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Heavy rain forecasts in mesoscale convective system in July 2016 in Belarus

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During the last decade, the frequency of severe weather phenomena, such as heavy precipitation, hail and squalls, over Europe is observed to increase, which is attributed to climate change in the region. Such hazardous weather events over the territory of Belarus every year, having significant economic and social effects.
Of special interest for further studies are mesoscale convective systems, which can be described as long-lived cloud complexes including groups of cumulonimbus clouds and squall lines. Passage of such systems is accompanied with intense thunderstorms, showers and squally wind.
In this study, we investigate a case of Mesoscale Convective System (MCS) passage over the territory of Belarus, which occurred 13 July 2016. During this Mesoscale Convective Complex passage, heavy precipitation (up to 43 mm), squally winds and intense thunderstorms have been observed.
Another feature of this MCS was the hook-shaped weather radar signature known as a “hook echo”, seen on the Doppler weather radar Minsk-2. Tornadoes and powerful mesocyclones are often characterized by the presence of a hook echo on radar.
Also we have performed simulations of the convective complex passage with the WRF-ARW mesoscale atmospheric modelling system using 6 different microphysics parameterizations. Our main objectives are to study the conditions of this Mesoscale Convective Systems (MCSs) development, to consider the microphysical structure of clouds in the MCS, and to identify which microphysics package provides the best forecast of precipitation for this case of MCS in terms of its geographical distribution and precipitation amount in towns and cities where highest levels of precipitation have been observed. We present analysis of microphysical structure of this MCS along with evaluation of precipitation forecasts obtained with different microphysics parametrizations as compared to real observational data. In particular, we may note that results of almost all microphysics simulations indicate underestimation of precipitation areas in the region of interest.