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The effect of different climate on outdoor human thermal perception – review of approaches, methods and quantification

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Over the past century, many research works were conducted in attempt to define and assess thermal condition for human in outdoor environment and to grade thermal sensation. Consequently, a large number of indices have been proposed worldwide. The earlier thermal indices concentrated on the negative effects of climates on human, like heat and cold stress. In the last five decades, the scientific approach concentrated on comfort or discomfort thermal conditions for human, which lead to a serious effort to develop universal indices, capable of evaluating both cold and hot human thermal sensation. Therefore, there is a need to evaluate the capability of these indices to define the human thermal sensation and its perception in different climatic zones. The aims of this study are: (a) to review the human thermal indices that are commonly in use by different studies worldwide and to defined their common dominator (b) to examine the amplitude of the human thermal sensation scale in different climatic zones and (c) to compare between human thermal perceptions in different climatic zones. The results show that although 162 bioclimatic indices were developed, only small group of indices (such as PMV, SET, ET, PT, PET and UTCI) are frequently in use and the PET index is the most used index worldwide. It also shows that the boundaries and range of the human thermal sensation scale changes from one climatic zone to the other and that human being are more tolerant towards cold temperature than towards hot temperature.