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What can individual walking patterns tell us about outdoor thermal comfort sensation in tropical cities?

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In general, most methodologies pertaining to thermal comfort studies involve the use/mapping of outdoor thermal comfort (OTC) indices at the multiple spatial scales. These OTC indices can be based on empirical relationships observed between a combination of meteorological variables (air temperature, air humidity, and wind speed,...) and individual sensations of thermal comfort surveyed in controlled indoor or static settings (i.e. fixed wind speed and humidity in-situ). It can alternately be computed from the resolution of a complex set of physical equations representing the human body thermoregulation processes with its surroundings. A challenge, however, is that these indices – and derivation of thresholds related to thermal comfort and discomfort – often do not account for dynamic variations of OTC resulting from human agency.
In this study, we thus propose to examine spatiotemporal patterns of Singapore pedestrians relative to microscale weather conditions in their everyday commute activities. We posit that variations in OTC sensation can be inferred through changes in walking patterns vis-à-vis prevailing weather patterns. For this purpose, we select two focus urban districts; the first being residential and located at a suburban residential area at the periphery of Singapore, and the second area located at the downtown core and characterized by a mix of business, commercial, and residential uses. In each district, randomly selected pedestrians are (i.) tracked with the help of telecom GPS technologies, and (ii.) asked to answer to a series of survey questions related to their decision of walking at the time of the survey, route choices (e.g. between vegetated and naturally shaded routes versus artificially shaded routes), and also preferred behavioural adaptation option under different weather conditions. As the experiment is currently in progress, we propose to present in this session the chosen methodology and the preliminary results obtained from the observational and survey campaigns. Results from this study will contribute towards a major multi-stakeholder project aimed towards reducing heat islands and thermal discomfort in Singapore through the implementation of climate responsive planning in the city-state.