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EXTREME TEMPERATURES IN SARDINIA DURING THE PERIOD 1951-2012

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The Reports of the Working Groups of the Intergovernmental Panel on Climate Change (IPCC, 2014) confirm that the warming of the climate system is unequivocal and since the 1950s many of the observed changes are unprecedented. Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. The globally combined land and ocean surface temperature data show a warming of 0.85 °C over the period 1880 to 2012. In Italy, an increase of approximately 1 °C has been measured over the last 50 years of the twentieth century (Brunetti et al., 2006a). Although many studies are focused on the analysis of the average values (Toreti et al., 2007), researches concerning the extreme thermometric events are rather limited (Toreti et al., 2008).
The aim of this study is to identify any possible extreme temperature changes within the last 60 years in Sardinia (Italy) and to provide necessary elements for a possible comparison with other geographical zones from Italy and Europe.
Ten temperature indices are selected from the list of climate extreme indices defined by the Expert Team on Climate Change Detection and Indices (ETCCDI), recommended by the World Meteorological Organization-Commission for Climatology (WMO-CCL).
The indices taken into consideration are:
1) Maximum absolute temperature (TX, °C); 2) Minimum absolute temperature (TN); 3) Frost days (n. of days/year with Tmin<0ºC, FD); 4) Summer days (n. of days/year with Tmax>25ºC, SU); 5) Tropical nights (n. of days/year with Tmin>20ºC, TR20); 6) Cool nights (% of days when Tmin<10th percentile, TN10p); 7) Cool days (% of days when Tmax<10th percentile, TX10p); 8) Warm nights (% of days when Tmin>90th percentile, TN90p); 9) Warm days (% of days when Tmax>90th percentile, TX90p); 10) Diurnal temperature range (mean difference between TX and TN), DTR.
Temperature data were elaborated from a set of 6 meteorological stations well distributed over the Sardinian territory. Raw data underwent quality control in order to check for any possible mistakes in the time series using the RClimdex software (Zhang et al, 2004). Finally, to homogenize the variables, we have employed the SPLIDHOM method (Mestre et al. 2011).
The trends of climate indices have been calculated for the seasonal and annual values, their significativity has been tested using the Mann Kendall parametric test.
Among the most significant indices, three of them (TX, TN and TN90p) show a warming trend for the entire period on most stations. Two indices (SU and TR) show a net increase (larger 10 summer days and tropical nights) in the last 25-30 years. However, the largest increase of tropical nights is observed at coastal stations. The evaluation of the extreme temperature indices and their trends at regional and local scale may contribute to a better insight on the possible impacts of climate change on agriculture and human health.