Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Resolving ozone vertical gradients in air quality models" *by* Katherine R. Travis et al.

Anonymous Referee #1

Received and published: 9 October 2017

Travis et al. presented a comprehensive model and observation comparison of horizontal and vertical ozone distributions over Southeastern US. The comparison started from adjusting the NOX emission in the model framework as recent studies have suggested and moved to discussion on meteorological parameter and boundary layer mixing treatments in the GEOS-Chem model framework. They reported two issues in the model framework – low ozone from precipitation events were underestimated and vertical mixing, especially, a strong asymmetry between top-down and bottom-up mixing are ill-represented in the model framework. I am an experimentalist so have limited knowledge in modeling but I believe this work will remind the research community the importance of representation of the dynamics of boundary layer, which has not been a high priority in our research community. In this perspective, this manuscript will be

highly beneficial to suggest a new research direction. The manuscript in general is well written and easy to follow. I have two suggestions that may improve the clarity of the arguments.

1) I believe the research flights usually conduct spiral maneuverings and was wondering that the spiral profiles can be utilized the ozone the vertical distribution analysis presented in Section 6.

2) May be I missed something but the vertical ozone distribution with suppressed the top-down mixing presented in Figure 6 has substantial bias with observed ozone in the lower mixed layer in terms of values although the shape is reasonably simulated for the cloudy day simulation. Discussion on this would be beneficial.