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Spatial heterogeneity of satellite derived land surface parameters and energy flux densities for LITFASS-area

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Abstract. Based on satellite data in different temporal and spatial resolution, the current use of frequency distribution functions (PDF) for surface parameters and energy fluxes is one of the most promising ways to describe subgrid heterogeneity of a landscape. Objective of this study is to find typical distribution patterns of parameters (albedo, NDVI) for the determination of the actual latent heat flux (*L.E*) determined from highly resolved satellite data within pixel on coarser scale.

Landsat ETM+, Terra MODIS and NOAA-AVHRR surface temperature and spectral reflectance were used to infer further surface parameters and radiant- and energy flux densities for LITFASS-area, a 20×20 km^2 heterogeneous area in Eastern Germany, mainly characterised by the land use types forest, crop, grass and water. Based on the Penman-Monteith-approach *L.E*, as key quantity of the hydrological cycle, is determined for each sensor in the accordant spatial resolution with an improved parametrisation. However, using three sensors, significant discrepancies between the inferred parameters can cause flux distinctions resultant from differences of the sensor filter response functions or atmospheric correction methods. The approximation of MODIS- and AVHRR- derived surface parameters to the reference parameters of ETM (via regression lines and histogram stretching, respectively), further the use of accurate land use classifications (CORINE and a new Landsat-classification), and a consistent parametrisation for the three sensors were realized to obtain a uniform base for investigations of the spatial variability.

The analyses for 4 scenes in 2002 and 2003 showed that for forest clear distribution-patterns for NDVI and albedo are found. Grass and crop distributions show higher variability and differ significantly to each other in NDVI but only marginal in albedo. Regarding NDVI-distribution functions NDVI was found to be the key variable for *L.E*-determination.

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