Uncertainties resulted from using different hydrological models for assessing the hydrological impact of climate change in different regions

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Large differences in future climatic scenarios resulted from different global circulation models (GCMs) have been extensively discussed in the scientific literature. However, differences in hydrological responses to the climatic scenarios resulting from the use of different hydrological models have received less attention. Therefore, comparing and quantifying such differences are of particular importance for the water resources management of a catchment, a region, or even the globe. This study first investigated the differences of hydrological impacts of climate change resulted from using six monthly water balance models in Dongjiang River basin in South China, and in the second part the impact of climate change on the hydrological regime in three very different climatic regions (China, Ethiopia and Norway) using WASMOD and HBV hydrological models was evaluated. The results show that the future water resources simulated by different hydrological models are not only dependent on the structure of the model, but also on the climate region, the season and the physical characteristics of the catchments. It is concluded that hydrological models are developed for simulating hydrological variables in stationary conditions; correct reproduction of historical hydrological variables provides no guarantee to correctly simulate hydrological response of changed climate. Attention must be paid when using existing hydrological models for simulating hydrological responses of either hypothetical climate changes or predicted changes by large-scale GCMs. More studies using different hydrological models on different catchments need to be carried out in order to provide more general conclusions.