TRACE -P
Aerosol Measurements on the P3

1) Ionic Composition of Fine Aerosols
2) Studies of New Particle Formation

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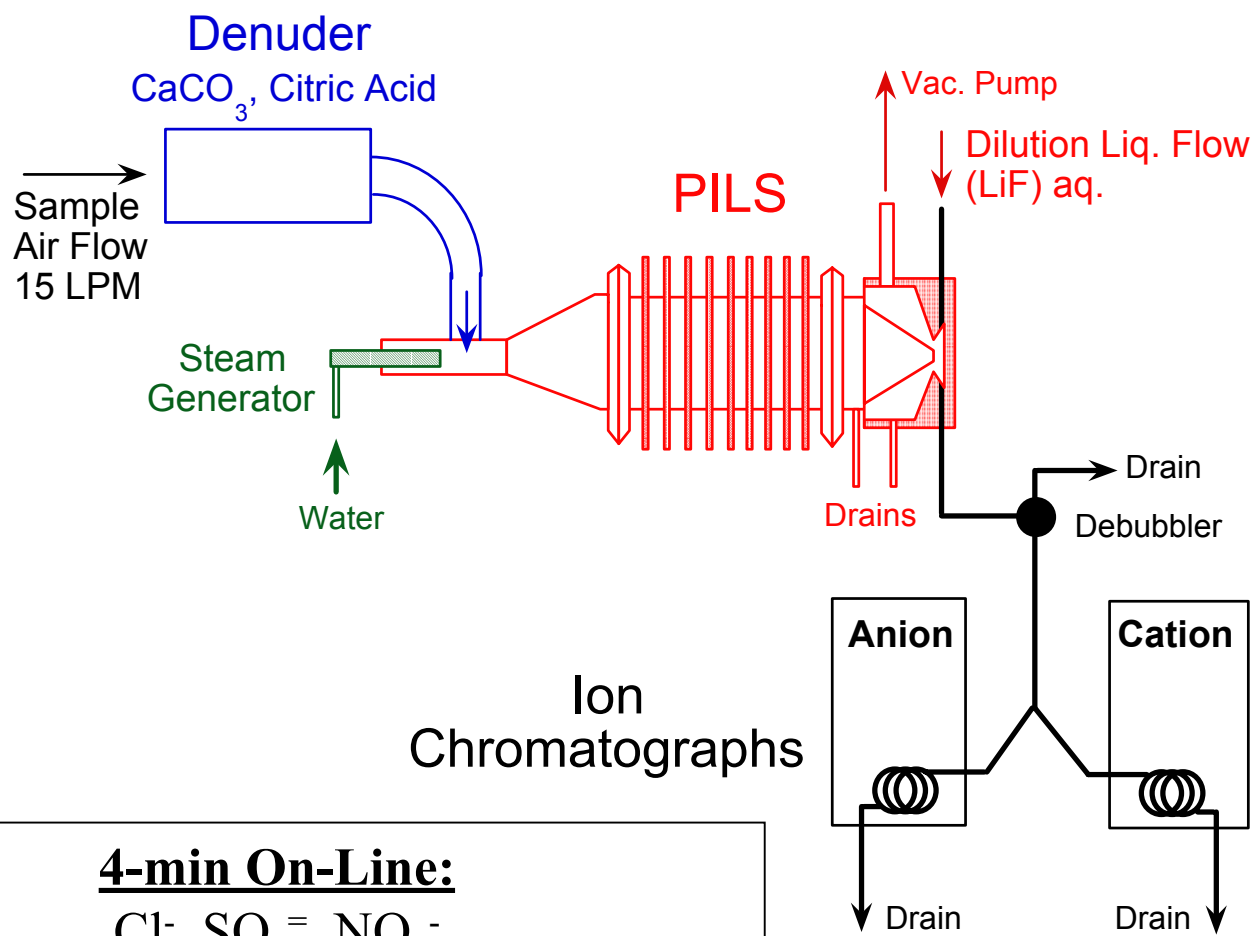
Aerosol Chemistry: Particle-Into-Liquid-Sampler



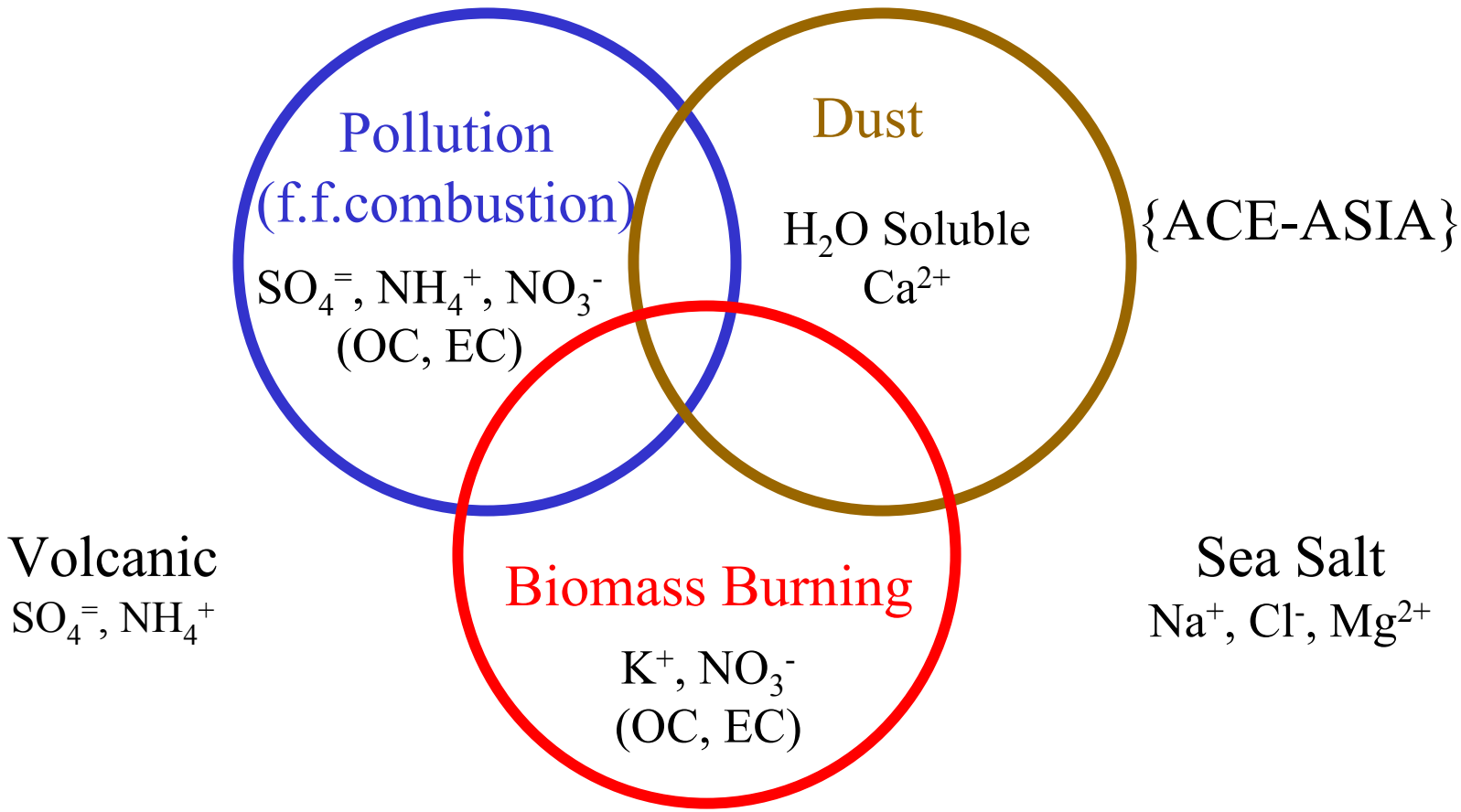
4-min On-Line:

Cl^-, $SO_4^=$, NO_3^-

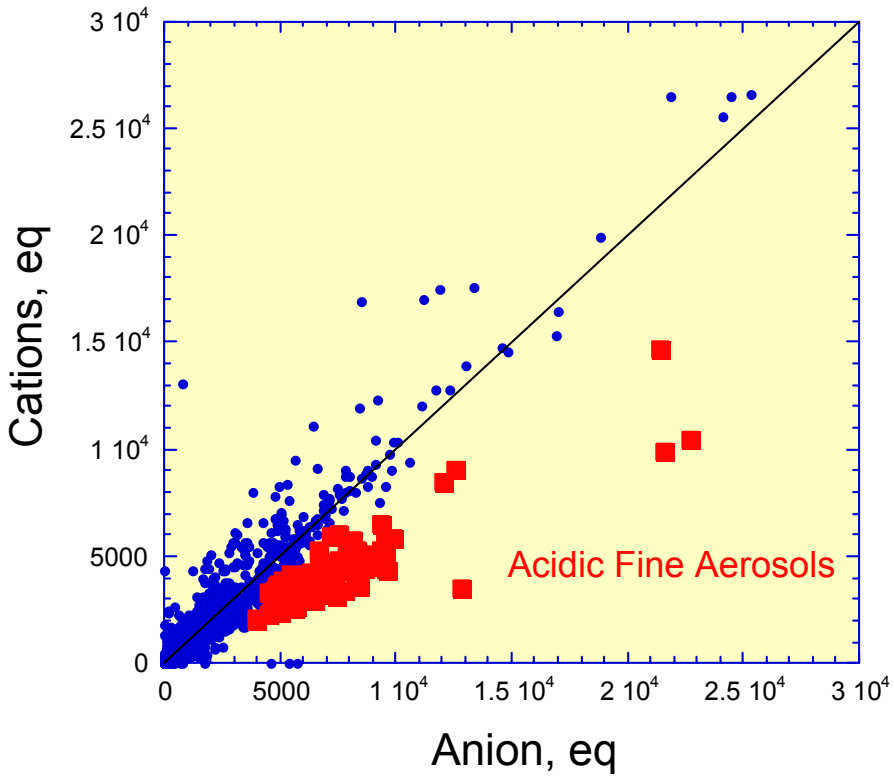
Na^+, NH_4^+, K^+, Ca^{2+}, Mg^{2+}

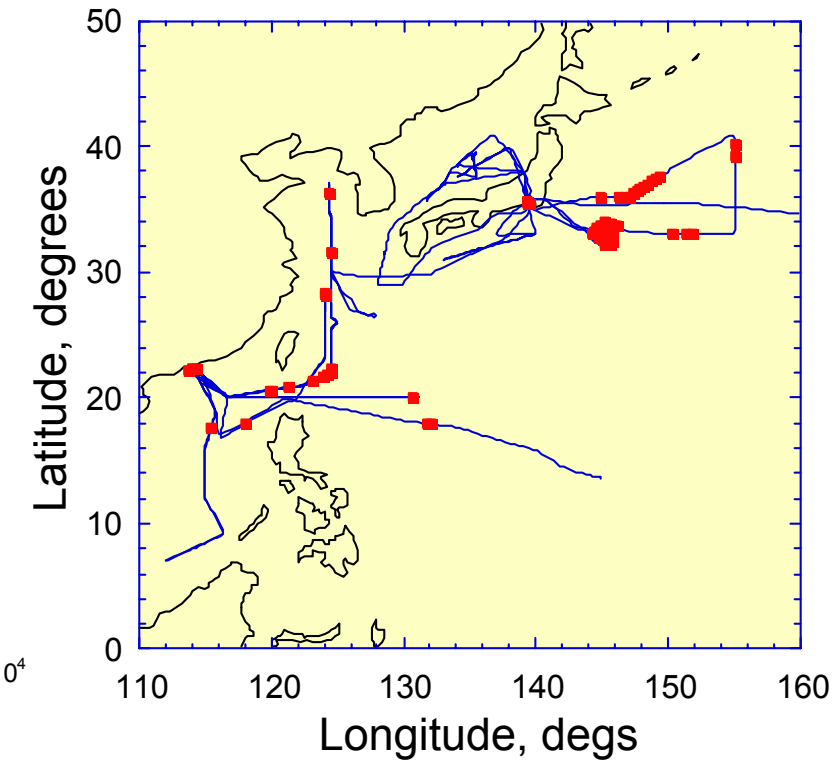
Fine Water soluble Aerosol Dp < 3μm(?)

Asian Fine Aerosol Chemistry



Periods of Acidic Aerosol: Primarily Volcanic

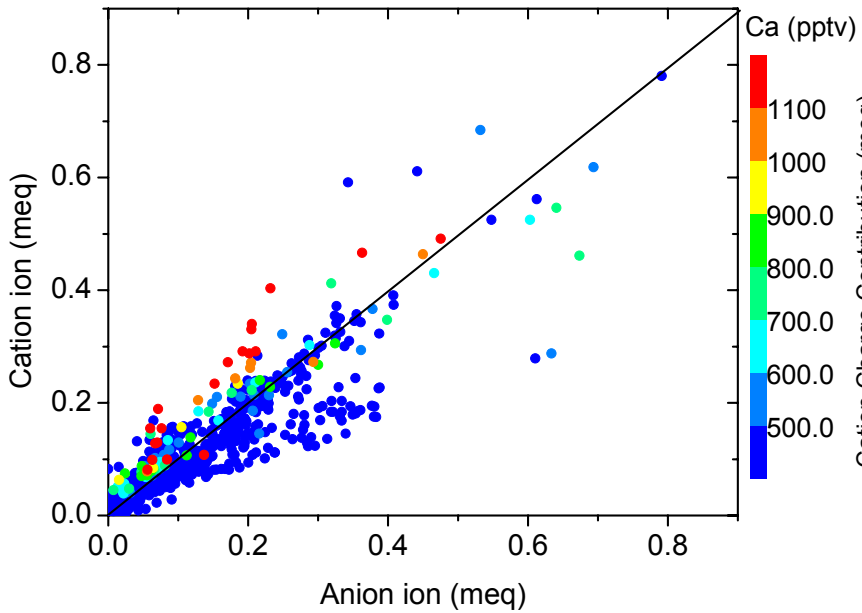




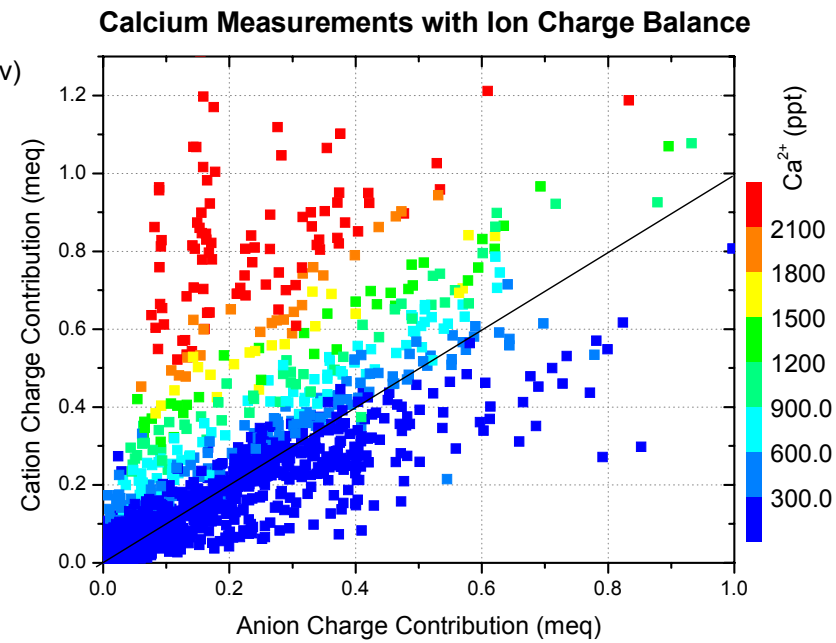
East of Japan: $NH_4^+/SO_4^{2-} = 0.9$, (NH_4HSO_4)

Calcium and Charge Balance

TRACE-P



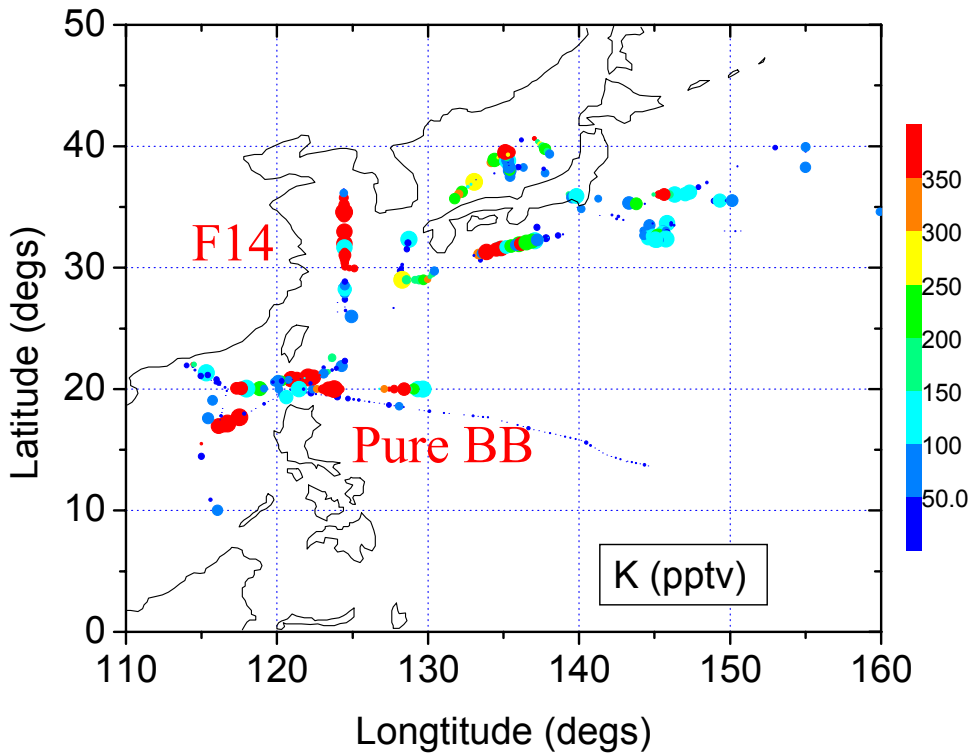
ACE ASIA

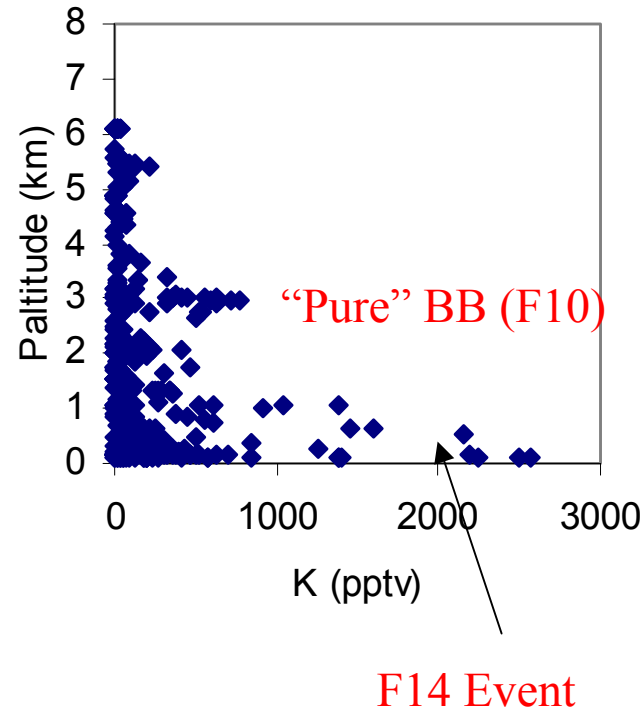


Missing Anion? Carbonate (CO_3^{2-})

- Pollution and dust often not mixed.
- Fine water soluble Ca is primarily $CaCO_3$ or $Ca(HCO_3)_2$

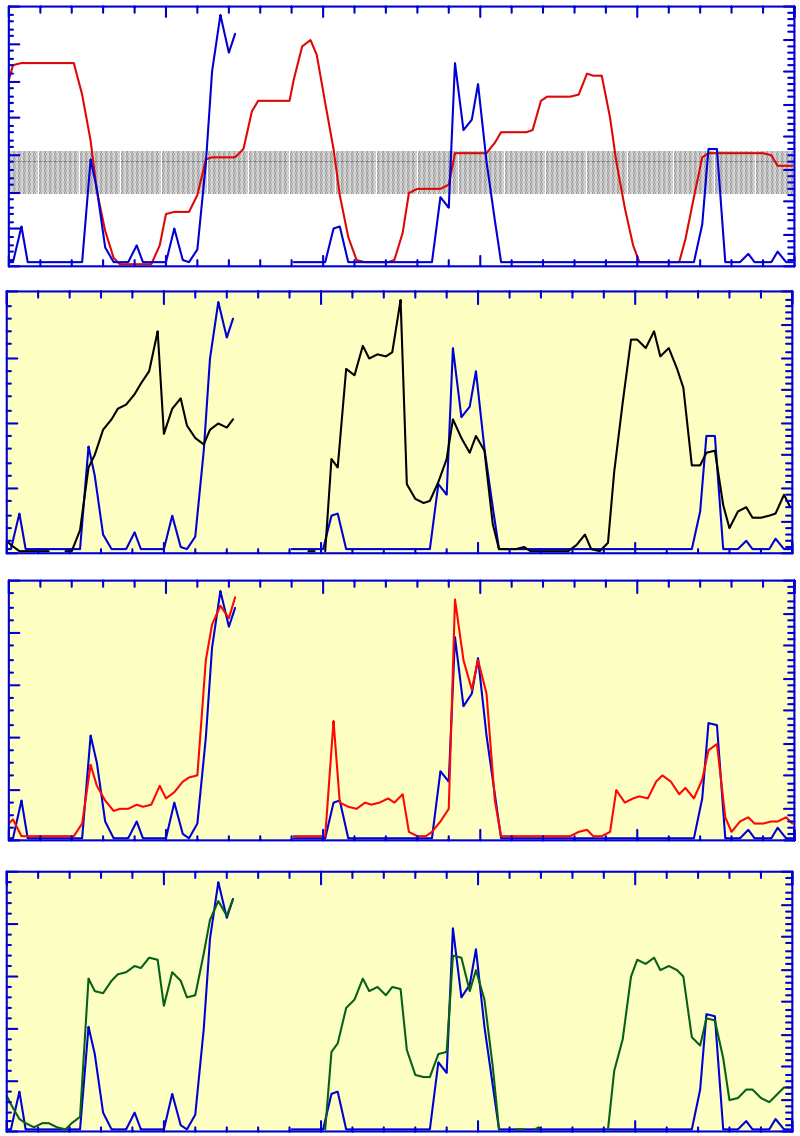
Fine Potassium & Biomass Burning



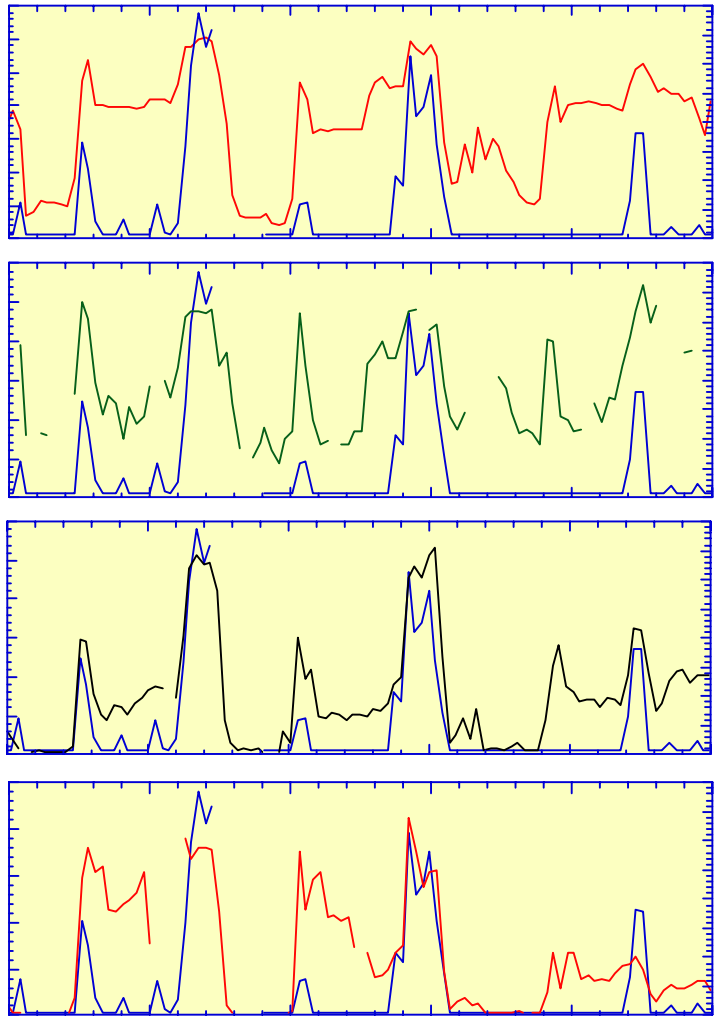


Highest K^+: E of HK and in Yellow Sea

Flight 10, Biomass Events

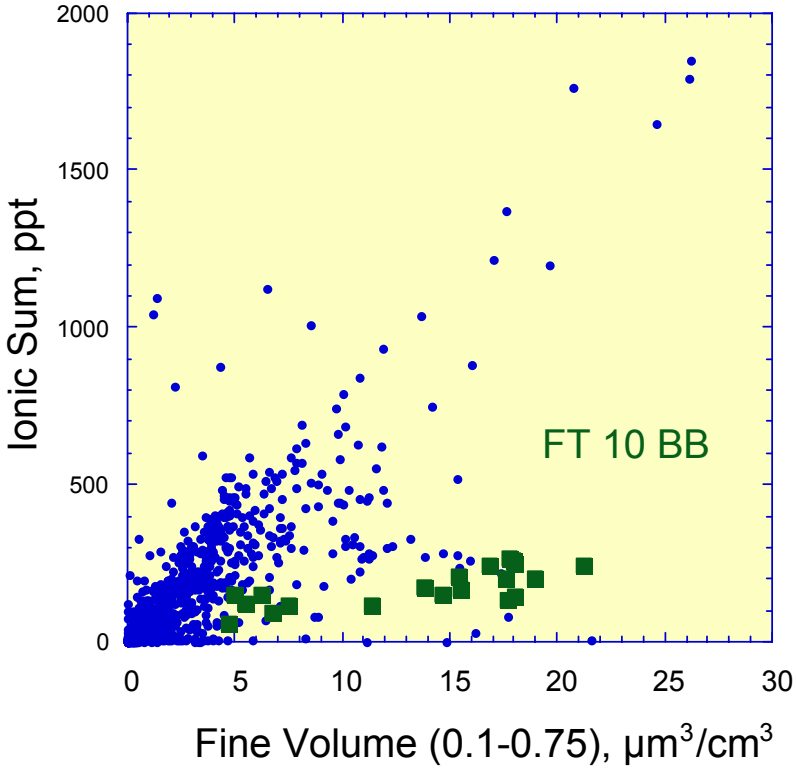


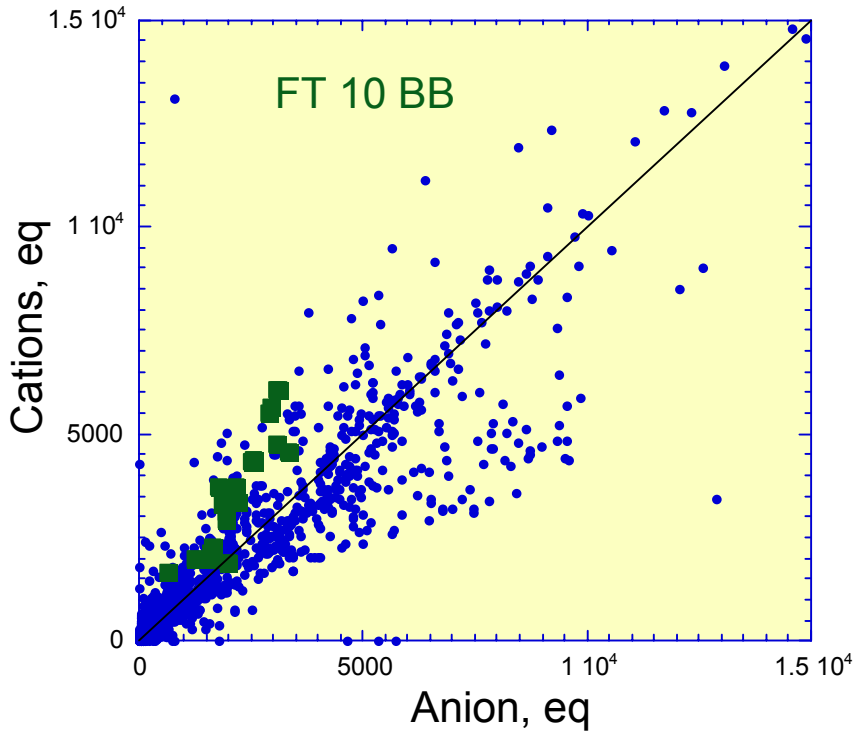
Flight 10, Biomass Events



Little evidence for ff combustion (ethyne...)

Flight 10: "Pure" Biomass Burning

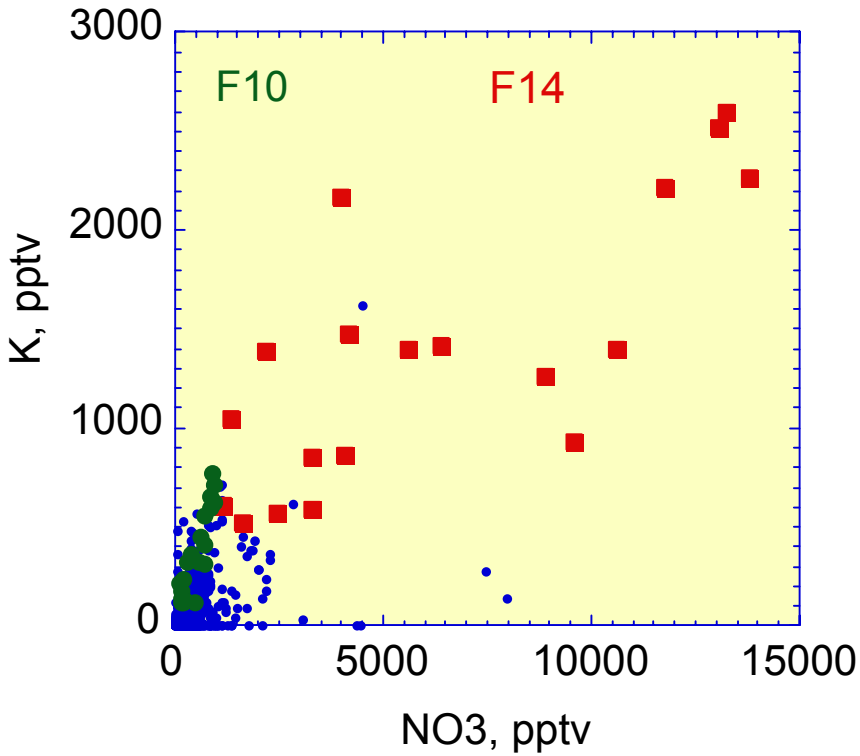


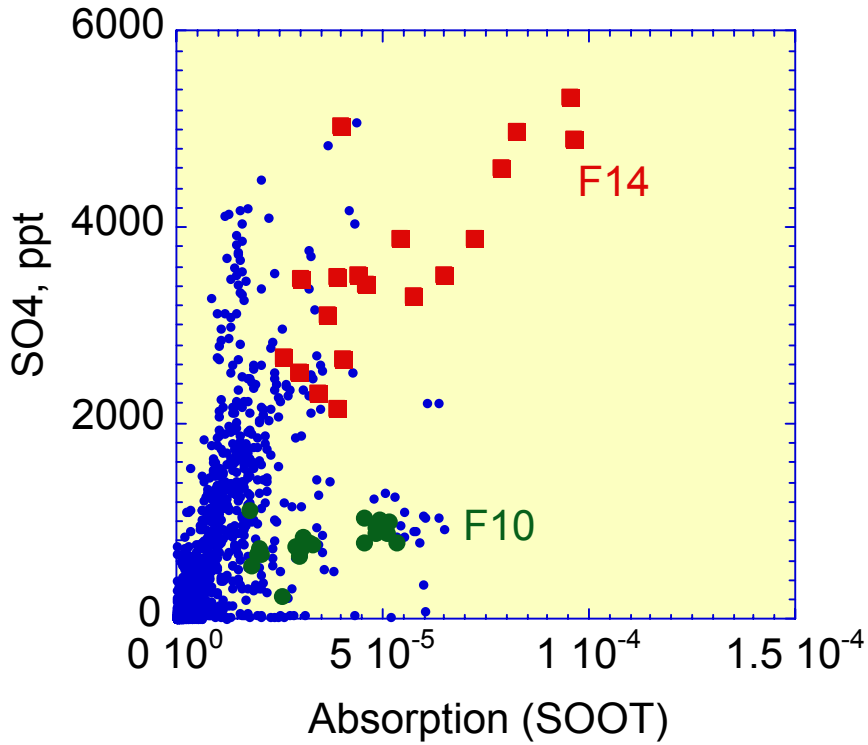


Biomass Event:
More Organic Aerosol Species

Biomass Event:
Slightly Basic
(organic acids?)

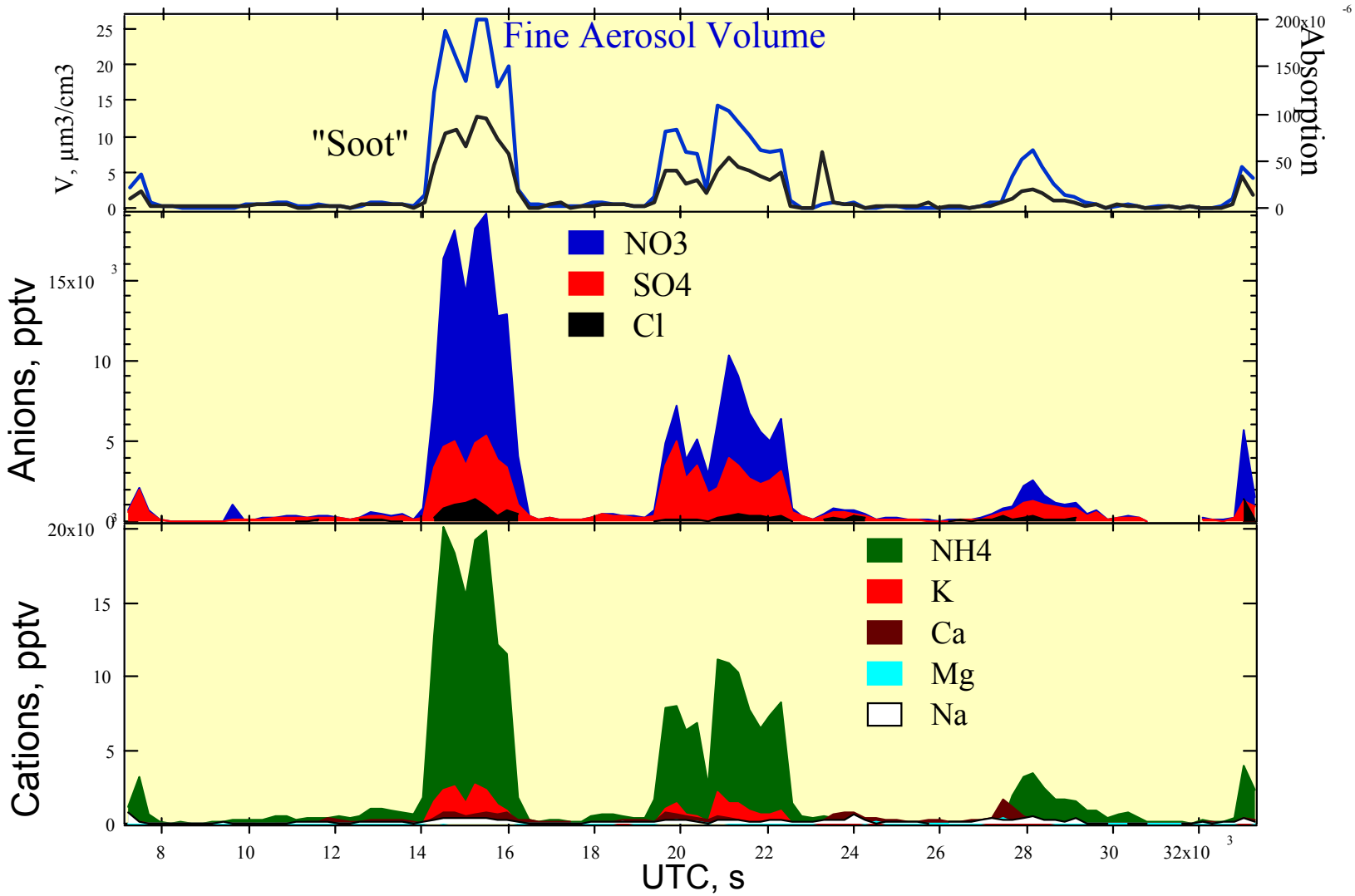
Flight 14 Event in Yellow Sea



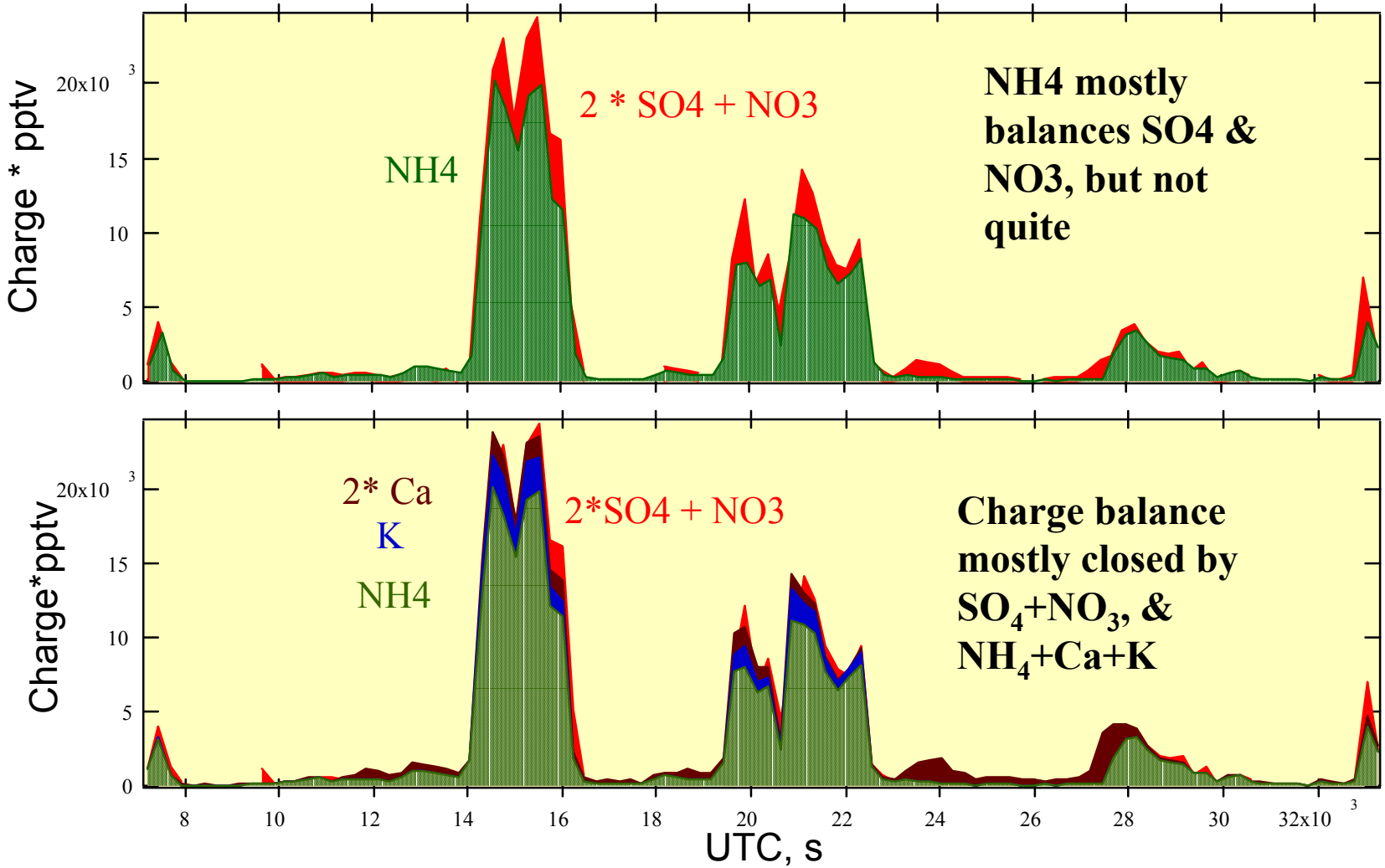


Highest NO_3^-, K^+, $SO_4^=$, Soot, … of study

Ft 14 Event: Aerosol Speciation



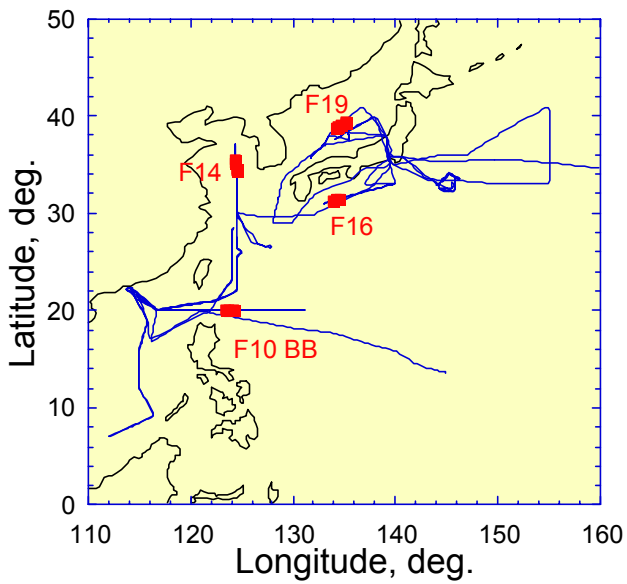
Ft 14 Event: $(NH_4)_2SO_4$, NH_4NO_3, and at least some of KNO_3, K_2SO_4, $Ca(NO_3)_2$, $CaSO_4$

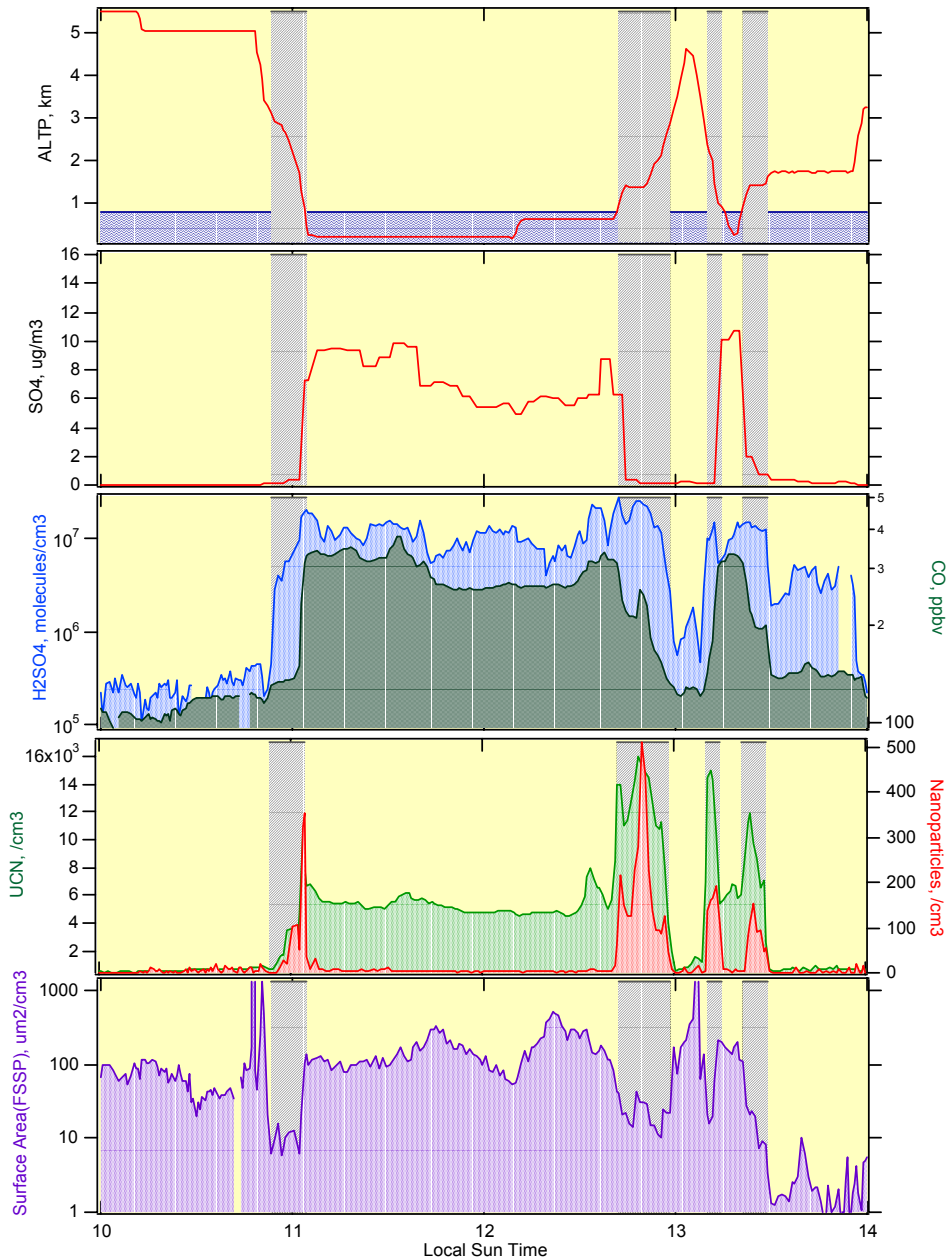


Plume Characteristics

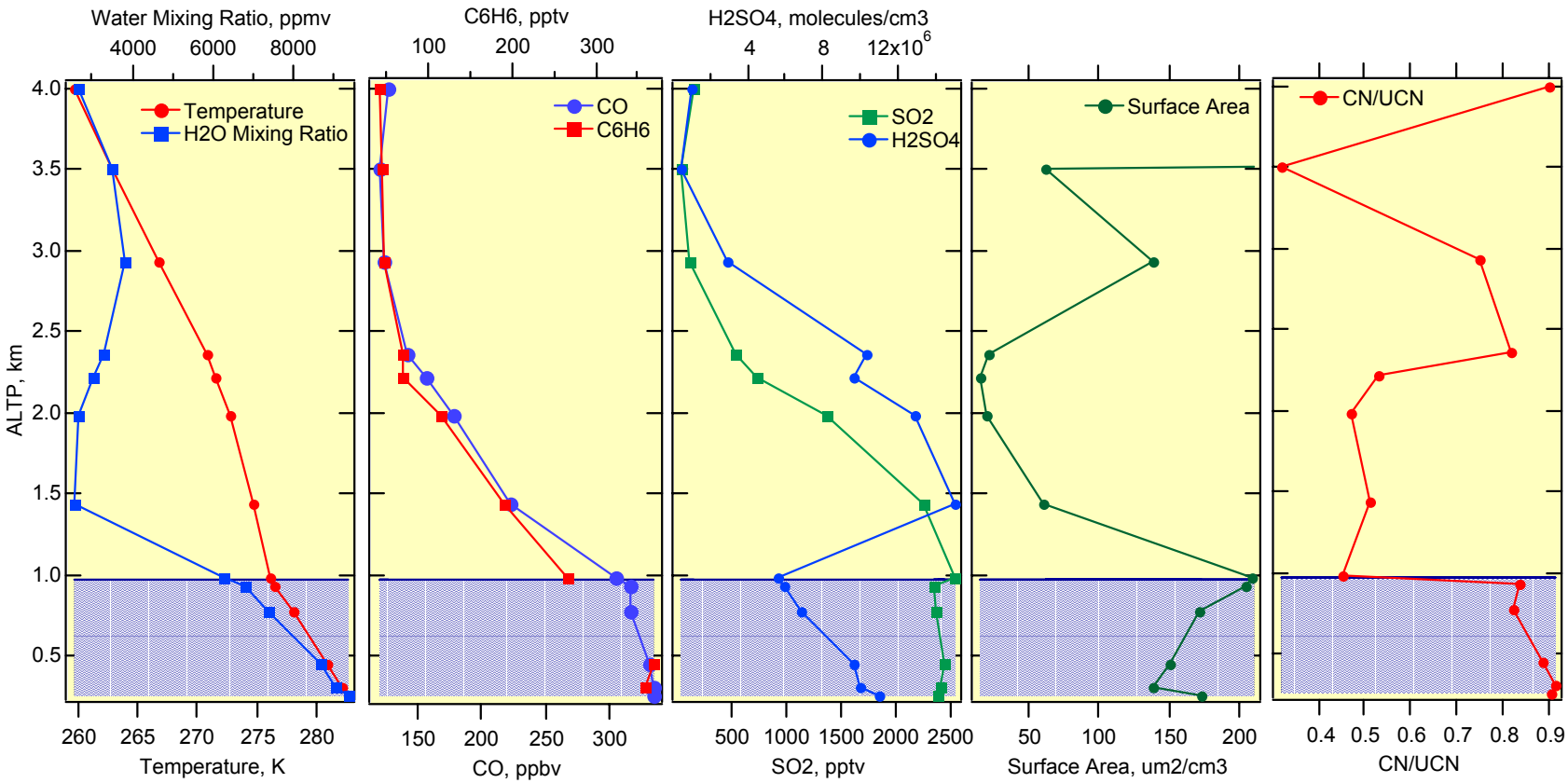
Δ[ ]/ Δ[ ]	F10 BB	F14 SuperP	F16	F19
K+/NO3-	1.10	0.20	0.13	0.74
CH3Cl/CO	1.10	0.23	0.30	0.81
NO3-/SO4=	6.10	2.80	0.94	0.20
Ethyne/CO	0.56	3.50	3.70	3.50
	BB ref.	Atyp. Event	pure poll	sign BB

CO [ppbv], all else [pptv]




ALTP, km
SO4, ug/m3
H2SO4, molecules/cm3
CO, ppbv
UCN, /cm3
Nanoparticles, /cm3
Surface Area(FSSP), um2/cm3
Local Sun Time

Vertical profiles at third region



Possible Papers

1) Fine Potassium: Biomass tracer and prevalence in Asian plumes (Impact of bb during TRACE P) (Blake, Weber, …)
   - How well does K+ serve as bb tracer, (when, why works/doesn't work)
   - Prevalence in Asian outflow and implications.
2) Fine aerosol chemistry: (Weber, ...)

   i) Nitrate

   ii) Sulfate
   - Most prevalent form: (NH4)2SO4, NH4NO3, Other forms: Ca2+, K+
   - Relation to gases, SO2, H2SO4, NOy, HNO3, Cloud processing (bimodal distrn)
3) Microphysical mechanism of new particle formation associated with Asian Plumes: A case study F19 (Weber, Clarke, Eisele, Bandy, …)
4) Aerosol Chemistry and particle size distribution; thermal volatility (Clarke, Weber …)
   - contrasts between various plumes, ie bb plume (high OC) vs volcanic (acidic) vs others
5) Chemistry and Aerosol physical properties (Clarke, Weber, …)
   - size distributions, light scattering, etc.
6) Spatial distributions of aerosol species (not Weber …)
   - Broad overview
   - relation to; meteorology, sources etc