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Distributed SVAT modelling using remotely sensed data products

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SVAT (Soil Vegetation Atmosphere Transfer) modeling is essential in understanding land surface processes at the regional scale. However, data availability at regional scale soon becomes limited, both spatially and temporally, in the details required.

Remotely sensed data solve some of the inherent problems. MODIS products such as LAI and albedo provide data in 1 km x 1 km spatial resolution, but with a 8 and 16 day temporal resolution, respectively. This temporal resolution is sufficient for variables changing gradually over the growth season, but for variables changing over the day, such as solar radiation or air temperature, the temporal resolution needs to be 3 hours or preferably less. Meteosat-7 or Meteosat Second Generation (MSG) with 30 and 15 min temporal resolutions solve this problem by compromising with the spatial resolution which is approximately 3 and 6 km for the study area. Despite the lower spatial resolution, data from the METEOSAT-7 and MSG-SEVIRI platforms provide a much better opportunity for feeding SVAT model with the needed temporal resolution.

In this study a fully distributed SVAT model, built on the MikeSHE code, has been set up in a 70 km x 70 km square in the northern part of Senegal, West Africa. In combination with in situ data from the Dahra test site located in the selected study area, the model is driven by forcing data derived from the sensors mentioned above.

Results show that using remotely sensed data is possible, but the validation is lacking robustness with respect to the number of days possible to validate against. E.g. MODIS provides a full cover surface temperature for the test area only once during the growing season, and only another two days are available with 30-65 % coverage.