Geophysical Research Abstracts
Vol. 17, EGU2015-5423, 2015
EGU General Assembly 2015

Impact of the energetic inputs on the upper atmosphere: Nitrogen Monoxide

Anne Vialatte (1), Jean Lilensten (1), Mathieu Barthélemy (1), Cléa Serpollier (1,2), and David Bernard (1)

(1) IPAG, UGA/CNRS, Grenoble, France (anne.vialatte@obs.ujf-grenoble.fr), (2) Space Research & Planetary Sciences Division, University of Bern, Bern, Switzerland

Nitric oxide in the upper atmosphere is known to be highly dependant on solar activity. It can be carried to the stratosphere by atmospheric circulation, where it can be responsible for ozone destruction. Consequently, stratospheric heating rates are affected. Because of this mechanism, solar variability could impact partly the energetic budget of the Earth lower atmosphere. Therefore, it seems essential to know every physical and chemical processes leading to a production or to a destruction of nitric oxide.

The aim of this work is to calculate the production rate (by unit of time and volume) of the ions and molecules created by photo-absorption and by electron impact on NO. This has been done with the TRANSSOLO ionospheric code. As an output of this study, we also modelled the emission rate created by NO. Indeed, airglow and aurorae may be the only evidence and proxy of these productions in the thermosphere. Thus, the study of these emissions may lead us to a better NO density model.

Into the upper atmosphere, the solar energetic inputs (EUV flux and electrons) can ionise NO, mostly creating the NO^+ ion. A smaller quantity of NO^{2+} is also produced. In addition, solar fluxes can dissociate NO in N^+ and O^+, still in smaller quantity than NO^+. Nine electronic states of NO^+ are reported when NO absorbes a photon. The electrons in the thermosphere can also excite NO into 22 different electronic states. We calculated the emission rate for these molecular transitions, and compare to another model (Cartwright et al., 2000). As this is a preliminary study, the emission model created will be enriched in order to simulate more accurately those emissions.