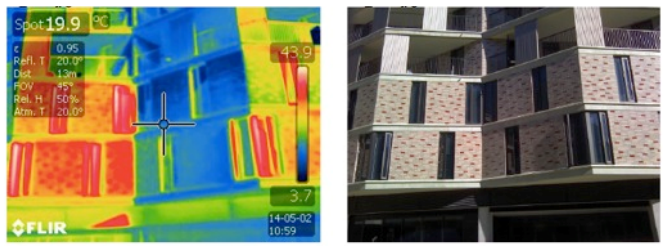
RP2005

URBAN MICROCLIMATES. COMPARATIVE STUDY OF MAJOR CONTRIBUTORS TO THE UHI EFFECT IN SYDNEY, ADELAIDE AND MELBOURNE

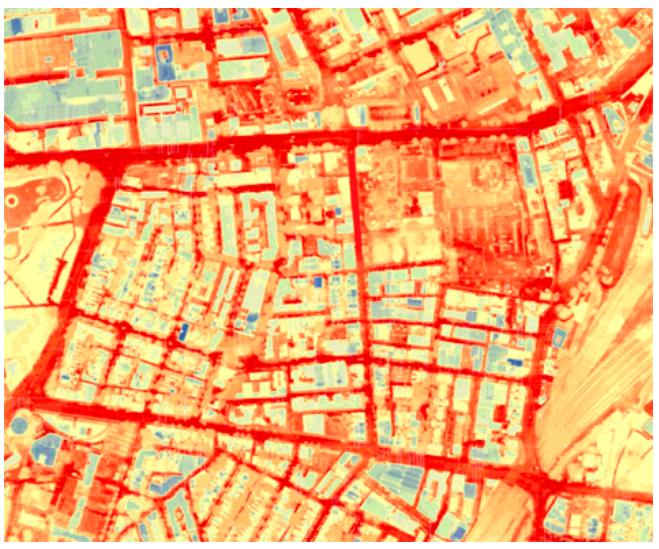
Problem

Cities are several degrees hotter than their rural surroundings – the **urban heat island** (UHI) effect. Higher urban daytime land surface temperatures and nighttime air temperatures exacerbate heatwave-related stress and result in higher cooling energy demand, greenhouse gas emissions and ozone/smog production. Extreme heat is the most common cause of death amongst natural hazard risks in Australia. Climate change and urbanisation increase heat exposure risks, with growing health, energy, productivity and ecological costs to governments, businesses and individuals.

Surface temperature of building facades



Land surface temperature in Sydney



Solution

Planning and design that deliberately shape urban microclimates – the unique climates experienced in city streets, squares and parks – may alleviate exposure to extreme heat and improve thermal comfort by altering the formation and intensity of UHIs. Mitigation of urban heat through microclimate responsive design will beneficially reduce cooling energy demand, heat and air pollution health impacts and greenhouse gas emissions, contributing to more liveable cities and resilient communities.

Since no single factor dominates UHI formation (due to non-linear processes with strong feedback) a multi-scalar, multi-temporal approach is required to mitigate UHIs attributable to individual buildings, street canyons, urban precincts and entire cities.

Benefits

Since individual buildings are the “fundamental units to create the urban climate”, improved knowledge of the micrometeorological impacts of building design is critical to addressing UHIs. Architects require information on the microclimate effects of their designs at spatial scales relevant to their decision-making. **This research investigates** the microclimate effects of building facades on outdoor surface and air temperatures and human thermal comfort. It aims to develop a transferable, diagnostic tool to identify, classify and predict the climate impacts of facade design.

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