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Examination of human comfort predictability using ECMWF deterministic model

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Research of the relationship between atmospheric environment and human body goes back to centuries. It is a well-known fact today that our body is exposed to greater bioclimatic load due to the climate change, especially in urban environments. Therefore, people exposed to greater heat risk (e.g. infants and older people, heavy manual workers, or soldiers) have to be aware of the intensifying environmental heat stress influencing them in order to maintain their health. This topic has received a little attention in Hungary until now despite the opportunity of human comfort forecast. Therefore, our goal is to understand this research field thoroughly. The first results of this research are presented in this study.

The paper presents the predictability of some well-known and commonly used human bioclimate indices: for example the Wet Bulb Globe Temperature (WBGT), the Thermohygrometric Index (THI), the Physiologically Equivalent Temperature (PET) or the Universal Thermal Climate Index (UTCI). To achieve this goal, a variety of existing verification methods were used, which were revised in accordance with our purposes. The predicted values of meteorological variables influencing thermal comfort were gained from the deterministic model ECMWF (European Centre for Medium-Range Weather Forecasts) based on the initial meteorological fields 00 UTC and 12 UTC. For this reason, there was also an opportunity to assess the temporal changes of the goodness of comfort forecasts. The study was performed for the period from 1 January 2013 to 31 December 2014 based on the measured and forecasted bioclimate indices 12 UTC of six meteorological stations (Budapest, Győr, Szombathely, Pécs, Szeged, Debrecen). Some of the indices were obtained using model RayMan. Based on our results, significant differences were found between the predictability of the indices.