Spectro-Microscopic Characterization: Field Campaign Single Particle Studies

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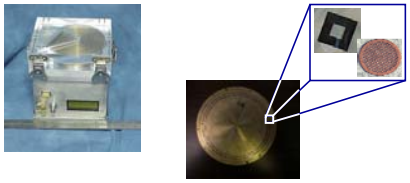
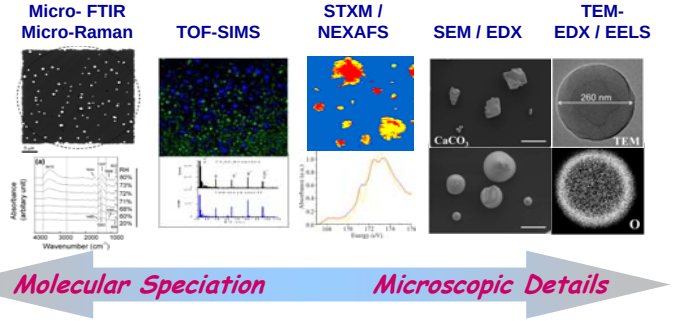
Combine Complementary Methods to Probe Field Collected Aerosols

In situ **measurements guide selection of samples for post collection analysis.**

Examine changes in mixing states of carbonaceous particulates-goal is to correlate these with optical properties. Provide chemical speciation of metals.



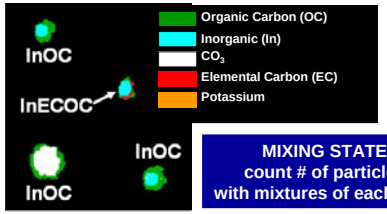
Time Resolved Aerosol Collection during field campaigns with subsequent Laboratory Analysis



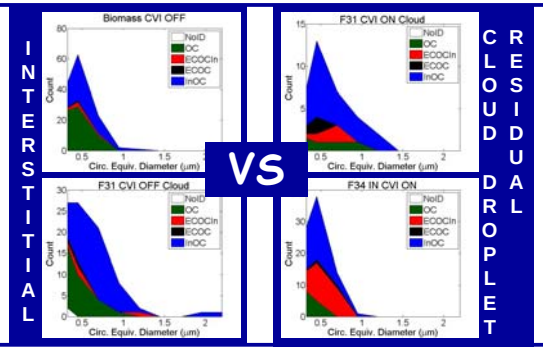
Indirect and Semi Direct Aerosol Campaign

Label Based Classification

STXM/NEXAFS to determine "types" of carbon in each particle



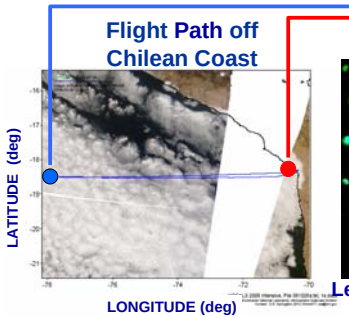
MIXING STATE
count # of particles with mixtures of each type

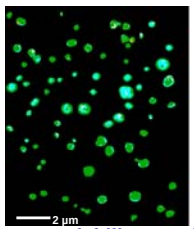


Inorganic Species Dominate Cloud Droplet Residuals

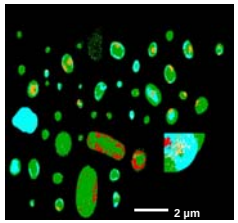
Cloud Sampler (CVI)	Condition	Inorganic Area (%)	CO_3 (# %)	K (# %)
OFF	In/Above Cloud	13	3	24
ON	Below/In Cloud	40	27	34
OFF	In Cloud	11	3	5
ON	In Cloud	31	28	21
ON	In Cloud - Ice Nuclei Event	28	20	7
ON	In Cloud - Ice Nuclei Event	34	71	6
OFF	Biomass Plume	3	4	23

VAMOS Ocean Cloud Atmosphere Land Study

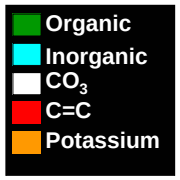




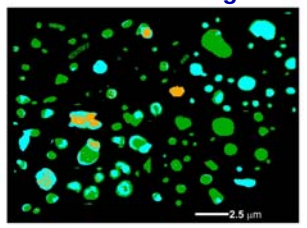
Less variability, smaller sizes, less C=C

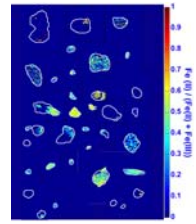


More variability, larger sizes, more C=C (bio?)



Dust Plume





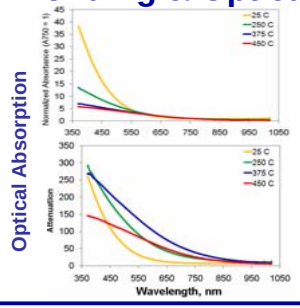
Charring: Changes in Chemical Bonding & Optical Properties Influence Thermo Optical Measurements?

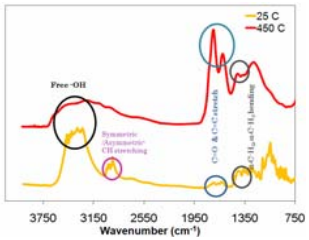
Smolder Cellulose

Nascent particles
UV/VIS wavelength dependence ~organics spectra match levoglucosan

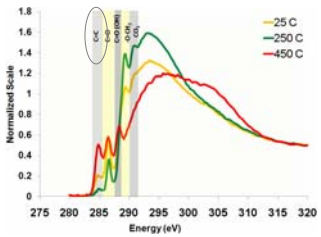
Charring (in O_2)
UV/VIS wavelength dependence ~ soot
increases C=C bonding
increases absorption
(although amount of material decreases)

25 C 375 C
250 C 450 C

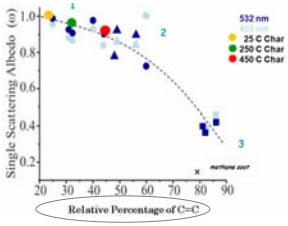




FTIR Spectra



Carbon Spectra (NEXAFS)



Biomass burn particulate Correlation between C=C & Single Scattering Albedo