

EVALUATION OF HEAT WAVES OVER THE NORTH WESTERN ITALIAN ALPS

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The aim of this study was to identify the increase in frequency of heat waves within the last 90 years in the North Western Italian Alps by examining data from high-altitude weather stations in the period 1924–2013. Furthermore a comparison between high-altitude and lowland weather stations were performed.

The data used in this study consist of daily observations of temperature from ARPA Piedmont, ARPA Valle d'Aosta and ENEL ground stations datasets. In addition a dataset from MODIS sensors from “Terra” and “Aqua” satellites (availability in according with their launch) were analyzed to evaluate their usability in alpine extremes analysis.

All the data were quality controlled using the Rclimdex package [1] for R software. Stations with high potential of erroneous data and missing data more than 20% were removed from the study [2]. The identified outliers are daily values outside the mean plus or minus four times standard deviation of the daily value (in agreement with [3] and [4]). The daily temperature data were subject to the homogenization process SPLIDHOM [5,6] to have an homogeneous time series where all the remaining variations are due only by variations in climate [7, 8].

The 90 years period was split in 3 sub-periods of 30 years (1924-1953; 1954-1983 and 1984-2013) and an additional sub-period (2000-2013) was created to compare the results between satellite and ground stations data.

Fixed thresholds (according with the alpine vertical lapse rate) and 90th, 95th and 99th for maximum temperature and and 10th, 5th and 1st for minimum temperature percentile and their frequency were calculated on the series. Then the MAKESENS procedure [9], based on the nonparametric Mann-Kendall test for the trend and the nonparametric Sen’s method for the magnitude of the trend, were applied.

Keywords: Heat Waves, North Western Italian Alps, Extremes, Temperature

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