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Catchment Classification Based on Runoff-Generation Processes for Different Climate Regimes

K. Rosin (1), N. Ilchmann (2), Y. Asadian (1), M. Weiler (3)

(1) University of British Columbia, Canada, (2) Technical University of Dresden, Germany, (3) University of Freiburg, Germany, (rosink@interchange.ubc.ca)

Appropriate catchment classification is considered to advance runoff modelling, since it can improve model selection and evaluation, especially in ungauged basins. With the Sensitive Area Mapping Model (SAMM), we classify watersheds for the entire Province of British Columbia (945,000 km^2) in Canada according to the dominant runoff-generating processes. In a hierarchical framework, runoff-generating processes are represented by parsimonious model structures, which are based on topographic and physiographic data. For the example of Saturation Overland Flow (SOF) we discuss the following questions: (1) Which model structures lead to classifications which agree best with reality? (2) What is the level of uncertainty we should a-priori take in consideration? For both questions, we are interested in providing answers for different climate regimes, since our process classification is mainly based on topographic data. Therefore, model structures and parameter sets have been evaluated for four catchments in British Columbia with different climate and precipitation regime. At more than 400 locations soil samples, indicator plants, and small scale morphology patterns which determine SOF occurrence have been mapped and analyzed. The results show how our topography-based process classification system can be applied for catchments in different climates. Based on Kappa statistics, we furthermore specified the uncertainties associated with our classification system. In summary, the new results allow us to apply a process-based classification in combination with the SAMM model to predict the effects and uncertainties of large scale forest disturbance and land-use change on hydrology in large, ungauged basins in British Columbia.