

УДК 551.583

HEAT WAVES IN THE COLD SEASON:
STUDY OF THE PROBLEM, REVIEW OF RESEARCH METHODS

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The paper presents the results of a comprehensive comparative analysis regarding the historical development, modern definitions, and quantification methods of heat waves during the cold season of the year. The key theoretical approaches to identifying extreme temperature phenomena, formed within the framework of climatological, medico-biological, and socio-ecological research directions, are thoroughly considered. The study summarizes the extensive experience of applying various statistical criteria – ranging from absolute deviations and standard anomaly indices to modern percentile-based methods – within the synoptic practice of the CIS countries, the Belarusian meteorological school, and the official recommendations of the WMO. Special attention is paid to the regional ecological and economic consequences of winter warming in Belarus, where sharp temperature transitions above zero degrees disrupt snow cover stability, damage winter crops, complicate ground and air transport operations through dense fog and black ice, and increase public health risks, particularly regarding cardiovascular diseases. The study revealed a significant variability in methodological standards, which often leads to substantial discrepancies in assessing the frequency, duration, and territorial extent of extreme climatic events. Based on the detailed analysis of the Belarusian meteorological observation network, which includes 54 stations, the paper establishes that the most informative and contextually appropriate parameter for monitoring winter heat waves is the daily maximum temperature exceeding the 90th percentile, calculated individually for each month of the cold season from November to March. The authors propose a specific threshold framework, where a winter heat wave is identified when this percentile level is exceeded for 3 or more consecutive days. Implementing this unified methodology provides a scientifically sound basis for developing targeted climate change adaptation strategies, optimizing agricultural planning, and reinforcing regional public safety measures in accordance with the international commitments under the Paris Agreement.

<https://doi.org/10.46991/PYSUC.2026.SI1.022>

Keywords: heat waves, cold season, climate change, percentile, monitoring.

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