



The diurnal cycle of the Urban Convective Boundary Layer over London

Christos Halios (1), Janet Barlow (1), and Curtis Wood (2)

(1) University of Reading, Department of Meteorology, Reading, United Kingdom (c.halios@reading.ac.uk), (2) Finnish Meteorological Institute, Helsinki, Finland

The daily evolution of the Urban Convective Boundary Layer is of importance in terms of the dispersion of pollutants and for initializing models. In particular, morning and afternoon transition periods are of interest for initializing prognostic models and also for basic understanding of significant processes such as the nocturnal low level jet (LLJ) and the whole structure of the nocturnal atmospheric boundary layer. Moreover, significant differences in the diurnal cycle of fluxes and boundary layer depths of urban and rural sites are expected due to different surface energy balance observed in urban and rural areas. Yet, long term observations of fluxes and boundary layer depth at both urban and rural sites are rare.

The aim of the present study is to examine the major phases (morning expansion, midday developed and afternoon decay) of the diurnal cycle of the Convective Boundary Layer. Towards this aim more than 1 year of measurements of a HALO Photonics Doppler Lidar and eddy covariance systems deployed in the frame of the ACTUAL (Advanced Climate Technology Urban Atmospheric Laboratory) project in central London, UK were analyzed. The urban lidar was operating in two modes: continuous stare mode (pointing vertically) and Doppler Beam Swinging (DBS) mode measuring the turbulence and the wind speed vertical profile respectively. The urban CBL is compared to the CBL over a nearby rural site (Chilbolton) and differences in urban and rural boundary layers are analyzed in terms of atmospheric stability and direction of the prevailing flow.