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Impacts of climate change on the hydrology of a montainous catchment estimated with different model structures

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This contribution is about the possible impacts of climate change on the hydrology of a small mountain stream located in the western Tatra Mountains in northern Slovak Republic using different rainfall-runoff model structures. The analysis is carried out by comparing the results of a baseline (1981-2010) with three climate change scenarios (2071-2100). All three data sets simulate the IPCC scenario A1B, two of them using the ECHAM5 global climate model and the other using the Arpege global climate model. The two ECHAM5 data sets where then downscaled with different regional climate models. For the baseline as well as for each scenario 300 years representative for the considered period (1981-2010, 2071-2100) were generated.

The data was used to drive two rainfall-runoff model structures. One of them is a simple conceptualization of the processes taking place in the catchment and the other is more complex, involving more processes and parameters. The results were analyzed for each month and season and finally an analysis of extreme flows was carried out. The results showed that the differences between the two regional models were not large, but that there were important differences when comparing the different global models. With respect to the model structures, there are in general similar trends between the simple and the complex model, but there are some differences which will be highlighted and explained.