



Simultaneous in-situ measurements of neutral temperature and oxygen in the mesosphere during the WADIS sounding rocket project

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The WADIS project (Wave propagation and dissipation in the middle atmosphere: energy budget and distribution of trace constituents) aimed at studying waves, their dissipation, and effects on trace constituents. The project comprised two sounding rocket campaigns conducted at the Andøya Space Center (69 °N, 16 °E). One sounding rocket was launched in summer 2013 and one in winter 2015.

In-situ measurements delivered high resolution altitude-profiles of neutral temperature and density, as well as plasma and oxygen densities. Atomic oxygen was measured by two different techniques. Airglow photometers operated by MISU measured emissions from excited molecular oxygen at 1.27 μm (daytime summer launch) and 762 nm (night-time winter launch), both of which can be used to infer altitude profiles of atomic oxygen. This is a well-proven technique and has been applied to sounding rocket and satellite measurements in the past. Solid electrolyte sensors (FIPEX) operated by IRS is a new technique for sounding rockets, which yielded atomic oxygen density profiles with a height resolution better than 10 m. The neutral air density and temperature was measured by the CONE instrument also with very high altitude resolution and precision. All these instruments were mounted on the same deck of the sounding rocket and, therefore delivered real common volume measurements.

In this paper we present simultaneous in-situ temperature and oxygen density measurements and discuss how variability of these quantities may influence temperature derivations from OH airglow observations at mesopause heights.