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Coherence of temporal variations (2-30 days) in the wind field of the midlatitude middle atmosphere of the Earth

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Abstract

Current work is dedicated to the investigation of the coherency between wave processes at heights of lower and middle atmospheres of the Earth in the field of background circulation. In this work the comparison between temporal variations of the wind velocity on heights of the mesosphere - lower thermosphere (MLT) and on heights of the troposphere and the stratosphere is accomplished. For analysis we used data of wind measurements accomplished during 1986-2004 at meteor radar of Kazan University (56N, 49E). Also we used data of BADC UK MO1 containing wind velocity in nodes of the longitudinal - latitudinal grid (96×72). Data of BADC UK MO are exposed to the spatial filtering. This allowed time series of complex amplitude of spatial waves with wave numbers 1-8. Performed analysis of wind data by the coherency spectra between this time series and time series of the wind velocity for heights of MLT allowed the detection of wave trains with specific periods close to Rossby waves (2, 5, 10 days) and to long-period waves (15-30 days) with significant coherency between variation on different height levels. Height profiles of the coherency phase showed the propagation direction and vertical wave length of the corresponding wave trains. The work has been performed under the support of Ministry of Education of Russian Federation, grant A03-2.13-513.

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Keywords

Coherency, Middle atmosphere, Planetary waves