



The Barth vs Frederick/Kopp processes as the source of the nightside green line emission in the atmospheres. The case of Venus.

G. Gronoff (1), J. Lilensten (1), C. Simon (2), M. Barthélemy (1), O. Dutuit (1)

(1) Laboratoire de planetologie de Grenoble, Universite Joseph Fourier, CNRS, France
<Guillaume.Gronoff@obs.ujf-grenoble.fr> (2) Research and Scientific Support Department of ESA, ESTEC, Noordwijk, The Netherlands.

The Barth process is widely used to model the Terrestrial nightside green line arising from the radiative deexcitation of the oxygen state $O(^1S)$. It consists of a three-body recombination (namely $O + O + N_2 \rightarrow O_2^* + N_2$) followed by a reaction ($O_2^* + O \rightarrow O_2 + O(^1S)$). However, the precursor, O_2^* , is not well constrained. Especially, its reaction with CO_2 is not known, preventing us to model with accuracy the green line intensity in the atmosphere of Venus. Though never confirmed, the Frederick/Kopp process is a chemical reaction that can also lead to the production of the green line ($O_2^+ + N \rightarrow NO^+ + O(^1S)$). This reaction could explain the variability of the green line intensity in the atmosphere of Venus, however no laboratory measurement on this reaction is currently available.

We discuss the possible influence of both processes in the atmosphere of Venus and other planets.