Atmos. Chem. Phys. Discuss., 14, C8761–C8762, 2014
www.atmos-chem-phys-discuss.net/14/C8761/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: A new mechanism of 15 µm emission in the mesosphere-lower thermosphere (MLT)" *by* R. D. Sharma

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Received and published: 3 November 2014

p. C8670, "values of K(CO2-O) derived by Feofilov et al. (2012), which I think has larger errors than those stated in that reference"

The error bars in Fig. 2c of this paper are large and the "lowermost value + error bar" is almost equal to the "uppermost value - error bar". These were the values we have obtained with the information available at the time of submitting/acceptance of the manuscript. At the moment, there are indications that SABER atomic oxygen may be overestimated [Kaufmann et al., 2014]. We have discussed a possibility of using

reduced [O] and negative dependency of k_{VT} on temperature (see Fig. 3b). I am not sure, though, if one has to include these effects to error bars. Perhaps, the best way to update Fig. 2c of [Feofilov et al., 2012] would be to divide $\gamma_{min}(z)$ values (see Fig. 2a) by the best known profile of atomic oxygen for a given area. If one uses the estimates by [Kaufmann et al., 2014], the resulting profile will be close to that shown by green line in Fig. 3b, leading to even stronger discrepancies between k_{LAB}, k_{GCM}, and k_{ATM}.

p. C8671, "the value derived by Feofilov et al (2012) at 105 km might be biased by as much as a factor of 2"

As we know now, this might be true, but, as discussed above, possible bias is in a "wrong" direction in a sense that it does not explain the k_{LAB} vs k_{ATM} difference. In principle, there is enough evidence that the atmospheric value is large, and the work under review could just refer to a "historical discrepancy" between k_{LAB} and k_{ATM}. In any case, I believe that the approach of splitting the "effective" rate coefficient k_{ATM}, which is retrieved from atmospheric observations, to "known" and "unknown" parts is promising. It is obvious that the collisions in a lab cell should not differ from that in the atmosphere, and the only explanation for the k_{LAB} vs k_{ATM} discrepancy I can give is some process, which takes place in the atmosphere and which is missing in the non-LTE models. We have suggested pumping from non-thermal oxygen atoms to be such a process, the author suggests pumping from thermal reservoir through N_2 rotational levels - both hypotheses are technically correct, but it takes a while to find an ultimate scientifically sound explanation.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 25083, 2014.