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Diurnal variations in integrated water vapor derived from a GPS ground network in the Volga-Ural region of Russia

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Abstract

© Author(s) 2017. In this article, we present estimates of diurnal and semidiurnal harmonics of variations in integrated water vapor content (IWV) according to data from 16 GPS stations in the Volga-Ural region of Russia during 2013-2015. Amplitudes of diurnal harmonics are maximal in summer and reach values from 0.37 to 1.01ĝ€mm. Time at the maximum of diurnal harmonic is typically in the period from 14:00 to 17:00. Semidiurnal harmonics have the largest amplitudes in spring and autumn, but they do not exceed 0.19ĝ€mm. A comparison of the diurnal cycle from GPS data and ERA-Interim reanalysis has revealed significant differences in the phase. It is established that, as a result of evaporation from the underlying surface and convective lifting of moist air, the summer diurnal variations in IWV and surface density of water vapor are in antiphase. The diurnal cycle of IWV is determined by surface air temperature to be 88ĝ€% in summer and less than at 35ĝ€% in other seasons. It is noted that maximal amplitudes of diurnal harmonic of IWV are observed at stations located on the windward side of mountains.

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