Supplement of

A Review of Aerosol Chemistry in Asia: Insights from Aerosol Mass Spectrometer Measurements

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Table S1. Summary of sampling sites and sampling informations for AMS measurements in Asia.

Area	Site	Site type	Sampling site	AMS Type	Year	Sampling period	References
Tibet	Menyuan	background	an air-conditioned room on Daban Mountain in Menyuan, Qinghai province~3295m, 15min resolution with 6 cycles	Q-ACSM	2013 Fall	Sep-Oct, 2013	(Du et al., 2015)[1]
Tibet	Nam Co	background	A trailer in Nam Co observatory station~4730m, only V mode no size distribution, 5min resolution	HR-AMS	2015 Summer	May-Jul, 2015	(Xu et al., 2018)[2]
Tibet	Qomolangma	background	An air-conditioned room at Qomolangma station ~4276m, V mode (6s MS+9s PToF)	HR-AMS	2016 Spring	Apr-May, 2016	(Zhang et al., 2018)[3]
Tibet	Waliguan	background	A two-story building at Waliguan observatory station ~3816m, 5min V mode (15s MS+15s PToF)+5min W mode	HR-AMS	2017 Summer	Jul 2017	(Zhang et al., 2019)[4]
Tibet	Mt. Yulong	background	Mt. Yulong, Yunnan province~3410m, 2.5min V mode (MS)+2.5 min W mode	HR-AMS	2015 Spring	Mar-Apr, 2015	(Zheng et al., 2017)[5]
Hainan	Mt. Wuzhi	background	an air-conditioned room at Mt. Wuzhi~958m, 2min V mode (20s MS+100s PToF)+2min W mode	HR-AMS	2015 Spring	Mar-Apr, 2015	(Zhu et al., 2016)[6]
NCP	Mt. Tai	background	Mt. Tai~1534m, only V mode no size distribution, 5min resolution	Q-AMS	Four season	Jun 2010-Jan 2012	(Zhang et al., 2014)[7]
YRD	Shanghai	urban	a 6-floor building of Shanghai Pudong Environmental Monitoring Station, 2min V mode (90s WS+30s PToF) + 2min W mode	HR-AMS	2010 Summer	May-Jun, 2010	(Huang et al., 2012)[8]
YRD	Shanghai	urban	A nine-floor building at Shanghai Academy of Environmental Sciences, 4min V mode (MS+PToF)	HR-AMS	2016 Winter	Nov 2016-Jan 2017	(Zhu et al., 2018)[9]
YRD	Nanjing	urban	Campus of Nanjing University of Information Science and Technology, 2.5min laser on V mode, 2.5min laser off V mode, 2.5min laser on W mode, 2.5min laser off W mode, 2.5min laser on PToF mode, 2.5min laser off PToF mode	SP-AMS	2015 Spring	Feb-Mar, 2015	(Wang et al., 2016)[10]
YRD	Nanjing	urban	A five-floor building in the environment monitoring station of Nanjing Olympic center~12m, 2.5min laser on V mode, 2.5min laser off V mode, 2.5min laser on W mode, 2.5min laser off W mode, 2.5min laser on PToF mode, 2.5min laser off PToF mode	SP-AMS	2015 Spring	Apr 2015	(Wang et al., 2016)[11]
YRD	Nanjing	urban	A six-floor building in the Jiangsu Environment Monitoring Center	Q-ACSM	2013 Winter	Dec 2013	(Zhang et al., 2015)[12]
YRD	Hangzhou	urban	an 8-floor building at Binjiang national air quality monitoring station, Hangzhou, 5min V mode (10s MS+10s+PToF)+5min W mode	HR-AMS	2016 Summer	Aug-Sep, 2016	(Li et al., 2018)[13]
YRD	Jiaxing	suburban	a 4-floor building in a village school in Jiaxing, 2min V mode (20s MS+100s PToF)+2min W mode	HR-AMS	2010 Summer 2010 Winter	Jun-Jul, 2010 Dec 2010	(Huang et al., 2013)[14]
YRD	Lake Hongze	rural	Lake Hongze, 2min V mode (20s MS+100s PToF)+2min W mode	HR-AMS	2011 Spring	Mar-Apr, 2011	(Zhu et al., 2016)[6]
YRD	Lin'an	background	Lin'an Regional Atmosphere Background Station	Q-AMS	2013 Spring	Mar 2013	(Zhang et al., 2015)[15]
YRD	Lin'an	background	Lin'an regional background station	Q-AMS	2013 Winter	Nov-Dec, 2013	(Zhang et al.,

							2015)[16]
PRD	Shenzhen	urban	4th floor, Building E, Shenzhen Graduate School of Peking University	HR-AMS	2008 Winter	Jan-Feb, 2009	(Yao et al., 2010)[17]
PRD	Shenzhen	urban	on the campus of Shenzhen Graduate School, Peking University	HR-AMS	2008 Winter	Jan-Feb, 2009	(Huang et al., 2010)[18]
PRD	Shenzhen	urban	on the campus of Shenzhen Graduate School, Peking University, 2 min V mode (MS), 2 min W mode, two 2 min PToF modes, 2 min Soft-EI mode using a lower EI voltage (~13 eV).	HR-AMS	2009 Fall	Oct-Dec, 2009	(He et al., 2011)[19]
PRD	Shenzhen	urban	on the campus of Shenzhen Graduate School, Peking University, V mode (MS+PToF)+W mode	HR-AMS	2014 Winter	Dec 2014-Jan 2015	(Cao et al., 2018)[20]
PRD	Dongguan	urban	Dongguan	HR-AMS	2013 Winter	Dec 2013-Jan 2014	(Lan et al., 2018)[21]
PRD	Heshan	urban outflow	2min V mode (20s MS+100s PToF)+2min W mode	HR-AMS	2010 Fall	Nov-Dec, 2010	(Gong et al., 2012)[22]
PRD	HongKong	urban	Mong Kok in urban Hongkong	Q-ACSM	2013 Fall	Sep-Dec, 2013	(Sun et al., 2016)[23]
PRD	Backgarden	rural	a 3 story building at Backgarden at~50km northwest of the center of the Guangzhou city	Q-AMS	2006 Summer	July 2006	(Xiao et al., 2011)[24]
PRD	Kaiping	rural	an air monitoring container settled at the Kaiping supersite, 2 min V-mode of MS, 2 min W-mode, 4 min separate PToF mode under V-mode, 2 min Soft-EI mode using a lower EI voltage (~13 eV)	HR-AMS	2008 Fall	Oct-Nov, 2008	(Huang et al., 2011)[25]
PRD	Panyu	suburban	Guangzhou Panyu Atmospheric Composition Station~150m, 5min V mode(MS+PToF)+5min W mode	HR-AMS	2014 Winter	Nov 2014-Jan 2015	(Qin et al., 2017)[26]
PRD	HongKong	suburban	Hong Kong University of Science and Technology Supersite	HR-AMS	Four season	Apr 2011-Mar 2012	(Li et al., 2015)[27]
PRD	HongKong	suburban	Hong Kong University of Science and Technology (HKUST) Supersite, 2min V mode+2min W mode	HR-AMS	2016 Fall	Oct 2016	(Li et al., 2019)[28]
NW	Lanzhou	urban	an air conditioned room on a seven-story academic building in the Cold and Arid Regions Environmental and Engineering Research Institute, 2.5min V mode (6s MS+9s PToF)+2.5 min W mode	HR-AMS	2012 Summer	Jul-Aug, 2012	(Xu et al., 2014)[29]
NW	Lanzhou	urban	a 22-story building on the campus of Lanzhou University, 2.5min V mode (6s MS+9s PToF)+2.5 min W mode	HR-AMS	2013 Winter	Jan-Feb, 2014	(Xu et al., 2016)[30]
NW	Lanzhou	urban	on the third floor ~12 m in the yard of the Gansu Meteorological Administration, 5min (MS+PToF)	Q-AMS	2014 Fall	Oct-Dec, 2014	(Zhang et al., 2017)[31]
NW	Xi'an	urban	rooftop in Institute of Earth Environment, Chinese Academy of Sciences~10m	Q-ACSM	2012 Winter	Dec 2012-Jan 2013	(Wang et al., 2014)[32]
NW	Baoji	urban	A four-story building~15m	Q-ACSM	2014 Spring	Feb-Mar, 2014	(Wang et al., 2017)[33]
NCP	Beijing	urban	on the campus of the Chinese Academy of Meteorological Sciences (CAMS), 5min (15s MS+15s PToF)	Q-AMS	2006 Summer	July 2006	(Sun et al., 2010)[34]
NCP	Beijing	urban	a six-story building in the campus of Peking University	HR-AMS	2008 Summer	Jul-Sep, 2008	(Huang et al.,

			~20m, 2 min V-mode, 2 min W-mode, 4 min separate PToF mode, 2 min Soft-EI mode using a lower EI voltage (~13 eV)				2010)[35]
NCP	Beijing	urban	a six-story building in the campus of Peking University ~20m, 2min V mode (MS+PToF)+2min W mode	HR-AMS	2010 Fall 2011 Summer	Nov-Dec, 2010 Aug-Sep, 2011	(Hu et al., 2016)[36]
NCP	Beijing	urban	a six-story building in the campus of Peking University ~20m, 2min V mode (MS+PToF)+2min W mode	HR-AMS	Four season	Mar 2012-Mar 2013	(Hu et al., 2017)[37]
NCP	Beijing	urban	a two-story building~8m on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 5min V mode no size distribution +5min W mode	HR-AMS	2012 Fall	Oct 2012	(Xu et al., 2018)[38]
NCP	Beijing	urban	a two-story building~8m on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 7.5min V mode (45s MS+45s PToF)+7.5min W mode	HR-AMS	2012 Winter	Jan-Feb, 2013	(Zhang et al., 2014)[39]
NCP	Beijing	urban	on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 2min V mode (MS+PToF)+2min W mode	HR-AMS	2013 Winter	Dec 2013-Jan 2014	(Sun et al., 2016)[40]
NCP	Beijing	urban	on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 5min V mode (MS+PToF) +5min W mode	HR-AMS	2014 Summer 2014 Fall	Jun-Jul, 2014 Oct-Nov, 2014	(Xu et al., 2017)[41]
NCP	Beijing	urban	on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 5min V mode (10s MS+20s PToF)+5min W mode	HR-AMS	2014 Fall 2014 Winter	Oct 2014 Dec 2014	(Zhang et al., 2016)[42]
NCP	Beijing	urban	on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 2014: 5min V mode (MS+PToF)+5min W mode, 2016: 2min V mode (MS+PToF)+2min W mode	HR-AMS	2014 Winter 2016 Winter	Nov-Dec, 2014 Nov-Dec, 2016	(Xu et al., 2019)[43]
NCP	Beijing	urban	on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 5min V mode (10s Ms+20s PToF)+5min W mode	HR-AMS	2015 Fall	Sep 2015	(Li et al., 2020)[44]
NCP	Beijing	urban	on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 5min V mode (MS+PToF)+5min W mode	HR-AMS	2015 Fall	Aug-Sep, 2015	(Zhao et al., 2017)[45]
NCP	Beijing	urban	on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 15min bypass (every 3min V mode)+15min TD	HR-AMS	2017 Summer 2018 Summer	Jun 2017 May-Jun, 2018	(Xu et al., 2019)[46]
NCP	Beijing	urban	on the campus of the State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, 3min V mode (10s Ms+20s PToF)+3min W mode	HR-AMS	2018 Winter	Nov 2018-Jan 2019	(Li et al., 2020)[47]
NCP	Tianjin	urban	Tianjin, 2min (MS+PToF)	C-ToF-AMS	2010 Fall	Sep 2010	(Zhang et al., 2012)[48]
NCP	Xinxiang	urban	mobile laboratory of Nanjing University in Xinxiang, 15min resolution	Q-ACSM	2017 Summer	Aug 2017	(Li et al., 2018)[49]

NCP	Handan	urban	a four-story building (~12m) in Handan, 15min resolution	Q-ACSM	2015 Winter	Dec 2015-Feb 2016	(Li et al., 2017)[50]
NCP	Shijiazhuang	urban	on the building roof (15 m) of the Institute of Genetics and Developmental Biology, Chinese Academy of Sciences in Shijiazhuang, 30min resolution	Q-ACSM	2013 Winter	Jan-Feb, 2014	(Huang et al., 2019)[51]
NCP	Xianghe	suburban	Xianghe Atmospheric Observatory	Q-ACSM	2013 Summer	Jun 2013	(Sun et al., 2016)[52]
NCP	Xinzhou	suburban	Xinfuqu National Meteorological Observatory in Xinzhou, 8min resolution	Q-ACSM	2014 Summer	Jul-Sep, 2014	(Wang et al., 2016)[53]
NCP	Xingtai	suburban	Xingtai National Meteorological Basic Station, 5min resolution	Q-ACSM	2016 Spring	Apr-Jun, 2016	(Zhang et al., 2018)[54]
NCP	Liulihe	rural	a one-story sampling station in Liulihe	Q-ACSM	Four season	Oct 2014-Jan 2015	(Hua et al., 2018)[55]
NCP	Yufa	suburban	on the campus of Huang Pu University in Yufa	Q-AMS	2006 Summer	Aug-Sep, 2006	(Gunthe et al., 2011)[56]
NCP	Xinglong	suburban	Xinglong Atmosphere Background Observation Station	Q-AMS	2018 Winter	Nov 2018-Jan 2019	(Li et al., 2020)[47]
NCP	Changping	suburban	A four-floor building on the Changping campus of Peking University, , 2min V mode+2min W mode	HR-AMS	2016 Summer	Jun 2016	(Li et al., 2019)[28]
NCP	Changdao	island	at an island of Changdao, 2min V mode (10s MS+10s PToF)+2min W mode	HR-AMS	2011 Spring	Mar-Apr, 2011	(Hu et al., 2013)[57]
India	Kanpur	urban	at the Indian Institute of Technology (IIT) Kanpur, 1min V mode+1min W mode	HR-AMS	2012 Fall/Winter	Nov 2012-Jan 2013	(Chakraborty et al., 2015)[58]
India	Kanpur	urban	at the Indian Institute of Technology (IIT) Kanpur	HR-AMS	2013 Spring	Feb-Mar, 2013	(Kumar et al., 2016)[59]
India	Kanpur	urban	At the campus of Indian Institute of Technology (IIT) Kanpur, switching ambient air to pass through TD to AMS and directly to AMS at every 10 min interval.	HR-AMS	2014 Winter	Dec 2014-Feb 2015	(Chakraborty et al., 2016)[58]
India	Kanpur	urban	at the Indian Institute of Technology (IIT) Kanpur, 2min V mode	HR-AMS	2015 Summer	May-Aug, 2015	(Chakraborty et al., 2016)[60]
India	Kanpur	urban	at the Indian Institute of Technology (IIT) Kanpur, 2min V mode	HR-AMS	Fall	Sep-Oct	(Chakraborty et al., 2018)[61]
India	Ahmedabad	urban	Post-monsoon season of the year 2017 at Ahmedabad	HR-AMS	2017 Fall	Sep-Oct, 2017	(Singh et al., 2019)[62]
India	Delhi	urban	at the Indian Institute of Technology Delhi (IITD) campus in South Delhi	Q-ACSM	Four Season	Dec 2016-Sep 2017	(Gani et al., 2019)[63]
India	Mt. Ghats	Background	A High Altitude Cloud Physics Laboratory at Mt. Ghats ~ 1378m	ToF-ACSM	Four season	Mar 2016-Feb 2017	(Mukherjee et al., 2018)[64]
Singapore		urban	on the fourth floor of the North Spine building at Nanyang Technological University (NTU), Singapore	ToF-ACSM	2015 Fall	Oct 2015	(Budisulistiorini et al, 2018)[65]
Singapore		urban	the campus of the National University of Singapore, 1 min alternating intervals between IR laser-on and laser-off mode	SP-AMS	2017 Summer	May-Jun, 2017	(Rivellini et al, 2019)[66]

Korea,	Seoul	urban	a five floor of building at the Korea Institute of Science and Technology, 2.5min V mode (MS+PToF)+2.5min W mode	HR-AMS	2015 Winter	Dec 2015-Jan 2016	(Kim et al., 2017)[67]
Korea	Seoul	urban	a five floor of building at the Korea Institute of Science and Technology, 3min V mode (MS+PToF)+3min W mode	HR-AMS	2016 Spring	Apr-Jun, 2016	(Kim et al., 2018)[68]
Korea	Gwangju	urban	on the Gwangju Institute of Science and technology (GIST) campus~6m	Q-AMS	2011 Fall 2011 Winter	Aug-Sep, 2011 Dec 2011	(Park et al., 2012)[69]
Korea	Gwangju	urban	on the Gwangju Institute of Science and technology (GIST) campus~6m	Q-AMS	Four season	Aug 2011-Aug 212	(Park et al., 2013)[70]
Korea	Gwangju	urban	an urban Gwangju site	Q-AMS	2015 Summer	May-Jun, 2015	(Cho et al., 2018)[71]
Korea	Gwangju	urban	an urban Gwangju site, 5min V mode	Q-AMS	2013 Fall	Nov 2013	(Lee et al., 2017)[72]
Korea	Boseong	coastal	Boseong Global Standard Meteorological Observation site	Q-AMS	2012/2013 Fall	Nov2012&Nov 2013	(Lee et al., 2017)[72]
Korea	Baengnyeong	island	At Baengnyeong Island Atmospheric Research Center, 5min V mode	HR-AMS	2011 Summer/Fall	May-Nov, 2011	(Lee et al., 2015)[73]
Korea	Jeju	Island	on the western edge of Jeju island, MS+PToF mode	Q-AMS	2001 Spring	Apr 2001	(Topping et al., 2004)[74]
Japan	Tokyo	urban	at the Research Center for Advanced Science and Technology (RCAST), Komaba	Q-AMS	Four season	Feb 2003-Feb 2004	(Takegawa et al., 2006)[75]
Japan	Tokyo	urban	at the Research Center for Advanced Science and Technology (RCAST), Komaba	Q-AMS	2004 Summer	Jul-Aug, 2004	(Miyakawa et al., 2008)[76]
Japan	Tokyo	urban	A three-floor building in the Hongo campus of the University of Tokyo, only V mode	Q-AMS	2008 Summer	Aug 2008	(Xing et al., 2011)[77]
Japan	Saitama	suburban	At the Center for Environmental Science in Saitama	Q-AMS	2004 Summer	Jul-Aug 2004	(Miyakawa et al., 2008)[76]
Japan	Okinawa	Island	--	Q-AMS	Four season	Oct 2003-Apr 2004	(Zhang et al., 2007)[78]
Japan	Fukue	Island	the northwest side of Fukue Island	Q-AMS	2003 Spring	Mar-Apr, 2003	(Takami et al., 2005)[79]

Table S2. Summary of sampling sites and mass concentrations of NR-PM_1 species for AMS measurements in Asia.

Area	Site	Site type	Sampling time	Instrument	NR-PM_1	Org	SO_4	NO_3	NH_4	Chl	Reference
Tibet	Menyuan	background	Sep-Oct, 2013	Q-ACSM	10.84	4.9	3.2	1.2	1.4	0.14	(Du et al., 2015)[1]
Tibet	Nam Co	background	May-Jul, 2015	HR-AMS	1.84	1.36	0.3	0.04	0.14	0	(Xu et al., 2018)[2]
Tibet	Qomolangma	background	Apr-May, 2016	HR-AMS	3.3	2.4	0.41	0.22	0.26	0.01	(Zhang et al., 2018)[3]
Tibet	Waliguan	background	Jul 2017	HR-AMS	8.83	3.14	3.47	0.74	1.38	0.1	(Zhang et al., 2019)[4]
Tibet	Mt. Yulong	background	Mar-Apr, 2015	HR-AMS	5.2	3.88	0.8	0.23	0.29	0	(Zheng et al., 2017)[5]
Hainan	Mt. Wuzhi	background	Mar-Apr, 2015	HR-AMS	10.33	4.9	3.4	0.5	1.5	0.03	(Zhu et al., 2016)[6]
NCP	Mt. Tai	background	Jun 2010-Jan 2012	Q-AMS	34.35	11.2	9.2	7.2	5.8	0.95	(Zhang et al., 2014)[7]
YRD	Shanghai	urban	May-Jun 2010	HR-AMS	27.2	8.4	9.8	4.9	3.9	0.2	(Huang et al., 2012)[8]
YRD	Shanghai	urban	Nov 2016-Jan 2017	HR-AMS	29.5	12.9	5.2	7.3	3.8	0.3	(Zhu et al., 2018)[9]
YRD	Nanjing	urban	Feb-Mar 2015	SP-AMS	43.5	11.8	10.8	11.2	7.8	1.9	(Wang et al., 2016)[10]
YRD	Nanjing	urban	Apr 2015	SP-AMS	25.5	12.7	5.5	3.8	3.1	0.4	(Wang et al., 2016)[11]
YRD	Nanjing	urban	Dec 2013	Q-ACSM	89.2	38.4	14.3	22.3	12.5	2.7	(Zhang et al., 2015)[12]
YRD	Hangzhou	urban	Aug 2016	HR-AMS	26.5	17	4.6	2.1	2.7	0.1	(Li et al., 2018)[13]
			Aug-Sep 2016		28.7	13.7	8.2	2.2	4.5	0.1	
			Sep 2016		39.8	18.5	6.7	8.7	5.5	0.4	
YRD	Jiaxing	suburban	Jun-Jul, 2010	HR-AMS	29.9	10.6	8.3	5.9	4.1	1	(Huang et al., 2013)[14]
			Dec 2010		34.9	12.7	7.1	7.5	4.9	2.7	
YRD	Lake Hongze	rural	Mar-Apr, 2011	HR-AMS	32.7	9.8	7.7	9.4	5.5	0.3	(Zhu et al., 2016)[6]
YRD	Lin'an	background	Mar 2013	Q-AMS	43.6	17.7	8.1	9.8	6.9	1.1	(Zhang et al., 2015)[15]
YRD	Lin'an	background	Nov-Dec, 2013	Q-AMS	62.8	29	10	15	7.7	1.1	(Zhang et al., 2015)[16]
PRD	Shenzhen	urban	Jan-Feb, 2009	HR-AMS	56.4	27	13	7.3	7.7	1.4	(Yao et al., 2010)[17]
PRD	Shenzhen	urban	Jan-Feb, 2009	HR-AMS	57.3	29.4	12.5	7.6	6.7	1.1	(Huang et al., 2010)[18]
PRD	Shenzhen	urban	Oct-Dec, 2009	HR-AMS	38.3	17.7	10.9	4.5	4.5	0.7	(He et al., 2011)[19]
PRD	Shenzhen	urban	Dec 2014-Jan 2015	HR-AMS	37.5	18.4	9.1	4.9	4.4	0.7	(Cao et al., 2018)[20]
PRD	Dongguan	urban	Dec 2013-Jan 2014	HR-AMS	52.1	23.2	13.2	8	6.5	1.2	(Lan et al., 2018)[21]
PRD	Heshan	urban outflow	Nov-Dec, 2010	HR-AMS	39.7	17.4	10	6.2	4.6	1.5	(Gong et al., 2012)[22]
PRD	HongKong	urban	Sep-Dec, 2013	Q-ACSM	25.9	15.1	6	1.7	3	0.1	(Sun et al., 2016)[23]
PRD	Backgarden	rural	July 2006	Q-AMS	37.7	16.1	12.8	1.8	6.1	1.9	(Xiao et al., 2011)[24]
PRD	Kaiping	rural	Oct-Nov, 2008	HR-AMS	30.8	11.2	11.1	3.5	4.6	0.4	(Huang et al., 2011)[25]
PRD	Panyu	suburban	Nov 2014-Jan 2015	HR-AMS	50.8	25.7	12.8	6.2	5	1.1	(Qin et al., 2017)[26]
PRD	HongKong	suburban	Apr-Jun, 2011	HR-AMS	14.32	4	7.4	0.6	2.3	0.02	(Li et al., 2015)[27]
			Sep 2011		15.61	4.1	8.7	0.4	2.4	0.01	
			Oct-Dec, 2011		15.92	6	7.1	0.7	2.1	0.02	
			Jan-Mar, 2012		15.43	5.1	6.2	1.6	2.4	0.13	
PRD	HongKong	suburban	Oct 2016	HR-AMS	16.24	7.3	6.1	0.6	2.2	0.04	(Li et al., 2019)[28]
NW	Lanzhou	urban	Jul-Aug, 2012	HR-AMS	21.6	11.5	3.9	2.5	2.7	1	(Xu et al., 2014)[29]
NW	Lanzhou	urban	Jan-Feb, 2014	HR-AMS	53.6	29.3	7.2	9.5	5.9	1.7	(Xu et al., 2016)[30]
NW	Lanzhou	urban	Oct-Dec, 2014	Q-AMS	37.3	18.2	6.1	5.7	5	2.3	(Zhang et al., 2017)[31]

NW	Xi'an	urban	Dec 2012-Jan 2013	Q-ACSM	134.5	78.3	18.3	13.6	16.7	7.6	(Wang et al., 2014)[32]
NW	Baoji	urban	Feb-Mar, 2014	Q-ACSM	54	29.7	8.6	8.1	5.9	1.7	(Wang et al., 2017)[33]
NCP	Beijing	urban	July 2006	Q-AMS	80	28.1	20.3	17.3	13.1	1.1	(Sun et al., 2010)[34]
NCP	Beijing	urban	Jul-Sep, 2008	HR-AMS	61.3	23.9	16.8	10	10	0.6	(Huang et al., 2010)[35]
NCP	Beijing	urban	Nov-Dec, 2010	HR-AMS	63.5	34.5	8.7	6.8	7.7	5.8	(Hu et al., 2016)[36]
			Aug-Sep, 2011		79.9	26.4	22	16.8	13.7	1	
NCP	Beijing	urban	Mar-May, 2012	HR-AMS	42	14	9.3	10.2	7.3	1.2	(Hu et al., 2017)[37]
			Jul-Aug, 2012		34.4	12.5	9.7	6.4	5.4	0.4	
			Oct-Nov, 2012		38.1	18.2	5.5	7.9	4.5	2	
			Jan-Mar, 2013		77.8	29.7	17.4	16.2	11.7	2.8	
NCP	Beijing	urban	Oct 2012	HR-AMS	56.4	28.8	8.5	11.3	6.2	1.6	(Xu et al., 2018)[38]
NCP	Beijing	urban	Jan-Feb, 2013	HR-AMS	89.3	44.7	19.6	12.5	8.9	3.6	(Zhang et al., 2014)[39]
NCP	Beijing	urban	Dec 2013-Jan 2014	HR-AMS	64	38.4	9.6	7	5.1	3.9	(Sun et al., 2016)[40]
NCP	Beijing	urban	Jun-Jul, 2014	HR-AMS	40.6	18.7	9.8	6.5	5.2	0.4	(Xu et al., 2017)[41]
			Oct-Nov, 2014		54	29.4	9.1	7.8	2.9	4.8	
NCP	Beijing	urban	Oct 2014	HR-AMS	74.2	34.6	11.5	16.5	9.1	2.5	(Zhang et al., 2016)[42]
			Dec 2014		34.2	20.3	6.8	3.3	2.3	1.5	
NCP	Beijing	urban	Nov-Dec, 2014	HR-AMS	60.5	30.4	10.4	7.8	6.2	5.7	(Xu et al., 2019)[43]
			Nov-Dec, 2016		86.2	36.4	15.5	18.1	9.5	6.7	
NCP	Beijing	urban	Sep 2015	HR-AMS	43.4	20	8.9	9.2	4.7	0.6	(Li et al., 2020)[44]
NCP	Beijing	urban	Aug-Sep, 2015	HR-AMS	35.4	16	7.4	7.2	4.4	0.4	(Zhao et al., 2017)[45]
NCP	Beijing	urban	Jun 2017	HR-AMS	21	9.9	4.1	4.2	2.6	0.2	(Xu et al., 2019)[46]
			May-Jun, 2018		31.1	12.7	6.5	7.4	4.3	0.2	
NCP	Beijing	urban	Nov 2018-Jan 2019	HR-AMS	26.8	11.5	3.2	8.2	3.5	0.4	(Li et al., 2020)[47]
NCP	Tianjin	urban	Sep 2010	C-ToF-AMS	66	15.7	14.4	16.2	13.6	6.1	(Zhang et al., 2012)[48]
NCP	Xinxiang	urban	Aug 2017	Q-ACSM	61.7	18	14.4	16.5	12.2	0.6	(Li et al., 2018)[49]
NCP	Handan	urban	Dec 2015-Feb 2016	Q-ACSM	178	83.3	28.4	26.5	22.7	17.1	(Li et al., 2017)[50]
NCP	Shijiazhuang	urban	Jan-Feb, 2014	Q-ACSM	178	89	37.4	21.4	19.6	10.6	(Huang et al., 2019)[51]
NCP	Xianghe	suburban	Jun 2013	Q-ACSM	67.3	28.3	12.8	14.3	8.8	3.1	(Sun et al., 2016)[52]
NCP	Xinzhou	suburban	Jul-Sep, 2014	Q-ACSM	33	11.7	11.5	5.1	4.2	0.5	(Wang et al., 2016)[53]
NCP	Xingtai	suburban	Apr-Jun, 2016	Q-ACSM	27.4	11.4	7.7	4.3	3.1	0.9	(Zhang et al., 2018)[54]
NCP	Liulihe	rural	Oct-Nov, 2014	Q-ACSM	53	30	4.3	11.2	5.9	1.6	(Hua et al., 2018)[55]
			Mar-Apr, 2015		31	16	2.5	7	4.9	0.6	
			Aug-Sep, 2015		24	13.9	3.3	2.8	3.8	0.2	
			Dec-Jan, 2015		122	70.8	13.4	15.9	20.7	1.2	
NCP	Yufa	suburban	Aug-Sep, 2006	Q-AMS	26.4	10.8	8.2	2.9	4.1	0.4	(Gunthe et al., 2011)[56]
NCP	Xinglong	suburban	Nov2018-Jan2019	Q-AMS	15.9	5.4	1.9	5.6	2.6	0.4	(Li et al., 2020)[47]
NCP	Changping	suburban	Jun 2016	HR-AMS	14.17	8	2.8	1.8	1.5	0.07	(Li et al., 2019)[28]
NCP	Changdao	island	Mar-Apr, 2011	HR-AMS	41.7	13.4	8.3	12.2	6.5	1.3	(Hu et al., 2013)[57]
India	Kanpur	urban	Nov 2012	HR-AMS	100	72	10	10	6	2	(Chakraborty et al.,
			Dec 2012-Jan 2013		139	93	14	15	14	3	2015)[58]
India	Kanpur	urban	Feb-Mar, 2013	HR-AMS	51	32	7	6	5	1	(Kumar et al.,

											2016)[59]
India	Kanpur	urban	Dec 2014-Feb 2015	HR-AMS	143.1	82	16.3	20.7	18.5	5.6	(Chakraborty et al., 2016)[58]
India	Kanpur	urban	May-Aug, 2015	HR-AMS	9.7	6	2.1	0.4	1.2	0	(Chakraborty et al., 2016)[60]
India	Kanpur	urban	Sep-Oct	HR-AMS	44	25.2	11	3.1	4.4	0.3	(Chakraborty et al., 2018)[61]
India	Ahmedabad	urban	Sep-Oct, 2017	HR-AMS	15.4	9	4.3	1.5	0.4	0.2	(Singh et al., 2019)[62]
India	Delhi	urban	Dec 2016-Feb 2017	Q-ACSM	195	112	16	24	20	23	(Gani et al., 2019)[63]
			Feb-Mar, 2017		99.5	61	10	9	10	9.5	
			Apr-Jun, 2017		55.5	35	10	3.8	5.2	1.5	
			Jul-Sep, 2017		41.6	23	10	3.6	4.6	0.4	
India	Mt. Ghats	Background	Mar-May, 2016	ToF-ACSM	10.29	6.25	2.39	0.56	0.97	0.12	(Mukherjee et al., 2018)[64]
			Jun-Sep, 2016		2.5	1.5	0.39	0.07	0.45	0.09	
			Oct-Nov, 2016		4.69	2.6	1.1	0.33	0.61	0.05	
			Dec 2016-Feb 2017		12.38	7.02	3	0.96	1.28	0.11	
Singapore		urban	Oct 2015	ToF-ACSM	49.8	39.2	5.6	2.1	2.6	0.3	(Budisulistiorini et al, 2018)[65]
Singapore		urban	May-Jun, 2017	SP-AMS	9.89	5.59	3.29	0.11	0.85	0.05	(Rivellini et al, 2019)[66]
Korea	Seoul	urban	Dec 2015-Jan 2016	HR-AMS	24.9	12.1	2.87	6.55	3.11	0.26	(Kim et al., 2017)[67]
Korea	Seoul	urban	Apr-Jun, 2016	HR-AMS	20.6	9.7	4.4	3.8	2.7	0	(Kim et al., 2018)[68]
Korea	Gwangju	urban	Aug-Sep, 2011	Q-AMS	8.23	4.7	1.75	0.62	1.07	0.09	(Park et al., 2012)[69]
			Dec 2011		12.76	6.31	1.9	2.45	1.7	0.4	
Korea	Gwangju	urban	Aug-Sep, 2011	Q-AMS	6.96	3.96	1.81	0.32	0.85	0.02	(Park et al., 2013)[70]
			Dec 2011		12.03	5.42	1.93	2.17	2.2	0.31	
			May 2012		7.51	3.28	2.58	0.61	0.99	0.05	
			Jul-Aug, 2012		8.66	4.9	2.41	0.37	0.92	0.06	
Korea	Gwangju	urban	May-Jun, 2015	Q-AMS	19.6	9.1	4.7	3.2	2.6	0	(Cho et al., 2018)[71]
Korea	Gwangju	urban	Nov 2013	Q-AMS	8.66	3.58	2.01	1.42	1.34	0.31	(Lee et al., 2017)[72]
Korea	Boseong	coastal	Nov 2012, Nov 2013	Q-AMS	2.05	0.84	0.72	0.23	0.21	0.05	(Lee et al., 2017)[72]
Korea	Baengnyeong	island	May 2011	HR-AMS		2.47	5.3	0.79	1.66	--	(Lee et al., 2015)[73]
			Jun 2011			2.11	4.43	0.62	1.21		
			Jul 2011			1.36	2.58	0.51	0.86		
			Aug 2011			1.62	2.74	0.32	0.85		
			Sep 2011			3.56	7.24	0.72	1.72		
			Oct 2011			5.84	5.04	1.47	1.66		
			Nov 2011			5.36	5.27	2.32	1.9		
Korea	Jeju	Island	Apr 2001	Q-AMS	8.61	3.5	3.1	0.51	1.5	0	(Topping et al., 2004)[74]
Japan	Tokyo	urban	Feb 2003	Q-AMS	15.3	6.7	2.5	3.1	2.2	0.5	(Takegawa et al., 2006)[75]
			Jul-Aug, 2003		12.7	5.7	3.2	1	1.8	0.09	
			Sep-Oct, 2003		11.9	7.1	1.8	1	1.3	0.1	
			Jan-Feb, 2004		14.0	5.8	1.7	2.8	2.3	0.5	

Japan	Tokyo	urban	Jul-Aug, 2004	Q-AMS	7.8	3.7	2.6	0.3	1.1	0.1	(Miyakawa et al., 2008)[76]
			Aug 2004		21.8	11.3	6.2	1.4	2.9	0	
Japan	Tokyo	urban	Aug 2008	Q-AMS	10.6	5.6	3.4	0.2	1.4	0	(Xing et al., 2011)[77]
Japan	Saitama	suburban	Jul-Aug, 2004	Q-AMS	32.4	17.9	8.1	2.5	3.5	0.4	(Miyakawa et al., 2008)[76]
			Aug 2004		13.4	6.8	3.8	0.9	1.7	0.2	
Japan	Okinawa	Island	Oct 2003	Q-AMS	14.45	3.1	9.2	0.19	1.9	0.06	(Zhang et al., 2007)[78]
			Nov 2003		9.82	1.9	6.6	0.14	1.1	0.08	
			Dec 2003		15.41	3.1	10.3	0.23	1.7	0.08	
			Mar-Apr, 2004		7.89	1.7	4.7	0.15	1.3	0.04	
			Apr 2004		15.21	2.7	9.5	0.18	2.8	0.03	
Japan	Fukue	Island	Mar-Apr, 2003	Q-AMS	12.03	5	4.8	0.56	1.6	0.07	(Takami et al., 2005)[79]

Table S3. Summary of sampling sites and mass concentrations, O/C and H/C ratios of OA components for AMS measurements in Asia.

Area	Site	Site type	Sampling time	Instrument	HOA	COA	BBOA	CCOA	LO-OOA	MO-OOA	Reference
Tibet	Menyuan	background	Sep-Oct, 2013	Q-ACSM	--	--	0.8	--	--	4.1 OOA	(Du et al., 2015)[1]
Tibet	Nam Co	background	May-Jul, 2015	HR-AMS O/C=0.88 H/C=1.33	--	--	--	--	0.56 O/C=0.49 H/C=1.34	0.8 O/C=0.96 H/C=1.04	(Xu et al., 2018)[2]
Tibet	Qomolang-ma	background	Apr-May, 2016	HR-AMS O/C=1.07 H/C=1.29	--	--	1.1 O/C=0.85 H/C=1.42	0.3 NOA O/C=1.1 H/C=1.16	--	1 O/C=1.34 H/C=1.17	(Zhang et al., 2018)[3]
Tibet	Waliguan	background	Jul 2017	HR-AMS O/C=0.99 H/C=1.43	0.21 O/C=0.33 H/C=1.83	--	0.58 O/C=0.69 H/C=1.58	--	1.27 aged BBOA O/C=1.02 H/C=1.5	1.08 OOA O/C=1.42 H/C=1.09	(Zhang et al., 2019)[4]
Tibet	Mt. Yulong	background	Mar-Apr, 2015	HR-AMS O/C=1.11 H/C=1.4	--	--	0.5 O/C=0.37 H/C=1.87	--	0.85 aged BBOA O/C=0.85 H/C=1.57	2.53 OOA O/C=1.45 H/C=1.26	(Zheng et al., 2017)[5]
Hainan	Mt. Wuzhi	background	Mar-Apr, 2015	HR-AMS O/C=0.67 H/C=1.52	--	--	--	--	1.9 O/C=0.55 H/C=1.57	3 O/C=1.35 H/C=1.08	(Zhu et al., 2016)[6]
NCP	Mt. Tai	background	Jun 2010-Jan 2012	Q-AMS	--	--	--	--	--	--	(Zhang et al., 2014)[7]
YRD	Shanghai	urban	May-Jun, 2010	HR-AMS O/C=0.28 H/C=1.74	2 O/C=0.16 H/C=1.77	--	--	--	3.9 O/C=0.35 H/C=1.48	2.5 O/C=0.65 H/C=1.49	(Huang et al., 2012)[8] **(AA method)**
YRD	Shanghai	urban	Nov 2016-Jan 2017	HR-AMS	--	--	--	--	--	--	(Zhu et al., 2018)[9]
YRD	Nanjing	urban	Feb-Mar, 2015	SP-AMS	2.4 O/C=0.15 H/C=1.73	1.8 O/C=0.24 H/C=1.61	1.9 IOA O/C=0.33 H/C=1.37	1.2 LSOA O/C=0.33 H/C=1.64	1.9 O/C=0.47 H/C=1.38	2.6 O/C=0.59 H/C=1.27	(Wang et al., 2016)[10]
YRD	Nanjing	urban	Apr 2015	SP-AMS O/C=0.27 H/C=1.52	3.5 O/C=0.1 H/C=1.75	2.1 O/C=0.16 H/C=1.67	--	--	3.5 O/C=0.32 H/C=1.51	3.6 O/C=0.55 H/C=1.27	(Wang et al., 2016)[11]
YRD	Nanjing	urban	Dec 2013	Q-ACSM	5	5	5.8	--	4.6	18	(Zhang et al., 2015)[12]
YRD	Hangzhou	urban	Aug 2016 Aug-Sep, 2016 Sep 2016	HR-AMS	3.4 0.3 2	3.1 2 4.2	-- -- --	-- -- --	6.6 2.4 4.3	3.9 9 8	(Li et al., 2018)[13]
YRD	Jiaxing	suburban	Jun-Jul, 2010	HR-AMS O/C=0.28	3.3 O/C=0.13	-- --	--	-- --	-- --	7.3 OOA O/C=0.41	(Huang et al., 2013)[14]

			Dec 2010	H/C=1.55 O/C=0.33 H/C=1.6	H/C=1.77 5.1 O/C=0.11 H/C=1.85		3.7 O/C=0.27 H/C=1.51			H/C=1.47 3.9 OOA O/C=0.59 H/C=1.29	**(AA method)**
YRD	Lake Hongze	rural	Mar-Apr, 2011	HR-AMS	3 O/C=0.28 H/C=1.73	--	--	--	4.8 O/C=0.86 H/C=1.37	2 O/C=0.89 H/C=1.56	(Zhu et al., 2016)[6]
YRD	Lin'an	background	Mar 2013	Q-AMS	--	--	--	--	--	--	(Zhang et al., 2015)[15]
YRD	Lin'an	background	Nov-Dec, 2013	Q-AMS	6.4	--	7.2	--	2.6	12.8	(Zhang et al., 2015)[16]
PRD	Shenzhen	urban	Jan-Feb, 2009	HR-AMS	--	--	--	--	--	--	(Yao et al., 2010)[17]
PRD	Shenzhen	urban	Jan-Feb, 2009	HR-AMS	19.9 POA	--	--	--	--	9.5 OOA	(Huang et al., 2010)[18]
PRD	Shenzhen	urban	Oct-Dec, 2009	HR-AMS O/C=0.3 H/C=1.63	5.2 O/C=0.11 H/C=1.7	--	4.3 O/C=0.32 H/C=1.47	--	4.9 O/C=0.45 H/C=1.45	3.3 O/C=0.59 H/C=1.26	(He et al., 2011)[19] **(AA method)**
PRD	Shenzhen	urban	Dec 2014-Jan 2015	HR-AMS O/C=0.52 H/C=1.61	2.5 O/C=0.1 H/C=2	3.8 O/C=0.18 H/C=1.77	1.6 O/C=0.33 H/C=1.52	--	7.2 O/C=0.76 H/C=1.54	3.3 O/C=0.95 H/C=1.18	(Cao et al., 2018)[20]
PRD	Dongguan	urban	Dec 2013-Jan 2014	HR-AMS	3.2	4.6	2.9	--	3.1	9.4	(Lan et al., 2018)[21]
PRD	Heshan	urban outflow	Nov-Dec, 2010	HR-AMS O/C=0.4 H/C=1.49	3.1 O/C=0.09 H/C=1.8	--	2.5 O/C=0.19 H/C=1.41	--	5 O/C=0.37 H/C=1.33	6.8 O/C=0.55 H/C=1.3	(Gong et al., 2012)[22] **(AA method)**
PRD	HongKong	urban	Sep 2013	Q-ACSM	2.7	3.6	--	--	3.1	5.7	(Sun et al., 2016)[23]
PRD	Backgarden	rural	July 2006	Q-AMS	5.5	--	--	--	3.9	6.7	(Xiao et al., 2011)[24]
PRD	Kaiping	rural	Oct-Nov, 2008	HR-AMS O/C=0.47 H/C=1.48	--	--	2.7 O/C=0.26 H/C=1.62	--	4 O/C=0.39 H/C=1.48	4.5 O/C=0.64 H/C=1.3	(Huang et al., 2011)[25] **(AA method)**
PRD	Panyu	suburban	Nov 2014-Jan 2015	HR-AMS O/C=0.53 H/C=1.65	6.7 O/C=0.22 H/C=1.91	2.1 O/C=0.12 H/C=1.83	1 O/C=0.51 H/C=1.92	--	8.2 O/C=0.69 H/C=1.68	7.7 O/C=0.92 H/C=1.37	(Qin et al., 2017)[26]
PRD	HongKong	suburban	Apr-Jun 2011 Sep 2011	HR-AMS	0.4 O/C=0.09 H/C=1.67 0.47 O/C=0.25	0.4 O/C=0.08 H/C=1.74 0.28 O/C=0.11	-- -- -- --	-- -- -- --	1.6 O/C=0.23 H/C=1.46 2.16 O/C=0.42	1.6 O/C=0.68 H/C=1.13 1.19 O/C=0.79	(Li et al., 2015)[27] **(AA method)**

			Oct-Dec 2011 Jan-Mar 2012		H/C=1.67 0.35 O/C=0.08 H/C=1.76 0.4 O/C=0.09 H/C=1.77	H/C=1.69 0.45 O/C=0.1 H/C=1.69 0.6 O/C=0.12 H/C=1.66			H/C=1.38 2.5 O/C=0.36 H/C=1.44 1.3 O/C=0.27 H/C=1.48	H/C=1.3 2.7 O/C=0.6 H/C=1.27 2.8 O/C=0.63 H/C=1.25	
PRD	HongKong	suburban	Oct 2016	HR-AMS O/C=0.68 H/C=1.57	--	O/C=0.21 H/C=1.85	--	--	O/C=0.75 H/C=1.52	O/C=1.04 H/C=1.38	(Li et al., 2019)[28]
NW	Lanzhou	urban	Jul-Aug, 2012	HR-AMS O/C=0.33 H/C=1.49	1.8 O/C=0.1 H/C=1.85	2.8 O/C=0.1 H/C=1.69	--	--	3.1 O/C=0.28 H/C=1.33	3.7 O/C=0.68 H/C=1.3	(Xu et al., 2014)[29] **(AA method)**
NW	Lanzhou	urban	Jan-Feb, 2014	HR-AMS O/C=0.28 H/C=1.55	2.9 O/C=0.1 H/C=1.86	5.9 O/C=0.07 H/C=1.73	3.2 O/C=0.24 H/C=1.55	6.4 O/C=0.2 H/C=1.54	6.5 O/C=0.33 H/C=1.47	4.4 O/C=0.8 H/C=1.14	(Xu et al., 2016)[30] **(AA method)**
NW	Lanzhou	urban	Oct-Dec, 2014	Q-AMS	1.5	3.4	2.3	3.7	3.2	4.1	(Zhang et al., 2017)[31]
NW	Xi'an	urban	Dec 2012-Jan 2013	Q-ACSM	--	--	--	--	--	--	(Wang et al., 2014)[32]
NW	Baoji	urban	Feb-Mar, 2014	Q-ACSM	5.9	4.2	3.9	2.7	6.8	6.2	(Wang et al., 2017)[33]
NCP	Beijing	urban	Jul 2006	Q-AMS	11.0	--	--	--	4.5	12.6	(Sun et al., 2010)[34]
NCP	Beijing	urban	Jul-Sep, 2008	HR-AMS	4.3 O/C=0.17 H/C=1.58	5.8 O/C=0.11 H/C=1.73	--	--	5.7 O/C=0.47 H/C=1.33	8.1 O/C=0.48 H/C=1.38	(Huang et al., 2010)[35] **(AA method)**
NCP	Beijing	urban	Nov-Dec, 2010 Aug-Sep, 2011	HR-AMS O/C=0.32 H/C=1.65 O/C=0.56 H/C=1.61	4.7 O/C=0.15 H/C=1.75 3.4 O/C=0.22 H/C=1.78	6.8 O/C=0.14 H/C=1.75 5.6 O/C=0.17 H/C=1.8	4.1 O/C=0.22 H/C=1.55 --	8.3 O/C=0.16 H/C=1.56 --	4.3 O/C=0.47 H/C=1.65 7.5 O/C=0.62 H/C=1.45	6.3 O/C=0.58 H/C=1.47 9.9 O/C=0.82 H/C=1.24	(Hu et al., 2016)[36]
NCP	Beijing	urban	Mar-May, 2012 Jul-Aug, 2012 Oct-Nov, 2012	HR-AMS O/C=0.49 H/C=1.63 O/C=0.53 H/C=1.61 O/C=0.46	2.8 O/C=0.18 H/C=1.81 1.4 O/C=0.19 H/C=1.71 2.5 O/C=0.07	2.6 O/C=0.13 H/C=1.89 2.5 O/C=0.17 H/C=1.85 5.2 O/C=0.13	1.8 O/C=0.31 H/C=1.67 -- -- -- 2 O/C=0.24	-- -- -- -- -- -- --- --	-- -- -- 5.3 O/C=0.67 H/C=1.51 -- --	6.8 OOA O/C=1 H/C=1.38 3.3 O/C=0.91 H/C=1.4 8.6 OOA O/C=0.88	(Hu et al., 2017)[37]

			Jan-Mar, 2013	H/C=1.58 O/C=0.47 H/C=1.52	H/C=1.94 5.5 O/C=0.36 H/C=1.66	H/C=1.82 4.3 O/C=0.23 H/C=1.73	H/C=1.53	-- 5 O/C=0.14 H/C=1.45	-- 5 O/C=0.77 H/C=1.72	H/C=1.32 9.8 O/C=0.84 H/C=1.34	
NCP	Beijing	urban	Oct 2012	HR-AMS	4.9 O/C=0.13 H/C=1.6	9.5 O/C=0.07 H/C=1.75	5.8 O/C=0.31 H/C=1.53	--	--	8.6 OOA O/C=1 H/C=1.08	(Xu et al., 2018)[38]
NCP	Beijing	urban	Jan-Feb, 2013	HR-AMS O/C=0.34 H/C=1.44	4.9 O/C=0.11 H/C=1.55	8.9 O/C=0.11 H/C=1.71	--	6.7 O/C=0.28 H/C=1.61	11.6 O/C=0.4 H/C=1.35	12.6 O/C=0.84 H/C=1.21	(Zhang et al., 2014)[39] **(AA method)**
NCP	Beijing	urban	Dec 2013-Jan 2014	HR-AMS O/C=0.37 H/C=1.75	3.8 O/C=0.11 H/C=2.08	6.8 O/C=0.14 H/C=1.88	3.4 O/C=0.36 H/C=1.67	7.6 O/C=0.14 H/C=1.67	7.2aq-OOA O/C=0.81 H/C=1.75	9.5 OOA O/C=0.75 H/C=1.51	(Sun et al., 2016)[40]
NCP	Beijing	urban	Jun-Jul, 2014 Oct-Nov, 2014	HR-AMS O/C=0.9 H/C=1.52 O/C=0.78 H/C=1.48	2.4 O/C=0.3 H/C=1.8 3.3 O/C=0.19 H/C=1.95	5.7 O/C=0.15 H/C=1.88 7.4 O/C=0.13 H/C=1.87	-- 4 O/C=0.65 H/C=1.81	-- --	6.5 O/C=0.78 H/C=1.55 6.9 O/C=0.58 H/C=1.5	4.1 O/C=1.15 H/C=1.45 7.8 O/C=1.23 H/C=1.44	(Xu et al., 2017)[41]
NCP	Beijing	urban	Oct 2014 Dec 2014	HR-AMS	6.2 O/C=0.07 H/C=1.75 4.2 O/C=0.08 H/C=1.66	5.9 O/C=0.13 H/C=1.61 3.5 O/C=0.1 H/C=1.68	3.5 O/C=0.2 H/C=1.53 --	-- 4.5 O/C=0.25 H/C=1.19	5.5 O/C=0.54 H/C=1.46 --	13.5 O/C=0.84 H/C=1.13 8.1 OOA O/C=0.56 H/C=1.42	(Zhang et al., 2016)[42]
NCP	Beijing	urban	Nov-Dec, 2014 Nov-Dec, 2016	HR-AMS O/C=0.4 H/C=1.69 O/C=0.45 H/C=1.68	4.7 FFOA O/C=0.16 H/C=1.83 5.6 FFOA O/C=0.22 H/C=1.69	7.6 O/C=0.19 H/C=1.83 5.4 O/C=0.16 H/C=1.82	3.7 O/C=0.39 H/C=1.75 6.3 O/C=0.32 H/C=1.98	4.1 OPOA O/C=0.38 H/C=1.48 6.2 OPOA O/C=0.4 H/C=1.58	5 aqOOA O/C=0.65 H/C=1.82 4.9 aqOOA O/C=0.82 H/C=1.75	5.3 OOA O/C=1.09 H/C=1.59 7.9 OOA O/C=1.09 H/C=1.27	(Xu et al., 2019)[43]
NCP	Beijing	urban	Sep 2015	HR-AMS	2.8 O/C=0.16 H/C=1.62	4 O/C=0.09 H/C=1.71	--	--	7.4 O/C=0.45 H/C=1.4	5.8 O/C=0.88 H/C=1.11	(Li et al., 2020)[44]
NCP	Beijing	urban	Aug-Sep, 2015	HR-AMS	1.7 O/C=0.23 H/C=1.89	3.8 O/C=0.13 H/C=1.85	--	--	6.2 O/C=0.84 H/C=1.55	4.3 O/C=1 H/C=1.39	(Zhao et al., 2017)[45]
NCP	Beijing	urban	Jun 2017 May-Jun, 2018	HR-AMS O/C=0.57 H/C=1.64 O/C=0.68 H/C=1.5	1 O/C=0.1 H/C=1.89 1.7 O/C=0.17 H/C=1.83	2.4 O/C=0.23 H/C=1.82 2 O/C=0.27 H/C=1.76	-- -- 	-- -- 	3.8 O/C=0.62 H/C=1.62 5.8 O/C=0.76 H/C=1.44	2.6 O/C=1.21 H/C=1.25 3.4 O/C=1.3 H/C=1.13	(Xu et al., 2019)[46]

NCP	Beijing	urban	Nov 2018-Jan 2019	HR-AMS	1.3	2.4	1.3	1.7	1.6	3.2	(Li et al., 2020)[47]
NCP	Tianjin	urban	Sep 2010	C-ToF-AMS	--	--	--	--	--	--	(Zhang et al., 2012)[48]
NCP	Xinxiang	urban	Aug 2017	Q-ACSM	4.4	--	--	--	4.1	9.5	(Li et al., 2018)[49]
NCP	Handan	urban	Dec 2015-Feb 2016	Q-ACSM	5.8	--	20.8	24.2	--	32.5 OOA	(Li et al., 2017)[50]
NCP	Shijiazhuang	urban	Jan-Feb, 2014	Q-ACSM	11.6	14.3	15.1	24	--	24 OOA	(Huang et al., 2019)[51]
NCP	Xianghe	suburban	Jun 2013	Q-ACSM	5.3	--	3.2	--	5.1	14.7	(Sun et al., 2016)[52]
NCP	Xinzhou	suburban	Jul-Sep, 2014	Q-ACSM	2.1	--	--	--	4.3	5.3	(Wang et al., 2016)[53]
NCP	Xingtai	suburban	Apr-Jun, 2016	Q-ACSM	1.25	1.25	--	--	--	8.9 OOA	(Zhang et al., 2018)[54]
NCP	Liulihe	rural	Oct-Nov, 2014 Mar-Apr, 2015 Aug-Sep, 2015 Dec-Jan, 2015	Q-ACSM	6 1.6 2.3 19.2	6 7.5 -- 9.2	-- -- -- 20.5	-- -- -- --	9 -- -- --	9 6.9 11.6 OOA 21.9 OOA	(Hua et al., 2018)[55]
NCP	Yufa	suburban	Aug-Sep, 2006	Q-AMS	--	--	--	--	--	--	(Gunthe et al., 2011)[56]
NCP	Xinglong	suburban	Nov 2018-Jan 2019	Q-AMS	2.2 POA	--	--	--	--	3.2 OOA	(Li et al., 2020)[47]
NCP	Changping	suburban	Jun 2016	HR-AMS O/C=0.52 H/C=1.64	-- O/C=0.05 H/C=2.06	-- O/C=0.22 H/C=1.81	-- O/C=0.46 H/C=1.76	--	-- O/C=0.48 H/C=1.53	-- O/C=0.79 H/C=1.51	(Li et al., 2019)[28]
NCP	Changdao	island	Mar-Apr, 2011	HR-AMS O/C=0.59 H/C=1.33	3.1 O/C=0.34 H/C=1.52	--	--	1.2 O/C=0.17 H/C=1.4	3.2 O/C=0.62 H/C=1.33	5.9 O/C=0.78 H/C=1.27	(Hu et al., 2013)[57] **(AA method)**
India	Kanpur	urban	Nov 2012 Dec 2012-Jan 2013	HR-AMS	 O/C=0.15 H/C=1.78	BBOA1 O/C=0.32 H/C=1.64	BBOA2 O/C=0.38 H/C=1.49	agedBBOA O/C=0.69 H/C=1.57	 O/C=0.44 H/C=1.43	 O/C=0.86 H/C=1.18	(Chakrabortty et al., 2015)[58] **(AA method)**
India	Kanpur	urban	Feb-Mar, 2013	HR-AMS	5.1 O/C=0.12	4.5 OPOA O/C=0.24	2.6 BBOA1 O/C=0.43	5.1 BBOA2 O/C=0.45	6.1 O/C=0.67	8.6 O/C=0.88	(Kumar et al., 2016)[59] **(AA method)**
India	Kanpur	urban	Dec 2014-Feb 2015	HR-AMS	6.6 O/C=0.05 H/C=1.84	--	22.1 O/C=0.26 H/C=1.68	8.2 agedBBOA O/C=0.73 H/C=1.53	LO-+MO-OOA=45.1 O/C=0.96 H/C=1.17	 O/C=1.19 H/C=1.11	(Chakrabortty et al., 2016)[58] **(AA**

											method)
India	Kanpur	urban	May-Aug, 2015	HR-AMS	0.5 O/C=0.09 H/C=1.83		0.4 O/C=0.45 H/C=1.38		2.3 O/C=0.56 H/C=1.37	2.8 O/C=0.95 H/C=1.17	(Chakraborty et al., 2016)[60] **(AA method)**
India	Kanpur	urban	Sep-Oct	HR-AMS	2.5 O/C=0.09 H/C=1.89		3.8 O/C=0.36 H/C=1.51	3.8 agedBBOA O/C=0.79 H/C=1.44	7.1 O/C=0.53 H/C=1.44	8.1 O/C=1.12 H/C=1.16	(Chakraborty et al., 2018)[61]
India	Ahmedabad	urban	Sep-Oct, 2017	HR-AMS	3.8				2.3	3	(Singh et al., 2019)[62]
India	Delhi	urban	Dec 2016-Feb 2017 Feb-Mar, 2017 Apr-Jun, 2017 Jul-Sep, 2017	Q-ACSM	53.9 POA 30.5 POA 15.4 POA 8.6 POA	--	--	--	--	58.1 OOA 30.5 OOA 19.6 OOA 14.4 OOA	(Gani et al., 2019)[63]
India	Mt. Ghats	Background	Mar-May, 2016 Jun-Sep, 2016 Oct-Nov, 2016 Dec 2016-Feb 2017	ToF-ACSM	2 0.64 0.6 1.47		1.1 0.56 0.2 1.97		1.05 LO-+MO-OOA=0.31 1.2 1.77	2.05 0.6 1.83	(Mukherjee et al., 2018)[64]
Singapore		urban	Oct 2015	ToF-ACSM	4.5 O/C=0.16 H/C=1.57		5.8 O/C=0.25 H/C=1.48	7.2 O/C=0.11 H/C=1.64		21.7 OOA O/C=0.88 H/C=1.55	(Budisulistiorini et al, 2018)[65]
Singapore		urban	May-Jun, 2017	SP-AMS	1.09 O/C=0.07 H/C=2.12	0.65 O/C=0.15 H/C=1.88	1.48 O-HOA O/C=0.28 H/C=1.87		0.58 O/C=0.41 H/C=1.67	1.79 O/C=0.94 H/C=1.41	(Rivellini et al, 2019)[66]
Korea	Seoul	urban	Dec 2015-Jan 2016	HR-AMS O/C=0.37 H/C=1.79	1.9 O/C=0.06 H/C=2.21	2.4 O/C=0.14 H/C=1.89	2.8 O/C=0.34 H/C=1.74		1.8 O/C=0.56 H/C=1.9	3.2 O/C=0.68 H/C=1.61	(Kim et al., 2017)[67]
Korea	Seoul	urban	Apr-Jun, 2016	HR-AMS O/C=0.49	1.7 O/C=0.15 H/C=2	2.1 O/C=0.19 H/C=1.83			2.6 O/C=0.44 H/C=1.73	3.3 O/C=0.91 H/C=1.46	(Kim et al., 2018)[68]
Korea	Gwangju	urban	Aug-Sep, 2011 Dec 2011	Q-AMS	--	--	--	--	--	--	(Park et al., 2012)[69]
Korea	Gwangju	urban	Aug-Sep, 2011 Dec 2011 May 2012 Jul-Aug, 2012	Q-AMS	1.15 2.05 0.94 1.5	--	--	--	0.89 1.37 1.26 1.56	1.92 2 1.08 1.84	(Park et al., 2013)[70]
Korea	Gwangju	urban	May-Jun, 2015	Q-AMS	4.8	--	--	--	--	4.3 OOA	(Cho et al., 2018)[71]
Korea	Gwangju	urban	Nov 2013	Q-AMS	1.1	--	--	--	1.31	1.17	(Lee et al., 2017)[72]

Korea	Boseong	coastal	Nov2012&Nov 2013	Q-AMS	0.23	--	--	--	0.34	0.27	(Lee et al., 2017)[72]
Korea	Baengnyeong	island	May 2011 Jun 2011 Jul 2011 Aug 2011 Sep 2011 Oct 2011 Nov 2011	HR-AMS	--	--	--	--	--	--	(Lee et al., 2015)[73]
Japan	Tokyo	urban	Feb 2003 Jul-Aug, 2003 Sep-Oct, 2003 Jan-Feb, 2004	Q-AMS	--	--	--	--	--	--	(Topping et al., 2004)[74]
Japan	Tokyo	urban	Jul-Aug, 2004 Aug 2004	Q-AMS	--	--	--	--	--	--	(Takegawa et al., 2006)[75]
Japan	Tokyo	urban	Aug 2008	Q-AMS	--	--	--	--	--	--	(Miyakawa et al., 2008)[76]
Japan	Saitama	suburban	Jul-Aug, 2004 Aug 2004	Q-AMS	--	--	--	--	--	--	(Xing et al., 2011)[77]
Japan	Okinawa	Island	Oct 2003 Nov 2003 Dec 2003 Mar-Apr, 2004 Apr 2004	Q-AMS	--	--	--	--	--	--	(Miyakawa et al., 2008)[76]
Japan	Fukue	Island	Mar-Apr, 2003	Q-AMS	--	--	--	--	--	--	(Zhang et al., 2007)[78]

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