



Overland flow velocity and roughness properties with different vegetation types in peatlands

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Overland flow is an important component of peatland hydrology. Some peats are dominated by Sphagnum, others moorland grasses and others by shrubs or bare areas. Management can change the vegetation structure on the peat. This may influence runoff rates over peatland surfaces. However, surprisingly little is known about overland flow velocities in peatlands. This paper presents field data on the velocity of overland flow in peatlands under different vegetation covers. The relationships between flow velocity, vegetation cover, slope and water depth were explored. Sphagnum provided a significantly greater effective hydraulic roughness to overland flow than peatland grasses. In all cases, a significant break in process occurred for flows with water depths of around 1 cm so that there were two components of the roughness curve. This is consistent with partial submergence theory for very shallow flows where resistance increases with depth as the soil surface first becomes fully submerged. While each surface cover type should be considered separately, the results also suggest that a first order estimate of Darcy-Weisbach roughness and mean velocity can be based on a single parameter for each surface cover. This paper presents an empirical overland flow velocity forecasting model that can be applied to peatlands. The model combines the partially submerged component for flows with water depths below 1 cm with the fully submerged component for flows with depths up to 5 cm which are representative of the depths of flows that occur across peatlands. The work will be useful when preparing flow models for catchments and trying to understand the impacts of vegetation cover change on streamflow such as when peat restoration converts bare peat to a Sphagnum-covered peat.