Table S1. Initial mixing ratio in the mixed-layer.

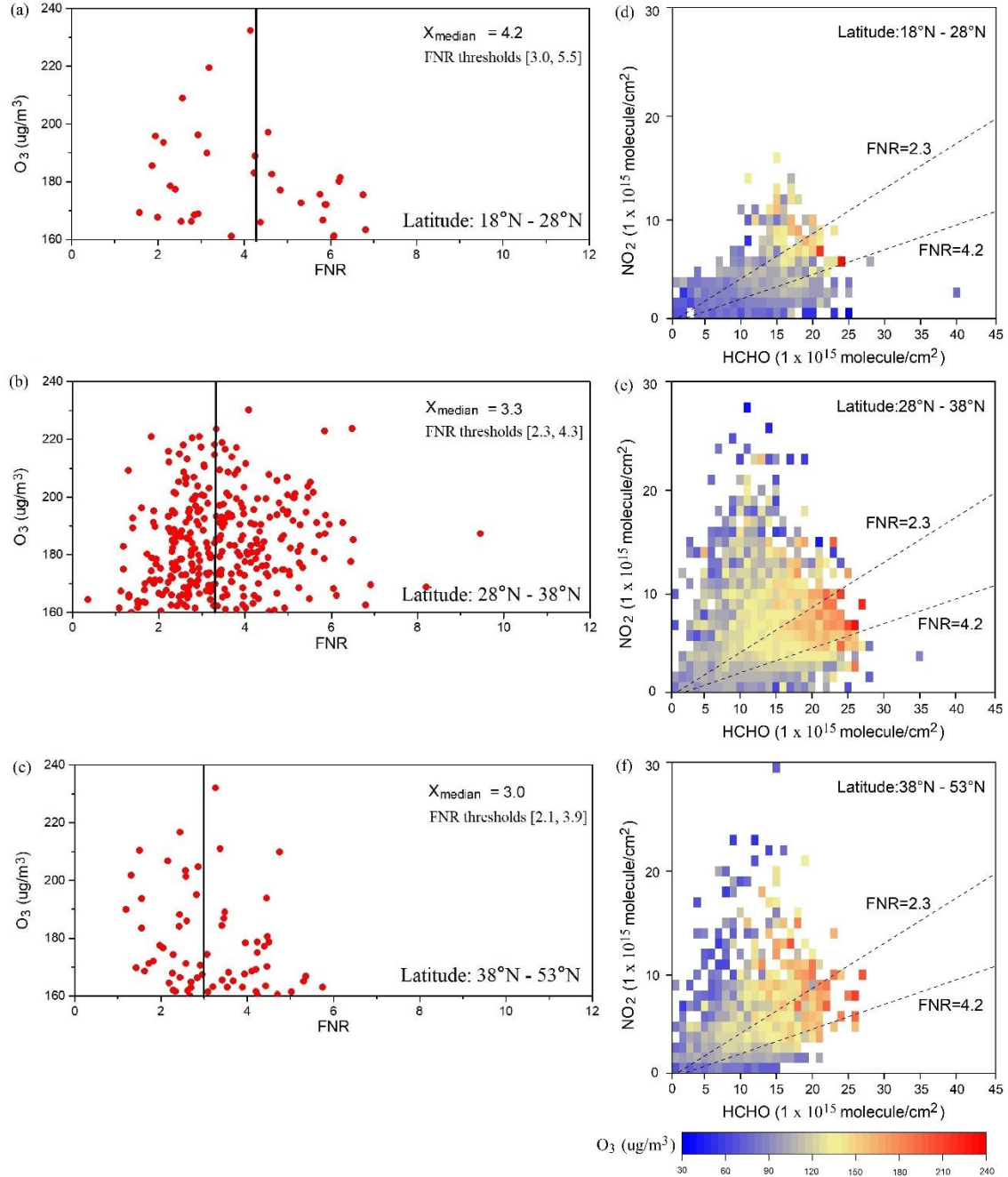| Species	O_3	NO	CH_4	isoprene	CO	H_2O_2
Units (ppb)	30	0	1724	0	105	0.1

Figure S1. (a) Derived FNR thresholds in 8°N-28°N. (b) same as (a), but in 28°N-38°N. (c) same as (a), but in 38°N-53°N. (d) The monthly mean in-situ O_3 concentrations versus NO_2 columns and

HCHO columns from OMI in 8 °N-28 °N. (e) same as (d), but in 28 °N-38 °N. (e) same as (d), but in 38 °N-53 °N.
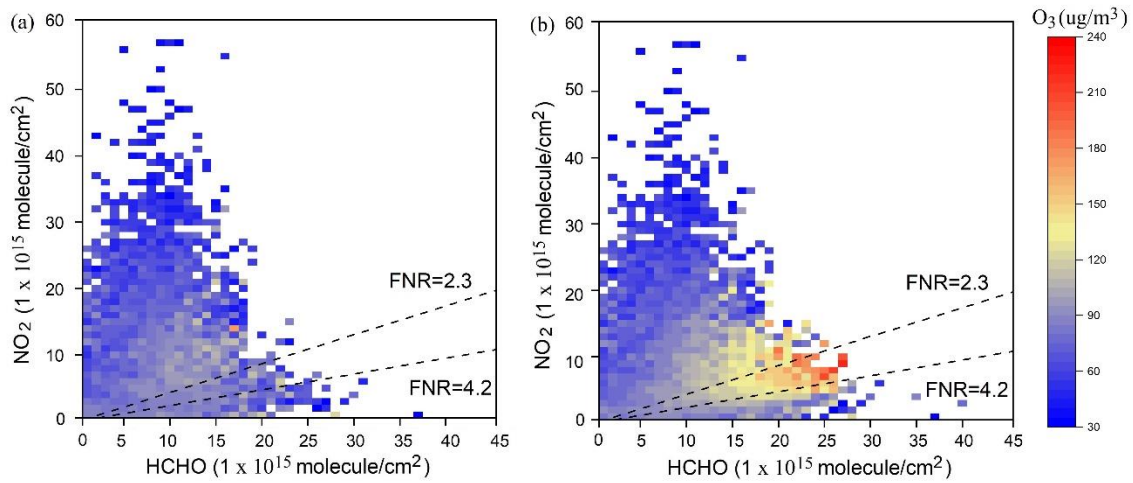

Figure S2. (a) The 360 cities' monthly mean in-situ O_3 concentrations versus NO_2 columns and HCHO columns from OMI observations in winter (Dec-Jan-Feb) during 2016-2019. (b) same as (a), but for all seasons.
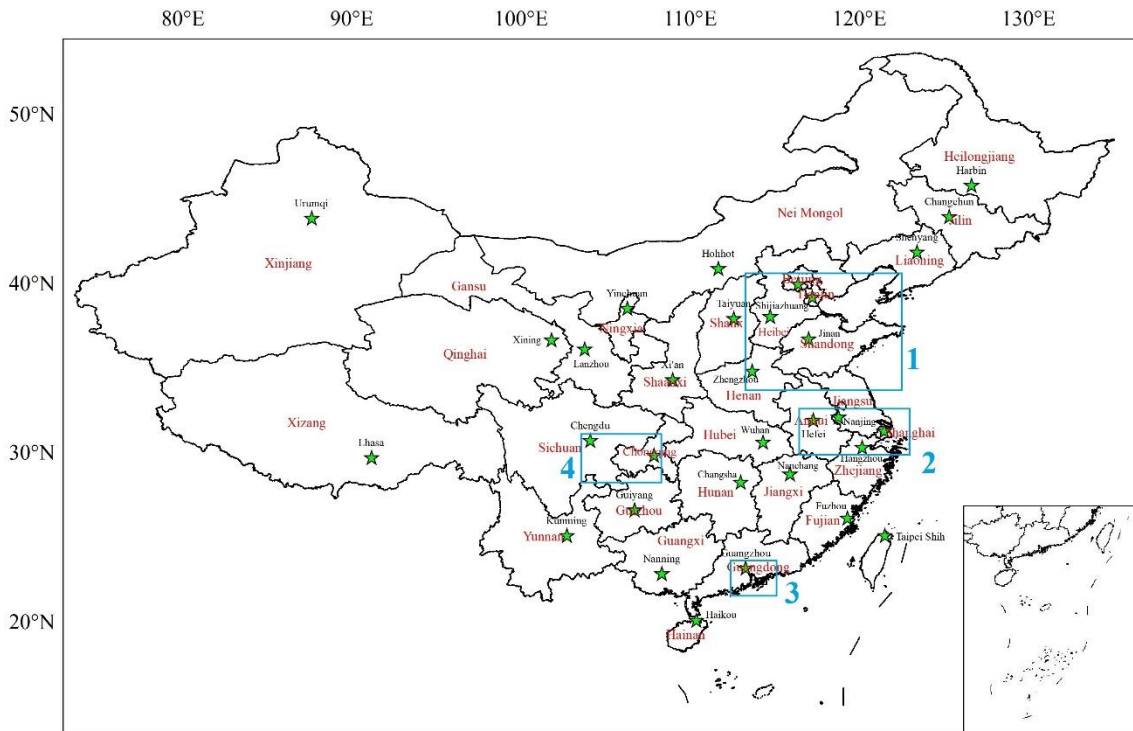

Figure S3. China provincial administrative division map. Red texts represent the provinces. Green stars represent the location of provincial capital city of each province. Black texts represent city

names. The blue frames 1, 2, 3, and 4 represent the North China Plain (NCP), the Yangtze River Delta (YRD), the Pearl River Delta (PRD) and the Sichuan Basin respectively.
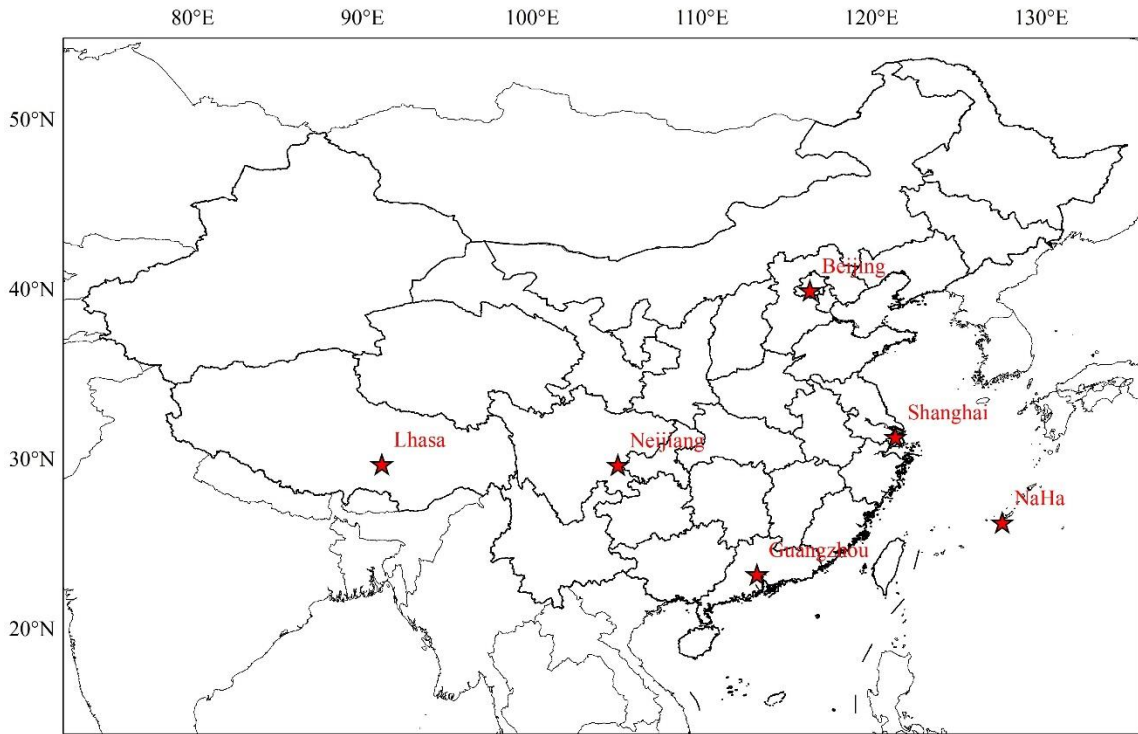

Figure S4. Location of the six cities (Beijing, Shanghai, Guangzhou, Neijiang, Lhasa and NaHa).