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The estimation of dynamical efficiency of vortex movements under the formation of regime of zonal and meridional circulation of midlatitude middle atmosphere

Fahrutdinova A., El'kin A.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

For the construction of circulation model of the middle Earth atmosphere it is necessary the estimation of dynamical efficiency of vortex movements, which depends on the nature of the movements and on characteristic of their interaction with the background wind. As the parameter of efficiency of vortex flows the ratio of the intermonth dispersion of the diurnal values of the wind velocity to the sum of the square of the wind velocity and the intermonth dispersion of the diurnal values of the wind velocity for the zonal and meridional circulations was used: $KU = \sigma U^2 / U^2 + \sigma U^2$ and $KV = \sigma V^2 / V^2 + \sigma V^2$. The estimations of K in depending on height in the field of zonal and meridional wind in the height interval 0-55 km (using the data archive BADC UKMO for the period 1993-2003) and 80-100 km (by the wind velocity measurements carried out on meteor radar of Kazan State University for the period 1986-2002) were obtained. The estimations were obtained in the local approach for the Kazan's region (56N, 49E). The results of the computation demonstrate the decreasing of the parameter of interaction efficiency with the increasing of height in the height interval 10-50 km which is the most evident in the field of meridional circulation. On the heights of the mesosphere - lower thermosphere the parameter K on average of the investigated period in the field of zonal and meridional circulation has the values which are greater than ones on the heights of stratosphere. This speciality is the most evident in the field of meridional wind what indicates on the greater contribution of vortex movements while the formation of meridional circulation in comparison with the zonal one.

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Keywords

Dynamical efficiency, Height structure, Vortex movements, Zonal and meridional circulation