Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-1042-RC3, 2017

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Glyoxal yield from isoprene oxidation and relation to formaldehyde: chemical mechanism, constraints from SENEX aircraft observations, and interpretation of OMI satellite data" *by* Christopher Chan Miller et al.

Anonymous Referee #3

Received and published: 9 January 2017

This paper presents a new chemical mechanism for glyoxal (CHOCHO) production from isoprene oxidation that is used in the GEOS-Chem global chemical transport model. The glyoxal and formaldehyde (HCHO) yields from this mechanism are compared to those of the Leed's Master Chemical Mechanism (MCM v3.3.1) under different NOx conditions. The performance of this mechanism is then evaluated using CHOCHO and HCHO observations from the NOAA SENEX campaign, as well as 2006-2007 retrievals of HCHO and CHOCHO from the NASA Ozone Monitoring Instrument (OMI). The later is the first validation exercise for the OMI CHOCHO retrieval.

Printer-friendly version

Discussion paper

This is a well-written paper on an important topic in atmospheric chemistry, specifically the oxidation chemistry of isoprene and the ability to use satellite observations to infer isoprene emissions in important regions such as the southeast US. The methods seem reasonable and are described well, and the conclusions are generally supported by the results. All of my comments detailed below are minor or technical in nature, so I recommend publication after minor revisions to address them.

Minor Comments:

P2, L21: HOx is usually defined as OH + HO2, not plus all peroxy radicals, right? Why are you including organic peroxy radicals here?

P4, L5: There is no 2013 NEI – Do you mean the 2011 NEI with growth/control factors applied to simulate 2013?

P5, L2: This sentence is rally a conclusion, and so is out of place here. I'd suggest rephrasing to say that you explore if this pathway is consistent with SENEX observations of CHOCHO production in low NOx conditions in Section 3.

P6, L18-19: Do you have any evidence from more conserved species, like CO or aerosols, that vertical transport is underestimated?

P6, L24: It's not clear what you mean by "correlative analysis in the SENEX observations offer no insight." What analyses did you attempt?

P7, L1-2: I can see the NOx sensitivity in the GEOS-Chem plot in Figure 5 (perpendicular to the regression line), but I can't see it in the observations. Am I missing something?

Typos:

P3, L32: need a space before "Travis"

P5, L12: Expand "DSMACC".

P5, L20: I think you need a comma before tOH

P10, L3: I think you need to hyphenate “NOx-dependent”

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-1042, 2016.