# The coupling of process models and remotely sensed data assimilation for regional modeling (upscaling)

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## The coupling of process models and remotely sensed data assimilation for regional modeling (upscaling)

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Vegetation process models are being developed to describe vegetation functioning under various environmental constraints, such as water ressources and climate change. These models provide satisfactory results at the local scale but are difficult to extend at landscape and regional scales. Our talk will address the combined use of process models and remotely sensed data in order to perform this extension.

We will present the concept and examples of results of remotely sensed data assimilation in coupled models of vegetation growth and water budget. Models are used to predict satellite radiances in solar and thermal infrared spectral bands. Over a given time period, the distance between predicted and observed radiances is minimized by tuning some model parameters. This approach allows to correct model parameters over large regions

Results we obtained for semi-arid grasslands will be presented. The assimilation technique was applied over one season to daily 1km resolution NOAA/AVHRR data. Shortwave radiances, combined as NDVI, allowed to adjust the partitioning of photosynthesis products between shoots and roots. Thermal infrared data were used to derive soil thermohydric properties. Tuning model parameters against satellite radiances leads to improved model outputs, including Leaf Area Index time profile and latent heat fluxes.

In addition, we will present preliminary results obtained when using NOAA/AVHRR data to monitor the phenology of deciduous forests. Finally, the various possible uses of assimilation techniques for vegetation studies will be summarized and discussed.

**Key words :** *vegetation functioning, modeling, remote sensing, assimilation technique*