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Spatial pattern of urban sensible heat flux retrieved by means of remote-sensing observations

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Land surface and atmospheric alteration by urbanization leads to the development of distinct urban climates (Landsberg 1981, Oke 1997, Lowry 1998, Helbig et al. 1999). Ultimately these urban climate effects are due to differences in the budgets of heat, mass, and momentum between a city and its pre-existing landscape (Oke 1997, Feigenwinter et al. 1999, Spronken-Smith 2002). However, relatively little is known about the spatial and temporal variability of these exchanges (Offerle, 2003). Accurate estimates of its components, particularly the sensible (H) and latent heat fluxes, are critical for understanding the urban energy balance. One of the methods of measuring these fluxes is eddy covariance (EC) (i.e. Foken, 2008), or large aperture scintillometer (LAS), which can obtain indirectly the path-averaged values of turbulent sensible heat flux (Zielinski et al., 2012; Zielinski, 2015).

Satellite remote sensing techniques offer an alternative to specify sensible heat flux by providing greater spatial extend than LAS or EC measurements. The spatial variability in the modeled fluxes is a result of spatial variability of remotely sensed surface temperature and the corresponding transfer coefficients and meteorological inputs (Offerle, 2003).

Using MODIS (Moderate Resolution Imaging Spectroradiometer) satellite measurements and in-situ meteorological observations, we will estimate the sensible heat flux across the city of Łódź, Poland. The results will be compared with LAS observations of H obtained by Zielinski, 2015. Maps of urban surface temperature and sensible heat flux will be presented.