1 **Supporting Information for**

2 **Identifying the spatiotemporal variations of ozone formation regimes across**

3 **China from 2005 to 2019 based on polynomial simulation and causality analysis**

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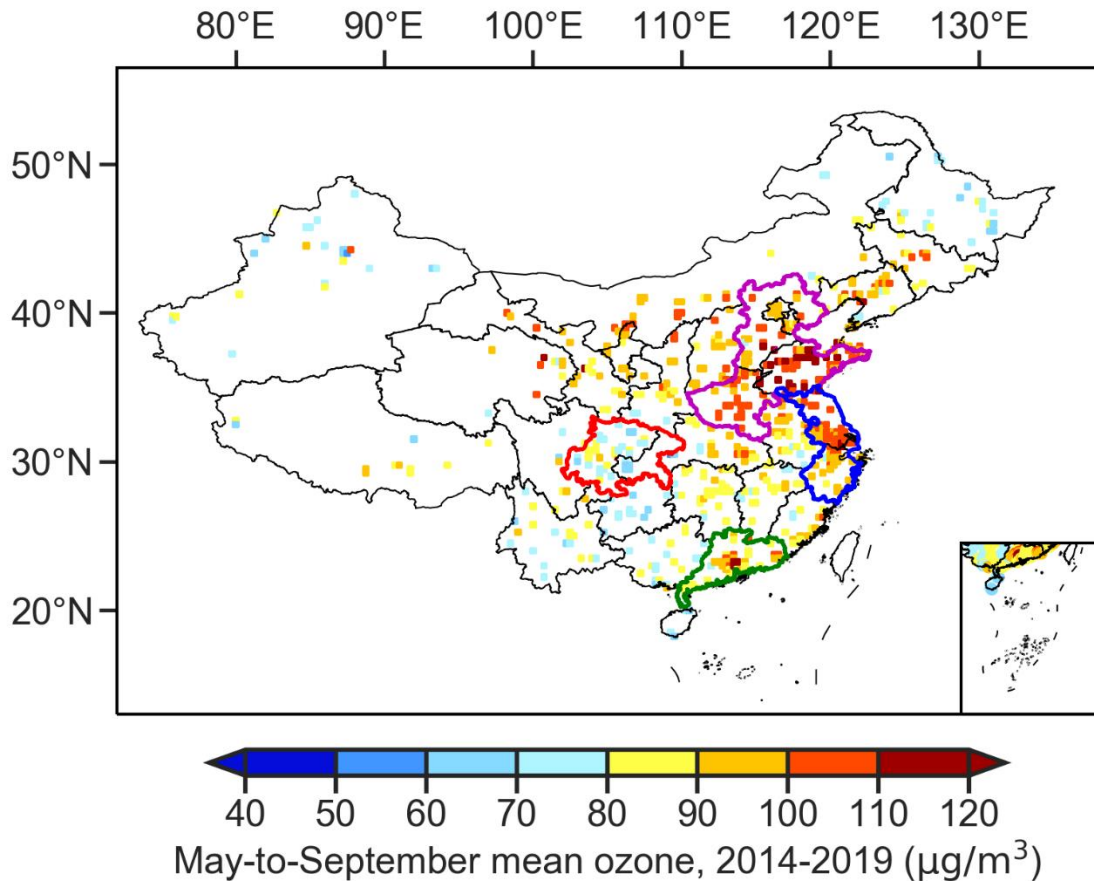
Fig. S1. The May-to-September mean hourly surface ozone network data from 2014 to 2019. Mean hourly surface ozone concentrations were calculated on the 0.25° × 0.25° grid. Purple, blue, green and red outlines indicate the boundaries of North China Plain (NCP), Yangtze River delta (YRD), Pearl River delta (PRD), and Sichuan Basin (SCB), respectively.
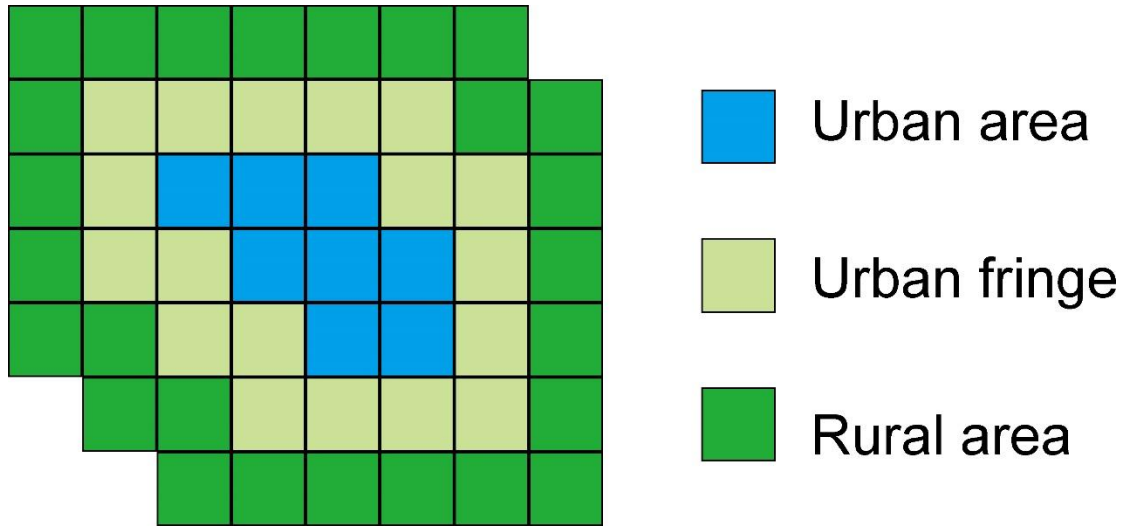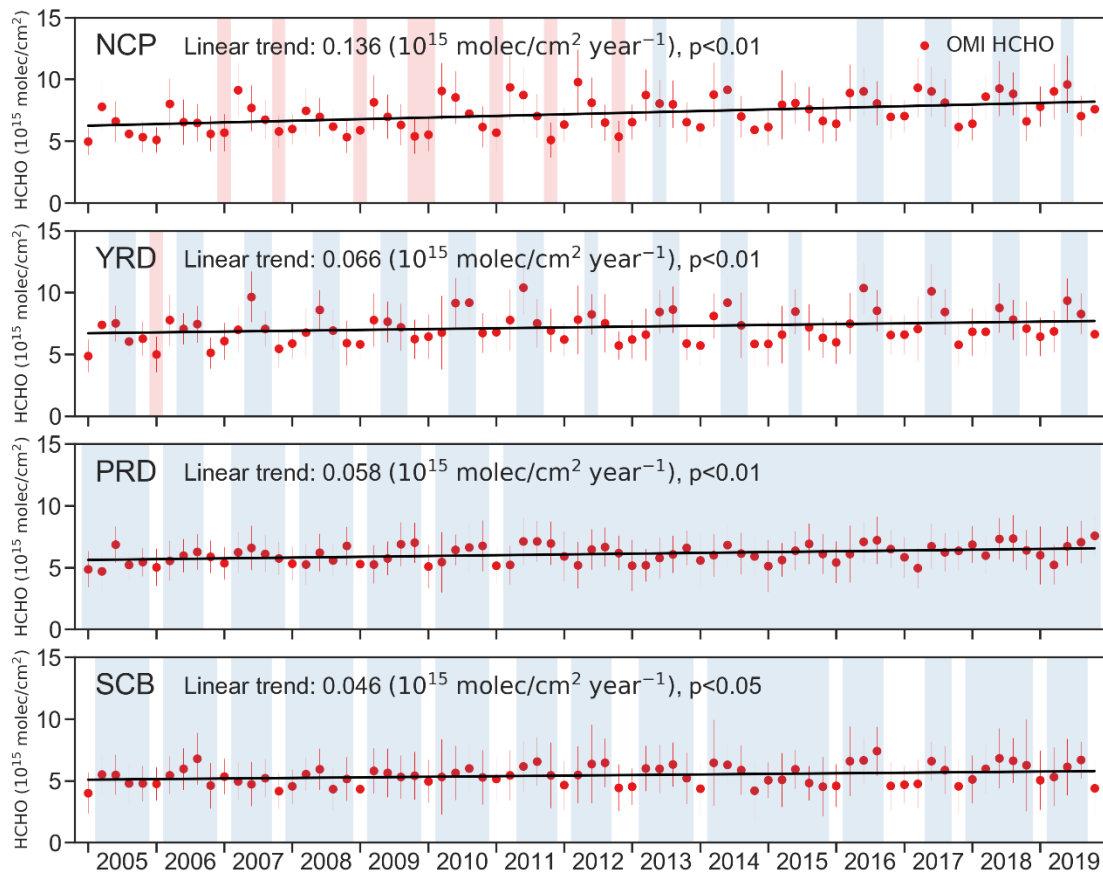
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23   **Fig. S2. The geographical locations of urban area, urban fringe and rural area.**
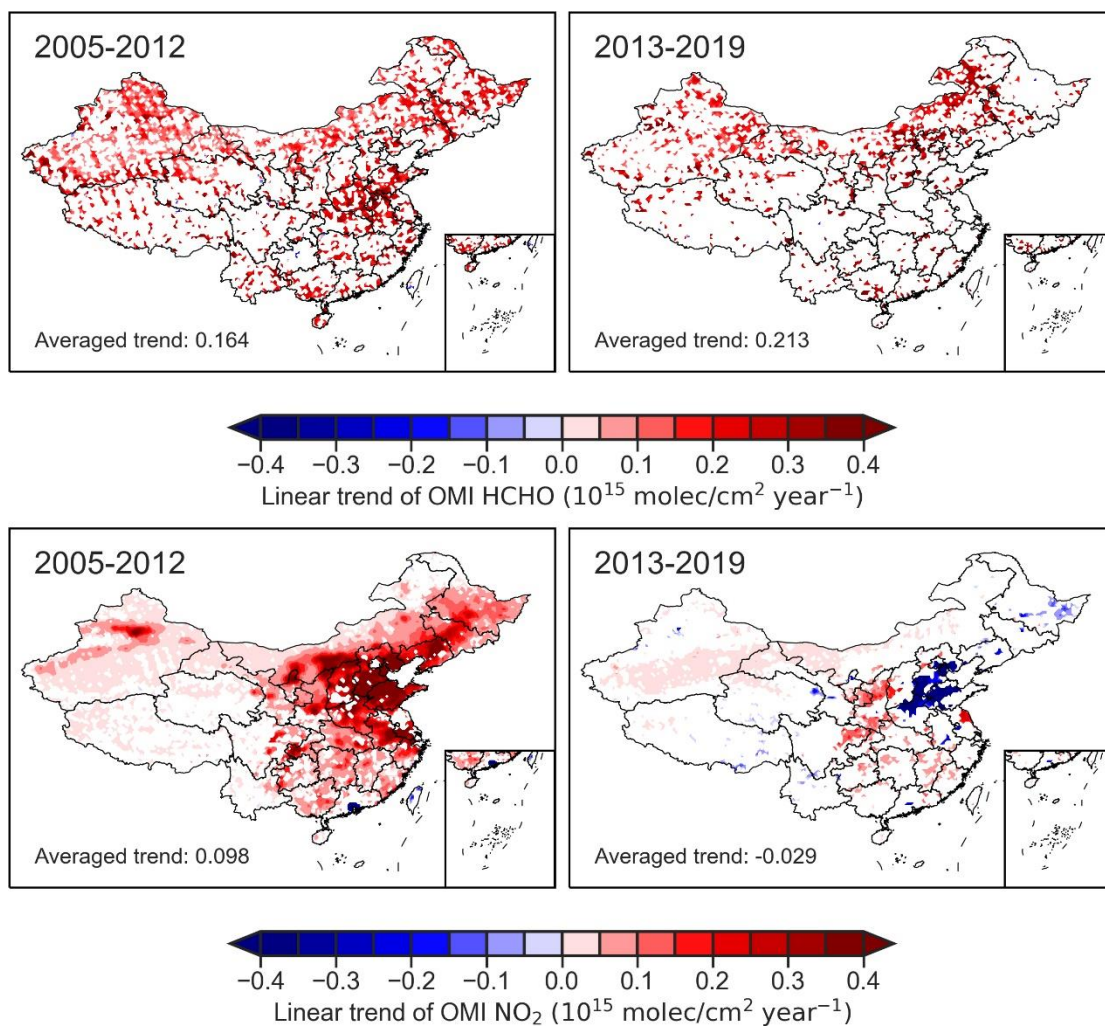
Fig. S3. The linear trends of May-to-September HCHO and NO₂ across China during the period of 2005-2012 and 2013-2019.
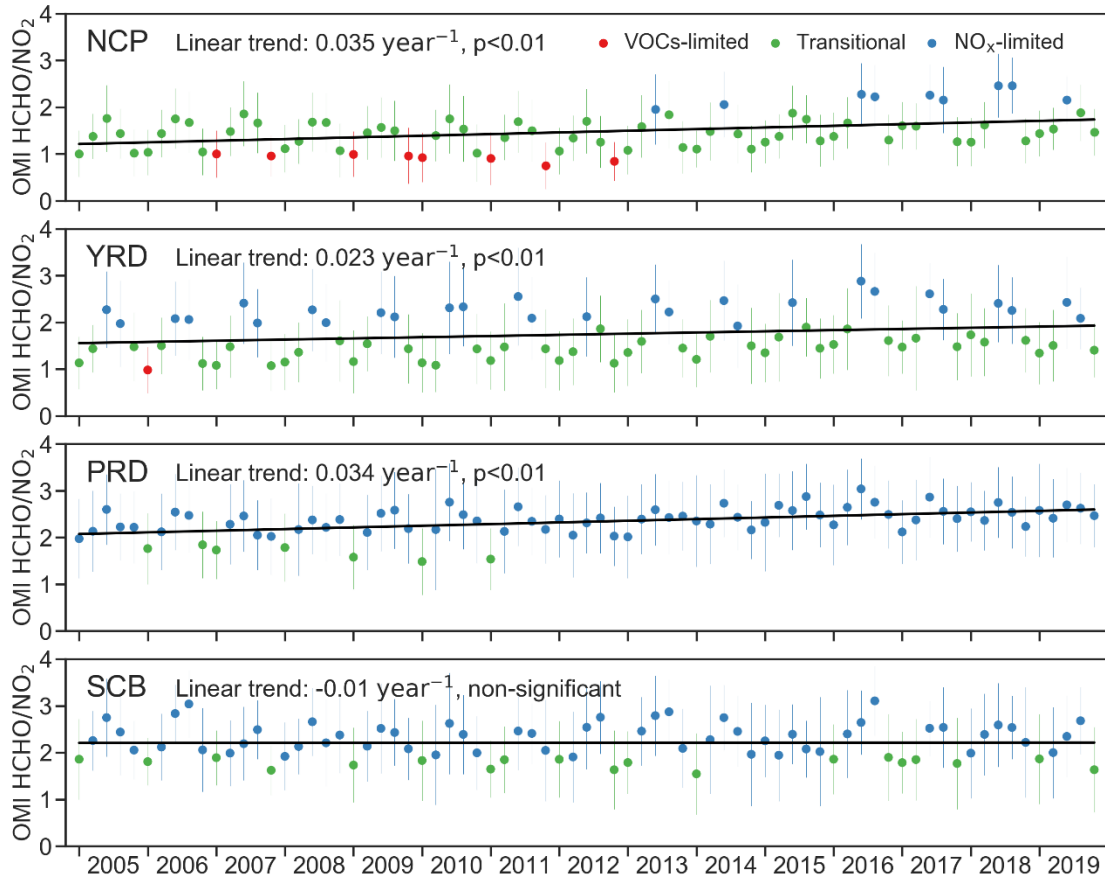
27

28 **Fig. S4. The time series of HCHO columns in the four megacity clusters from 2005**

29 **to 2019. Black lines indicate the linear trend of HCHO columns. Red, white and**

30 **blue areas stand for VOC-limited, transitional and NO_x-limited regimes,**

31 **respectively.**

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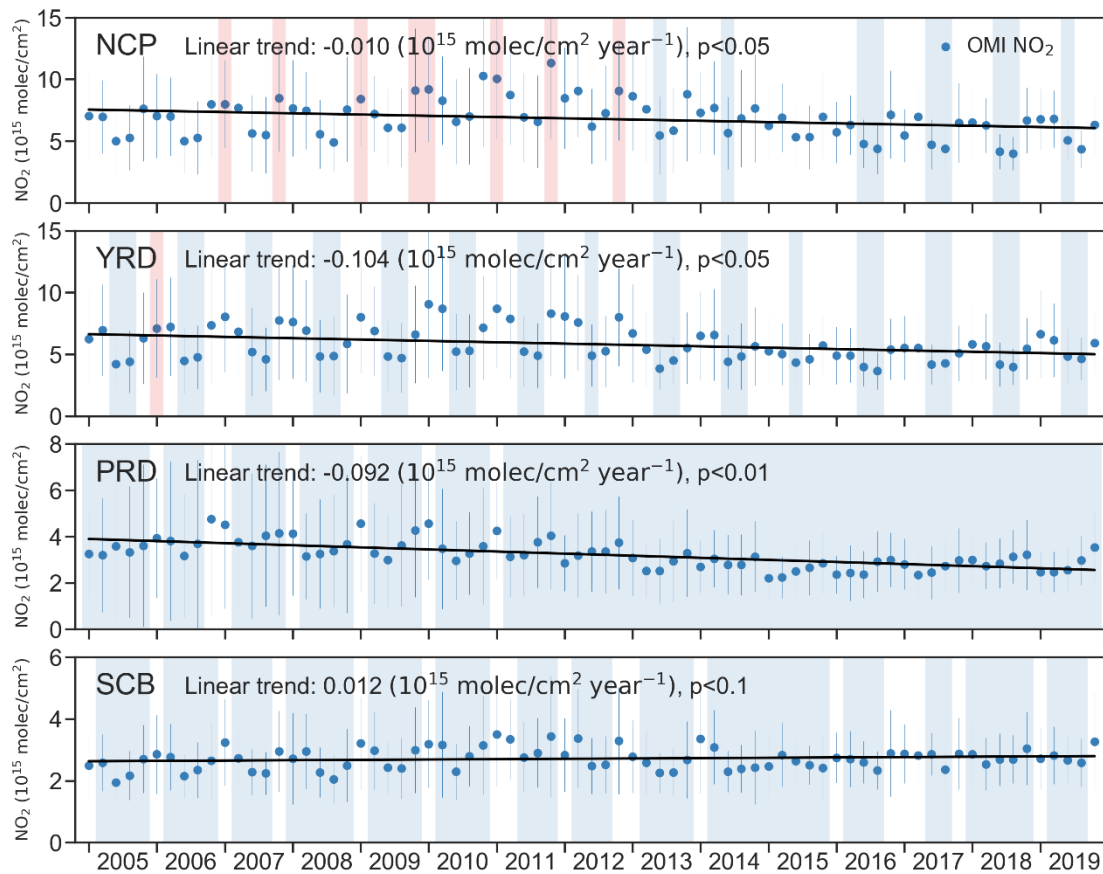
Fig. S5. The time series of NO₂ columns in the four megacity clusters from 2005 to

2019. Black lines indicate the linear trend of NO₂ columns. Red, white and blue

areas stand for VOC-limited, transitional and NOₓ-limited regimes, respectively.

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Fig. S6. The time series of HCHO/NO₂ in the four megacity clusters from 2005 to

2019. Black lines indicate the linear trend of HCHO/NO₂. Red, green and blue dots

stand for VOC-limited, transitional and NOₓ-limited regimes, respectively.