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Assessment of bioclimatic conditions in Crete Island, Greece

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The objective of this study is to assess and analyze the human bioclimatic conditions of Crete Island, using the Physiologically Equivalent Temperature (PET), which is one of the most popular human thermal indices derived from the human energy balance. Bioclimatic studies provide a framework linking biophysical climate sensitivity to social/economic factors that mitigate or amplify the consequences of environmental changes. PET is defined as the physiological equivalent temperature at any given place (outdoors or indoors). It is equivalent to the air temperature at which, in a typical indoor setting, the heat balance of the human body (work metabolism 80 W of light activity, added to basic metabolism; heat resistance of clothing 0.9 clo) is maintained with core and skin temperatures equal to those of the under assessment conditions.

It has been realized that, to estimate the thermal effect of the environment to the human body, the total of effects of all of the thermal components, not only as individual parameters, should be taken into account. The climatic data (air temperature, relative humidity, cloudiness, wind speed) for Crete Island, were obtained by archives of fifteen meteorological stations of the Hellenic National Meteorological Service (HNMS). These data of period 1955-2010 were used for the calculation of PET in order to interpret the grade of the thermo-physiological stress.

Crete Island, as it is located in the Southeastern Mediterranean basin, is of great touristic interest due to its splendid landscapes, archaeological sites and coastal areas combined with its excellent climatic conditions. However, Crete Island is frequently affected by Saharan outbreaks which are associated with miscellaneous phenomena, such as Föhn winds - hot and dry winds - causing extreme bioclimatic conditions (strong heat stress).

The exploitation of the results of this analysis, such as bioclimatic diagrams, temporal and spatial distributions of PET as well as trends and variability, will help stake holders of Crete Island to understand and interpret its current bioclimate, in order to adapt and become more resilient of the oncoming climate change.