



Carbon dioxide fluxes in urban and suburban environments from northwestern Portugal

Mário Cerqueira, Maria João Matos, Casimiro Pio, and Carlos Borrego

Department of Environment and Planning & Centre for Environmental and Marine Studies (CESAM), University of Aveiro, 3810-193 Aveiro, Portugal

The combined effect of global climate change and urban growth makes people in cities more vulnerable to environmental problems like extreme weather and poor air quality. CLICURB project aims at assessing the impact of future climate on urban areas and how cities can adapt to reduce exposure and sensitivity to those impacts, increasing resilience to climate change. CLICURB focuses in Oporto, a European urban area experiencing accelerated rates of urbanization and simultaneously presenting poor air quality. In the framework of CLICURB, the eddy covariance technique has been used to measure CO₂, energy and water vapor fluxes at an urban environment and a suburban environment with different population densities and surface characteristics (particularly concerning vegetation cover). This study reports the first months of CO₂ fluxes, which started in the middle of 2014. The urban site was a source of CO₂ most of the time and fluxes appeared to be governed by anthropogenic emissions from vehicular traffic and domestic heating. The suburban site was a day-time sink and a night-time source of CO₂. Day-time negative values were attributed to photosynthesis and strong mixing within the atmospheric boundary layer whereas night-time positive values were related with biospheric respiration, anthropogenic emissions and poor mixing within the atmospheric boundary layer. CO₂ fluxes gathered at both sites were also used to explore the role of human activities in the surface energy balance and its contribution to urban heat island effect.