The use of probability distribution functions of surface properties to infer surface energy fluxes from satellite data

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Satellite data provide spatial integrated information about various surface and atmospheric properties. With respect to measurements at individual sites during field experiments or at specific site for routine, long-term measurement programmes (like Lindenberg for CEOP), there is discrepancy to validate satellite inferred energy fluxes with surface measured fluxes due to the different spatial resolution. To solve this problem probability distribution functions of surface properties could be generated based on high spatial resolved satellite data (Terra/Aqua ASTER data, Landsat ETM data) for lower resolved areas. Thus, these pdfs can be applied to lower spatial satellite data (like MSG SEVIRI, NOAA AVHRR, Terra/Aqua Modis) as well as to numerical model grid data.

In the present study, synthetical and real pdfs, could be determined and used for the determination of latent heat fluxes based on the Penman-Monteith equation. Different definitions (from simple to precise) of probability distribution functions could be considered, where the focus was to find the best compromise for the number of computations per satellite pixel. It has to be noted that this approach will be used for routine satellite data analysis (MSG SEVIRI analysis) which is limited to the available computing time. The results can therefore also be expressed in form of a pdf for the latent heat fluxes. And this allows now a more convenient comparison with surface measurements.