

RACORO Campaign Journal- June 2009

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20090628

Flight Summary
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20090629

Flight Summary
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SGP Plots
CCN Activity

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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

20090601

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
16:55 UTC	21:53 UTC	5.0	Aerosol long-leg variability & Turbulence at SGP	KML
Flight hours to date		179.1		

Out of Ponca City we climbed to 6700' and did a spiral descent over the CF.

The first 100 nm leg was downwind heading 010 becoming 015. Winds were 190/15 then 195/25. Altitude was 3000'. Times were 1727Z-1811Z.

The second leg was also at 3000'. Winds were 195/20. We flew back to the CF on a 195 heading. Times were 1812Z-1918Z.

The turbulence legs were done next. There were a few to scattered clouds in sight, but they were well to the north of the CF, and drifting north. Bases were ~6000 with tops extending much higher.

Leg # 1 2000'. Winds 180/24 1922Z DW

Leg # 2 2800'. Winds 185/25. 1941Z UW

Leg # 3 3600'. Winds 190/20. 2006ZDW

Leg # 4 4400'. Winds 195/26. 2023Z UW

Leg # 5 5200' Winds 210/25. 2048Z DW

Leg # 6 6000'. Winds 210/25 2106Z UW. There were a couple of clouds at the very northern end of this leg, and at the CF. Bases were 6000.' It was clear in between.

Back at the CF we climbed to 7000' and did a spiral descent to 1500'. 2126Z.

We RTB'd at 2135Z and 2500'.

No issues with the plane.

Weather Summary

Partly clear skies with broken high cumulus.

Aircraft Instrumentation Status

DLH still not working - Glenn Diskin on his way to Ponca City

Surface Instrumentation Status

nothing to report

Flight Images



1705 UTC



1730 UTC



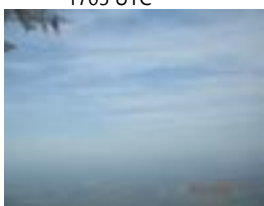
1754 UTC



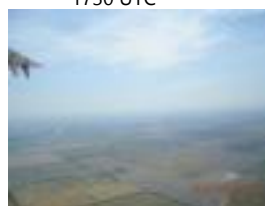
1810 UTC



1923 UTC



1714 UTC



1745 UTC



1803 UTC



1833 UTC



1939 UTC



1948 UTC



2018 UTC



2042 UTC



2105 UTC



2122 UTC



2005 UTC



2025 UTC



2042 UTC



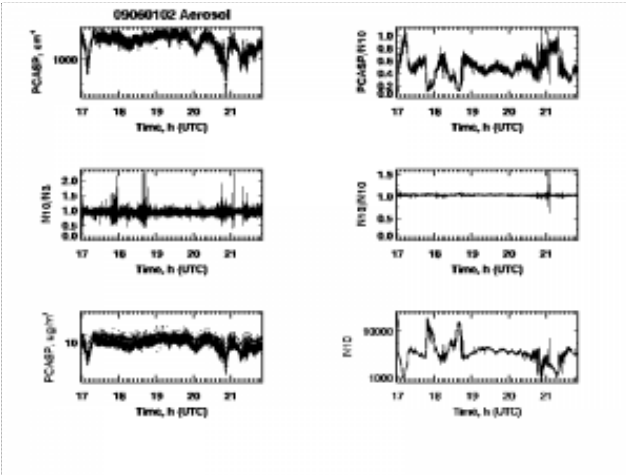
2105 UTC



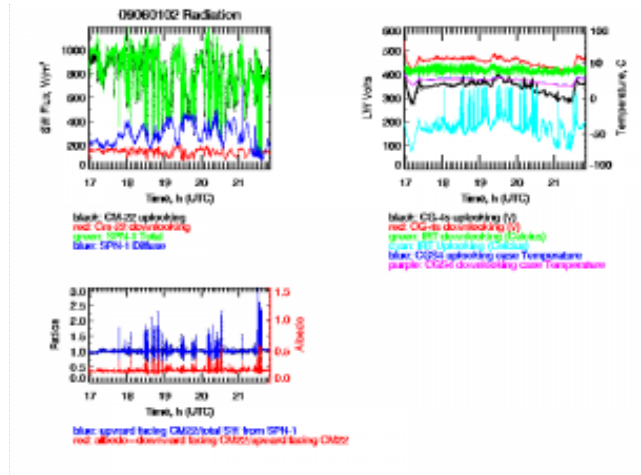
1859 UTC

Flight Plots

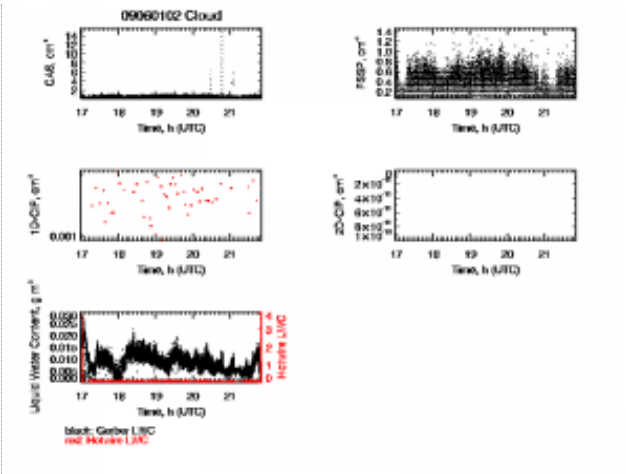
Aerosol



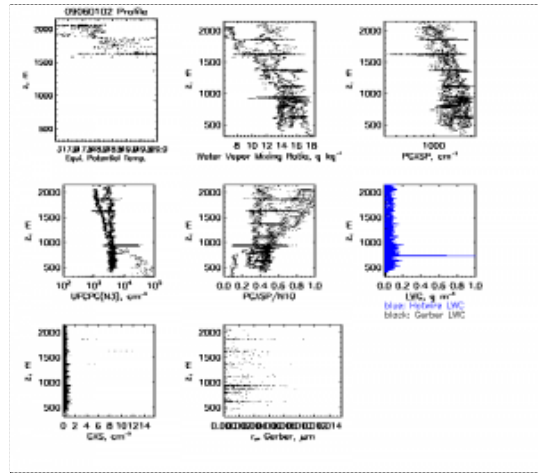
Radiation



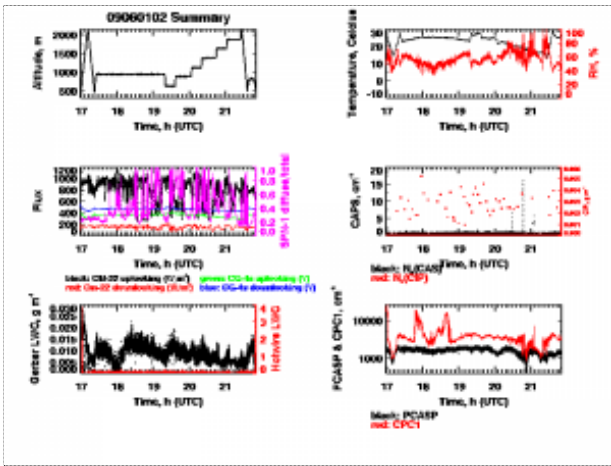
Cloud



Profile

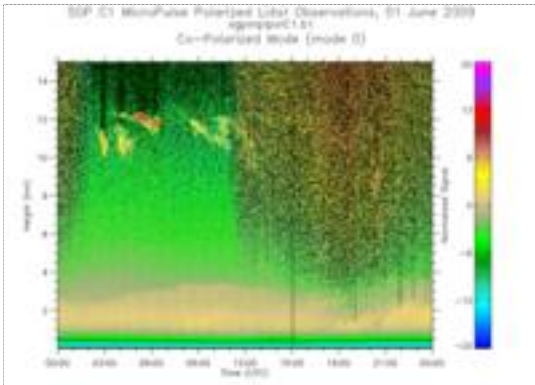


Summary

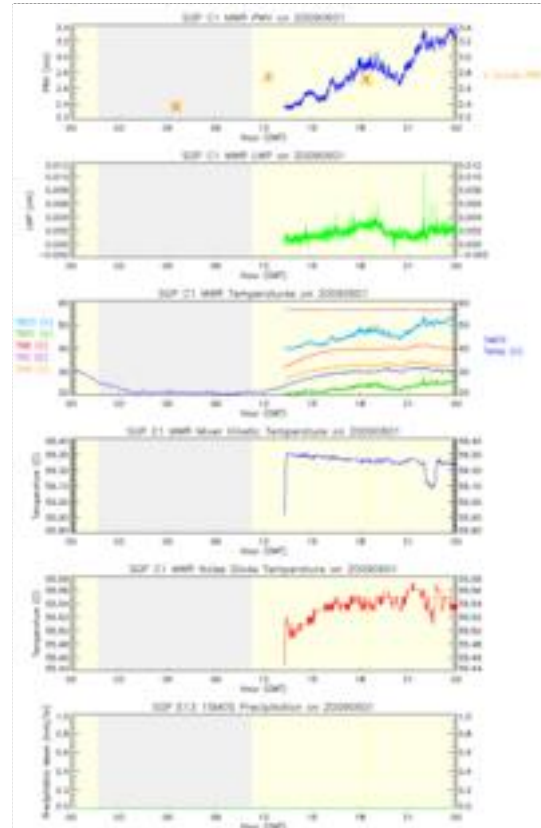


SGP Plots

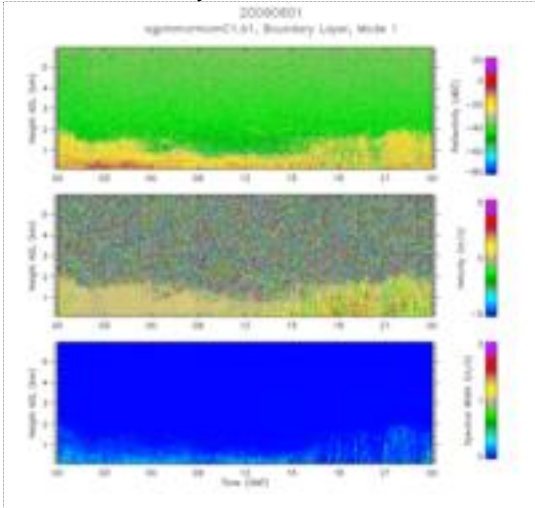
MPL Co-Pol



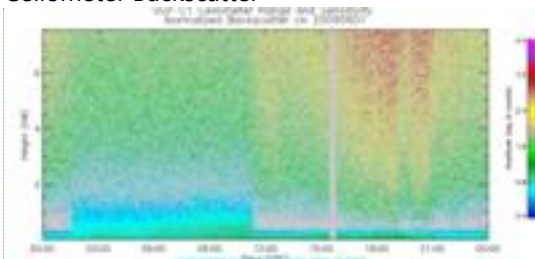
Microwave Radiometer



MMCR Bound. Layer Mode

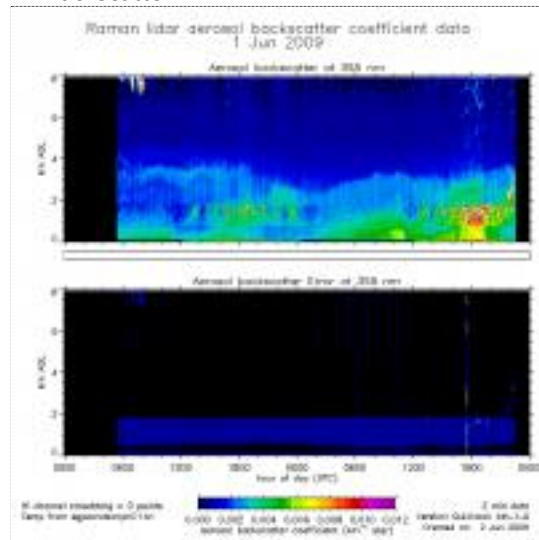
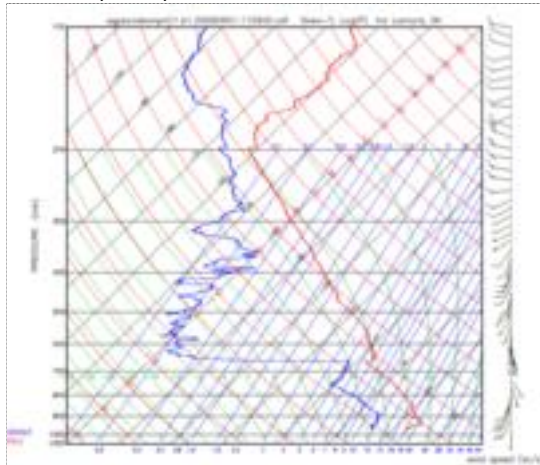


Ceilometer Backscatter

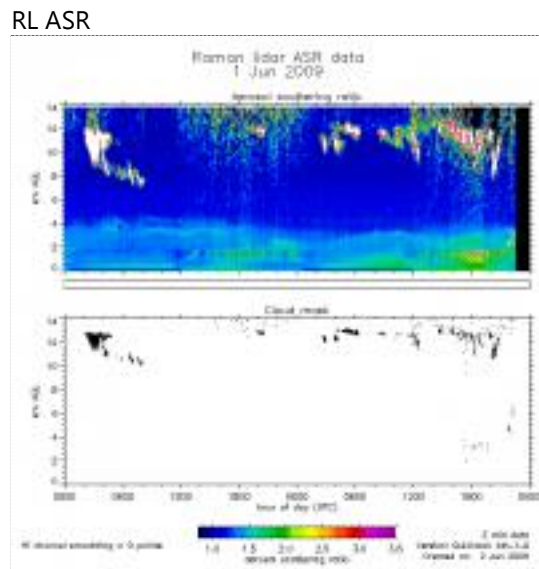
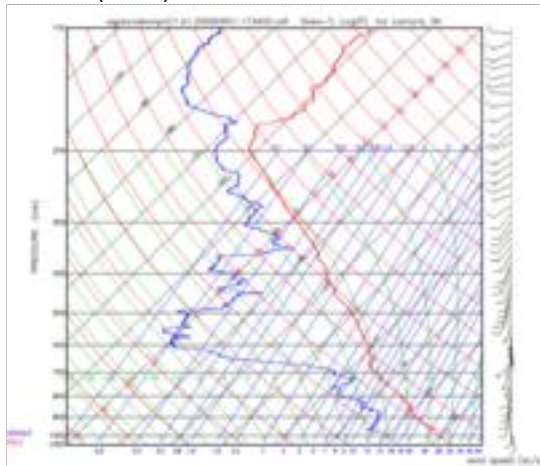


RL Backscatter

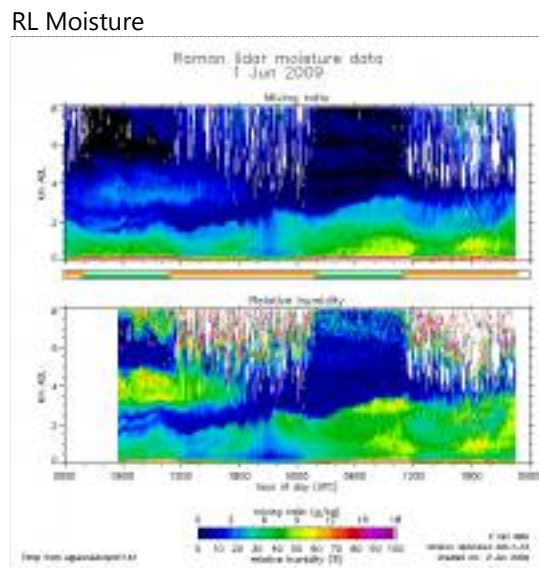
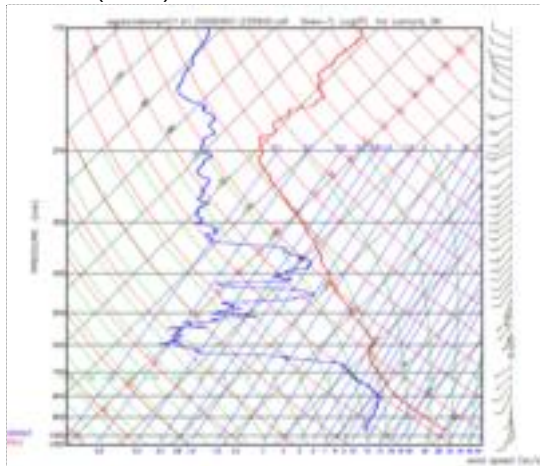
SONDE (11:30)



SONDE (17:30)



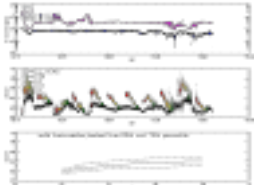
SONDE (23:30)



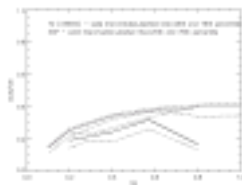
CCN Activity

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.

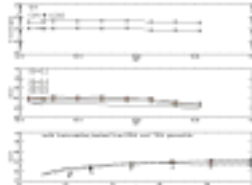
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 17 Jun 2009



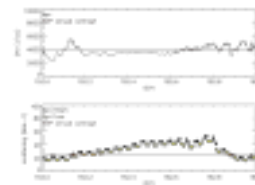
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



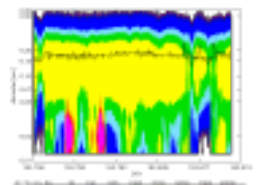
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

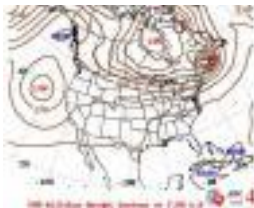


time series of CN and light scattering at SGP



TAMU DMA size distribution and CCN activation diameter

Weather Maps



map612



OK City: 1/8 cloud coverage; 8-12 knots | Tulsa: Clear; 38-12 knots; 1100 mb | 67 F/63 F

20090603

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
19:07 UTC	23:34 UTC	4.5	Cloud triangles at SGP	KML
Flight hours to date		183.5		

We departed Ponca City and climbed to the bases of 3900' and continued to the CF at 3400'.

Triangle #1. 3400'.

Leg #1 1908Z

Leg #2 1917Z

Leg #3 1930Z

Back at the CF we descended to 1500' and did a spiral climb to 7000'. Bases were 4800'-5000' Tops were 5600'. There was an overcast above us.

Triangle #2 7000'. We were below an overcast layer, but mixed in with the clouds. The tops ranged from 7000 to ~5000'. It was well mixed in there.

Leg #1 1959Z

Leg #2 2009Z

Leg #3 2021Z

Triangle #3. 6700'.

Leg #1 2035Z

Leg #2 2045Z

Leg #3 2057Z

Triangle #4 6400' We were pretty much cloud free from this point on. There were some thin wispy clouds in the area.

Leg #1 2109Z

Leg #2 2121Z

Leg #3 2132Z

Triangle #5 6100'

Leg #1 2147Z

Leg #2 2158Z

Leg #3 2209Z

Triangle #6 5500'

Leg #1 2224Z

Leg #2 2236Z

Leg #3 2247Z

Back at the CF we climbed to 7000' and did a spiral descent to 1500' time 2303. We RTB'd at 2316 and 2500'

Weather Summary

Low overcast skies in the morning; scattered clouds in the afternoon; winds out of the north.

Aircraft Instrumentation Status

DLH did not work again today..Glenn is here working on it.

Surface Instrumentation Status

nothing to report

Flight Images



1920 UTC



1928 UTC



1939 UTC



1946 UTC



1952 UTC



1956 UTC



1956 UTC



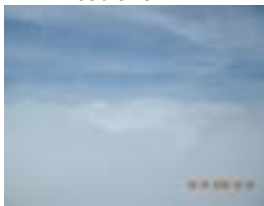
2000 UTC



2032 UTC



2041 UTC



2056 UTC



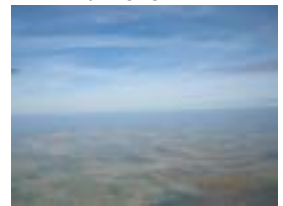
2102 UTC



2130 UTC



2148 UTC



2221 UTC



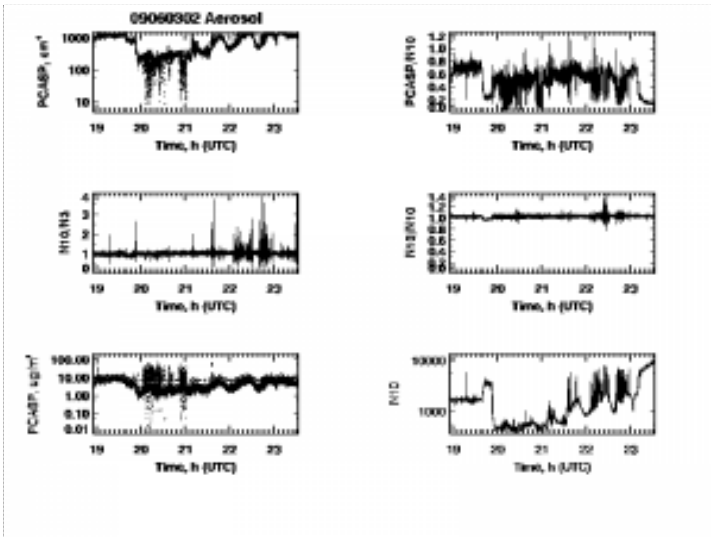
2258 UTC



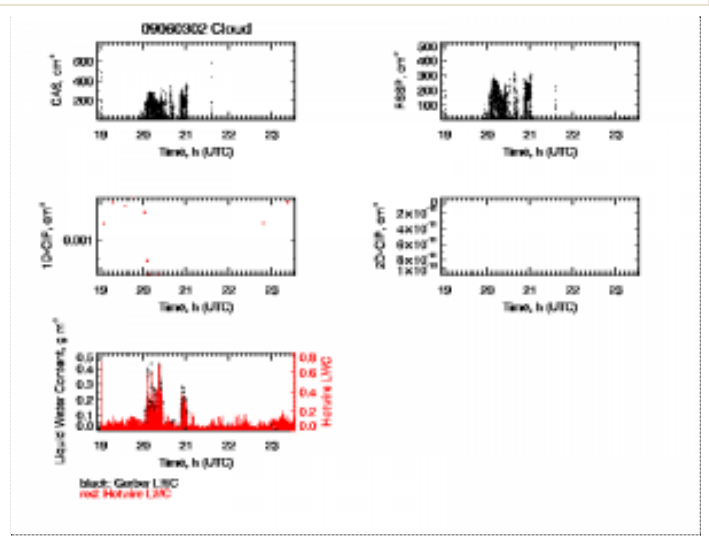
2316 UTC

Flight Plots

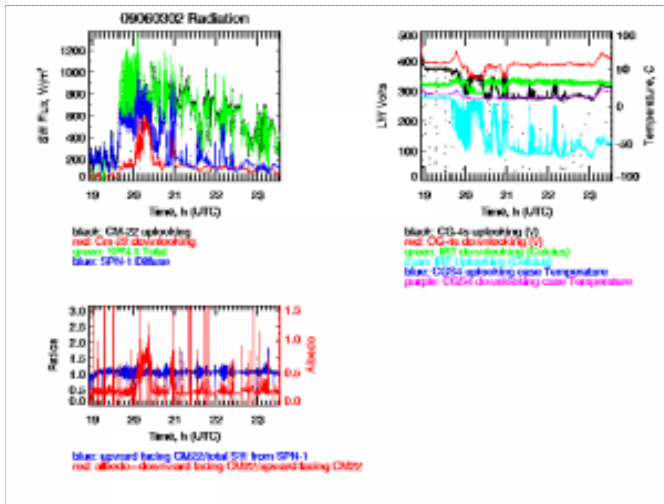
Aerosol



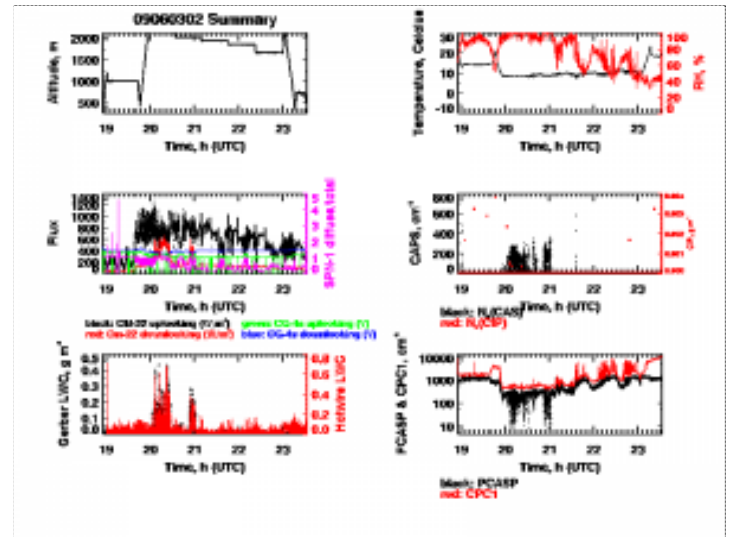
Cloud



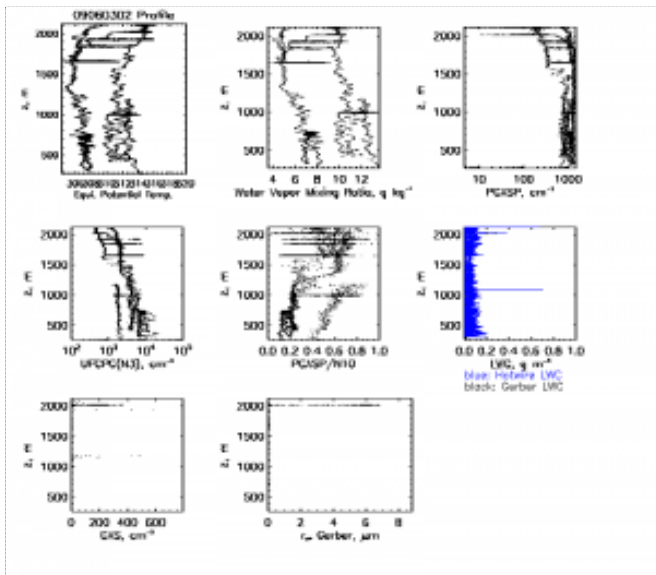
Radiation



Summary

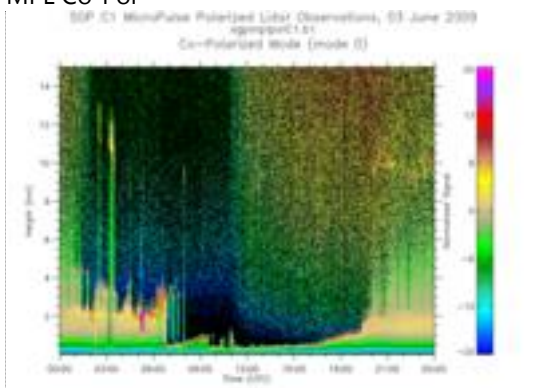


Profile

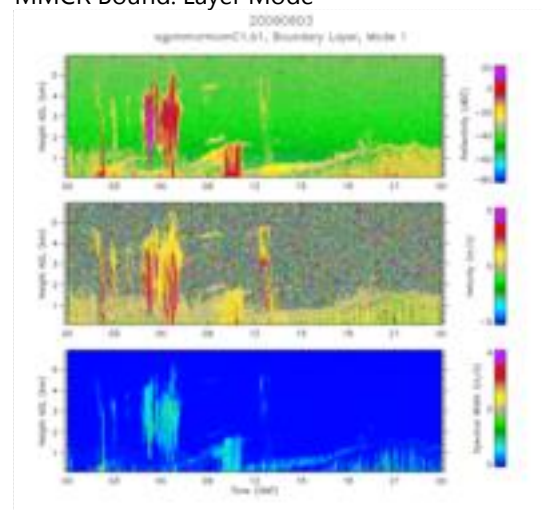


SGP Plots

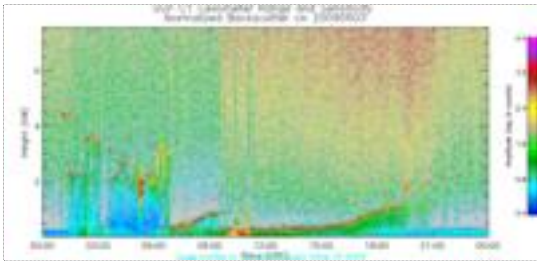
MPL Co-Pol



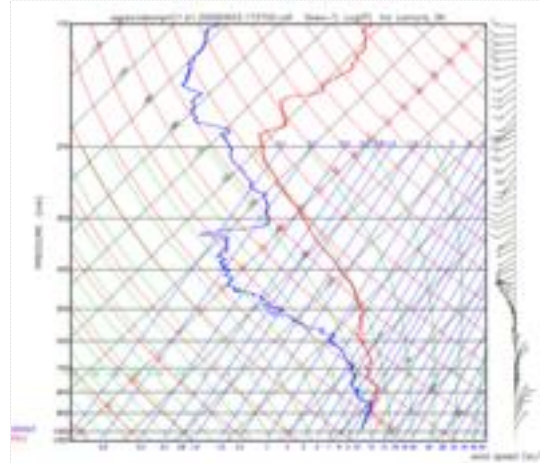
MMCR Bound. Layer Mode



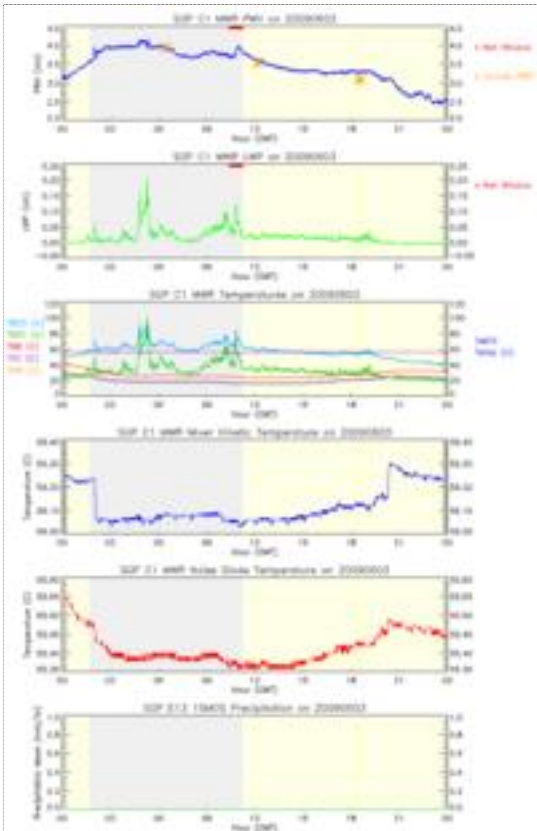
Ceilometer Backscatter



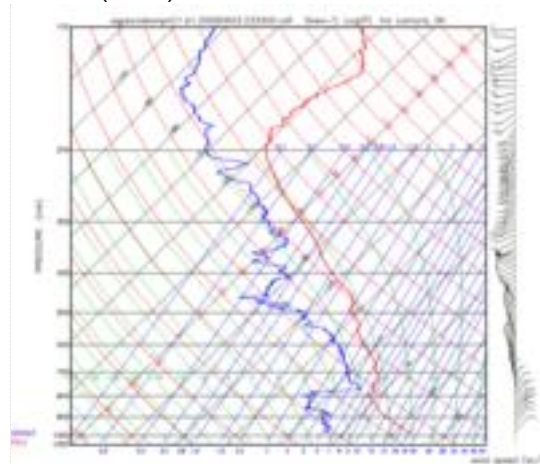
SONDE (17:30)



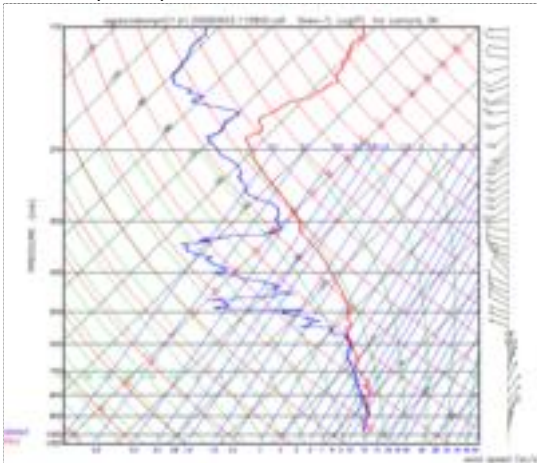
Microwave Radiometer



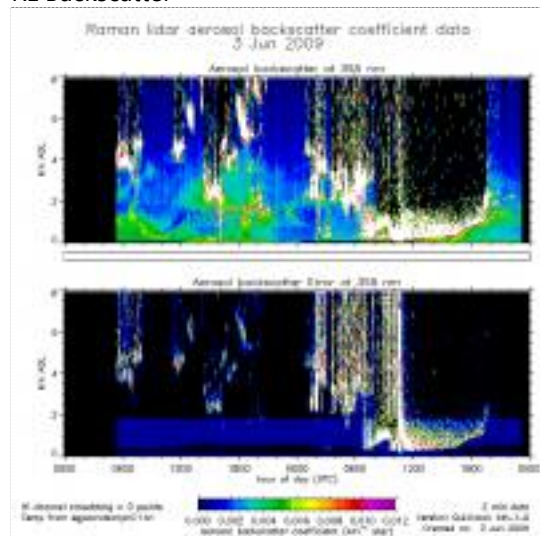
SONDE (23:30)



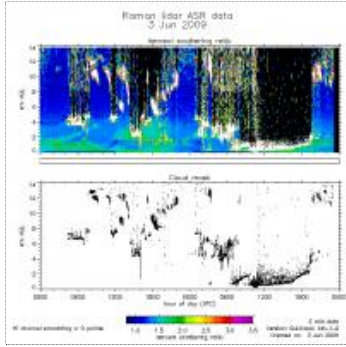
SONDE (11:30)



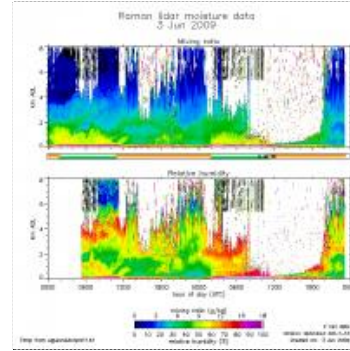
RL Backscatter



RL ASR



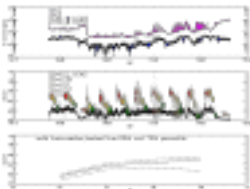
RL Moisture



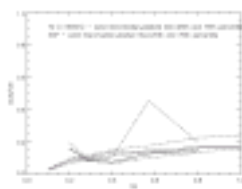
CCN Activity

I've 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.

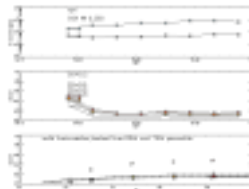
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 17 Jun 2009



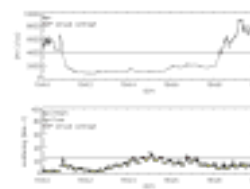
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



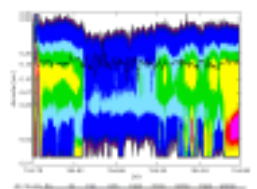
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

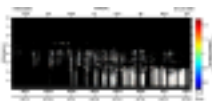


time series of CN and light scattering at SGP

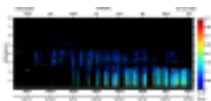


TAMU DMA size distribution and CCN activation diameter

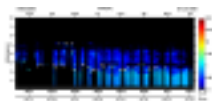
NASA Quick Look Plots



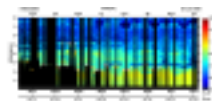
20090603_L1_1064_532_aer_dep_rat
io



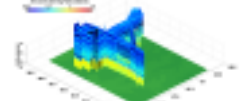
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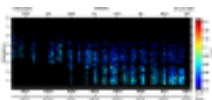
20090603_L1_bsc532



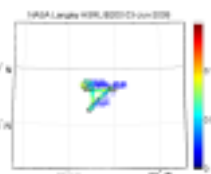
20090603_L1_bsr532



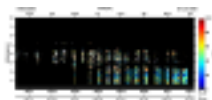
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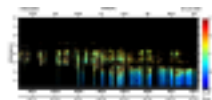
20090603_L1_ext532



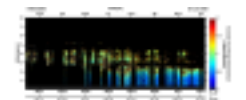
20090603_L1_flight_track_A
OT



20090603_L1_Sa532



20090603_L1_wvd



20090603_L1_wvd(1)

Weather Maps



map-632



OK City: Scattered; 3-7 knots | Tulsa: 1/8 cloud coverage; 8-12 knots; 1109 mb | 81 F/60 F | Pre-cold front

20090604

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
15:16 UTC	20:02 UTC	4.8	Surface albedo & Turbulence at SGP	KML
Flight hours to date		188.3		

Skies were generally clear with only very few cumulus clouds in the area during the later part of the flight. Bases were above 7000'.

Out of Ponca City we climbed to 7000' to the CF. Over the site we spiraled from 7000' to 1500' at 1530Z.

We did the pinwheel pattern at 1600' the King Air was overhead. Times were 1543Z-1638Z.

We did the paperclip pattern at 1600', the King Air was overhead. Times were 1641Z-1723Z.

We did the turbulence legs with the King Air overhead.

Leg # 1 2000' winds 010/10; 1731Z Upwind

Leg # 2 2700' winds 101/11; 1752Z Downwind

Leg # 3 3400' winds 020/6; 1813Z UW

Leg # 4 4100', winds NIL < 5 kts. We ran the 020 line; 1827Z.

Leg # 5 4800', winds NIL. We ran the 020 line; 1856Z.

Leg # 6 5500', winds NIL. We ran the 020 line; 1917Z.

Back at the CF we climbed to 7000' and did a spiral to 1500' 1934Z. We RTB'd at 1946Z and 2500'.

Weather Summary

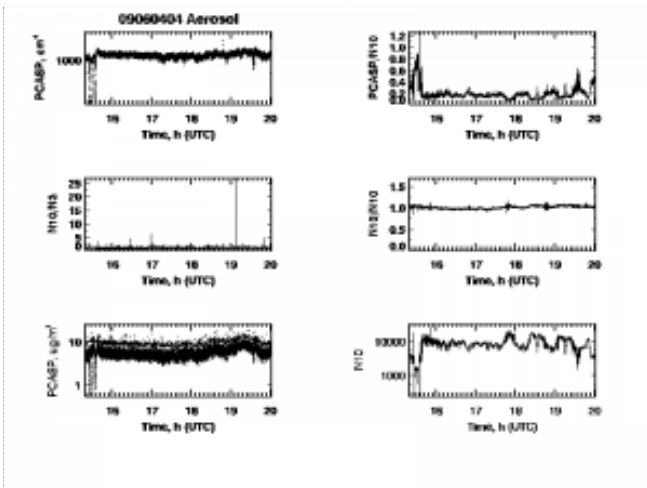
Clear skies with a few cumulus clouds.

Surface Instrumentation Status

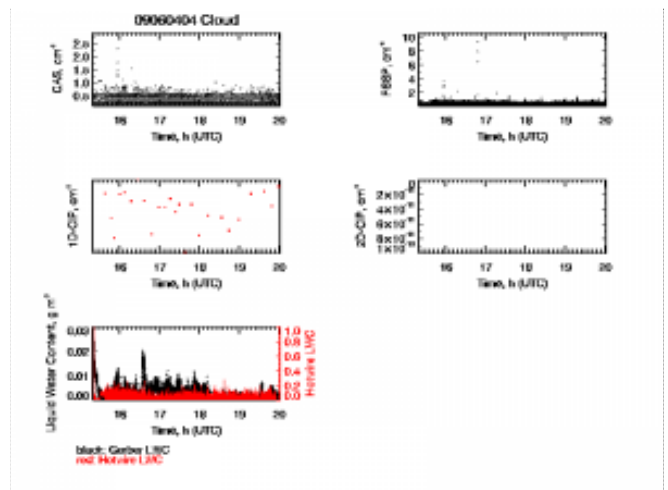
nothing to report

Flight Plots

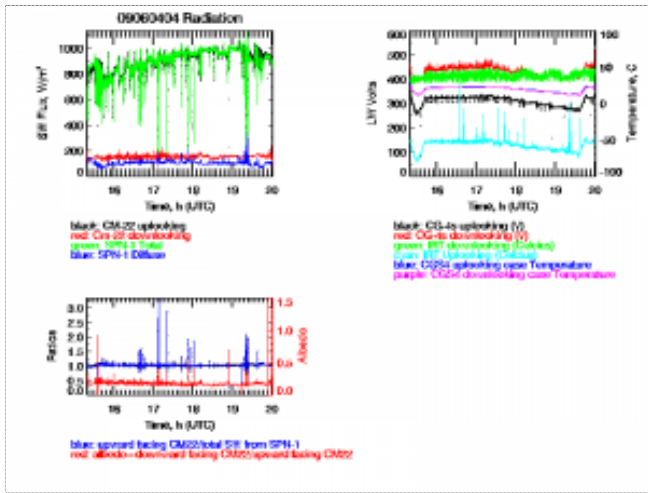
Aerosol



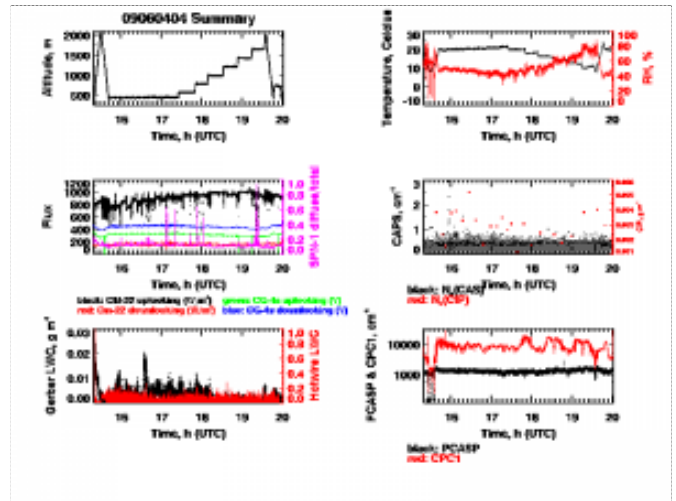
Cloud



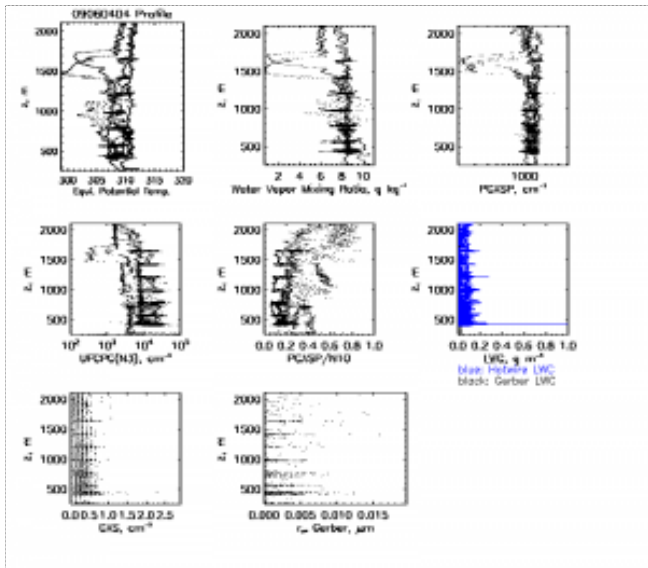
Radiation



Summary

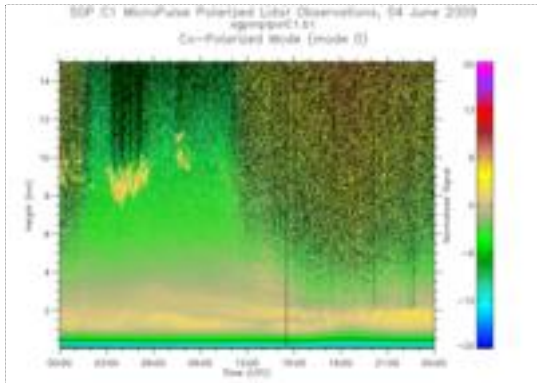


Profile

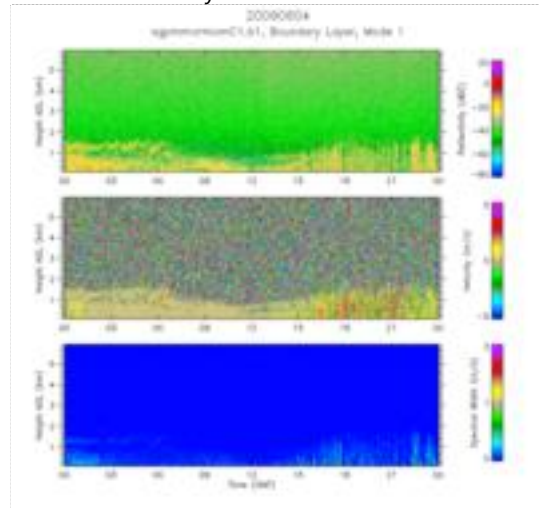


SGP Plots

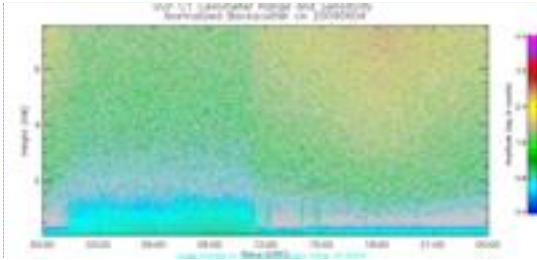
MPL Co-Pol



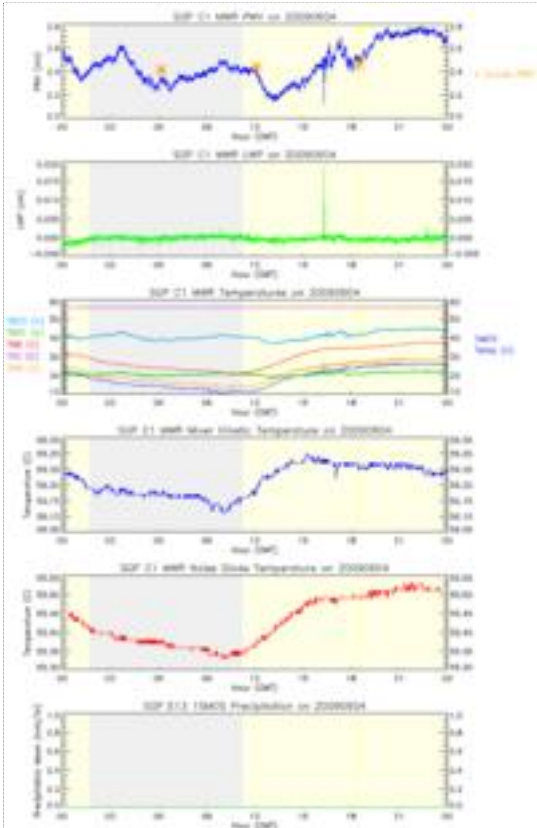
MMCR Bound. Layer Mode



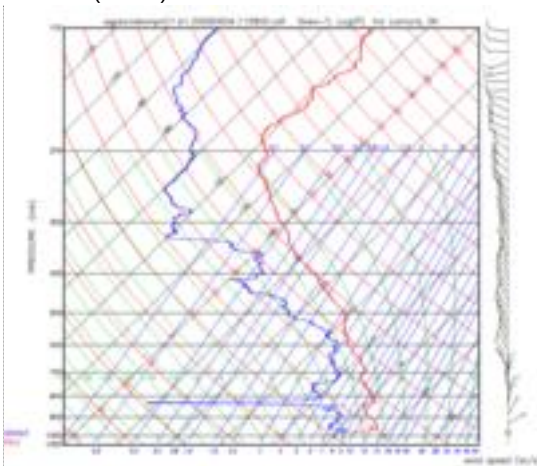
Ceilometer Backscatter



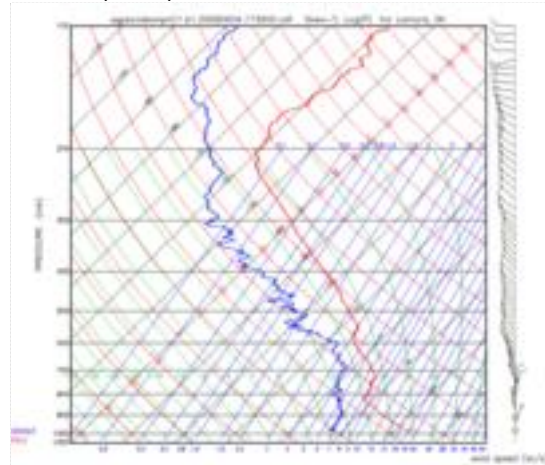
Microwave Radiometer



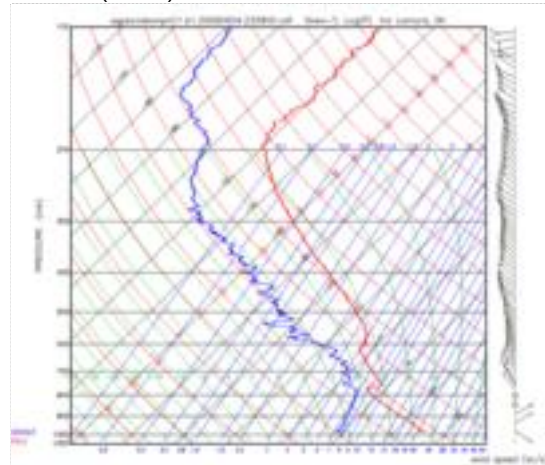
SONDE (11:30)



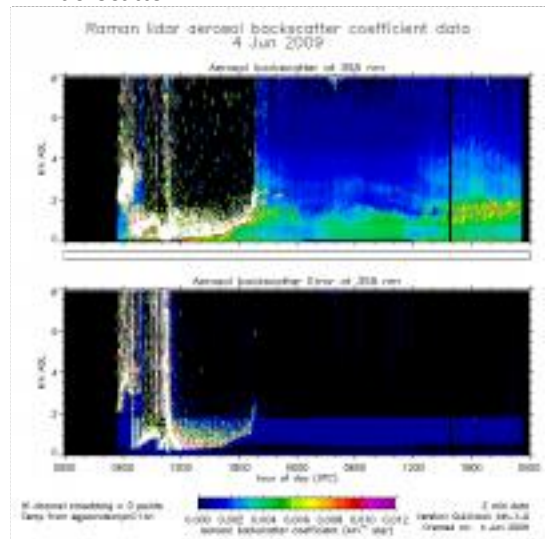
SONDE (17:30)



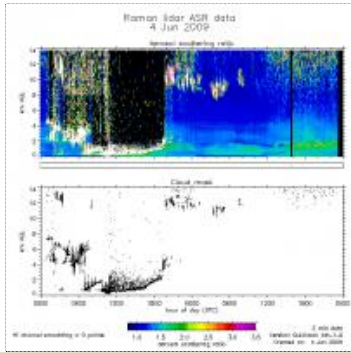
SONDE (23:30)



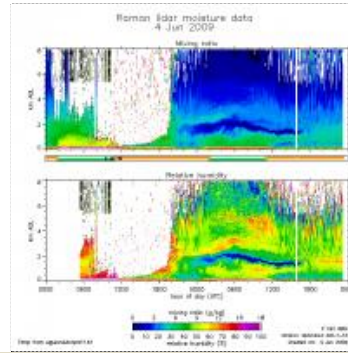
RL Backscatter



RL ASR



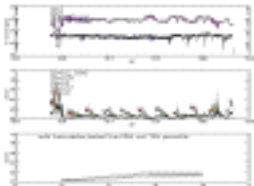
RL Moisture



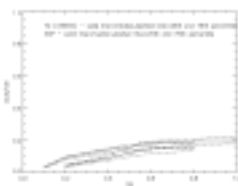
CCN Activity

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.

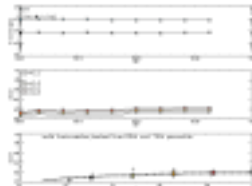
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as f(SS)). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 17 Jun 2009



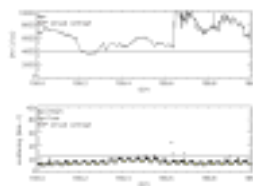
plot of CN and CCN and CCN/CN ratio as f(SS) from twin otter



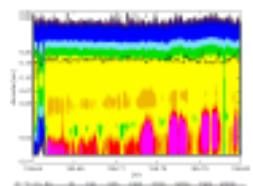
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

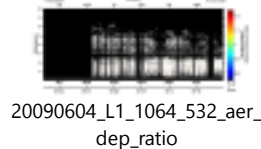


time series of CN and light scattering at SGP

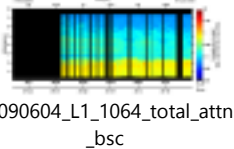


TAMU DMA size distribution and CCN activation diameter

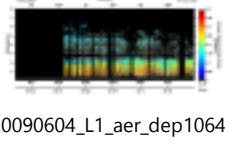
NASA Quick Look Plots



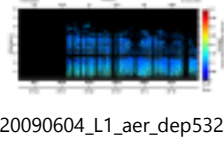
20090604_L1_1064_532_aer_dep_ratio



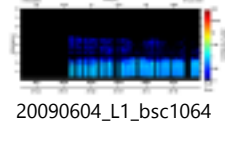
20090604_L1_1064_total_attn_bsc



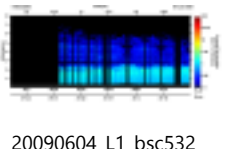
20090604_L1_aer_dep1064



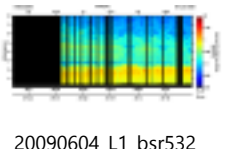
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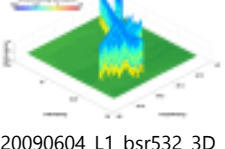
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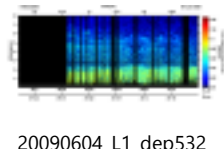
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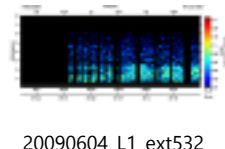
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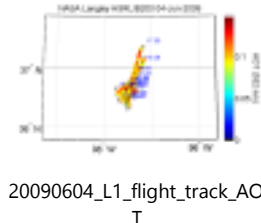
20090604_L1_bsr532_3D



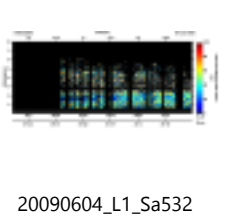
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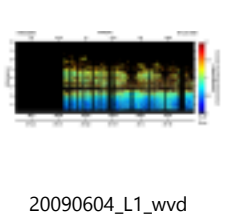
20090604_L1_ext532



20090604_L1_flight_track_AO_T

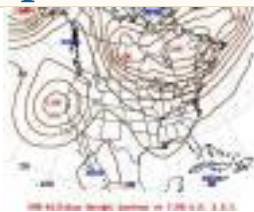


20090604_L1_Sa532



20090604_L1_wvd

Weather Maps



map-642



Both OK City and Tulsa: Overcast, 13-17 knots; 1147 mb | 70 F/56 F | Post-cold front

20090607

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
17:10 UTC	22:53 UTC	5.7	Aerosol triangles at SGP (with 40 mile legs)	KML
Flight hours to date		194.0		

We departed Ponca City and climbed to 6800' and continued to the CF at 6800'. Top of the boundary layer was roughly 6300'. There was a high broken cirrus layer at what looked to be about 18000'.

We conducted a spiral descent at 1725 zulu from 6800' to 1500' over the CF.

Triangle #1. 4000'.

Leg #1 1742Z Wind 233 @ 16 Temp. 22

Leg #2 1802Z 263 @ 20 22

Leg #3 1839Z 235 @ 10 23

Back at the CF we flew past the CF to the North for 2 NM. At 1843 ZULU the NASA King Air departed to a different location. We then climbed to 4500' for the next leg.

Triangle #2 4500'. A thick high cumulus layer had formed above us and there was light intermittent precipitation that began at 1945 Zulu.

Leg #1 1900Z Wind 253 @ 12 Temp. 23

Leg #2 1920Z 229 @ 18 21

Leg #3 1954Z 290 @ 14 24

Back at the CF we flew past the CF to the North for 2 NM. We started painting solid yellow returns on our radar (medium intensity precipitation) from the high cumulus and were still encountering intermittent light precipitation. All cumulus was still above us. We flew past the CF to the North for 2 NM and climbed to 5000' for our next leg.

Triangle #3. 5000'.

Leg #1 2018Z Wind 260 @ 20 Temp. 22

Leg #2 2035Z 296 @ 20 22

Leg #3 2109Z 185 @ 11 22

Triangle #4 7000'. We flew past the CF to the North for 2 NM. The high cumulus had dissipated but the high cirrus was still present. In the climb to 7000' we noted the top of the boundary layer at about 6500'. Due to fuel we decided to conduct the last triangular pattern with 30 Nautical mile legs.

Leg #1 2133Z Wind 240 @ 36 Temp. 20

Leg #2 2145Z 247 @ 33 20

Leg #3 2214Z 205 @ 30 20

Back at the CF flew past the CF to the North for 2 NM and did a spiral descent to 1500' time 2230. We RTB'd at 2242 Zulu at 3000'.

No issues with the airplane.

Weather Summary

High, dissipating cumulus with broken cirrus above; light precipitation now and then.

Aircraft Instrumentation Status

Roy said everything appears to be working fine.

DLH data not available.

Surface Instrumentation Status

nothing to report

Flight Images



1747 UTC



1748 UTC



1849 UTC



1947 UTC



1747 UTC



1749 UTC



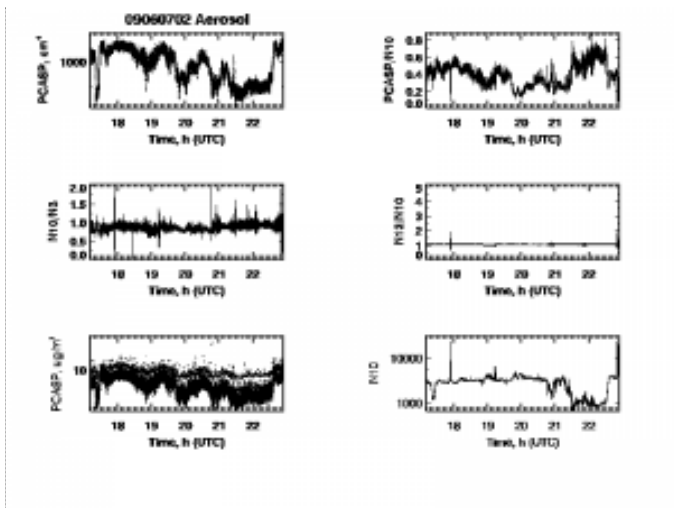
1849 UTC



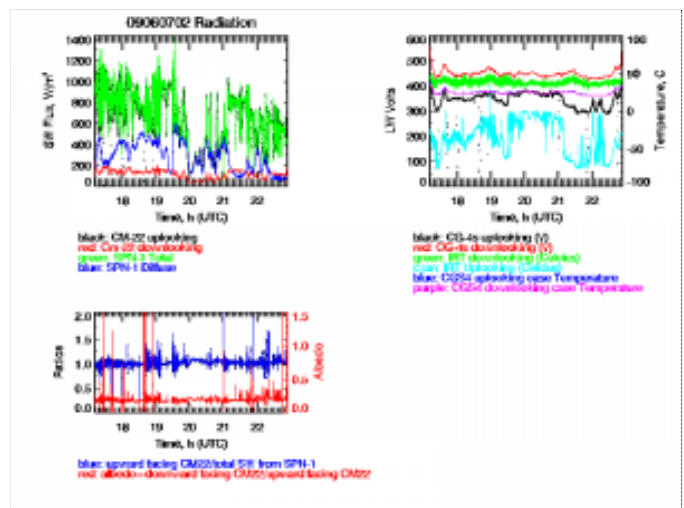
2042 UTC

Flight Plots

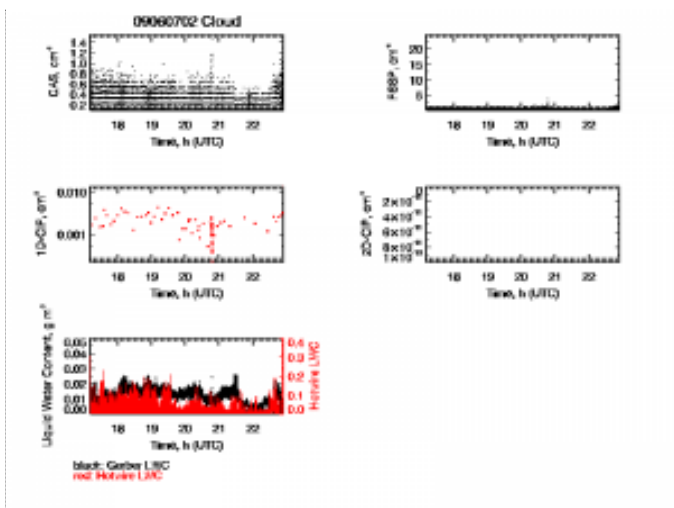
Aerosol



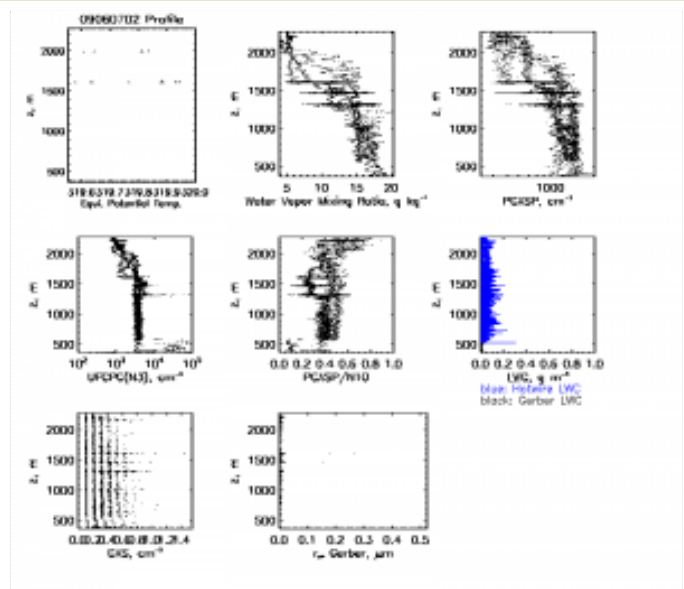
Radiation



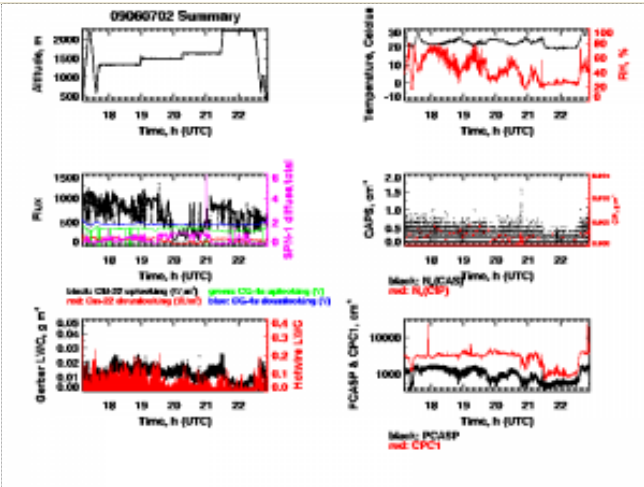
Cloud



Profile

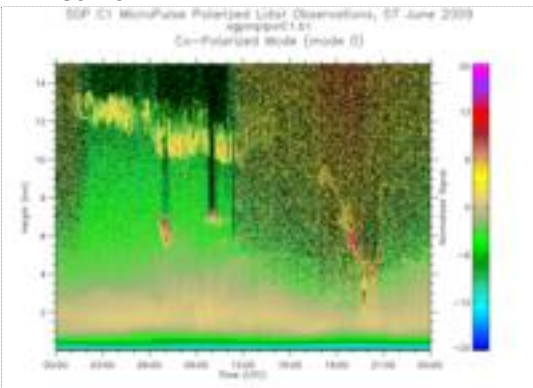


Summary

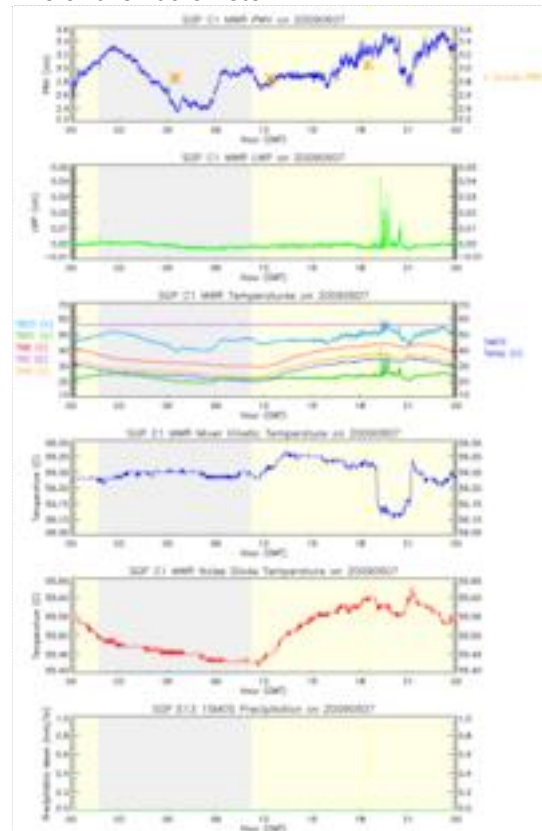


SGP Plots

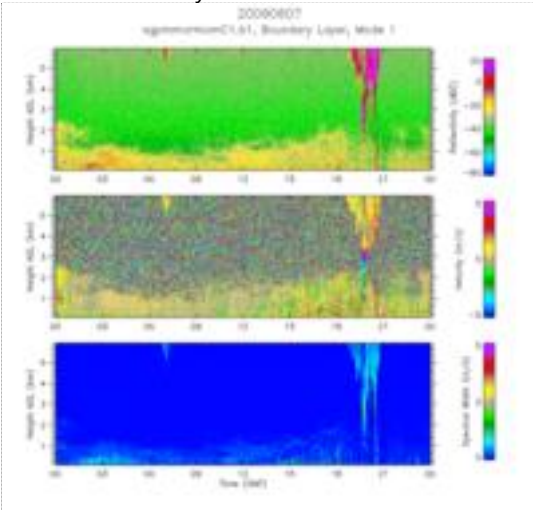
MPL Co-Pol



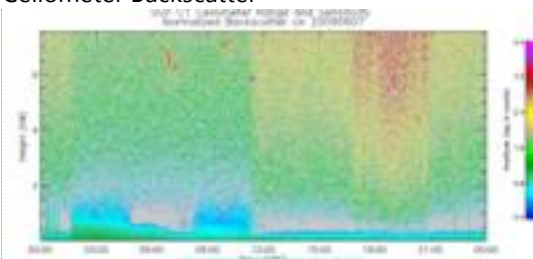
Microwave Radiometer



MMCR Bound. Layer Mode

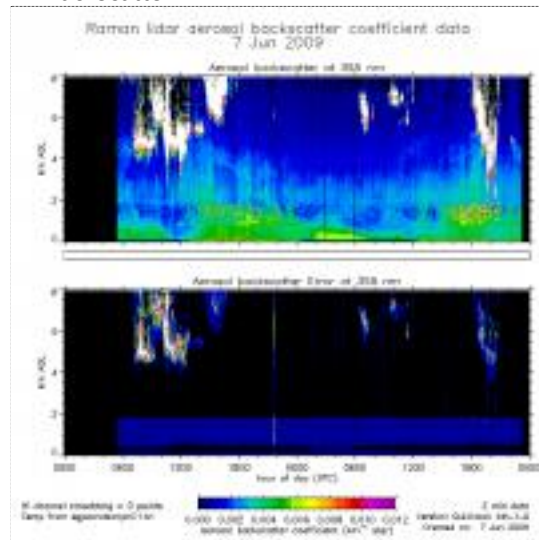
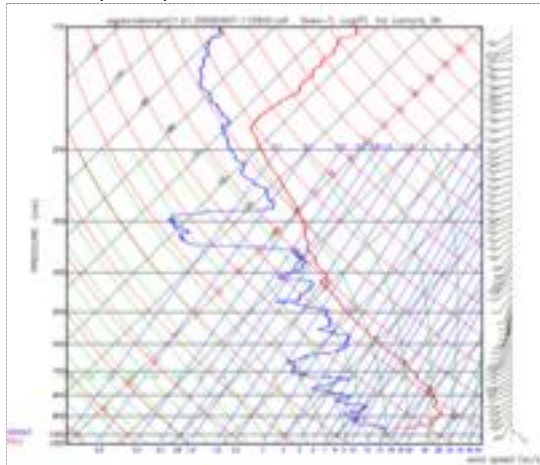


Ceilometer Backscatter

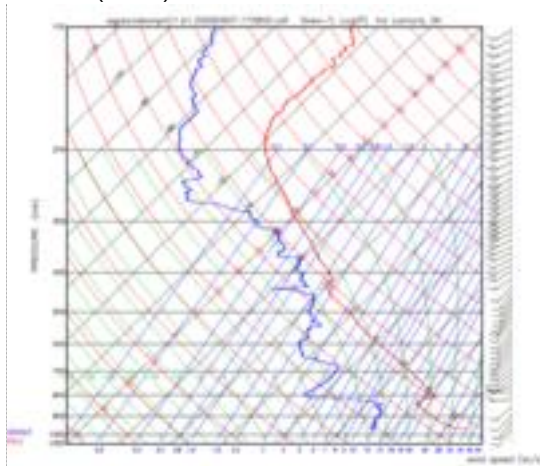


RL Backscatter

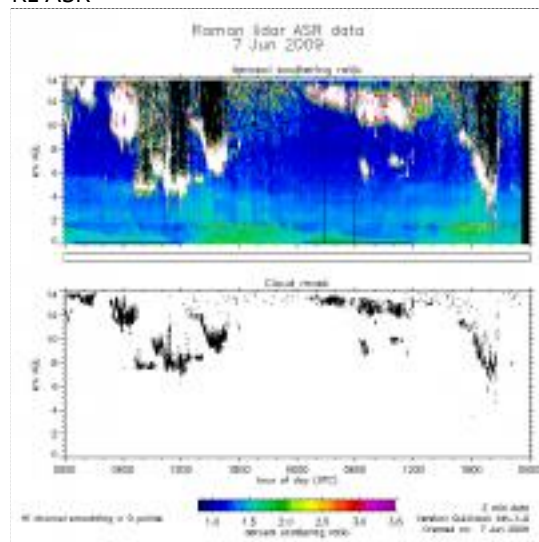
SONDE (11:30)



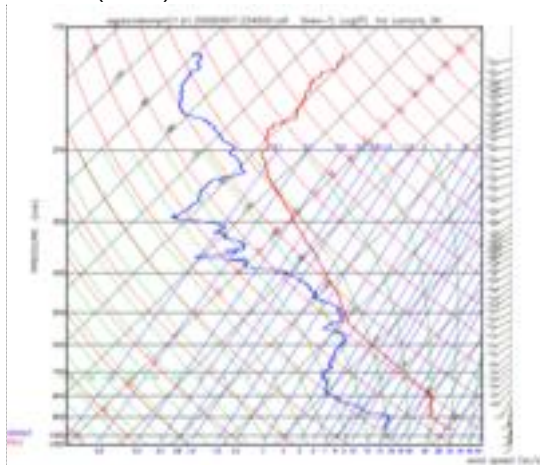
SONDE (17:30)



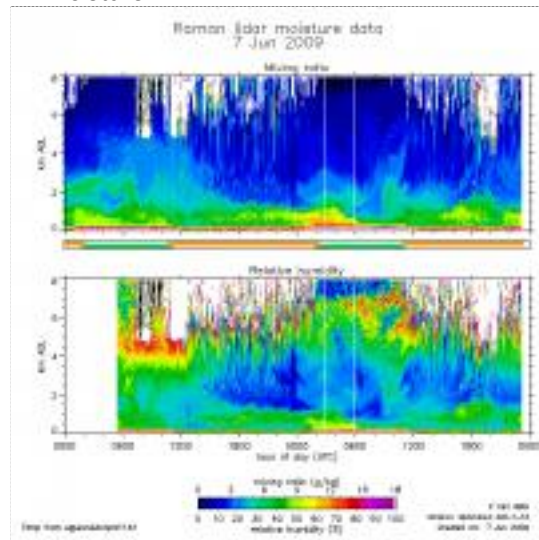
RL ASR



SONDE (23:30)



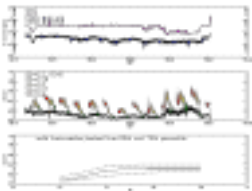
RL Moisture



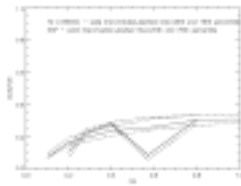
CCN Activity

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.

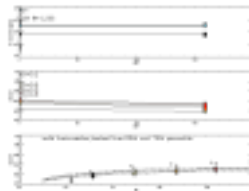
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 17 Jun 2009



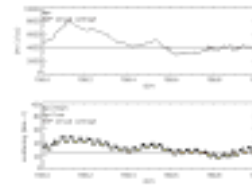
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



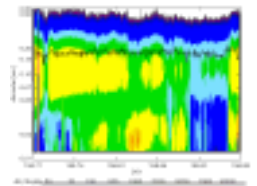
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

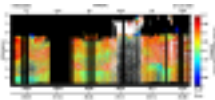


time series of CN and light scattering at SGP

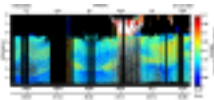


TAMU DMA size distribution and CCN activation diameter

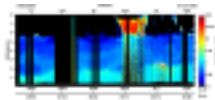
NASA Quick Look Plots



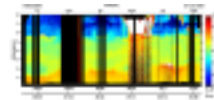
20090607_L1_aer_dep1064



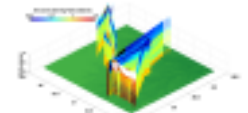
20090607_L1_aer_dep532



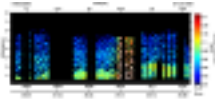
20090607_L1_bsc532



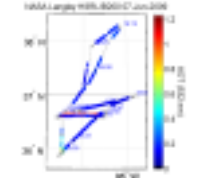
20090607_L1_bsr532



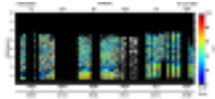
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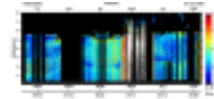
20090607_L1_ext532



20090607_L1_flight_track_AO
T



20090607_L1_Sa532



20090607_L1_wvd

Weather Maps



map-672



OK City: 1/8 cloud coverage; 18-22 knots | Tulsa: Clear; 18-22 knots; 1061 mb | 85 F/66 F | Pre-cold front

20090608

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
16:17 UTC	22:03 UTC	5.8	Cloud triangles at SGP (with 30 Nautical Mile legs)	KML
Flight hours to date		199.8		

We departed Ponca City and climbed to 4000' and continued to the CF at 4000'. Cloud base was about 3800'. There was a very thin scattered layer over the CF. There was a high broken cirrus layer at what looked to be about 18000'.

We continued to track to the Southeast on a line from the CF to a point 43 nautical miles southeast of the CF. At about 10 NM on that track we realized there was a significant cloud field to the east southeast within the triangular pattern from the CF. We decided to work this cloud field using the 30 NM legs east and south from the CF. We found the bases to be about 3800' and descended to 3300' and returned to the CF to start the first triangle at base - 500'. There was a high cirrus layer which we estimated to be at 18000'.

Triangle #1. 3300' to 2800'. Base -500'. At 1656 Zulu we descended to 2800' due to lower bases at 3300'.

Leg #1 1644Z Wind 354 @ 03 Temp. 18

Leg #2 1701Z 353 @ 04 20

Leg #3 1723Z 046 @ 07 21

Back at the CF we flew past the CF to the North for 2 NM. At 1741 we spiraled down to 1500' and back up to 5000'. At this point there were few clouds over the CF so we used the Boundary Layer top which we determined to be about 4500'.

Triangle #2 4000' to 4300'. Cloud base +500'. The cloud bases varied so we changed altitudes accordingly to stay in cloud.

Leg #1 1751Z Wind 048 @ 06 Temp. 17

Leg #2 1808Z 026 @ 04 18

Leg #3 1829Z 078 @ 10 17

Back at the CF we flew past the CF to the North for 2 NM. We climbed to 4600' for a mid cloud leg. Note: There were more clouds to the east and southeast of the CF.

Triangle #3. 4600'. Mid cloud leg.

Leg #1 1849Z Wind 052 @ 04 Temp. 18

Leg #2 1906Z 041 @ 06 17

Leg #3 1927Z 110 @ 08 17

Back at the CF we flew past the CF to the North for 2 NM. We climbed to 4900' roughly tops - 500'.

Triangle # 4 4900'. Tops - 500'.

Leg #1 1947Z Wind 112 @ 05 Temp. 18

Leg #2 2004Z 048 @ 02 17

Leg #3 2027Z 110 @ 05 17\

Back at the CF flew past the CF to the North for 2 NM. We climbed to tops + 500' at 6500'. We estimated the tops to be 6000'. Note: Clouds were dissipating and there was significant haze.

Triangle # 5 6500'. Tops + 500'

Leg #1 2046 Wind 087 @ 03 Temp. 17

Leg #2 2103 016 @ 07 17

Leg #3 2124 109 @ 09 17

Back at the CF we flew past the CF to the North for 2 NM. We began a spiral descent to 1500' at 2142 and returned to Ponca City at an altitude of 2500'.

Note: There was a defined cloud line about 5 to 10 NM east southeast of the CF during the entire flight. It was relatively clear west northwest of this line and very cloudy east and southeast of this line.

No issues with the airplane.

Weather Summary

Scattered cloud layer with high broken cirrus.

Aircraft Instrumentation Status

Roy says everything was fine

Surface Instrumentation Status

nothing to report

Flight Images



1650 UTC



1706 UTC



1809 UTC



1908 UTC



1650 UTC



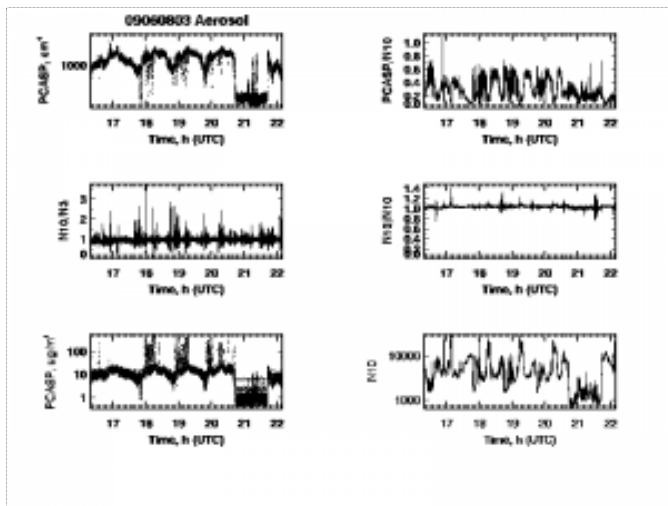
1808 UTC



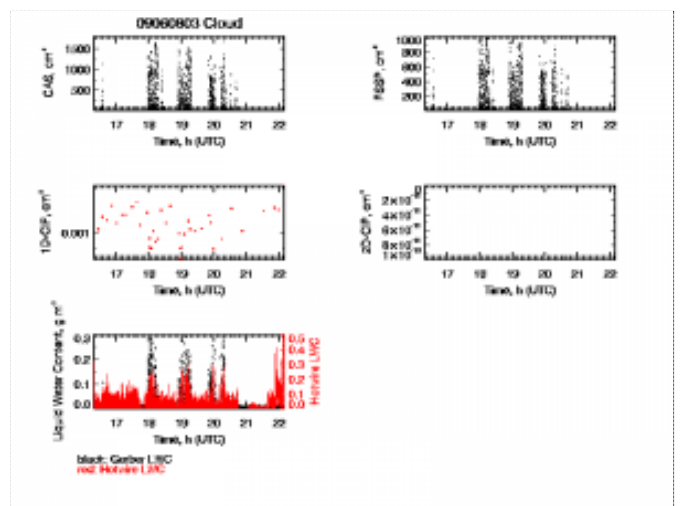
1908 UTC

Flight Plots

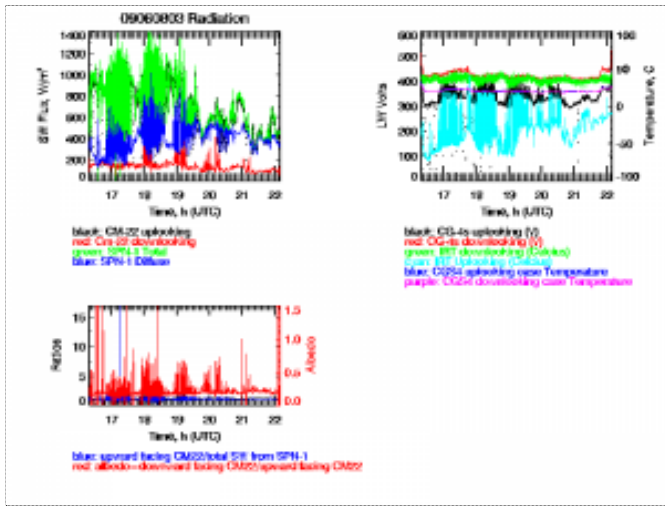
Aerosol



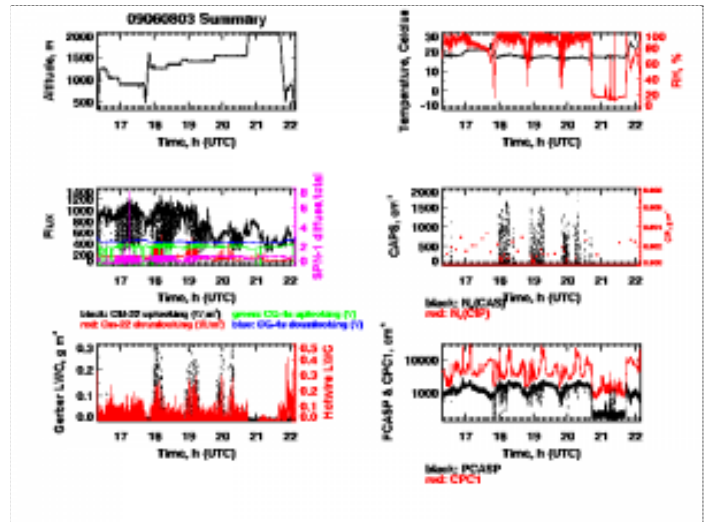
Cloud



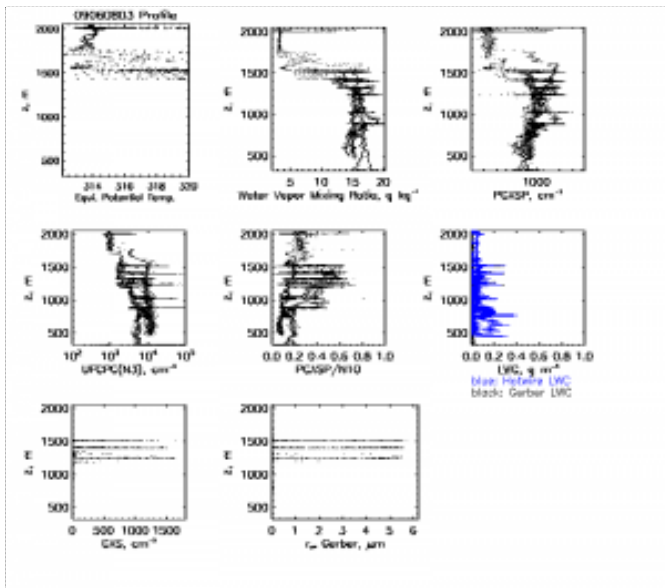
Radiation



Summary

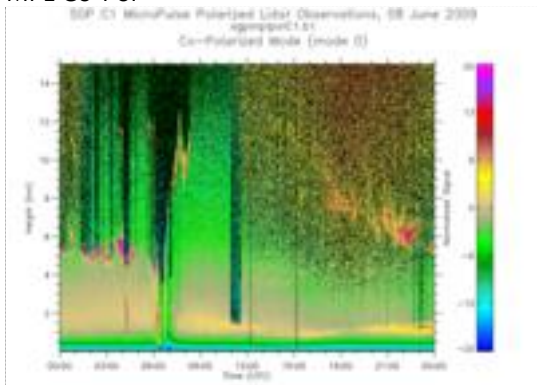


Profile

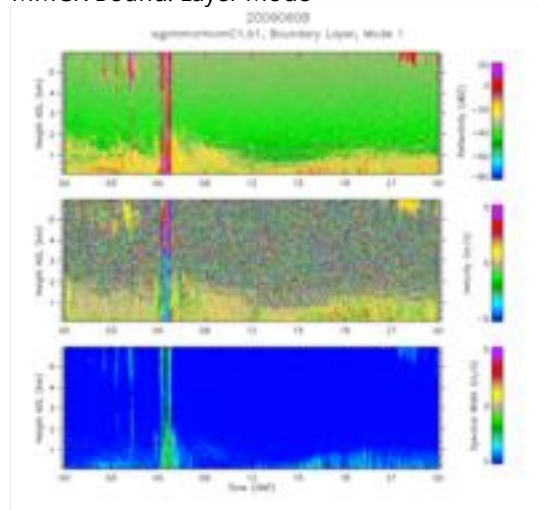


SGP Plots

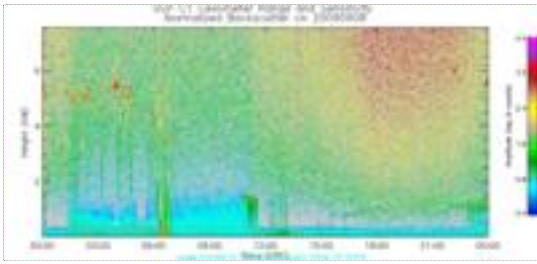
MPL Co-Pol



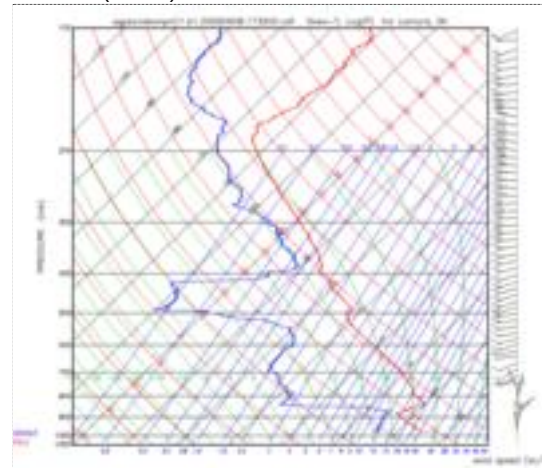
MMCR Bound. Layer Mode



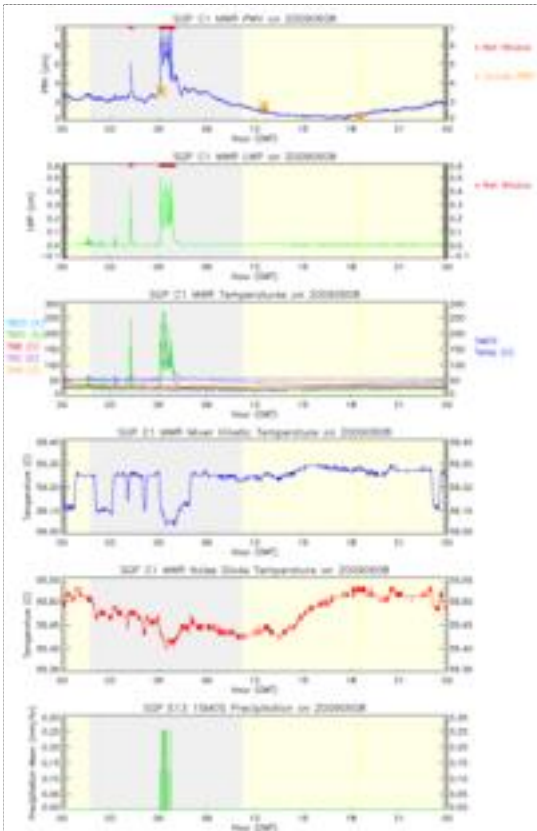
Ceilometer Backscatter



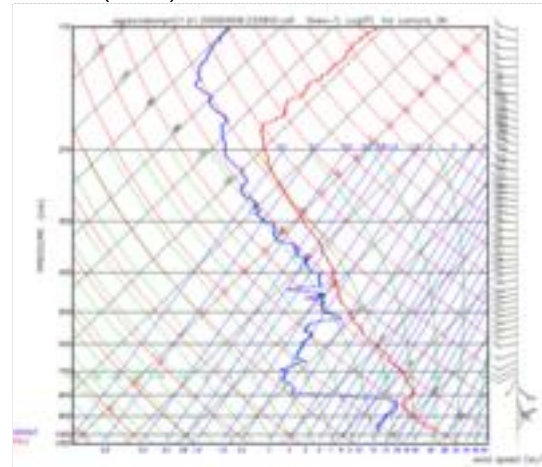
SONDE (17:30)



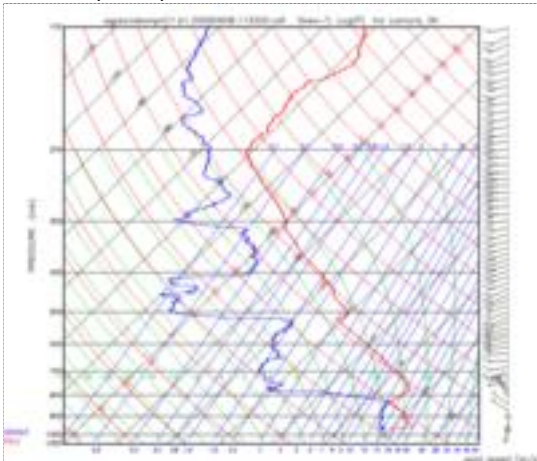
Microwave Radiometer



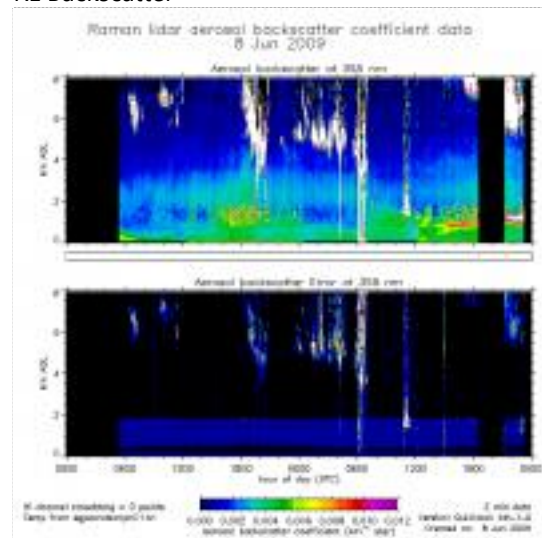
SONDE (23:30)



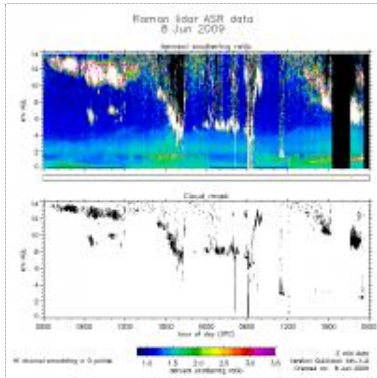
SONDE (11:30)



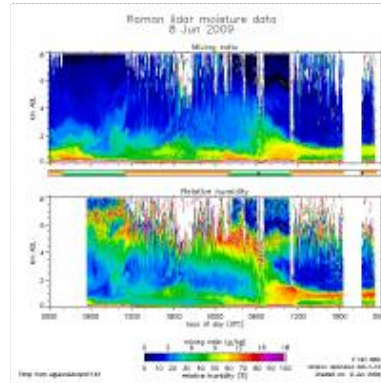
RL Backscatter



RL ASR



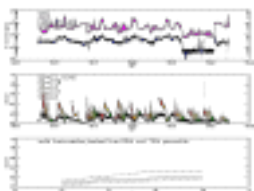
RL Moisture



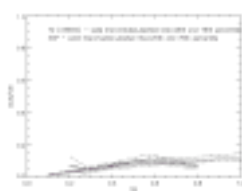
CCN Activity

I've 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.

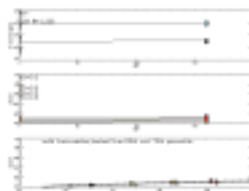
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as f(SS)). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 17 Jun 2009



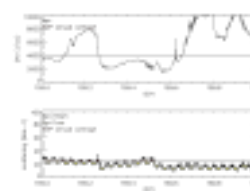
plot of CN and CCN and CCN/CN ratio as f(SS) from twin otter



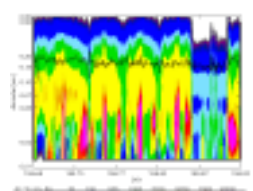
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

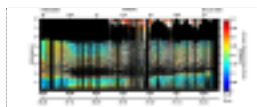


time series of CN and light scattering at SGP

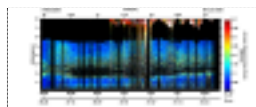


TAMU DMA size distribution and CCN activation diameter

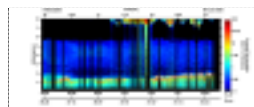
NASA Quick Look Plots



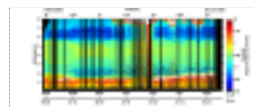
20090608_L1_aer_dep1064



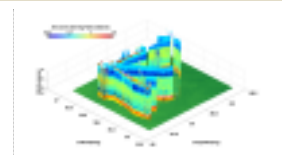
20090608_L1_aer_dep532



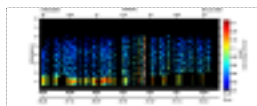
20090608_L1_bsc532



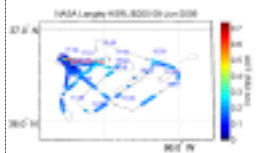
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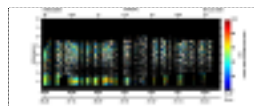
20090608_L1_bsr532_3D



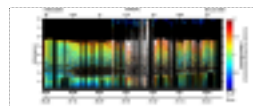
20090608_L1_ext532



20090608_L1_flight_track_AO



20090608_L1_Sa532



20090608_L1_wwd

Weather Maps



map-672



OK City: 1/8 cloud coverage; 13-17 knots | Tulsa: 1/8 cloud coverage; 18-22 knots; 1037 mb | 86 F/65 F | Pre-cold front

20090609

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
16:26 UTC	20:14 UTC	3.8	Cloud triangles at SGP (with 30 Nautical Mile legs)	KML
Flight hours to date		203.6		

We departed Ponca City and climbed to 3000' and continued to the CF at 3000'.

We conducted a spiral at about 1643 zulu from 3000' to 1500' and up to 7000' over the CF. There were very few clouds at this point so we used the Boundary Layer top of about 6000'. We decided to fly the first leg at 6500'.

Triangle #1 6500'. BL top +500'.

Leg #1 1701Z Wind 220 @ 34 Temp. 19

Leg #2 1715Z 222 @ 33 19

Leg #3 1745Z 232 @ 37 21

Back at the CF we flew past the CF to the North for 2 NM. During the first leg, the clouds thickened up a bit to a scattered to broken layer. Tops we estimated at 6500' bases at 5500'. There was also a high cirrus layer at about 20000'. We decided to fly a mid cloud leg at 6000'.

Triangle #2 6000'-5700. At 1809 zulu we descended to 5700' to stay in cloud due to lower tops.

Leg #1 1801Z Wind 239 @ 34 Temp. 19

Leg #2 1814Z 220 @ 28 20

Leg #3 1844Z 243 @ 40 24

Back at the CF we flew past the CF to the North for 2 NM.

Triangle #3 5000' Bases – 500'.

Leg #1 1900Z Wind 229 @ 22 Temp. 20

Leg #2 1914Z 228 @ 19 21

Leg #3 1940Z 220 @ 26 21

We flew past the CF to the North for 2 NM. During this leg the cloud field was drying out. There was still high cirrus.

At 1956 zulu we spiraled from 5000' to 1500' over the CF. We returned to Ponca City at 2500'

No issues with the airplane.

Weather Summary

Partly cloudy turning scattered and broken clouds with high cirrus.

Aircraft Instrumentation Status

Jesse is back and said Instruments ran fine.

Surface Instrumentation Status

John is looking into the balloon launches so that he can let the pilot know when launch occurs.

Flight Images



1642 UTC



1655 UTC



1700 UTC



1705 UTC



1720 UTC



1729 UTC



1736 UTC



1740 UTC



1747 UTC



1800 UTC



1801 UTC



1802 UTC



1804 UTC



1812 UTC



1823 UTC



1828 UTC



1833 UTC



1848 UTC



1857 UTC



1900 UTC



1904 UTC



1909 UTC



1917 UTC



1933 UTC



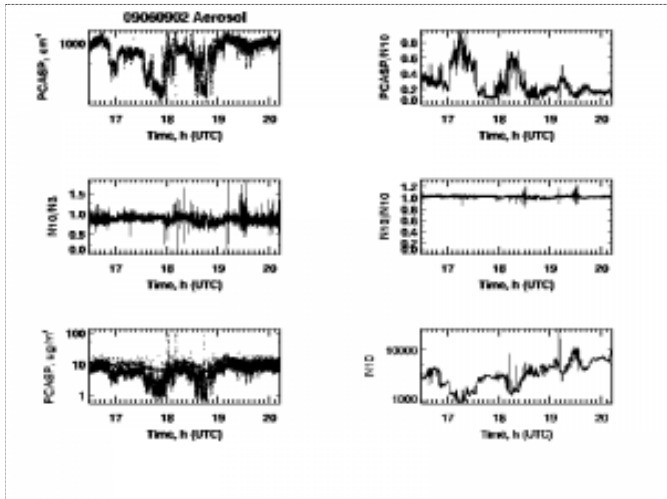
1942 UTC



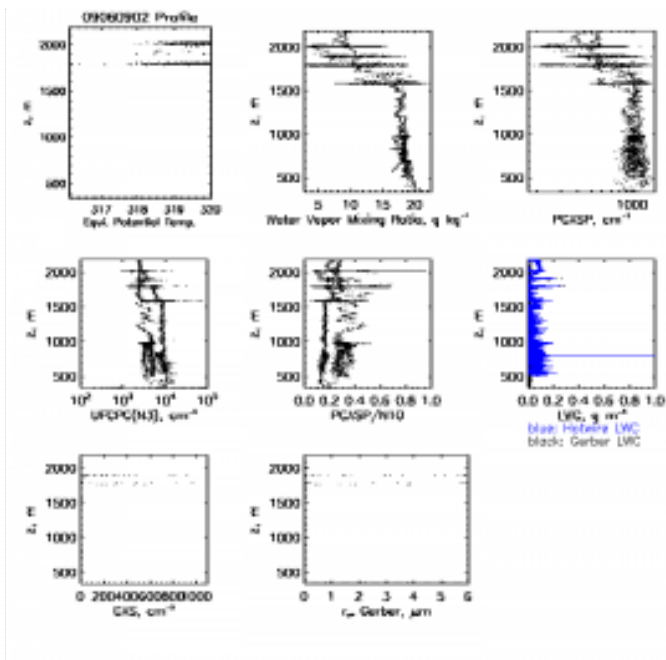
1949 UTC

Flight Plots

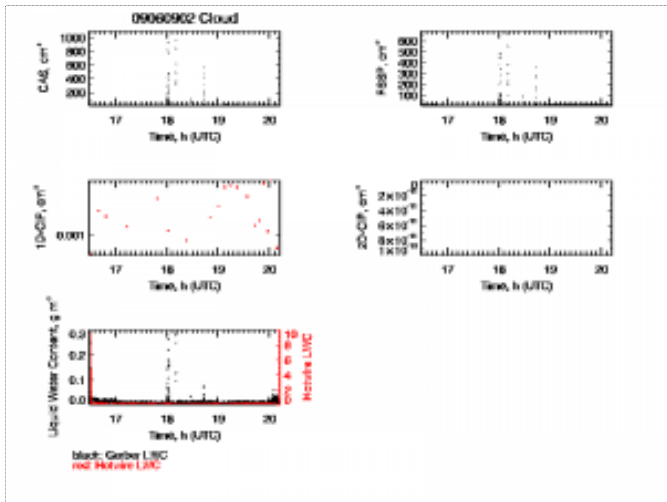
Aerosol



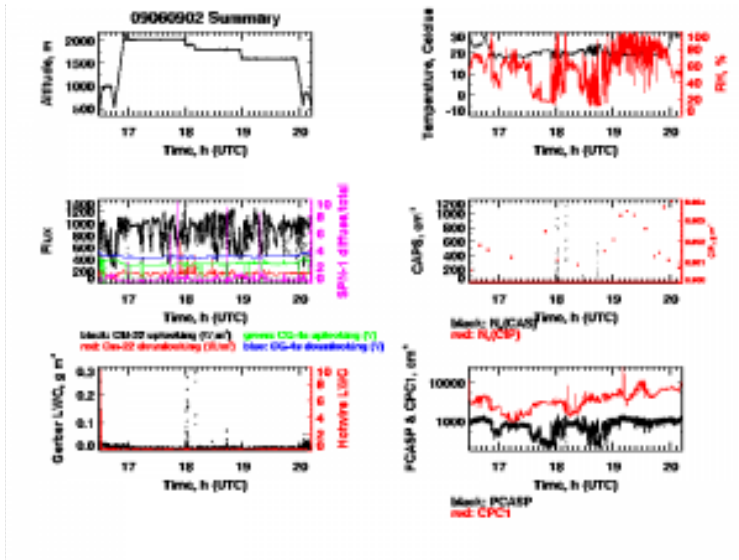
Profile



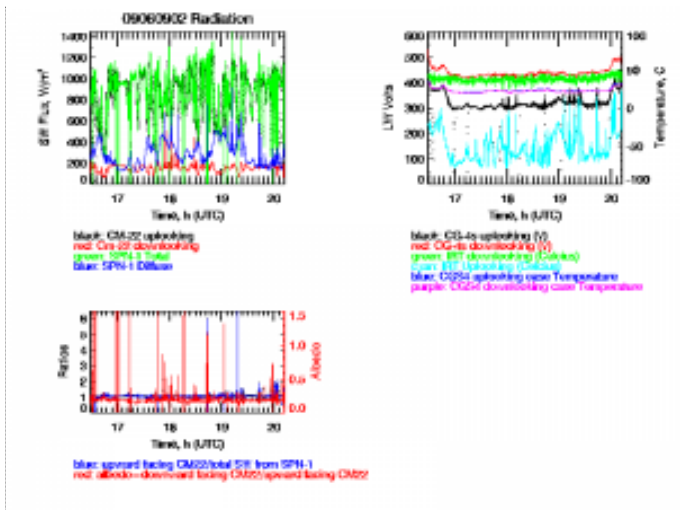
Cloud



Summary

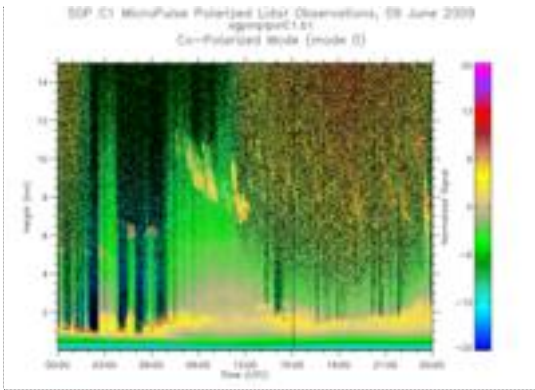


Radiation

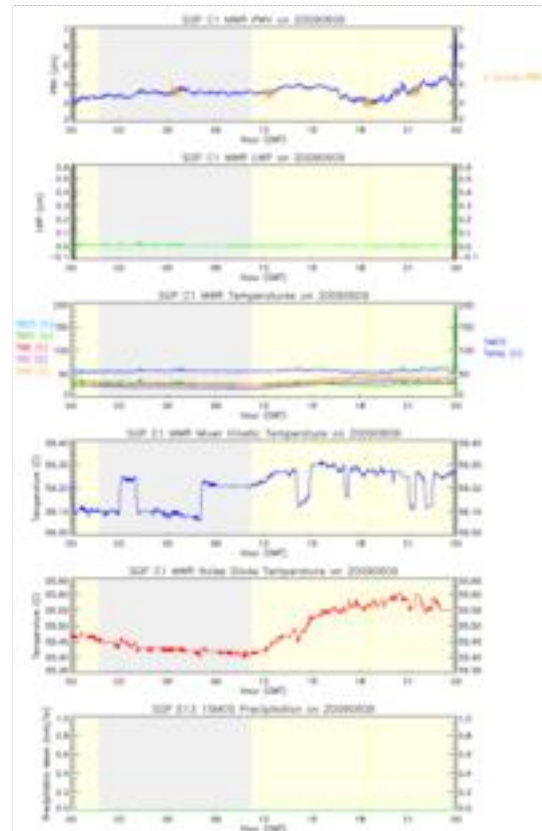


SGP Plots

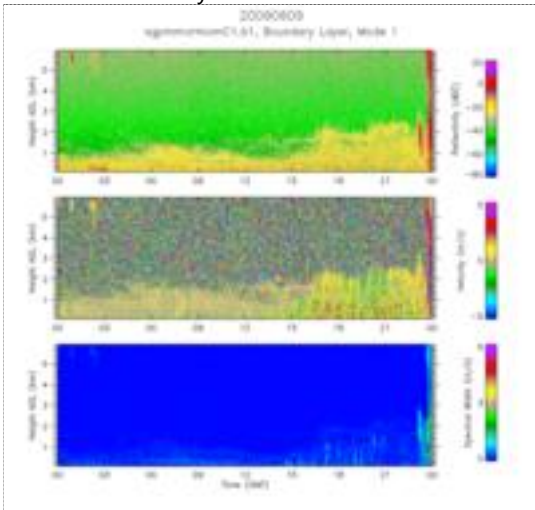
MPL Co-Pol



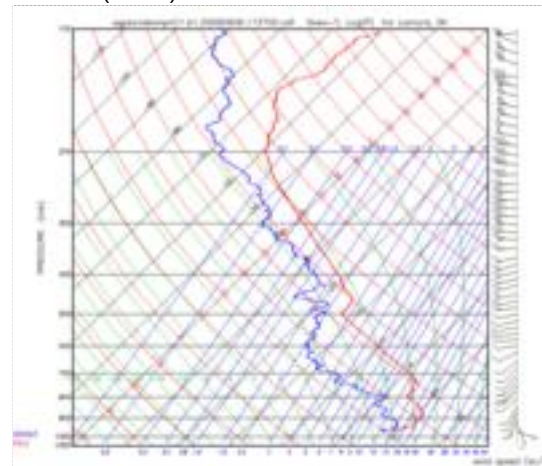
Microwave Radiometer



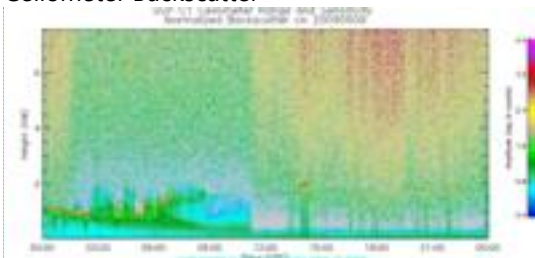
MMCR Bound. Layer Mode



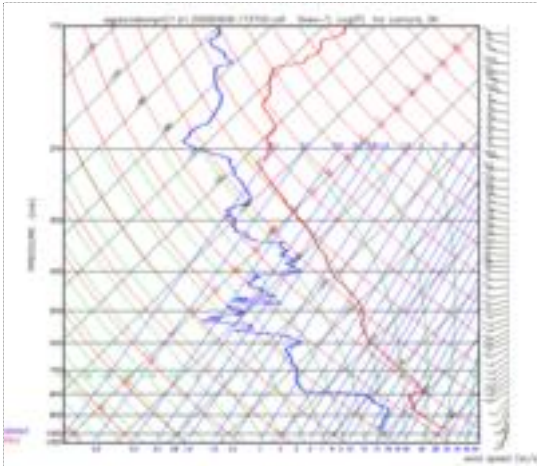
SONDE (11:30)



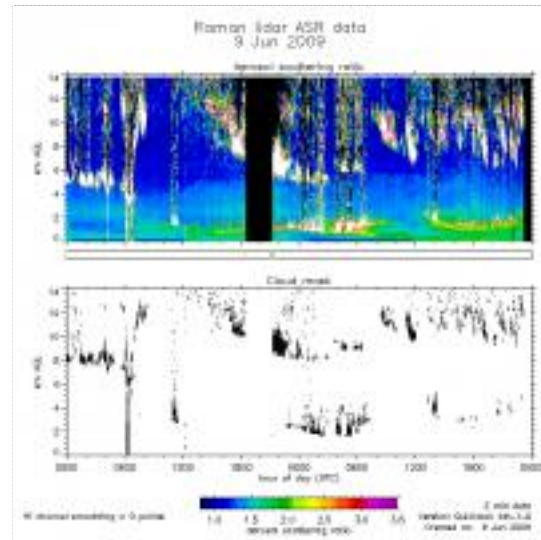
Ceilmeter Backscatter



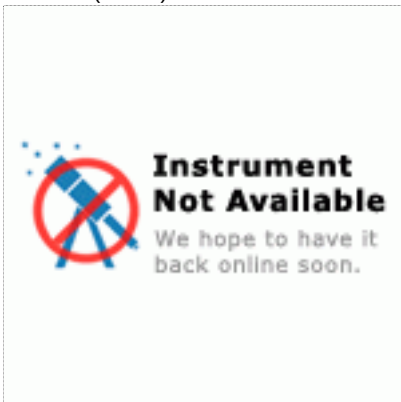
SONDE (17:30)



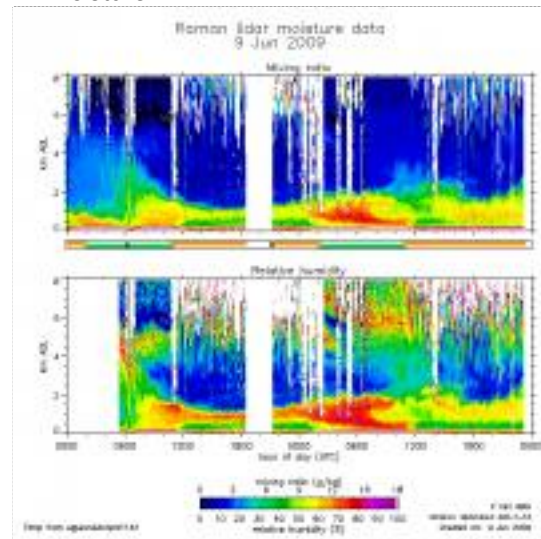
RL ASR



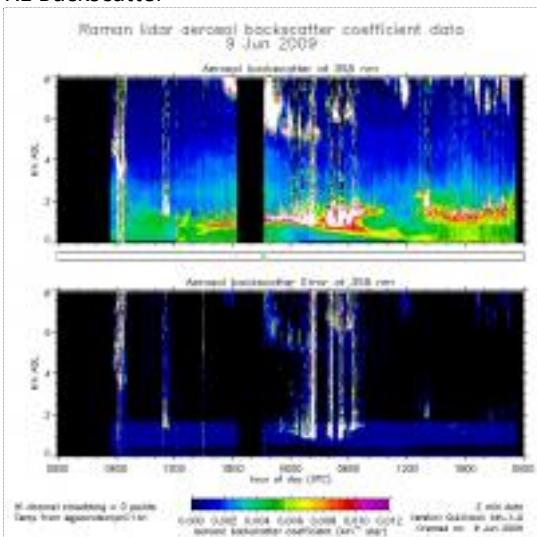
SONDE (23:30)



RL Moisture



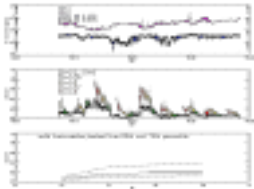
RL Backscatter



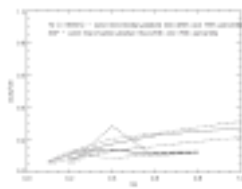
CCN Activity

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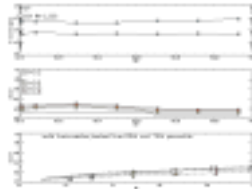
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 17 Jun 2009



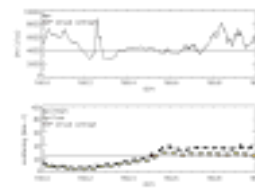
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



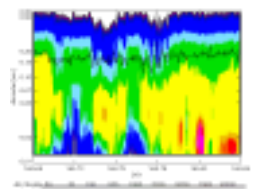
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

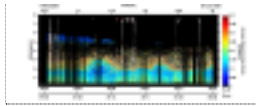


time series of CN and light scattering at SGP

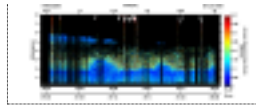


TAMU DMA size distribution and CCN activation diameter

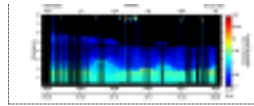
NASA Quick Look Plots



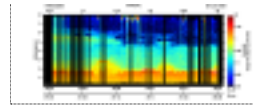
20090609_L1_aer_dep1064



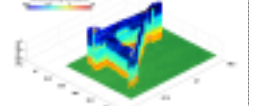
20090609_L1_aer_dep532



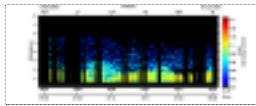
20090609_L1_bsc532



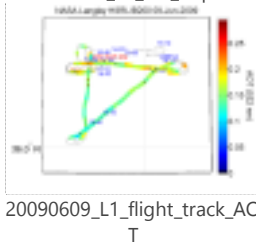
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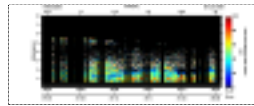
20090609_L1_bsr532_3D



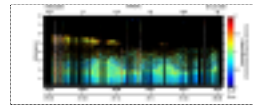
20090609_L1_ext532



20090609_L1_flight_track_AO

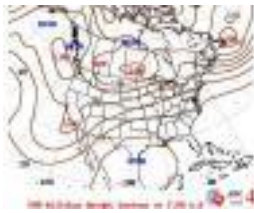


20090609_L1_Sa532



20090609_L1_wvd

Weather Maps




map692



Both OK City and Tulsa: Scattered; 3-7 knots; 1089 mb | 85 F/67 F | Low pressure

20090611

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
16:59 UTC	21:12 UTC	4.2	Cloud triangles at SGP (with 20 Nautical Mile legs)	
Flight hours to date		207.8		

We departed Ponca City and climbed to 3500' to find the bases. They were at 3500' and we continued to the CF at 3000'. A good broken layer was present with very little high cirrus.

Triangle #1. 3000'. Base -500'. At 1734 Z we descended to 2500' due to lower bases at 3000'.

Leg #1 1712Z Wind 090 @ 01 Temp. 18

Leg #2 1722Z 359 @ 11 18

Leg #3 1738Z 243 @ 04 18

Back at the CF we flew past the CF to the North for 2 NM. At 1751Z we spiraled down to 1600' and back up to 6500'. Cloud bases were at 3500' and tops were roughly 5000'. The Boundary Layer seemed to be around 5800'. The clouds were thinning at this point and so we decided to jump in - starting with base + 500'. We chose an altitude of 4200'-4300' due to the bases rising. We also noted a definite haze layer right at the BL altitude of 5800'.

Triangle #2 4200' to 4300'. Cloud base +500'. The cloud bases varied so we changed altitudes accordingly to stay in cloud.

Leg #1 1809Z Wind 312 @ 07 Temp. 16

Leg #2 1819Z 348 @ 19 16

Leg #3 1835Z 239 @ 03 16

Back at the CF we flew past the CF to the North for 2 NM. We climbed to 5000' for a mid cloud leg. The cloud bases were rising more on the South track. At 1920Z we climbed to 5500' to stay in mid cloud.

Triangle #3. 5000'. Mid cloud leg.

Leg #1 1848Z Wind 309 @ 04 Temp. 15

Leg #2 1859Z 321 @ 14 15

Leg #3 1915Z 260 @ 03 15

Back at the CF we flew past the CF to the North for 2 NM. At this point I decided to stay at 5500' due to the fact that this altitude seemed to be a good near top altitude for the rest of the triangle. Also, I noted that during this leg, the clouds were building again.

Triangle # 4 5500'. Tops - 500'.

Leg #1 1927Z Wind 318 @ 09 Temp. 14

Leg #2 1938Z 340 @ 11 14

Leg #3 1953Z 347 @ 04 14

Back at the CF we flew past the CF to the North for 2 NM. We climbed to 7000' and there were still tops above us. We stayed at 7000' due to airspace and still penetrated multiple cloud tops. We did encounter visible moisture on the windscreen multiple times. There was a spike in the temperature from 11 to 14 around the southern point. The cloud tops were lower on the track from the southern point to the CF.

Triangle # 5 7000'

Leg #1 2005 Wind 314 @ 06 Temp. 11

Leg #2 2016 328 @ 19 11

Leg #3 2030 255 @ 13 14

Back at the CF we flew past the CF to the North for 2 NM. We began a spiral descent from 7000' to 1600' at 2045 and returned to Ponca City at an altitude of 2500'.

No issues with the airplane.

Weather Summary

Broken cloud layer with high cirrus.

Aircraft Instrumentation Status

Jesse said, "No issues with the instruments"

All computers on the Twin Otter (except the 2-DS) are connected to and in sync with the time server.

Surface Instrumentation Status

The balloon launches are now being tracked for coordination with the Twin Otter. The SGP site is calling Debbie who then lets the NASA team know. The NASA team lets the King Air know who then radios the Twin Otter.

Flight Images



1704 UTC



1818 UTC



1822 UTC



1826 UTC



1849 UTC



1853 UTC



1905 UTC



1911 UTC



1912 UTC



1920 UTC



1923 UTC



1928 UTC



1931 UTC



1933 UTC



1941 UTC



1949 UTC



1953 UTC



1957 UTC



2000 UTC



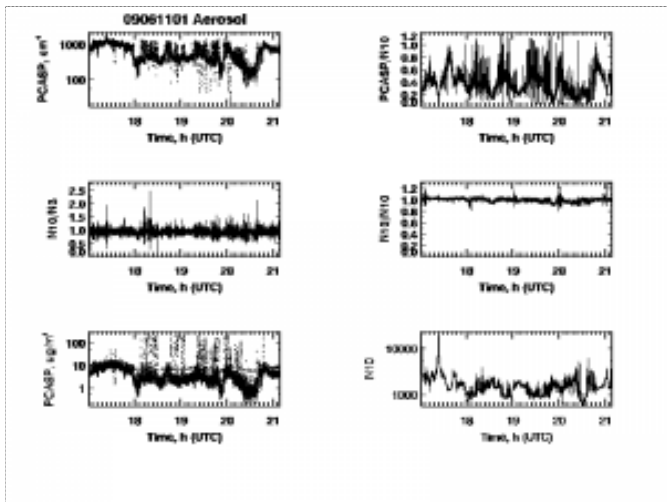
2011 UTC



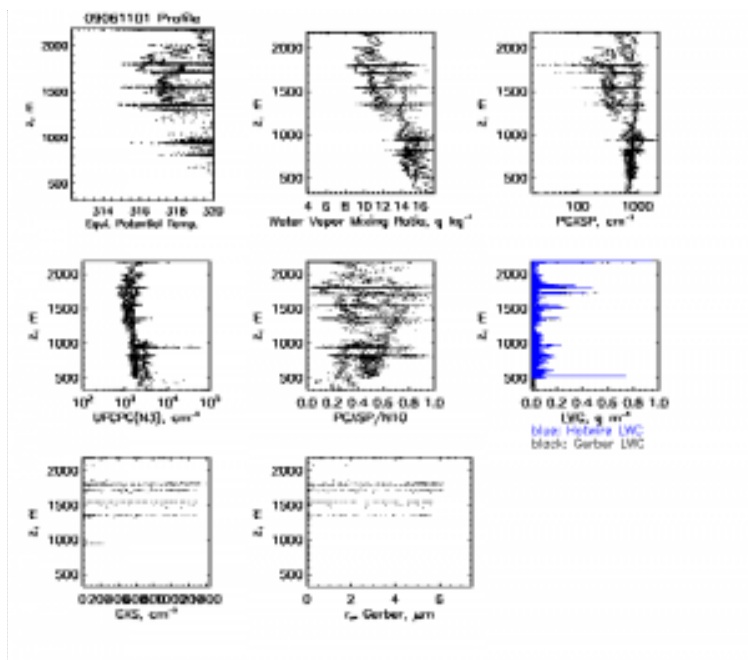
2045 UTC

Flight Plots

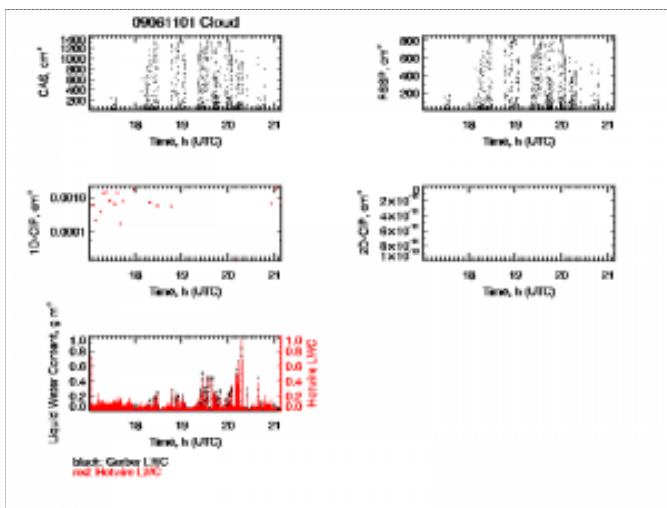
Aerosol



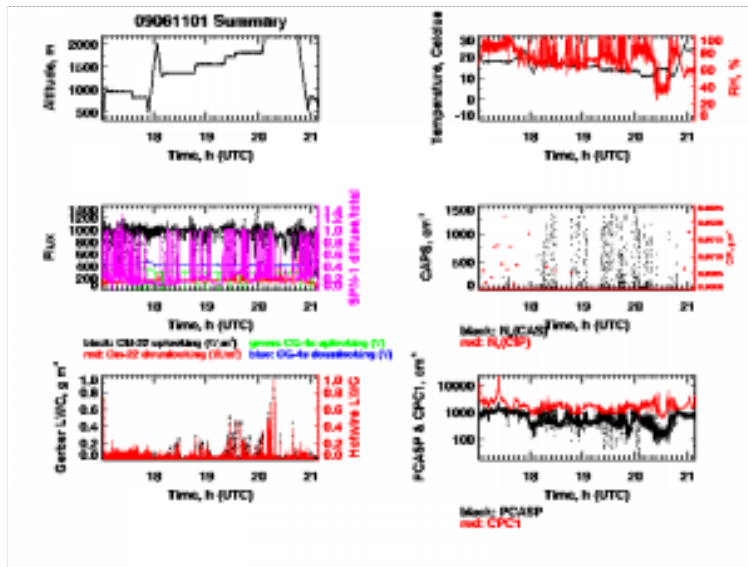
Profile



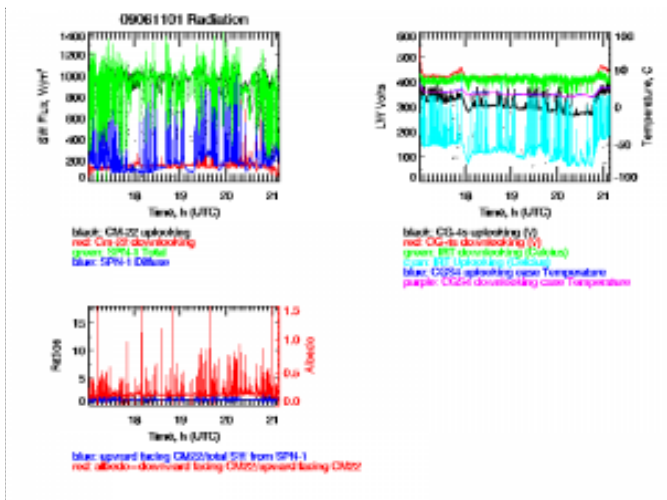
Cloud



Summary

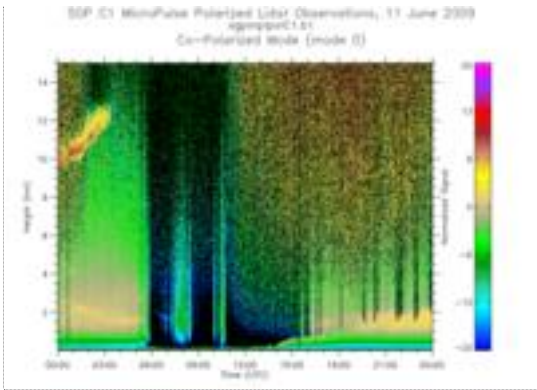


Radiation

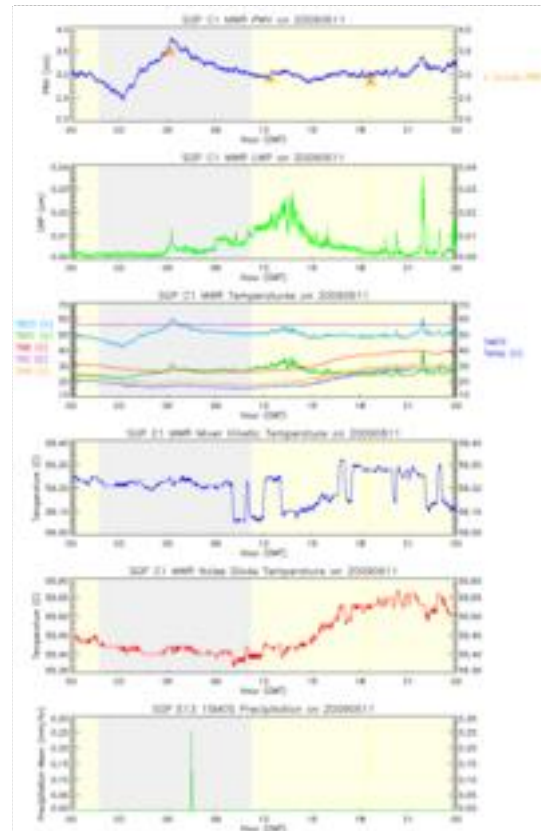


SGP Plots

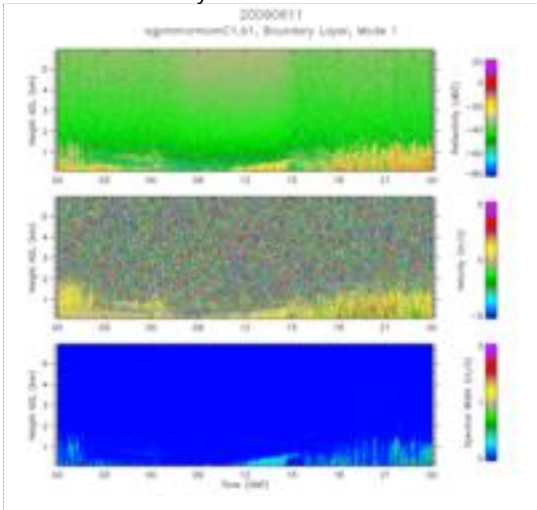
MPL Co-Pol



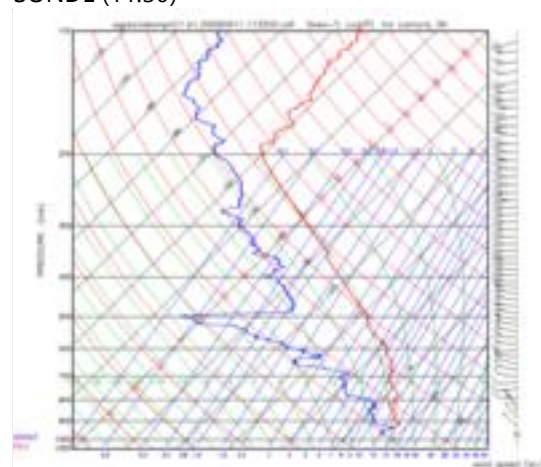
Microwave Radiometer



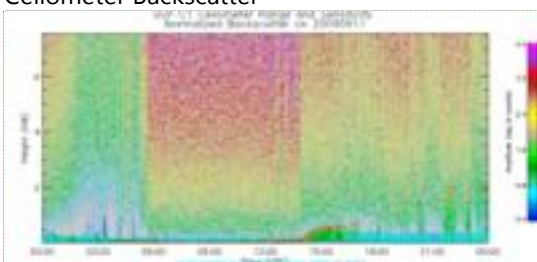
MMCR Bound. Layer Mode



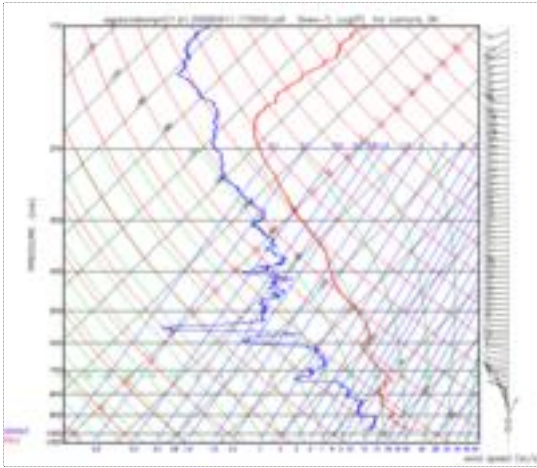
SONDE (11:30)



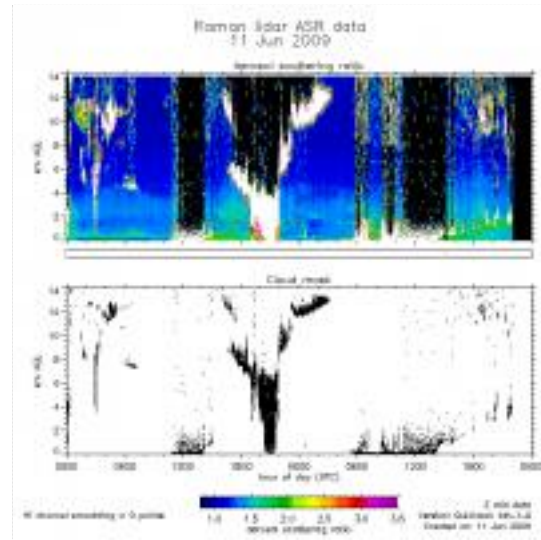
Ceilometer Backscatter



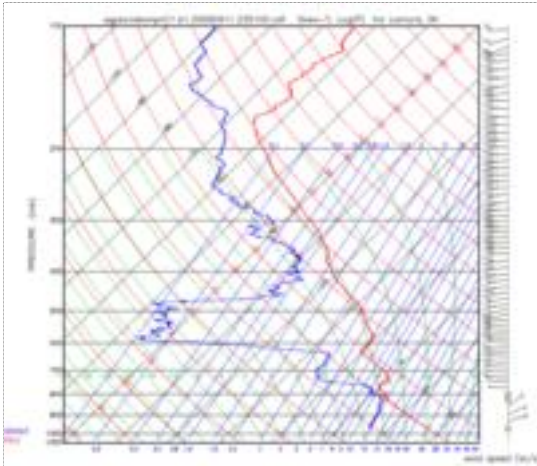
SONDE (17:30)



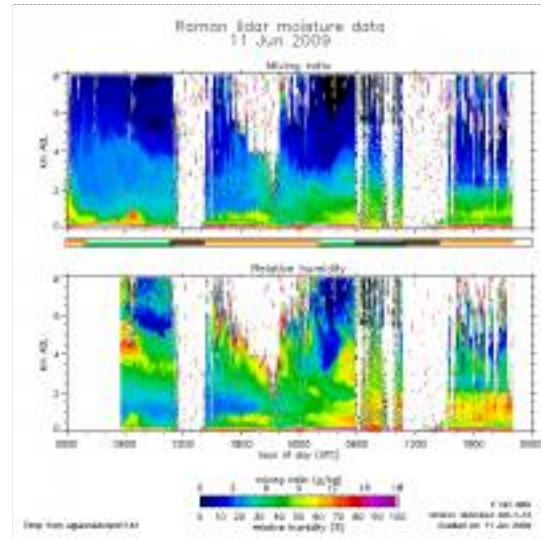
RL ASR



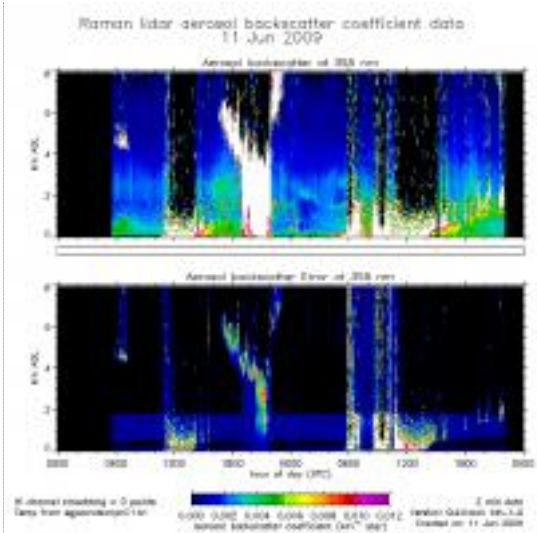
SONDE (23:30)



RL Moisture



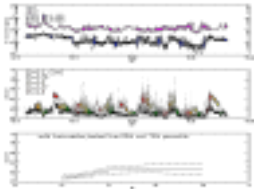
RL Backscatter



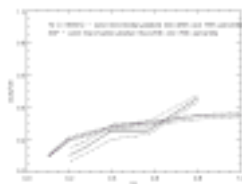
CCN Activity

I've 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.

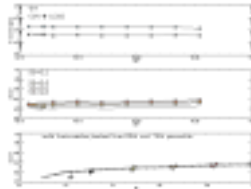
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 17 Jun 2009



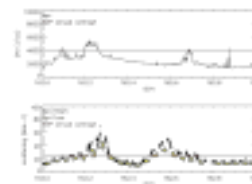
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



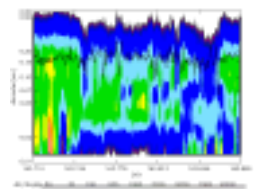
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

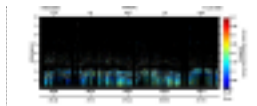


time series of CN and light scattering at SGP

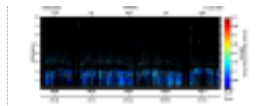


TAMU DMA size distribution and CCN activation diameter

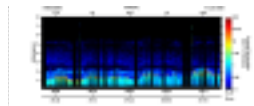
NASA Quick Look Plots



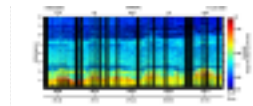
20090611_L1_aer_dep1064



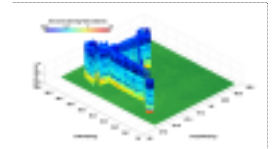
20090611_L1_aer_dep532



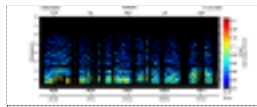
20090611_L1_bsc532



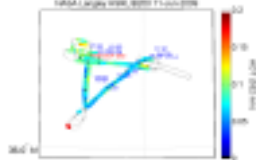
20090611_L1_bsr532



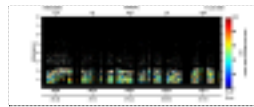
20090611_L1_bsr532_3D



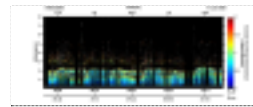
20090611_L1_ext532



20090611_L1_flight_track_AO



20090611_L1_Sa532



20090611_L1_wvd

Weather Maps



map6112



OK City: Overcast; 3-7 knots | Tulsa: Broken; 3-7 knots; 1070 (?) mb | 67 F/63 F | Low pressure

20090612

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
18:01 UTC	21:27 UTC	3.4	Cloud triangles at SGP (with 20 Nautical Mile legs)	KML
Flight hours to date		211.2		

We departed Ponca City and climbed to 3000'. Conditions were clear and hazy. There was high cirrus but nothing else. At the CF we decided to conduct a spiral to get a full profile. At 1814Z we began a spiral down to 1600' and up to 7000'. We noted a moisture layer between 4000' and 5500' and planned our four pattern altitudes to be one above, two in and one below this layer.

Triangle #1. 6000'. This was top of the moisture layer + 500'.

Leg #1 1831Z Wind 287 @ 08 Temp. 16

Leg #2 1841Z 298 @ 14 17

Leg #3 1855Z 301 @ 06 17

Back at the CF we flew past the CF to the North for 2 NM. During the first pattern we noticed a cloud layer to the west of the north south leg. We chose our next altitude of 5000'.

Triangle #2 5000'. Top of the moist layer 5500'-500'.

Leg #1 1910Z Wind 262 @ 07 Temp. 18

Leg #2 1920Z 319 @ 17 19

Leg #3 1935Z 355 @ 04 19

Back at the CF we flew past the CF to the North for 2 NM. During the second pattern, the cloud layer was still to the west of the north south leg. We were still in the clear so we chose another leg at the base of the moist layer at 4000'.

Triangle #3. 4000'. Base of moist layer.

Leg #1 1949Z Wind 250 @ 06 Temp. 19

Leg #2 2000Z 350 @ 03 19

Leg #3 2015Z 200 @ 02 19

Back at the CF we flew past the CF to the North for 2 NM. During the third pattern, the cloud field that had been west of the triangle began to fill into the western side of the triangle. At this point we decided to ditch the lower altitude leg and try to sample some clouds. We chose an altitude of 4800' which put us near mid cloud. This was not a well defined field and we had to adjust our altitude twice due to varying cloud bases and tops.

Triangle # 4 4700' to 4900'.

Leg #1 2029Z Wind 233 @ 04 Temp. 19

Leg #2 2039Z 311 @ 11 19

Leg #3 2054Z 144 @ 10 19

We had multiple cloud penetrations during the last pattern. However, the cloud field did not form as we had hoped. We adjusted altitude twice to stay in cloud. At 2050 we descended to 4700' and at 2056Z we climbed to 4900'.

Back at the CF we flew past the CF to the North for 2 NM. We began a spiral descent from 4900' to 1600' at 2108Z and returned to Ponca City at an altitude of 2500'.

No issues with the airplane.

Weather Summary

Clear and hazy with high cirrus.

Aircraft Instrumentation Status

Jesse said everything was fine.

Surface Instrumentation Status

nothing to report

Flight Images



1812 UTC



1853 UTC



1944 UTC



2030 UTC



1812 UTC



1859 UTC



1946 UTC



2032 UTC



1815 UTC



1901 UTC



1949 UTC



2034 UTC



1831 UTC



1905 UTC



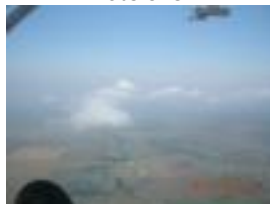
1954 UTC



2036 UTC



1831 UTC



1909 UTC



2016 UTC



2051 UTC



1843 UTC



1914 UTC



2024 UTC



2051 UTC



1851 UTC



1934 UTC



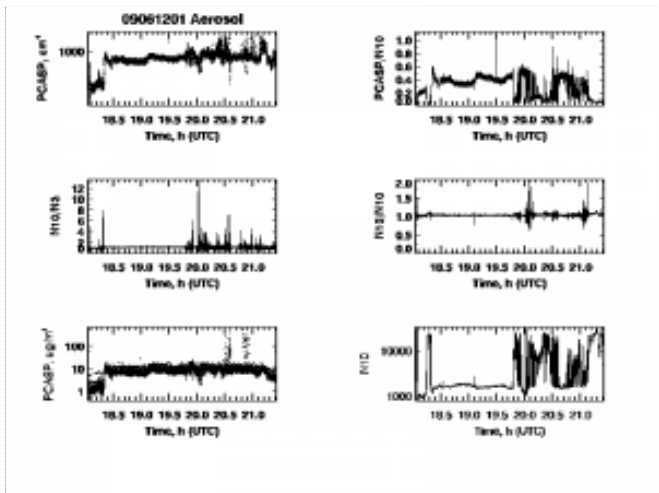
2030 UTC



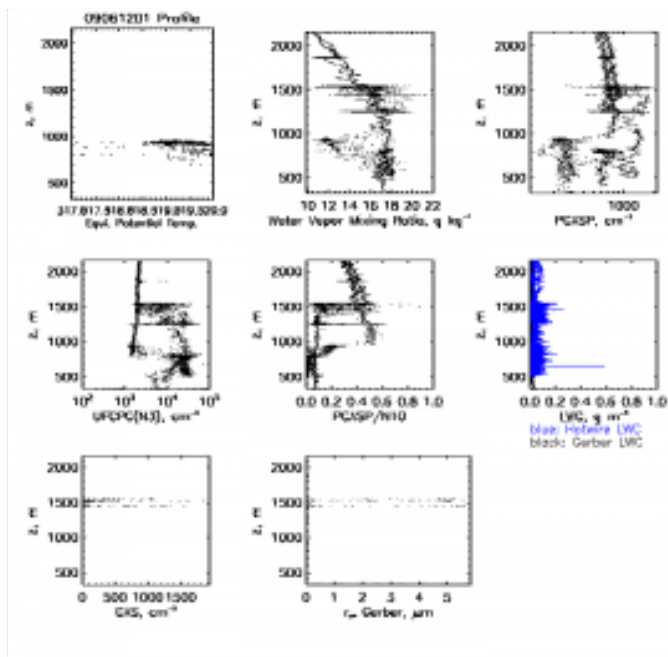
2053 UTC

Flight Plots

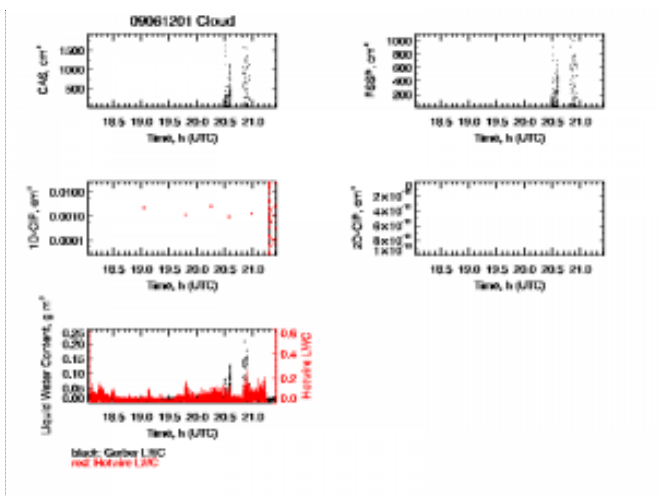
Aerosol



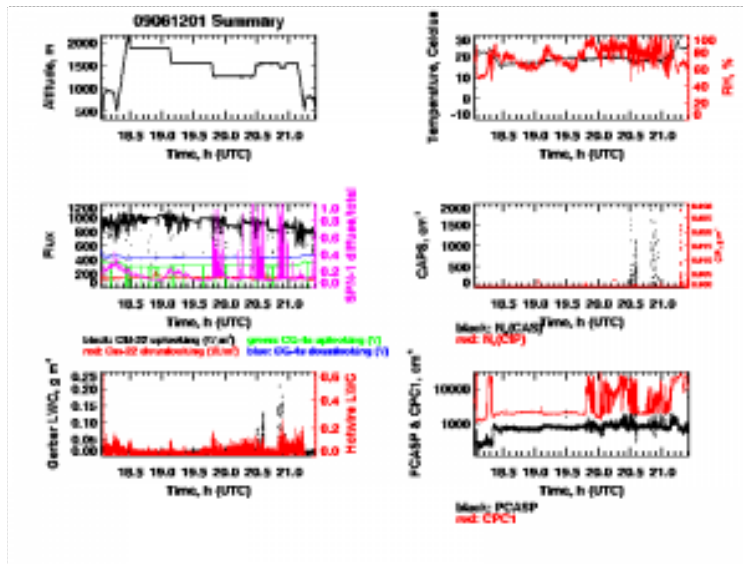
Profile



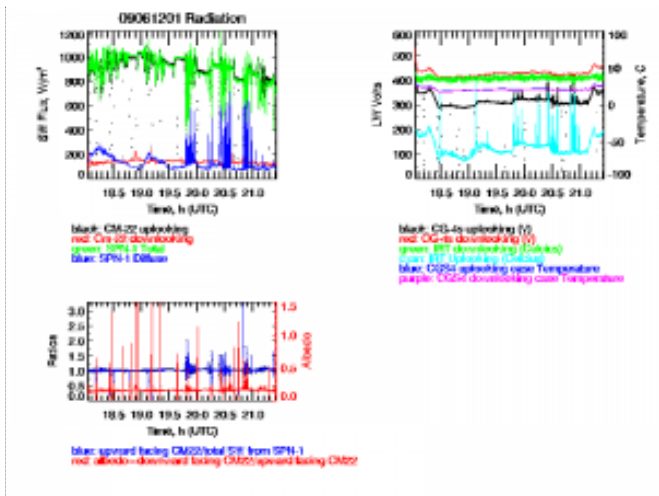
Cloud



Summary

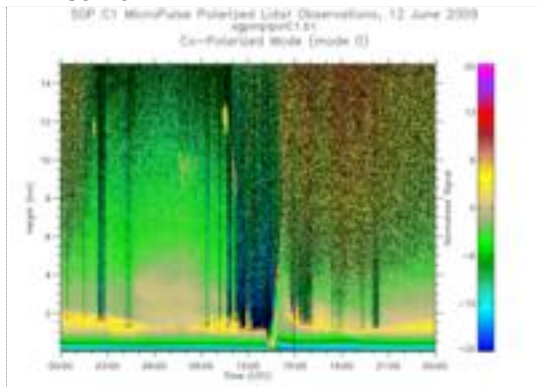


Radiation

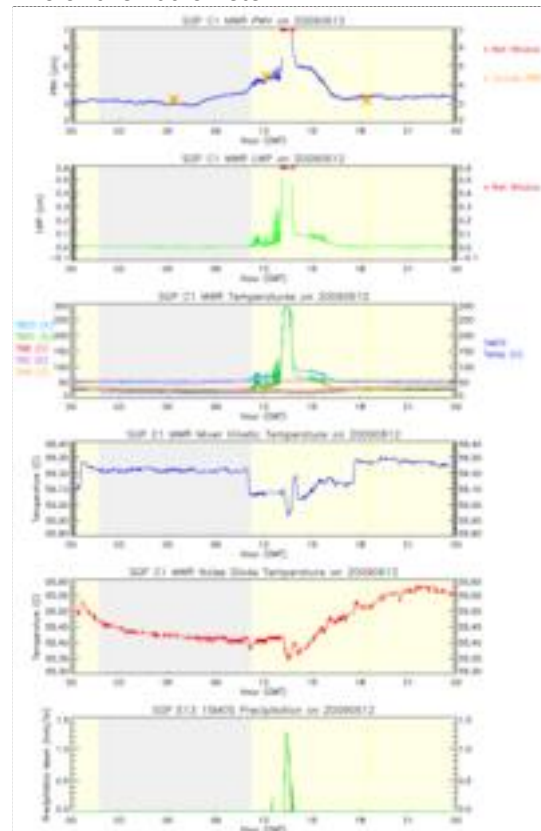


SGP Plots

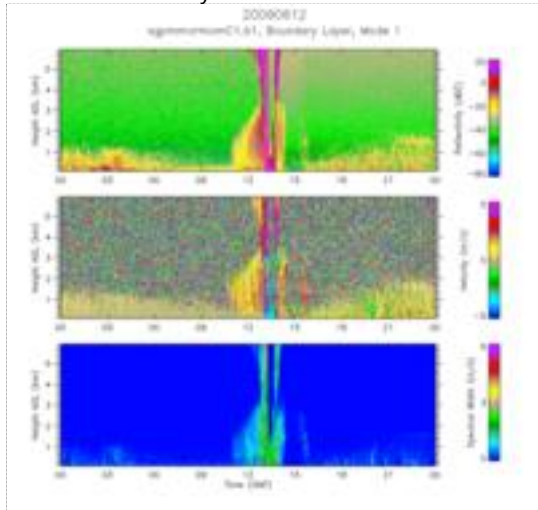
MPL Co-Pol



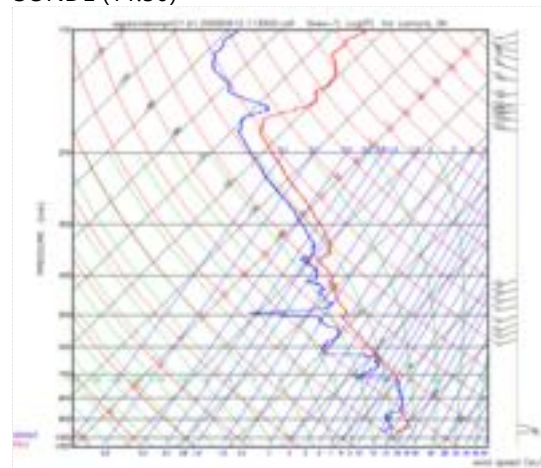
Microwave Radiometer



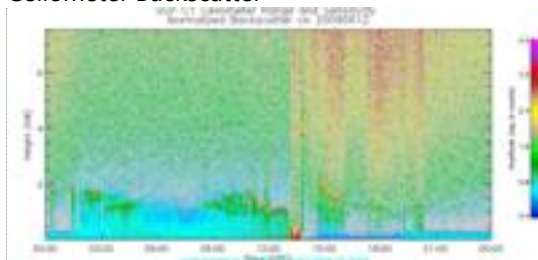
MMCR Bound. Layer Mode



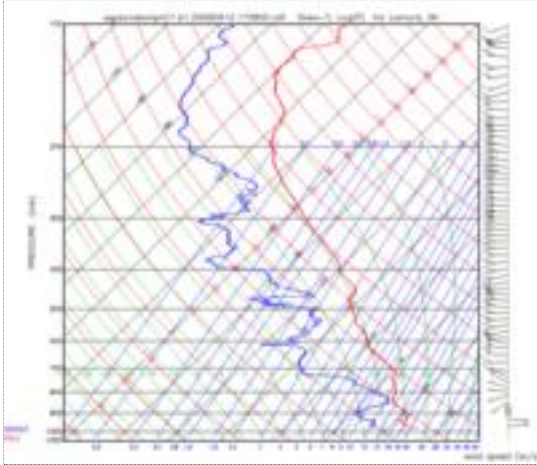
SONDE (11:30)



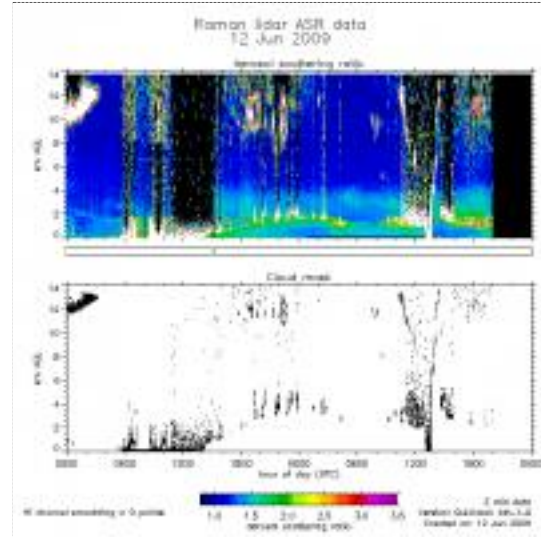
Ceilometer Backscatter



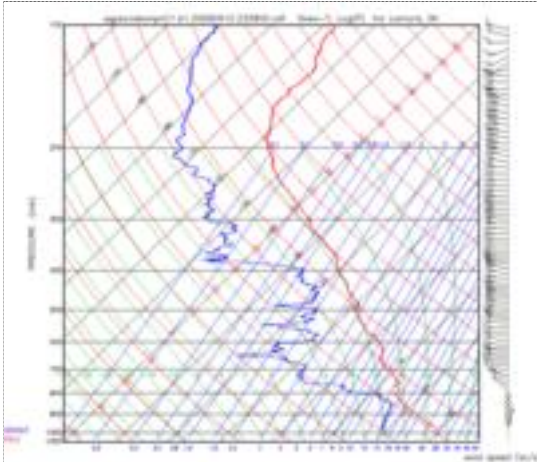
SONDE (17:30)



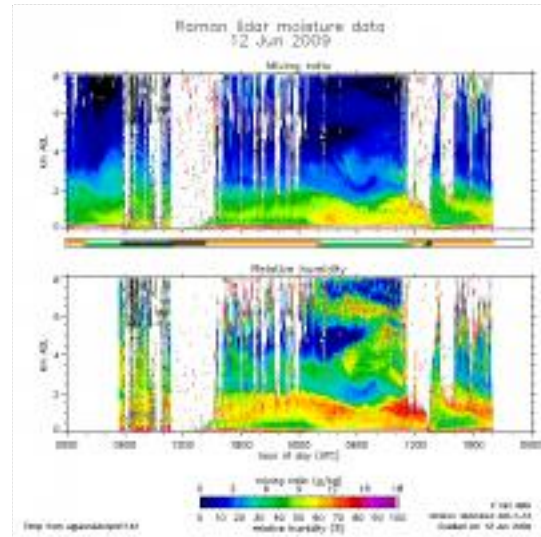
RL ASR



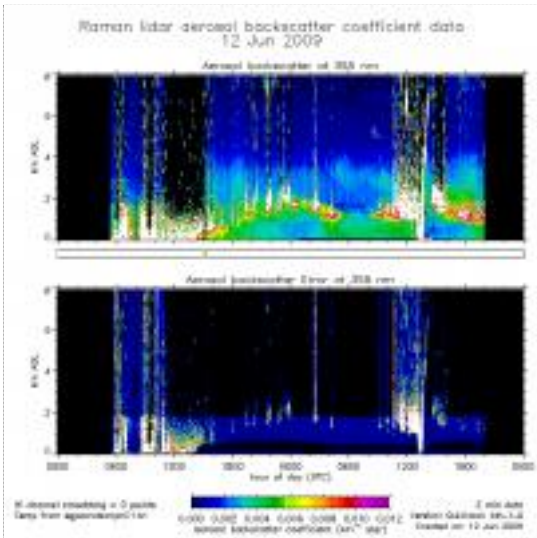
SONDE (23:30)



RL Moisture



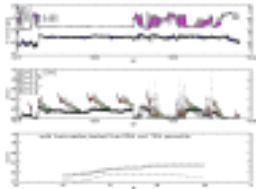
RL Backscatter



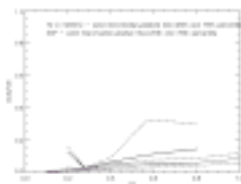
CCN Activity

I've 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.

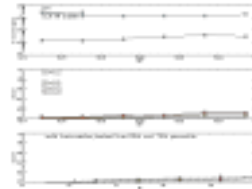
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 23 Jun 2009



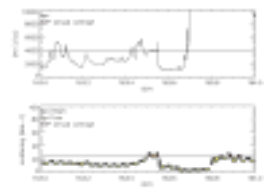
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



comparison of CCN fraction on twin otter and at SGP

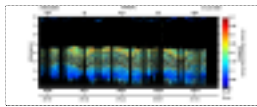


plot of CN and CCN and CCN fraction at SGP-flight1

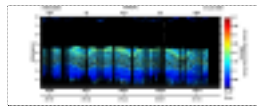


time series of CN and light scattering at SGP

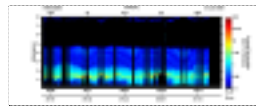
NASA Quick Look Plots



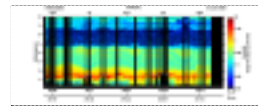
20090612_L1_aer_dep1064



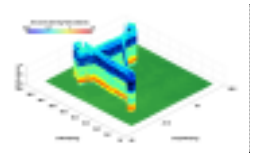
20090612_L1_aer_dep532



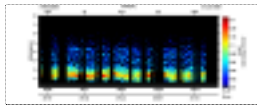
20090612_L1_bsc532



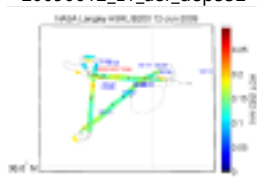
20090612_L1_bsr532



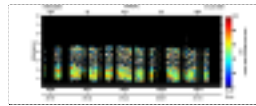
20090612_L1_bsr532_3D



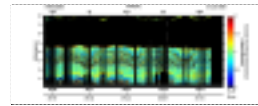
20090612_L1_ext532



20090612_L1_flight_track_AO
T



20090612_L1_Sa532



20090612_L1_wvd

Weather Maps




map-6122



OK City: Broken; 3-7 knots | Tulsa: 1/8 cloud coverage; 8-12 knots; 1080 mb
| 83 F/63 F | In cold front

20090615

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
16:01 UTC	20:58 UTC	5.0	Surface albedo & Turbulence at SGP & Cloud legs northeast of SGP	
Flight hours to date		216.2		

We departed Ponca City and climbed to 7000'. Conditions were clear and hazy. Over the CF we spiraled from 7000' @ 1617Z to 1600' to start our pinwheel. Boundary Layer was noted at about 5000'.

We flew the pinwheel at 1600'.

Started 1634Z

End 1727Z

We then flew the paperclip pattern at 1600'.

Start 1730Z

End sorry, forgot to note.

Turbulence patterns.

Leg #1 Downwind from CF

Altitude 2000'

Wind 215 @ 15

Start time 1818Z

Leg # 2 Upwind toward CF

Altitude 3000'

Wind 200 @ 16

Start time 1845Z

Leg # 3 Downwind from CF

Altitude 4000'

Wind 225 @ 16

Start time 1907Z

During leg # 3 we started to notice a very scattered layer forming to the North Northeast,

Leg # 4 Upwind toward CF

Altitude 5000'

Wind 210 @ 05

Start time 1926Z

During leg # 4 the cloud field was developing about 10 NM North Northeast of the CF with bases about 5500' and tops about 6500'.

Leg # 5 Downwind from CF.

Altitude 6000'

Wind 225 @ 05

Start time 1950Z

During leg # 6 we began to penetrate clouds. At 1955Z we descended to 5800' stay in mid cloud. At 2000Z we descended to 5600' and at 2005Z we climbed back to 5800'.

Leg # 6 Cloud leg. We decided to fly south to stay in cloud.

Altitude 5800'

Winds 250 @ 14

Time 2005Z

Leg # 7 Cloud leg. Back to the CF.

Altitude 5600'

Winds 228 @ 16

Time 2015Z

Over the CF at 2031Z we began a spiral climb to 7000'. At 2034Z we began a spiral descent to 1600'. And Returned to Ponca at 2500'

No issues with the airplane.

Weather Summary

Mostly clear and hazy with scattered clouds forming to the north-northeast.

Aircraft Instrumentation Status

Hydradrad laptop shut off in flight - no data for today.

2D-S laptop overheated so Jesse shut it off. When they were at 3000' (temperature cooler) Jesse turned it back on. So data was retrieved but will be missing approx. an hour of data.

Surface Instrumentation Status

nothing to report

Flight Images



1616 UTC



1619 UTC



1630 UTC



1630 UTC



1656 UTC



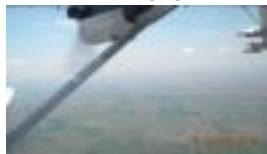
1704 UTC



1707 UTC



1721 UTC



1731 UTC



1731 UTC



1804 UTC



1805 UTC



1823 UTC



1823 UTC



1845 UTC



1845 UTC



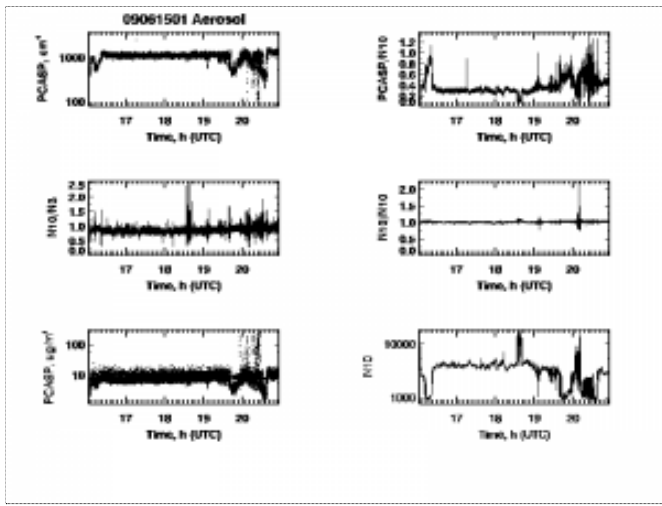
1908 UTC



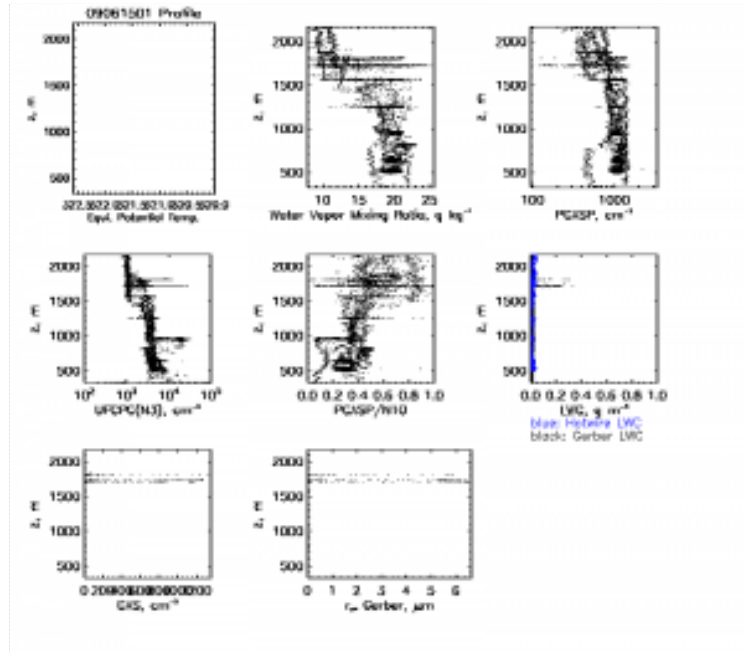
1926 UTC

Flight Plots

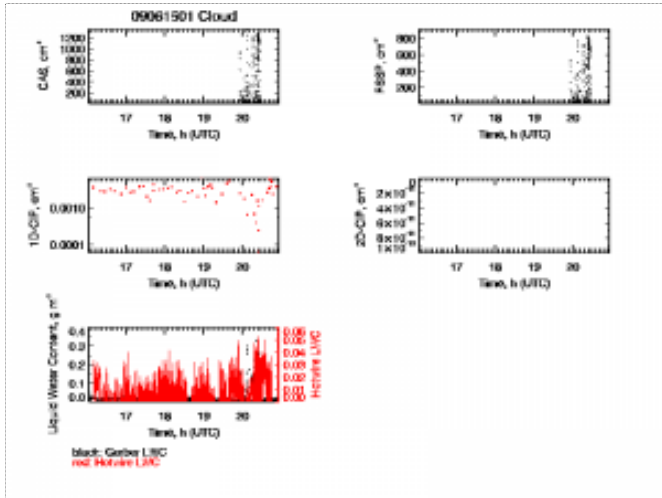
Aerosol



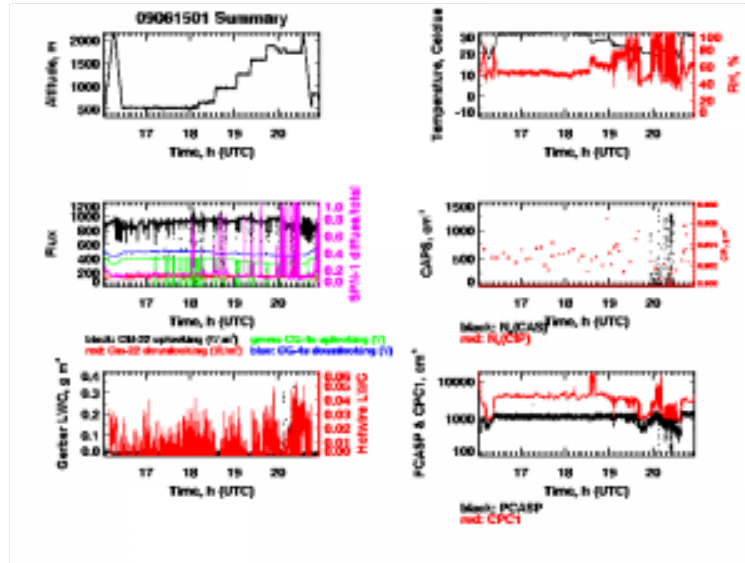
Profile



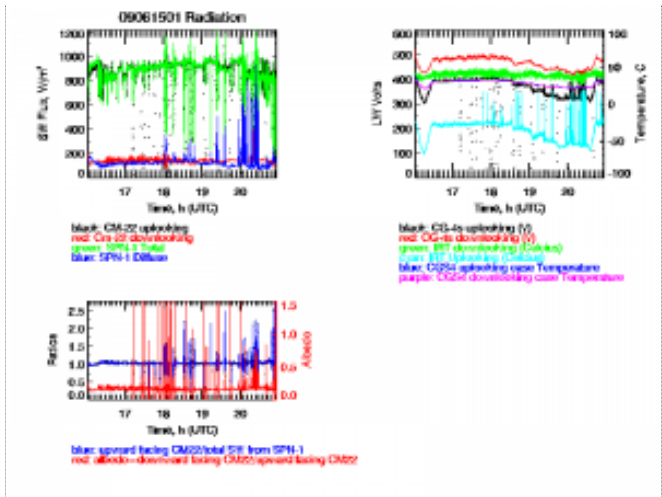
Cloud



Summary

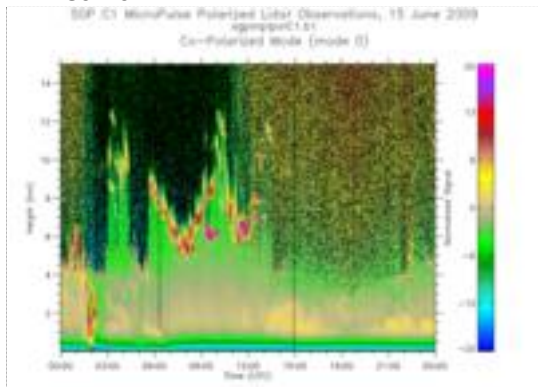


Radiation

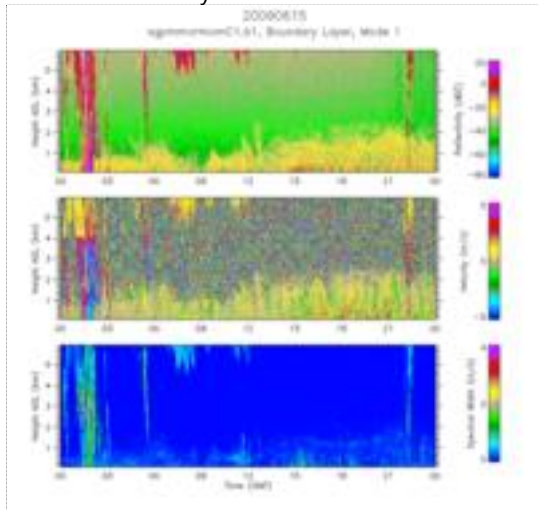


SGP Plots

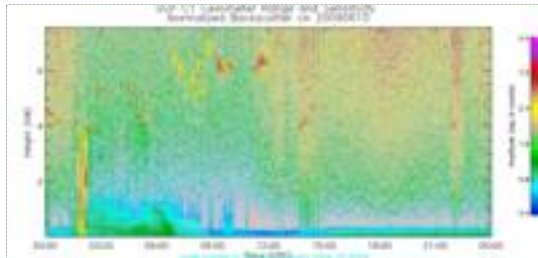
MPL Co-Pol



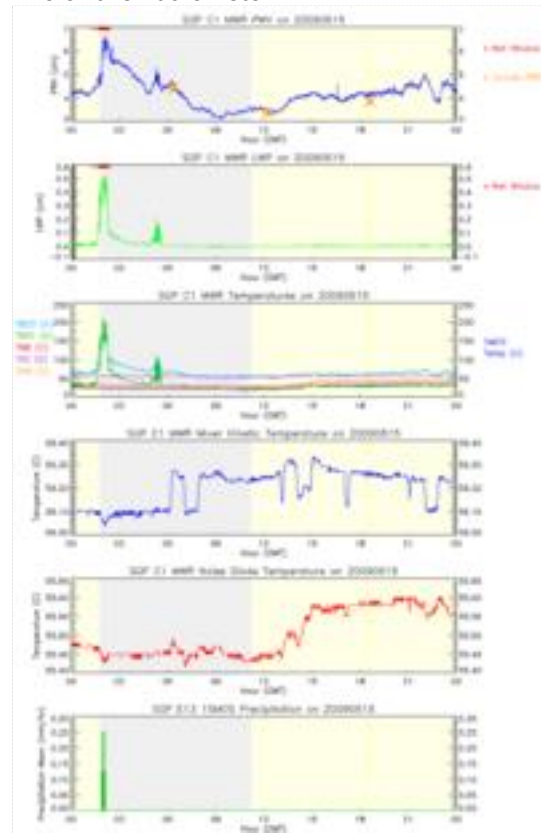
MMCR Bound. Layer Mode



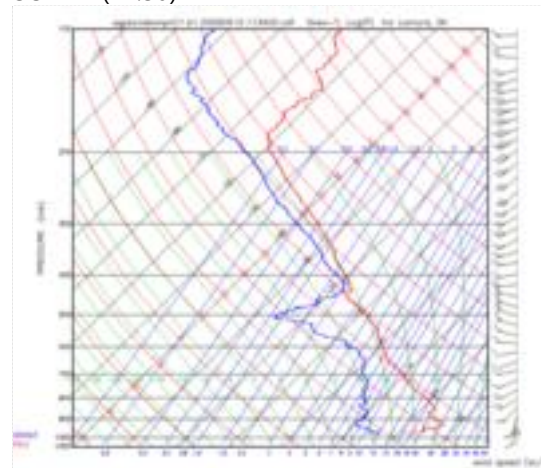
Ceilometer Backscatter



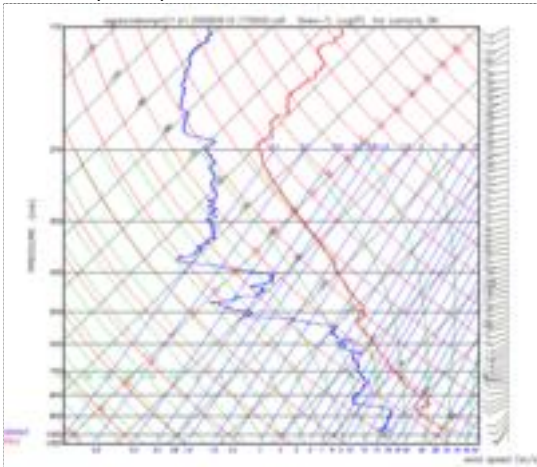
Microwave Radiometer



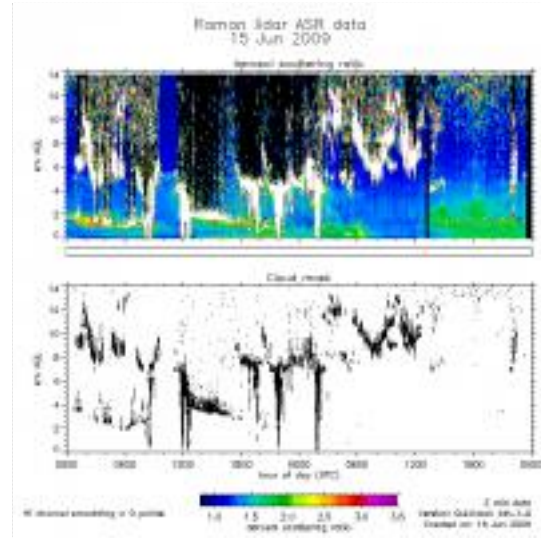
SONDE (11:30)



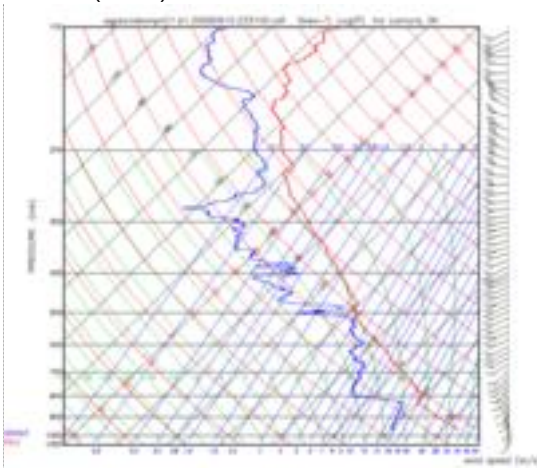
SONDE (17:30)



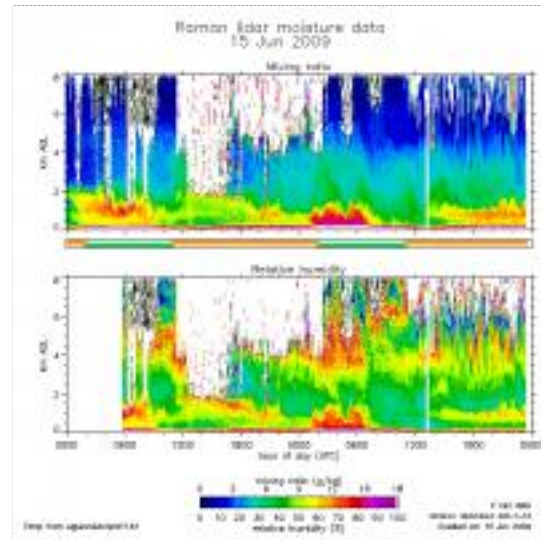
RL ASR



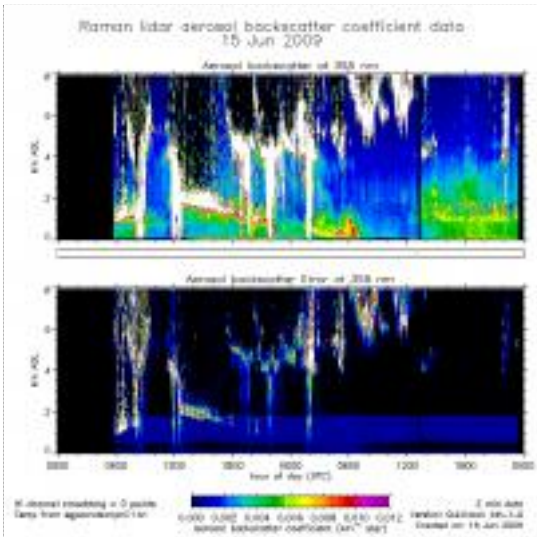
SONDE (23:30)



RL Moisture



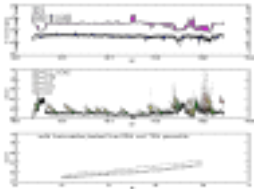
RL Backscatter



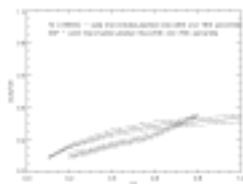
CCN Activity

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.

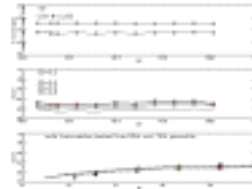
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 23 Jun 2009



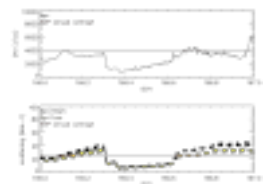
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



comparison of CCN fraction on twin otter and at SGP

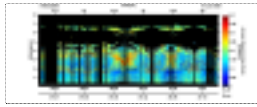


plot of CN and CCN and CCN fraction at SGP

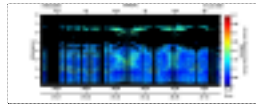


time series of CN and light scattering at SGP

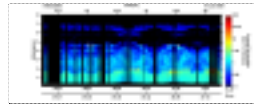
NASA Quick Look Plots



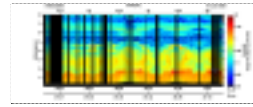
20090615_L1_aer_dep1064



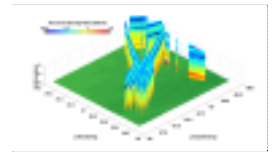
20090615_L1_aer_dep532



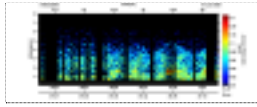
20090615_L1_bsc532



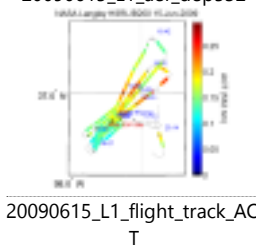
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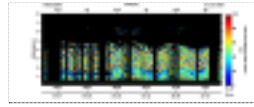
20090615_L1_bsr532_3D



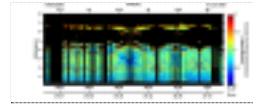
20090615_L1_ext532



20090615_L1_flight_track_AO
T



20090615_L1_Sa532



20090615_L1_wvd

Weather Maps



map-6152



OK City: Overcast, 8-12 knots | Tulsa: Clear, 3-7 knots; 1116 mb | 85 F/73 F | In cold front

20090617

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
16:57 UTC	22:29 UTC	5.5	Aerosol triangles for CALIPSO overpass at SGP	KML
Flight hours to date		221.7		

We departed Ponca City and climbed to 5000' towards the CF. The BL was ~4000'.

We did the first triangle pattern at 3800'.

Leg #1 1715Z winds 210/25

Leg #2 1734Z

Leg #3 1756Z

Over the CF we descended to 3000' and did the next 2 legs of the triangle.

Leg #1 1826Z winds 195/25

Leg #2 1847Z

We had some time to spare before the overpass, so we descended to 1500' and spiraled up to 6500 at 1914Z. BL was ~4300'.

We reversed course on the pattern for the satellite overpass. We did it at 4000'. We were over point T (Target for Calipso overpass) at 19:51:18. Skies were clear overhead with cirrus to the distant SE and W through N. There were 2 of contrails to the S.

Leg to the CF at 4000' 2007Z

Over the CF we descended to 1500' and did a spiral to 12,500' and then back down at 2028Z. BL was ~5000'.

We did the last triangle at 4500'.

Leg #1 2110Z winds 210/23

Leg #2 2130Z

Leg #3 2151Z

We RTB'd at 2218 and descended into Ponca City.

Weather Summary

Mostly clear skies with high cirrus and haze below the boundary layer.

Aircraft Instrumentation Status

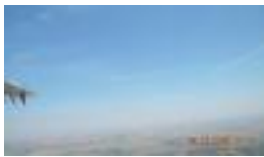
The Hydrorad did overheat again today and shut off (early in the flight) but Jesse was able to put a fan on it and let it cool down. He was then able to get it going and it ran most of the flight.

2D-S also overheated and shut off today. Jesse was able to turn it back on for the Satellite overpass but then turned it off so not to damage the computer.

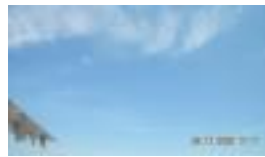
Surface Instrumentation Status

nothing to report

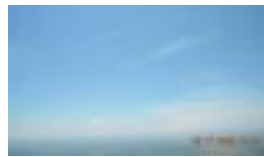
Flight Images



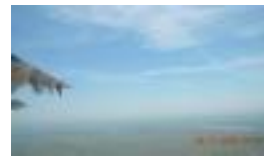
1711 UTC



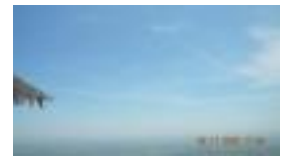
1711 UTC



1734 UTC



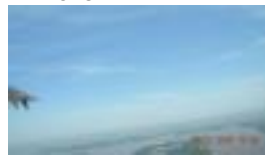
1748 UTC



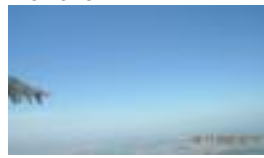
1755 UTC



1859 UTC



1859 UTC



2013 UTC



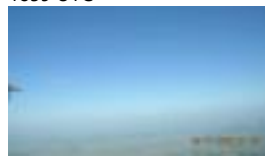
2013 UTC



2044 UTC



2049 UTC



2137 UTC



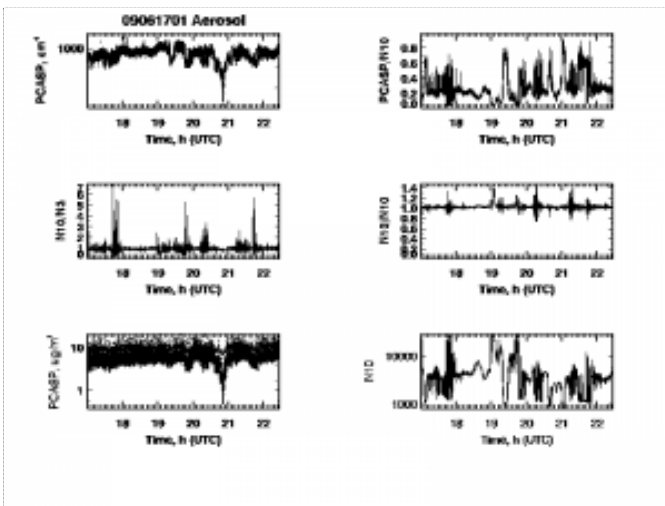
2138 UTC



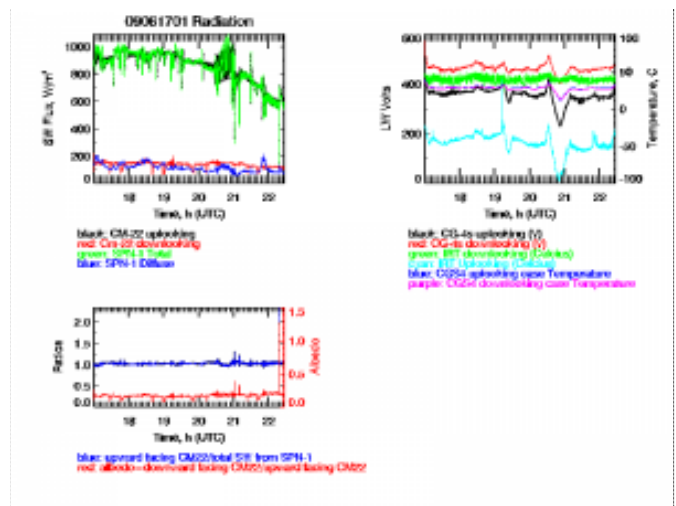
2155 UTC

Flight Plots

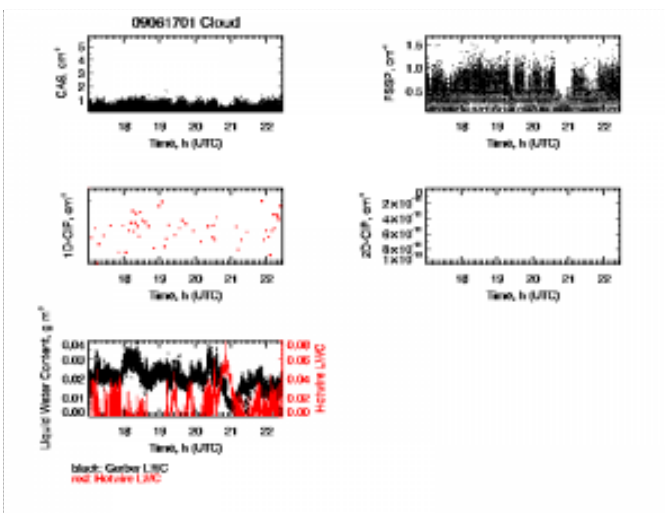
Aerosol



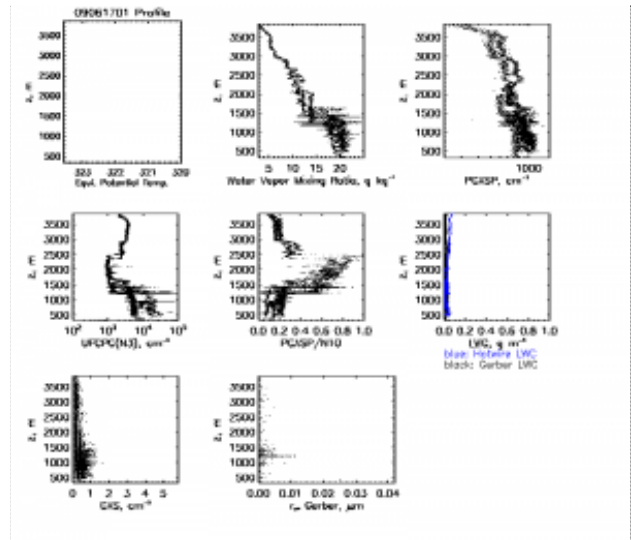
Radiation



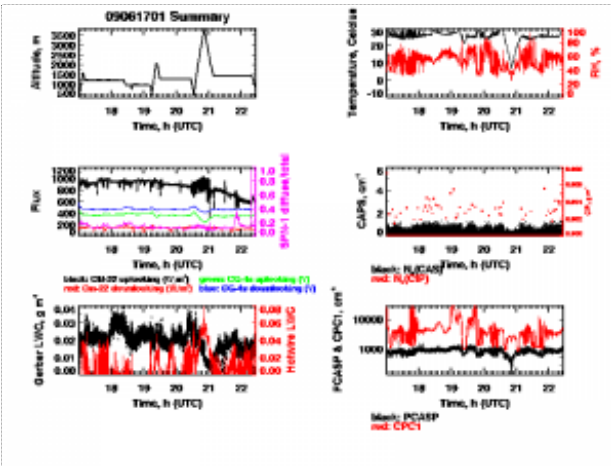
Cloud



Profile

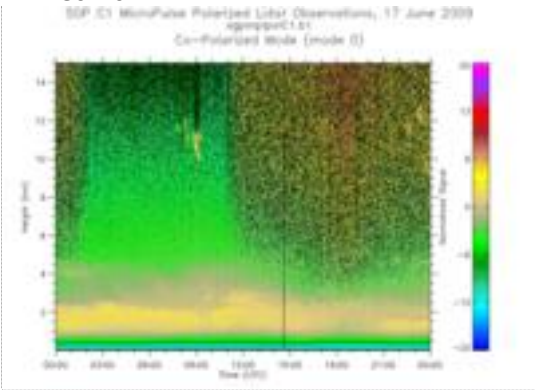


Summary

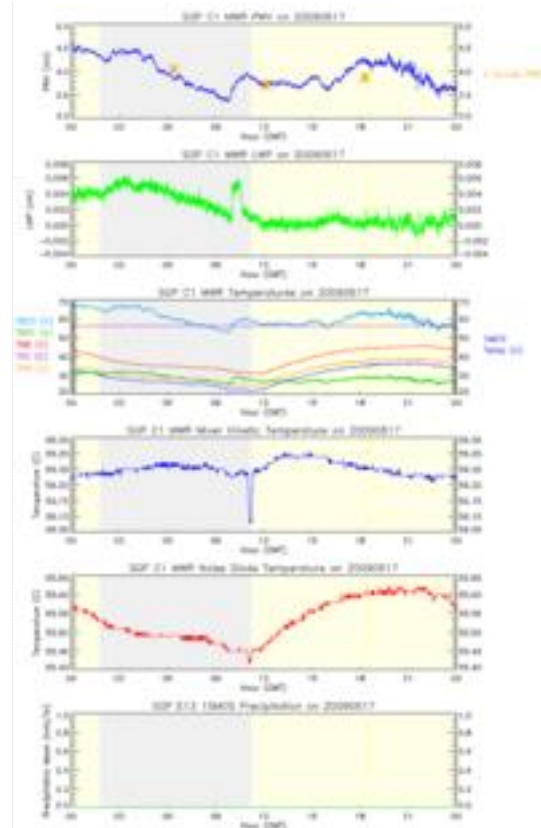


SGP Plots

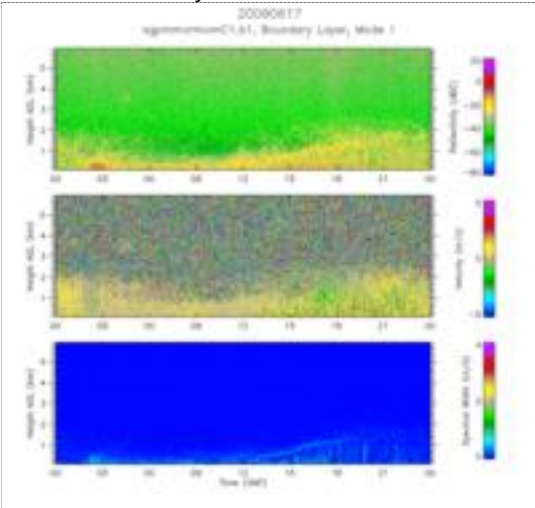
MPL Co-Pol



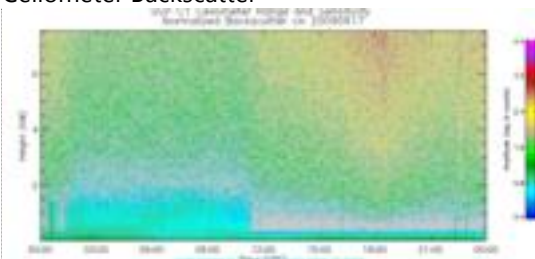
Microwave Radiometer



MMCR Bound. Layer Mode

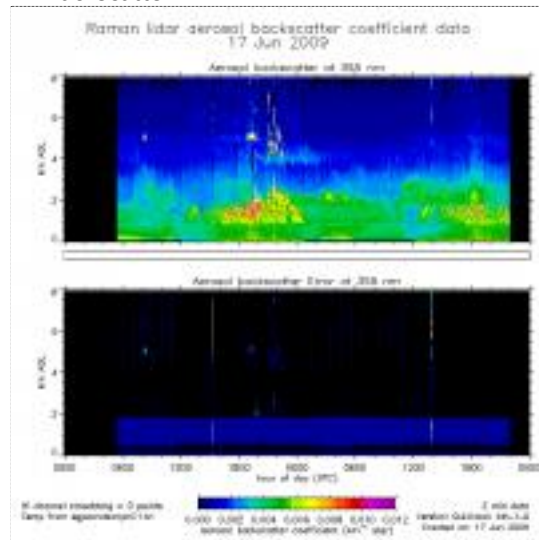
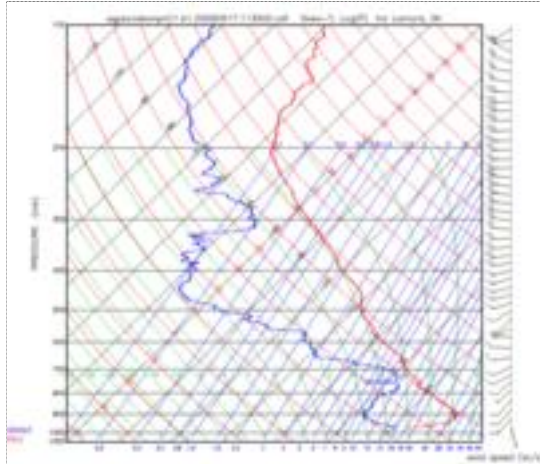


Ceilometer Backscatter

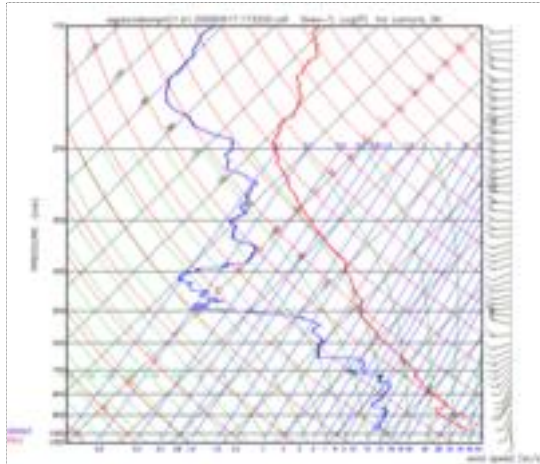


RL Backscatter

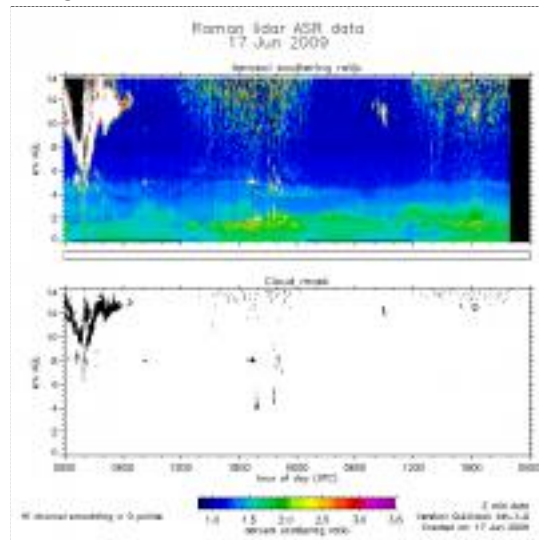
SONDE (11:30)



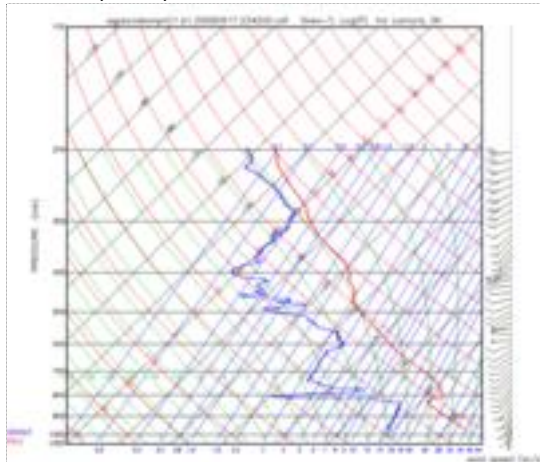
SONDE (17:30)



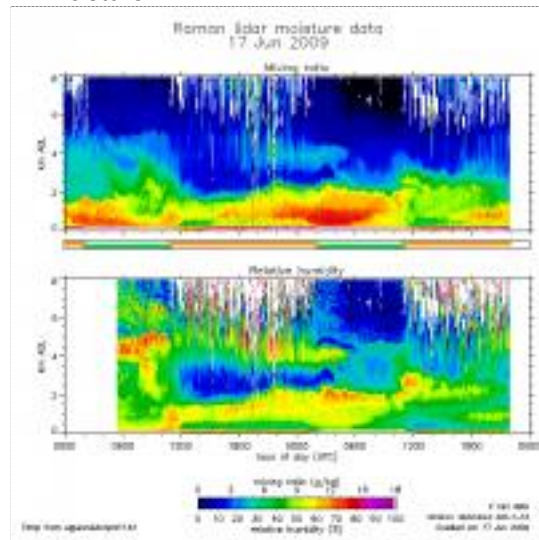
RL ASR



SONDE (23:30)



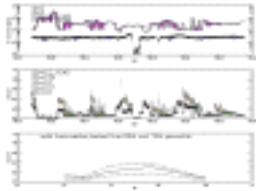
RL Moisture



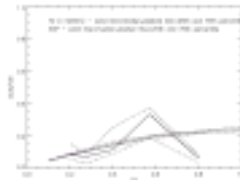
CCN Activity

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.

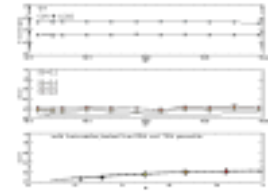
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 23 Jun 2009



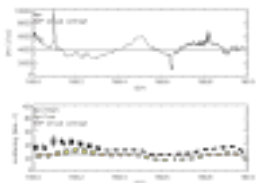
plot of CN and CCN and CCN/CN ratio as $f(SS)$ from twin otter



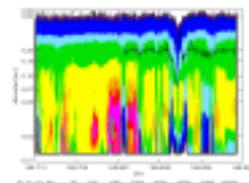
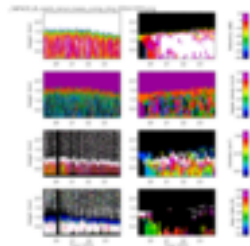
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP



time series of CN and light scattering at SGP

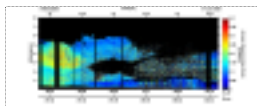


TAMU DMA size distribution and CCN activation diameter

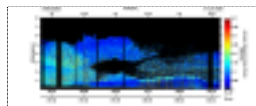
MSPACE_B_resid_rerun.meas_comp_img.20041009

NASA Quick Look Plots

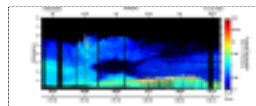
First flight



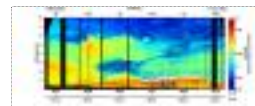
20090617_L1_aer_dep1064



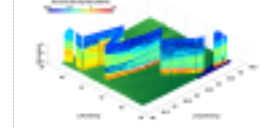
20090617_L1_aer_dep532



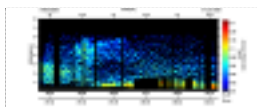
20090617_L1_bsc532



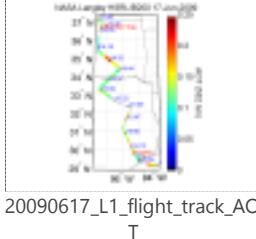
20090617_L1_bsr532



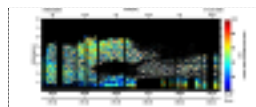
20090617_L1_bsr532_3D



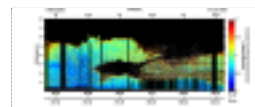
20090617_L1_ext532



20090617_L1_flight_track_AO
T

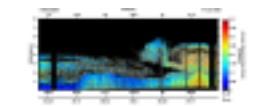


20090617_L1_Sa532

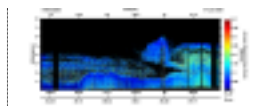


20090617_L1_wwd

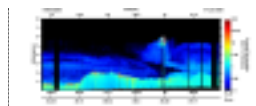
Second flight



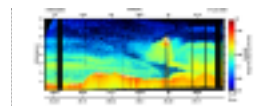
20090617_L2_aer_dep1064



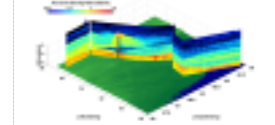
20090617_L2_aer_dep532



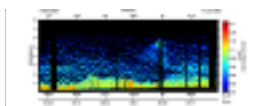
20090617_L2_bsc532



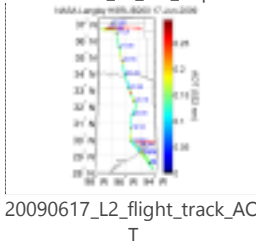
20090617_L2_bsr532



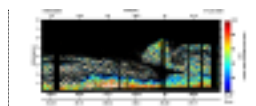
20090617_L2_bsr532_3D



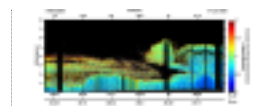
20090617_L2_ext532



20090617_L2_flight_track_AO
T

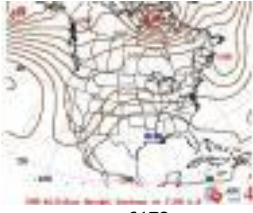


20090617_L2_Sa532



20090617_L2_wwd

Weather Maps



map6172



OK City: 1/8 cloud coverage; 13-17 knots | Tulsa: 1/8 cloud coverage; 8-12 knots; 1074 mb | 90 F/70 F | Low pressure

20090618

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
18:15 UTC	23:15 UTC	5.0	Cloud triangles at SGP	KML
Flight hours to date		226.7		

There was nothing uniform about the clouds today. Tops and bases varied 1000' along any given leg. We stayed the course for the first couple of triangles, but chased the cloud bases and tops after that.

We climbed out to the CF to above clouds. Bases were 6400' tops were 9,000'.

We did the first triangle at 9500'.

Leg #1 1835z. Winds 225/26

Leg #2 1848z

Leg #3 1917z

Back at the CF we spiraled from 9,500' to 1500' - 1926z.

We climbed up to below cloud base. Bases were 7000'. We did the triangle at 6500'.

Leg #1 1952z Winds 235/23. On this leg the clouds lowered, skies were nearly clear at the East point. We flew from below the bases to in the clouds to over the tops.

Leg #2 2007z We dropped to 5500'.

Leg #3 2032z

Triangle #3. We started out at 7300'.

Leg #1 2050z 7300' to 6900'. Winds 220/25

Leg #2 2103z 6900' to 6500' to 6300' to 6500'

Leg #3 2129z 6700', 6800', 6900', 7100', 7300', 7500'.

Triangle #4 We started out at 8900'.

Leg #1 2146. 8900', 8400', 8200', 7800'

Leg #2 2159. 7800', 7300'

Leg #3 2224 7300', 7800'.

Back at the CF we climbed to 9500' and spiraled to 1500'. 2241z

We RTB'd at 2256z at 2700'.

Weather Summary

Heavy scattered clouds in the area, thinning toward the east.

Aircraft Instrumentation Status

Hydrorad laptop went off about 20 minutes into flight. Jesse repositioned the fan and started it back up. It ran the remainder of the flight. He thought it was restarted prior to the 1st triangle.

Jesse and Roy put a fan on the DLH for today's flight.

Surface Instrumentation Status

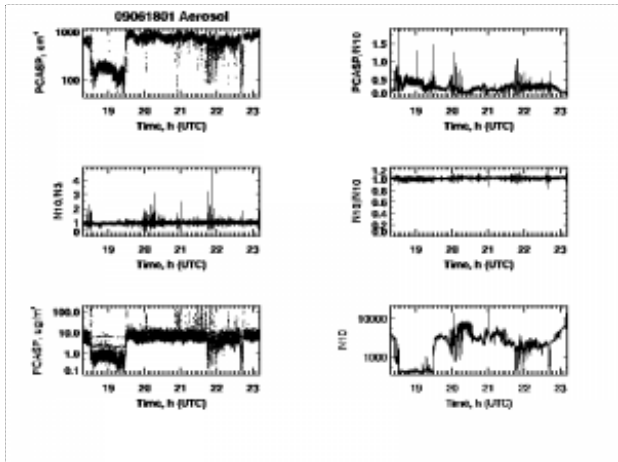
nothing to report

Flight Images

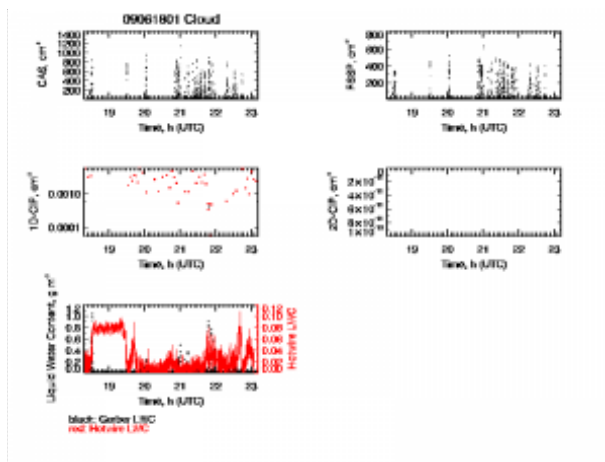


Flight Plots

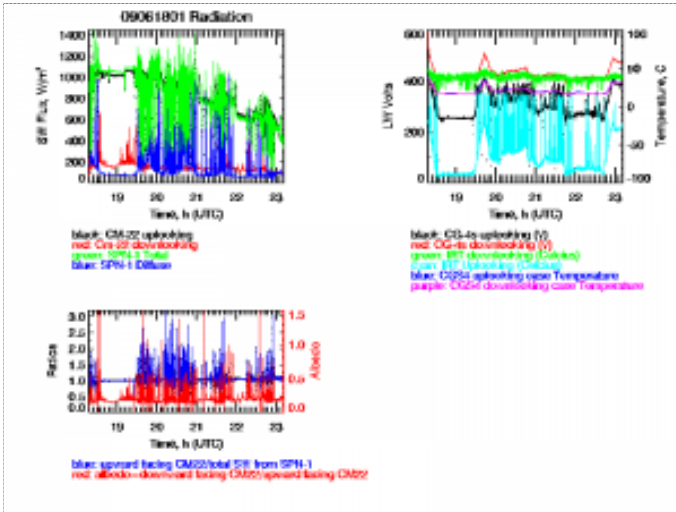
Aerosol



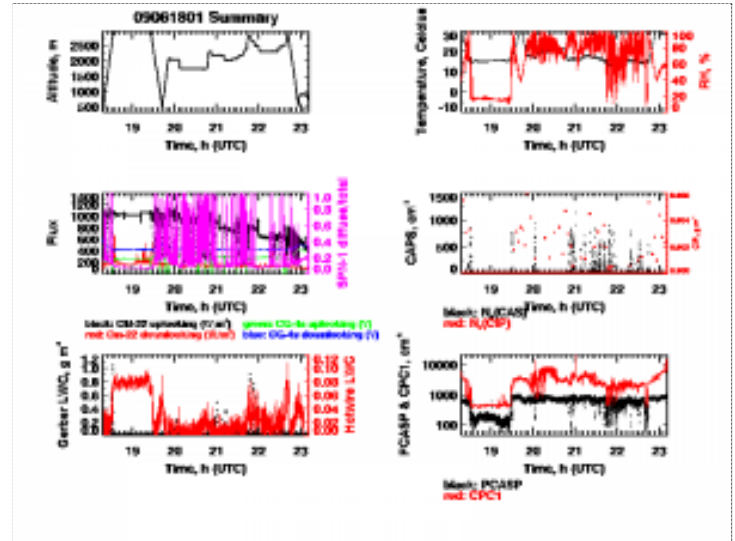
Cloud



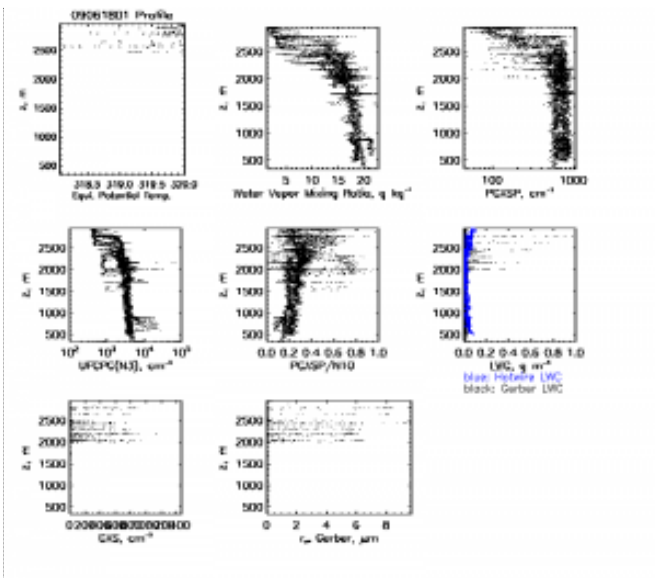
Radiation



Summary

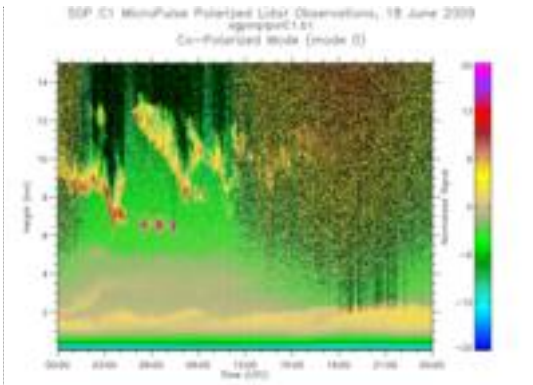


Profile

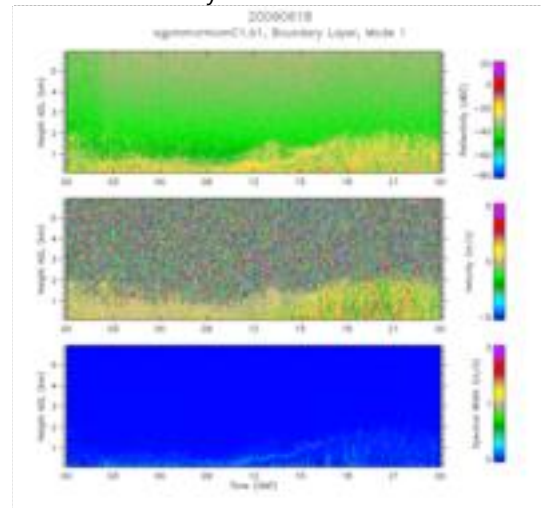


SGP Plots

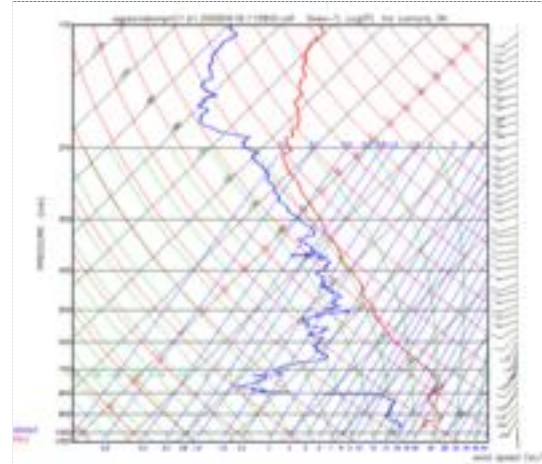
MPL Co-Pol



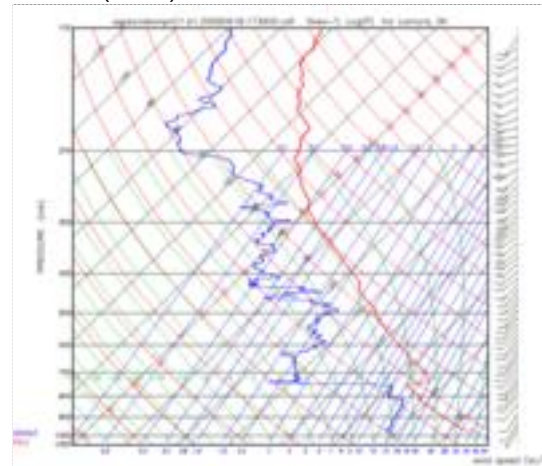
MMCR Bound. Layer Mode



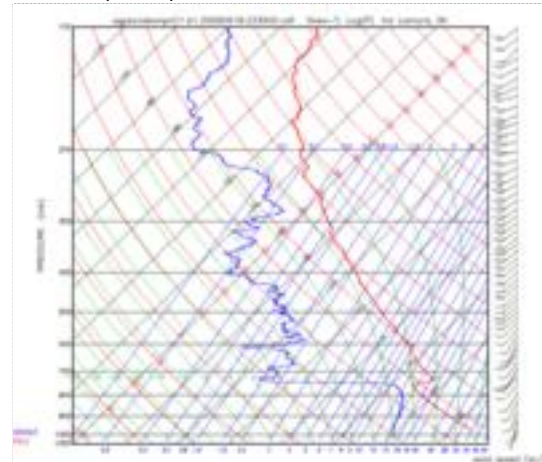
SONDE (11:30)



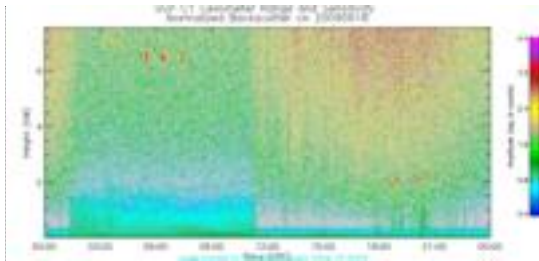
SONDE (17:30)



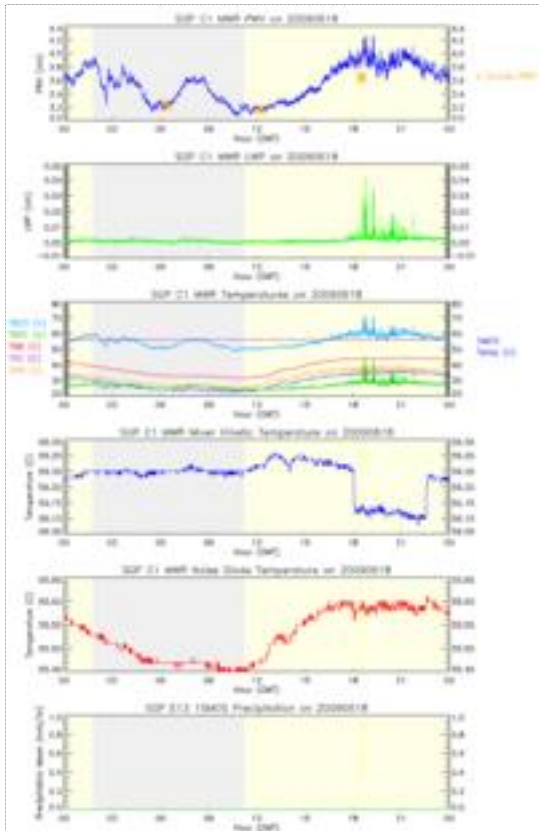
SONDE (23:30)



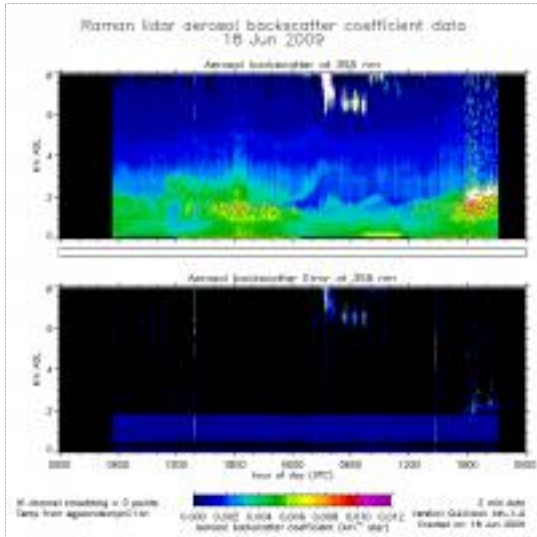
Ceilometer Backscatter



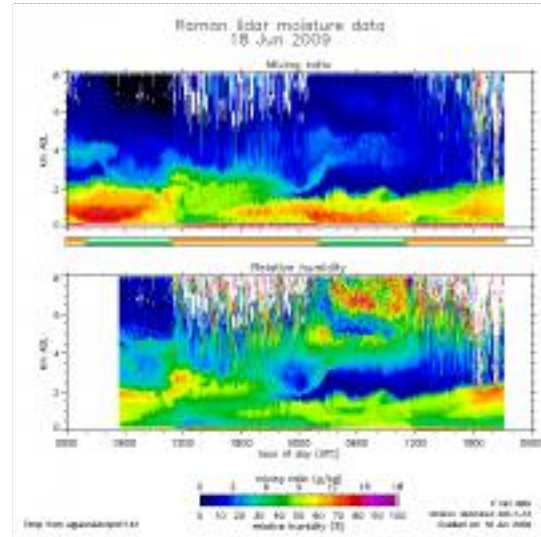
Microwave Radiometer



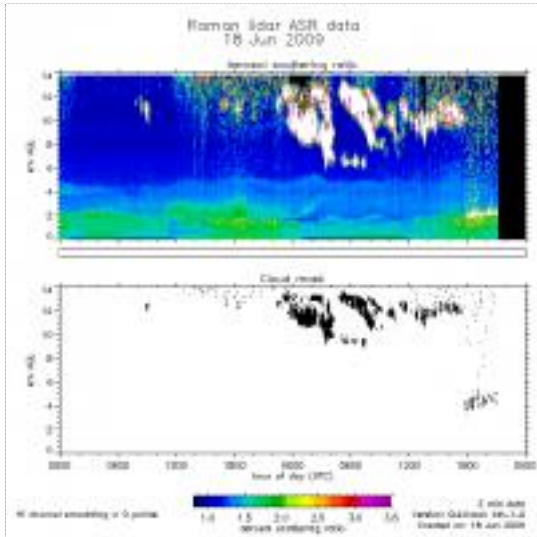
RL Backscatter



RL Moisture



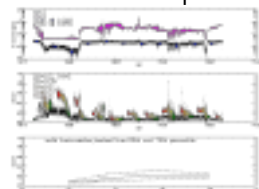
RL ASR



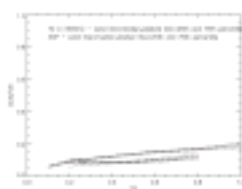
CCN Activity

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.

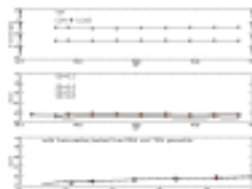
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as f(SS)). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 30 Jun 2009



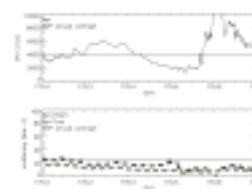
plot of CN and CCN and CCN/CN ratio as f(SS) from twin otter



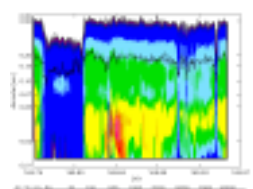
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

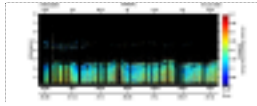


time series of CN and light scattering at SGP

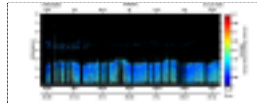


TAMU DMA size distribution and CCN activation diameter

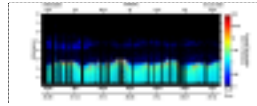
NASA Quick Look Plots



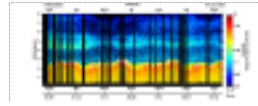
20090618_L1_aer_dep1064



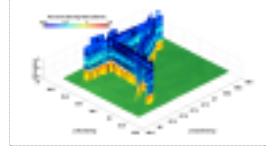
20090618_L1_aer_dep532



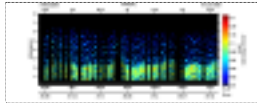
20090618_L1_bsc532



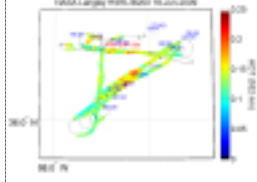
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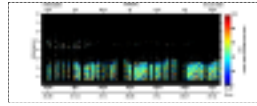
20090618_L1_bsr532_3D



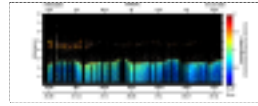
20090618_L1_ext532



20090618_L1_flight_track_AO
T



20090618_L1_Sa532



20090618_L1_wvd

Weather Maps



map6182



OK City: Scattered; 8-12 knots | Tulsa: 1/8 cloud coverage; 13-17 knots; 1089 mb | 89 F/68 F

20090619

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
19:31 UTC	23:47 UTC	4.3	Cloud triangles at SGP & Cloud out and backs east of SGP	KML
Flight hours to date		231.0		

We departed Ponca City and headed towards the CF. We ran the first triangle backwards, S, NE, W because the clouds were all to the South. We crossed the CF at 9500' but were still below them. We climbed to 12,500' on the S leg. Some tops were still above us. We came over the clouds about 10 miles N of the S point. We came out of the cloud field about half way along the NE leg.

At the NE point we turned East to find a line on the NE/SW leg that would keep us into the clouds. It was 15 nm east of the original point.

We continued at 12,500' on the W leg of the triangle.

Back at the CF we spiraled from 12,500' to 1,500'.

Triangle #2 5400' below clouds.

Leg #1 2116z

Leg #2 2133z

At this point we joined up with the NASA King Air. We decided to fly a 40 nm 045/220 line based on the point set above.

Leg #1 2148 Below cloud leg. 5400', 5200', 5000', 4800'

Leg #2 Time missing Above bases 5300', 5800', 6100', 6400'

Leg #3 2232 In tops. 6800'

Leg #4 2248z 6600' mid level

Leg #5 2309z 6900' mid level. At this point the clouds had grown too large for us to get near. We offset most of the leg.

We RTB'd 2321z. On the way back to Ponca City, we climbed to 7000' and did a slant descent to 1500'.

Weather Summary

Mostly cloudy with high cirrus.

Aircraft Instrumentation Status

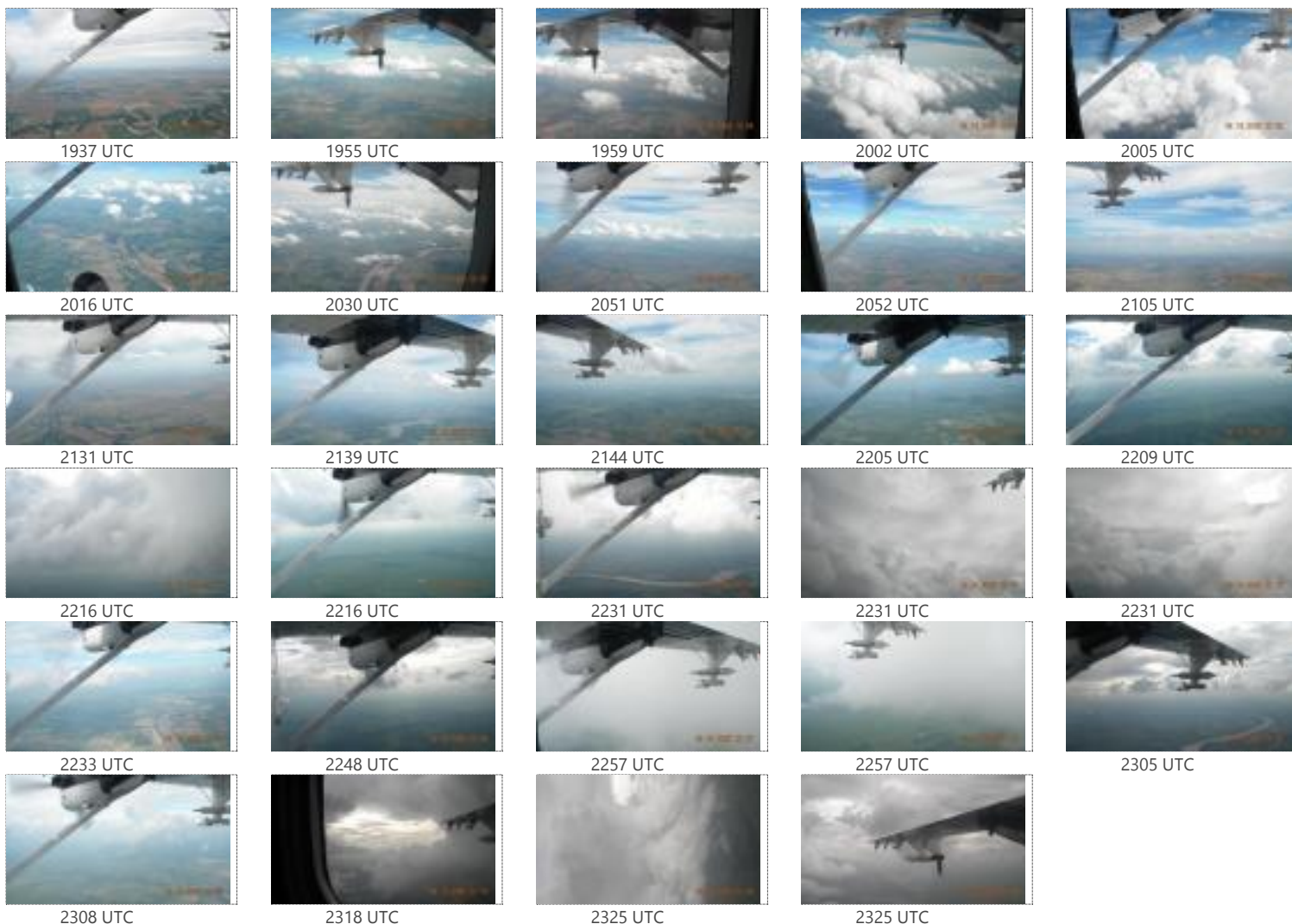
Jesse said it was cooler today so instruments appeared to run fine.

Today DLH ran with the new configuration file.

Surface Instrumentation Status

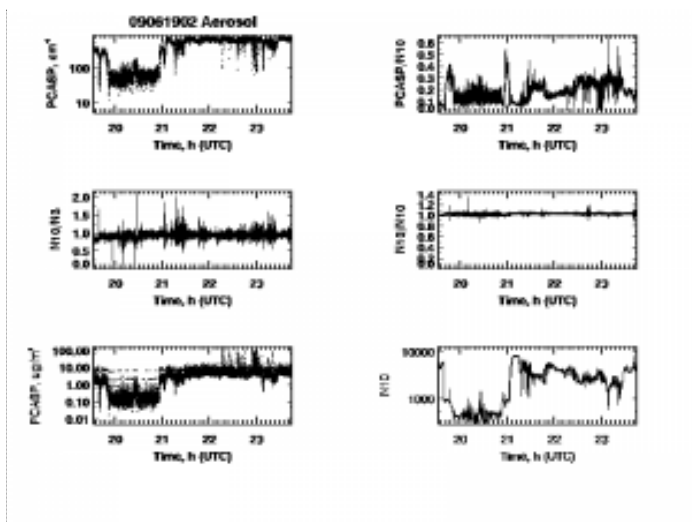
nothing to report

Flight Images

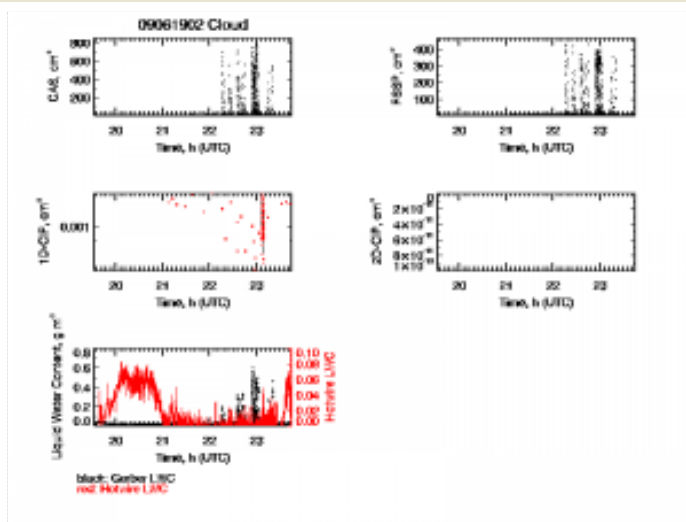


Flight Plots

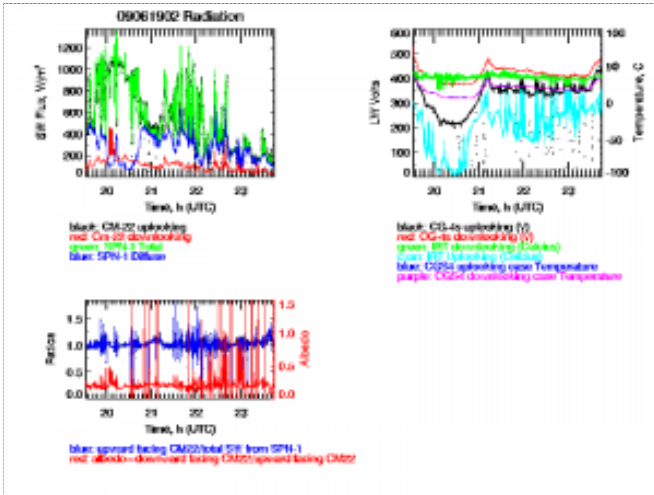
Aerosol



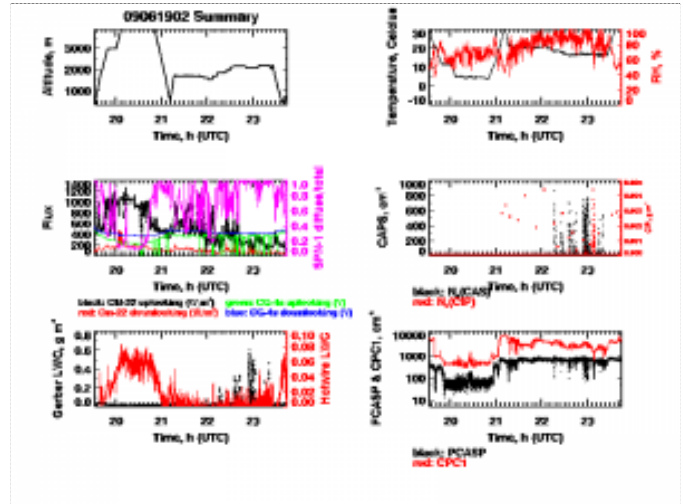
Cloud



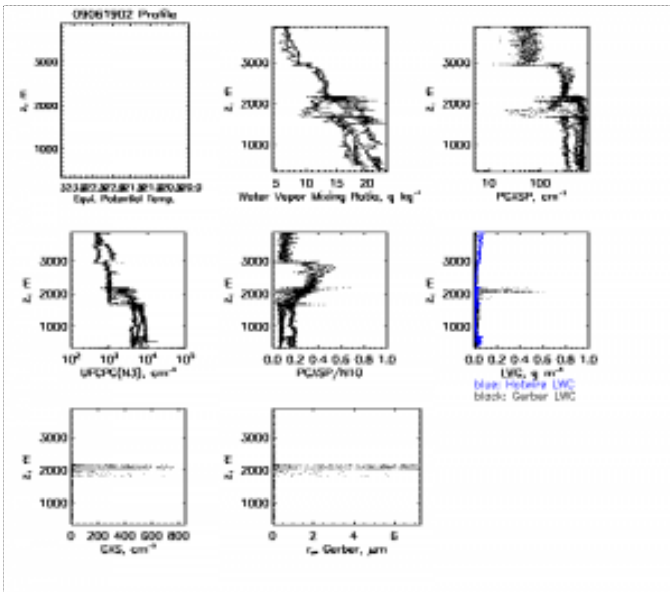
Radiation



Summary

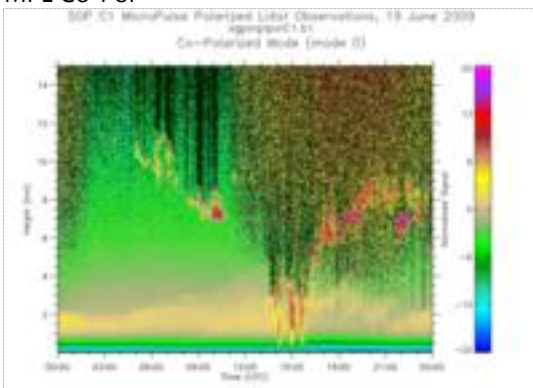


Profile

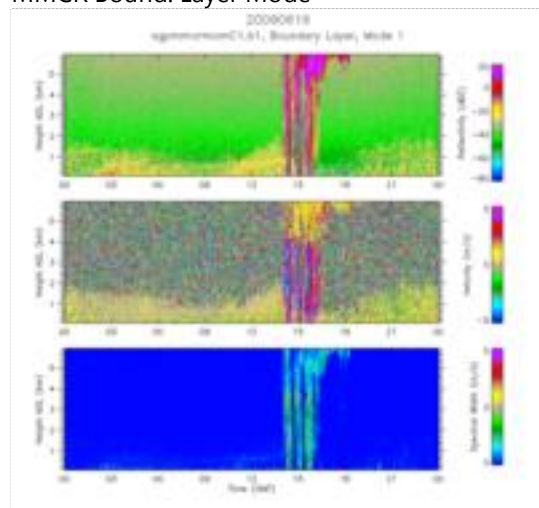


SGP Plots

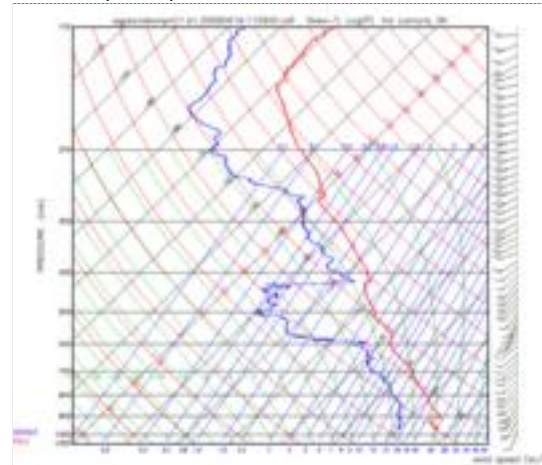
MPL Co-Pol



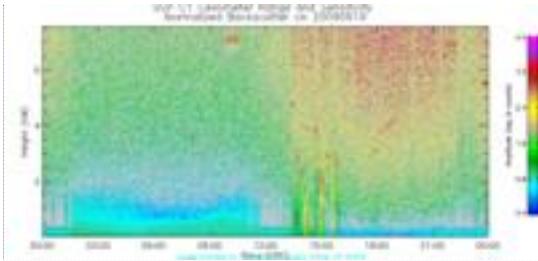
MMCR Bound. Layer Mode



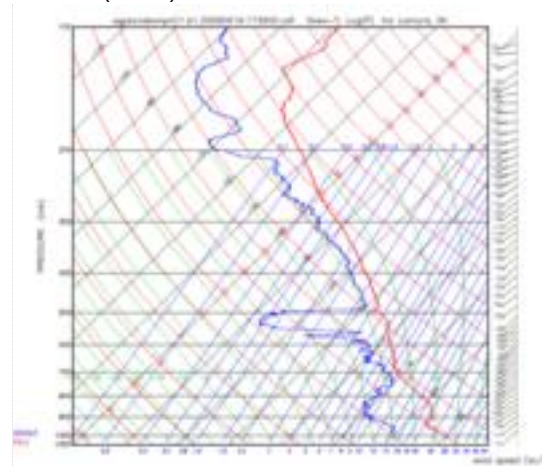
SONDE (11:30)



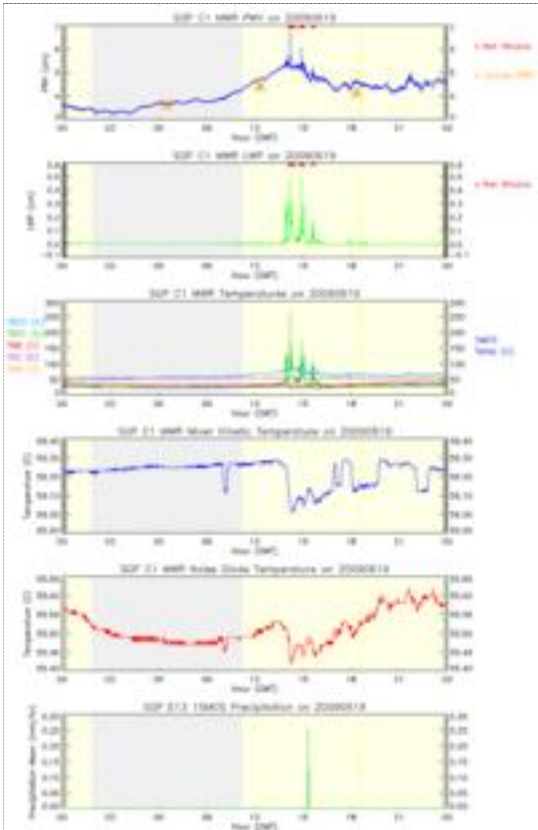
Ceilometer Backscatter



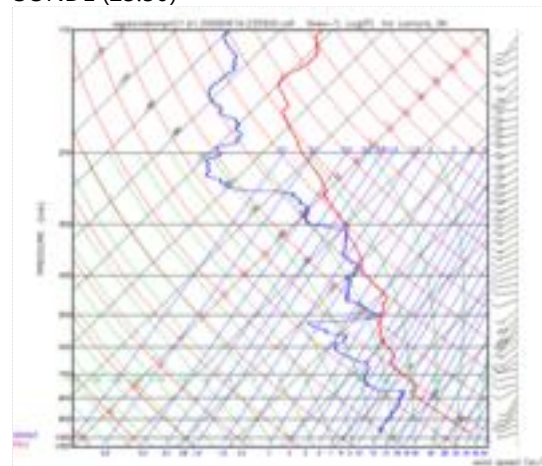
SONDE (17:30)



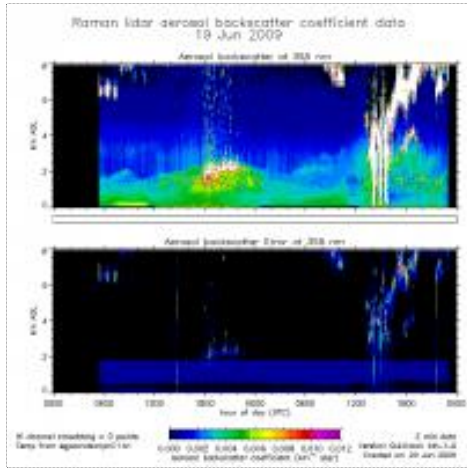
Microwave Radiometer



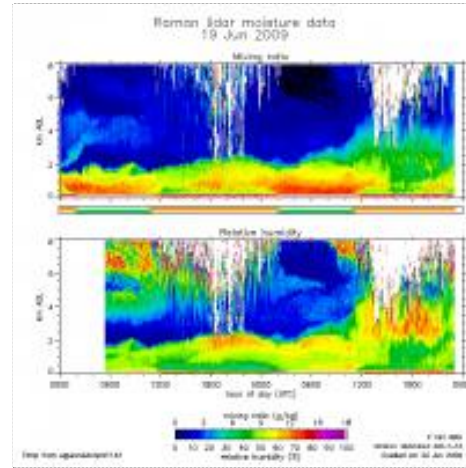
SONDE (23:30)



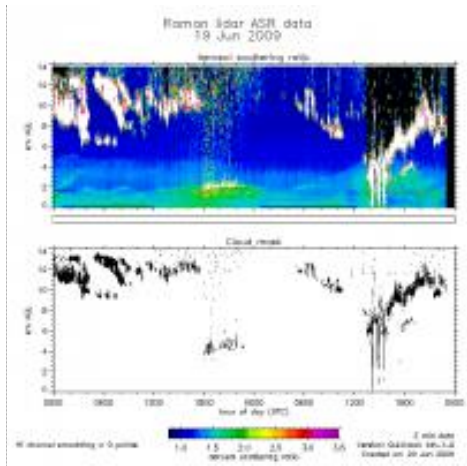
RL Backscatter



RL Moisture

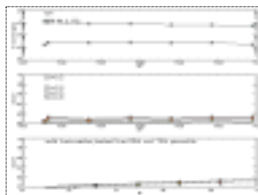


RL ASR

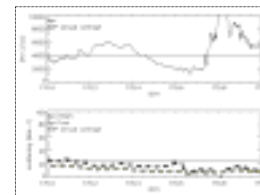


CCN Activity

I've generated plots indicative of CCN activity from the surface data, 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). Elisabeth Andrews - 30 Jun 2009



plot of CN and CCN and CCN fraction at SGP



time series of CN and light scattering at SGP

NASA Quick Look Plots

20090619_L1_aer_dep1064	20090619_L1_aer_dep532	20090619_L1_bsc532	20090619_L1_bsr532	20090619_L1_bsr532_3D
20090619_L1_ext532	20090619_L1_flight_track_AO T	20090619_L1_Sa532	20090619_L1_wvd	

Weather Maps



map6192



OK City: Scattered; 13-17 knots | Tulsa: 1/8 cloud coverage; 13-17 knots;
1070 mb | 90 F/66 F

20090620

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
17:25 UTC	22:26 UTC	5.0	Cloud triangles at SGP (with 20 Nautical Mile legs)	KML
Flight hours to date		236.0		

We departed out of Ponca City and climbed towards the CF. Bases were 4700, tops were 9000'.

Triangle #1 was above clouds at 9500'. There were multiple layers of clouds below us.

Leg #1 1744z. Winds 210/36. Clouds thinned out significantly to the East.

Leg #2 1757z

Leg #3 1824z

Back at the CF we spiraled from 9500' to 1500' at 1836. Tops were 9000', bases 5700'.

Triangle #2 was below bases.

Leg #1 1900z. 5200', 4800'

Leg #2 1915z. 4800', 4900'

Leg #3 1940z. 4900', 5100'

Triangle #3 In bases.

Leg #1 1958z, 6500', 6400', 5800'. Clouds were ~500' thick. Winds 200/24

Leg #2 2014z. 5800', 6300', 6500', 6700'

Leg #3 2038z. 6700', 6800', 6900', 7000'

Triangle #4 In tops

Leg #1 2055z. 7700', 7500', 7100', 6600'. Winds 220/29

Leg #2 2109z. 6600', 6400', 6800', 7100'

Leg #3 2136z. 7100', 7200'.

At the CF we spiraled from 9500-1500 at 2151z.

No issues with the plane.

Weather Summary

Broken to scattered clouds with cirrus forming overhead

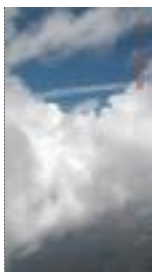
Surface Instrumentation Status

nothing to report

Flight Images



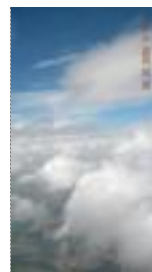
1735 UTC



1735 UTC



1736 UTC

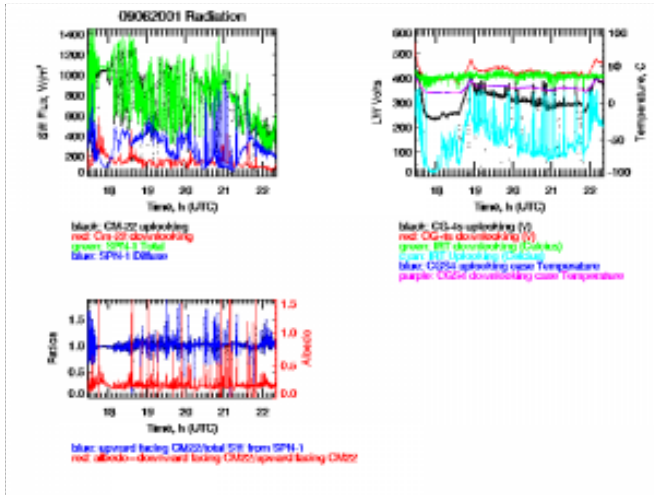


1737 UTC

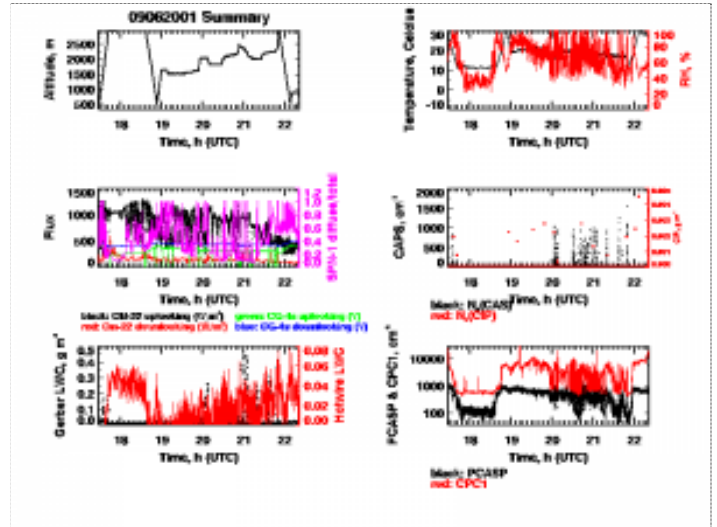


1743 UTC

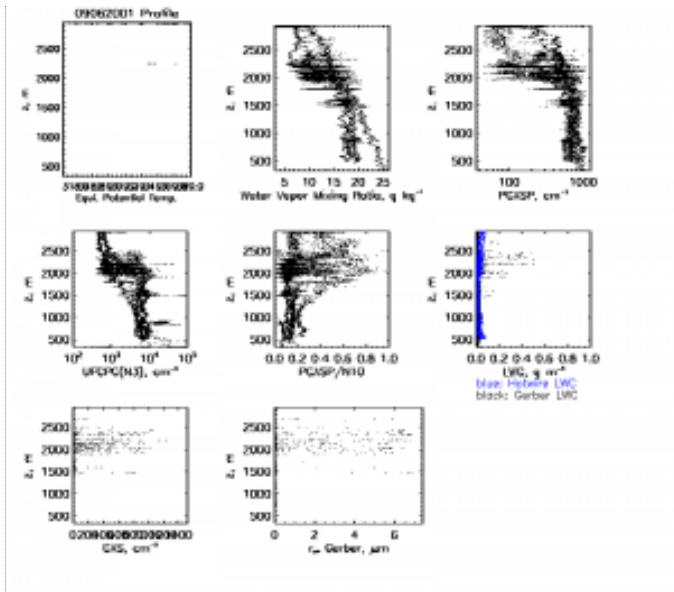
Radiation



Summary

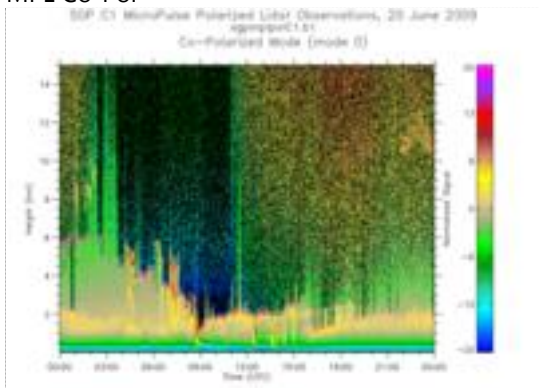


Profile

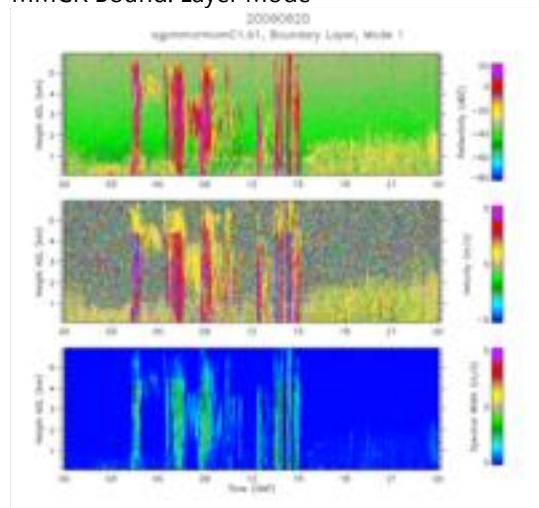


SGP Plots

MPL Co-Pol

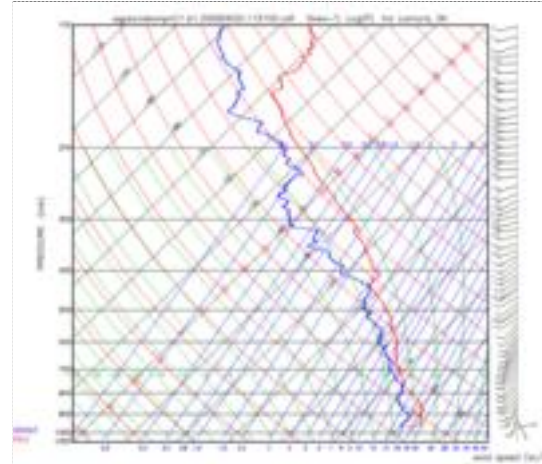
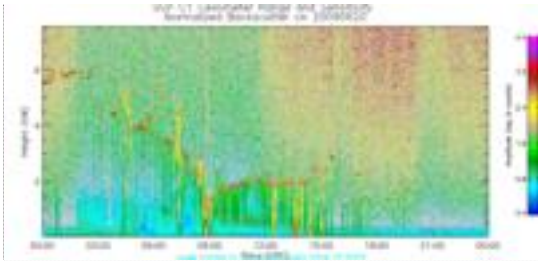


MMCR Bound. Layer Mode

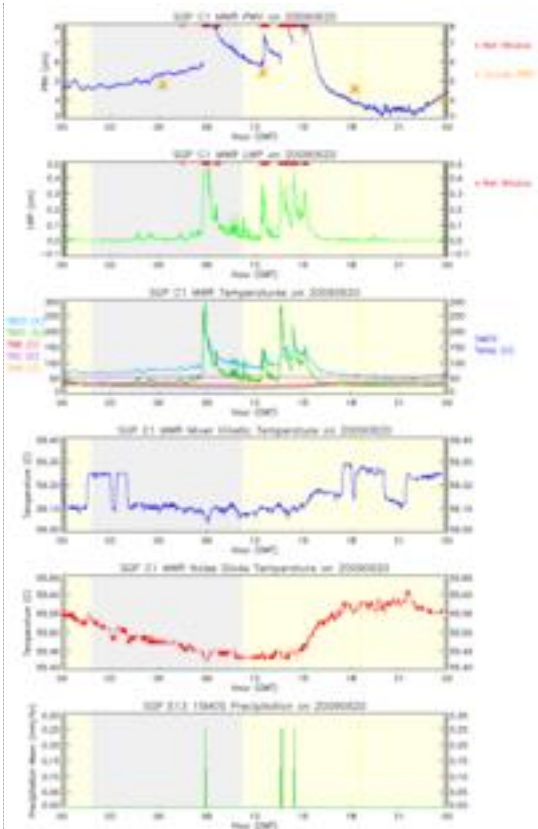


SONDE (11:30)

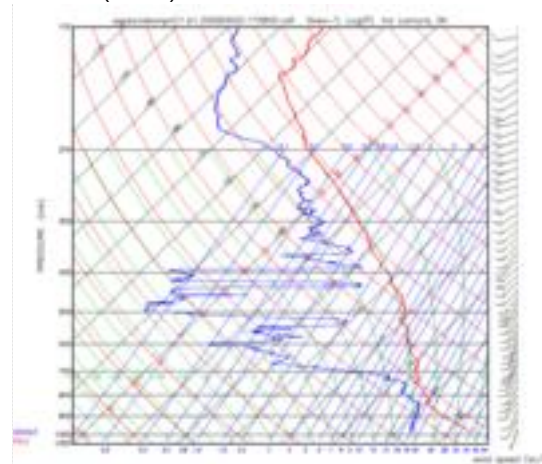
Ceilometer Backscatter



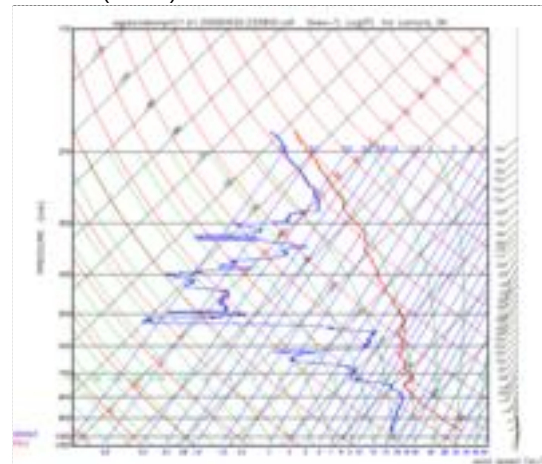
Microwave Radiometer



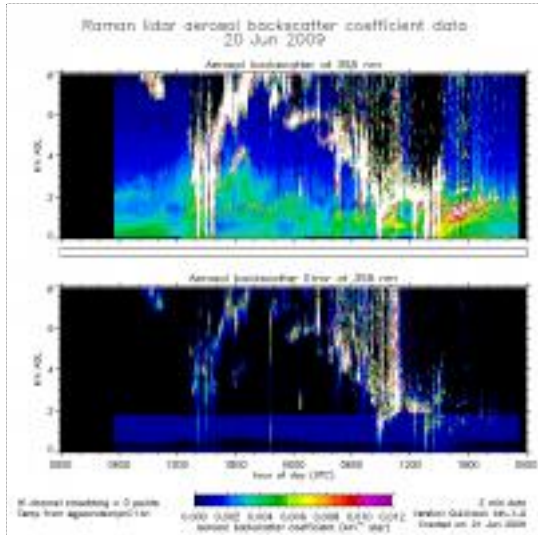
SONDE (17:30)



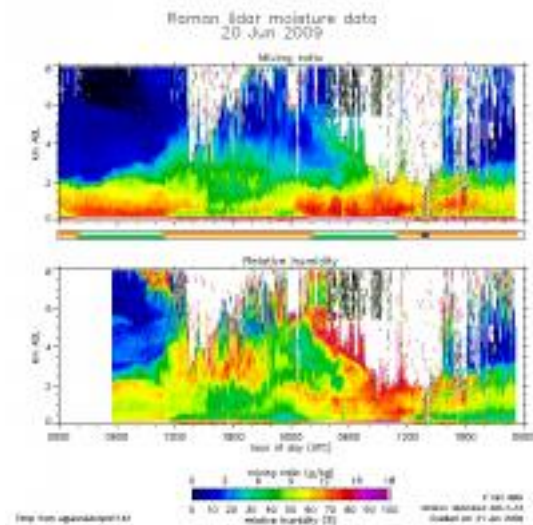
SONDE (23:30)



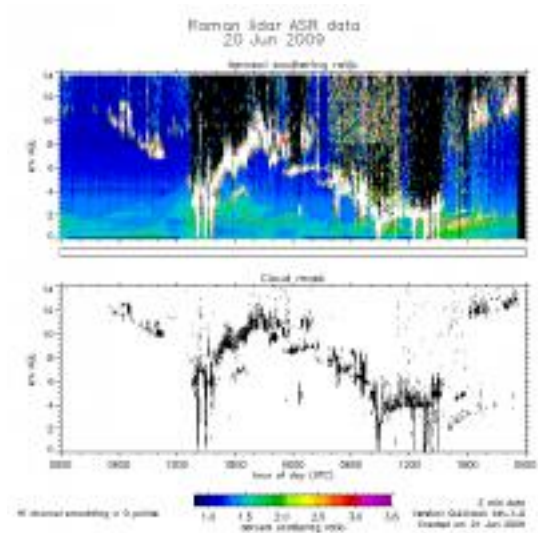
RL Backscatter



RL Moisture



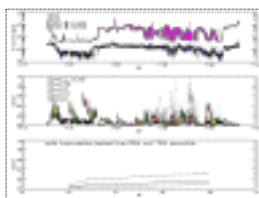
RL ASR



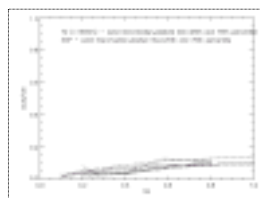
CCN Activity

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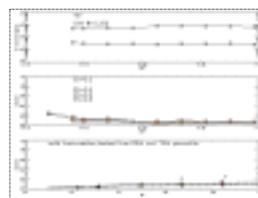
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 30 Jun 2009



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



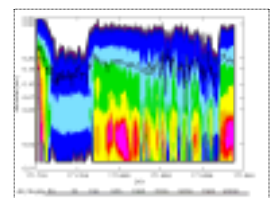
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

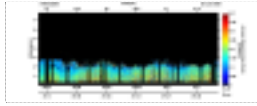


time series of CN and light scattering at SGP

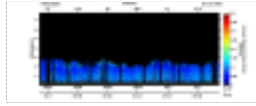


TAMU DMA size distribution and CCN activation diameter

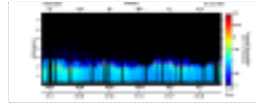
NASA Quick Look Plots



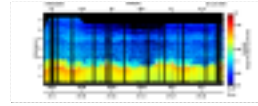
20090620_L1_aer_dep1064



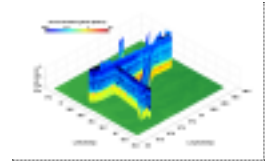
20090620_L1_aer_dep532



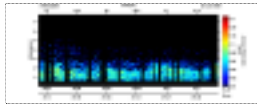
20090620_L1_bsc532



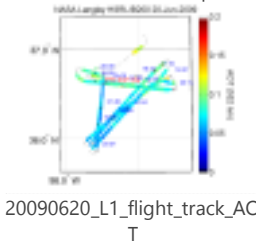
20090620_L1_bsr532



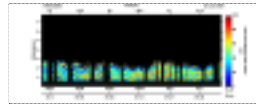
20090620_L1_bsr532_3D



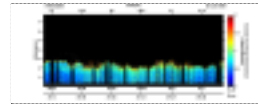
20090620_L1_ext532



20090620_L1_flight_track_AOT

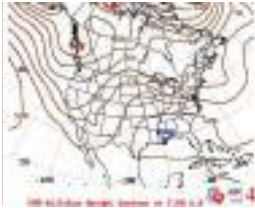


20090620_L1_Sa532



20090620_L1_wvd

Weather Maps



map6202



OK City: Scattered; 3-7 knots | Tulsa: 1/8 cloud coverage; 8-12 knots; 1070 mb | 86 F/67 F | Low pressure

20090623

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
19:00 UTC	23:26 UTC	4.4	Cloud triangles (modified) east of SGP	KML
Flight hours to date		240.4		

We departed Ponca City and climbed to the cloud tops +500. Bases were ~7500', tops were ~9000'.

Triangle #1. On top. 9500'.
Leg #1 1918z. Winds 170/11
Leg #2 1933z
Leg #3 1954z

We spiraled down from 9500' to 1500'. 2007z.
Triangle #2. Below clouds 6500'
Leg #1 2059z. Winds 170/09. 6500', 6300', 5800'
Leg #2 2044z. 5800' 6000' 6500'
Leg #3 2016z. 7000' 7200'

Triangle #3/Parallelogram #1. Above Bases. 7900'
Leg #1 2122z. Winds 190/13. 7900', 7700', 7000'.
Leg #2 2137z. We changed the pattern because there were no clouds to the South at all. We turned NW opposite of the diagonal SW. 7000', 6900' 7000'
Leg #3 2157z. We turned due west to get the clouds because there was nothing to the east. 7200', 8200', 8500', 9000'
Leg #4 2211z. 9200', 9000', 8300'. We stopped 13 nm short because there were no other clouds than those behind us. We reversed course.

Leg #1 In Tops. 9200', 9500' 10000'.
Leg #2 There was nothing left within 50 miles. We returned towards Ponca City.

We did a spiral from 10,000' to 1500' at 2304z.

Weather Summary

Mostly clear skies with scattered clouds developing in the afternoon

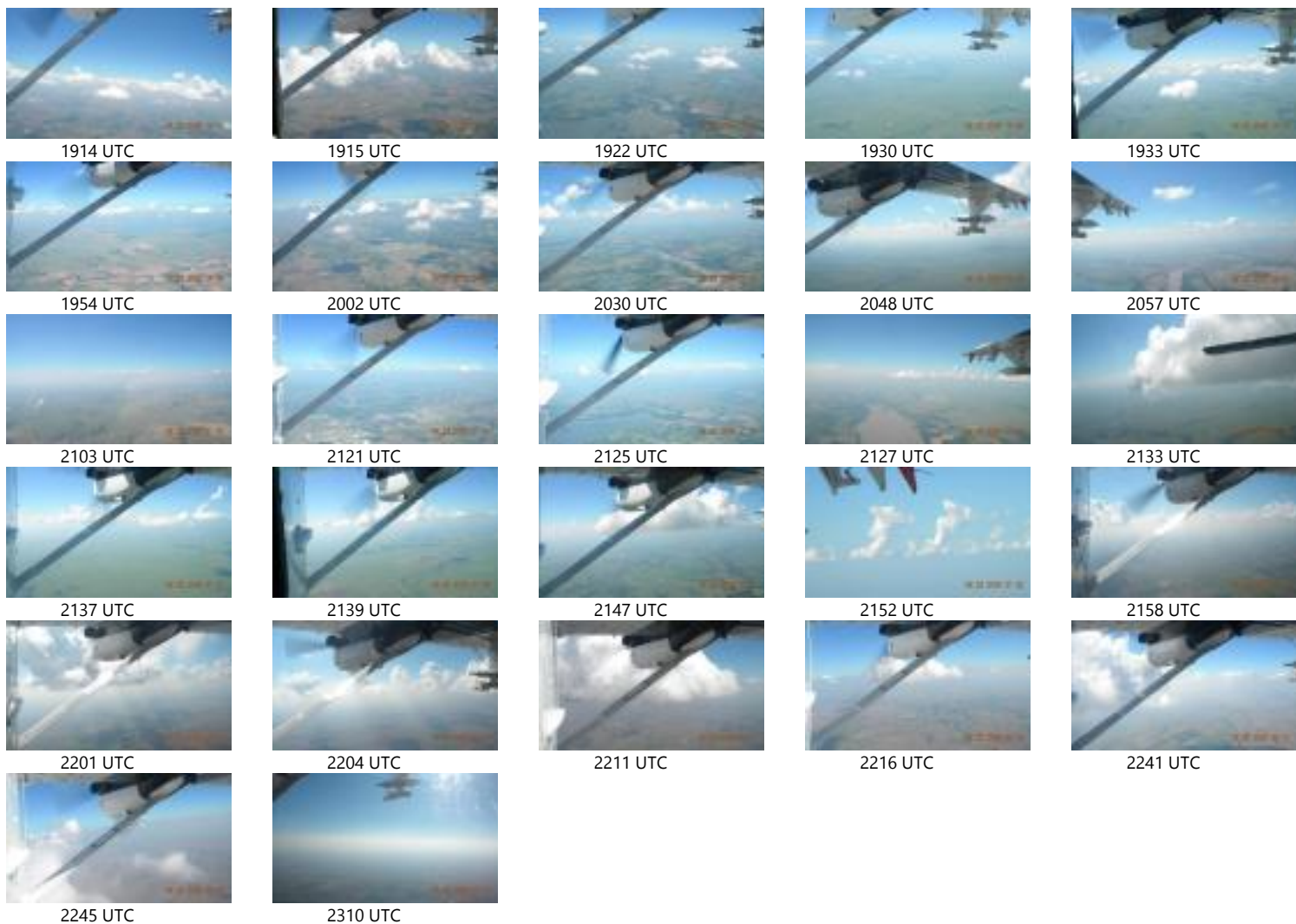
Aircraft Instrumentation Status

Jesse said everything ran fine.

Surface Instrumentation Status

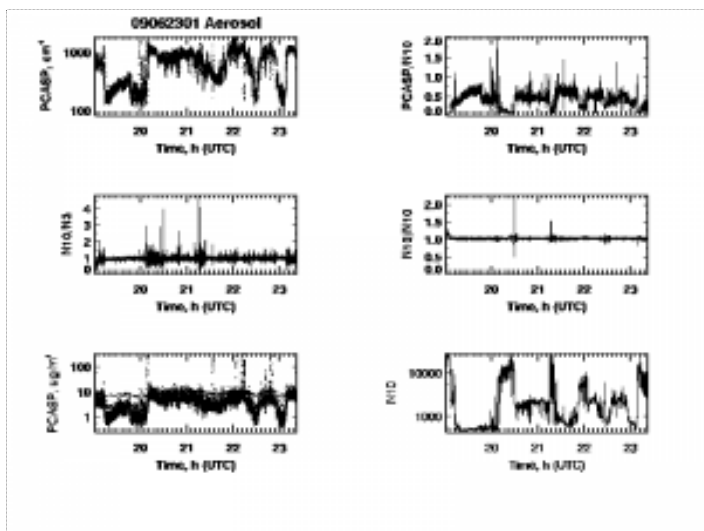
nothing to report

Flight Images

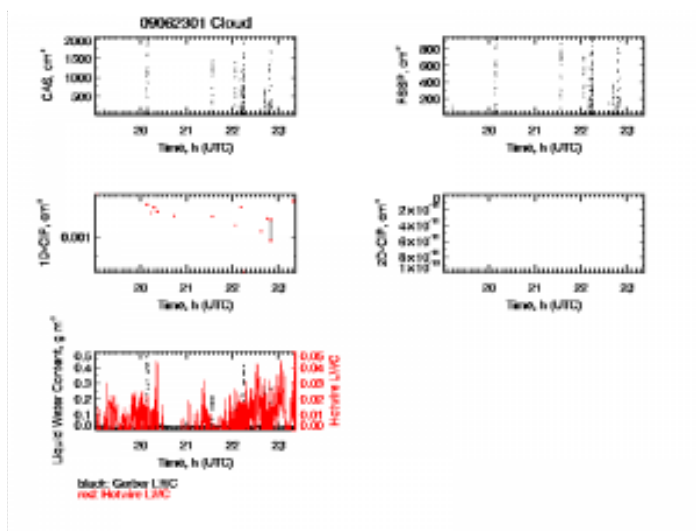


Flight Plots

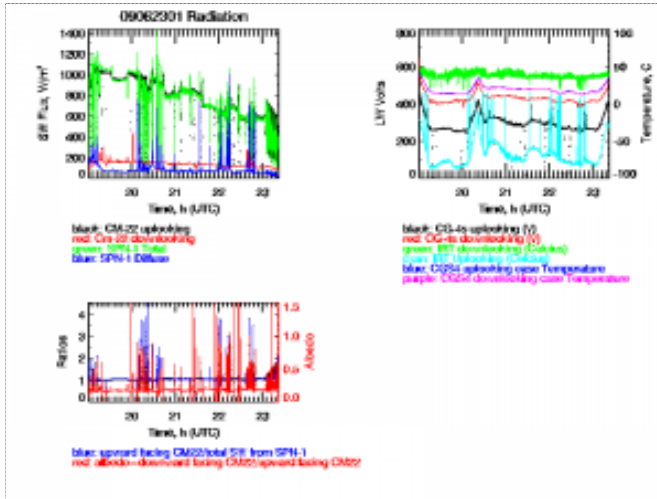
Aerosol



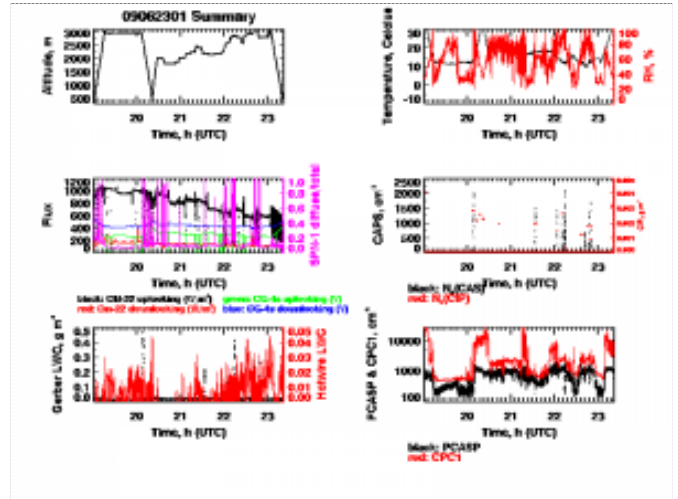
Cloud



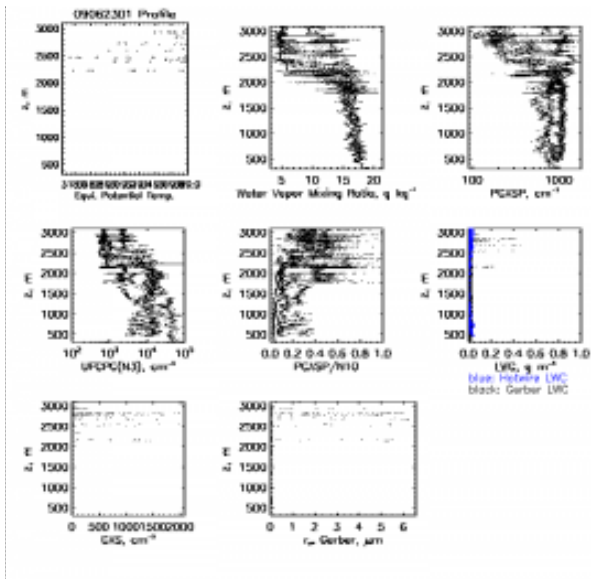
Radiation



Summary

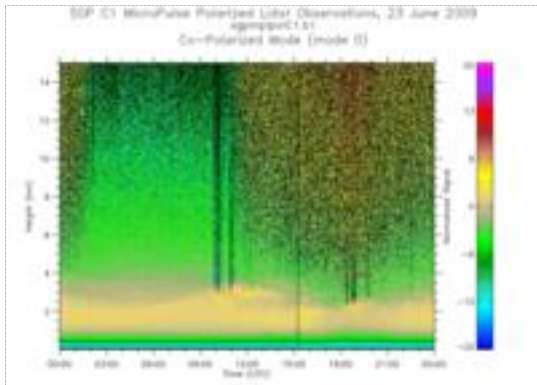


Profile

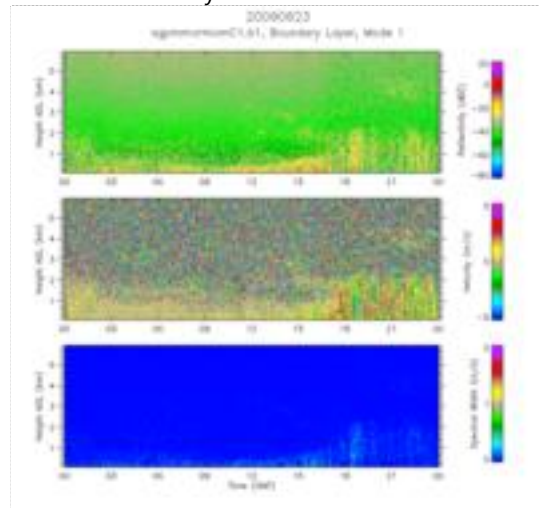


SGP Plots

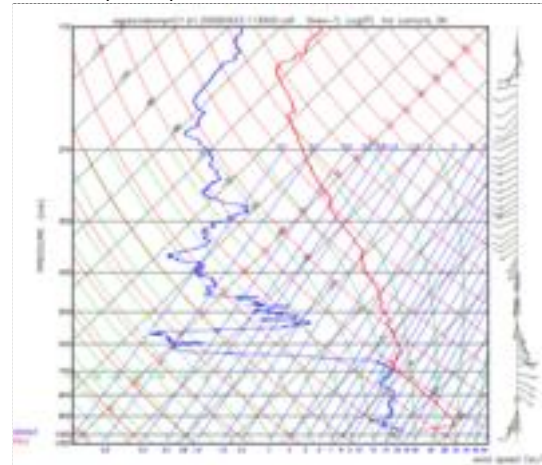
MPL Co-Pol



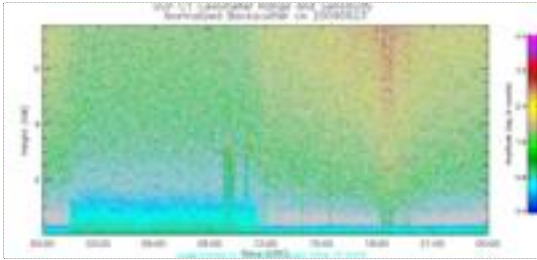
MMCR Bound. Layer Mode



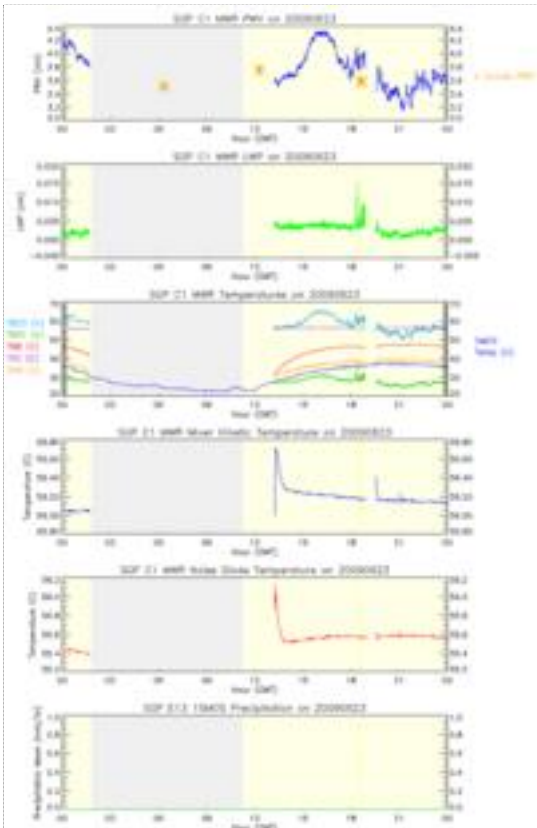
SONDE (11:30)



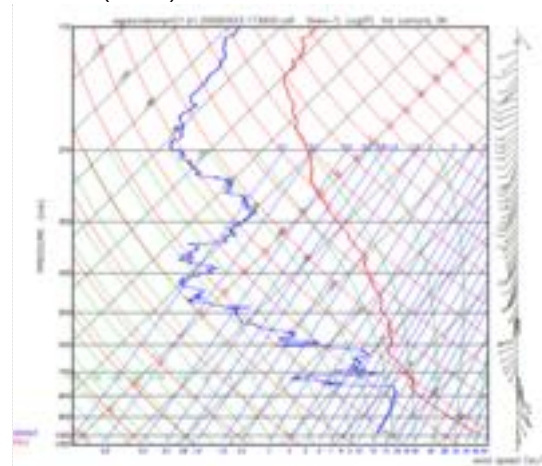
Ceilometer Backscatter



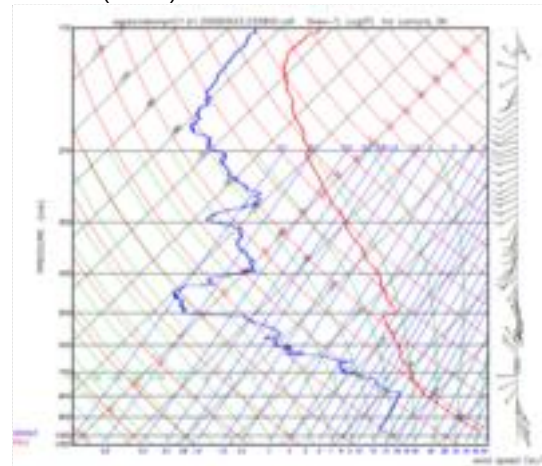
Microwave Radiometer



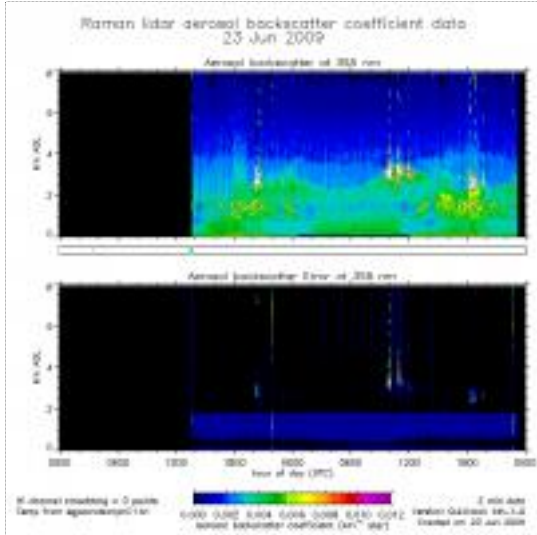
SONDE (17:30)



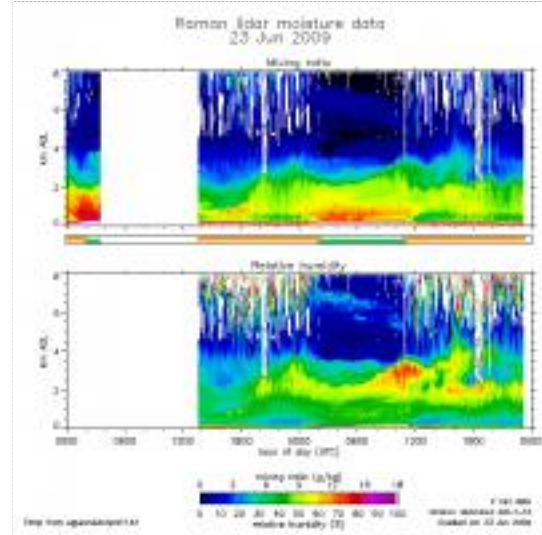
SONDE (23:30)



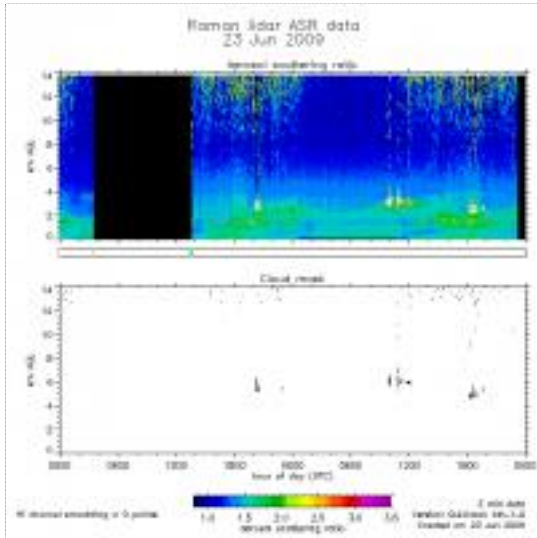
RL Backscatter



RL Moisture



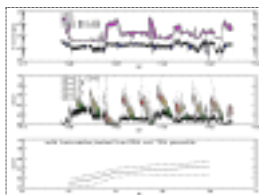
RL ASR



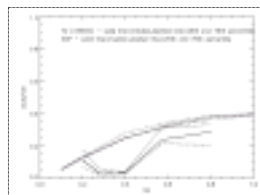
CCN Activity

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.

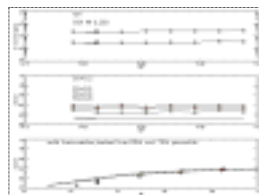
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as f(SS)). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 30 Jun 2009



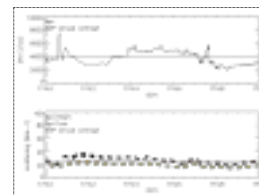
plot of CN and CCN and CCN/CN ratio as f(SS) from twin otter



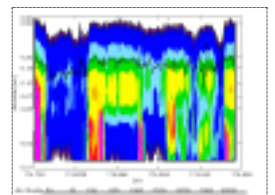
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

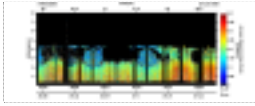


time series of CN and light scattering at SGP

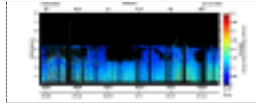


TAMU DMA size distribution and CCN activation diameter

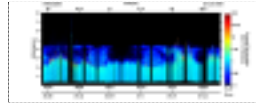
NASA Quick Look Plots



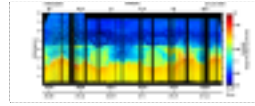
20090623_L1_aer_dep1064



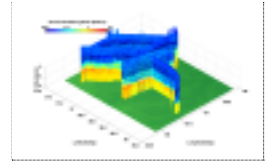
20090623_L1_aer_dep532



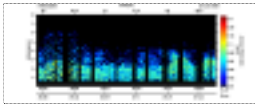
20090623_L1_bsc532



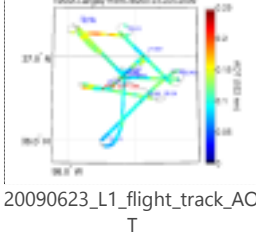
20090623_L1_bsr532



20090623_L1_bsr532_3D



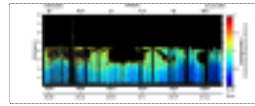
20090623_L1_ext532



20090623_L1_flight_track_AO
T

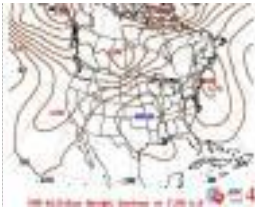


20090623_L1_Sa532



20090623_L1_wvd

Weather Maps



map6232



OK City: Broken; 3-7 knots | Tulsa: Scattered; 3-7 knots; 1072 knots | 95 F/67 F

20090624

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
19:00 UTC	23:42 UTC	4.7	Cloud out and backs for CALIPSO overpass south of SGP, then north-south legs in cloud	KML
Flight hours to date		245.1		

We departed Ponca City and did a slant climb to 10,500'. Near the first point we descended to below the bases. Bases were 8800'.

Triangle #1. 8300' winds 170/03.

Leg #1 1946z. 8300', 7800', 7700', 7300' (Sat Overpass alt. 20 nm N of S point)

Leg #2 2007z. 7300', 6500'

Leg #3 2021z. 6500', 7200', 7400', 7500', 7800', 8000'

We decided to just fly the N/S Leg because there were no clouds to the West of that line.

Leg #1 2038z. Above bases. 9500', 9200', 8900'.

Leg #2 Below Tops. 9500', 10,500'

Leg #3 2123z. Above bases. 9800', 9500', 9300', 9100'

Leg #4 2146z. Below Tops. 9700', 9800', 10000', 10600'.

Leg #5 Above tops. 12,500'

We did a spiral from 12,500' to 1700' and RTB'd at 7500', 500' below the clouds.

No issues with the plane.

Weather Summary

Scattered clouds.

Surface Instrumentation Status

nothing to report

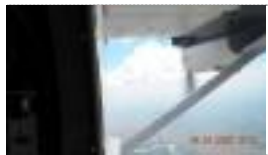
Flight Images



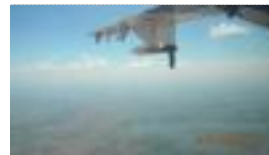
1924 UTC



1938 UTC



1957 UTC



2010 UTC



2015 UTC



1924 UTC



1951 UTC



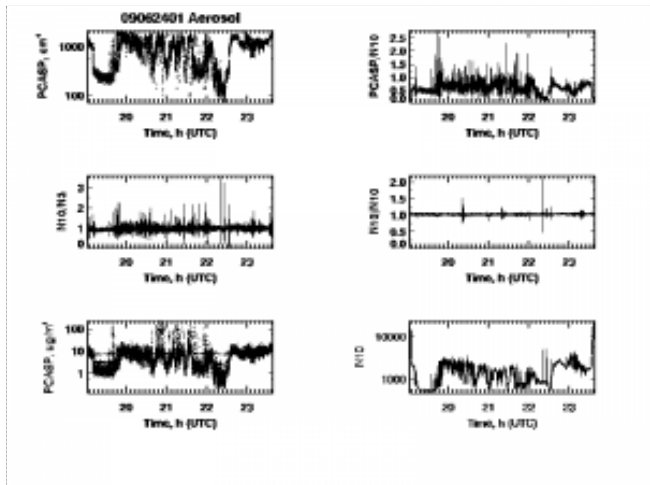
1957 UTC



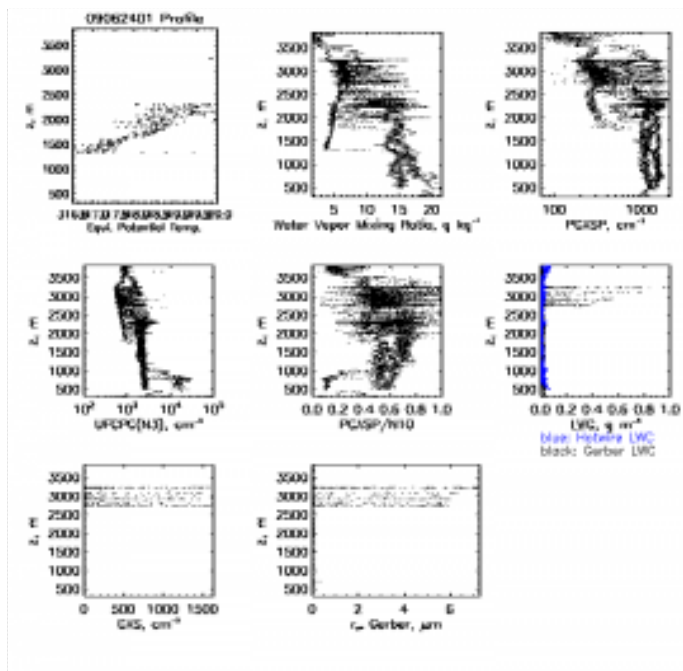
2015 UTC

Flight Plots

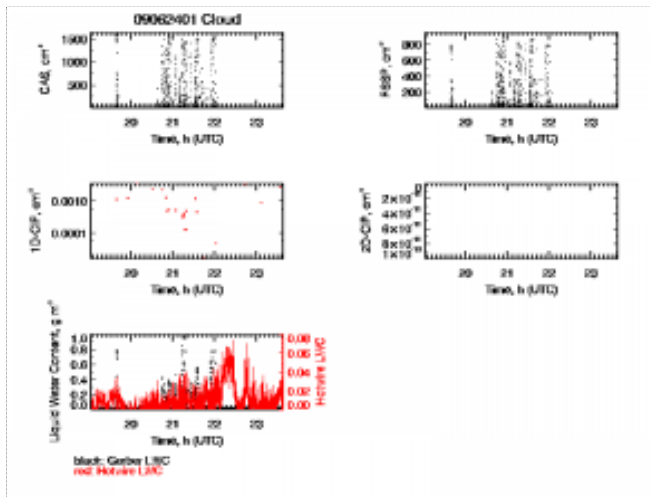
Aerosol



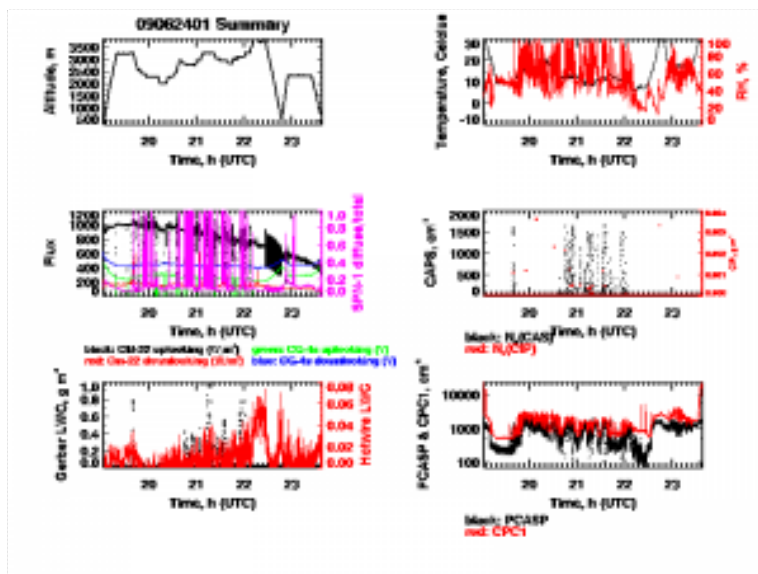
Profile



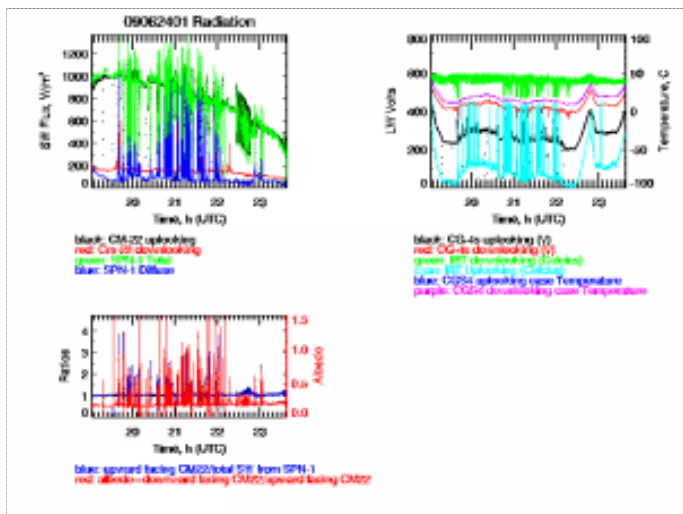
Cloud



Summary

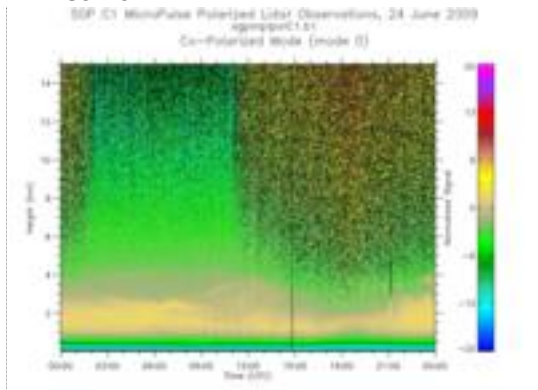


Radiation

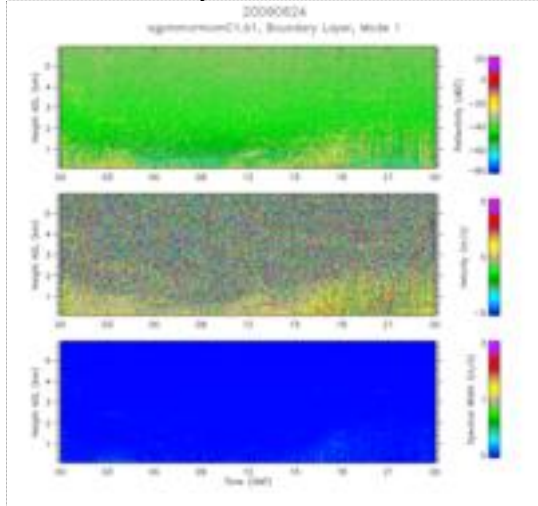


SGP Plots

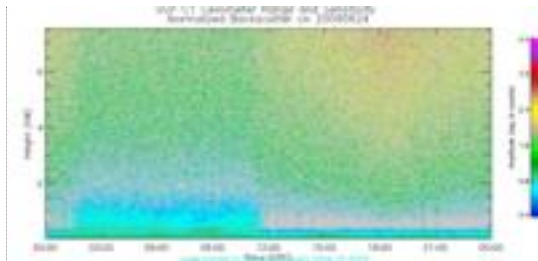
MPL Co-Pol



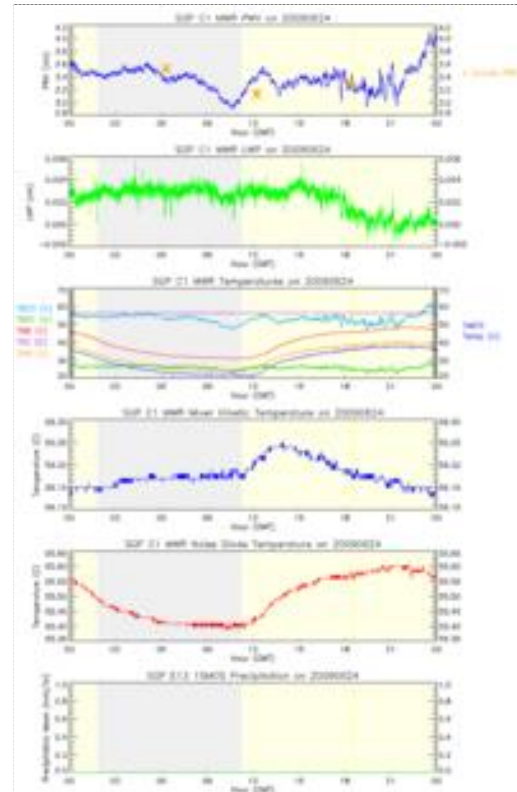
MMCR Bound. Layer Mode



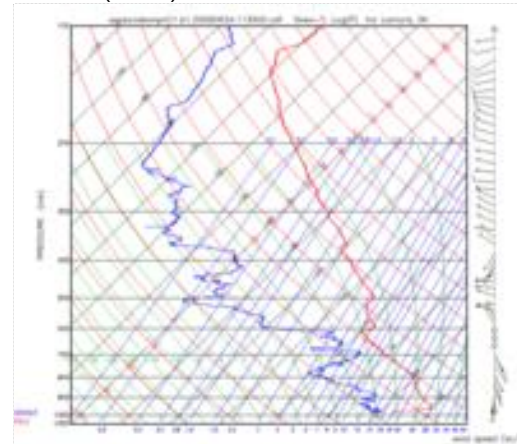
Ceilometer Backscatter



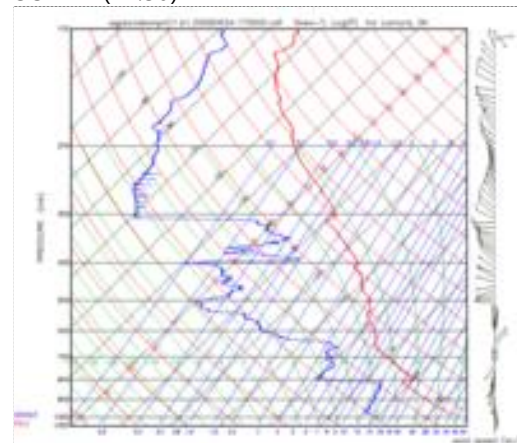
Microwave Radiometer



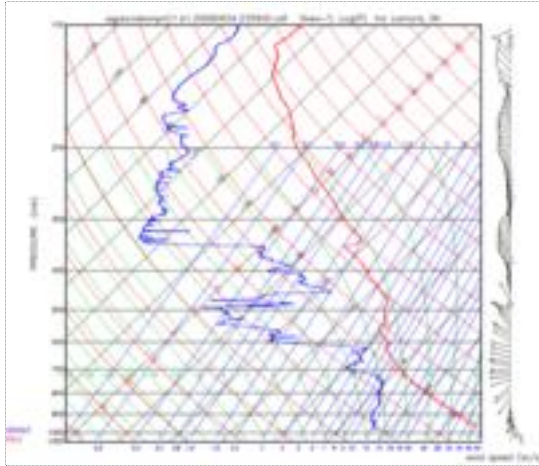
SONDE (11:30)



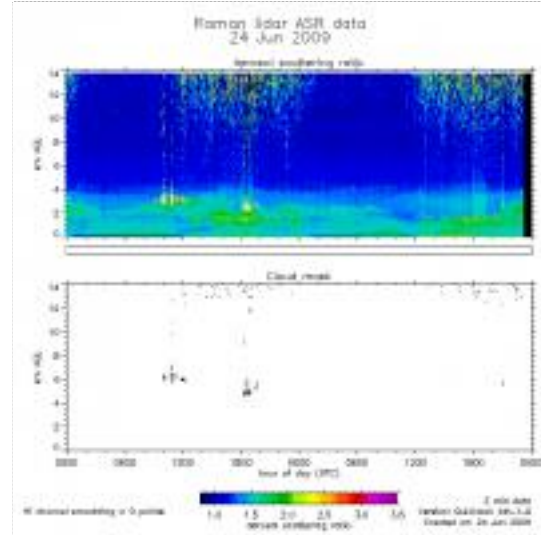
SONDE (17:30)



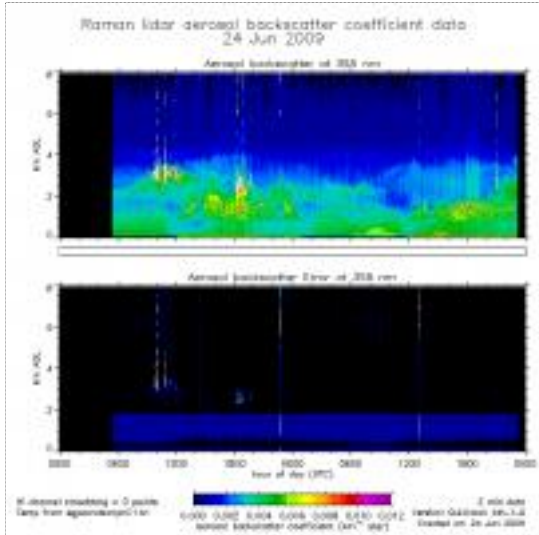
SONDE (23:30)



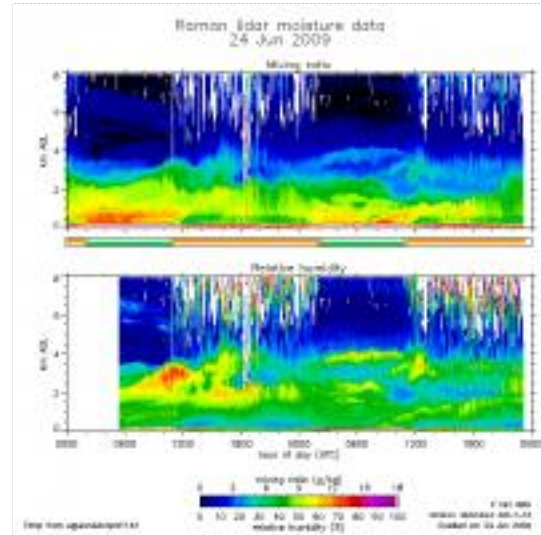
RL ASR



RL Backscatter



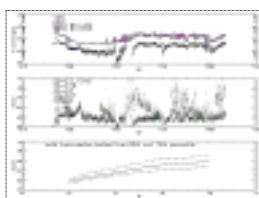
RL Moisture



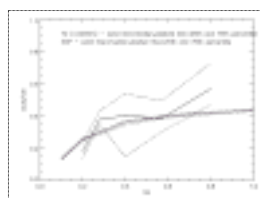
CCN Activity

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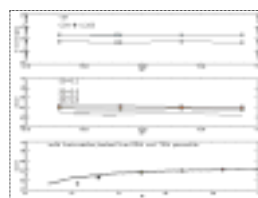
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as f(SS)). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 30 Jun 2009



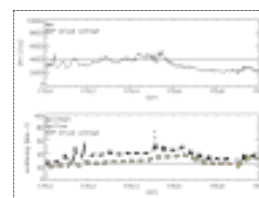
plot of CN and CCN and CCN fraction at SGP



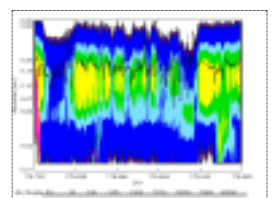
comparison of CCN fraction on twin otter and at SGP



plot of CN and CCN and CCN fraction at SGP

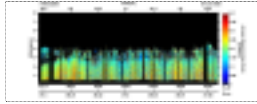


time series of CN and light scattering at SGP

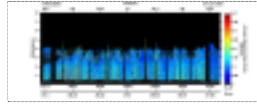


TAMU DMA size distribution and CCN activation diameter

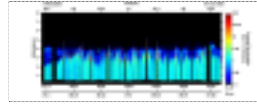
NASA Quick Look Plots



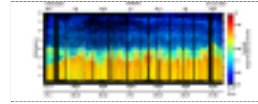
20090624_L1_aer_dep1064



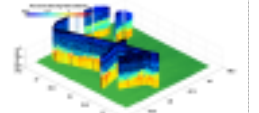
20090624_L1_aer_dep532



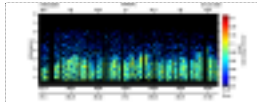
20090624_L1_bsc532



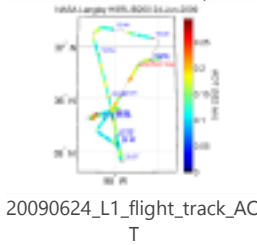
20090624_L1_bsr532



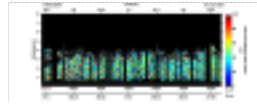
20090624_L1_bsr532_3D



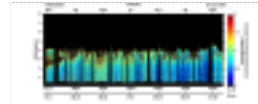
20090624_L1_ext532



20090624_L1_flight_track_AO
T

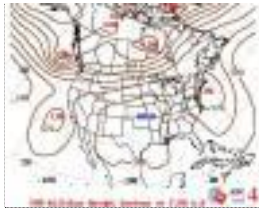


20090624_L1_Sa532



20090624_L1_wvd

Weather Maps




map6242



OK City: Clear; 3-7 knots | Tulsa: 1/8 cloud coverage; 3-7 knots; 1088 md | 95 F/64 F

20090626

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
18:42 UTC	23:33 UTC	4.9	Aerosol out + backs for CALIPSO overpass plus Turbulence & Cloud legs south of SGP	
Flight hours to date		250.0		

CALIPSO track Lat/Lon points:

Northern point N37 21.10'
W95 31.40'

Southern point N36 45.10
W95 20.80'

We departed Ponca City and climbed to 12000'. Conditions were clear and hazy.

In the climb we determined the boundary layer to be around 11500'; however, it was not very distinct. We chose an altitude of 11000' for the ferry to the northern point of the CALIPSO track.

Temp. 08
Wind 007 @ 04

During the ferry we descended multiple times due to the varied boundary layer.

At 1913Z we descended to 10500'.

Temp. 10
Wind 126 @ 07

At 1916Z we descended to 6500'. We determined a new boundary layer at around 7000'; however, it was still not very distinct.

Temp. 20
Wind 124 @ 05

At 1939Z we descended to 6000'.

Temp. 22
Wind 275 @ 11

At 1942Z we climbed to 6300'.

Temp. 22
Wind 275 @ 10

We crossed the northern CALIPSO point at 1938Z and began our southeast overpass track. At the overpass time of 1945Z our position was:

N 37 07.71'
W 95 27.59'

We reached our southeast point on the track at 1956Z. Conditions were still clear and hazy and we determined we would be flying turbulence legs. The NASA King Air departed. Winds were very light and variable, so we decided to fly the reverse CALIPSO track for our first leg at 6300'.

Turbulence patterns.

Leg #1 Reverse CALIPSO track 30 NM.

Altitude 6300'
Temp. 21
Wind 080 @ 06
Start time 1958Z

At the northern end of the first leg, we realized a small cloud field was forming north of the northern point on the track. It seemed to be lined up with the wind direction, which was 090 @ 10. We decided to work this cloud field on an east west track,

hoping it would build with time. It did. The field started at about 28 NM north of the northern CALIPSO track point:

N 37 21.10'

W 95 31.40

Cloud legs.

Leg # 1 090 tracks 30NM. Cloud bases were about 5500' to start, but varied as we headed east. We flew this leg at bases – 500' or 5000'. We had to adjust altitude to stay 500' below cloud bases.

Altitude 5000'

Temp. 22

Wind 090 @ 10

Start time 2035Z

At 2042Z we descended to 4700'

At 2046 we descended to 4200'

Leg # 2 Reverse track back to the west 30 NM. Cloud field building. In cloud bases.

Altitude 5000'

Temp. 22

Wind 030 @ 10

Start time 2053Z

At 2101 we climbed to 5300'

At 2104 we climbed to 5500'

Leg # 3 Southeast track of 130 for 30NM. We shifted the track to a southeast/northwest track of 130/310 to maximize our time in cloud.

Altitude 6000'

Temp. 20

Wind 200 @ 08

Start time 2109Z

Leg # 4 Northwest track 30NM in cloud.

Altitude 6500'

Temp. 18

Wind 090 @ 08

Start time 2127Z

Leg # 5 Southeast track 30NM in cloud.

Altitude 7500'

Temp. 18

Winds 215 @ 12

Time 2143Z

Leg # 6 Northwest track 30NM in cloud top. We tried to pick an altitude that would keep us above most cloud tops. However, there were some towering cumulus that were very high at this point. I would guess 12000'.

Altitude 9000'

Temp. 14

Winds 131 @ 14

Time 2202Z

At the end of this leg we did a spiral descent from 9000' to 1600' for a profile. We started the spiral at 2216Z.

During the spiral we determined the Boundary layer to be around 5000' to 5500'. We returned to Ponca at 5000'.

No issues with the airplane.

Weather Summary

Mostly clear and hazy; scattered clouds to the north.

Aircraft Instrumentation Status

A few notes from Anthony:

He turned the CIP heat on at 2054Z

He had to restart the 2DS at 2056Z.

Surface Instrumentation Status

nothing to report

Flight Images



1951 UTC



2019 UTC



2045 UTC



2117 UTC



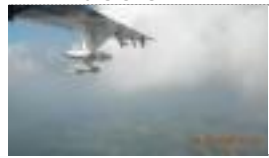
2144 UTC



1951 UTC



2020 UTC



2105 UTC



2129 UTC



2144 UTC



1958 UTC



2033 UTC



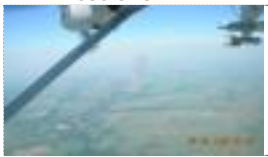
2105 UTC



2129 UTC



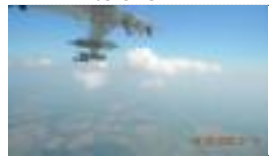
2145 UTC



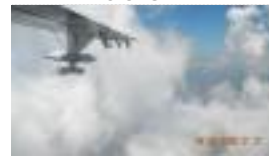
2003 UTC



2033 UTC



2110 UTC



2131 UTC



2145 UTC



2004 UTC



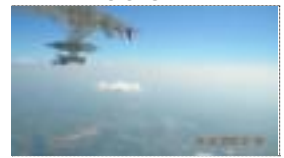
2039 UTC



2110 UTC



2131 UTC



2148 UTC



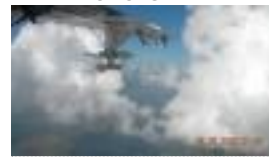
2005 UTC



2044 UTC



2112 UTC



2133 UTC



2005 UTC



2044 UTC



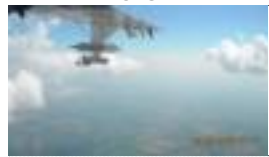
2117 UTC



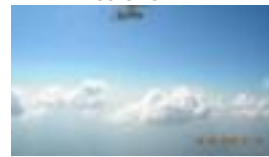
2133 UTC



2045 UTC



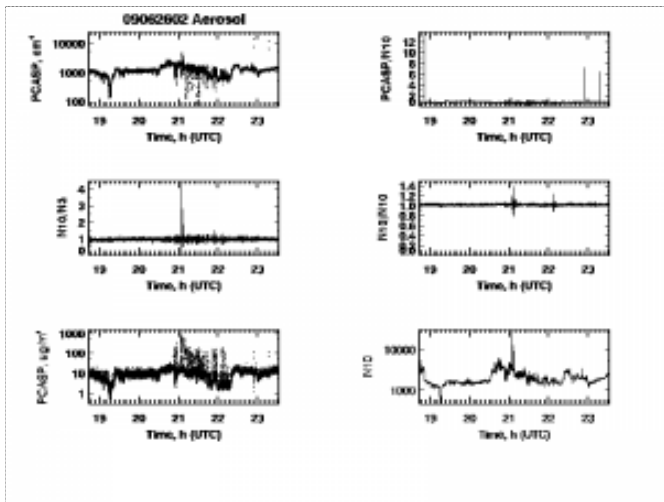
2117 UTC



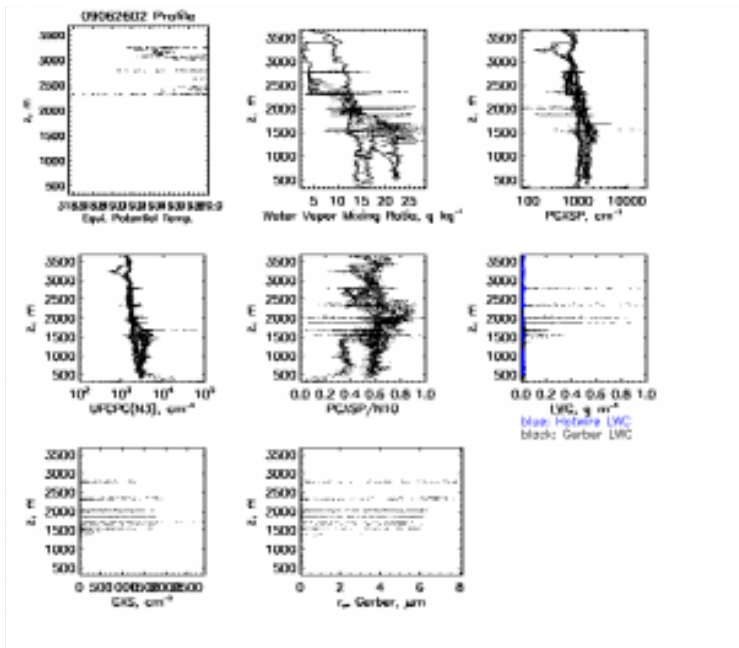
2143 UTC

Flight Plots

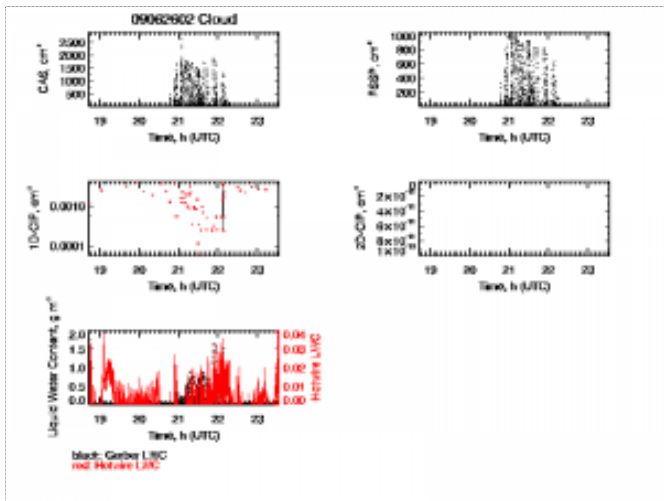
Aerosol



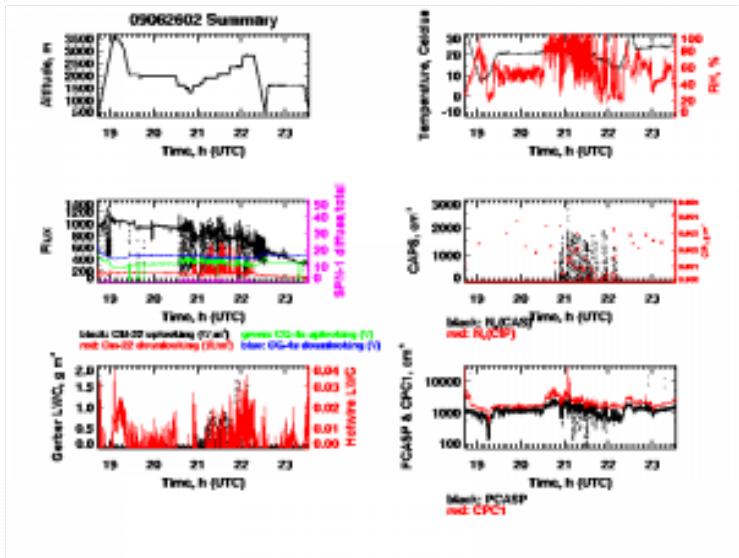
Profile



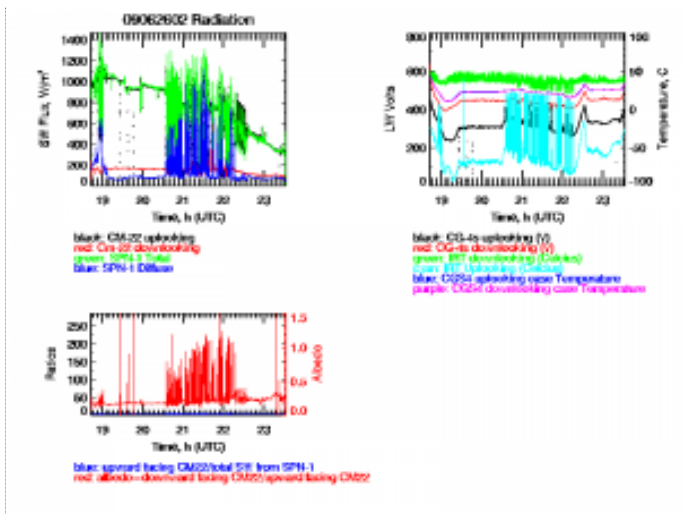
Cloud



Summary

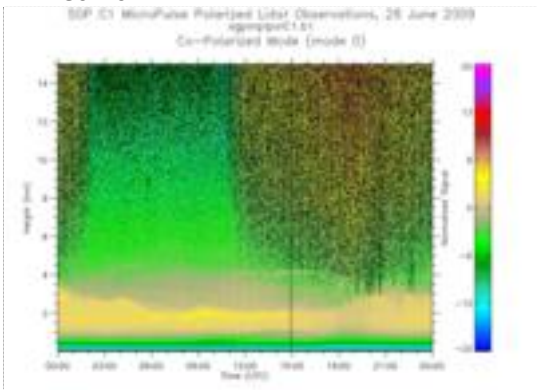


Radiation

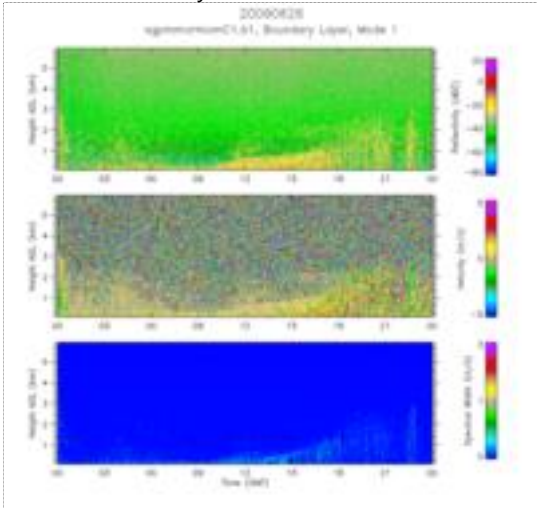


SGP Plots

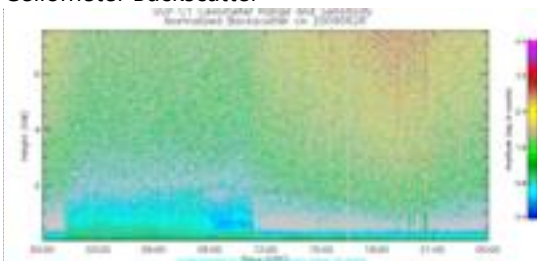
MPL Co-Pol



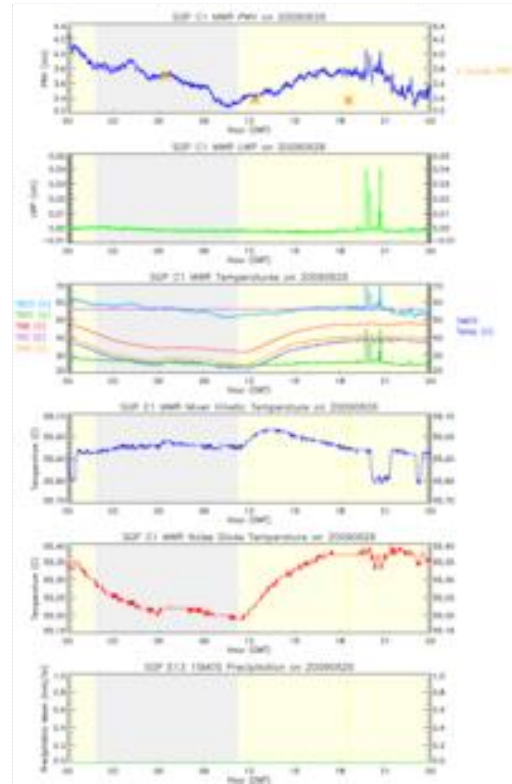
MMCR Bound. Layer Mode



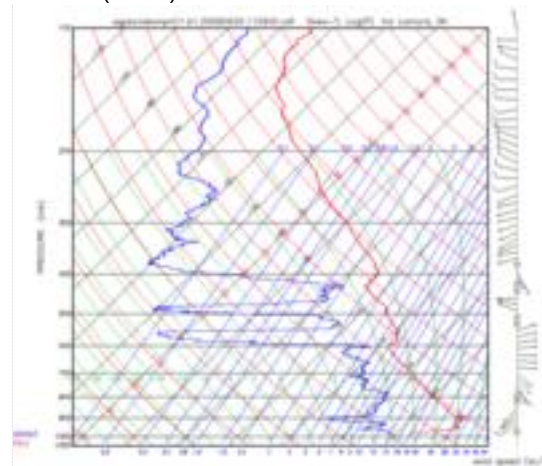
Ceilometer Backscatter



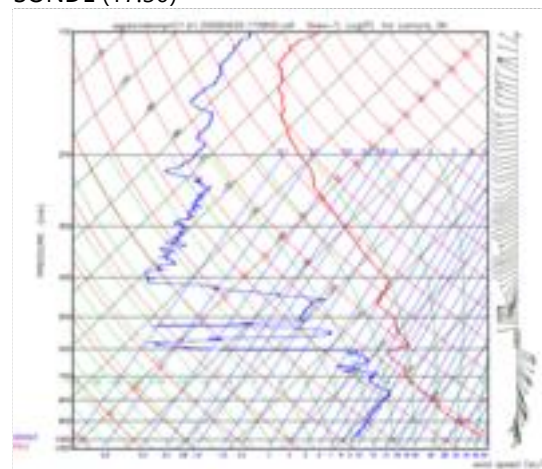
Microwave Radiometer



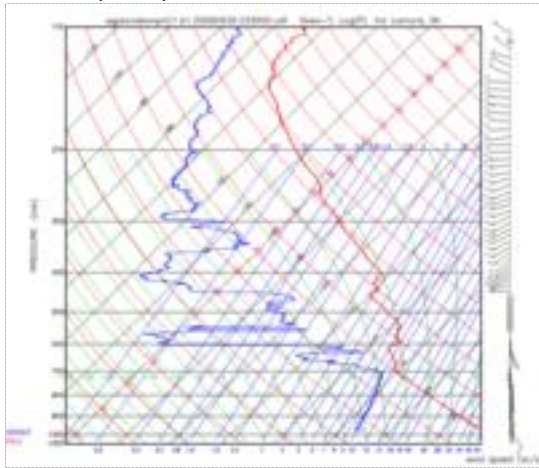
SONDE (11:30)



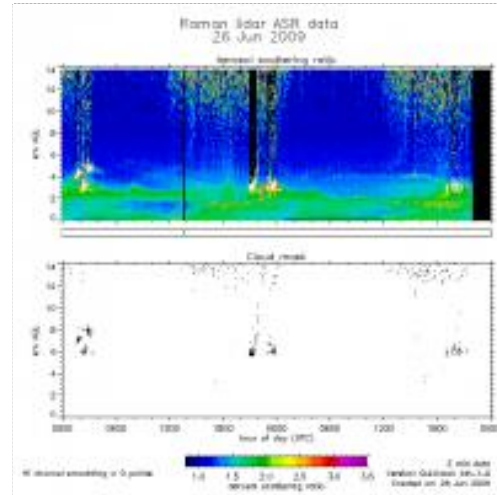
SONDE (17:30)



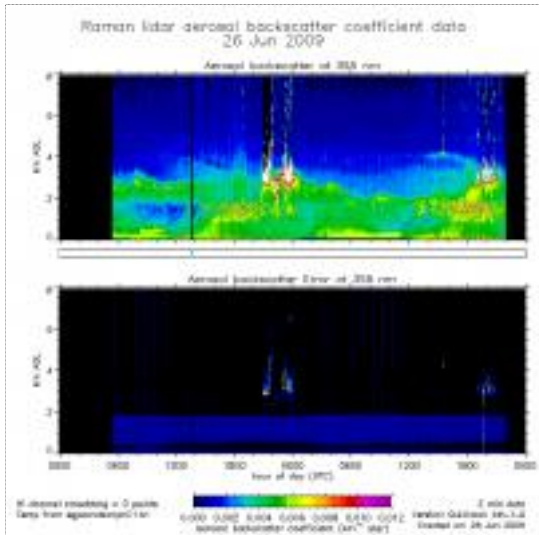
SONDE (23:30)



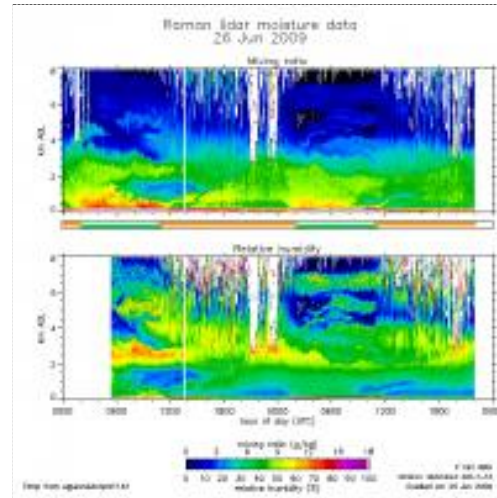
RL ASR



RL Backscatter



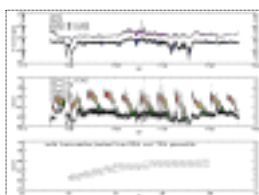
RL Moisture



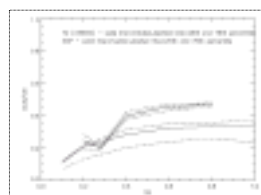
CCN Activity

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.

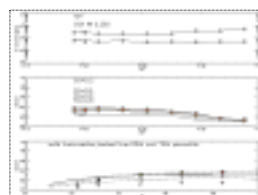
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 10 Jul 2009



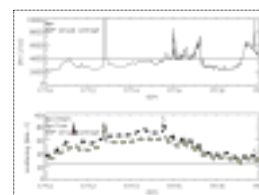
plot of CN and CCN and CCN fraction on Twin Otter



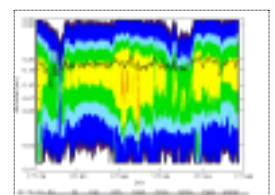
comparison of CCN fraction on Twin Otter and at SGP



plot of CN and CCN and CCN fraction at SGP

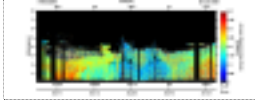


time series of CN and light scattering at SGP

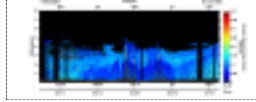


TAMU DMA size distribution and CCN activation diameter

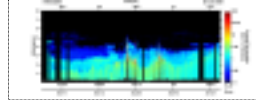
NASA Quick Look Plots



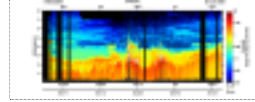
20090626_L1_aer_dep1064



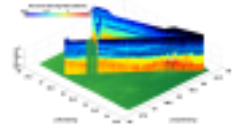
20090626_L1_aer_dep532



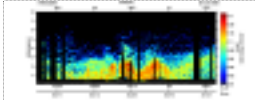
20090626_L1_bsc532



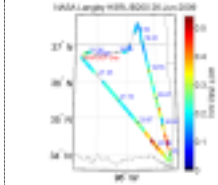
20090626_L1_bsr532



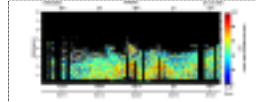
20090626_L1_bsr532_3D



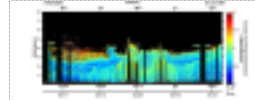
20090626_L1_ext532



20090626_L1_flight_track_AO
T



20090626_L1_Sa532



20090626_L1_wvd

Weather Maps



OK City: 1/8 cloud coverage; 3-7 knots | Tulsa: Clear; 8-12 knots; 1096 mb | 97 F/81 F | Surrounded by low and high pressure

20090628

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
15:58 UTC	20:59 UTC	5.0	Surface albedo & Turbulence at SGP	KML
Flight hours to date		255.0		

We departed Ponca and climbed to 5000' enroute to the CF. The BL was ~3500'.

Over the CF we did a spiral from 5000' to 1600'/500' agl. We started the spiral down at 1610Z.

We did the pinwheel pattern at 1600'. Times 1622-1717.

Wind 060 @ 12

Temp. 27

We did the paperclip pattern at 1600'. Times were 1720-1805.

Wind 056 @ 12

Temp. 27

We ramped up to 5500', the BL was ~ 3200'. We conducted the Calibration maneuvers.

We did the turbulence legs starting at 3800'.

Leg #1 3800' winds 060 @ 13 Temp. 22 Upwind leg. Start time 1825Z

Leg #2 3500' winds 040 @ 10 Temp. 22 Downwind leg. Start time 1854Z

Leg #3 3200' winds 040 @ 10 Temp. 24 Upwind leg. Start time 1912Z

Leg #4 2900' winds 050 @ 10 Temp. 24 Downwind leg. Start time 1934Z

Leg #5 2600' winds 050 @ 20 Temp. 26 Upwind leg. Start time 1954Z

Leg #6 2300' winds 050 @ 20 Temp. 26 Downwind leg. Start time 2017

Back over the CF we did a spiral down from 2300' to 1600' and did a spiral climb to 6500'. We started the spiral at 2031Z. BL was ~ 6000'.

We RTB'd to Ponca in a slant descent from 6500'

No issues with the Otter.

Weather Summary

Clear and hazy skies with some high cirrus.

Aircraft Instrumentation Status

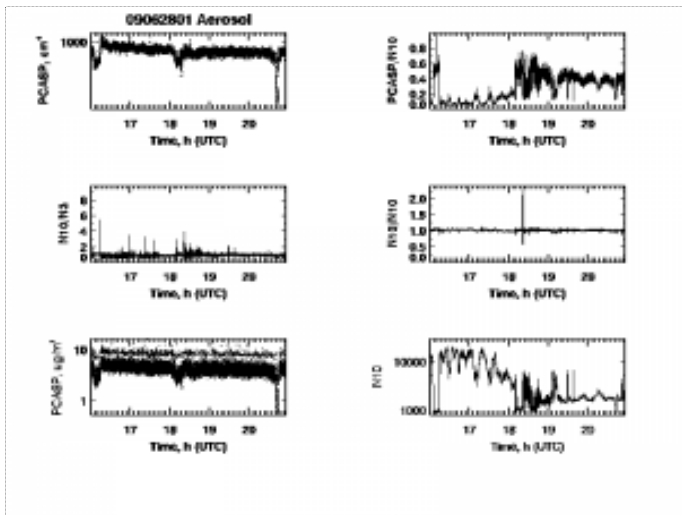
Anthony shut the 2DS down at 1709Z due to overheating. He turned the 2DS back on at 1822Z.

Surface Instrumentation Status

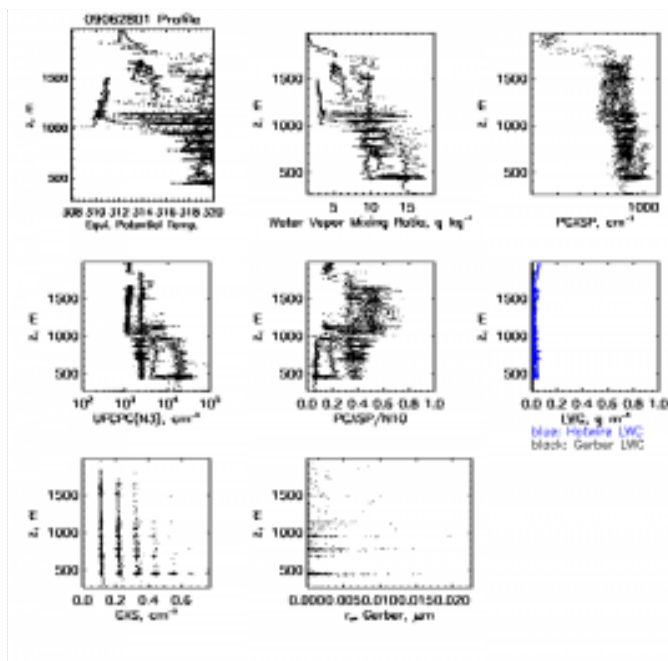
nothing to report

Flight Plots

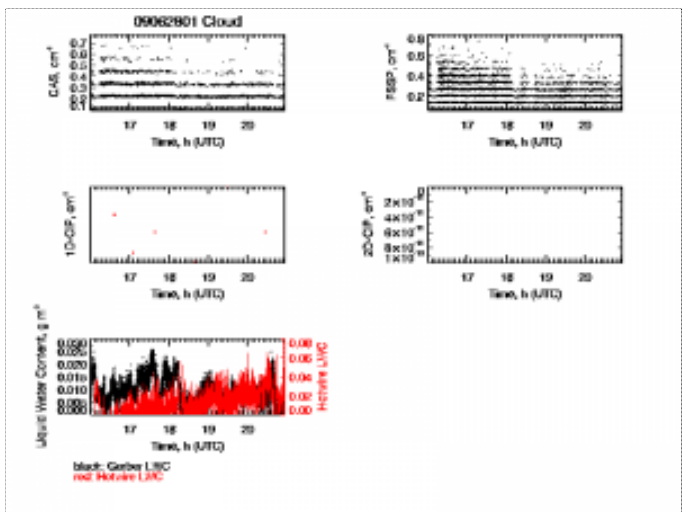
Aerosol



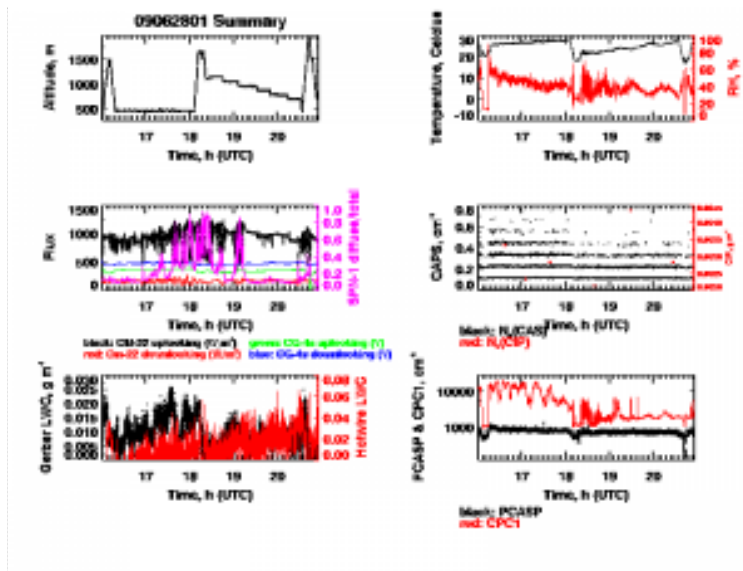
Profile



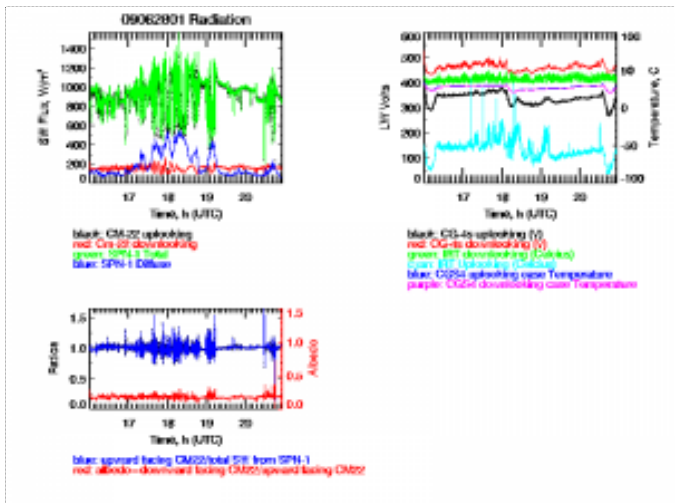
Cloud



Summary

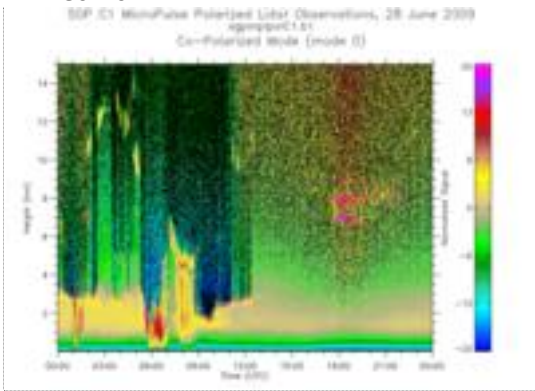


Radiation

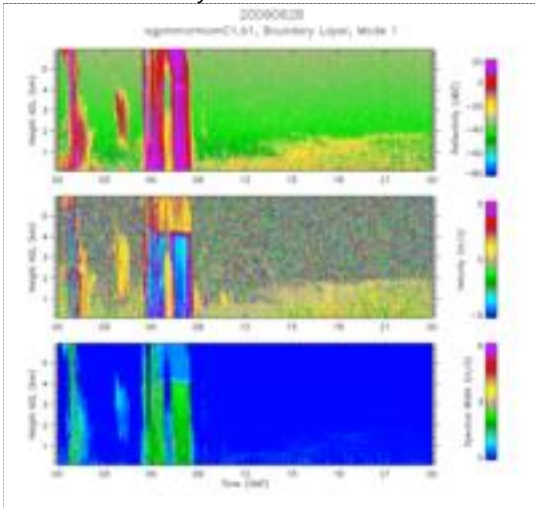


SGP Plots

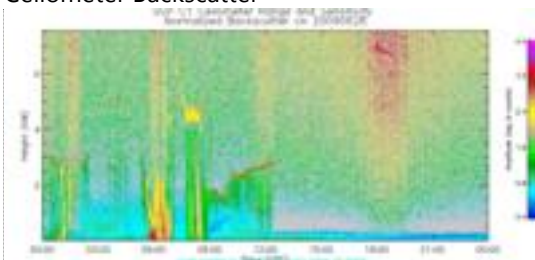
MPL Co-Pol



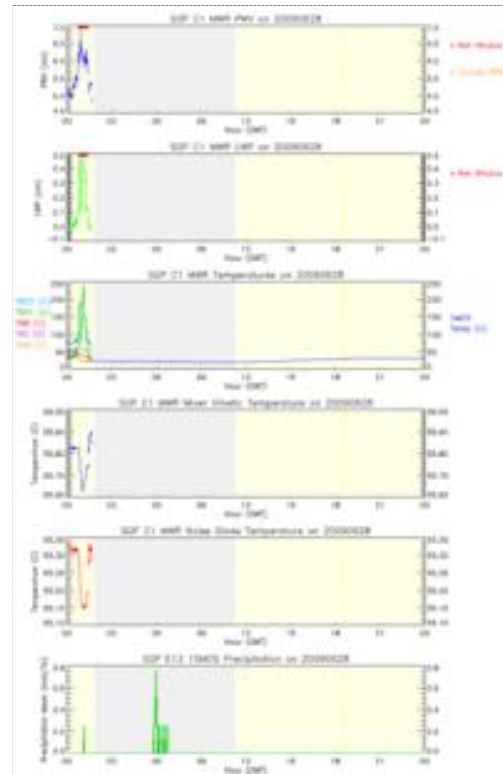
MMCR Bound. Layer Mode



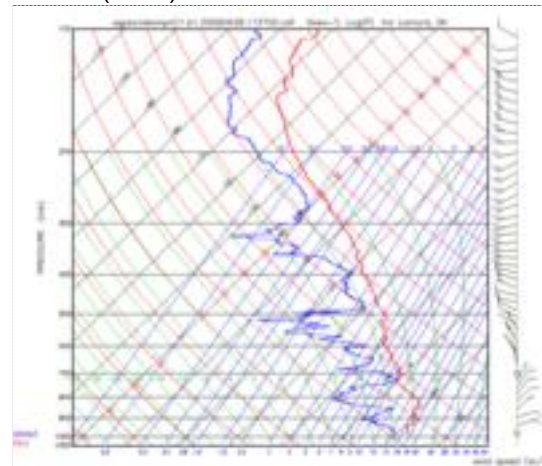
Ceilometer Backscatter



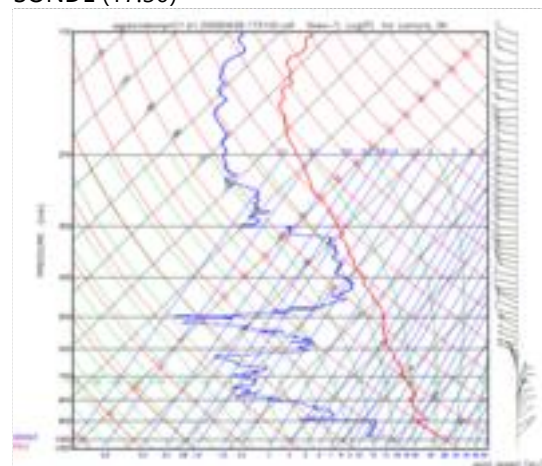
Microwave Radiometer



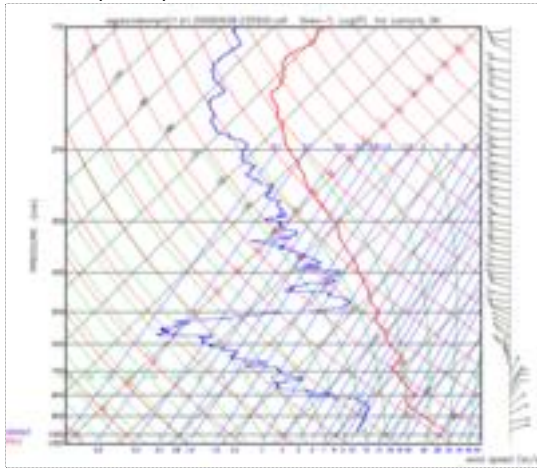
SONDE (11:30)



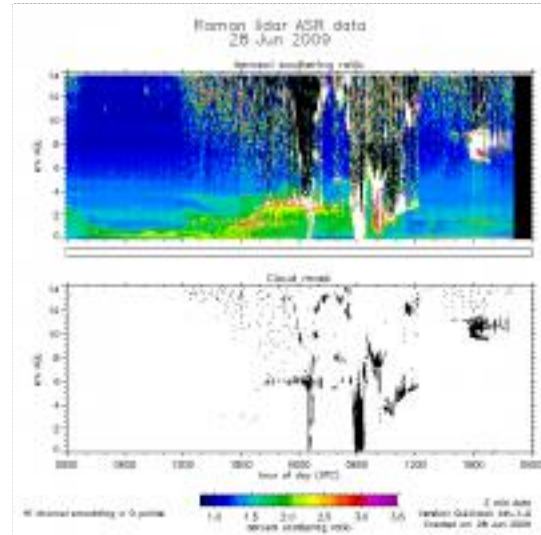
SONDE (17:30)



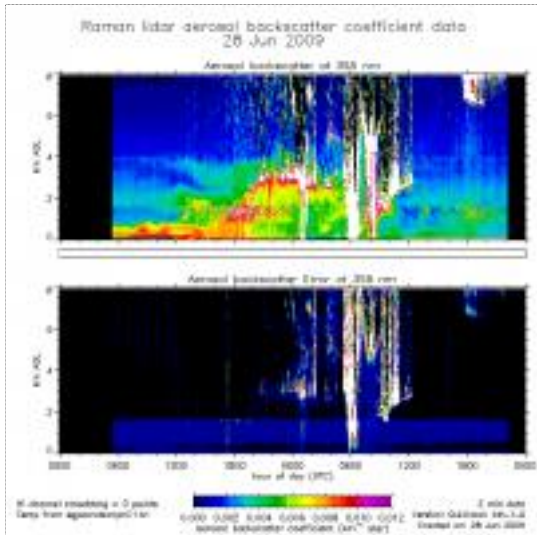
SONDE (23:30)



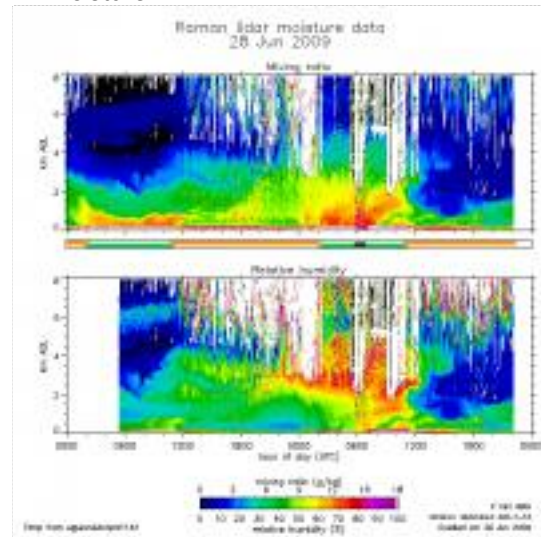
RL ASR



RL Backscatter



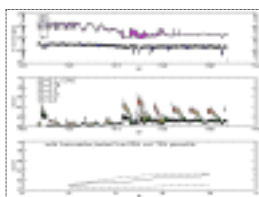
RL Moisture



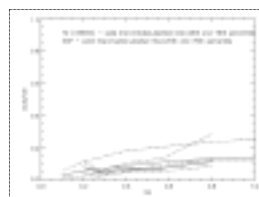
CCN Activity

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.

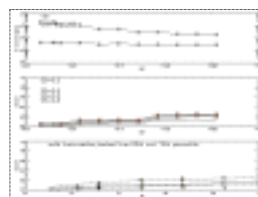
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as f(SS)). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 10 Jul 2009



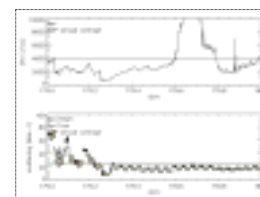
plot of CN and CCN and CCN fraction on Twin Otter



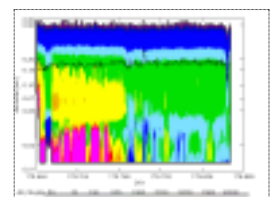
comparison of CCN fraction on Twin Otter and at SGP



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

20090629

Flight Summary

Depart	Return	Hours	Synopsis	Google Earth
18:00 UTC	22:46 UTC	4.8	Turbulence at SGP	KML
Flight hours to date		259.8		

We departed Ponca and climbed to 7000' enroute to the CF. We could not find the BL up to this altitude.

Leg # 1

Winds 230 @ 8 Temp. 16 Downwind leg. Start time 1816Z

At the CF we began our first leg and decided to continue a ramp climb outside of the Vance Airspace to find the BL. We climbed to 12000' and we found a weak BL at ~ 9000' – 10000'. Due to the 7000' Vance altitude restriction, we decided to fly our legs from 7000' and below. Over the NE point of our first leg, we did a spiral down to 7000' from 12000' at 1830Z.

We did the turbulence legs starting at 7000'.

Leg #2 7000' winds 250 @ 25 Temp. 16 Upwind leg. Start time 1850Z

Leg #3 6700' winds 240 @ 12 Temp. 18 Downwind leg. Start time 1911Z

Leg #4 6400' winds 225 @ 08 Temp. 18 Upwind leg. Start time 1930Z

Leg #5 6100' winds 220 @ 15 Temp. 18 Downwind leg. Start time 1952Z

Leg #6 5800' winds 230 @ 12 Temp. 18 Upwind leg. Start time 2015Z

Leg #7 5500' winds 230 @ 12 Temp. 20 Downwind leg. Start time 2037

Leg #8 5200' winds 250 @ 18 Temp. 20 Upwind leg. Start time 2058

Leg #9 4900' winds 220 @ 17 Temp. 23 Downwind leg. Start time 2120

Leg #10 4600' winds 240 @ 18 Temp. 24 Upwind leg. Start time 2141

During leg 3 and 4 there was a large control burn ~ 2 miles SE of the CF.

Back over the CF we did a spiral down from 4600' to 1600' at 2203Z. At 1600' we flew over the CF straight and level for a radiometer calibration. We then did a spiral climb to 7000', exited the Vance airspace and climbed to 10000' to find smooth air for Haf's Calibration maneuvers.

We RTB'd to Ponca in a slant descent from 10000'.

No issues with the Otter.

Weather Summary

Clear and hazy with high cirrus.

Aircraft Instrumentation Status

At 1907 Anthony had to restart the Hydrorad.

Surface Instrumentation Status

nothing to report

Flight Images



2113 UTC



2205 UTC



2208 UTC



2209 UTC



2127 UTC



2205 UTC



2209 UTC



2209 UTC



2150 UTC



2205 UTC



2209 UTC



2209 UTC



2154 UTC



2206 UTC



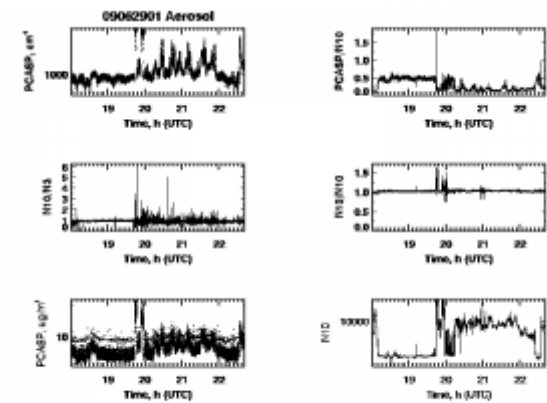
2209 UTC



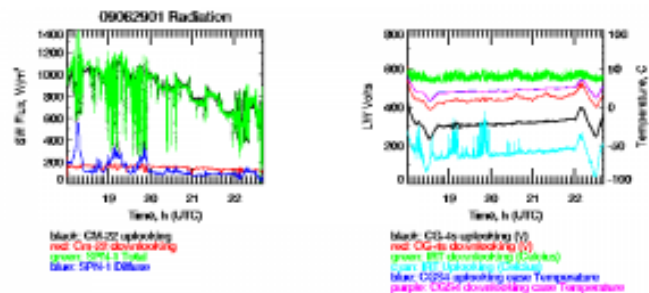
2127 UTC

Flight Plots

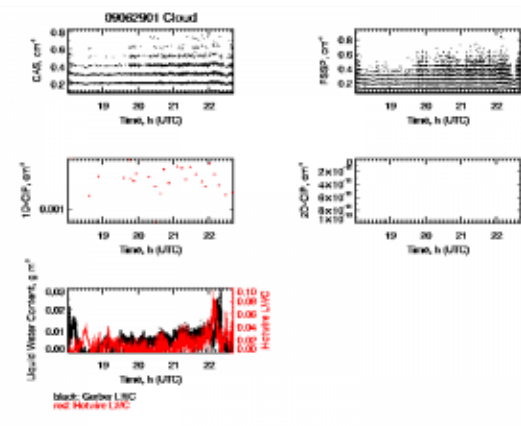
Aerosol



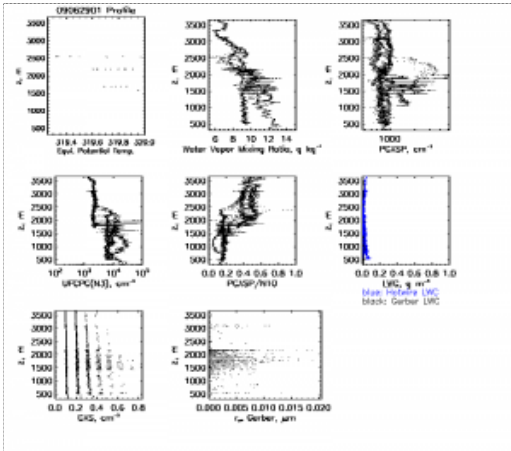
Radiation



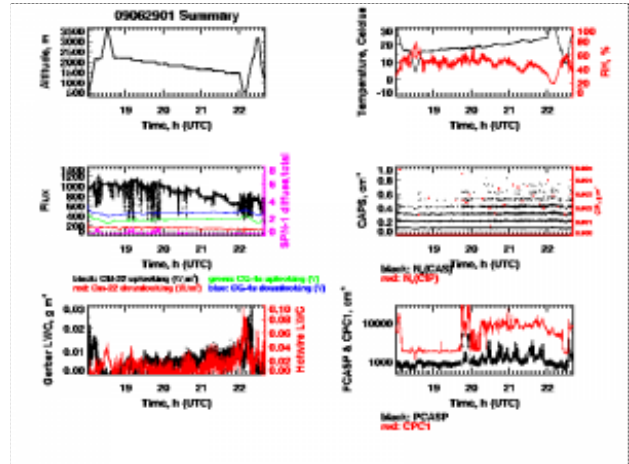
Cloud



Profile

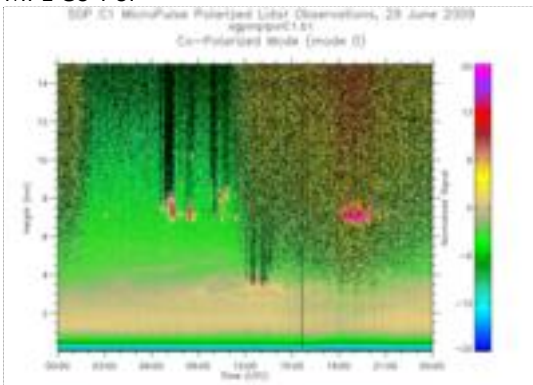


Summary

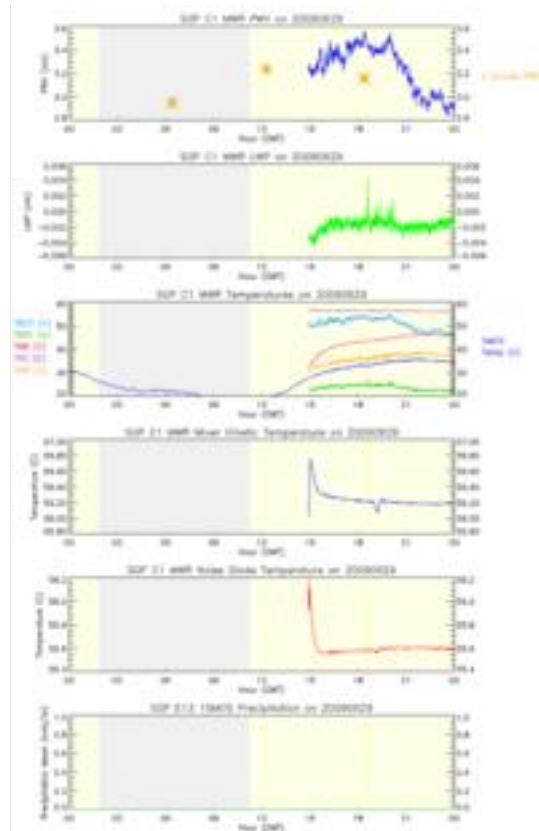


SGP Plots

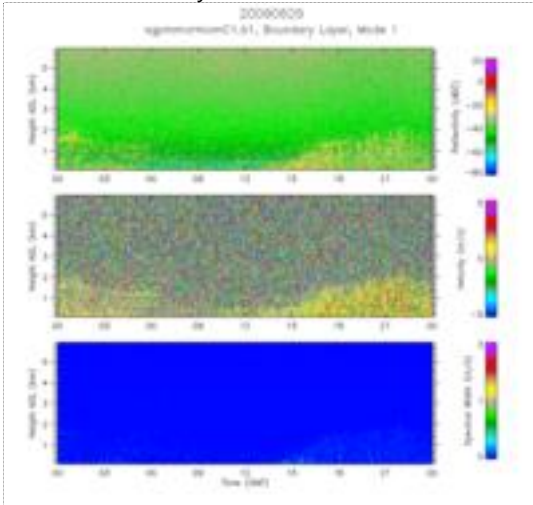
MPL Co-Pol



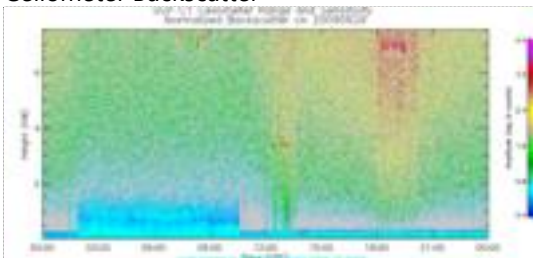
Microwave Radiometer



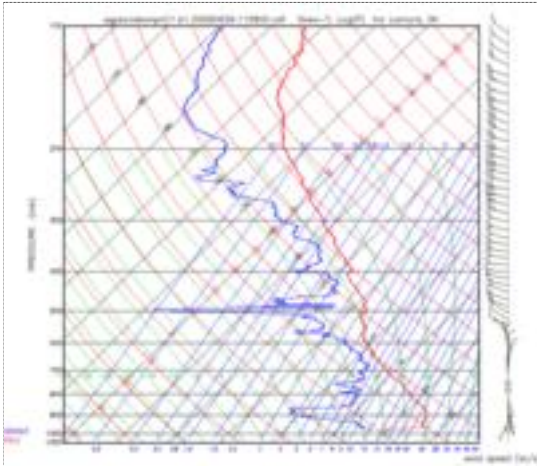
MMCR Bound. Layer Mode



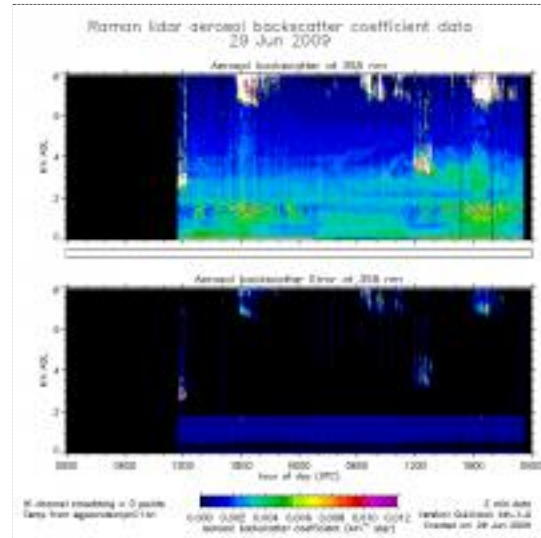
Ceilometer Backscatter



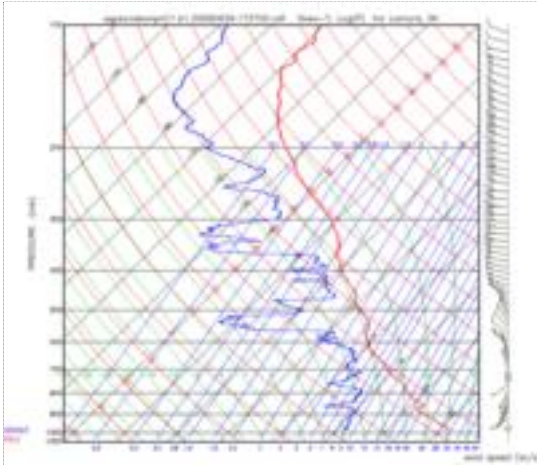
SONDE (11:30)



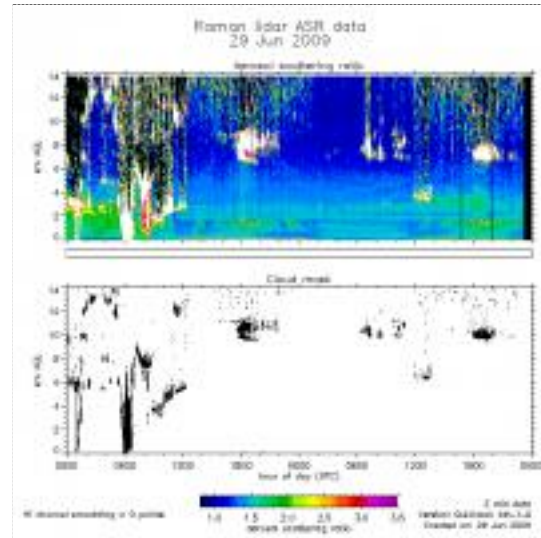
RL Backscatter



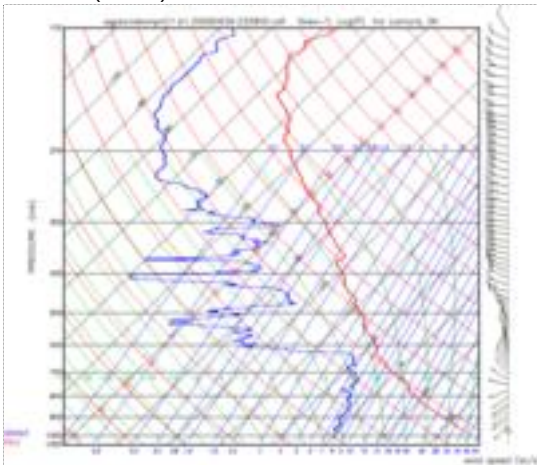
SONDE (17:30)



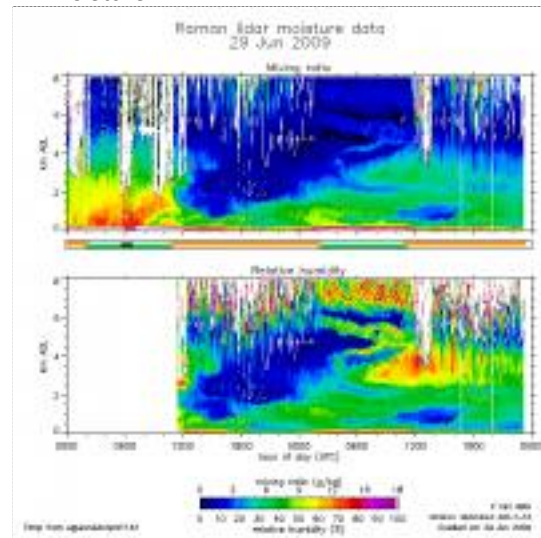
RL ASR



SONDE (23:30)



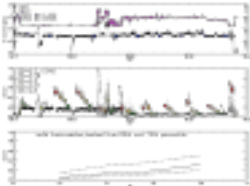
RL Moisture



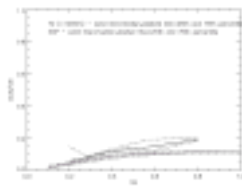
CCN Activity

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.

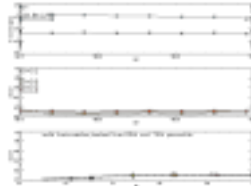
I've generated plots indicative of CCN activity from the Twin Otter CABIN and CCN files (i.e. CCN/CN as $f(SS)$). I've also generated time series plots showing CN concentration and scattering at the ground (i.e. at SGP) and CCN fraction measured at the surface so one can compare with that measured aloft. Elisabeth Andrews - 10 Jul 2009



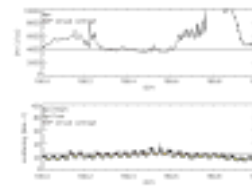
plot of CN and CCN and CCN fraction on Twin Otter



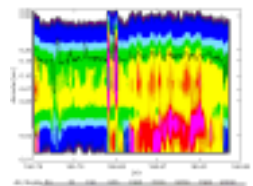
comparison of CCN fraction on Twin Otter and at SGP



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