



Empirical model of nitric oxide in the mesosphere from SCIAMACHY/Envisat satellite observations

Stefan Bender (1), Miriam Sinnhuber (2), Patrick Espy (1), and John P. Burrows (3)

(1) Norwegian University of Science and Technology, Physics, Trondheim, Norway (stefan.bender@ntnu.no), (2) Karlsruhe Institute of Technology, Karlsruhe, Germany, (3) University of Bremen, Bremen, Germany

Solar, auroral, and radiation belt electrons as well as soft solar X-rays produce nitric oxide (NO) in the mesosphere and lower thermosphere (MLT, 50–150 km). NO downward transport, in particular during polar winters, influences the lower atmosphere by, for example, catalytically reducing ozone.

We present ten years of daily global NO number density measurements from 60 km to 90 km obtained by the satellite instrument SCIAMACHY on board Envisat. From this data set (from 08/2002 to 04/2012) we construct an empirical model of NO in the mesosphere. In particular, we link NO production and its lifetime to geomagnetic disturbances (given by the AE index) and to the solar UV radiation (using the Lyman- α index). The derived parameters constrain how solar and geomagnetic activity influence the NO content in the mesosphere. Our model will help to fill gaps in measurements and to validate and improve chemistry climate models.