Applying fingerprinting methods on multielement measurements to track sediment transport in a small erosion-prone hilly catchment

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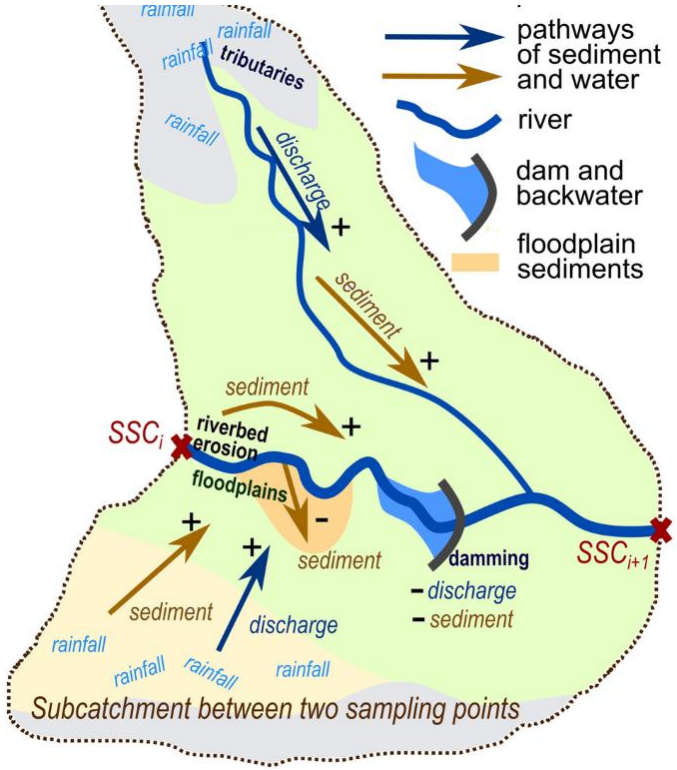
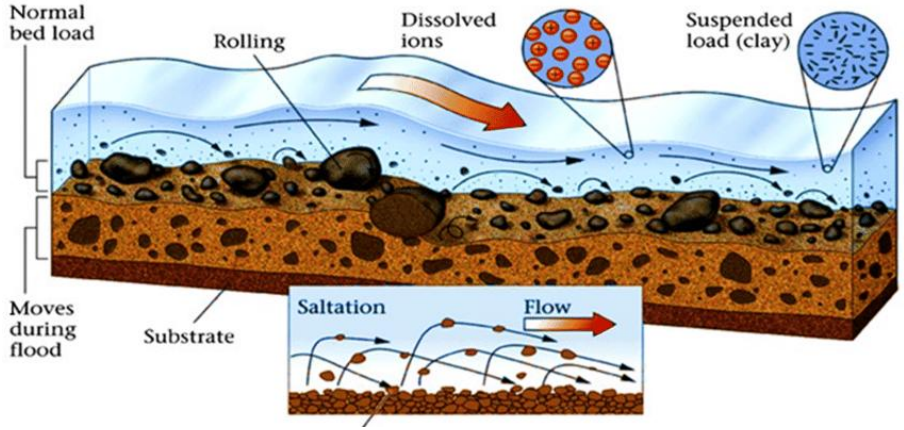
KARDOS, Máté Krisztián; JOLÁNKAI, Zsolt; CLEMENT, Adrienne

Budapest University of Technology and Economics, Department of Sanitary and Environmental Engineering, Budapest, Hungary

Sediment transport in river catchments





Problems

- sedimentation of reservoirs
- pollutant transport

Questions

- composition?
- mitigation possibilities?
  ←transport pathways, origin?

Wolf, S., Stenger, D., Steudtner, F. *et al.* Modeling anthropogenic affected sediment transport in a mid-sized European river catchment—extension of the sediment rating curve equation. *Model. Earth Syst. Environ.* 9, 3815–3835 (2023). https://doi.org/10.1007/s40808-023-01703-8

Pilot area

The Koppány catchment:

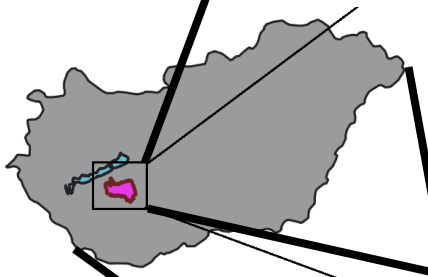
- 660 km^2 area, rare settlements (29 cap km^{-2})

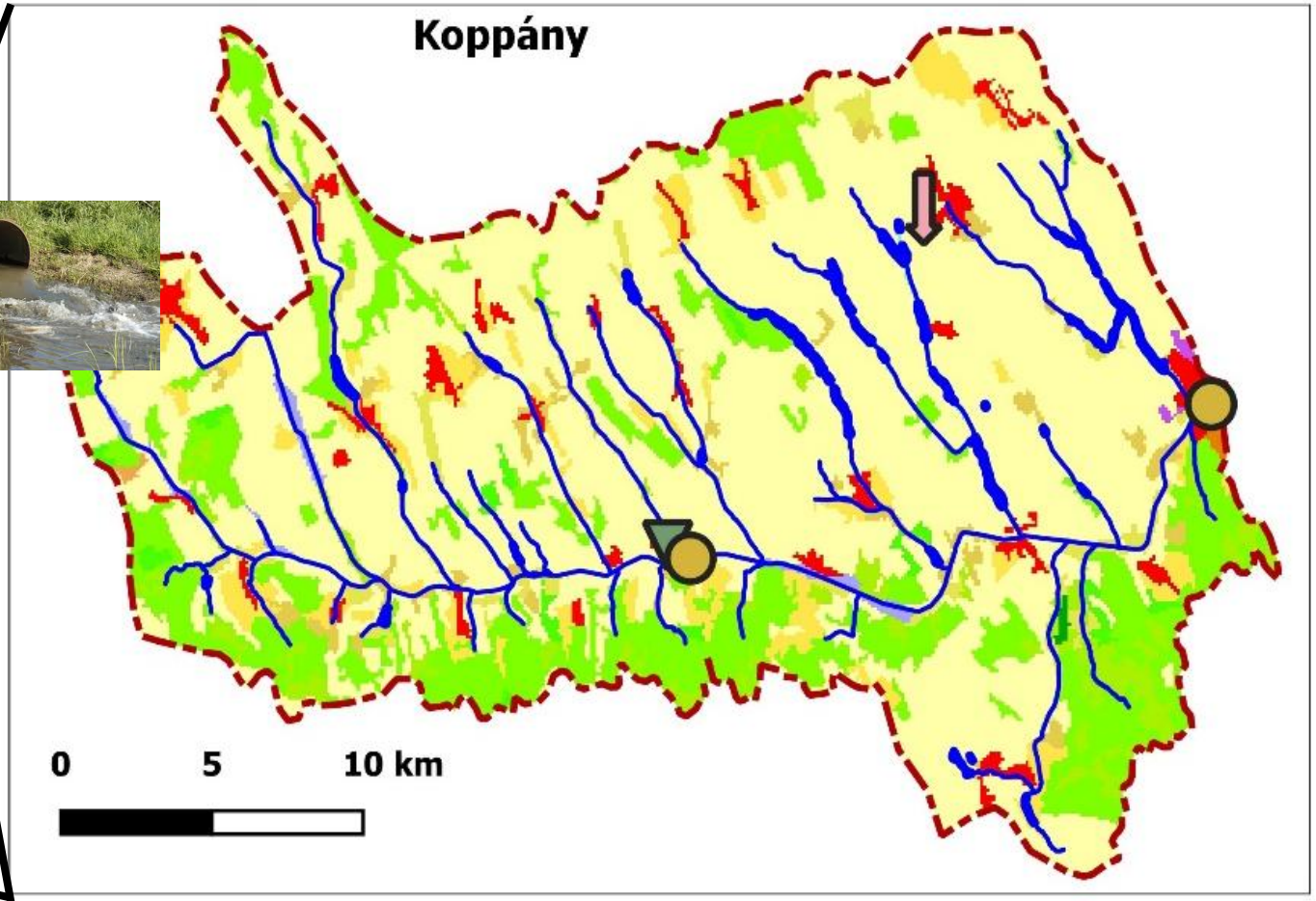
- 79% agricultural land + high erosion potential

- 18% forests

- fishponds

- large WWTP Balatonlelle discharge at the spring





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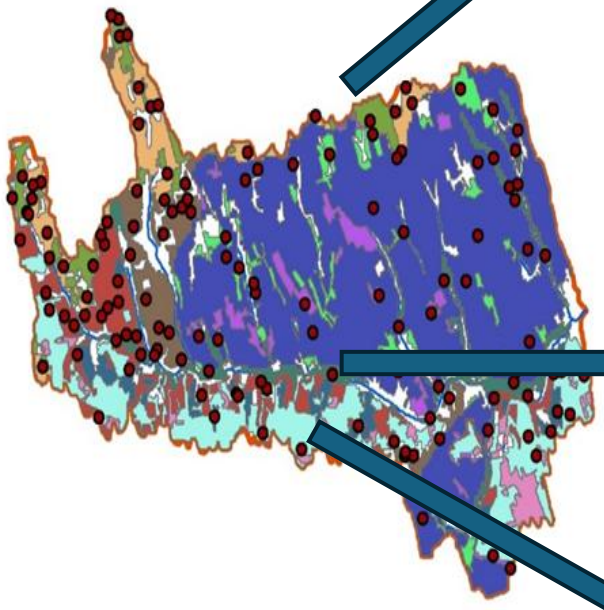
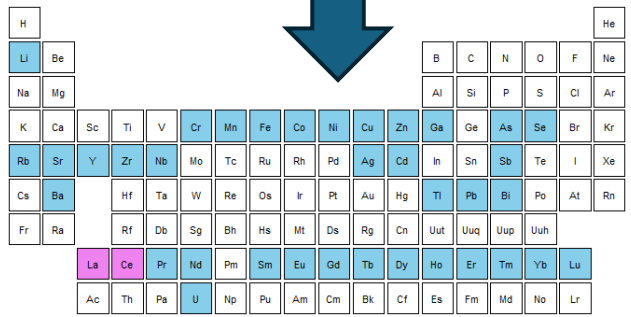
Sampling program



SOiL 		200 locations 20 samples agricultural ≠ forest ≠ pasture land
riverbed **SED-**iment 		19 locations 19 samples main stream ≠ tributary
river **S**uspended **P**articulate **M**atter 		2 locations 14 samples high flow ≠ low flow conditions



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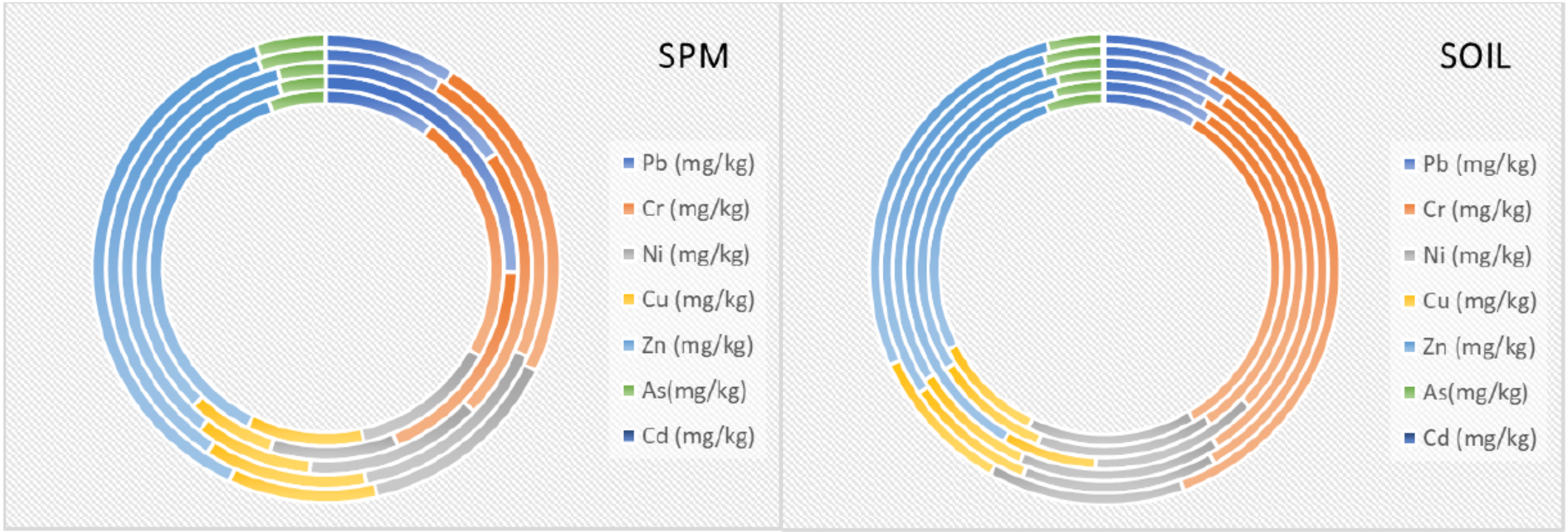
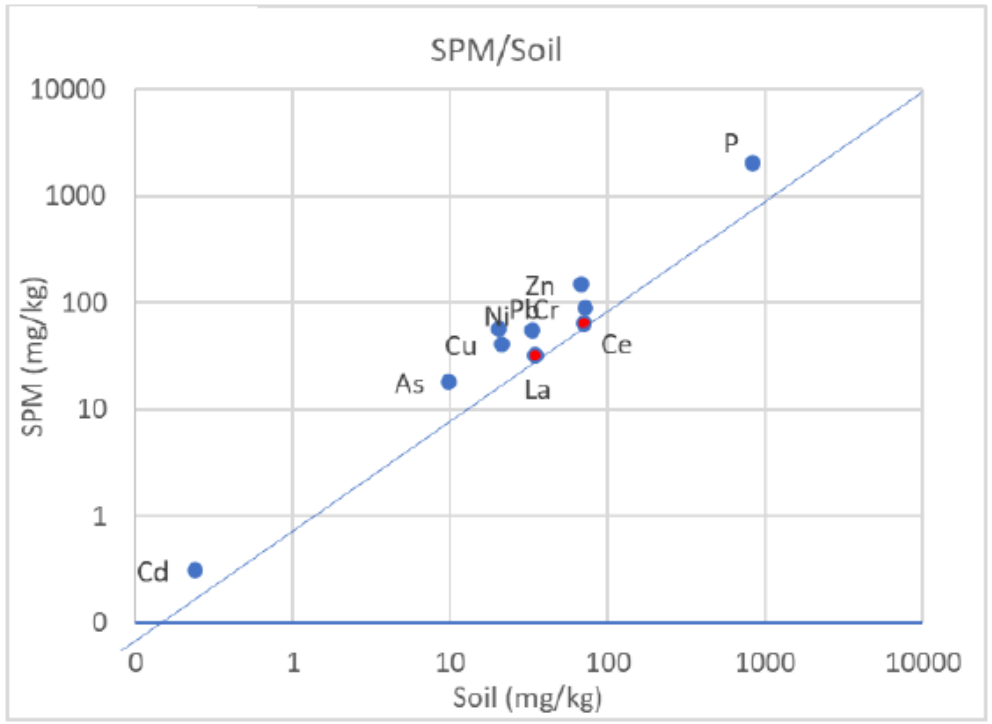
Results

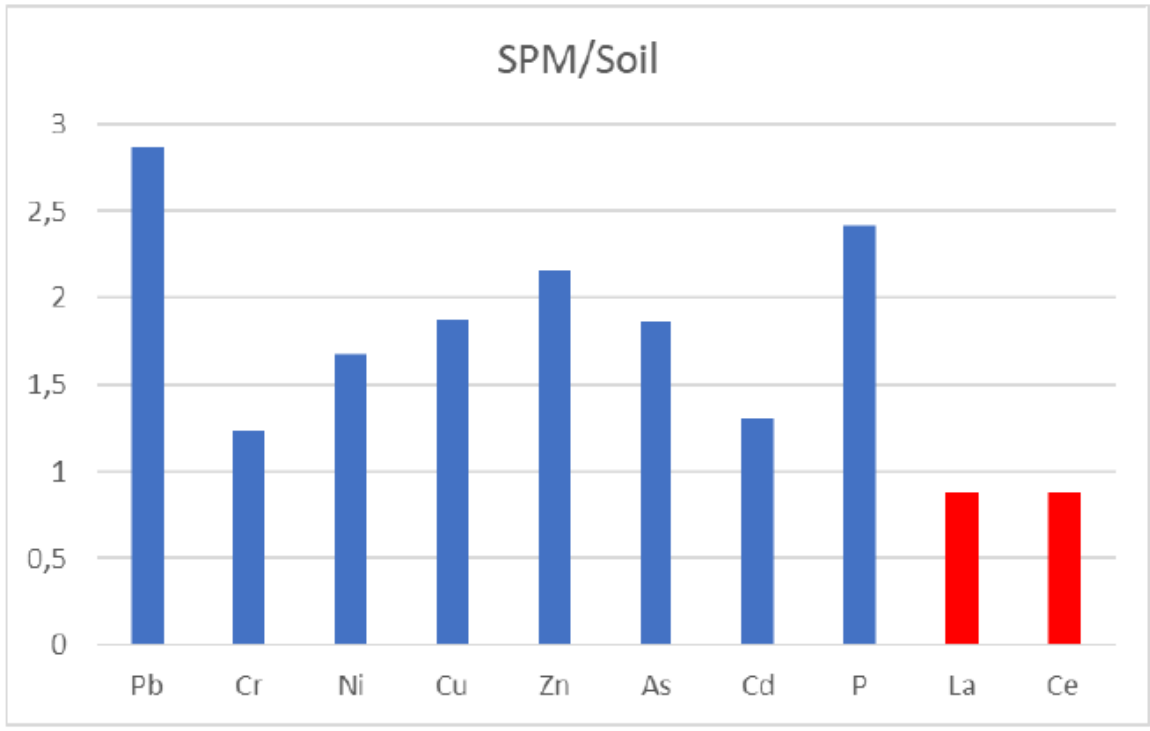
“Fingerprint”



Percentage of PTE concentrations in river SPM and in agricultural SOIL

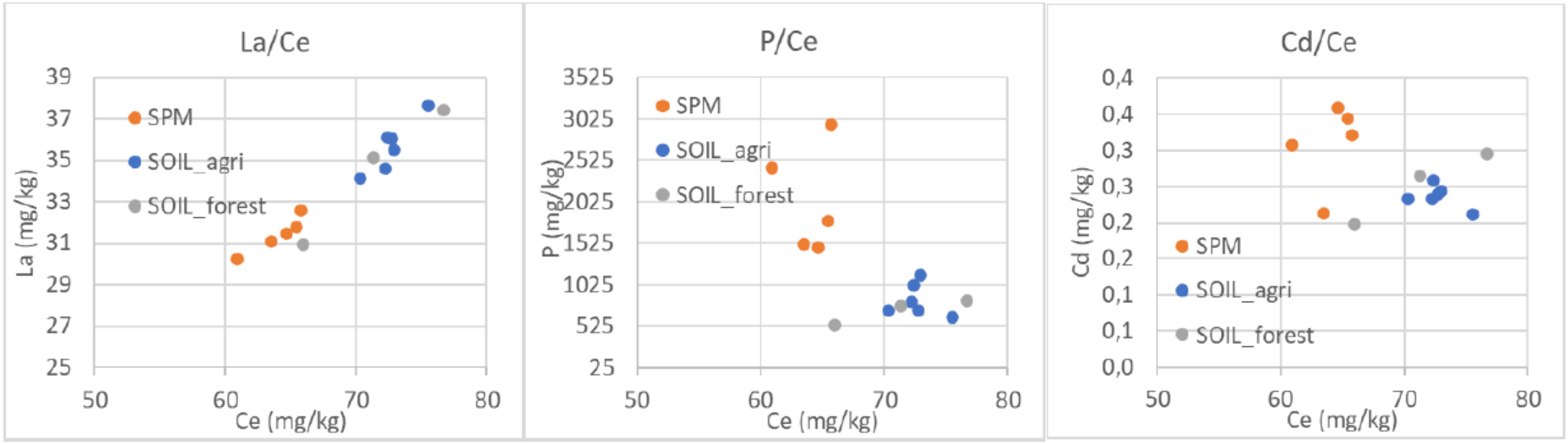
Enrichment during transport





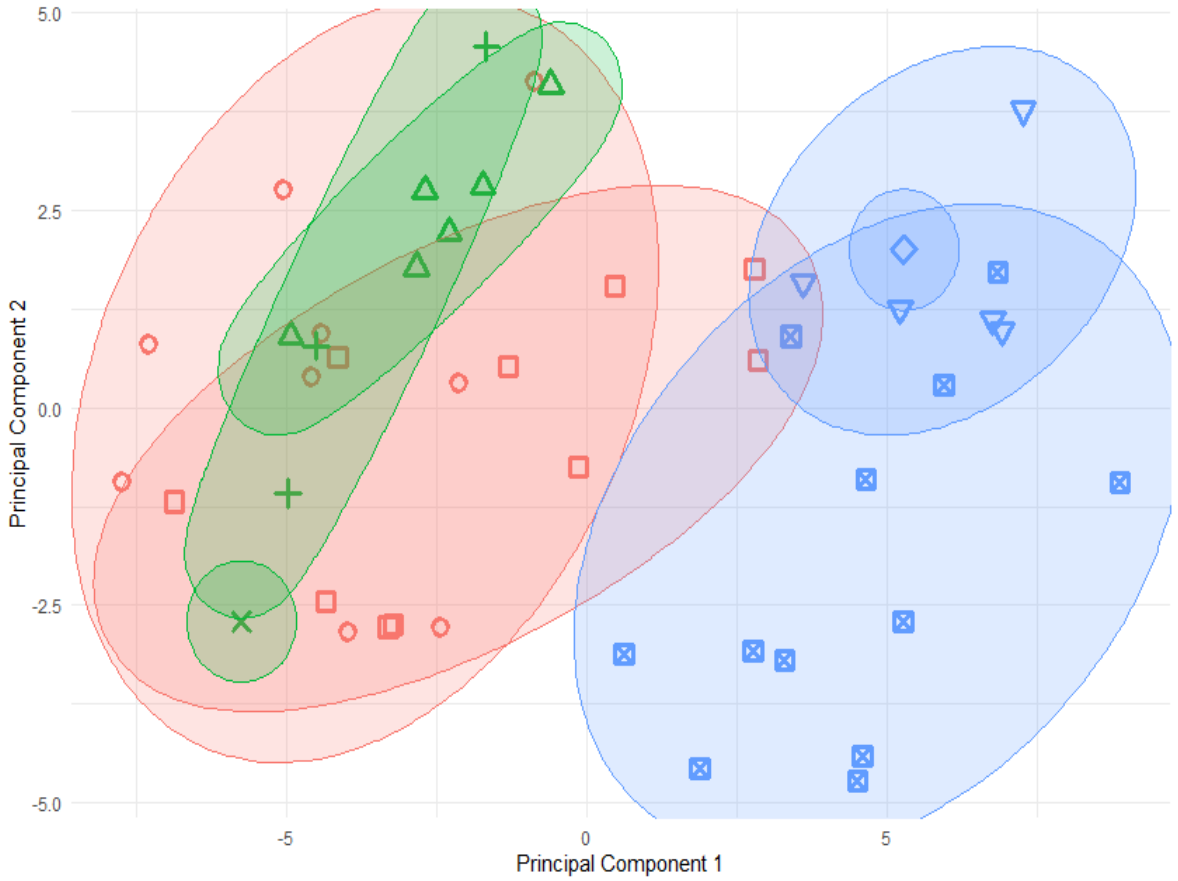
Relationship between the concentrations in SPM and soil (left). The ratio of the two values shows the degree of enrichment (right)

Geochemical normalizers: Ce & La

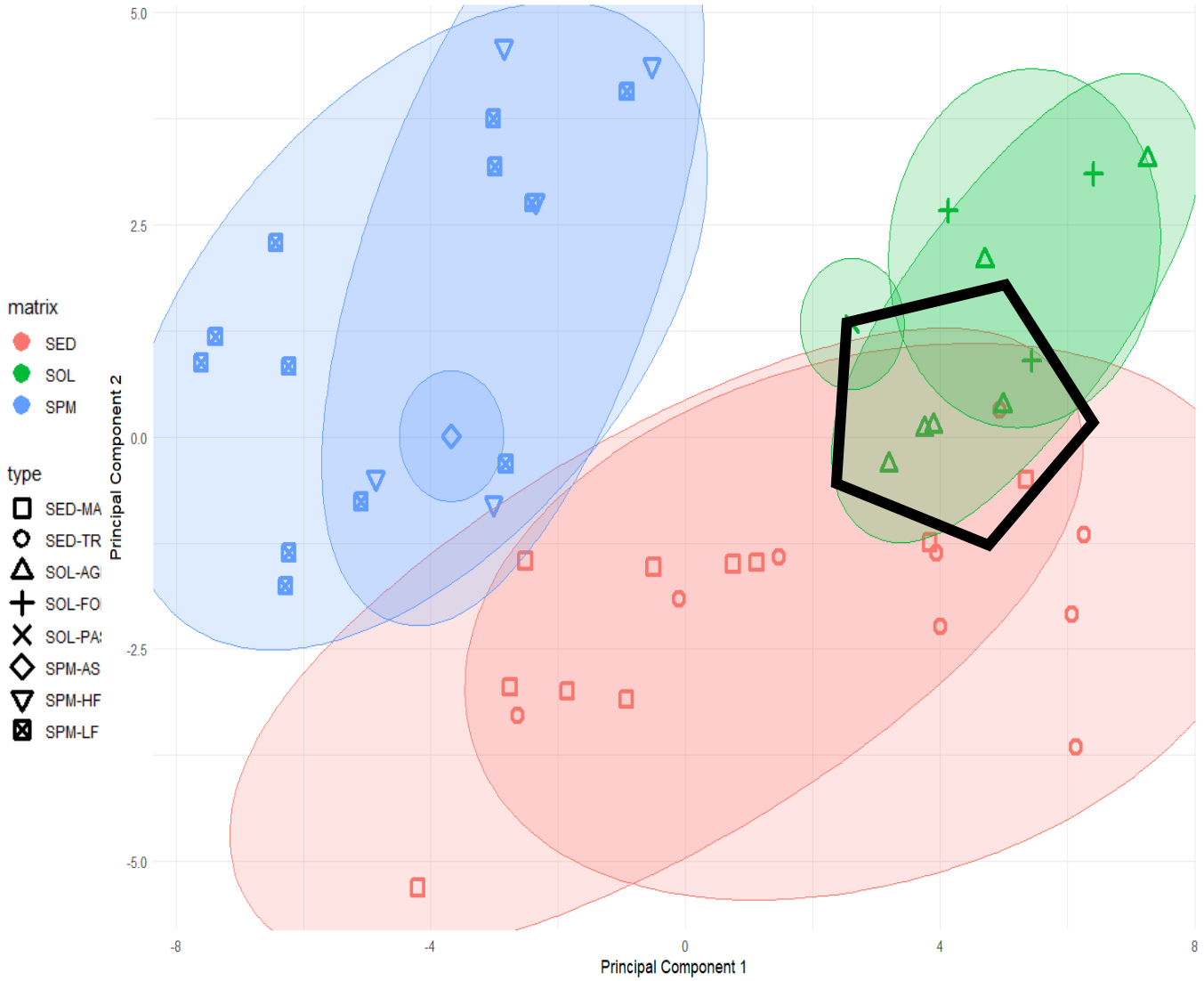


Concentrations of La, P, and Cd in suspended particulate matter (SPM), agricultural and forest soils as a function of Ce used as a geochemical normalizer

PCA on original data



PCA after norming with Ce



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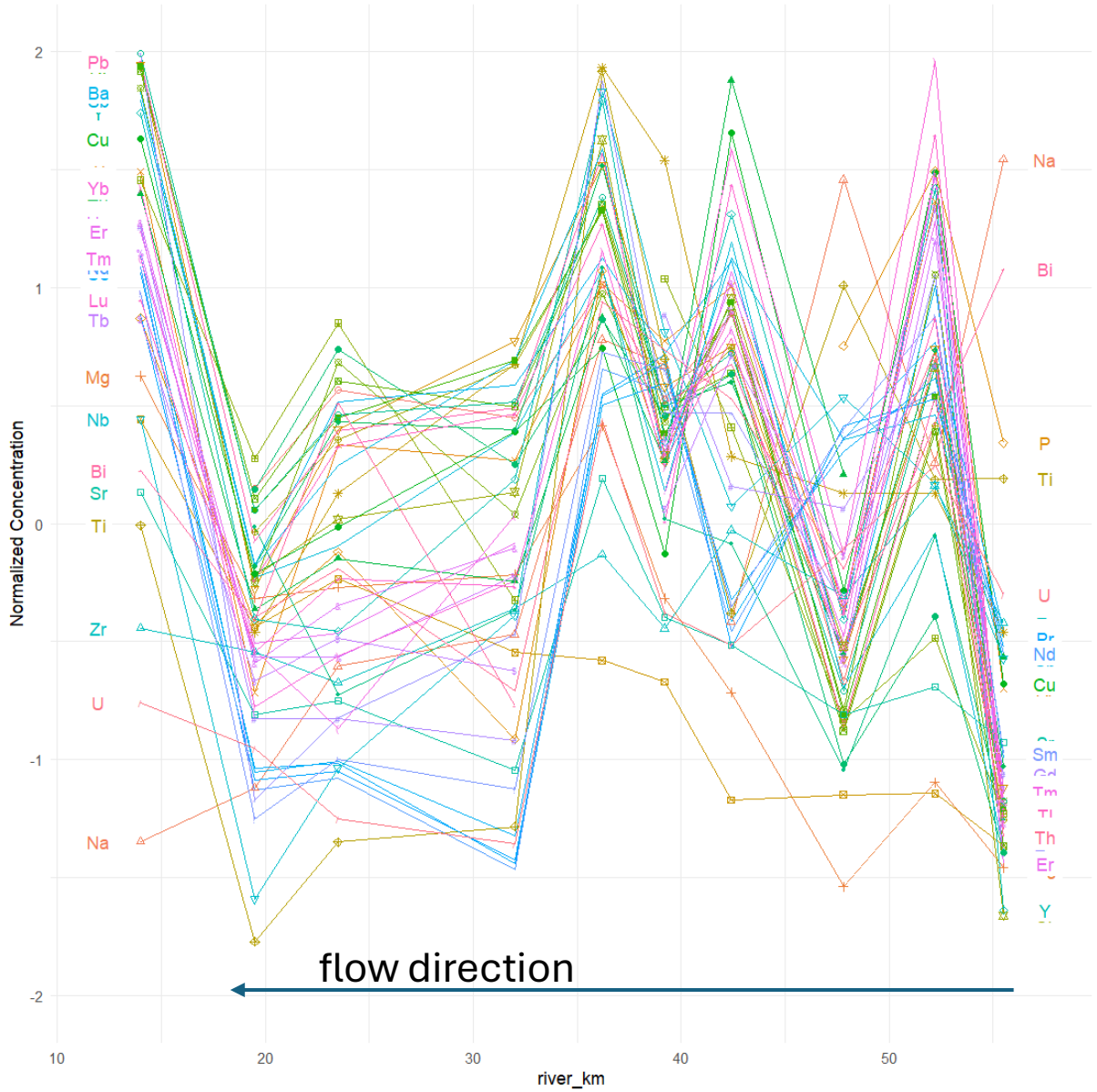
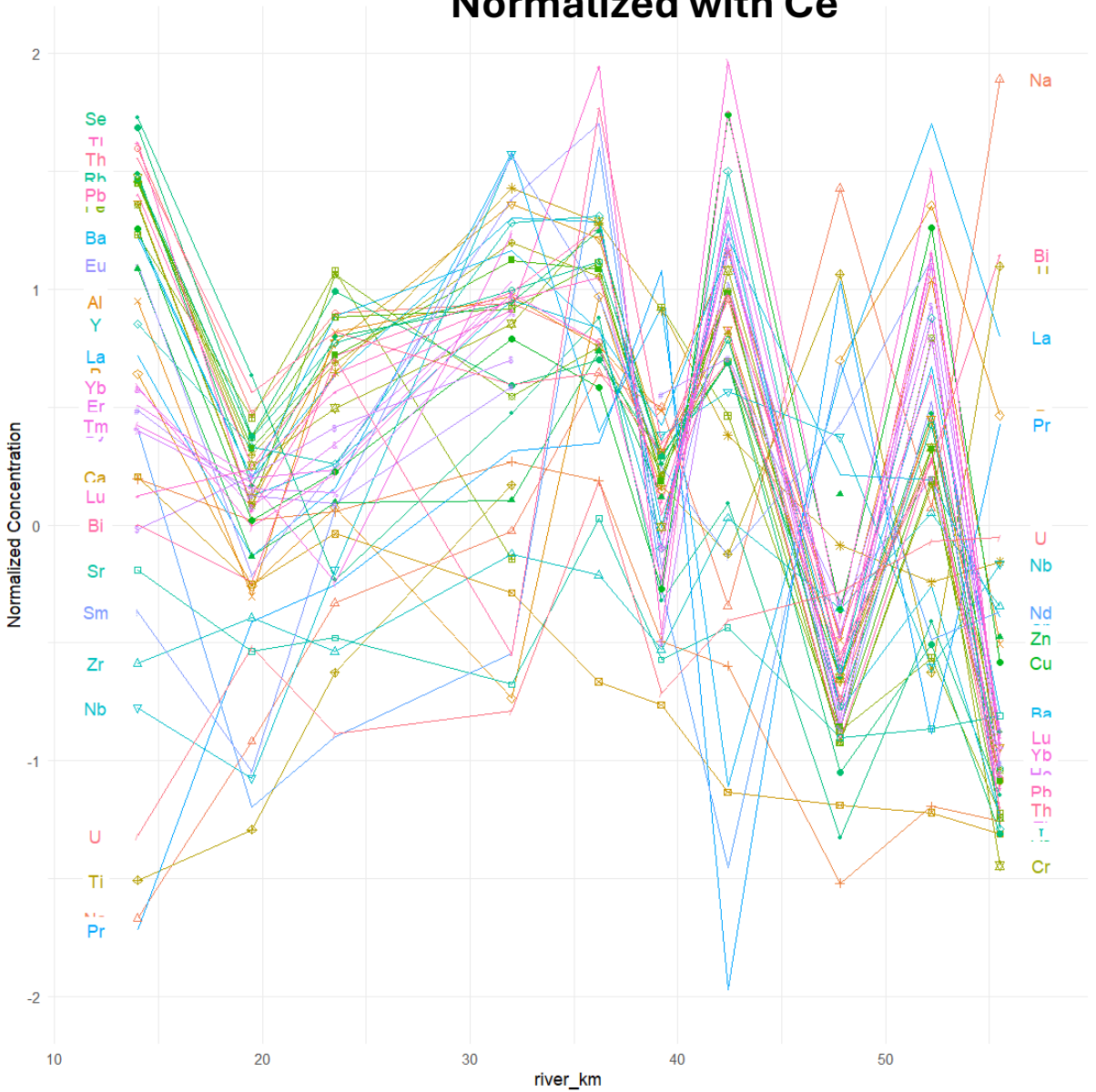
Main river SED longitudinal section



Normalized with Ce



Conclusions and outlook

- Expectation of more similarity between SED-SPM and agricultural soil fulfilled
- Sediment dynamics hardly influencing
- “Outlier” substances in BED longsect: Ca, Na, Ti
- Further MV methods needed to compare substances

Next steps

- sampling of WW SPM
- Sieving (SED)
- Cluster analysis of locations (and substances)
- Your ideas?

Please read our abstract!

Nr. 12894

Thank you for your attention!

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