Geophysical Research Abstracts
Vol. 17, EGU2015-9621, 2015
EGU General Assembly 2015

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

Stefan Versick (1,2), Miriam Sinnhuber (1), Christian von Savigny (3), Georg Teiser (3), and Alexey Vlasov (1)

(1) Karlsruhe Institute of Technology, Institute for Meteorology and Climate Research, Eggenstein-Leopoldshafen, Germany, (2) Karlsruhe Institute of Technology, Steinbuch Centre for Computing, Eggenstein-Leopoldshafen, Germany, (3) Ernst-Moritz-Arndt-University of Greifswald, Institute of Physics, Greifswald, Germany

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. There are many molecules which produce airglow, here we concentrate on Airglow from excited O_2- and OH-molecules. For the presented study we use the newly developed extended EMAC version which now includes the thermosphere and reaches up to 3.5E-05 Pa.

Vibrationally excited OH-molecules are mainly produced by the reaction of atomic hydrogen with ozone. We include this production in the global model EMAC, as well as other important processes for excited OH (e.g. quenching by other molecules, spontaneous emission of photons). As a result we get the airglow for different transitions of the excited OH-molecules. Our model results are compared to airglow derived from observations by SCIAMACHY onboard ENVISAT.

The airglow from O_2 is produced by light emission from two excited O_2 states, $O_2(^1\Delta)$ at 1.27μm and $O_2(^1\Sigma)$ at 762nm. $O_2(^1\Delta)$ is mainly produced by photolysis of ozone in the Hartley-Band and $O_2(^1\Sigma)$ is mainly produced by the chemical reaction of $O(^1D)$ with molecular oxygen. We show first model results and compare them to values from literature.