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Climate extremes in urban area and their impact on human health: the summer heat waves

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In the period 1951-2012 the average global land and ocean temperature has increased by approximately 0.72°C [0.49-0.89] when described by a linear trend, and is projected to rapidly increase. Each of the past three decades has been warmer than all the previous decades, with the decade of the 2000's as the warmest, and, since 1880, nine of the ten warmest years are in the 21st century, the only exception being 1998, which was warmed by the strongest El Niño event of the past century.
In parallel an increase in the frequency and intensity of extremely hot days is detected with differences at different scales, which represent an health risk specially in largely populated areas as documented for several regions in the world including the Euro-Mediterranean region.
If it is still under discussion if heat wave episodes are a direct result of the warming of the lower troposphere, or if, more likely, they are a regional climate event, however heat episodes have been studied in order to define their correlation with large scale atmospheric patterns and with changes in the regional circulation. Whatever the causes and the spatio-temporal extension of the episodes, epidemiological studies show that these conditions pose increasing health risks inducing heat-related diseases including hyperthermia and heat stress, cardiovascular and respiratory illnesses in susceptible individuals with a significant increase in morbidity and mortality especially in densely populated urban areas.
In several Mediterranean cities peaks of mortality associated with extremely high temperature (with simultaneous high humidity levels) have been documented showing that, in some cases, a large increase in daily mortality has been reached compared to the average for the period. The number of fatalities during the summer 2003 heat wave in Europe was estimated to largely exceed the average value of some between 22000 and 50000 cases. In the same summer it was also unusually hot across much of Asia, and Shanghai, which is particularly prone to heat waves, recorded the hottest summer in over 50 years. During the event, the maximum number of daily deaths was 317, 42% above the non-heat day average, even though an heat warning system in operation.
In this study results from the analysis of heat waves events in Italian cities is presented. Indices representative of extremely hot conditions have been taken into account and results of the analysis of indices such as the number of summer days (SU), number of tropical nights (TR), maxima and minima of daily maximum and minimum temperatures (TXx, TXn, TNx, TNn, respectively), exceedances over fixed thresholds is presented. Results show a clear increase in the past decades of the numbers of days affected by heat events. Some considerations are also presented about the impact on human health of the longest events occurred in the Country.