



Spatial distribution and temporal evolution of distinct periodicities detected in NAO index

P. Pisoft

Department of Meteorology and Environment Protection, Faculty of Mathematics and Physics, Charles University, Czech Republic (petr.pisoft@mff.cuni.cz)

The presented study is focused on the spatial and temporal changes in distribution of distinct periodicities detected in NAO index, i.e. regular variations with periods of about 8 and 13 years. The periods are analyzed by the pseudo-2D wavelet transform (p2D-WT) in the NCEP/NCAR reanalyzed temperature fields at 17 geopotential levels from 1000 hPa to 10 hPa.

Wavelet analysis of the NAO index time series shows that there are present several significant oscillations with periods of 0.5, 1, 8+ and 13+ years (the sign plus implies that the periods are not set by one exact value but they are defined rather as a interval of periods with a mean values about 8 and 13 years). These periods or periods bands are also detected in many European secular temperature series. However a frequency analysis of those series provides a spatial limited information and it is not possible to use such a study to describe frequency parallels between NAO and geographically extensive fields of meteorological variable. To analyze and to describe worldwide spatial distribution and temporal evolution of the detected periodicities, it is necessary to apply an advance algorithm like pseudo-2D wavelet transform on reanalyzed global meteorological fields.

The results of the p2D-WT application show that the periods of about 8 and 13 years are distinct over large areas at every analyzed level. At lower heights (especially at 1000 hPa), the regions, where the periods were significant, are less compact and pronounced than the detected regions within higher geopotential levels (above 400 hPa). Vertical comparison of the achieved results shows that there are marked changes be-

tween particular levels but it is possible to point to several regions that are detected in most results. Typical regions for the analyzed periods intervals are the north polar regions, wide belt around equator and Pacific ocean.