

## ***Interactive comment on “Photochemical modeling of molecular and atomic oxygen based on multiple *in-situ* emissions measured during the Energy Transfer in the Oxygen Nightglow rocket campaign” by Olexandr Lednyts’kyy and Christian von Savigny***

### **Anonymous Referee #2**

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I believe that this paper contains a valuable contribution to the field and as such is publishable. However the paper is extremely difficult to read and requires major revision of the structure and language before it can be published. The paper is attempting a complex task and may be helped by some flow charts show in the procedures, the relationships between various products etc.

As I have managed to understand the paper: The authors first review a substantial

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literature on many of the airglow emissions contrasting and comparing relevant groups and then make selections as to which reactions to maintain in the MAC model. Some tests are then carried out but I was unable to follow exactly what was done. I believe that Figure 3 is supposed to show the agreement between the model after tuning with the various ETON emission profiles. I do not see the point in showing both the concentration of the emitter and the intensity of the emissions as the conversion between them is trivial.

The sensitivity analysis in section 3.5 is a useful contribution. I might note that the temperature cannot actually be varied independently of the pressure because of hydrostatic equilibrium.

Much of the content of section 4 -discussion should appear earlier in the paper to explain what is actually done in the model. For instance the tuning of parameters is described first in section 4.1.

The discussion of dynamics on page 32 seems somewhat superfluous to the aim of the paper and could be excluded.

The use of some wording also confuses the reader. I believe that the use of “continuity equation” in for instance line 9 page 32 refers to a steady state chemical balance equation although some wording earlier in the paper may suggest that time dependent equations are being solved.

The use of the word retrieve when I believe calculate would be better is also a problem. Eg line 10 page 38, line 12 page 39

A few minor points Page 4 line 22 - The reference to Greer et al 1986 about the atomic oxygen measurement technique would be better replaced but a reference to one of the Dickinson papers.

Page 12 second line of the caption to table 3. I believe it should be the character E that marks the equations excluded not M

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Page 28 . In the discussion of the vibrational distribution of the Herzberg states a reference to some of the ground based work by Slinger or Stegman might be appropriate.

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