AN EMISSION LAYER AS A GRAVITY WAVE DETECTOR

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A three-dimensional model is used to investigate the relations between parameters of atmospheric gravity waves (GW) and the spatial structure of O_2 atmospheric (0,0) nightglow wave perturbations observed from space. The “observed” amplitudes of the airglow perturbations induced by GWs are simulated for different slant lines of sight. It is shown that “observed” perturbations may be divided into the linear and nonlinear parts. The linear perturbations appear as wavelet signatures observed at certain view directions. The nonlinear part of the perturbations causes an increase in all sky brightness of the O_2 atmospheric (0,0) nightglow. The model shows that at certain view directions the waves, whose vertical wavelength is smaller than thickness of the emission layer, may be successfully registered, i.e. the cancellation effect for waves passing through the emission layer disappears. The latter gives the opportunity to create the complete set of functions that may be used for the spectral decomposition of “observed” brightness field. The obtained spectrum may be interpreted in terms of the Fourier coefficients of 3D decomposition of the temperature fluctuations induced by GWs just near the emission layer.

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