

Shock wave structure around a sounding rocket, and the accuracy in the atomic oxygen density measurement

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Atomic oxygen density measured in the lower thermosphere on board a sounding rocket with the resonance fluorescence technique may be disturbed by various causes due to the supersonic motion of the rocket such as (1) density and temperature modulation due to the shock wave, (2) density and temperature modulation due to the rocket wake, and (3) measurement error due to the Doppler shift.

We simulate the shock wave structure around the rocket with a technique based on the Monte Carlo method. We check the accuracy of the atomic oxygen measurement in ascent, and try to understand the serious differences found between the ascent and the descent data sets quantitatively.