



A mobile system for quantifying the spatial variability of the surface energy balance: design and application

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We present a mobile device for the quantification of the small-scale spatial variability in the surface energy balance components and several auxiliary variables of short-statured canopies. The key element of the mobile device is a hand-held four-component net radiometer for the quantification of net radiation, albedo and infrared surface temperature, which is complemented with measurements of air temperature, wind speed, soil temperature and soil water content. Data are acquired by a battery-powered data logger, which is mounted on a backpack together with the auxiliary sensors. The proposed device was developed to bridge between the spatial scales of satellite/airborne remote sensing and fixed, stationary tower-based measurements with an emphasis on micrometeorological, catchment hydrological and landscape-ecological research questions. The potential of the new device is demonstrated through four selected case studies, which cover the issues of net radiation heterogeneity within the footprint of eddy covariance flux measurements due to (i) land use and (ii) slope and aspect of the underlying surface, (iii) controls on landscape-scale variability in soil temperature and albedo, and (iv) the estimation of evapotranspiration based exclusively on measurements with the mobile device.