Text S1. The data quality assurance and quality control procedures

Calibrations

The calibration of this instrument in this study contained two parts. One was the multi-points calibrations with the standard gas (Spectra, USA), which was performed periodically and were carried out with the points of 0.0 ppbv, 0.5 ppbv, 1.0 ppbv, 2.0 ppbv, and 4.0 ppbv The slopes of calibration curves without intercepts were obtained, to recalculate the concentrations of the target species. The other one was single-point calibration every day using the standard matters (n-Hexane and benzene) in the permeation tube, to ensure the stability of the instrument system and reliability of the observed data. Stringent quality assurance of observed data during 2009–2010 has been conducted and described before (Wang et al., 2013), we considered it is convincing for later analysis. Then we mainly clarified data quality over the later years.

Data quality

As shown in Figure S2(a), correlations between the measured and the reference concentrations in standard gas, obtained from multi-points calibrations, were found to be consistent over seven years. The several fluctuations of response in daily single-point calibrations (Figure S2 (b) and (c)), were mainly caused by several maintenances, such as replacement of permeation tubes, cold trap repair and parameter adjustment after repair, during the long-term period (listed in Table S3). Each large variation could be also reflected on the change of slopes of multipoint calibrations for target species, where the correction factor was calculated by linear correct of slopes to maintain data consistency. Thus combined results of calibrations mentioned above were used to assure and control the data quality.

The averaged slopes and correlation coefficients for targeted species were showed in Table S3, and concentration of most species measured agreed well with standard gases.

The method detection limit (MDL) of each species, was calculated through following equation,

$$S = \sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}} \qquad (1\text{-}1)$$

$$\mathrm{MDL} = t_{n-1,0.99} \times S \qquad (1\text{-}2)$$

S represent standard deviation of data, MDLs were calculated as the standard deviation resulted from 7 repeated analyses of the standard gas mixture at the lowest concentrations (0.5 ppbv) of the calibration curves with a confidence level of 99% and the t-value of 3. The MDLs for all measured species were shown in Table S2.

The precision of targeted species, was calculated as the relative standard deviation of responses to 2-ppb dilution in multi-times calibrations,

$$Precision = \frac{\sqrt{\frac{\sum_{i=1}^{n}(y_i-\bar{y})^2}{n-1}}}{\bar{y}} \times 100\% \qquad (1\text{-}3)$$

y_i means concentration measured at the i times, $\bar{y}$ is the averaged concentration, and n means numbers of times. The precision of target species was also listed in Table S2, ranging from 3%~19%. The accuracy of species was determined as relative error of measured to standard gases in multi-times calibrations, ranging from 6%~20%. Then uncertainty of major groups was calculated as followed equation,

$$Uncertainty = \sqrt{\sum_{i=1}^{n} a_i x_i^2} \qquad (1\text{-}4)$$

x_i is the accuracy of species, a_i means the contribution of each species to the groups. Overall, the uncertainty of NMHCs was 13%, alkanes, alkenes, aromatics and acetylene were 14%, 14%, 10%, and 13%, respectively.

Text S2. The effect of meteorology on NMHCs trend

To rule out the interference from meteorology on trends of NMHCs, we performed the multiple linear regression model (MLR) with ambient NMHCs and major meteorological variables during the long-term period. A number of studies have examined meteorological influences on air pollutants (like O_3 and $PM_{2.5}$) variability with MLR analysis (Tai et al., 2010;Otero et al., 2018;Zhai et al., 2019;Li et al., 2019a). Here we tended to analysis the effects on trends of four grouped and total NMHCs.

Separate fits of NMHCs to the meteorological factors

The model fits the deseasonalized and detrended monthly NMHCs mean time series to the five deseasonalized and detrended monthly mean meteorological variables (Temperature, Relative Humidity, Pressure, Wind Direction/Speed). The deseasonalized and detrended time series were obtained by removing the 12-month moving averages from the monthly mean time series(Tai et al., 2010;Zhai et al., 2019). This focused on synoptic time scales, without influences from seasonal variations or long-term trend. All monthly grouped NMHCs were deseasonalized and detrended, as well as the meteorological variables.

Separate fits of NMHCs to the meteorological factors has the followed form (Zhai et al., 2019):

$$Y_d(t) = \sum_{k=1}^{5} \beta_k X_{d,k}(t) + b \qquad (2\text{-}1)$$

$Y_d(t)$ represents the deseasonalized and detrended grouped NMHCs time series and $X_{d,k}(t)$ is the corresponding time seres for the meteorological factors. We fit the regression coefficients β_k and the intercept b, with stepwise linear regression, by adding or deleting terms based on their independent statiscal significance to obtain the best model fit (Zhai et al., 2019). The regression coefficient β_k is zero for meteorological variable not included in the final MLR model.

The meteorology-driven NMHCs anomalies

The MLR model was used to remove the effect of meteorological variability from the long-term NMHCs trends, including synoptic-scale variablity and interannual variability and 7-year trends. There was an assumption that the same factors that drive synotic-scale variability, as well as interannual variability (Jacob and Winner, 2009;Tai et al., 2012). We thus apply Eq.(2-1) to the meteorological anomalies $X_{a,k}$ derived from removing the 7-year means for that month of the year, which represent the deseasonalized anomalies not detrended. In the meantime, the NMHCs anomaly Y_a is obtained by deseasonalizing but not detrending the NMHCs data in the same way as for the meteorological variables. The meteorology-driven NMHCs anomalies Y_m:

$$Y_m(t) = \sum_{k=1}^{5} \beta_k X_{a,k}(t) + b \qquad (2\text{-}2)$$

Meteorology-corrected data

After removing the meteorological influence from the MLR model, the residual anomaly Y_r :

$$Y_r(t) = Y_a(t) - Y_m(t) \qquad (2\text{-}3)$$

The residual was the component of the anomaly that cannot be explained by the MLR meteorological model, and we would refer to it as the meteorology-corrected data. It included noise due to limitations of the MLR model and other factors but also a long-term trend over the 7-year period that can mainly be attributed to changes in anthropogenic emissions.

Text S3. The evaluation of effects of photochemistry on NMHCs trends.

Chemical loss rate

The mixing ratios of NMHCs could be affected by change in oxidation capacity, as the chemical loss of NMHCs was mainly through the reactions with OH radical, ozone and NO_3 radical in ambient (Yuan et al., 2013;Atkinson and Arey, 2003;Wang et al., 2020). In order to examine the effect of change in oxidation capacity, we then explore the trends of NMHC loss rate (L_{NMHC}) in the atmosphere. The L_{NMHC} can be expressed by

$$L_{NMHC} = \sum_i^3 k \times [NMHC] \times [Oxidant]. \qquad (3\text{-}1)$$

k is the rate constant of NMHC species with the oxidants (OH radical, ozone and NO_3 radical). [NMHC] and [Oxidant] are mixing ratios of NMHC species and the oxidants, respectively(Atkinson, 2000;Atkinson and Arey, 2003).

OH radical concentration

OH radical concentration ([OH] in molecule cm^{-3}) can be estimated from the empirical equation (Ehhalt and Rohrer, 2000):

$$[OH]=4.1\times10^9\times(J_{O1D})^{0.83}\times(J_{NO2})^{0.19}\times\frac{140\times[NO_2]+1}{0.41\times[NO_2]^2+1.7\times[NO_2]+1} \qquad (3\text{-}2)$$

J_{O1D} and J_{NO2} are photolysis frequency (s^{-1}) of O_3 and NO_2, respectively. [NO_2] is measured NO_2 concentration (ppbv). In this study, we only got UVA data but not J_{O1D} and J_{NO2}. Through the fitting between UVA and J_{O1D}, J_{NO2} which were measured in Shanghai in May of 2017, we scaled the observed UVA to get J_{O1D} and J_{NO2}, as shown in Figure S4.

The effect of chemical loss on observed NMHCs trends

According to the above method, [OH] was calculated based on the observed NO_2 concentration and UVA during 2009–2015. Previous works have revealed the OH radicals accounted for more than 90% of the average loss rates of anthropogenic NMHCs (Wang et al., 2020;Yuan et al., 2013). Oxidation by ozone also contributes to the loss rates of alkenes. While the oxidation by NO_3 radicals is more important for the loss rates of biogenic hydrocarbons, we thought they could be neglected in this study. Combined the OH radical and ozone concentration, NMHC loss rate (L_{NMHC}) each year was calculated. As shown in Figure S5, the trends of chemical loss of NMHCs showed insignificant change over seven years. This suggest the little effect of change of chemical loss on the observed NMHCs trends during the studying period.

Comparison with nighttime data (without photochemistry)

In addition, the trends of grouped NMHCs at nighttime (0:00-4:00 LT, with little impact of photochemistry) were also evaluated (Table S5). Differences between whole-day and nighttime datasets were found but not significant. The trends of NMHCs are not much changed, as well as their significance. This also suggests the long-term trends of NMHCs would not be influenced much by change of oxidation capacity

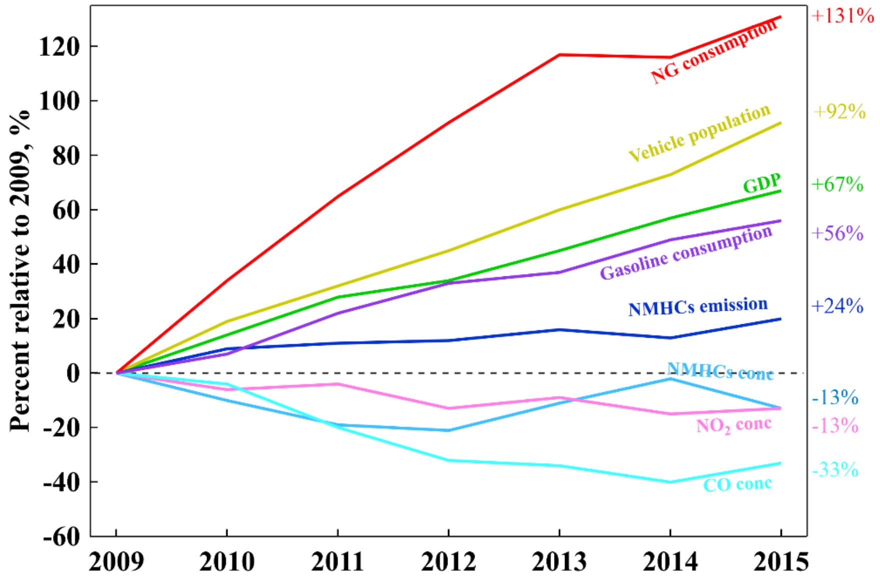

Figure S1. Trends of NMHCs concentration (this study), emission (Multi-resolution Emission Inventory)(Li et al., 2019b), social and economic factors in Shanghai. The gross domestic product (GDP), vehicle population, energy consumption data come from the National Bureau of Statistics (NBS). The CO, NO2 concentration are achieved from Shanghai Ecological and Environmental Bulletin (SMBEE). The lines show the percentage change to their corresponding value in 2009.

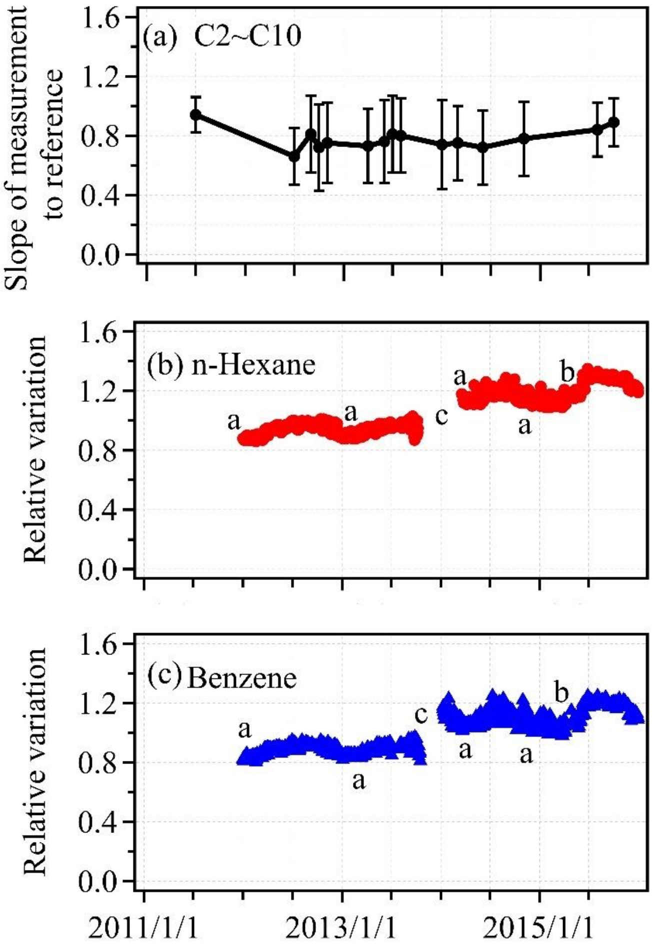

Figure S2. (a) The mean slope of measurement to reference in manual calibrations. Error bar means one standard deviation of species; (b) The relative variations of daily external standard calibration with n-Hexane for C2~C6 monitoring system; (c) The relative variations of daily external standard calibration with benzene for C6~C10 monitoring system. Annotation a, b and c represent replacement of permeation tubes, column replacement and repair of instrument, respectively, and detailed time period was listed in Table S3.

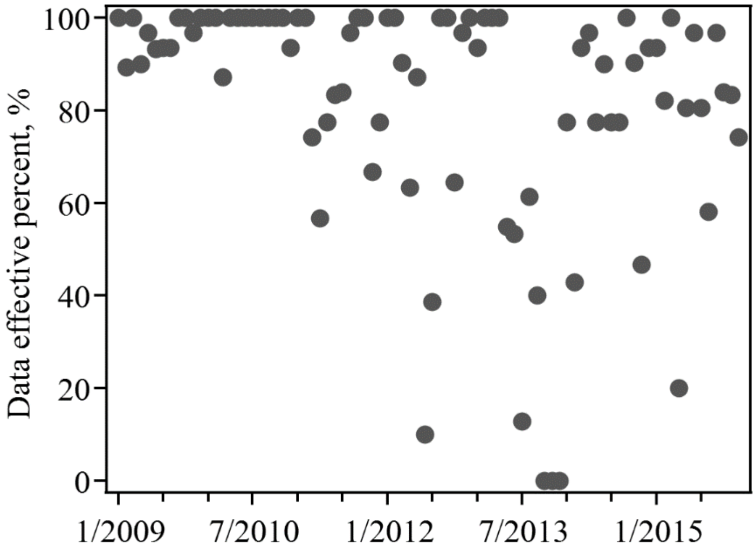

Figure S3. Efficiency of dataset during 2009–2015

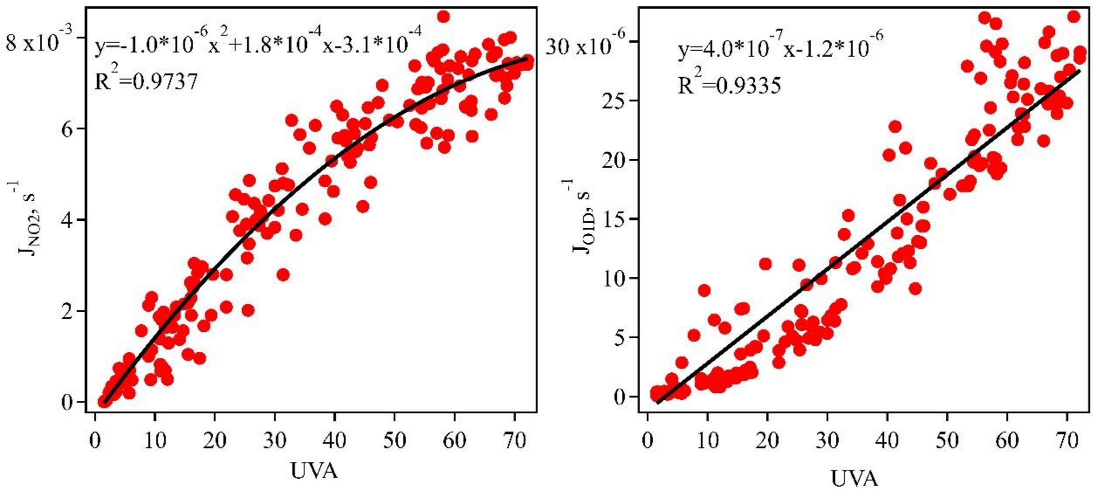

Figure S4. Fitting between the UVA and J_{O1D}, J_{NO2} simultaneously measured in Shanghai at May of 2017.

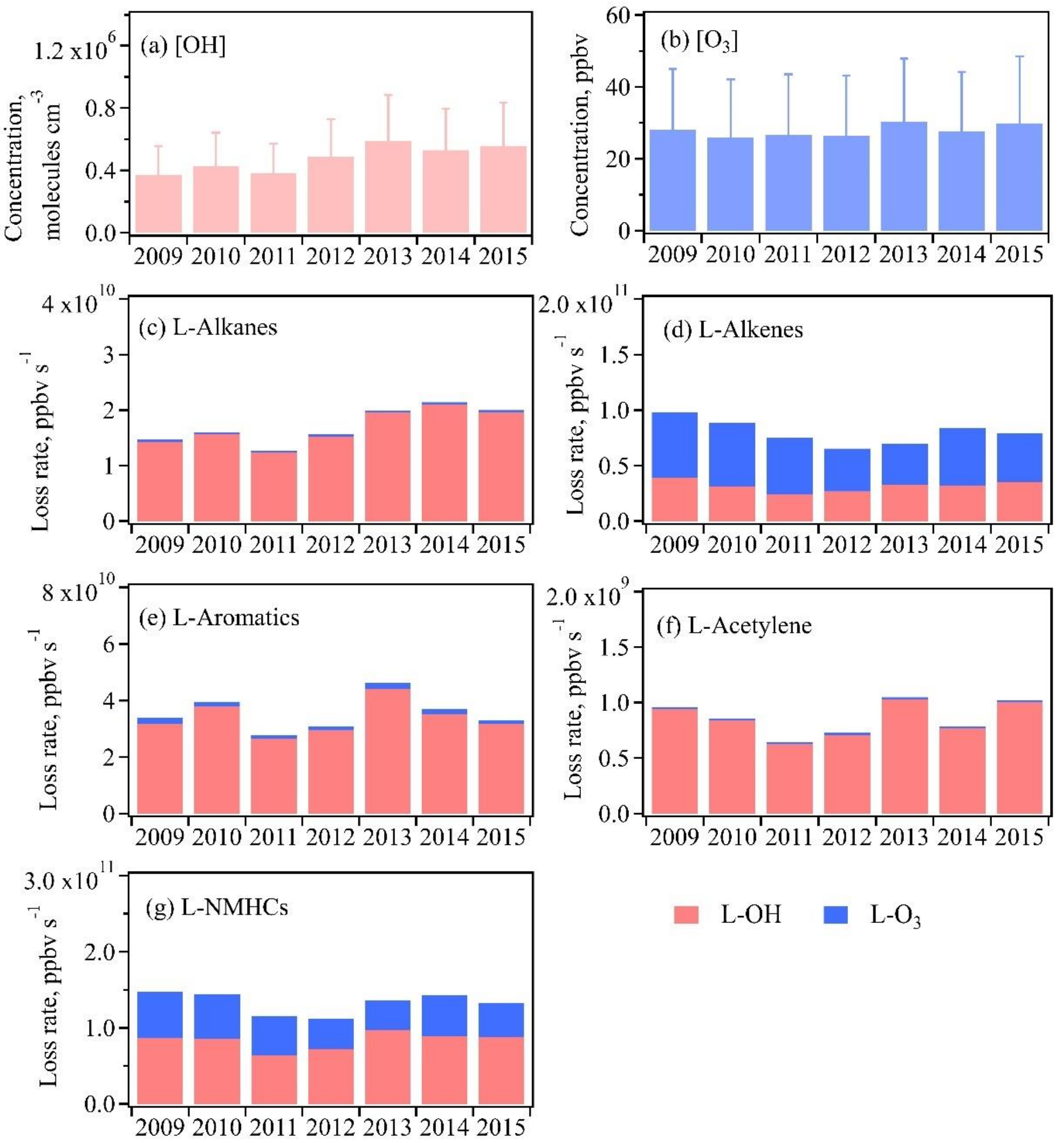

Figure S5. The annual mean loss rate of NMHCs and major groups by reaction with OH radical (red) and ozone (blue), respectively. L-NMHCs means chemical loss rate of NMHCs, L-Alkanes, L-Alkenes, L-Aromatics, L-Acetylene represent the chemical loss rate of alkanes, alkenes, aromatics and acetylene, respectively.

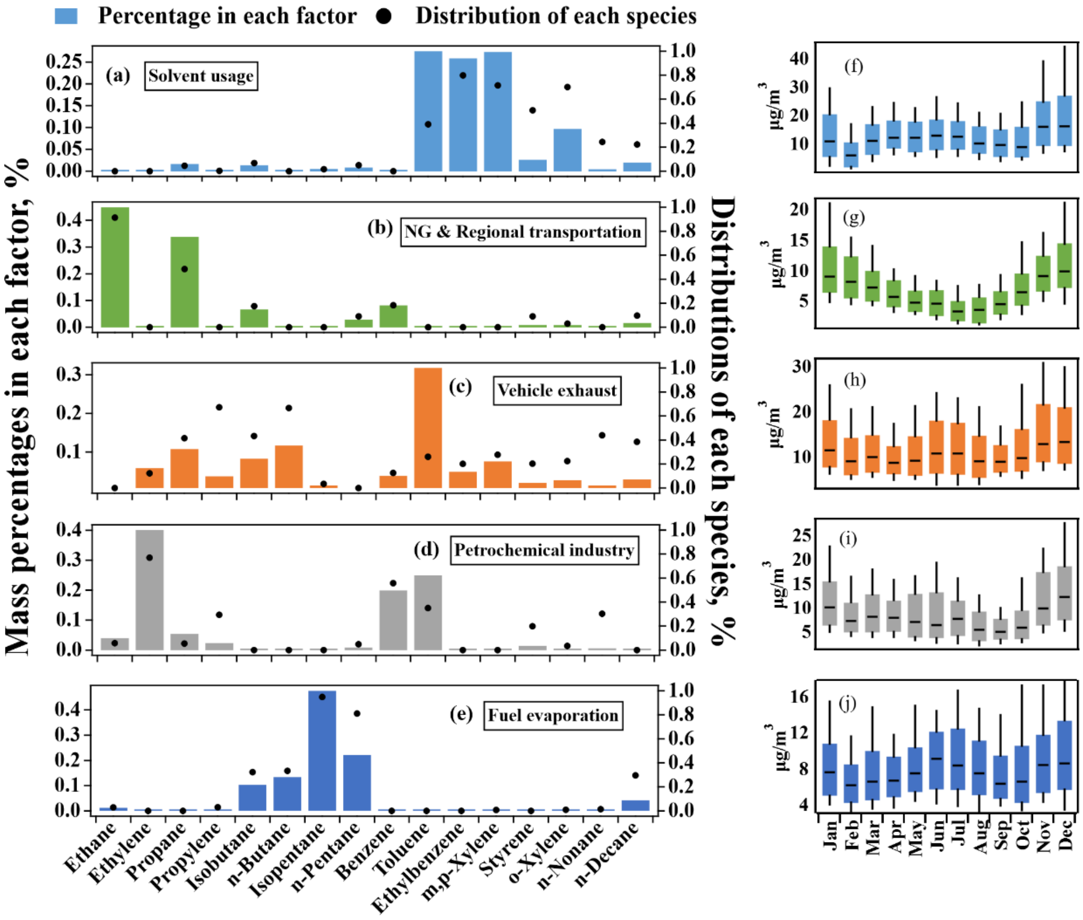

Figure S6. (a–e): Source profiles (percentages and distribution) from PMF model; (f–j): Monthly variations of the corresponding factors (in μgm^{-3}), the whiskers show the 10–90th percentiles, the box shows the 25–75th percentiles, and the line in box represents the median value.

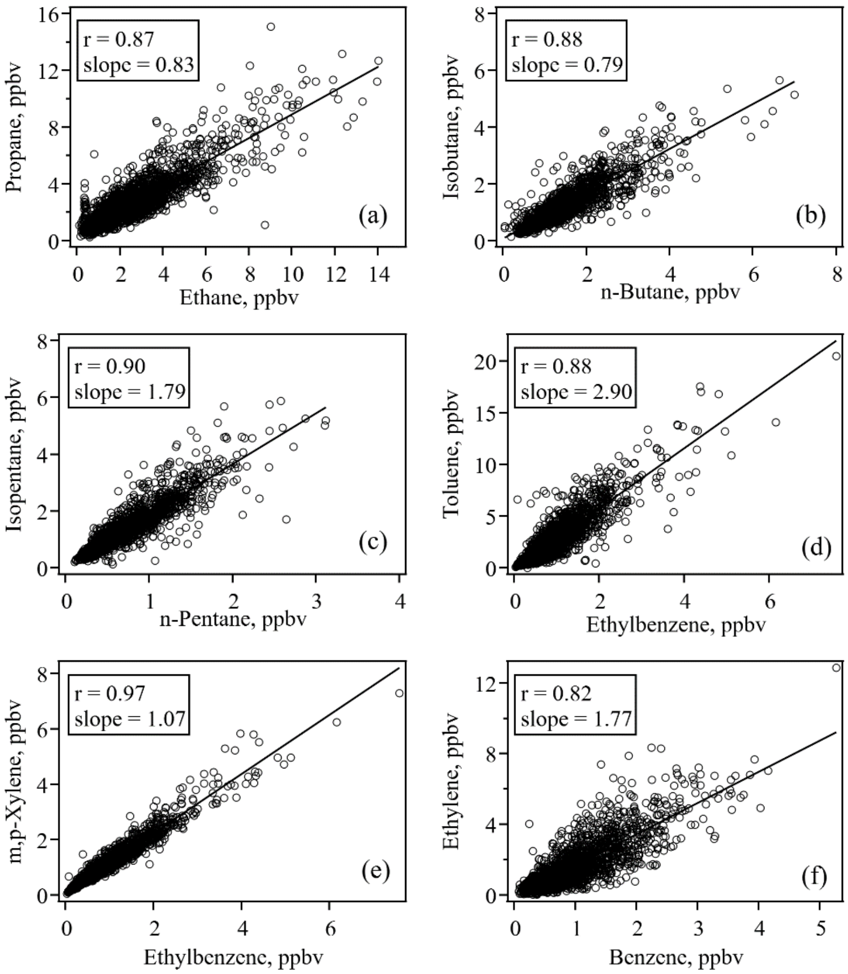

Figure S7. Scatter plot of (a) Propane vs. Ethane, (b) Isobutane vs. n-Butane, (c) Isopentane vs. n-Pentane, (d) Toluene vs. Ethylbenzene, (e) m,p-Xylene vs. Ethylbenzene, (f) Ethylene vs. Benzene. The line gives the result of a linear regression analysis. Good relationships (r > 0.8) represent the two species come from similar sources. Daily data averaged from hourly measured dataset.

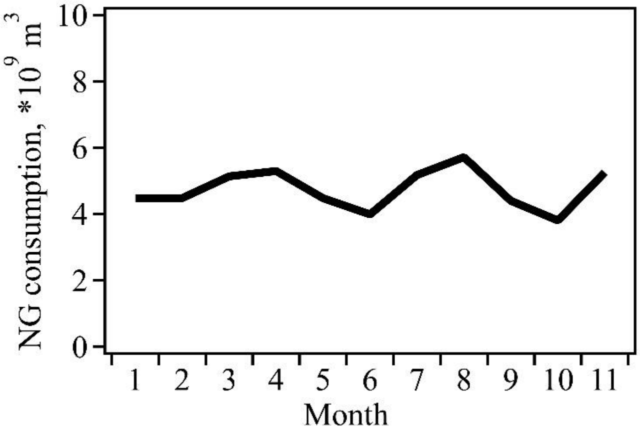

Figure S8. Monthly variation of natural gas consumption in 2018 in Shanghai. (Private communication with Shanghai Municipal Development and Reform Commission)

Table S1. Summary of major air control measures taken from 2009 to 2015 in Shanghai.

Source sector	Limitation		2009	2010	2011	2012	2013	2014	2015
Transportation	Emission standards	Light duty gasoline vehicle	Euro 3	Euro 4				Euro 5	
		Heavy duty gasoline vehicle	Euro 3				Euro 4		
		Diesel vehicle	Euro 3				Euro 4		
	Other		License control; Regular restrictions within the Middle Ring Road (~400 km^2)					Restrictions within the Outer Ring Road (~620 km^2); Eliminated old or "yellow label" vehicles (more than 170 thousand)[a]	Restrictions within the Suburb Ring Road (~6000 km^2); Eliminated all old vehicles
Residential	Energy		More electricity and natural gas, less coal usage						
Industry	National standards		Limit of BTEX on Floor coatings; waterproof coatings	Limit of BTEX of coatings for automobile, exterior wall, solvent-based woodenware and toys					Limit of harmful substances of anticorrosion coatings for construction steel structures
	Other		/		Key chemistry industries focused			Petrochemical industries treated systemastically	

[a] "yellow label" vehicles refer to gasoline and diesel vehicles that fail to meet Euro 1 and Euro 3 standards, respectively.

Table S2. The averaged slope along with standard deviation, correlation coefficient (R2), detection limit (ppbv), precision and accuracy of each species, resulting from calibrations during 2009–2015.

Species	Slope[a]	R^2	MDL	Precision [b]	Accuracy [c]
Ethane	0.59±0.10	0.949	0.17	11%	18%
Ethylene	0.53±0.07	0.966	0.03	11%	12%
Propane	0.66±0.05	0.996	0.16	10%	8%
Propylene	0.46±0.07	0.996	0.07	7%	10%
Isobutane	0.64±0.12	0.995	0.03	11%	15%
n-Butane	0.57±0.14	0.985	0.05	10%	17%
Acetylene	0.77±0.10	0.993	0.05	3%	13%
Trans-2-butene	0.43±0.20	0.997	0.02	15%	17%
1-Butene	0.36±0.17	0.998	0.03	12%	14%
Cis-2-butene	0.41±0.20	0.996	0.02	14%	16%
Cyclopentane	0.48±0.16	0.995	0.02	7%	13%
Isopentane	0.90±0.13	0.993	0.02	15%	13%
n-Pentane	0.97±0.14	0.987	0.01	11%	15%
trans-2-Pentene	0.40±0.20	0.998	0.02	18%	16%
1-Pentene	0.38±0.20	0.997	0.02	11%	17%
cis-2-Pentene	0.39±0.21	0.998	0.02	13%	16%
2,2-Dimethylbutane	0.86±0.17	0.995	0.03	11%	19%
Methylcyclopentane	0.43±0.15	0.997	0.07	6%	15%
2,3-Dimethylbutane	0.47±0.18	0.990	0.03	19%	18%
2-Methylpentane	1.08±0.20	0.966	0.05	19%	20%
3-Methylpentane	1.02±0.16	0.985	0.05	19%	17%
n-Hexane	0.51±0.18	0.994	0.04	16%	13%
2-Methyl-1-pentene	0.51±0.25	0.949	0.08	15%	20%
1,3-Butadiene	0.26±0.04	0.992	0.01	7%	13%
2,4-Dimethylpentane	1.07±0.18	0.983	0.02	11%	18%
Benzene	0.95±0.06	0.996	0.03	6%	6%
Cyclohexane	0.99±0.06	0.997	0.02	9%	6%
2-Methylhexane/ 2,3-Dimethylpentane	0.86±0.11	0.983	0.03	13%	12%
3-Methylhexane	0.88±0.05	0.992	0.03	8%	6%
2,2,4-Trimethylpentane	1.00±0.07	0.998	0.03	9%	7%
n-Heptane	0.97±0.06	0.998	0.04	9%	7%

Species	Slope[a]	R^2	MDL	Precision [b]	Accuracy [c]
Methylcyclohexane	1.01±0.06	0.998	0.02	12%	6%
2,3,4-Trimethylpentane	0.90±0.05	0.998	0.04	9%	6%
Toluene	0.87±0.06	0.997	0.05	12%	7%
2-Methylheptane	0.97±0.05	0.998	0.07	10%	6%
3-Methylheptane	0.98±0.05	0.998	0.06	11%	6%
n-octane	0.99±0.06	0.998	0.10	11%	6%
Ethylbenzene	0.95±0.06	0.998	0.13	8%	7%
m,p-Xylene	0.93±0.15	0.995	0.35	10%	16%
Styrene	0.80±0.09	0.994	0.31	17%	12%
o-Xylene	1.04±0.14	0.993	0.32	19%	14%
n-Nonane	0.95±0.06	0.997	0.21	15%	7%
iso-Propylbenzene	0.98±0.06	0.998	0.21	11%	6%
n-Propylbenzene	0.81±0.06	0.996	0.19	9%	7%
m-ethyltoluene	0.68±0.06	0.996	0.23	10%	9%
p-ethyltoluene	0.87±0.09	0.994	0.20	16%	11%
1,3,5-Trimethylbenzene	0.91±0.11	0.994	0.20	18%	13%
o-ethyltoluene	0.87±0.07	0.996	0.29	11%	8%
1,2,4-Trimethylbenzene	0.86±0.08	0.991	0.29	15%	10%
n-Decane	0.91±0.12	0.977	0.29	16%	13%
1,2,3-Trimethylbenzene	0.82±0.09	0.986	0.35	18%	11%
m-diethylbenzene	0.73±0.08	0.979	0.30	12%	11%
p-diethylbenzene	0.69±0.11	0.972	0.28	15%	15%

[a] Slope was averaged from multi-point calibrations.

[b] Precision was the relative standard deviation of response to 2 ppbv standard gas in manual calibrations.

[c] Accuracy was the relative standard deviation of slopes in multi-times calibrations.

Table S3. The specific maintenances and time during the long-term observations.

Annotation	Maintenance	Period
a	Replacement of permeation tubes	08 Mar 2012, 29 Mar 2013, 22 Mar 2014, 06 Nov 2014
b	Column replacement	01 Jun 2015
c	Repair of instrument	18 Oct 2013–31 Dec 2013

Table S4. Mean mixing ratios and trends of 14 NMHC species in urban Shanghai during 2009-2015 [a]..

Species	Mixing ratio, ppbv	Trend, ppbv/yr	Annual Change Rate, /yr	R^2	abundance, %	OFP contribution, %
Ethane	2.8±0.7	0.27	13.5%	0.73*	11.0±2.8	0.4±0.1
Acetylene	2.1±0.5	-0.21	-7.1%	0.67*	8.2±1.3	0.9±0.1
Benzene	0.9±0.2	-0.08	-6.0%	0.77**	3.7±0.6	0.9±0.1
Toluene	2.7±0.6	-0.28	-8.3%	0.88**	10.4±2.4	17.1±3.1
Propane	2.9±0.5	0.17	5.9%	0.54	11.1±1.6	1.1±0.2
Isobutane	1.2±0.1	0.03	2.5%	0.49	4.5±0.4	1.5±0.2
n-Butane	1.4±0.2	0.03	2.0%	0.07	5.3±0.9	1.6±0.3
Isopentane	1.4±0.2	0.03	1.8%	0.12	5.3±0.5	2.5±0.4
n-Pentane	0.7±0.1	0.02	2.4%	0.34	2.8±0.3	1.2±0.2
Ethylene	1.6±0.3	-0.01	-0.3%	0.00	6.3±1.0	7.2±1.4
Propylene	0.6±0.1	-0.04	-5.1%	0.50	2.5±0.4	5.4±0.7
Ethylbenzene	0.9±0.1	-0.04	-4.2%	0.52	3.7±0.5	5.3±0.5
m,p-Xylene	1.1±0.2	-0.06	-4.3%	0.49	4.3±0.6	20.0±1.6
o-Xylene	0.4±0.1	-0.02	-5.3%	0.31	1.6±0.3	5.8±1.1

[a] Listed species dominated NMHC abundance and reactivity, with average percentages of 80.7±1.0% and 70.9±0.7%, respectively. The p-value is represented as follows: $p<0.01$**, $p<0.05$*.

Table S5. Comparison of grouped NMHCs between whole day and nighttime.

	Mean ± sd ppbv		Slope (ppbv/yr)[a]		Annual change rate (/yr)	
	All day	Nighttime	All day	Nighttime	All day	Nighttime
NMHCs	25.8 ± 2.3	27.2 ± 3.0	-0.20	-0.10	-0.7%	-1.0%
Alkanes	13.6 ± 1.7	15.1 ± 2.4	0.51*	0.82*	3.8%	3.7%
Alkenes	3.2 ± 0.6	3.3 ± 0.7	-0.05	-0.01	-1.3%	-1.0%
Aromatics	6.9 ± 1.2	7.3 ± 1.2	-0.50*	-0.42*	-6.0%	-4.3%
Acetylene	2.1 ± 0.4	1.7 ± 0.4	-0.24*	-0.17*	-7.8%	-8.5%

[a] The p-value is represented as follows: $p<0.05$*

Table S6. Summarize of mean NMHCs mixing ratios during 2005-2015 in China.

Sampling Period	Literature	Location	Sampling method	Number of species	Mixing ratio (ppbv)	Contributions of same species with this study
2006 – 2008	Geng et al.,2010	urban SH	canister	21	43.8	79%
Jan 2007 – Mar 2010	Cai et al.,2010	urban SH	canister	32	32.4	79%
2009	Wang et al.,2013	urban SH	online	56	28.6	100%
2010	Wang et al.,2013	urban SH	online	56	26.6	100%
Mar 2011 – Feb 2012	An et al.,2014	urban NJ	online	56	43.5	100%
Sep 2011 – Jan 2012	Xia et al.,2014	urban NJ	online	56	36.5	100%
2013	An et al.,2017	urban NJ	online	56	38	100%
2013	Mo et al.,2017	urban NB	canister	56	24.5	100%
Aug 2005	Song et al.,2007	urban BJ	online	31	43.4	94%
Aug 2006	Duan et al.,2008	urban BJ	canister	57	40.5	99%
Aug – Sep 2006	Xie et al.,2008	urban BJ	online	47	29.1	96%
Jun – Sep 2008	Wang et al.,2010	urban BJ	canister	55	27.4	99%
May 2014	Li et al.,2015	urban BJ	online	56	23.3	100%
Nov 2014 – Oct 2015	Liu et al.,2016	urban TJ	online	56	28.7	100%
Mar – Dec 2005	Li et al.,2012	urban GZ	canister	59	47.26	98%
Jun 2011– May 2012	Zou et al.,2015	suburban GZ	online	56	42.74	100%
May 2011– Feb 2012	Huang et al.,2015	roadside HK	canister	53	52.1	95%

Sampling Period	Literature	Location	Sampling method	Number of species	Slope (ppbv yr^{-1})	Contributions of same species with this study
2007 – 2015	Gao et al.,2017	urban SH	canister	22	-0.44[a]	60%
2005 – 2011	Zhang et al.,2014	urban BJ	online	18	-1.6[b]	59%
2005 – 2015	Wang et al.,2017	suburban HK	online	22	-0.03[c]	61%

SH: Shanghai; NJ: Nanjing; NB: Ningbo; BJ: Beijing; TJ: Tianjin; GZ: Guangzhou; HK: Hong Kong; [a] not giving statistics value; [b] $r^2 = 0.70$ (without statistical significance); [c] $p = 0.71$.

Table S7. Detailed information of NMHCs measured and comparison of emission ratios between observations and inventory[a].

Species		MIR (gO_3 /gVOC)	ER-Observations (ppbv/ppbv)	ER-Inventory (ppbv/ppbv)
Alkane	Ethane*	0.28	2.16±0.94	0.95±0.03
	Propane*	0.49	1.67±0.72	0.66±0.08
	Isobutane*	1.23	0.58±0.16	0.47±0.05
	n-Butane*	1.15	0.56±0.15	0.73±0.08
	Cyclopentane	2.39		
	Isopentane*	1.45	0.66±0.32	1.01±0.08
	n-Pentane*	1.31	0.30±0.11	0.54±0.06
	2,2-Dimethylbutane*	1.17	0.06±0.03	0.03±0.00
	Methylcyclopentane*	2.19	0.06±0.04	0.22±0.02
	2,3-dimethylbutane	0.97		
	2-methylpentane	1.50		
	3-Methylpentane*	1.80	0.13±0.05	0.35±0.03
	n-hexane*	1.24	0.19±0.08	0.48±0.04
	2,4-dimethylpentane	1.55		
	Cyclohexane*	1.25	0.09±0.06	0.39±0.05
	2-Methylhexane&2,3-Dimethylpentane*	1.34	0.08±0.06	0.21±0.01
	3-methylhexane*	1.61	0.06±0.02	0.14±0.01
	2,2,4-trimethylpentane	1.26		
	n-Heptane*	1.07	0.08±0.03	0.28±0.03
	Methylcyclohexane	1.70		
	2,3,4-trimethylpentane	1.03		
	2-methylheptane	1.07		
	3-methylheptane	1.24		
	n-Octane	0.90		
	n-Nonane*	0.78	0.01±0.00	0.05±0.01
	n-Decane*	0.68	0.04±0.02	0.03±0.00
Alkene	Ethylene*	9.00	1.16±0.20	2.02±0.08
	Propylene*	11.66	0.21±0.06	0.62±0.02
	trans-2-Butene*	15.16	0.06±0.02	0.30±0.02
	1-Butene*	9.73	0.05±0.02	0.37±0.02
	cis-2-Butene*	14.24	0.04±0.01	0.27±0.02
	trans-2-pentene	10.56		
	1-Pentene	7.21		

	cis-2-pentene	10.38		
	2-Methyl-1-Pentene	5.26		
	1,3-Butadiene	12.61		
Aromatic	Benzene*	0.72	0.36±0.03	0.72±0.04
	Toluene*	4.00	2.48±0.57	2.94±0.42
	Ethylbenzene*	3.04	0.50±0.10	0.53±0.11
	m,p-Xylene*	8.45	0.56±0.06	1.27±0.25
	Styrene*	1.73	0.08±0.01	0.32±0.04
	o-Xylene*	7.64	0.16±0.03	0.47±0.07
	Isopropylbenzene	2.52		
	n-Propylbenzene*	2.03	0.04±0.01	0.07±0.01
	m-Ethyltoluene	7.39		
	p-Ethyltoluene*	4.44	0.04±0.02	0.07±0.01
	1,3,5-Trimethylbenzene	11.76		
	o-Ethyltoluene*	5.59	0.02±0.00	0.06±0.01
	1,2,4-trimethylbenzene*	8.87	0.07±0.02	0.21±0.03
	1,2,3-trimethylbenzene*	11.97	0.02±0.01	0.05±0.01
	m-Diethylbenzene*	7.10	0.02±0.01	0.01±0.00
	p-Diethylbenzene	4.43		
Alkyne	Acetylene	0.95		

* emission ratios of these species were calculated, due to data efficiency (>60 %) of species.

[a] ERs are expressed as "averaged ± standard deviation"

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