



Hydrological event response analysis: how much data is necessary to identify differences across landscape units?

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The identification of differences and similarities in hydrological response is a key concern in many hydrological studies and we are quick to describe and attribute differences in hydrological behavior even though this might be based only on a few data points (i.e. low number of events analyzed or few measurement locations).

In this study we investigated the minimum data needs in space and time for the reliable identification of differences and similarities in hydrological event response, comparing different geologies, land uses and seasons. The analysis is based on an extensive data set collected in the mesoscale Attert Catchment in Luxembourg, where the response of soil moisture and electric conductivity (EC) of stream water to rainfall events was measured for several years. Measurements were carried out at 135 soil moisture profiles on the one hand and at 93 EC monitoring points across the stream network on the other hand. We find that in this study area between 10 and 20 monitoring locations per landscape unit are necessary to reliably identify differences in their event response behavior. Using lower numbers (or shorter time series) can result in erroneous interpretation and attribution of response behavior, either by identifying differences or similarities where there are none or by erroneously attributing typical response behaviors to specific landscape units.