2019 TBS Deployments

SAND2019-13709PE

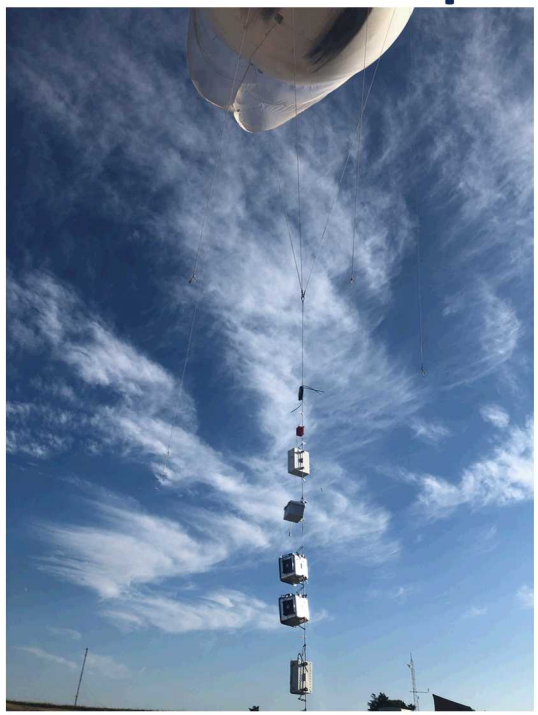


Photo courtesy of Brent Peterson

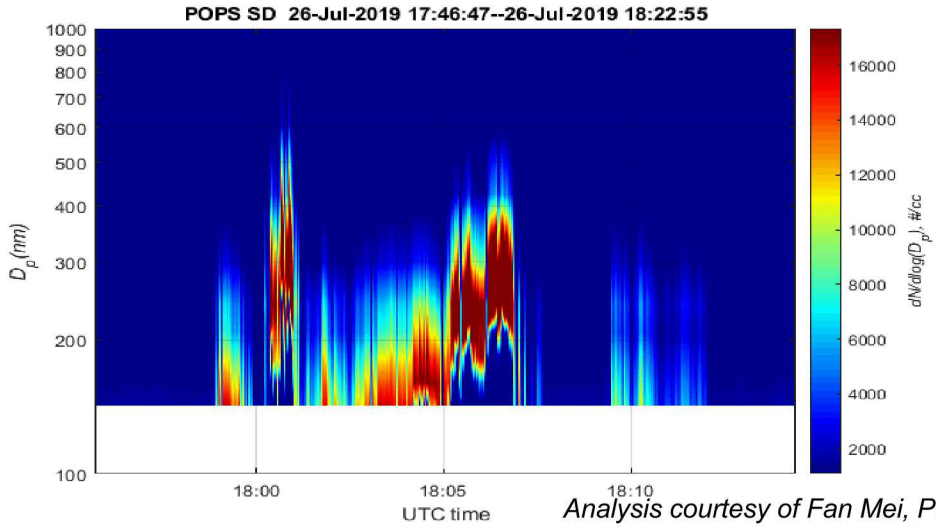
- *Over 150 hours* of ARM TBS flights at:
  - SGP (Southern Great Plains in OK) for two-week periods in April, July, and October
  - AMF3 (Advanced Mobile Facility 3 in AK) for two-week periods in May and August

- At SGP TBS is flown under an FAA waiver to 1 km AGL and must remain 150 m below cloud base.
  - FAA approval for 1.5 km AGL flights in progress
- At AMF3 TBS operates within Restricted Airspace R-2204 to 1.65 km AGL.

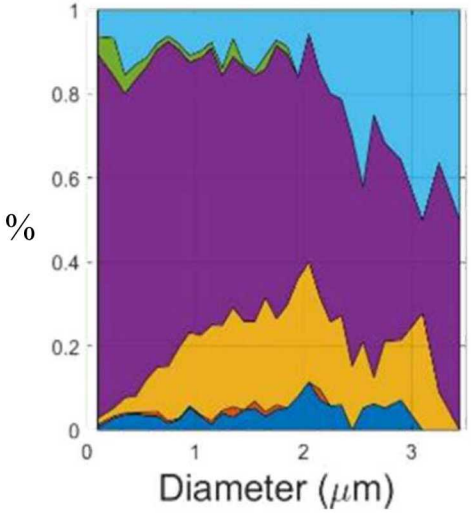
- Payload capacity is ~80 pounds and has included:
  - aerosol instrumentation (two POPS and multiple CPCs)
  - Anemometers
  - Radiosondes
  - Distributed Temperature Sensing (DTS) optical fiber
  - Cascade impactors

2019 TBS Results

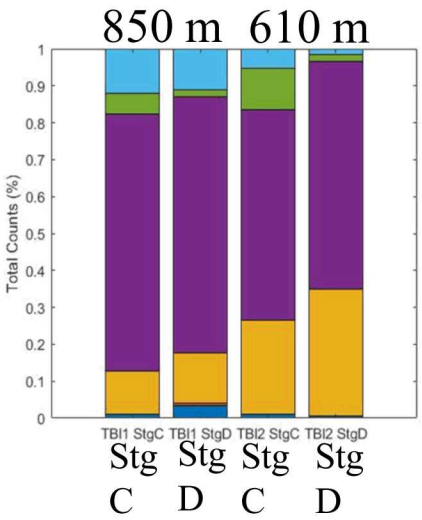
- TBS operated in smoke plumes from agricultural burning at SGP in July 2019 and observed elevated particle concentrations (> 20000 #/cc)



Analysis courtesy of Fan Mei, PNNL



Size-resolved chemical compositions



Particle categories at different altitudes

Other
Dust
Carbonaceous
Sulfates
Na-rich Sulfates
Na-rich particles

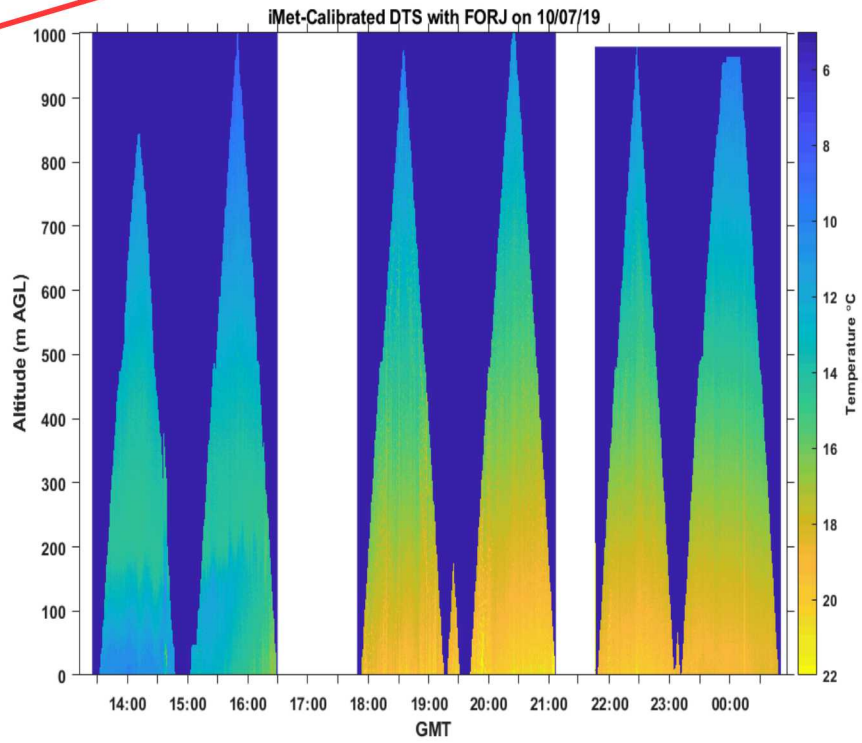
Analysis courtesy of Swarup China, PNNL

Future TBS Activities

- Deployments to SGP and AMF3 with guest instrumentation:
  - Video ice particle sampler
  - Cloud droplet probe
  - VOC gas sampler
  - Multiple CPCs (Condensation Particle Counters) with varying cut sizes
  - Ice fog droplet spectrometers

- Continued deployments of ARM instrumentation:
  - Cascade impactors
  - Distributed Temperature Sensing
  - Printed Optical Particle Spectrometers

- Simultaneous TBS flights at SGP central facility and extended facilities (> 100 km apart) to characterize spatial heterogeneity in aerosols aloft



Distributed Temperature Sensing temperature profiles from five TBS flights at SGP on 10/07/19