



Investigation of the cold drops in the European area, study based on ERA Interim and ECMWF ensemble model

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We aimed to analyze the cold drops and the upper level lows formed in the middle troposphere - which are often difficult to be predicted - by means of the statistical methods and case studies. Cold drops are often followed by intensive events such as heavy rainfall, rainstorm, at times tubas and non mesocyclonical tornadoes. Due to the above mentioned events and the incentive of Aviation and Severe Weather Forecasting Division at Hungarian Meteorological Service, the phenomenon was analyzed in a complex way by a self-developed multiple method.

Upper-Level Lows (ULL-s) are closed; cyclonically circulating eddies isolated from the main western stream in the middle and upper troposphere. They are also sometimes called „cold drops” because the air within an Upper Level low is colder than in its surroundings. The cold air within usually does not show up on the surface, meaning the vertical temperature gradient is high, which in turn causes instability and heavy storms, especially during the summer. An ULL-s diameter is about a couple hundred km-s, so it looks like a miniature cyclone.

ERA INTERIM is the current state of reanalysis that is still in development. It also has the best possible spatial resolution, which leads to its usage in a wide area of fields. Our studies focused mainly on the cold drops' statistics and meteorology, as well as a few case studies. Since ULL's occur rarely, we developed a new ULL-recognition process to increase the number of samples available.

First of all, we gathered 70days when cold drops occurred in the past 10 years. Then we analyzed them in 6-hour periods, for a total of 280 separate time periods. Finally, we have four main case studies in the paper. In the future, we would like to run further tests with our ULL-recognition algorithm to study the last 30 years of cold drops, and we would also like to experiment more with ULL forecasting as well.