

Comparative Analysis of Surface Urban Heat Island Effect in Central Sydney

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ABSTRACT The Urban Heat Island (UHI) effect can result in higher urban densities being significantly hotter (frequently more than 4 °C, even up to 10 °C) compared to their peri-urban surroundings. Such artificial heat stress increases the health risk of spending time outdoors and boosts the need for energy consumption, particularly for cooling during summer. Urban structure, land cover and metabolism are underlined as key contributors in city scale. Under question is which urban configurations can make urban precincts and their microclimates more resilient to the surface layer Urban Heat Island (sUHI) effect? The City of Sydney is increasingly experiencing the UHI effect due to its numerous urban development projects and changes in climate. In the Sydney context, this ongoing research aims to explore the most heat resilient urban features at precinct scale. It covers five high density precincts in central Sydney and is based on a nocturnal remote-sensing thermal image of central Sydney taken on 6 February 2009. Comparing the surface temperature of streetscapes and buildings' rooftops (dominant urban horizontal surfaces), indicates that open public spaces and particularly streetscapes are the most sensitive urban elements to the sUHI effect. The correlations between street network intensity, open public space plot ratio, urban greenery plot ratio and sUHI effect is being analysed in Sydney's high density precincts. Results indicate that higher open space plot ratio and street network intensity correlate significantly to higher sUHI effect at precinct scale. However, higher urban greenery plot ratio can effectively mitigate the sUHI effect in high density precincts.

Keywords: urban heat island effect, urban greenery, public space surface, streetscape, heat stress, Sydney