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Comparison of Airglow from excited O_2- and OH-molecules in the global model EMAC compared to SCIAMACHY observations

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Airglow is a luminous effect mainly in the upper atmosphere (mesosphere and thermosphere). It is caused by various processes. Airglow can be used to derive minor species abundances, to diagnose dynamical phenomena or to derive chemical heating rates (Mlynzcak 1999). Here we concentrate on Airglow from excited O_2- and OH-molecules.

For the presented study we use the newly developed extended EMAC (3d-CTM) version which includes the thermosphere and reaches upto about 170 km. We extended the chemistry by the relevant processes for airglow. The online-coupled chemistry module MECCA is calculating the different transitions of the excited OH-molecules. In this presentation we weill concentrate on the OH(3-1) transition at a wavelength of 1540 nm. We compare the model results to SCIAMACHY observations during the sudden stratospheric warming in the northern hemisphere winter 2008/09. The model results are qualitatively in good agreement with the observations.

EMAC chemistry has also been extended by two excited states of molcular oxygen: $O_2(^1\Delta)$ at 1270 nm and $O_2(^1\Sigma)$ at 762 nm. We show first results of the newly developed retrieval for the 762 nm band from SCIAMACHY-observations and compare it to EMAC results.