



## **The Feasibility of Soil Moisture Estimation through Streamflow Assimilation in dense Vegetated Areas**

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This study investigates the feasibility of applying a source-to-sink routing scheme combined with optimization techniques in order to estimate soil moisture states over a catchment, using streamflow and precipitation observations. Unlike recent studies that have used a lumped routing approach for estimating average soil moisture states over the entire basin (or portions of it), the retrieval of the spatial variability by routing the runoff produced at each cell by a distributed hydrological model to the basin outlet is proposed. Over a period of time, a moving time-window is determined and the initial soil moisture states for each period are then retrieved by rescaling the response function from each cell at the outlet to the total observed streamflow, constituting a time series for the whole period. In order to avoid underdetermined problems, extra information on the spatial variability is necessary however results from synthetic experiments show that precipitation plays a more important role than the soil moisture initial guess. This important information suggests that the use of remote sensing information on constraining the soil moisture spatial variability plays a secondary role and precipitation estimates are more important. For densely vegetated areas where satellite retrieval of soil moisture is problematic this technique could be combined with more reliable precipitation estimates for soil moisture retrieval.