



Predictability of soil moisture and runoff in Switzerland

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Hydrological forecasts are an important tool in water resource management, especially in case of extreme events. This study investigates the potential predictability of soil moisture and runoff in Switzerland using a conceptual simple water balance model. We validate and add a snow module to the model to capture impacts of snow melting.

Our results show that soil moisture and runoff are well predictable until lead times of approximately one week and 2-3 days, respectively, when using only initial soil moisture information. Using also initial snow information and seasonal weather forecasts the predictable time scales double in case of soil moisture and triple for runoff. The skill contributions of the additional information vary with altitude; at low levels the precipitation forecast is most important whereas in mountainous areas the temperature forecast and the initial snow information are the most valuable contributors. We find furthermore that information about initial soil moisture lead to better soil moisture and runoff forecasts the more anomalous the initial soil moisture content is.

We show that a realistic initial soil moisture content is more important for a soil moisture forecast than a good forcing forecast because inaccurate initial soil moisture values deteriorate the forecast much stronger than atmospheric forcing with zero skill. For runoff forecasts we find the opposite; due to its strong relation with precipitation the forcing forecasts are more important.