

Interactive comment on “Tropospheric column ozone response to ENSO in GEOS-5 assimilation of OMI and MLS ozone data” by M. A. Olsen et al.

Anonymous Referee #4

Received and published: 19 February 2016

The authors use ozone observations from OMI and MLS to investigate the ENSO influence on tropospheric column ozone (TCO), including in mid-latitudes. They evaluate the variance explained and sensitivity of TCO to Nino 3.4 index, and find strong response of TCO to the ENSO signal in the tropics which agrees well with the previous studies. They also find that the large-scale transport in the tropics dominate the ozone response compared to the small-scale convective transport. A step forward achieved by this study is the quantification of the ozone response to ENSO induced changes in large-scale circulation and in the mean tropopause height, which contribute significantly to the TCO response in mid-latitudes. This is a very well written paper with some thorough and convincing analyses presented, and is highly recommended to be published in ACP. There are only some minor points listed below.

Specific comments:

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Page 4, lines 107-108: “In the midlatitudes, ... ENSO in some regions” - Is this the finding from your study (then it should be in your conclusions) or from existing studies, in which case these should be cited?

Page 5-6, lines 143-146: The description given here is unclear. You write that “some impact from emissions and other tropospheric chemistry sources and sinks is included in the analyses to the extent that each OMI column retrieval is sensitive to tropospheric altitudes”; can you explain what these impact from emissions and other tropospheric chemistry sources and sinks are? Do you mean the OMI column retrieval is sensitive to tropospheric ozone?

Page 6, lines 155-157: Although the simulations have been described somewhere else, it would be useful to briefly describe the chemical scheme used in these model simulations, and related boundary conditions (i.e. what sources and sinks are included in the model?).

Page 6, line 159: “surface emissions” of what?

Page 9, line 249: I wonder why you didn't mention some significant negative response over the Southern Ocean which are quite obvious.

Page 13, line 362-364, it would be easier to understand if you express these relationships in a formula, or re-phrase the sentence.

Technical corrections:

Page 10, line 271, delete “in” after “shown”.

Page 13, line 366, delete “the” before “both”.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2015-958, 2016.

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