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Interactive comment on "Assimilating compact phase space retrievals of atmospheric composition with WRF-Chem/DART: a regional chemical transport/ensemble Kalman filter data assimilation system" *by A. P. Mizzi et al.*

Anonymous Referee #2

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Review of

gmd-2015-116

Assimilating Compact Phase Space Retrievals of Atmospheric Composition with WRF-Chem/DART: A Regional Chemical Transport/Ensemble Kalman Filter Data Assimilation System by A. P. Mizzi, A. F. Arellano, D. P. Edwards, J. L. Anderson, and G. G. Pfister

Minor Comments:

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Interactive Discussion

Discussion Paper

p. 7698 l.2: truncation is an arbitrary process and requires clarification. At what thresholds are singular values/vectors set to zero?

p. 7701 l. 16: it is not clear why increased vertical resolution would make the assimilation more sensitive to vertical localization. Do authors claim that the vertical lenghtscales fall within the grid spacing? Can that be elaborated on?

p. 7705 description of Fig. 1: comparison of forecasts and increments does not lead to conclusions as optimistic as the authors claim. E.g. difference MPO – MET DA is negative SW of Lakes Huron and Michigan and in Ohio Valley while the increment over this area is positive suggesting that the forecast issued from MET DA might have been superior to MPO there. Even over Bay area the sign of the difference is not as consistent with the increment as the authors claim. To somewhat lesser extent the same applies to Fig. 5

p. 7705 description of Fig. 2: it would be much easier to see biases and correlations if scatter plots were shown rather than time series of dots that are somewhat difficult to follow.

p. 7706 l.11-19: difference between two results is not likely to be exactly zero. Can authors specify what hypothesis testing involved and how much would the means need to differ compared to what they were to reject/accept the hypothesis?

p. 7709 l. 1-13: authors talk about positive/negative sensitivities of singular vectors but later note that the sign of the vectors is arbitrary because left/right singular vectors can jointly by negative one which is true. However, do the considerations on the positive/negative sensitivities make any sense in this case. Can that be discussed?

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