



清华大学  
Tsinghua University



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# Mixing States of Aerosol Particles in Urban Haze

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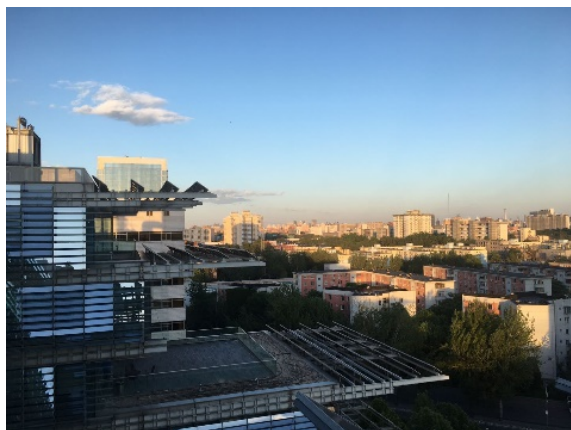
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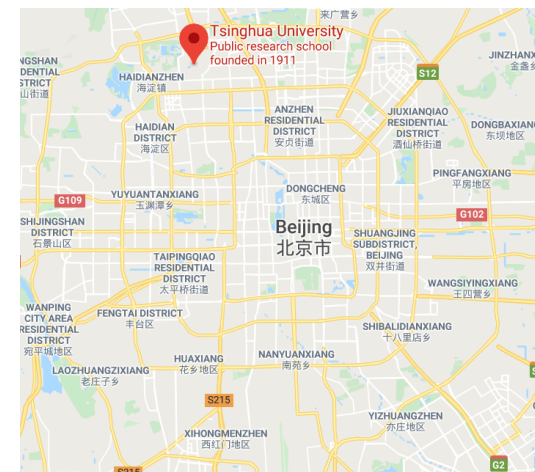
# Sample information



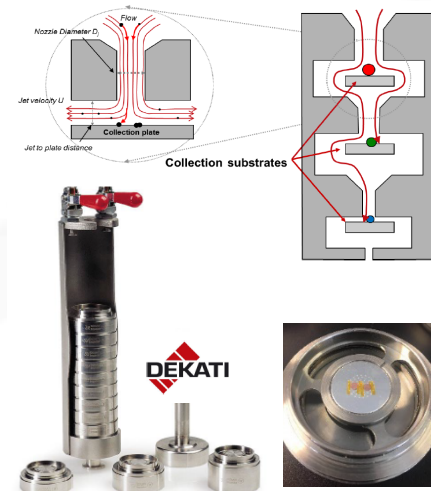
Clean Conditions  
( $\text{PM}_{2.5}$  mass =  $2 \mu\text{g m}^{-3}$ )



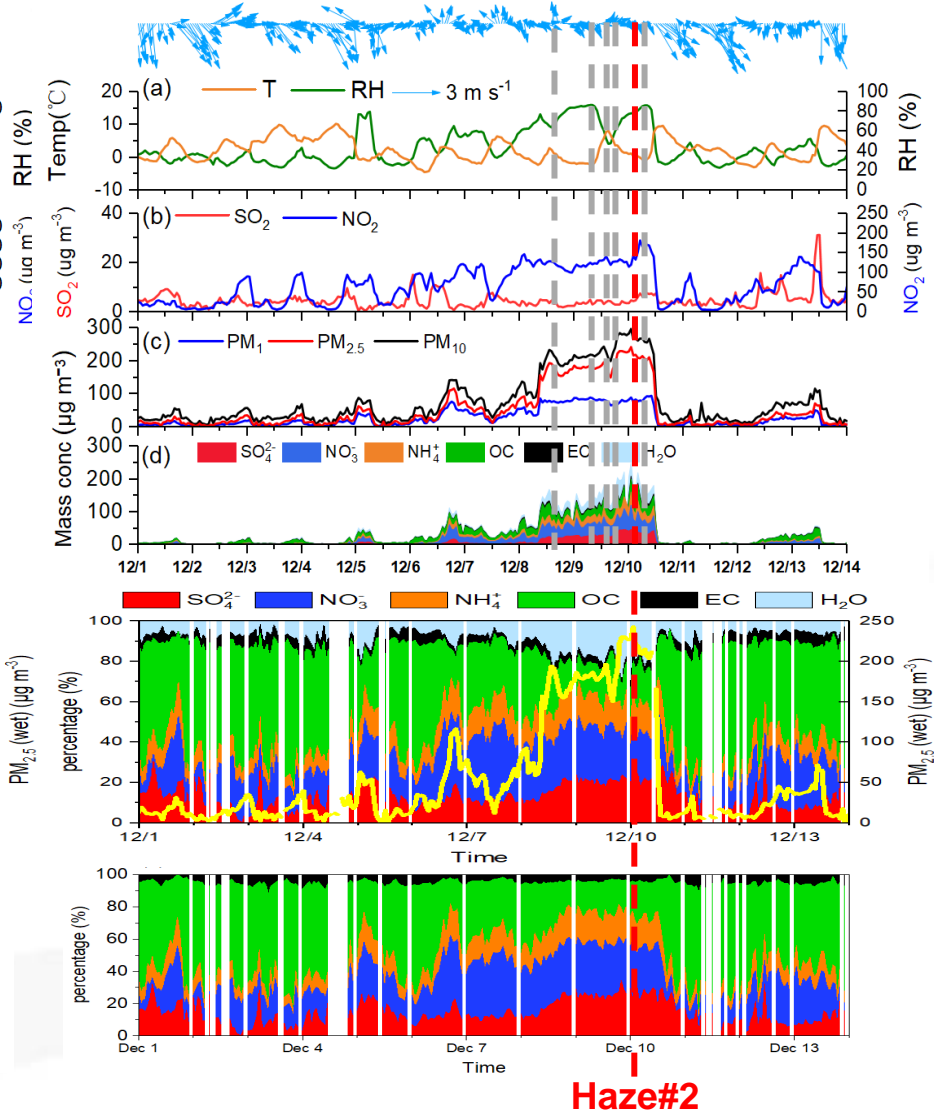
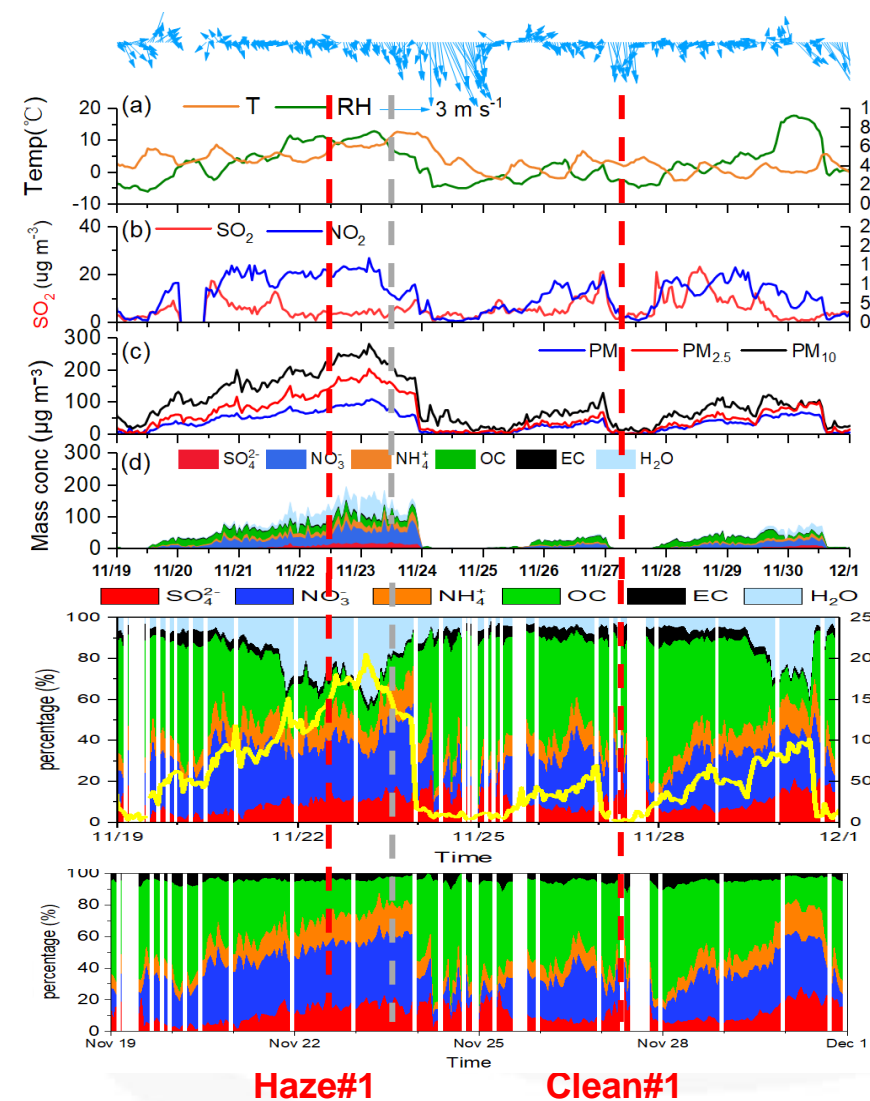
Haze Conditions  
( $\text{PM}_{2.5}$  mass =  $156 \mu\text{g m}^{-3}$ )



- ◆ Sample sites: On the campus of Tsinghua University
- ◆ Time periods: 22/11/2019—25/12/2020
- ◆ Samples are collected on TEM-grids by cascade impactors
- ◆ Two haze episodes and one clean episode were captured



# Sample information

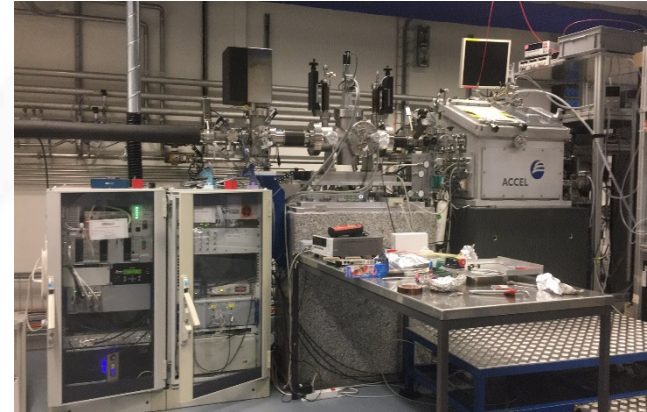




# Analysis Methods

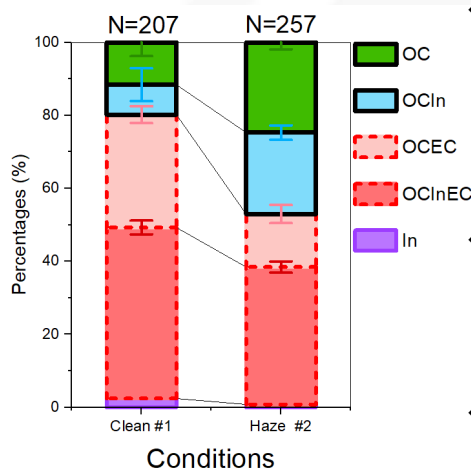
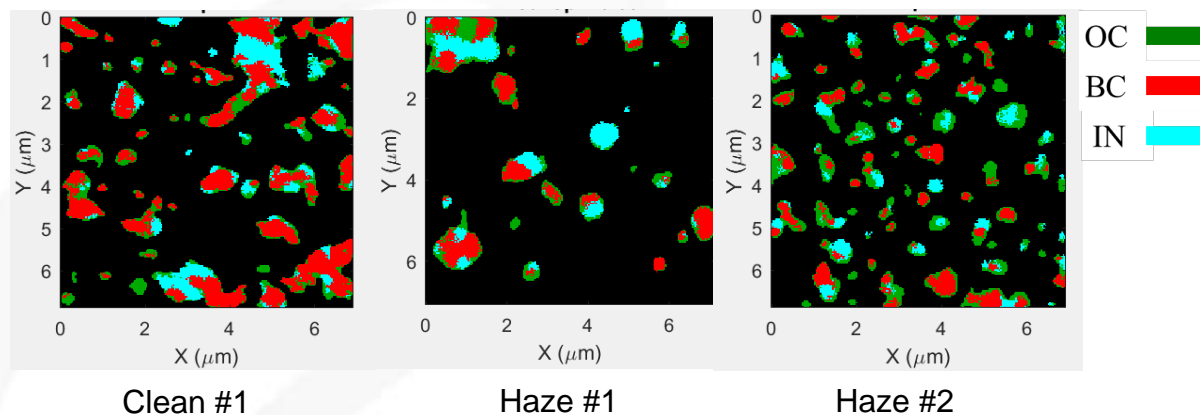
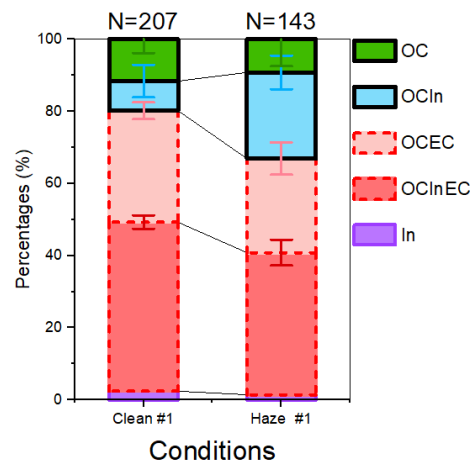
## STXM/NEXAFS

(Scanning Transmission X-Ray Microscopy/Near-Edge X-Ray Absorption Fine-Structure Spectroscopy)



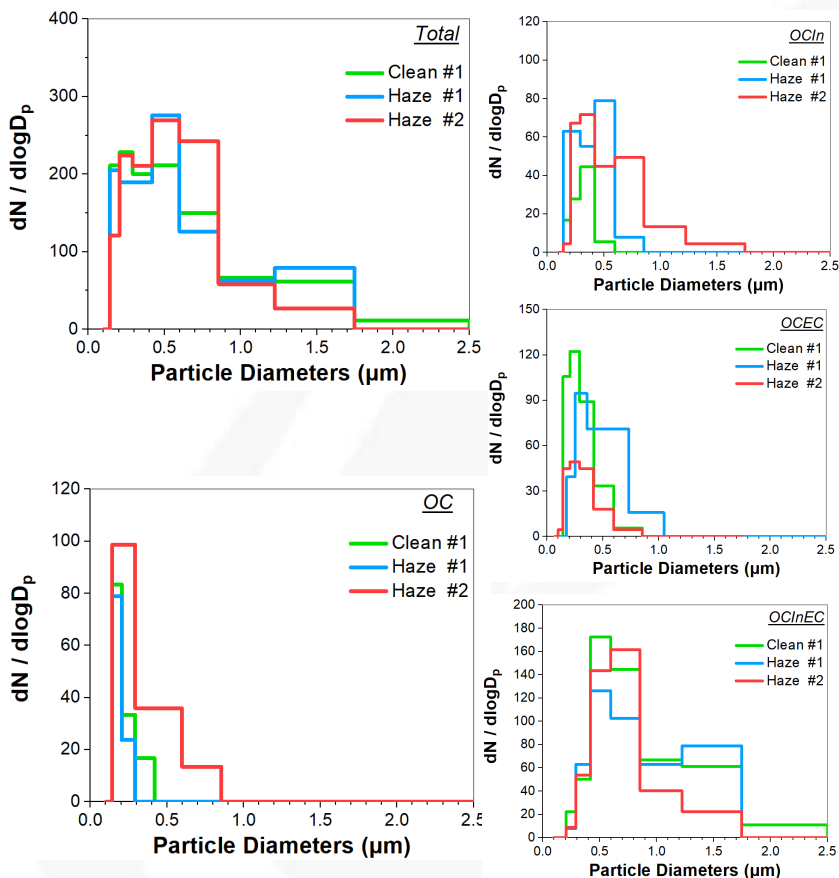
- ◆ Operated in PoLLux endstation, Swiss Light Source (SLS)
- ◆ Images of 500-600 individual particles were acquired at 278, 285.4, 288.6 and 320 eV to derive how components of inorganic matter (In), organic carbon (OC) and elemental carbon or soot (EC) were mixed.

# Results



- ◆ Most individual particles are mixtures in the form of **OCInEC** (37.4-46.9%), followed by **OCEC** particles at 14.4-30.9%, pure **OC** particles and **OCIn** mixtures.
- ◆ No pure **EC** and **In** particles were observed, which indicates particles in the atmosphere are mostly internally mixed.
- ◆ **OCIn** proportions increased as  $PM_{2.5}$  load elevated, but only Increased OC proportions were observed from **Clean#1** (11.6%) to **haze#2** (24.6%) samples.

# Results



- ◆ Size distributions of bulk particles showed no distinct differences whether in clean or haze conditions.
- ◆ high normalized concentrations of OC particle ranging from 200-600 nm in diameters were observed only in **Haze#2**, which is expected for oligomer-SOA particles.
- ◆ high relative humidity (>70%) in **Haze#2** may indicate these small-in-size organics are formed probably by aqueous reactions.



# Thank you!

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