

**Supplementary Figures for
"The MERRA-2 Aerosol Reanalysis, 1980 – onward,
Part II: Evaluation and Case Studies"**

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ABSTRACT

Supplementary figures for *the MERRA-2 Aerosol Reanalysis, 1980 – onward, Part II: Evaluation and Case Studies* that show the MERRAero simulations comparisons to observations from OMI, EPA, IMPROVE and HSRL published in Buchard et al. (2015, 2016). We also show an illustration of MERRA-2 simulation during an event of trans-Atlantic dust transport between the end of March 2010 and early April 2010. Then, we present comparisons of the climatology of dust surface concentrations at Barbados [13.17°N, 59.53°W] based on monthly-mean observations. Finally, larger versions of the inset plots of figures 8,9,12 are shown.

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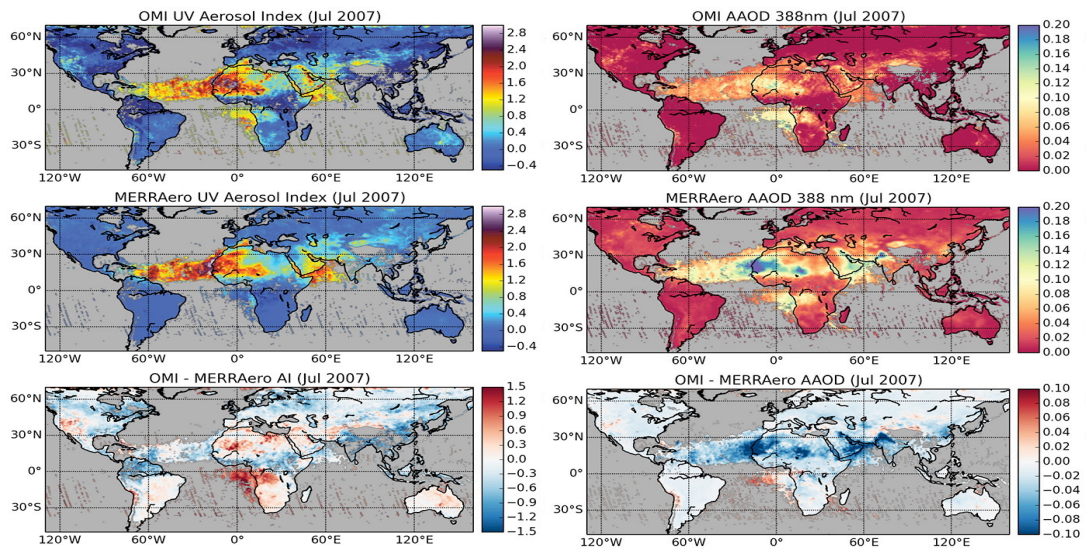


FIG. 1. Figures 2 and 3 of Buchard et al. (2015) for July 2007: Monthly mean OMI UV AI (left column) and AAOD (right column) observed (top row) and simulated with MERRAero aerosol fields (middle row). Difference of OMI minus MERRAero is shown on the bottom row.

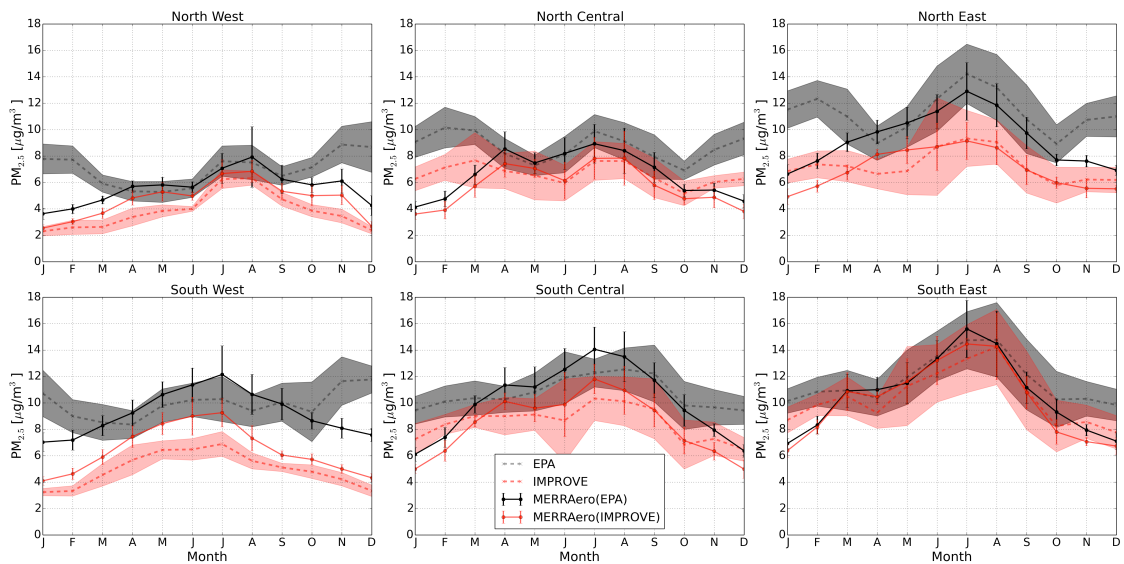


FIG. 2. Figure 4 of Buchard et al. (2016): Monthly and regional variations of surface PM_{2.5} [$\mu\text{g m}^{-3}$] from both EPA-AQS (gray dashed-line) and IMPROVE (red dashed-line) networks compared to MERRAero PM_{2.5} sampled at IMPROVE sites (red continuous-line) and EPA sites (black continuous-line) located in NW, NC, NE, SW, SC, SE of the US for the period 2003-2012. Vertical bars are the standard deviations of monthly values calculated from years 2003-2012 for the model, shaded area for observations.

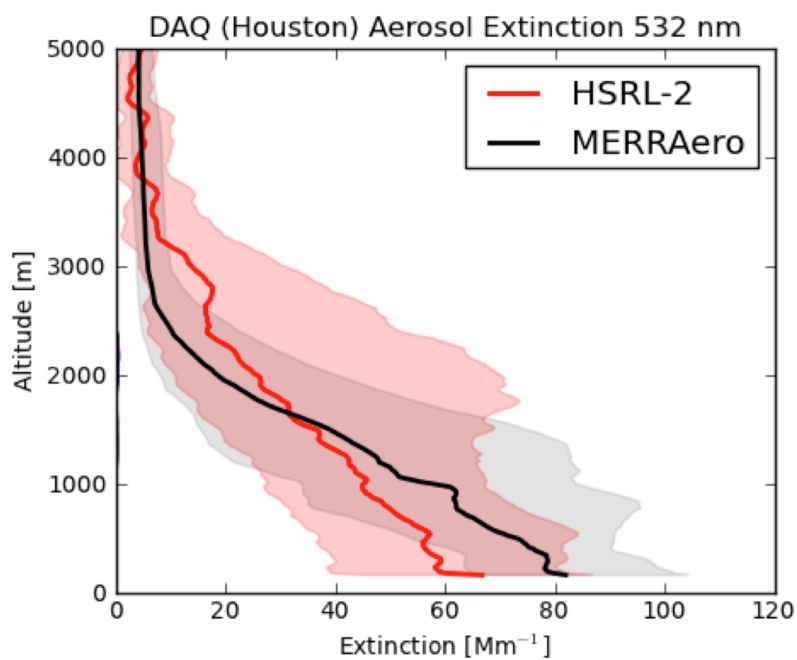


FIG. 3. Vertical profiles of extinction coefficients measured by HSRL instruments and derived from MERRAero simulations sampled on the HSRL flight path during DISCOVER-AQ Houston (August–September, 2013). The solid red and black lines are the median of all profiles for HSRL and MERRAero, respectively. Shaded areas are the 25th to 75th percentile of all modeled and observed profiles.

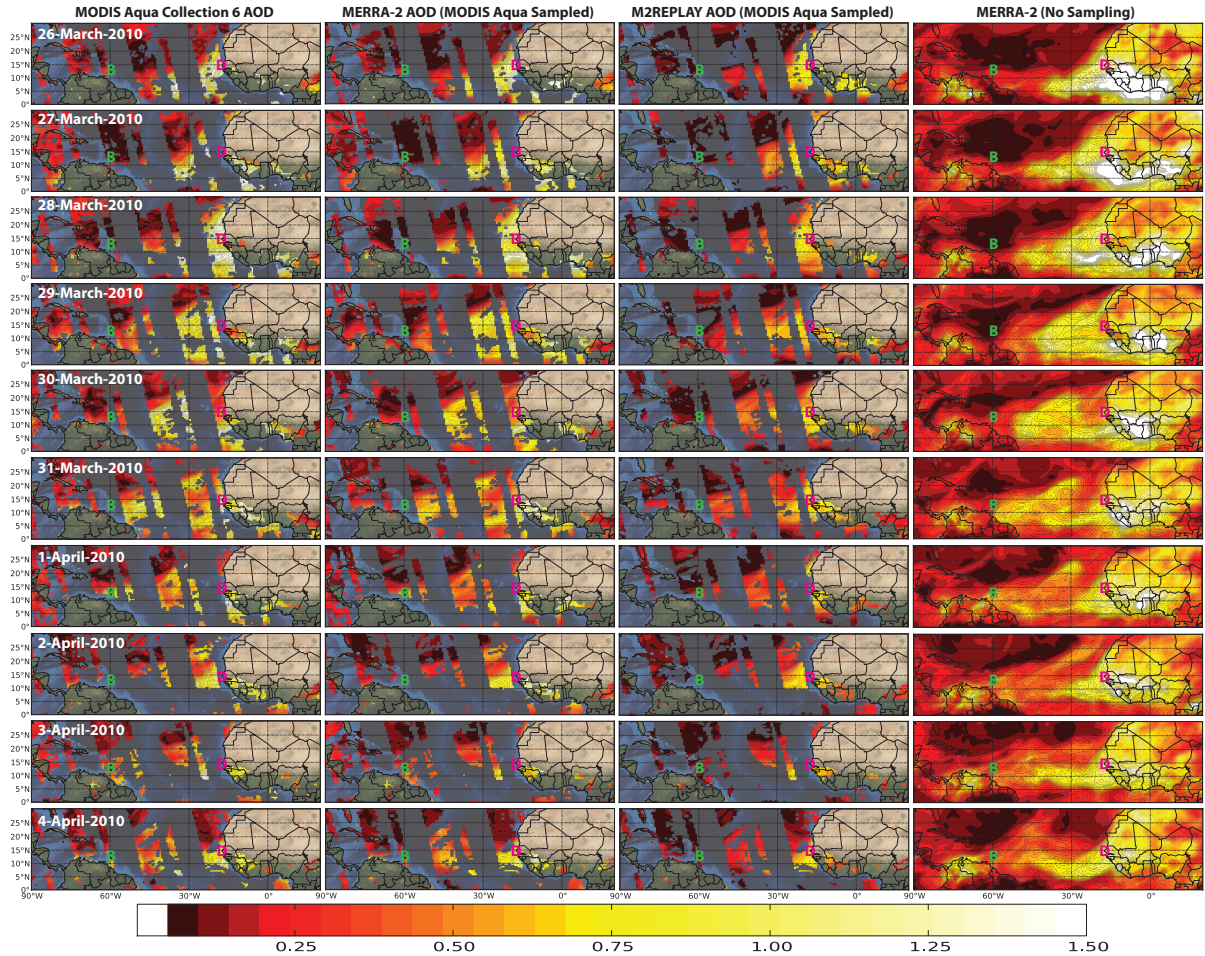


FIG. 4. Evolution of the March-April 2010 dust event as observed by MODIS Aqua (Collection 6 (Levy et al. 2013), left column, not assimilated), simulated by MERRA-2 (second column from left), and by M2REPLAY (third column from left). Here, the simulations have been sampled with the MODIS Aqua orbit. For reference, the right column shows the MERRA-2 AOD without sampling to show the progression of the dust event as it traverses the Atlantic from the Sahara. The locations of Barbados and Dakar are indicated by the letters "B" and "D".

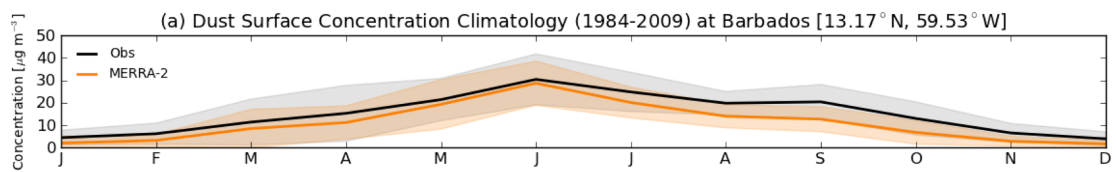


FIG. 5. Figure 4.16 of Randles et al. (2016): Climatology of monthly-mean dust surface concentration [$\mu\text{g m}^{-3}$] at the Barbados [13.17°N, 59.53°W] station. The mean (solid lines) and standard deviation (shading) are calculated for the period 1984-2009 at Barbados. Note that data were available only as monthly means, so the model has not been sampled on sub-monthly timescales to be consistent with the measurements making up the reported monthly mean.

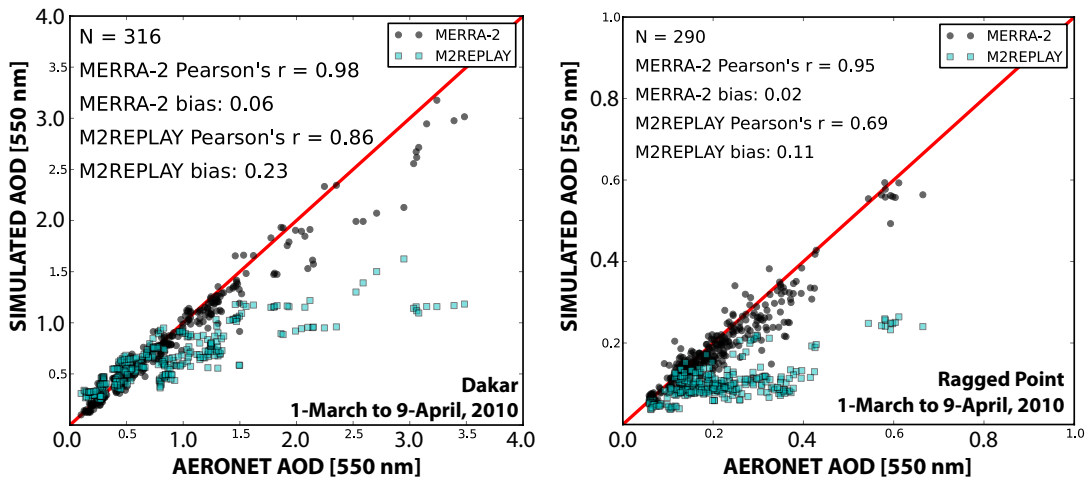


FIG. 6. Inset plots of Buchard et al. (2017, Fig. 8)

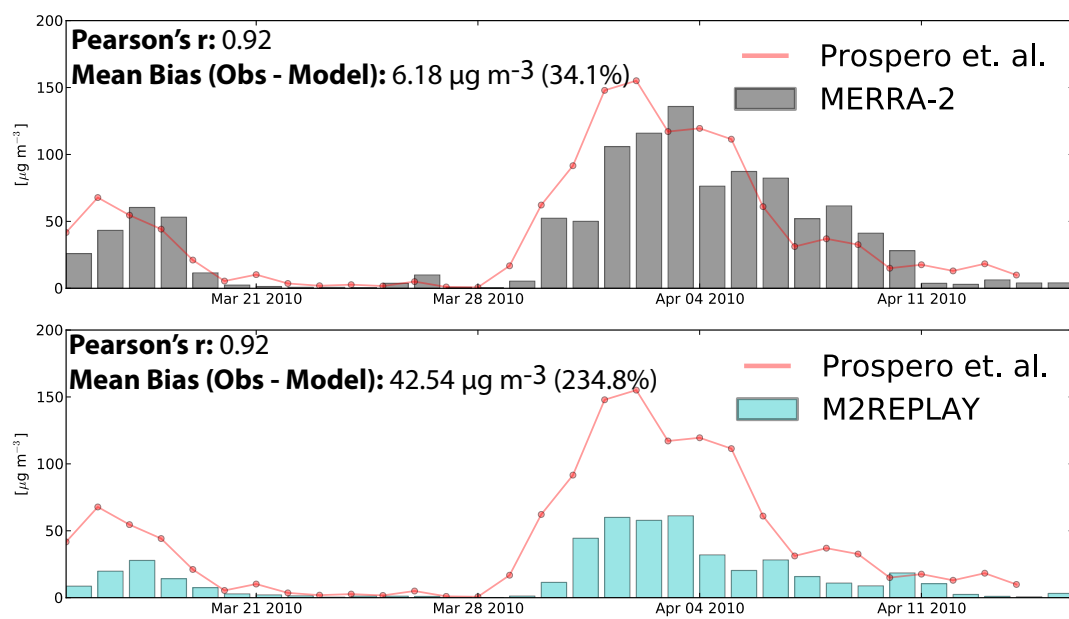


FIG. 7. Inset plots of Buchard et al. (2017, Fig. 9)

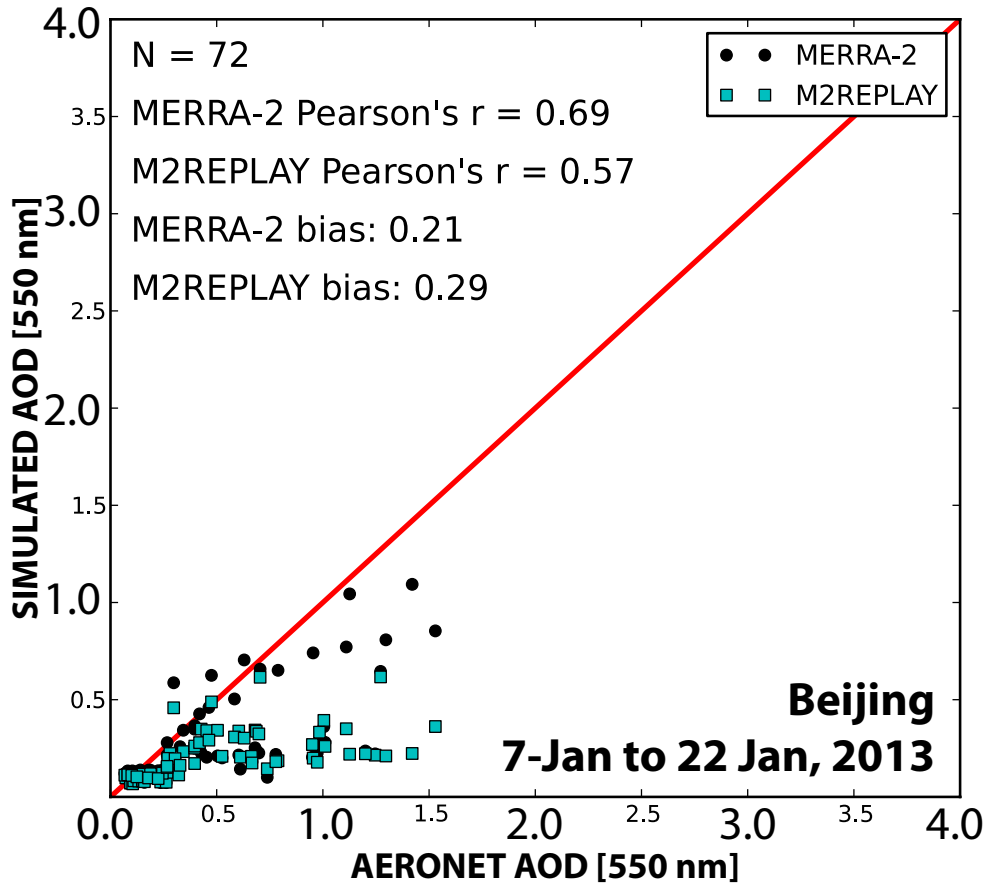


FIG. 8. Inset plot of Buchard et al. (2017, Fig. 12)

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