



„Cold” and „Hot” thermal anomalies/events during spring and autumn in Poland

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Regular air temperatures' changes, as an effect of succession of the seasons, are a part of people's everyday life. When winters and summers are not characterised by extreme thermal conditions, people are well prepared and there are no losses for agriculture and economy or human health consequences observed. A similar situation takes place in case of typical springs and autumns, where normally no too low or too high air temperatures occur. The situation becomes totally different when the air temperature significantly exceeds frames of typical temperature for particular months or seasons. Appearance of winter conditions during months in which they are not expected may lead to losses in different branches of the economy e.g. transport or agriculture. Heat in non-summer months potentially brings less damages for the economy, but it might be a great threat for human health, especially for those with cardiological diseases, and it may result in thermal discomfort. If these conditions last for sufficient period of time, they may cause disorders in plant vegetation cycles. One element of the discussion held on the global warming which has been observed since the half of the twentieth century, is the question of how this effects the occurrence of climatic anomalies. Does it result in an decrease of "cold" thermal anomalies and in an increase of frequency of "hot" anomalies? Or does it increase the occurrence of both types of these events?

In this research there will be performed an analysis of the occurrence of conditions typical for winter months, outside the climatic winter (December, January, February) at ten locations in the area of Poland. During the months directly close to this period (November and March) the threshold for winter conditions will be maximum temperature below 0 oC which means occurrence of frost all day long. For other non-summer months the threshold will be mean daily temperature below 0 oC meaning low temperatures during the day, not only morning frosts. A similar procedure will be used for summer conditions outside the climatic summer (June, July, August), where for months close to climatic summer (May and September) the thresholds will be set at maximum temperature higher than 30 oC and 25 oC for other spring and autumn months.

In order to assess if, and to what extent, the occurrence of anomalies and rare thermal events changes, their number will be compared in three sub-periods: 1951-1980; 1961-1990; 1991-2013 (the period after 1990, where warming in Poland is observed). The final stage of the analysis will be detection of trend of anomalies calculated for ten meteorological stations in the multi-year period of 1951-2013, using statistical tests in time series.