Vertical Localization of New Particle Formation

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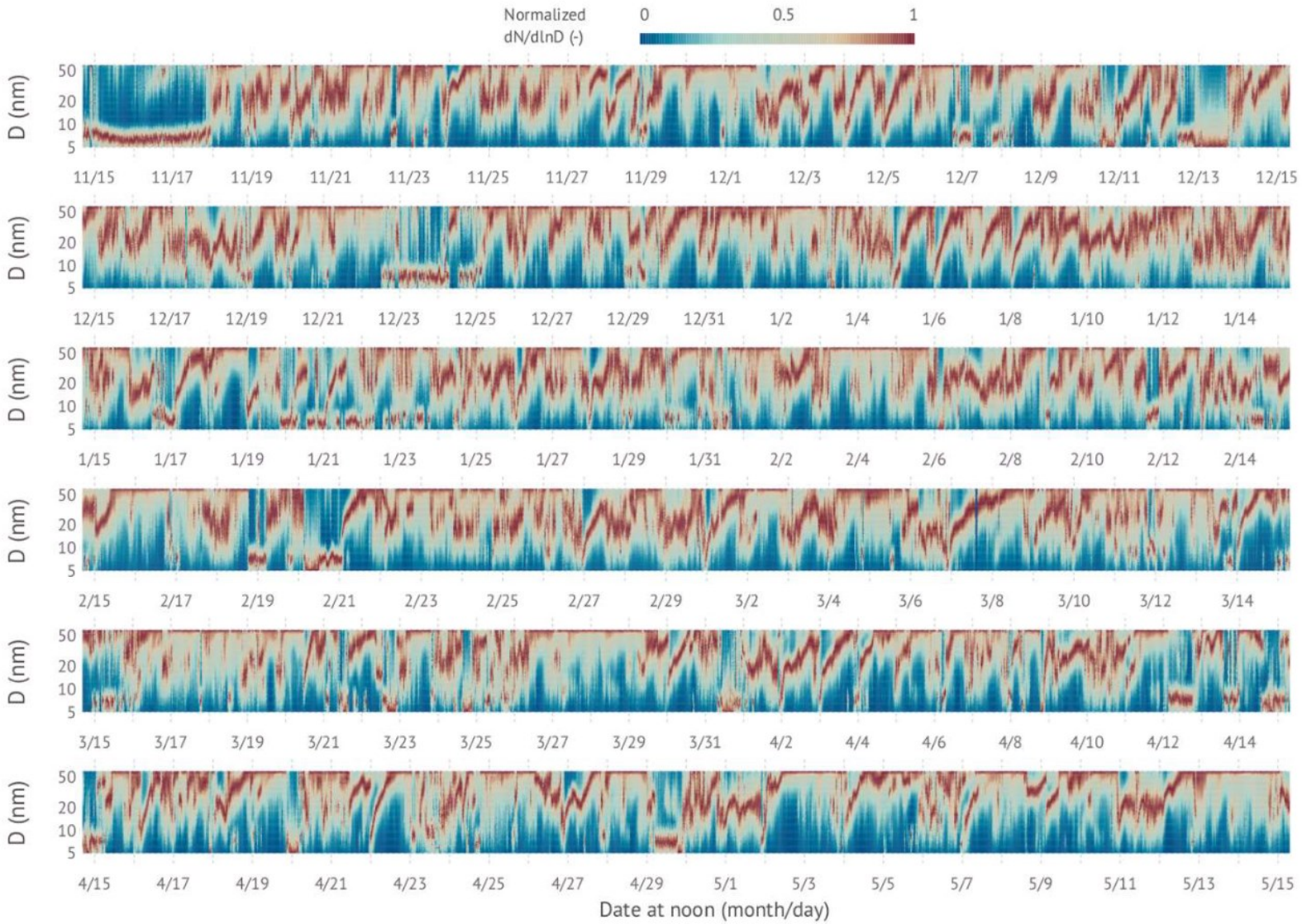
ASR Atmospheric System Research

Persistent NPF in Southeastern US (Research Triangle Area)



[Meskhidze et al., 2019, JGR; Zimmermann et al., 2020]

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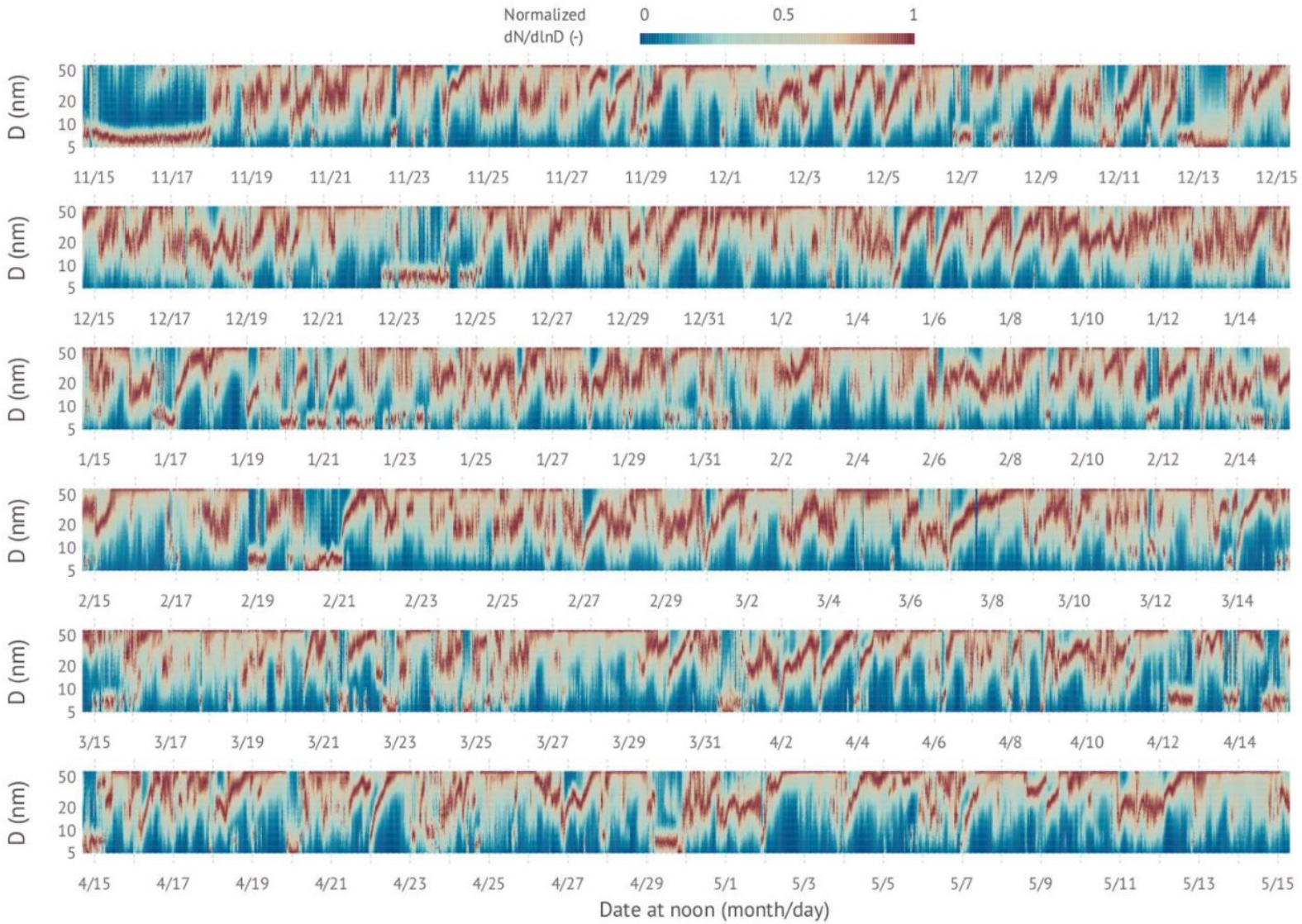
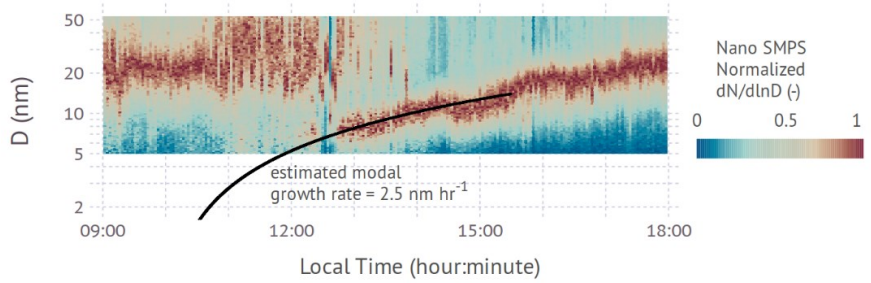
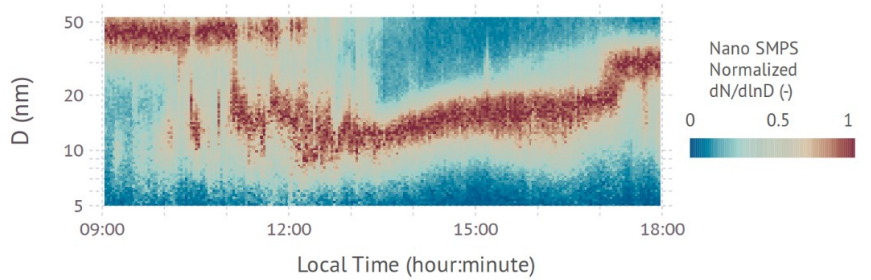


Class A Event

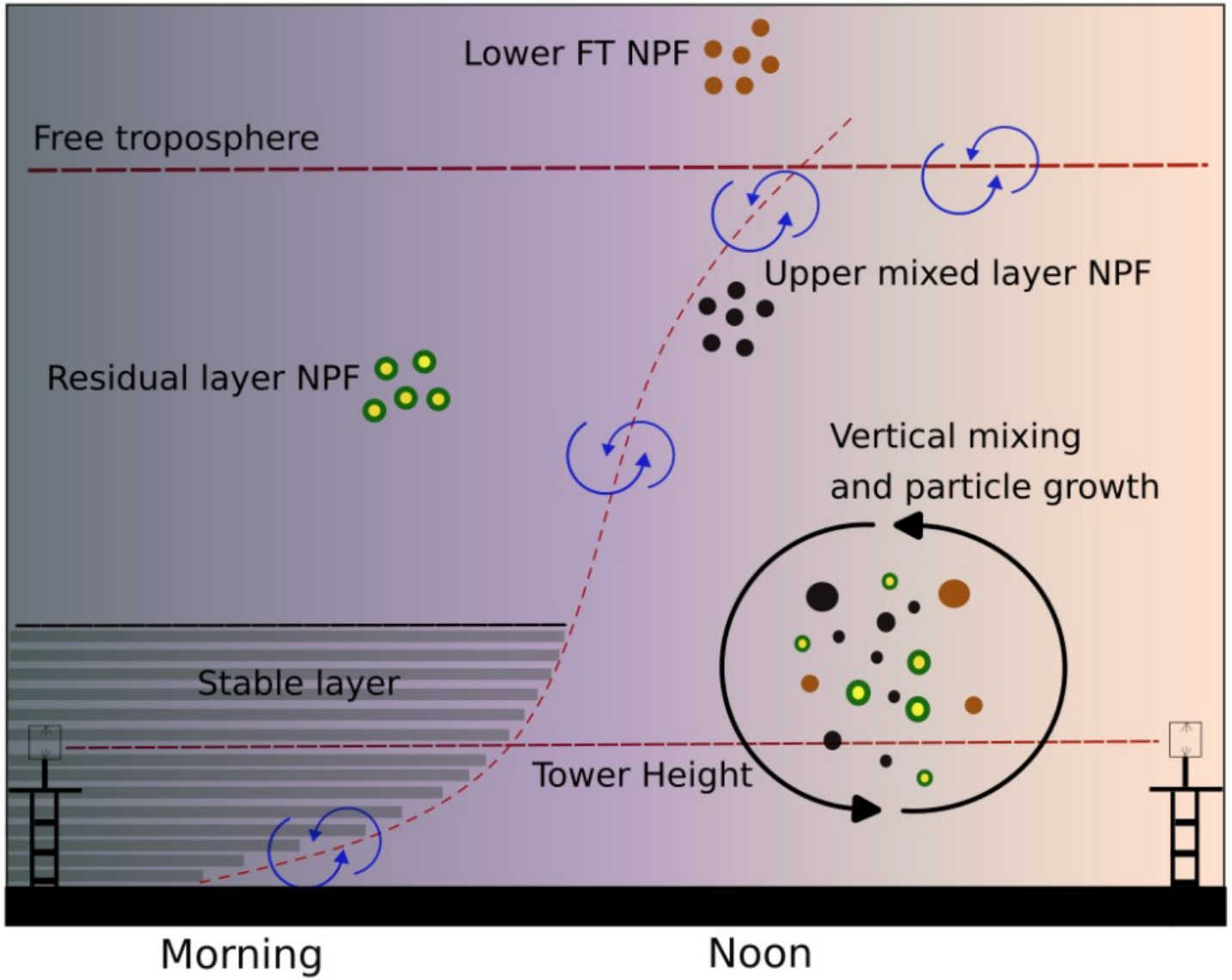


Class B or C Event



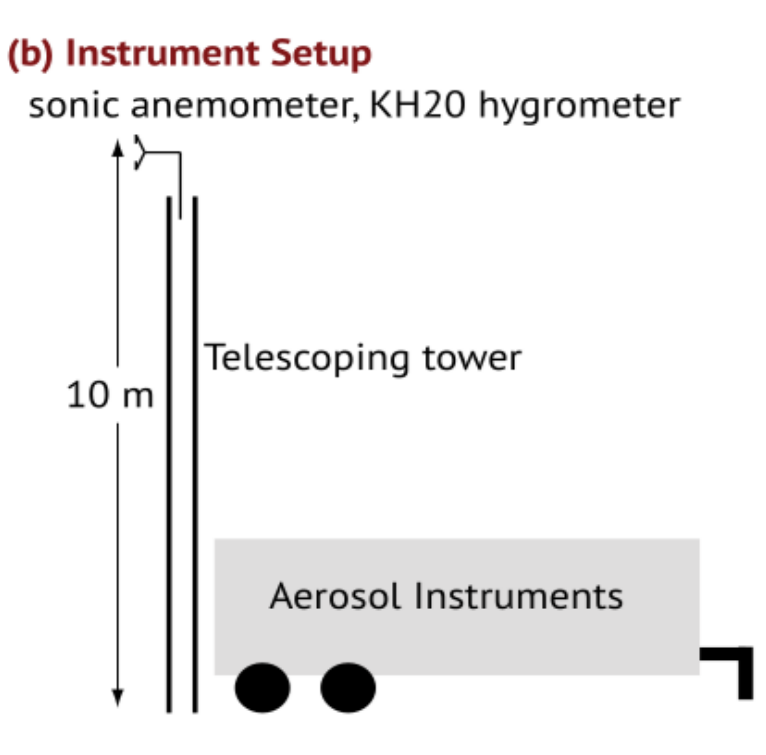
[Meskhidze et al., 2019, JGR; Zimmermann et al., 2020]

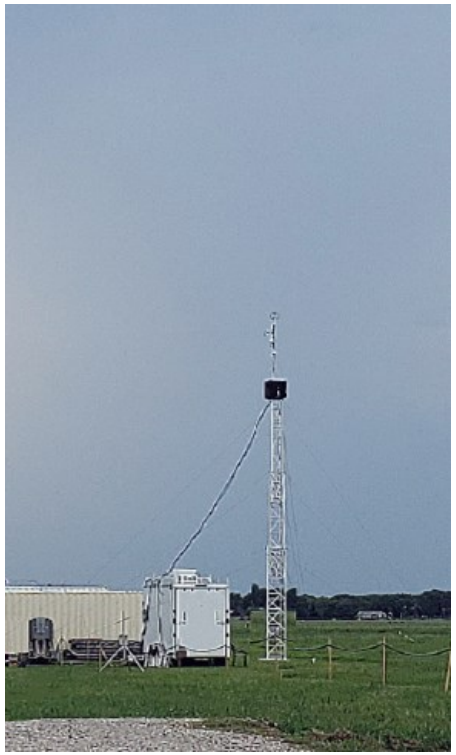
Hypothesis: NPF aloft + vertical mixing explains Class B events



Example Setup for Turbulent Flux Measurements

(a) Particle size ranges	Instrumentation	
2.5-10 nm	CPC1 - CPC2	Eddy Flux Measurement
10-40 nm	CPC2 - CPC3	
70-500 nm	SP2	
180-3500 nm	POPS	
10-50 nm	HTDMA (hygroscopicity)	
5-55 nm	nano SMPS (size dist.)	





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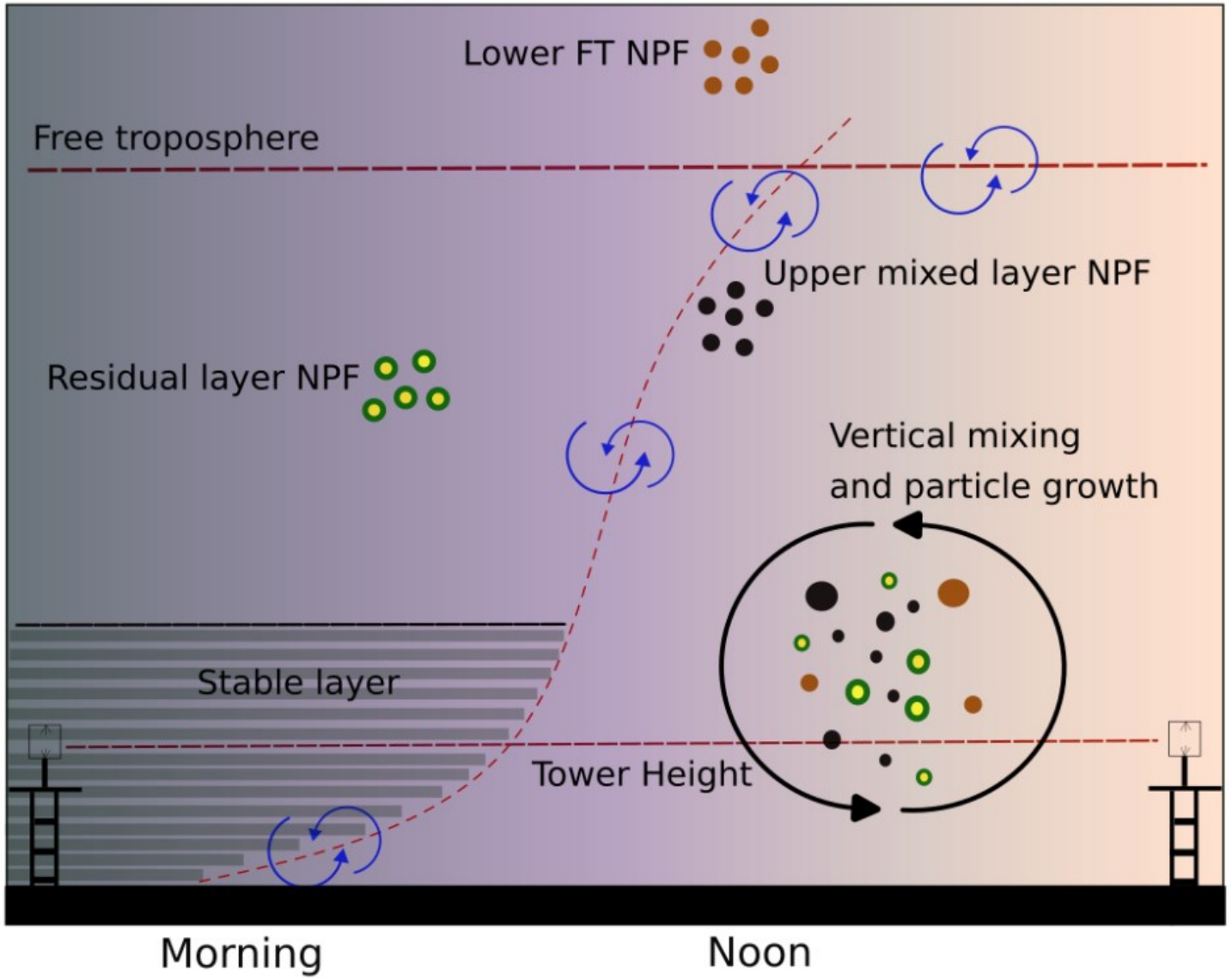
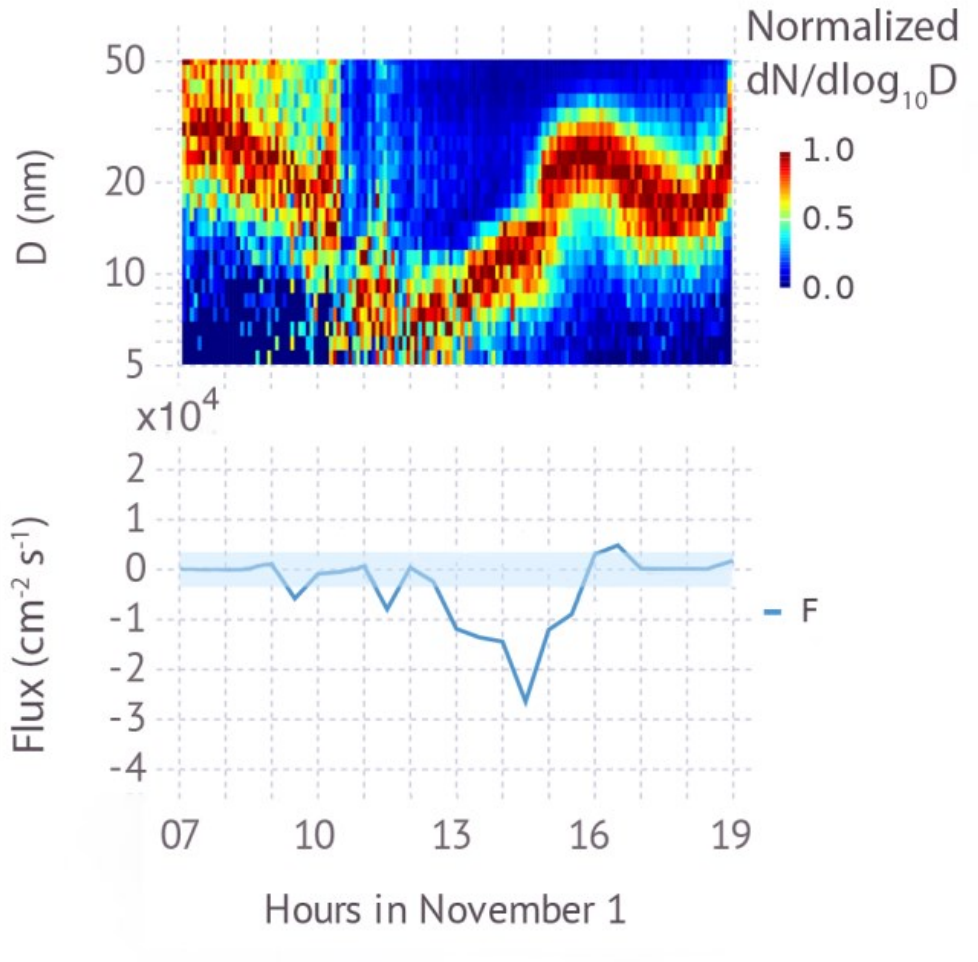
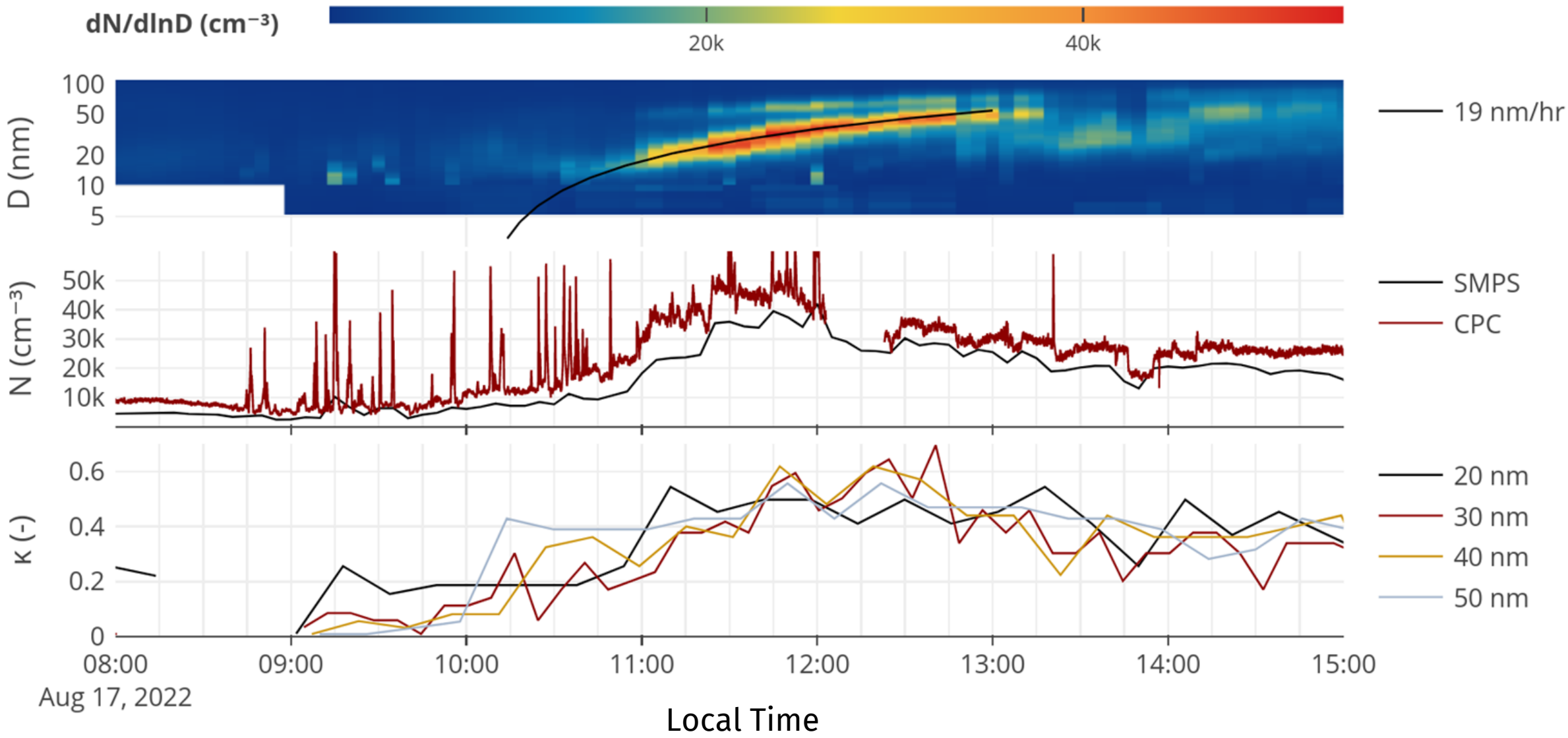


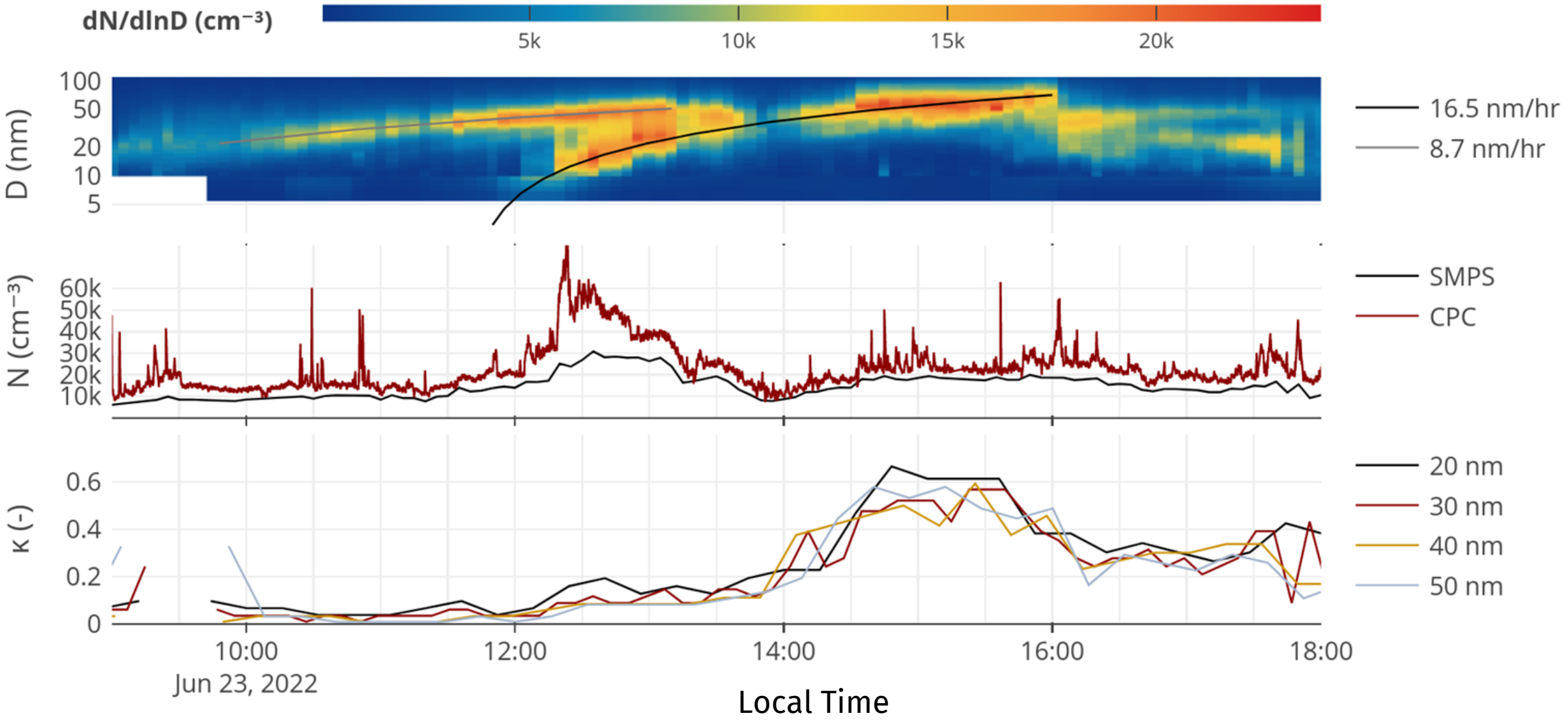


[Islam et al., 2022, JGR]

Example NPF event during TRACER



Another example event during TRACER



Food for discussion

- Class B and NPF “aloft” is common
- Vertical flux measurement may be one of many approaches to aid vertical localization
- Flux measurements are ambiguous, especially in heterogeneous environments such as TRACER
- **Need routine high quality measurements of 1-10 nm size distribution**