EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-491-3, 2009
9th EMS / 9th ECAM

9th EMS Annual Meeting
9th European Conference on Applications of Meteorology
High resolution meteorology
- applications and services

Heat waves frequency analysis and spatial-temporal variability of daily maximum temperature in southern Slovakia within the 1951, respectively 1961-2008 periods

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Heat waves temporal and spatial analysis at selected meteorological stations in southern part of Slovakia within the 1951, respectively 1961-2008 periods is a goal of the presented contribution. It is expected that climate change in terms of global warming would amplify temporal frequency and spatial extension of extreme heat wave incidence in region of central Europe in the next few decades. The frequency of occurrence and amplitude of heat waves may be impacted by changes in the temperature regime.

Heat waves can cause severe thermal environmental stress leading to higher hospital admission rates, health complications, and increased mortality. These effects arise because of one or more meteorology-related factors such as higher effective temperatures, sunshine, more consecutive hot days and nights, stagnation, increased humidity, increased pollutant emissions, and accelerated photochemical smog and particulate formation. Heat waves bring about higher temperatures, increased solar heating of buildings, inhibited ventilation, and a larger number of consecutive warm days and nights. All of these effects increase the thermal loads on buildings, reduce their ability to cool down, and increase indoor temperatures.

The paper deals with analysis of temporal and spatial variability of heat waves occurrence at meteorological station Hurbanovo (time series of daily maximum air temperature available from at least 1901) and some other climatological stations in lowlands of southern Slovakia (Žiharec, Bratislava-airport, Jaslovské Bohunice, Kráľová pri Senci, etc.). We can characterize the heat waves by its magnitude and duration, hence both of these characteristics need to be investigated together using sophisticated statistical methods developed particularly for the analysis of extreme hydrological events. These methods are quite similar to the intensity-duration-frequency approach often used in the analysis of extreme precipitation events. The HDF-curves (heatwave-duration-frequency curves) defining relation between duration and return period of heat wave is usually modelled utilizing the general extreme value distribution (GEV).