



Net precipitation assessment in a grassland and soil moisture response at plot scale in the temperate climate

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Most net precipitation observations were done in the forest, followed by shrublands, croplands. Among 644 studies, only 7 and 3 were done for throughfall and stemflow in herbaceous vegetation, respectively (Sadeghi et al., 2020).

Thus, there is also a lack of experimental data on how a small canopy affects the increase in soil water

Keywords • Ecchydology • Fog • Forests • Grasslands • Precipitation • Water • Wetlands

4.1 Introduction

The volume and spatiotemporal pattern of precipitation above plant canopies differ significantly from observations at the surface. This is because plant canopies redistribute precipitation as throughfall and stemflow. Throughfall is any precipi-



We designed an in-situ net precipitation measurement tool for small canopies: “Interception Grid”

The interception grid (Fig. 1) consists of four half-opened plexiglass pipes, which are connected to a plastic sampling bottle (12 L). Between the pipes, the canopy can grow naturally.

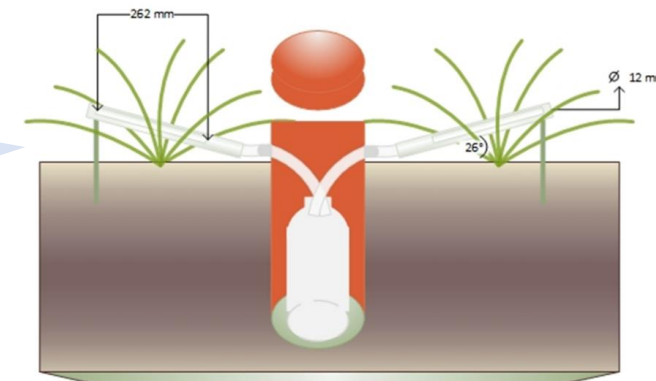


Figure 1



Figure 2

We tested for a splash loss in the lab by representing the kinetic energy of typical raindrop sizes.

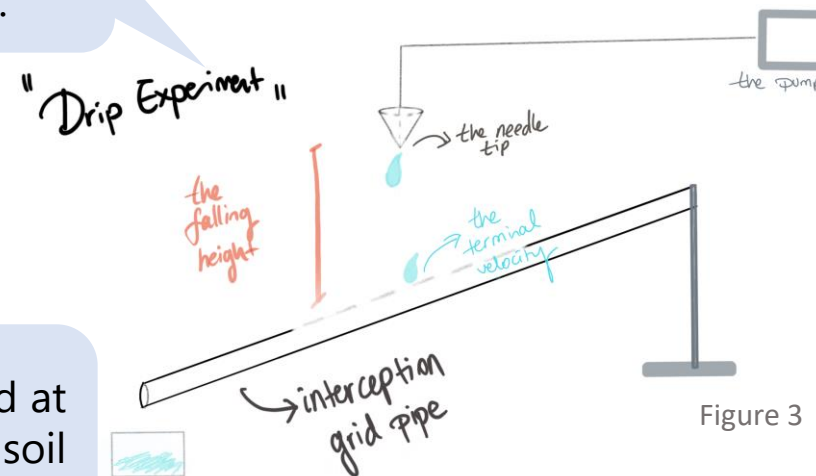


Figure 3

We installed the grids in the grassland at 25 locations and paired them with soil moisture sensors (at 7.5 cm and 27.5cm).



We used the linear mixed effect model to understand how net precipitation influence an increase in soil moisture



Figure 4

Next, we checked how grass height, grid measured net precipitation, and pre-event soil moisture, affect the soil moisture response using mixed-effects models.

In periods when the canopy left the grids' pipes uncovered, we compared the grid measurements with conventional precipitation measurements by using a linear mixed effect model (LMEM).



Figure 5

We measured net precipitation along with grass height and soil moisture.

We also checked wind and slope position impacts on an increase in soil moisture.





The Interception grid works well except for large events

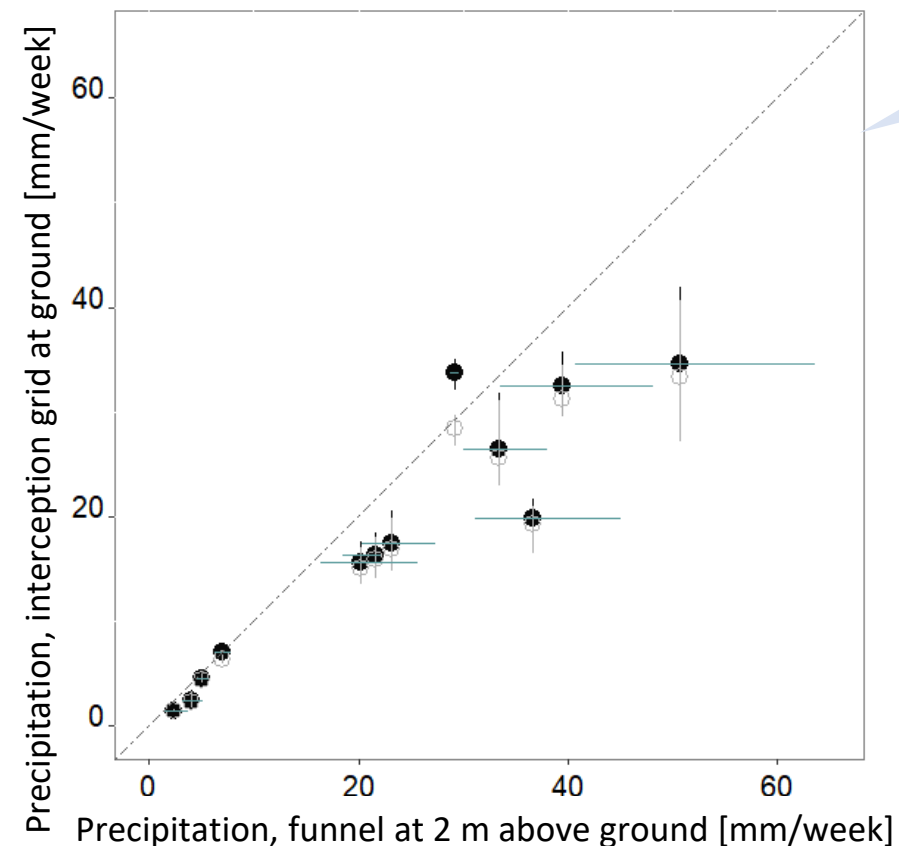


Figure 6

Splash loss only slightly affected the interception grid measurements.

Interception grid measurement was not influenced by the field setup design. Also, the measurement was mainly driven by net precipitation.

The larger events showed a higher spatial variance of precipitation both using the grid and conventional gross precipitation measurement with funnels.

Grid measurements depend on ..

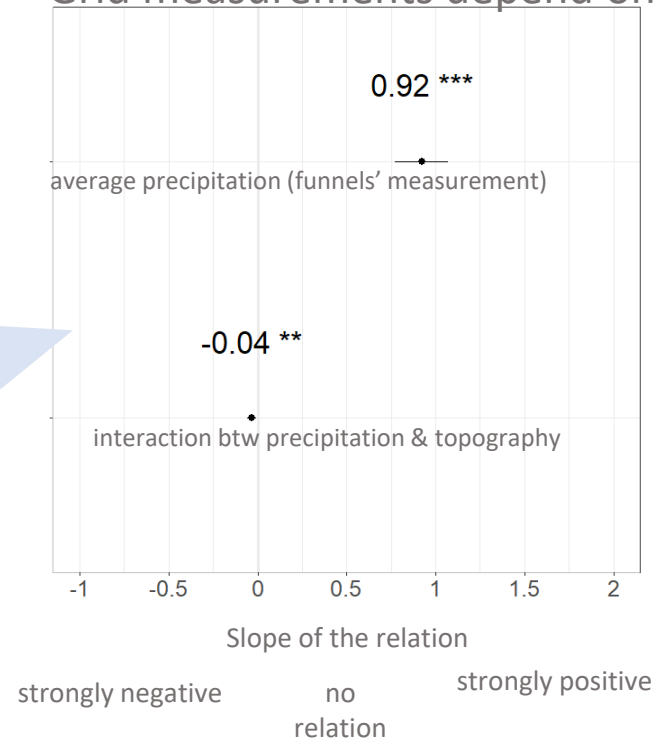


Figure 7



Grass canopy height causes spatial and temporal variation in net precipitation

Rainfall was the strongest driver for net precipitation, followed by grass height. Spatial variation of grass height affected net precipitation differently, depending on wind speed.

Net precipitation depends on ..

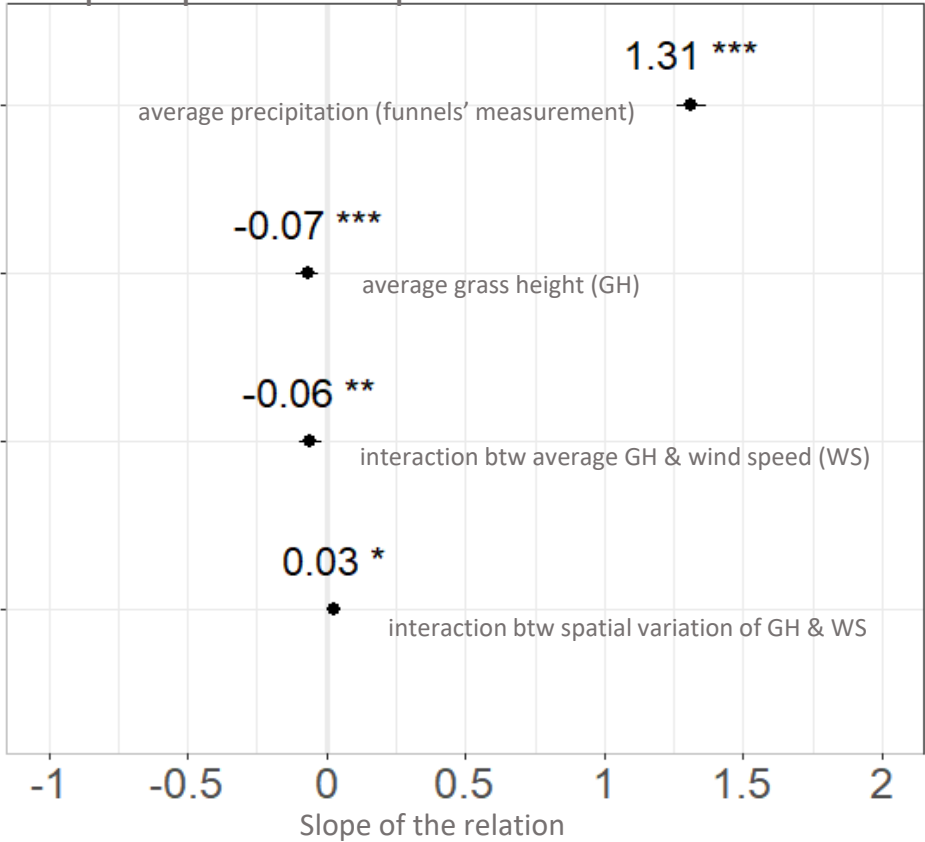


Figure 8

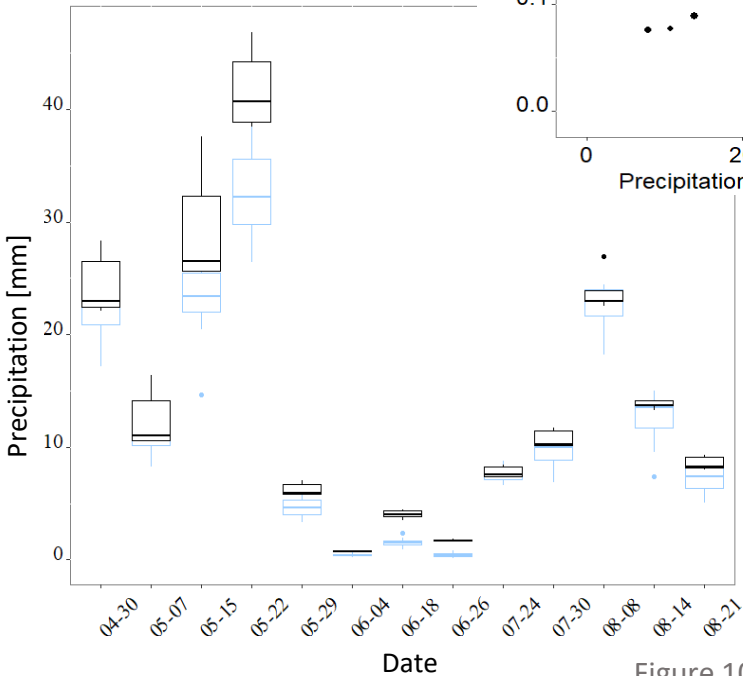


Figure 10

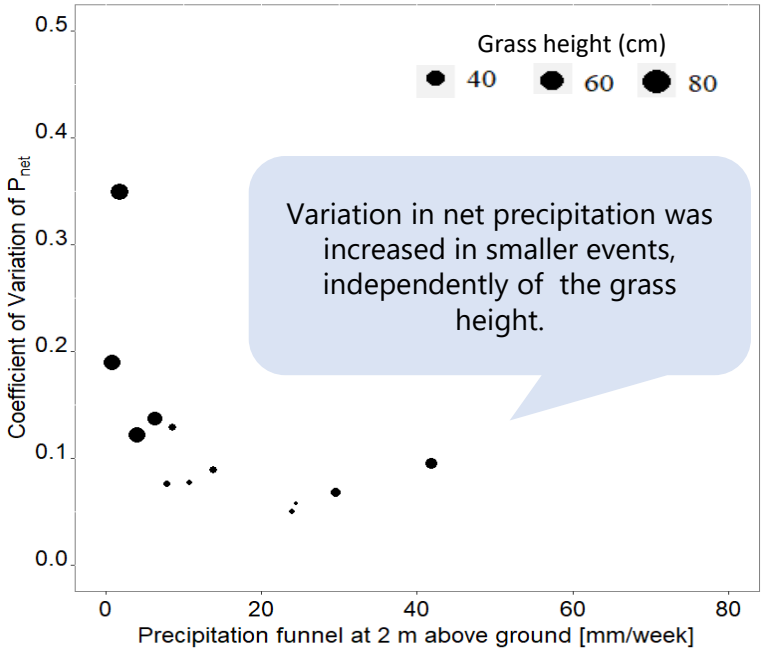


Figure 9

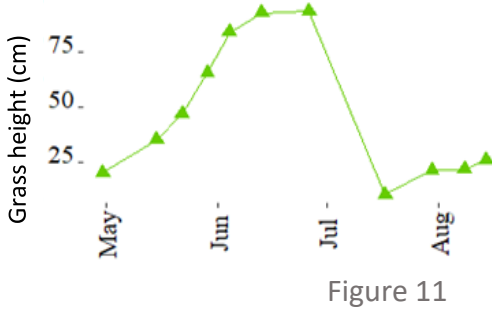
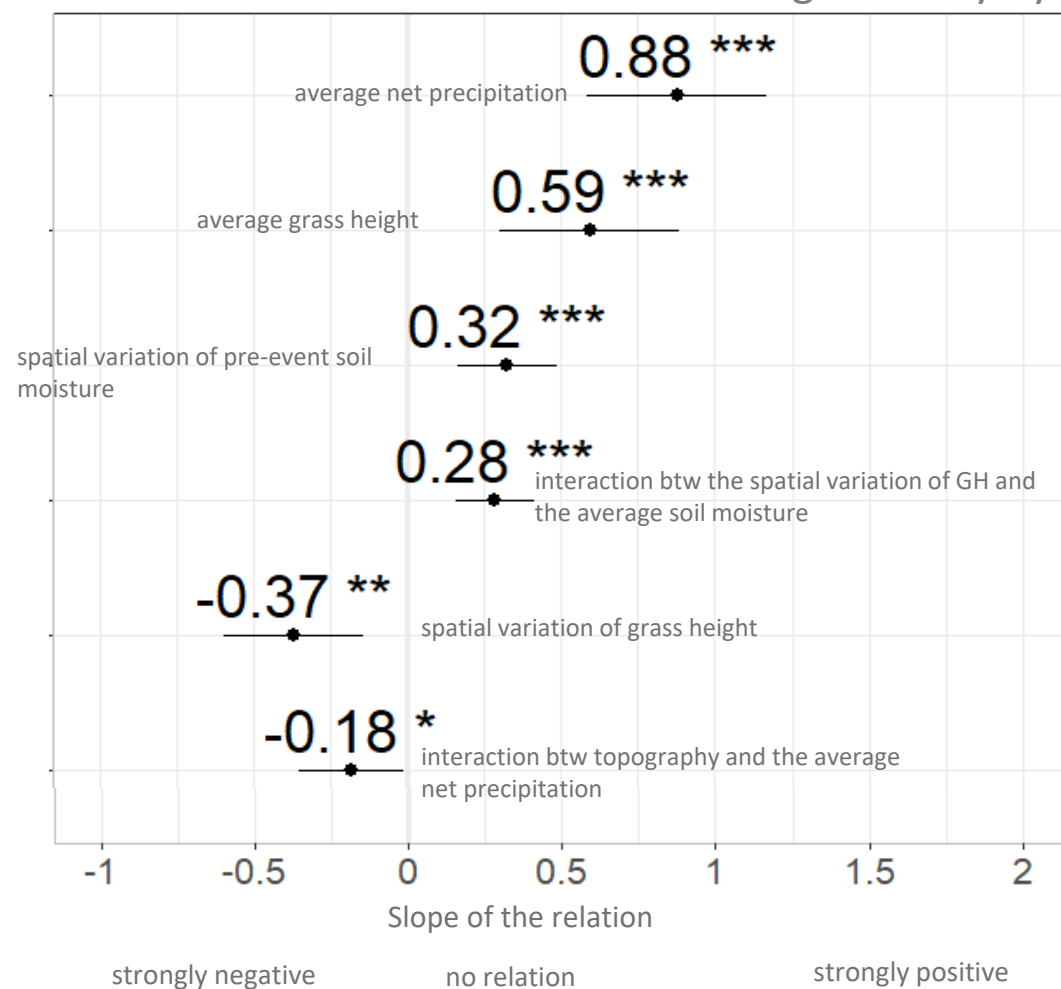


Figure 11



Grass height significantly affected soil moisture response to rainfall, but modified by soil moisture state

Increase in soil moisture was driven significantly by ...



Stronger soil water response with more precipitation, although slightly modified by location (last line)

Taller grass causes a stronger soil moisture response to rain - probably related to seasonally drier soils providing more soil water storage

BUT locally less precipitation stored in drier locations and below locally taller grasses

Figure 12



Lets discuss on Tue, 27 Apr at 09:32 – 10:30 EGU21-10038 | HS10.1



vPICO time: Tue, 27 Apr, 09:06–09:08



Breakout text chats :27 Apr at 09:32 – 10:30 EGU21-10038 | HS10.1

Selected References:

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