Small-scale Spatial Variability of Hydro-physical Properties of Differently Degraded Peat

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Study Site

Figure 1 Three sampling sites in Mecklenburg-Western Pomerania, Germany. (Right plate 72 sampling points at each site within 35 m × 40 m plot)

Introduction

- Spatial variability of soil properties is important for hydrological studies. However, little information is available on the spatial variability of hydro-physical properties of peat soils.
- 216 undisturbed soil cores were collected from one extremely drained (site 1), one degraded (site 2) and one natural peatland (site 3). The saturated hydraulic conductivity (Kₛ), soil water retention curves, total porosity, macroporosity, bulk density, soil organic matter (OM) content and the van Genuchten model parameters (θₛ, α, n) were determined for all sampling locations.
- Hypothesis: Spatial correlation of hydro-physical properties of peat soils is related to soil degradation.

Concluding Remarks

- Macroporosity and LogKₛ are positively correlated, however, the functions differ between natural peatlands and degraded peatlands.
- In general, the hydro-physical properties of peat soils are weakly or moderately auto-correlated.
- The hydro-physical parameters logKₛ, logθ, n are spatially cross-correlated with macroporosity indicating that the soil structure is important for spatial variance of hydro-physical properties of peat.
- Degradation stage plays an important role and should be considered more often in spatial analysis.

References


First Results

Relationship between hydro-physical properties of differently degraded peat

Figure 2 The relationship between (a) saturated hydraulic conductivity Kₛ (LogKₛ) and macroporosity; (b) macroporosity and van Genuchten parameter α (Logα); (c) macroporosity and van Genuchten parameter n in differently degraded peat. (blue: site 1; orange: site 2; pink: site 3)

Semivariogram for hydro-physical properties along transect

Figure 3 Semivariograms of different hydro-physical properties (macroporosity, LogKₛ, Logθ, n) of three study sites. (blue: site 1; orange: site 2; pink: site 3)

Cross Semivariogram for hydro-physical properties

Figure 4 Cross semivariograms of different hydro-physical properties (macroporosity and LogKₛ, macroporosity and Logθ, macroporosity and n) of three study sites. (blue: site 1; orange: site 2; pink: site 3)