Graduate Student Poster Abstract: Peter Price, PhD Candidate

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Mobile Assessment of Mean Radiant Temperature in a Tempe, Arizona Rooftop Garden During Extreme Heat.

This study examines spatial variability in mean radiant temperature (MRT) across a rooftop garden in an older adult community in Tempe, Arizona during extreme summer heat waves. Older adults are disproportionately vulnerable to heat-related health risks, and rooftop green spaces are increasingly promoted as nature-based solutions in dense, vertical urban environments. However, empirical micrometeorological data on thermal exposure within these spaces during extreme heat events remain limited, particularly in hot desert climates. Mobile biometeorological measurements were collected using the MaRTy mobile biometeorological cart on the 16th floor rooftop terrace at Mirabella on two separate days during extreme heat wave conditions of July and September 2023. Data collection captured fine-scale variations in MRT across different surface materials, vegetation, synthetic turf, shade structures, and surrounding built features. Measurements enable comparisons between shaded and unshaded areas, vegetated and non-vegetated zones, and areas influenced by reflected heat from building features. Results reveal a spatial heterogeneity in MRT across the rooftop terrace and garden environment, with shaded and vegetated areas exhibiting lower radiant heat loads than exposed hardscape and synthetic turf areas, even under uniformly extreme ambient temperatures. These findings highlight the dominant influence of solar exposure and shade on thermal conditions within rooftop landscapes in arid environments. By providing empirical MRT measurements from a rooftop community garden during heat wave events, this study contributes evidence to inform the design, evaluation, and management of rooftop green spaces. The results underscore both the potential and limitations of rooftop gardens as heat-mitigating environments and offer practical insights for designers, planners, and facility managers working in desert cities.

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