

# **Impact of urbanisation on the energy and carbon exchange over a residential neighbourhood in a tropical Asian city**

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The surface energy and carbon dioxide fluxes of a city differ greatly from those of surrounding rural areas. Detailed, multi-year radiation and energy fluxes for a residential neighborhood in a tropical humid and wet climate (viz Singapore) are presented. The measurements cover a period of ~7 years (2006-2013). Owing to the equatorial location of the site, a number of interesting seasonal features are observed, which differ from those found in the more commonly researched mid-latitude cities. Incoming radiation is uniformly high throughout the year, with values which are amongst the highest reported by any urban study. Annual changes in climate and surface-atmosphere energy exchange are therefore much less than observed in cities located outside the tropics. The traditional seasonal classification (i.e. summer vs winter season) does not apply in the tropical context. Rather, significant variability exists using a classification based on clouds and rainfall (i.e. wet vs dry season). Singapore provides a unique climatic context, and the present long-term study is expected to add robust statistics from the understudied (sub)tropical region to the global dataset of urban energy balance fluxes, which is dominated by work conducted in mid and high latitudes. The present data can be used to evaluate and adapt models to investigate the urban heat island, improve the thermal comfort of residents or study extremes of urban weather.

Reference: Roth M, Jansson C, Velasco E, 2017. Multi-year energy balance and carbon dioxide fluxes over a residential neighbourhood in a tropical city. *Int J Climatol*, 37, 2679–2698.