

A Year Long Study: Bare Topsoil Temporal and Vertical Variability in Hydraulic Properties

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Variability of Soils

Soils exhibit considerable variability in their physical and hydraulic properties, which can change both spatially and temporally. Research on the temporal variability and especially the internal variability of hydraulic and physical properties within the shallow topsoil itself remains scarce. In this one-year study (2023–2024), we investigated seasonal changes in the physical and hydraulic properties of post-tillage bare topsoil at the plot scale, hypothesizing significant temporal variability and heterogeneity within topsoil.

Study Site

- Study site: Risuty, Central Bohemia, Czechia (30 km NW of Prague).
- Climate: humid continental; mean annual temperature 10 °C; annual precipitation 500 mm.
- Plot: 2 × 8 m, tilled to 20 cm depth, bordered by metal sheets; short side perpendicular to slope.
- Focus: variability of 0.12 m thick bare topsoil over one year (May 2023–May 2024).



Sampling

- Vegetation suppressed with total herbicide; plot fenced to prevent runoff, outlet left open.
- Probes installed at 10, 20, and 30 cm depths to monitor moisture.
- Monthly sampling from May 2023–June 2024 (excluding winter); 107 undisturbed and 28 disturbed samples collected.
- Disturbed samples (0–12 cm) combined into composite samples for PSD, TOC, and aggregate stability analysis.



Outflow

May 2023



Jun 2023



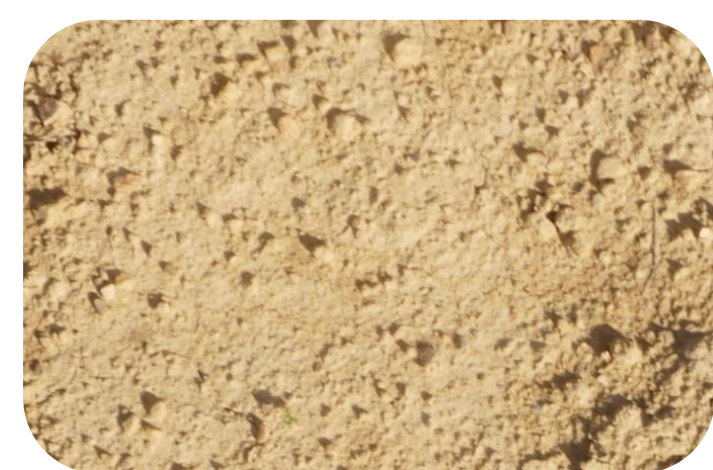
Jul 2023



Aug 2023



Sep 2023



Nov 2023



Apr 2024



May 2024



Conclusion

Significant temporal and vertical variability found between upper and deeper layer.

Surface

Sample 0-5 cm

Sample 7-12 cm

