

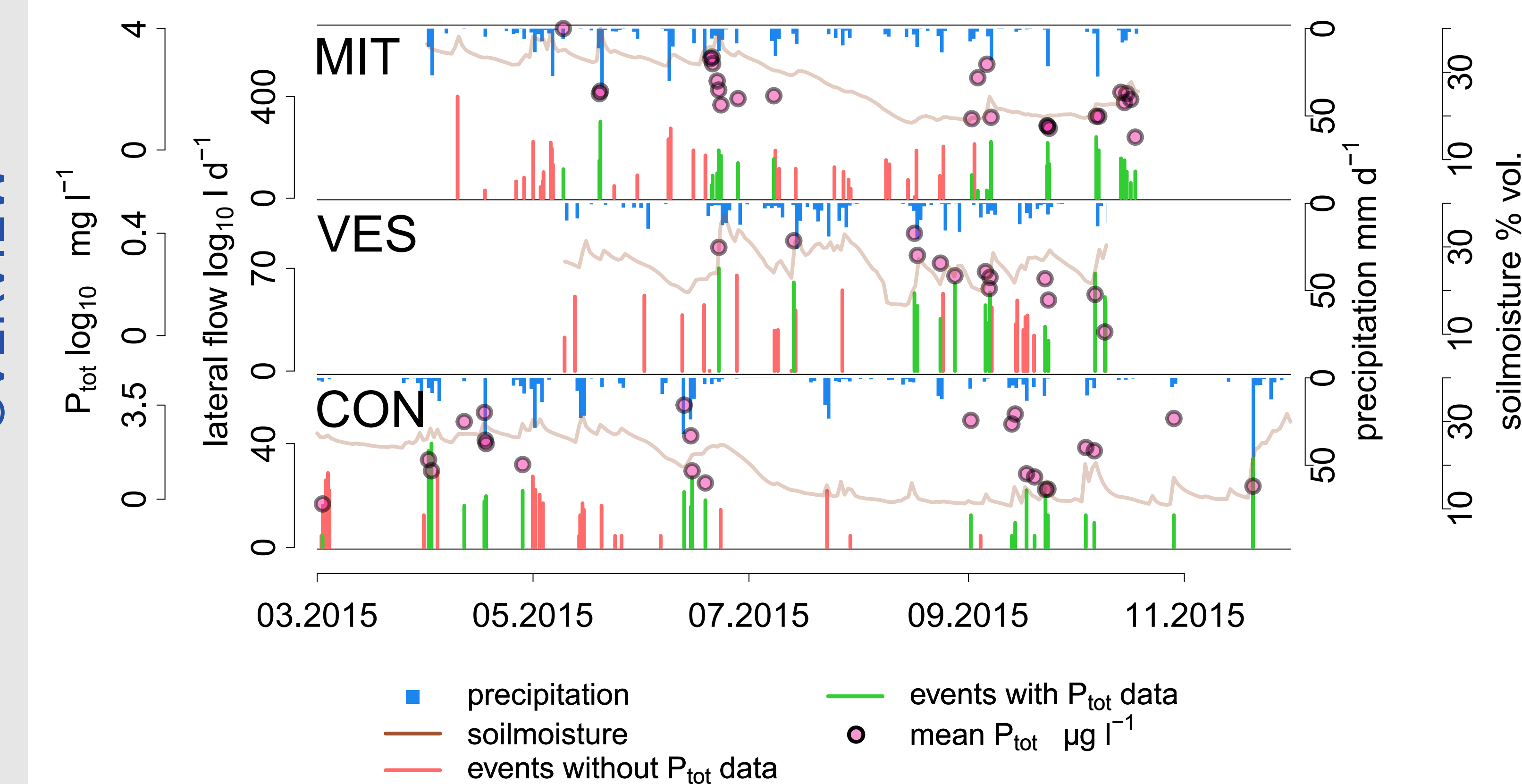
MOTIVATION Phosphorus (P) is a critical nutrient for all ecosystems and often a limiting factor for ecosystem productivity. The organic topsoil is considered the most important source and sink of P in forest ecosystems. It is where most dead biomass is accumulated and broken down and also where we usually find the greatest root density. Mobilization and transport of P in this zone therefore gives important information about its availability in the soil solution and possibly the underlying processes controlling temporal patterns of its mineralization and usage.

METHODS We sampled total phosphorus in lateral flow in the organic topsoil on three beech stands in mountain ranges in Germany from March to November 2015. A total of 417 samples covering 61 flow events were collected from a 10 m wide cross-section of the organic layer. The sampling was handled by an automated system drawing flow-proportional samples. Samples were collected without filtering and analyzed using persulfate digestion and the molybdenum-blue photometric method. Flow rate and EC of the lateral flow as well as additional hydrological and meteorological field data was measured on site.

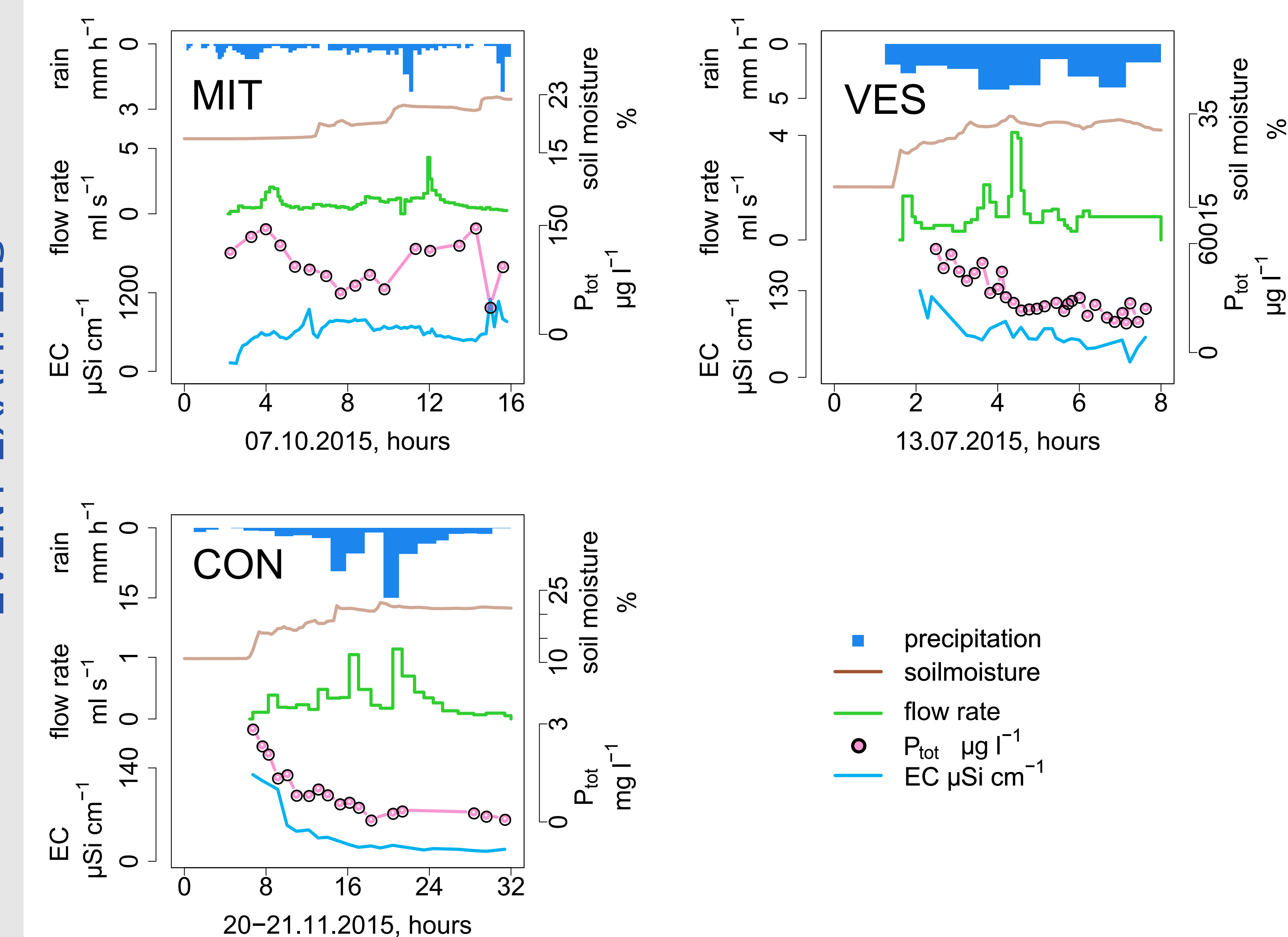
SITES Sampling took place at three sites: Mitterfels (MIT) in Bavaria, Vessertal (VES) in Thuringia and Conventwald (CON) in Baden-Württemberg. The sites were selected for their similarity in climate, vegetation, elevation and topography, while also representing differences in soil-P-availability. MIT being the richest site, VES the intermediate and CON the poorest one.

DATA

OVERVIEW



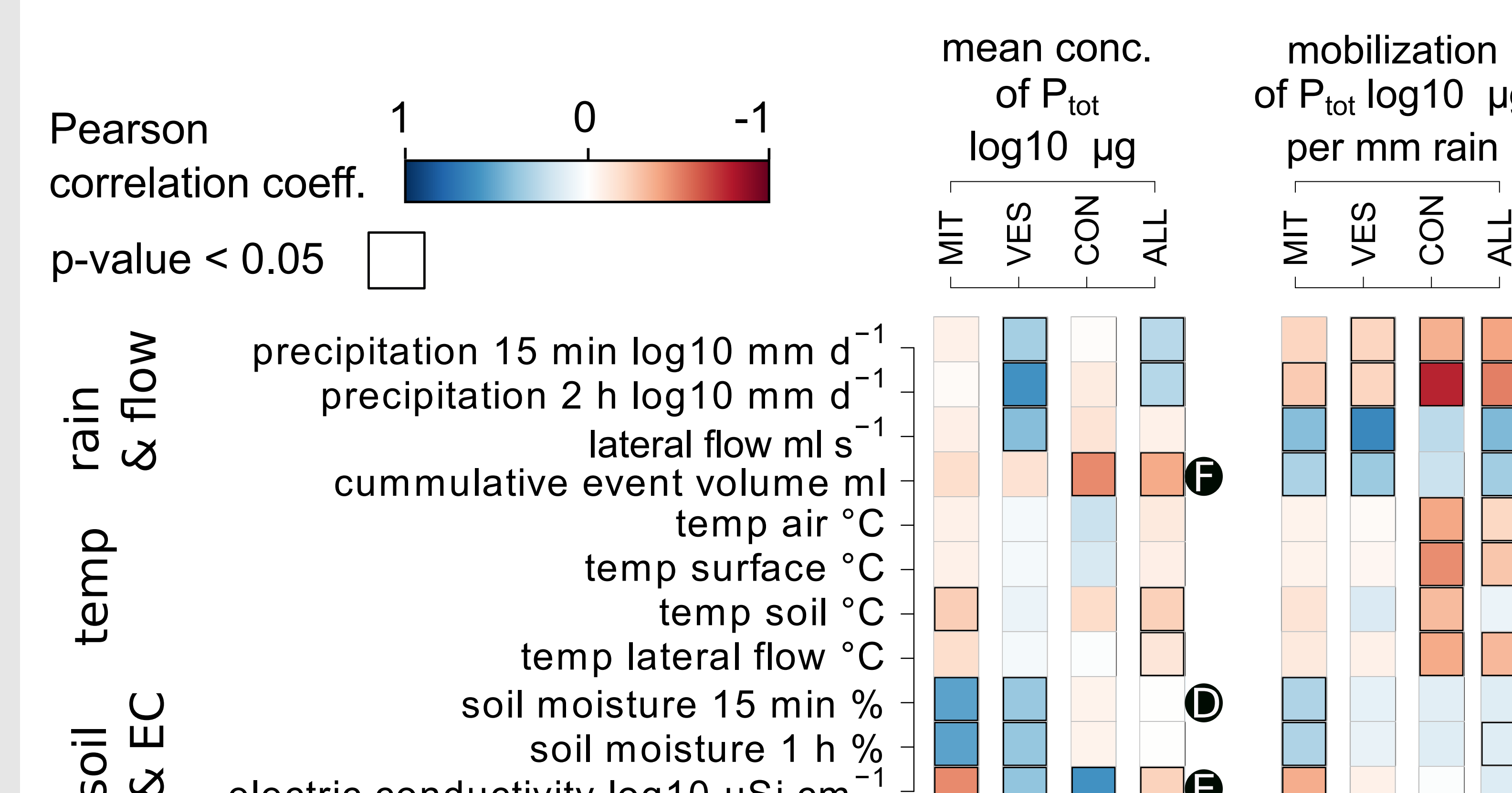
EVENT EXAMPLES



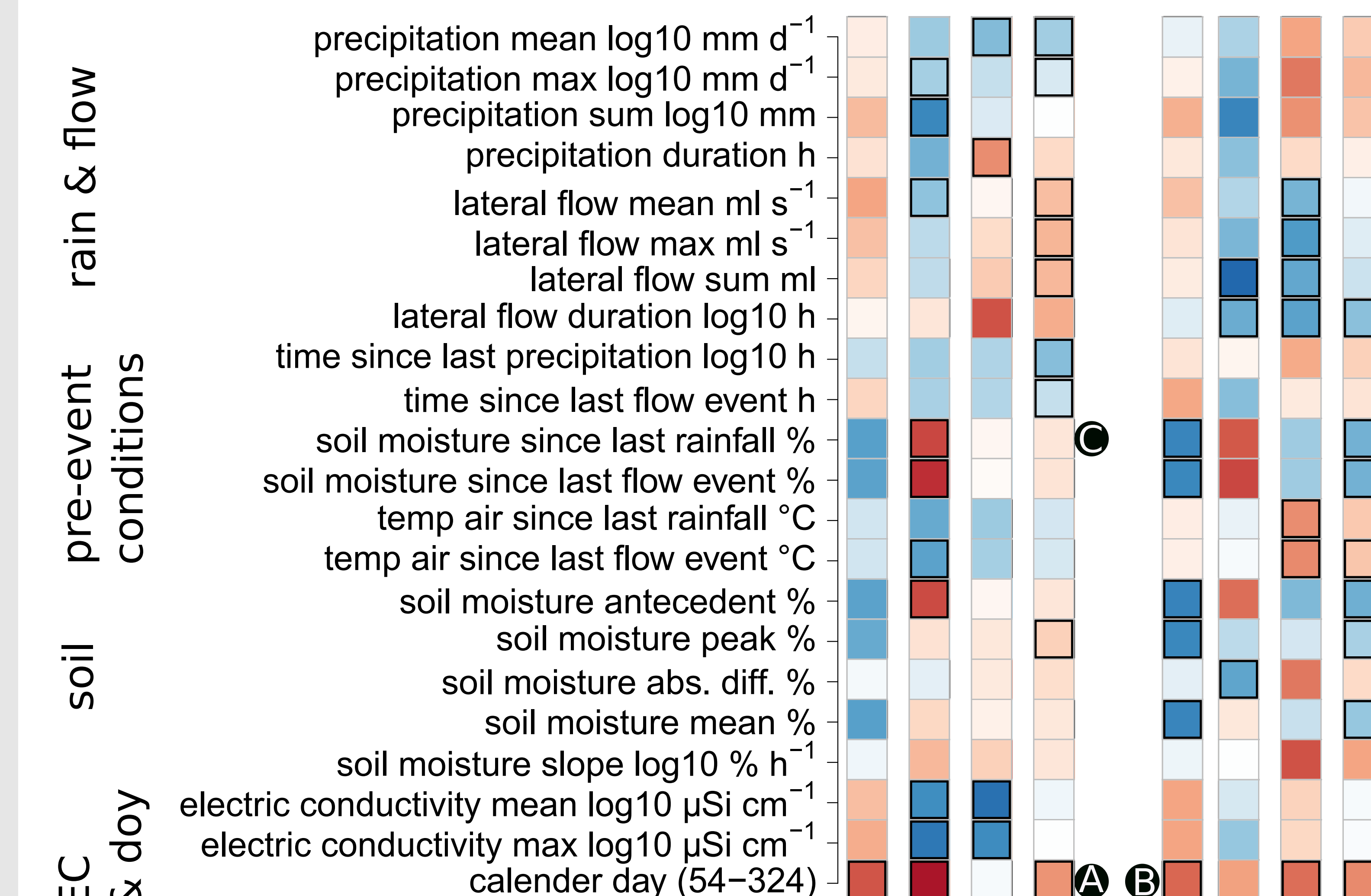
The observed lateral flow events occurred only after precipitation events, but almost every precipitation event > 1 mm produced measurable lateral flow. Flow responds quickly to the current precipitation intensity and ceases shortly after the precipitation event is over.

FACTORS CONTROLLING P TRANSPORT

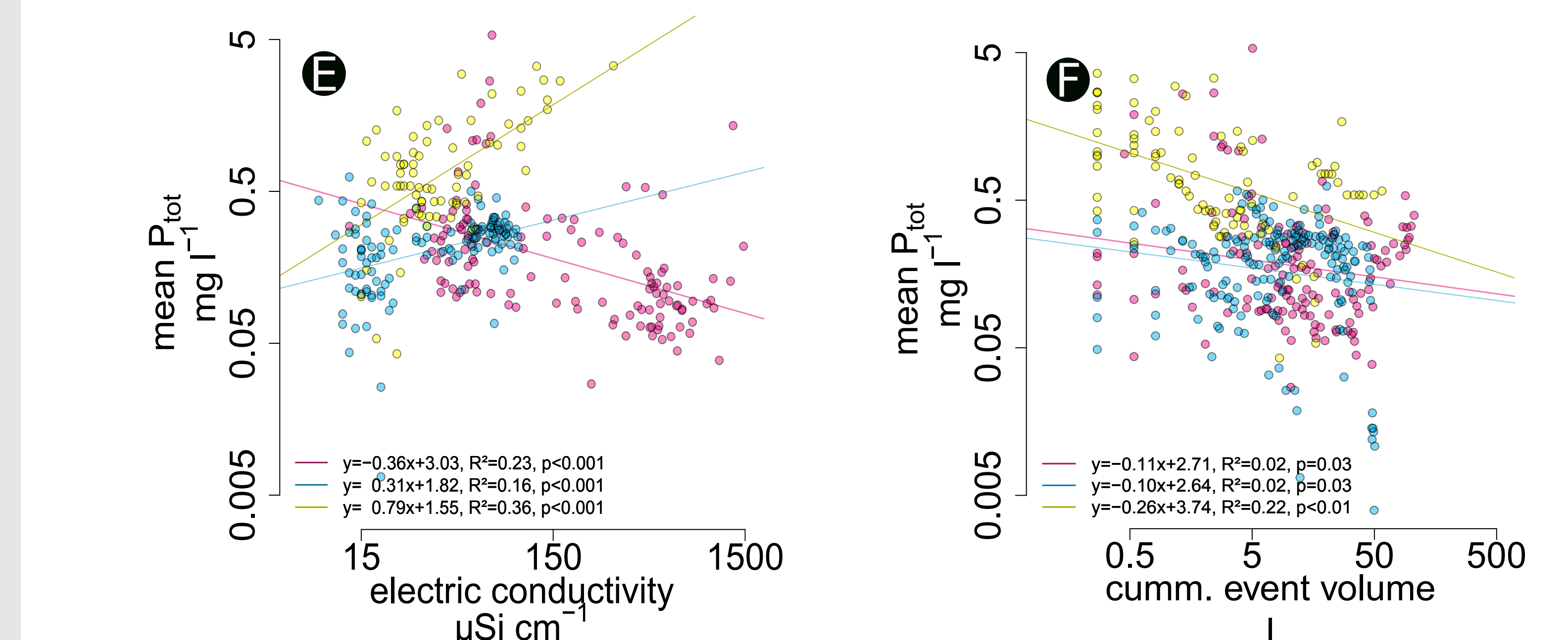
ORIGINAL DATA



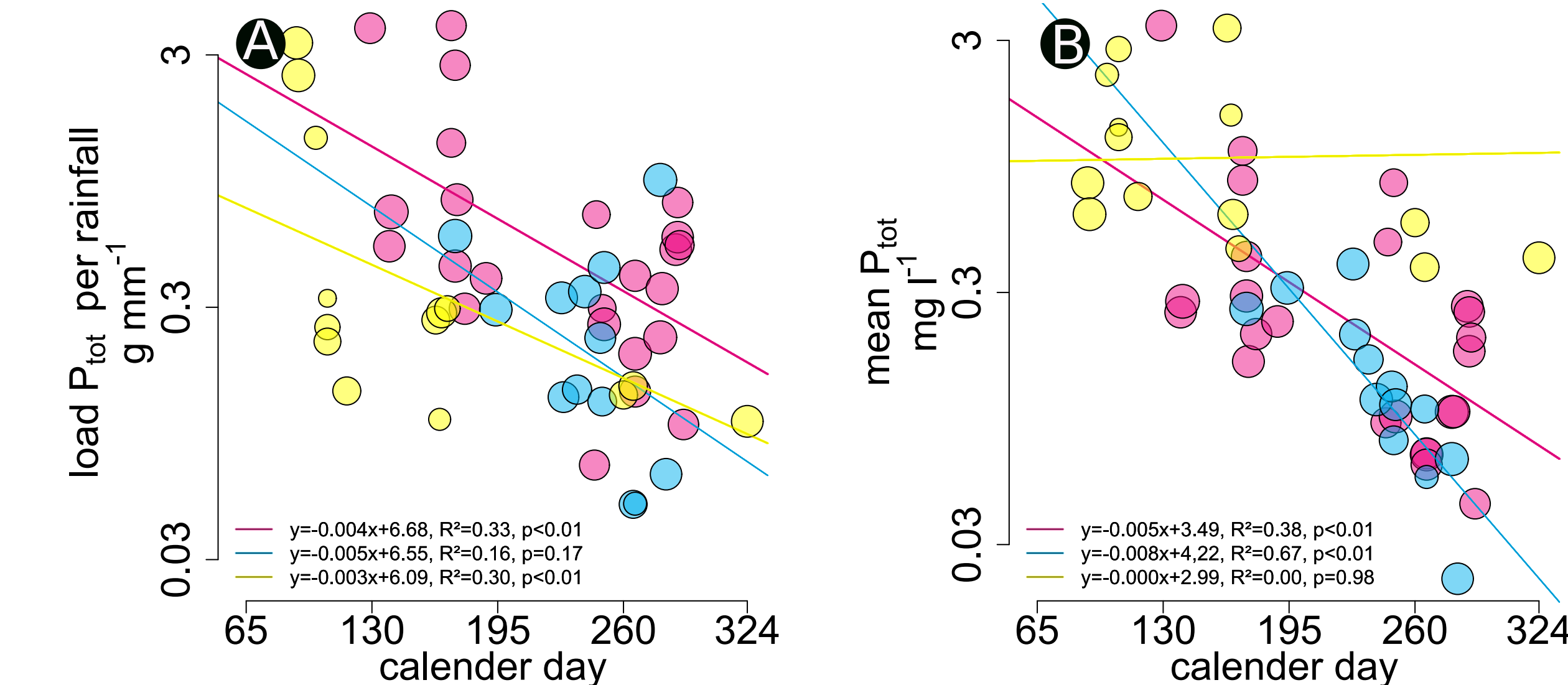
AVERAGE DATA FOR EVENTS



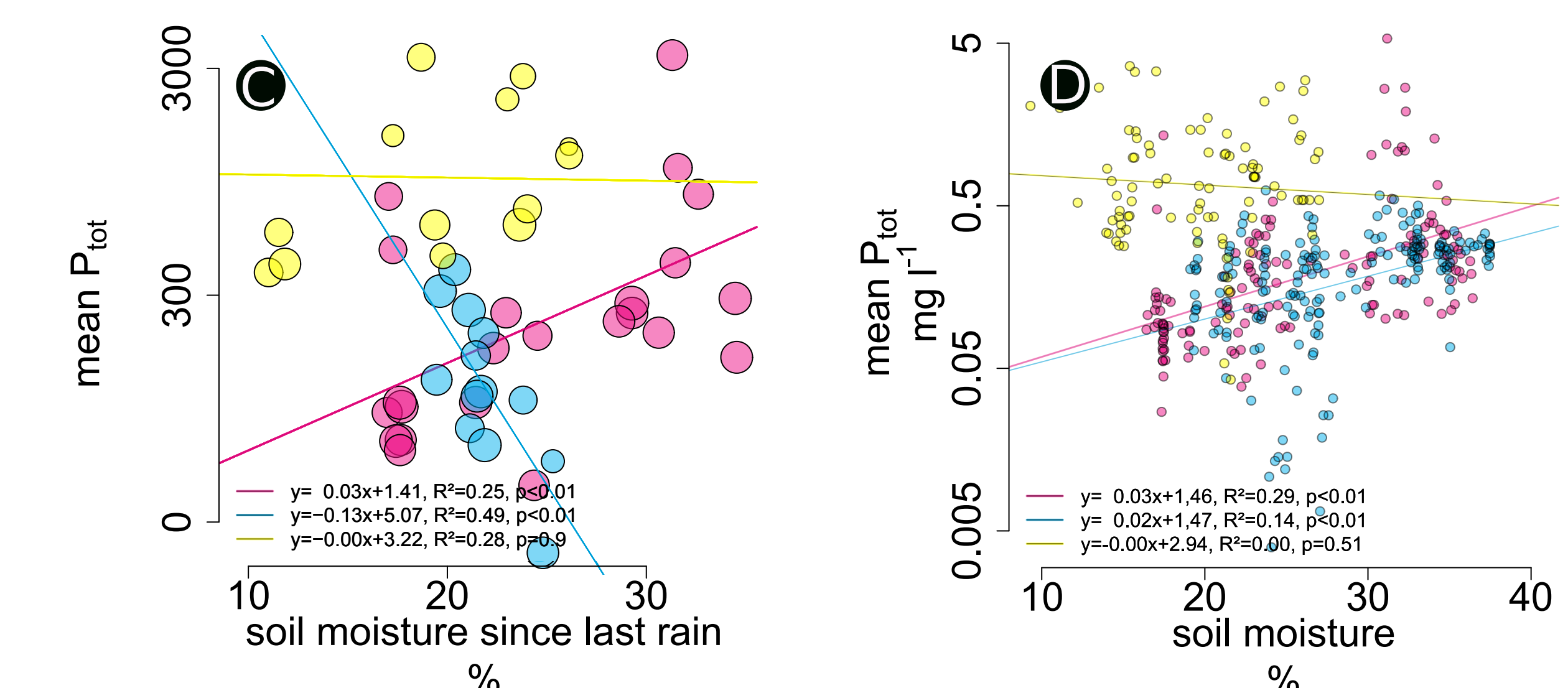
CUMM. VOL. & EC



SEASONAL TREND



SOIL MOISTURE



Conclusion Aside from the seasonal trend of declining P concentrations and transport rates though the vegetation periode, most environmental parameters that are included in this study show mixed results for the different sites. The fact that seasonality seems to be a major influence on P transport via lateral flow in the organic layer on all three sites indicates that availability rather than potential for mobilisation is the limiting factor for P transport. Thus, further efforts regarding this issue should focus additionally on processes that supply transportable forms of P to the forest floor.

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