

Interactive comment on “Transport analysis and source attribution of seasonal and interannual variability of CO in the tropical upper troposphere and lower stratosphere” by Junhua Liu et al.

Anonymous Referee #3

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The paper by Liu et al. compares multiannual time series of MLS satellite observations of CO with model simulations of GEOS-Chem driven by different meteorological input fields (GEOS-4 and GEOS-5). Biomass burning data are GFED V2 for GEOS-4 and GEOS-5. In addition GEOS-5 data are used with GFED V3 and tagged CO tracers to conclude on possible source regions. Potential causes for differences between the models and observations are discussed. The central point of the discussion is the discussion of the CO tape recorder and vertical transport in the TTL-region and above. The authors deduce upward velocities from the CO phase in the TTL and the tropical lower stratosphere.

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In general the paper is well written, but a bit lengthy. The Figures are clear and the paper contains a lot of information, but I would suggest to more focus on the main aspect. It is not entirely clear to me what the final purpose of this paper is: To investigate the distribution of sources and sinks in models and satellite observations? Or to evaluate model uncertainties due to different emissions and transport schemes? Or to investigate vertical transport across the TTL region? I regard the latter as most important since the time for this pathway determines in the end, how much of a tracer with finite chemical lifetime enters the stratosphere.

Therefore I highly recommend to restructure it before publication and focus more on the central point: the discussion of the upward velocities in the tropics.

P.17401, l.17: Please provide some key informations relevant for transport or at least the names of the convection schemes. Were the CO emissions released at ground or at a given emission height?

p.17412, l.1: How do the transport times relate to the trajectory studies of e.g. Fueglistaler et al., JGR, 2004, 2005, or Ploeger et al., JGR, or in-situ measurements (e.g Marcy et al., Atmos Env. 2007)

p.17415, l.18 and Fig. 10d) How is it possible to have zonal mean negative mean upward velocities in the tropics during boreal summer? Even if there is some local downwelling, doesn't this point to a general transport problem in the model?

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