Geophysical Research Abstracts
Vol. 20, EGU2018-14558, 2018
EGU General Assembly 2018

Characterising the atmospheric boundary layer over London and its rural surroundings for different cloud types

Natalie Theeuwes (1), Janet Barlow (1), Simone Kotthaus (1), Christos Halios (1), Bart van Stratum (2), and Sue Grimmond (1)

(1) University of Reading, Reading, United Kingdom (n.e.theeuwes@reading.ac.uk), (2) Royal Netherlands Meteorological Institute (KNMI), de Bilt, the Netherlands

The development of the atmospheric boundary layer is directly influenced by the surface. Surface heterogeneity influences the turbulence in the boundary layer and can trigger local circulations. Urban areas are a hotspot for these interactions and have been known to disturb flow, influence the boundary layer depth and alter cloud formation and precipitation. However, the processes leading to the alteration of boundary-layer phenomena are not yet fully understood, particularly in the case of boundary-layer clouds and the triggering of precipitation.

In this study, we compare the characteristic structure of the urban and rural boundary layer for different cloud types using active remote sensing techniques. In addition, conceptual modelling is used to attempt to explain the differences. Data from Doppler Lidars and ceilometers situated in the city centre of London (UK) and at a rural site near Chilbolton (approximately 100 km south west of London) are used to characterise the boundary layer, based on variables such as the vertical velocity variance and skewness, boundary-layer and cloud-base heights. Large eddy simulation (LES) is used in an idealised setup to reproduce the observed boundary-layer characteristics and identify the underlying processes involved. The lessons learned in this study will be applied in challenging numerical weather prediction models simulating urban and rural cloudy boundary layers.