



Synoptic-dynamic causes of rain floods in the Czech Republic

Marek Kaspar (1) and Miloslav Müller (1,2)

(1) Institute of Atmospheric Physics, Department of Meteorology, Prague, Czech Republic (kaspar@ufa.cas.cz / +420272763745), (2) Charles University, Faculty of Science, Prague, Czech Republic

Central European countries repeatedly experience heavy, widespread and steady rains that produce floods in the major rivers. An array of studies has confirmed the close relationship between heavy rains and synoptic-dynamic conditions. One of the methods how to analyze the conditions is to quantify the strength of the anomalies of selected meteorological variables in specific regions. The presented study applies this method to ERA-40 reanalyses with the horizontal resolution of 2.5 to describe and compare synoptic-dynamic causes of significant rain floods in the major rivers in the Czech Republic in the period of 1958–2002.

In the first step, we compiled the 26 most significant flood events taking into account both the aggregate area of affected catchments and the return period of peak flows. In the next step, we defined a set of dynamic and thermodynamic variables which typically reached statistically outlying values relatively to their climatology in specific sub-areas over Europe and the Northern Atlantic for the duration of the events. We quantified the strength of such anomalies using the values of distribution function. We further considered only the variables which are linearly independent and sufficiently fluctuating in the strength of anomalies across the events. The comparison of individual events in view of the strength of anomalies indicates that they tend to cluster into groups with similar synoptic-dynamic conditions. The most important clusters are presented and discussed in terms of synoptic-dynamic meteorology.