



## **Air masses typology for the territory of Poland – methodological approach**

Michał Rozycki (1), Bogdan Bochenek (2), Zbigniew Ustrnul (2), and Agnieszka Wypych (2)

(1) Jagiellonian University, Krakow, Poland, (2) Institute of Meteorology and Water Management - National Research Institute, Krakow, Poland

The problem of air mass' types evaluation has been widely discussed for last few decades. However, there is still no satisfying method to make an objective choice of the proper air mass type in local and regional scales. Today, in the most typical cases, air mass is evaluated subjectively, based on the expert's knowledge. Surely, that approach is highly exposed on human mistake possibility. Another disadvantage is the fact that every dataset has to be checked manually, so the necessity to develop objective methods appears indisputable and urgent.

The methods of artificial intelligence, especially artificial neural networks, because of their ability to non-linear calculations, in last few decades have become one of the most often used way of modeling in many research areas. However, their capabilities in meteorological studies, with high complexity level, still remains not fully utilized. In spite of the fact, that the determination of air mass types over given area requires advanced numerical calculation, the results achieved in this way remain questionable and relatively uneasy to reach. Using the methods of artificial intelligence for this purpose can significantly buoy up the quality of matching.

The main aim of the research was to distinguish the type of the air mass in given measuring point based on essential meteorological data: temperature, wind speed and direction, sea level pressure, cloudiness and several others, with the usage of artificial neural networks with various parameters. Data from years 1966-2010 from Poland (synoptic stations) were divided to training and testing datasets. Calculations were proceeded on Statistica Neural Network toolbox.

With the help of sensitivity matrix climatological parameters which have the highest influence on the final air mass types selection were indicated. The influence of the enhancement function was also examined. The most popular functions were checked: linear, logistic, hyperbolic tangents, exponential and sine.

All the results were verified using relevant synoptic charts and manual classification for Poland carried out by Niedźwiedź. The compatibility between the results of self-operated and manual procedure was obtained in more than 50% of cases in general, regionally differentiated.