



## **Time Variations of the Relationships between Circulation Variability Modes and European Temperature and Precipitation throughout the Year**

Romana Beranová (1,2), Radan Huth (1)

(1) Institute of Atmospheric Physics, Prague, Czech Republic

(rber@ufa.cas.cz / Phone: +420 272016069)

(2) Dept. of Meteorology and Environment Protection, Charles University, Prague, Czech Republic

We expand upon our previous study dealing with non-stationarity of the effects of the large-scale modes of circulation variability on European temperature and precipitation in winter. Rotated principal component analysis is used to identify circulation variability modes in monthly mean 500 hPa heights, separately in individual seasons (DJF, MAM, etc.). Modes are defined on the data over the whole Northern Hemisphere (north of 20°N), and only the modes over the Euro-Atlantic sector are considered. 4 such modes are identified in all seasons. The time variations of the effects of the atmospheric modes on temperature and precipitation at more than a hundred of European stations are examined for the period 1958-1998. The effects are quantified in terms of running correlations with a 15-year window. At the majority of stations, the correlations with circulation modes vary considerably in time both for temperature and precipitation. The spatial structure of the variations is assessed by cluster analysis of time courses of correlations. This, together with a composite analysis of modes in different periods, helps to understand the causes of the non-stationarity of correlations, which to a certain extent stem from the time variations in the position and intensity of the action centres of the modes. The support from the Grant Agency of the Czech Academy of Sciences (project A300420506) is acknowledged.