Supplementary for manuscript "Evaluation of the TOF-ACSM-CV for PM1.0 and PM2.5 measurements during the RITA-2021 field campaign"

Table S1: The Comparison of the online (ACSM) and offline (Filters) mass concentrations of various chemical components for $PM_{1.0}$.

			Online $PM_{1.0}$ VS Offline $PM_{1.0}$		
Species	**NO$_3$**	**SO$_4$**	**NH$_4$**	**Org/OC**	**Total**
Slope	0.939	0.901	1.092	2.774	1.244
Slope_std	0.089	0.159	0.104	0.918	0.136
R^2	0.978	0.927	0.978	0.801	0.971
Intercept	-0.186	-0.316	0.089	-0.929	-1.146
T-statistic	6.390	24.294	-7.838	-3.851	-0.261
P-value	2.38E-05	3.22E-12	2.80E-06	2.31E-03	7.98E-01

Table S2: The Comparison of the online (ACSM and MAAP) and offline (Filters) mass concentrations of various chemical components for $PM_{2.5}$.

			ACSM +MAAP $PM_{2.5}$ VS Filter $PM_{2.5}$ in May 2021			
Species	**NO$_3$**	**SO$_4$**	**NH$_4$**	**Org/OC**	**eBC/EC**	**Total**
Slope	0.884	0.989	0.958	2.111	1.550	1.135
Slope_std	0.100	0.241	0.149	1.272	0.441	0.172
R^2	0.968	0.870	0.942	0.548	0.830	0.945
Intercept	-0.394	-0.477	0.161	-0.103	0.013	-1.126
T-statistic	9.137	15.513	-3.754	-4.941	-6.949	1.376
P-value	5.08E-07	9.11E-10	2.41E-03	3.42E-04	1.01E-05	1.92E-01

Table S3: The Comparison of the online (ACSM and MAAP) and offline (Filters) mass concentrations of various chemical components for $PM_{2.5}$.

			ACSM +MAAP $PM_{2.5}$ VS Filter $PM_{2.5}$ in Sep 2021			
Species	**NO$_3$**	**SO$_4$**	**NH$_4$**	**Org/OC**	**eBC/EC**	**Total**
Slope	0.931	0.856	1.163	1.994	1.577	1.352
Slope_std	0.242	0.259	0.229	0.324	0.150	0.266
R^2	0.748	0.687	0.838	0.612	0.821	0.508
Intercept	0.809	0.260	0.012	1.104	0.003	4.614
T-statistic	-3.628	-0.484	-1.116	-6.361	-5.578	-6.312
P-value	1.10E-02	6.46E-01	3.07E-01	1.17E-06	8.42E-06	1.11E-06

Table S4: The Molar mass concentrations (Mol m^{-3}) from Filter samples.

Molar mass (Mol m^{-3}) / Date	Cation PM$_{1.0}$	Anion PM$_{1.0}$	Cation PM$_{2.5}$	Anion PM$_{2.5}$
2021-5-10	0.026	0.042	0.029	0.055
2021-5-11	0.053	0.070	0.065	0.095
2021-5-12	0.038	0.059	0.042	0.085
2021-5-13	0.045	0.066	0.059	0.089
2021-5-14	0.079	0.100	0.102	0.133
2021-5-15	0.068	0.087	0.090	0.115
2021-5-16	0.019	0.038	0.021	0.059
2021-5-17	0.030	0.045	0.036	0.061
2021-5-18	0.035	0.054	0.042	0.071
2021-5-19	0.048	0.067	0.056	0.089
2021-5-20	0.049	0.068	0.076	0.100
2021-5-21	0.004	0.020	0.003	0.030
2021-5-22	0.010	0.025	0.013	0.034
2021-5-23	0.022	0.037	0.033	0.058
Slope	1.070		1.005	
R^2	0.992		0.958	
Intercept	0.015		0.029	
T statistic	-27.330		-18.207	
P value	7.170E-13		1.238E-10	

Table S5: The Molar mass concentrations (Mol m^{-3}) from ACSM measurements.

Molar mass (Mol m^{-3}) / Date	Cation PM$_{1.0}$	Anion PM$_{1.0}$	Cation PM$_{2.5}$	Anion PM$_{2.5}$
2021-5-10	0.031	0.027	0.028	0.027
2021-5-11	0.064	0.058	0.065	0.064
2021-5-12	0.043	0.040	0.054	0.058
2021-5-13	0.062	0.056	0.076	0.076
2021-5-14	0.093	0.082	0.111	0.105
2021-5-15	0.073	0.064	0.088	0.084
2021-5-16	0.026	0.022	0.032	0.032
2021-5-17	0.040	0.032	0.047	0.043
2021-5-18	0.046	0.040	0.057	0.054
2021-5-19	0.056	0.049	0.068	0.064
2021-5-20	0.058	0.053	0.074	0.070
2021-5-21	0.007	0.007	0.008	0.010
2021-5-22	0.018	0.014	0.021	0.019
2021-5-23	0.025	0.022	0.033	0.032
Slope	0.903		0.951	
R^2	0.996		0.994	
Intercept	-0.001		0.001	
T statistic	7.716		2.520	
P value	3.315E-06		2.559E-02	

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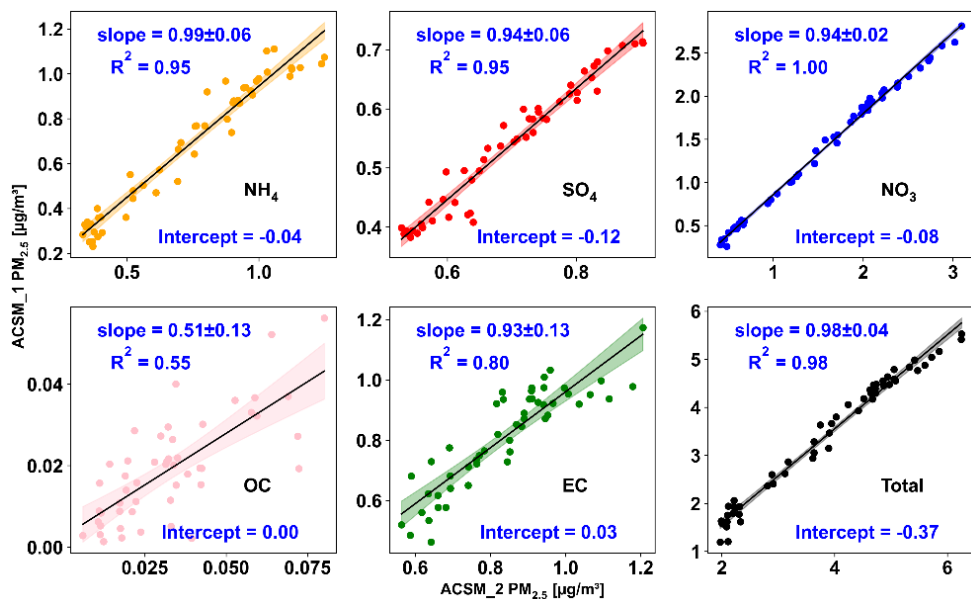
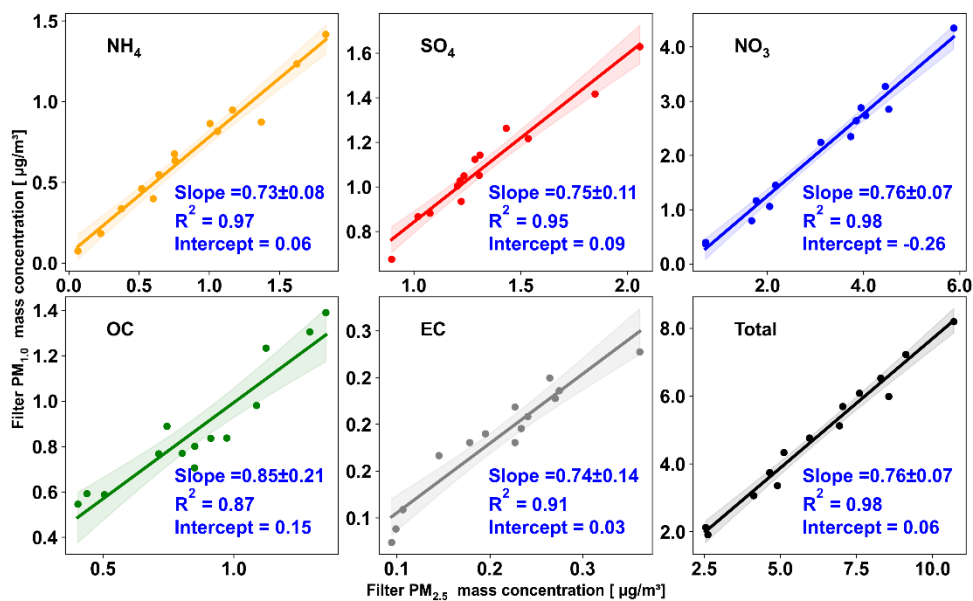


Figure S 1 Intercomparison and correlation of two collocated TOF-ACSM with PM₂.₅ measurements. The light shades represent the 95% confidential interval.

15   **Figure S 2 The correlation between the PM₁.₀ and PM₂.₅ measured by Filters. The light shades represent the 95% confidential interval.**

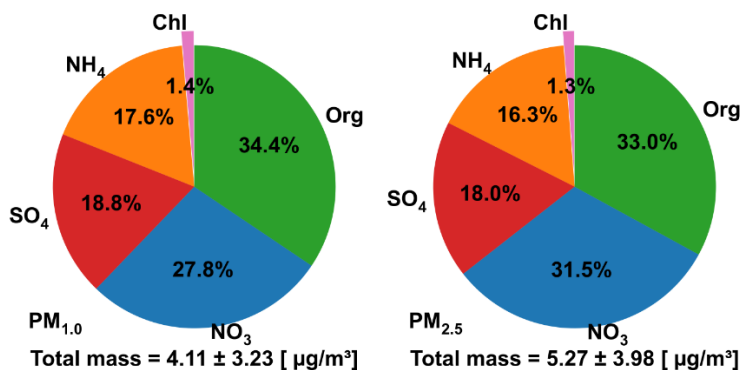



Figure S 3 The ACSM measured hourly chemical mass concertation fraction of the NR-PM$_{1.0}$ and NR-PM$_{2.5}$, and the corresponding mass concentration of each components.

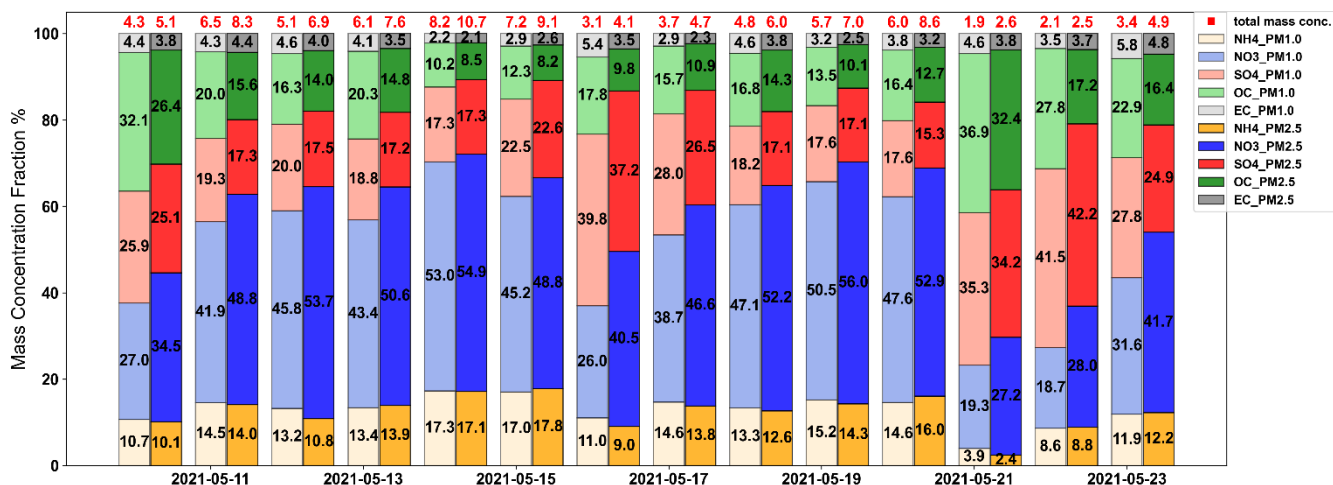



Figure S 4 The daily mass fraction of the PM$_{1.0}$(left in light colour) and PM$_{2.5}$ (right in dark colour) measured by Filters. The total mass was labelled in red at the top of the bar.

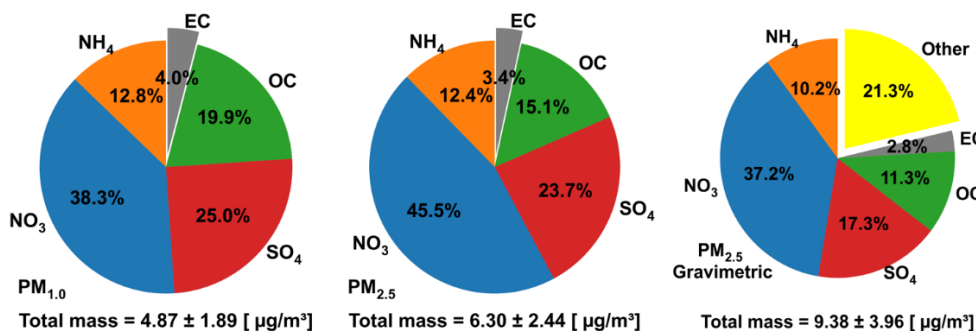



Figure S 5 The average mass fraction of each species in the PM$_{1.0}$ and PM$_{2.5}$ measured by Filters, and the PM$_{2.5}$ mass fraction of the total PM$_{2.5}$ Gravimetric mass.

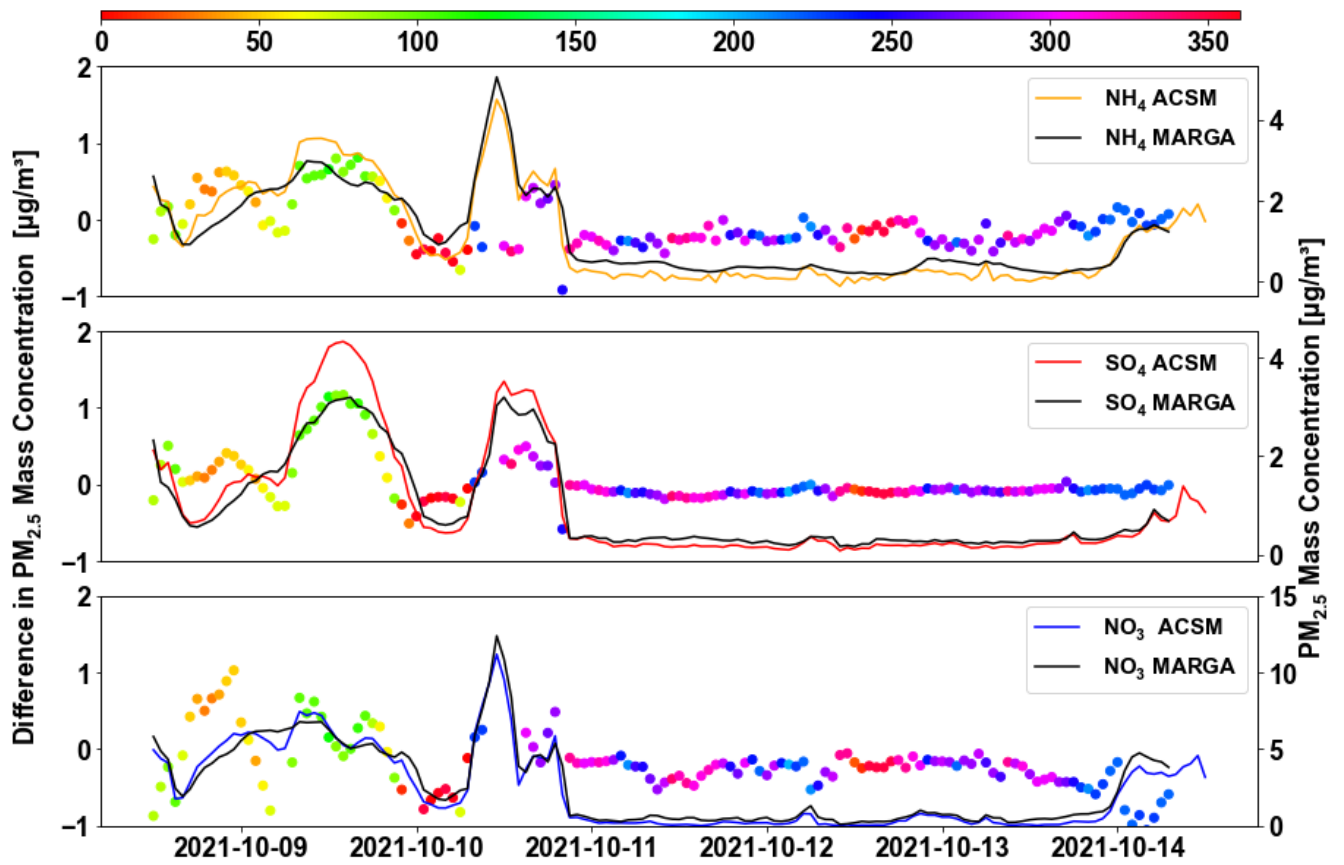



Figure S 6 Time series of the differences (y axis at the left) between the ACSM and MARGA in PM$_{2.5}$ mass concentration colored by the wind direction.