

An investigation of the solar cycle impact on the mesopause O(¹S) nightglow emission as observed by WINDII/UARS

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This paper examines the long-term variation of the O(¹S) nightglow emission as observed by the Wind Imaging Interferometer (WINDII) on the Upper Atmosphere Research Satellite (UARS). Because the production of atomic oxygen is attributed to solar ultraviolet radiation, variation of the oxygen nightglow in the mesopause region is expected to be related to the solar cycle. Ground-based observations from individual sites have provided some evidence for this. The space-borne WINDII observations from Nov 1991 to Aug 1997 cover half of a solar cycle, and offer the opportunity to study this relation from the global aspect. In this work, more than 300,000 emission rate profiles observed by WINDII are analyzed. Column integrated emission rates of these profiles within 80-110 km altitude are zonally averaged for every two months during the observation period and 5° latitudes in the range between ±45°. It is found that the O(¹S) emission is consistently correlated with the corresponding solar F10.7 flux for each latitude examined. The emission rate increases with increasing solar flux, showing a linear relationship. This characterizes the influence of solar cycle on the observed O(¹S) nightglow emission.