



*Supplement of*

**Influence of aerosols and surface reflectance on satellite NO<sub>2</sub> retrieval:  
seasonal and spatial characteristics and implications for  
NO<sub>x</sub> emission constraints**

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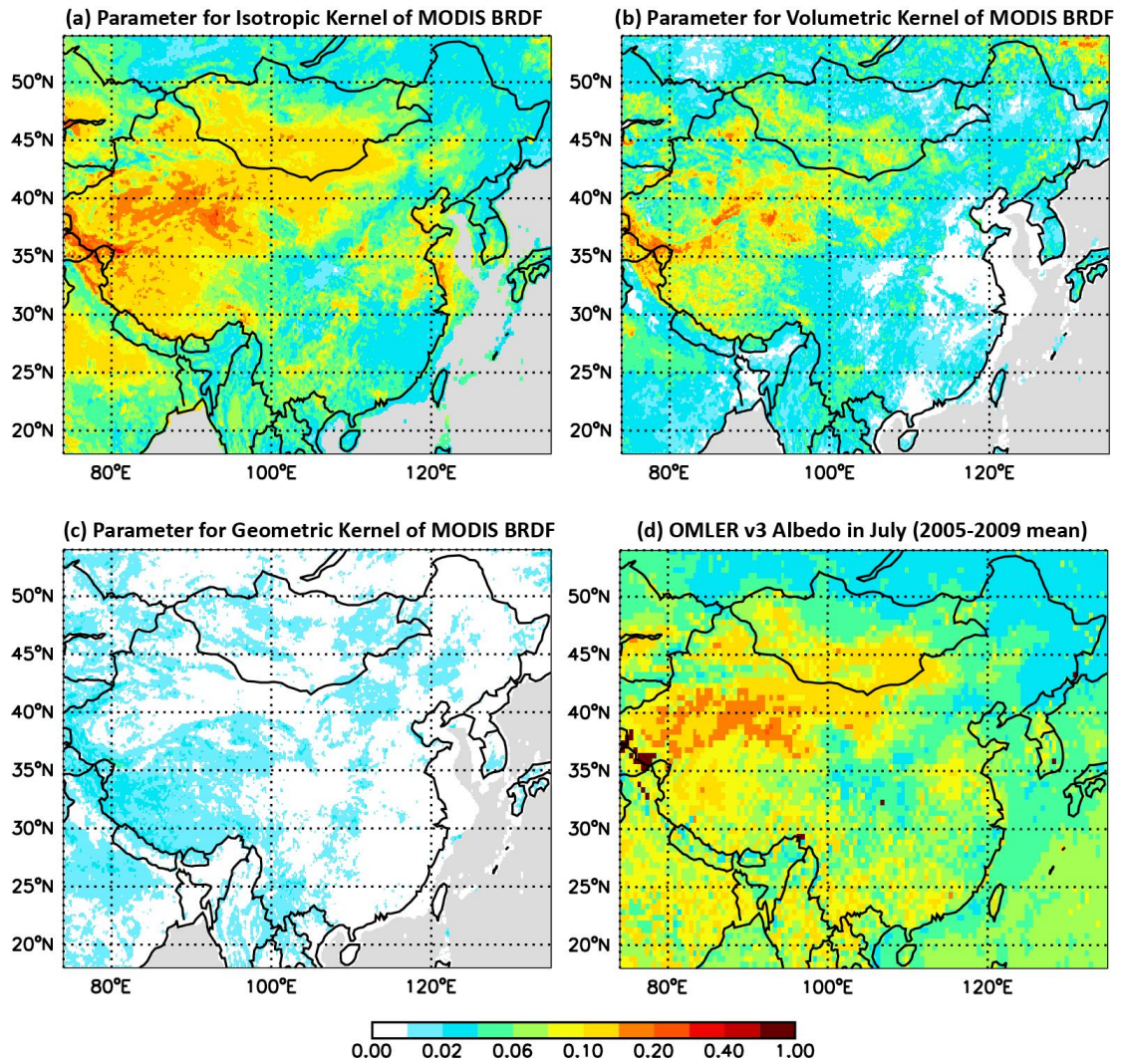


Fig. S1. (a–c) 16-day average values for MODIS BRDF parameters over June 25<sup>th</sup>, 2012–July 10<sup>th</sup>, 2012 on a 0.05 °long. x 0.05 °lat. grid. (d) Monthly mean OMLER v3 albedo data in July (2005–2009 mean) on a 0.5 °long. x 0.5 °lat. grid.



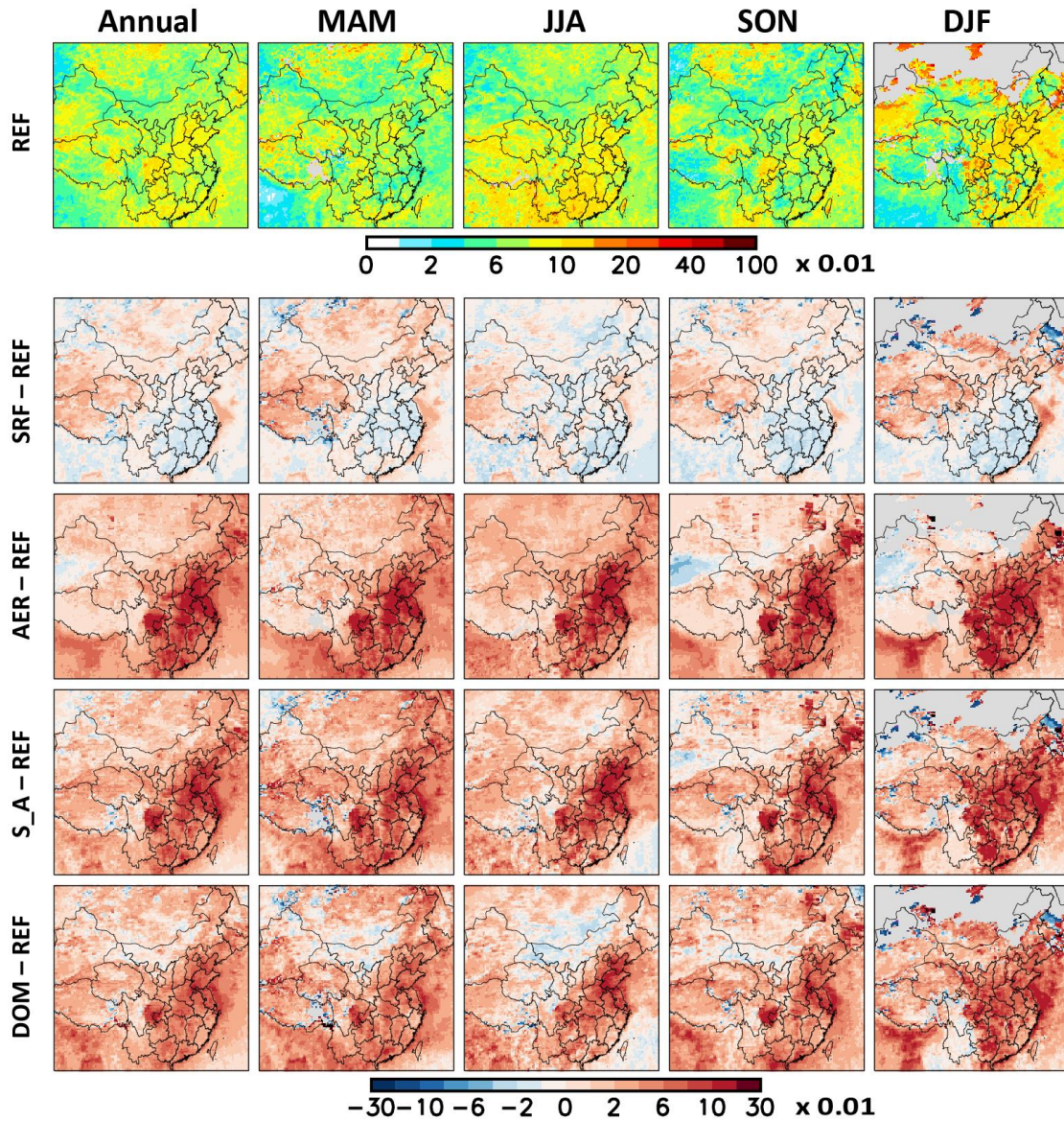


Fig. S2. (First row) Cloud fraction (CF) retrieved from case REF at annual and seasonal scales. (Second–fifth rows) changes in CF from case REF to other retrieval cases. Provincial boundaries of China are shown. Data are sampled from valid pixels of case REF. Values outside the upper (lower) bound of color intervals are shown in black (purple). Missing values are shown in grey. Color intervals are nonlinear to better present the data range; an interval without labeling represents the mean of adjacent two intervals.



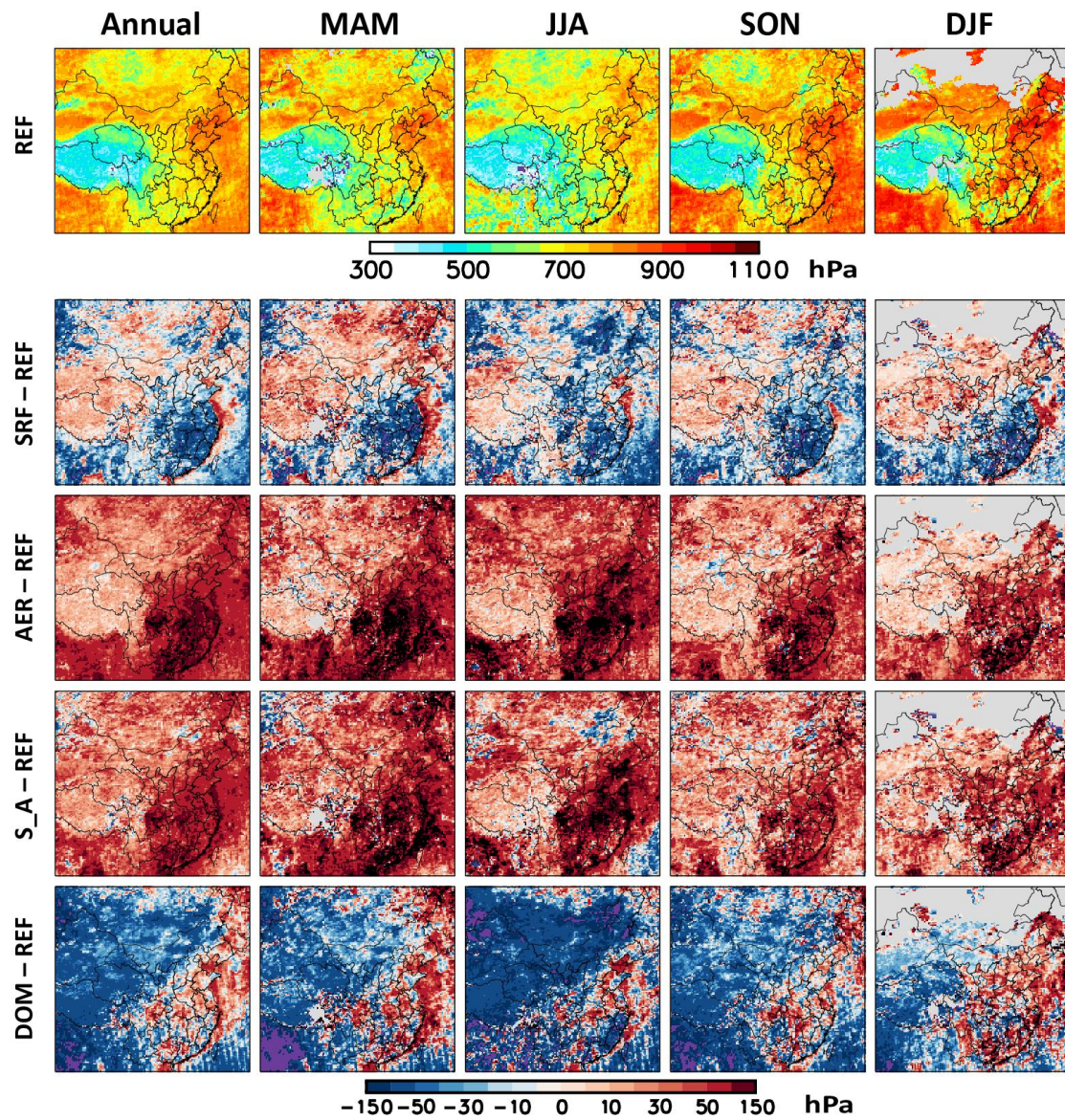


Fig. S3. Same as Fig. S2 but for cloud pressure (CP).



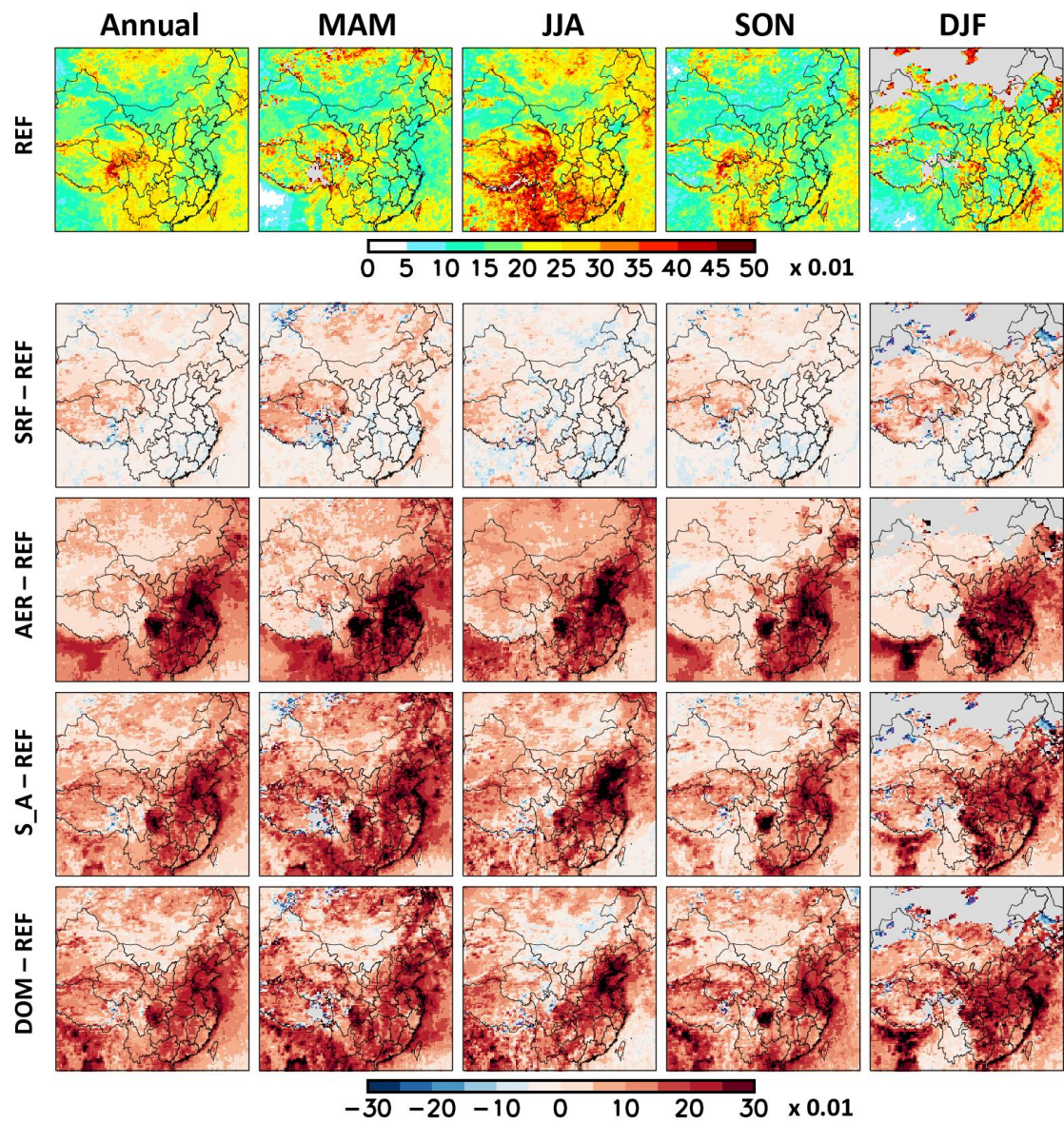


Fig. S4. Same as Fig. S2 but for cloud radiance fraction (CRF). Color intervals are linear here.

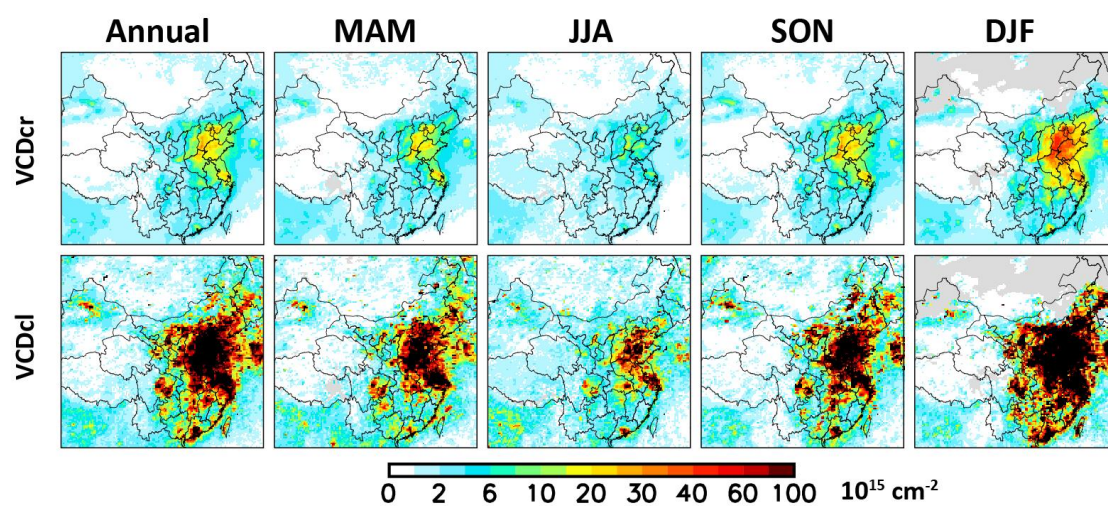


Fig. S5. VCD<sub>cr</sub> and VCD<sub>cl</sub> of NO<sub>2</sub> retrieved from case REF. Provincial boundaries of China are shown. Data are sampled from valid pixels in case REF. Values outside the upper bound of color intervals are shown in black. Missing values are shown in grey. Color intervals are nonlinear to better present the data range; an interval without labeling represents the mean of adjacent two intervals.



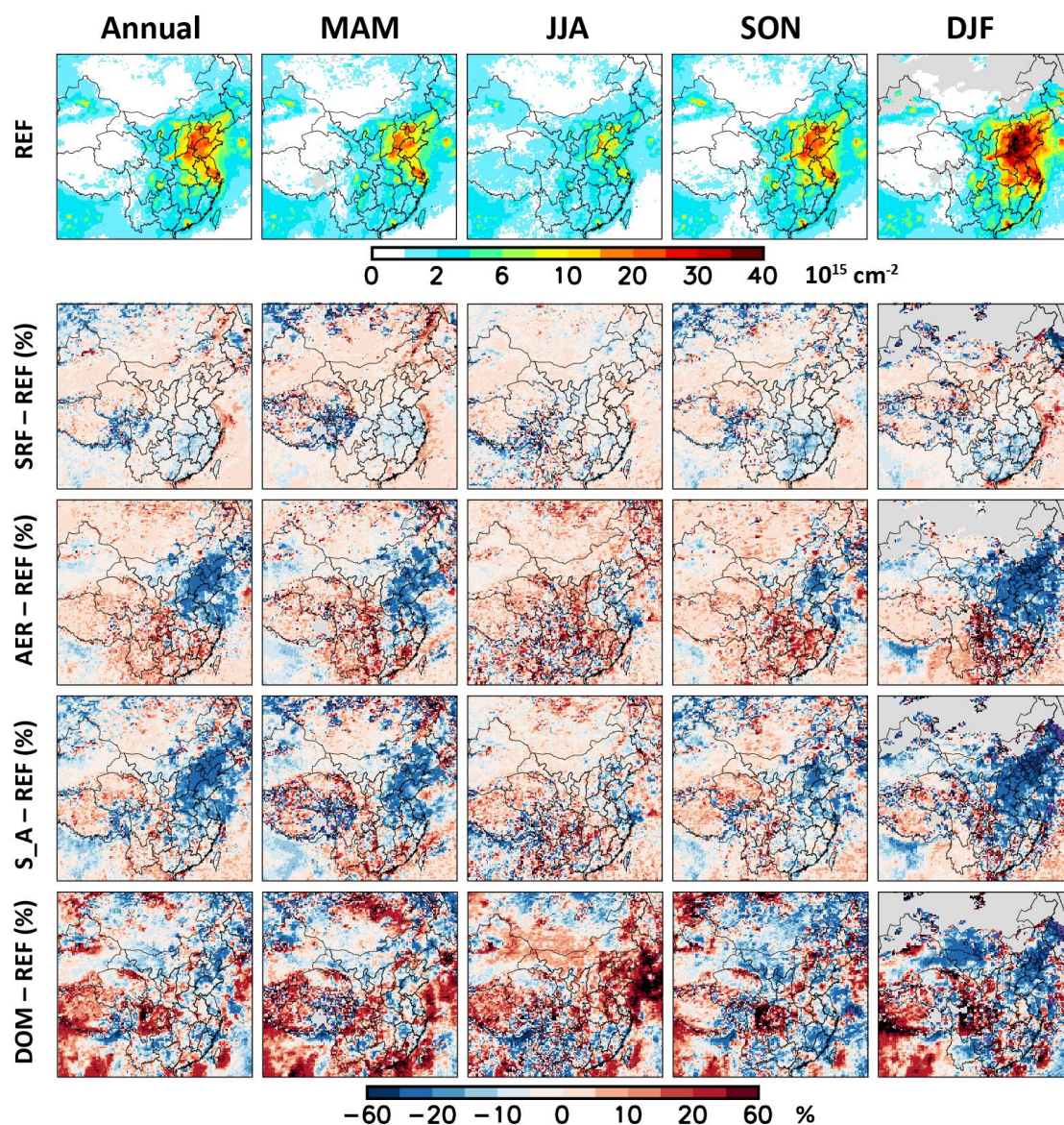


Fig. S6. (First row) Tropospheric NO<sub>2</sub> VCDs retrieved from case REF at annual and seasonal scales. (Second–fifth rows) changes in NO<sub>2</sub> VCDs from case REF to other cases as a percentage fraction of case REF. Provincial boundaries of China are shown. Here, data are sampled from pixels designated as “valid” in respective retrievals, instead of from valid pixels in case REF as in Fig. 5 of the main text. Values outside the upper (lower) bound of color intervals are shown in black (purple). Missing values are shown in grey. Color intervals are nonlinear to better present the data range; an interval without labeling represents the mean of adjacent two intervals.



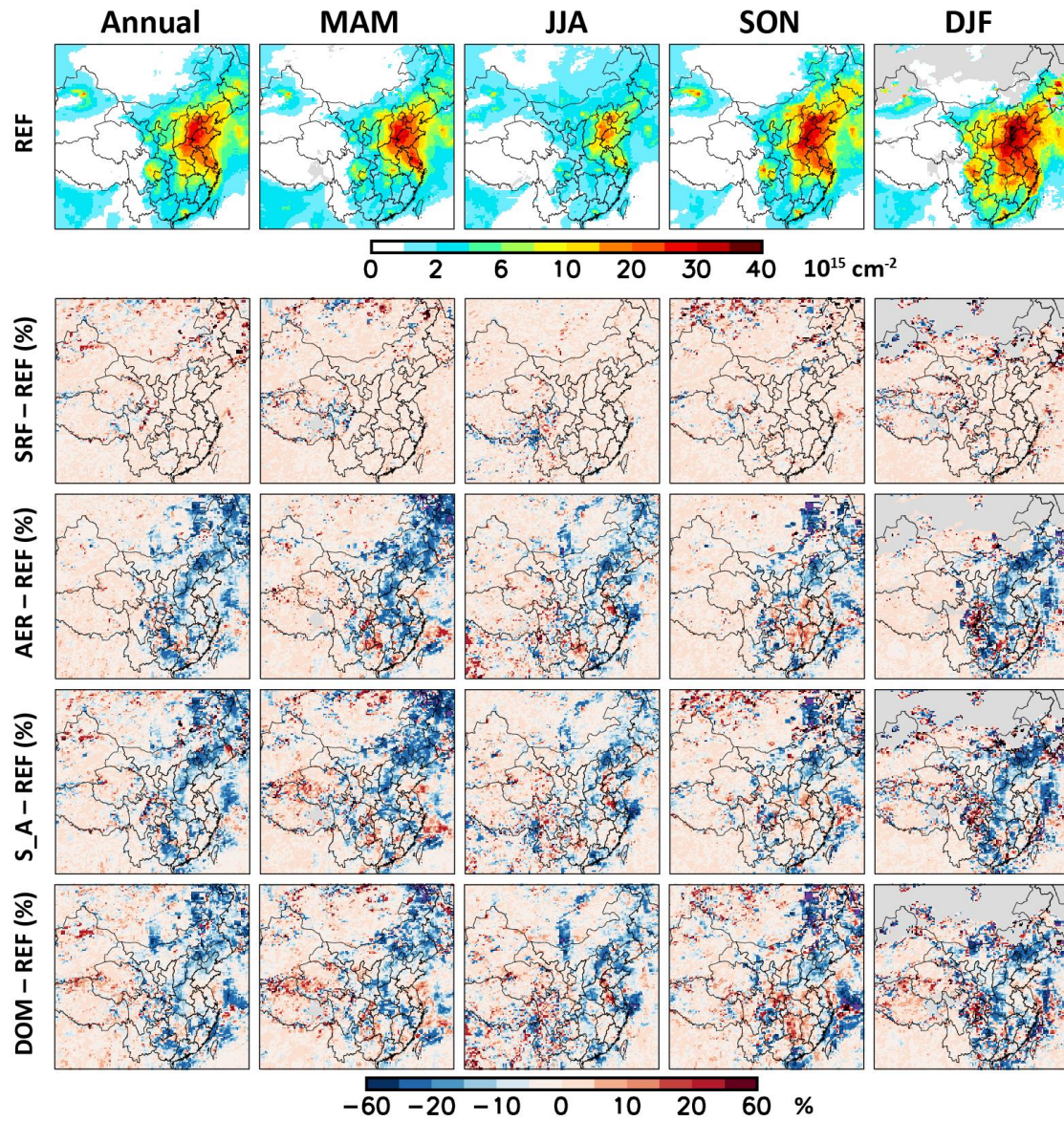


Fig. S7. Same as Fig. S6 but for GEOS-Chem modeled NO<sub>2</sub> VCDs.



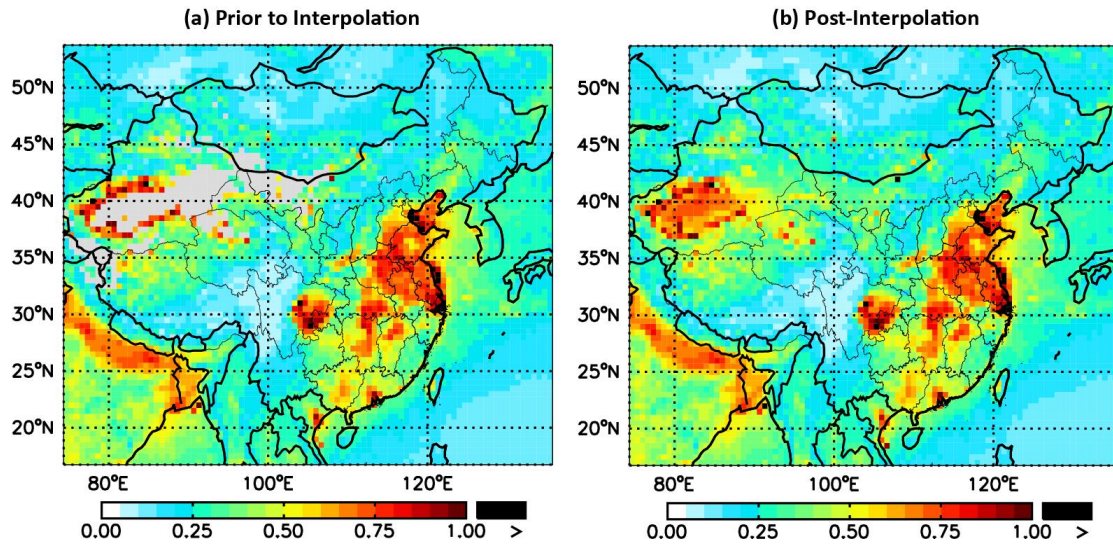


Fig. S8. Annual mean MODIS/Aqua AOD at 550 nm in 2012 mapped to a  $0.667^\circ$  long.  $\times$   $0.5^\circ$  lat. grid (a) prior to and (b) after a temporal and spatial interpolation process.