

Analyzing the London Urban Heat Island and boundary layer structure from ACTUAL project measurements

Christos Halios, Curtis Wood, Janet Barlow

Urban Heat Islands are not just surface phenomena, but also associated with particular structure and evolution of the boundary layer. From September 28 until October 4 2011, high pressure synoptic systems which dominated over UK resulted in clear skies, unseasonably high temperatures and relatively low winds from the southern and western sectors over London; conditions favourable for the development of the Urban Heat Island (UHI). During this period the Urban Boundary Layer (UBL) in London was monitored by three instrumentation platforms that were deployed in the frame of the ACTUAL project (Advanced Climate Technology Urban Atmospheric Laboratory). ACTUAL aims to the monitoring and simulating urban climate from city down to building scale. The vertical structure of the Urban Boundary Layer and the aerosol layer during the development and evolution of the UHI were monitored with a Halo-Photonics scanning Doppler lidar. The heat and momentum fluxes within the roughness sublayer and aloft in the UBL were analyzed with measurements from two identical instrumentation platforms; they were equipped with eddy correlation systems, net radiometers and weather stations, and were installed at the Westminster City Council Library roof-top (18m agl) and at the BT-tower (190.8 m agl). Morphological data were available from the Virtual London dataset, from which the main aerodynamic characteristics of the underlying urban area (average height of buildings layout, aerodynamic roughness length and zero-plane displacement height) were deduced. Turbulence characteristics under different advection patterns resulting from flows from the southern and western sectors will be analyzed.