EMS Annual Meeting Abstracts
Vol. 9, EMS2012-427, 2012
12th EMS / 9th ECAC

Selected extreme weather events due to atmospheric circulation indices over Poland

Z. Ustrnul (1,2) and A. Wypych (2)

(1) Institute of Meteorology and Water Management - National Research Institute, Poland (zbigniew.ustrnul@imgw.pl), (2) Jagiellonian University, Krakow, Poland

TThe main aim of the study was to create complex atmospheric circulation index, which would enable to present the potential possibility of extreme weather phenomena occurrence in Poland. One focused on air temperature (maximum and minimum values) and precipitation totals as two main meteorological and climatological elements. All the analysis were based on homogenous daily series covering the period 1951-2010 obtained from 14 meteorological stations chosen as the best to represent the whole area of Poland.

First of all, the temperature and precipitation extremes were distinguished, indicated as rare atmospheric phenomena in a given place. They have been defined by a probabilistic approach, according to IPCC suggestion, that is phenomena that occur with a frequency lower or equal to 10%. Extreme values of maximum temperature (>90 percentile), minimum temperature (<10 percentile) and daily precipitation totals (>90 percentile) were designated separately for each month and every station.

Distinguished extremes were estimated due to their frequency within particular circulation types of 5 different, widely used atmospheric circulation classifications: macroscale Grosswetterlagen, Litynski and Osuchowska-Klein as well as local ones by Niedzwiedz and by Ustrnul.

The final step was to create the compositive circulation index of extremes (CIE) which would inform about the potential possibility of particular extreme phenomena occurrence. The index was based on the conditional probability of a given weather extreme in particular circulation type definite according to considered classifications. The proposed atmospheric circulation index of a given phenomena is an arithmetic mean of conditional probabilities counted for particular types and classifications and all months.

As a result a catalogue of extremes favorable circulation indices was created for the whole period under consideration (1951-2010). Significant differences of extremes occurrence probability within particular types were proved.