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 (\(\bullet\)). 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

