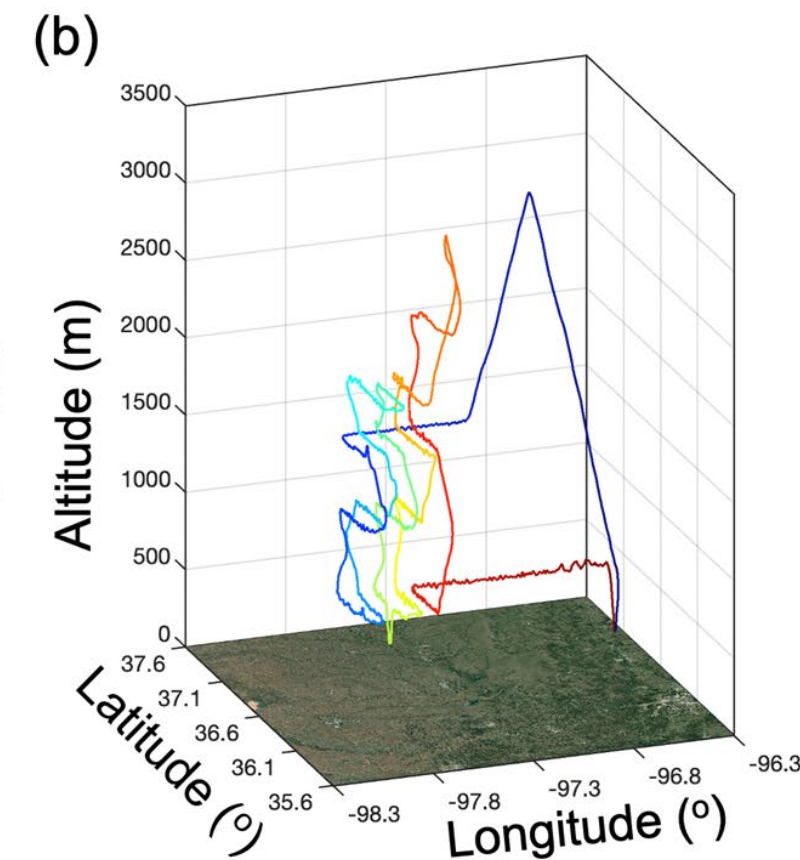
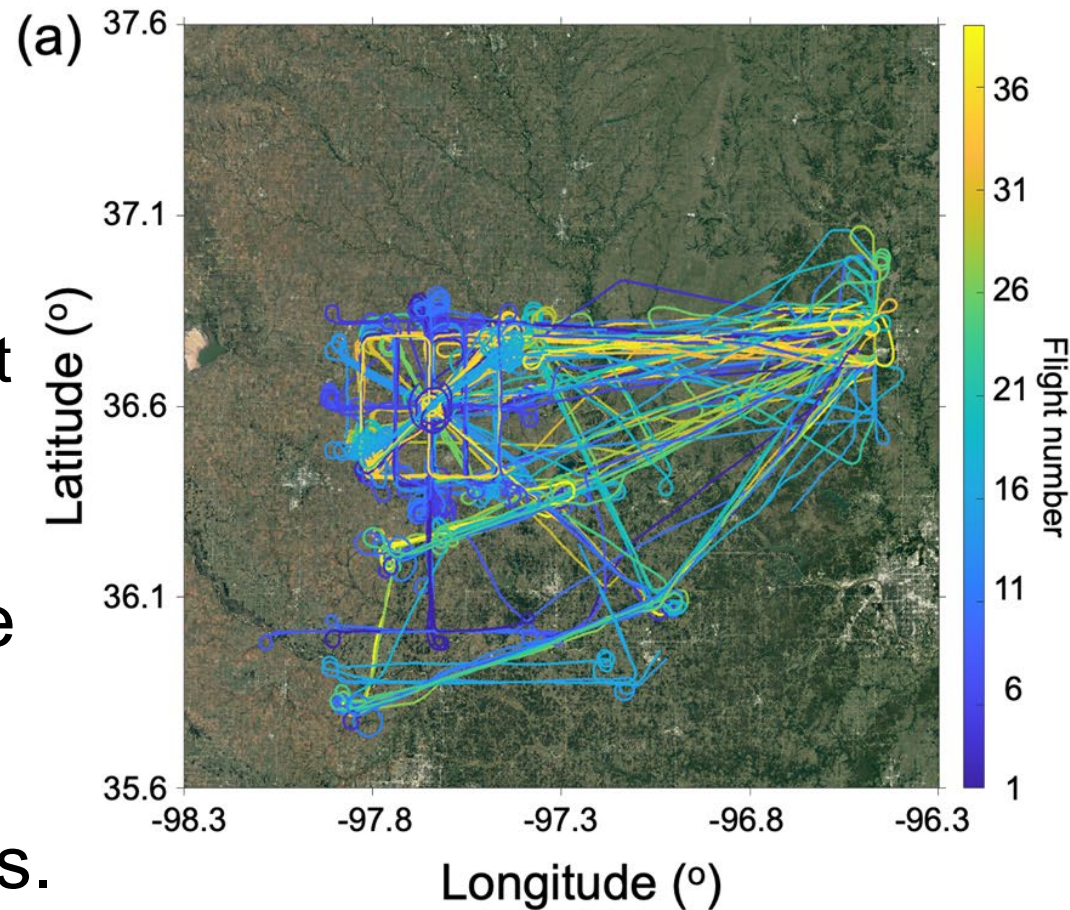
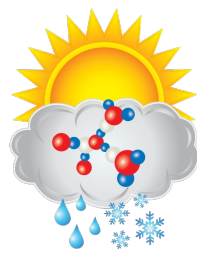


## Examining the vertical heterogeneity of aerosols over the Southern Great Plains

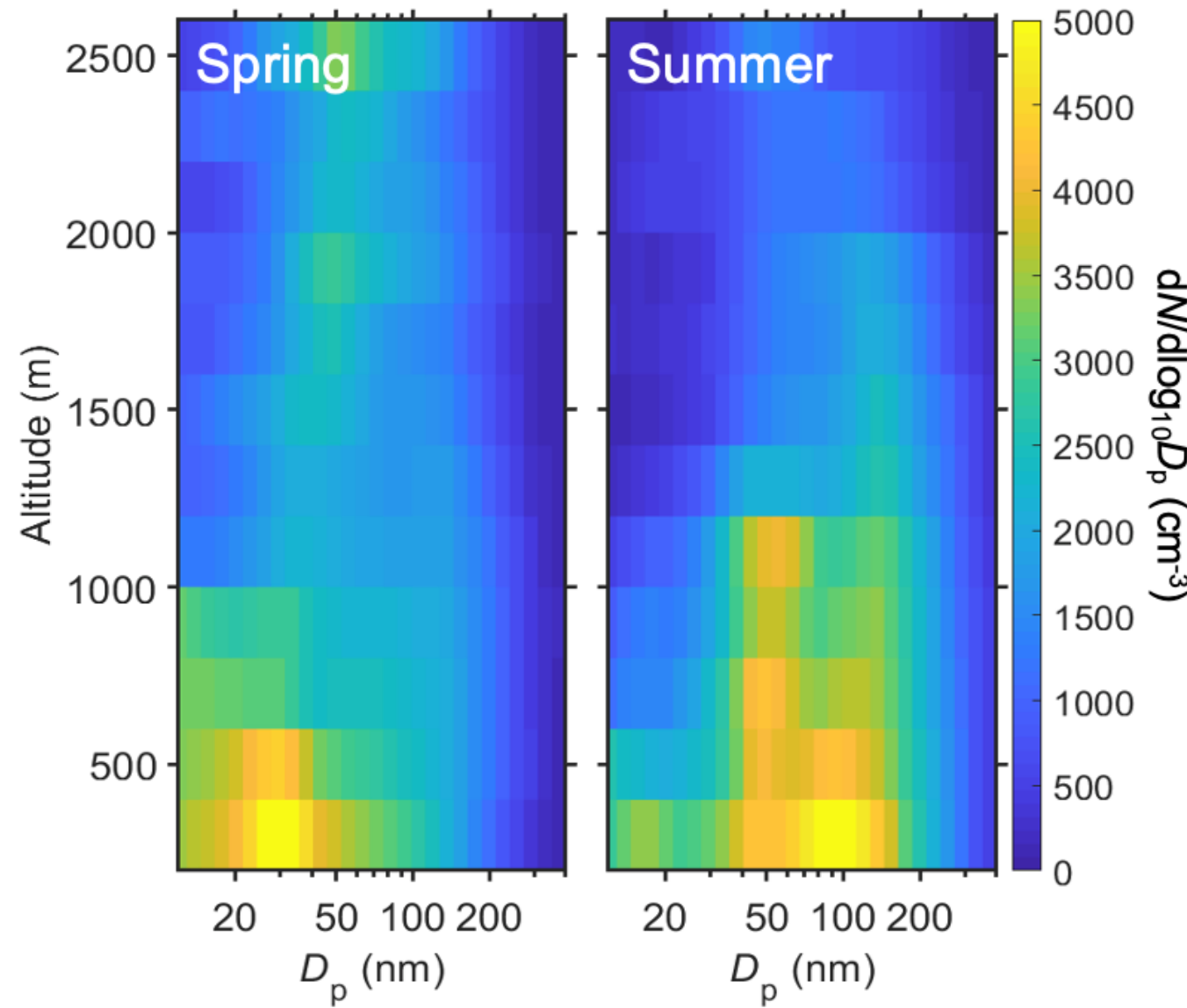
Yang Wang, Chanakya Bagya Ramesh, Scott E. Giangrande, Xianda Gong, Jiaoshi Zhang, Jerome Fast, Alyssa Matthews, Fan Mei, Ahmet Odabasi, John Shilling, Stephen Springston, Jason Tomlinson, Die Wang, Jian Wang

- The vertical profiles of meteorological and aerosol physiochemical properties up to 2500 m above the ground are examined based on the 38 flights conducted during the HI-SCALE campaign.
- Aerosol physiochemical properties include
  - Aerosol size distributions
  - Aerosol number concentrations in different size modes
  - Chemical composition
- Processes influencing the vertical distribution of aerosol properties are discussed by case studies.



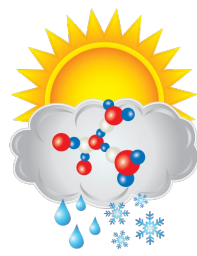


# Average aerosol size distribution

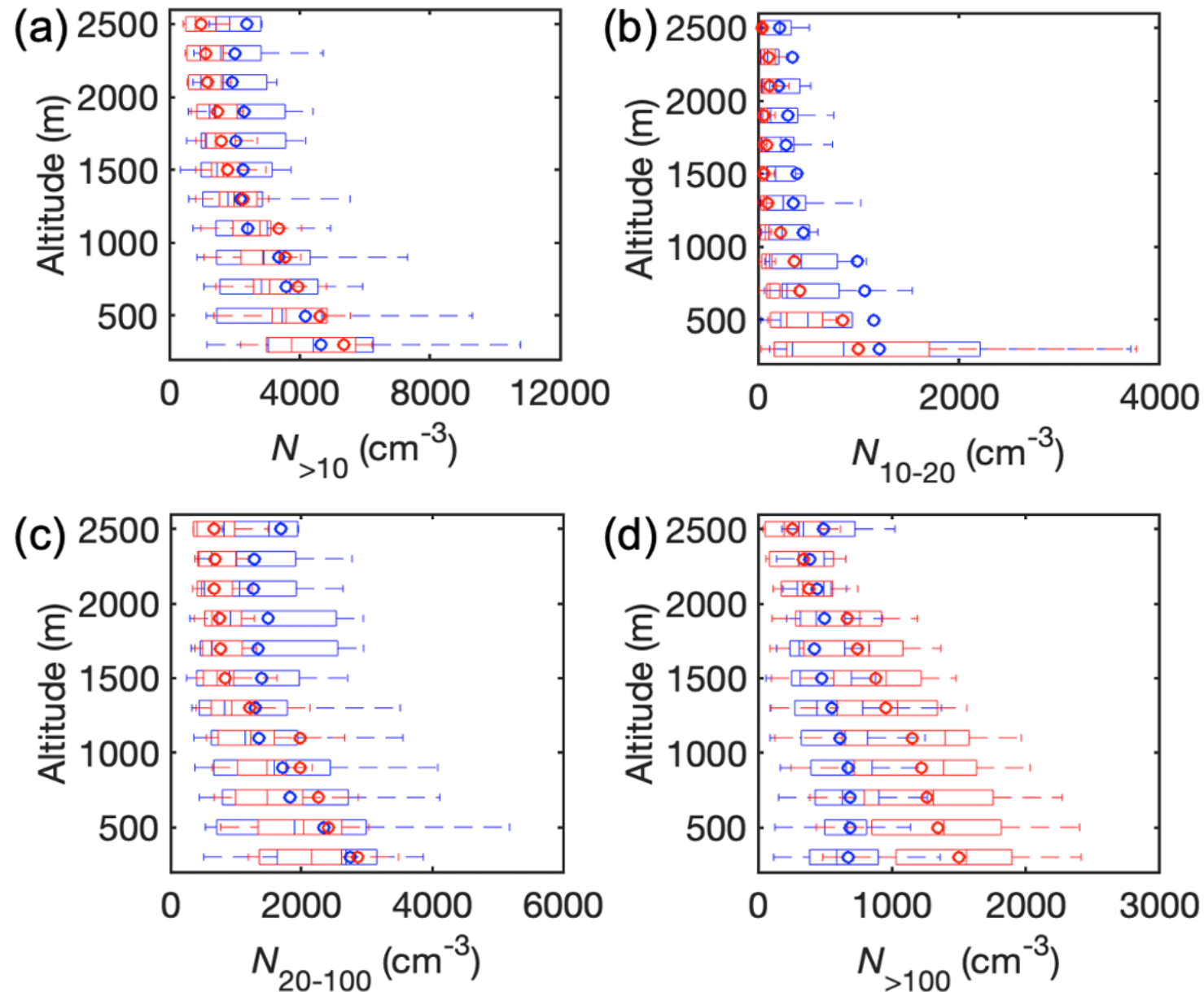


Strong vertical heterogeneity:

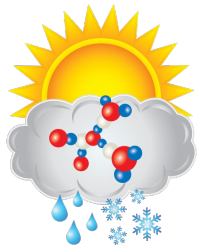
- Higher concentration at surface due to emission and cloud processing at higher altitudes
  - Seasonal difference
  - Clearer Hoppel minimum at higher altitudes
- Surface measurement may overestimate aerosol concentration at cloud levels



# Aerosol concentrations in different size modes

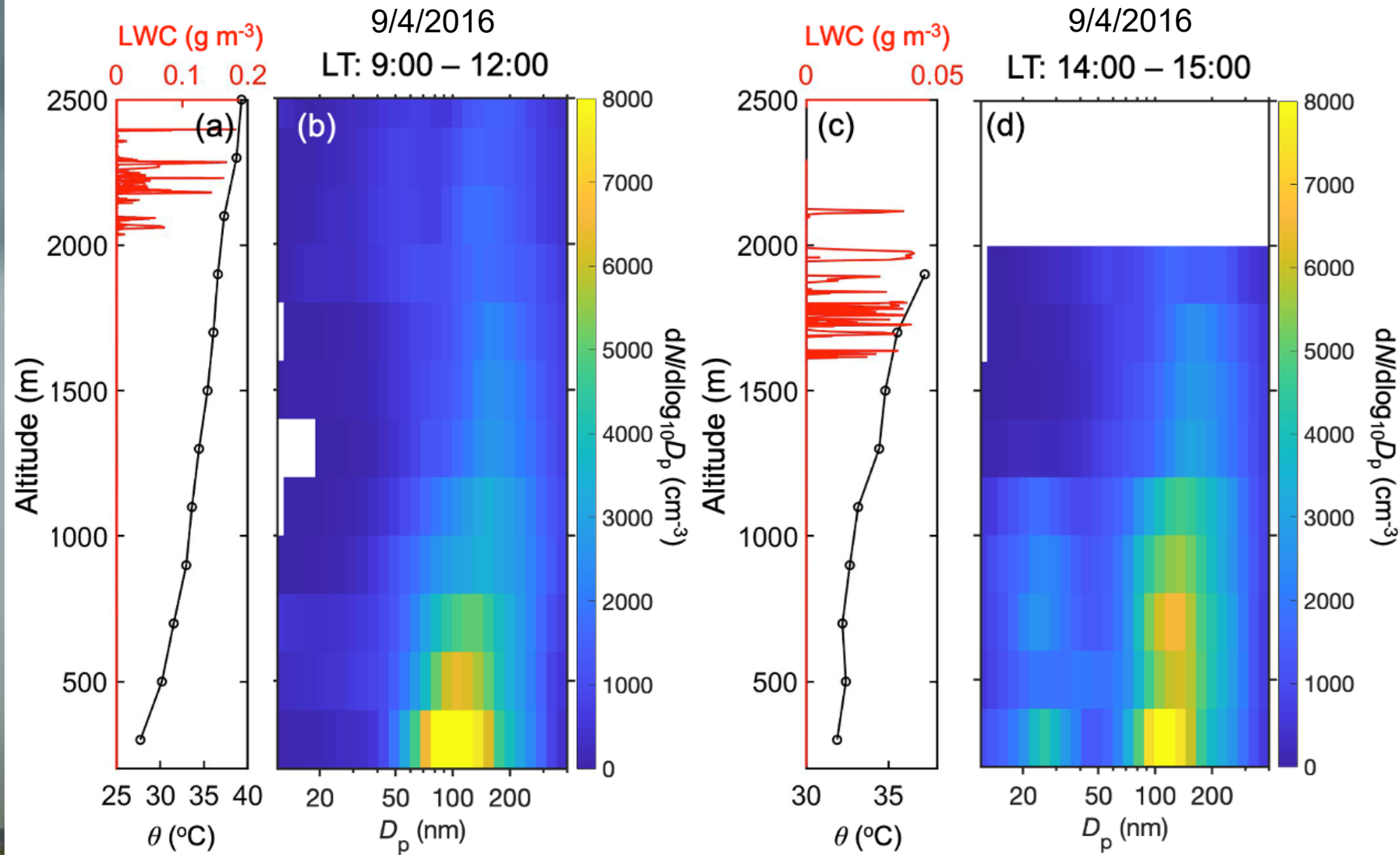


- The total aerosol concentrations for both seasons are similar
- In the BL, the nucleation mode aerosols are more concentrated in spring due to new particle formation events
- The accumulation mode aerosol concentrations are elevated in summer likely due to growth by condensable vapors

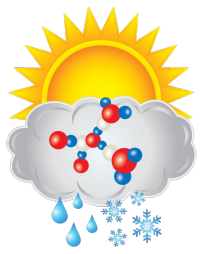


# ASR Influence of BL structure

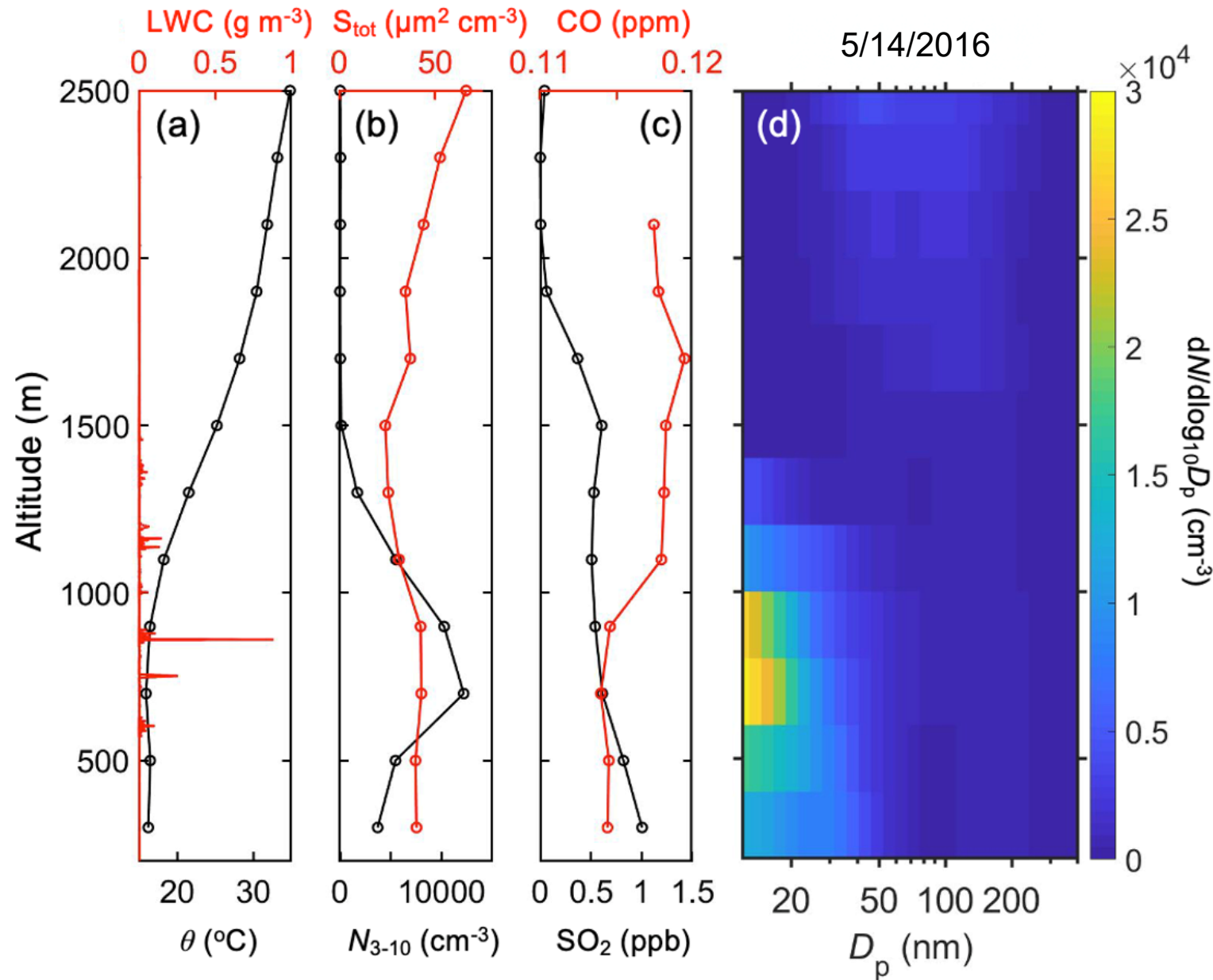
Atmospheric  
System Research



- The vertical distribution of aerosols dependent on atmospheric stability
- HI-SCALE same-day flights during summer
- Gradual mixing of aerosols from the surface to the upper BL during daytime
- Mixing is still not complete in the BL by 15:00



# New particle formation in the upper BL



- Out of the 38 research flights
  - 8 observed NPF at the surface
  - **7 observed NPF in the upper BL**
  - 2 observed NPF in the lower FT
- The NPF occurred at the upper BL (cloud level) – pre-existing aerosols removed through cloud processing and precipitation
- Newly formed particles grow to larger sizes as they transport to the surface, potentially contributing to CCN in the BL