

Study project/master's thesis @HFM: Investigating links between conceptual and observed variables

Problem description

Conceptual rainfall-runoff models are used in data-scarce regions or for large study areas. Their distributed variants, are theoretically, capable of producing gridded outputs such as snowcover, evapotranspiration, soil moisture and the ground water table. As these are calculated in a statistical manner, their absolute values may or may not be the same as those of the real ones. Moreover, these models are mass conservative and therefore, there must be a relationship between the model and the ground truth. For this reason, it is important to realize the usefulness of such relationships. Such an idea is not new, but we would like to go where others haven't ventured yet. The reference data that we will use are not necessarily observations such as evapotranspiration. Hence, it is not expected that the model completely matches them. For this reason, multiple products can be used to see if there is any consistent pattern in the discrepancy between the model and the reference.

Steps

The basic plan is as follows: Prepare gridded inputs for a conceptual rainfall-runoff model and then calibrate it. Next, the snowcover, evapotranspiration, soil moisture, non-stationary waters, and groundwater tables are extracted from the model results. The reference data are resampled to the same resolution as that of the model. Finally, a comparison is performed. It should tell us whether the dynamics inside the model have any truth to them or not and may be also point us in the right direction to make improvements to the model input and structure.

Requirements

The student is expected to have some background in rainfall-runoff modeling, statistics, geostatistics and programming in python as everything mentioned above is coded in it. The required background could be acquired before and/or during the study.

Contact

Interested students may write to me (faizan.anwar@tum.de) for further discussion. The work load can be adjusted depending on the student if they want to pursue a study project or a master's thesis.