

The effects of temperature and meridional neutral wind on the 630.0 nm nightglow

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The ISUAL payload onboard the FORMOSAT-2 satellite had often observed airglow bright spots around midnight at equatorial latitudes. Such features had been suggested as the signature of thermospheric midnight temperature maximum (MTM) effect, implying an association between the emission intensity and the temperature. This study investigates the influence of neutral temperature and meridional neutral wind on the volume emission rates of the 630.0 nm nightglow. We utilize the SAMI2 model to simulate the charged and neutral species at the 630.0 nm nightglow emission layer under different temperatures with and without the effect of neutral wind. The results show that the neutral wind is more efficient than temperature variation in affecting the nightglow emission rates. The emission rate features a local maximum in its variation with the temperature. Two kinds of tendencies can be seen regarding the temperature that corresponds to the turning point, which is named the turning temperature (Tt) in this study: firstly, Tt decreases with the emission rate for the same altitude; secondly, Tt increases with the altitude for approximately the same emission rate.

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