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ANALYZING THE IMPORTANCE OF CUT-OFF LOWS IN THE OCCURRENCE OF HIGH PRECIPITATION AMOUNTS IN ROMANIA

Abstract

The observation of precipitation processes is essential for hydrological and meteorological studies, particularly in Romania where the wettest month is June with mean monthly precipitation exceeding 200 mm in high terrain regions. The orographic convection contributes significantly to this phenomenon, generating convective systems that result in high precipitation amounts within a short period. The cut-off lows (COLs) represent the most important aero-synoptic feature that increases precipitation amounts in the first month of summer at a continental scale. COLs refer to pockets of cold air detached from the polar vortex, and their formation results from a weakening of the polar jet stream due to the powerful heating at high latitudes that contribute to a meridional circulation. This study focuses on the synoptic and mesoscale features that resulted in high precipitation amounts in counties from the Moldova region of Romania, such as Vaslui, Iai, Botoani, or Neam, between the 27th and 30th of June 2018. The research highlights the importance of investigating COLs, which may become more frequent due to the weakening of the polar vortex and, implicitly, the polar jet stream caused by climate change. As a result, this can lead to a predominantly negative phase of the Arctic Oscillation (AO), which contributes to a higher number of COLs. Additionally, this phenomenon could occur in the cold semester and result in a higher frequency of episodes with high amounts of precipitation and other severe weather phenomena at lower latitudes during the warm season. In summary, this study emphasizes the importance of understanding the synoptic and mesoscale features that lead to high amounts of precipitation, especially in regions susceptible to severe weather phenomena such as Romania's high terrain regions. The findings also highlight the significance of investigating the impact of climate change on the frequency and severity of COLs and their subsequent effects on precipitation and other severe weather phenomena.