



Observed and projected trends in urban thermal risk at a large Mediterranean city based on bioclimatic indices - A case study for Athens (Greece)

George Katavoutas, Dimitra Founda, Konstantinos V. Varotsos, and Christos Giannakopoulos
National Observatory of Athens, Institute for Environmental Research and Sustainable Development, Greece
(gkatavoutas@noa.gr)

Increased frequency of exceptionally hot weather enhances human thermal risk worldwide. Urban residents are more vulnerable to heat-related risk due to the additive effect of the urban heat islands that make cities hotter compared to the surrounding non urban areas. Today, increased exposure of urban population to heat-related risk emerges as one of the major threats for human health.

The study explores long-term variations in urban thermal risk in a large city of the Eastern Mediterranean (Athens). Capital cities of the Eastern Mediterranean like Athens have been identified as hot spots among other European cities with respect to future heat related risk. Human thermal risk was assessed employing two thermal indices, namely the Heat Index and the Humidex. Both indices have been designed exclusively for warm weather conditions and are based on the environmental factors of air temperature and humidity.

A statistically significant increase in the frequency of threshold exceedances was detected in Athens since the mid 20th century for both indices, suggesting thermal discomfort and higher risk to the body from the continued exposure to the excessive heat. Moreover, the timing and length of heat stress periods have significantly altered over the recent decades. Thermal conditions during nighttime were further investigated, indicating significant increase in the time of heat stress exposure during nighttime hours as well.

Our findings will be used to validate respective simulations of Regional Climate Models downscaled over the areas of interest for a past control period. Moreover, future simulations will be realized to detect projected trends in urban thermal risk in Athens. Level of heat stress under present climate conditions will be compared to the corresponding heat stress for two future periods representing near future (2021-2050) and distant future (2071-2100) climate.