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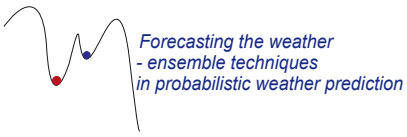

Long-term flux observations in London - Examining anthropogenic impact on surface exchange in a dense European city centre

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The urban environment depicts a prime example of anthropogenic influence on microclimate conditions. Specific surface characteristics like roughness, albedo or heat capacity indirectly modify energy fluxes while direct impact on available energy is enforced by various anthropogenic sources of heat and moisture. Both, direct and indirect aspects affect components of the surface energy balance. Further, concentrations and fluxes of exhaust gases like CO_2 are enhanced due to emissions from traffic and other human activities. All these aspects vary with geographic location and climate conditions which emphasizes the strong need to widen the diversity and temporal extend of flux data collection in urban areas. Since turbulent surface fluxes provide a direct measure of exchange processes between the surface and the atmosphere, they present key components in model land surface schemes. Surface flux observations are required for model evaluation and the improvement of our understanding of processes determining urban microclimate.
Here we present flux results obtained from eddy covariance monitoring sites in Central London ('KSK' and 'KSS'), operating since 2008 and 2009 respectively. Radiation budget components as well as turbulent fluxes of sensible heat, latent heat and CO_2 are being recorded. Data processing involves intense quality control (Kotthaus and Grimmond 2011) and detailed modelling of the flux source area (using the model by Kormann and Meixner 2001). Hence a trustworthy, long-term dataset is created which allows for a variety of analytical applications. Given the dense urban environment, distinct features can be attributed to anthropogenic sources of carbon dioxide and sensible heat. Latent heat flux remains weak in all seasons due to the low vegetation fraction in the flux source area. Composition of available energy is analysed on different time scales from days to weeks months and seasons in order to quantify the role anthropogenic heat emissions play in the constitution of local climate conditions. For instance, results indicate a strong coherency of traffic volume and carbon dioxide transport, expressed in a significant difference between weekday and weekend observations.

Kormann, R. and Meixner, F. X.: 2001, An Analytical Footprint Model for Non-Neutral Stratification, Boundary-Layer Meteorol. 99, 207–224.

Kotthaus, S. and Grimmond, C.S.B.: 2011, Long-term flux observations in London - Examining anthropogenic impact on surface exchange in a dense European city centre, in preparation.