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Extreme temperature: an overview of trend analysis for the period 1955-2008

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Abstract

Studies concerning climate trends at various locations across Europe abound. However, results from these are not directly comparable because of the contrasts in data set length and quality and the different methods used for data processing and trend analysis. The occasion for this paper is to analyze in a comprehensive manner the behavior of the extremely cold days (ECD) and extremely hot days (EHD) that occur in Europe for the period 1955-2008 addition, the synoptic patterns of major influence in the extreme temperature days have been identified. For them, we used a set of homogenized temperature series of stations distributed for different European countries and the catalogue of weather of Hess-Brezowsky (HB). An ECD has been defined as one in which the minimum temperature is below a percentile 5th of the distribution of daily minimum temperatures and an EHD as one in which his maximum temperature above the percentile 95th of the distribution of daily maximum temperatures.

The relationship between the occurrence of an ECD-EHD and the general circulation of the atmosphere was based on a statistical coefficient which assigns a type or another synoptic pattern. This coefficient expresses the probability that occur a certain synoptic pattern in a region. From this database a rotated principal components (RPC) analysis was applied to identify the synoptic patterns. Some results that have been obtained in the present study were the significant positive trends in the annual frequency of EHD and negative trends in the annual frequency of ECD for the period analysis. The trends each synoptic pattern is also analyzed where verified a major frequency of synoptic patterns anticyclones over Western Europe. Additional results, conclusions and comments are described also in the work.