

RACORO Campaign Journal- April 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

20090403

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
18:30 UTC	23:51 UTC	5.4	Surface albedo & Turbulence at SGP	KML
Flight hours to date		54.1		

We departed Guthrie and climbed to 4500' to the CF. Just prior to the CF we climbed to 5000' and spiraled down over the site to 1500'/500 agl.

We did the pinwheel pattern at 1600'/600 agl. Starting time was 1911 and ending times were 2008.

We did the paperclip pattern at 1600'/600 agl. Times were 2014-2057.

We then did upwind/downwind legs.

Leg #1 2000' winds 140/09 start time 2104 (about 1000' above ground)

Leg #2 2500' winds 150/20 start time 2128

Leg #3 3000' winds 165/20 start time 2146

Leg #4 3500' winds 160/25 start time 2210

Leg #5 4000' winds 175/20 forgot to mark the time

Leg #6 4500' winds 175/20 start time 2251

We ended up back at the CF, climbed to 6500' and spiraled down to 1500'/500' agl.

We RTB's to Guthrie at 2317 and 2500'.

No clouds above or below. There were only one or two small brush fires in the area. One of these penetrated as part of the spiral at the end (was a smell of smoke). Picture below was taken during paperclip pattern (no smell of smoke).

We had to key the #1 VHF radio a couple of times to talk with Stillwater Tower between 2120-2125. I'll inform Anthony

Weather Summary

Clear skies.

Aircraft Instrumentation Status

MFR's ran the whole flight

2D-S cut out twice but was restarted both times

CIP ran fine

Flight Images



1854 UTC



2226 UTC



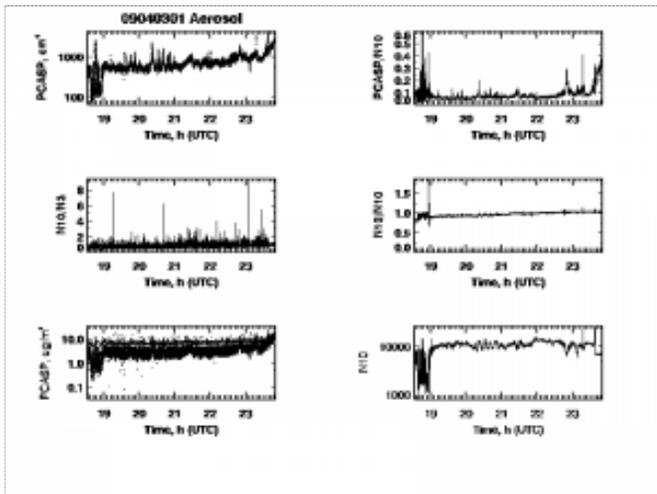
1967 UTC



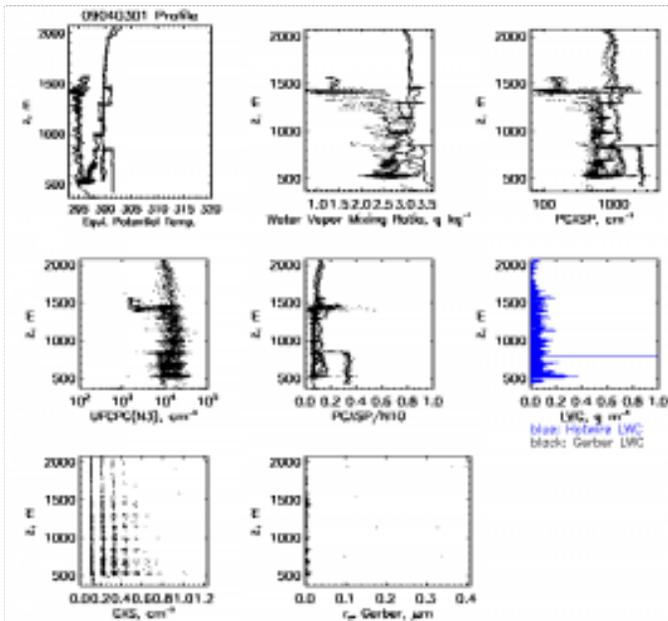
1965 UTC

Flight Plots

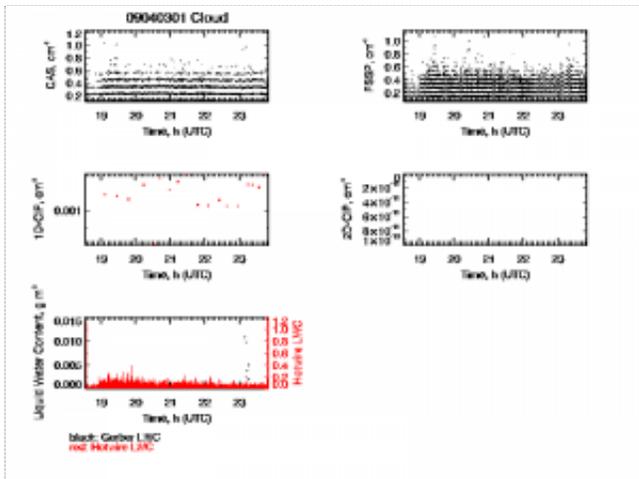
Aerosol



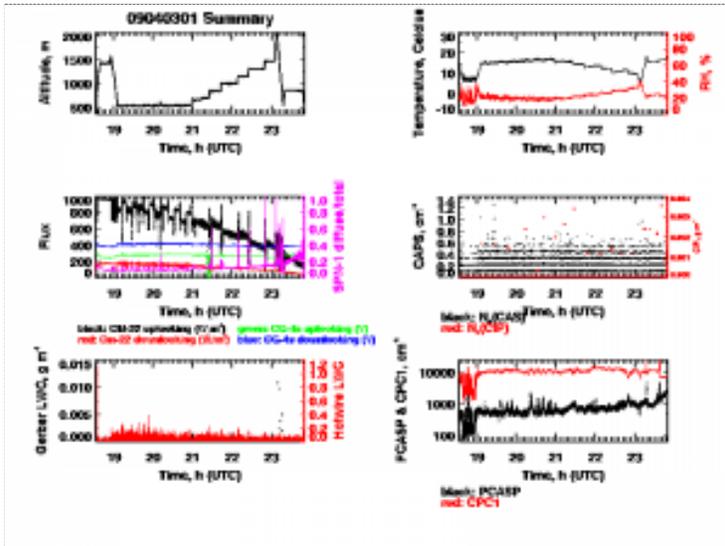
Profile



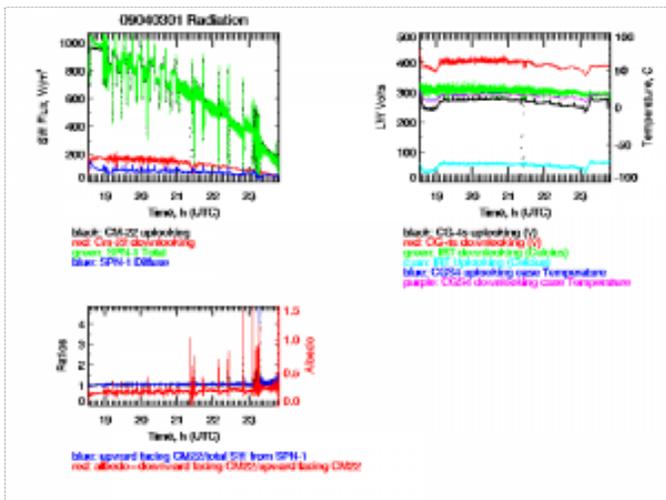
Cloud



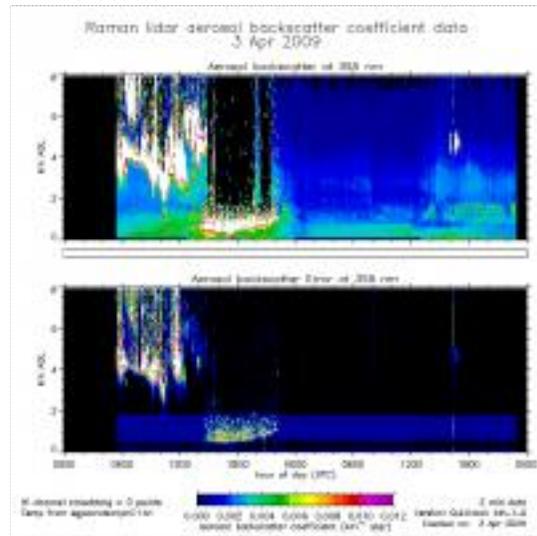
Summary



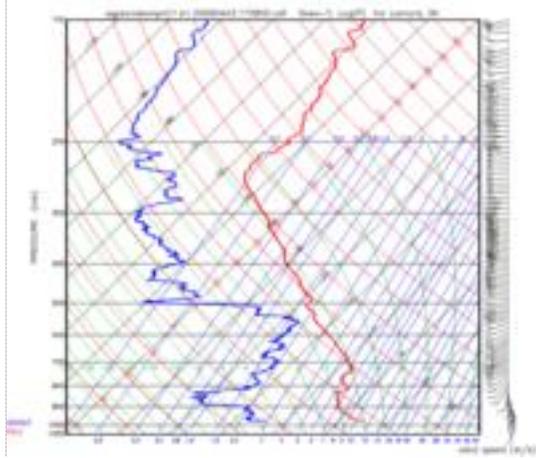
Radiation



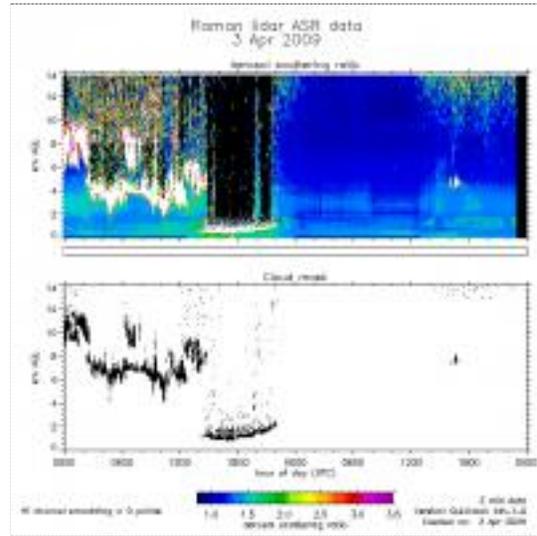
RL Backscatter



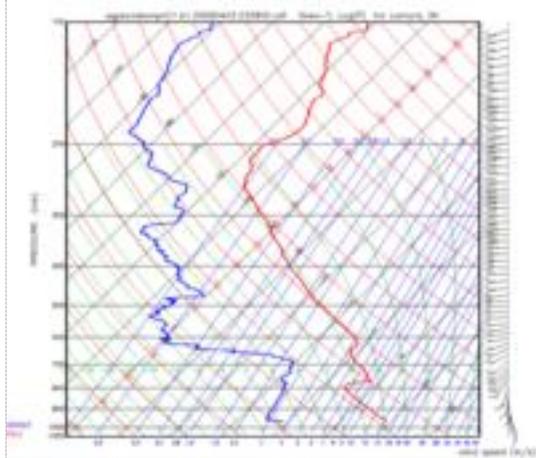
SONDE (17:30)



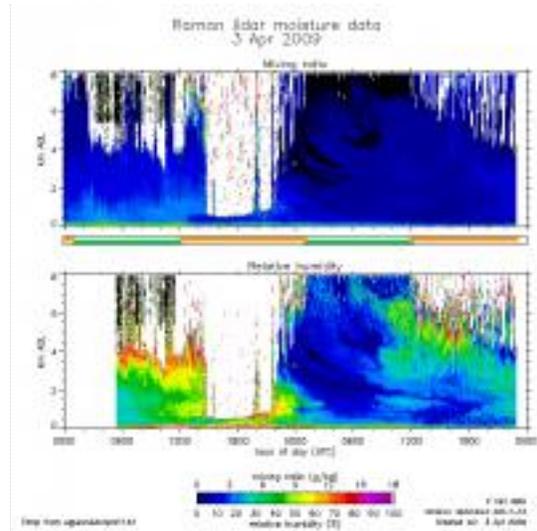
RL ASR



SONDE (23:30)



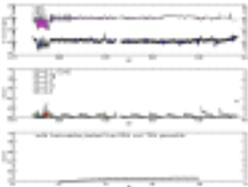
RL Moisture



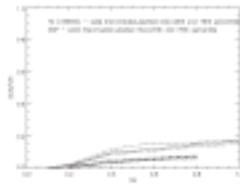
CCN Activity

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). 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

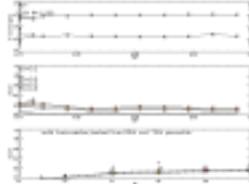
The last plot shows: I've made size distribution contour plots from the DMA operated by TAMU on the Twin Otter. These plots are overlaid with a line indicating the CCN activation diameter at 0.2% SS based on the CCN measurements on the Twin Otter. To do this, I cumulatively summed the DMA number concentration 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



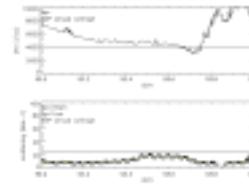
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



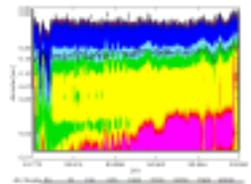
comparison of CCN fraction on twin otter and at SGP



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



map432



OK City: Broken; 13-17 knots | Tulsa: Overcast; 8-12 knots; 1067 mb | 51 F/34 F

20090407

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
14:00 UTC	18:05 UTC	4.1	First Flight - Surface albedo & Turbulence at SGP	KML
19:19 UTC	23:17 UTC	4.0	Second Flight - Surface albedo & Turbulence at SGP	KML
Flight hours to date		62.2		

Flight #1

We departed Guthrie and transited out to the CF at 4500. Smoke in the air - could not see it. Could only see in horizontal not overhead. Concentrations that looked as thick as clouds. We began the spiral at 4500' over the site at 1430Z to 1500'/500 agl.

We did the pinwheel pattern at 1600'/600' agl. Times were 1441-1539.

We did the paperclip pattern at 1600'/600' agl. Times were 1542-1626.

We then did the upwind/downwind legs starting at the CF.

Leg #1 2000' winds 215/04 started at 1633.

Leg #2 2300' winds 220/10 started at 1651.

Leg #3 2600' winds 215/10 started at 1731.

Leg #4 2900' winds 225/10 started at 1733.

We climbed up and did a slant profile on the way to Ponca City from 4200' to 1500'/500 agl. We then climbed up to pattern altitude and landed at Ponca City.

There were no issues with the power transfer.

There were a few smoke plumes on the horizon after takeoff. I don't know where they were coming from, but there were several different ones scattered over the horizon.

There were a couple of very small brush fires around the area. We smelled smoke in the cabin once.

Flight #2

We departed Ponca City and climbed to 5500' and did a spiral over the site to 1500'/500' agl. We were at 2700' at the satellite overpass.

We did the pinwheel pattern at 1600'/600' agl. Times were 1953-2049.

We did the paperclip pattern at 1600'/600' agl. Times were 2053-2138

We did the upwind/downwind legs. Heading N bound with head wind.

Leg#1 2000' winds 220/21 started at 2146.

Leg #2 3000' winds 215/20 started at 2206.

Leg #3 4000' winds 220/30 started at 2229. We ended this leg at 2239 and headed to Guthrie.

We climbed to 7000' and did a slant descent to 1500'/500 agl.

There was a large brush fire to the WSW of the CF. We flew through it's plume on the upwind/downwind legs. No smell of smoke, but it reduced visibility to about 3 miles.

There were several smoke plumes on the way back to Guthrie, similar to the ones we saw on the way out

Weather Summary

Clear skies.

Aircraft Instrumentation Status

Hydrad only recorded 1st flight and then memory became full. Jesse is installing a computer today just for the Hydrad so they don't believe this will be a problem in the future.

Flight Images



1412 UTC



1422 UTC



2229 UTC

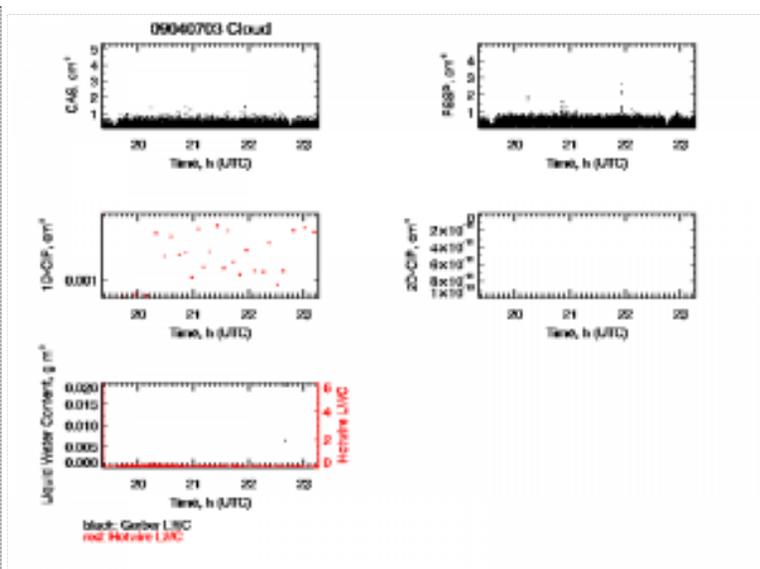
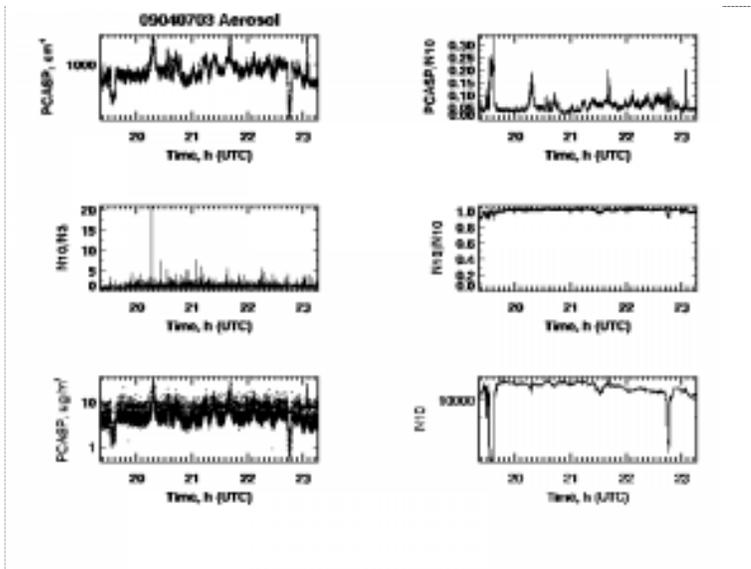
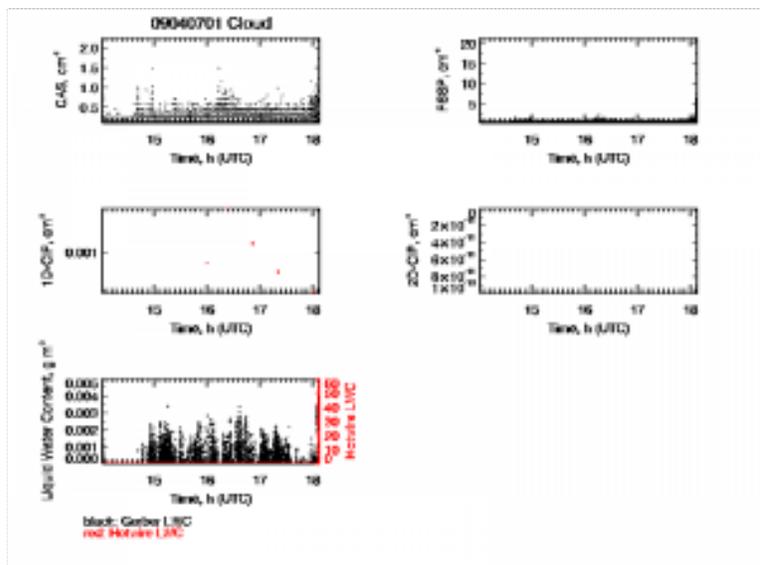
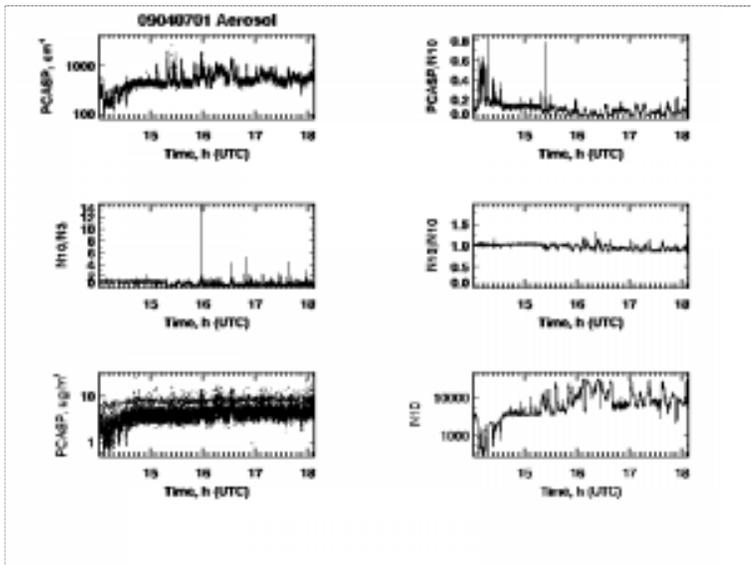


2243 UTC

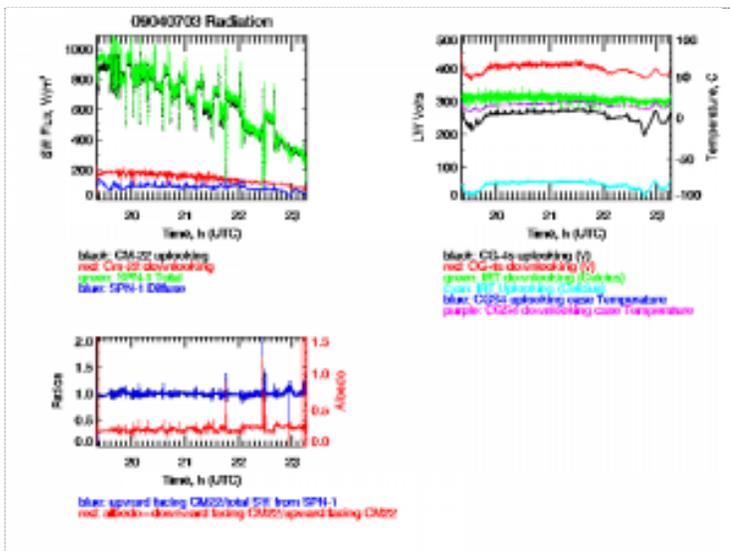
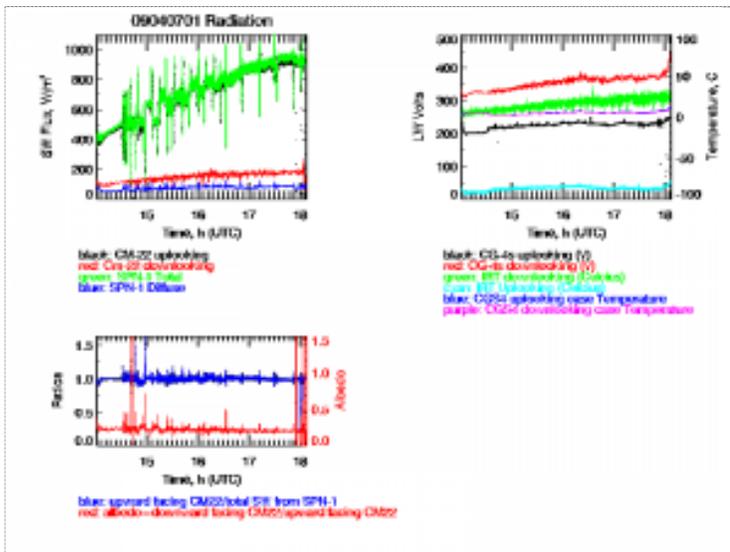
Flight Plots

Aerosol

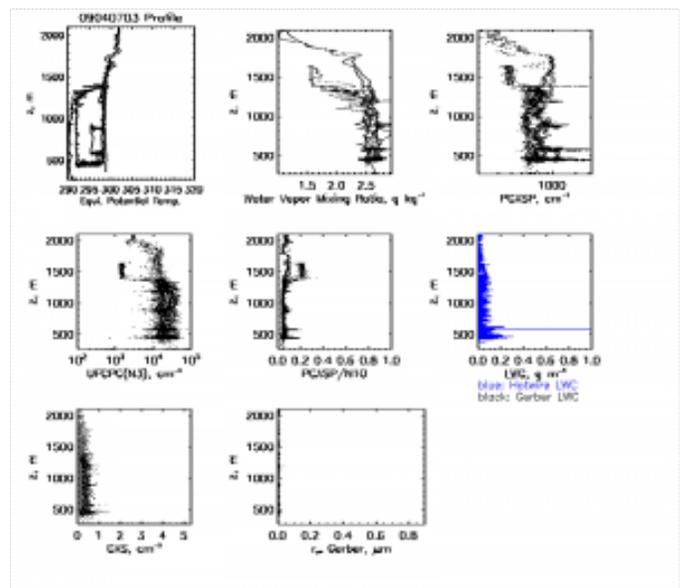
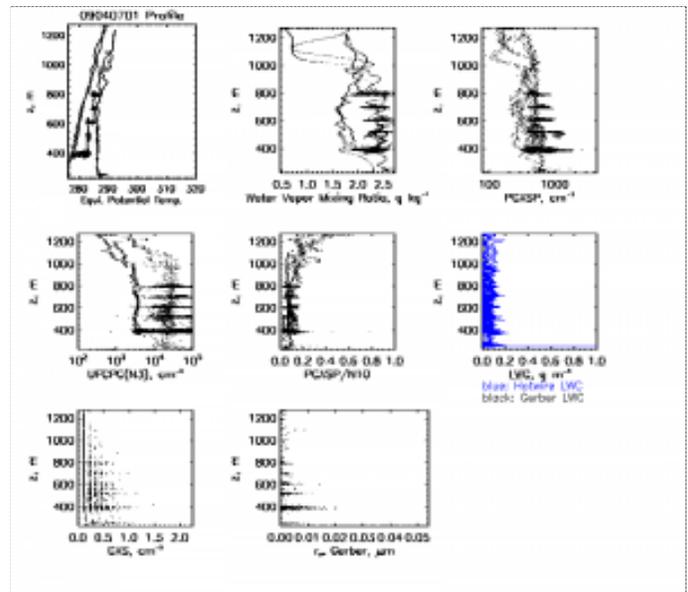
Cloud



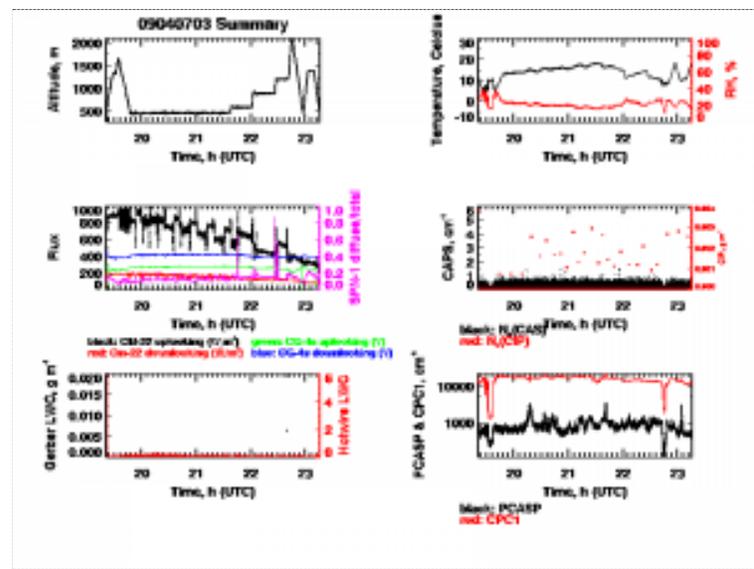
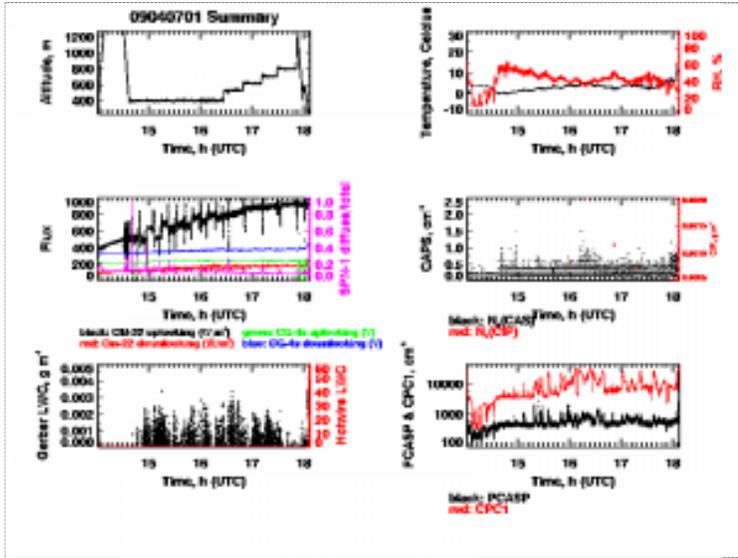
Radiation



Profile

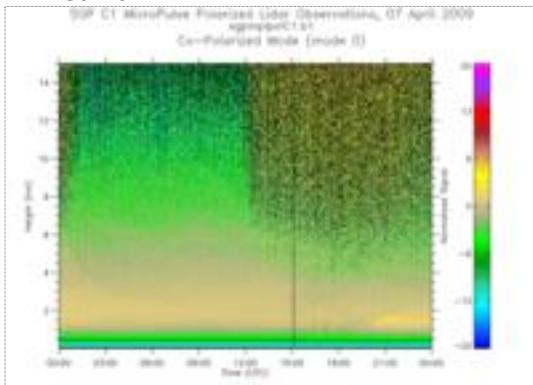


Summary

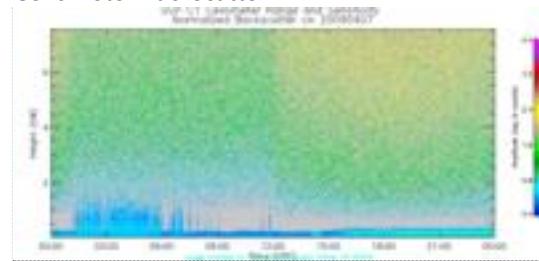


SGP Plots

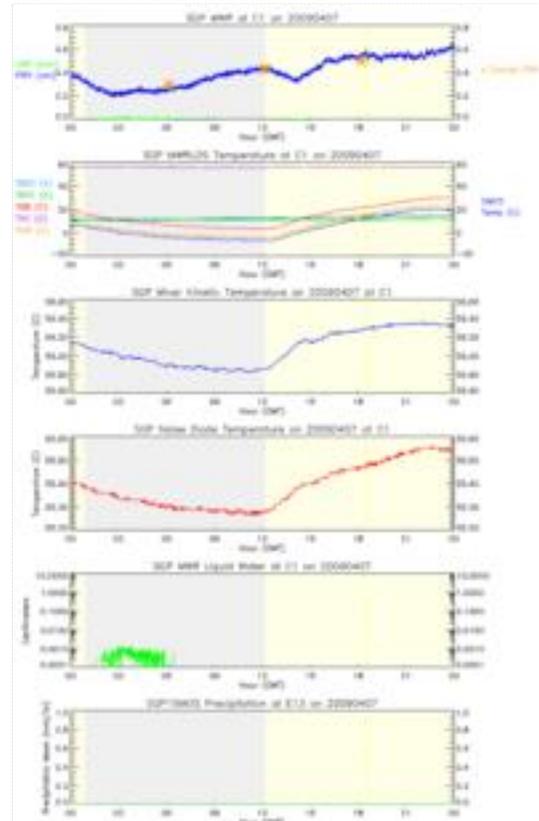
MPL Co-Pol



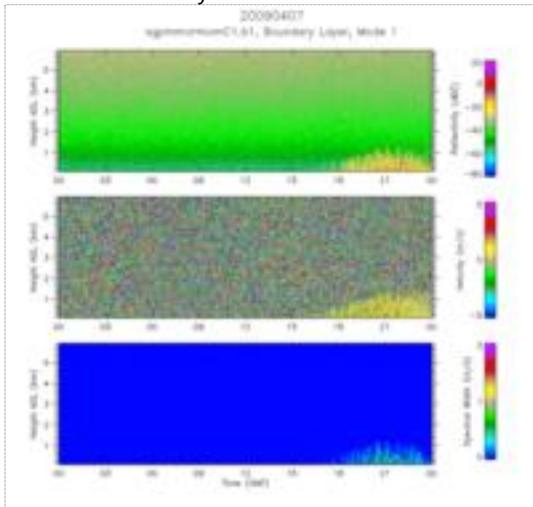
Ceilometer Backscatter



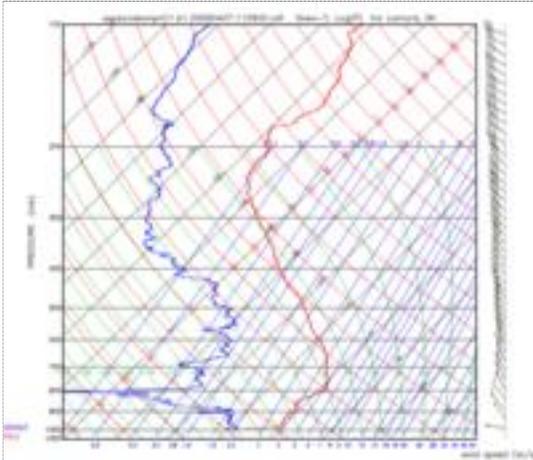
Microwave Radiometer



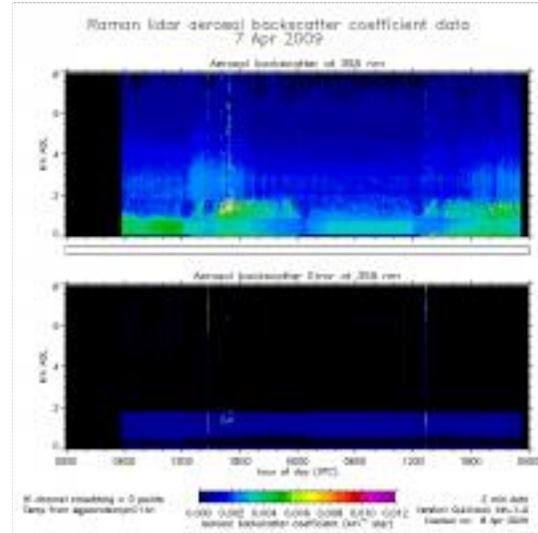
MMCR Bound. Layer Mode



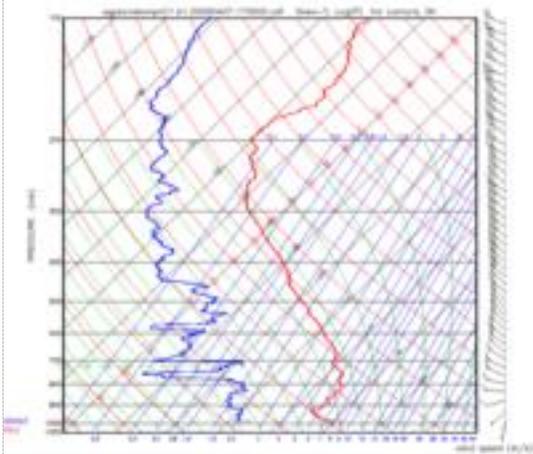
SONDE (11:30)



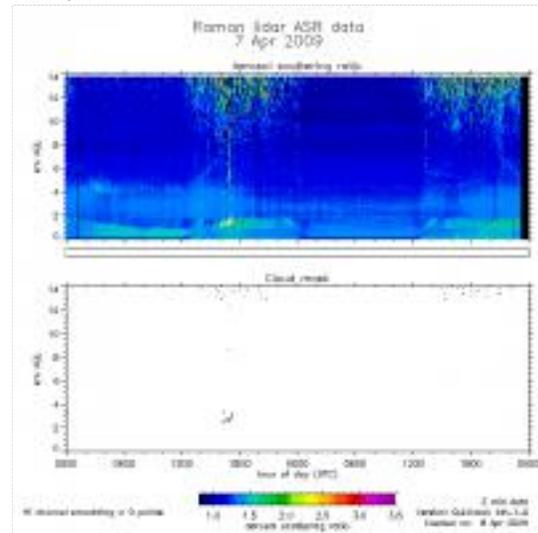
RL Backscatter



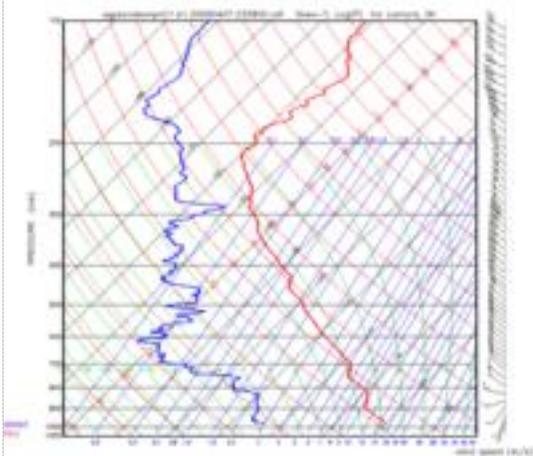
SONDE (17:30)



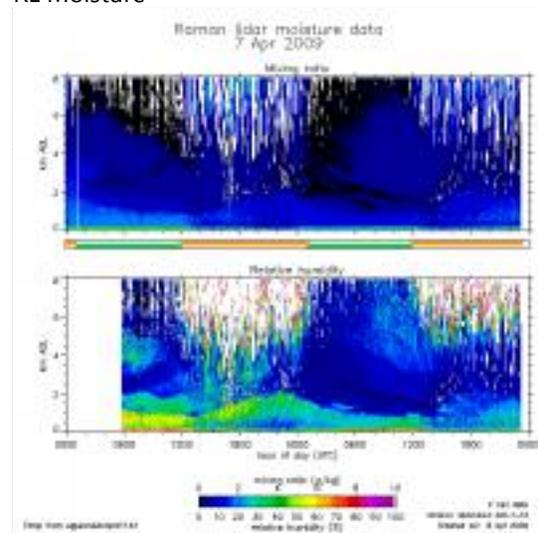
RL ASR



SONDE (23:30)



RL Moisture

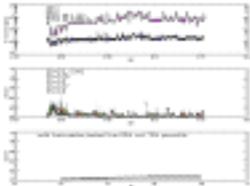


CCN Activity

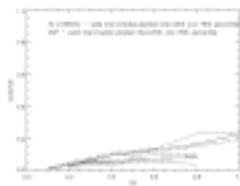
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-- Elisabeth Andrews - 28 Apr 2009



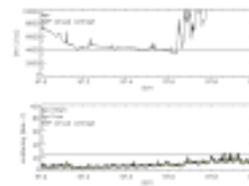
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter-flight1



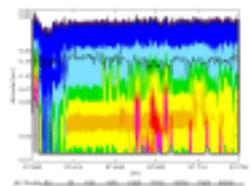
comparison of CCN fraction on twin otter and at SGP-flight1



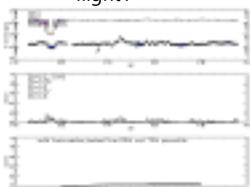
plot of CN and CCN and CCN fraction at SGP-flight1



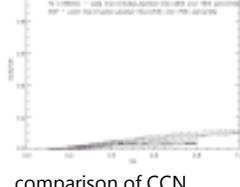
plot of CN and light scattering at surface (SGP)-flight1



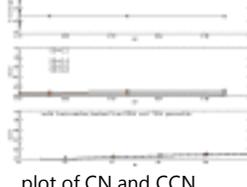
TAMU DMA size distribution and CCN activation diameter



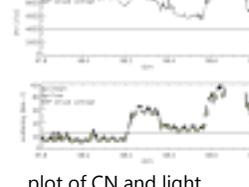
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter-flight2



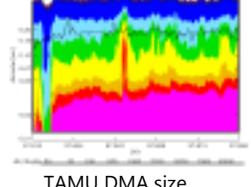
comparison of CCN fraction on twin otter and at SGP-flight2



plot of CN and CCN and CCN fraction at SGP-flight2



plot of CN and light scattering at surface (SGP)-flight2



TAMU DMA size distribution and CCN activation diameter

Weather Maps



map472



Clear; 18-22 knots; 1250 mb | 49 F/12 F

20090410

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
12:10 UTC	16:48 UTC	4.6	Cloud triangles southeast of Guthrie (few penetrations at cloud top due to sub-zero temperatures)	KML
Flight hours to date		66.8		

We departed Guthrie and proceeded SE towards Shawnee airport. Skies were overcast. We transited out at 3000' msl. OAT was +01C several hundred feet below the bases. Good visibility and no fires.

Triangle #1

Altitude was 3000'.

Leg #1 (East) 1229. Skies overcast

Leg #2 1238 (Southwest). Skies overcast, breaks in overcast distant S-SE

Leg #3 1252. (North) skies overcast

We were stuck at this point. The clouds were supercooled. We descended.

Triangle #2

Altitude was 2500'.

Leg #1 1307, skies overcast

Leg #2 1317 skies overcast

Leg #3 1252 skies overcast

Triangle #3

Altitude was 2000'.

Leg #1 1346, skies overcast

Leg #2 1356, skies overcast, breaks in overcast SE

Leg #3 1409 skies overcast

We were directly over Shawnee airport at this time. We descended down to about 20' above the runway and began a spiral climb at 1425Z to 3300'. We were 50-100' below the bases at 3300' OAT was +01.

Triangle #4

Altitude 3300'.

Leg #1 1430 skies overcast

Leg #2 1439 skies overcast, Had to descend to 3100' to remain clear of the clouds. The bases had fallen and so had the temperature. We were still about 50-100' below the bases. Breaks in overcast to the SW.

Leg #3 1453 skies broken to S-SW

At 1506 we completed triangle #4 and headed South to see if we could get above the clouds. We got on top near the southern point of the triangle. There was an inversion above at cloud tops. The clouds remained at or below zero.

Triangle #5

Altitude stated at 4700 +3C about 100' above the clouds so we descended into the tops. Wrong thing to do because of the inversion, the clouds remained below freezing. We did hit a few whisps. We did it 500' above the tops at 5200'.

Leg #1 (North) 1521 we did the climb to 5200' at 1529.

Leg #2 (East) 1539 Mostly clear above, 3 very small patches of cirrus to the distant SE. They burned off or moved out of sight within 5 minutes.

Leg #3 (SW) 1549 clear skies above, cirrus on the SW horizon. Tops of the clouds had risen to 5200 on this leg. We did hit a few tops that remained above freezing.

We climbed to 6000' and did a spiral down to 1500'/500 agl. We slanted down through the cloud field.

We RTB'd at 1611 at 2000'.

Weather Summary

Overcast with scattered clouds.

Aircraft Instrumentation Status

Per Jesse everything appears to be running fine.

Surface Instrumentation Status

Nothing to report

Flight Images



1240 UTC



1349 UTC



1431 UTC



1520 UTC



1537 UTC



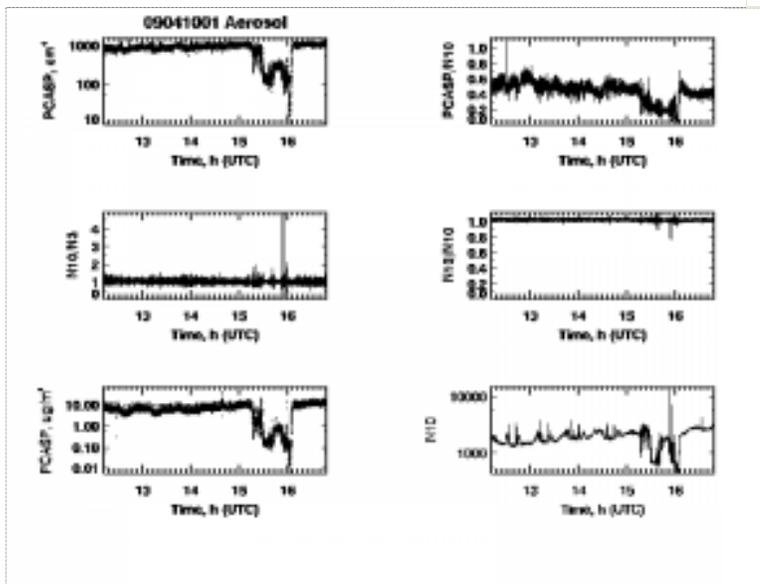
1602 UTC



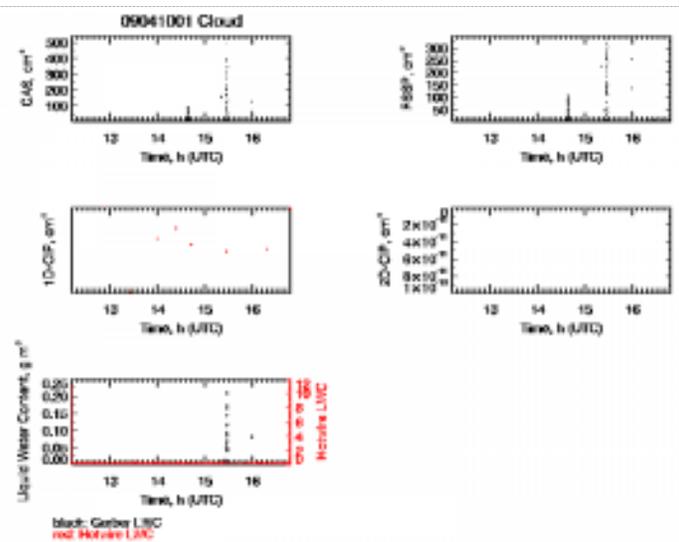
1528 UTC

Flight Plots

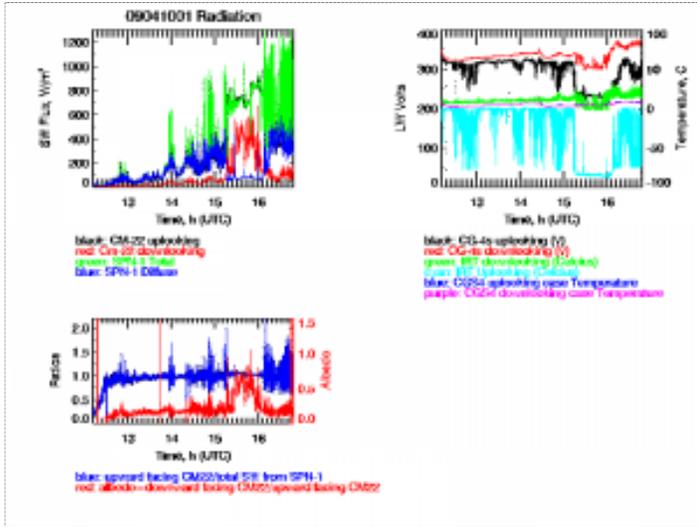
Aerosol



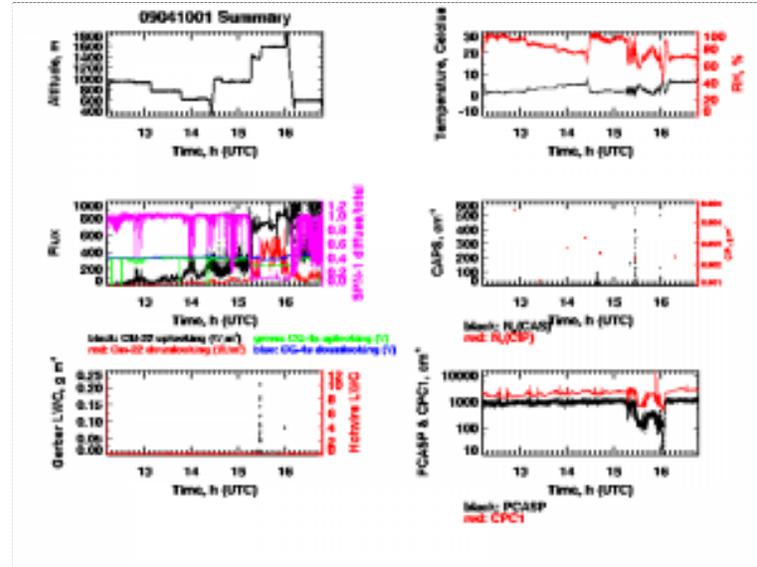
Cloud



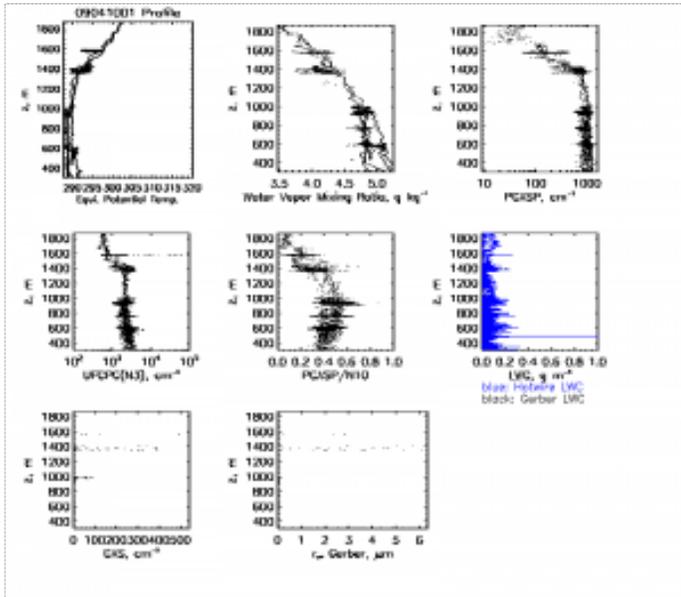
Radiation



Summary

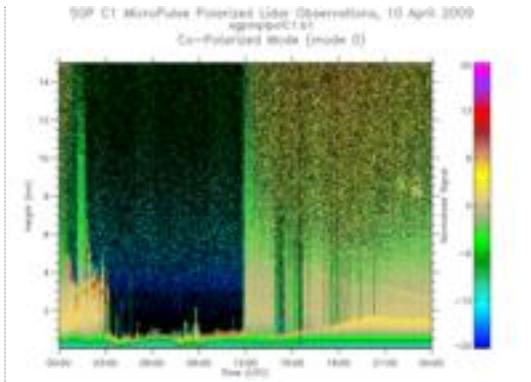


Profile

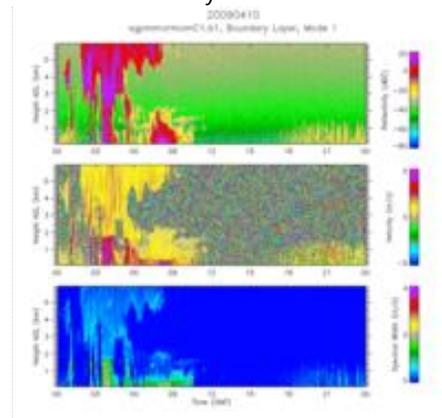


SGP Plots

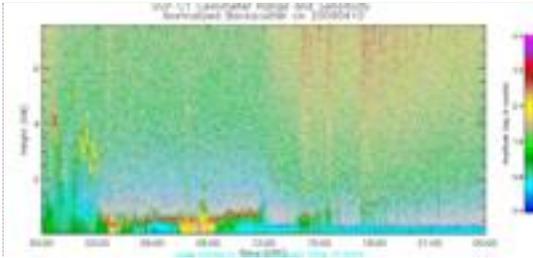
MPL Co-Pol



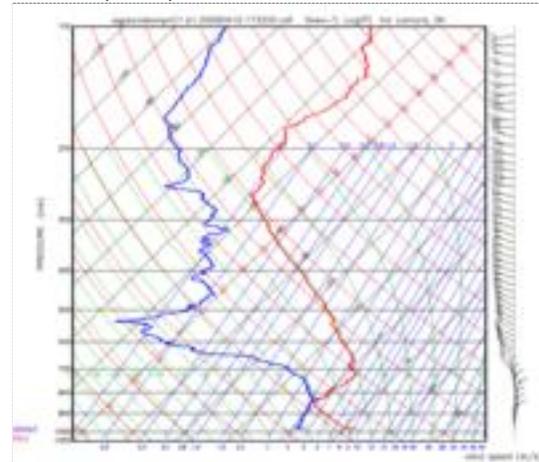
MMCR Bound. Layer Mode



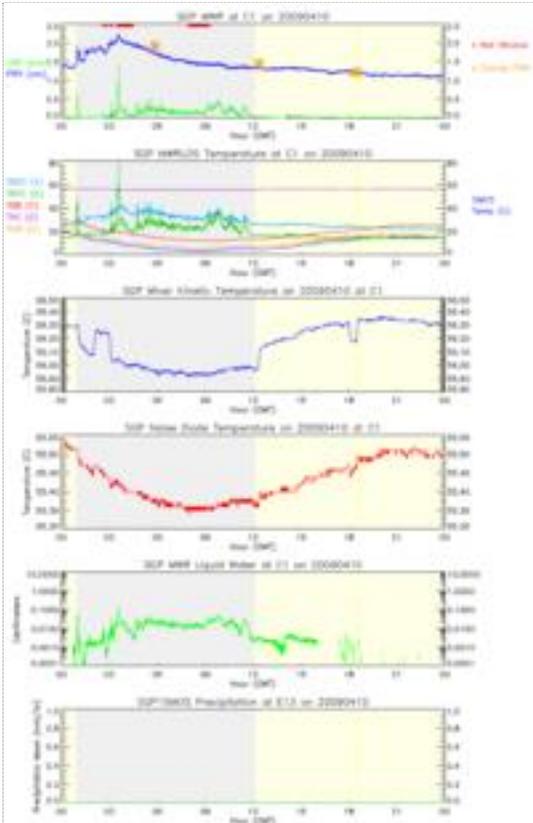
Ceilometer Backscatter



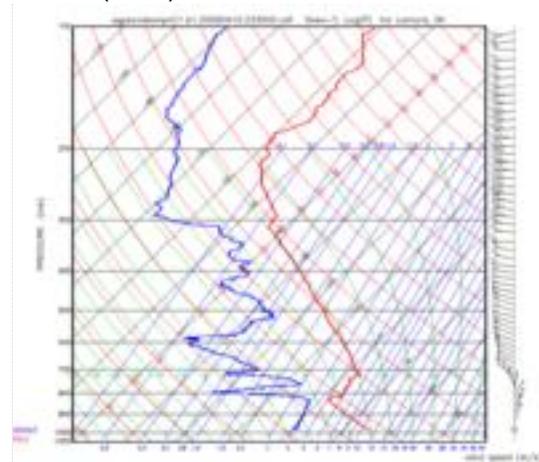
SONDE (17:30)



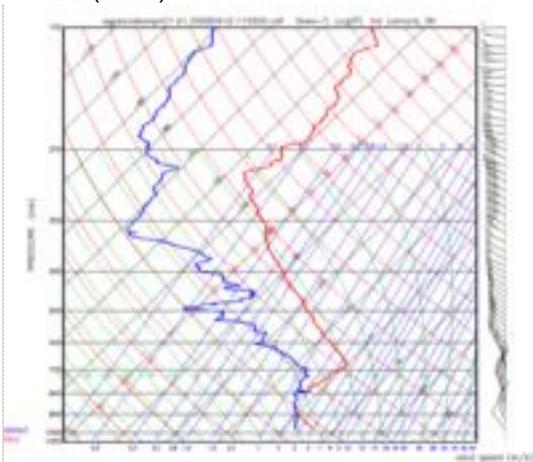
Microwave Radiometer



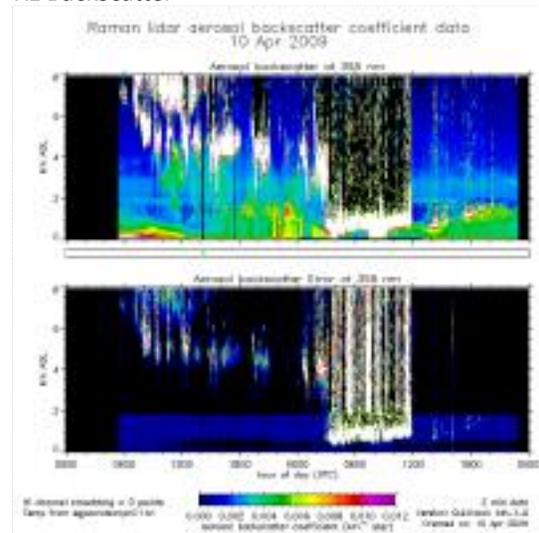
SONDE (23:30)



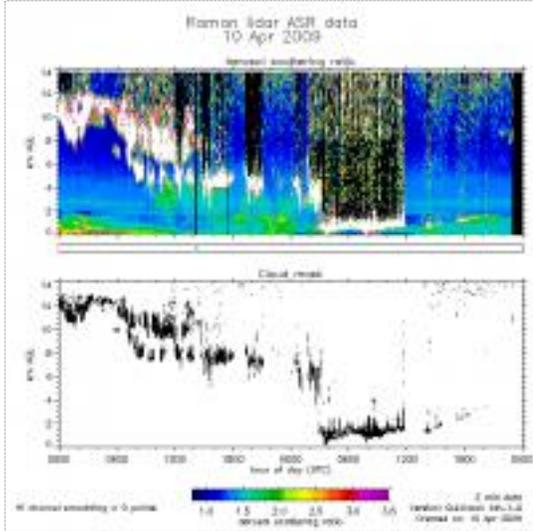
SONDE (11:30)



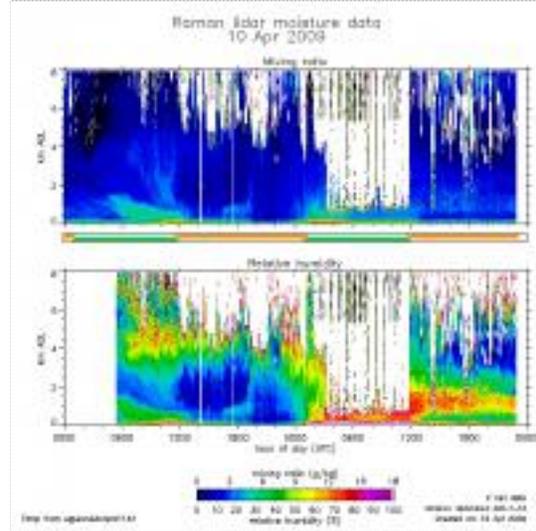
RL Backscatter



RL ASR



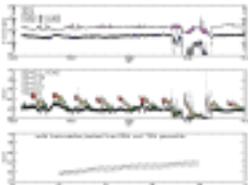
RL Moisture



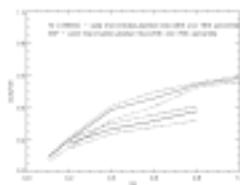
CCN Activity

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

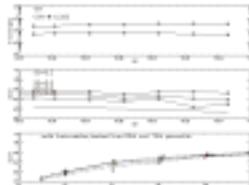
The last 3 plots show: I've made size distribution contour plots from the DMA operated by TAMU on the Twin Otter. These plots are overlaid with a line indicating the CCN activation diameter at 0.2% SS based on the CCN measurements on the Twin Otter. To do this, I cumulatively summed the DMA number concentration 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



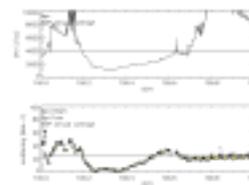
plot of CN and CCN and CCN/CN ratio as f(SS) from twin otter



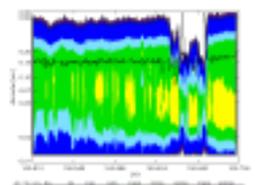
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP



plot of CN and CCN and CCN fraction at SGP

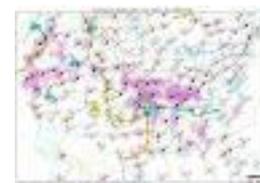


TAMU DMA size distribution and CCN activation diameter

Weather Maps



map4102



OK City: Clear; 28-32 knots | Tulsa: 1/8 cloud coverage; 8-12 knots; 917 mb | 70 F/29 F

20090414

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
15:25 UTC	20:35 UTC	5.2	Surface albedo & Turbulence at SGP	KML
Flight hours to date		72.0		

We took off about 10 minutes behind schedule due to a fuel indication problem.

We climbed to 6500' enroute to the CF. We spiraled down over the CF at 1555z from 6500' to 1500'/500 agl.

We did the pinwheel pattern at 1600'/600' agl. Times were 1611-1707. There was thin scattered cirrus overhead. By the end of this pattern the cirrus clouds were gone.

We did the paperclip patterns at 1600'/600' agl. Times were 1710-1753. The cirrus moved out. Some on the horizon.

We did the upwind/downwind legs. There was thin scattered cirrus in the area the rest of the flight, some old contrails, some patchy cirrus.

Leg #1 2000'(Eastbound) winds 120/3 time 1758z

Leg #2 2700' (Westbound) winds NIL. We ran the same 120 line.1820z

Leg #3 3700' (Northbound) winds 180/8. I don't know how/why we ended up at 3700 instead of 3400'. Blame it on my sloppy handwriting in the turbulence. Time 1842z

Leg #4 4100' (Southbound) winds 185/5 time 1903z

Leg #5 4800' (NE) winds 235/5 time 1922.

Leg #6 5500' (SW) winds were 300/17. We would have had to reposition 30 miles to the south to get there, and we didn't have the time. We ran the same 235 line as we did at 4800'. Time 1941z.

We did a spiral descent over the CF from 5500' to 1500'/500 agl. 1958z.

We RTB's at 2007z and 3500'.

Weather Summary

Mostly clear with scattered thin cirrus clouds.

Aircraft Instrumentation Status

Notes from Jesse: DMA shut down for no apparent reason towards the end of the flight, before the last spiral. He is not sure of the exact time.

PCASP, FSSP, and CAPS did not initialize properly.

Surface Instrumentation Status

nothing to report

Flight Images



1532 UTC



1533 UTC



1843 UTC



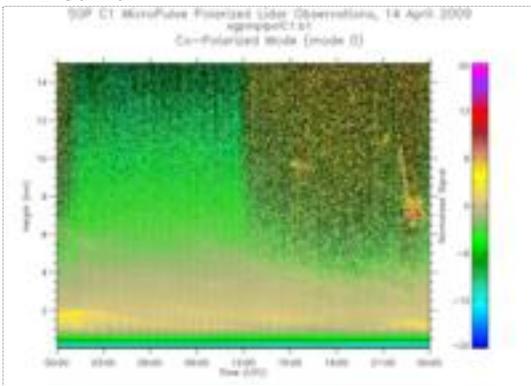
1842 UTC



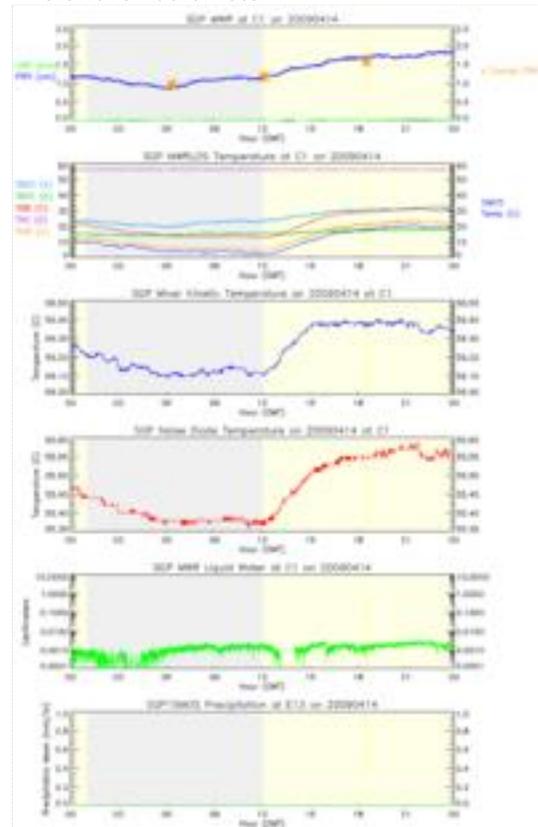
2001 UTC

SGP Plots

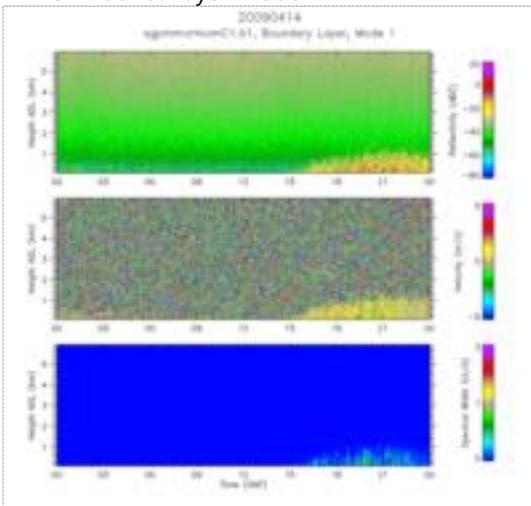
MPL Co-Pol



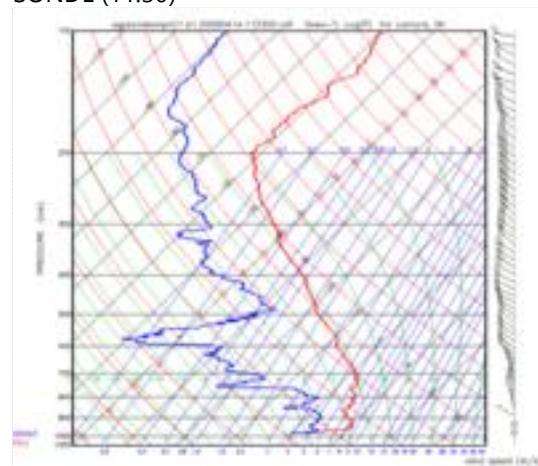
Microwave Radiometer



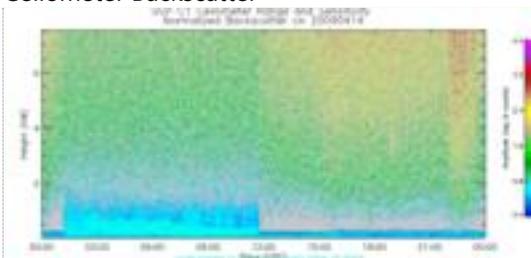
MMCR Bound. Layer Mode



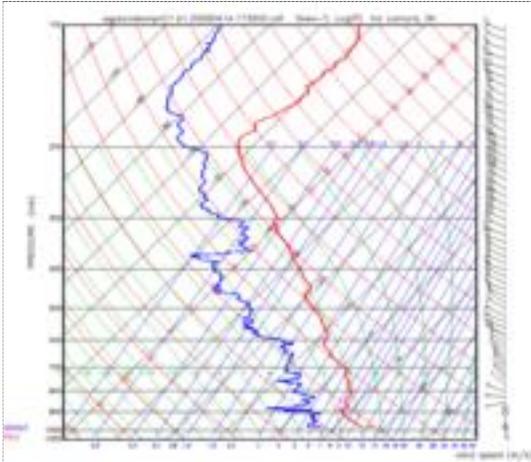
SONDE (11:30)



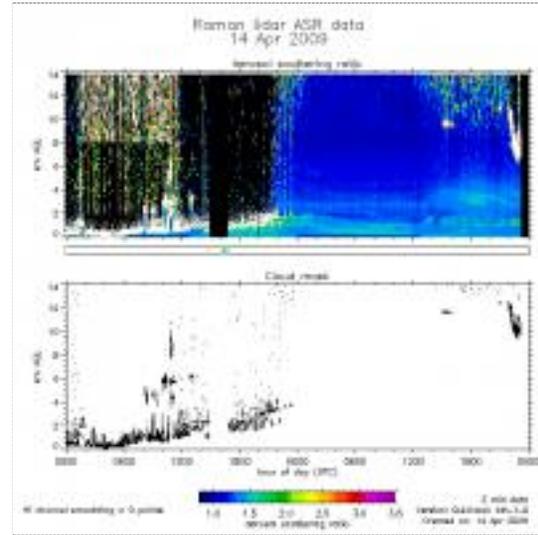
Ceilometer Backscatter



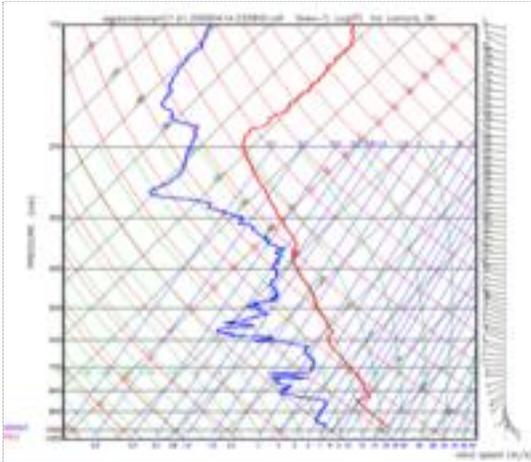
SONDE (17:30)



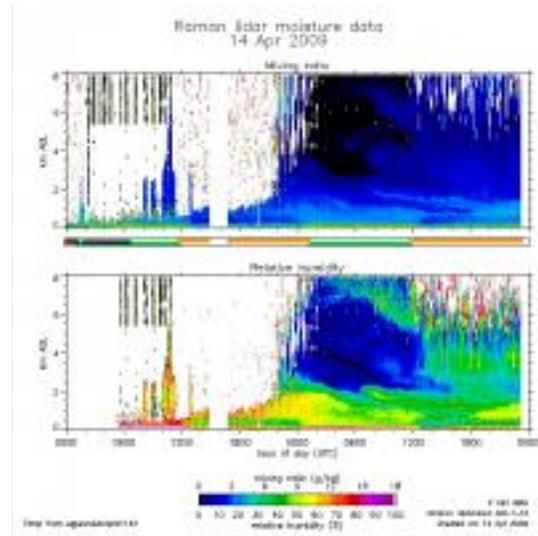
RL ASR



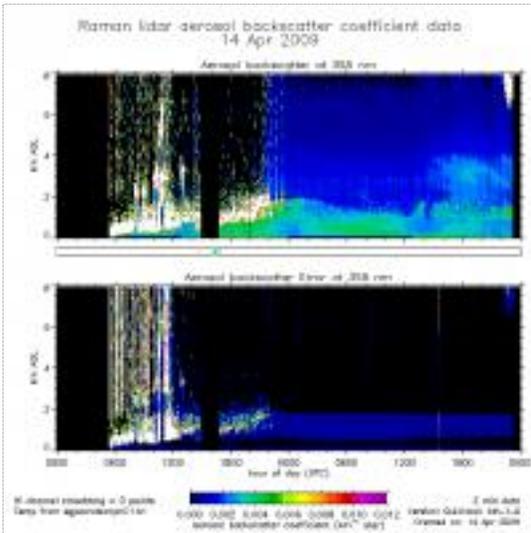
SONDE (23:30)



RL Moisture



RL Backscatter

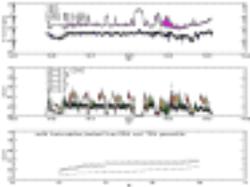


CCN Activity

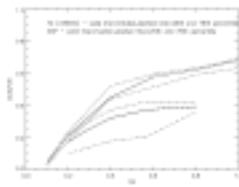
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP). I did not make a plot of CCN fraction measured at the surface so one can compare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

The last 3 plots show: 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.

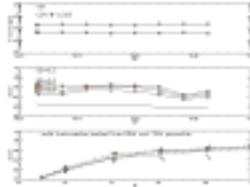
-- Elisabeth Andrews - 07 May 2009



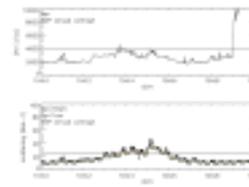
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



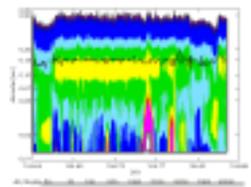
comparison of CCN fraction on twin otter and at SGP



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



map4142



OK City: Broken; 3-7 knots | Tulsa: Overcast; 8-12 knots; 1128 mb | 55 F/41 F

20090416

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
16:58 UTC	21:11 UTC	4.2	Cloud triangles at SGP (no clouds penetrated)	KML
Flight hours to date		76.2		

We departed out of Guthrie and climbed to 4800. We cruised out to the CF at 4200'. Patchy cirrus above. No other clouds in the area.

Triangle #1 4200' Broken cirrus above, no other clouds

Leg 1 – time 1720

Leg 2 – time 1731

Leg 3 – time 1746

Back at the CF we descended to 1500'/500 agl and did a spiral climb to 6500'. 1757Z

Triangle #2 5000' Broken cirrus, no other clouds in the area.

Leg 1 – time 1809

Leg 2 – time 1820

Leg 3 – time 1836

Triangle #3 4400' Broken to Overcast cirrus above. No other clouds in the area.

Leg 1 – time 1844

Leg 2 – time 1855

Leg 3 – time 1909

Triangle #4 4000' Overcast cirrus above. Mid level clouds to the west. Enid was reporting 9000 scattered.

Leg 1 – time 1917

Leg 2 – time 1928

Leg 3 – time 1942

Triangle #5 3800' Overcast cirrus above. 9000' clouds were moving slightly closer, but still out of range.

Leg 1 – time 1950

Leg 2 – time 2001

Leg 3 – time 2014

We climbed to 6500 over the CF and did a spiral descent to 1500'/500 agl.

There were defined layers but they don't show real well in pictures.

We RTB'd at 4600 for about 10 minutes and then dropped to 3000 for the rest of the flight.

No issues with the plane.

Weather Summary

Mostly clear skies with patchy cirrus.

Aircraft Instrumentation Status

Jesse said there were no issues with any instruments as far as he could tell.

2-D CIP has a stuck bit

Surface Instrumentation Status

nothing to report

Flight Images



1707 UTC



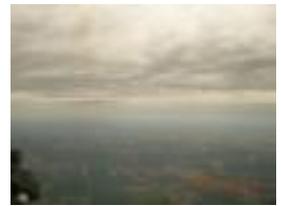
1824 UTC



1920 UTC



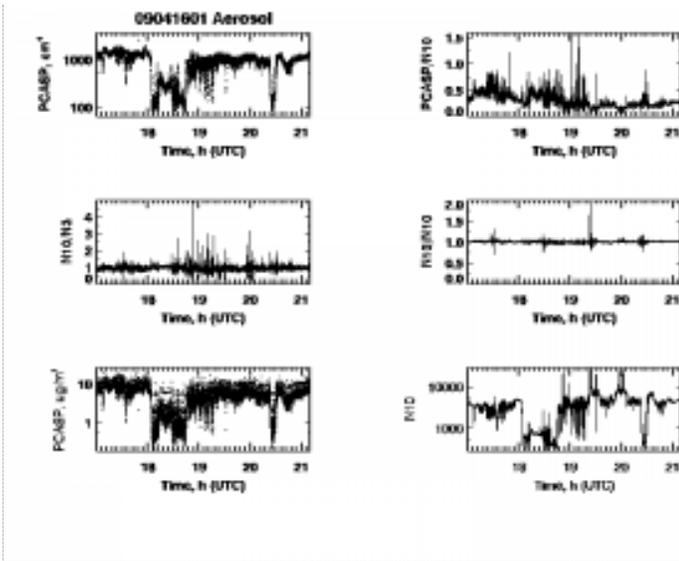
1934 UTC



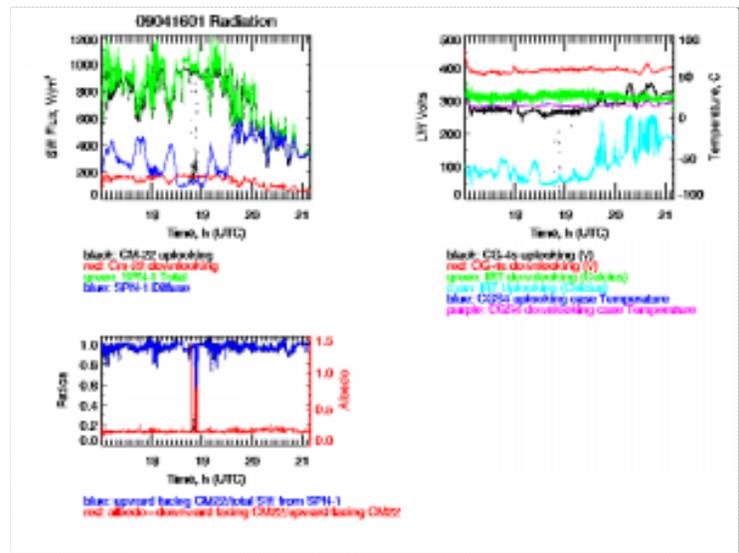
2026 UTC

Flight Plots

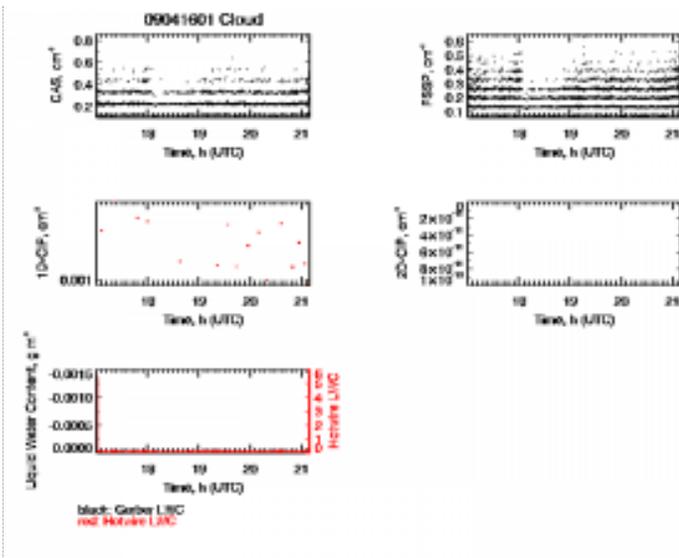
Aerosol



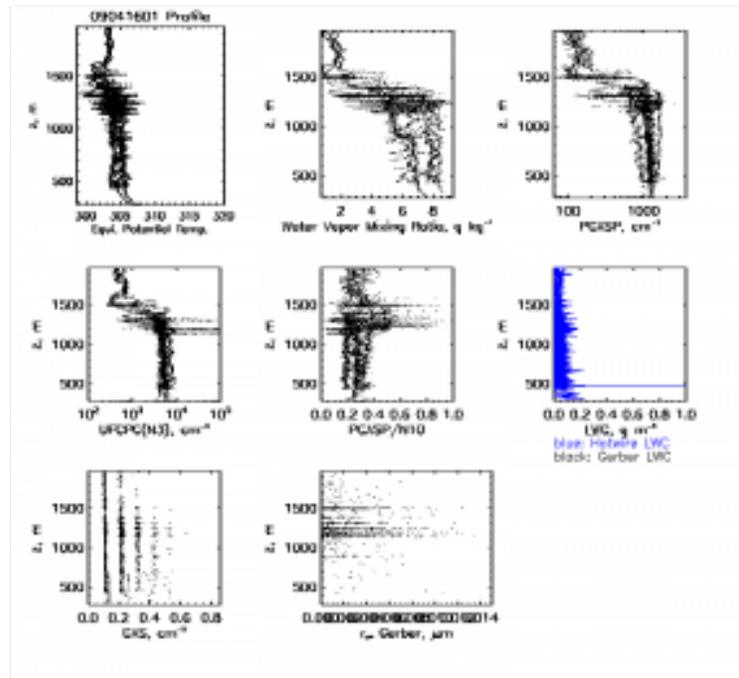
Radiation



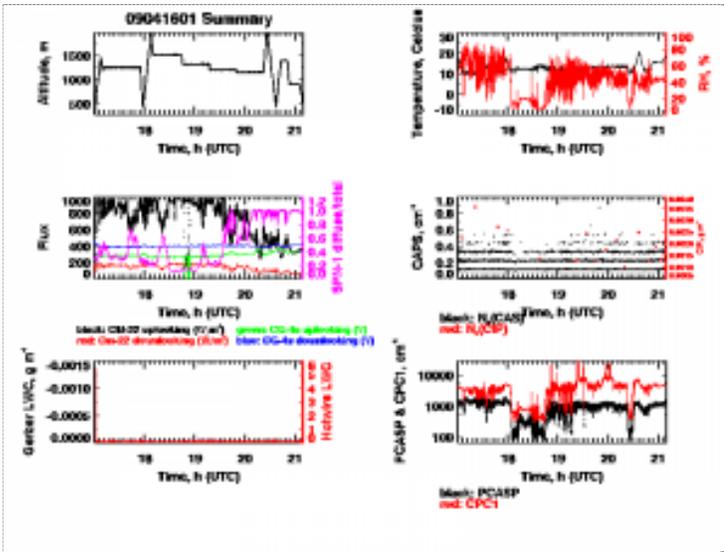
Cloud



Profile

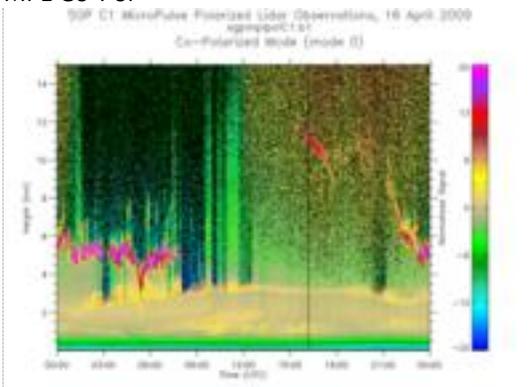


Summary

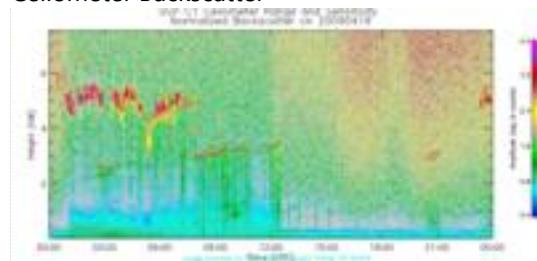


SGP Plots

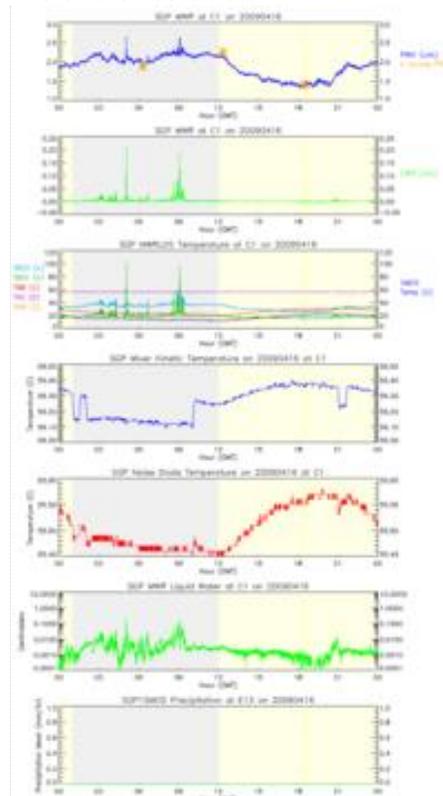
MPL Co-Pol



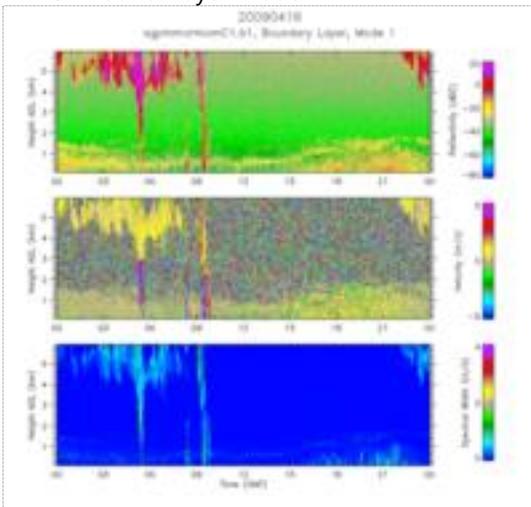
Ceilometer Backscatter



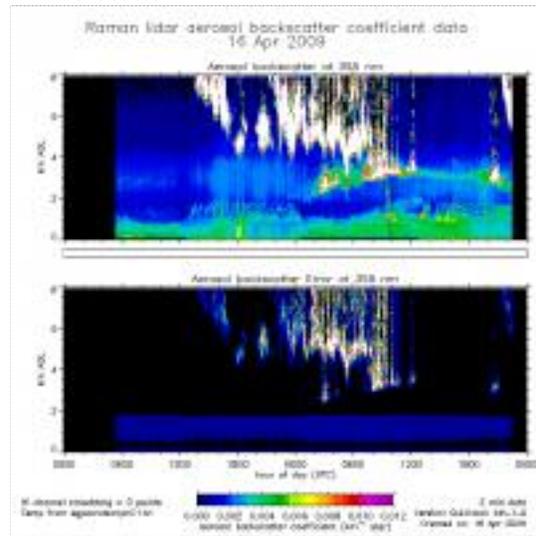
Microwave Radiometer



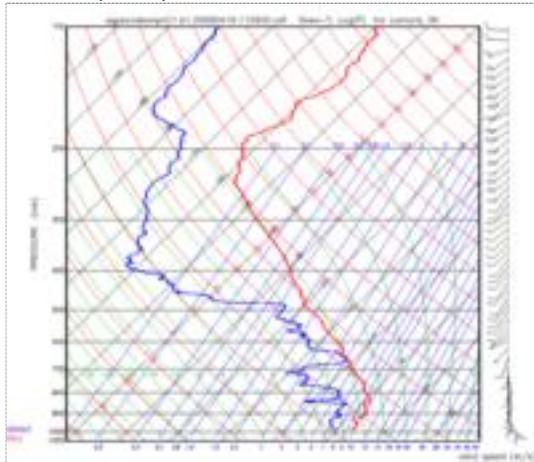
MMCR Bound. Layer Mode



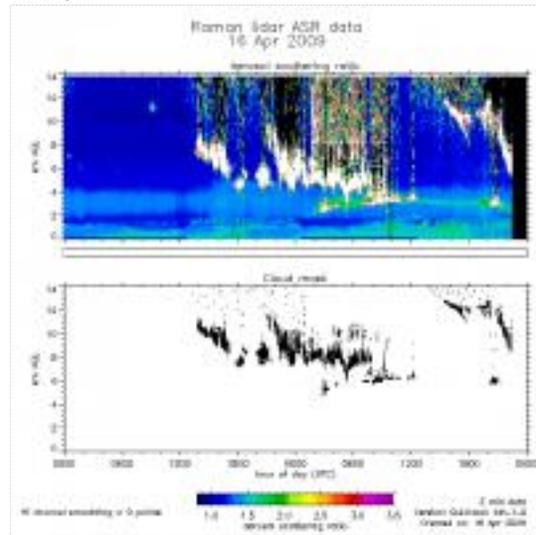
RL Backscatter



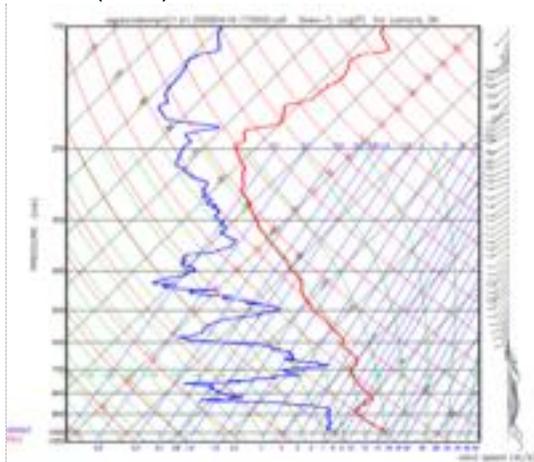
SONDE (11:30)



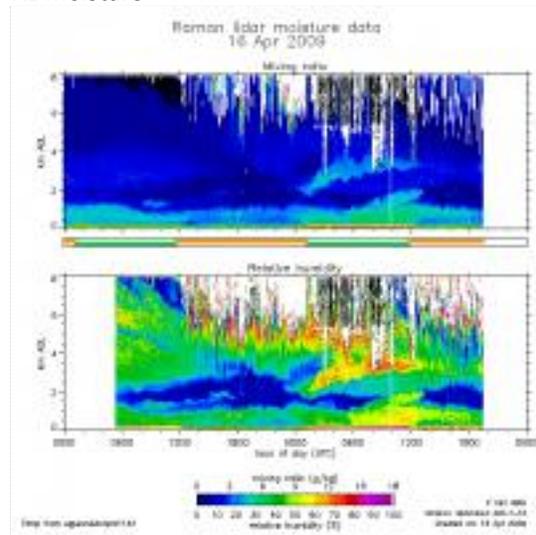
RL ASR



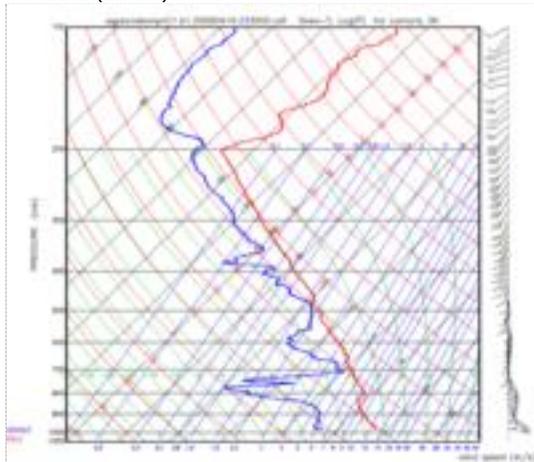
SONDE (17:30)



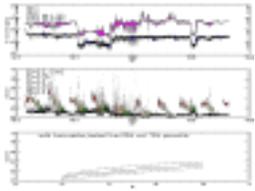
RL Moisture



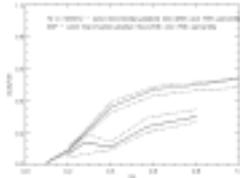
SONDE (23:30)



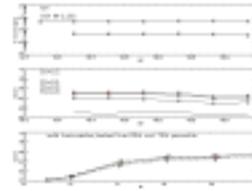
CCN Activity



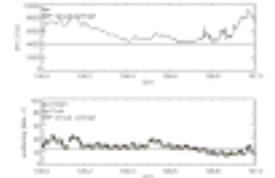
plot of CN and CCN and CCN/CN ratio as f(SS) from twin otter



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



map-4

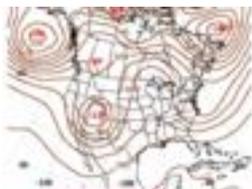


OK City: Overcast; 13-17 knots | Tulsa: 1/8 cloud coverage; 8-12 knots; 1154 mb | 71 F/43 F dew point | Pre-cold front

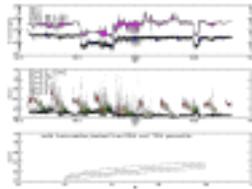
Comments

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 - 07 May 2009

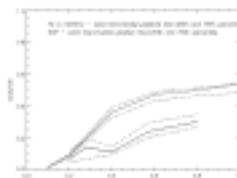
The last 3 plots show: I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as f(SS)). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 06 Apr 2009 Elisabeth Andrews - 07 May 2009



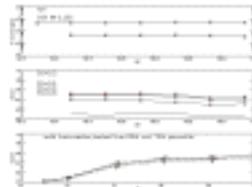
4.16.2



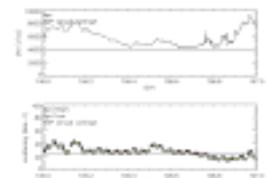
plot of CN and CCN and CCN/CN ratio as f(SS) from twin otter



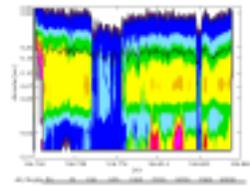
comparison of CCN fraction on twin otter and at SGP



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

20090419

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
14:34 UTC	19:00 UTC	4.4	Cloud triangles at SGP	KML
Flight hours to date		80.6		

We departed Guthrie and climbed to the bases at 2600', then dropped 500' and cruised out to the CF at 2100'.

We mixed the legs up to maximize the time in clouds in case they dissipated.

We did a slant descent to the CF and did a spiral climb. Bases of the overcast 2700', tops 3800'. Spiraled to 4200'.

Triangle #1 3300'

Leg #1 1521

Leg #2 1531

Leg #3 1545

Triangle #2 3500'

Leg #1 1557

Leg #2 1607

Leg #3 1619

Triangle #3 3700'

Leg #1 1631

Leg #2 1641

Leg #3 1654

All three legs in clouds, a little drizzle but no rain.

Triangle #4 6200' – A second layer had formed (around 4 degrees)

Leg #1 1711

Leg #2 1720

Leg #3 1731

Spiral descent from 6200 to 1500'/500 agl over the site. Tops of the first layer 5700', bases 5300'. Second layer Tops 4900', bases 3200'.

Triangle #5 2700'

Leg #1 1757

Leg #2 1806

Leg #3 1820

We RTB'd at 1833 and 2700'.

No issues with the plane.

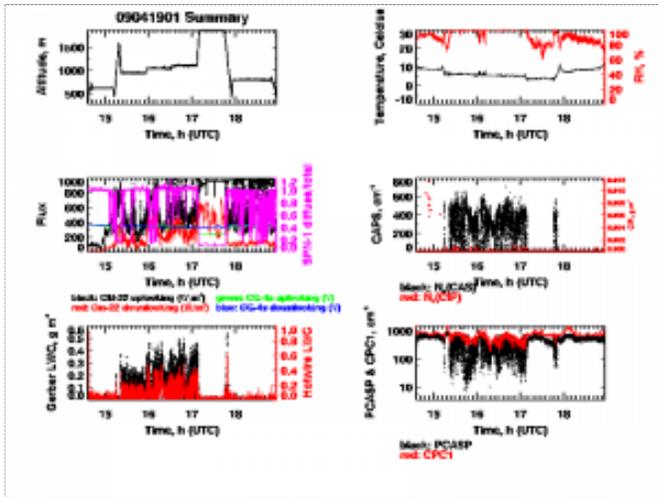
Weather Summary

Overcast to broken low level clouds.

Aircraft Instrumentation Status

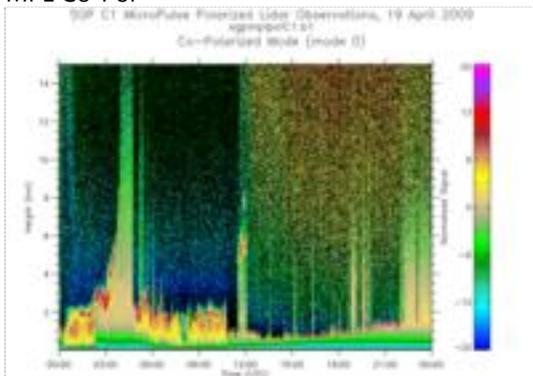
Jesse said there were no issues with the instruments

Summary

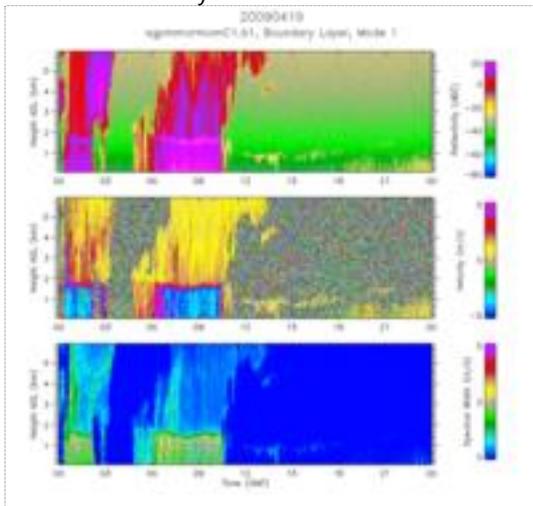


SGP Plots

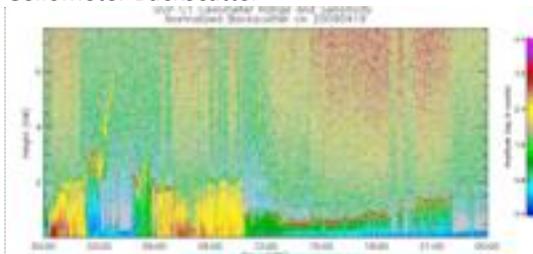
MPL Co-Pol



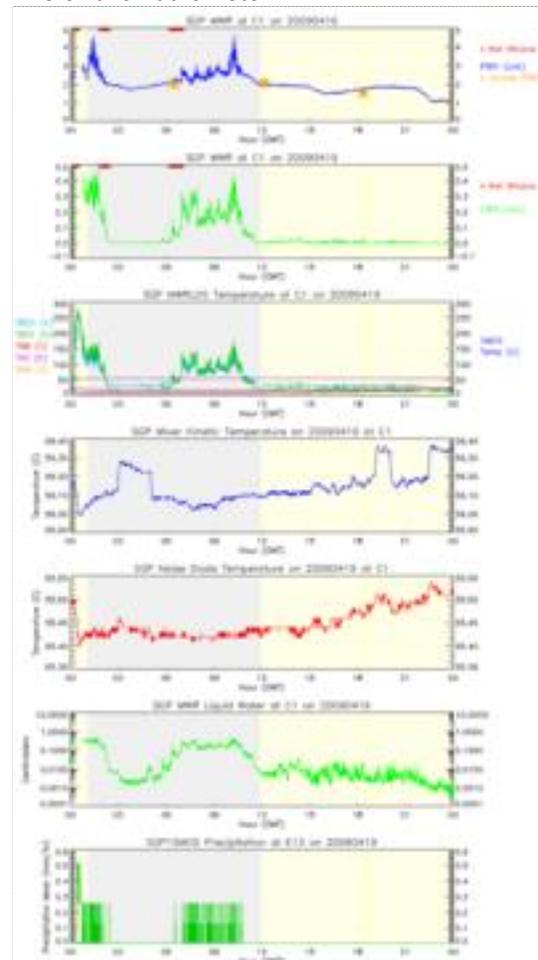
MMCR Bound. Layer Mode



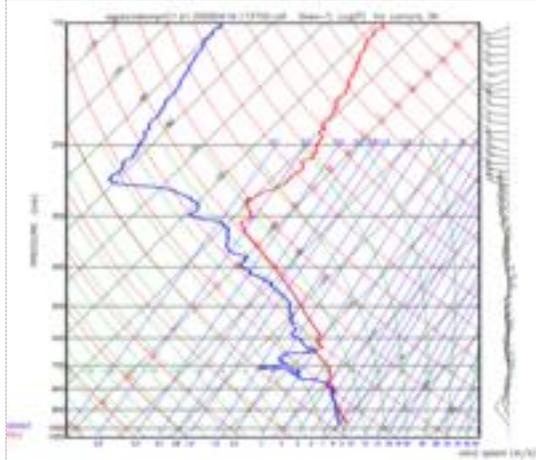
Ceilometer Backscatter



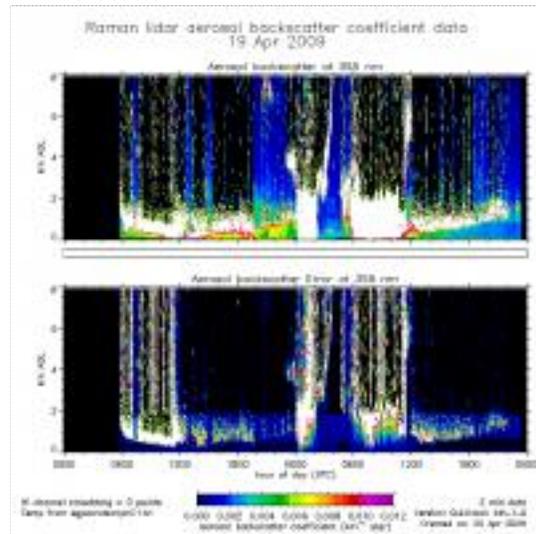
Microwave Radiometer



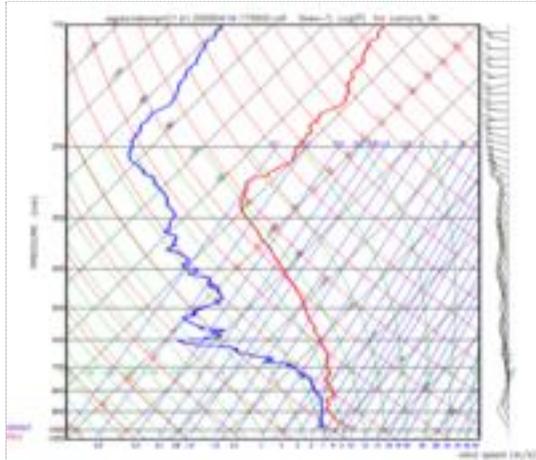
SONDE (11:30)



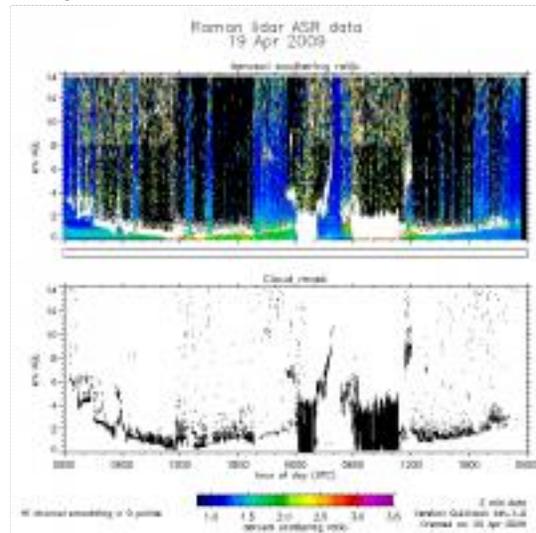
RL Backscatter



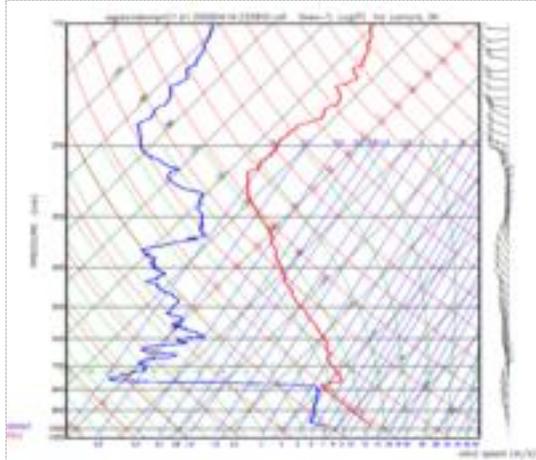
SONDE (17:30)



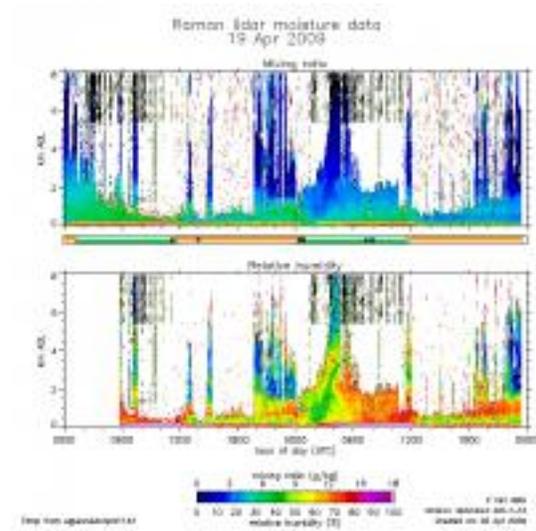
RL ASR



SONDE (23:30)



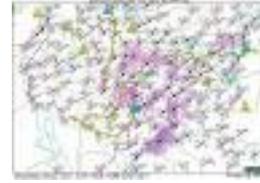
RL Moisture



Weather Maps



map-4192

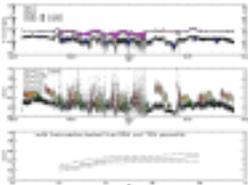


OK City: Scattered; 8-12 knots | Tulsa: Broken; 8-12 knots; 1060 mb | 67 F/49 F | Pre-cold front

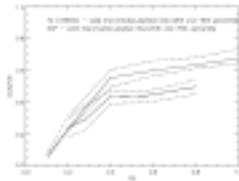
CCN Activity

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 - 07 May 2009

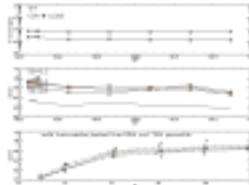
The last plot shows: I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 06 Apr 2009 Elisabeth Andrews - 07 May 2009



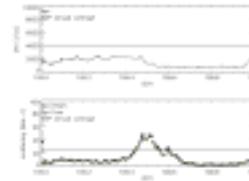
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



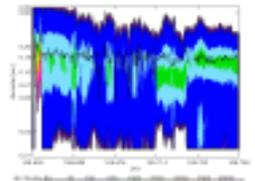
comparison of CCN fraction on twin otter and at SGP



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

20090420

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
17:54 UTC	22:19 UTC	4.4	Aerosol long-leg variability characterization at SGP	KML
Flight hours to date		85.0		

We initially climbed to 2400' to get an idea of what the winds would be. We stayed there for about 5 minutes. Winds were 275/30.

We dropped to 500 agl and did a slant climb to 6000', then back down to 2400'.

Leg #1 – 100nm leg; winds 275/30

We had to cut the first leg 30 miles short (71nm) because the 100 nm point was on the east side of Tulsa and the path would have taken us directly over the airport. They would not have let us do that.

Leg # 2 – 50nm leg; winds 350/20

Leg #3 – 50 nm leg; winds 350/20

Leg #4 – 25 nm leg; winds 335/25

Leg #5 – 25 nm leg; winds 335/20

Leg #6 – 100nm leg; winds 330/25

We went to 1400'/500 agl and did a slant climb to 6000'. RTB altitude was 4500.

There was a good size controlled burn going on just to the SW of our flight path at 30nm into leg #6.

Weather Summary

Broken cirrus and mid-level clouds with light rain.

Aircraft Instrumentation Status

CPC2 issues.

Flight Images



1959 UTC



2104 UTC



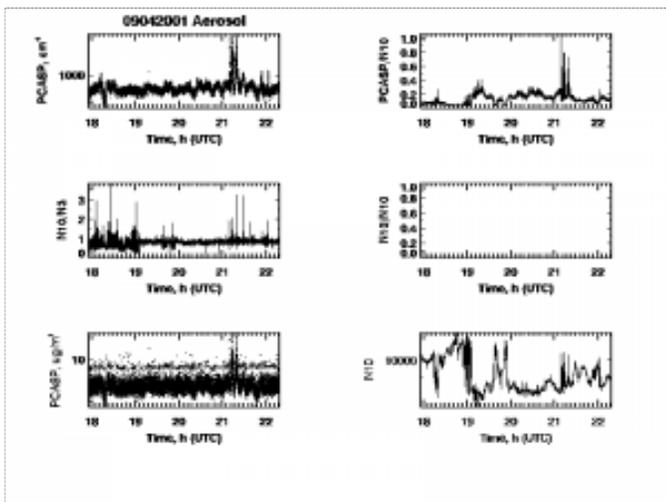
2104 UTC



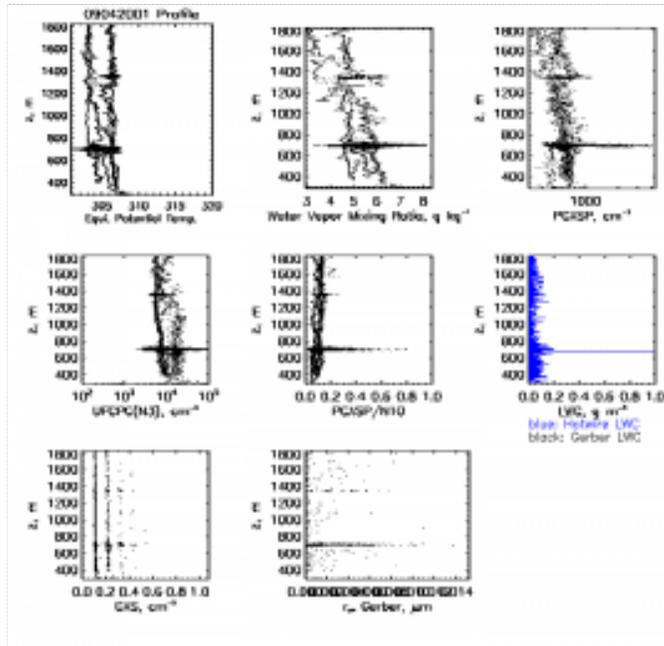
2107 UTC

Flight Plots

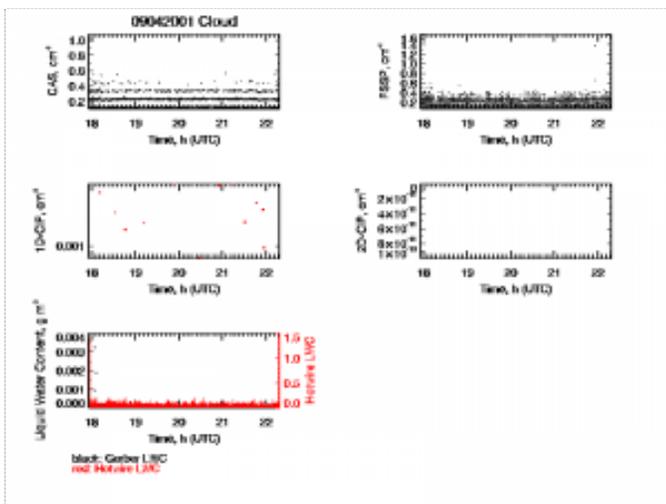
Aerosol



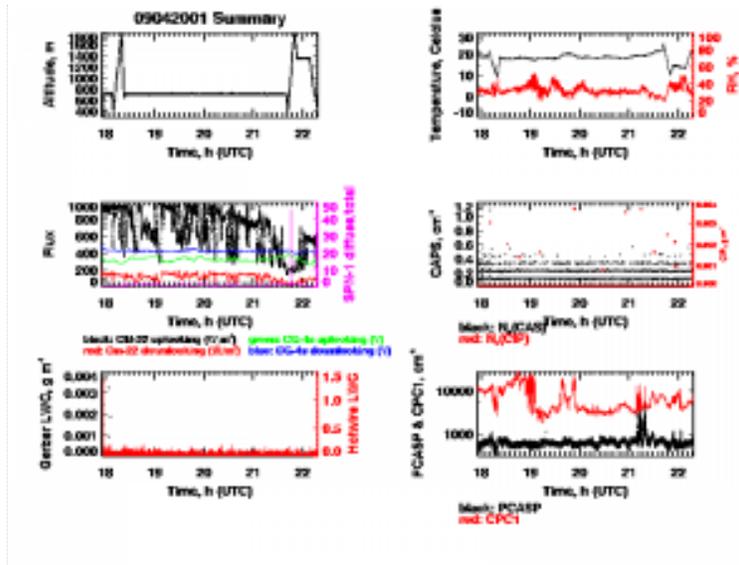
Profile



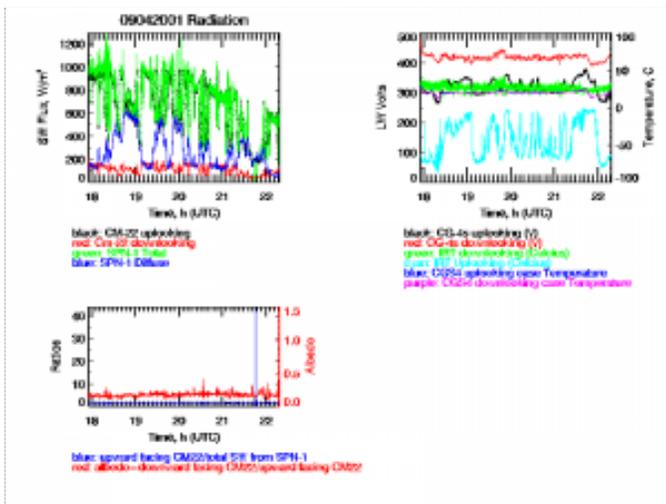
Cloud



Summary

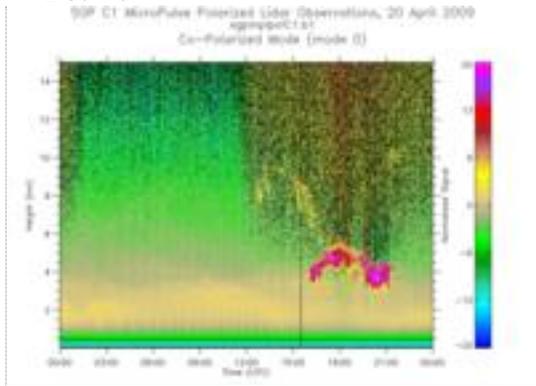


Radiation

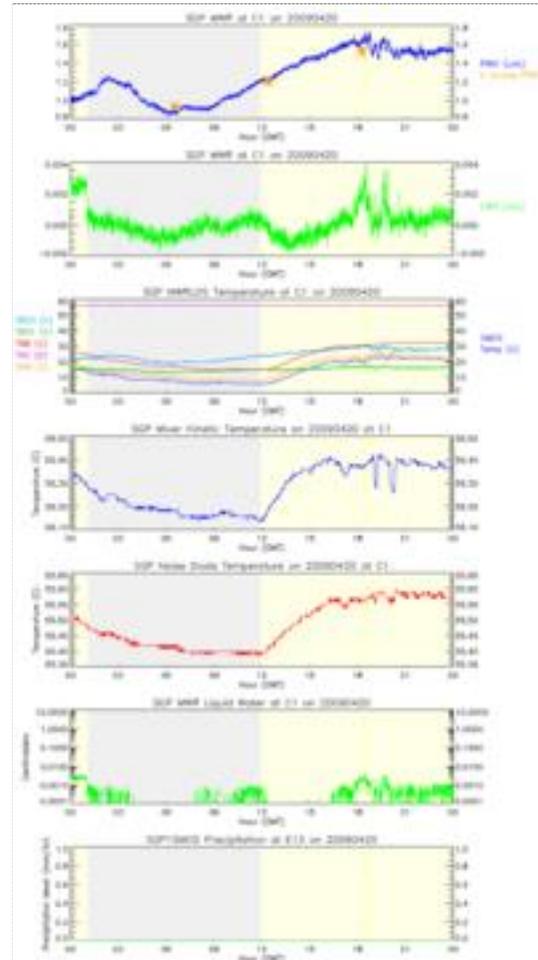


SGP Plots

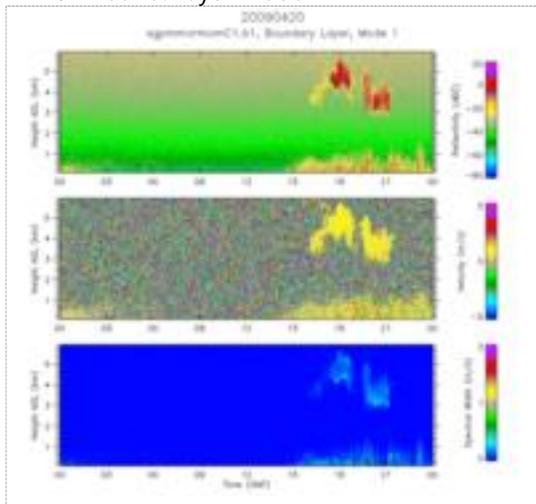
MPL Co-Pol



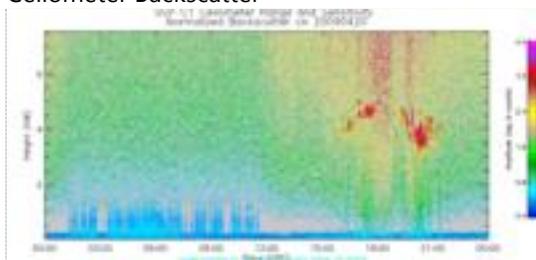
Microwave Radiometer



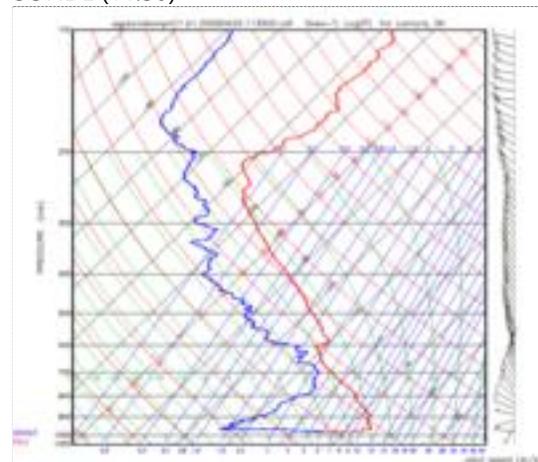
MMCR Bound. Layer Mode



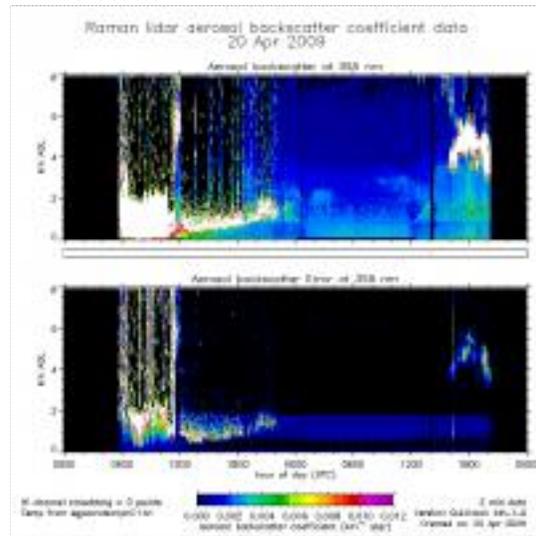
Ceilometer Backscatter



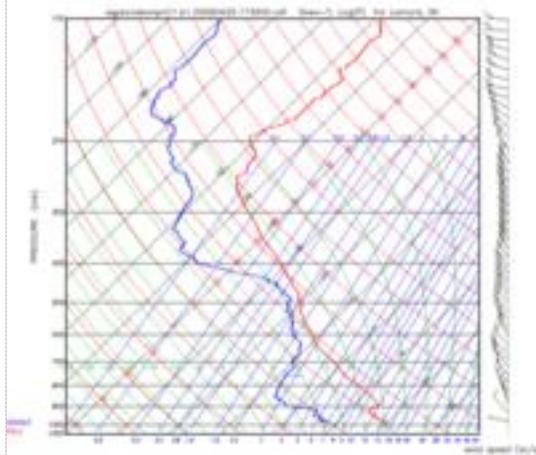
SONDE (11:30)



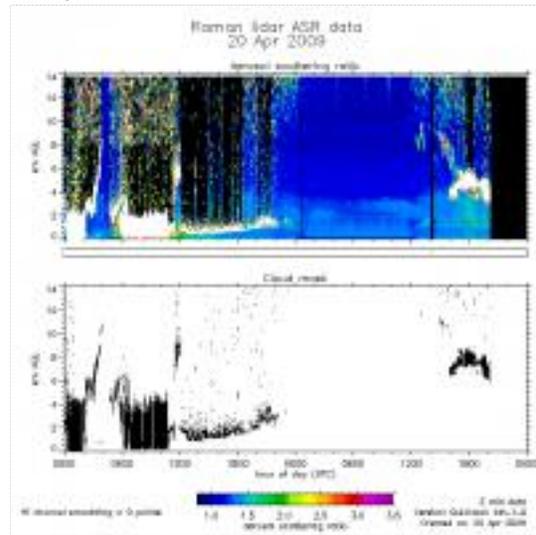
RL Backscatter



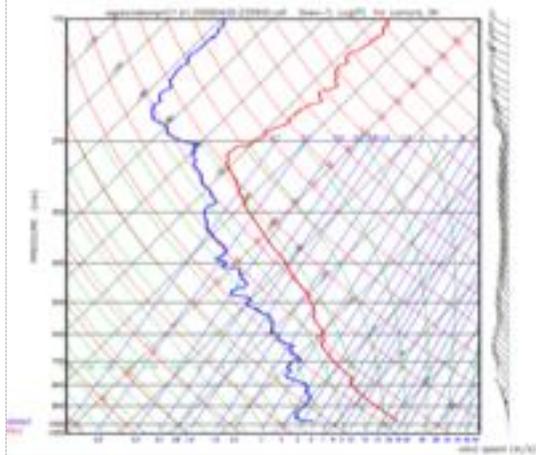
SONDE (17:30)



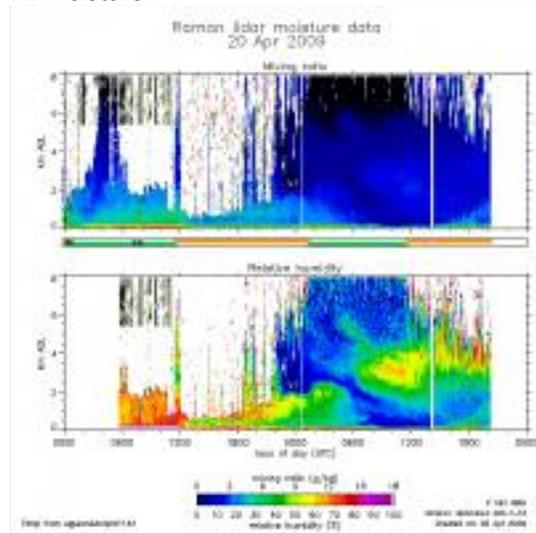
RL ASR



SONDE (23:30)



RL Moisture



Weather Maps



map4202

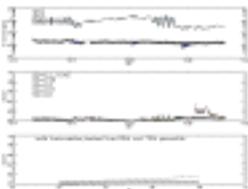


OK City: Scattered; 13-17 knots | Tulsa: Overcast; 18-22 knots: 1158 mb | 61 F/43 F

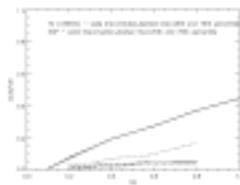
CCN Activity

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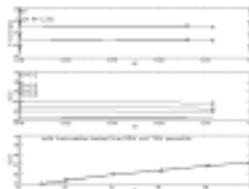
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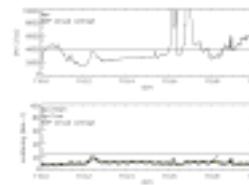
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



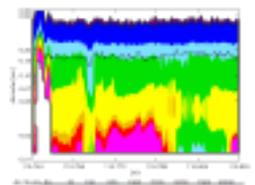
comparison of CCN fraction on twin otter and at SGP



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

20090421

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
18:03 UTC	23:10 UTC	5.1	Surface albedo & Turbulence at SGP	KML
Flight hours to date		90.1		

We departed Guthrie and climbed out to 4500'. We cruised to the CF at 4500'.

Over the CF we did a spiral descent from 4500' to 1500/500 agl. 1831Z.

We did the pinwheel pattern at 1600'. Times were 1842-1938. There was a very small wood fire on one of the legs. Broken Cirrus and contrails above.

We did the paperclip pattern at 1600'. Times were 1941-2023. Broken Cirrus and contrails above.

We did the upwind/downwind legs.

Leg # 1 2000' winds 220/20; 2030z NE: Broken Cirrus and contrails above.

Leg # 2 2300' winds 230/20; 2052z SW: Broken Cirrus and contrails above.

Leg # 3 2600' winds 240/20; 2114z NE: Skies cleared a bit. Contrails

Leg # 4 2900' winds 260/10; 2137z W: Skies cleared a bit. Contrails

Leg # 5 3200' winds 250/12; 2158z E: Cirrus N-NW Contrails

Leg # 6 3500' winds 255/20; 2216z W: Cirrus N-NW Skies cleared a bit. Contrails

Over the CF we climbed to 4500' and did a spiral descent to 1500/500' agl.

No pictures today. I forgot the camera. Jesse got some. Sorry.

Weather Summary

Clear skies with cirrus clouds.

Aircraft Instrumentation Status

Jesse: Hydrorad laptop would not boot
CPCs not valid.

Surface Instrumentation Status

nothing to report

Flight Images



Unknown time



Unknown time



Unknown time



Unknown time



Unknown time



Unknown time



Unknown time



Unknown time



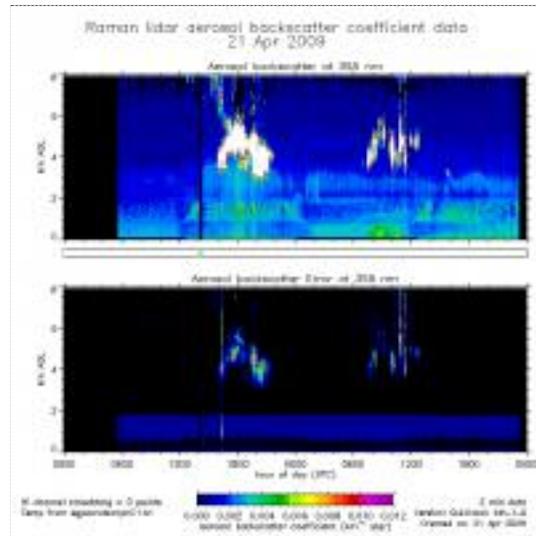
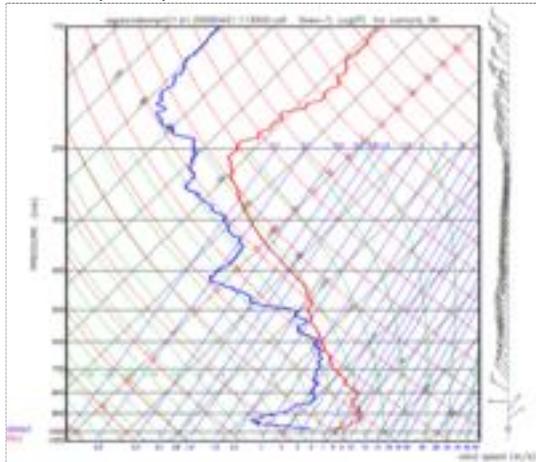
Unknown time



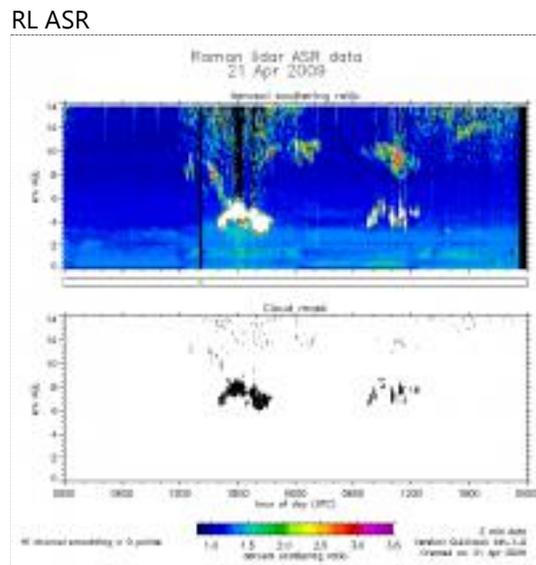
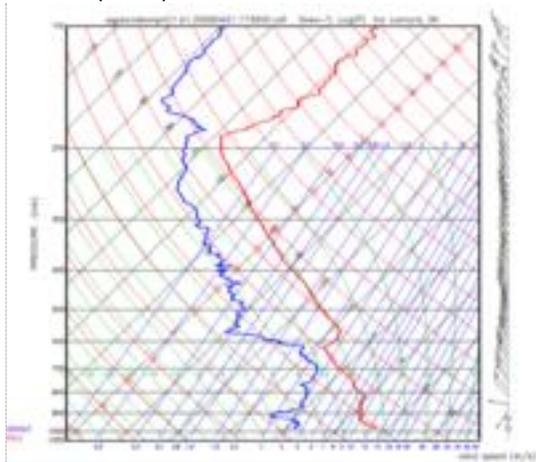
Unknown time

RL Backscatter

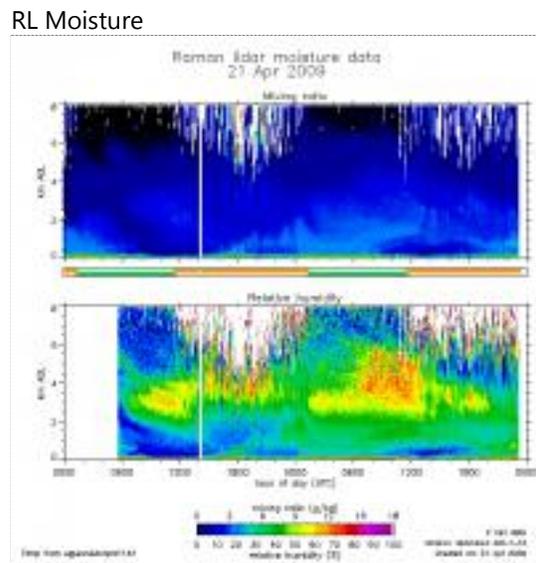
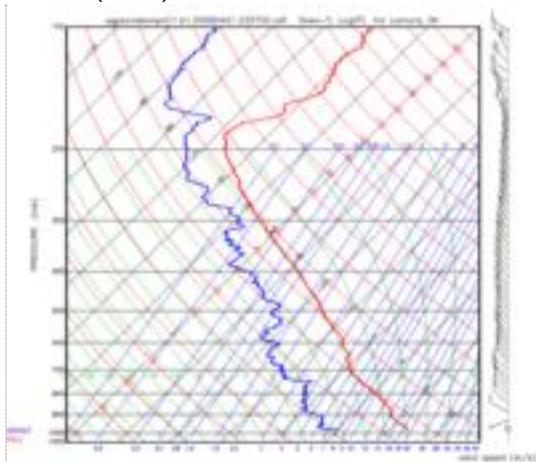
SONDE (11:30)



SONDE (17:30)



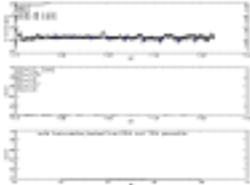
SONDE (23:30)



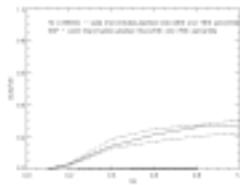
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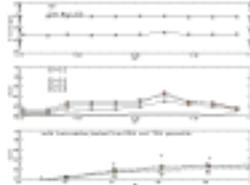
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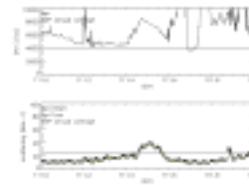
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



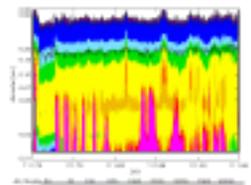
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP



time series of CN and light scattering at SGP



TAMU DMA size distribution and CCN activation diameter

Weather Maps



map4212



OK City: Broken; 3-7 knots | Tulsa: Clear; 13-17 knots; 1141 mb | 73 F/41 F

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
20:02 UTC	00:19 UTC	4.3	Cloud triangles at SGP	[NONE]
Flight hours to date		94.4		

We departed Guthrie and climbed to 5500'. There was one cloud south of Guthrie @ 5500'.

Triangle #1

4000' No clouds other than the cirrus.

Leg # 1 2024z

Leg # 2 2033

Leg # 3 2050

Spiral descent over the CF from 5500 to 1500'/500 agl.

Triangle #2

5000'. No clouds other than the cirrus. Some clouds moving in from the south.

Leg # 1 2110z

Leg # 2 2118

Leg # 3 2136 The clouds had moved over head. We were well below the bases.

Triangle #3

6500'. Mid level of the clouds.

Leg # 1 2145z

Leg # 2 2154, clouds

Leg # 3 2213, clouds

Triangle #4

7000' Mid-upper part of the clouds.

Leg # 1 2200

Leg # 2 2228

Leg # 3 2246.

Triangle #5

6800'

Leg # 1 2253 Clouds were dissipating.

Leg # 2 2301

Leg # 3 missing time

Spiral decent over the CF from 8000' to 1500'/500 agl.

RTB at 7500'.

Weather Summary

Broken thin cirrus to the north.

Aircraft Instrumentation Status

Jesse:

DMA shut off early in flight and was brought back up quickly.

The Hydrorad laptop shut off because the power settings were wrong had to be shut down and was able to correct power settings and bring it back on-line.

Static pressures on DAQ went haywire between the 4th and 5th triangle.

Cabin file not available for flight.

Surface Instrumentation Status

nothing to report

Flight Images



2025 UTC



2132 UTC



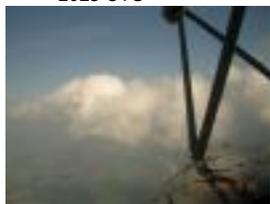
2201 UTC



2202 UTC



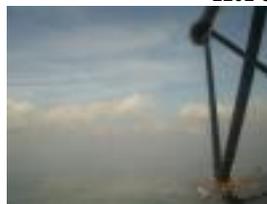
2221 UTC



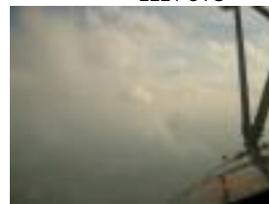
2223 UTC



2233 UTC



2254 UTC



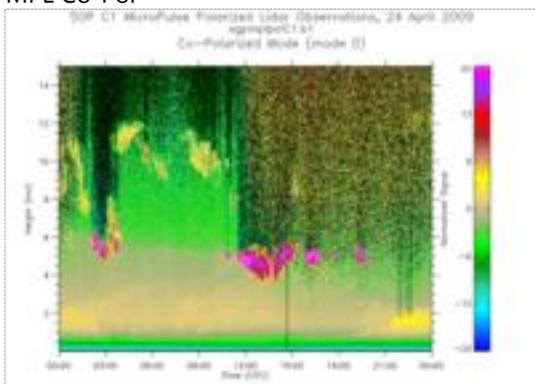
2304 UTC

Flight Plots

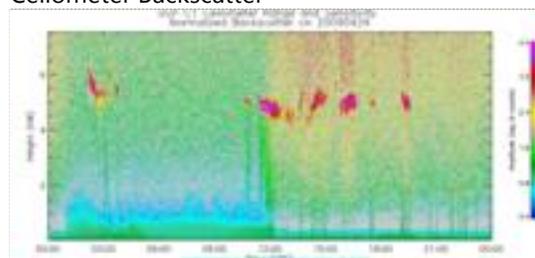
[Not available.]

SGP Plots

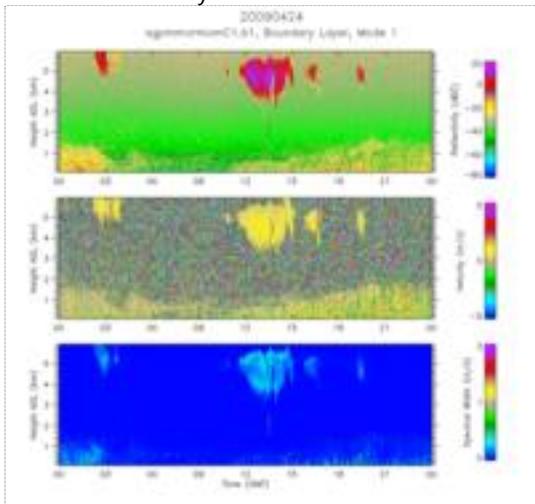
MPL Co-Pol



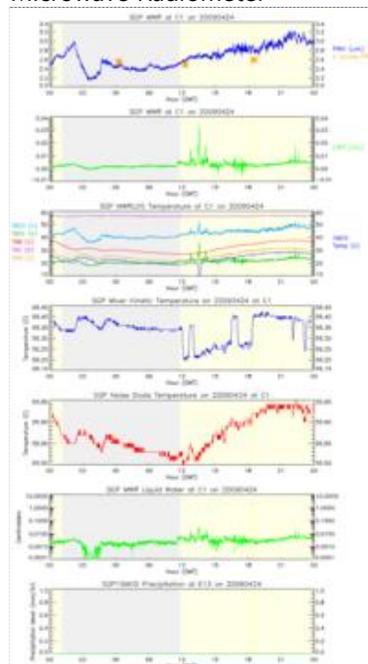
Ceilometer Backscatter



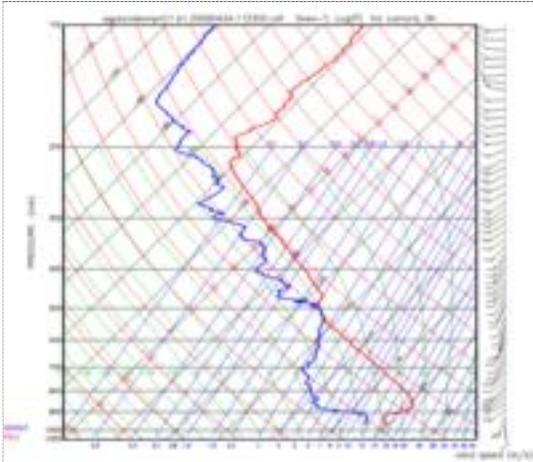
MMCR Bound. Layer Mode



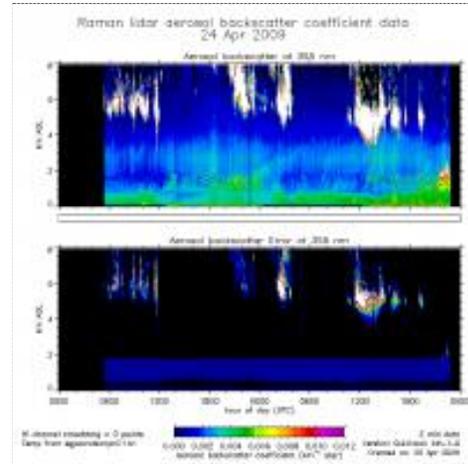
Microwave Radiometer



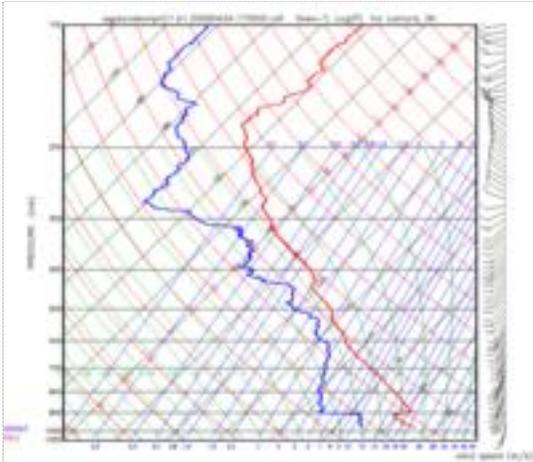
SONDE (11:30)



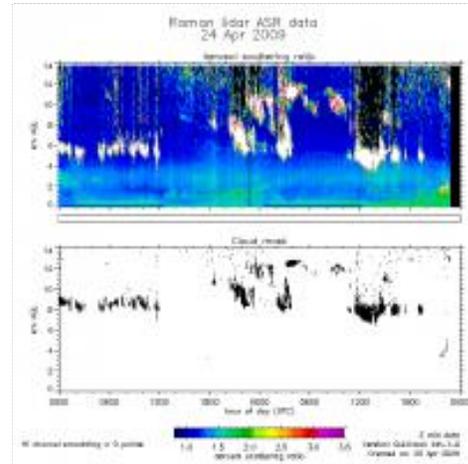
RL Backscatter



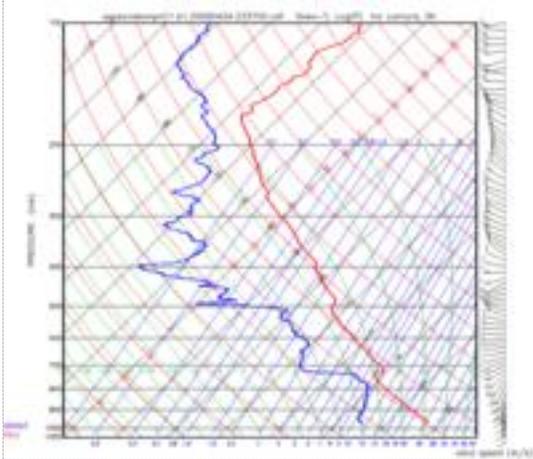
SONDE (17:30)



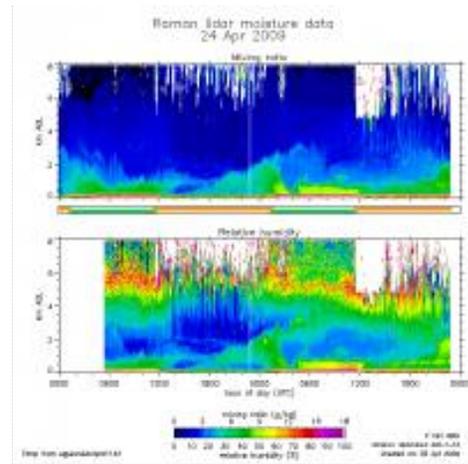
RL ASR



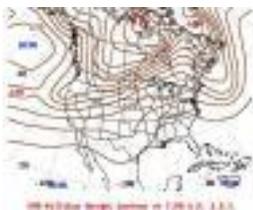
SONDE (23:30)



RL Moisture



Weather Maps



map-4242



OK City: Overcast; 13-17 knots | Tulsa: Clear; 8-12 knots; 1062 mb | 83 F/55 F | Pre-cold front

20090427

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
19:44 UTC	00:41 UTC	5.0	Cloud missed approaches Ponca-Perry	KML
Flight hours to date		99.4		

We got off later than we wanted to because a line of thunderstorms developed west of us. We shut the payload off and pulled the plane back into the hangar. Another storm popped up but was able to work around it.

We climbed initially to 5000' as we transitioned out.

We found an approach that went from Ponca City to Perry. It was 22 nm long. Basically we went from 4000' to 1400' during those 22 miles. We did that 8 times.

#1 Tops near 4000; Bases 1900'

#2 Did not clear the tops; Bases 1900'

#3 Did not clear the tops; bases 1900'

#4 Did not clear the tops; bases 1900'

#5 Did not clear the tops; bases 1800'

After this approach we climbed to 5800'. Tops of the first layer were 4100'. There was another overcast layer above that. We did a hold at 5000' inbetween the layers for about 10 minutes.

#6 Descended from 5000' to 1400' on the approach. Tops 4200' sloping to 2900' as we went south. Bases 1800'

#7 Tops varied from 4000'-2900'. Bases 2100'-2000'

#8 Tops 4000, bases 2100'.

We climbed to 6000' on the way to Guthrie. This put us above everything that wasn't developing into a storm.

There was drizzle most of the flight. The clouds were wet. They were less wet as the flight went by. There were storms in the area, but we only encountered light rain a couple of times. Half way through the flight most of the storm clouds were gone.

Of the 5 hour flight, I would say that we were in the clouds for at around 4 hours.

Weather Summary

Mostly cloudy with slight drizzle.

Aircraft Instrumentation Status

Jesse said no problems with instruments.

Surface Instrumentation Status

nothing to report

Flight Images



Time Unknown



Time Unknown



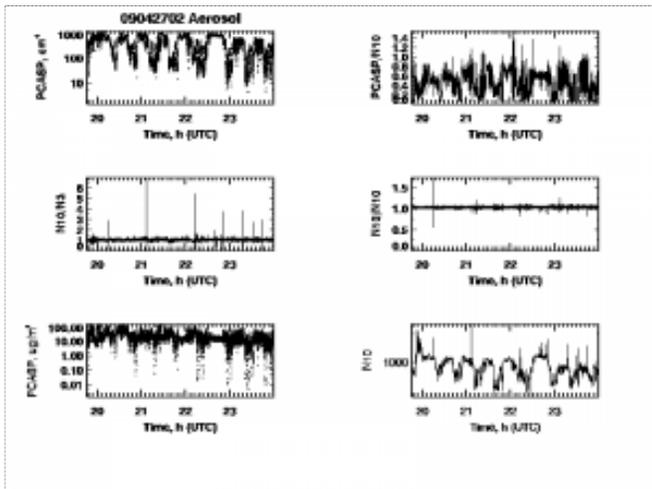
Time Unknown



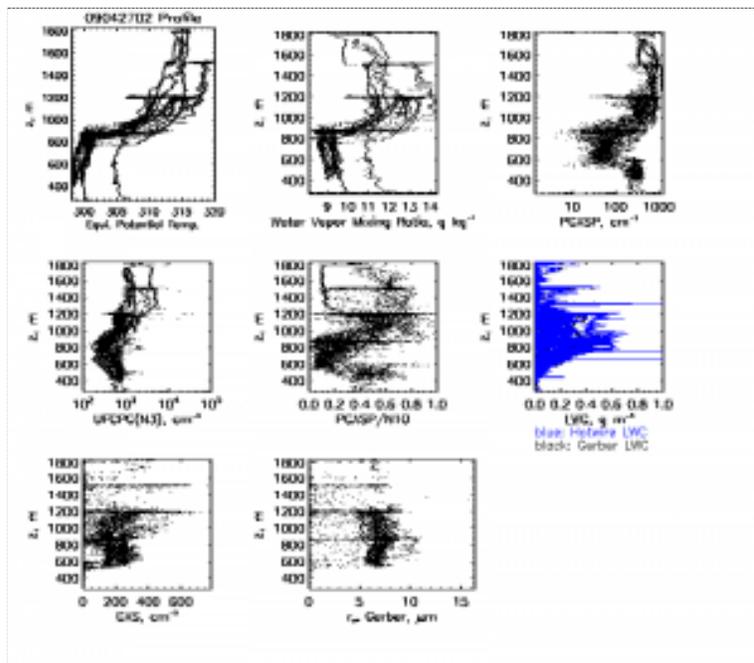
Time Unknown

Flight Plots

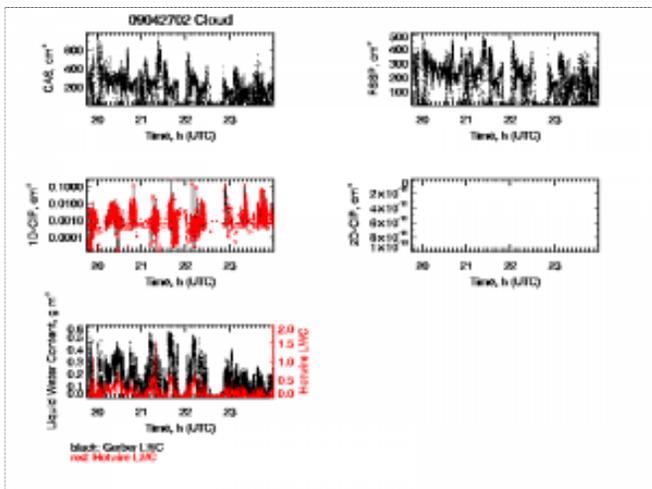
Aerosol



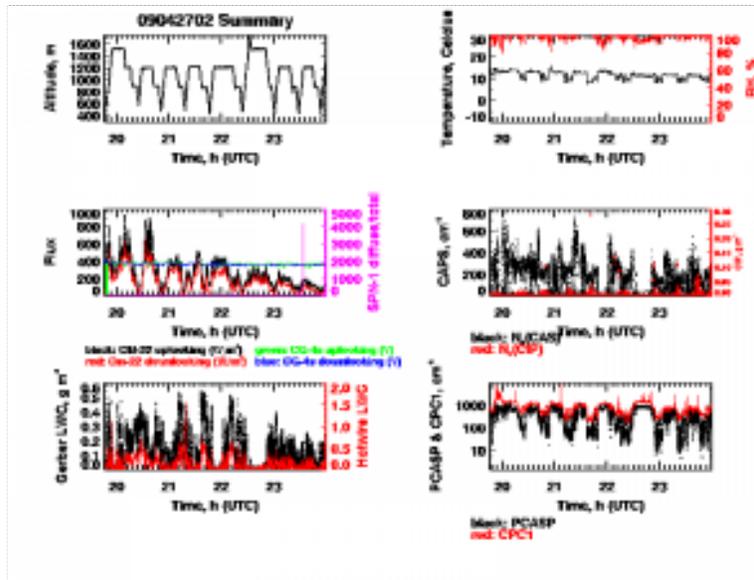
Profile



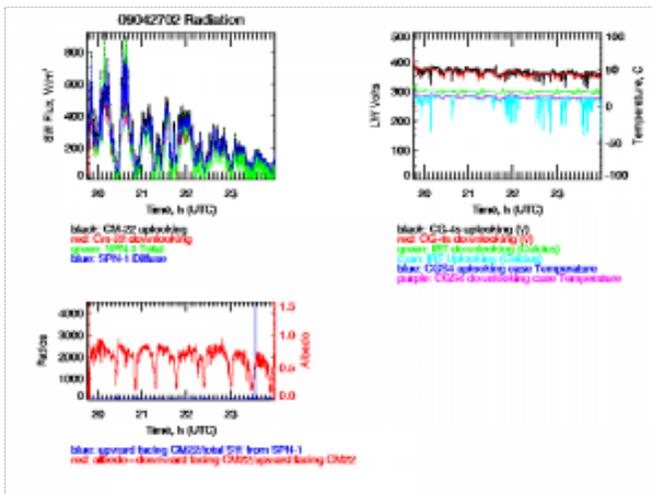
Cloud



Summary

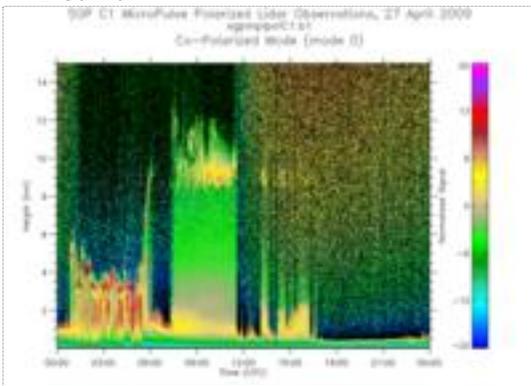


Radiation

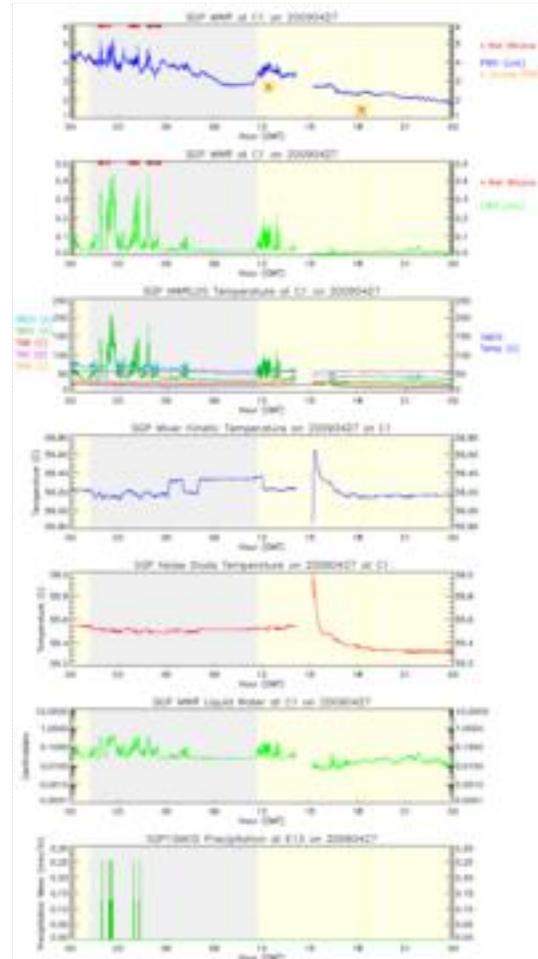


SGP Plots

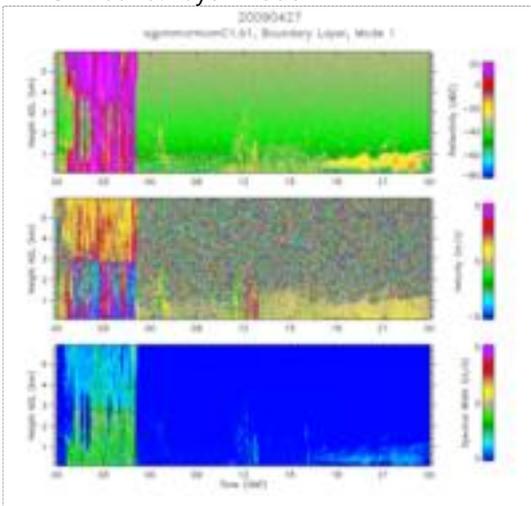
MPL Co-Pol



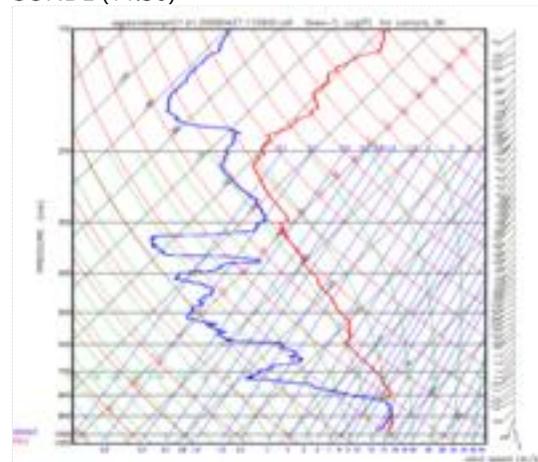
Microwave Radiometer



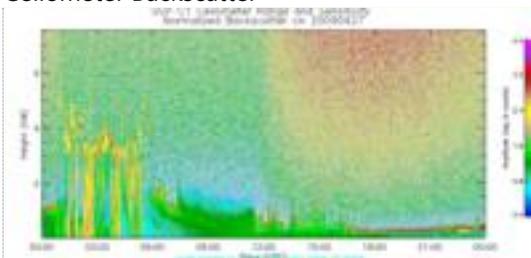
MMCR Bound. Layer Mode



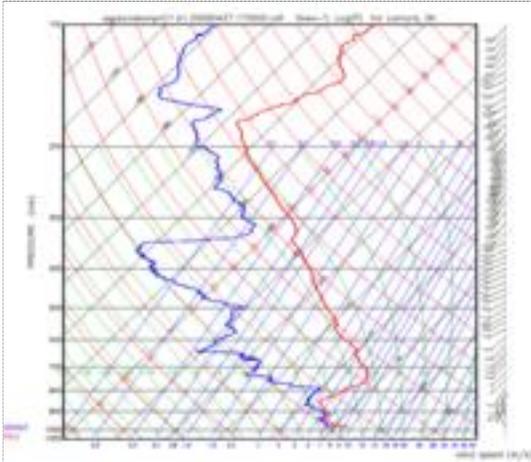
SONDE (11:30)



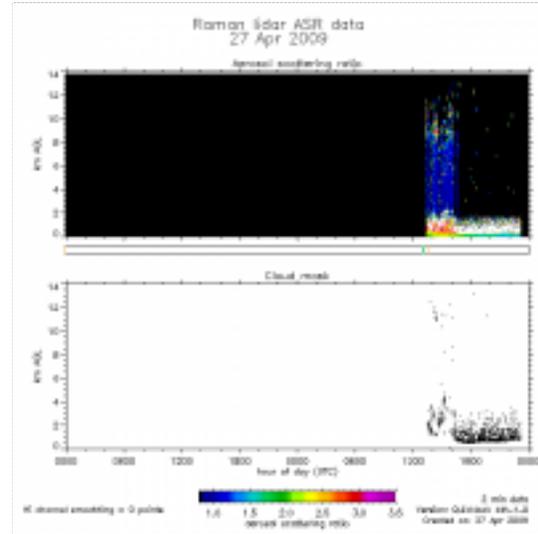
Ceilometer Backscatter



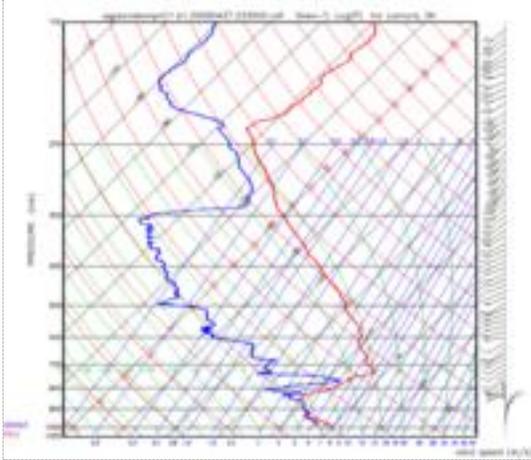
SONDE (17:30)



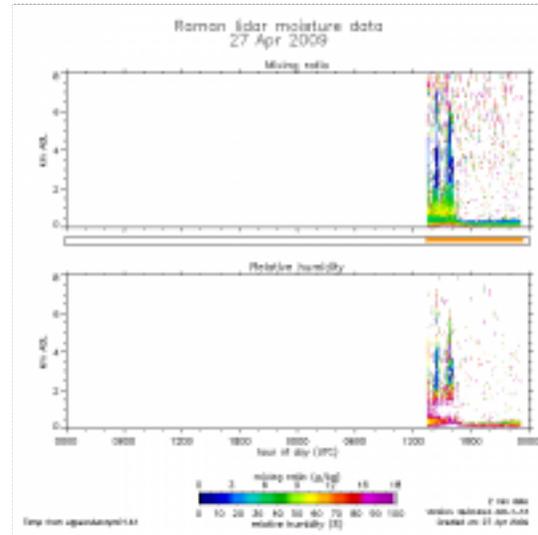
RL ASR



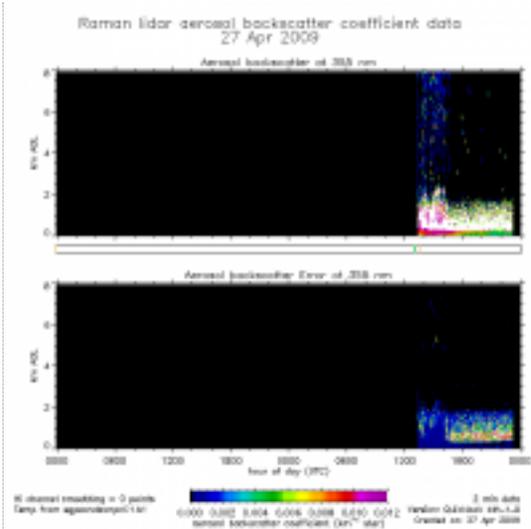
SONDE (23:30)



RL Moisture



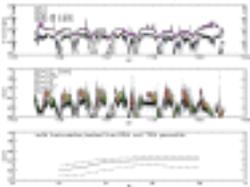
RL Backscatter



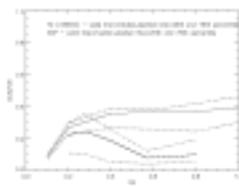
CCN Activity

I've 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 - 07 May 2009

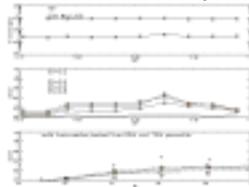
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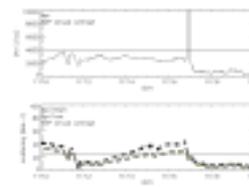
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



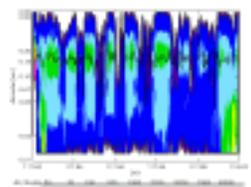
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP



time series of CN and light scattering at SGP



TAMU DMA size distribution and CCN activation diameter

Weather Maps



map4272



OK City: Overcast; 18-22 knots | Tulsa: Broken; 13-17 knots; 1072 mb | 73 F/60 F

20090428

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
19:18 UTC	00:16 UTC	5.0	Cloud missed approaches Ponca-Perry	KML
Flight hours to date		104.3		

We departed out of Guthrie and climbed to 5000' tops were 4200'.

We did 8 approaches from Ponca City to Perry.

#1 Tops were 4400' on the first approach. Bases of the first layer were 3000'. Tops of the second layer were 2400, bases 2100'. Generally the 1st layer was about 300' and broken overcast.

We returned to the VOR at 4000'.

#2 At 4000' we were at or near the tops. Higher was not available today until much later in the flight. There were several layers down to 2100'

We returned to the VOR at 4100'. Never got above the tops. We flew around in the clouds for about 20 minutes on radar vectors at 4100'.

#3 Bases 3300'. 2nd layer Tops 2600', bases 2200'

Back to the VOR at 4000'.

#4 Didn't get above the tops. Tops of the 2nd layer 2600, bases 2300'

Back to the VOR at 4000'. We were at or near the tops. They were 3800' on the south end and 4000' on the north end.

#5 Tops 4000'-3800'. Bases 3100'. Tops of 2nd layer 2400, bases 2200'. We ran at 1700' (500 below) for 5 minutes on this leg.

#6 Tops 3700', bases 2400'. No 2nd layer.

#7 Tops 3700', bases 2400'.

We returned to the VOR at 5000'

#8 Tops 3600' sloping to 3000', bases 2400'.

We climbed to 6000' and did a 15 minute hold over the VOR and returned to Guthrie at 6000'.

No issues with the plane.

Weather Summary

Partly to mostly cloudy.

Aircraft Instrumentation Status

Jesse notes:

WCM liquid water probe was popping a circuit breaker. He'll look into it tomorrow. No other instrument issues.

Surface Instrumentation Status

nothing to report

Flight Images



1936 UTC



1946 UTC



1950 UTC



2005 UTC



2029 UTC



2029b UTC



2242 UTC



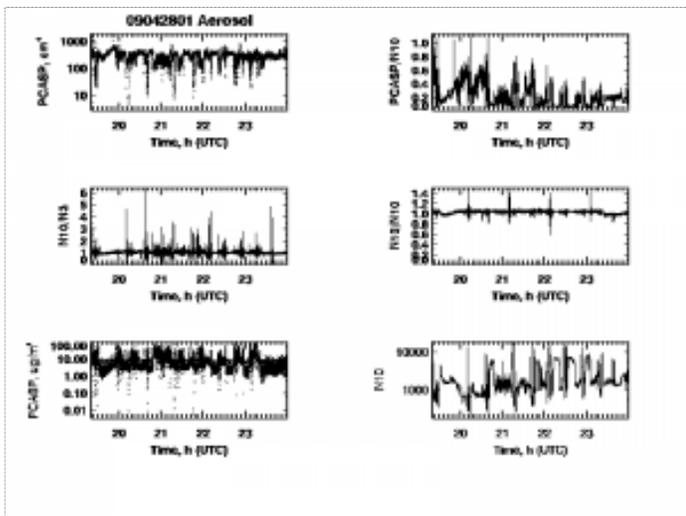
2301 UTC



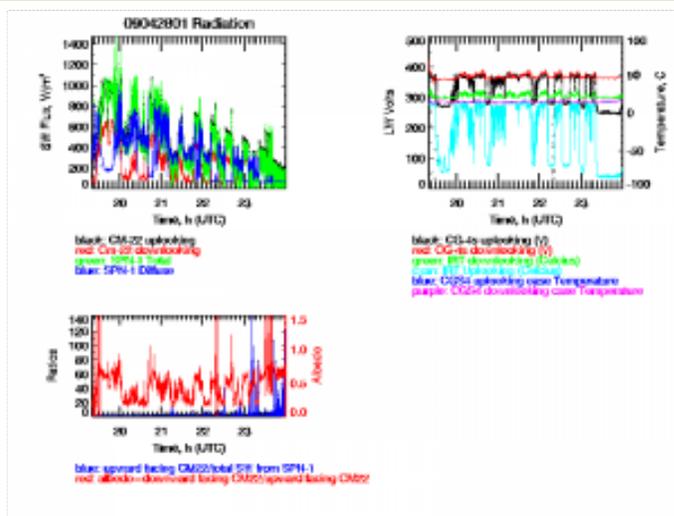
0000 UTC

Flight Plots

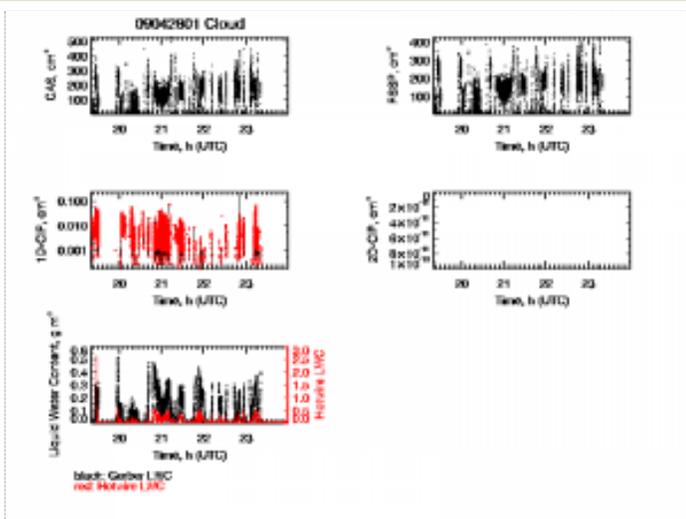
Aerosol



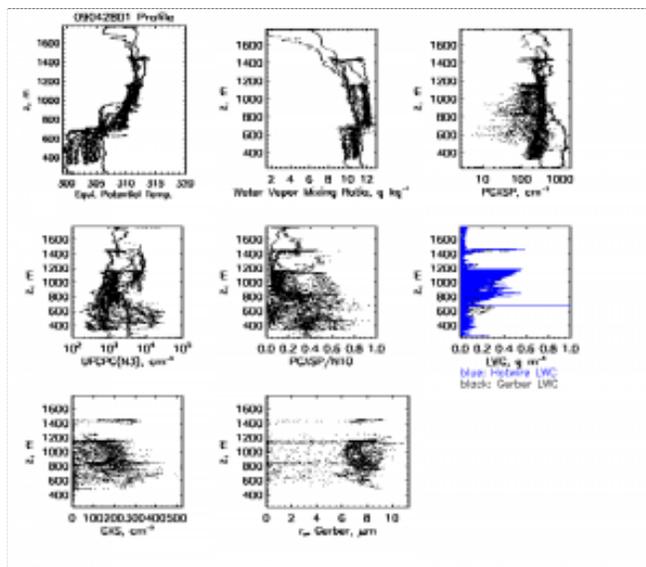
Radiation



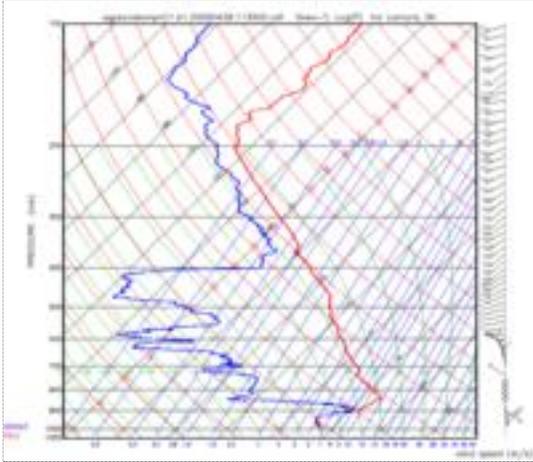
Cloud



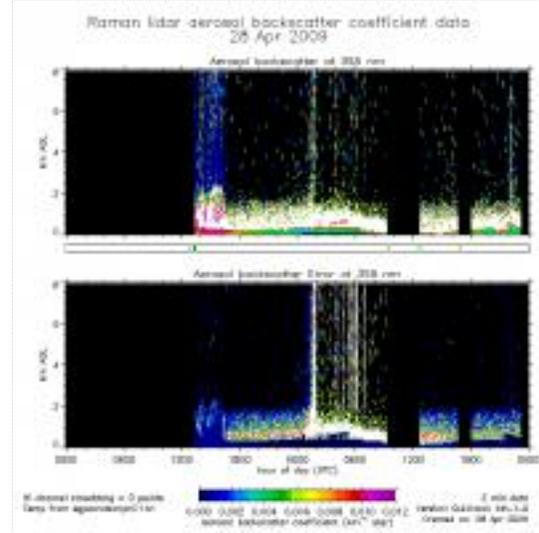
Profile



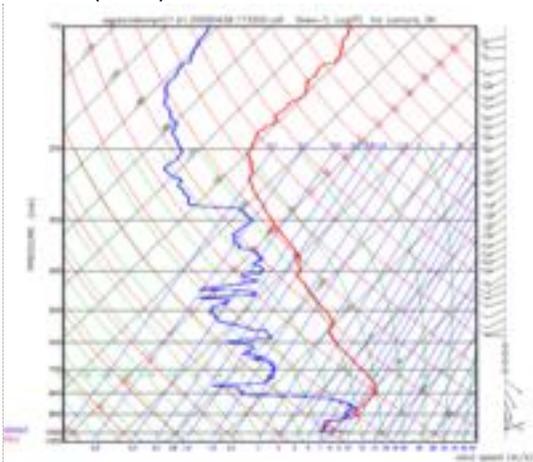
SONDE (11:30)



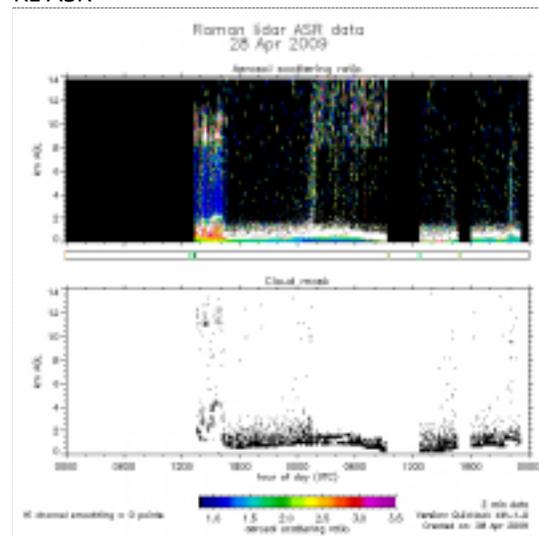
RL Backscatter



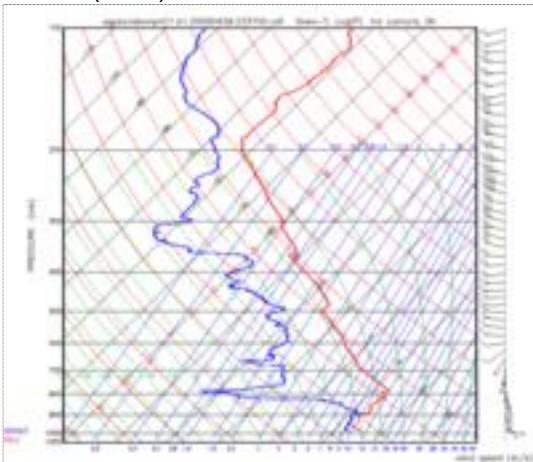
SONDE (17:30)



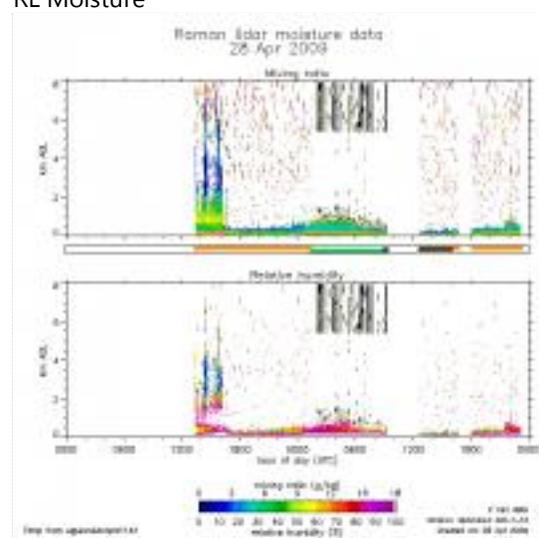
RL ASR



SONDE (23:30)



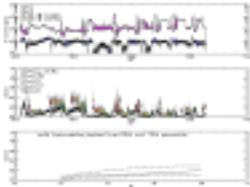
RL Moisture



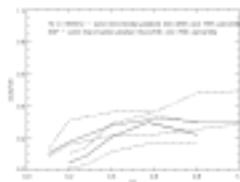
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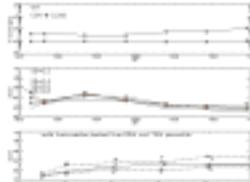
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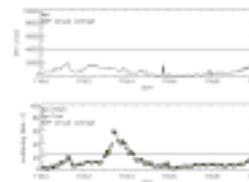
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



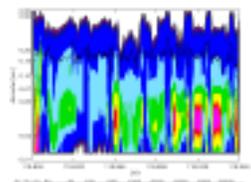
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

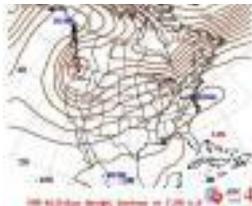


time series of CN and light scattering at SGP

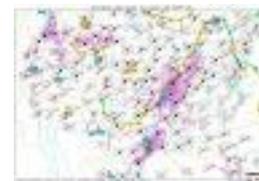


TAMU DMA size distribution and CCN activation diameter

Weather Maps



map4282



Overcast; 13-17 knots; 1175 mb | 56 F/50 F