Research Flights					
Date	**Flight# (*.kml)**	**Status**	**Times (UTC)**	**Hours**	**Crew/Notes**
Jul 16 2015	RF28	MCS mission to southeast Nebraska. Outbound at 6000 until bumped up to 8000 MSL for restricted air space. Tried to fly a sawtooth pattern on the east side of a supercell transitioning to MCS and with convection to the east. The middle began to blow up fast and we backed off. Began E-W lines to the south of the complex mapping inflow at flight levels of 4000-5000-6000 MSL. Performed a ladder N-S line in front of western cells as it transitioned to a bow echo at 4000-7000 MSL. Did one last westbound leg along the same E-W track before returning to GBD. Flew at 6000 MSL on flight back. No PCASP data.	0115-0630	4.3	T Drew D Mueller N Guy R Pauly

Links

- PECAN Field Catalog (NCAR/EOL)
- PECAN EOL Project Page
- PECAN Project Page

PECAN Data

- Flight Notes
- Order 1 hz files
- Order high rate 10 hz files
- Flight Data Quicklooks
- Lidar
  - Quicklooks
  - Order lidar data

Jul 15 2015	RF27	CI-bore mission. Flew a mission tonight looking at the outflow boundary/bore from storms in eastern Colorado/western Kansas. Flew three different locations, choosing a new one as storms starting forming too close to the boundary. Finished the mission with a 70 mile line parallel to the storms. No PCASP data.	0130-0545	4.2	B Wadsworth D Mueller L Oolman R Pauly
Jul 14 2015	RF26	CI mission sampling N-S along a line from approximately Russell, KS to Pratt, KS. Performed stepped race tracks along line dropping from 10000-8000-6000-4000 MSL and repeating up. A step was performed on each long leg. Offset to east for a northern track. Mission was called off due to large tropical-like convective system coming into southern domain. No PCASP data. Butanol in CPC refilled.	0245-0545	3.1	T Drew D Mueller N Guy R Pauly
Jul 13 2015	RF25a	Ferry back from Omaha. No data collected.		1.2	B Wadsworth D Mueller L Oolman R Pauly
Jul 13 2015	RF25	MCS-bore mission to SE Minnesota. Storm too strong and outside domain coverage for telemetered data. Did four lines west of	0444-0901	4.4	B Wadsworth D Mueller L Oolman

- Wyoming Compact Raman Lidar data
- July 15 Nexrad loop

User Information

- Planning Chart
- EOL Facilities
- Software Repository
- Projects & Data Requests
- Planning and tracking tools
- Facility User's Guide

Facility Instruments

- In Situ
- Wyoming Cloud Radar
- Wyoming Cloud Lidar

Contact

Mailing Address:

Atmospheric Science

		Minneapolis. No CPC or PCASP data.			R Pauly
Jul 12 2015	RF24	Mission coincident with the NASA DC8 to overpass FP3, FP2, and FP1 sites for instrument intercomparison. No CPC data. PCASP does not report any counts.	0527-0745	2.1	T Drew M McAulliffe N Guy R Pauly
Jul 12 2015	RF23	CI/LLJ mission along predefined LLJ track. Observed transition from PBL to LLJ, with the apparent jet shifting from the east end of the line to the west. A greater the 42 kt jet observed between 1000-1500 ft AGL. Diurnal convection at the beginning of mission may have influenced the moisture distribution on the western end. WCL was kept off during the flight due to cabin heating. No CPC data.	0019-0449	4.6	T Drew V Hower N Guy R Pauly
Jul 11 2015	RF22	Bore mission with initial point north focusing on the outflow from a supercell/MCS along the KS-NE border. Began in the wake of the system, performing racetracks along a boundary on the west side of storm before moving east to the western edge of the main outflow boundary. We worked a SE-NW racetrack for a couple of hours. Sampled	0312-0756	4.7	T Drew D Mueller N Guy R Pauly

University of Wyoming
College of Engineering
1000 E. University Ave.
Laramie, WY 82071
Phone:(307)766-3245
Fax: (307)766-2635

Facility Manager:
Jeff French

		evolution of a probable bore until wave structure was very minimal. No CPC data.			
Jul 10 2015	RF21	CI mission flying north/south lines over FP2. No CPC data.	0142-0542	4.1	B Wadsworth D Mueller L Oolman R Pauly
Jul 09 2015	RF20	CI mission using pre-defined lawnmower pattern with longer legs N-S and beginning northwest of GBD. Started with constant 4000 ft AGL on ferry out, switched to constant flight levels varying from 6600 down to 5500 MSL during lawnmower pattern. Four main N-S legs and a partial repeat of leg 3 down to FP2 site. CPC probably ran out of butanol early in the flight.	0256-0733	4.4	T Drew D Mueller N Guy R Pauly
Jul 06 2015	RF19	Bore mission targeting an area south of a cluster of MCSs north of Grand Island, NE. Moved the line further south after CI formed along the bore.	0403-0838	4.7	B Wadsworth D Mueller L Oolman R Pauly
		CI mission using predefined south, central, and north legs roughly in east-west orientation connecting ground instrument platforms across western KS. The flight pattern connected FP2 to MP1 to MP4 to MP3 to FPN (a northern point) to a			

Jul 04 2015	RF18	point 18 nm past FP5. Stepped 500 ft at a time along tracks to stay approximately 4000 and later 5000 ft AGL. A deep moist layer observed throughout much of flight. Performed two additional laps on the central track at constant 7500 MSL, extending east of MP3, deviating around convective cells along track. Distinctive wave features noted in water vapor and aerosol CRL channels. Lots of structure present both below and above the aircraft. No known instrument problems.	0245-0720	4.5	T Drew D Mueller N Guy R Pauly
Jul 02 2015	RF17	Bore mission tonight targeting a cold pool and outflow from storms in eastern Colorado and western Kansas. Only weak waves were observed.	0238-0646	4.0	B Wadsworth D Mueller L Oolman R Pauly
Jul 01 2015	RF16	CI mission to northeast Kansas just to the south of a cluster of developing cells. We were able to map the inflow with the CRL and did race tracks across the lines which the cells were developing.	0407-0850	4.6	B Wadsworth D Mueller L Oolman R Pauly
Jun 26 2015	RF15a	Ferry from Wichita to Great Bend. No data collected.		1.5	B Wadsworth B Geerts L Oolman D Wu

Jun 26 2015	RF15	Bore mission west and south of Topeka. WCL clock set to Laramie time.	0404-0831	4.5	B Wadsworth B Geerts L Oolman D Wu
Jun 24 2015	RF14a	Ferry flight from Lincoln to Great Bend following a re-fuel as part of a CI-LLJ mission. No data collected.		1.0	T Drew S Sullivan N Guy D Wu
Jun 24 2015	RF14	CI-LLJ mission tonight. We transited to Osborne, KS where we started a leg at 10000 passing over MP1 to MP2 sites (across KS-NE border). We then flew a leg at 6000 MSL from NOXP to TWOLF in Nebraska. We began SW-NE oriented racetracks of approx. 30 miles to near Lincoln, NE. Convection to north stretching into IA began to build westward forcing us to move our track west. Convection west began to build eastward and we moved our track south. We varied between 6000 and 10000 feet MSL. The water vapor structure was deep for much of the flight and at times some sort of layers were present. We stayed at 10000 ft to stay below a forming cloud base. Refueled in Lincoln, NE and ferried back to Great Bend. No other known problems with instruments.	0254-0713	4.3	T Drew S Sullivan N Guy D Wu
		LLJ mission along pre-			

Jun 22 2015	RF13	defined track north of GBD. A north-south leg at 2000 ft AGL was flown at the beginning and end of the mission. Following the first two eastbound-westbound sawtooth leg couplets where a drier, warmer and stronger jet was observed westward, a west-east track was flown at a constant altitude of 4500 ft MSL to look at the jet structure. Ascent/descent rate was increased to reach higher altitudes for the next two eastbound-westbound sawtooth leg couplets. A maximum jet wind speed of 55 kt was observed at approx. 1500 ft AGL. Total flight time was 4.7 hours. Funds for this flight were not billed to the PECAN project, but provided by the University of Wyoming.	0148-0638	0.0	B Wadsworth S Sullivan N Guy Z Wang
Jun 20 2015	RF12a	Ferry flight from Grand Island to Great Bend following a re-fuel as part of a bore mission. No data collected.		0.9	B Wadsworth B Geerts N Guy Z Wang
		A bore UFO mission with a plan to ferry to O'Neill, NE and sample a bore event from an east-west oriented MCS in South Dakota with east-southeastward propagation. A density current was obvious at takeoff moving ahead the storm complex with a more			

Jun 20 2015	RF12	southerly motion than storm system. Dropped to 10000 ft MSL 50 nm south of O'Neill. Continued at 10000 ft for a few passes. There was a well-developed bore west of our position, however we elected to work east and south with motion to sample bore from density current through later evolution. Refueled in Grand Island, NE and ferried back to Great Bend. No known problems.	0620-1055	4.4	B Wadsworth B Geerts N Guy Z Wang
Jun 20 2015	RF11	LLJ mission beginning ~1 hr before sunset. Completed 4 sawtooth leg, followed by 2 constant pressure legs, followed by 4 more sawtooth legs. Significant evolution of LLJ during the flight, development of several inversions with signficant differences between west and east end of legs. LWC was turned on late, WCL was off for most of flight except for ~30 minute period near end of flight (due to heat). Reference LICOR bottle turned on later (~10 minutes after takeoff). No other known problems.	0045-0528	4.8	T Drew T Parish J French Z Wang
		MCS mission of a developing system propagating from WY to SW Nebraska. The line of			

Jun 17 2015	RF10	convection overran discrete supercells that had stalled in the NE panhandle and became a large MCS system with east-northeastward motion. We worked NW-SE racetracks along the eastern side of the merged storm. Convection continued to develop along the south side. We eventually began to work to the south side of this line, however the outflow boundary was embedded in the larger system. This complex did not develop a well defined outflow away from the storm, though it did engulf out original alternates. All instruments worked well.	0124-0541	4.2	B Wadsworth B Geerts N Guy Z Wang
Jun 15 2015	RF09	MCS mission focused on a system on the KS/OK border souther of Great Bend. Tried to work in front of main line, but by the time we reached the point, line was falling apart and new convection was popping to the south. Ended up skirting around south end and flew 3 repeated legs on the back side of the system near the location of the ground assets. Most flight was at 4000 MSL. First flight back following over-G incident, we did not do an instrument test flight prior to this research mission...no known	0204-0501	3.1	T Drew T Parish J French Z Wang

		instrument issues.			
Jun 15 2015	RF08a	Ferry flight back from Salina, KS. No data collection.		0.6	B Wadsworth
Jun 11 2015	RF08	MCS mission centered on a large, growing system straddling the NE and KS border. Operated in close to the MCS, with initial legs being very short toward the system. There was significant turbulence crossing and outflow boundary from what appeared to be breaking wave dynamics. Experienced mechanical issues requiring a reroute to Salina, KS and early termination of the mission.	0151-0321	1.8	B Wadsworth B Geerts N Guy Z Wang
Jun 10 2015	RF07	Second LLJ mission flight for the night. Jet was stronger than previous flight and began to lift during the flight. UWKA completed 4 sawtooths, an isobaric leg at 3000 MSL, followed by 4 more sawtooths. Very hot in cabin, but no known instrument issues. WCL was not operated on this flight.	0540-1010	4.6	T Drew S Sullivan J French Z Wang
		A solo mission for the Low-level jet and the first of two flights for the night. Completed 8 sawtooth patterns and one straight-leg at 6500 ft MSL. The jet			

Jun 10 2015	RF06	was slow to take shape and the maximum was located below 500 ft AGL for the entirety of the mission. Variability in the potential temperature and water vapor structure was observed late in the flight. Applanix died mid-flight, but was brought back to life. The winds using the real-time Applanix are not good for 30-45 minutes in middle of flight. Licor6262 bad early in flight, ref gas bottle was not turned on. The WCL was not operated during the flight.	0015-0500	4.6	B Wadsworth S Sullivan N Guy Z Wang
Jun 08 2015	RF05	Full mission targeting convective initiation south and west of Great Bend. Worked along several race tracks that were lcoated south of the SPOL site and near where ground assets had been deployed. Early legs in the flight occured just north of a convective cluster and several passes were made along a line that spawned some large cells. Later passes focused on radar features further west, and apperaed more bore-like in the structure as observed from the aircraft. No known instrument issues.	0201-0609	4.2	T Drew B Geerts J French Z Wang
		A bore mission that did not quite produce. Searched for a while before settling			

Jun 06 2015	RF04	on an outflow boundary was sampled with a couple of passes. A solitary wave structure, with a bulge along the front on the feature. A vertical spiral temperature and humidity profile was taken at the end of the flight. The WCL was realigned and appeared to operate normally. PCASP required restart. No other known issues.	0342-0649	2.8	B Wadsworth B Geerts N Guy Z Wang
Jun 05 2015	RF03	Short flight, capturing bore that formed just south of Hays and propogated to the south. Made ~8 passes at between 5000 and 7500 ft MSL. In situ measurements show nice wave structure; this was also captured with the CRL. WCL alignment is suspect---needs to be checked prior to next flight. No other known issues.	0529-0722	2.0	T Drew B Geerts J French Z Wang
Jun 03 2015	RF02	Flight 2 of 2 focussing on LLJ line south of Hays. Great LLJ case. Very warm in cabin (remained >20C outside throughout entire flight) resulting in overheating of the WCL throughout the second half of the flight. CRL affected by heat -- leads to higher uncertainty in receiver. Essentially replay of flight 1. No other known instrument problems.	0643-1043	4.1	T Drew T Parish J French Z Wang

Jun 03 2015	RF01	Flight 1 of 2 focussing on LLJ line south of Hays. Great LLJ case. Very warm in cabin (remained >20C outside throughout entire flight) resulting in overheating of the WCL throughout the second half of the flight. CRL affected by heat -- leads to higher uncertainty in receiver. No other known instrument problems.	0142-0542	4.1	B Wadsworth T Parish L Oolman Z Wang

Calibration Flights					
Date	**Flight# (*.kml)**	**Status**	**Times (UTC)**	**Hours**	**Crew/Notes**
Jun 30 2015	CF03	Intercomparison calibration flight for the lidars. Flying tracks approximately along wind of 10 - 30 nm at heights between 5000 and 10000 AGL. Multiple spiral performed including near the FP3 site. Rawinsonde launched within minutes of the spiral near the FP3 site. Straight legs over the site also will allow for lidar comparison. Licor 7500 was not enabled the first few minutes of flight. Otherwise, no known instrument problems.	0215-0438	2.2	T Drew Z Wang N Guy R Pauly
Jun 16 2015	CF02	Flight to test CRL alignment, re-align CRL (as needed) and collected additional calibration data following the changes of the PMT prior to flight. No	0130-0257	1.6	T Drew G Craft J French Z Wang

		known problems.			
Jun 02 2015	CF01	First flight in 'normal' PECAN operations, evening takeoff (near dusk). Objective to test the CRL--alignment, stability, and SNR under normal PECAN conditions. Test flight included several spiral soundings, straight and level adifferent altitudes from a few thousand ft AGL to about 10 kft AGL. No known problems.	0202-0530	3.6	T Drew B Geerts J French

Test Flights					
Date	**Flight# (*.kml)**	**Status**	**Times (UTC)**	**Hours**	**Crew/Notes**
May 30 2015	TF08	Return flight Hays to Great Bend, data system not operated for this flight.	2230-2245	0.3	B Wadsworth L Oolman G Craft
May 30 2015	TF07	Short test flight in Great Bend that included two sawtooth legs along low-level jet line followed by landing in Hays for Open House. Lidars were not run during this flight. No known data problems.	1702-1811	1.3	T Drew B Wadsworth L Oolman G Craft
		Both lidars appeared to show improved performance. The false signal from the WCL observed in previous flight was not apparent. The back reflection from the CRL nadir port port window was decreased by 2/3			

May 27 2015	TF06	strength from the cover installation on beam output. Re-routing of air conditioning vent near CRL may have changed alignment and will be tweaked on later test flight. Firewall installation went well, decreasing data leakage. Gast pump was inoperable, therefore Licor 6262 data unavailable.	2153-2252	0.8	T Drew L Oolman N Guy
May 22 2015	TF05	Porpoising maneuvers performed. Began at ascent/descent rate of 500 ft/min, which was too slow. Adjusted to 750 ft/min which allowed us to hit the goal of an approx 60 mi track length. It will take some practice to get a feel for this maneuver. Lidar operation went well, though there were too many clouds to retrieve useful calibration data. It should be noted to check laser operation mode upon startup. The WCL displayed false signal approx 1 km from aircraft. The CRL showed a strong reflection signal from the nadir port window. It was believed that the LWC was not working during the flight as the signal was quiet. However, after processing it was confirmed working properly. A data leakage issue was also identified.	0159-0420	2.2	T Drew D Mueller N Guy Z Wang
		All instruments worked			

May 19 2015	TF04	well. Edgetech chilled mirror cleaned preceeding flight and the oscillation that was present previously disappeared. Avionics circuit popped.	0159-0420	2.1	T Drew D Wu J French Z Wang
May 06 2015	TF03	Auto-balance of chilled mirror at 26,000 ft, still some oscillatory nature to measurements at colder temperatures. PCASP installed, but read zero counts. Later found to be a software bug and fixed post-flight. Compact Raman and Wyoming Cloud lidars (CRL and WCL, repectively) were installed and tested. High noise was found on the CRL, but otherwise looked decent. An arcing connector resulted in in a deformation of power connector. Sent for repairs.	1613-1809	1.9	T Drew S Yum L Oolman Z Wang
Apr 14 2015	TF02	Multiples straight-and-level legs, vertical profile, cloud penetrations, wind cal maneuvers, two missed approaches - this had it all. Calibration offsets were updated for this flight for Licor 7500. Manual calibration performed on chilled mirror. Gerber instrument was inoperable. Still some disagreement between the dewpoint temperature measurements. Reworked bezel on front display fixed	1808-2021	2.1	E Sigel T Drew N Guy L Oolman

		previous flight problems.			
Mar 12 2015	TF01	Flew 3 level legs at ~ 8000, 12000, and 16000 ft MSL. In addition, we performed wind calibration maneuvers. Pump pressure was higher than expected. The front display was unresponsive and "ghost touches" were present throughout the flight. Disarity between the Licor 6262, Licor 7500, the chilled mirror were observed. Wind calibration maneuvers performed. No lidars were aboard for testing.	1611-1744	1.5	T Drew S Sullivan N Guy L Oolman

Flight Hours: As of Jul 16, 2015, 119.8 out of 120 research hours were flown, 0.2 remain.
Test: 12.2
Ferry: 4.3

7/15/15 PECAN Pilot notes (RF 28)

Crew: Drew, Mueller, Guy, Pauly

Flight Time: 4.3

Objective: MCS

Planned: Fly to a point in SE Nebraska at 6000.

Actual: Departed GBD and proceeded to the point. Needed to deviate south of direct course for weather. Because military airspace was active was required to climb to 8000 ft. to avoid. Along the way were given five waypoints to fly between. Upon arrival at first point some convection was present and it was decided to abort the waypoints and fly an east-west track south of the convection. Flew 5000, 4000, 6000 ft. MSL along the track truncating to the west and extending to the east. Then flew north/south lines at about mid track each with 5 nm offsets to the east. Stepped 4000, 7000, 6000 MSL. Repeated east-west track at 6000 before departing the area. Flew to GBD at 6000 MSL, with some deviations south of direct course for weather.

PECAN

RF28

16 July 2015

System Scientist: Nick Guy

0213 Wheels up.

0217 Instruments up, ascending to 6000 MSL heading toward Nebraska City.

0238 Deviating around cells and “hot” stratiform. Ascending to 8000 MSL due to restricte air space around Manhattan, KS.

0257 Descending back down to 6000 MSL. Cells are growing in the northern section we were going to work. Not sure right now what we’ll do there…

031? We tried the sawtooth, but a cell in the middle between two larger clusters was growing fast. We bailed and went south. Set up for E-W track south of the storm complex.

0323 Outbound from storms. Got close enough to cells and lots of lightning.

0336 Bulge in CRL water vapor south of eastern convective system

0338 Descend to 4000 and turn westbound

0342 Hit some cloud on the east end of that track.

0356 Turn eastbound and ascend to 5000 MSL

0412 Turn westbound and ascend to 6000 MSL

0414 WCL down due to heat

0424 Dry layer more westward on this leg and extending further toward surface.

0428 Turning and heading to southern IP for N-S line.

0435 Northbound on line east of what we are told is a N-S bow echo setting up. Cells continue to develop on the SE side of the line.

0440 Turning southbound due to lightning and descending to 5000 MSL

0452 Turning northbound at 4000 MSL

0458 Turning southbound ascending to 7000 MSL

0507 Turning to an eastern point along our previous E-W track. Descend to 6000 MSL.

0511 Westbound on east-west track.

0520 Saw a low amplitude wave pattern in water vapor thin dry layer with wavelength about 6 nm

0533 Breaking off and heading back to GBD.

0559 Seeing moisture bulges corresponding to the convective “fingers” from an MCS that grew upscale from convection SW of GBD at takeoff.

0627 Wheels down

Notes:
PCASP not working.

WCL shut down due to heat.

Flight Summary:

MCS mission to southeast Nebraska. Outbound at 6000 until bumped up to 8000 MSL for restricted air space. Tried to fly a sawtooth pattern on the east side of a supercell transitioning to MCS and with convection to the east. The middle began to blow up fast and we backed off. Began E –W lines to the south of the complex mapping inflow at flight levels of 4000-5000-6000 MSL. Performed a ladder N-S line in front of western cells as it transitioned to a bow echo at 4000-7000 MSL. Did one last westbound leg along the same E-W track before returning to GBD. Flew at 6000 MSL on flight back.

Summary

The Plains Elevated Convection At Night (PECAN) campaign was a multi-agency (NSF, NOAA, NASA, DOE), multi-aircraft (Wyoming KA, NASA DC8, NOAA P3) project designed to advance the understanding of continental nocturnal warm-season precipitation. PECAN focused on nocturnal convection in conditions with a low-level jet and a stable boundary layer with the largest Convectively Available Potential Energy (CAPE) located aloft. PECAN had four research foci:

- i) Nocturnal convection initiation and early evolution of mesoscale convective clusters;
- ii) Bore and other wave-like disturbances;
- iii) Dynamics and microphysics of nocturnal mesoscale convective systems (MCSs);
- iv) Prediction of nocturnal convection initiation and evolution. The Wyoming King Air was used to probe the pre-convective environment and to study the low level jet in an undisturbed environment.

Principal investigators

Bart Geerts (University of Wyoming)
David Parsons (University of Oklahoma)
Tammy Weckwerth (NCAR)
Josh Wurman (Center for Severe Weather Research [CSWR])
Conrad Ziegler (NOAA-NSSL)

Temporal coverage

Links

- PECAN Field Catalog (NCAR/EOL)
- PECAN EOL Project Page
- PECAN Project Page

PECAN Data

- Flight Notes
- Order 1 hz files
- Order high rate 10 hz files
- Flight Data Quicklooks
- Lidar
  - Quicklooks
  - Order lidar data

Begin: 2 June 2015
End: 16 July 2015

Geographic coverage

Minimum latitude: 36, Maximum latitude: 46
Minimum longitude: -102, Maximum latitude: -93

References to the data [Digital Object Identifiers (DOI)]

University of Wyoming - Research Flight Center, 2017: Flight Level Data from the University of Wyoming King Air during the Plains Elevated Convection At Night (PECAN) project, Version 1.0. University of Wyoming, College of Engineering, Department of Atmospheric Science, doi:10.15786/M2901N.
Format Citation (ReFindit). Download metadata: XML JSON Order 1 Hz data Order 10 Hz data

University of Wyoming - Research Flight Center, 2017: Zenith pointing Wyoming Cloud Lidar (WCL) data from the University of Wyoming King Air during the Plains Elevated Convection At Night (PECAN) project, Version 1.0. University of Wyoming, College of Engineering, Department of Atmospheric Science, doi:10.15786/M2588T.
Format Citation (ReFindit). Download metadata: XML JSON Order Wyoming Cloud Lidar data

Wang, Z. and Coauthors, 2016: University of Wyoming King Air Compact Raman Lidar Data. Version 1.0. UCAR/NCAR - Earth Observing Laboratory, doi:10.5065/D6MS3R0P.
Order Wyoming Compact Raman Lidar data

- Wyoming Compact Raman Lidar data
- July 15 Nexrad loop

User Information

- Planning Chart
- EOL Facilities
- Software Repository
- Projects & Data Requests
- Planning and tracking tools
- Facility User's Guide

Facility Instruments

- In Situ
- Wyoming Cloud Radar
- Wyoming Cloud Lidar

Contact

Mailing Address:

Atmospheric Science

University of Wyoming
College of Engineering
1000 E. University Ave.
Laramie, WY 82071
Phone:(307)766-3245
Fax: (307)766-2635

Facility Manager:
Jeff French

PECAN Data

- **Flight Notes**

  Format: Microsoft word (.docx), Adobe acrobat (.pdf)
- **Order 1 hz files**

  Format: netCDF (Network Common Data Format), RAF/Nimbus Conventions
- **Order high rate 10 hz files**

  Format: netCDF (Network Common Data Format), RAF/Nimbus Conventions
- **Flight Data Quicklooks**
- **Lidar**
  - **Quicklooks**

    Format: JPG
  - **Order lidar data**

    Format: netCDF (Network Common Data Format)
- **Wyoming Compact Raman Lidar data**

  Format: netCDF (Network Common Data Format) and GIF: Graphics Interchange Format
- **July 15 Nexrad loop**

Links

- PECAN Field Catalog (NCAR/EOL)
- PECAN EOL Project Page
- PECAN Project Page

PECAN Data

- Flight Notes
- Order 1 hz files
- Order high rate 10 hz files
- Flight Data Quicklooks
- Lidar
  - Quicklooks
  - Order lidar data

- Wyoming Compact Raman Lidar data
- July 15 Nexrad loop

User Information

- Planning Chart
- EOL Facilities
- Software Repository
- Projects & Data Requests
- Planning and tracking tools
- Facility User's Guide

Facility Instruments

- In Situ
- Wyoming Cloud Radar
- Wyoming Cloud Lidar

Contact

Mailing Address:

Atmospheric Science

University of Wyoming
College of Engineering
1000 E. University Ave.
Laramie, WY 82071
Phone:(307)766-3245
Fax: (307)766-2635

Facility Manager:
Jeff French

Movie Error

Figure ES1: Animation of composite radar reflectivity from 02 to 11 UTC on 15 July 2015. Locations of the fixed and mobile PISAs are marked in white as well as the SPOL radar. The red dot indicates the location of the UWKA with a trailing hour of flight track.

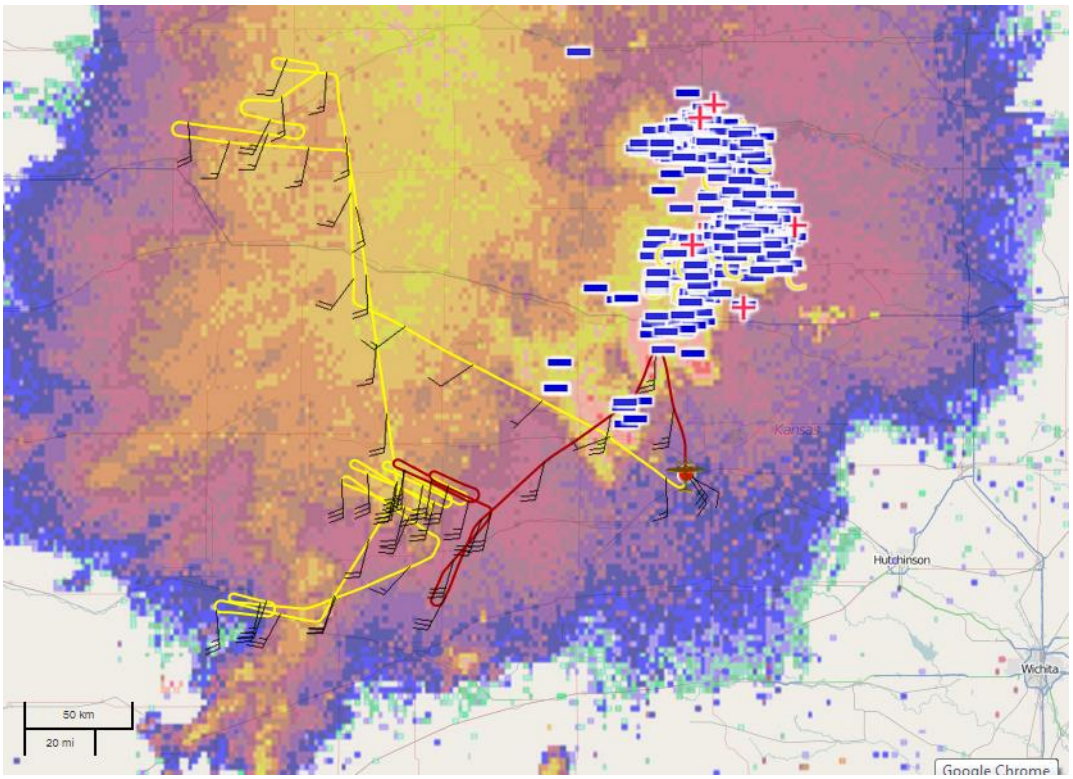
7/14/2015 PECAN Pilot notes (RF 27)

Crew: Wadsworth, Mueller, Oolman, Pauly

Flight Time: 4.2
Objective: Bore/CI mission .

Planned: A combination Bore/CI mission west of Hays.

Actual: Flew the profile shown below. Primarily Bore, but some simple CI work. Lightening was very active – primarily in-cloud, but some cloud-to-ground. Fairly uneventful which was appreciated as there is little desire to break the plane at this point and remain any longer in Great Bend. Just sayin'.



Pecan RF27 – 15 July 2015

Brett Wadsworth, Dana Mueller, Larry Oolman, Rebecca Pauly

Target CI and bore between Hays and North Platte. As of RF26, the CPC has butanol. The PCASP is still reporting no counts.

0257 Take off, climb to FL100

0308 Flew through a series of 1 m/s waves

0324 Start north at longitude 100 17', west of Hays. FL100, T=13 DP=7 winds 18 kt from 215

0332 Turning westbound at latitude 39 25' to intercept outflow boundary. Climb to FL110

0340 Descend to FL101 to get below cloud

0341 In base of cloud,

0343 Turn outbound to east. Descend to FL097

0352 Turn inbound at FL085

0356 Within 10 nmi of red echo on nose radar, turn outbound and descend to FL075

0402 In bound along 270

0405 Out bound along 90

0410 Boundary too close to new cells here, head south to work near Dodge City.

0452 Turning to west at FL090 at N37 50'

0459 Turning out just as we may have found line

0504 Turing to west, new cell close in north of our line

0516 Turning out, this area is filling in fast

0522 At new IP 18 miles N of DDC, turning to 290 deg mag

0529 Turn outbound. Flew through two waves, W=1.5 m/s, CRL could see lifting of aerosol layer

0536 Turning inbound, FL080

0543 Turning outbound, two waves, W=2 m/s cloud on westernmost wave 300-400 meter below

0545 Cloud below about 600 meters below FL.

0548 Wavelength on outbound longer, W lower on eastern wave

0551 Turning inbound

0556 Outbound, still two waves

0603 Inbound, first wave has decayed, weak W, cloud below on CRL gone

0608 Westernmost wave stronger, W around 2.5 m/s

0615 Turing inbound, descend to FL070

0619 Turning outbound, descend to FL060

0625 Heading SW to fly track parallel to bore.

0634 Hit 4 m/s updraft, from bore from southern more storm. Starting a NE track parallel to storm.

0653 This part of line is more moist. Continuous lightning, about 80-90 strikes/minute

0655 Done with mission, heading to Great Bend

0706 Land

7/13/15 PECAN Pilot notes (RF 26)

Crew: Drew, Mueller, Guy, Pauly

Flight Time: 3.1

Objective: CI

Planned: Fly N-S line just east of GBD. Start at 10,000, 8000, 6000, 4000, near 1000 AGL and back up.

Actual: Departed GBD and proceeded to north point. Stepped 10,000, 8000, 6000, 4000, 3000 MSL.

Upon completing 3000 MSL shifted line east 15 nm and started north at 4000 MSL. However, with thunderstorm to the east terminated leg prior to end point and returned to GBD.

PECAN

RF26

14 July 2015

System Scientist: Nick Guy

0245 Wheels up

0259 Passed northern point of track along 270-90 track near Russell, KS. MSL.

0302 Turning southbound at 10000. Single cloud about 8500 MSL.

0309 Dry at flight level, around 6 g/kg. Well define water vapor and aerososl layer about 4800 ft below aircraft.

0315 Bulge in water vapor on CRL 5 nm north of GBD. Just south of GBD, weak moist layer at aircraft level, but no cloud. Dries out below.

0319 Moisture plume from surface combine with moisture aloft for whole column moisture

0325 Southern point. Will turn northbound, descend to 8000 MSL.

0328 On northbound track

0334 Observed a split in moisture above and below FL, stronger winds to the north with different directionality.

0348 Seeing multiple bulges in water vapor on CRL and now an elevated aerosol layer

0350 Crossed northern point, descend to 6000 MSL and head southbound.

0354 On southbound leg

0412 Crossed boundary to the south, no wind shift at the FL.

0417 Finishing leg, descending to 4000 MSL for northbound.

0420 Northbound track.

Lost WCL somewhere around here.

0425 Dry layer at surface

0443 North end of track. Descend to 3000 MSL for southbound.

0447 On southbound leg

0511 Completed southbound leg, ascending to 4000 MSL and displacing to a point due east of the southern point of track. Will continue N-S line.

0517 270 heading onto new track.

0536 Abandoned line due to impending MCS coming into GBD for a potential second flight later

0545 Wheels down

Notes:
PCASP is still not working after maintenance before flight.

WCL overheated after descent to 4000 MSL and turned off.

Flight Summary:

CI mission sampling N-S along a line from approximately Russell, KS to Pratt, KS. Performed stepped race tracks along line dropping from 10000-8000-6000-4000 MSL and repeating up. A step was performed on each long leg. Offset to east for a northern track. Mission was called off due to large tropical-like convective system coming into southern domain.

7/12/2015 PECAN Pilot notes (RF 25)

Crew: Wadsworth, Mueller, Oolman, Pauly

Flight Time: 4.4+1.2
Objective: Bore mission .

Planned: A bore mission NE of Sioux City. Expected to land at Sioux City to refuel before ferrying back to Great Bend.

Actual: Flew the profile shown below. About 1+40 to get to the research area. Significant T-storm over central Minnesota. We flew east of the area programmed into the telemeter software so Mission Control could no longer track us. We also lost the high resolution nexrad images so we elected to not pursue data in the vicinity of some nasty looking clouds & lightening. We worked west then due north towards the west side of Minneapolis. We were substantially NE of the area expected to be worked and our primary destination (Sioux City) was getting targeted by a TS that was not in the TAF. Alternate was Omaha so we ended up departing the research area after only about an hour (best case) of research.

IMO, going this far for research in N2UW is not the best employment of the aircraft, but if that is what the scientists want to do, my name is Smith and I'm here to paint.

After refueling in Omaha, we ferried back to Great Bend.

Pecan RF25 – 13 July 2015

Brett Wadsworth, Dana Mueller, Larry Oolman, Rebecca Pauly

Target bore in northern Iowa.

0444 Take off, PCASP reading 0 counts. CPC is reading about 1 cm^{-3}, may be out of butanol. Maximum low level winds: 38 kt at 2800 ft msl.

0505 At FL230. T=-15, DP=-42, winds 38 kt from 270 deg T

0527 PCASP: BASE4=.01, BASE3=.28, BASE1=.36, FLOW=.34, REF=7.1, AUX=0, SHTHFLOW=4.1, TEMP=18.5 AVGTRAN=0, FIFOFULL=0, FLAG=0, OVERFLOW=0, SYNCERRA=0 to 6, SYNCERRB=0 to 7, SYNCERRC=0 to 4

0604 In southeast Minnesota. There is a line of growing cells between us and the lightning

0614 Start descent to FL100

0629 Too far east for telemetered longitude. With fast growing, low reflectivity clouds ahead of us we decided to turn back west of 94 degrees longitude.

0649 Heading 10 degrees from Fairmont VOR trying to intercept tail end of bore.

0708 Heading 160 to offset 10 nmi east. Descend to FL070. Maybe caught low very shallow waves.

0716 Turn to north again at 7000 ft.

0733 Climb to 8000 ft to stay above cloud.

0738 Reverse to south and descend to 7000 ft. Saw 2 or 3 waves on last leg (one of the waves may have been during the climb). Vertical velocity was +/- 1 to 1.5 m/s in wave.

0805 Near Fairmont, done with mission. Climb to FL140 and head to OMA.

0901 Land in Omaha

7/11/15 PECAN Pilot notes (RF 24)

Crew: Drew, McAuliffe, Guy, Pauly

Flight Time: 2.1

Objective: Lidar

Planned: Fly to FP3, 90/270, FP2, FP1 at 7000 MSL.

Actual: Departed GBD at 7000 MSL and arrived at FP3 a little early made a couple passes over FP3 for delay. Continued to FP2, and FP1, but made a modified 90/270 at FP1 to return to GBD.

PECAN

RF24

12 July 2015

System Scientist: Nick Guy

0537 Wheels up

0600 Delayed for 5 minutes over FP3. Passed over the site multiple times during the next few minutes.

0606 Final pass over FP3. Transit to FP2.

0630 Pass over FP2

0654 Turned off WCL due to overheating.

0703 Pass over FP1

0707 Second pass over FP1, heading back to GBD.

0742 Wheels down

Notes:
Realized that the WCL would be of value and turned on, though we may have missed the FP3 site overpass with the DC8, not sure.

LWC and PCASP breakers were not on! Fixed 40 minutes into flight.

WCL overheated very quickly after turning on (collected 3 files) and turned off.

Flight Summary:

Mission to overpass FP3, FP2, and FP1 sites for instrument intercomparison.

7/11/15 PECAN Pilot notes (Pecan Research Flight 23)

Crew: Drew, Hower, Guy, Pauly

Flight Time: 4.6

Objective: Low Level Jet (Fixed track)

Planned: Track north to end of line at Isobaric 3700 MSL. Fly two complete vertical saw-tooth patterns, (out and back); Fly Isobaric at 3800 MSL; repeat two full saw-tooth patterns. Fly Isobaric track back.

Actual: Departed GBD on track towards north on 355 at 3700. Started vertical saw-tooth low each time. Completed vertical saw-tooth from 500 AGL to 3,000' AGL and repeated. Then flew a full isobaric leg at 3700 MSL. Then repeated full saw-tooth twice more.

Returned on same leg at 3700, climbed to 6300 made a 10 mile northbound leg and returned to KGBD.

PECAN

RF23

12 July 2015

System Scientist: Nick Guy

0016 Wheels up

0023 Instruments up

0027 Passed east point, beginning at lowest altitude

0050 Turning around for eastward leg

0204 On the east end fo the track the low level winds are weaker and there is a define moist layer near the surface

0205 Turning westbound. Isobaric leg at 3800 MSL.

0209 Moisture gradient right near -99.0, moist east, dry to the west

0229 End of westward leg, turning eastbound

0250 End of level leg at 3800 MSL. Descend to 500 AGL to begin westbound sawtooth pattern

0254 Begin westward leg

0320 Begin eastward leg

0410 Begin final eastward sawtooth leg

0431 Finished sawtooths. Will set up for final N-S leg to GBD

0447 Wheels down

Notes:

Flight Summary:

CI/LLJ mission along predefined LLJ track. Observed transition from PBL to LLJ, with the apparent jet shifting from the east end of the line to the west. A greater the 42 kt jet observed between 1000-1500 ft AGL. Diurnal convection at the beginning of mission may have influenced the moisture distribution on

the western end. WCL was kept off during the flight due to cabin heating. No known problems with instruments.

7/10/15 PECAN Pilot notes (RF 22)

Crew: Drew, Mueller, Guy, Pauly

Flight Time: 4.7

Objective: Bore

Planned: Fly to a point east of McCook and set up a racetrack pattern on southeast side.

Actual: Departed GBD and received new point a little further west then original. Set up racetrack on 353 bearing. Offset left and right as requested. First moved 5 nm west, then 15 nm east (decided to change to 20nm east) maintaining same orientation. Then moved 30 nm farther east and set up originally with 335 orientation and then 330. Extended final outbound towards GBD and returned to GBD.

PECAN

RF22

11 July 2015

System Scientist: Nick Guy

0318 Wheels up

0323 Instruments up

0355 Northbound track along 100 25W

0400 Turning outbound at 15nm from aircraft radar return. Dropping to 9000 MSL

0406 Tight N-S racetracks to begin.

0407 Descend to 8000 MSL for inbound

0421 Offset track 5 nm west, heading northbound at same 8000 MSL

0433 Outbound at 8000 MSL saw two distinct waves.

0446 Past through moisture plume, light chop. Turning to go inbound at 8500 MSL

0501 Southbound track at 7000 MSL

0518 Making turn to east displacing 15 nm. Ascending to 9000 MSL for inbound leg.

0525 Northbound on racetrack

0534 Turning east to go southbound on track

0549 Eastbound for 30 nm to set new track, descending to 8500 MSL

0601 Inbound on 335 heading

0606 Turned outbound, were between cloud layers. Approx 40 nm racetrack.

0638 Did inbound/outbound at 8500/7500 MSL

0639 Turning inbound, ascending to 8500 MSL

0648 Turn outbound

0717 Turn outbound, saw up to 5 wave indicated by vert vel and lidar.

0719 Will extend the outbound leg to close to GBD

0752 Wheels down

Notes:
DDS application needs opened

Flight Summary:

Bore mission with initial point north focusing on the outflow from a supercell/MCS along the KS-NE border. Began in the wake of the system, performing racetracks along a boundary on the west side of storm before moving east to the western edge of the main outflow boundary. We worked a SE-NW racetrack for a couple of hours. Sampled evolution of a probable bore until wave structure was very minimal.

7/9/2015 PECAN Pilot notes (RF 21)

Crew: Wadsworth, Mueller, Oolman, Pauly

Flight Time: 4.1
Objective: CI mission .

Planned: Briefed a relatively short flight (2.2hrs) working a straight line from the vicinity of MMB 015/43 to HYS 068/25 prior to return to KGBD.

Actual: Flew the profile shown below. Various altitude stacks of 6600', 6000', 5200' and 4500'. Kansas City Center was great as always. No significant weather encountered.

Pecan RF21 – 10 July 2015

Brett Wadsworth, Dana Mueller, Larry Oolman, Rebecca Pauly

Target convective initialization in western Kansas

0142 Take off, climb to FL066

0153 TDP=12.3, DPLICOR=11.8, TD7500=12.2. Cleaned LI75 windows prior to flight. It was reading 9 C higher that TDP last night.

0203 Stratus deck slightly above and to our right.

0207 Passing over a few thin boundary layer Cu

0213 Reverse course at first point, descend to FL059.

0219 Climb to FL060 to be sufficiently above the tethersonde.

0222 Passing through thin cloud

0255 At northern point, descending to FL052

0310 On last leg, the wind speed changed from around 15 knots on the south end to 5 knots on the north end

0318 In cloud

0344 At south end, offset 5 nmi to west to avoid overflight of tethersonde at FP2.

0346 Heading north at FL045

0418 At north end of shortened, offset line. Climb to FL055 and head towards the HYS 300 degrees at 50 nmi. Trying to work in front of developing cells to north of main convection. Dew point along last leg was constant at 17 C.

0424 Climb to FL060 for Denver ATC.

0432 Head towards south, parallel to original track and 34 nmi west

0448 Reverse course, stay at FL060

0505 At 39N, reverse to south and descend to FL052.

0522 Done with mission, head to GBD.

0542 Land

7/8/15 PECAN Pilot notes (RF 20)

Crew: Drew, Mueller, Guy, Pauly

Flight Time: 4.4

Objective: CI

Planned: Fly ladder type fixed track on four north south legs at approximately 4000 AGL.

Actual: Departed GBD and received new direction to proceed to the north end of line 2, deleting line 1 and picking the route up from that point and adding an additional line farther to the east. After completing the pattern, repeated 2/3 of line 3 just past FP2 and returned to GDB.

PECAN

RF20

09 July 2015

System Scientist: Nick Guy

0304 Wheels up

0300 Instruments up

0314 Licor 6262 missed, just turned on.

0323 Constant 4000 AGL heading to destination

0338 Reached NW corner of pattern, turning for southbound leg. Raise to constant 6900 MSL

0415 Making turn east, descending to 6600 MSL. In cloud for last couple minutes of leg 1

0417 Pretty thin cloud below, coming out a little bit now

0420 Cleared earlier cloud

0427 Turning northbound, descending to 6500 MSL for leg 2

0447 Seeing clouds below flight level from 1500 to 500 feet below

0500 Turning eastbound, descending to 6300 MSL

0512 Turning southbound, descending to 6000 MSL for leg 3

0531 Little bit of cloud at flight level

0541 Two layers of aerosols, one below flight level and one near ground

0546 Turning eastbound, descending to 5800 MSL

0558 Turning northbound, descending to 5500 MSL for leg 4

0625 In cloud momentarily where a decaying convective cell was previously

0632 Turning westbound, ascending to 5800 MSL

0643 Turning southbound, ascending to 6000 MSL for a repeat of leg 3.

0711 Heading back toward GBD, turn was made near FP2 site.

0729 Wheels down

Notes:
Licor 7500 seems to have drifted off more, reading 9-10 degrees higher.

NEXRAD base scan on flight track very slow to update. Sometimes 15 min latency.

Flight Summary:

CI mission using pre-defined lawnmower pattern with longer legs N-S and beginning northwest of GBD. Started with constant 4000 ft AGL on ferry out, switched to constant flight levels varying from 6600 down to 5500 MSL during lawnmower pattern. Four main N-S legs and a partial repeat of leg 3 down to FP2 site.

7/5/2015 PECAN Pilot notes (RF 19)

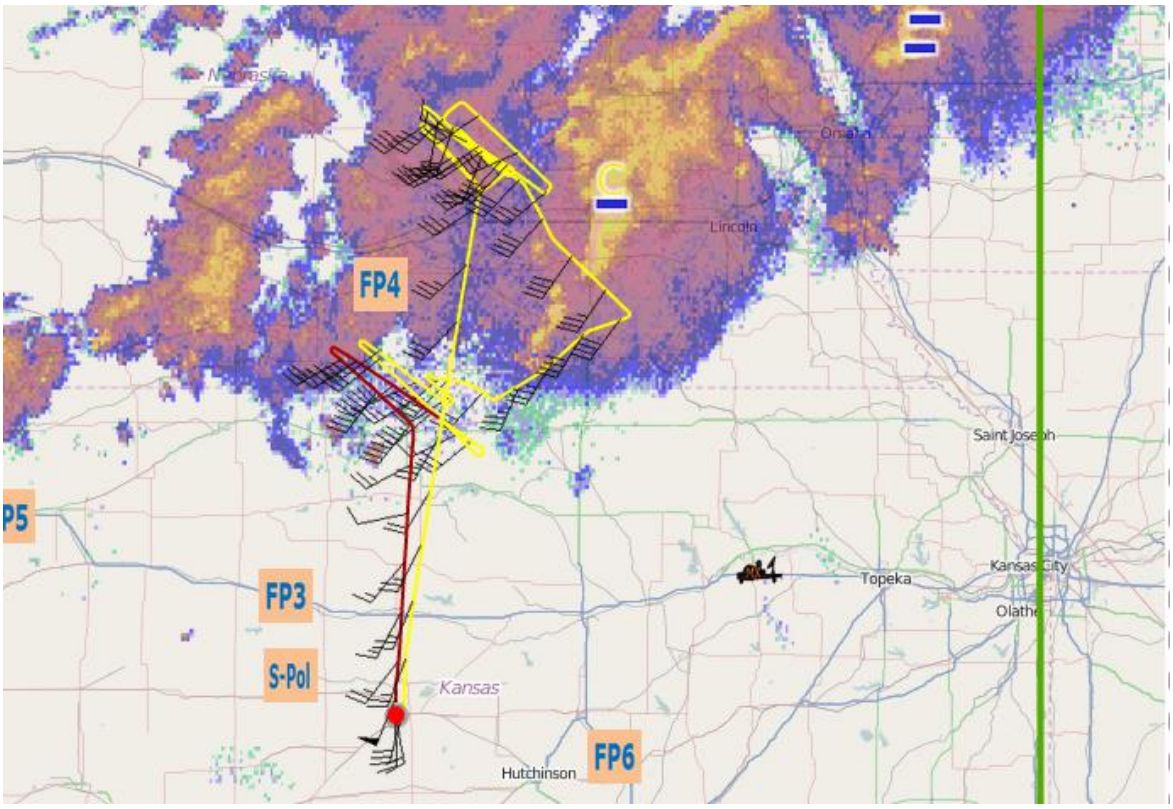
Crew: Wadsworth, Mueller, Oolman, Pauly

Flight Time: 4.7
Objective: Bore mission .

Planned: Head to Grand Island VOR. Expected to refuel there or possibly in Lincoln prior to return to KGBD.

Actual: Flew the profile shown below. 7000' MSL out to the GRI VOR (northernmost racetracks in the image below). Worded racetrack patterns with 2000' block altitudes, all quadrants around the GRI VOR. Eventually Minnesota Center offered us a block of 4500'-14000' MSL. We worked through the tops of a series of bores, then climbed above them and also descended below. We saw that there was a line of convection starting to build east of our position so we headed SE through a gap in the developing line. The Ops Center still thought we had time and plenty of room in which to work where we were. The weather radar on the aircraft said otherwise.

After getting some breathing room, we turned to the SW and set up a new sequence of racetrack patterns. Observed some more waves. Elected to return to KGBD since we were now closer to it than to just about any other airport with decent weather.



Pecan RF19 – 6 July 2015

Brett Wadsworth, Dana Mueller, Larry Oolman, Rebecca Pauly

Target outflow from convection in central Nebraska

0403 Take off, climb to FL070

0449 Climb to FL080.

0452 At GRI, turn to 310 degrees

0458 FL080, T=17 C, DP=12 C, winds 46 kt from 240

0500 Turning outbound, T=16, DP=10, winds 38 from 230

0509 Offsetting 10 nmi to NE, climb to FL100

0511 Turning to track 300, T=13, DP=3, winds 21 kt from 250

0522 Climb to FL125 and turn to SE. Intercepted two clouds on inbound. Barely grazed them outbound.

0533 Climb to FL132 and turn inbound (track 300). There were maybe 3 waves.

0544 Turn outbound and descend to FL090

0547 Max updraft speed to 2.5 m/s

0553 Descend to FL055 in turn to NW

0616 Our area is starting to fill in. Leaving to the SE.

0653 On new track further south at FL070

0703 Turning and climbing to FL100

0705 Back on 300 track

0712 Passing through wave. Clouds above on WCL, W up to 1.5 m/s

0733 Turn to NW and descend to FL070

0747 Seeing waves in WCL, W varies by 1 m/s, T by 2 C and 90 degrees out of phase from W.

0753 Last leg, turn to SE and descend to FL050

0805 Done with mission. Waves not as prominent. Head back to Great Bend at FL110

0813 Passing though boundary? From lidars, height of layers drop to south. W = +2 m/s. T increases, DP decreases.

0838 Land

7/3/15 PECAN Pilot notes (RF 18)

Crew: Drew, Mueller, Guy, Pauly

Flight Time: 4.5

Objective: CI

Planned: Fly over FP2 to MP1 to MP4 to MP3 to FP 3 to FP5 to MP4 to MP3 to MP4 and return adjusting altitude periodically to maintain around 4000 AGL.

Actual: Flew GBD to FP2 on the way to MP2 changed location somewhat to the south and added MP1. MP1 to MP4 to MP3 and then added 11 nm east of MP3 and then added new waypoint due north instead of FP3. After the new waypoint proceeded to FP5 and then 18 nm past FP5 to West. Then MP4 to 11 nm east of MP3 to MP4 to 11 east of MP3. Continued on track to the east on way to GBD. We did have to alter course around two storms between MP4 and MP3.

PECAN

RF18

04 July 2015

System Scientist: Guy

0255 Wheels up

0300 Instruments up

0317 Increase in theta E along south track

0351 Made north turn toward MP4 and central track

0428 3 nm east of MP3, going to a new eastern point on northern track

0440 Well into northward progress up to northern track

0511 Turned southward, increased to FL75

0516 Skirting under the anvil of Cb to our west,

0522 Seeing gravity wave ripples in anvil. Also begin to see cloud forming below us on CRL

0529 Turn east to central track

0531 Water vapor bulging

0553 Passed the 11 nm mark past MP3, turning around for westbound track

0619 Deviated south around a quickly intensifying cell. Under anvil twice and approaching the boundary or anvil of the earlier Cb to the north.

0625 Turned around, heading east along track. We have stayed at constant 7500 MSL the last couple of tracks. We will try to stay at 4500 AGL for return.

0636 Another cell to our east in the track. Deviating to the south

0645 Getting back on track, little chop under a cloud layer extending from cell

0654 Passed eastern point

0713 Finished east leg, north of GBD. Turning off lidars and heading in

0717 Wheels down

Notes:
.

Flight Summary:

CI mission using predefined south, central, and north legs roughly in east-west orientation connecting ground instrument platforms across western KS. The flight pattern connected FP2 to MP1 to MP4 to MP3 to FPN (a northern point) to a point 18 nm past FP5. Stepped 500 ft at a time along tracks to stay approx. 4000 and later 5000 ft AGL. A deep moist layer observed throughout much of flight. Performed two additional laps on the central track at constant 7500 MSL, extending east of MP3, deviating around convective cells along track. Distinctive wave features noted in water vapor and aerosol CRL channels. Lots of structure present both below and above the aircraft.

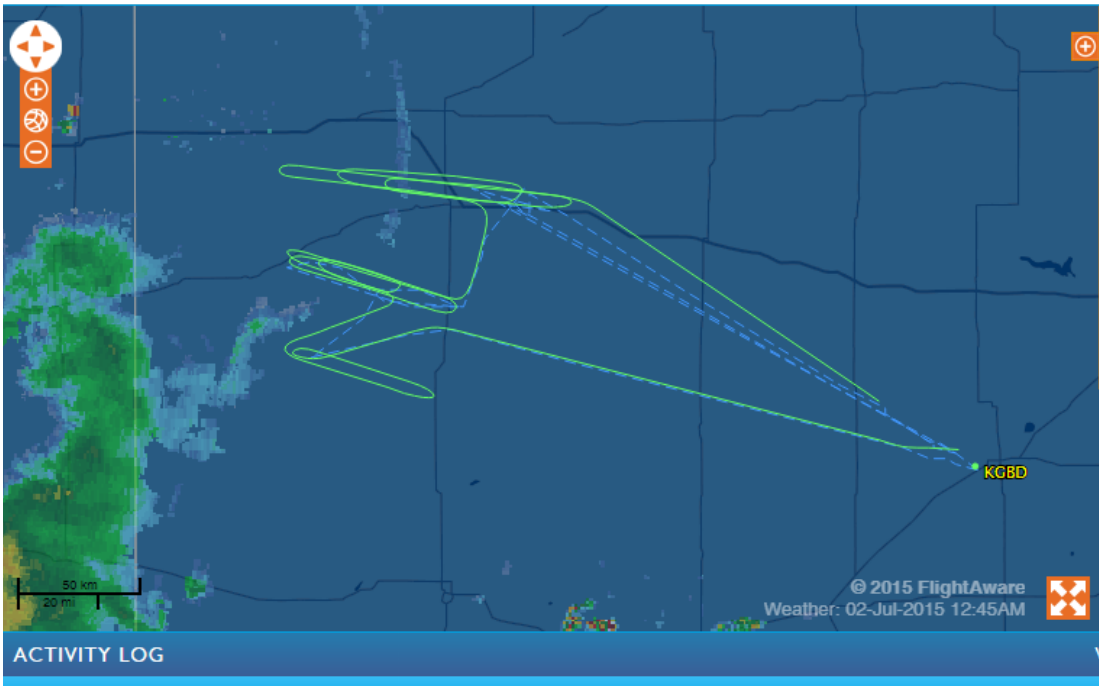
7/1/2015 PECAN Pilot notes (RF 17)

Crew: Wadsworth, Mueller, Oolman, Pauly

Flight Time: 4.0
Objective: Bore mission – more or less.

Planned: Head to location about 25 nm south of Goodland for a bore mission.

Actual: Flew the profile shown below. 10k' out, 9k' back. Used a block of 6 k – 10 k under Denver Center control. Little in-cloud lightning. Little wave development.. Returned to KGBD.



Pecan RF17 – 2 July 2015

Brett Wadsworth, Dana Mueller, Larry Oolman, Rebecca Pauly

Target outflow from convection in eastern Colorado and western Kansas

0248 Take off, climb to FL100

0305 FL100, 40 miles north of DDC, T=12 C, DP=1 C, Winds 25 kt @ 350 deg

0321 FL100, 60 miles SE Goodland, T=13, DP=6 C, Winds 15 kt @ 330 deg

0331 Start tracks, track 280, 45 nmi SSE of GLD. T=13, DP=5, Wind=12 @ 330.

0333 Right turn to a track of 100, nothing worth noting on CRL

0339 Descend to FL070

0342 Inbound along track 280

0352 Outbound along 060, climb to FL100

0359 Inbound along 280, passed over what appears to be a line on GLD but didn't see much.

0405 Outbound along 100

0410 Inbound along 280

0418 Turning, T=13, DP=4, Winds=5 kt from 080

0429 T=14, DP=2, winds 15 from 330, descending to FL085 and turning inbound

0433 T=17, DP=6, winds 12 from 250

0440 Turn to 100 degrees

0451 Shifting line 10 nmi to north

0458 Starting new line with track 270. T=16, DP=8, wind=13 kt from 250

0506 Turning outbound along 090. T=16, DP=8, wind=10 kt from 160

0517 Descending to FL060, turn inbound

0521 T=22, DP=10, winds 6 from 160

0523 T=21, DP=10, winds 6 kt from 240

0551 Turn inbound and climb to FL072

0615 Done with mission, head to Great Bend

0643 Land

6/30/2015 PECAN Pilot notes (RF 16)

Crew: Wadsworth, Geertz, Oolman, Wu

Flight Time: 4.6
Objective: Bore mission – more or less.

Planned: Head to location about 50 nm NNW of Topeka for a bore mission. Expected to refuel in Manhattan for fuel prior to return to KGBD.

Actual: Flew the profile shown below. 7000' MSL out & back. Descended to 5500' MSL after a couple of racetrack patterns. Given 1000' block altitude by KC Center. Some of the area crossed into Minneapolis Center airspace as well, but it was easy. Relatively smooth throughout. Little in-cloud lightning. System did not develop as hoped, so we returned to KGBD without stopping in Manhattan.

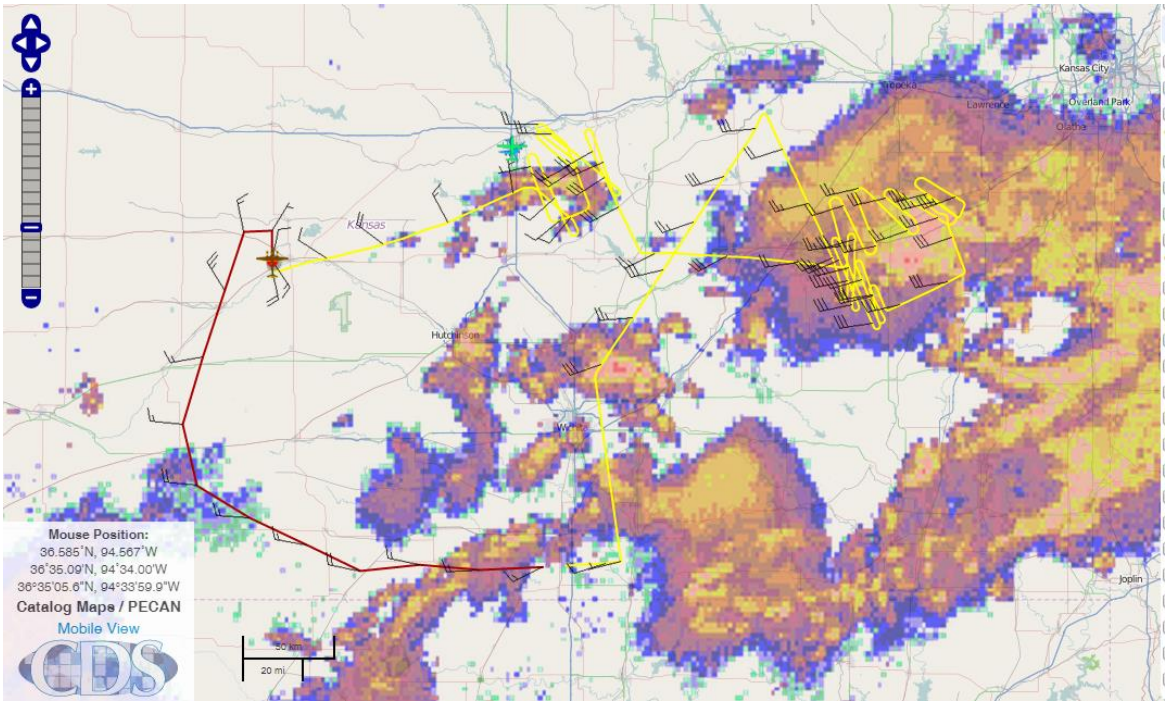
6/25/2015 PECAN Pilot notes (RF 15)

Crew: Wadsworth, Geertz, Oolman, Wu

Flight Time: 4.5 + 1.5 ferry
Objective: Bore mission.

Planned: Head to location just west of Topeka for a bore mission.

Actual: Flew the profile shown below. Large convective system arrayed from SW-NE. Landed in Wichita for fuel then took 1.5 hour ferry back to Great Bend wandering around additional convection. Yingling Aviation in Wichita was a good quick turn. Operates 24 hours/day.



Pecan RF15 – 26 June 2015

Brett Wadsworth, Bart Geerts, Larry Oolman, Decheng Wu

Bore mission.

0404 Take off, climb to FL160

0432 Start track towards 330 at FL120 from point SE of Salina

0438 Lighting to NE, reverse course just SE of Salina

0444 Reverse towards 070, descend to FL100

0447 Heading towards 335

0452 Turn to track angle 330 at about 15 miles east of Salina

0455 Reverse course

0459 Reverse with track angle of 330

0503 Reverse to SE, descend to FL085

0511 Reverse to 335 ground track. Still at FL085

0529 Head east through gap between clouds beyond N38 20' W96 30'

0543 Turn to 335 at N38 20’ W96 00’ at FL085, east of Emporia

0548 Reverse to track 155

0554 Reverse to track 335, descend to FL070

0600 Reverse to track 132

0605 Reverse to track 302

0610 Turn 10 nmi from echoes to track 122. Still at FL070

0615 Reverse and descend to FL060

0621 Turning and descend to FL050. Track 122.

0526 Turn to SW

0627 Turn to 302

0630 Reverse

0633 Cu forming in front of us, turn to south.

0639 New point N38 12’ W95 45’, climb to FL070

0646 Turn inbound with track 335

0648 Hitting some bumps, reversing course

0652 Turn to 335, still at FL070

0658 Turn to 155

0704 Turn to 335

0711 Hit a weak wave. From lidars, clouds above and below us.

0712 Reverse to 155

0715 Found wave again

0719 Reverse to the north and descend to FL060

0725 Turn to the south

0731 Turn to the 335

0748 Done, head to Wichita

0831 Land in Wichita

Note: the WCL clock was not set to UTC but rather MDT or PDT.

6/22/2015 PECAN Pilot notes (RF 13)

Crew: Wadsworth, Sullivan, Guy, Wang

Flight Time: 4.7
Objective: LLJ Mission.

Planned: Pretty standard low-level jet mission.

Actual: Standard low-level jet flight. Micro-switch on the right ice-vane was triggering the master caution light, so extended the ice vanes to prevent further distraction. Uneventful flight.

PECAN

RF13

22 June 2015

0201 Wheels up

0206 On the northbound track to sawtooth pattern

0209 Passing the eastern point of sawtooth track. Descending to 500 ft AGL

0212 Starting westbound leg

0214 Warmer, drier airmass heading west. Max jet around 42 kt at 1100 or so ft AGL

0237 Begin eastbound leg

0258 End eastbound leg

0301 Begin westbound leg

0325 End of westbound leg, max jet of 47 kt at 3500 MSL, though the nose was a little higher just east of the most westward point of track

0328 Begin eastbound leg

0333 Airmass has changed. Inversion at 5000 MSL.

0351 East-west leg at 4500 MSL above jet max

0420 On the west-east leg at 4500 MSL. Observing more structure in the water vapor and seeing evidence of inversions below. There is a double layer of WV along track. Observed a 41 kt wind.

0439 End of straight leg, going back to sawtooth legs

0442 Begin westbound sawtooth. Bumpy at low levels. Observed a 50 kt max at 3200 MSL.

0506 End westbound leg

0510 Begin eastbound leg. Inversion near 3500 MSL, max jet speed 52 kt.

0531 End eastbound leg

0534 Increase ascent rate to sample higher altitude. Note fighting headwind westbound and vice versa eastbound. Somewhat complex temperature structure with multiple inversion.

0559 End of westbound leg. Peak max jet speed of 55 kt.

0602 Begin eastbound leg

0624 End eastbound leg. Ascend to 2000 ft AGL for N-S transit back to GBD.

0636 Wheels down

Notes:
Had to cycle the PMS breakers 3 times to get PCASP data flow. No PCASP display, though the data is coming in. Cycled PMS R breaker per LOD suggestion. Had to cycle 3 times again to get data flow, but no display.

The touch display became slow and then unresponsive after a while.

The Java track tanked after out last descent. No updates following that time.

Flight Summary:

LLJ mission along pre-defined track north of GBD. A north-south leg at 2000 ft AGL was flown at the beginning and end of the mission. Following the first two eastbound-westbound sawtooth leg couplets where a drier, warmer and stronger jet was observed westward, a west-east track was flown at a constant altitude of 4500 ft MSL to look at the jet structure. Ascent/descent rate was increased to reach higher altitudes for the next two eastbound-westbound sawtooth leg couplets. A maximum jet wind speed of 55 kt was observed at approx. 1500 ft AGL.

Total flight time was 4.7 hours. Funds for this flight were not billed to the PECAN project, but provided by the University of Wyoming.

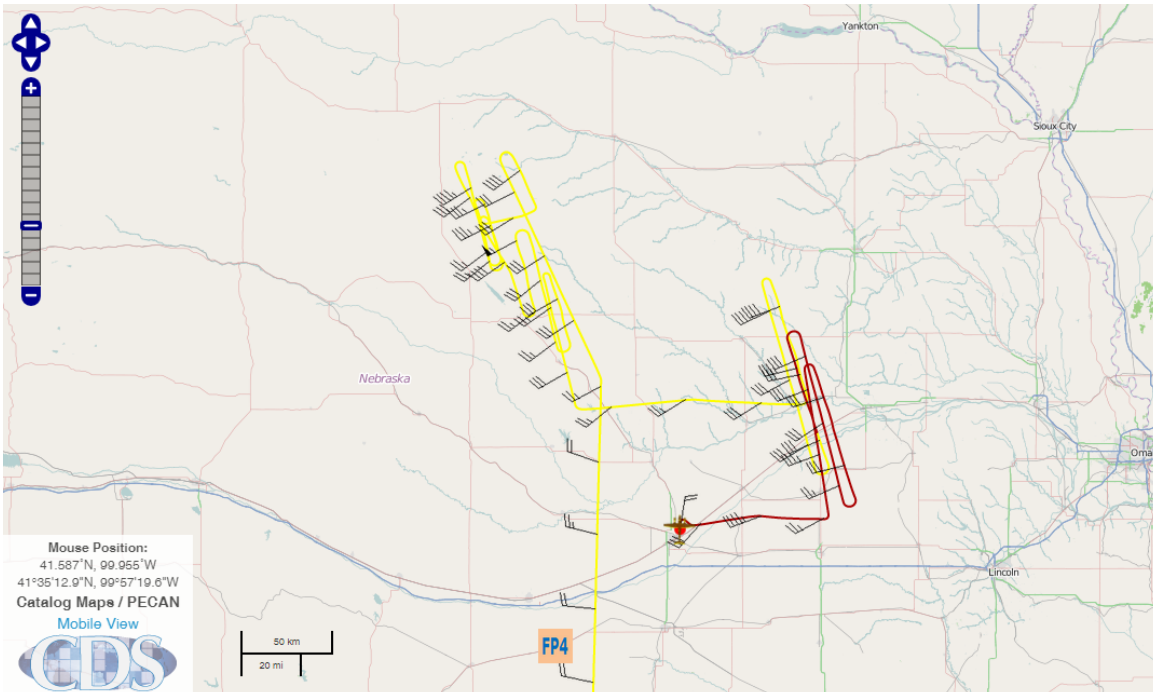
6/20/2015 PECAN Pilot notes (RF 12)

Crew: Wadsworth, Geertz, Guy, Wang

Flight Time: 4.4 + 0.9
Objective: Bore UFO Mission.

Planned: Ferry to the north of Nebraska. Start in vicinity of Oneill and work the SE side of an expected bore propagating from an MCS in South Dakota. Plan to stop in Norfolk for fuel, the ferry back to KGBD.

Actual: Filed & departed to Oneill. Flew out at 16,000. Started descent when ~70nm from Oneill to 12,000 at 50 nm out. Changed initial point to the ONL 270/030. Worked over multiple waves in the pattern shown below. Eventually descended to 10,000 feet. First penetration of the event revealed moderate turbulence, all later penetrations had less. Changed the refuel stop from Norfolk to Grand Island when the wave clouds were crossing both Norfolk and the alternate of Columbus. Multiple changes of reference points with Minneapolis Center as the bore pushed us further to the SE. The controller was quite busy with commercial traffic and we were initially working right on the border with Denver Center, so there were some significant delays getting approved for changing our points.



Ferry back to KGBD was after sunrise. Uneventful but the first all-nighter since college, 30 years ago (more or less).

PECAN

RF12

20 June 2015

0630 Wheels up

0639 Instruments up and running

0727 Descending to 10000 MSL

0730 Turned to 330 magnetic ground track toward a point 30 nm due west of ONiell

0746 Seeing wavelike features in vertical velocity.

0747 Passed updraft of about 8 m/s, turning around as we are in cloud. Turned back 180 degrees.

0749 Out of cloud

0754 240 degree heading, going 10 nm

0757 Turn to 340 heading

0801 Wave features, up

0803 20 m/s updraft , coming out through downdraft and updraft

0806 Continuing to see waves on outbound leg

0811 Inbound on line

0815 Turning for outbond

0819 A secondary wave is becoming very apparent ahead of the outflow

0823 Updraft to 7-8 m/s to south of main outflow

0825 Turning outbound

0834 Turning inbound

0838 Downdraft of 5 m/s

0840 Turning outbound

0846 Updrafts seem to be wider

0852 Inbound

0857 Outbound

0910 Transiting 40 nm east

0922 Turning outbound

0927 Rising to 12000 ft

0929 Two layer wave cloud

0932 Got behind second band on radar turning outbond

0957 Turned outbound

1011 Turning inbound. Four waves apparent on outbound leg previously.

1023 Turn outbound, descend to 10000 MSL

1034 End of Bore mission

1048 Wheels down in Grand Island for refuel

Notes:

Flight Summary:

A bore UFO mission with a plan to ferry to O'Neill, NE and sample a bore event from an east-west oriented MCS in South Dakota with east-southeastward propagation. A density current was obvious at takeoff moving ahead the storm complex with a more southerly motion than storm system. Dropped to 10000 ft MSL 50 nm south of O'Neill. Continued at 10000 ft for a few passes. There was a well-developed bore west of our position, however we elected to work east and south with motion to sample bore from density current through later evolution. Refueled in Grand Island, NE and ferried back to Great Bend. No known problems.

6/19/15 PECAN Pilot notes (Pecan Research Flight 11)

Crew: Drew, Parish, French, Wang

Flight Time: 4.8

Objective: Low Level Jet (Fixed track)

Planned: Track north to end of line at Isobaric 3700 MSL. Fly two complete vertical sawtooth patterns, (out and back); Fly Isobaric at 3700 MSL; repeat two full sawtooth patterns. Fly Isobaric track back.

Actual: Departed GBD on track towards north on 355 at 3700. Started vertical sawtooth low each time. Completed vertical sawtooth from 500 AGL to 3,000' AGL and repeated. Then flew a full isobaric leg at 3700 MSL. Then repeated full sawtooth twice more. However, on second vertical sawtooth, extended climb up to about 4400 AGL. Increased rate of climb and descent to keep close to vertical track.

Returned on same leg at 3700, climbed to 6300 made a 10 mile northbound leg and returned to KGBD.

PECAN 2015
TF11 (062015)
Drew, Parish, French, Wang

French Flight Notes

Plan-
Single LLJ mission with a takeoff a bit before sunset. Plan is to capture the initial formation of the LLJ. We will focus primarily on sawtooths and one pair of constant pressure legs.

Flight-

0045 Wheels up

0058 – 0234 Complete 4 Sawtooth legs (2 east to west; 2 west to east)

0238 – 0322 Complete 2 constant P legs at 3700 ft MSL

0326 – 0505 Complete 4 sawtooth legs (went a bit higher on last two sawtooth legs to profile top of BL and into layer that showed a strong inversion and significant drying).

0528 Wheels down

Post Flight-
No major issues on flight.

LWC100 was turned on late (no clouds on this flight).
LICOR reference bottle turned on about 10 minutes into flight.
Issues with KingAir data displays noticed after engine start. Needed to restart DDS software (not reboot computer) then restart all of the displays

WCL was going to be left off for entire flight due to expected heat in cabin. Decided to turn on near end of flight as we were profiling higher up. It still overheated within 15 minutes of being turned on.

6/16/2015 PECAN Pilot notes (RF 10)

Crew: Wadsworth, Geertz, Guy, Wang

Flight Time: 4.2
Objective: MCS Mission.

Planned: Ferry to the NW about 140 NM from KGBD to work a system to NW of McCook, NE. Expected to land in McCook with an alternate of Goodland to refuel prior to ferrying home.

Actual: Filed & departed toward a fix over Hayes Center, NE (HCT) and climbed to FL 200. Enroute changed the IP to McCook. Worked a MCS to the NW of McCook. Started at 12,000' MSL. Gradually worked down to 6,000' MSL. Copious amounts of cloud-to-cloud lightening which essentially provided backlighting to all the cloud features in the area we were working. Tended to heighten the confidence level overall. Maybe a requirement for working such features. Either have significant environmental lighting or else have backlighting from the lightning so that all cloud feature can be periodically seen. This was not the case during the previous flight when we overstressed the aircraft.

As flight approached 3 hours it became clear that both McCook and Goodland were becoming less optimum as landing sites as the storms were moving over the fields. Decision made to return to Great Bend.

PECAN

RF10

17 June 2015

0136 Wheels up
0147 In transit. Radar and lightning momentarily not working.

0156 Ops Center sending us toward supercells and linear MCS setting up. We are first going to south of systems near McCook

0209 Descending to 12000 MSL to get better boundary layer information from CRL

0223 Begin east-west racetrack

0225 Turning for inbound along racetrack

0228 Lots of electrical activity all around

0235 Approached supercell MCS and turned around maybe a little further out on the safe side

0245 Outbound leg and descending to 10000 ft. Seeing wavelike features in CRL

0254 Begin a 307 heading toward NW

0257 Turning outbound. Very active storm

0303 Turning inbound. Descend to 9000 ft, not much structure below, but an inversion present about 1.2 km down

0306 Anvil is spreading eastward, will turn north to shift our racetrack northward

0309 Turning outbound, descending to 8000 ft MSL

0316 Inbound turn, same level

0321 Shelf cloud possibly above out flight level out in front being lit from lightning

0322 Turning outbound

0327 Turning inbound, descend to 7000 MSL. Drifting northward with wind. Keep track of 307 ground

0331 Shelf cloud more widespread, but we are seeing cloud-to-ground now (last pass too)

0333 Turning outbound, ice cloud above (seen from large depolarization ratio). Expanding out you can also see an anvil cloud above, so Sc mid-level and anvil high.

0339 Turning inbound

0343 Wave feature in aerosol boundary layer

0346 Turning outbound

0353 Turning inbound, same alt 7000 MSL

0359 Turning outbound, cloud layer above, slanted

0400 Descending to 6000 MSL

0406 Inbound at 6000 MSL

0412 Outbound

0419 Turning to 262 and ascending to 8000 MSL, moving west

0421 Mapping inflow along storm

0428 Ascend to 10000 MSL

0429 Turning southwestbound to set up a northward track

0433 Turn westbound to get into position for a track

0434 Setting up for our run, but seeing towering Cu along outflow boundary. Bugging out to regroup.

0437 Outbound away from storm

0440 Turning north for a north-south racetrack

0445 Outbound

0450 Heading back to GBD

0537 Wheels down

Notes:

Had to restart the Nexrad and lightning data on DDS at beginning of flight.

Flight Summary:

MCS mission of a developing system propagating from WY to SW Nebraska. The line of convection overran discrete supercells that had stalled in the NE panhandle and became a large MCS system with east-northeastward motion. We worked NW-SE racetracks along the eastern side of the merged storm. Convection continued to develop along the south side. We eventually began to work to the south side of this line, however the outflow boundary was embedded in the larger system. This complex did not develop a well defined outflow away from the storm, though it did engulf out original alternates. All instruments worked well.

6/14/15 ASCII Pilot notes (Flight 9)

Crew: Drew, Parish, French, Wang

Flight Time: 3.1

Objective: MCS

Planned: Fly to point picked by Ops Center, fly racetrack pattern on eastern side of convective area. Possible vertical sawtooths in the racetrack.

Actual:

Departed GBD climbed to 11000 MSL and proceeded towards Hutchinson to the east end of a convection line SW/NE to get around to the south east side of the line. Descended to 4000 ft. On the south side continued west to a line just south and west of the initial line. Set a couple of racetracks NW/SE but started to get boxed in with new growth developing to the southwest (resulting in very short racetracks). Initially exited to the southeast, but then decided to move to the west and then north towards Pratt, KS to work near the ground assets. Climbed to 5000 ft. On west side of line found cells blocking our way to the north. Decided to set a racetrack NW/SE off the convection farther to the west and completed one full racetrack from convection to the east to convection to the west. At the western end of the track headed towards Great Bend.

PECAN 2015
RF09 (061515)
Drew, Parish, French, Wang

French Flight Notes

Plan-
Single flight MCS mission. UWKA returned from Salina after repair of generators early in the day. Plan was to conduct a short test flight followed by research mission later in the evening. Ground testing for the CRL took longer than expected, decided to forego the test flight and try a research mission.

MCS is forecast to move through the area south of Great Bend. Plan to intercept to the eastern side and get on front side to look for outflow boundaries. Do not expect a large system.

Bart is out of town, so Tom volunteered to take this flight.

Flight-

0204 Wheels up

0209 everything is up and running

At time of takeoff, a line of cells stretched west to east south of Great Bend and primary convection was on south side of the line. So UWKA decided to fly around east end of line to get to south side and try to work on south side nearer the main convection.

There was not a well-defined, cohesive line, but rather a few individual cells. We worked around the south end of cell clusters, mostly below 5000 ft because of a persistent stratus deck above.

For first ~1 hr, work in a 'notch' that eventually closed off from new convection. After that, moved further west to attempt repeated legs over ground assets.

0501 Wheels down

Post Flight-
A bit of a frustrating flight because the convection would not behave itself. No well-defined line ever formed and we spent much of the flight dodging in around individual cells and clusters of cells.

6/10/2015 PECAN Pilot notes (RF 8)

Crew: Wadsworth, Geertz, Guy, Wang

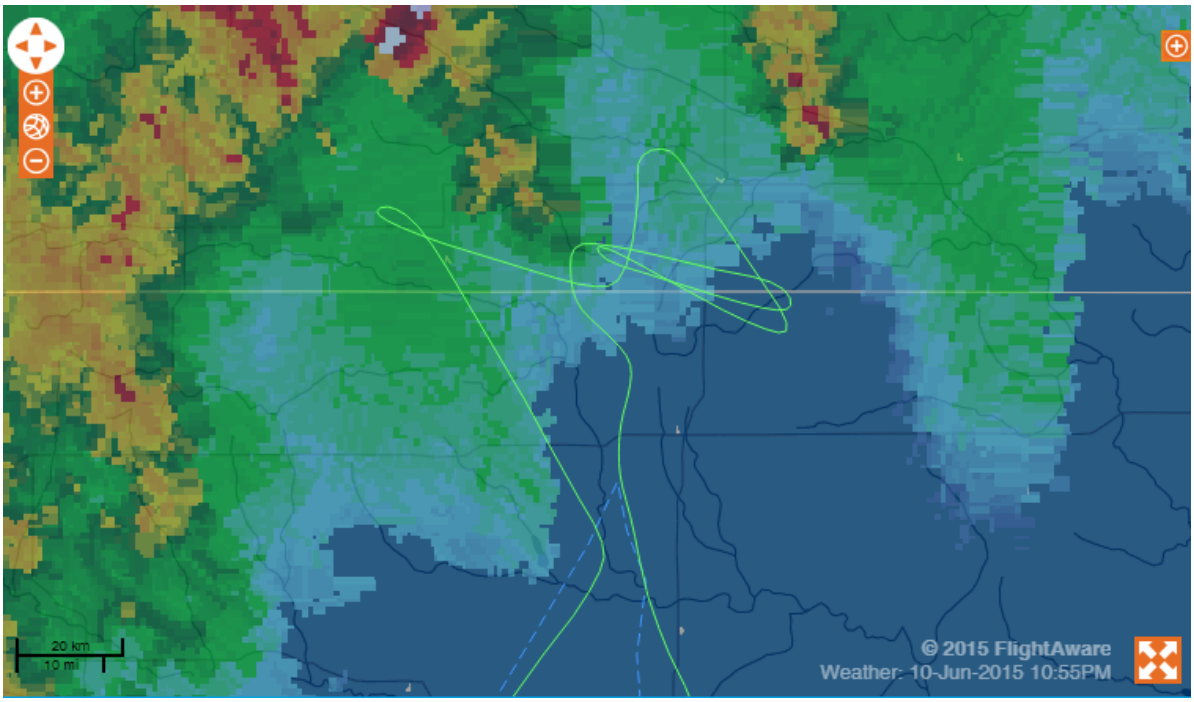
Flight Time: 1.8
Objective: MCS Mission.

Planned: Main, Major, Monstrous, Mesoscale Convective System flight. Ferry to the NE about 160 NM from KGBD to work a system north of the NE/KS border. Expected to land in Lincoln to refuel prior to ferrying home.

Actual: Filed & departed toward a fix over York, NE and climbed to FL 200. Enroute received an update to the desired IP. Flew toward that point & started a descent to arrive over it at 7,000' MSL. The initial leg outbound from that first point took us towards the NW basically normal to the line. We approached the line and when at about 5 miles from the return on the aircraft radar we turned outbound to an ESE heading. While on this leg we received a new IP which took us almost due north. We barely crossed this point before we had to turn outbound due to proximity to the MCS. We tracked to the SE and then turned basically westbound toward the line of storms.

This track we worked for a total of 1 ½ cycles. Two trips westbound and one eastbound. Wind was pushing us to the NE (about 40 kts) so we had to incorporate some crab on both the inbound & outbound legs. Still wasn't a perfect track as shown below.

On the last westbound leg, we were holding a large radar return off our right front and at a distance of between 5 & 10 miles. No visible lightning exiting the cloud although there was a fair amount of in-cloud lightning. As shown below, this last westbound leg took us about 2 ½ miles further west than the previous westbound leg.



All returns on the aircraft radar were beyond 5 miles. Approaching the west end of this leg, we entered cloud so ice vanes were extended and prop heat energized. Almost immediately we experienced significant turbulence and we bailed-out with a left turn towards the SE. During the turn we saw the left generator had kicked off. One attempted restart of the generator then the data system was secured via the FWD power switch. The turbulence continued although not to the level of violence as the first thumper.

As we started to exit the cloud, the turbulence subsided. Coordination with Minneapolis Center made for a direct flight to Great Bend at about 17,000 feet and we started to turn toward the SW in the direction of the airport. XM weather showed that there was still convective activity along the route of flight so deviations to the SE to avoid the weather requested of ATC.

The Master Warning light had continued to flash since the initial loss of the left generator in spite of attempts to clear it. About this time, noticed that the right generator had dropped off-line as well. An attempted restart made with no success.

Decision made to divert to Salina at this point and coordinated with ATC. They suggested a closer airport, but it was less than 5000’ in length. They gave an initial vector and a distance to Salina. Rough math indicated that it was going to take over 20 minutes to get there so decision made to secure the

battery to save it for gear extension. ATC informed of what we was doing and that we would periodically check back in with them.

The iPad rocks. We were in great VMC conditions but with the battery off, we were navigating by dead-reckoning. The iPad with ownship position and GPS guidance was a huge help. The top image above shows how the aircraft was trending towards the SE until it takes a correction almost due south and tracks directly to Salina. That was when the iPad was enabled and provided the guidance to the field.

Nick was keeping time so we would periodically check back in with ATC. Bart was helping with the flashlight. Zhien was looking for his headrest and his phone which later provided more illumination via his flashlight app.

Coordinated later with ATC to have Salina turn their field lights up on bright which helped us spot the field from ~20 miles out.

Landing was uneventful.

During the research phase we had received four different IPs to utilize with very little time spent on any one of them.

PECAN

RF08

11 June 11, 2015

0202 Wheels up
0209 Instruments up

0220 No nexrad composite on track

0227 Start racetrack from SE to NW at 7000 MSL

0241 At 7000 ft, turned 293

0242 Turned to 113

0251 Now on a track NE on a different outflow

0308 103 and 283 heading for racetrack

0319 wave structure observed on upward lidar on inbound toward storm

03

Notes:

Nexrad composite feed not operating

Flight Summary:

MCS mission centered on a large, growing system straddling the NE and KS border. Operated in close to the MCS, with initial legs being very short toward the system. There was significant turbulence crossing and outflow boundary from what appeared to be breaking wave dynamics. Experienced mechanical issues requiring a reroute to Salina, KS and early termination of the mission.

6/9/15 ASCII Pilot notes (Pecan Research Flight 7)

Crew: Drew, Sullivan, French, Wang

Flight Time: 4.6

Objective: Low Level Jet (Fixed track)

Planned: Fly two complete sawtooth patterns, (out and back); Fly Isobaric at 3000 MSL; repeat two full sawtooth patterns.

Actual: Departed GBD heading towards east end point. Started sawtooth low from 3,000' AGL to 500' AGL and reversed on return leg (repeated). Then flew a full isobaric leg at 3000 MSL. Then repeated full sawtooth twice.

PECAN 2015
RF07 (061015)
Drew, Sullivan, French, Wang

French Flight Notes

Plan-
Flight 2 for a LLJ mission. Flight1 lasted about 4.5 hours, expect 45-60 minute turn-around for the aircraft then another 4.5 hour mission.

LLJ is weaker and much lower than during first LLJ (RF01 & RF02). For this reason we will be focusing on sawtooths, with potential for 1 (out and back) isobaric leg, depending on how the jet develops.

There were several issues on flight1 with instruments (see RF06 notes)—we will keep a close eye on everything for this flight.

Because of cabin heat, we are not running the WCL during this flight.

Flight-

0540 Wheels up

0545 – 0728 completed 2 sawtooths (out and back) along ~60 nmi leg between 500 and 3000 AGL

0730 – 0815 completed 2 (out and back) isobaric legs at 3000 ft MSL (~1200 AGL on east end, 500 AGL on west end)

0821 – 1000 completed 2 sawtooths (out and back) along ~60 nmi leg between 500 and 3000 AGL

The LLJ was stronger on east end, as strong as 35-40 kts in the early/middle of the flight period, but then began to weaken later in the flight. Early in the flight, the peak winds were around 500 AGL (we saw the peak on a few decents, others the winds were still increasing when we reached 500 AGL). Later in the flight, peak wind level was between 600 and 750 AGL on most of the descents.

Post Flight-
Despite the issues during the first flight, there were no issues during this flight.

We calibrated the LI-7500 following the flight and updated the header. The cal values changed only a little.

6/9/2015 PECAN Pilot notes (RF 6)

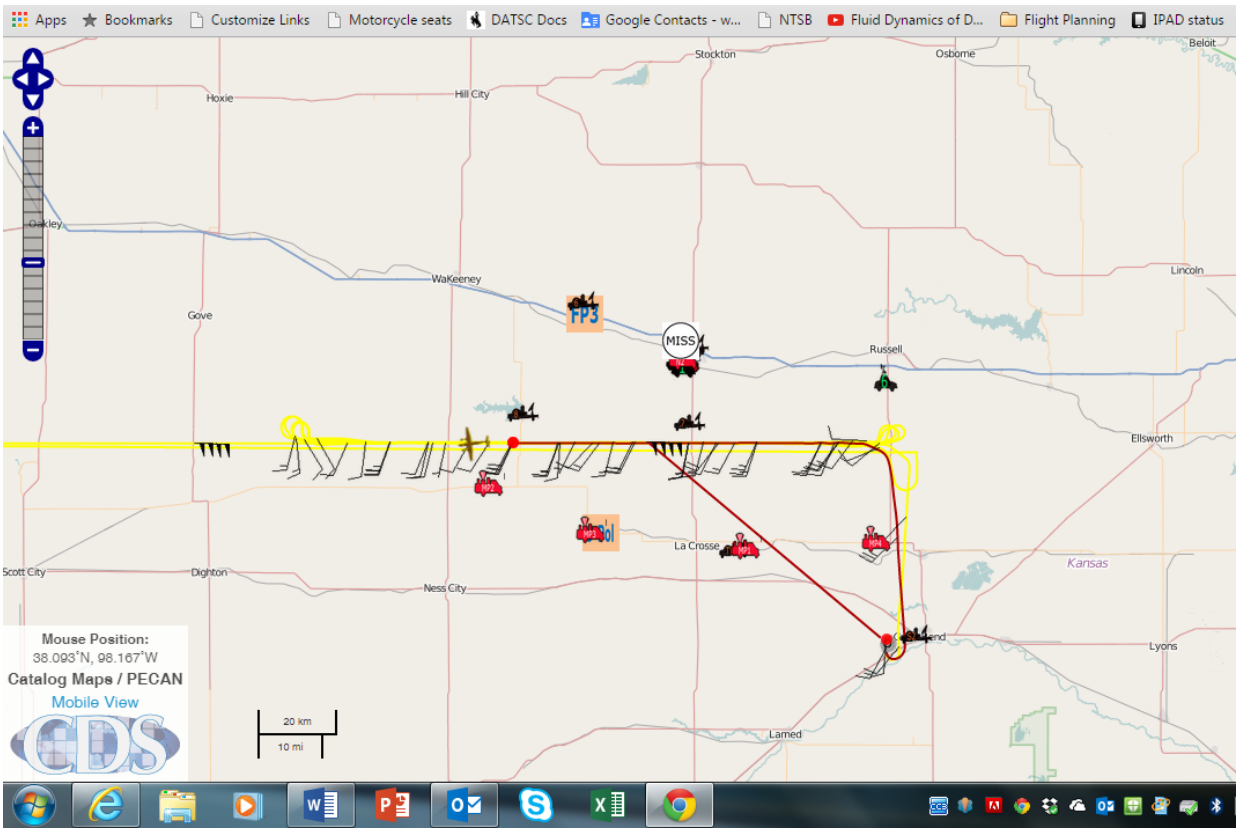
Crew: Wadsworth, Sullivan, Guy, Wang

Flight Time: 4.6
Objective: LLJ Mission.

Planned: Low Level Jet mission along the standard line.

Actual: Total of 10 transits doing the vertical sawtooth from ~500' to 3000' AGL. One leg at ~6500' MSL level and another at 14,000' MSL to allow the lidar to cool a bit.

No issues. Walk in the park.



PECAN 2015
20150610
RF06a

Flight Notes
System Scientist: Nick Guy

Plan
Plan for a bore mission, with 2300 LT (0400 Z) takeoff.

Flight
10 June 2015
0027 Takeoff
0032 Systems up and running, en route to LLJ line
0036 Turned off nexrad composite download
0039 Reached LLJ track, beginning maneuvers, a mean of 750 ft/min ascent/descent rate
0101 End of line westward, 7th point reached
0105 Beginning 2nd sawtooth leg west to east
0126 Finishing 2nd sawtooth
0130 Begin 3rd sawtooth leg
0138 Peak of 16 knots appeared about 1500 ft AGL
0143 Tom says have patience on LLJ formation, but we are seeing a wind shift as we descend from westerly aloft to southerly near surface
0154 Begin 4th sawtooth leg
0211 Zhien checked the back temperature only the back cabinet is hot
0216 End of 4th sawtooth leg
0217 Ascend to 4500 ft AGL for straight level pass over LLJ track
0220 On track at 5000 AGL
0231 Zhien sees some corresponding variation in CRL with in situ dewpoint. Temperature homogeneous and water vapor was variable.
0241 End of straight leg
0242 Ascending along straight leg to 14000 ft MSL
0310 Had to restart GPS as Nav/GPS Position had faulted
0311 Beginning a sawtooth pass
0314 21 kt wind at 2500 ft MSL
0331 End of 5th sawtooth
0336 Begin 6th sawtooth leg
0338 Some more turbulence felt on the climb up
0356 Jet seems stronger to the east
0357 End of 6th sawtooth leg
0400 Start 7th sawtooth leg
0422 End of 7th sawtooth leg
0424 8th and final sawtooth leg begun
0446 finished 8th sawtooth pattern. 30 kt wind, an inversion layer
0457 Wheels down

Notes:

PCASP data was not flowing through, had to pull PMS breakers and enable again to fix.
Touch screen on seats 3 & 4 not working. Also usb automount not occurring for thumb drive
The gas bottle in the back rack was not turned on
The flight turned out to be a good cal flight for CRL. Temperature structure was homogeneous while variability in water vapor was found.
Front computer shut down with Error message just before landing.

LLJ mission, with the jet trying to set up near the end, though it was located very low (< 500 ft for the nose) by the end. We completed 8 sawtooth legs along the pre-determined flight path, as well as two straight-and-level lower down and a "cooling" flight at 14k ft. It was decided to not run the WCL on this (and following) flight due to the heat generated in the cabin and the fact that the WCL shut down under similar conditions on a previous flight.

6/7/15 ASCII Pilot notes (Flight 5)

Crew: Drew, Geerts, French, Wang

Flight Time: 4.2

Objective: CI

Planned: Fly to point picked by Ops Center, fly rectangle 10 nm by 30 nm on

Actual:

Departed GBD climbed to 5000 MSL and proceeded to point for western line. Climbed to 8000 MSL flew western line. Extended line extra 10 nm south then flew east and north legs. Decided to fly racetrack along eastern edge on 350/170. Moved west about 10 nm and flew a new racetrack with same orientation. Descended to 4200 MSL. Moved about another 10 nm west and flew a new racetrack with 330/150 orientation. After a few altitude changes, Center offered a block altitude instead of asking for each change. I was given 4200 – 9000 MSL. On racetrack at 4500 MSL, Center could not hear us until I climbed to 6500 ft. MSL. Ops gave us two points for a new line and flew it southeast/northwest. On way to GBD did a slow 500 fpm sounding to 1000 ft. AGL.

PECAN 2015
RF05 (060815)
Drew, Geerts, French, Wang

French Flight Notes

Plan-
Plan for CI (Convective Initiation) Mission. We will fly south and east of Great Bend, near the 75 km range ring of the SPOL; there will be several ground assets in the area. We will be focusing on several lines that are evident on the radars and expected to result in convective initiation on the north side of some more intense convective activity further south.

Flight-

0201 Wheels up

0204 climbing out of GB, everything up and running

0209 begin NW→SE pass along the pre-defined box; a boundary evident on radar is also visible as a line of clouds near the south end of this prescribed line. As we pass over the line (out of cloud) we note strong updraft and uplift of wv vapor evident on the CRL.

Following first pass, we return flying more s→n to orient ourselves more perpendicular to line. Cells are beginning to form along the line.

At north end, turn back south for another pass, as we approach we note the cells have grown rapidly, and one has become electrified. We break off the pattern.

0245 move further west to get away from the rapidly growing large convection

Once west, we begin to work primarily N-S legs across lines that are evident on radars. These look more like bore-type features with 2-4 waves on top of warm, moist boundary layers, propagating north out from convection that is situated to the south. We make several passes at various levels, above and within the waves.

Some waves are topped by small clouds, but no significant convective initiation occurs.

The last two legs are oriented NNW – SSE along an RHI radial for one of the DOWS.

0609 Wheels Down

Post Flight-

For catching pristine CI, it may have been better if we launched earlier. CI occurred, but shortly after we reached station, so an earlier takeoff time would have allowed better sampling of the pre-convective environment and repaeated sampling before the convection grew too large to work.

The latter half of the mission turned somewhat into a bore mission with repeated passes over wave-like features in the boundary-layer.

No known instrument issues.

6/5/2015 PECAN Pilot notes (RF 4)

Crew: Wadsworth, Geertz, Guy, Wang

Flight Time: 2.8
Objective: Bore Mission.

Planned: Bore mission with an initial point of Ness City then due north to Hill City.

Actual: Departed GBD, climbed to 8,000' MSL direct to HYS 215/ 036 DME fix then set up a racetrack pattern north to the HLC 060/019 DME fix. Altitude was 8,000'. Kansas City gave an altitude block of 5 – 8K'. After turning back to the south towards the IP, the ops center vectored us around for some goose chasing, and ended up after about 30 minutes back near the northern point off HLC. Then they turned us to the west across a bore that developed and we worked it for four legs before heading east and doing a spiral sounding over the east end of the low-level jet leg. Then we headed home to Great Bend.

Both Kansas City and Denver were very helpful. Zero traffic in our area. Total of three frequencies worked: two with Kansas City and one with Denver. We cancelled IFR and took VFR flight following for the spiral sounding. Image of the flight track below.

Wyoming King Air Mission Scientist Summary

Author: Bart Geerts

Mission ID: IOP5 –RF4

Mission Type: bore

Takeoff Time: 2015-06-06 04:02:00 UTC

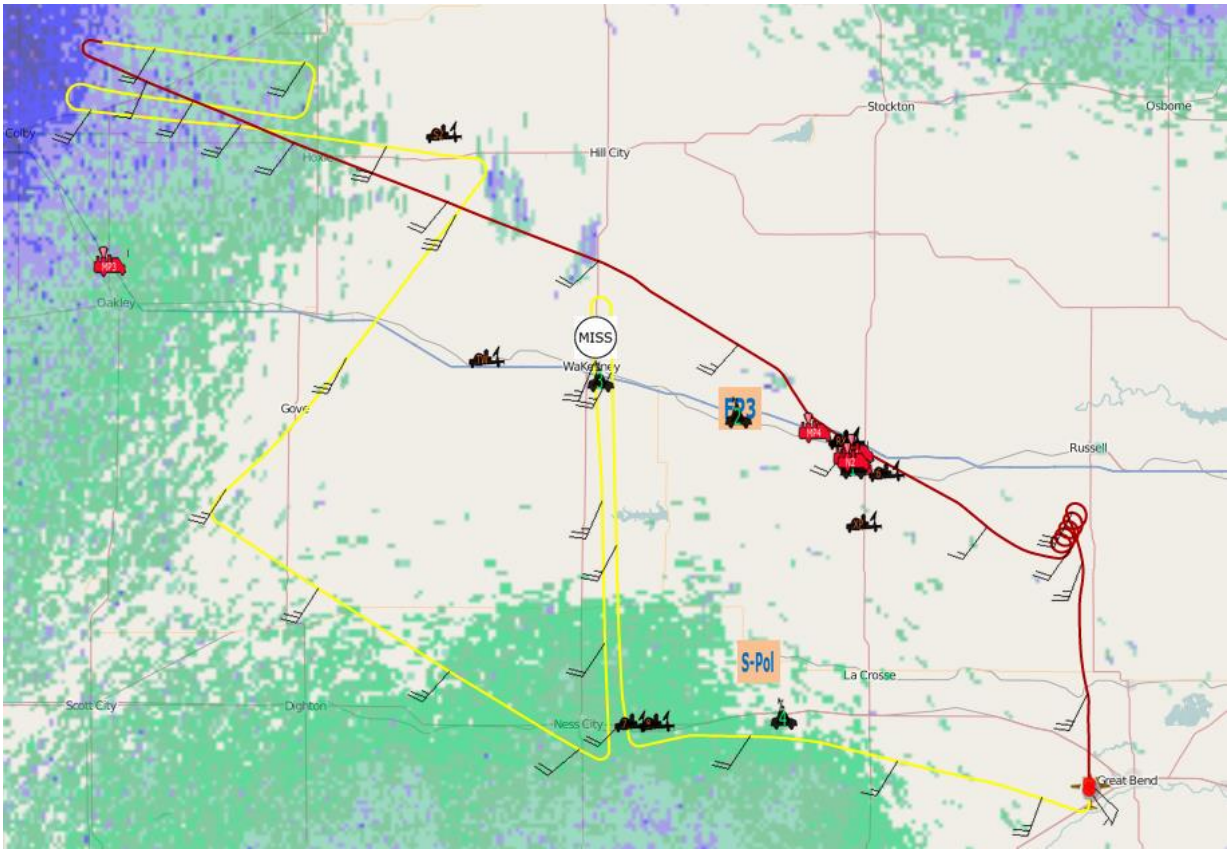
Landing Time: 2015-06-06 06:48:00 UTC

Summary:

This mission was definitely more challenging than the bore mission on 5 June. The mobile armada was placed in preparation for a bore moving toward 180°. We flew two 80 km long N-S legs along the MP array between Ness City and Hill City, south of an MCS. By the time we completed these legs, the MCS had decayed with remnants moving off to the NE. The western radars (SR1, SR2) began seeing a boundary coming in from the west (moving to the east) and so it was suggested that the KA fly westbound to determine if there was a wave train as opposed to sticking with the original setup. The KA then flew out to the NW to determine if the boundary was indeed a bore/soliton because the fine line was very faint due to being on the edge of a radar hole. That boundary dissipated quickly. Indeed the KA did not see anything, so then KA flew up to the NE, near Hoxie to sample a stronger outflow boundary coming eastbound from the MCS near the NE stateline, in hopes of seeing a bore form later on. SR1 and SR2 went out to sample this boundary, most other platforms had been shut off, and went home. The KA flew 4 E-W legs across this outflow boundary, which turned out to a shallow undular cloud boundary with some wavelike cloud top behind it, and steady cloud deepening, remaining less than 1.5 km AGL. Not clear whether this was a density current with leading head and trapped lee waves, or a bore. The SRL capture the cloud top well, as well as the lifted moist layer above, but of course there is no lidar info below cloud top.

The SR2 operated in RHI mode across this cloud boundary until the UWKA left the scene.

All flight levels were rather high, 8000 MSL (1.6-1.7 km AGL). Compared to RF2, which had a deep moist layer up to the level of an elevated cap, the moist layer in this flight was quite shallow, contained within the 300-400 m deep SBL. The LLJ peaked at 400 m AGL. As for RF3, we did a spiral descent at 500 ft/min to obtain a humidity profile collocated with CRL measurements.


Stockton
Osborne
Colby
Hill City
Oakley
MISS
Wakeeney
Gove
FP3
Russell
S-Pol
La Crosse
Scott City
Dighton
Ness City
Great Bend

PECAN 2015
20150606
RF04

Flight Notes
System Scientist: Nick Guy

Plan
Plan for a bore mission, with 2300 LT (0400 Z) takeoff.

Flight
0401 Wheels up

0408 Transit at 8200 ft MSL

0422 North heading along track from Ness City to Hill City

0433 180 degree turn, transiting south along same line above ground assets

0449 Begin westward turn to 290 deg heading

0514 Approaching southern edge of storm, lightning to west

0516 Turing westward toward outflow boundary

0523 Step pattern in dew point

0525 CRL downward wave feature evident

0528 Turbulence encountered, continue 20 nm to see if solitary wave or train

0530 Reversing to racetrack pattern, approx. 20 nm track

0539 Offset track to north and continuing west track

0540 Westbound along track

0548 Turned to heading 110

0555 Passed leading edge of outflow feature and saw a dewpoint depression of a few degrees

0559 Zhien pointed a stable layer on CRL that near the ground layer

0622 Begin spiral descent, corkscrew (continuous angle) descent, 500 ft/min. From 7500 ft MSL

0632 Down to 2700 ft MSL, begin ascent

0644 Landing

Notes:

PCASP data was not flowing through, had to pull PMS breakers and enable again to fix.

A solitary wave structure, with a bulge along the front on the feature. A vertical spiral temperature and humidity profile was taken at the end of the flight. The WCL was realigned and appeared to operate normally. PCASP required restart. No other known issues.

6/4/15 ASCII Pilot notes (Flight 3)

Crew: Drew, Geerts, French, Wang

Flight Time: 2.0

Objective: Bore

Planned: Fly to southern edge of radar echoes to a point identified by the ops center. Set a racetrack and move with radar returns.

Actual: Several points identified prior to getting in aircraft. However just prior to takeoff, received new coordinates and orientation just northwest of GBD.

Departed GBD climbed to 5000 MSL and proceeded to line. Flew inbound to 10 nm from echo line due to lightning present. Turning back inbound raised to 6000 MSL, flew inbound to 5 nm from echo line because lightning had died out. On second outbound received new coordinates and orientation. Finished the outbound leg and turned to the new line. Tracked inbound on new line when ops recommended turn to the SW to cross radar feature. Climbed to 7500 MSL during inbound turn. After making full circuit, flew middle leg outbound and repeated part of first line inbound. Did sounding to 1000 AGL and returned to GBD.

Wyoming King Air Mission Scientist Summary

Author: Bart Geerts

Mission ID: IOP4 –RF3

Mission Type: bore

Takeoff Time: 2015-06-05 05:21:00 UTC

Landing Time: 2015-06-05 07:23:00 UTC

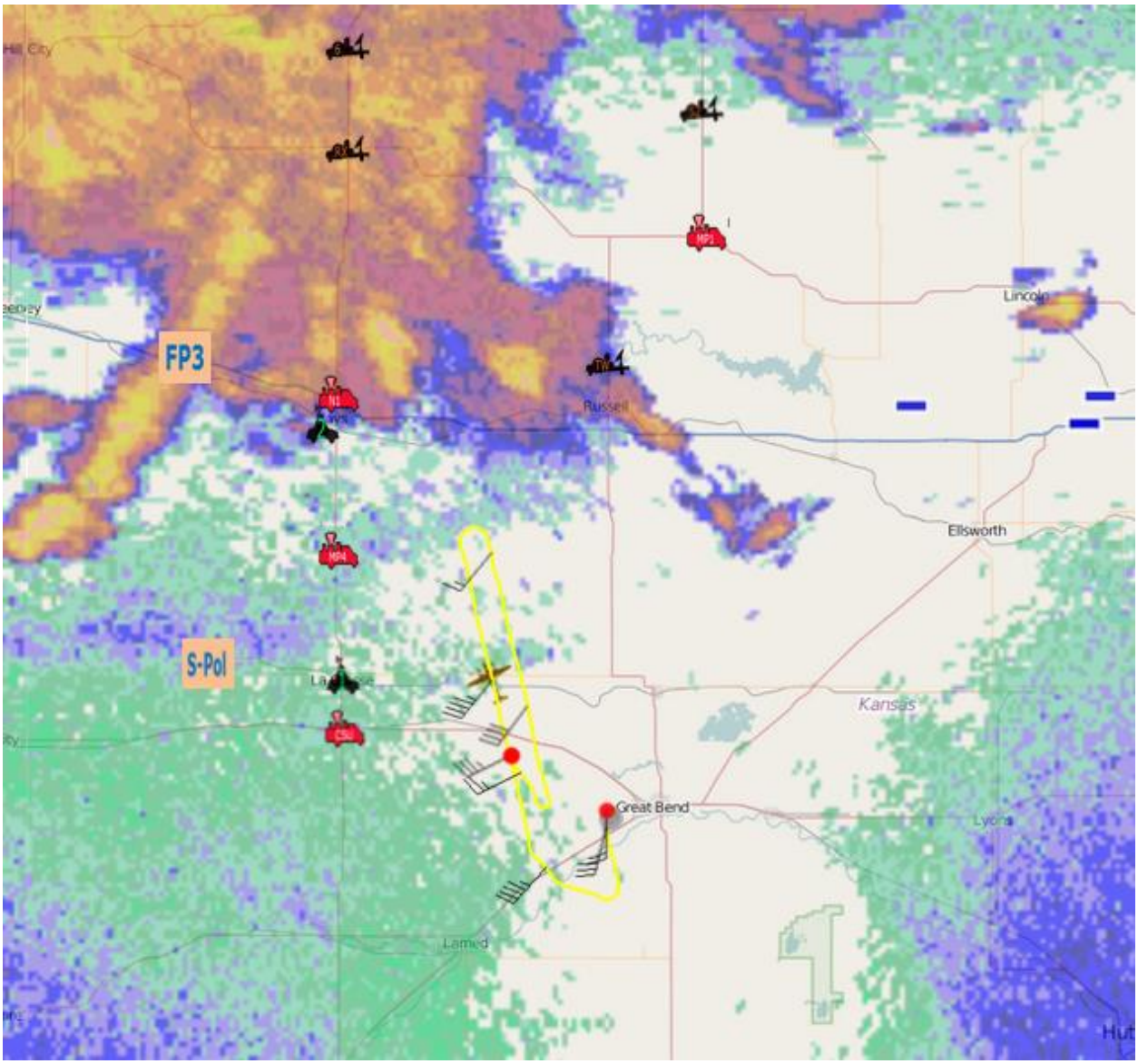
Summary:

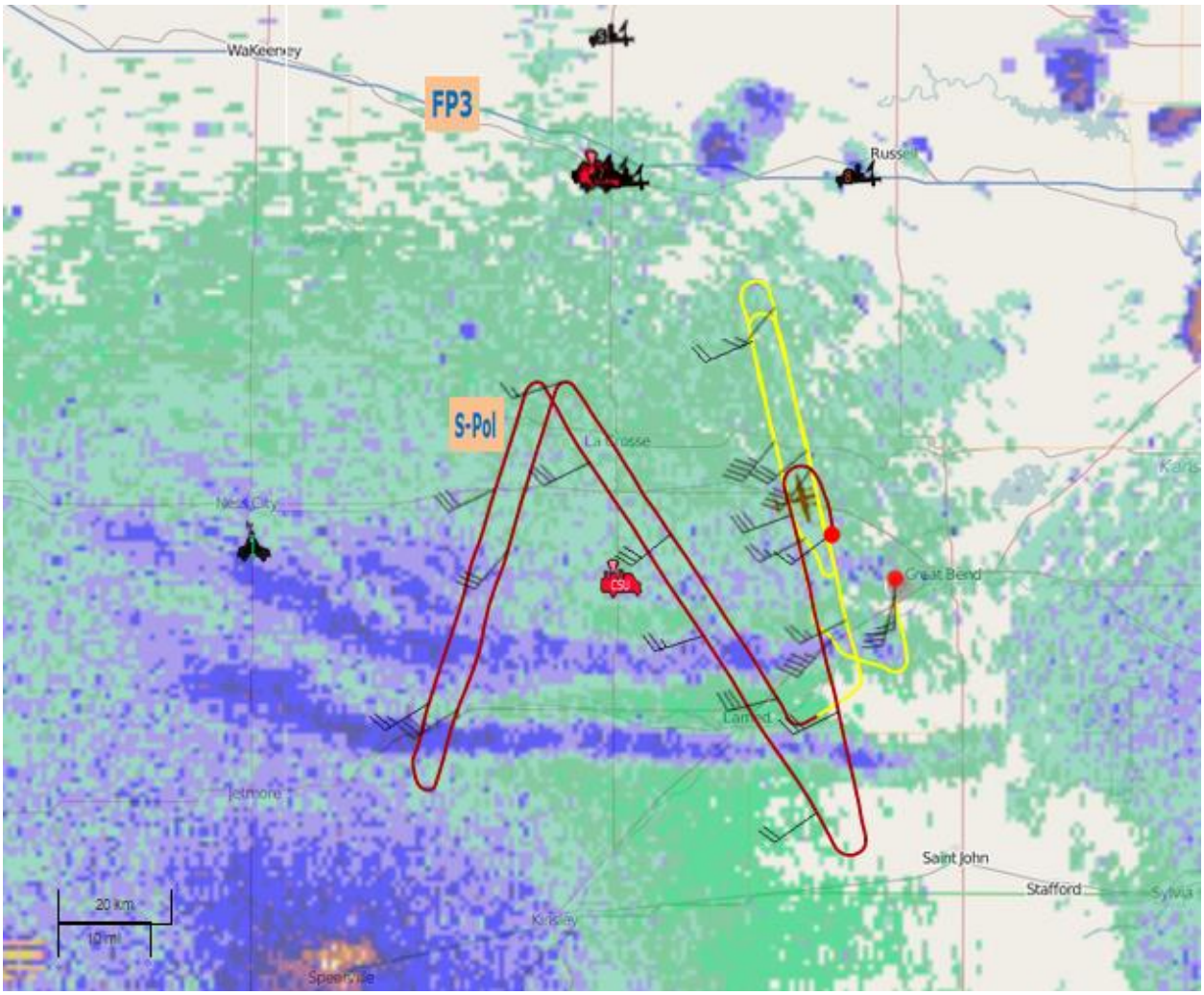
Mostly a solo mission as mobile armada was operating well north of the flight track, and already had ended most of their ops by the time the UWKA started. Also, S-POL was down. We did have a mobile mesonet vehicle, the CSU MGAUS, and soundings from FP2 and FP3 to the south and north of the flt track resp. Relevant sounding time only at 6 Z.

We flew 9 legs across an evolving undular bore. Flight levels 5000 MSL (~1.0 km AGL) for legs 1-2, 6000 MSL (~1.3 km AGL) for legs 3-6. Since we cut through the wave crests and into the moist layer in the bore source region, we raised the FL to 7500 MSL (~1.7 km AGL) for legs 7-9 so the entire bore undulation was below flight level, captured by the nadir-viewing CRL. On each of the 9 legs some wave feature was observed, with vertical velocity amplitude up to 4 m/s. Vertical velocity mostly was quadrature-shifted from temperature at flight level, indicating gravity waves, but there was sustained BL deepening, indicating a bore. The waves were mostly smooth. Light turbulence was encountered only near the decaying convection in the north, and near the downstream side of some undular waves.

The CSU MGAUS was released around 530Z ahead of the bore, near Lacrosse KS. The moist layer is only up to 850 mb, consistent with CRL observations. This layer is capped by an isothermal layer 850-800 mb that may have served as waveguide. Shallow LLJ, 40-45 kts, peaking below 850 mb.

All instruments performed well on board the UWKA. The CRL water vapor retrieval is somewhat uncertain b/o the overheating of the laser and resulting expansion of lenses. But the CRL nicely captures undulations in the moist-layer top.


FP3
S-Pol
Great Bend
Ellsworth
Russell
Lincoln
Kansas
Larned

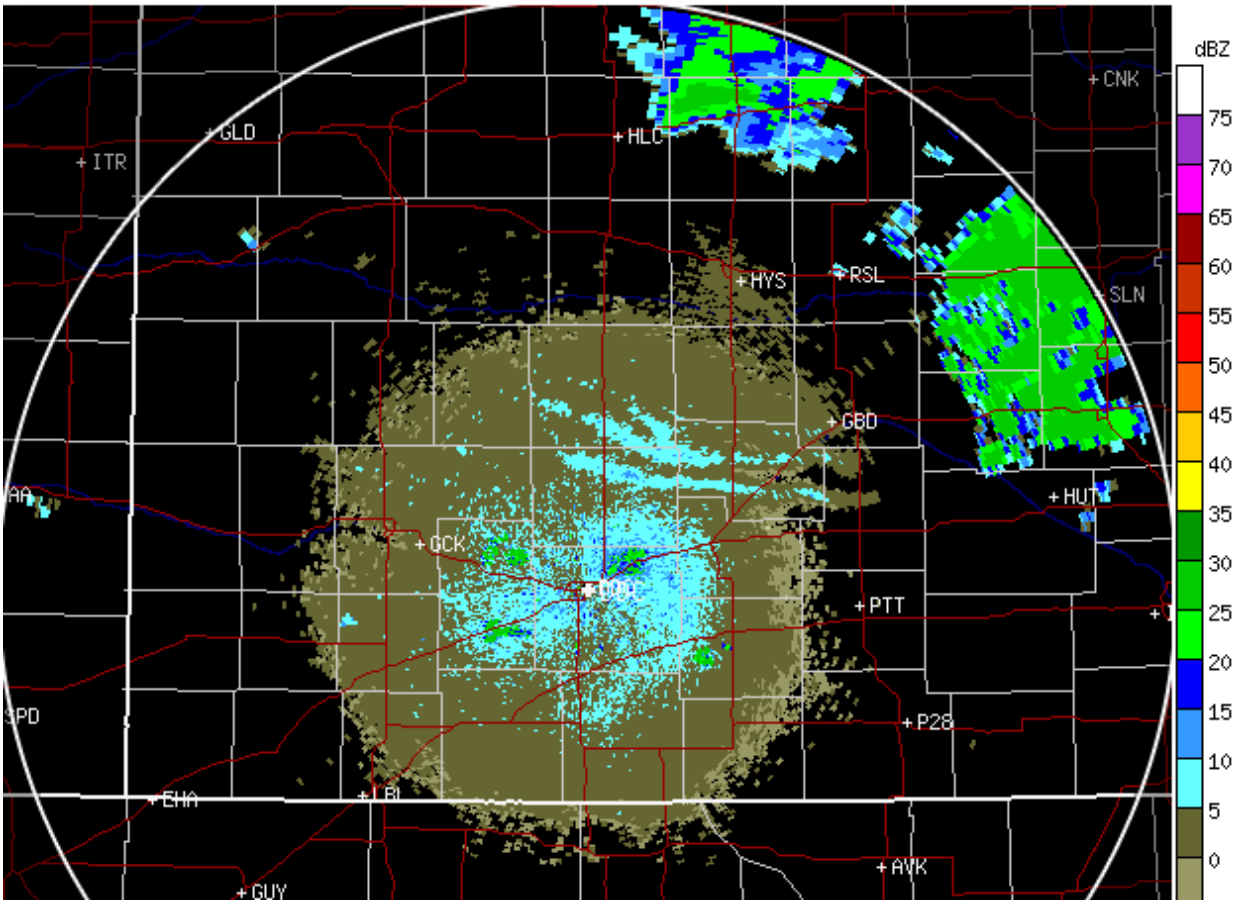

FP3
S-Pol
Russell
Great Bend
Saint John
Stafford
20 km
10 mi

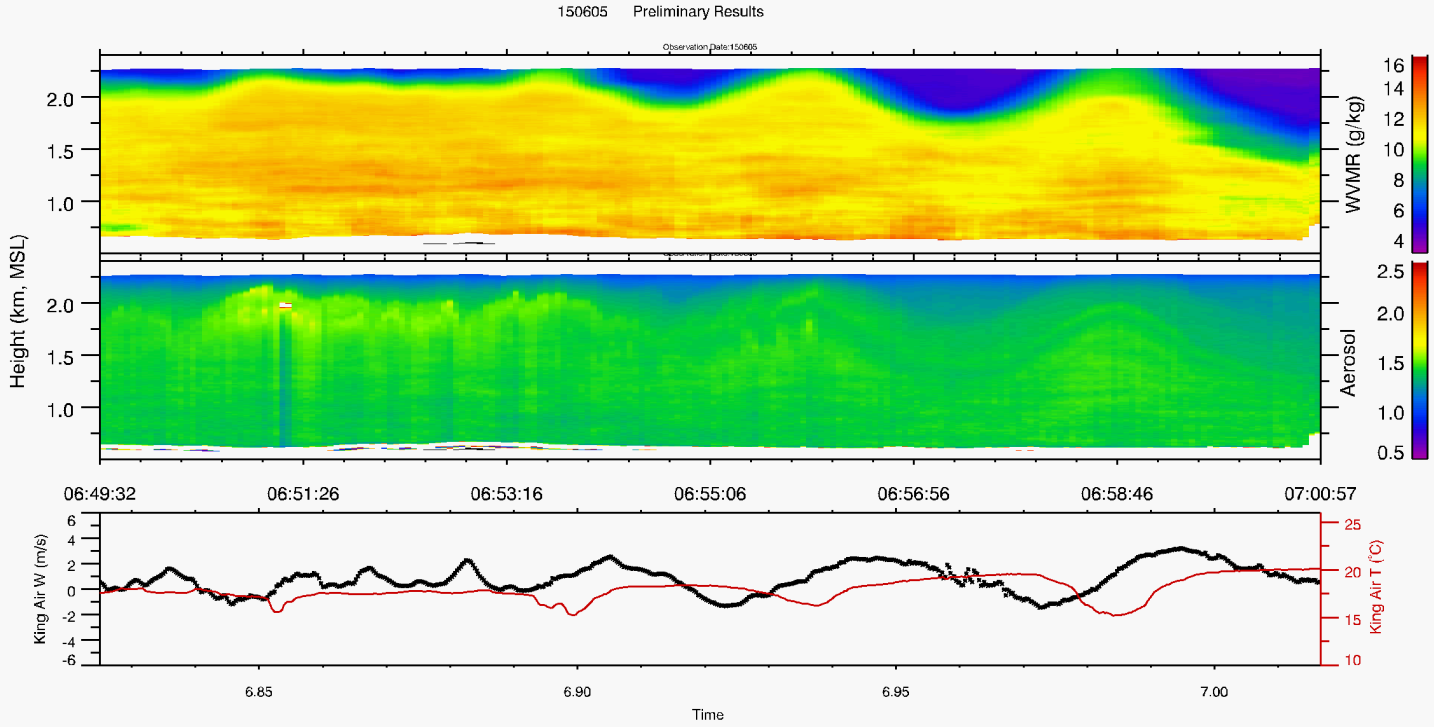
KDDC -- Dodge City, KS

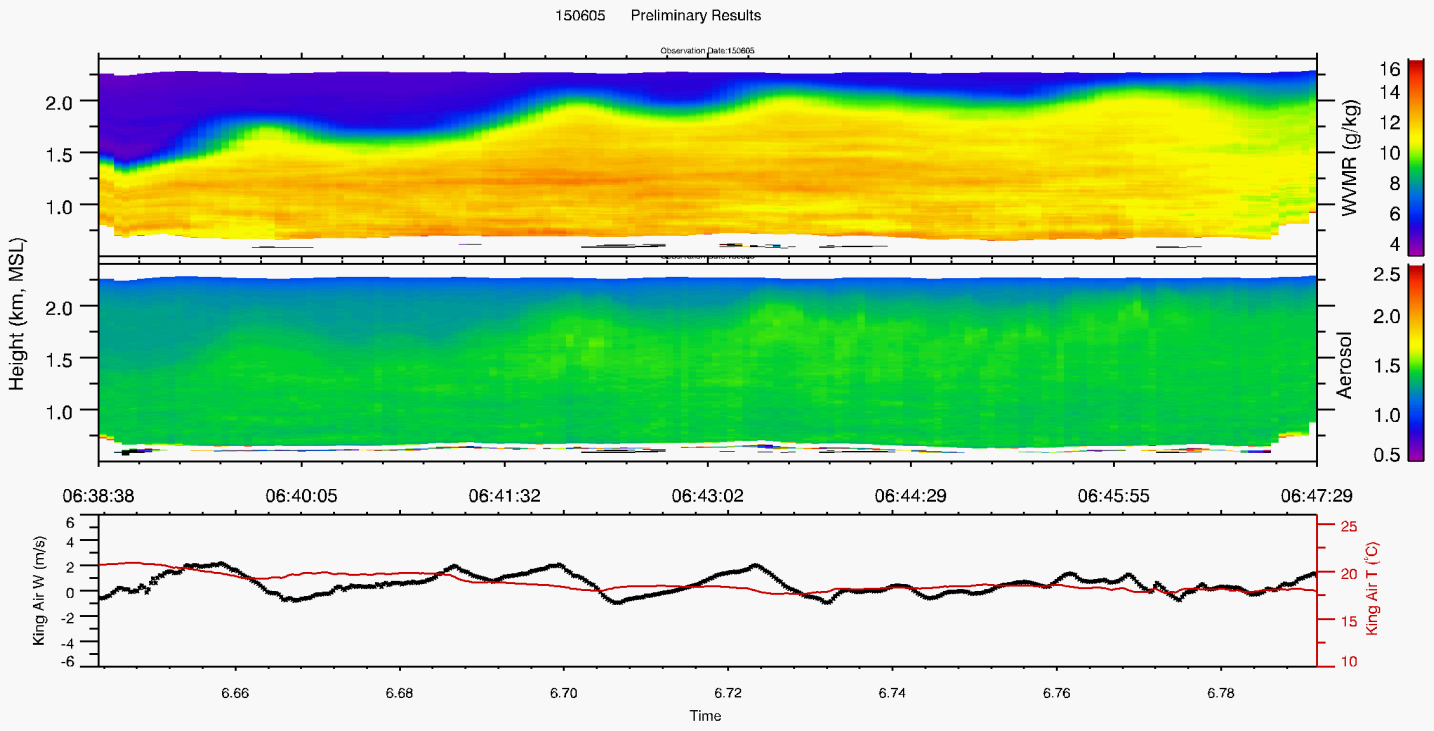
06:59:24 UTC Fri 05 June 2015

Base Reflectivity: 0.5 degrees, Clear-air Mode

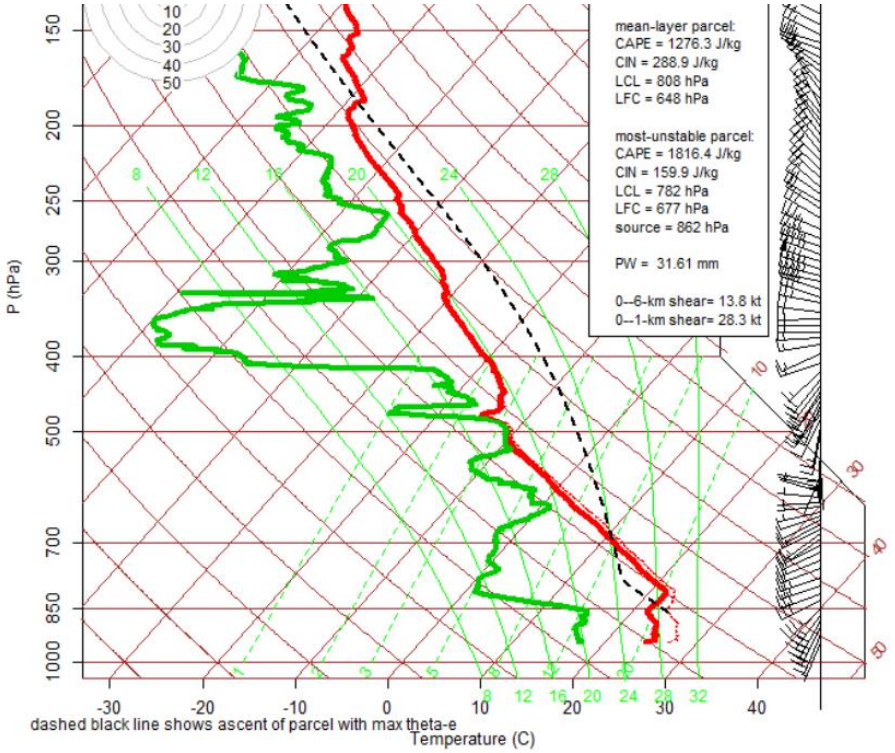
(c) UCAR http://www.rap.ucar.edu/weather/radar/



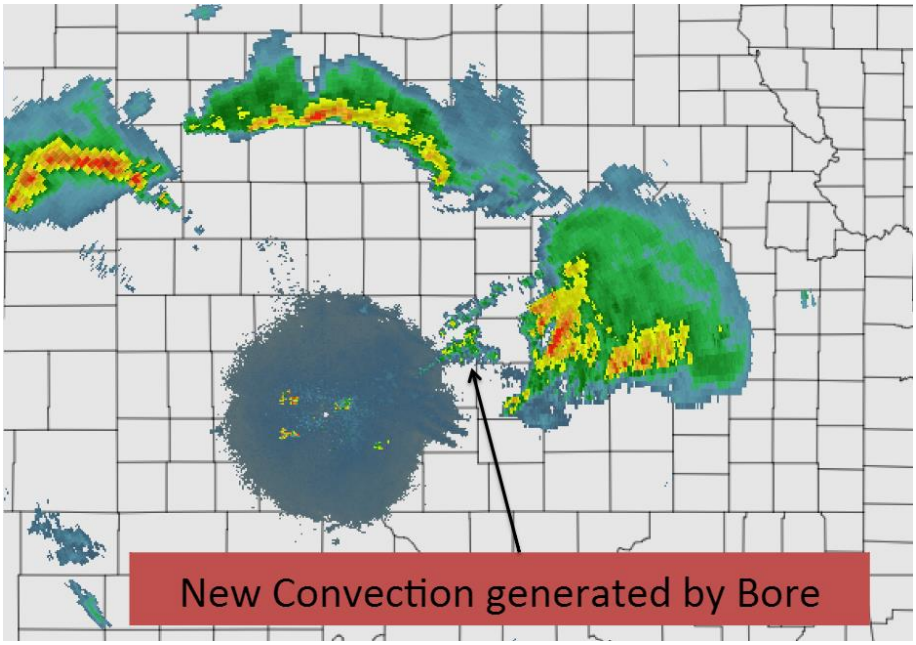




Compact Raman Lidar water vapor mixing ratio, aerosol backscatter (both below flight level, down to the ground, and flight-level vertical velocity and temperature. Clearly an undular bore, with the highest amplitude wave leading the wave train. Sustained deepening of the moist BL following bore passage. There is no evidence of a trailing parent density current in the CRL water vapor transects. Top: leg 8 (outbound); Bottom: leg 9 (inbound)



CSU 6Z sounding from LaCrosse KS



DDC base reflectivity around 720 UTC

PECAN 2015
RF03 (060515)
Drew, Geerts, French, Wang

French Flight Notes

Plan-
Bore mission; convection that we expected to fly all evening in NE Kansas was quite messy and never organized a good line to allow a bore to develop. After several delays awaiting for the convection to organize, Ops center observed a bore generated from some isolated convection in the Hays area. Decided to fly to capture that bore.

At time of takeoff, convection around Hays showed 3-4 big cells with lots of lightning. This was observable from the ground in Great Bend.

Shoot for takeoff about 1130 local

Flight-

0529 Wheels up

0540 things are up and running, level at 5 kft; plan to work on roughly N-S oriented racetrack

1st race track conducted at 5 kft; turned away at 10 mi. out from convection on nose radar due to lightning in storm

2nd race track conducted at 6 kft; convection and lightning had lessened up significantly, turned back at 5 mi. out from convection

0611 finished with 2nd race track

0615 began working a 'sawtooth-type' pattern more to west. Conducted one inbound and one outbound leg, then reversed the sawtooth back to the east. (I think these were done at 7500 MSL

Finished ops, conducted a spiral descent to 1000 AGL for lidar calibration.

0722 wheels down

Post Flight-
Decent flight, we captured a nice bore in an area where nothing was forecast. No ground assets, but great lidar data.

6/2/15 ASCII Pilot notes (Pecan Flight 2)

Crew: Drew, Parish, French, Wang

Flight Time: 4.1

Objective: Low Level Jet Fixed track

Planned: Fly sawtooth, out and back, Fly Isobaric at 3900 MSL, 5500 MSL, repeat sawtooth, repeat 3900 MSL Isobaric.

Actual: Departed GBD, climbed to 3000 AGL heading towards east end point. Started sawtooth high from 3,000' AGL to 500' AGL and reversed on return leg. Then flew an isobaric cycle at 3800 MSL. Then climbed to around 5100' MSL and did the same. Repeated sawtooth and another line at 3800 MSL.

Wyoming King Air Mission Scientist Summary

Author: Tom Parish

Mission ID: IOP2 –RF2

Mission Type: LLJ

Takeoff Time: 2015-06-03 06:40:00 UTC

Landing Time: 2015-06-03 10:45:00 UTC

Summary:

This was the second flight to study the LLJ on 03 June. Flight was identical to the earlier flight, along LLJ track (between 100.03°W and 98.89°W following 38.7°). Purpose was to sample kinematic, thermodynamic and dynamic properties of the low-level jet. Objective was to measure the horizontal pressure field and monitor changes in both the wind and pressure fields. Secondary objective was to examine impact of sloping terrain on temperature field. Flight strategy consisted of a combination of vertical sawtooth maneuvers between 160 m and 1000 m and isobaric legs at about 600 m and 1200 m agl.

Four vertical sawtooth legs conducted along track. Four isobaric legs at 600 m and two isobaric legs at 1200 m were flown. Sawtooth legs permitted detailed soundings throughout the flight. Jet was well organized at start of flight remained strong throughout the flight with maximum winds in excess of 50 knots. The nose of the LLJ became more pronounced throughout the flight; maximum winds observed were observed around 400 m agl.

PECAN 2015
RF02 (060315)

French Flight Notes

Plan-
Flight number 2 for the evening…..LLJ mission. First mission lasted roughly 4 hours. Following landing of mission 1, expect ~1 hour turn-around and launch for another 4 hour mission

All flight should be completed in clear air.

Plan for 130-200 AM local (0630 - 0700 Z) takeoff

Flight-

0644 Wheels up

0650 everything is up and running

0653 – 0735 two legs (out & back) of sawtooth between 500' AGL and 3000' AGL

0739 – 0820 two legs, constant Palt at 3800 ft MSL (2000 AGL on east end, 1500 AGL on west end)

0824 – 0903 two legs, constant Palt at 5100 MSL

REPEAT PATTERN

0906 – 0948 two legs, sawtooths between 500' and 3000' AGL

0952 – 1031 two legs, constant Palt at 3800 ft MSL

1042 wheels down

Post Flight-
Easy flight, most things worked well. LI7500 looks much better with new calibration (and operating nearer the dewpoint/temerpature where the span was set)

Very warm in cabin, WCL continued to overheat. Most of the WCL data is from first half of flight.

6/2/2015 PECAN Pilot notes (RF 1)

Crew: Wadsworth, Parish, Oolman, Wang

Flight Time: 4.1

Objective: Low-level jet.

Planned: Multiple passes along the low-altitude line established by Tom Parish

Actual: Departed GBD, climbed to 7,000' MSL direct to point L2EE (east end of the low-level line). Descended enroute to arrive at the point at ~3,000' AGL. We dropped the west end point (L2WE) from the sequence to reduce the overall length a bit. Performed a vertical sawtooth pattern from 3,000' AGL to 500' AGL out & back along the line. Then flew an isobaric cycle at 3900' MSL. Then climbed to around 5500' MSL and did the same. Then flew the vertical sawtooth and completed with a repeat of the isobaric line at 3,900' MSL. Completed with a descent to 1000' AGL in the vicinity of L2EE, then did a slow climb to 5500' on the return to GBD.

Used VFR flight following with KC Center a bit, but most of the time we were below their radar coverage.

Aircraft was very warm the entire flight. Uncomfortably so.

It is uncomfortable flying at low altitude, with GPWS alerts sounding and descending into the blackness.

Overall, it went well.

Wyoming King Air Mission Scientist Summary

Author: Tom Parish

Mission ID: IOP2 –RF1

Mission Type: LLJ

Takeoff Time: 2015-06-03 01:40:00 UTC

Landing Time: 2015-06-03 05:46:00 UTC

Summary:

Flight conducted along LLJ track (between 100.03°W and 98.89°W following 38.7°) to sample kinematic, thermodynamic and dynamic properties of the low-level jet. Objective was to measure the horizontal pressure field and monitor changes in both the wind and pressure fields. Secondary objective was to examine impact of sloping terrain on temperature field during early evening hours. Flight strategy consisted of a combination of vertical sawtooth maneuvers between 160 m and 1000 m and isobaric legs at about 600 m and 1200 m agl.

Four vertical sawtooth legs conducted along track. Four isobaric legs at 600 m and two isobaric legs at 1200 m were flown. Sawtooth legs permitted detailed soundings throughout the flight. Jet was incoherent at start of flight but became well organized with a maximum wind of about 50 knots from the south at about 400 – 600 m agl.

Pecan RF01 – 3 June 2015

Brett Wadsworth, Tom Parish, Larry Oolman, Zhien Wang

Low level jet mission

0142 Take off, climb to 7000 ft

0145 Highest wind speeds (35 knots) at 4300 ft msl. This is about 2500 ft agl

0152 Westbound sawtooth on line from 5000 ft

0153 Max wind, 35 kt, at 3800 ft

0210 West end of line at 500 ft. Peak at 4000 ft at 38 kt.

0214 Eastbound saw tooth from 5800 ft

0218 Peak at 3500 ft at 38 kt. Wind direction at 160 deg true low and 200 deg true high.

0232 East end at 500 ft. Peak wind at 3800 ft and 38 kt

0235 Isobaric leg at 3900 ft msl. Winds 38 kt.

0254 At west end, winds at 42 kt.

0257 Eastbound at 3900 ft. Winds 42 kt.

0305 Upward lidar over temp.

0312 Upward lidar restarted.

0315 Done with leg. Descend to 1000 ft agl and do sounding.

0317 Start climb to 7500 ft. Peak wind 42 kt at 3600 ft. WCL overheated again.

0321 Westbound at 5500 ft. Winds 34 kt.

0326 WCL back on.

0341 On west end. Winds up to 38 kt.

0345 Return to east at 5500 ft.

0401 Winds on this leg about 3 kt lower from 35 kt on west end to 32 kt on east

0405 Start saw tooth from east end at 5000 ft. Highest winds at 48 kt at 3000 ft

0424 At west end, peak wind 52 kt at 3500 ft.

0427 Start saw tooth to east.

0445	At east end, peak winds around 49 knots
0449	Westbound at 3900 ft, winds 45 kt
0509	At west end. Winds up to 53 knots
0512	Back to the east
0528	Done with line, winds decreased from 50 kt to west to 45 kt.
0542	Land

2014JD022626R, Rev. 2

Review of "Impact of mesoscale meteorological structures on anomalous radar propagation conditions" by M. T. Prtenjak, I. Horvat, I. Tomažić, M. Kvakić, M. Viher, and B. Grisogono

The manuscript studies anomalous propagation of weather radar from mesoscale processes, bora and sea/landbreeze. The authors present a systematic framework of analysis using fine-scale WRF simulations, verified by rawinsonde observations, to represent the important thermodynamic fields for a regional study of AP conditions. I found this study to be very interesting, and overall convincing. Despite this, there are few points that should be considered as mentioned below. Many of the comments are minor or inquisitive in nature, and I do not believe should drastically alter any conclusions. For these reasons, I am recommending minor revisions to before consideration for publication.

General Comments

1. The figure

Specific Comments

1. Multiple

PECAN

TF14 - 30 June 2015

Flight Scientist: Guy

0223 Wheels up

0226 Instruments up

0232 Just noticed no 7500 data

0242 Turned on breaker to get Licor 7500 working

0252 Turning northbound

0254 Track at 324 heading

0300 Spiral down at 1000 ft/min down to 1000 ft AGL

0308 Finished spiral, heading back up to 5000 AGL

0319 Ascending to 10900 MSL

0327 Now turning around for northwestbound leg

0347 Spiraling down over FP2 now and then spiral up to 5000 MSL head NW 10 mi at 5000 then reverse direction

0351 Begin spiral up to 9000 AGL

0359 Begin spiral down to 5000 AGL

0405 Leveling at 5000 AGL and turning for northwestward leg

0408 Number 1 compass out to lunch, pilot switching to compass 2

0411 Southbound on 10nm track

0418 Finish 10 nm leg, headed back.

0435 Wheels down

Notes:
Had to release DDS and restart.
Licor 7500 breaker is on the CDP breaker, just behind System Scientist. This was turned off.

Flight Summary:

Calibration flight for the lidars. Flying tracks approximately along wind of 30, 20, and 10 nm at heights between 5000 and 10000 AGL. Multiple spiral performed including near the FP3 site. Rawinsonde launched within minutes of the spiral near the FP3 site. Straight legs over the site also will allow for lidar comparison.

6/15/15 PECAN Pilot notes (Test Flight 10)

Crew: Drew, Crafts, French, Wang

Flight Time: 1.5

Objective: Align and Calibrate Lidar

Planned: Climb to 15000 straight and level until done with alignment. Spiral decent. Climb to 4000-5000 straight and level. Final spiral.

Actual: Departed GBD climbed WNW to 15000 MSL continued WNW and reversed course until Zhien was ready, then started spiral decent. Climbed back to 7500 MSL and headed towards GBD. Did another spiral and landed.

PECAN 2015
TF10 (061615)
Drew, Craft, French, Wang

French Flight Notes

Plan-
After changing PMTs prior to last night's flight, we needed to take an opportunity to check alignment of the CRL, particularly the far field. With plenty of clear air forecast, we decide to fly primarily before sunset to avoid problems with nocturnal boundary layer that leads to heteorogeneity and complicates the environmental calibration of the CRL. This flight should also provide very good data for determining the WCL overlap.

Flight-

0130 Wheels up

0135 everything is up and running

0140 – 0200 straight and level legs at 15 kft MSL, Zhien completes alignment on CRL

0203 begin spiral descent for T calibration, 500 ft/min
0223 end spiral descent at 500 ft AGL

climb to ~7.5 kft MSL for some straight and level passes

0228 – 0242 stright and level at 7500 MSL

0244 spiral descent to 1000 AGL
0251 done with spiral

0257 Wheels down

Post Flight-
No issues on flight. Instruments worked well. Both lidars appeared to work well.

6/1/15 ASCII Pilot notes (Test Flight 9)

Crew: Drew, Geerts, French, Wang

Flight Time: 3.6

Objective: Align and Calibrate Lidar

Planned: Three soundings to 10,000 ft. AGL and several along wind legs at different altitudes. When done, go to FP2 and fly N-S/W-E legs.

Actual: Departed GBD climbed to 10,000 AGL. Flew towards DDC until Zhien was ready, then started spiral to 1000 AGL. Then back up to 10,000 to do LIDAR alignment. Then another spiral decent to 1000 AGL then stepped up for the 27 nm legs. Eliminated the middle and last steps. Did another spiral to 1000 AGL and then climbed up to ~ 7000 AGL and flew to FP2 N-S then W-E/reverse. Finally went direct to GBD.

ATC Interaction: The Ops center made the call/emailed the ARTCC's at 6:00 PM. I filed an IFR to DDC because of reported low clouds and the poor TAF's in the area, although I was hopeful they would burn off at nightfall and the flight could be done VFR.

After departing GBD, I called KCC and told them I would be conducting the flight VFR because of the low altitudes that we would need to fly. He gave me a squawk for flight following.

One controller remarked that he was told we would be flying near the bad weather, and we were not anywhere near it. I believe he was joking. After a shift change, the new controller got worried when we went below his radar/radio coverage. When we came up again, he explained that the last controller did not tell him that we were going up and down.

As we approached FP2 the controller asked if we knew about the tethersounde. Just SE of GBD I canceled the flight following.

PECAN 2015
TF09 (060215)

French Flight Notes

Plan-
Test flight for CRL – complete several spirals, straight and level high up for alignment, and stacked legs at different levels to check signal strength. Finish with overflight of FP2 for comparison data set.

All flight should be completed in clear air.

Plan for 9 PM local (0200 Z) takeoff

Flight-

0202 Wheels up

0212 Everything up and running, UWKA level at 10 kft – run for 10-15 minutes to look for change in lidar signal as temperature of laser stabilizes

0221 begin 500 ft/min descent for CRL temperature and water vapor cal

0236 bottom of sounding; now climb back up at 1000 – 1500 ft/min, setup for straight and level for alignment

0311 Zhien is done with alignment

0314 begin another spiral descent

0328 climb to 2500 AGL to complete stacked legs
Leg 1 ~4500 MSL, 2500 AGL
0338 Leg 2 ~7000 MSL, 5000 AGL, few hundred ft above inversion
0352 Leg 3 ~8500 MSL, 6600 AGL

0402 climb to 12000 MSL to setup for last descent sounding
0405 begin 500 ft/min descent
0422 end sounding

0427 setup for overpass of FP2 at 7000 AGL
0509 done w/ legs over FP2 (completed 3), headed home

0530 wheels down

Post Flight-

No problems during flight—instruments and aircraft worked well, no issues with ATC…pattern was pretty simple and we were clear of weather.

Co-pilot (flight scientist) map display very slow to non-responsive. Larry needs to look at this.

Both N2 bottles empty—need to be filled prior to flight, should put hang tag on bottles to indicate which one to use during flight.

LI7500 needs re-cal (cal done on 05/31 is bad)….this is fixed in the data file by back-setting the zero/span using a corrections file.