

## ***Interactive comment on “On the isotopic fingerprint exerted on carbonyl sulfide by the stratosphere” by J. A. Schmidt et al.***

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### Summary

The manuscript presents ab initio cross sections for the sulfur and carbon isotopologues of OCS. They show excellent agreement with measured cross sections and photochemical fractionations. Implications for the stratosphere are given, and are found to be in opposition to the large  $^{34}\text{S}$  fractionations claimed by Leung et al. 2002 and Colussi et al. 2004, thus allowing OCS to be a significant source for SSA.

### General comments:

This looks like careful and thorough work. It makes a valuable contribution to resolving earlier  $^{34}\text{S}$  fractionation discrepancies, and proposes looking for a  $^{13}\text{C}$  trend in the

C10267

stratosphere. I recommend the paper for publication, once the minor comments below are addressed.

### Specific comments:

Line 127 – Justify setting quantum yields to unity. Is there any data on quantum yields in this wavelength region? Isotopic differences in yields can lead to large isotope effects, as I'm sure the authors know.

Line 135 – give standard for  $^{13}\text{C}$ , presumably PDB.

Line 156 – Why attribute the need for a 30% increase in cross section to inaccuracies in transition dipole moments? What is the evidence for this being the source of the error, and what can be done to improve it?

Line 220-224 – Please discuss the Leung et al. 2002 and Colussi et al. 2004 results in more detail, and in comparison with Lin et al. 2011 and Hattori et al. 2011. Colussi et al. differs dramatically from the latter two, but are the experiments directly comparable? Do the Lin et al. 2011 and Hattori et al. 2011 results imply isotopic quantum yields that are  $\sim$  unity, thus removing concerns about differences in isotopic yields?

Table 2 – The stratospheric model is very weak. This is of course not the emphasis of the paper, but a vertical profile of expected isotopic values for OCS would be a nice addition.

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