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Atmospheric teleconnection patterns and eddy kinetic energy content:

wavelet analysis

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In this paper, we employ a non-decimated wavelet decomposition to analyse time variations of the teleconnection pattern indices /1/ and relationship of these variations with eddy kinetic energy contents (K_E) in the atmosphere of mid-latitudes and tropics. The advantage of using our decomposition of teleconnection pattern indices and eddy kinetic energy content is to isolate short- and long-term components while retaining the flexibility for variability in the cycle length. By using wavelet decomposition based on the non-decimated wavelet transform we reveal some basic periodicities for the North Atlantic Oscillation indices such as the 4-8-year cycle, which is characterised by the maximum of atmospheric pressure anomaly, and the natural change of dominant phase. These fluctuations are analysed together with the eddy kinetic energy contents in the mid-latitudes and tropics. Main results of such joint analysis can be briefly stated as follows:

i) if the phases of the North Atlantic and Southern Oscillations vary synchronously with the 4-8-year period then the relationship between the variations of the NAO indices and the K_E contents is the most appreciable. In the converse case, if above oscillations is at antiphase then the correlation coefficient NAO-$K_{E,ml}$ is unessential and the correlation coefficient NAO-$K_{E,tr}$ varies incidentally. Thus we may assume that there exists the influence not only of the North Atlantic Oscillation but also of the Southern Oscillation on the eddy kinetic energy content;

ii) if the NAO phase tends to abrupt changes then the impact of these variations on the eddy kinetic energy contents in both mid-latitudes and tropics is more significant than for the durational dominance of certain phase.

Hence we can consider that method used here allows to identify prominent physical behaviours of large-scale atmospheric dynamics and to reveal the detailed characteristics of dominant teleconnection patterns.

/1/ A.Glushkov, V.Khokhlov, T.Tsenenko, 2004, Nonlinear Proc. in Geophys. 11, 295; 2005 Atm.Res., in print; J. Hydrology, in print; Climat in Past, in print;