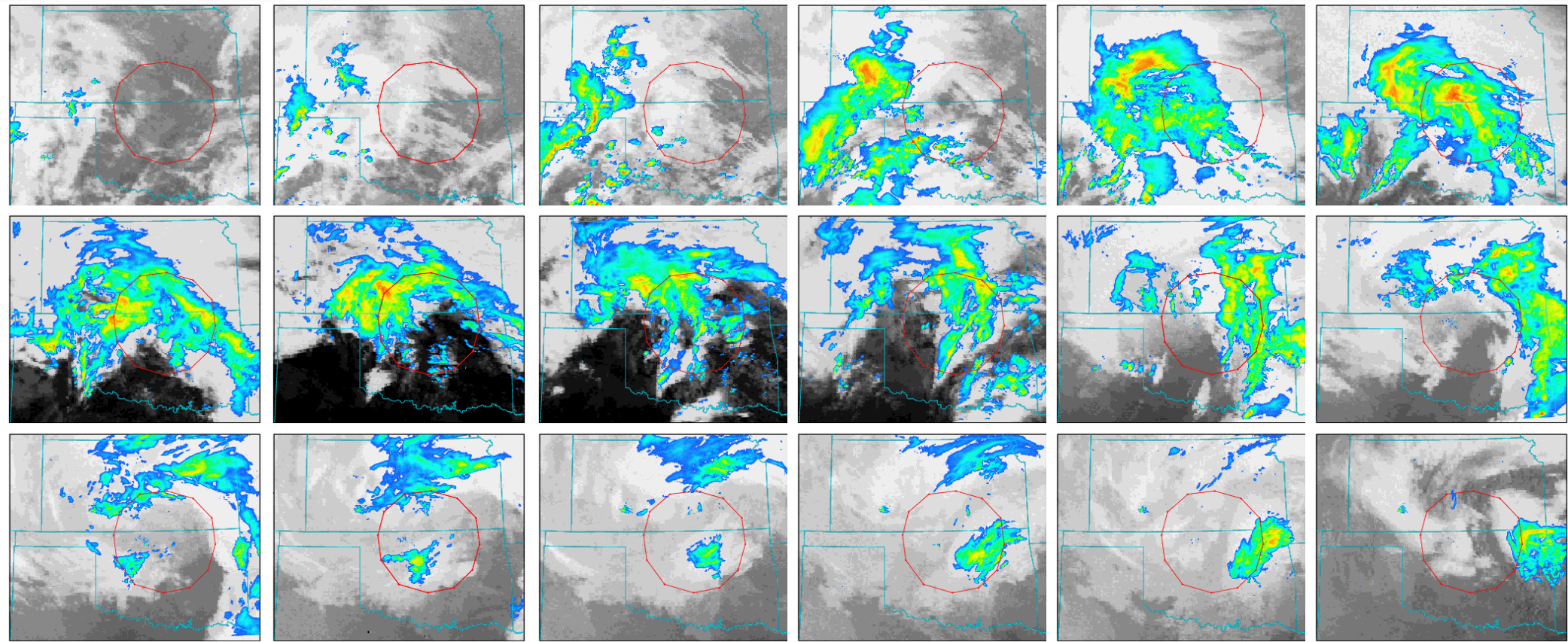


FASTER: New Data Support Activities



**Tami Toto, Michael Jensen, Andrew Vogelmann, Richard Wagener,
Wuyin Lin and Scott Giangrande, Brookhaven National Laboratory**

**Gijs De Boer and Surabi Menon, Lawrence Berkeley National Laboratory
Anne Jefferson and Betsy Andrews, NOAA GMD**

March 28, 2011

FASTER: Customized Data Support for You



FAST PHYSICS PROJECT
Brookhaven Climate Consortium

cus-tom-ize (verb)

To build, fit, or alter according to individual specifications

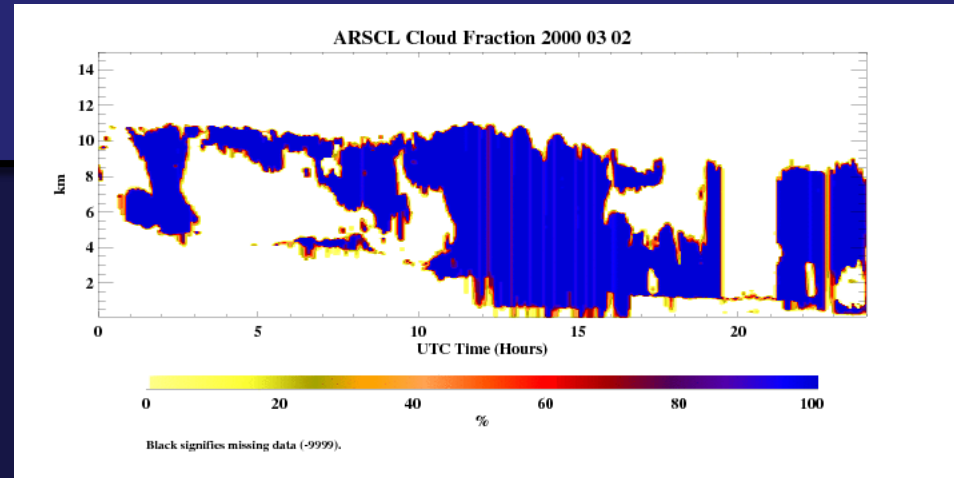
-Merriam Webster Online Dictionary

We are here for your data needs.

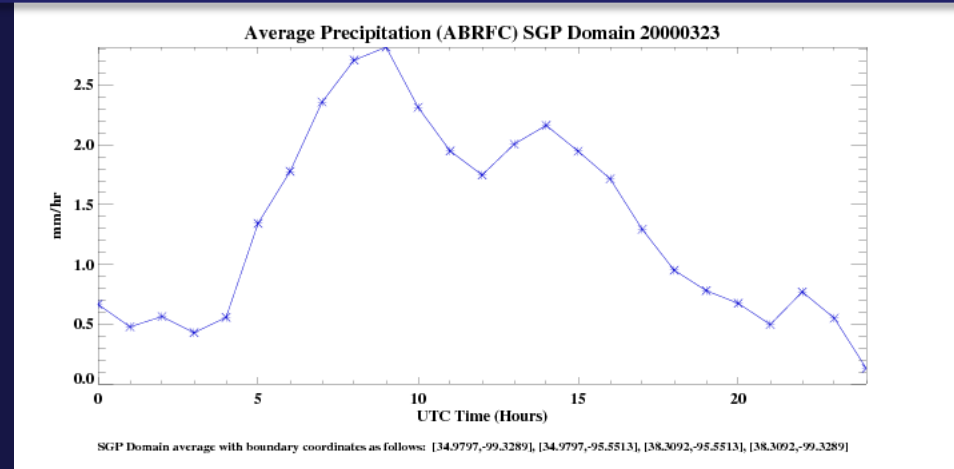
Last Year: Warm-ups at SGP
March 2000
May 2003

faster.arm.gov

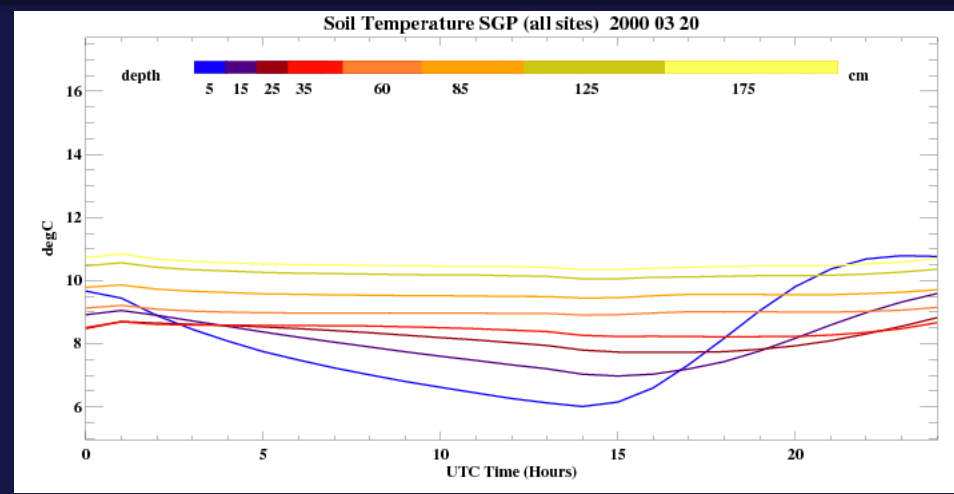
- CLDMDL
(cloud descriptors)



- Gridded Precipitation
from ABRFC

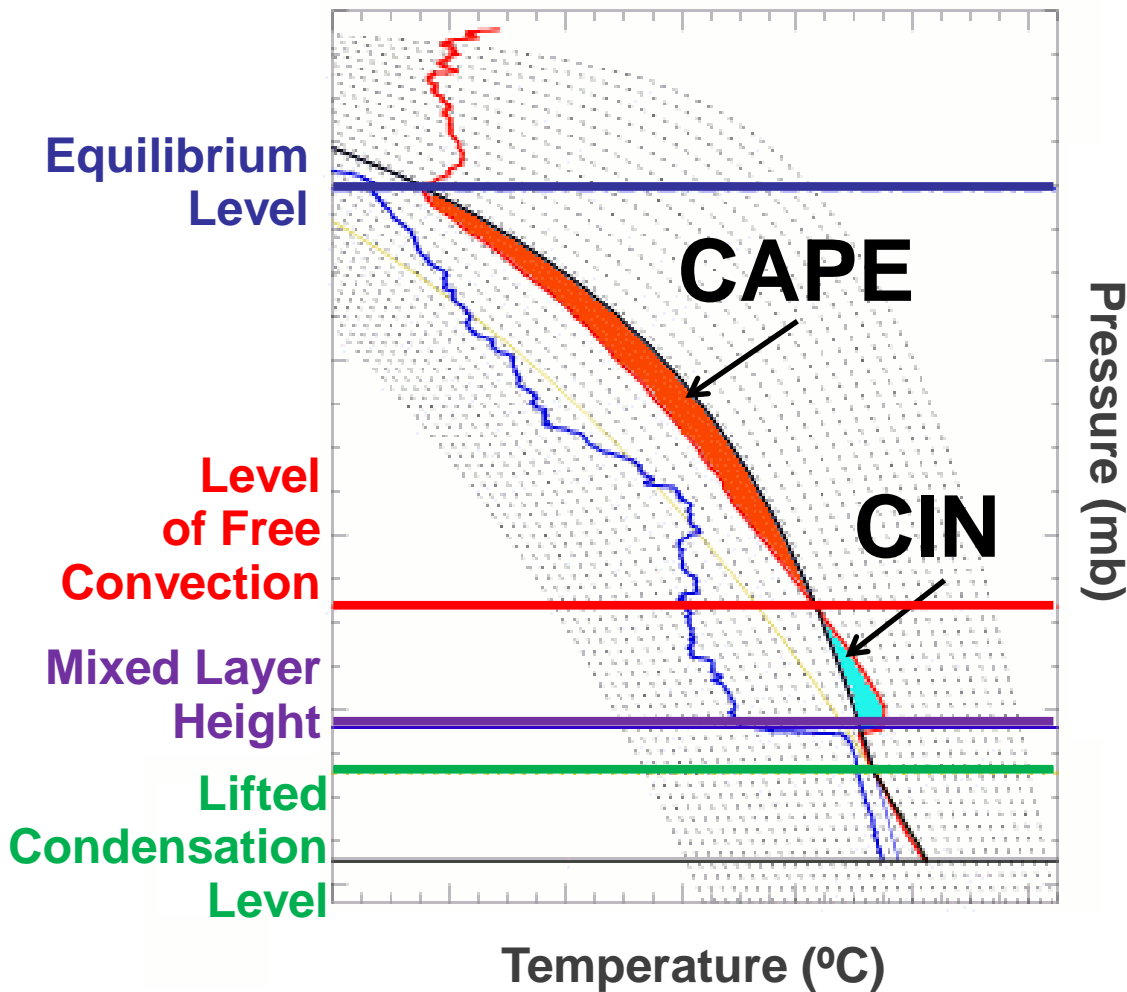


- Soil Temp & Moisture
from SWATS



Convective Available Potential Energy

Convective Inhibition



Available for:

- SGP (1993 - 2009)
- TWP (2001 - 2009)
- NSA (2002 - 2009)
- AMF: Azores (2009)
- AMF: Black Forest (2007)
- AMF: China (2008)
- AMF: Niamey (2006)
- AMF: Point Reyes (2005)

Future Plans:

Mixed Layer Height Product
based on Merged Soundings
Coming Soon

Based on ARM soundings

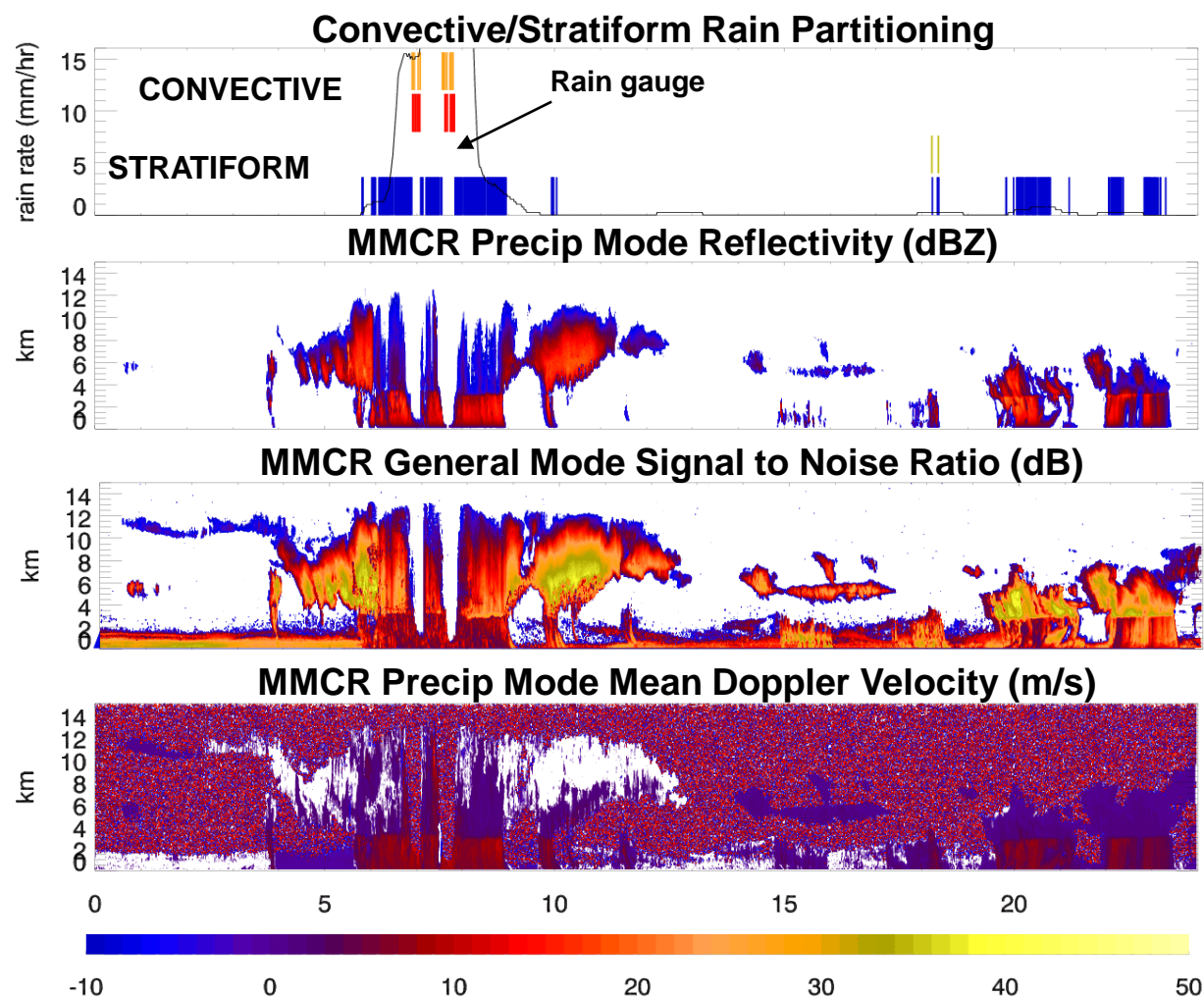
Convective/Stratiform Rain Partitioning at SGP

Based on vertically pointing MMCR

Algorithm recognizes attenuation caused by convective precipitation (10+ mm/hr)

Future plans: Spatially resolved partitioning based on NEXRAD

Data Availability: SGP, 2000 - 2007



Aerosols: Aerosol IOP, MASRAD / MASE

Daily and Hourly Statistics:

- Mean
- Median
- Standard deviation
- Percentiles
(10th, 25th, 75th, 90th)

GISS Model Heights

**Thanks to collaboration
and input from
G. de Boer and S. Menon**

Aircraft:

- Aerosol Number Concentration
- Drop Number Concentration
- CCN (various SS)

Surface In Situ:

- Aerosol Number Concentration
(MASRAD, RACORO)
- NO, SO₂, NO_x, O₃, CO Conc
- Total Carbon/Black Carbon Conc
- **CCN 0.2% SS (MASRAD, RACORO)**
- Aerosol Mass Loadings
- Precip, Temp, Pressure, Wind

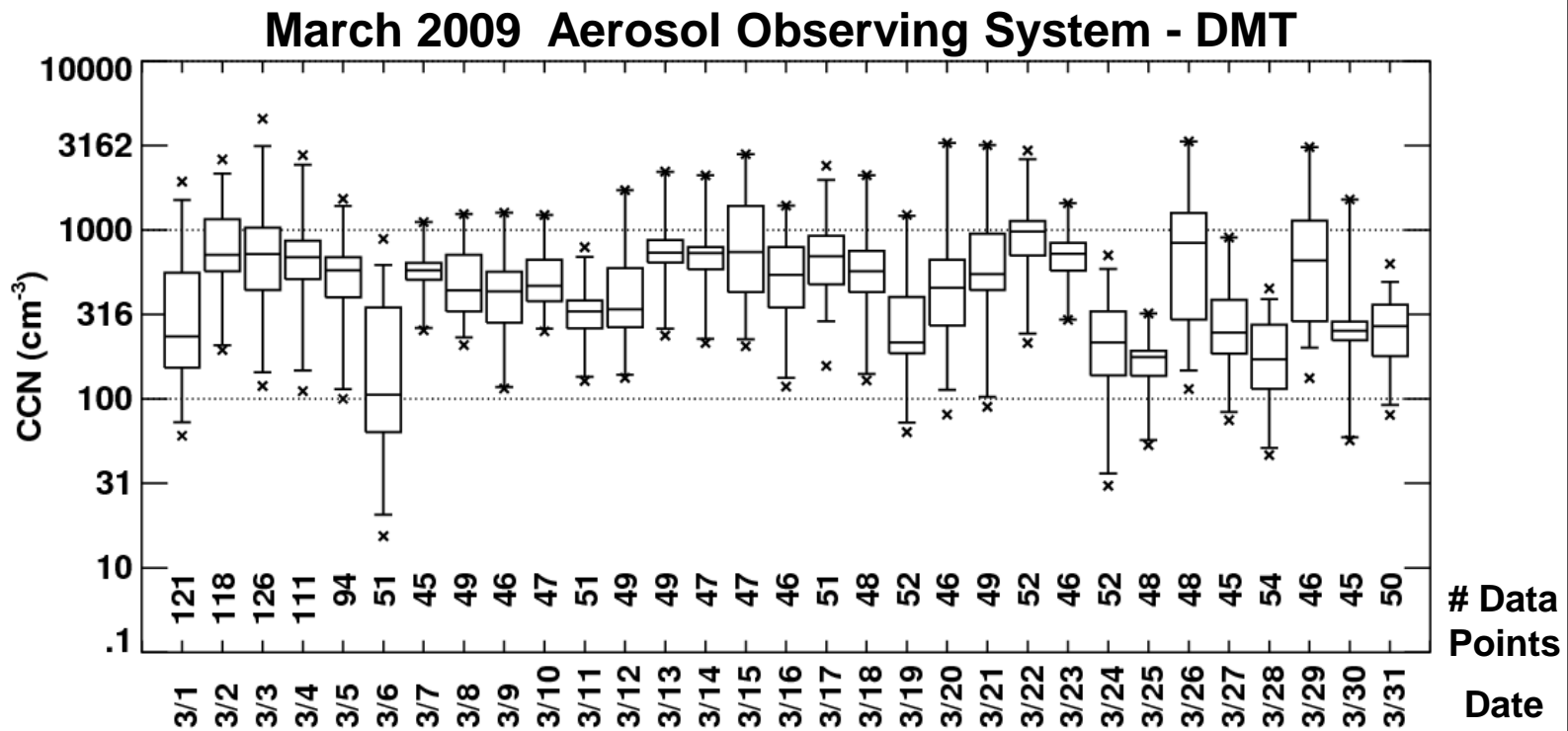
Remote Sensing:

- LWP, LWC
- Aerosol Optical Depth

Aerosols

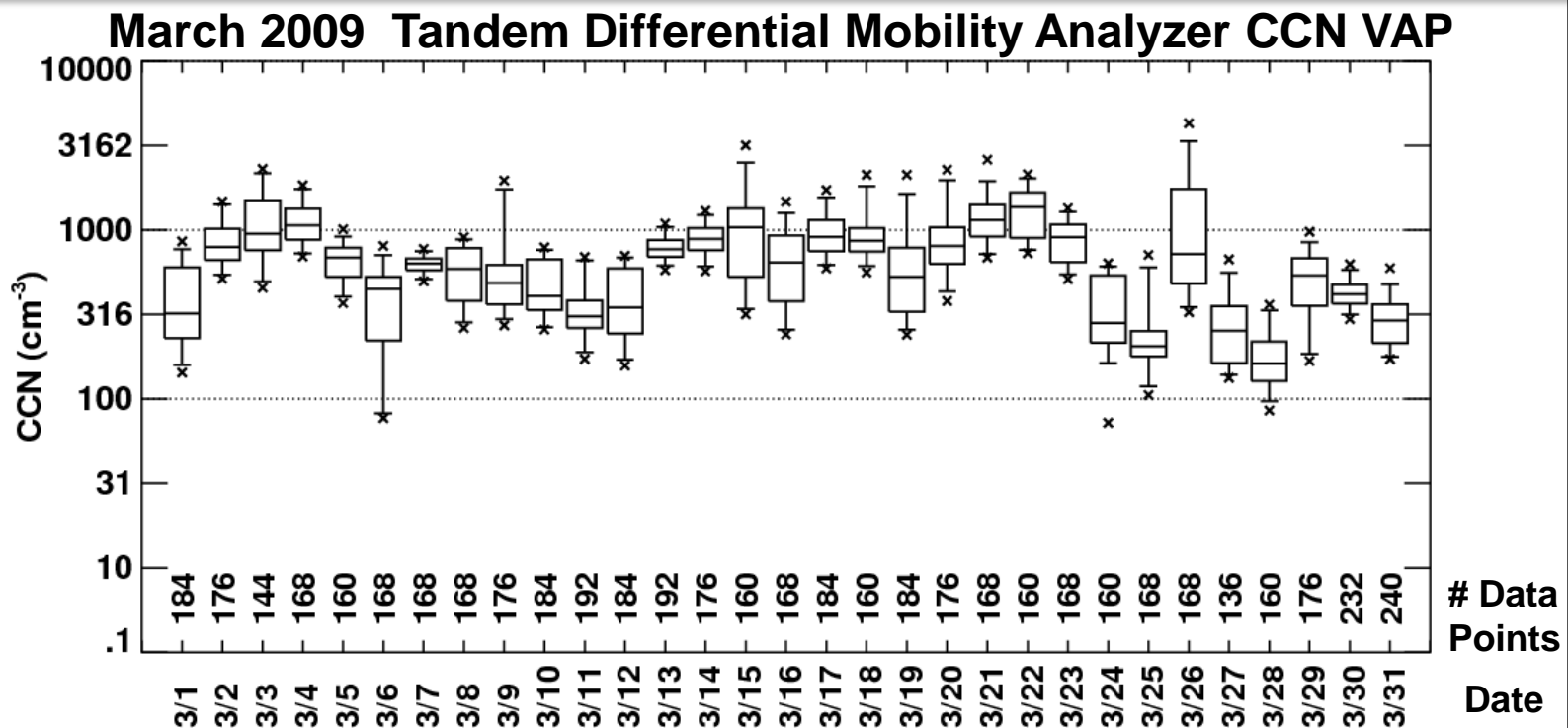
Surface
CCN 0.2% SS
AOS - DMT

SGP: 5/2007 – 12/2009
PYE: 3/2005 – 9/2005



Surface
CCN 0.2% SS
TDMACCOLL

SGP: 10/2005 – 5/2009



3D Visualization Tool

- Developed in C++, OpenGL, GLUT/freeGLUT
- Load and render 3D gridded data: radar, model, any 3D data!
- Rotate rendering
- Zoom in/out with mouse
- Slice through data (X/Y/Z plane) and dynamically display projection of slice
- Future Plans: Ability to overlay aircraft data

SWACR_CW1_MODE_03_.nc

X-RANGE: -15000m - 15000m

Y-RANGE: 0m - 6950m

Z-RANGE: 0m - 15000m

Select Mode

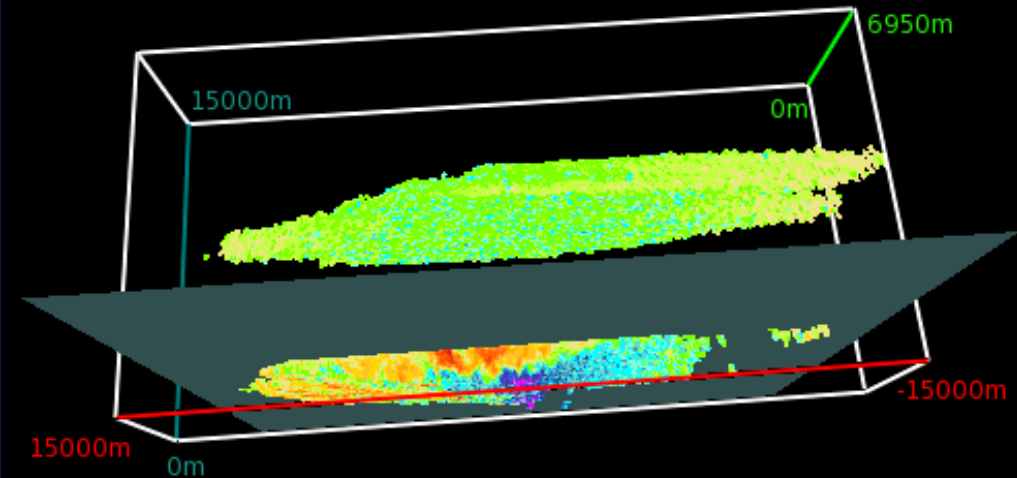
Slice

Save Image

X Plane

Y Plane

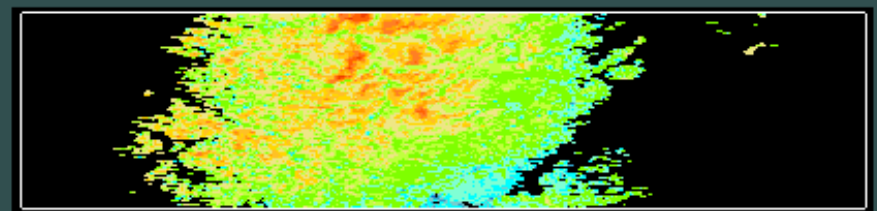
Z Plane



CONSTANT Z-SLICE

HEIGHT: 1700m

CLOUD FRACTION: 0.461053



Come see the FASTER Data Support Poster!

New Data Support Activities for the Fast-physics System Testbed & Research (FASTER) Project

BROOKHAVEN NATIONAL LABORATORY

ARM Atmospheric Radiation Measurement

Tami Toto, Michael Jensen, Andrew Vogelmann, Richard Wagener, Yangang Liu, Wuyin Lin, and Robert Giangrande
Brookhaven National Laboratory

What is FASTER?

The multi-institutional project aims to evaluate and improve parameterizations of fast processes (those involving clouds, precipitation, and aerosols) in global climate models, using a combination of numerical prediction models, single-column models, cloud-resolving models, large-eddy simulations, full global climate model output, and ARM active and passive remote sensing and in situ data.

Summary

The FASTER Data Support effort provides datasets customized to the needs of FASTER GCM, CRM and LES modelers. Select products will be made available to the ARM community.

Data Products

Products Introduced Last Year (for SGP: March 2000, May 2003):

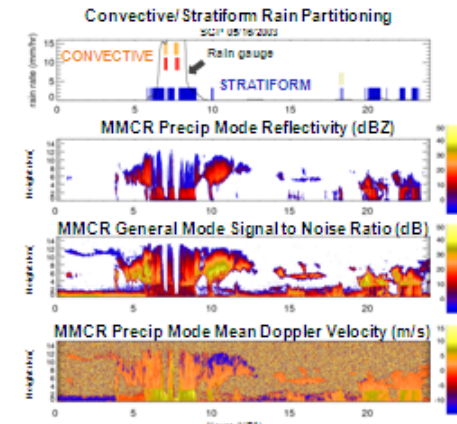
- CLDMDL (a CMBE-like dataset)
- Gridded precipitation product based on ABRFC
- Soil moisture and temperature profiling product based on SWAT S

Products Introduced This Year:

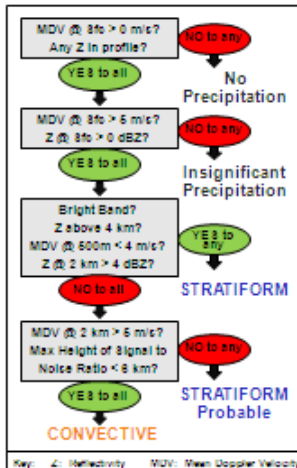
1. Convective/Stratiform Rain Partitioning
2. CAPE/CIN
3. RACORO Statistical Plots
4. Aerosol IOP / MASRAD

1. Convective/Stratiform Rain Partitioning Product

MMCR-based algorithm recognizes attenuation caused by convective precipitation.



Data Availability: SGP (2000 - 2007)

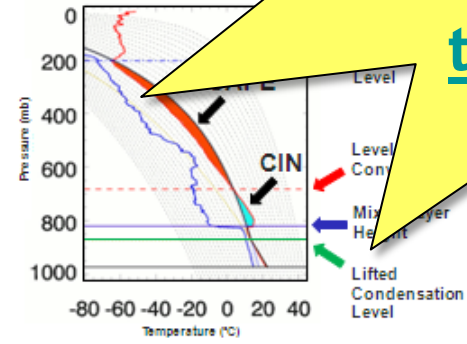


2. CAPE/CIN Product

ARM soundings are used to determine surface-based Convective Potential Energy (CAPE), Convective Inhibition (CIN) and other properties.

The level from which to raise the parcel is the level of the maximum virtual temperature within the first kilometer.

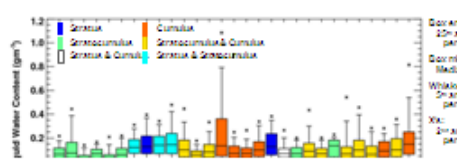
Integrations use potential virtual temperature.



Data Availability: SGP (1993 - 2009), TWP (2001 - 2009), NSA (2002 - 2009), Azores, Black Forest, China, Niamey, Point Reyes

3. *RACORO Statistical Plots

Statistical plots have been generated for RACORO period aircraft and surface aerosol data, such as that shown below.



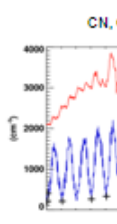
Partial list of variables included in RACORO, Aerosol IOP, MASRAD and MACE statistics:

- Aircraft Statistics:**
- Temperature
 - Water Vapor Mixing Ratio
 - Vertical Velocity
 - CCN (variable SS)
 - Aerosol Number Concentration
 - Liquid Water Content
 - Cloud Extinction
 - Effective Radius
 - Drop Number Concentration
 - Aerosol Size Distribution
 - Cloud Drop Size Distribution
- Surface Aerosol Statistics:**

4. Aerosol IOP / *MASRAD /

Daily and hourly statistics:

- Mean
- Median
- Standard deviation
- 10th, 25th, 75th, 90th percentiles
- GISS gridded profiles



Contact us with requests!

mjensen@bnl.gov

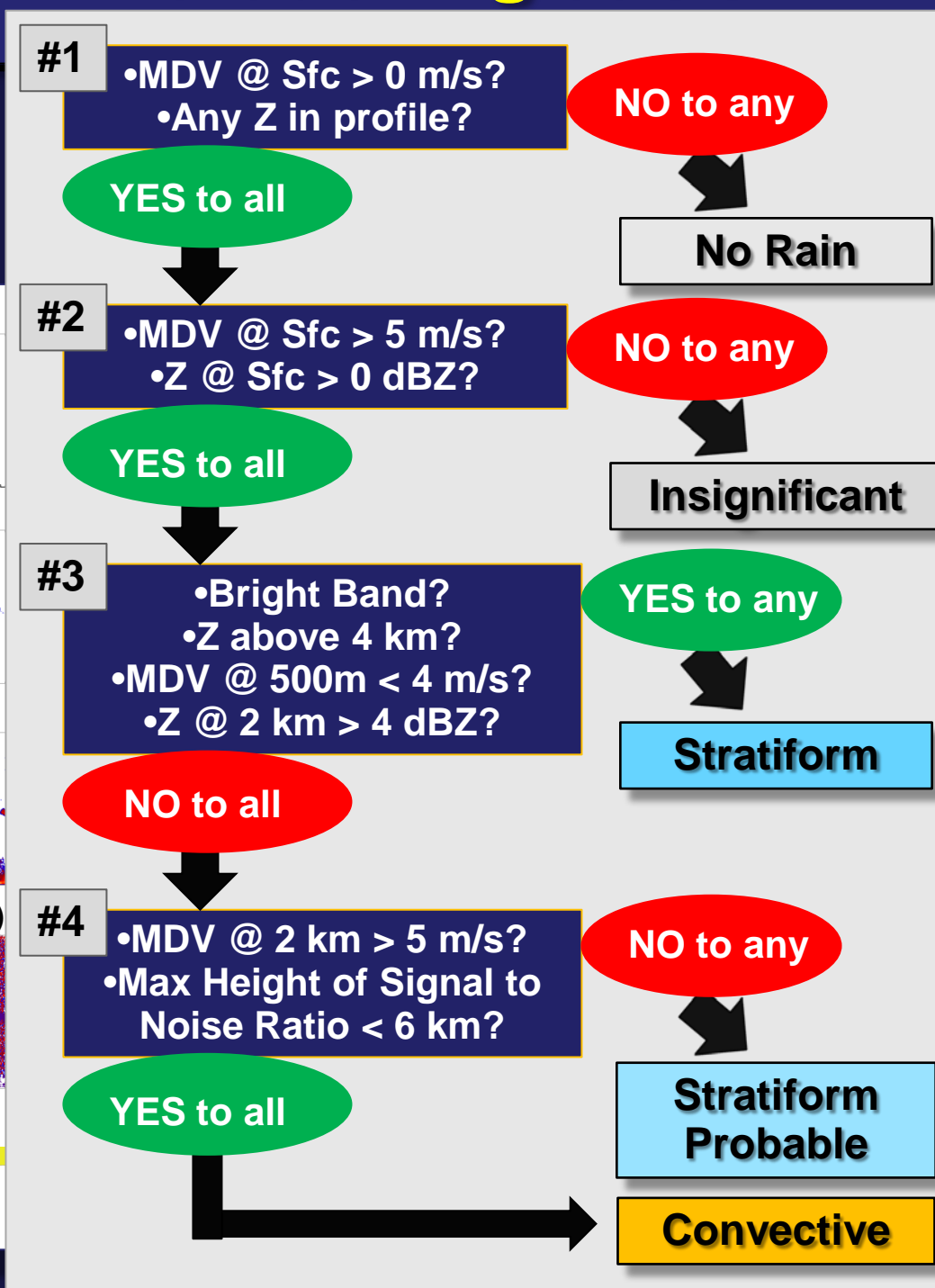
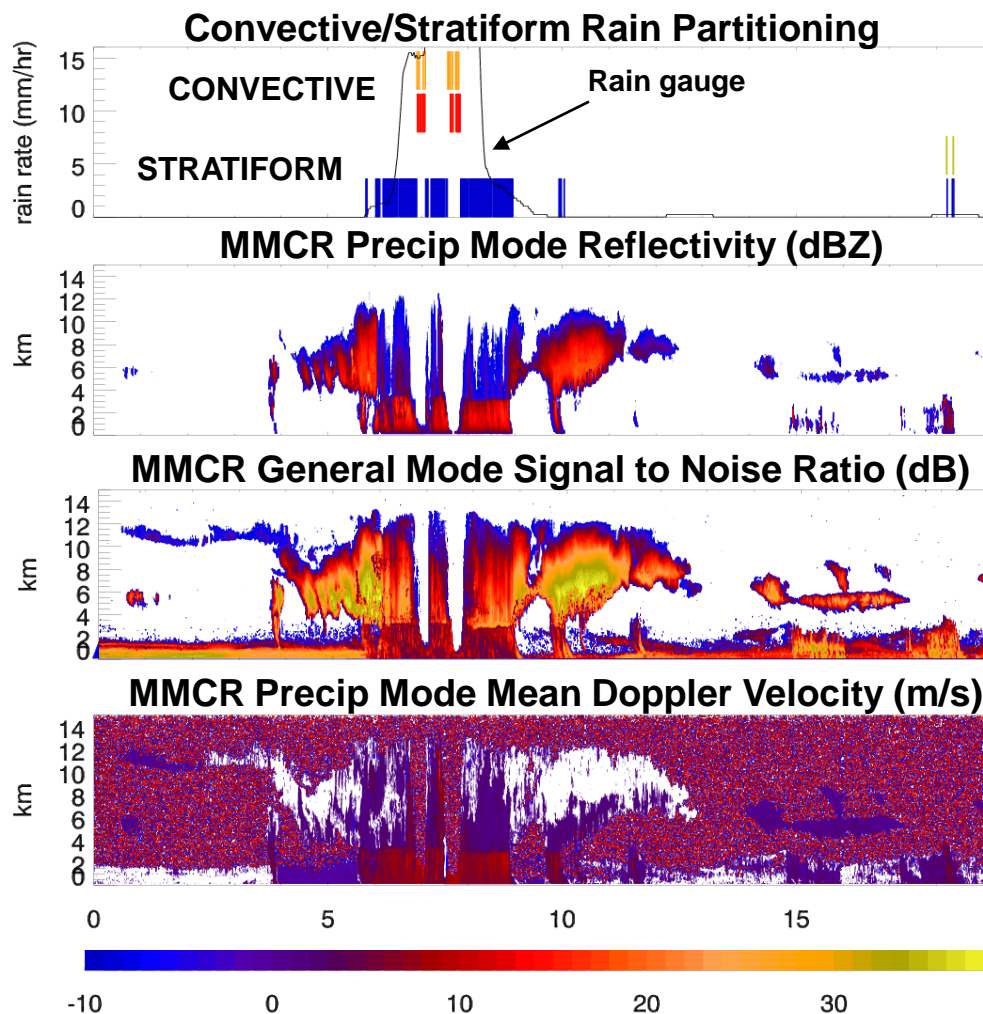
ttoto@bnl.gov

Future Plans: Depend on You!



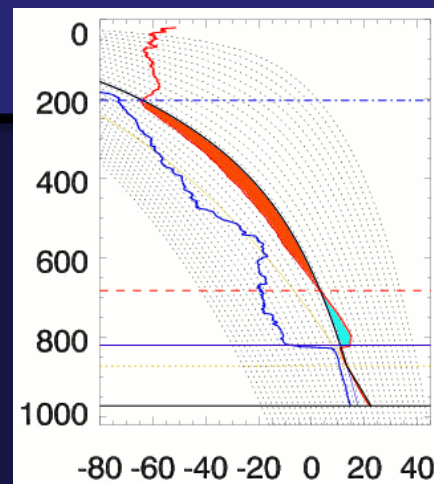
Convective/Stratiform Rain Partitioning at SGP

Available for:
2000 - 2007



This Year:

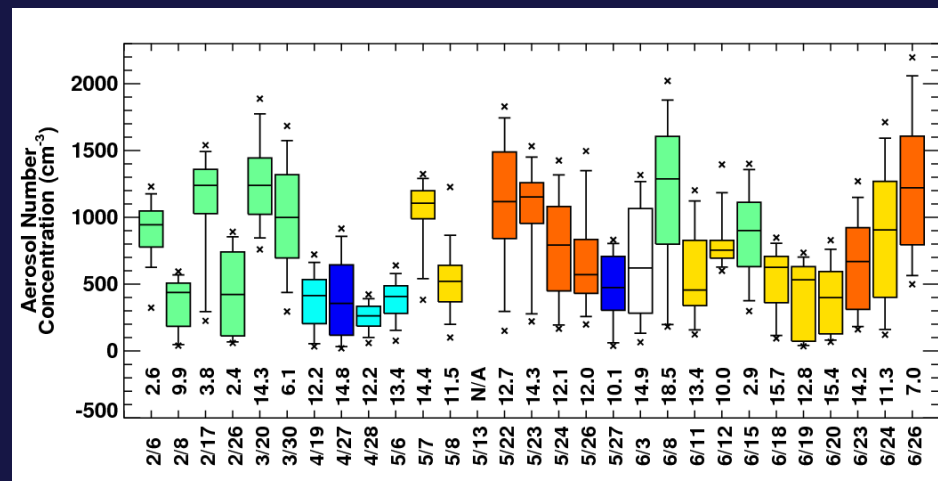
- CAPE/CIN



- Convective/Stratiform Rain Partitioning at SGP



- Aerosols:
 - Aerosol IOP
 - MASRAD/MACE
 - RACORO Statistics



Aerosol IOP

Quantity	Surface	Notes
CCN Concentration	DRI	0.4, 0.6, 0.8, 1.0% SS
Precipitation	SMOS	
Temperature	SMOS	
RH	SMOS	
Pressure	SMOS	
Wind	SMOS	
NO Concentration	SMART	
SO2 Concentration	SMART	
NOx Concentration	SMART	
O3 Concentration	SMART	
CO Concentration	SMART	

Aerosol IOP (Continued)

Quantity	Remote Sensing	Notes
Liquid Water Path	MWRRET	
Liquid Water Content	MICROBASE	
Aerosol Optical Depth	Aerosol Best Estimate Product	500 nm

Quantity	Aircraft Instrument	Notes
Aerosol Number Concentration	PCASP	0.1 - 3.2 μm
Condensation Nuclei Concentration	CNC	
Cloud Droplet Number Concentration	CAS	0.6 – 55 μm
Cloud Droplet Number Concentration	FSSP	2.4 – 52 μm
CCN Concentration	CalTech	

MASRAD / MASE

Quantity	Surface	Notes
Precipitation	SMET	
Temperature	SMET	
RH	SMET	
Pressure	SMET	
Wind	SMET	
CN	AOS	
CCN	AOS	0.2% SS

Quantity	Remote Sensing	Notes
Liquid Water Path	MWRRET	To be done
Liquid Water Content	MWRP	

MASRAD / MASE (Continued)

Quantity	Aircraft Instrument	Notes
<p>T RH CPC 3010 (CPC concentration for particles > 10 nm) CPC 3025 (CPC concentration for particles > 3 nm) DMA tot N (DMA concentration for particles between 0.016279 and 0.44368 microns) PCASP tot N (PCASP concentration for particles between 0.106-2.645 microns) CAS tot N (CAS concentration for particles between 0.703 and 54 microns) CIP tot N (CIP concentration for particles between 25 and 1550 microns) LWC Gerber (LWC profiles) LWC Hot Wire (LWC profiles) CCNs 1% (CCN concentration at 1% supersaturation) CCNs 0.6% (CCN concentration at 0.6% supersaturation) CCNs 0.1% (CCN concentration at 0.1% supersaturation) CCNs 0.06% (CCN concentration at 0.06% supersaturation) CCNs 0.02% (CCN concentration at 0.02% supersaturation) DMT CCN#1 (DMT CCN concentration) DMT CCN#2 (DMT CCN concentration) O3 (Ozone concentration) SO2 (Sulfur Dioxide concentration)</p>		
SO4 Aerosol Mass Loading	ToF Aerodyne Mass Spectrometer	
NH4 Aerosol Mass Loading	ToF Aerodyne Mass Spectrometer	
NO3 Aerosol Mass Loading	ToF Aerodyne Mass Spectrometer	
Organics Aerosol Mass Loading	ToF Aerodyne Mass Spectrometer	