

We thank the two reviewers for their generous efforts in reviewing our manuscript again. Both reviewers suggest to provide validation results if the emission scenarios are changed. To address the concern, we provided comparison results with additional 9 cases in Figure S10.

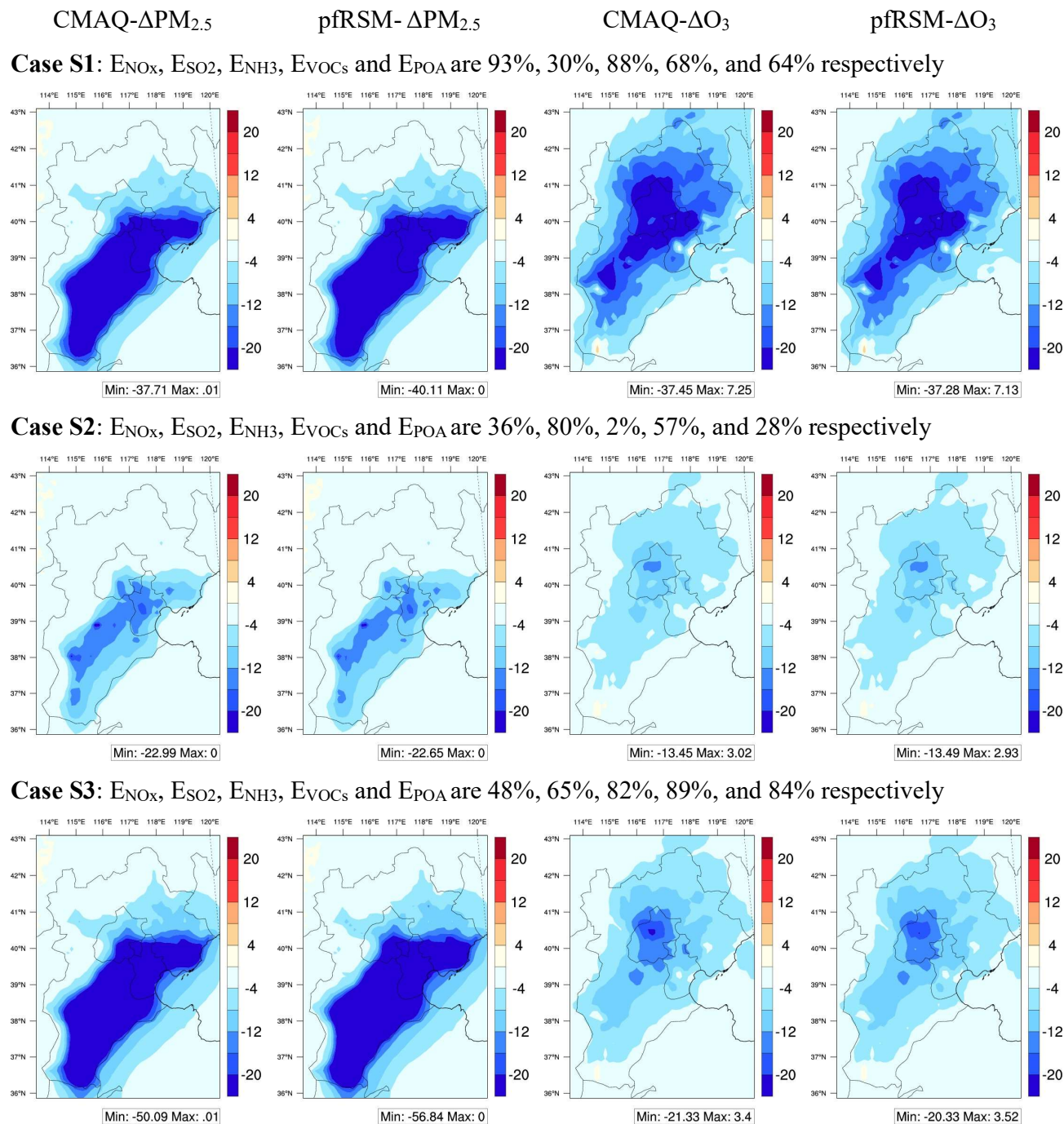


Figure S10. Spatial distribution of CMAQ-simulated and pf-RSM-predicted  $O_3$  in baseline and  $O_3$  responses in two control scenarios (monthly averages of daily 1-hour maxima  $O_3$  in July 2014, unit: ppb)

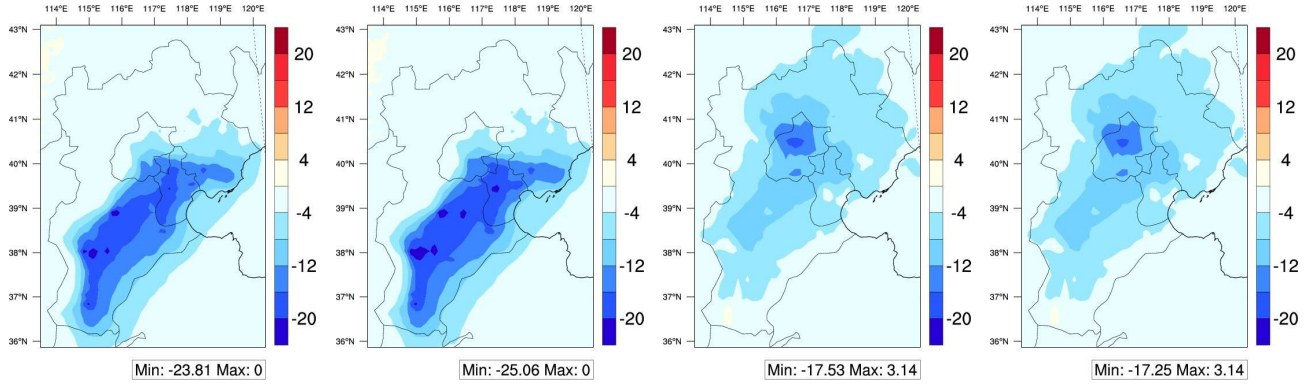
CMAQ- $\Delta PM_{2.5}$

pfRSM- $\Delta PM_{2.5}$

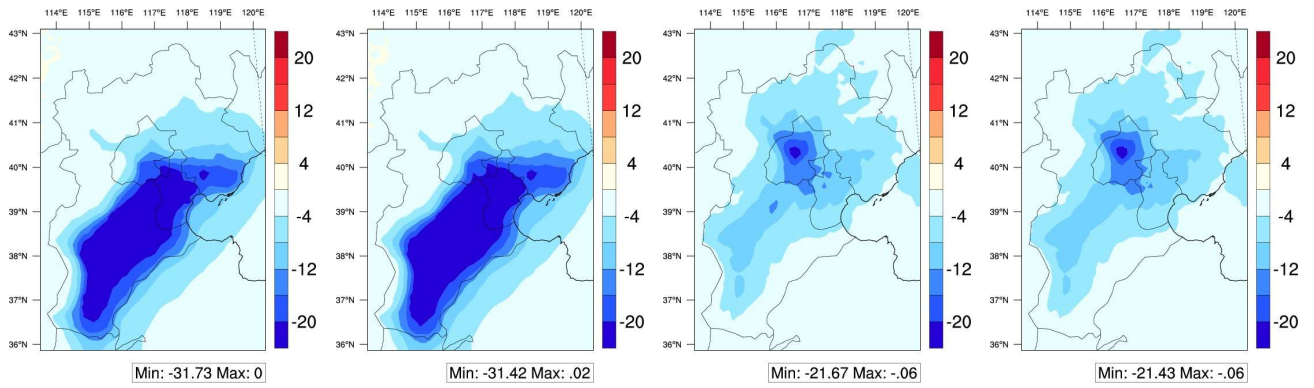
CMAQ- $\Delta O_3$

pfRSM- $\Delta O_3$

**Case S4:**  $E_{NO_x}$ ,  $E_{SO_2}$ ,  $E_{NH_3}$ ,  $E_{VOCs}$  and  $E_{POA}$  are 42%, 1%, 30%, 74%, and 43% respectively



**Case S5:**  $E_{NO_x}$ ,  $E_{SO_2}$ ,  $E_{NH_3}$ ,  $E_{VOCs}$  and  $E_{POA}$  are 16%, 57%, 61%, 92%, and 36% respectively



**Case S6:**  $E_{NO_x}$ ,  $E_{SO_2}$ ,  $E_{NH_3}$ ,  $E_{VOCs}$  and  $E_{POA}$  are 89%, 11%, 56%, 6%, and 56% respectively

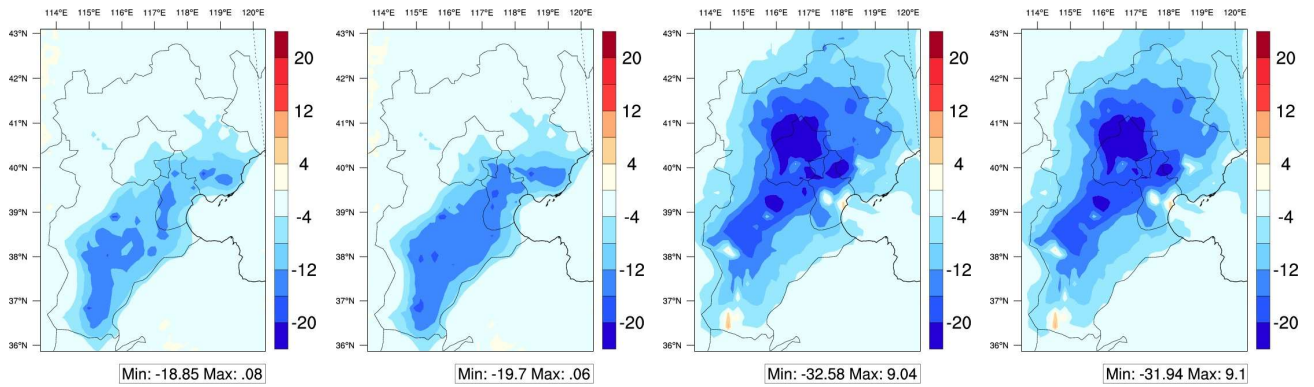
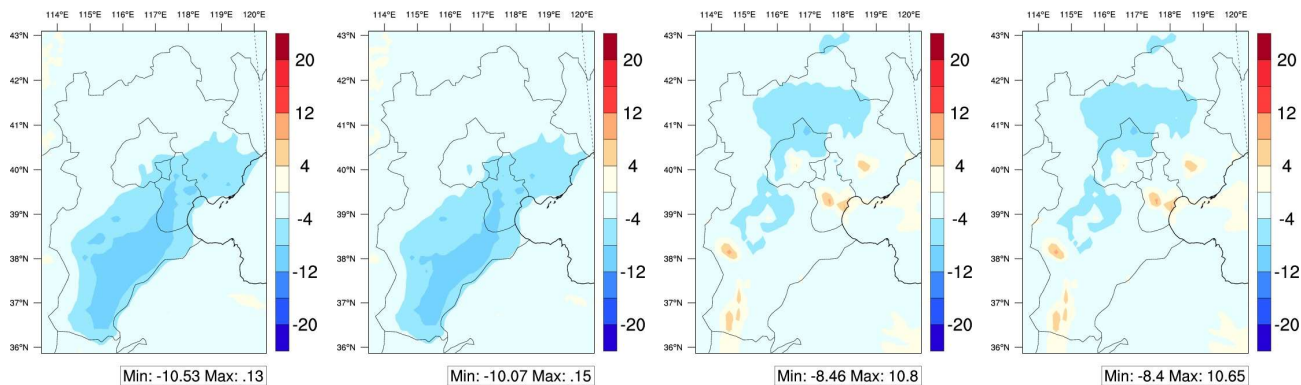


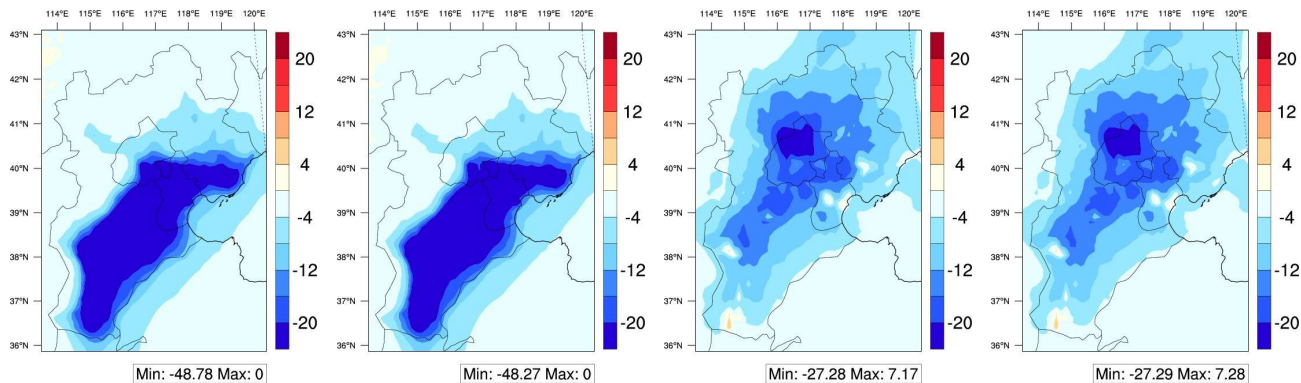
Figure S10. (cont.)

CMAQ- $\Delta PM_{2.5}$ pfRSM-  $\Delta PM_{2.5}$ CMAQ- $\Delta O_3$ pfRSM- $\Delta O_3$ 

**Case S7:**  $E_{NOx}$ ,  $E_{SO_2}$ ,  $E_{NH_3}$ ,  $E_{VOCs}$  and  $E_{POA}$  are 43%, 17%, 60%, 1%, and 29% respectively



**Case S8:**  $E_{NOx}$ ,  $E_{SO_2}$ ,  $E_{NH_3}$ ,  $E_{VOCs}$  and  $E_{POA}$  are 78%, 85%, 45%, 81%, and 96% respectively



**Case S9:**  $E_{NOx}$ ,  $E_{SO_2}$ ,  $E_{NH_3}$ ,  $E_{VOCs}$  and  $E_{POA}$  are 77%, 10%, 48%, 51%, and 7% respectively

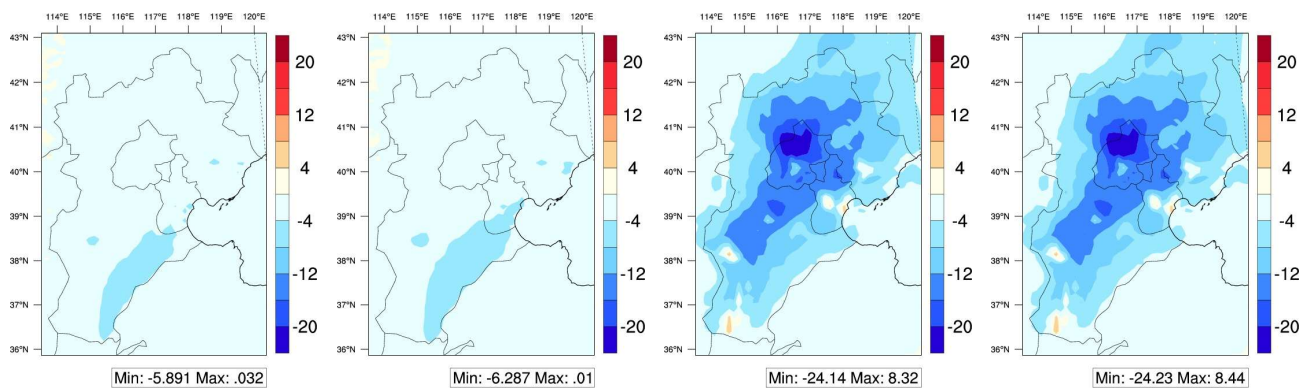


Figure S10. (cont.)