

*Supplementary Material*

**Concentration and community composition of airborne bacteria staged  
responding to the haze events in Beijing, China**

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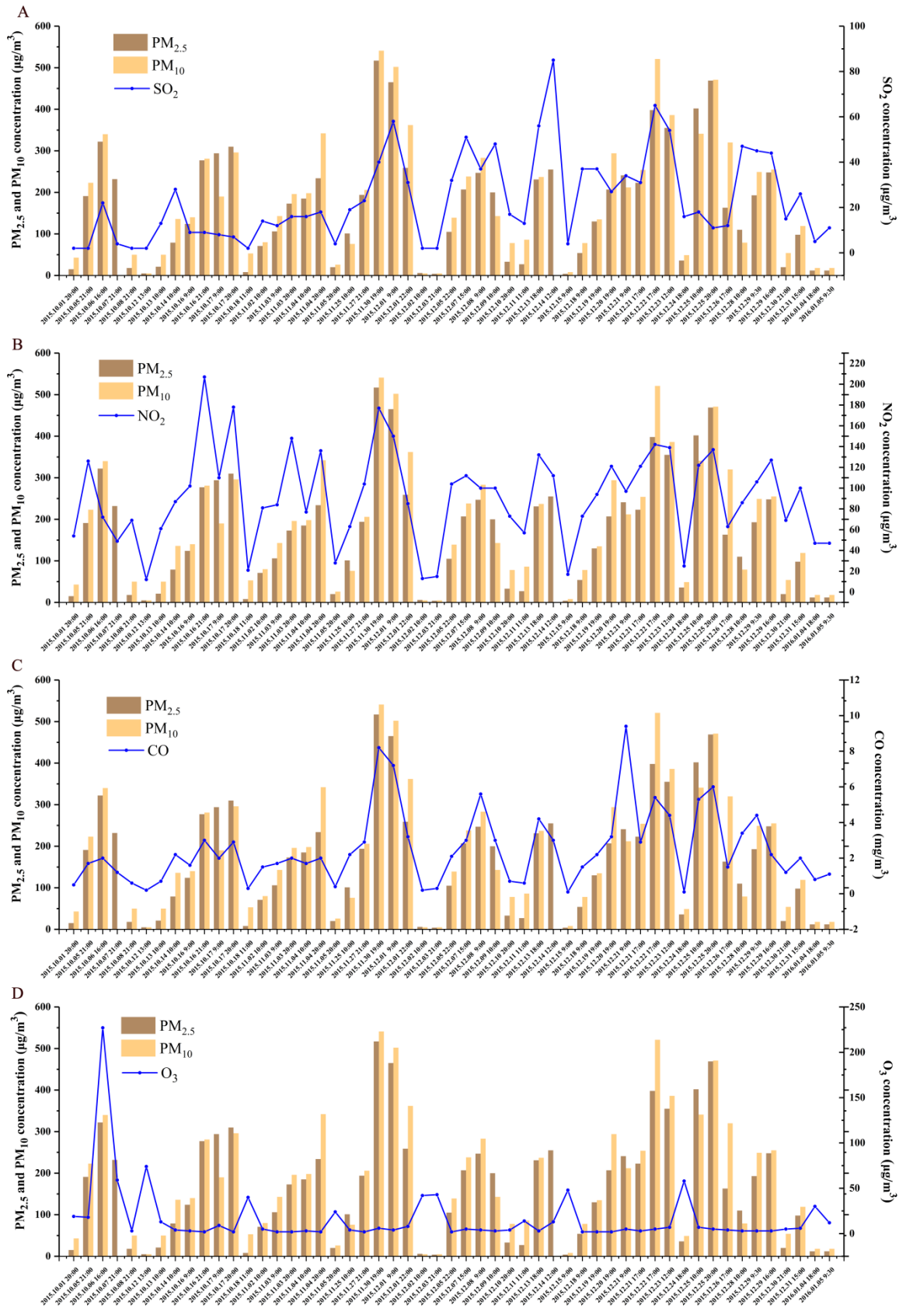
**\* Correspondence:**

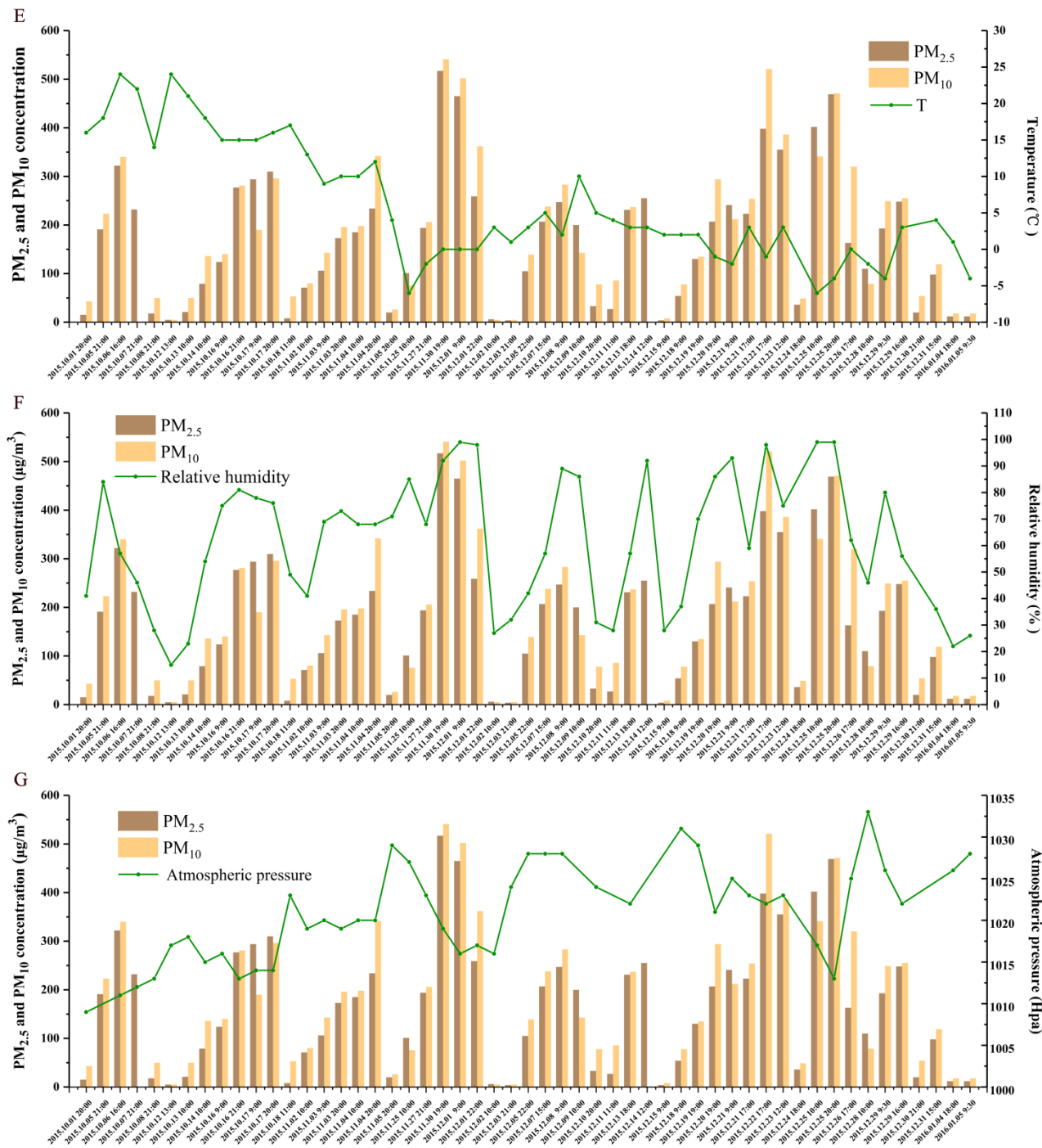
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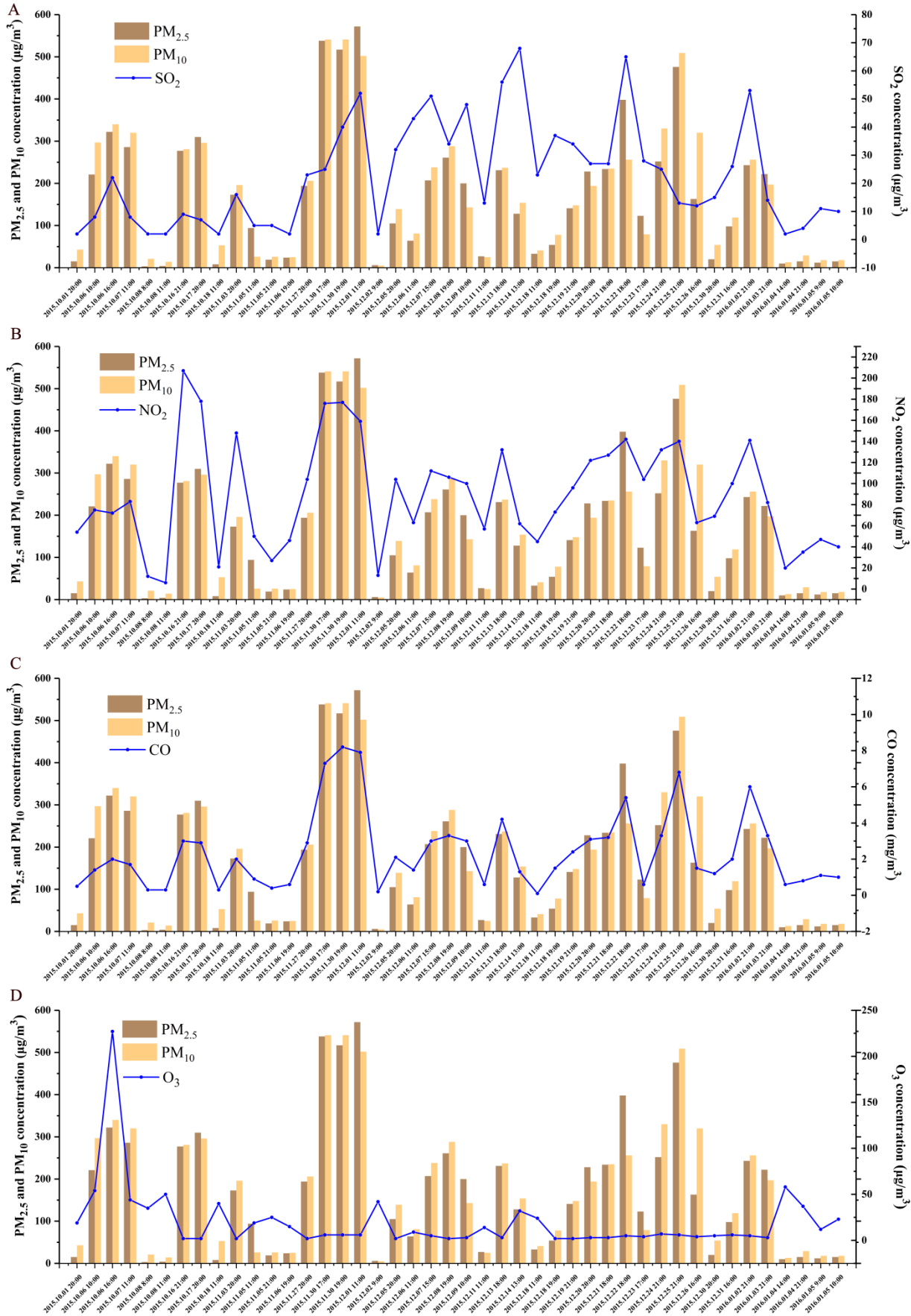
Supplementary Figures and Tables

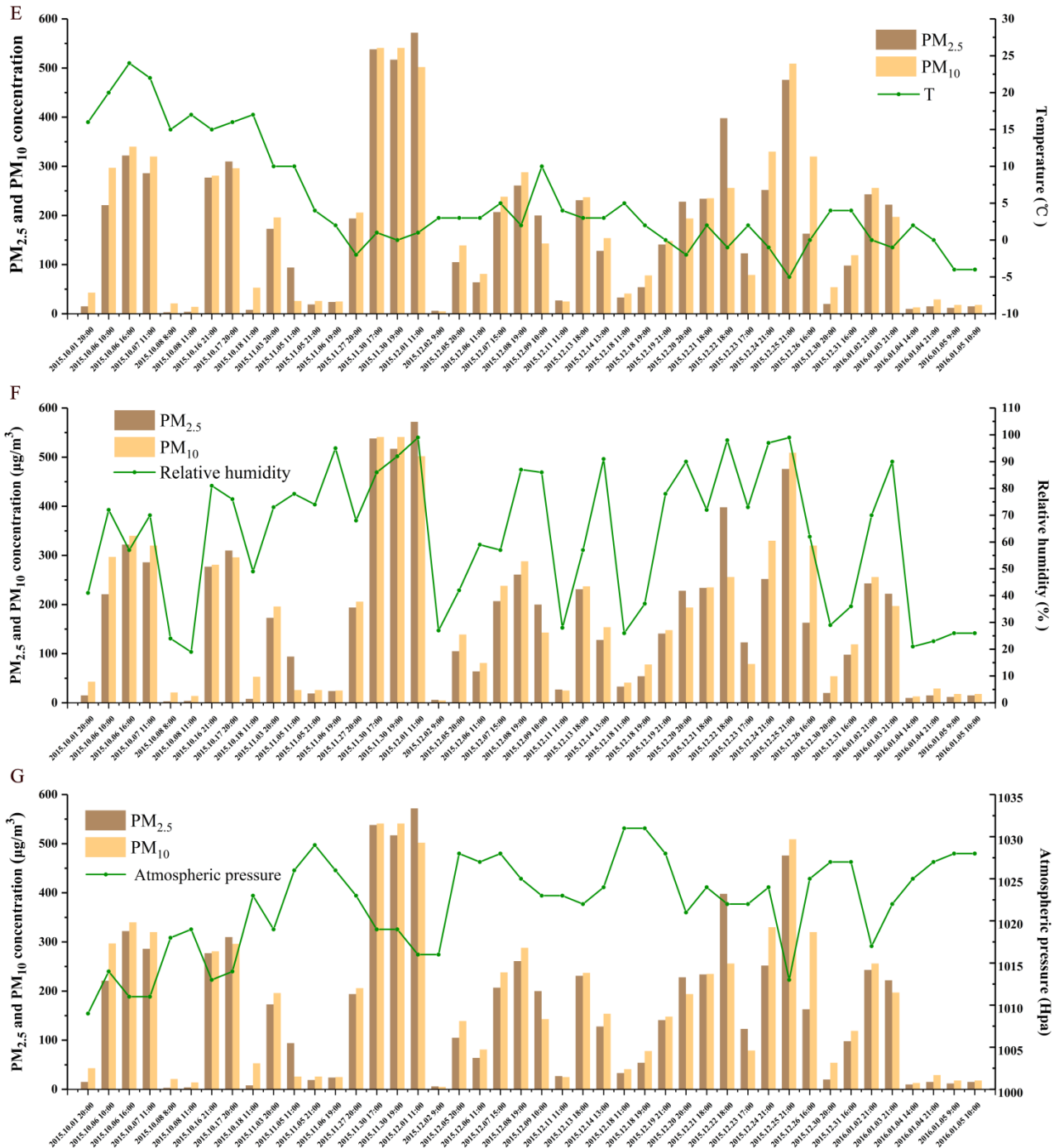
1.1 Supplementary Figures



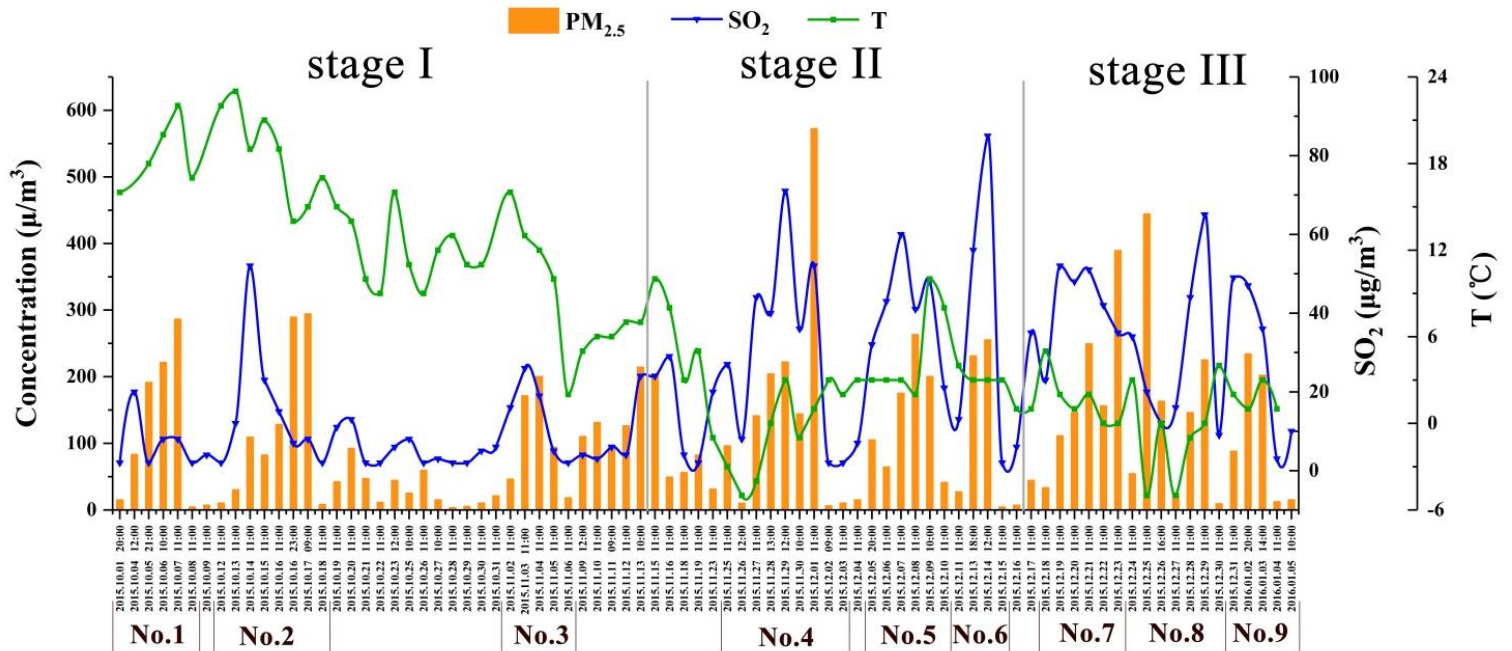


**Supplementary Figure 1.** Pollutant concentrations and meteorological data when samples were collected to enumerate airborne bacterial concentration. (A) SO<sub>2</sub> concentration, (B) NO<sub>2</sub> concentration, (C) CO concentration, (D) O<sub>3</sub> concentration, (E) Temperature, (F) Relative humidity, and (G) atmospheric pressure.

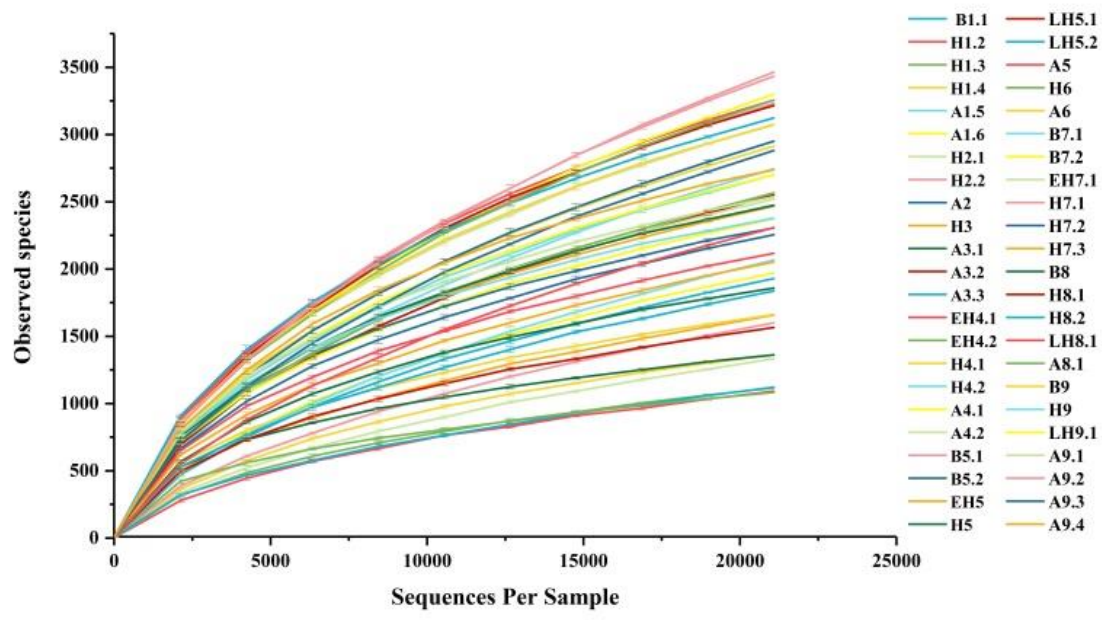




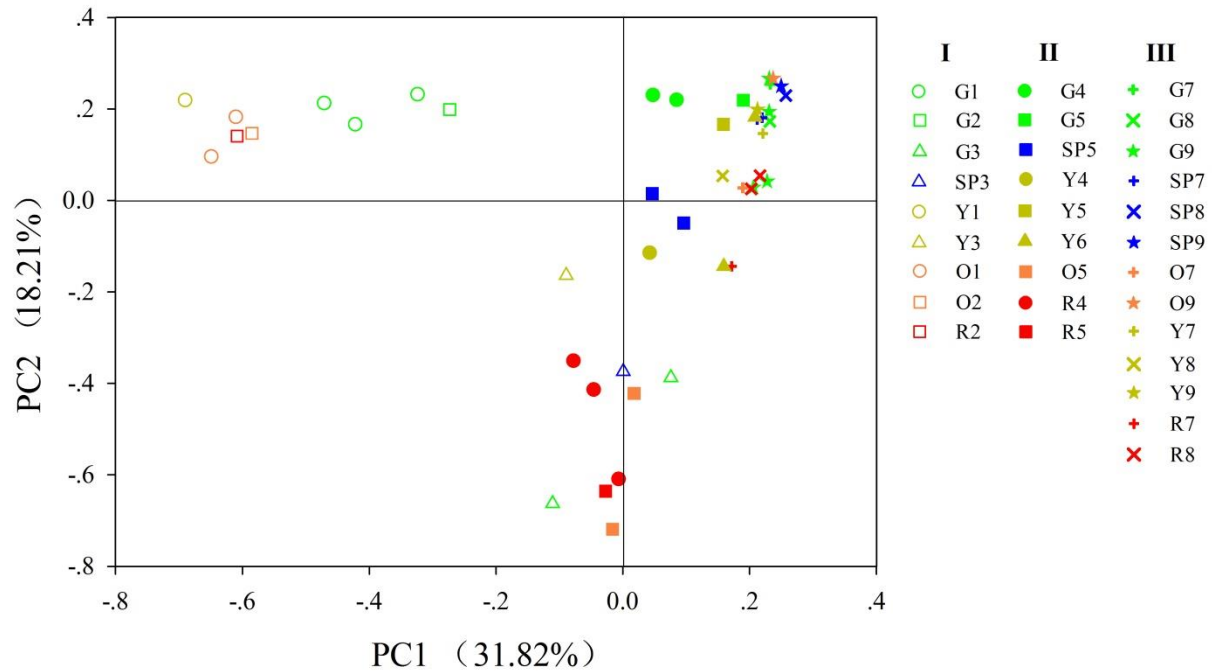
**Supplementary Figure 2.** Pollutant concentrations and meteorological data when samples were collected to analyze airborne bacterial community structure. (A) SO<sub>2</sub> concentration, (B) NO<sub>2</sub> concentration, (C) CO concentration, (D) O<sub>3</sub> concentration, (E) Temperature, (F) Relative humidity, and (G) atmospheric pressure.



**Supplementary Figure 3.** Daily temperature and concentration of PM<sub>2.5</sub> and SO<sub>2</sub> during October 1st 2015 to January 5th 2016. During this period, nine independent haze events (No. 1-No. 9) occurred and were divided into three stages for comparison.

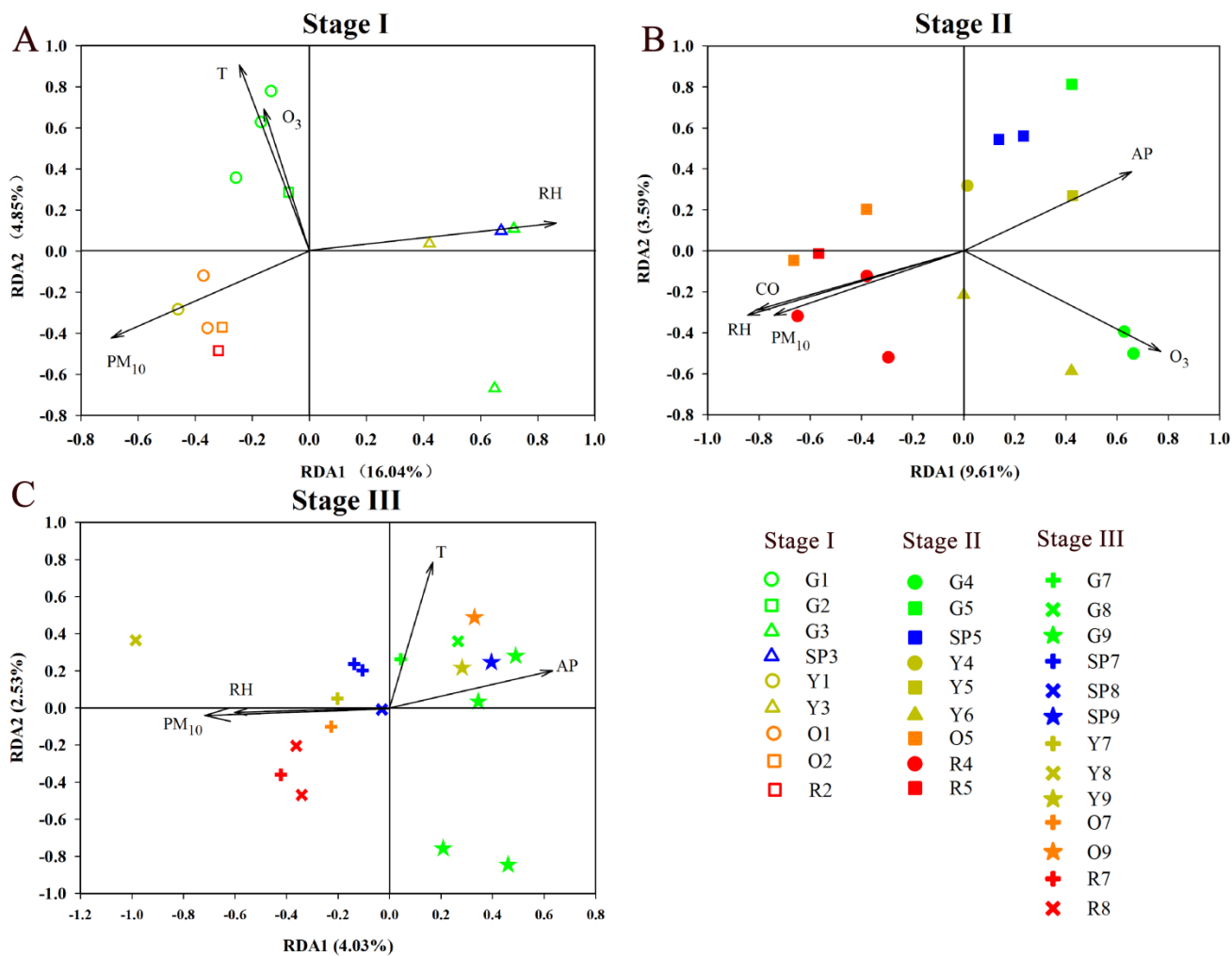


**Supplementary Figure 4.** Rarefaction curves of all the samples

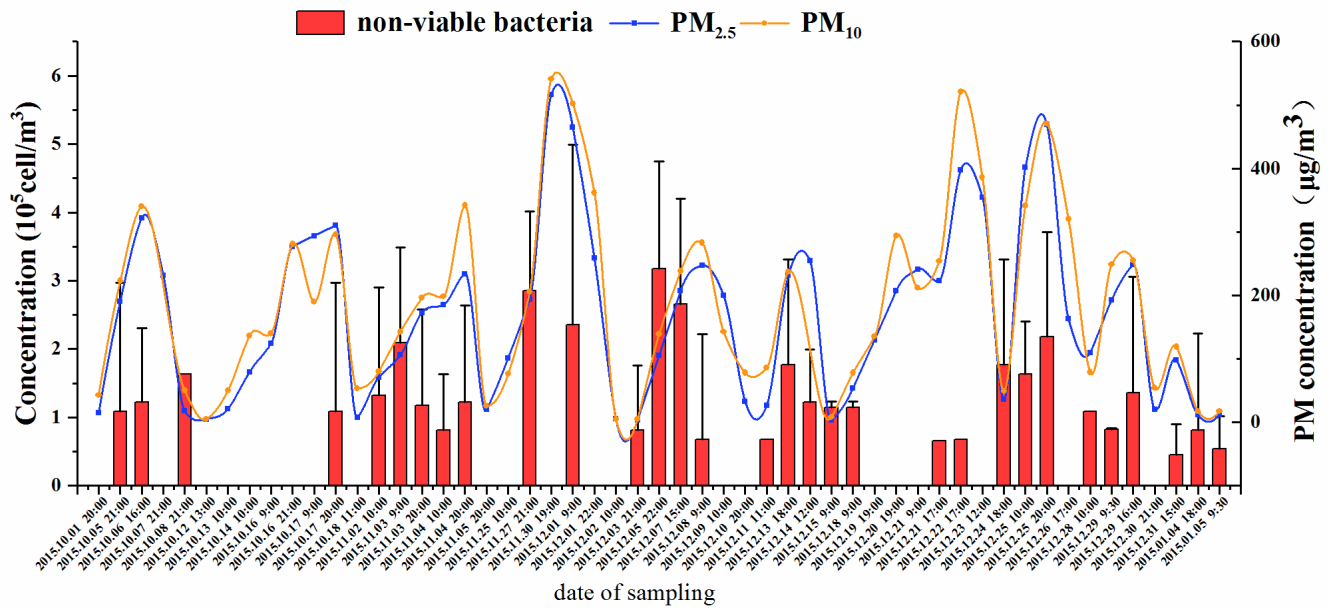


**Supplementary Figure 5.** Principal component analysis of the bacterial community. G, SP, Y, O, and R respectively represent haze pollution levels “Green”, “Slightly Polluted”, “Yellow”, “Orange” and “Red”. No.1-No.9 represent the nine haze events during Oct. 1st 2015 to Jan. 5th 2016.





**Supplementary Figure 6.** Redundancy analysis (RDA) of biological with environmental parameters at Stage I (A), Stage II (B) and Stage III (C) independently. G, SP, Y, O, and R respectively represent haze pollution levels “Green”, “Slightly Polluted”, “Yellow”, “Orange” and “Red”. No. 1-No. 9 represent the nine haze events during Oct. 1st 2015 to Jan. 5th 2016. Only significant environmental variables are shown in this figure.



**Supplementary Figure 7.** The concentration of non-viable airborne bacteria,  $\text{PM}_{2.5}$ , and  $\text{PM}_{10}$  during nine haze events from October 1st 2015 to January 5th 2016. Error bars represent SD of samples from non-haze or haze days in each haze event, respectively.

## 1.2 Supplementary Tables

**Supplementary Table 1.** Spearman's correlation coefficients between airborne bacterial concentration and pollutants, meteorological parameters.

	PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	O <sub>3</sub>	CO	AP	T	RH	WS
C <sub>ab</sub> <sup>a</sup>	0.624 <sup>**</sup>	0.655 <sup>**</sup>	0.447 <sup>**</sup>	0.561 <sup>**</sup>	-0.268	0.543 <sup>**</sup>	-0.015	-0.297	0.421 <sup>**</sup>	-0.340 <sup>*</sup>

\*\*  $P < 0.01$  (2-tailed), \*  $P < 0.05$  (2-tailed)

<sup>a</sup> C<sub>ab</sub>: concentration of airborne bacteria.

**Supplementary Table 2.** Spearman's correlation coefficients between airborne bacterial concentration and pollutants, meteorological parameters at each stage, respectively.

	Concentration of airborne bacteria		
	Stage I	Stage II	Stage III
PM <sub>2.5</sub>	0.697**	0.687**	0.495*

**Supplementary Table 3.** Pearson's correlation coefficients between pollutants, meteorological parameters and alpha diversity indexes.

	PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	O <sub>3</sub>	CO	AP	T	RH	WS
Shannon index	-0.281	-0.299*	0.244	-0.175	-0.390**	-0.021	0.620**	-0.763**	-0.241	0.223
observed_species	-0.376*	-0.345*	0.058	-0.252	-0.256	-0.185	0.468**	-0.565**	-0.397**	0.200
PD_whole_tree	-0.368*	-0.338*	0.071	-0.222	-0.283	-0.176	0.491**	-0.561**	-0.363*	0.148
fisher_alpha	-0.368*	-0.334*	0.040	-0.244	-0.237	-0.185	0.460**	-0.554**	-0.393**	0.202

\*\* p < 0.01 (2-tailed), \* P < 0.05 (2-tailed)

**Supplementary Table 4.** ANOSIM tests on the bacteria community between each stage and between haze & non-haze samples.

		<i>R</i> value	<i>P</i> value
stages	Stage I vs Stage II	0.4584	0.001
	Stage I vs Stage III	0.7677	0.001
	Stage II vs Stage III	0.3503	0.001
Haze vs Non-haze	Stage I	0.2791	0.030
	Stage II	0.3580	0.011
	Stage III	0.1111	0.039

**Supplementary Table 5.** Redundancy analysis (RDA) of bacterial community and environmental factors

	<b>RDA1</b>	<b>RDA2</b>	<b>r<sup>2</sup></b>	<b>Pr(&gt;r)</b>
<b>T</b>	-0.98792	0.15494	0.8043	0.001***
<b>RH</b>	-0.0596	-0.99822	0.3775	0.001***
<b>O<sub>3</sub></b>	-0.92025	0.39133	0.2568	0.001***
<b>SO<sub>2</sub></b>	0.85398	-0.52031	0.2245	0.002**
<b>CO</b>	0.29844	-0.95443	0.2232	0.005**
<b>AP</b>	0.52018	0.85406	0.1975	0.010**
<b>PM<sub>10</sub></b>	-0.56326	-0.82628	0.1516	0.022*
<b>NO<sub>2</sub></b>	-0.16413	-0.98644	0.0984	0.112
<b>WS</b>	0.69831	0.7158	0.0709	0.204

\*\*\*  $P < 0.001$ , \*\*  $P < 0.01$ , \*  $P < 0.05$