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A method to determine the saturated hydraulic conductivity in living peat moss (Sphagnum) layers

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With 30% of terrestrial soil carbon being stored in peatlands, these ecosystems are an important carbon sink and component in the global carbon balance. The majority of peatlands is situated in the boreal zone, in which peat-forming bryophytes of the genus *Sphagnum* are the dominant vegetation and are thereby play a central role in carbon accumulation.

Morphological characteristics of the peat moss alter the ability to conduct and retain water in the highly porous, apical living part (capitula layer), which jointly affect growth and sequestration of carbon. The capitulum water content is governed by changes in the water balance terms, which are respectively rainfall, capillary rise, leakage and evaporation. Except for rainfall, all fluxes in the capitula layer are influenced by the relative hydraulic conductivity, which is a measure for resistance to water flow in porous media and is a function of water content.

To quantify the relative hydraulic conductivity, several empirical models have been developed. In the majority of these models the saturated hydraulic conductivity is included as indispensable parameter. To reliably quantify the water balance and solute transport it is crucial to have reliable parameter estimates of the saturated hydraulic conductivity. However, applying standard methods for mineral soils to determine the saturated hydraulic conductivity of the living moss layer introduces several complications.

In this study we describe the complications involved and introduce a modified method to determine the saturated hydraulic conductivity of the living moss layer. The new method was successfully tested on intact soil cores (Depth 0-10cm) of three contrasting *Sphagnum* species.