Geophysical Research Abstracts
Vol. 14, EGU2012-8338, 2012
EGU General Assembly 2012

The Mesospheric OH* layer above Spitsbergen: Investigation of polar mesospheric dynamics and temperature trends by means of ground based OH* airglow measurements and model studies

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The hydroxyl (OH*) emission layer is one of the dominant features of the mesopause region. It is primarily formed via the reaction of ozone and atomic hydrogen, which results in vibrationally excited OH* radicals. Due to radiative deexcitation, these radicals contribute to the airglow, which we can observe at different emission bands. For low excitation levels ($\nu \leq 6$) of OH*, its lifetime can be sufficient to become thermalized by collision with the surrounding molecules, hence its emission can serve as a measure of ambient temperature. Because of the remoteness of the mesosphere, this offers a valuable source of information on mesospheric temperatures.

While satellite based observations of the OH* layer offer comprehensive data sets on global scales, the spatial as well as the temporal resolution is limited by the corresponding orbits. Ground based measurements can fill this gap and enable us to study mesospheric disturbances at shorter time scales. Particularly the polar mesospheric region can be subject to large variability, which becomes apparent in the brightness and temperature signals from the OH* emission layer.

In this poster we present temperatures derived from measurements taken from a Fourier Transform Spectrometer (FTS), which is located at the AWIPEV Arctic Research Base in Ny-Ålesund, Spitsbergen (79°). Measurements are available since 2007 and cover various emission bands of OH* in the spectral region from 5900 cm$\hat{}$-1 to 6500 cm$\hat{}$-1.

We illustrate large scale polar mesospheric warming events, which have a striking impact on mesospheric dynamics and the coupling to the lower atmosphere. In addition to satellite based observations that we compare with our data, we illustrate the ability of our instrument to resolve short term perturbations. We discuss how we will combine these observations to model studies, in order to shed more light on the associated polar mesospheric dynamics in an upcoming analyis.