

## ATMOSPHERIC EXTRATROPICAL VORTICES: CYCLONE-ANTICYCLONE ASYMMETRY

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Relationships between extratropical cyclones and anticyclones in the Northern Hemisphere are analyzed with the use of the NCEP/NCAR reanalysis data for the period 1948-2012. The characteristics of extratropical cyclones and anticyclones are determined similar to (Akperov et al., 2007; Akperov and Mokhov, 2013).

Figure 1 shows interannual variations for relation ( $N_c/N_{ac}$ ) of the cyclones number  $N_c$  to the anticyclones number  $N_{ac}$  during 1948-2012 in winter, summer and for annual means. According to Fig. 1 the  $N_c/N_{ac}$  relation is larger for summer than that for winter.

Similar cyclone-anticyclone asymmetry is characteristic for the total duration of extratropical cyclones ( $N\tau)_c$  and anticyclones ( $N\tau)_{ac}$  or for their frequency (see also Mokhov et al., 1992)

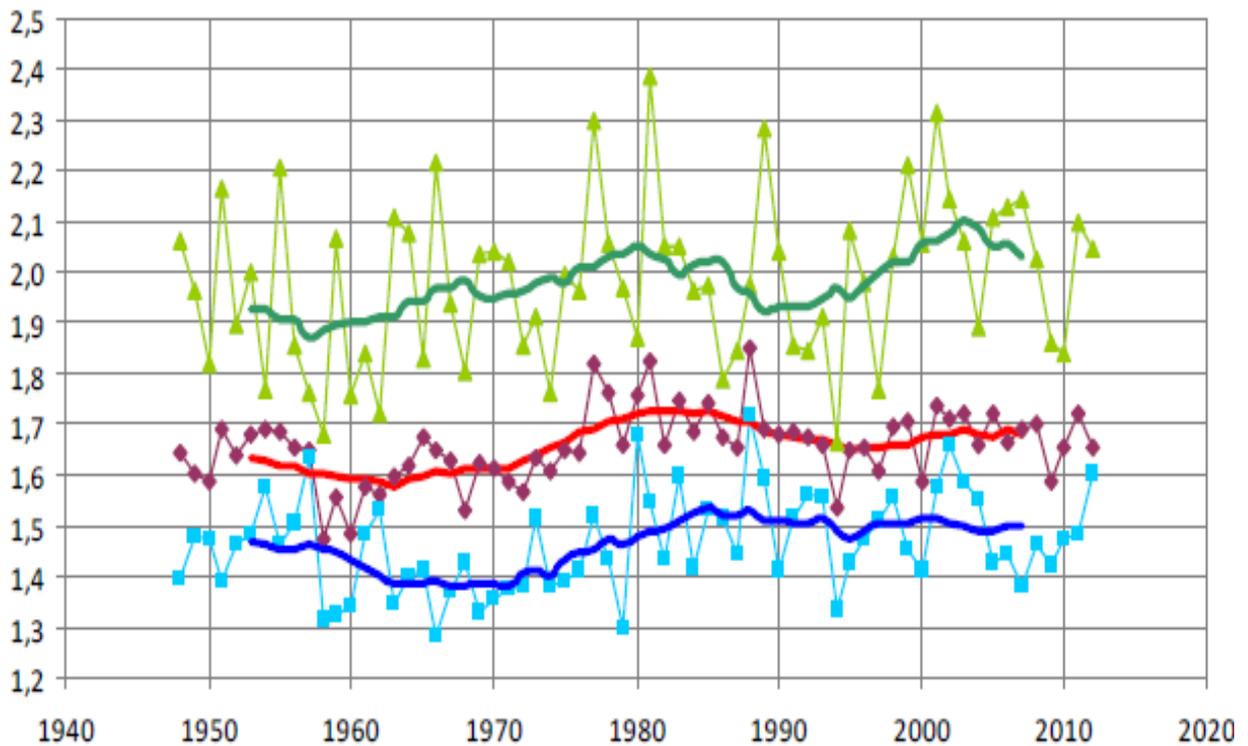


Figure 1. Interannual variations for relation of the cyclones number to the anticyclones number during 1948-2012 in winter (blue curves), summer (green curves) and for annual means (red curves). Bold curves are corresponding variations with the 11-years moving averaging.

Figure 2 illustrates the relationship between the annual-mean total duration of extratropical cyclones ( $N\tau)_c$  and anticyclones ( $N\tau)_{ac}$  with different life times (from 1 day to 13 days) obtained from reanalysis data for two periods (1948-1977 and 1983-2012). Similar dependencies were obtained for different seasons.

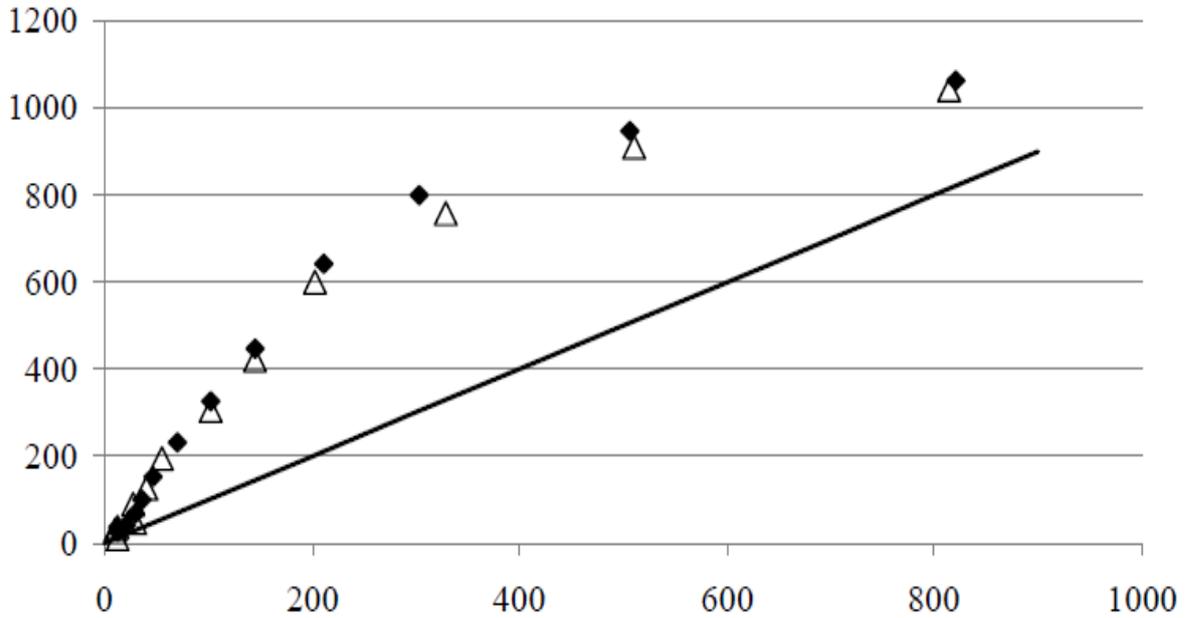


Figure 2. Relationship between the annual-mean total duration of extratropical cyclones  $(N\tau)_c$  (ordinate) and anticyclones  $(N\tau)_{ac}$  (abscissa) with different life times obtained from reanalysis data for two periods: 1948-1977 ( $\Delta$ ) and 1983-2012 ( $\blacklozenge$ ). Straight line corresponds to the equality of  $(N\tau)_c$  and  $(N\tau)_{ac}$ .

According to Fig. 2 the relationship of  $(N\tau)_c$  and  $(N\tau)_{ac}$  is nonlinear. The cyclone-anticyclone asymmetry for the frequency of cyclones and anticyclones is the most pronounced for vortices with intermediate values of frequency or total duration.

## References

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