

A climatology of Steadman's apparent temperature over the Iberian Peninsula

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In recent years the effect of extreme temperatures has become a subject of increasing research by the scientific community. In many cases, the research is based on the analysis of just one variable, like daily maximum temperatures; however, there is also a common knowledge that the effect of the temperature is exacerbated or mitigated by the addition of other variables like wind speed and humidity, and in many cases, the impact on health of daytime temperatures is emphasized by hot nights. The objectives of this contribution are as follows: to elaborate a basic climatology of Steadman's apparent temperatures over the Iberian Peninsula, highlighting their spatial and temporal variability; to establish the role of the atmospheric circulation on producing the differences between actual and apparent temperatures, emphasizing the role of variables involved into the calculations of apparent temperature; to analyze the synoptic patterns responsible of events of extreme apparent temperatures, and to consider the characteristics of the summer 2003 heat wave in the Iberian Peninsula from the point of view of the apparent temperatures. Daily mean apparent temperatures between the years 1994 to 2005 are calculated using measured daily average temperature, relative humidity and wind speed at 79 stations in SW Europe and Northern Africa, extracted from the NOAA Globalsod database. The atmospheric circulation was examined using composites of several meteorological fields derived from the NCEP/NCAR reanalysis project. The climatological analysis confirms the regional differences between the interior observatories and the coastal ones, when usual high humidity and stronger winds have an opposite effect in winter, providing an uncomfortable sensation and summer, bringing a refrigeration effect. A Rotated Principal Component Analysis (S-Mode) was applied to the differences between the raw mean daily "classical" temperature and the mean daily apparent temperature data in order to obtain the main modes of spatial and temporal variability in the data. Three regions were obtained. A subset of days above the 90th percentile of each region was extracted in order to analyze the mechanisms responsible of extreme temperature apparent days. The impact of the high temperatures during the summer'03 heat wave was aggravated in the coastal northern observatories by the high humidity and nighttime temperature values, while the more continental observatories of the Central Plateau displayed low humidity values which could explain the observed contrast in mortality during that event.