EMS Annual Meeting Abstracts
Vol. 8, EMS2011-533, 2011
11th EMS / 10th ECAM

Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

The Universal Thermal Climate Index Case Studies at Portuguese Meteorological Institute

S. Cunha, J. Ferreira, J. Marques, A. Silva, M. Mendes, and L. Nunes
Portuguese Meteorological Institute (sofia.cunha@meteo.pt)

This paper presents some results concerning the latest Biometeorological developments at the Portuguese Meteorological Institute (IM, I.P.), trough the application of "Universal Thermal Climate Index" developed in the frame of the COST 730 Action, (http://www.utci.org) in which these Institute participated.
This new index is specific to assess the outdoor thermal conditions in the major fields of human biometeorology, such as public weather services and civil defense planning. One of the advantages of UTCI is its assessment scale, which is measured in ºC and ranges from extreme cold stress to extreme heat stress categories.
The observational network includes meteorological data representative of the main administrative units of Portugal Mainland, (18 automatic stations) in the period between 2003 and 2008. The UTCI values were estimated at 9:00 and 15: 00 UTC.
Seasonal correlations of UTCI with meteorological elements are higher during summer at 15:00 UTC, when compared with correlation coefficients during winter at 09:00 UTC, excepting with wind velocity that shows a higher correlation in winter at 09:00 UTC.
Although the relationship between these two variables (wind velocity vs UTCI) in these two seasons is negative, the wind velocity in winter at 09:00 UTC is stronger when compared with summer at 15:00 UTC.
UTCI has a negative correlation with relative humidity in summer (15:00 UTC) and a positive correlation in winter (09:00 UTC). In summer when the relative humidity increases, the comfort is greater. This situation can be explained because hot days may be influenced by eastern continental air masses, extremely dry. When occurs the penetration of maritime air in the mainland territory, with high moisture content, in particular in situations of extreme heat (UTCI high) the UTCI values drop and raises the human comfort.
Correlations between UTCI values and the lagged deaths average exhibit a more consistent behavior and closer to what is referred to in literature than the correlation values taking into account only with the temperature. At 9 UTC in winter, the UTCI presents a relative maximum with a lag of one day and another much more significant for a lag of 5 days. At 15 UTC in summer, UTCI presents the maximum correlation with one day lag.
Concerning GIS modeling of UTCI in mainland Portugal during 2003-2008, UTCI maps when compared with the mean air temperature maps, present a more detailed thermal behavior, at both temporal scales: seasonal, monthly and daily. Taking into account the spatial distribution of this index, the most appropriate model for their spatial distribution is the multivariate residual kriging, with several predictors: altitude, latitude, and distance to coast. The highest correlation coefficients with this observational network (18 stations) were obtained with the implementation of joint three variables: altitude, latitude and distance from the coast, and range between 0.55 and 0.84.

References

http://www.utci.org/cost.php