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Effect of relative humidity on non-refractory submicron aerosol evolution during summertime in Hangzhou, China

Linghong-Chen

Key words: relative humidity; aerosol composition; size distribution; wet removal; aqueous-phase

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Introduction

Instrument and Method:

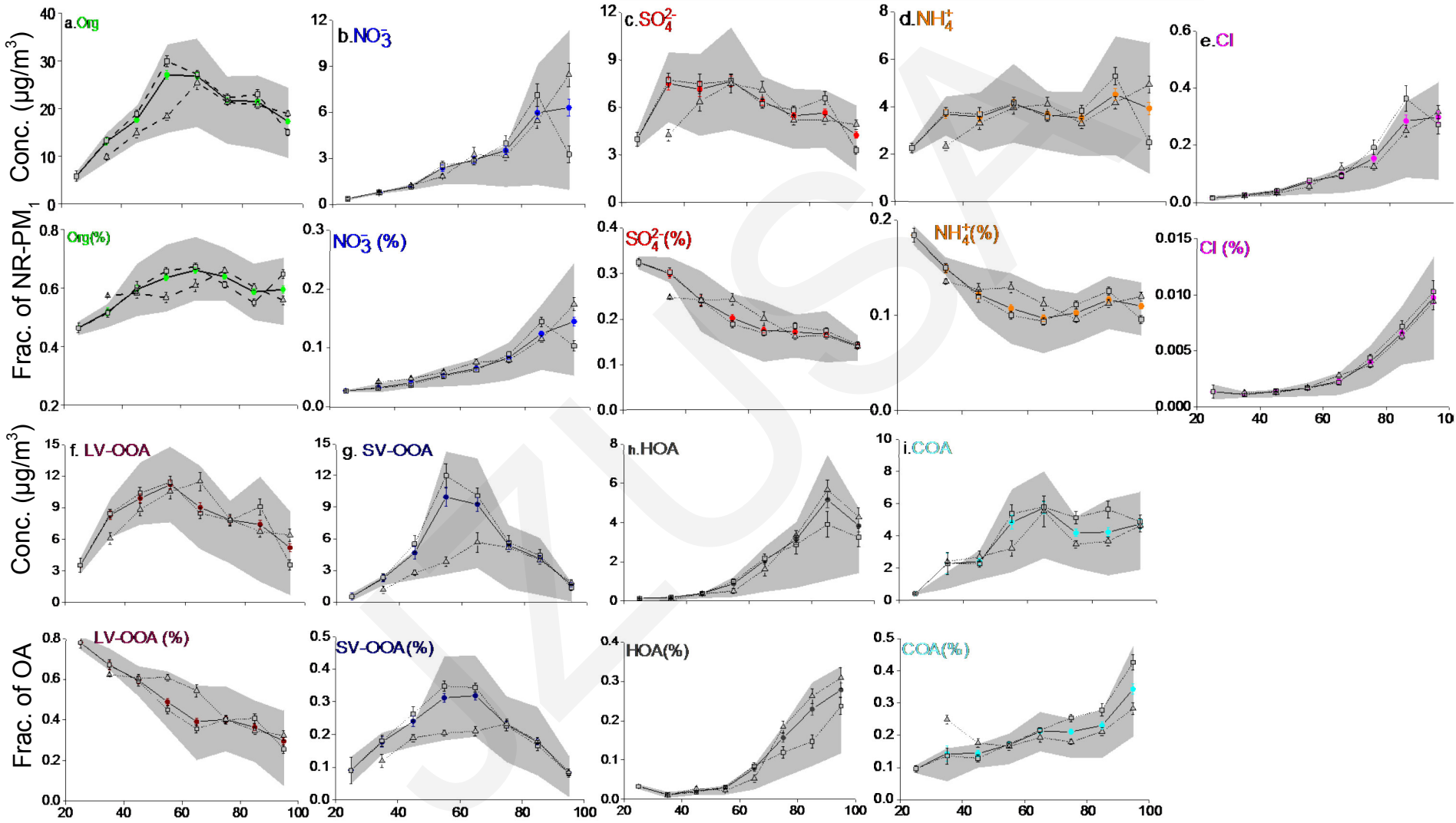
- High resolution time of flight aerosol mass spectrometer (HR-ToF-AMS)
- Positive Matrix Factorization (PMF) source appointment and Correlation analysis

Highlight:

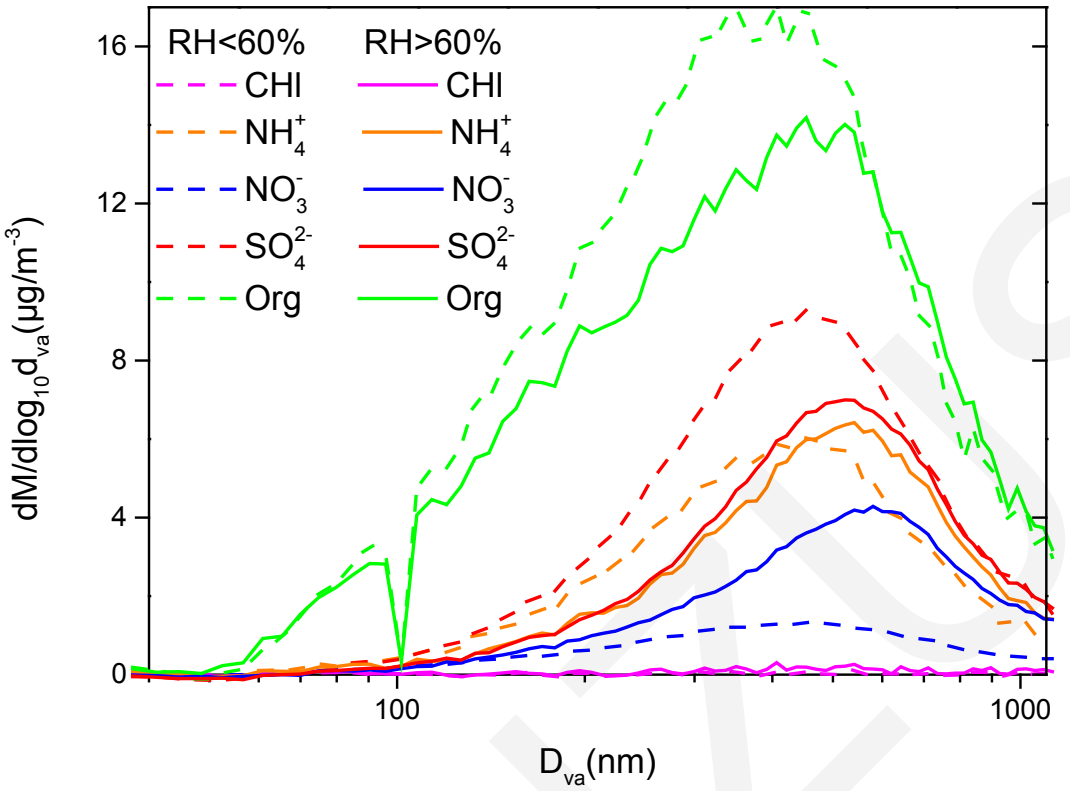
- Organic(mainly SOA) and sulfate are affected by **wet removal** while nitrate is improved by **aqueous process** at high RH
- The **pattern of fixation of ammonium** in aerosols changed as the RH increased

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RH impact on NR-PM_1 aerosol composition



RH impact on NR-PM_1 aerosol size distribution



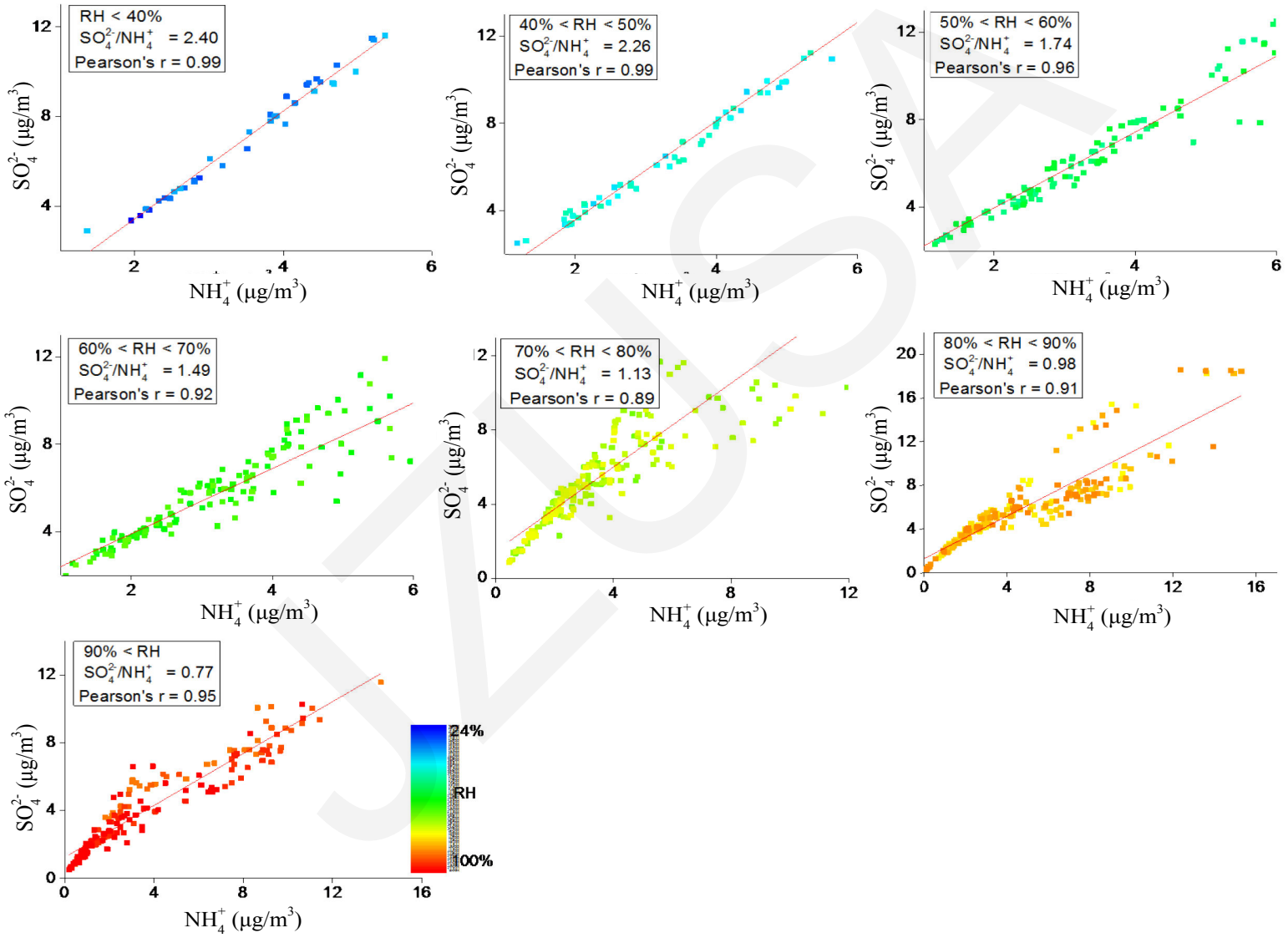
	Peak size mass Conc.(μg/m^3)	
	RH<60%	RH>60%
Organic	17.03	14.19
Sulfate	9.29	7.00
Nitrate	1.33	4.29
Ammonium.	6.02	6.42
Chlorine	0.12	0.31

As RH increases, all species peak sizes become larger

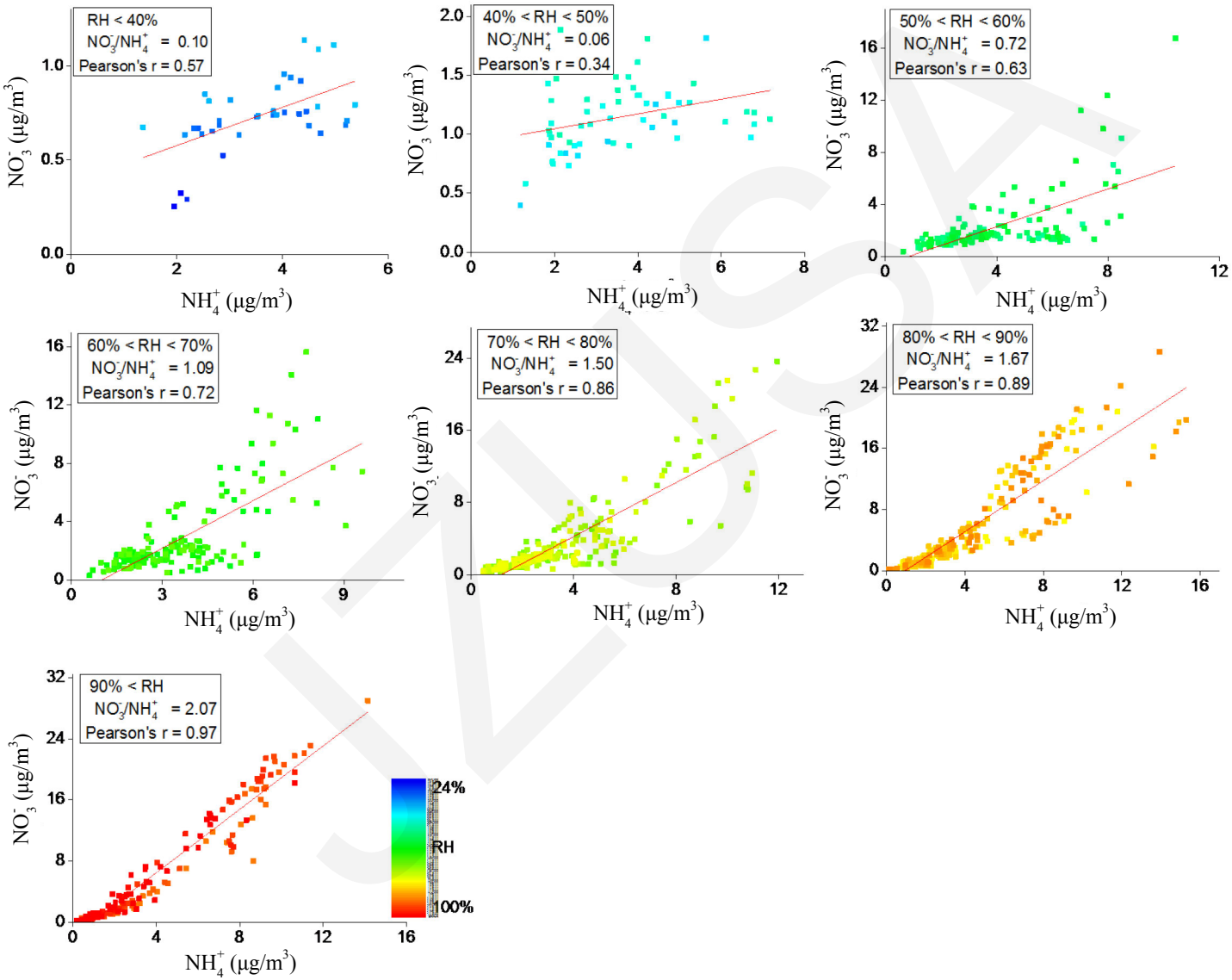
The mass concentration of organic and sulfate decreased, and that of nitrate and ammonium increased

The former is due to dissolution into the droplets, the latter indicating that the liquid-phase reaction promotes the formation

Correlation of sulfate and ammonium



Correlation of nitrate and ammonium



Conclusion

In NR-PM_1, all species show a peak size growth as RH increases.

The organic and sulfate peak size mass concentrations become lower while the mass concentrations of other species, especially nitrate, become higher as a consequence of the wet removal effect on OOA and sulfate and aqueous-phase process enhancing nitrate formation.

NH_4NO_3 replaces $(NH4)_2SO_4$ as the dominant pattern of ammonium fixation with increasing RH.

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