Geophysical Research Abstracts
Vol. 18, EGU2016-2928, 2016
EGU General Assembly 2016

Synoptic climatological analysis of persistent cold air pools over the Carpathian Basin

Karolina Szabóné André, Judit Bartholy, and Rita Pongrácz
Dept. of Meteorology Eötvös Loránd University, Budapest, Hungary (karol@nimbus.elte.hu)

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 even 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 destructed by a coming strong cold front of another midlatitude cyclone. Moreover, the intensity of the anticyclone affects the intensity of the PCAP.
PCAP may result in different hazards for the population: (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, the 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 be easily 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, we used the ERA-Interim reanalysis datasets to examine this very specific weather event (i.e. PCAP) over the Carpathian Basin. The connection between the mean sea level pressure and some PCAP measures (e.g., SCPE, energy deficit, etc.) is evaluated. For instance, we used logistic regression to identify PCAP periods over the Carpathian Basin. Then, further statistical analysis includes the evaluation of the length and intensity of these PCAP periods.