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Estimation of land surface heat fluxes from remote sensing data - an uncertainty assessment

M Borsche and A Loew
Max Planck Institute for Meteorology, Land in the Earth System, Hamburg, Germany (michael.borsche@zmaw.de)

Evapotranspiration is an essential component of the water and energy cycle and governs the interactions between the Earth surface and the atmosphere. On a larger spatial scale, reaching from regional to global, especially above the heterogeneous land surface these water and energy fluxes cannot be measured directly. In-situ point measurements are possible and available through FLUXNET, a network of flux tower networks. To estimate evapotranspiration on a global scale models are developed which are driven by all data needed. Satellite remote sensing techniques provide the data necessary to characterize the land surface water cycle.

The aim of the presented study is to assess the uncertainty introduced when estimating evapotranspiration by a globally applicable model framework driven by satellite data as compared to the FLUXNET in-situ measurements. Satellite data used here is derived mainly from geostationary satellites at very high temporal (30 min) and moderate spatial ($\leq$5x5km) resolution, from polar orbiting satellites with a comparable spatial resolution, and from ERA-INTERIM reanalysis. In addition, it is aimed to produce quasi-global estimates of latent heat flux densities using the same framework.

The flexible model framework developed in this study includes a land surface scheme which consists of a single layer surface resistance model. It is constrained by remote sensing based observations of surface skin temperature and soil moisture. The coupling of the land surface model with a dynamic boundary layer model implements an additional constraint to the surface flux estimations.