Influence of the space factor and oscillation in the Earth atmosphere on the total ozone content: Altitude and latitude variations

N. Loboda (1) , V. Khokhlov (1) and I. Tsenenko (1)

(1) University of Odessa, Odessa, Ukraine (loboda@paco.net / Fax: +380 482-637227)

Paper is devoted to detailed analysis and estimating an influence of the space factor and oscillation in the Earth atmosphere on the total ozone content. To reveal the reasons for the low-frequency variations of total ozone at the Southern mid-latitudes and tropics, the joint wavelet analysis of the Antarctic Oscillation Index and total ozone is carried out by using the non-decimated wavelet transform (Loboda et al, 2004, 2005) Since the new reanalysis data was appeared (Kistler *et al.*, 2001), an opportunity offered for investigating the dynamics of atmospheric processes in the Southern Hemisphere as a whole and over the Antarctic in particular. However, most reliable data to the south of 50^oS exists since the 1979 only when satellites were used to obtain various meteorological data. In spite of the fact that the NCEP-NCAR reanalysis covers the period starting with the 1948, the usefulness of Antarctic analysis in the NCEP-NCAR reanalysis before the satellite era is very questioned (Marshall, 2002). The advantage of using wavelet decomposition is to isolate short- and long-term components while retaining the flexibility for variability in the cycle length. Also, in addition to the revealed periodicities, this technique allows to observe the dynamic relationship between the variations of the AAO index and total ozone at the different latitudes of the Southern Hemisphere. Main findings can be shortly stated as following. The analysis shows that the cycles of the Antarctic Oscillation with periods of 5.5, 3-4, 2-3, and 1 year have greatest wavelet power. The positive correlation dependence between the 5.5-year period of the Antarctic Oscillation Index and the mid-latitude total ozone is disclosed. On the contrary, the negative correlation is registered for the variations with the 2-3-year period of the Antarctic Oscillation Index and the tropical total ozone.

References:

Glushkov, A.V, Loboda N.S., etal, 2004. Atmospheric teleconnection patterns and eddy kinetic energy content: wavelet analysis. *Nonlin. Proc. Geophys.* 11: 295-301; 2005 Atm.Res., in print;

Loboda N., Glushkov A.V., Khokhlov V.N., Non-decimated wave-let decomposition to analysing time variations of the atmospheric teleconnection patterns and eddy kinetic energy content, *J. Hydrology,* in print; *Climat in Past*, in print;

Kistler, R., Kalnay, E., Collins, W., Saha, S., White, G., Woollen, J., Chelliah, M.,

Ebisuzaki, W., Kanamitsu, M., Kousky, V., van den Dool, H., Jenne, R. & Fiorino, M. 2001. The NCEP-NCAR 50-year reanalysis: monthly means CD-ROM and documentation. *Bull. Amer. Meteor. Soc.* 82: 247-267.

Marshall, G.J. 2002. Trends in Antarctic geopotential height and temperature: A comparison between radiosonde and NCEP-NCAR reanalysis data. *J. Climate* 15: 659-674.