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The Effect of Facades on Outdoor Microclimate: A Review

Jonathan Fox

University of New South Wales (UNSW), Sydney (Australia)

ABSTRACT This paper reviews the literature regarding the microclimate effects of building facades with a focus on vertical surface temperature observations using infrared thermography. The paper identifies several key themes apposite the climatology of facades: scale – of microclimate observations and architectural decision-making; uncertainty – in urban surface thermal behaviour due to the underrepresentation of facades in nadir-remote sensing; significance of facades – the spatio-temporally dependent role of facades in urban energetics; and the potential benefits and challenges of using smaller, affordable and more mobile high-resolution thermal sensors to observe the microclimate effects of building facades at the architectural scale (i.e. $\leq 10\text{m}$). The paper is part of current research which aims to quantitatively establish predictive relations between the thermal properties of building facades – by accounting for the thermal effects of a facade's structure, cover and materiality (Oke 2006b) – and observed outdoor surface and air temperatures, using ground-based high-resolution thermal infrared (TIR) thermography, mobile meteorological measurements and a geographical information system (GIS) platform. The research will contribute to understanding the causes and characteristics of, and potential countermeasures to mitigate, the UHI effect in the Australian context.