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Interactive comment on "3D-Var versus Optimal Interpolation for Aerosol Assimilation: a Case Study over the Contiguous United States" *by* Youhua Tang et al.

Youhua Tang et al.

youhua.tang@noaa.gov

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We agree that this manuscript should not be treated as the general comparison of 3d-Var and OI data assimilations. Instead, it is just a regional case study with these specified methods. We changed the title accordingly (StatesA case study of Aerosol data assimilation with the Community Multi-scale Air Quality Model over the Contiguous United States using 3D-Var and optimal interpolation methods) as well as theabstract and corresponding conclusion part. We understand the reviewer's concern on the OI method. It indeed has some nudging flavor in the system, such as limiting the PM2.5 assimilation below the PBL and only applying the AOD assimilation above it

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when both AOD and PM2.5 observations are available at one grid cell. However, we believe it is essentially still an OI scheme, based on covariance functions (see Chai et al. 2017, for detail,http://onlinelibrary.wiley.com/doi/10.1002/2016JD026295/full). The boxes of 11x11 grid points horizontally and with PBL height in the vertical direction (for PM2.5 observation assimilation) are the localization applied for the efficiency of the computation.

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