



ERA-Interim based analysis of persistent cold air pools over the Carpathian Basin

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A persistent cold air pool (PCAP) is a winter-time, anticyclone-related weather event over a relatively large basin. During this time the air is colder near the surface than aloft. This inversion near the surface can last for weeks. As the cold air cools down, relative humidity increases and fog forms. The entire life cycle of a PCAP depends on the large scale circulation pattern. PCAP usually appears when an anticyclone builds up after a cold front passed over the examined basin, and it is usually destroyed by a coming strong cold front of another midlatitude cyclone. Moreover, the intensity of anticyclone affects the intensity of the PCAP.

PCAP may result in different socio-economic hazards: (1) Temperature inversion in the surface layers together with weak wind may lead to severe air pollution causing health problems for many people, especially, elderly and children. (2) The fog and/or smog during chilly weather conditions often results in freezing rain. Both fog and freezing rain can distract transportation and electricity supply.

Unfortunately, numerical weather prediction models have difficulties to predict PCAP formation and destruction. One of the reasons is that PCAP is not defined objectively with a simple formula, which could easily be applied to the numerical output data. However, according to some recommendations from the synoptic literature, the shallow convective potential energy (SCPE) can be used to mathematically describe PCAP.

In this study, the ERA-Interim reanalysis dataset is used to examine this very specific weather event (i.e. PCAP) over the Carpathian Basin. This dataset has certainly finer temporal and spatial resolution than radiosonde and synoptic measurements, which predestinates it clearly more appropriate for such a synoptic analysis. The reanalysis is objectively compared to measurements to demonstrate its suitability for examining PCAPs and validating regional climate models. After that the spatial and temporal characteristics of climatological elements (e.g. mean sea level pressure) and some PCAP specific variables (e.g. SCPE) are examined.