Rotational effects in the field of tidal wind of the mid-latitude MLT-Region

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Abstract

Investigation of non-linear effects in the approach of quadratic coupling of tidal motions and planetary waves with taking into consideration their polarization properties was carried out. The investigation was based on the wind observations performed by meteor radar station of Kazan State University (Russia, Kazan, 56N, 49E) in the MLT-region (80-100km) during 1998-1999 years. A complex approach is used to analyze non-linear interactions. It includes calculation of rotational autospectra of vectorial time series in the representation as complex u+i*v, where u and v is zonal and meridional winds correspondingly and 'i' is a complex unit. Autoregressive spectra show a stable clockwise rotation of the resulting vector of the tidal winds, quasi 2-day and quasi 4-day waves in spite of the presence of modulating effects by planetary waves at heights of the MLT-region. The spectral analysis of vectorial time series for tidal winds reveals side frequencies. These side frequencies appear as result of interactions of tides and quasi-2 day and quasi 4-day planetary waves and correspond to the interaction with consideration of their polarization properties. © 2003 COSPAR. Published by Elsevier Ltd. All rights reserved.