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The probability of runoff initiation as a means of understanding controls on runoff

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In order to understand the controls upon runoff in a peat-covered catchment the probability of runoff initiation was calculated and analysed across a 4 year period: in total 1614 rainfall events were considered. Each rainfall is characterized in terms of its duration, peak intensity and the total depth of rainfall. For each rainfall event the the antecedent conditions were characterized in terms of the depth to the water table and the outflow from the catchment. For each characterisable event the discharge record at the outflow of the catchment is examined in order to assess whether in the rainfall did or did not lead to runoff and therefore each rainfall event can be categorized as a runoff event or non-event. Given this database of characterized runoff event and non-events the probability of a rainstorm leading to runoff given the particular antecedent conditions can be calculated using logistic regression. The study shows that the runoff is controlled by the capacity of the system and is not affected by the rainfall intensity. By considering different months the study can show that probability of runoff initiation changes across the year showing that there seasonal changes in the soil that control runoff generation above and beyond the antecedent depth of the water table – the nature of this control is discussed.