

Essential drivers of pyrogenic carbon redistribution after post-fire rainfall events

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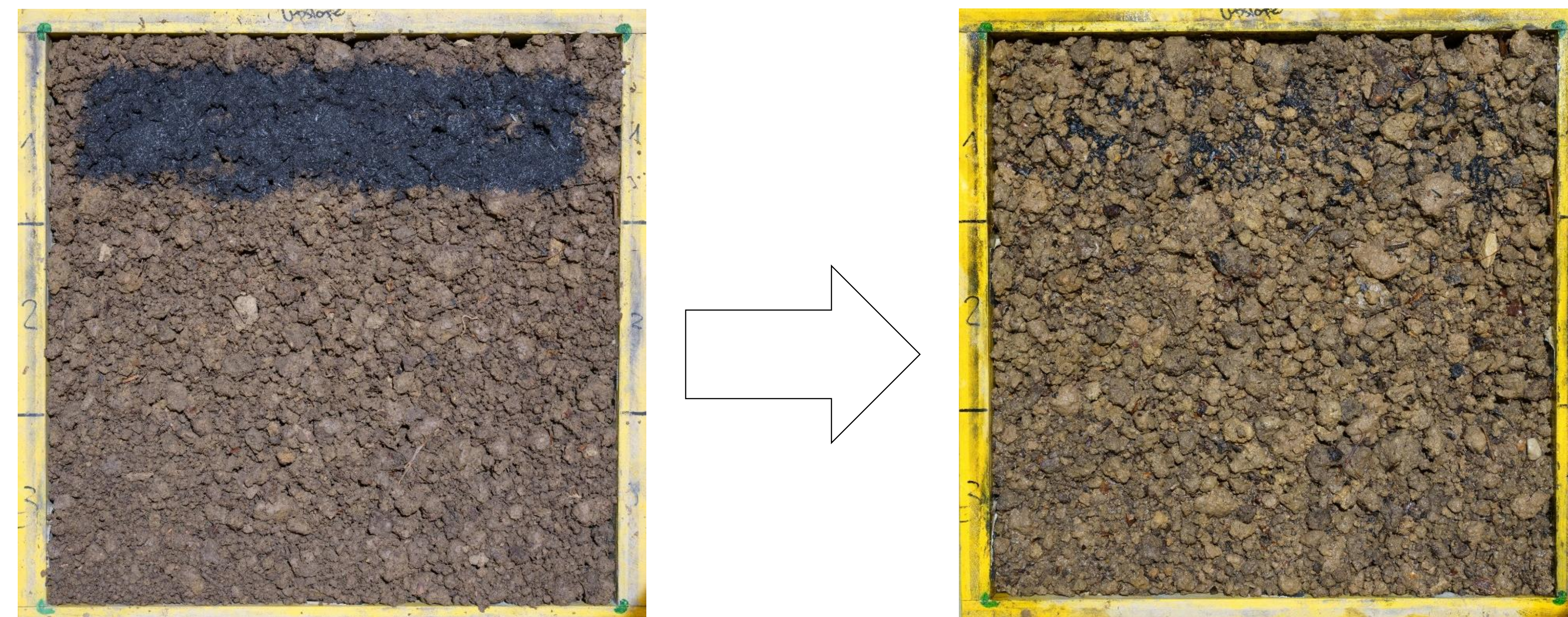
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Context

- Pyrogenic carbon (PyC), a product of incomplete combustion during wildfires, represents one of the largest and oldest organic C pool on Earth.
- Soil (and SOC) erosion is a major disturbance in terrestrial ecosystems and perceived to be increased in post-fire landscapes.
- Main drivers of PyC redistribution after fires at landscape level remain largely unknown.
- We conducted a manipulative PyC erosion experiment to investigate its **horizontal** transport using a variety of driver combinations and simulated rainfall.

Results



Highlights:

- Higher lateral redistribution (runoff and splash) of PyC on the sandy silt soil, and higher vertical redistribution of PyC in the clayey loam soil (fraction PyC (fPyC))
- Higher mobility of wood-derived PyC than grass-derived PyC
- Slope only plays a minor role

Experimental design

Drivers:

- Soil texture (clayey loam and sandy silt)
- PyC feedstock (9.9 g m⁻²)
 - Grass (*Miscanthus sinensis*) and wood (*Picea abies*)
- PyC particle size (<63µm vs. 63µm to 2 mm)
- Slope angle (10° vs. 25°)

Experimental setup (Figure 1)

- Gravity-type rainfall simulator (I = 51.5 mm h⁻¹)
- Soil flumes (0.5 x 0.5 x 0.2 meter)
- Forest topsoils (0-20cm)
- Runoff and splash sediments, soil cores, floating particles, aggregate and water repellence of soils and PyCs



Figure 1: Experimental set-up with four randomized replicates.



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