

Air humidity conditions in the upper Vistula river basin (Southern Poland) in relation to atmospheric circulation patterns

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

(1) Jagiellonian University, Poland (agnieszka.wypych@uj.edu.pl), (2) Institute of Meteorology and Water Management – National Research Institute, Poland (zbigniew.ustrnul@imgw.pl)

Air humidity, describing the amount of water vapour in the atmosphere, is an element which plays important roles among the meteorological processes which are taking place within the atmosphere. Research studies based on the variability of atmospheric circulation confirmed the strong correlation between global circulation indices above Europe and the Northern Atlantic and the air temperature as well as between regional circulation and the air temperature and precipitation. These results allow expecting that the variability of circulation indices has an influence also on humidity conditions however the body of research examining it is lacking.

The principal goal of this study is to examine the global and regional atmospheric circulation conditionings of air humidity differentiation and its long-term variability in the upper Vistula river basin (Southern Poland). The research was based on data for the period 1951–2010 coming from 10 meteorological stations. The annual differentiation as well as long-term variability of air humidity in relation to atmospheric circulation patterns was examined by analysis of specific air humidity (SH) and saturation deficit (SD) values. Simultaneously different five circulation type classifications (Grosswetterlagen, Grosswetterlagen - objective, by Osuchowska-Klein, Litynski, Niedzwiedz, Ustrnul) have been applied. Additionally also some circulation indices including zonal ones were used.

Analysis conducted to confirm the impact of global atmospheric circulation (zonal circulation above all) and the regional circulation over Southern Poland on humidity conditions showed the significant but not very strong relationship. Specified synoptic situations affect both low and high air humidity conditions, seasonally-dependent. The analysis of correlation of independent synoptic pattern classifications proved that regarding the circulation factor the scale of the study seems to be relevant.