



## **Synoptic conditions of extremely high reference evapotranspiration values in Poland (1971-2010)**

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Extreme evapotranspiration can negatively affect crop yields. Normally, low humidity and high net radiation offer the possibility of occurrence of high evapotranspiration values. Our main purposes were (1) to show synoptic patterns on days with high evapotranspiration in Poland and (2) to determine the source area of air masses offering conditions for high evapotranspiration in Poland.

A 40-year long set of daily Penman-Monteith reference evapotranspiration data (years: 1971-2010) from seven stations corresponding to different regions in Poland was used to find days with extreme evapotranspiration. To indicate extremely high values we used 95th and 99th percentiles as thresholds. Mann-Kendall test and Sen's slope estimate were applied to examine trends in the number of days with extreme evapotranspiration. The further analysis was limited to days when high evapotranspiration values were recorded at least at five stations. For such days, synoptic charts were created on the basis of sea level pressure (SLP) records from NCEP/NCAR reanalysis. Maps of 500 hPa geopotential heights were constructed as well. In addition, back trajectories were calculated by means of HYSPLIT model to indicate the source area of air masses which occupied the area of Poland on days with extreme evapotranspiration.

The highest 95th and 99th percentile values occurred in the central part of Poland (Poznań), whereas the lowest values were recorded at seaside station (Kołobrzeg). The average number of days with high evapotranspiration values for all the investigated stations increased (0.058 day/year,  $p < 0.01$ ). However, the trends were not statistically significant at Suwałki, Sulejów and Kołobrzeg. During days with extremely high evapotranspiration the high pressure center was located over Lithuania and Belarus. This pressure pattern determined the air motion from the east and southeast to Poland.

This kind of analysis can provide valuable information to interpret high evapotranspiration events. It could be also helpful in forecasting evapotranspiration, as appropriate pressure pattern is closely connected with the occurrence of high evapotranspiration in summer months.