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Thermal conditions and oscillation patterns in the region of Central Europe in years 1918-2010

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On the basis of data from the years 1981-2010 taken from the territory of the south-eastern part of the European late glacial area, with distinct characteristics determining the local climate, the distribution of air temperature values, the tendency for their changes, and the impact of global circulation factors in the form of correlation with values of the NAO (North Atlantic Oscillation) Index were determined.
During the 30-year period under analysis, annual temperatures rose every decade in all locations, with differences between the first and last decade of the period being similar in the entire area and amounting to 0.6-0.8oC. In the space of the area under analysis, temperatures clearly decreased on the West – East axis. The dependence of temperature changes in the scale of time, which actually means following the global warming trend in the region, was low, and the process itself can be defined as depending on the lapse of time only within the limits of approx. 15% (from the value of the r-square coefficient). Statistically important time tendencies for changes in the annual temperature ranged from 0.036 to 0.41oC. Unlike in the global scale, only three out of the ten warmest years occurred in the last decade of the period. Thus, the region remains largely resistant towards occurring changes of the Earth's climate. Minimum annual temperatures were characterised by a systematic increase over successive decades. In the first decade of the 30-year period, minimum averages ranged from 2.4 to 4.1oC; in the third decade, they ranged from 2.9 to 5.2oC. Maximum temperatures were also increasingly higher in the annual scale in each successive decade, with the absence of a clear statistical tendency on a year-to-year basis. In spite of the evident regional impacts on the air temperature values, the dominant teleconnection leading effect became apparent. In the cold season of the year, from December till March, a clear and significant relationship between average and extreme temperature values and values of the NAO index (the correlation coefficient ranged from 0.56 in March to 0.72 in January) became apparent in all measurement points. The positive values of this index related to the movement of mild and humid air masses from over the Atlantic to the territory of Central Europe resulted in higher air temperatures. When the western air flow became weaker, the temperatures of the winter period were remarkably lower. During the warm period of the year such a dependence did not occur.