

Interactive comment on “The impact of observation nudging on simulated meteorology and ozone concentrations during DISCOVER-AQ 2013 Texas campaign” by X. Li et al.

Anonymous Referee #1

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Review of the manuscript titled “The impact of observation nudging on simulated meteorology and ozone concentrations during DISCOVER-AQ 2013 Texas campaign” By Xiangshang Li et al. Submitted to the ACP

Recommendation: minor revision

Comments Line 11-12, it is confusing to say observational nudging is objective analysis and to use “OA” representing observational nudging for the rest of the paper. In the WRF modeling community, objective analysis usually refers to “OBSGRID” which is an extra package in the WRF model system to take observations to improve the first guess

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fields (WPS output files) through an objective analysis method. Observational nudging is the Newtonian relaxation method implemented in WRF code to use observations to minimize model error during the simulation. It is known as “four-dimensional data assimilation (FDDA)” introduced by Stauffer and Seaman (1990). The observational nudging is not necessary to be run with objective analysis package even though the OBSGRID provides the observational data written in required by WRF for nudging. Stauffer, D., Seaman, N.L., 1990. Use of four-dimensional data assimilation in a limited-area mesoscale model. Part I: Experiments with synoptic-scale data. Month. Weather Rev. 110, 1250e1277.

Line 70-71, what does this mean??? There are detailed statistics about the nudging impacts shown in those studies (Deng 2009, Gilliam and Pleim 2010, Otte 2008 and Ngan et al 2012).

Line 91, Daum et al., 2004

Line 96, missing reference for Lefer and Rappengluck 2010. Olaguer et al., 2009

Line 103, it is good to have a citation for DISCOVER-AQ.

Line 141-143, suggesting not to use “OA” to refer observational nudging. Instead, just use “no-FDDA” .vs. “FDDA”

Line 171, give citation for those prior modeling studies.

Line 202-224, these three paragraphs should be shortened since this is not project report and technical note. Please summarize what are the data frequency for analysis nudging, surface nudging and observational nudging, what variables to be nudged, and for what vertical layers.

Line 242, missing reference for Willmott 1981

Line 306, it is more desirable to see time-series of hourly temperature and ozone instead of daily average since both variable have strong diurnal variation. What did the

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authors choose to show the daily average plots?

Line 378, Figure 7 is hardly to read due to poor figure quality and small text.

Line 394, it should be showing hourly ozone plot instead of daily average. There are a lot variations for ozone through a day.

Line 484, Did the nudged met data provide better ozone results than the base case in the comparison with aircraft measurements?

Line 487, missing reference for Li and Rappengluck 2014

Line 500, the model under-predicted ozone both at the surface and aloft on Sep 25th. Even with nudged meteorology, there was not much improvement. Is that because the met data are still wrong or emission data may have problem?

Line 543-548, the discussion about the impact of nudging on cloud/precipitation prediction is ambiguous. There is no comparison on these two variables shown. Did the nudging configuration help to prevent the inaccuracy of the prediction or make it worse?

Line 555, what does this “small-scale meteorological events” refer to? In what sense it is relevant to the high ozone events? Is this something for future works? The conclusion section is not clear. Suggest to revise and include future works.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 27357, 2015.