# Supporting Material: Key drivers of pyrogenic carbon redistribution during a simulated rainfall event

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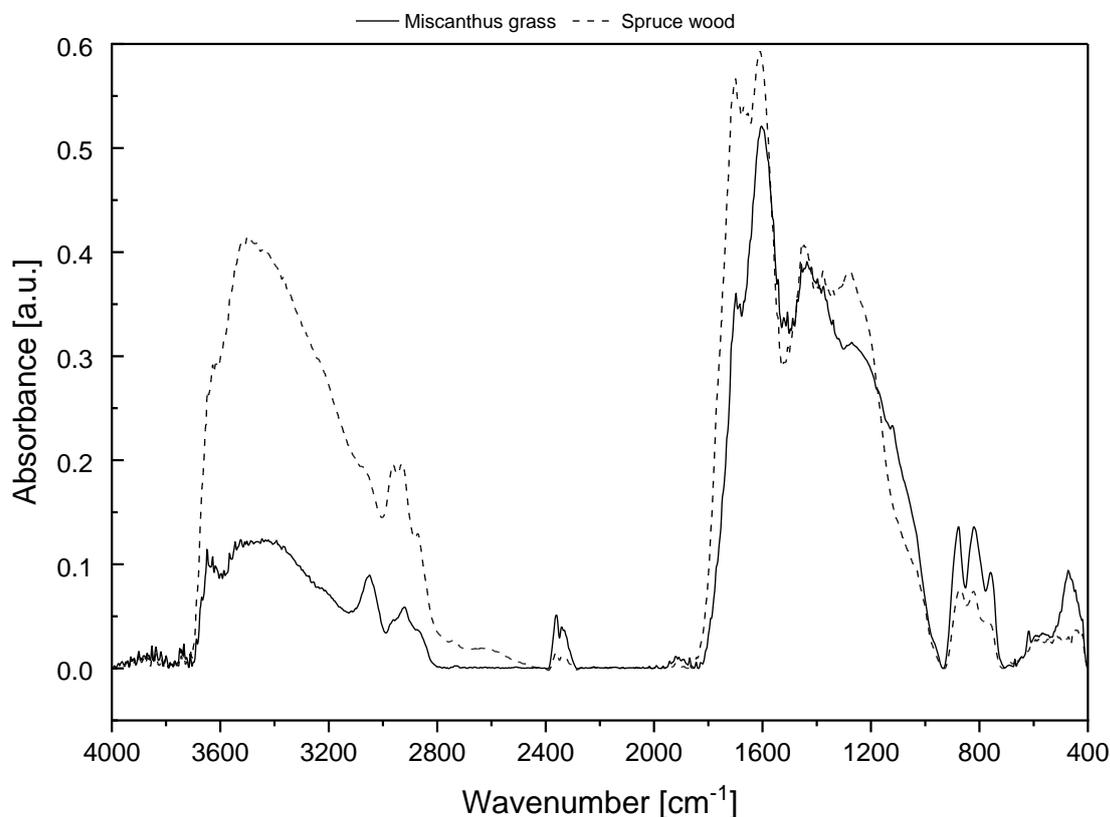*Correspondence to:* Samuel Abiven (abiven@biotite.ens.fr)

**Figure S1: Mid-infrared absorption spectra for wood-PyC (*Picea abies*) and grass-PyC (*Miscanthus sinensis*) between 4000 to 400 cm$^{-1}$ (64 scans on each sample with a resolution of 4 cm$^{-1}$) from Diffuse Reflectance Infrared Fourier Transform Spectroscopy (DRIFT) using a Bruker TENSOR 27 spectrophotometer (Fällanden, Switzerland).**

**Table S1: Key parameters of the rainfall simulator at the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Birmensdorf.**

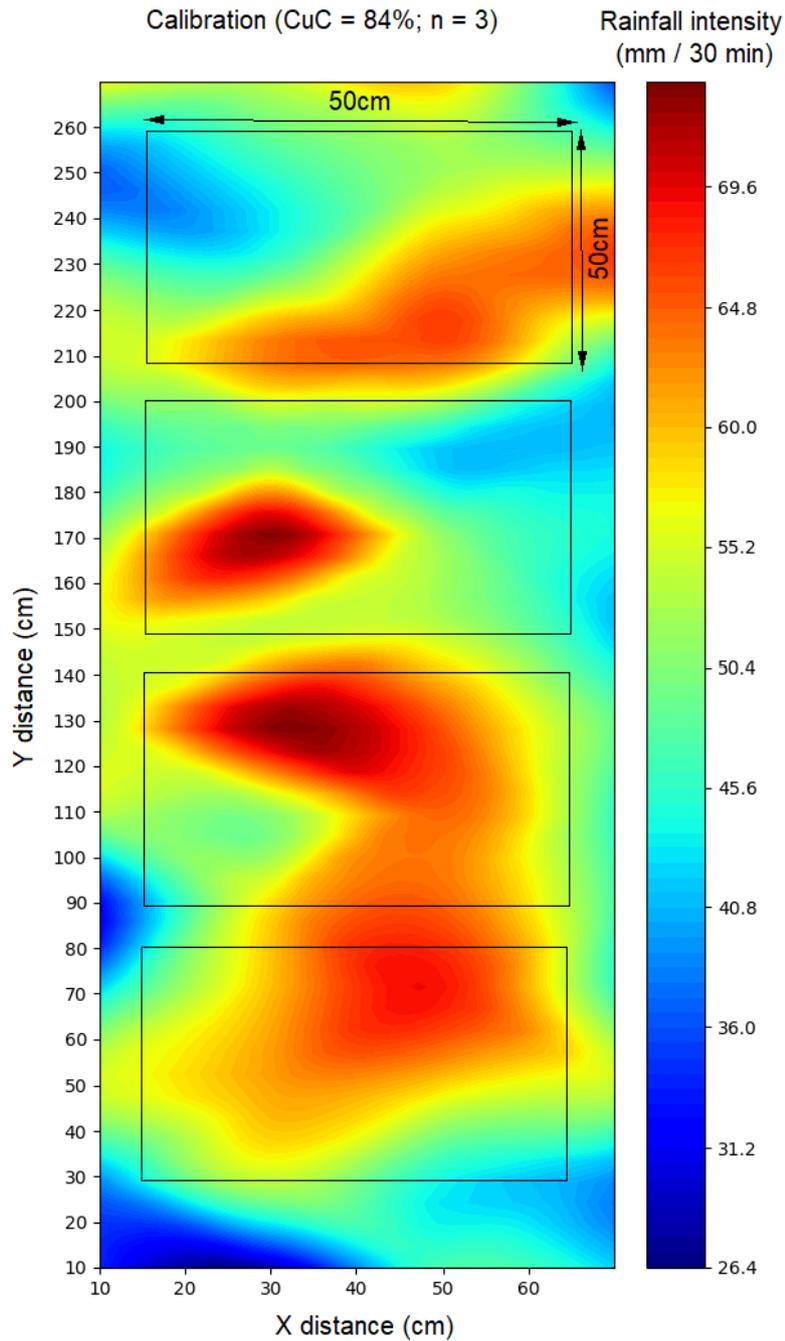| Parameter | Unit |
|---|---|
| Pressure (main tube) | 0.8 bar |
| Water flow (main tube) | 6 l/min (max. possible = 30 l/min) |
| Water temperature | 16 °C |
| Water density | 0.998946 g/cm$^3$ |
| Rainfall intensity | 102.8 mm h$^{-1}$ (51.4 ± 1.4 mm) |
| Christiansen Uniformity Coefficient | 84 % |
| Fall height of raindrops | 7 to 8.5 m |
| Needles per m$^2$ | 250 (Ø = 0.05 mm) |

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**Figure S2: Heat map of averaged rainfall depth (mm) during three rainfall simulator calibration runs (30 minutes each). Christiansen uniformity coefficient (CuC) represented 84 % at a rainfall intensity of 102.8 mmh$^{-1}$. Rectangles represent the position where the four 0.25-m$^2$ plots were placed during the experiments.**
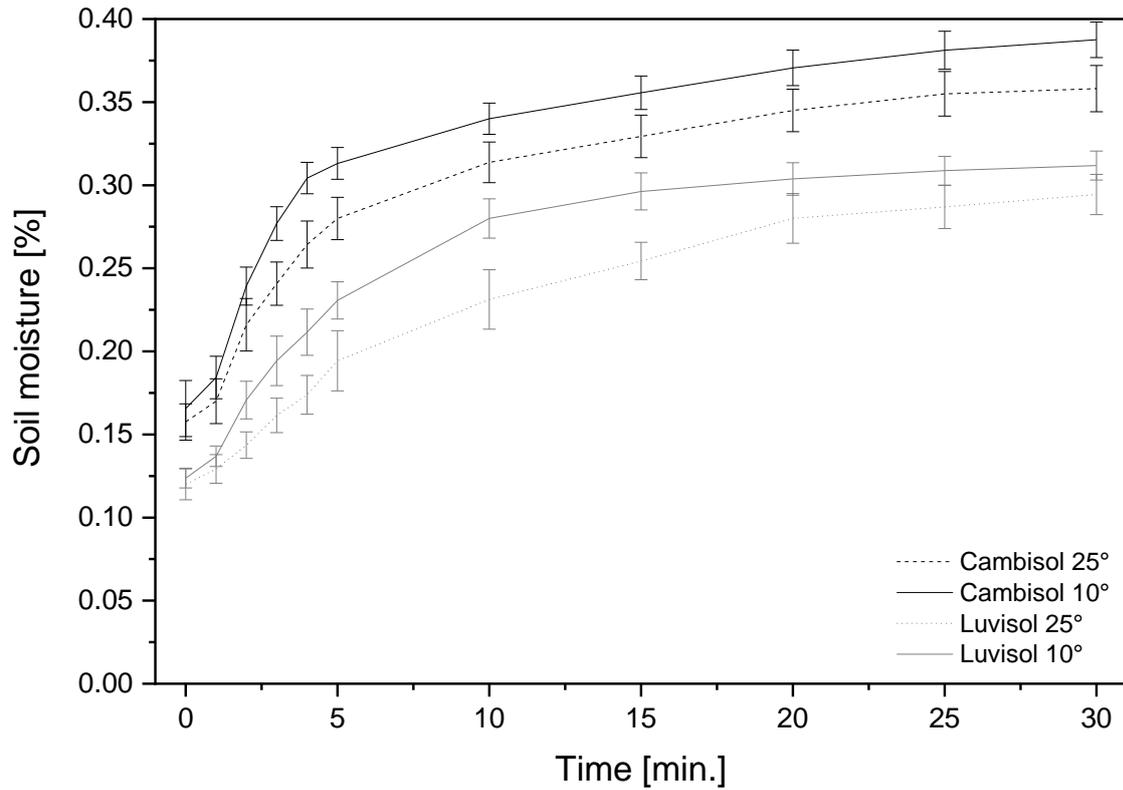
**Figure S3: Evolution of soil moisture (%) during rainfall simulation experiments (51.4 mm for 30 minutes) for the Cambisol and Luvisol depending on slope angle (25° and 10°). Average values over all 0.25-m² plots per soil type and slope angle ± 1 standard error (n = 16).**

**Table S2: Results of the statistical model (two-way ANOVA) for the PyC fraction (= fraction of OC derived from the PyC in %) in soil cores (see Figure 6) grouped by slope position (upslope, midslope and downslope and depth (0-1, 1-3 and 3-10 cm) with the full dataset (Full model), and subsets for the Cambisol and Luvisol only (ns = not significant at p < 0.05).**

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**Upslope / 0-1cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| | F value | Pr (>F) | F value | Pr (>F) | F value | Pr (>F) |
| Soil type | 13.4 | 0.0009 | | | | |
| Slope | | ns | | ns | | ns |
| Feedstock | 15.0 | 0.0005 | 10.3 | 0.005 | 5.6 | 0.03 |
| Particle size | 54.4 | < 0.001 | 99.2 | < 0.001 | | ns |
| Particle size : Soil type | 28.6 | < 0.001 | | | | |

**Upslope / 1-3cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| Soil type | 67.9 | < 0.001 | | | | |
| Slope | | ns | | ns | | ns |
| Feedstock | 4.4 | 0.045 | | ns | 4.7 | 0.046 |
| Particle size | | ns | | ns | | ns |

**Upslope / 3-10cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| Soil type | 8.4 | 0.007 | | | | |
| Slope | | ns | | ns | | ns |
| Feedstock | | ns | | ns | | ns |
| Particle size | | ns | | ns | | ns |

**Midslope / 0-1cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| Soil type | | ns | | | | |
| Slope | | ns | | ns | | ns |
| Feedstock | 11.2 | 0.002 | | ns | 13.5 | 0.002 |
| Particle size | | ns | | ns | | ns |

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**Midslope / 1-3cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| | F value | Pr (>F) | F value | Pr (>F) | F value | Pr (>F) |
| Soil type | 11.2 | 0.002 | | | | |
| Slope | | ns | | ns | | |
| Feedstock | 7.2 | 0.01 | | ns | 6.2 | 0.02 |
| Particle size | | ns | 6.1 | 0.03 | 8.0 | 0.01 |
| Soil type : Particle size | 12.9 | 0.001 | | | | |
| Particle size : Feedstock | | | | | 7.0 | 0.02 |

**Midslope / 3-10cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| Soil type | | ns | | | | |
| Slope | | ns | | ns | | ns |
| Feedstock | | ns | | ns | | ns |
| Particle size | | ns | | ns | | ns |

**Downslope / 0-1cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| Soil type | 3.9 | 0.058 | | | | |
| Slope | | ns | | ns | | ns |
| Feedstock | | ns | | ns | | ns |
| Particle size | | ns | 4.2 | 0.059 | | ns |

**Downslope / 1-3cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| Soil type | | ns | | | | |
| Slope | | ns | | ns | | ns |
| Feedstock | | ns | 4.5 | 0.049 | | ns |
| Particle size | | ns | | ns | | ns |
| Soil type : Feedstock | 7.6 | 0.01 | | | | |

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**Downslope / 3-10cm**

| Driver | Full model | | Cambisol | | Luvisol | |
|---|---|---|---|---|---|---|
| Soil type | | ns | | | | |
| Slope | | ns | | ns | | ns |

| | | | | | |
|---|---|---|---|---|---|
| Feedstock | ns | | ns | | ns |
| Particle size | ns | | ns | | ns |