

# Vertical Profiles of Aerosol Properties over the Eastern North Atlantic

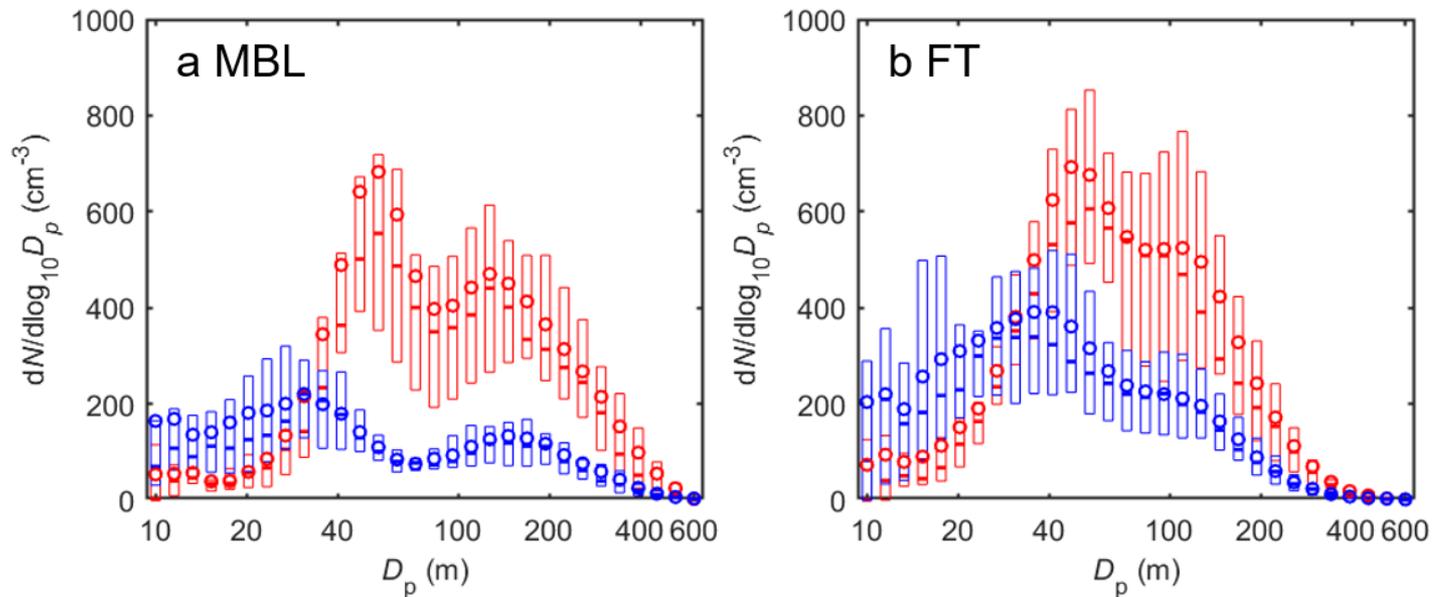
Yang Wang, Maria Zawadowicz, Guangjie Zheng, Swarup China,  
Michael Jensen, Daniel Knopf, Alex Laskin, Alyssa A Matthews,  
David Mechem, Fan Mei, Ryan Moffet, Arthur J Sedlacek, John  
Shilling, Stephen Springston, Amy Sullivan, Jason Tomlinson,  
Daniel Veghte, Robert Wood, and Jian Wang\*

*Washington University in St. Louis  
Brookhaven National Laboratory  
Pacific Northwest National Laboratory  
Stony Brook University  
Purdue University  
University of Kansas  
Colorado State University  
University of Washington*

\*Contact information: [jian@wustl.edu](mailto:jian@wustl.edu)



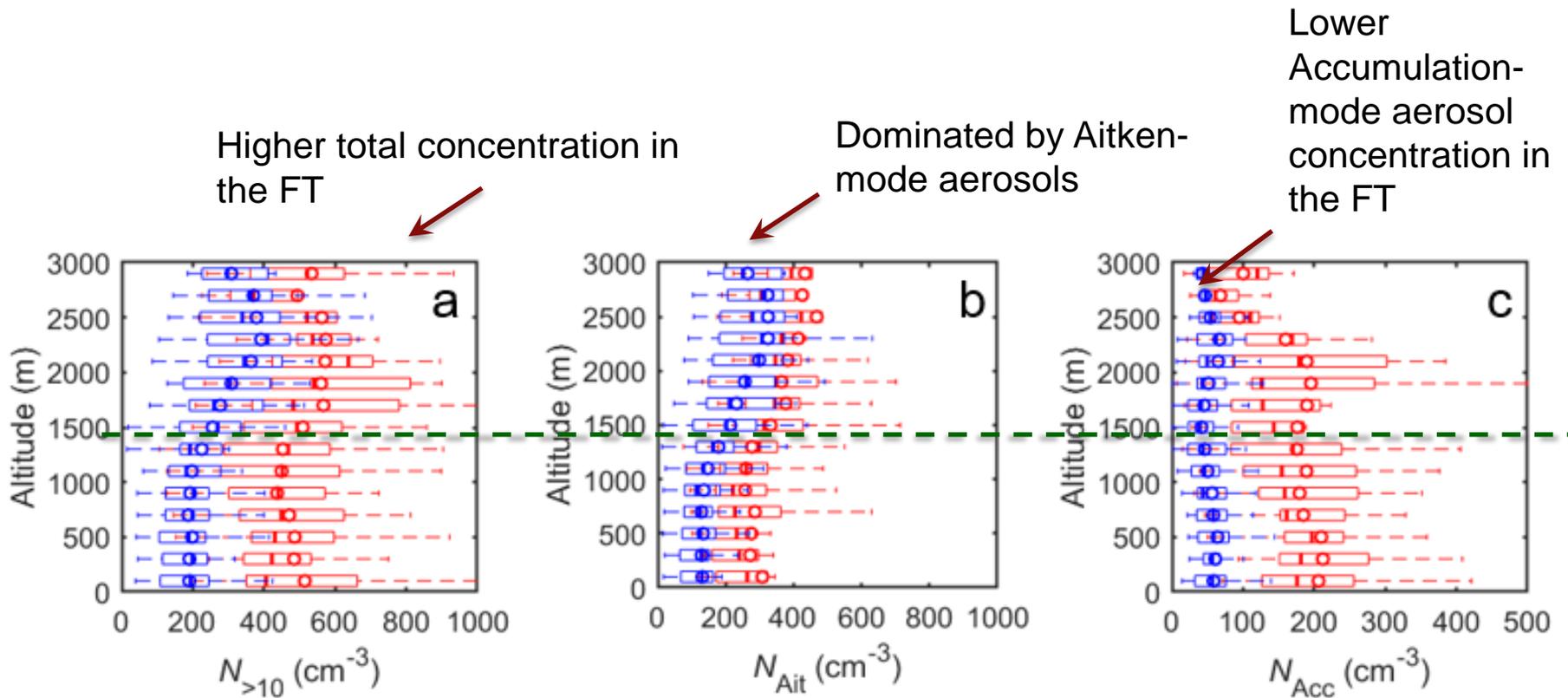
# Average aerosol size distributions



- Strong seasonal variations
- Bimodal size distributions
- High aerosol concentration during summer
- Stronger influence from new particle formation during winter



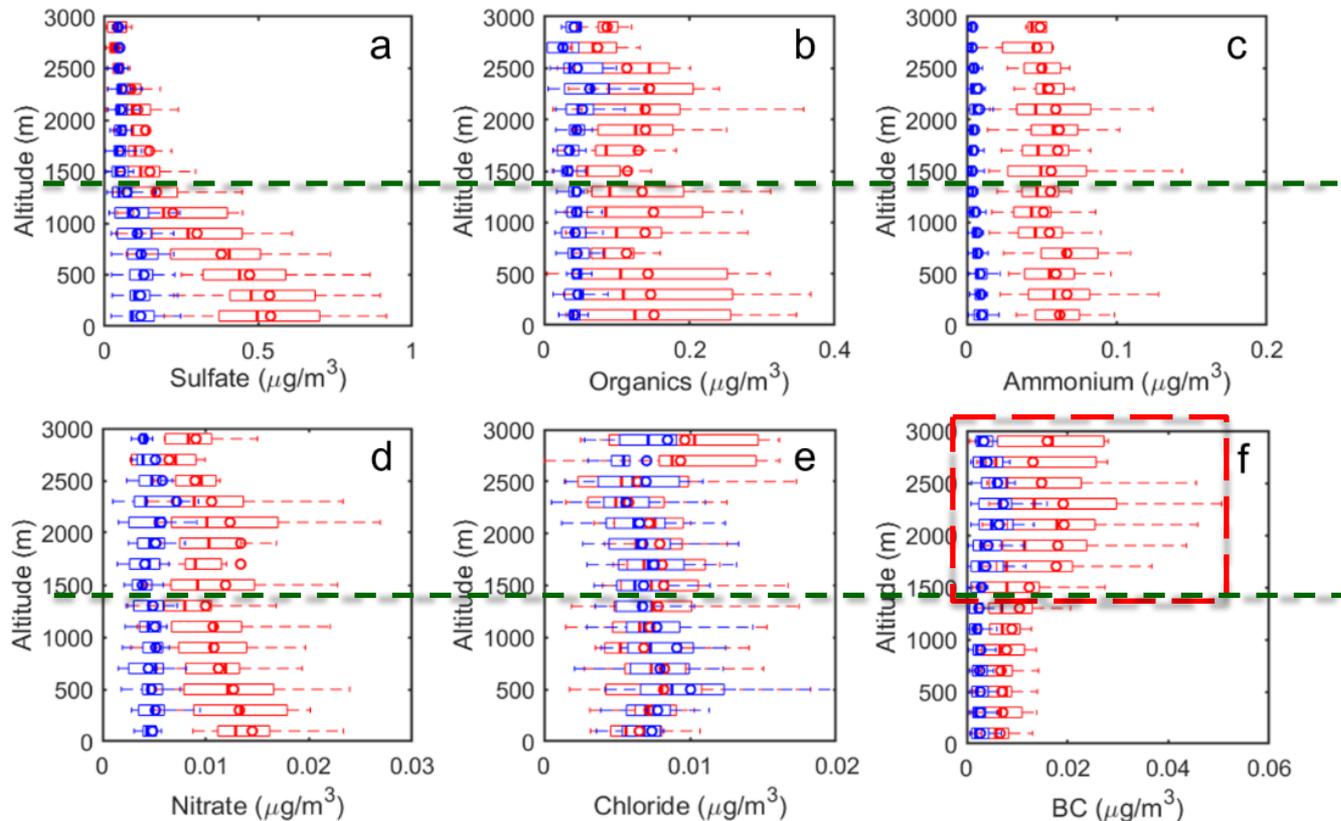
# Vertical profiles of aerosol number concentrations



- On average, entrainment of FT aerosol is not a direct source of boundary layer CCN
- Entrained Aitken-mode particles as an “indirect source” of CCN
  - ✓ Condensational growth into CCN size range
  - ✓ Activation in an abnormally high updraft followed by aqueous chemistry



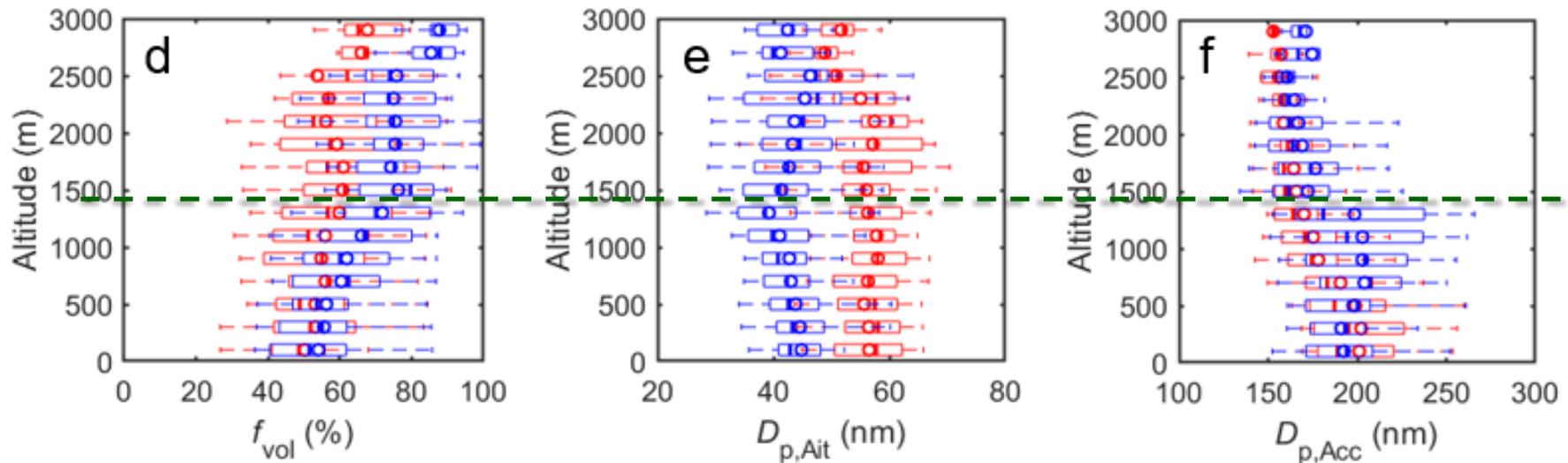
# Aerosol chemical compositions



- BC concentration is higher in the FT (long-range transport from North America)
  - ✓ High sulfate fraction and lack of correlation between Potassium and OC suggests strong influence from continental pollutions.
- Higher sulfate and organics mass loading in the MBL during summer.



# Vertical profiles of volatile aerosol fraction and aerosol mode sizes



- Higher volatile fraction in the FT (influence of new particle formation)
- Summertime volatile fraction is lower than wintertime (stronger influence from long range transported continental emissions).
- Larger Aitken-mode particle diameter in summer
  - ✓ Higher particle growth rate in summer
  - ✓ Higher updraft velocity activates smaller particles in winter
- Larger accumulation-mode diameter in the MBL (in-cloud processing)



# Conclusions

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- On average, entrainment of FT aerosol is not a direct source of boundary layer CCN in the ENA.
- Entrained FT Aitken-mode particles represent an indirect source of boundary layer CCN.
- Seasonal variation of boundary layer CCN is likely due to a combination of (1) stronger influence of long range transported pollution, (2) faster condensational growth of Aitken-mode particles, and (3) slower wet scavenging during summer.

Wang et al. (2020), Impact of seasonal variabilities and synoptic conditions on the vertical profile of trace gas and aerosol properties over the Eastern North Atlantic. *Atmos. Chem. Phys.* In preparation.



Thank you!

