



Anthropogenic Heat Flux Estimation from Space: Results of the second phase of the URBANFLUXES Project

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The H2020-Space project URBANFLUXES (URBAn ANthropogenic heat FLUX from Earth observation Satellites) investigates the potential of Copernicus Sentinels to retrieve anthropogenic heat flux, as a key component of the Urban Energy Budget (UEB). URBANFLUXES advances the current knowledge of the impacts of UEB fluxes on urban heat island and consequently on energy consumption in cities. In URBANFLUXES, the anthropogenic heat flux is estimated as a residual of UEB. Therefore, the rest UEB components, namely, the net all-wave radiation, the net change in heat storage and the turbulent sensible and latent heat fluxes are independently estimated from Earth Observation (EO), whereas the advection term is included in the error of the anthropogenic heat flux estimation from the UEB closure. The Discrete Anisotropic Radiative Transfer (DART) model is employed to improve the estimation of the net all-wave radiation balance, whereas the Element Surface Temperature Method (ESTM), adjusted to satellite observations is used to improve the estimation of the net change in heat storage. Furthermore the estimation of the turbulent sensible and latent heat fluxes is based on the Aerodynamic Resistance Method (ARM). Based on these outcomes, QF is estimated by regressing the sum of the turbulent heat fluxes versus the available energy. In-situ flux measurements are used to evaluate URBANFLUXES outcomes, whereas uncertainties are specified and analyzed. URBANFLUXES is expected to prepare the ground for further innovative exploitation of EO in scientific activities (climate variability studies at local and regional scales) and future and emerging applications (sustainable urban planning, mitigation technologies) to benefit climate change mitigation/adaptation. This study presents the results of the second phase of the project and detailed information on URBANFLUXES is available at: <http://urbanfluxes.eu>