

Modeling of mesospheric airglow layers response to gravity waves (freely propagating and damped)

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Modeling of the $O(^1S)$ airglow layer response to gravity waves was carried out and combined with previous modeling of O_2 and OH layers to derive dynamical parameters of the three mesospheric airglow layers. The cancellation factor was computed for various vertical wavelengths and damping factors and a comparison was performed among the three layers. The simulations show that the centroid height of the variance in brightness of $O(^1S)$, due to waves, is lower (and thinner) than the emission layer itself. This finding is similar to that found earlier for O_2 and OH layers. The phase and amplitude differences among three layers were also derived. They are primarily determined by the wave's vertical wavelength and damping factor. These relations can be used with airglow observation to derive wave parameters and their momentum and energy fluxes.