High-Resolution Size Distribution of Organic Aerosol in Indo-Gangetic Plain.

Navaneeth M. Thamban

Prof. Sachchida Nand Tripathi's research group

Indian Institute of Technology, Kanpur, India

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Evolution of Aerosol Size and Composition in the Indo-Gangetic Plain: Size-Resolved Analysis of High-Resolution Aerosol Mass Spectra

Navaneeth M. Thamban,[†] Bhuvana Joshi,[†] S. N. Tripathi,[*,†,‡] Donna Sueper,[§,∥] Manjula R. Canagaratna,[§] Shamjad P. Moosakutty,[†] Rangu Satish,[⊥] and Neeraj Rastogi[⊥]

[†]Department of Civil Engineering, Indian Institute of Technology, Kanpur 208016, India

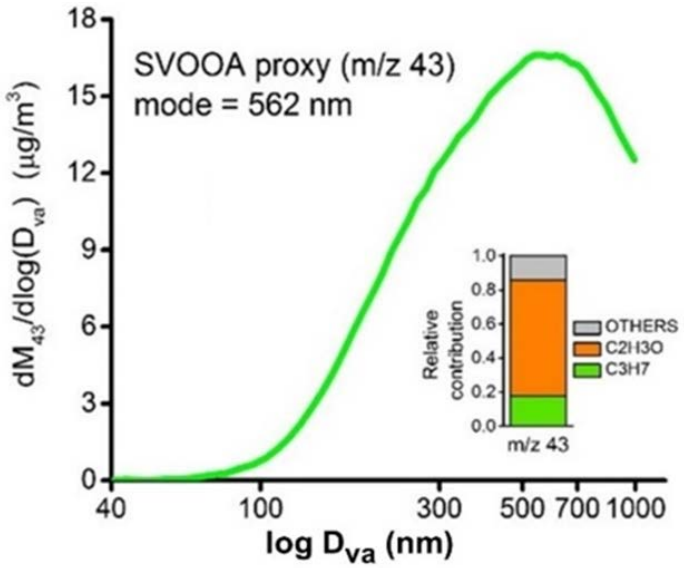
[‡]Centre for Environmental Science and Engineering, Indian Institute of Technology, Kanpur 208016, India

[§]Aerodyne Research, Inc., Billerica, Massachusetts 01821, United States

[∥]Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, Colorado 80309, United States

[⊥]Geosciences Division, Physical Research Laboratory, Ahmedabad 380009, India

Introduction



- interfering isobaric species?
- Growth rate of HR fragments and UMR proxies ?

HR-ToF-AMS (AMS)

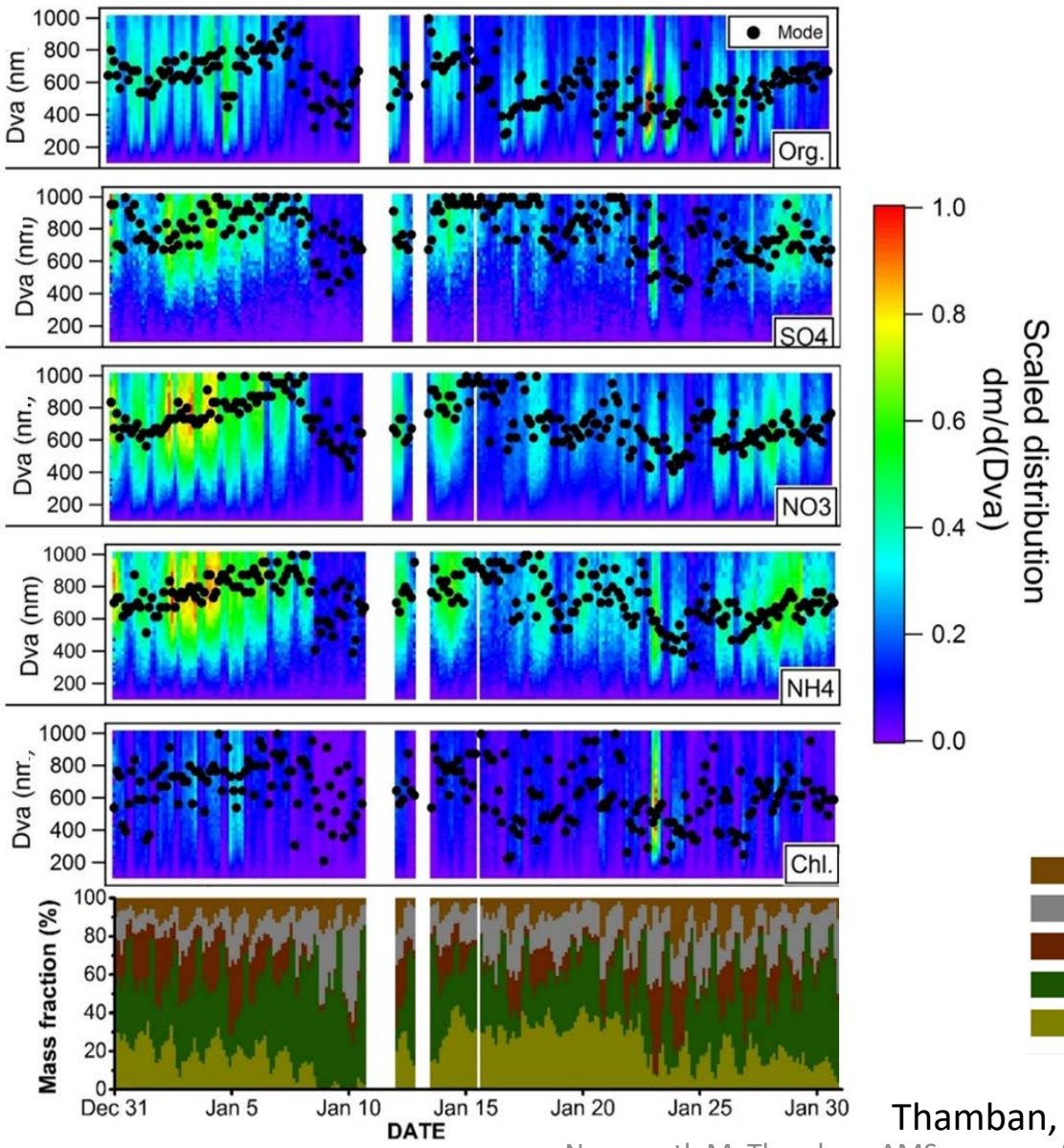
High Resolution Particle Time of Flight (HR-P**ToF)**
Size distribution of OA

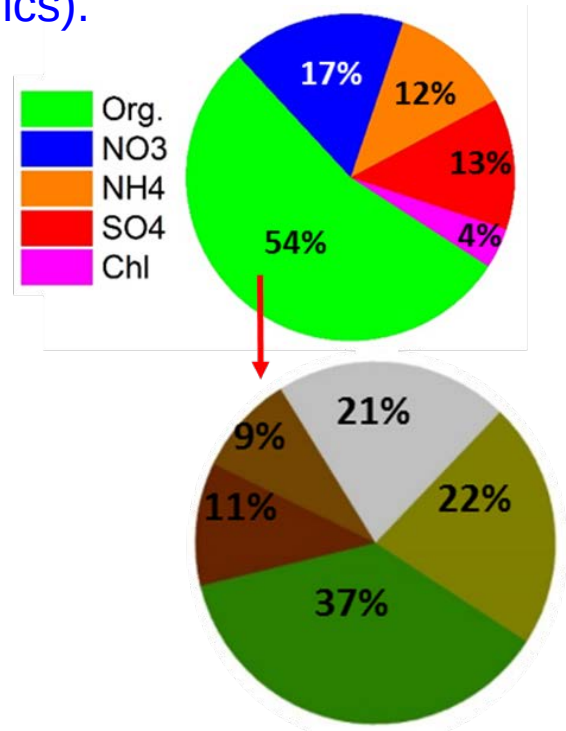
OA sources derived from Positive matrix factorization (PMF) using PMF evaluation tool (PET, Version 2.06)

Navaneeth M. Thamban; AMS user meeting, 2021

Evolution of size and composition of OA

Temporal variation of the mass and size distributions of the PM_1 non-refractory species (OA and inorganics).





HR positive matrix factorization factors

BBOA 2 : Mixed Biomass burning OA (BBOA)
HOA : Hydrocarbon OA
BBOA 1 : Less oxygenated BBOA
LVOOA : Low Volatile OA
OOA-BBOA : Oxygenated BBOA

Thamban, N.M., Tripathi et al., ACS Earth Sp. Chem. **3**, 823–832 (2019).

2016

HR size distributions of SVOOA (m/z 43), COA (m/z 55) and HOA proxies (m/z 57)

UMR SVOOA (m/z 43)

UMR COA (m/z 55)

UMR HOA (m/z 57)

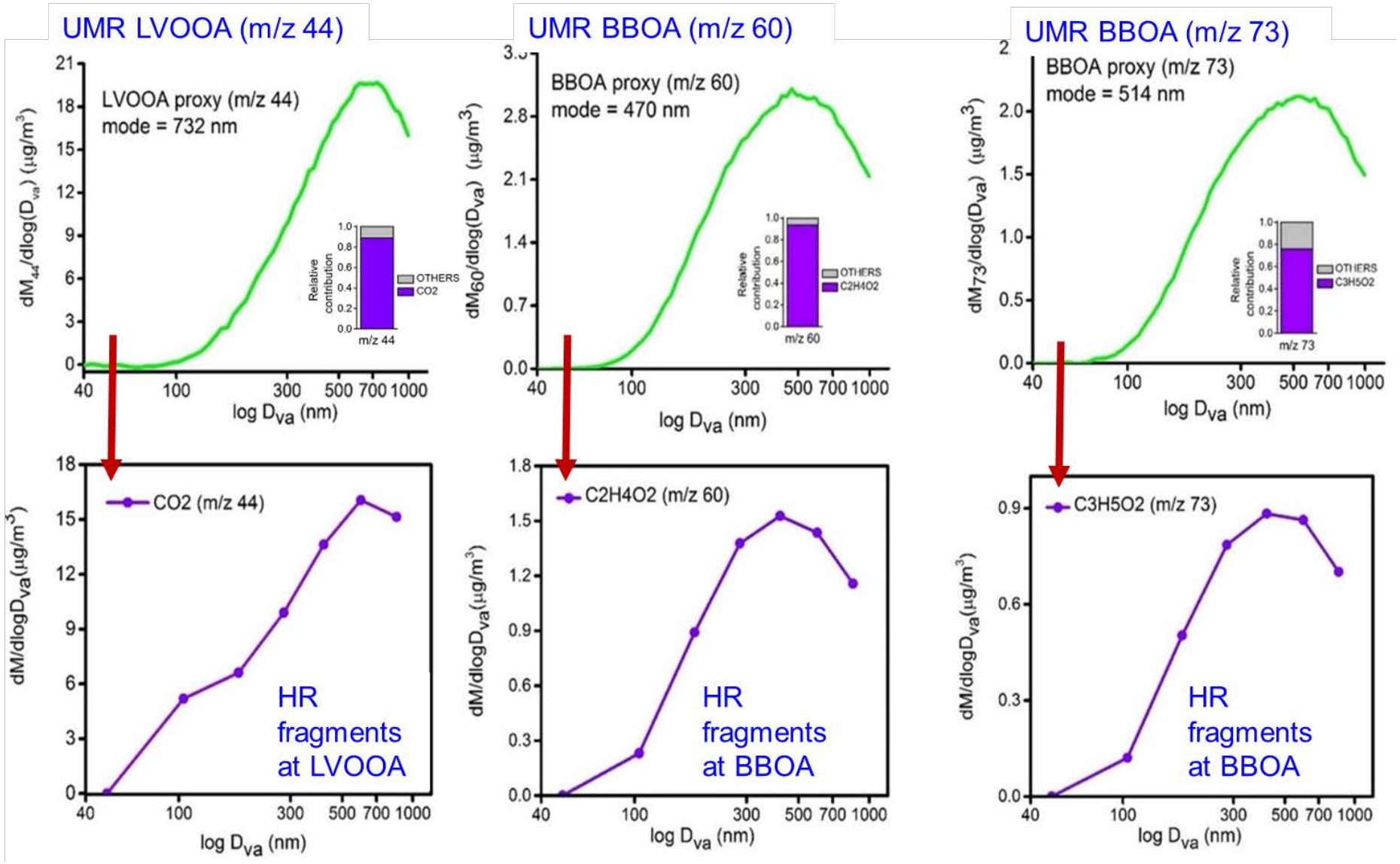
HR fragments at SVOOA

HR fragments at COA

HR fragments at HOA

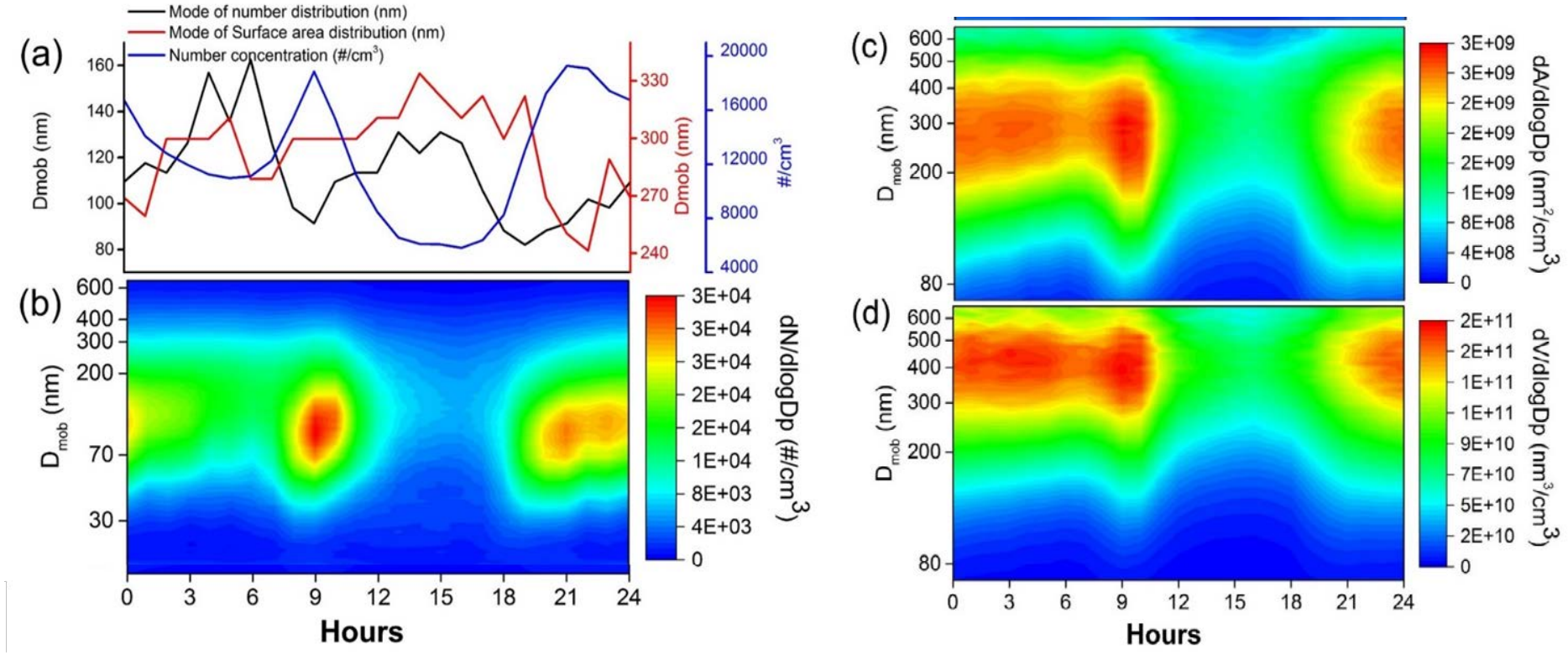
UMR size distributions of (a) SVOOA (m/z 43), (c) COA (m/z 55) and (e) HOA (m/z 57) proxies (top row) and the respective binned HR size distributions (b,d and f).

HR size distributions at LVOOA (m/z 44) and BBOA (m/z 60 & 73) proxies



UMR size distributions of LVOOA (m/z 44) and BBOAs (m/z 60 & 73)) and the respective binned HR size distributions

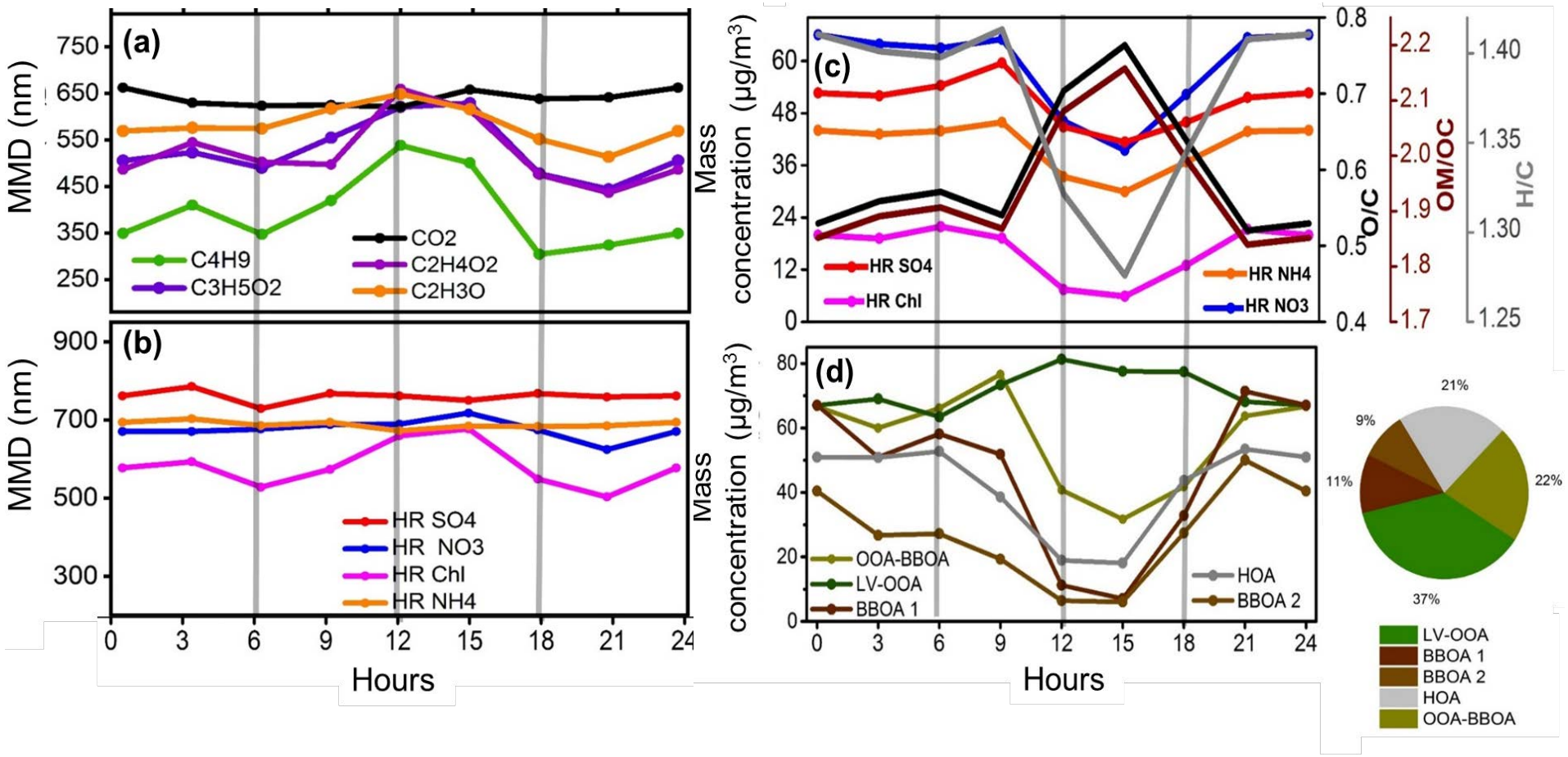
Diurnal variation of PM_1 distribution in Kanpur, derived from Scanning mobility particle sizer (SMPS)



a) : Diurnal variation in the number concentration and MMD of number and surface area distribution derived from SMPS.

(b), (c) and (d) : Diurnal variation of number, surface area and volume distribution of PM_1 species derived from SMPS.

Evolution of aerosol size and composition of OA and PM_1 in Kanpur using size-resolved analysis of high-resolution aerosol mass spectra.



Diurnal variation of the Mean Modal Diameter (MMD) and Mass concentration of HR organic proxies and inorganic species. **Figure d** indicates the diurnal variation of PMF factors derived from HR-PMF analysis.

Conclusions

- Distinct externally mixed primary and secondary aerosol particles are observed in the mornings, evenings, and nights when photochemistry does not take place.
-
- The growth rate of primary OA family is different from that the secondary OA families.

- The increase in the mode of the primary species with increase in secondary organic loading during the middle of the day suggest that the observed particle growth is primarily influenced by the condensation of oxidized organic species produced by in-situ photochemistry.

- This condensational growth results in externally mixed primary aerosols becoming internally mixed with secondary species diurnally within the timescales of a few hours.