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Comparison of different infiltration schemes in the regional climate model REMO

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The European Regional Development Fund-Project BigData@Geo aims to create highly resolved climate projections for the model region of Lower Franconia in Bavaria, Germany. These projections are analyzed and made available to local stakeholders of agriculture, forestry, and viniculture as well as general public. Since regional climate models' spatiotemporal resolution often is too coarse to deal with such local issues, the regional climate model REMO is improved within the frame of the project in cooperation with the Climate Service Center Germany (GERICS).

Accurate and highly resolved climate projections require realistic modeling of soil hydrology. Thus, REMO's original bucket scheme is replaced by a 5-layer soil scheme. It allows for the representation of water below the root zone. Evaporation is possible solely from the top layer instead of the entire bucket and water can flow vertically between the layers. Consequently, the properties and processes change significantly compared to the bucket scheme. Both, the bucket and the 5-layer scheme, use the improved Arno scheme to separate throughfall into infiltration and surface runoff.

In this study, we examine if this scheme is suitable for use with the improved soil hydrology or if other schemes lead to better results. For this, we (1) modify the improved Arno scheme and further introduce the infiltration equations of (2) Philip as well as (3) Green and Ampt. First results of the comparison of these four different schemes and their influence on soil moisture and near-surface atmospheric variables are presented.