

Interactive comment on “Atmospheric Band Fitting Coefficients Derived from Self-Consistent Rocket-Borne Experiment” by Mykhaylo Grygalashvyly et al.

Anonymous Referee #2

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General comments. The paper is an extension of the previous works related to the problem of atomic oxygen concentration derivation from nighttime observations of atmospheric exited O₂ emission. In-situ consistent measurements of the temperature, air density, atomic oxygen concentration, and volume emission at 762 nm during WADIS-2 sounding rocket mission are used to correct the fitting coefficients for exited O₂ emission parameterization. These corrected fitting coefficients may be useful to study dynamical and chemical processes in the mesosphere region. The advantage of these fitting coefficients is their self-consistence in contradiction to the previously derived ones. The paper may be recommended for publication after minor revision.

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Specific comments. 1. It seems that there is an imbalance between the description of the three instruments used during the rocket mission. CONE and FIPEX are described in more or less detail, whereas for an Airglow Photometer only its functional purpose is mentioned. It is recommended to either shorten the description of the first two or expand the description of the Airglow Photometer. 2. It is not clear why the theory is divided into two parts. It seems that the Appendix can be combined with the “Theory” section, and one should begin with the first sentence of the Appendix about the assumption of photochemical equilibrium. In this case, it is desirable to discuss the possibility of using the assumption of photochemical equilibrium at night. In addition, despite the well-established term "photochemical equilibrium", for pure night conditions it is more correct to call it "chemical equilibrium". 3. It is necessary to describe the method of estimating the errors shown in the figures. With such large errors, it is necessary to speak of height dependence of fraction of recombination with caution. In addition, error estimates for the fitting coefficient estimates should also be presented. 4. More detailed comparison to the McDade et al. (1986) fitting coefficients is desirable taking into account error analysis.

Technical corrections. 1. Figure captures should be extended. 2. Figure 3 is not correlation. 3. Equations (1) and (A2) are the same. After combining theory section and appendix some equations may be omitted.

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