

ROME 2015 SCIENCE SYMPOSIUM ON CLIMATE THE URBANFLUXES PROJECT: USING SATELLITE DATA TO ESTIMATE ANTHROPOGENIC HEAT FLUX

Chrysoulakis N.¹, Heldens W.², Gastellu-Etchegorry J.-P.³, Grimmond C.S.B.⁴, Feigenwinter C.⁵, Lindberg F.⁶, Del Frate F.^{7*}, Klostermann J.⁸, Mitraka Z.¹, Esch T.², Albitar A.³, Gabey, A.⁴, Parlow E.⁵, and Olofson F.⁶

¹ Foundation for Research and Technology Hellas (FORTH), Greece ²German Aerospace Center (DLR), Germany, ³Centre d'Etude Spatiale de la Biosphère (CESBIO), France⁴, University of Reading, UK, ⁵University of Basel, Switzerland ⁶University of Goeteborgs, Sweden, ^{7*}GEO-K s.r.l., Italy, ⁸ALTERRA, Netherlands

*Corresponding Author: delfrate@disp.uniroma2.it

In the future, temperatures in cities are predicted to keep on rising, resulting in increased energy demand for cooling systems in low and mid-latitude cities, modifying UEB and increasing heat wave risk. The URBANFLUXES (URBan ANthropogenic heat FLUX from Earth observation Satellites) project, funded within the H2020 program, started in 2015 and aims at investigating the potential of Copernicus Earth Observation (EO) data [1], with particular attention to Sentinels missions [2], to retrieve anthropogenic heat flux as a key component of the Urban Energy Budget (UEB) [3]. The anthropogenic heat flux is estimated as a residual of UEB [4]. 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 EO, whereas the advection term is included in the error of the anthropogenic heat flux estimation from the UEB closure. EO data is initially analysed to map urban surface morphology and cover, whilst a new approach has been developed to define Local Climate Zones (LCZ) [5]. Using the LCZ as a framework, advanced EO-based methods and radiation transfer models [6] are then used to estimate UEB fluxes. Within the project a dense network of conventional meteorological stations is used in each case study city: London, Basel and Heraklion. In-situ flux measurements (Eddy Covariance, scintillometry) and bottom-up approaches (inventories, building energy models) are also considered to evaluate URBANFLUXES outcomes, whereas uncertainties are specified and analysed. URBANFLUXES is expected to prepare the ground for further innovative exploitation

of European space data 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 and civil protection.

Keywords:

Earth Observation, Copernicus, anthropogenic heat flux, urban heat islands, climate change

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