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# Catchment Sensitivity to Changing Climate Conditions: The Importance of Landscape Characteristics

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The scientific literature is full of studies analyzing future climate change impacts on hydrology with focus on individual catchments. We recently found, however, that hydrologic behavior and specific discharge vary considerably even in neighboring and rather similar catchments under current climate conditions and that these variations are related to landscape characteristics. Therefore we hypothesize that these landscape characteristics also play a fundamental role for the sensitivity of a catchment to changing climate conditions. We analyzed the hydrological response of 14 partially nested catchments in Northern Sweden with slightly different topography, land cover, size and geology. Current (1981-2010) and future (2061-2090) streamflows were simulated with the hydrological model HBV light based on 15 regional climate model projections that were bias-corrected with a distribution-mapping approach.

Our simulations revealed that – in a future climate- the total annual streamflow will be higher, spring flood peaks will occur earlier and decrease considerably, whereas winter base flows will more than double. These changes are somewhat expected and mainly triggered by a projected increase in winter temperature, which leads to less snow accumulation on the ground. However, our results also show that there is a large variability amongst these catchments in their hydrological response to the same future climate conditions. We identified wetlands, lakes, peat soils and higher elevations as factors that had a stronger effect on spring floods, whereas catchments dominated by forests, steeper slopes and till soils showed stronger responses in winter base flows and total annual streamflow. Therefore, our results suggest that the sensitivity of catchments to future climate conditions is strongly linked to landscape characteristics and also depends on the streamflow characteristic as well as season analyzed.