# Calibrating a coupled SVAT / vegetation growth model with remotely sensed reflectance and surface temperature

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**Calibrating a Coupled SVAT / Vegetation Growth Model with Remotely Sensed Reflectance and Surface Temperature. A Case Study for the HAPEX-Sahel and SALSA Grassland Sites**

Models simulating the seasonal growth of vegetation have been recently coupled to Soil-Vegetation-Atmosphere Transfer Schemes (SVATS). Such coupled vegetation-SVATS models (V-S) account for changes of the vegetation leaf area index (LAI) over time. One problem faced by the V-S models is the high number of parameters that are required to simulate different sites or large areas. Therefore, efficient calibration procedures are needed. This study describes an attempt to calibrate a V-S model with satellite (AVHRR) data in the short-wave and long-wave domains. A V-S model is described and validated using ground data collected over four semi-arid grassland sites during the HAPEX-Sahel and SALSA-MEX experiments. The impact of calibrating model parameters with time-series of normalized difference vegetation index (NDVI) and thermal infrared (TIR) data is assessed by examining the simulated latent heat flux (LE) and LAI for a suite of calibration experiments. The NDVI and TIR time series were used, both independently and simultaneously. Ground-based, airborne, and satellite sensor (AVHRR) data were successively investigated. Both airborne and AVHRR NDVI data could be used to constrain the vegetation growth vigor. These calibrations significantly improved the simulation of the LAI and LE and the site-to-site variability was greatly enhanced. The soil resistance could also be calibrated with ground-based TIR data, but the impact on the simulated variables was rather small. Although both NDVI and TIR data were suitable to constrain the V-S model, the synergy between the two wavelengths was not clearly established. Finally, satellite TIR data from the AVHRR proved unsuitable for model calibration. The AVHRR surface temperature values were systematically lower than both ground-based data and model outputs. We conclude that the calibration of a vegetation-SVAT model with short-wave AVHRR time-series can be used to scale the energy and water fluxes up to the regional scale.

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