

Decadal application of WRF/Chem under future climate and emission scenarios: Impacts of technology-driven climate and emission changes on regional meteorology and air quality

Chinmay Jena ^{1,2}, Yang Zhang ^{1,3,*}, Kai Wang ^{1,3,4} and Patrick C. Campbell ^{1,5,6}

¹ Department of Marine, Earth, and Atmospheric Sciences, North Carolina State University, Raleigh, NC 27695, USA

² India Meteorological Department, Ministry of Earth Science, Lodhi Road, New Delhi, India, 110003.

³ Department of Civil and Environmental Engineering, Northeastern University, Boston, MA 02115, USA

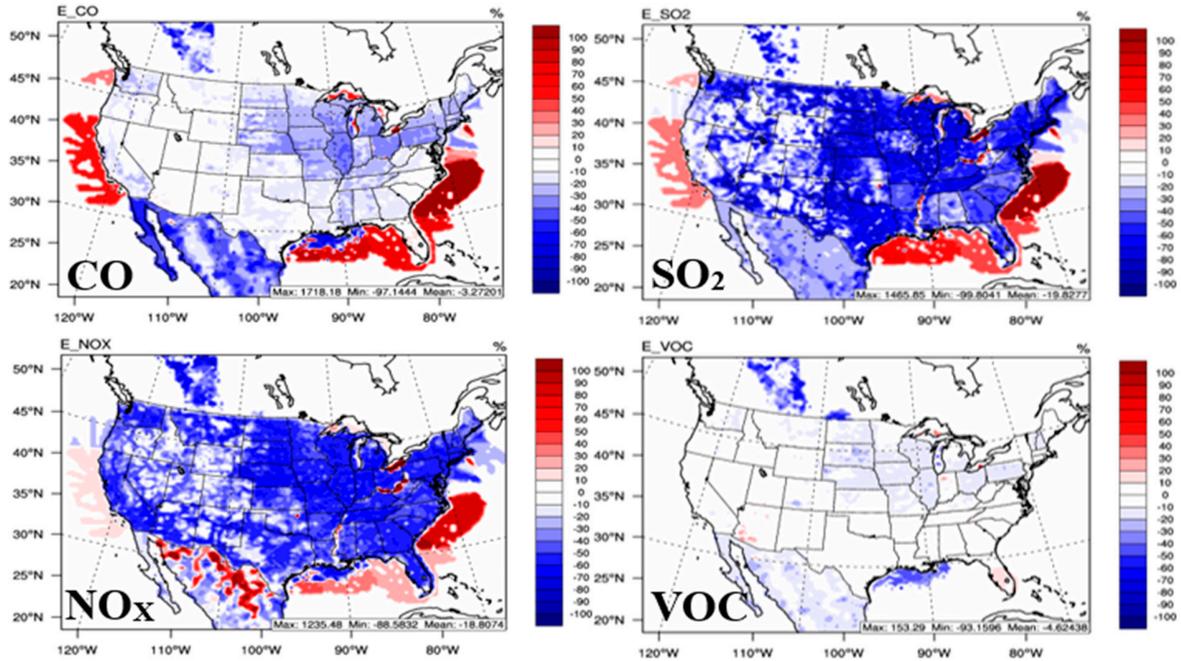
⁴ Lynker, Environmental Modeling Center, NOAA, College Park, MD 20740, USA

⁵ Cooperative Institute for Satellite Earth System Studies, Center for Spatial Information Science and Systems, George Mason University, Fairfax, VA 22030, USA.

⁶ Atmospheric Sciences Modeling Division, Air Resources Laboratory, NOAA, College Park, MD 20740, USA

* Correspondence: ya.zhang@northeastern.edu

TDM/A1B



TDM/B2

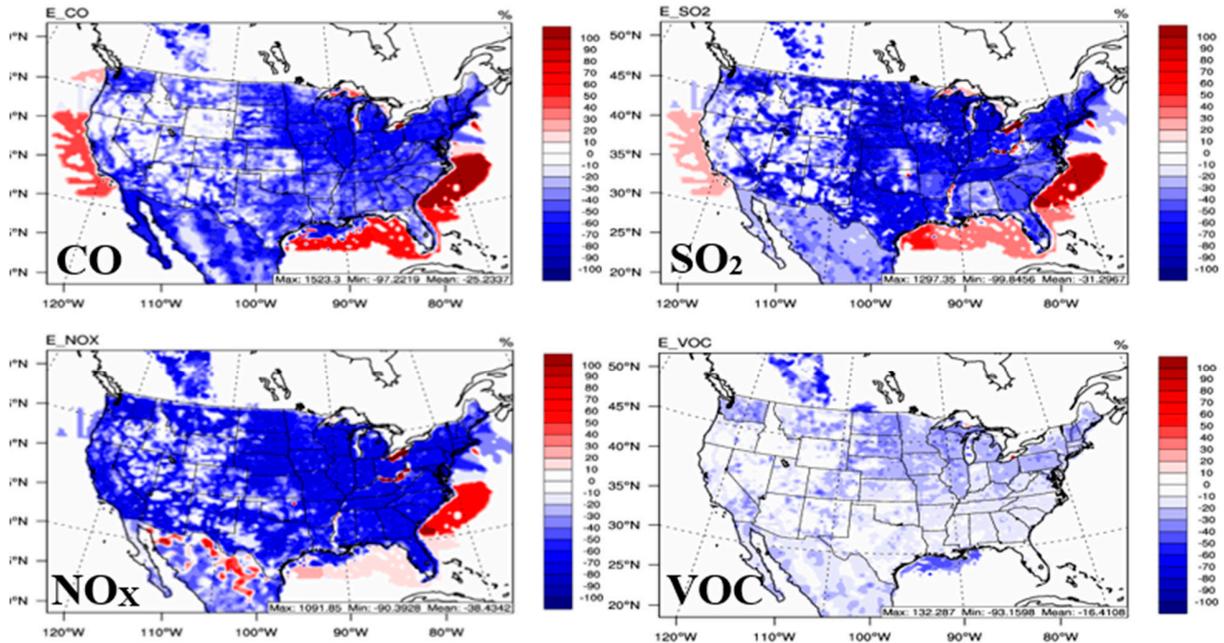


Figure S1. Spatial distributions of relative (%) changes of CO, SO₂, NO_x, and VOC emissions between annual average of future (2046 - 2055) and present (2005) conditions under the TDM/A1B (top) and TDM/B2 (bottom) scenarios.

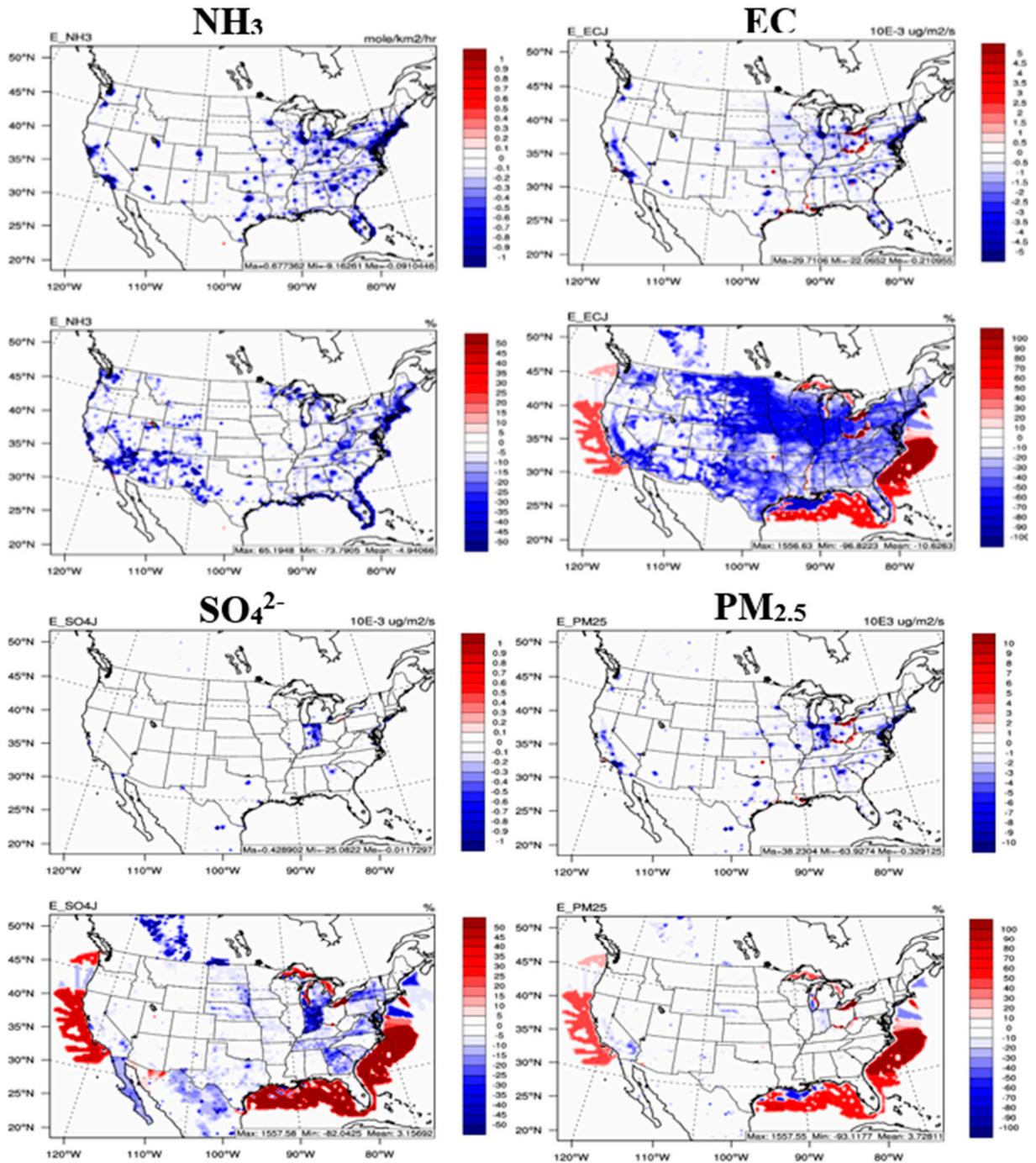


Figure S2. Spatial distributions of absolute (top panel) relative (lower panel) changes of NH₃, EC, SO₄²⁻, and PM_{2.5} emissions between annual average of future (2046 - 2055) and present (2005) conditions under the TDM/A1B scenario.

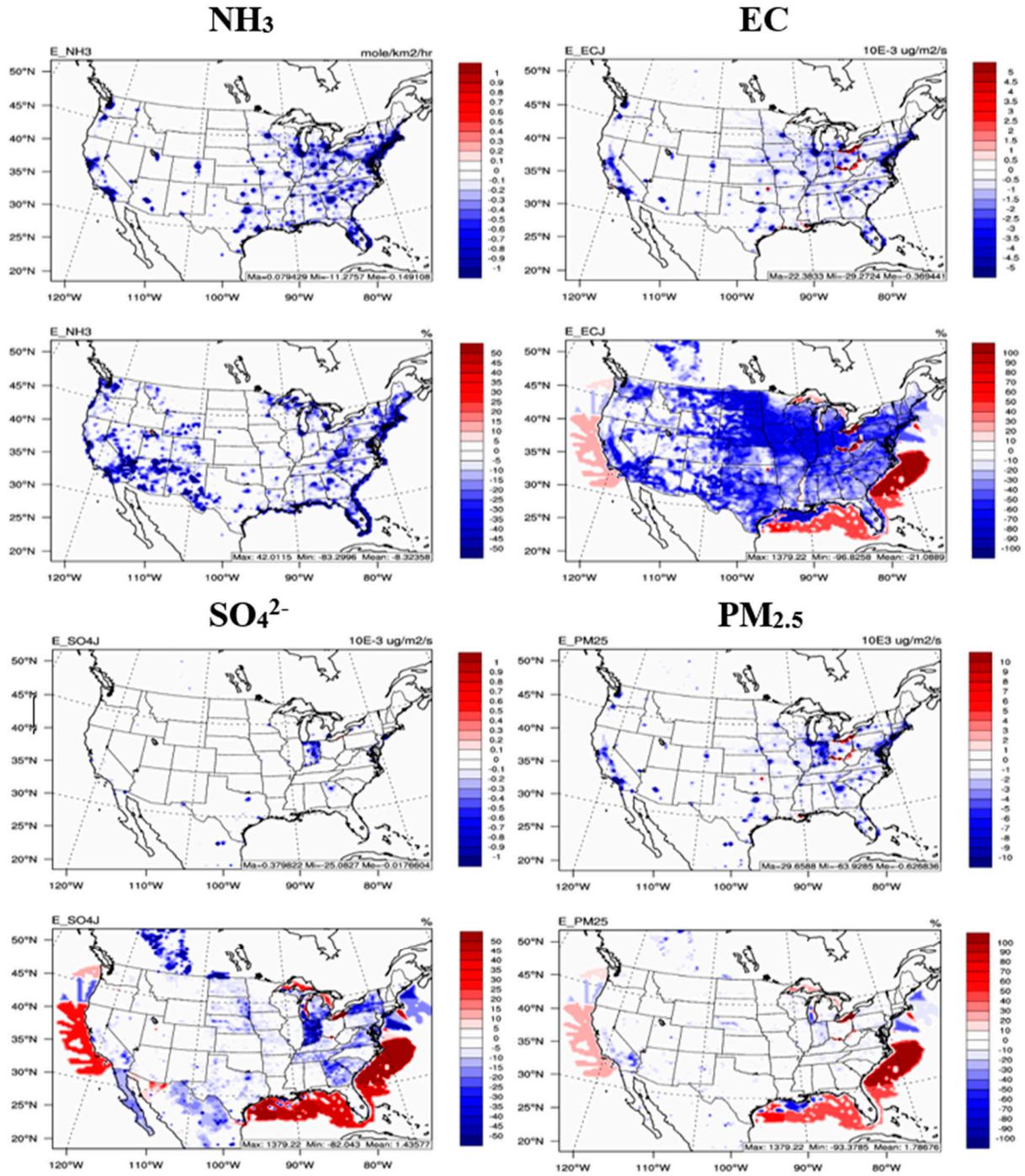


Figure S3. Same as in Figure S2, but for the TDM/B2 scenario.



TDM/A1B

Q2

TDM/B2

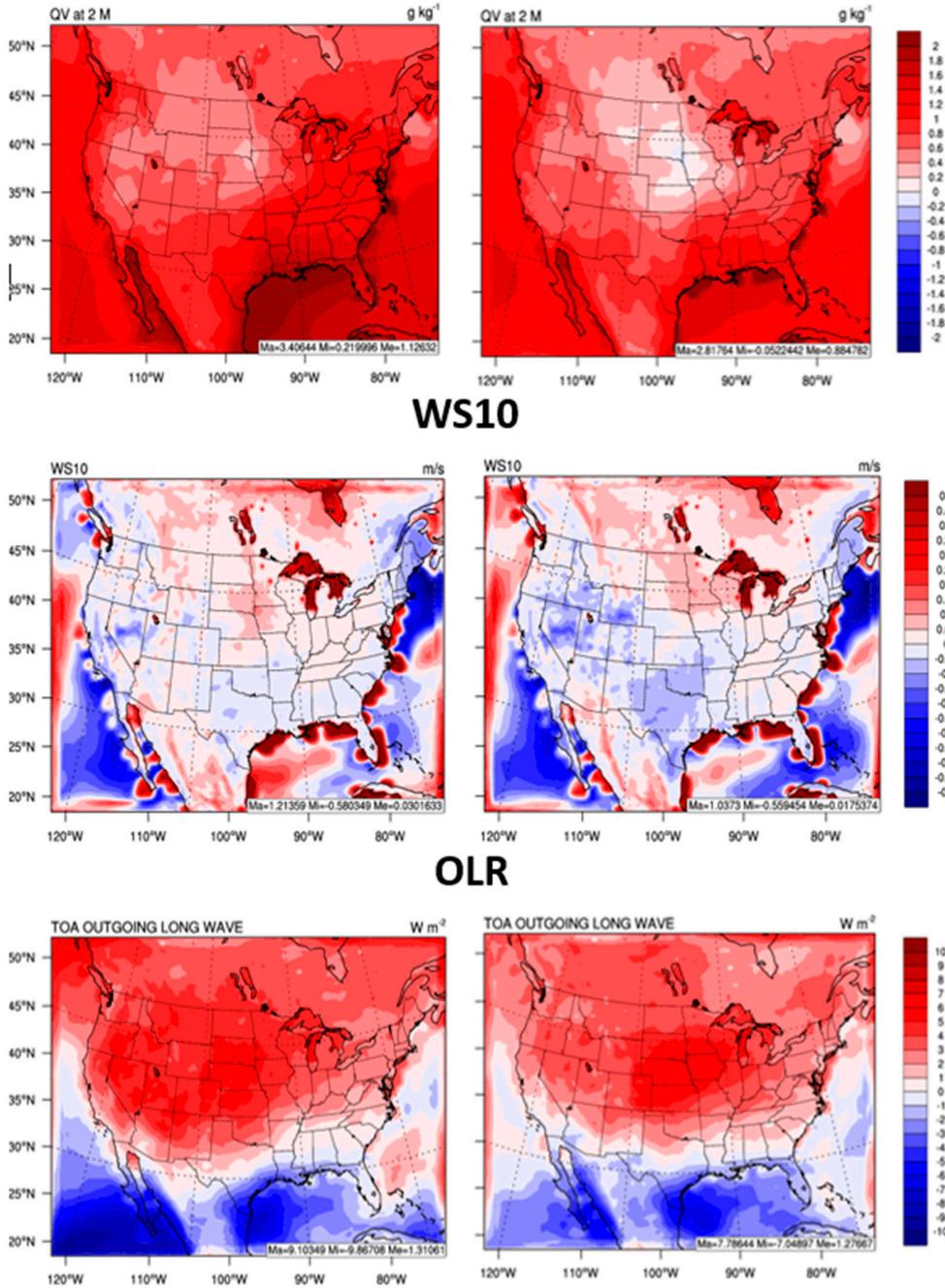


Figure S4. Absolute changes of annual average 2-meter water vapor mixing ratio (Q2), 10-meter wind speed (WS10), and outgoing longwave radiation at the top of the atmosphere (OLR) between future and current decade for TDM/A1B (left) and TDM/B2 (right).



TDM/A1B

TDM/B2

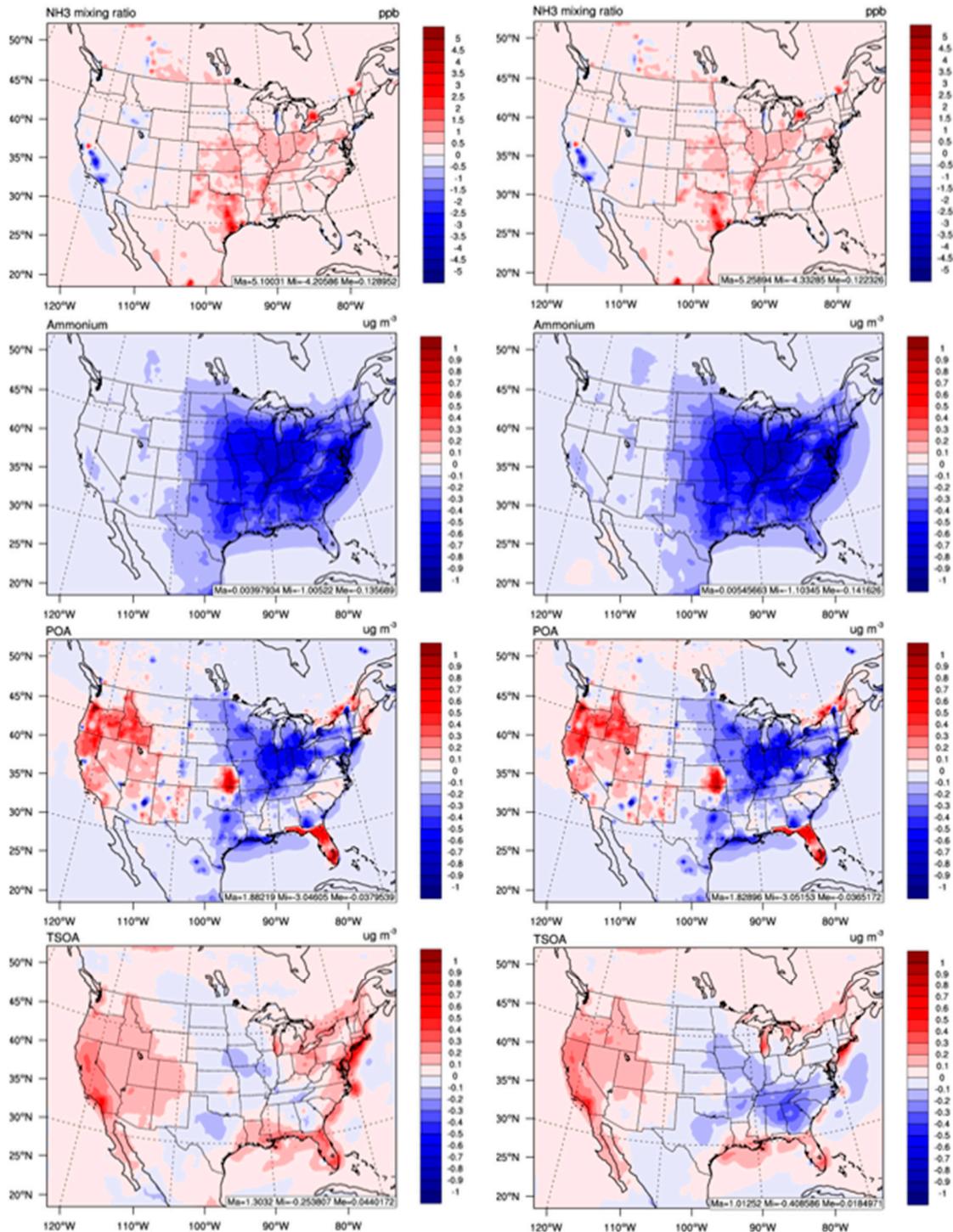


Figure S5. Absolute changes of annual average of gaseous ammonia (NH₃), ammonium (NH₄⁺), primary organic aerosol (POA), and total secondary organic aerosol (TSOA) between future and current decade for TDM/A1B and TDM/B2.