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## Assessing different urban heat metrics in varied settlements and their relation to thermal comfort

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Rising temperatures, resulting in prolonged heat waves and increased occurrences of tropical nights, present a risk to both morbidity and mortality rates. Urban populations are particularly vulnerable due to the additional elevation of temperatures within urban areas compared to the rural surroundings, commonly known as the "urban heat island effect". For the identification of heat exposure air temperature ( $T_a$ ) at a high spatial scale is a preferred metric, however due to the scarcity of official measurement stations land surfaces temperature (LST) measurements are often used as a substitute. In addition, most studies focus only on densely populated urban areas, neglecting smaller settlements in a rural environment.

Here we show the differences in LST and air temperature extremes at nighttime for the state of Hesse, Germany. This involves comparing various temporal aggregates (such as 90th percentile and mean) and diverse urban heat metrics (including absolute temperatures and rural-urban temperature differences). We furthermore focus on small towns (5000 to under 20000 residents), medium-sized cities (20000 to under 100000 residents) and large urban metropolises (over 100000 residents) separately, taking into account the distinct relations to land cover/land use characteristics (indicated by Local Climate Zones) of the individual urban heat metrics. To gain insights into how these different temperature parameters (as well as daytime LST) relate to human-perceived comfort the Thermal Comfort Index 'Physiological Equivalent Temperature' (PET) is included as a metric.