EMS Annual Meeting Abstracts
Vol. 15, EMS2018-752, 2018

The atmospheric circulation changes over the Northern Hemisphere during the 20th Century

Vladimír Piskala (1) and Radan Huth (1,2)

(1) Charles University, Faculty of Science, Prague 2, Czech Republic (vladimir.piskala@natur.cuni.cz), (2) Institute of Atmospheric Physics, Czech Academy of Sciences, Prague, Czech Republic

The Northern Hemisphere circulation has changed during the past century as many studies proved before. Our aim is to find out whether these changes are also evident in modes of low-frequency variability (i.e. teleconnections). The long-term reanalyses: 20th Century and ERA-20C, are employed to identify circulation changes in a period longer than 100 years according to reanalyses availability. Modes are detected by the varimax-rotated principle component analysis (PCA) of winter monthly mean 500 hPa geopotential heights. We use the moving PCA of 40 years periods with two years step which allows us to get more precise information about a geographical shift of modes. The number of leading modes were specified separately for each analysed period.

The intensity and even the position of all modes have been slightly changing during the 20th century. The NAO mode was the first leading mode in the late 19th and the early 20th century period. However, the highest differences occur mainly in changes of the PNA mode which is the first leading mode for the most part of the 20th century. In the early century period, the explained variance of this mode is significantly lower and centres are weaker. This is probably caused by lack of observed data over North America or Siberia which were assimilated to the reanalyses. The distribution of assimilated data in the early period of reanalyses can lead to preference of European modes. We hypothesize that the main detected changes are given by the different quality of assimilated data during each period.