

# A novel approach for anthropogenic heat flux estimation from space

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**THEME:** SOCI - Socioeconomic issues including health, urbanization and human heritage

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## ABSTRACT:

While Earth Observation (EO) has made significant advances in the study of urban areas, there are several unanswered science and policy questions to which it could contribute. To this aim the recently launched Horizon 2020 project URBANFLUXES (URBAN ANthropogenic heat FLUX from Earth observation Satellites) investigates the potential of EO to retrieve anthropogenic heat flux, as a key component in the urban energy budget. The anthropogenic heat flux is the heat flux resulting from vehicular emissions, space heating and cooling of buildings, industrial processing and the metabolic heat release by people. Optical, thermal and SAR data from existing satellite sensors are used to improve the accuracy of the radiation balance spatial distribution calculation, using also in-situ reflectance measurements of urban materials are for calibration. EO-based methods are developed for estimating turbulent sensible and latent heat fluxes, as well as urban heat storage flux and anthropogenic heat flux spatial patterns at city scale and local scale by employing an energy budget closure approach. Independent methods and models are engaged to evaluate the derived products and statistical analyses provide uncertainty measures as well. Ultimate goal of the URBANFLUXES is to develop a highly automated method for estimating urban energy budget components to use with Copernicus Sentinel data, enabling its integration into applications and operational services. Thus, URBANFLUXES prepares the ground for further innovative exploitation of European space data in scientific activities (i.e. Earth system modelling and climate change studies in cities) and future and emerging applications (i.e. sustainable urban planning) by exploiting the improved data quality, coverage and revisit times of the Copernicus data. The URBANFLUXES products will therefore have the potential to support both sustainable planning strategies to improve the quality of life in cities, as well as Earth system models to provide more robust climate simulations.

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