

# RACORO Campaign Journal- March 2009

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## Legend for Flight Plots:

- Aerosol
  - PCASP - Aerosol Size Distribution 100-3000 nm at 1 Hz
  - N3 - Ultrafine particle counter (UPC)  $D > 3$  nm at 1 Hz
  - N10 - Condensation particle counter (CPC)  $D > 10$  nm
  - N13 - Condensation particle counter (CPC)  $D > 15$  nm
  
- Cloud
  - CAS - Cloud drop size distribution 0.5-50 microns
  - 1D CIP - Cloud drop size distribution 25-1550 microns
  - FSSP - Cloud drop size distribution 0.3-47 microns
  - 2D CIP - Cloud drop size distribution 25-1550 microns
  
- Radiation
  - CM22 - SW radiometer
  - CG-4 - LW radiometer
  - SPN-1 - total and diffuse SW radiometer
  - IRT - infrared thermometer

# 20090301

## Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
15:31 UTC	19:57 UTC	4.4	Aerosol triangles at SGP	<a href="#">KML</a>
Flight hours to date		17.9		

We transited out to the triangle at 2500. There clear skies and no cirrus above.

We did a slant down to 500' AGL and ran to the CF at 500 along the N/S line'. The first triangle was at 500 AGL. Our altitude varied slightly with the terrain to maintain the 500'.

Back at the CF we reset the GPS waypoint to be directly over the CF as it was off by a mile. We did a spiral climb to 6,500'. Cirrus had started moving in at that point, and remained for the rest of the flight.

We did a triangle at 6500' followed by one at 5300' in a layer, another at 4000' and one at 2800 in a layer.

Back to the CF we spiraled down to 500 AGL and up to 6500. We did a slant down to 3200, and transited back to Guthrie between 3000 and 2500.

There is no radar coverage in the area below 4200 on the weekends when Vance is closed. That might interfere with weekend flights when it gets cloudier.

The left wing boost pump failed in flight. Dave will repair it tomorrow.

## Weather Summary

Clear skies, with cirrus moving in toward the end of the flight.

## Aircraft Instrumentation Status

CAS and PCASP not available.

DLH stopped early.

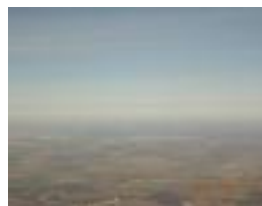
## Flight Images



1540 UTC



1643 UTC



1733 UTC



1844 UTC



1929 UTC



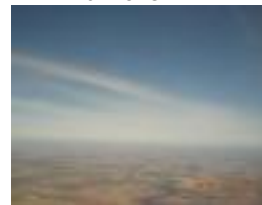
1544 UTC



1705 UTC



1830 UTC Dual haze layers



1852 UTC



1935 UTC



1641 UTC



1730 UTC Dual haze layers



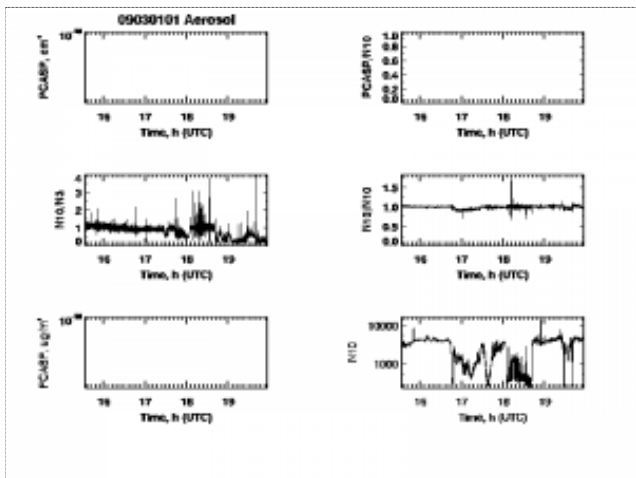
1835 UTC



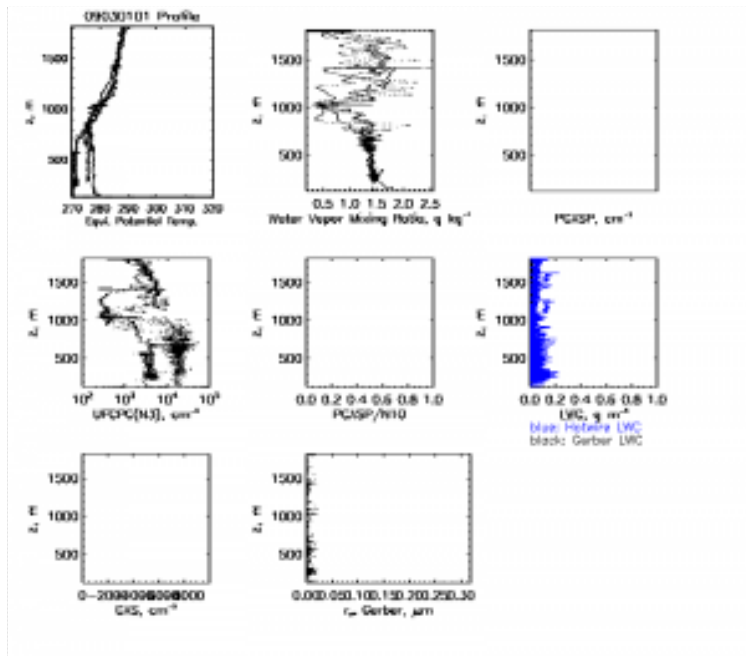
1919 UTC

# Flight Plots

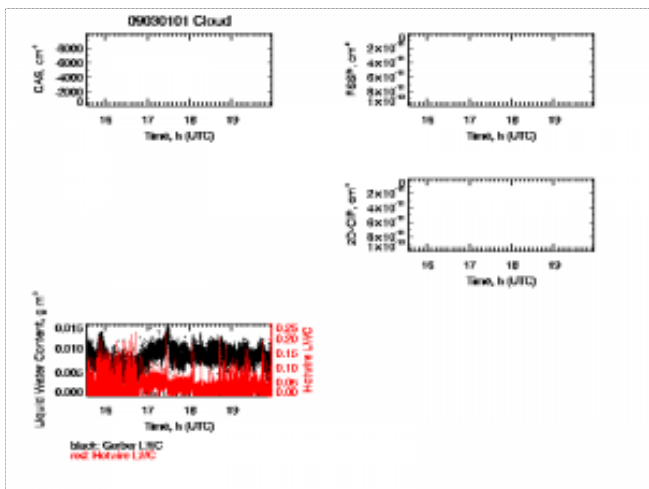
## Aerosol



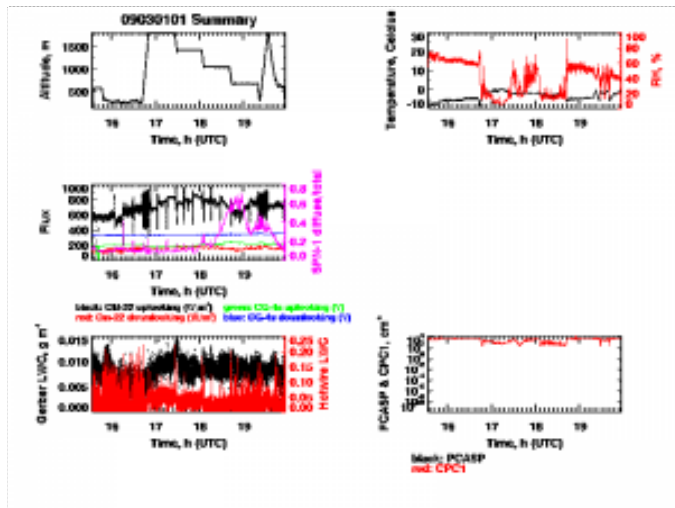
## Profile



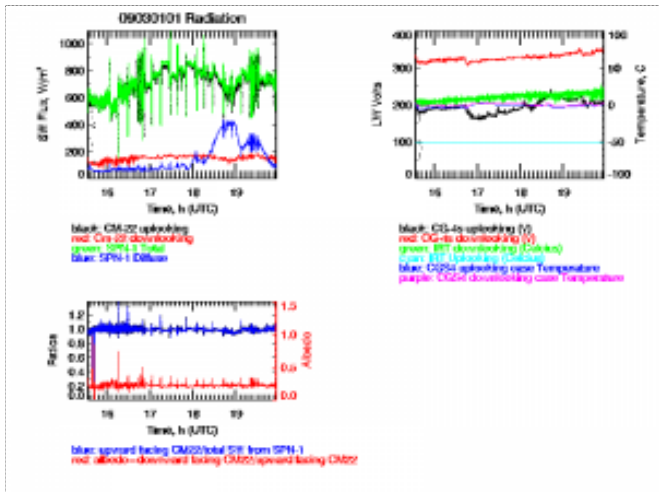
## Cloud



## Summary

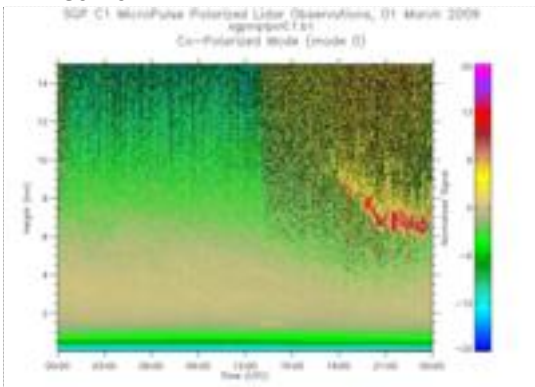


## Radiation

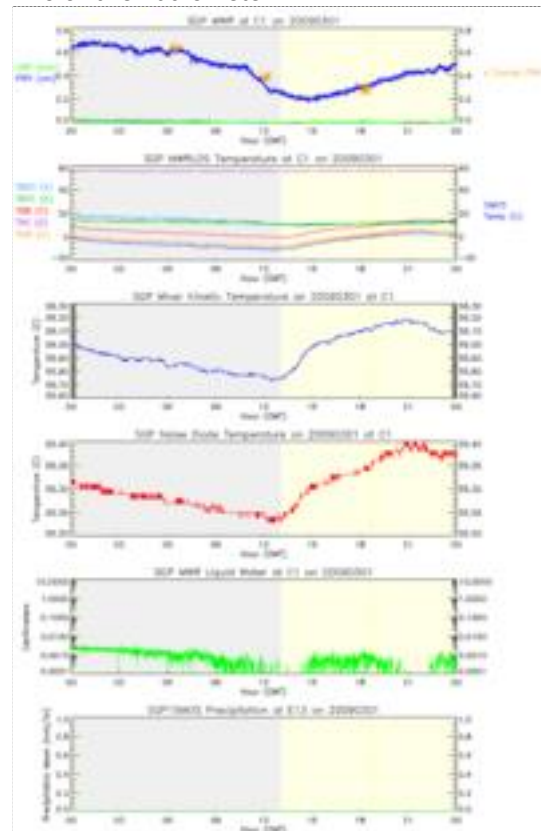


# SGP Plots

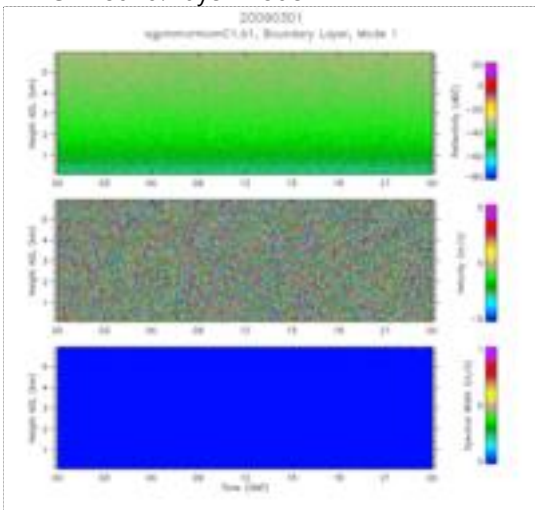
MPL Co-Pol



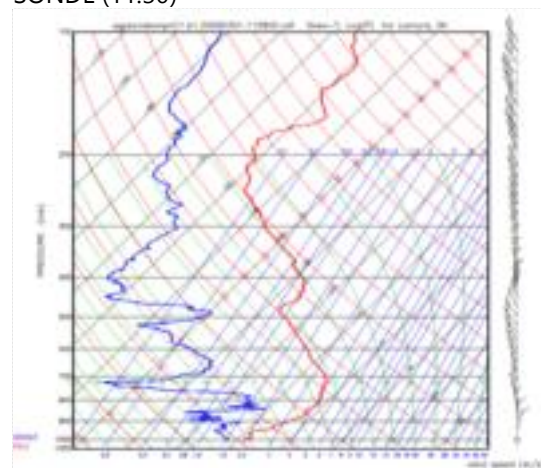
Microwave Radiometer



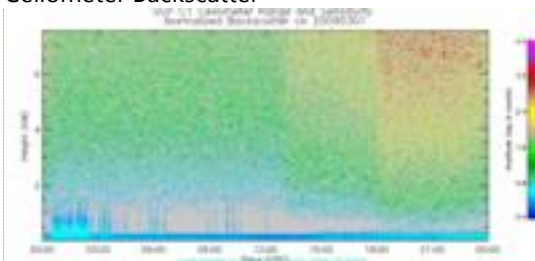
MMCR Bound. Layer Mode



SONDE (11:30)

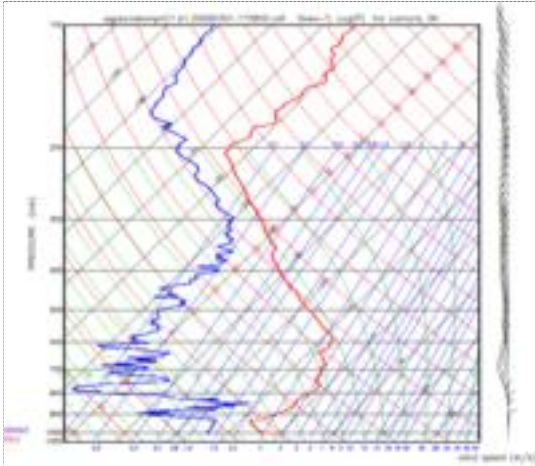


Ceilometer Backscatter

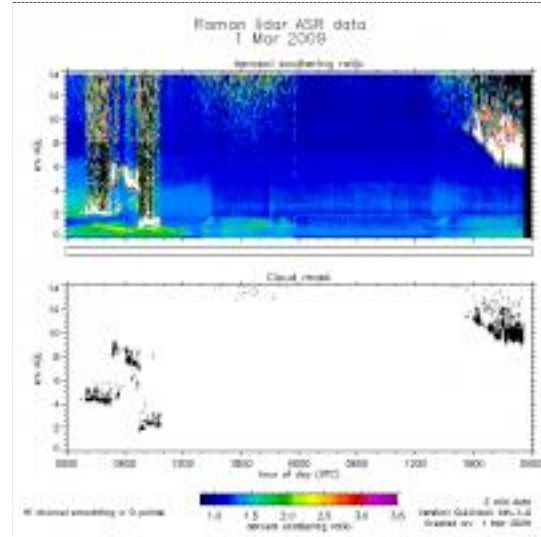




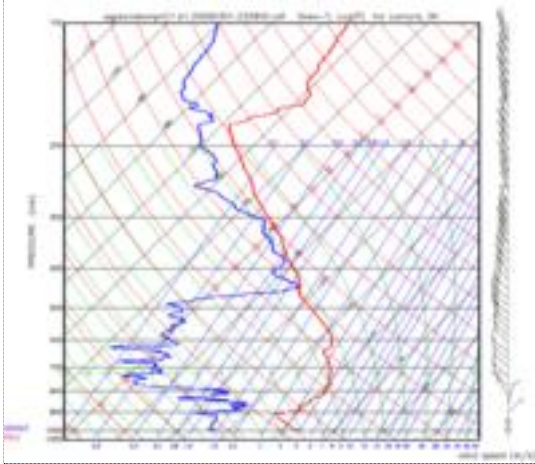
SONDE (17:30)



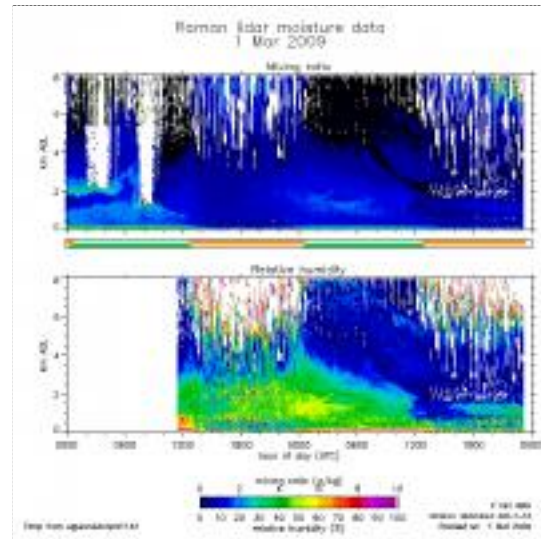
RL ASR



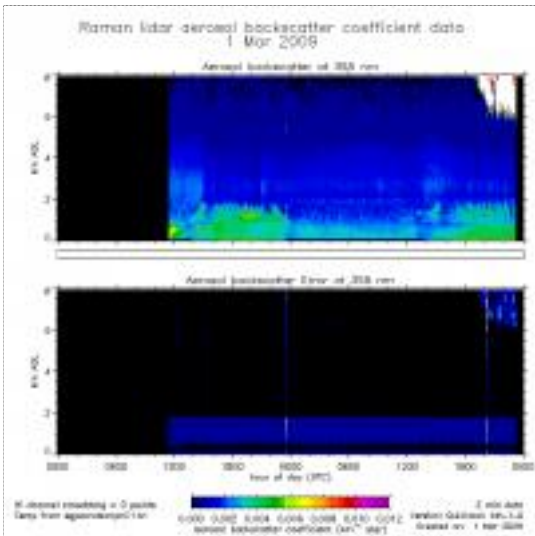
SONDE (23:30)



RL Moisture



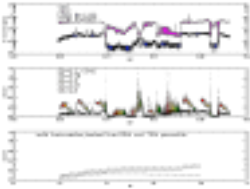
RL Backscatter



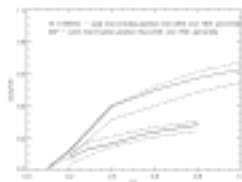
## CCN Activity

I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as  $f(SS)$ ). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 06 Apr 2009

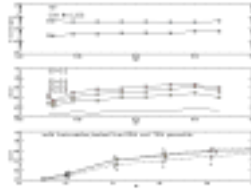
The last plot shows: I've made size distribution contour plots from the DMA operated by TAMU on the Twin Otter. These plots are overlaid with a line indicating the CCN activation diameter at 0.2% SS based on the CCN measurements on the Twin Otter. To do this, I cumulatively summed the DMA number concentration backwards from largest to smallest diameter bin. I identified the bin diameter where the cumulative summed concentration was closest to the measured CCN concentration and chose that as the CCN activation diameter. Elisabeth Andrews - 24 Apr 2009



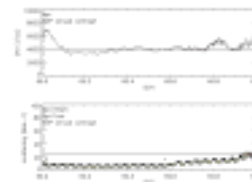
plot of CN and CCN and CCN/CN ratio as  $f(SS)$  from twin otter



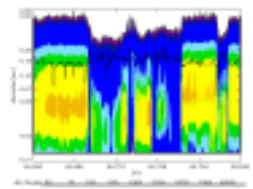
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

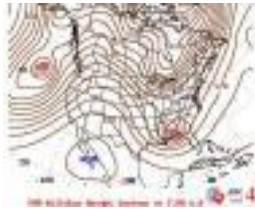


plot of CN and light scattering at surface (SGP)



TAMU DMA size distribution and CCN activation diameter

## Weather Maps



map312



OK City: Clear; 18-22 knots | Tulsa: 1/8 cloud coverage; 13-17 knots; 1321 mb | 34 F/8 F

# 20090304

## Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
14:49 UTC	19:15 UTC	4.4	Aerosol triangles at SGP (high aerosol loading)	<a href="#">KML</a>
Flight hours to date		22.3		

I don't know why, but we extended the flight by slowing the spirals and we came back with the same flight time. Who knows...

We climbed up to 6500 and did a 300 fpm descent to the SGP site. We were over the site at 500' AGL and did our first triangle at 500' AGL. There was broken cirrus above. There was less cirrus to the North.

Back at the SGP site and a 300 fpm spiral climb to 6500. Triangles at 6500', 5700', 4400', and 3000'.

After the last leg, we went down to 500' AGL over the SGP site and spiraled up to 6500'. Once at altitude we did ~250 fpm descent into Guthrie

## Weather Summary

Broken cirrus.

## Aircraft Instrumentation Status

Nothing to report

## Surface Instrumentation Status

Nothing to report

## Flight Images



1634 UTC



1714 UTC



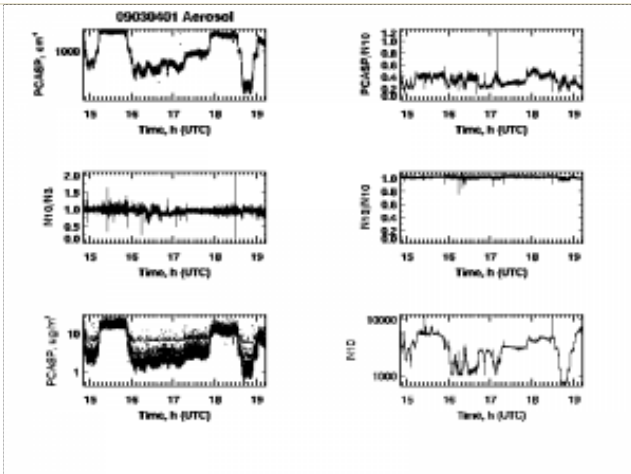
1743 UTC



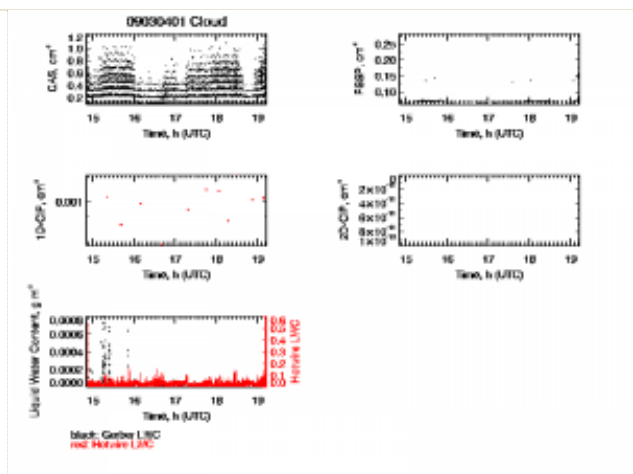
1758 UTC

## Flight Plots

### Aerosol

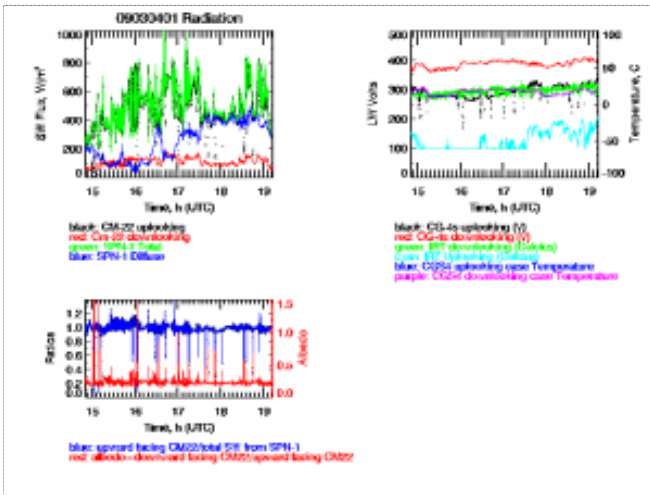


### Cloud

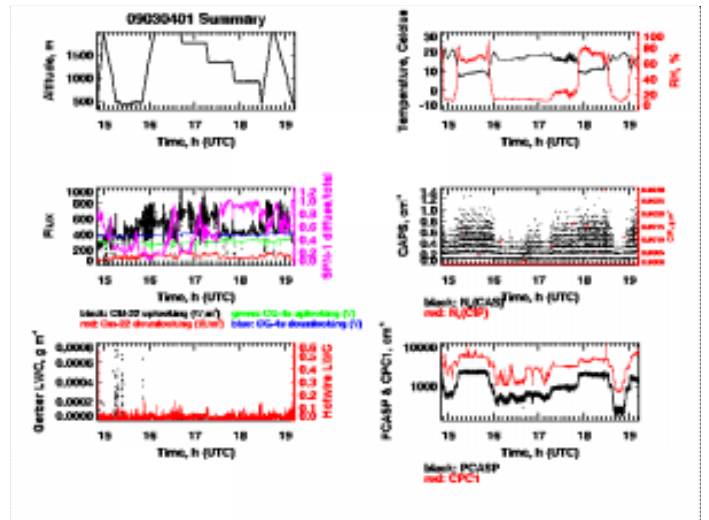




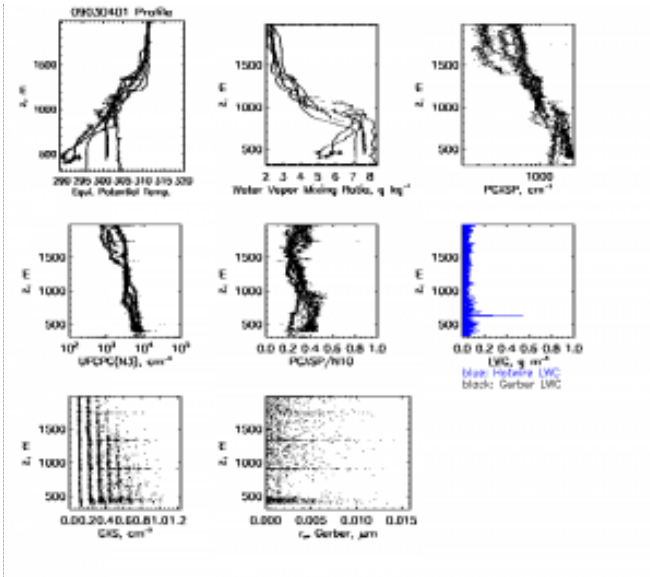
## Radiation



## Summary

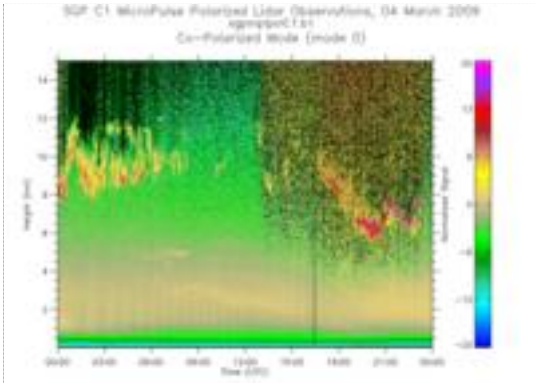


## Profile

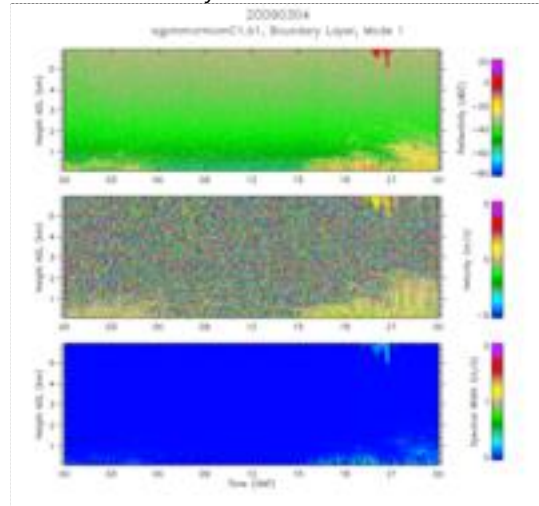


## SGP Plots

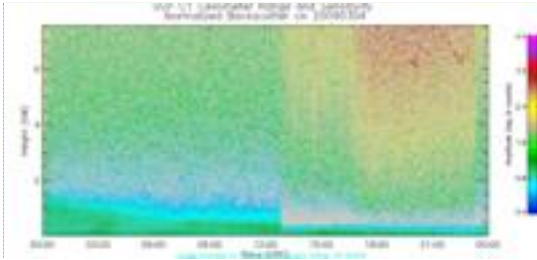
### MPL Co-Pol



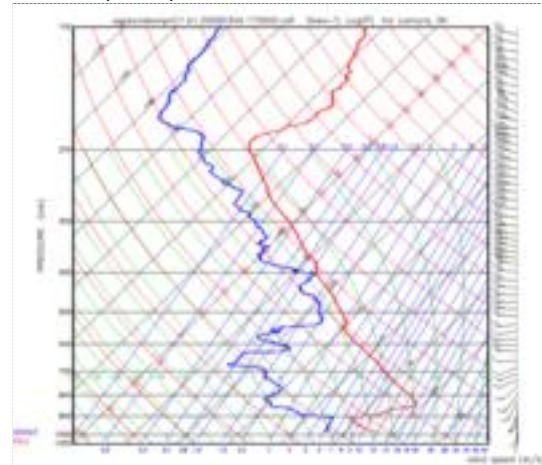
### MMCR Bound. Layer Mode



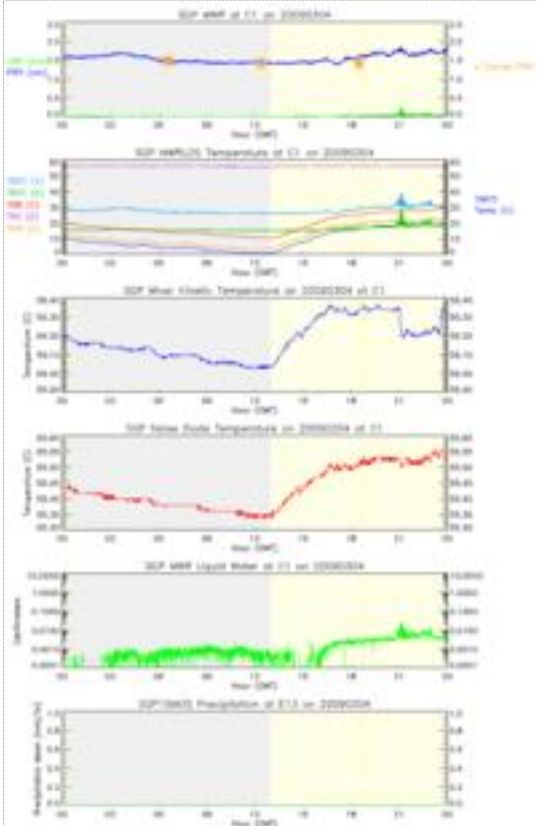
Ceilometer Backscatter



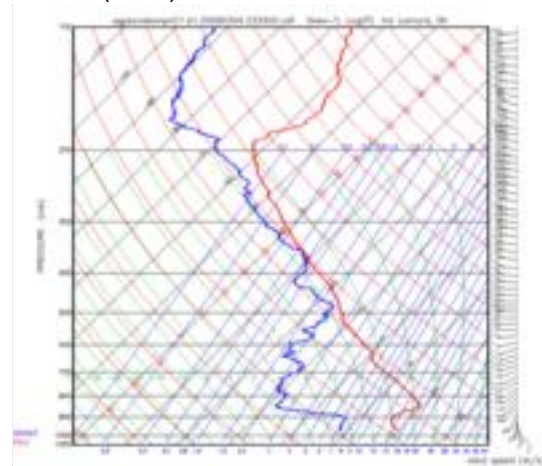
SONDE (17:30)



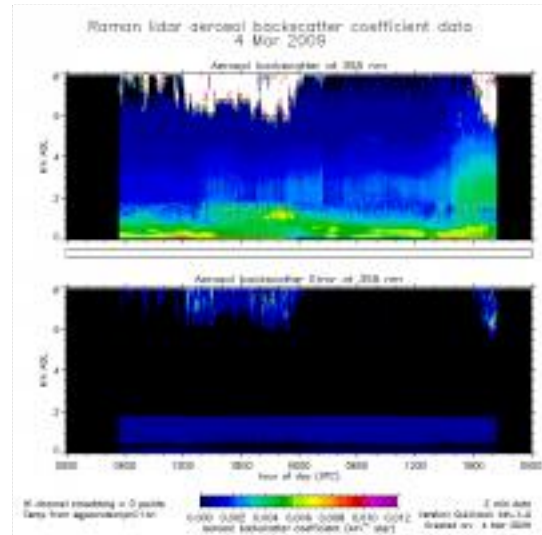
Microwave Radiometer



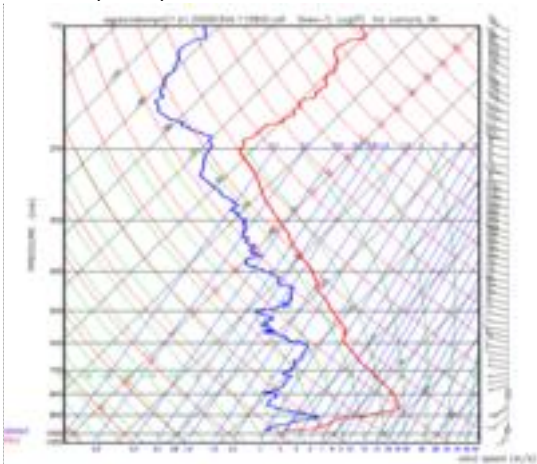
SONDE (23:30)



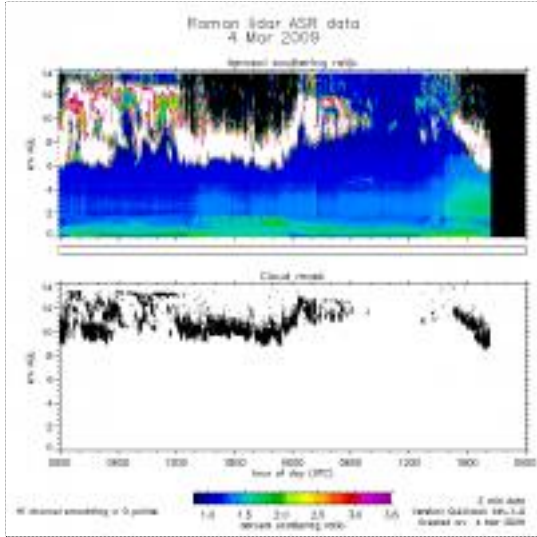
RL Backscatter



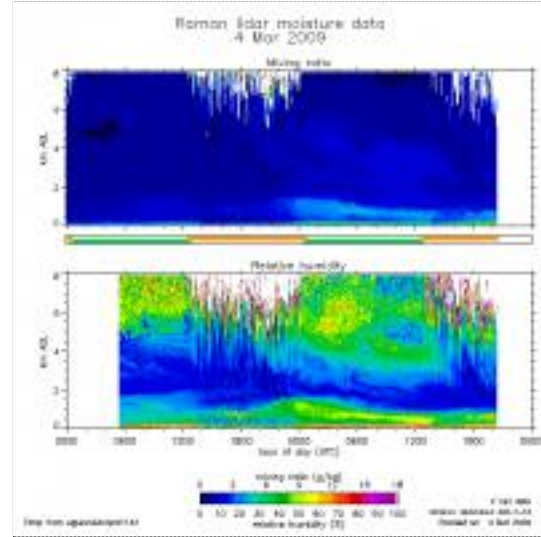
SONDE (11:30)



RL ASR



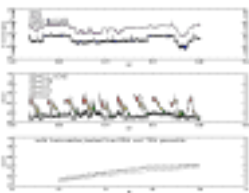
RL Moisture



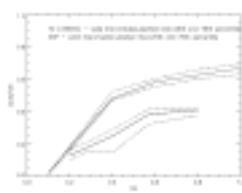
CCN Activity

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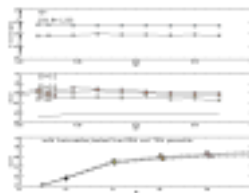
The last plot shows: I've made size distribution contour plots from the DMA operated by TAMU on the Twin Otter. These plots are overlaid with a line indicating the CCN activation diameter at 0.2% SS based on the CCN measurements on the Twin Otter. To do this, I cumulatively summed the DMA number concentration backwards from largest to smallest diameter bin. I identified the bin diameter where the cumulative summed concentration was closest to the measured CCN concentration and chose that as the CCN activation diameter. Elisabeth Andrews - 24 Apr 2009



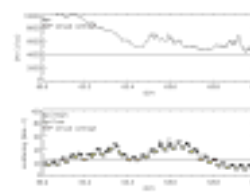
plot of CN and CCN and CCN/CN ratio as  $f(SS)$  from twin otter



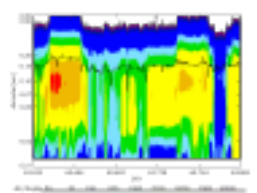
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP



plot of CN and light scattering at surface (SGP)



TAMU DMA size distribution and CCN activation diameter

Weather Maps



map342



OK City: Broken; 13-17 knots | Tulsa: Clear; 8-12 knots; 1195 mb | 60 F/33 F

# 20090315

## Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
17:57 UTC	22:57 UTC	5.0	Turbulence at SGP & Radiometer tilt characterizatio	<a href="#">KML</a>
Flight hours to date		27.3		

We climbed out initially to find the top of the boundary layer. It was somewhere between 4000-4500. There were a few clouds to the southeast.

We dropped down to 2400 and got the winds. I used onboard GPS winds and the winds in the back. They were usually within 5 degrees of each other. If they were 10 or more, I split the difference.

We proceeded to a point 30 nm south of the CF and began the legs.

2400' winds were 187/22

2900' winds were 193/23

3400' winds were 205/12

At this point we switched the pattern from SE of Vance to NE of Vance.

3900' winds were 190/20

4400' winds were 165/14

We did the square pattern at 5500'. There was no discernable turbulence due to the BL. There were up and down drafts due to thermals, so we flew above the haze layer and did the pattern. Headings were 210/120/030/300. All were 5 nm and flaps were added to bring us to zero pitch. We did a diagonal leg and pitched +/- 5 degrees for 2.5 miles and then did +/- 10 degree rolls.

We went back down to 4400 and repeated the pattern.

4400' winds were 195/16

3900' winds were 200/15

3400' winds were 190/16

2900' winds were 185/9

2400' winds were 180/14

We ran the last 2400' leg twice as we were on the north side of the pattern.

RTB at 3500'.

There were a few controlled field burns in the area, they didn't last long, but Jesse was seeing them on the instruments. There was no cirrus, although there were a couple of very small clouds during the first half of the flight. Nothing we could fly through

## Weather Summary

Clear skies with a few clouds to the southeast.

## Aircraft Instrumentation Status

DAC pictures is not working since the installation of the MRF's. Pilot and Jesse are taking photos during flights. They are working on the problem but at this time it is not a priority.

## Surface Instrumentation Status

Nothing to report

## Flight Images



1916 UTC



1958 UTC

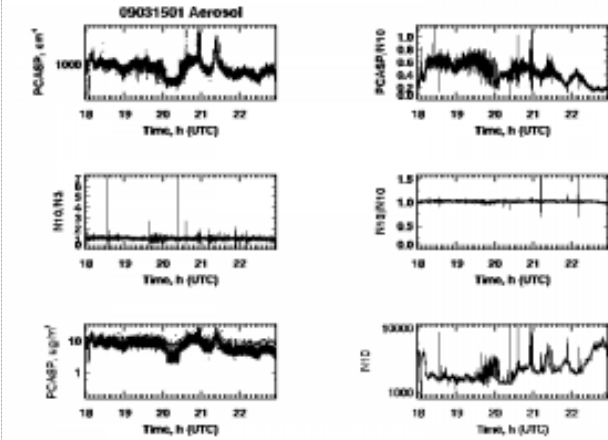


2005 UTC

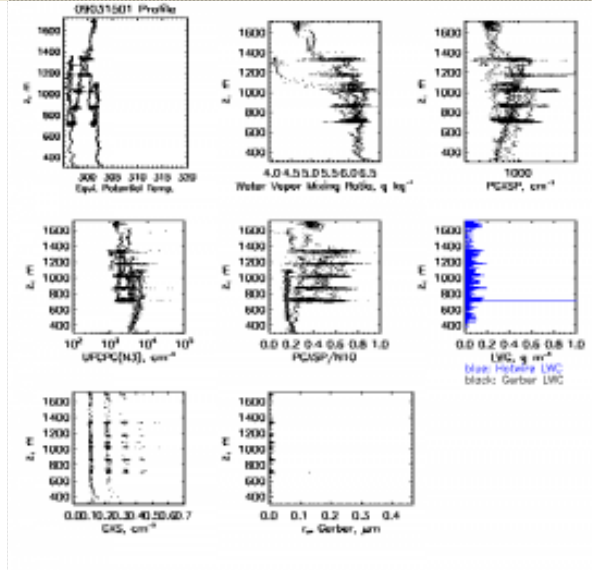


# Flight Plots

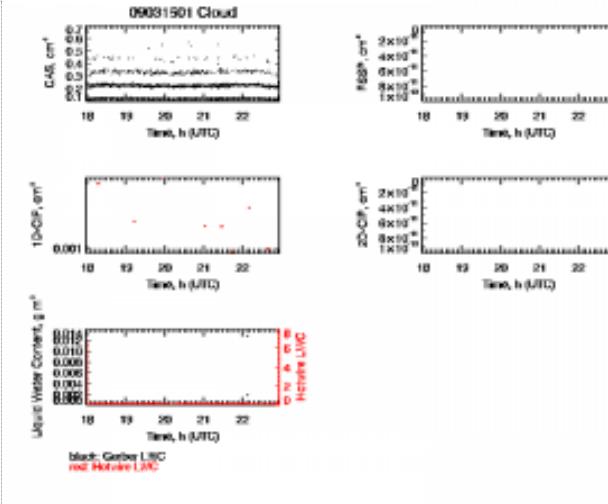
## Aerosol



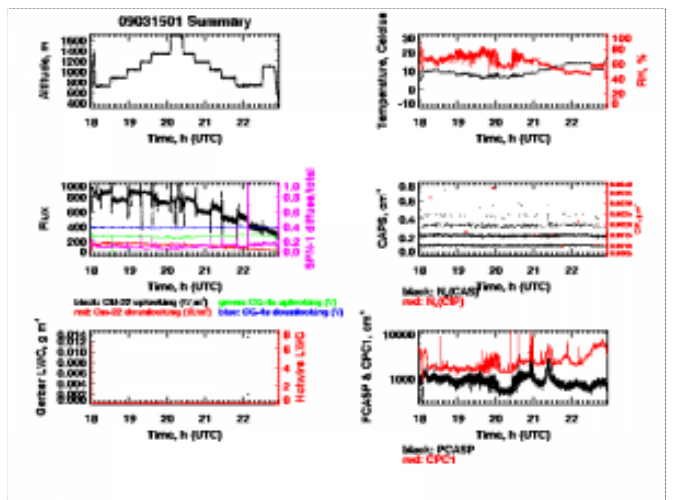
## Profile



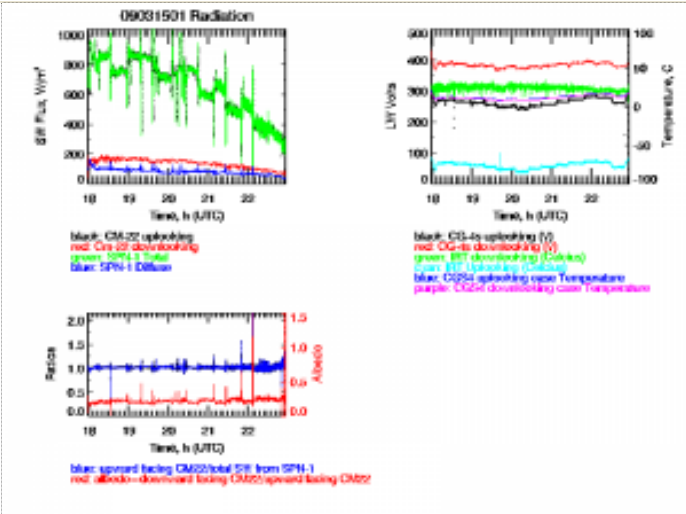
## Cloud



## Summary

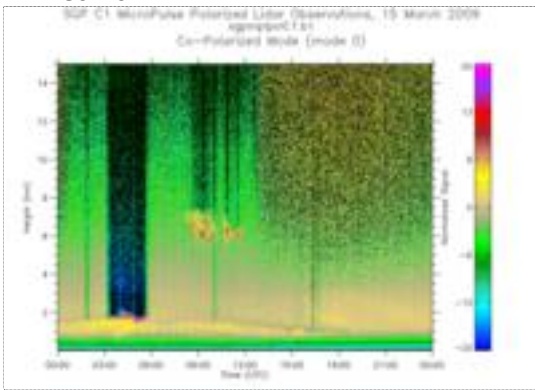


## Radiation

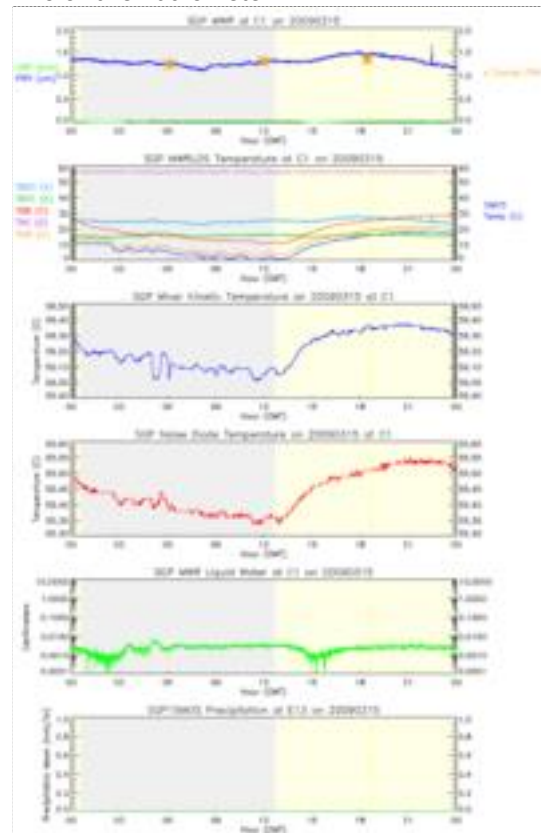


# SGP Plots

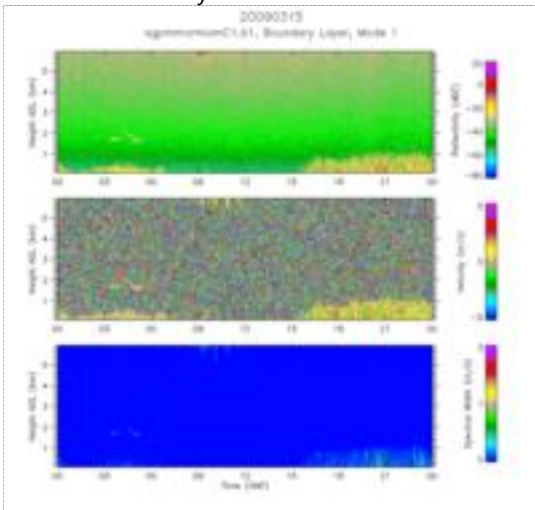
MPL Co-Pol



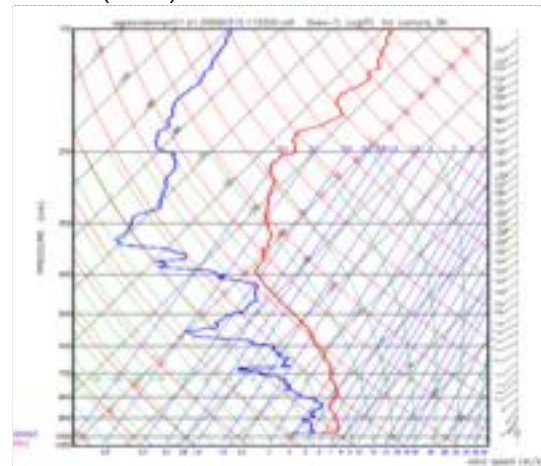
Microwave Radiometer



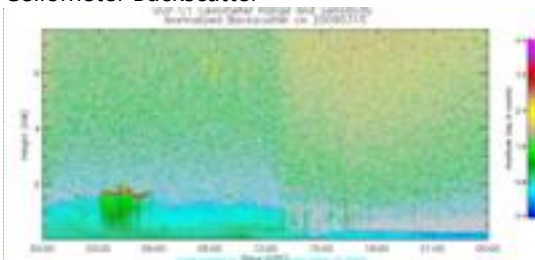
MMCR Bound. Layer Mode



SONDE (11:30)

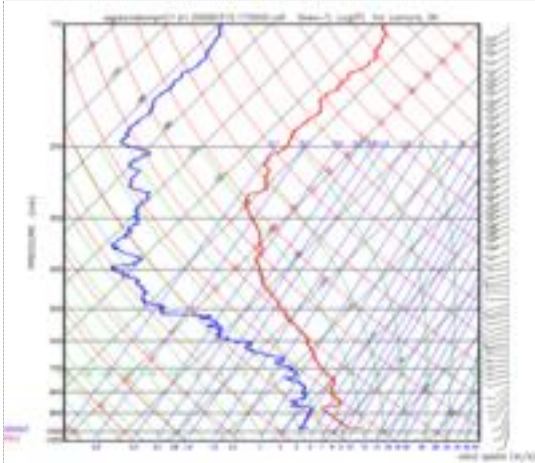


Ceilometer Backscatter

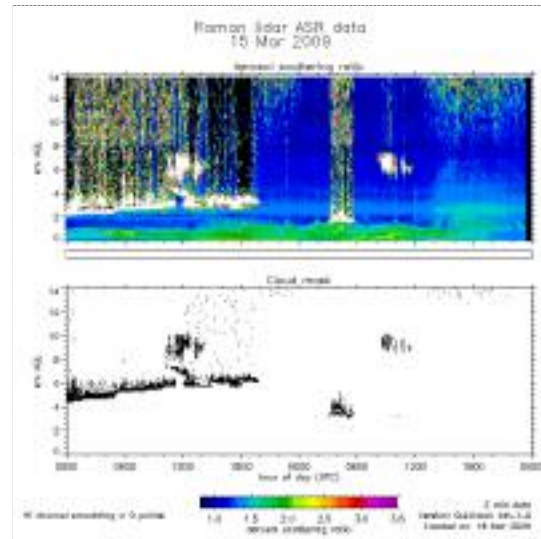




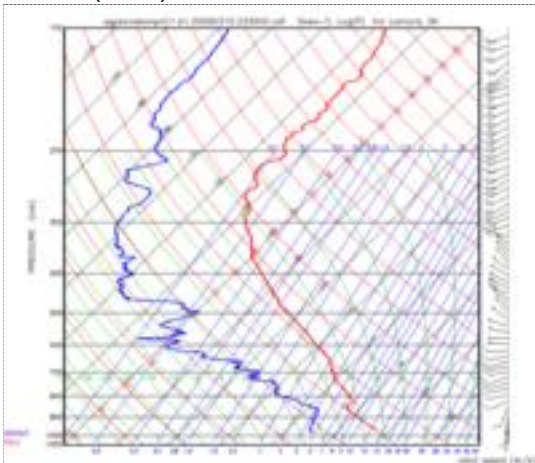
SONDE (17:30)



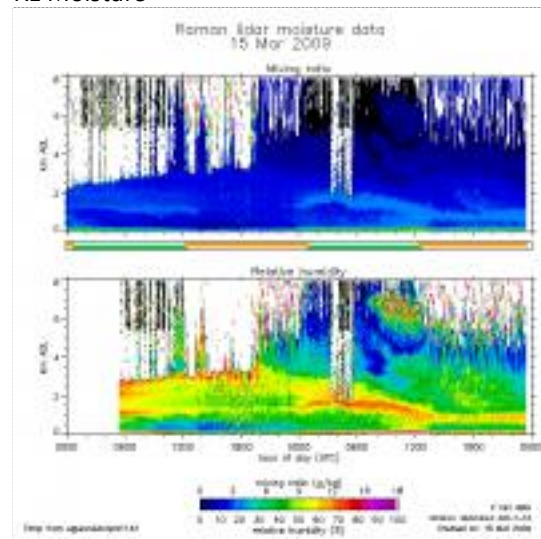
RL ASR



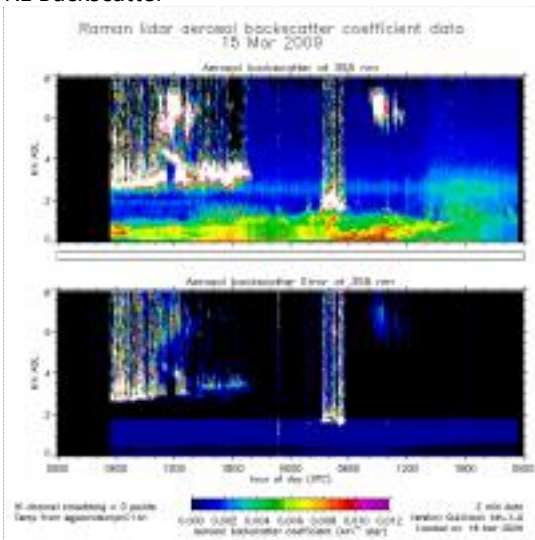
SONDE (23:30)



RL Moisture



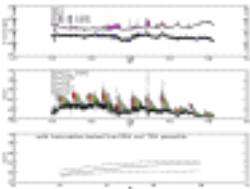
RL Backscatter



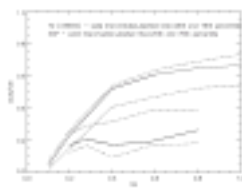
## CCN Activity

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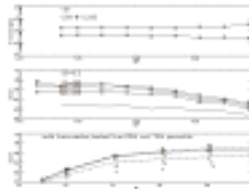
The last plot shows: I've made size distribution contour plots from the DMA operated by TAMU on the Twin Otter. These plots are overlaid with a line indicating the CCN activation diameter at 0.2% SS based on the CCN measurements on the Twin Otter. To do this, I cumulatively summed the DMA number concentration backwards from largest to smallest diameter bin. I identified the bin diameter where the cumulative summed concentration was closest to the measured CCN concentration and chose that as the CCN activation diameter. Elisabeth Andrews - 28 Apr 2009



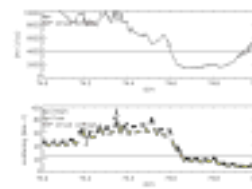
plot of CN and CCN and CCN/CN ratio as  $f(SS)$  from twin otter



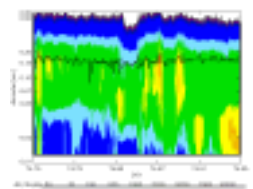
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

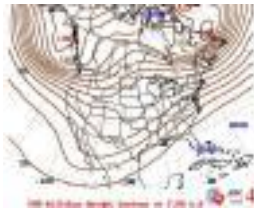


plot of CN and light scattering at surface (SGP)



TAMU DMA size distribution and CCN activation diameter

## Weather Maps



map3152



OK City: Clear; calm winds | Tulsa: Clear; 3-7 knots; 1149 mb | 56 F/31 F

# 20090317

## Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
17:57 UTC	22:48 UTC	4.9	Turbulence at SGP & Radiometer tilt characterization	<a href="#">KML</a>
Flight hours to date		32.2		

We departed out of Guthrie and climbed up to 5000, and descended to 2400 enroute to the CF. The winds were too far out of the west so we had to go to the CF for the first leg. By that time they had gone more southerly.

Leg #1 2400' winds were 205/20  
Leg #2 3000' winds were 195/15  
Leg #3 3600' winds were 215/15  
Leg #4 4200' winds were 215/15  
Leg #5 4800' winds were 220/25

That put us north of the CF we did the square there at 6000'. Legs were 5 nm long. We began the square at 2002Z. 210/120/030/300. We were at 0 pitch with flaps extended for the square. Initially I forgot about the diagonal. We started descending, but we went back to the end point and ran 45 degrees off the last heading and did the pitch and rolls.

Leg #6 4800' winds were 215/20  
Leg #7 4200' winds were 215/28  
Leg #8 3600' winds were 200/25  
Leg #9 3000' winds were 200/25  
Leg #10 2400 winds were 210/15

At the end of that leg we headed back to Guthrie at 2400'.

There was no cirrus. Skies were clear the entire flight. There were a few control burns along the flight path. There was visible smoke above us on legs 8, 9, and 10.

No issues with the plane.

## Weather Summary

Clear skies.

## Aircraft Instrumentation Status

CIP still not back

## Flight Images



1842 UTC



1945 UTC



2006 UTC



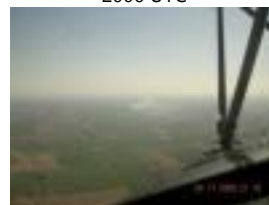
2120 UTC



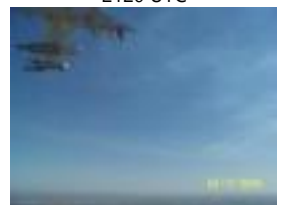
1906 UTC



1949 UTC



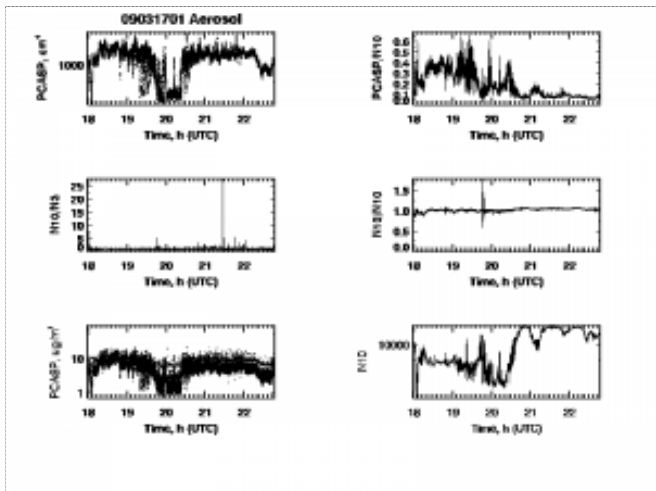
2116 UTC



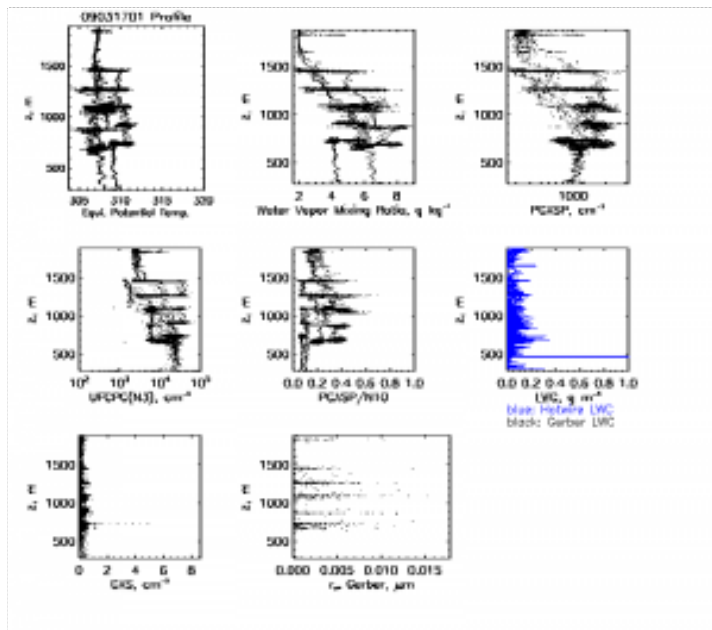
2135 UTC

# Flight Plots

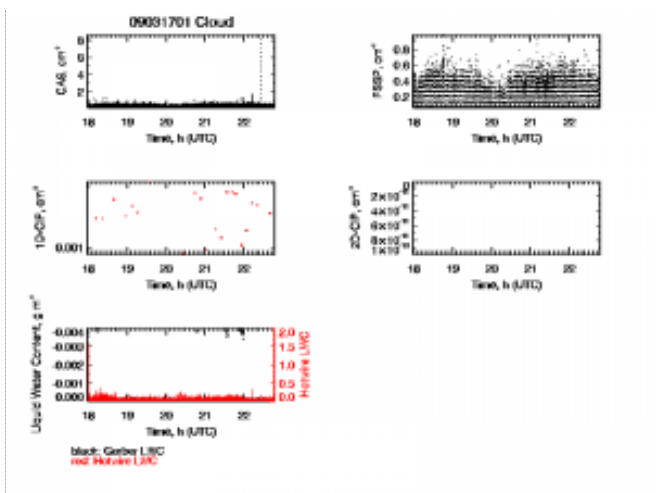
## Aerosol



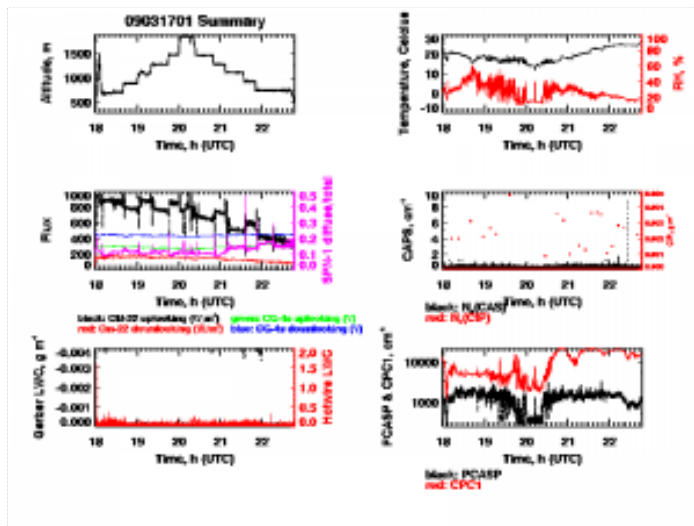
## Profile



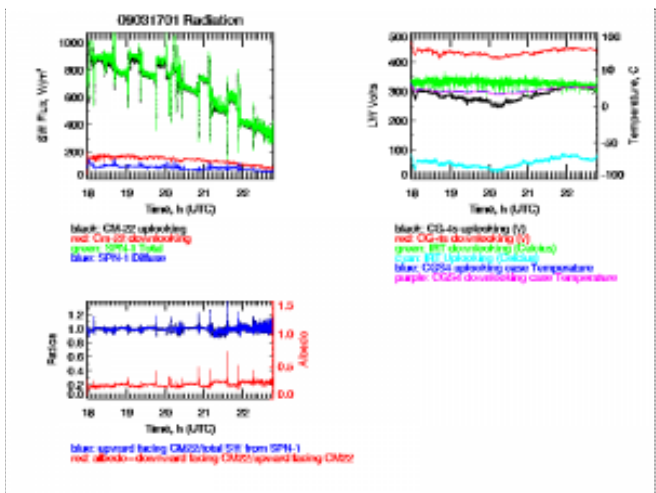
## Cloud



## Summary



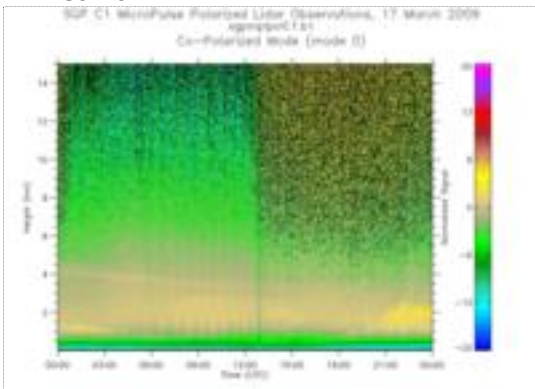
## Radiation



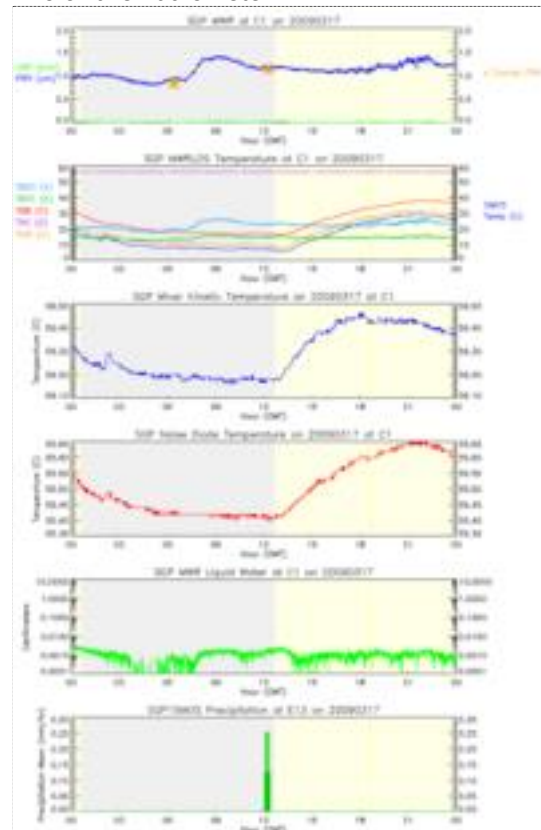


# SGP Plots

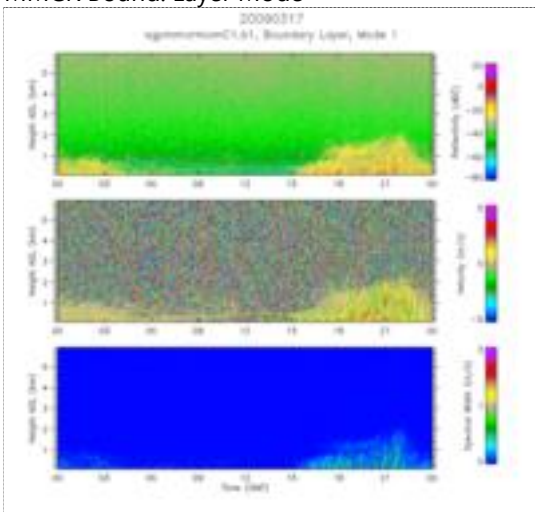
MPL Co-Pol



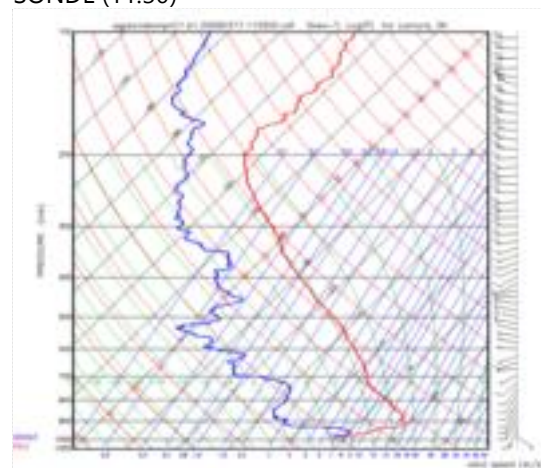
Microwave Radiometer



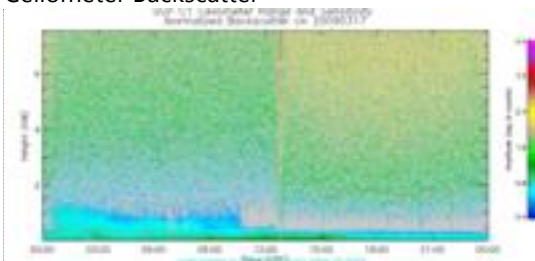
MMCR Bound. Layer Mode



SONDE (11:30)



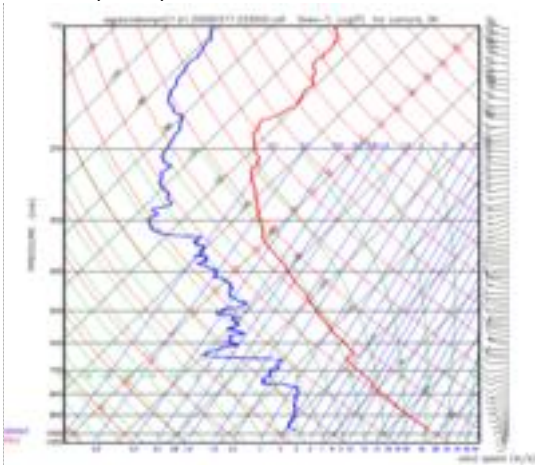
Ceilometer Backscatter



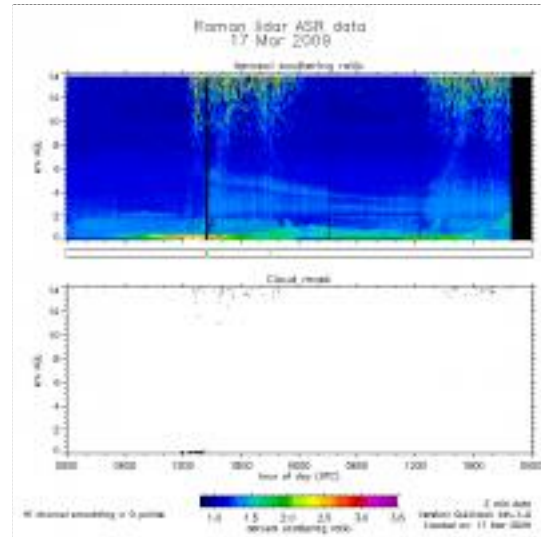
SONDE (17:30)



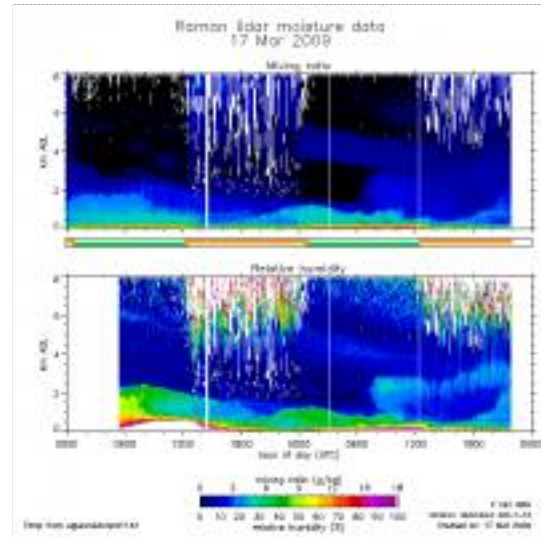
SONDE (23:30)



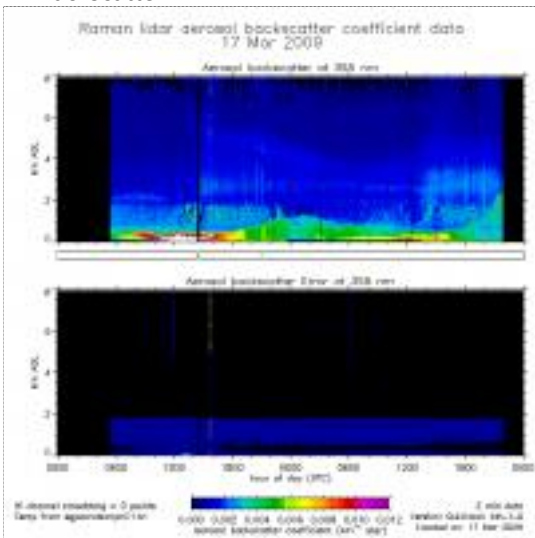
RL ASR



RL Moisture



RL Backscatter

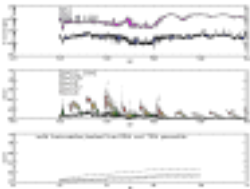




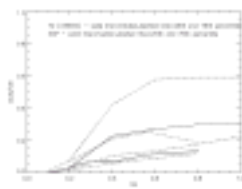
## CCN Activity

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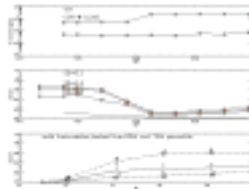
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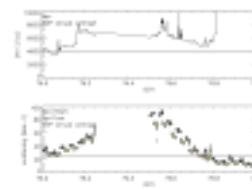
plot of CN and CCN and CCN/CN ratio as  $f(SS)$  from twin otter



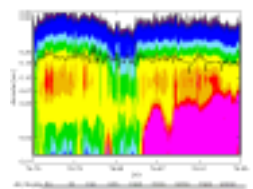
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP



plot of CN and light scattering at surface (SGP)



TAMU DMA size distribution and CCN activation diameter

## Weather Maps



map3172



Clear, 8-12 knots; 1195 mb | 70 F/45 F

# 20090318

## Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
18:27 UTC	21:07 UTC	2.7	Surface albedo at SGP	<a href="#">KML</a>
Flight hours to date		34.9		

We transited to the south point of the "pinwheel" pattern at 2500.

We descended to 1600' MSL about 5 miles prior to the leg. We ran the pattern at 1600. That was ~600' AGL. The pattern began at 1853 and ended at 1944.

We repositioned to do the "paper clip" pattern. That was also ran at 1600'. It started at 1946 and ended at 2038.

We flew back to Guthrie at 2500'.

There were cirrus over head the entire time. Sometimes broken, sometimes overcast. There were several control burns going on, and we were in close proximity to them on a couple of legs, but did not fly through the smoke plume directly.

The pinwheel was not centered on the CF. The original point was off by about  $\frac{3}{4}$  of a mile, and that is what the pattern was based on. I reset the CF point for the other patterns but I didn't have time to reset all of the points for today's flight.

The paper clip pattern was centered on the CF.

The Cessna was up and flying and we had good communications with him.

## Weather Summary

Broken and overcast cirrus.

## Aircraft Instrumentation Status

Jesse reports no glitches.

## Flight Images



1847 UTC



1914 UTC



1914 UTC



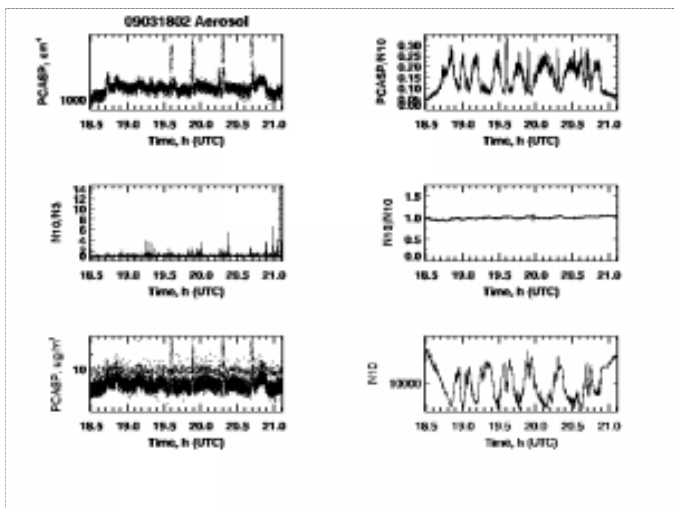
1934 UTC



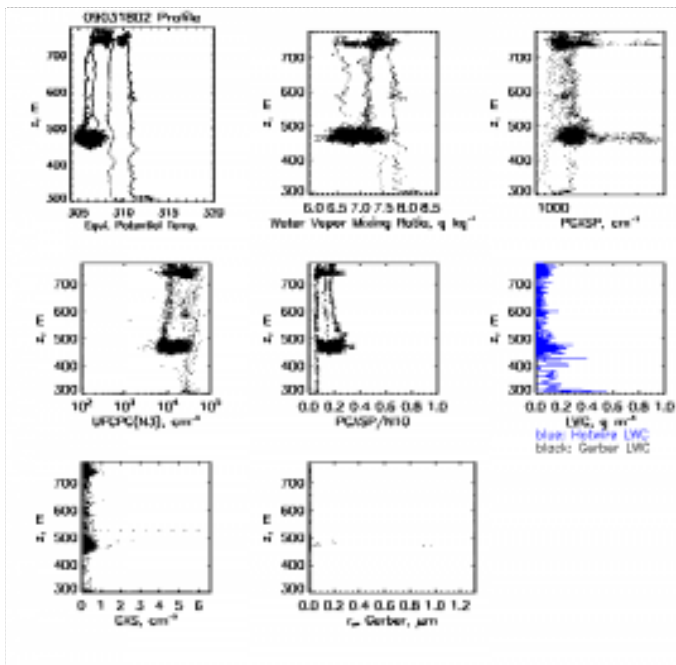
1936 UTC

# Flight Plots

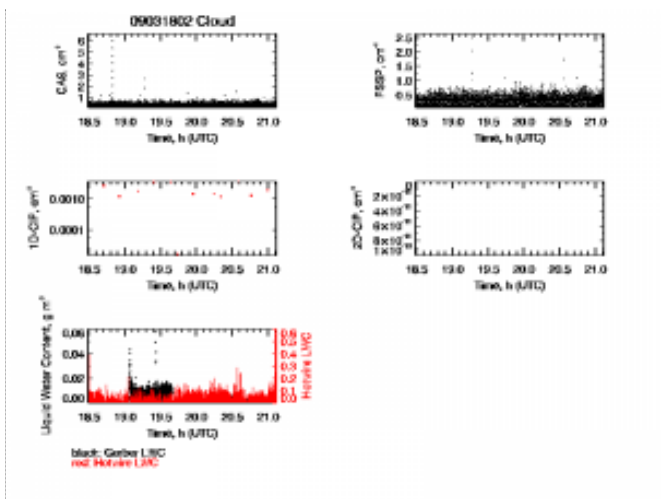
## Aerosol



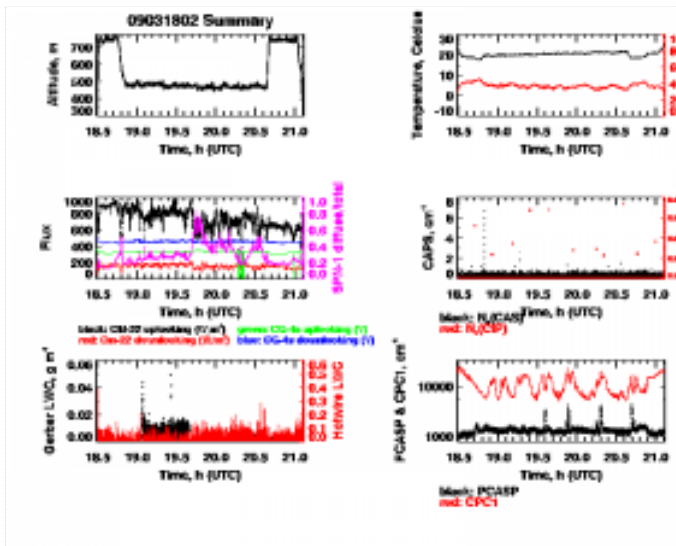
## Profile



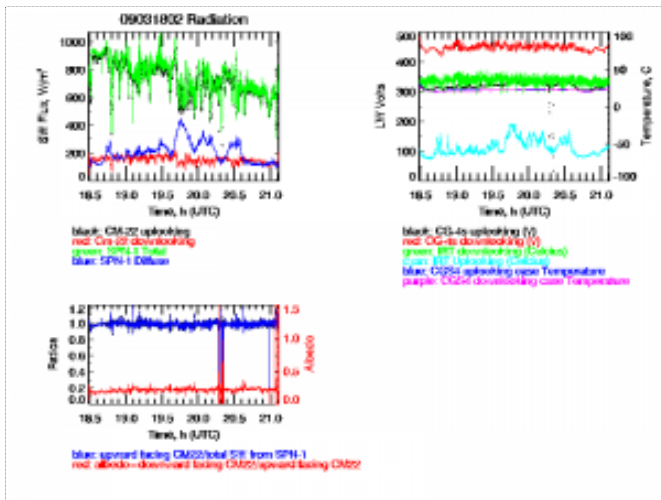
## Cloud



## Summary

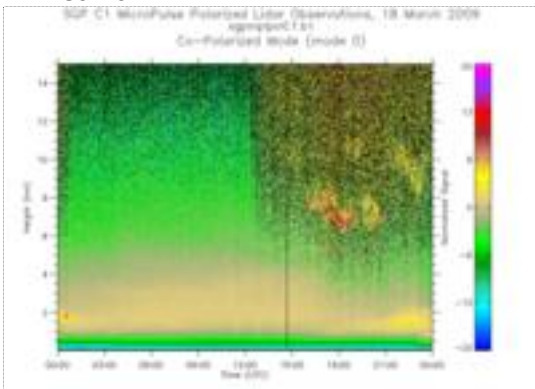


## Radiation

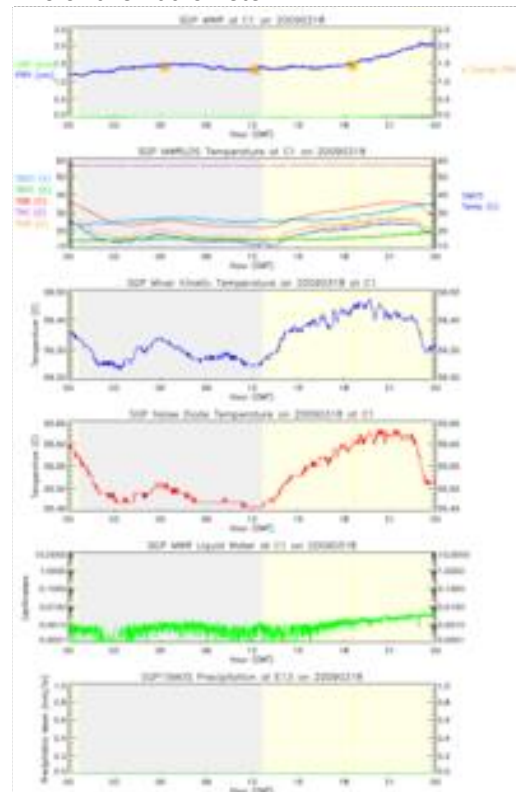


# SGP Plots

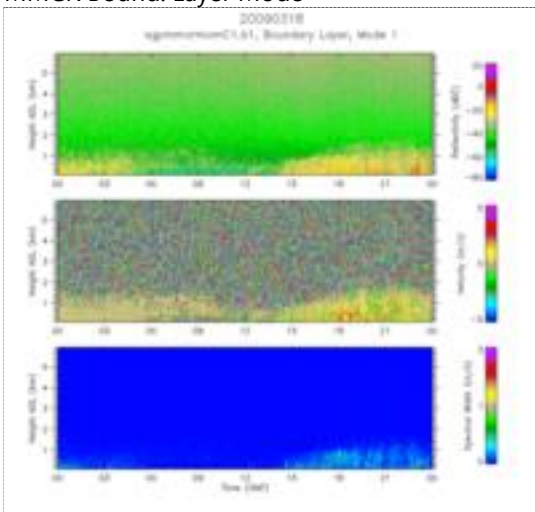
MPL Co-Pol



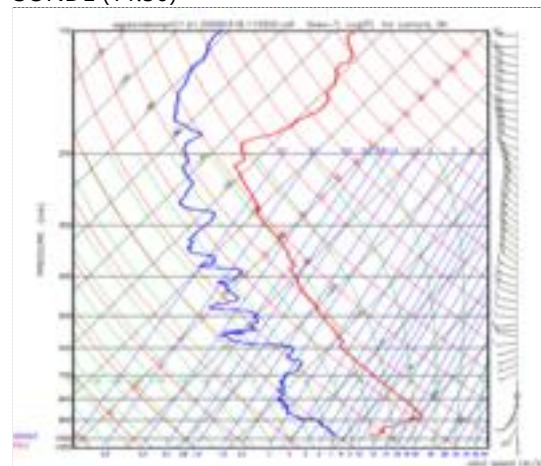
Microwave Radiometer



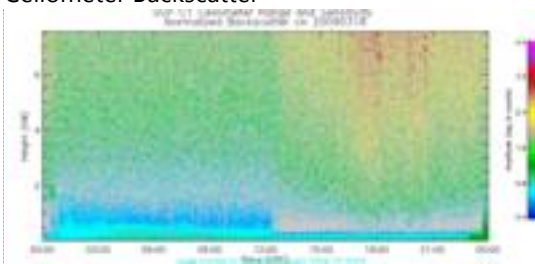
MMCR Bound. Layer Mode



SONDE (11:30)

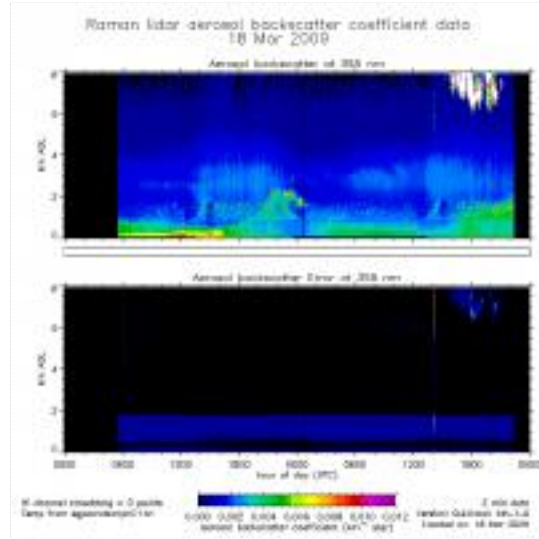


Ceilometer Backscatter

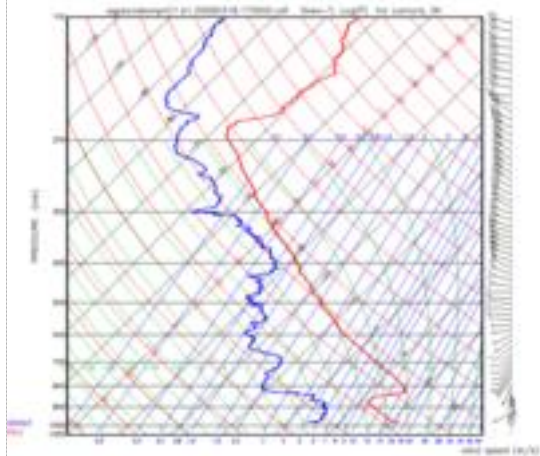




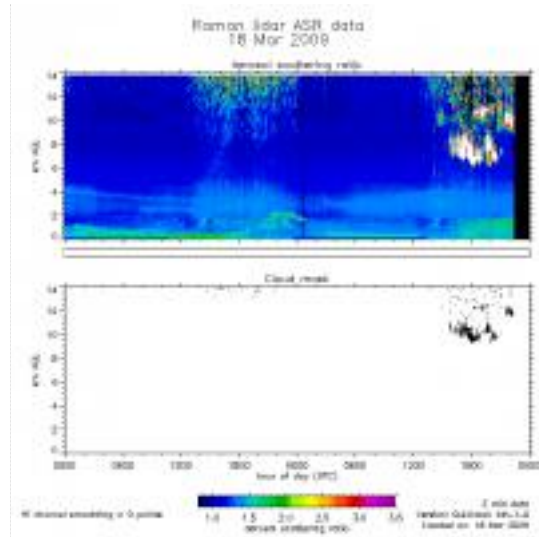
RL Backscatter



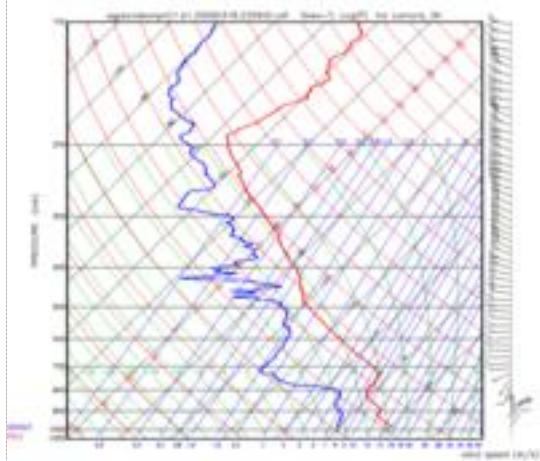
SONDE (17:30)



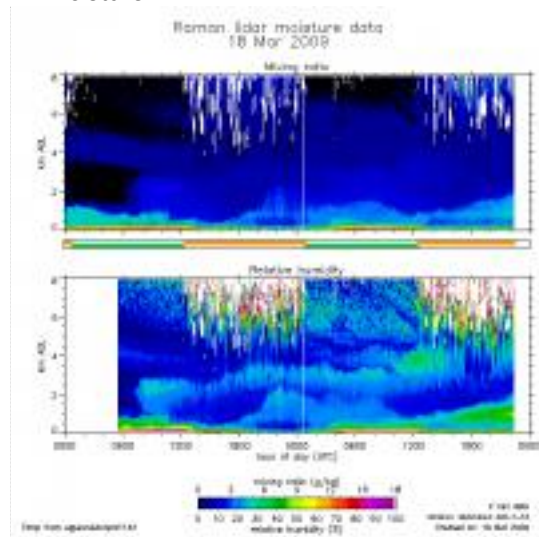
RL ASR



SONDE (23:30)



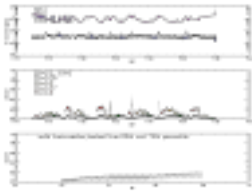
RL Moisture



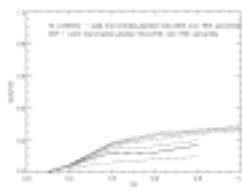
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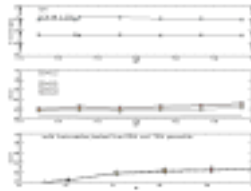
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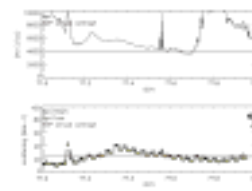
plot of CN and CCN and CCN/CN ratio as  $f(SS)$  from twin otter



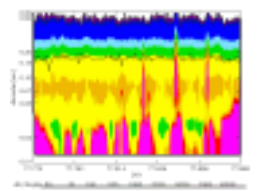
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

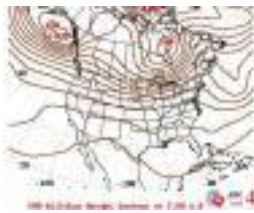


plot of CN and light scattering at surface (SGP)



TAMU DMA size distribution and CCN activation diameter

## Weather Maps



map3182



Clear; 8-12 knots; 1145 mb | 79 F/36 F



# 20090320

## Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
12:00 UTC	16:51 UTC	4.9	Cloud triangles at SGP	<a href="#">KML</a>
Flight hours to date		39.7		

Flight time was 1200-1651. 4.9 total.

Departed GOK and climbed to 8000'. It was still very dark out when we left. We found the clouds by keeping the landing lights on. The bases were 7000 and tops were at 7500. There were clouds again at 7900-8100'. I have no estimates of the tops.

5 minutes from the CF we dropped to bases -500'. Bases were 7200. We did the first triangle at 6800. There was some drizzle on the windscreen on the northern leg.

We descended over the CF to 1500'msl/500 agl and did a spiral climb to 9500'. Bases during the climb were 7200'. We stopped the spiral at 9500' because of the freezing level. The clouds were extending above us and there was broken cirrus above that.

We did the second triangle at 9000'. That put us mostly above the tops, and below a layer of clouds. The clouds had cleared from our altitude by the time we reached midway through the second leg of the triangle.

By the time we started the 3rd triangle it was clear below 10000'. We set the 3rd leg based on the temperature dew point spread. That was 7200. Midway along the first leg, we caught up with the clouds, but they were at 7400 and only a hundred feet thick or so. We readjusted the altitude to 7500. That put us below to eventually in the clouds. We continued the triangle back into the clear air.

4th and 5th triangles were at 7100' and 7000' same situation.

We climbed up over the CF to 9500 and did a 300 fpm spiral down to 1500/500 agl. At that point we climbed up to 6700 and ferried back in an aerosol layer.

No issues with Vance airspace.

No issues with the plane.

Mike Hubbell  
CIRPAS Chief Pilot

## Weather Summary

Mostly cloudy. Variable stcu (broken and multi-level).

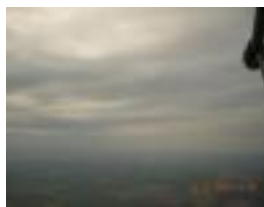
## Aircraft Instrumentation Status

Jesse reports AOK

## Flight Images



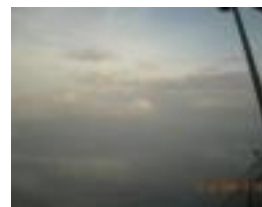
1223 UTC



1300 UTC



1305 UTC



1319 UTC



1319 UTC



1320 UTC



1324 UTC



1325 UTC



1347 UTC



1420 UTC



1323 UTC



1325 UTC



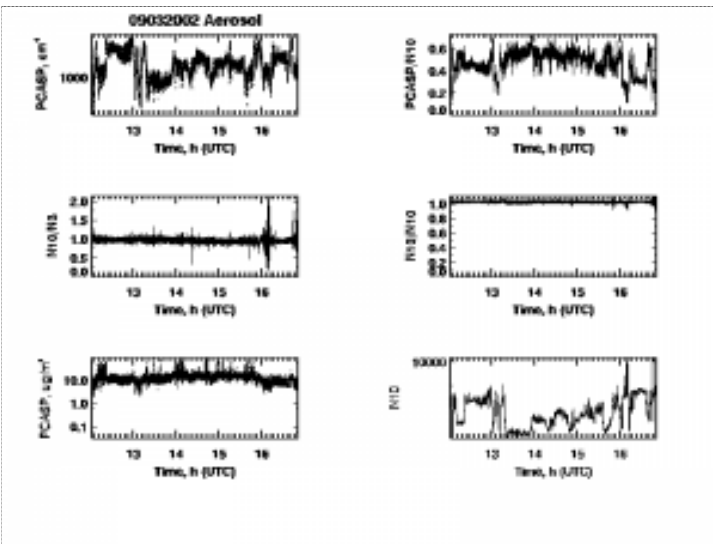
1334 UTC



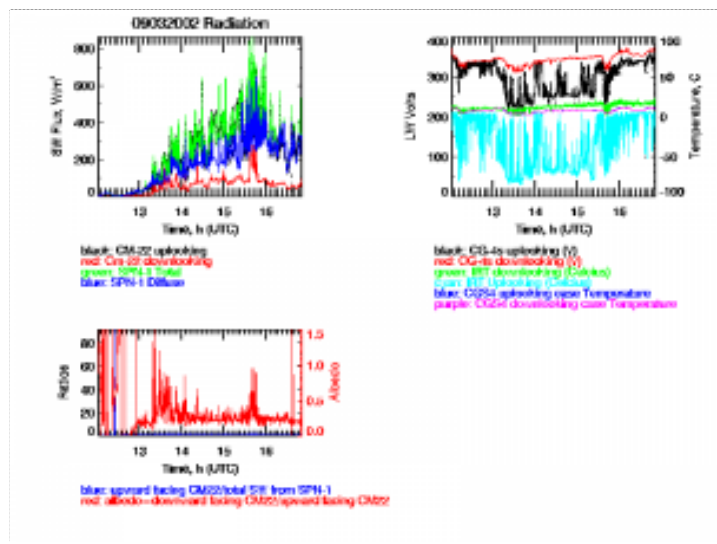
1412 UTC

## Flight Plots

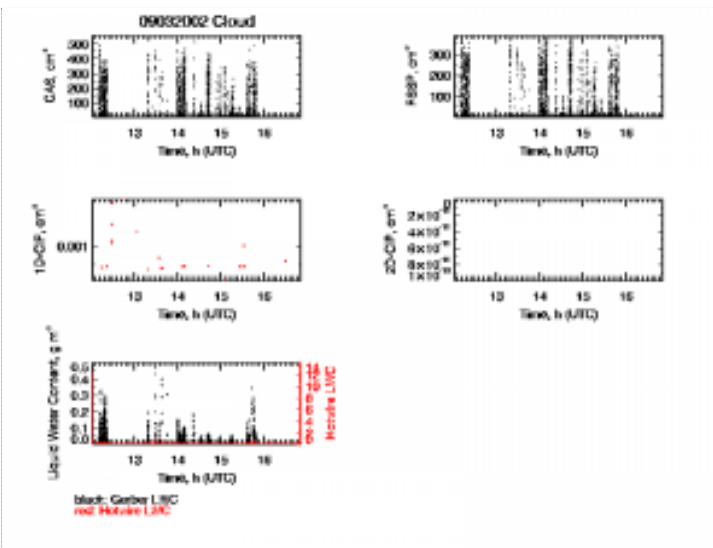
### Aerosol



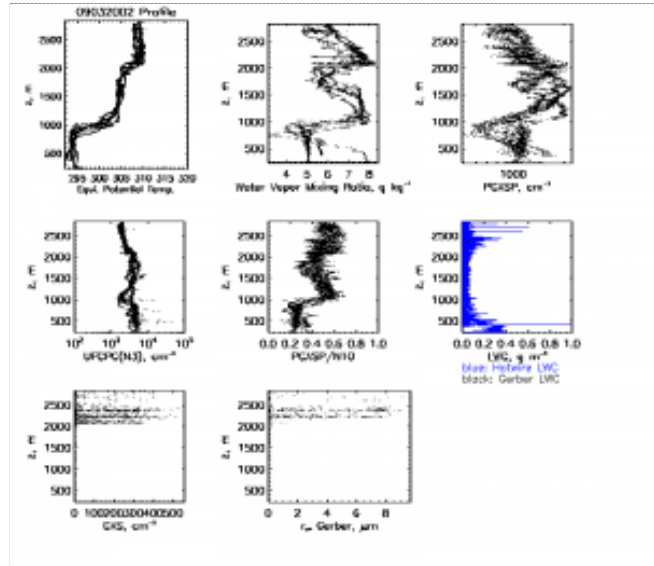
### Radiation



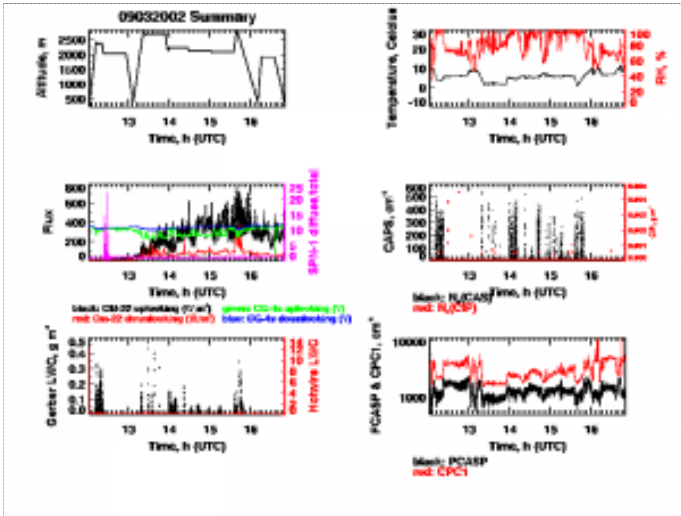
### Cloud



### Profile

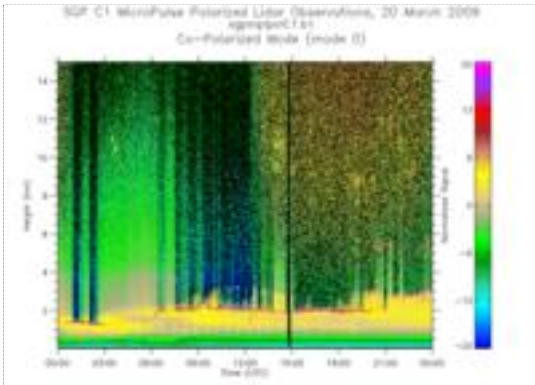


# Summary

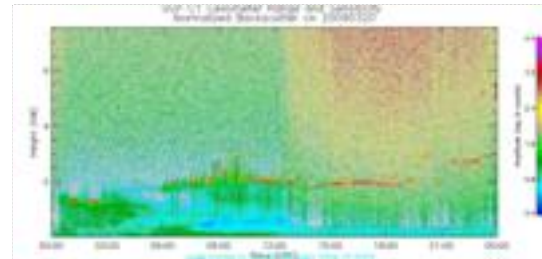


# SGP Plots

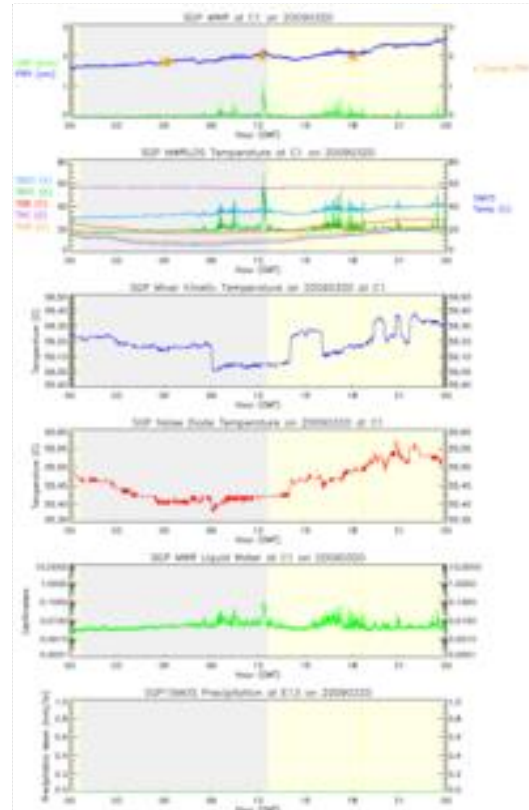
MPL Co-Pol



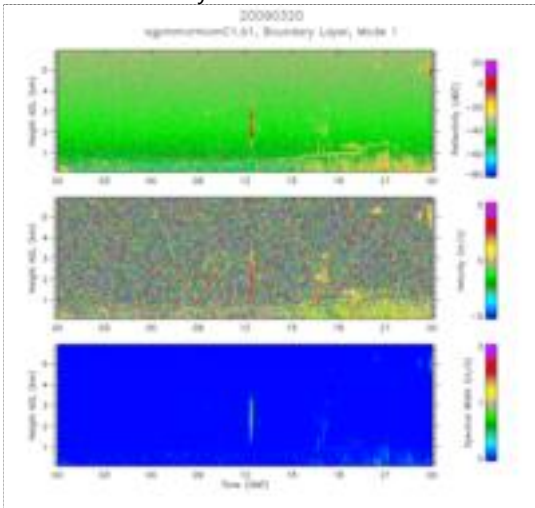
Ceilometer Backscatter



Microwave Radiometer



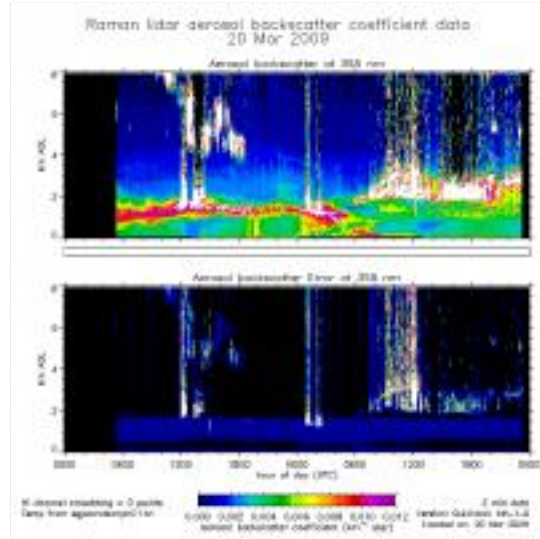
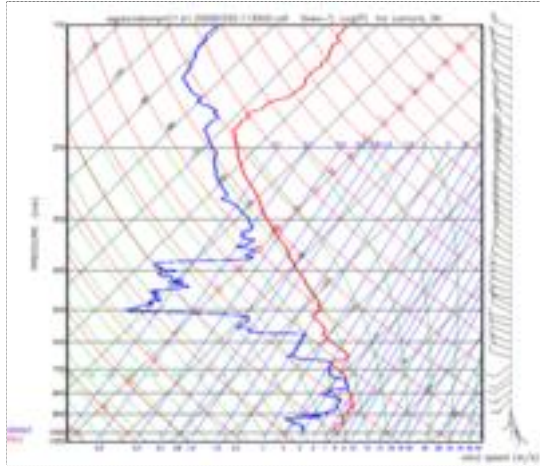
MMCR Bound. Layer Mode



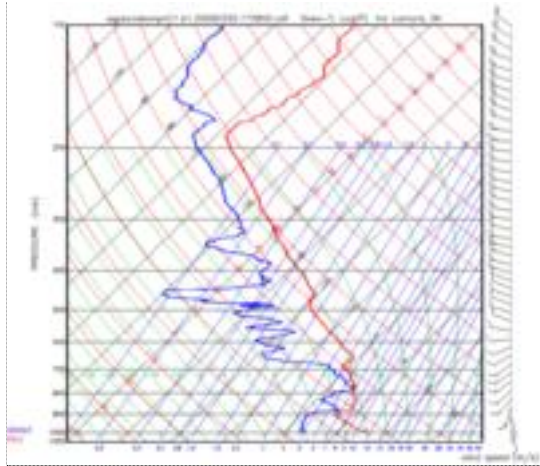


RL Backscatter

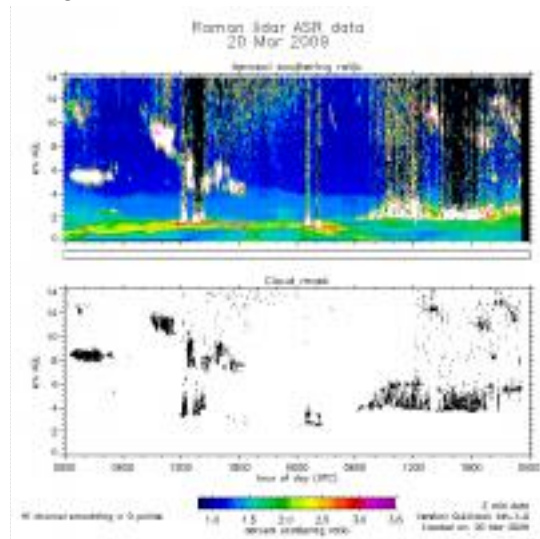
SONDE (11:30)



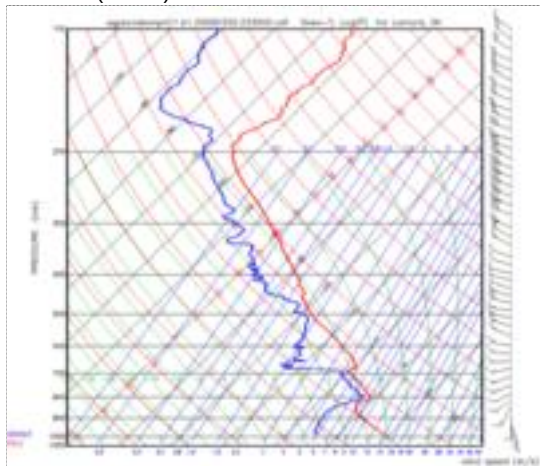
SONDE (17:30)



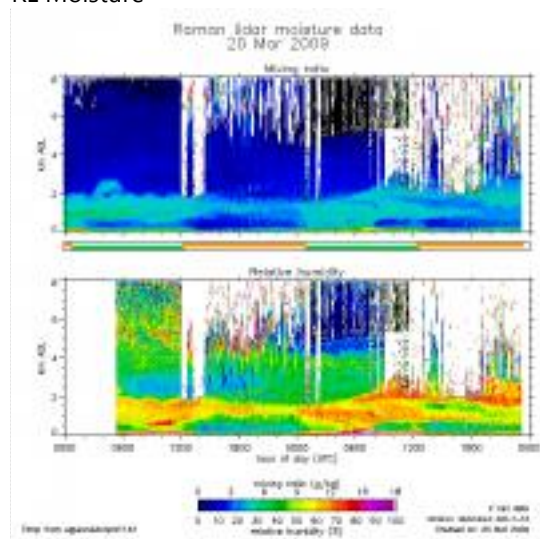
RL ASR



SONDE (23:30)



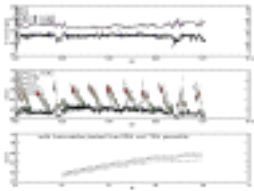
RL Moisture



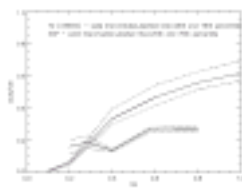
## CCN Activity

I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as  $f(SS)$ ). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 06 Apr 2009

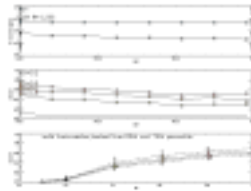
The last plot shows: I've made size distribution contour plots from the DMA operated by TAMU on the Twin Otter. These plots are overlaid with a line indicating the CCN activation diameter at 0.2% SS based on the CCN measurements on the Twin Otter. To do this, I cumulatively summed the DMA number concentration backwards from largest to smallest diameter bin. I identified the bin diameter where the cumulative summed concentration was closest to the measured CCN concentration and chose that as the CCN activation diameter. Elisabeth Andrews - 28 Apr 2009



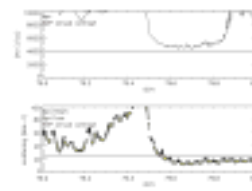
plot of CN and CCN and CCN/CN ratio as  $f(SS)$  from twin otter



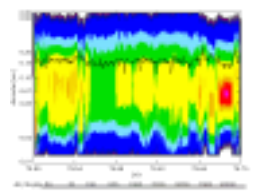
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

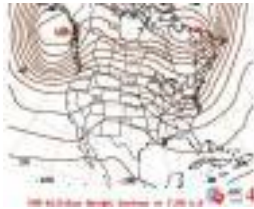


plot of CN and light scattering at surface (SGP)



TAMU DMA size distribution and CCN activation diameter

## Weather Maps



map3202



OK City: Scattered; 8-12 knots | Tulsa: Overcast; 8-12 knots; 1244 mb | 61 F/48 F

# 20090324

## Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
17:16 UTC	22:04 UTC	4.8	Surface albedo & Turbulence at SGP	<a href="#">KML</a>
Flight hours to date		44.5		

We initially climbed to see where the boundary layer was. We climbed to 5000' and Jesse said it was at 4250.

We transitioned out to the CF at 3400 (2400 agl).

We did the pinwheel pattern at 1600' (600' agl). Times were 1743-1841. There were 2 small cirrus clouds to the WNW otherwise clear.

We did the modified Paperclip pattern at the same altitude. Times were 1845-1932. Cirrus moved closer, one of the clouds dissipated.

At this point we climbed to 3400' (2400 agl) and began the upwind/downwinds runs. The other cirrus dissipated, there was cirrus on the distant NW horizon and a few low level clouds ~7000' to the WNW.

Leg #1 3400 winds 285/35

We climbed to find the boundary layer and it was at 6000'.

Leg #2 5700' winds 290/35 there were a few clouds ~10 miles W of the CF at ~7000' - 7500'

Leg #3 4500' winds 275/39

Leg #4 2000' winds 280/37

Leg #5 3400' winds 285.42

Controlled burn SW during paperclip pattern. Smoke was going up to boundry layer but moving quickly because of winds. Visability 3-4 miles.

We returned to Guthrie at 3400.

## Weather Summary

Mainly clear skies with a few cirrus.

## Aircraft Instrumentation Status

MFR data is only getting first couple of hours.

CIP is still being repaired. (should be shipped back to Guthrie on March 31st).

DMA did not work but problem has been identified and fixed

## Flight Images



1726 UTC



1807 UTC



1905 UTC



2002 UTC

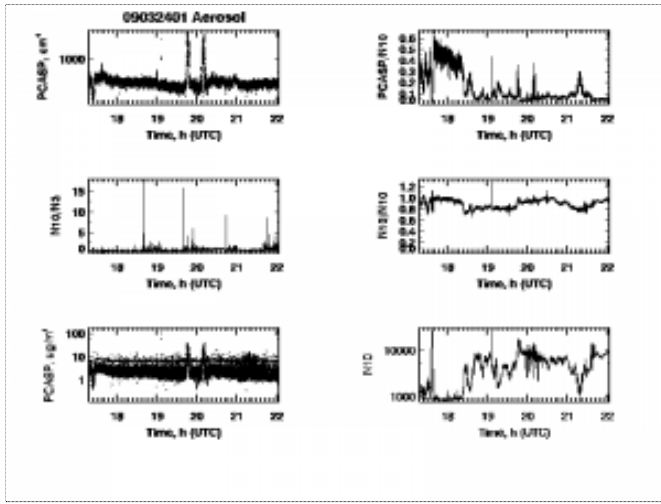


2025 UTC

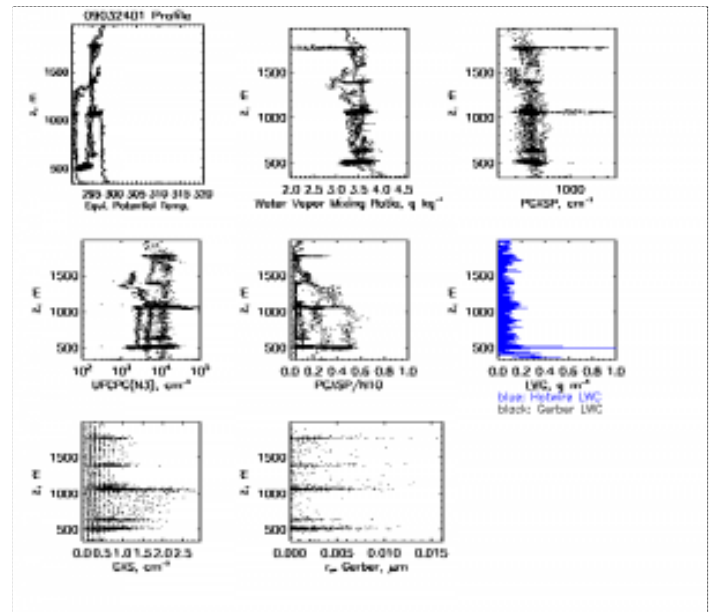


# Flight Plots

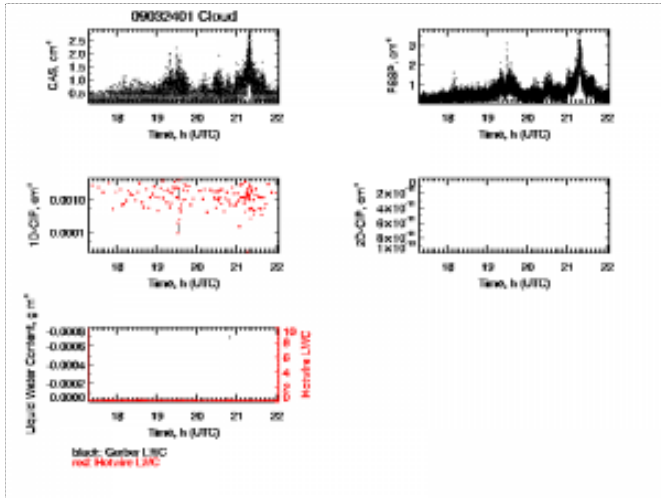
## Aerosol



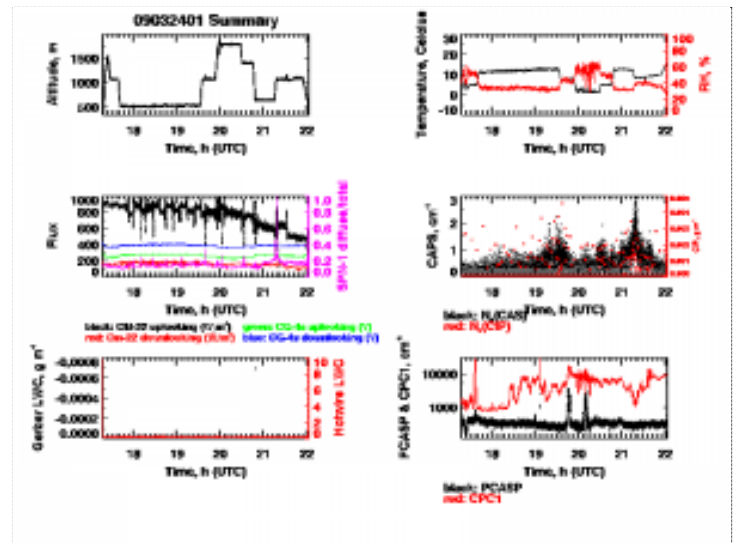
## Profile



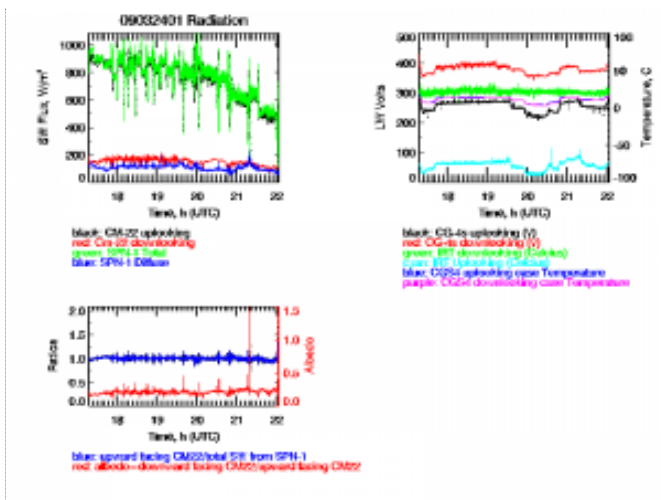
## Cloud



## Summary

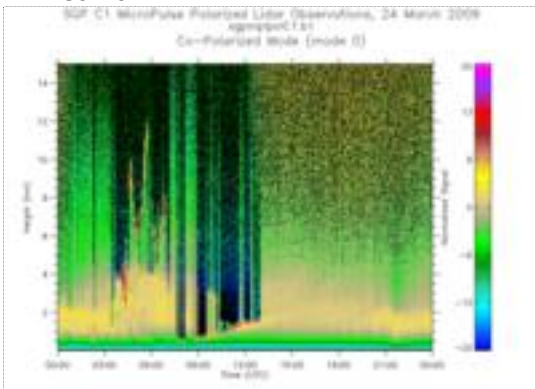


## Radiation

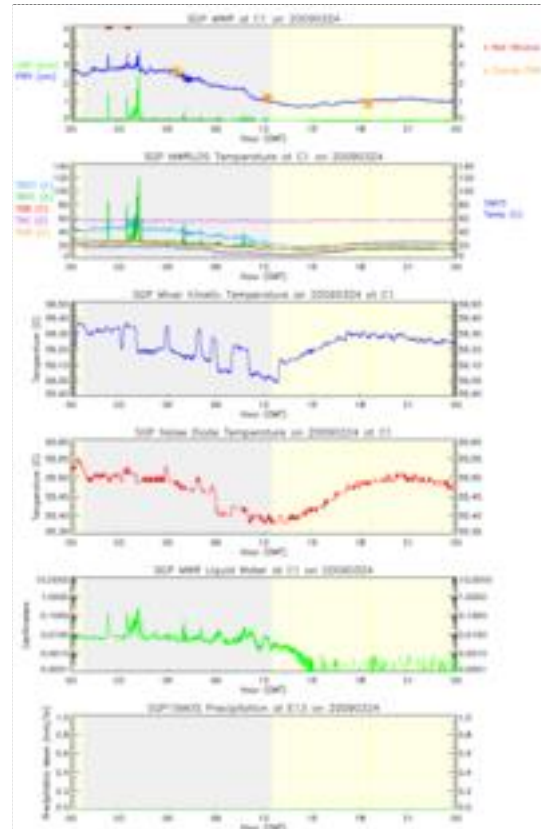


# SGP Plots

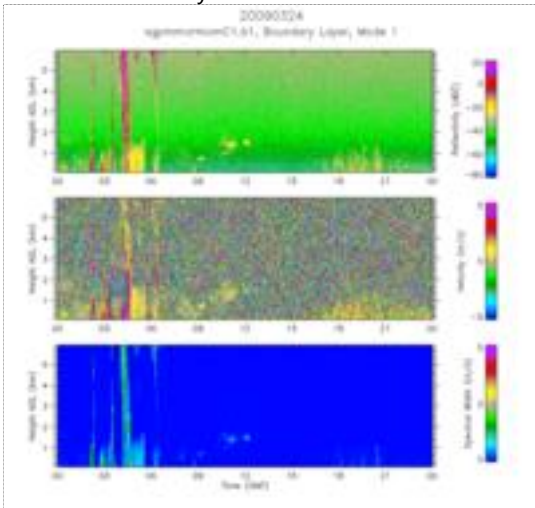
MPL Co-Pol



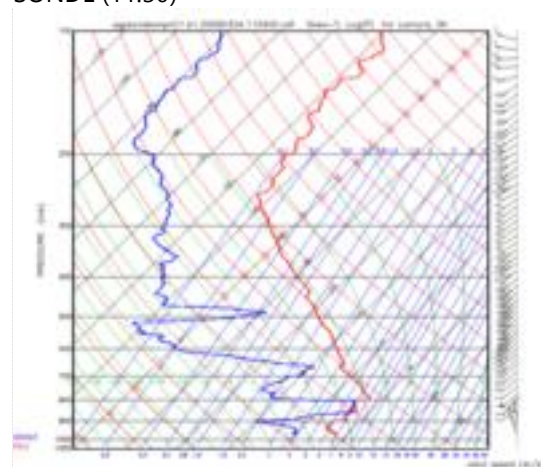
Microwave Radiometer



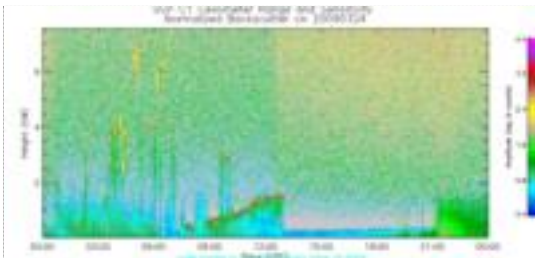
MMCR Bound. Layer Mode



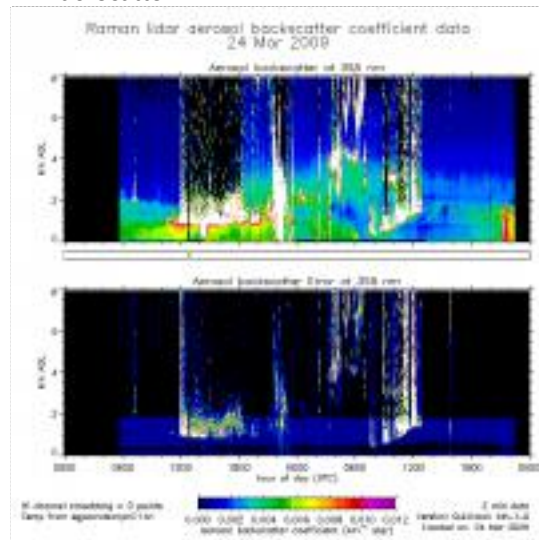
SONDE (11:30)



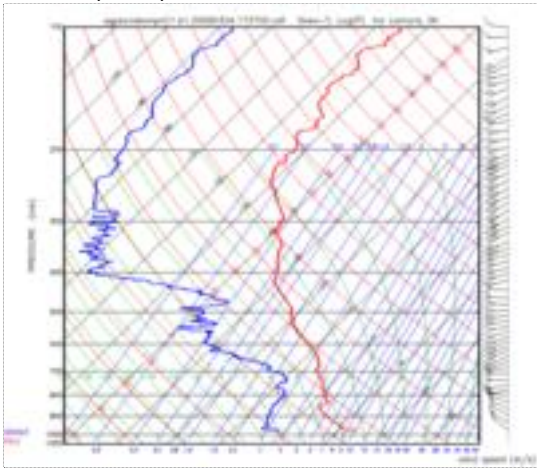
Ceilometer Backscatter



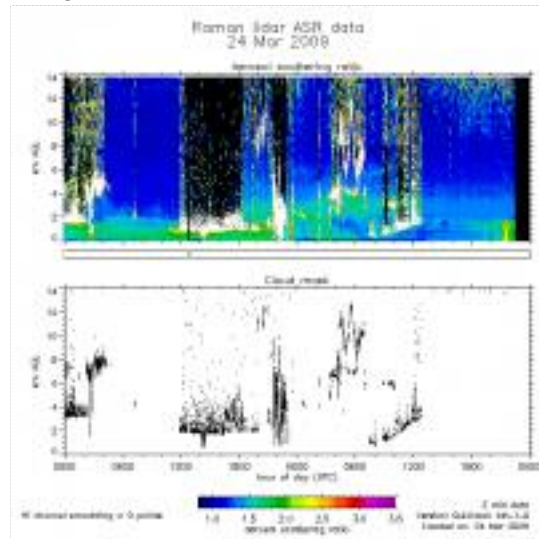
RL Backscatter



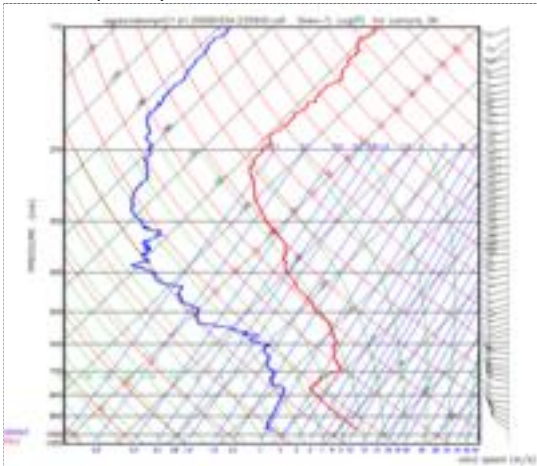
SONDE (17:30)



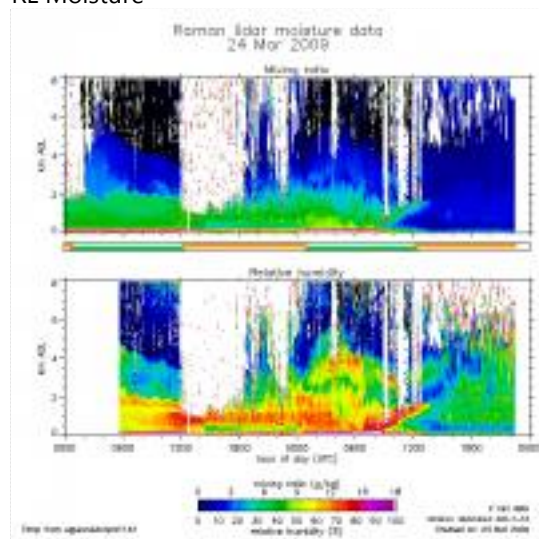
RL ASR



SONDE (23:30)

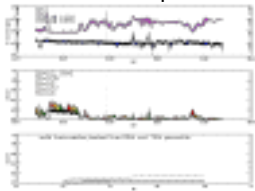


RL Moisture

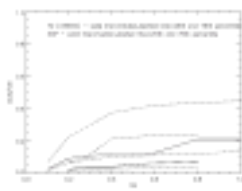


## CCN Activity

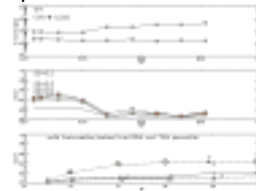
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as  $f(SS)$ ). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 06 Apr 2009



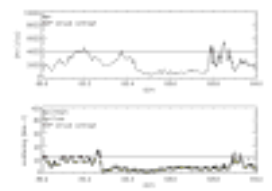
plot of CN and CCN and CCN/CN ratio as  $f(SS)$  from twin otter



comparison of CCN fraction on twin otter and at SGP

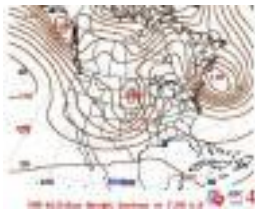


plot of CN and CCN and CCN fraction at SGP



plot of CN and light scattering at surface (SGP)

## Weather Maps



map3242




OK City: Broken; 28-32 knots | Tulsa: Scattered; 18-22 knots; 1023 mb



# 20090330

## Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
19:27 UTC	23:42 UTC	4.3	Clear-sky triangles at SGP & Cloud triangles 50 miles east of SGP	
Flight hours to date		48.8		

We departed out of Guthrie and climbed to 5200' to find the boundary layer. It was at 4500'. We transitioned to the CF at 4000'.

We did our first triangle at 4000'. Skies were clear.

We spiraled down to 500' agl and back up to 8500'. Clouds on the other side of Vance - well West.

We did our next triangle at 6500'. Skies were clear and nothing on the horizon, except a small patch to the west over Vance AFB and a small line of clouds to the far east.

We began our next triangle at 6300'. We abandoned that triangle after the northern leg and proceeded to try and work the clouds to the east. We caught up with them about 50 nm east of the CF.

We began a new triangle with the same tracks and distances as the triangle over the CF. The first altitude was 6300 near mid cloud level.

The next triangle was at 6000' just above the bases. Bases were not real consistant. A line of thunderstorms began developing over Vance and Ponca City stretching NE/SW.

The next one was at 6800' near the tops. Good clouds on northern leg.

The bases varied several hundred feet depending where we were. The tops varied just as much.

We did not complete the 6800' triangle. By this time the line of storms had developed and weather watches and SIGMETs had been issued.

We did not get the last profile in. We returned to Guthrie at full power to ensure we would beat the storms. I asked Jesse to shutdown the payload inflight to allow us to get the plane in the hangar as quickly as possible.

There were no issues/squawks with the plane.

## Weather Summary

Clear skies over SGP with clouds to the East and thunderstorms developing to the north.

## Aircraft Instrumentation Status

MFR shutdown less than an hour into the flight. Jesse said that all the changes he made the other day had reset. He will look into it tomorrow.

CIP will be shipped back to Guthrie on 4/1/2009.

## Surface Instrumentation Status

Nothing to report



## Flight Images



2043 UTC



2222 UTC



2150 UTC



2145 UTC



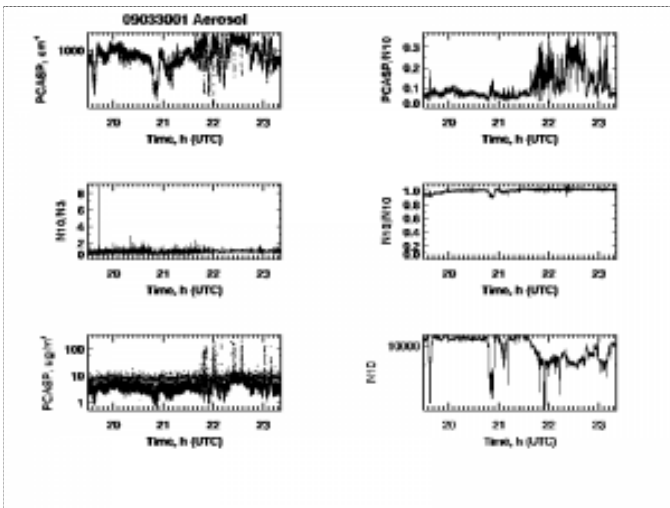
2148 UTC



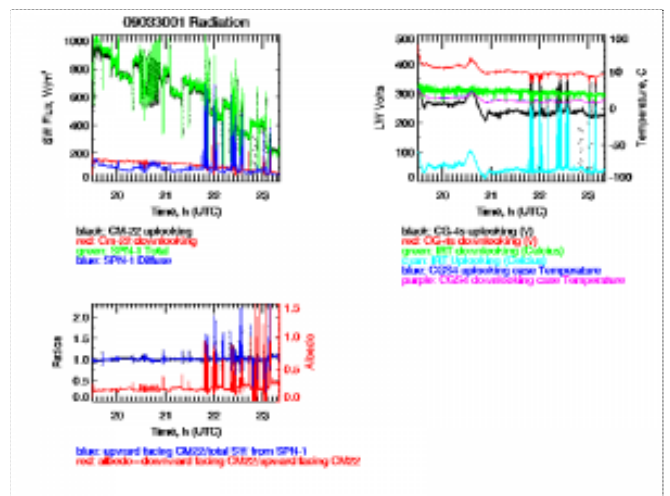
2157 UTC

## Flight Plots

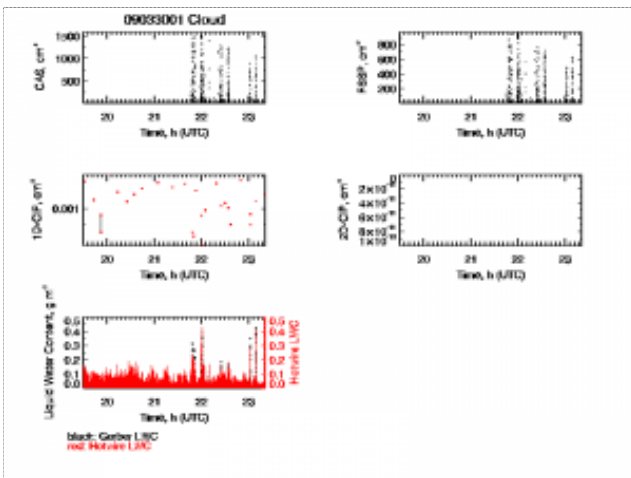
### Aerosol



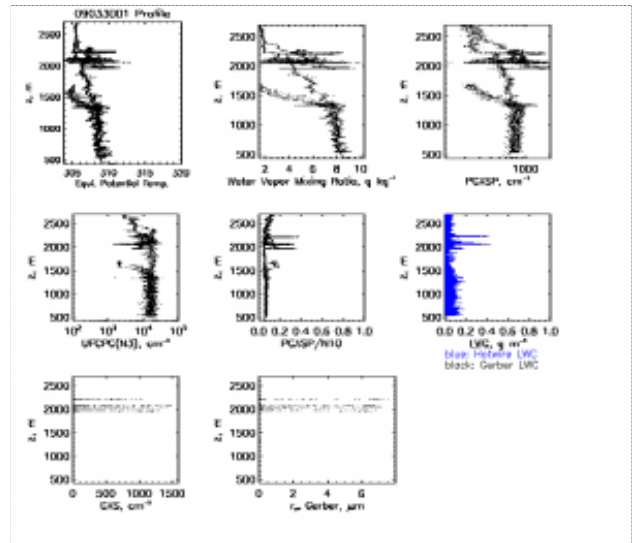
### Radiation



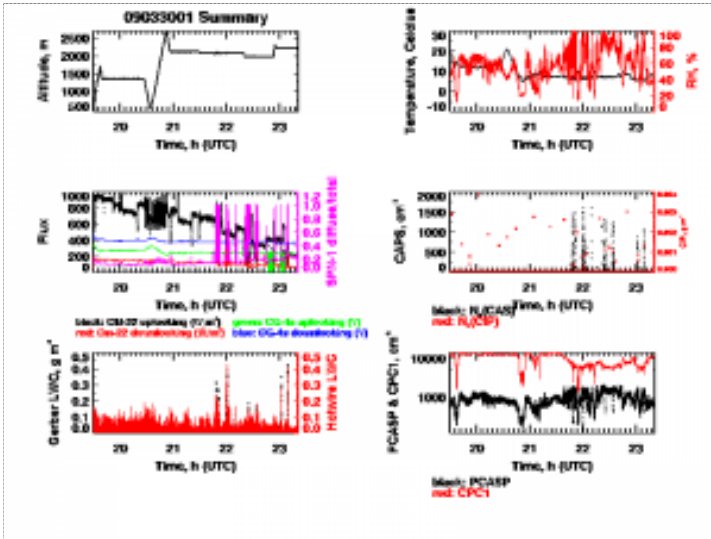
### Cloud



### Profile

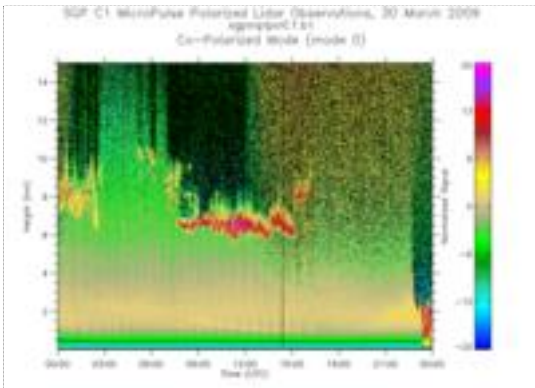


# Summary

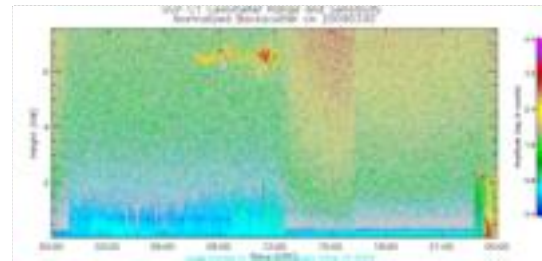


# SGP Plots

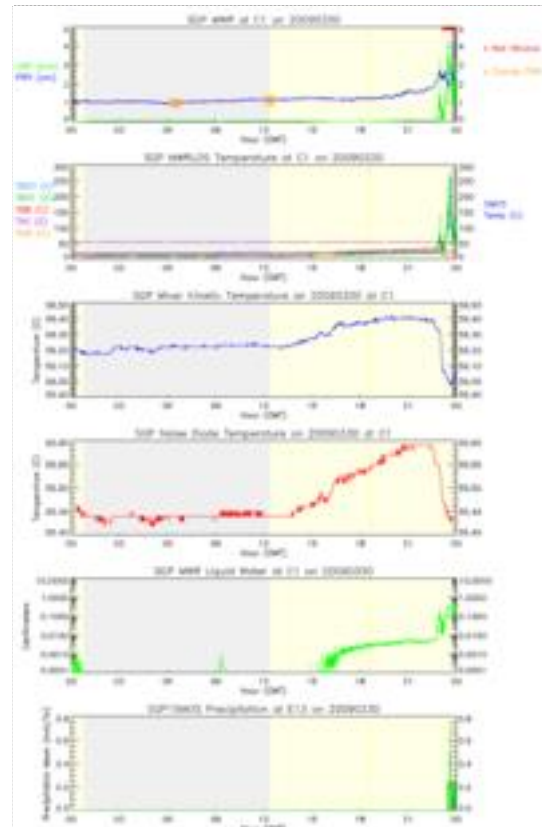
MPL Co-Pol



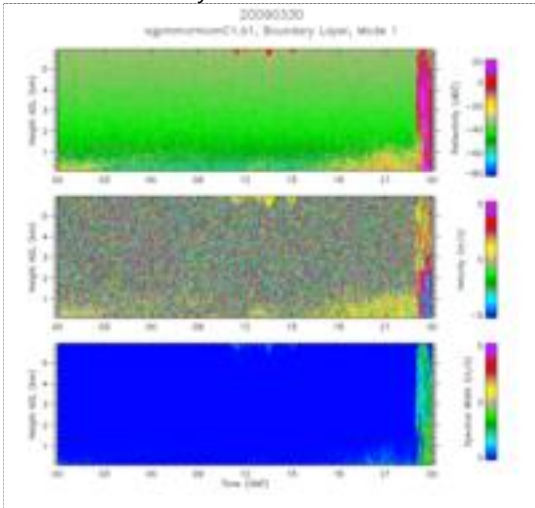
Ceilometer Backscatter



Microwave Radiometer

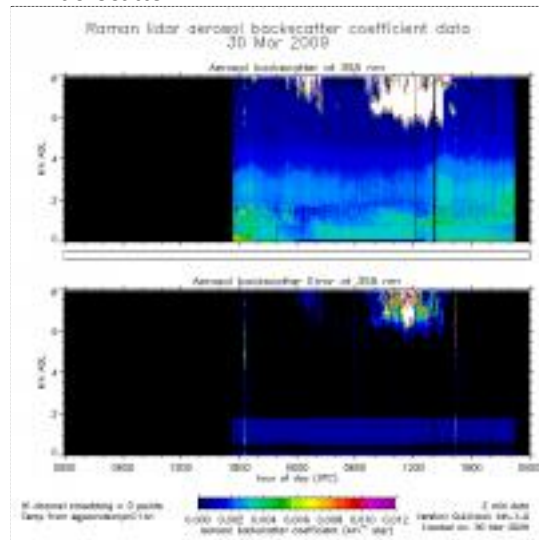
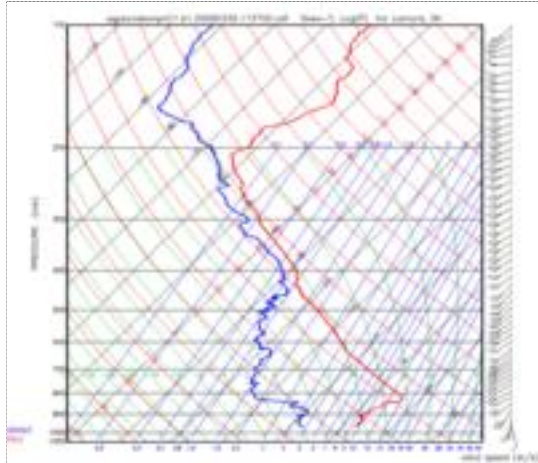


MMCR Bound. Layer Mode

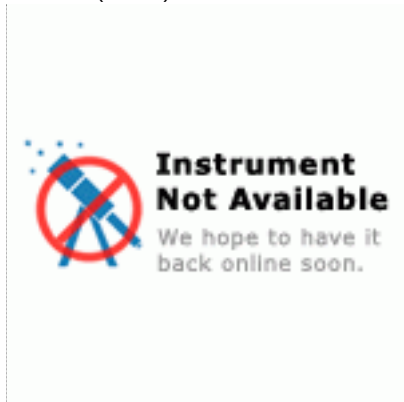


RL Backscatter

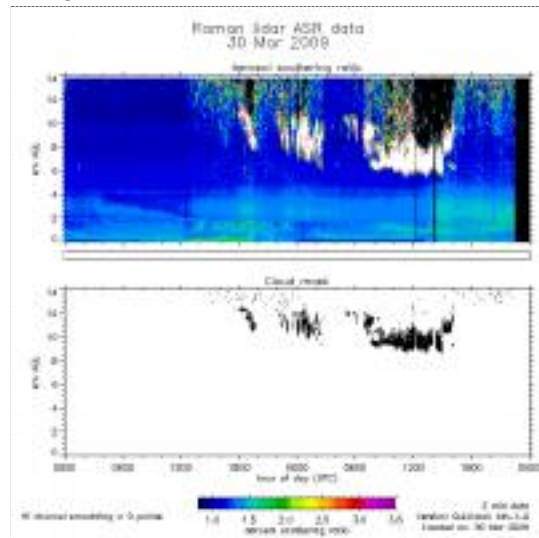
SONDE (11:30)



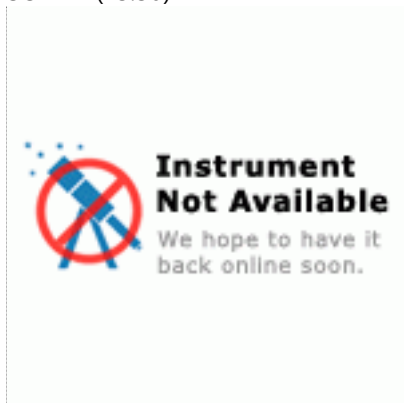
SONDE (17:30)



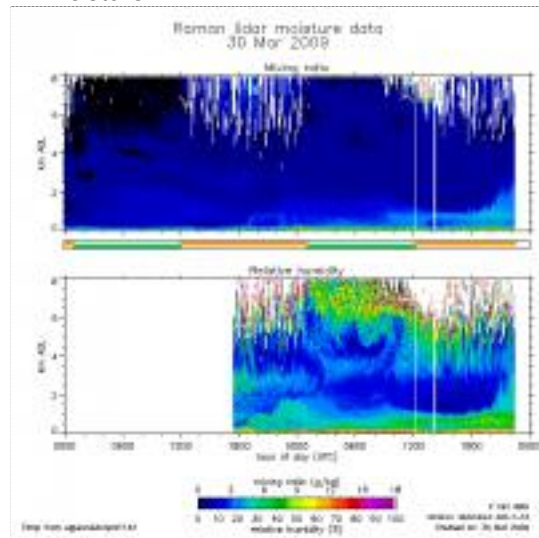
RL ASR



SONDE (23:30)



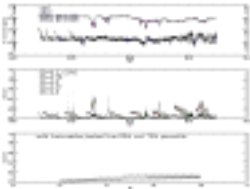
RL Moisture



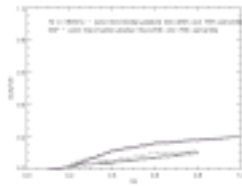
## CCN Activity

I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as  $f(SS)$ ). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP). I did not make a plot of CCN fraction measured at the surface so one can compare with that measured aloft because the CCN instrument was not doing normal SS scans. Elisabeth Andrews - 20 Apr 2009

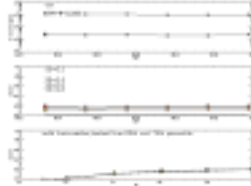
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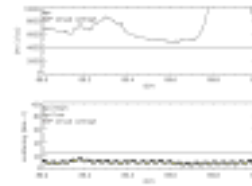
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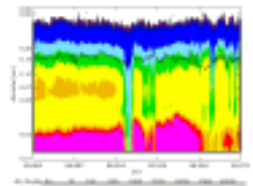
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

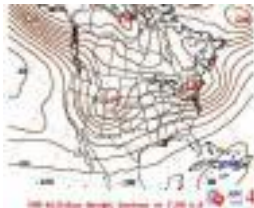


plot of CN and light scattering at surface (SGP)



TAMU DMA size distribution and CCN activation diameter

## Weather Maps



map3302



OK City: Broken; 13-17 knots | Tulsa: Clear; 8-12 knots; 1085 mb | 62 F/31 F