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Observation of the O2* dayglow in the mesosphere and lower thermosphere from Sciamachy limb observations

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Abstract

The atmospheric airglow in the mesosphere and lower thermosphere is formed by fluorescent emission from excited states of atoms and molecules. Atoms and molecules can be excited by absorption of solar radiation, or by exothermic chemical reactions. Airglow emissions are used to derive, e.g., densities of trace species and temperatures in the mesosphere and lower thermosphere, but can also be used as indicators of chemical and radiative heating.

We derive volume emission rates of the O2* dayglow from Sciamachy observations of the mesosphere/lower thermosphere limb mode. During day-time, O2* is excited by photoabsorption of ozone, by quenching of O(1D), and as a by-product of the exothermic self-reaction of atomic oxygen. The distribution and variability of the airglow will be discussed, and an overview will be given over further data-products which can be derived from these volume emission rates: number densities of ozone and O(1D), temperature, and solar O3 heating.