



Modelling of heat stress in micro scale – Sensitivity studies of thermal comfort indices and influencing parameters

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Thermal indices are applied frequently for the estimation of thermal comfort and thermal stress of a human being exposed to the prevailing meteorological conditions. Among the most common thermal indices, there is the Perceived Temperature (PT), the Universal Thermal Climate Index (UTCI), and the Physiologically Equivalent Temperature (PET). All three indices do require the same meteorological input parameters, the air temperature (Ta), vapour pressure (VP), wind speed (v), as well as the mean radiant temperature (Tmrt). Based on those, PT, UTCI, and PET can be easily calculated e.g. using RayMan or the SkyHelios model.

However, the meteorological input data for the calculation of thermal indices is to be selected carefully. Parameters with strong spatial fluctuation need to be representative for the location a thermal index is estimated for. If e.g. wind speed is recorded in 10 m height and a thermal index is calculated based on the recorded values directly, the thermal indices will be underestimated severely. All indices show individual sensitivity to the individual input parameters. However, they mostly agree on the of their response as found in a sensitivity analysis in the course of this study.

While PT and PET are quite suitable for spatial calculations, there have been found limitations concerning the applicability of UTCI in spatially resolved analysis for urban human thermal microclimate.