

Spatio-temporal analysis of heat waves by the application of human-biometeorological indices in Athens, Greece

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In this study we analyze and quantify the recorded three heat waves in the greater Athens area (GAA) during the summer 2007. Although a heat wave is a meteorological event, it cannot be assessed without reference to its impacts on humans. Thus, the analysis of the biometeorological conditions associated with the examined three heat waves within GAA in June, July and August 2007 was carried out using human-meteorological indices based on the whole heat balance of the human body. More specifically, the spatio-temporal variation of the physiologically equivalent temperature (PET) and the universal thermal climate index (UTCI) within GAA for each heat wave is examined.

The meteorological data used for the calculation of the above thermal indices concern hourly values of air temperature, relative humidity, wind speed and total solar radiation from a network of 15 meteorological stations, operated by the Hydrological Observatory of National Technical University of Athens (NTUA) and the Laboratory of Climatology and Atmospheric Environment of University of Athens (NKUA).

The extracted results indicate that the urban environment of Athens downtown (well established urban heat island) contributes in addition to the already adverse bioclimatic conditions due to heat waves, compared to the respective ones appeared in the suburbs of GAA. Besides, the temporal analysis revealed the hours of the day when thermal comfort or stress prevailed. The use of PET or UTCI instead of common meteorological variables in order to quantify the heat waves give superior information in the interpretation and further to the forecasting of the intensity of an oncoming heat wave.