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Quantifying the impacts of built environment and surface properties on temperature extremes

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Urbanization has created an increase in Urban Heat Island (UHI) e ect. UHI re ects an elevated temperature in cities as compared with nearby rural areas which is due to the change in landscape from grass covered and vegetative to concre and asphalt with three-dimensional structures. Our on-site study revealed that mixed environments (grass, water and concrete) result in di erent temperature pro les within speci c ranges. Grass shows the coolest environment, water is the most temperate and concrete has the highest peak temperatures during the day for the duration of the study. To further understand temperature extremes at ne temporal and spatial scales in complex urban settings and to minimize the thermal impact of structures on the surrounding environment, we plan on quantifying the impacts to build environment and surface properties on surrounding temperature through three speci c tasks, downscaling satellite infrared radiation brightness temperatures to identify hot spots within urban environments and introduction of a localized o set table concept to quantify the impact of various surface type on thermal anomalies, understanding the behavior of common surface materials in the built environment in interaction with solar radiation and quanti cation of the vertical association between skin temperature and near surface air temperature for thermal mapping within urban microclimates and development of a conceptual framework for assessing environmental risk and vulnerability to temperature extremes by modeling the near surface air temperature pro le of complex urban systems based on land surface properties and eld measured data.

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