

Thermodynamic Parameter Variations in the Troposphere and Stratosphere in 1979-2016

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Abstract

© Published under licence by IOP Publishing Ltd. Changes in the air temperature, ozone mass mixing ratio, and characteristics of wave activity on 26 levels in the tropo-stratosphere during 1979-2016 are discussed. Reanalysis data ERA-Interim and indices of atmospheric circulation are used as initial data. Vertical profiles of the coefficient of slope in a linear temperature trend are built. The vertical correlations between the levels are estimated. The differences in the thermal regime and ozone mass mixing ratio in three sectors of the Northern Hemisphere: Atlantic-European, Asia-Pacific, and American are shown. A credible correlation between the wave activity in the stratosphere and the atmospheric circulation indices (AO, QBO-50) has been obtained.

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References

- [1] Vargin P, Volodin E, A., Karpechko A and Pogoreltzev A V 2015 Arctic Oscillation and its impact on temperature and precipitations in the Northern Eurasia in the XX century Herald of the Russian Academy of Science 85 39-6
- [2] Guryanov V V, Eliseev A V, Mokhov I I and Perevedentsev Y P 2018 Arctic Oscillation and its impact on temperature and precipitations in the Northern Eurasia in the XX century Izvestiya - Atmospheric and Ocean Physics 54 114-26
- [3] Kokin G A and Gaygerov S S 1981 Meteorology of the Earth's upper atmosphere (Leningrad: Hydrometeoizdat Press) 270
- [4] Dee D P, Uppala S M, Simmons A J et al 2011 The ERAInterim reanalysis: configuration and performance of the data assimilation system Q.J. Roy. Meteorol. Soc. 137 553-97
- [5] Hayashi Y A 1971 A generalized method of resolving disturbances into progressive and retrogressive waves by space Fourier and time cross-spectral Analyses J. Meteorol. Soc. Japan. 49 125-28
- [6] Perevedentsev Y P and Shantalinskii K M 2014 Estimation of contemporary observed variations of air temperature and wind speed in the troposphere of the Northern Hemisphere Russian Meteorology and Hydrology 39 650-59
- [7] Perevedentsev Y P, Vasilev A A, Shantalinskii K M and Guryanov V V 2017 Long-term variations in surface air pressure and surface air temperature in the northern hemisphere mid-latitudes Russian Meteorology and Hydrology 42 461-70
- [8] Fahrutdinova A N, Guryanov V V, Korotyshkin D V, Manson A H, Meek C E, Jacobi C and Kurschner D 2003 Longitudinal variability of the zonal and meridional circulation and the intensity of planetary waves in the lower and middle atmosphere Adv. Space Res. 32 1759-64
- [9] Guryanov V V and Fahrutdinova A N 2009 Height and time variability of planetary wave activity Adv. Space Res. 43 401-12
- [10] Guryanov V V and Fahrutdinova A N 2014 Height-latitude structure of stationary planetary waves in the stratosphere and lower mesosphere Adv. Space Res. 53 674-88