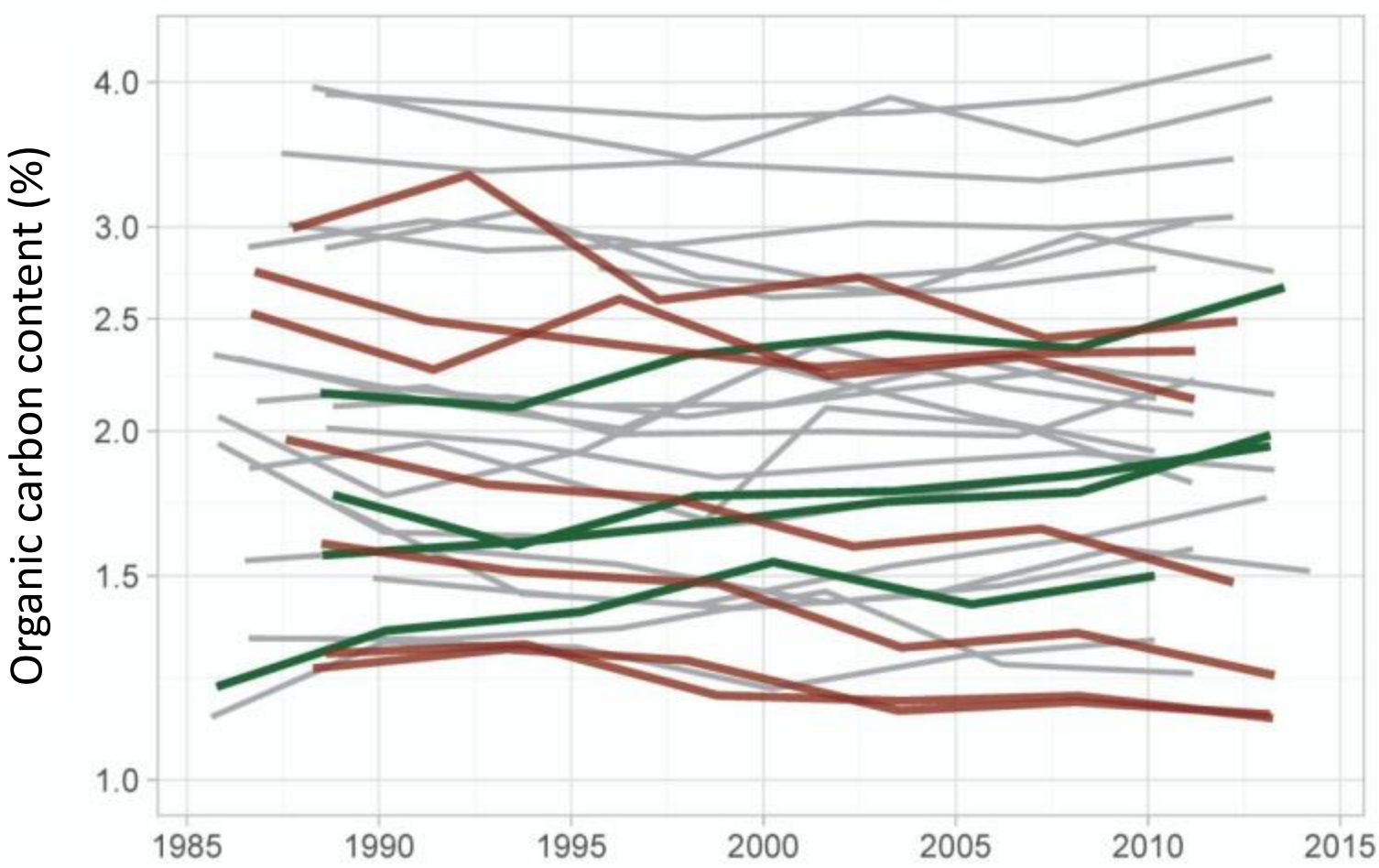
(3) Soil Organic Carbon

Variability between sites



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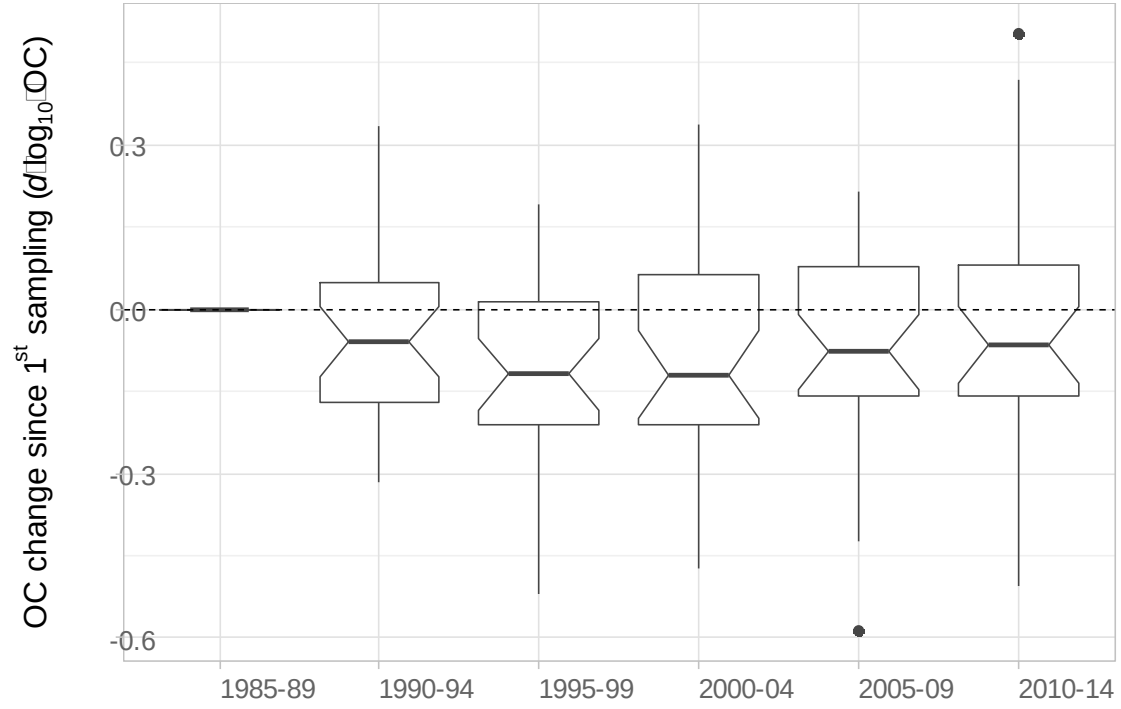
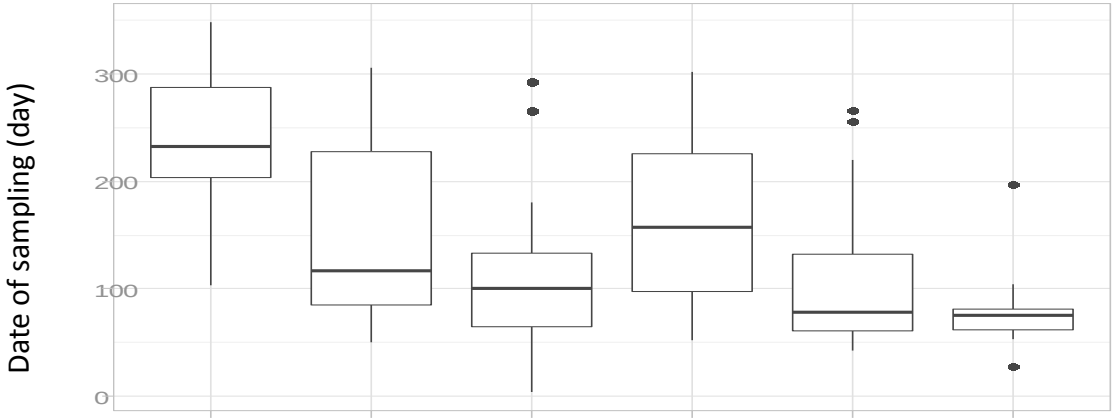
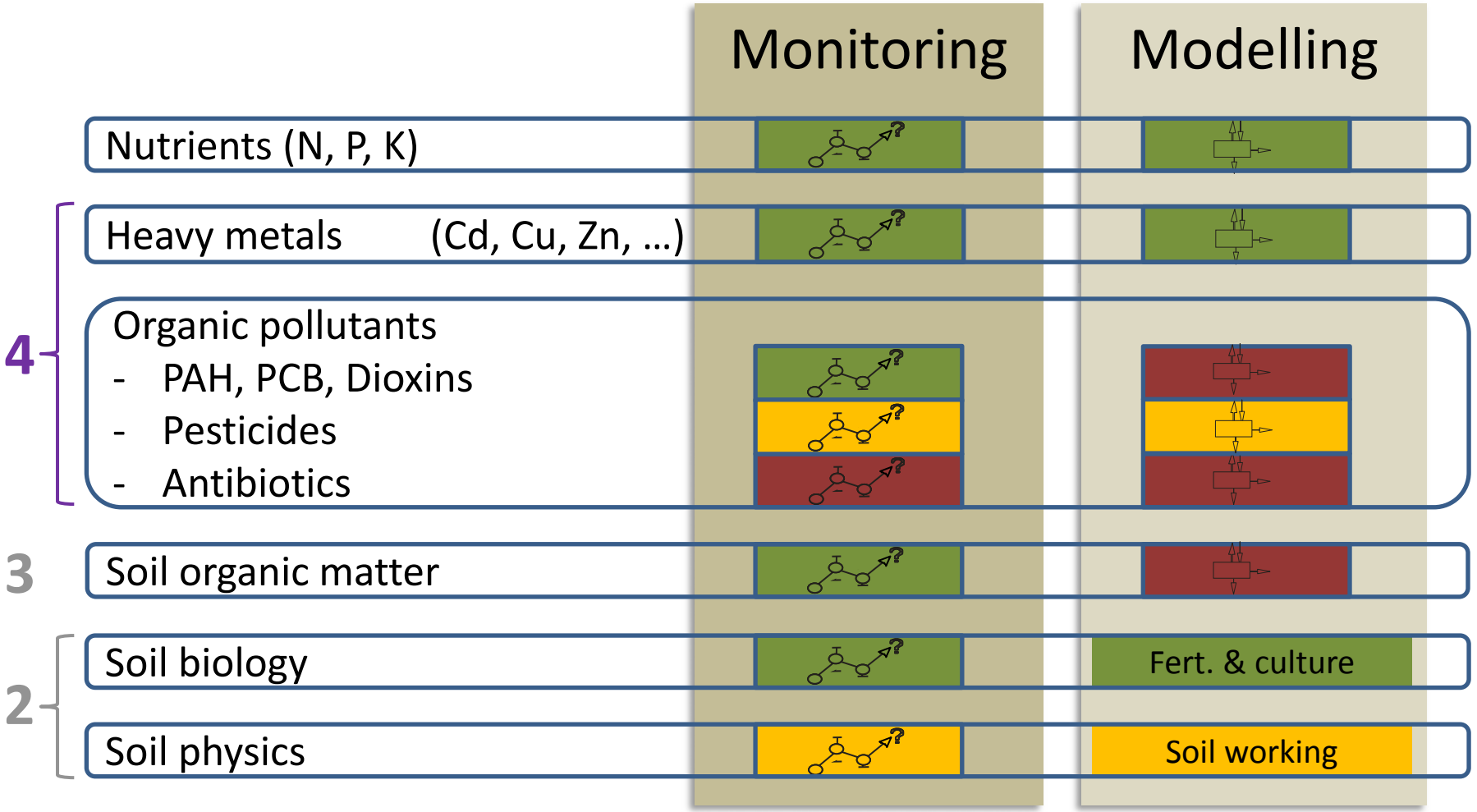
(3) Soil Organic Carbon

No clear trend 1990-2014





MDC (5 campaigns)
≈
3.5 % relative
change per 10 yrs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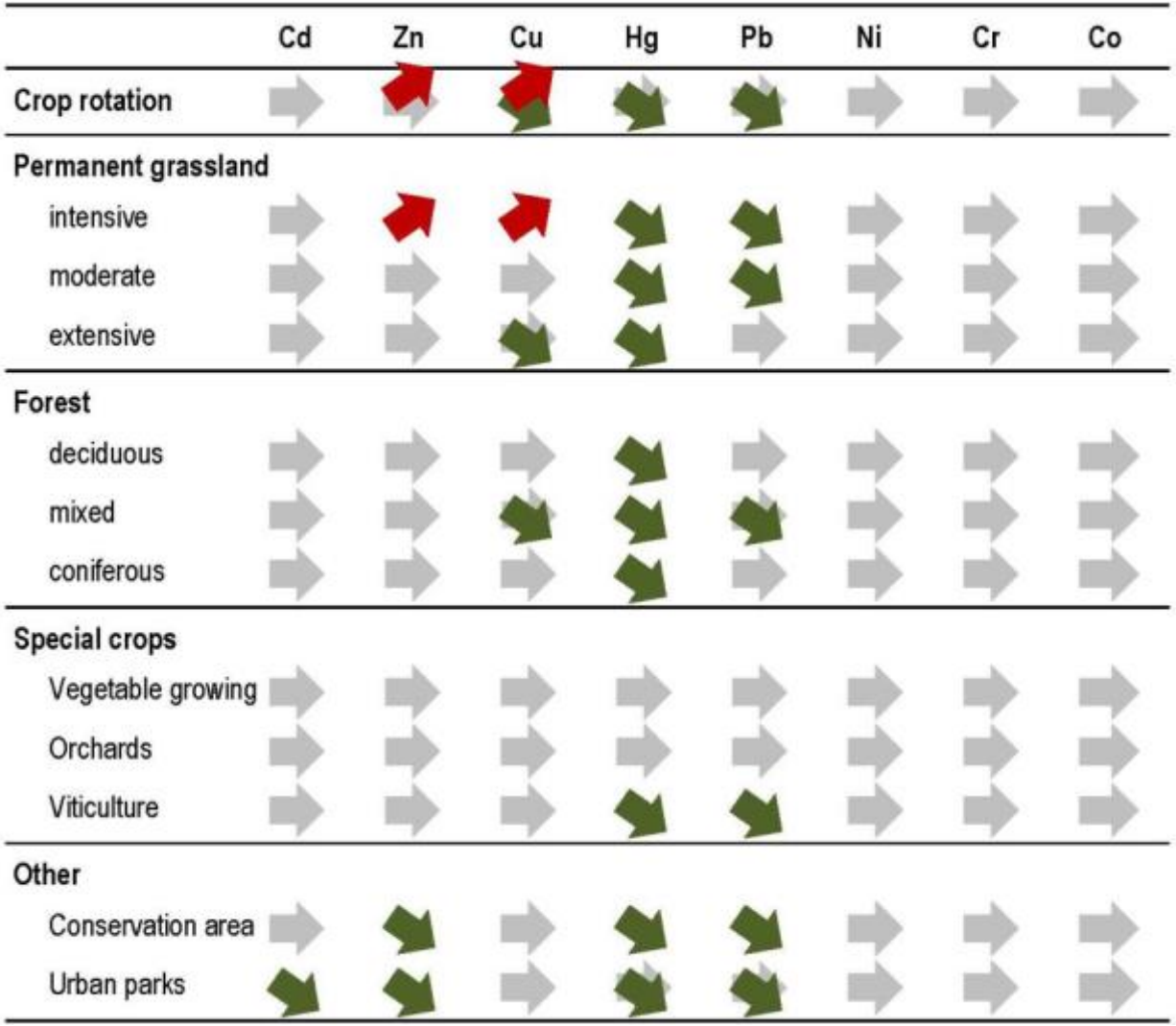
(4) Pollutants

Heavy metals: Trends 1985-2009



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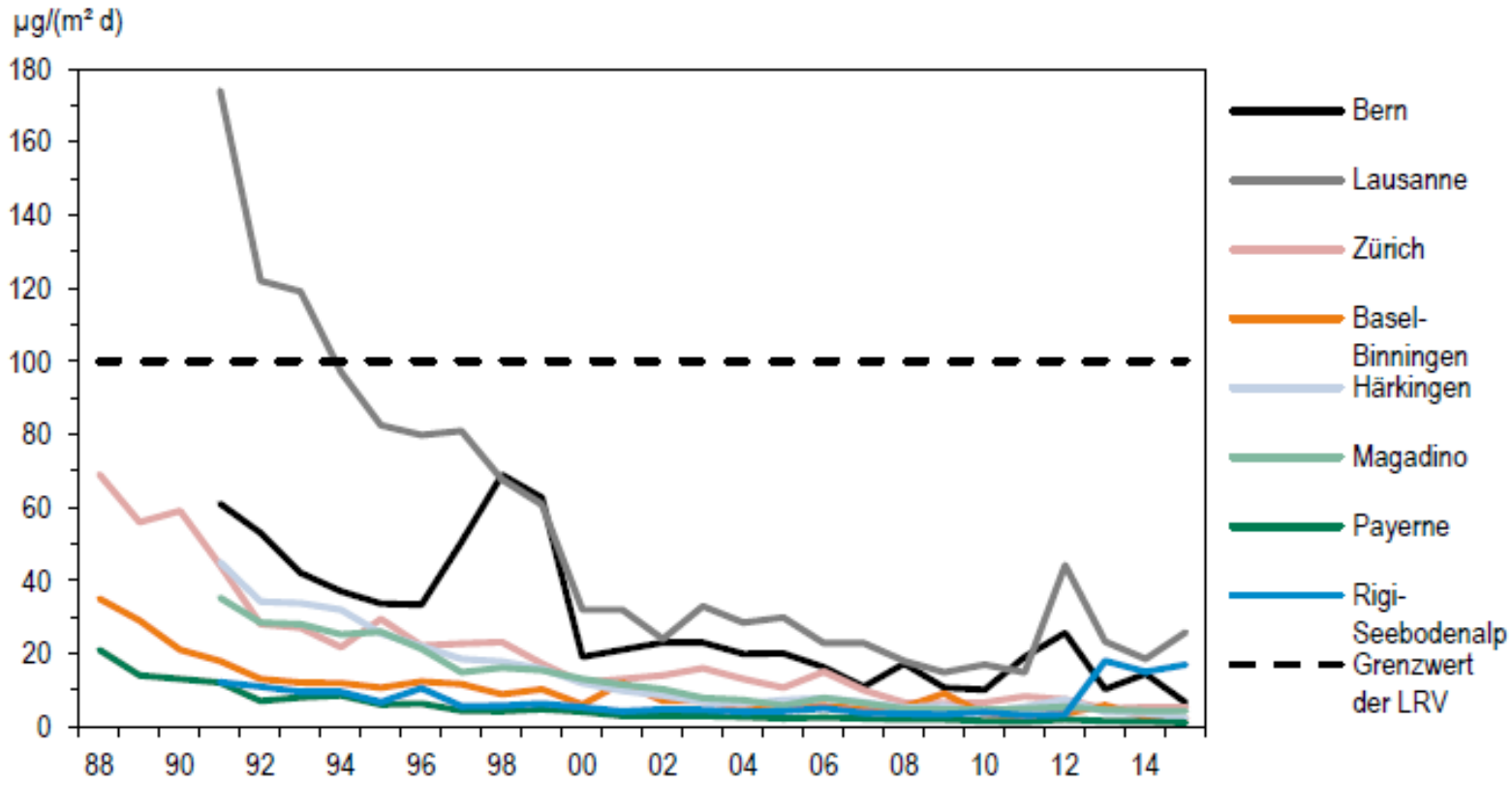
(4) Pollutants

Atmospheric deposition of Pb

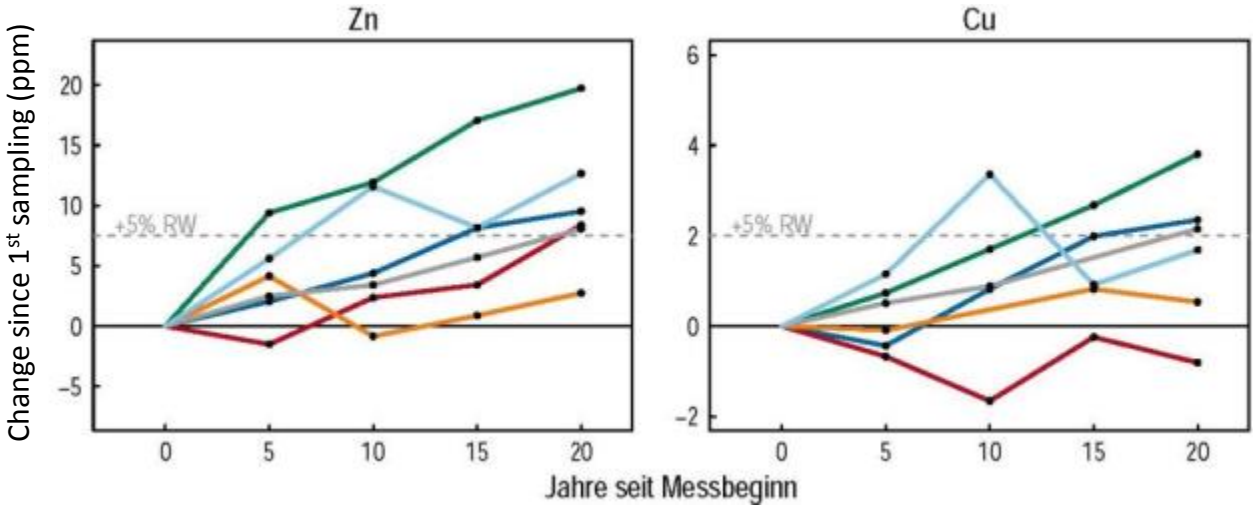
Abb. 44 > Blei im Staubniederschlag, Jahresmittelwerte 1988–2015



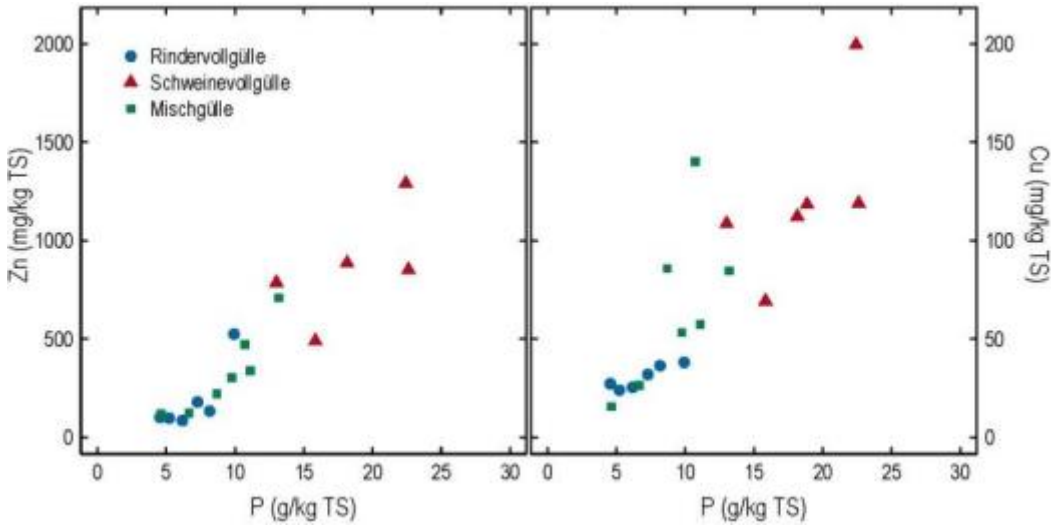
Source: NABEL, Annual report 2015

(4) Pollutants

Cu & Zn through farmyard manure



Intensively used grassland



Concentrations in farmyard manure

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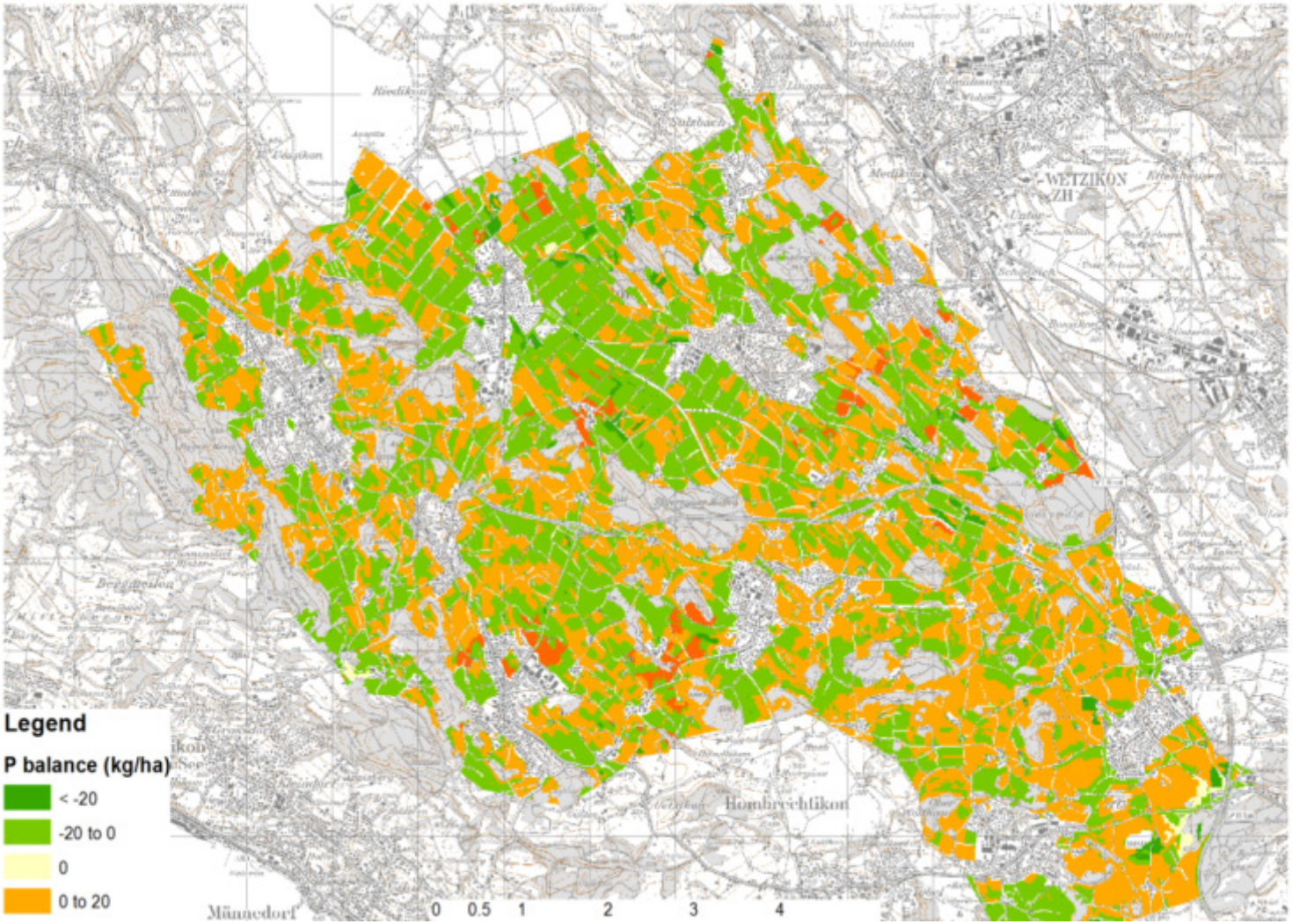
(4) Pollutants

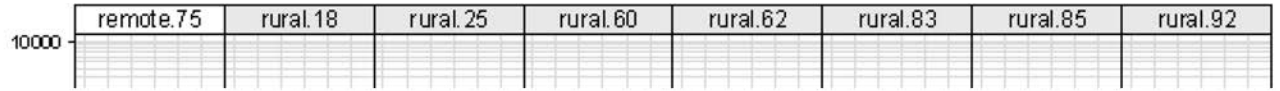
Modelling @ regional scales

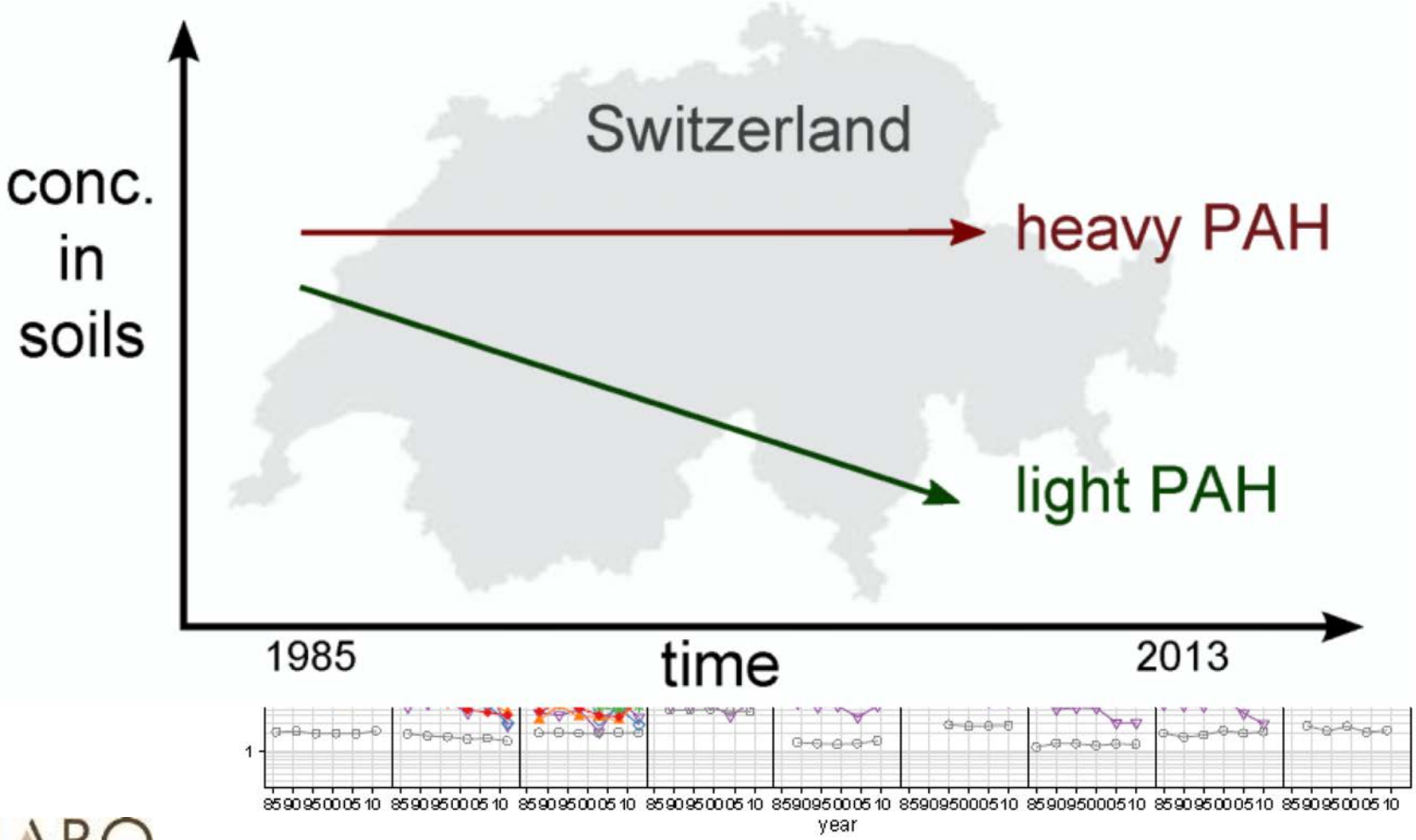


Greiner & Keller 2016. BGS-Bulletin 37.

(4) Pollutants

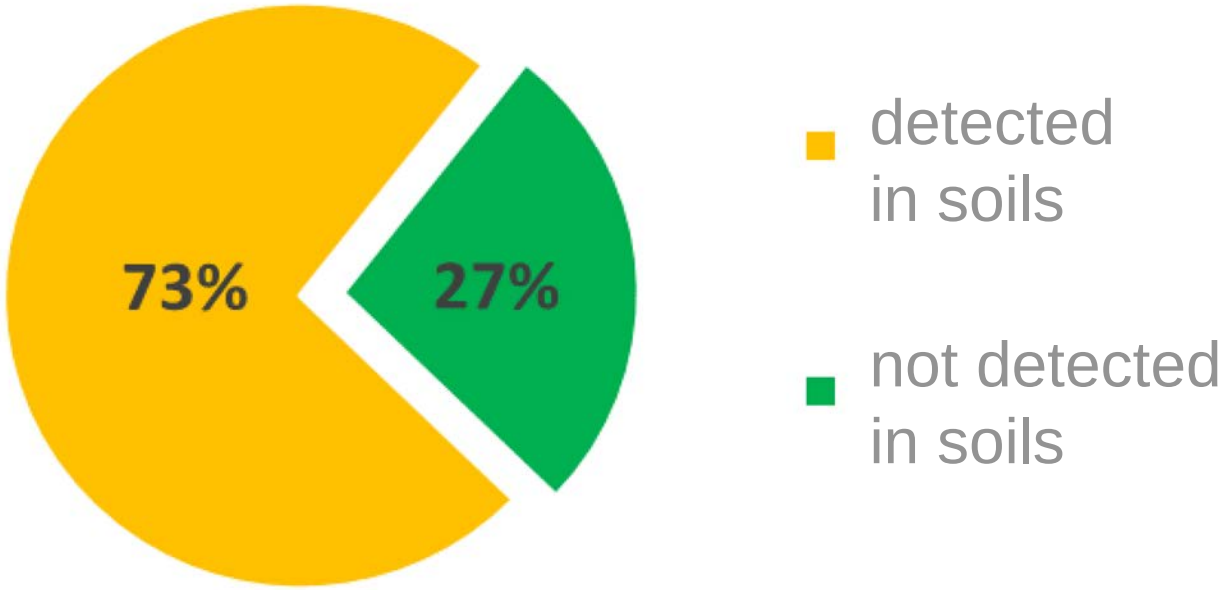
PAH





Gubler et al. 2015. Envir. Sci.: Processes & Impacts 17, 1816-1828

(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:

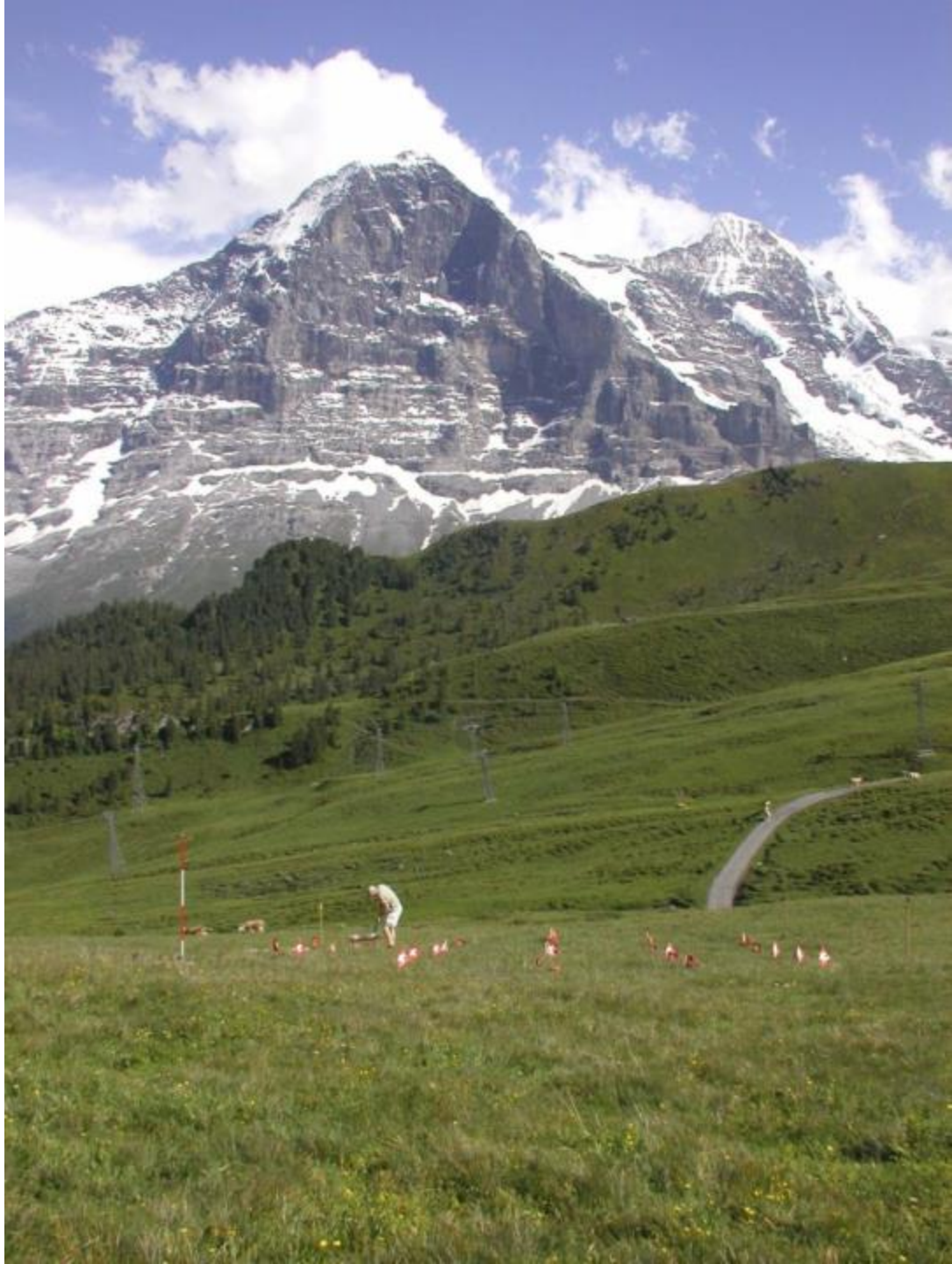
climate change/soil carbon,
soil biology, soil physics,
new groups of pollutants

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!



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