Supplementary Material

Diversity, abundance and activity of ammonia-oxidizing microorganisms in fine particulate matter

Jing-Feng Gao *, Xiao-Yan Fan, Kai-Ling Pan, Hong-Yu Li and Li-Xin Sun

Correspondence and phone calls about the paper should be directed to Jing-Feng Gao at the following address, phone and fax number, and e-mail address:

Jing-Feng Gao

College of Environmental and Energy Engineering, Beijing University of Technology, 100 Pingleyuan, Chaoyang District, Beijing 100124, China

Tel: +86-10-6739-2627(office); Fax: +86-10-6739-1983

E-mail: gao.jingfeng@bjut.edu.cn or gao158@gmail.com

Supplementary Table S1 AOA and AOB sequence diversity and Good's coverage of the six $PM_{2.5}$ clone libraries.

Supplementary Table S2 Concentrations of OC, EC, water-soluble inorganic ions and atmospheric pollutants of six cities in BTH.

Supplementary Table S3 Comparisons of AOA and AOB *amoA* gene abundances in different types of samples from literature.

Table S1 AOA and AOB sequence diversity and Good's coverage of the six $PM_{2.5}$ clone libraries

Target gene	Sample_ID	Numbers of sequences	OTUs(3% cut-off)	Good's coverage/(%)	Chao1	OUT observed/OUT estimated(%)	Shannon index	ACE	Simpson
AOA *amoA* gene	BJ	24	1	100.00	1.00	100.00	0.00	0.00	1.00
	LF	26	1	100.00	1.00	100.00	0.68	0.00	0.49
	TJ	27	2	96.30	2.00	100.00	0.16	0.00	0.93
	BDH	25	1	96.00	1.00	100.00	0.17	0.00	0.92
	TS	27	5	85.19	11.00	45.45	0.62	0.00	0.72
	BD	28	1	100.00	1.00	100.00	0.00	0.00	1.00
AOB 16S rRNA	BJ	20	4	100.00	4.00	100.00	1.19	4.00	1.00
	LF	15	4	93.33	4.00	100.00	1.16	4.70	0.93
	TJ	18	6	90.89	7.00	85.71	1.40	6.27	0.91
	BDH	20	2	95.00	2.00	100.00	0.20	0.00	0.95
	TS	16	5	93.75	5.00	100.00	1.42	5.55	0.94
	BD	20	6	90.00	6.50	92.31	1.53	7.72	0.90

Table S2 Concentrations of OC, EC, water-soluble inorganic ions and atmospheric pollutants of six cities in BTH

Cities	OC	EC	Na^+	$NH4^+$	K^+	Mg^{2+}	Ca^{2+}	F^-	Cl^-	NO_2^-	NO_3^-	SO_4^{2-}	NO_2*	SO_2*	O_3*	CO*	HNO_3
BJ	4.07	2.97	0.00	0.1	0.01	1.16	2.76	0.00	0.11	0.01	1.05	2.69	66.45±28.15	33.04±4.95	115.16±102.51	1.92±0.38	0.193±0.154
LF	4.39	3.56	0.01	0.08	0.01	0.43	2.05	0.01	0.09	0.01	0.42	2.00	30.52±15.84	27.22±14.31	143.87±59.53	0.64±0.23	0
TJ	6.45	5.14	0.01	0.31	0.01	0.72	2.40	0.01	0.36	0.01	0.67	2.34	68.22±34.26	28.96±22.79	54.26±45.72	1.80±0.67	0
BDH	4.56	3.88	0.00	0.06	0.01	0.55	1.79	0.00	0.07	0.02	0.52	1.75	30.22±15.12	62.48±13.77	46.35±15.13	0.63±0.43	0
TS	14.47	8.61	0.03	0.23	0.00	2.1	3.82	0.03	0.27	0.00	1.86	3.72	60.48±32.28	81.17±51.68	182.87±88.58	3.30±3.08	0
BD	11.97	8.84	0.01	0.05	0.01	1.39	3.75	0.01	0.06	0.01	1.25	3.66	26.42±7.17	37.74±17.61	46.53±17.26	0.95±0.76	0

*: Concentrations of atmospheric pollutants (NO_2, SO_2, O_3 and CO) were the average of that obtained hourly from the China National Environmental Monitoring Center (http://113.108.142.147:20035/emcpublish/).
The unit of all the pollutants was μg m^{-3}, except CO (mg m^{-3}).

Table S3 Comparisons of AOA and AOB *amoA* gene abundances in different types of samples from literature.

Reference	Samples	AOA *amoA* gene	AOB *amoA* gene	AOA *amoA* gene of our study compared to the reference	AOB *amoA* gene of our study compared to the reference
1	**Sandy soils**	7.0×10^{6}-1.0×10^{8} cell /g dry soil	2.4×10^{4}-2.0×10^{7} cell /g dry soil	Lower (<)	Higher (>)
2	**Paddy soils**	7.7×10^{6}-1.8×10^{7} cell/g paddy soil	9.7×10^{5}-2.6×10^{6} cell/g paddy soil	Lower (<)	Higher (>)
3	**Soils**	2.52×10^{5} - 3.36×10^{8} cell/g soil	1.2×10^{5} – 3.3×10^{7} cell/g soil	Comparable (~)	Higher (>)
4	**Compost samples**	2.8×10^{8}-1.1×10^{9} cell /g DW composst sample	8.8×10^{7}-1×10^{9} cell /g DW composst sample	Lower (<)	Comparable (~)
5	**Activated sludge** (Saline sewage)	1.7×10^{2} to 3.8×10^{3} cell/ng DNA	1.2×10^{3} to 9.2×10^{4} cell/ng DNA	Lower (<)	Lower (<)
6	**Activated sludge** (Municipal wastewater)	3.07×10^{5} cell/g sludge	2.9×10^{7} cell/g sludge	Higher (>)	Comparable (~)
7	**Activated sludge** (Domestic wastewater)	6.0×10^{5}-4.5×10^{6} cell/g sludge	2.9×10^{3}-6.8×10^{4} cell/g sludge	Comparable (~)	Higher (>)
8	**Sediment** (a eutrophic river)	1.48×10^{7}-5.50×10^{7} cell/g dry sediment	1.6×10^{4}-7.0×10^{4} cell/g dry sediment	Comparable (~)	Higher (>)

The abundance of AOA and AOB are transformed to cell number based on that there are 1 and 2.5 *amoA* genes per AOA and AOB.

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