Geophysical Research Abstracts
Vol. 12, EGU2010-9770, 2010
EGU General Assembly 2010

Remote Sensing based Estimation of Latent Heat Flux Density Utilizing Ensemble Based Approaches

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The paper presents a technique for estimating land surface fluxes from remote sensing data. A remote sensing based land surface flux model is developed that mainly depends on remote sensing data. We make best use of high temporal frequency of geostationary satellite data for estimating land surface fluxes. The estimates are further constrained by observations from low Earth orbiting satellites. Spatial resolution of the used data is 0.05 degree, whereas the temporal resolution of the used satellite data is 30 minutes.

The developed technique is based on an Ensemble Kalman Smoother technique, that uses observed land surface temperature dynamics and soil moisture observations to estimate the surface resistance to evapotranspiration. Further data like surface radiation data, land cover information and precipitation data are obtained from satellite data and are used as weak constraints in the surface flux estimates. The developed framework enables for a flexible estimate of land surface fluxes based on satellite observations and the quantification of their errors.

The model is validated in two ways. First, a proof of concept is presented that is based on simulations from a state-of-the-art land surface model which is used to generate reference simulations and synthetic remote sensing observations. Further validation of the retrieval scheme is given for selected FluxNet sites and serve as an evaluation of the developed model.