

NPOL/IPHEX Science Log (Rutherfordton, NC)

Official operations begin May 1, 2014 and end June 15, 2014.

Link to schedule is:

https://docs.google.com/spreadsheet/ccc?key=0ApNVxw8eLwsHdGVERjNQdVhRU2JmS0NtSTQ1UmN5ZHc&usp=drive_web#gid=6

Thursday, April 24, 2014

NPOL construction is going well.

Antenna level. (The best it has ever started at.)

Waveguide run complete.

Power connections complete.

Access road complete.

D3R pad installed and trailer set.

Working up fence/cattle panels installation logistics.

Last major hurdle is commercial power. (Waiting on Duke power and electrician.)

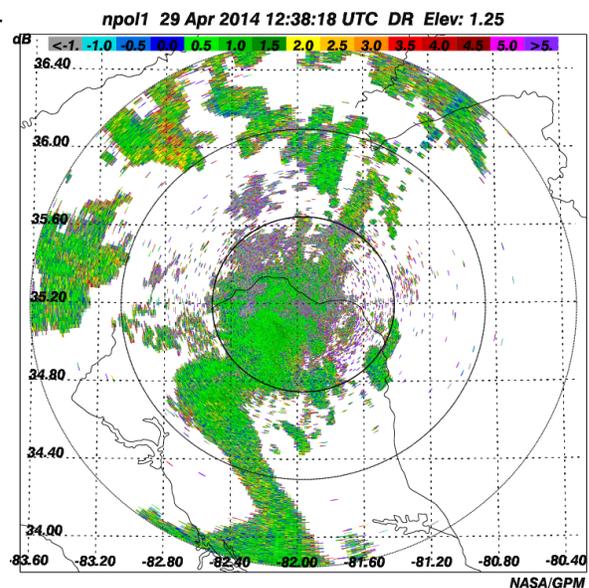
I expect to become operational off of the generator tomorrow.

Note: The generator noise is not perceivable from the road

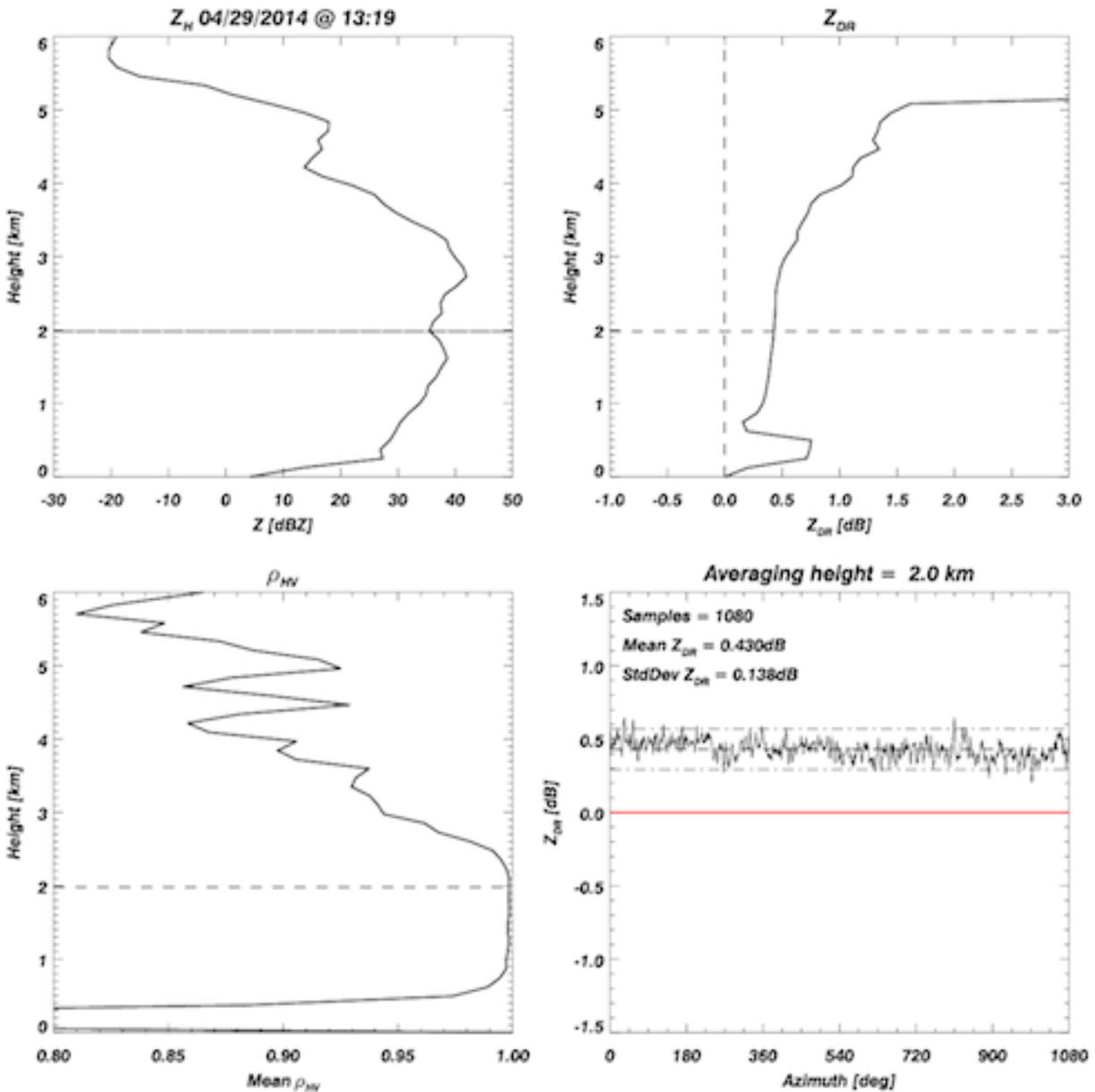
Tuesday, April 29, 2014

NPOL operations began with rain scans at 1230 UTC. Will be working on timing issues with other scans and will try to get sector scans over Pigeon/Catawba, radar/2dvd RHIs and birdbaths for Zdr calibration

Zdr looks a bit hot, and will adjust accordingly once we settle some timing issues.



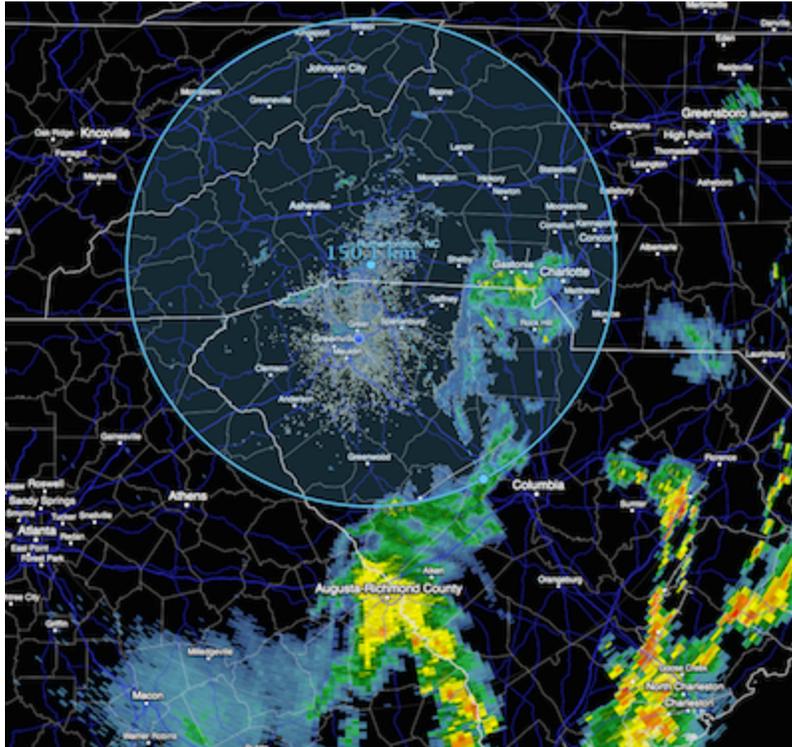
First birdbath done at 1319 UTC. BB estimated Zdr offset = +0.43, which agrees well with solar cal estimate of 0.40 on 04/28. GDR set to -0.44 while iris is down @ 1337 UTC. Will restart and do another BB to verify.



Wednesday, April 30, 2014

NPOL back on line at 1130 UTC. Running rain scans, PPS and RHI. Will get a BB in when rain is present at radar.

1507 UTC: Perfect miss on GPM overpass. Going to back-to-back IPHEX_Rain scans to get high res rain mapping to the east for GMIU... DPR overpass will not hit any rain w/in 150 km of NPOL.



1530 UTC: A squall line is forming west of Knoxville, which is now about 250 km away. Hopefully it will build and head our way.

1549 UTC: GPM OP Time! Not much to see with PR but GMI will pick up a bit of convection to the E and SE. Continuing rain scans, back-to-back until 1620 UTC.

Thursday, May 1, 2014

First official day of campaign... severe clear. NPOL not run as of 1933 UTC so that commercial power can be installed and we can work out some blanking issues over the house across the road and the transformer. Given conditions, will run IPHEX_Rain once every 15 minutes. Will begin 24/7 operations as of this morning.

Hoping to do a sphere cal tomorrow if winds are light enough, if not, may have to wait.

Mike and Gary went to Maggie Valley to work with ACHIEVE UPS issues. Tim Lang on night shift tonight.

DBW

Friday, May 2, 2014

0000 UTC - Timothy Lang on shift. Sky clear outside. Remain in 15-min surv updates.

0100 - Insects starting to show up on surveillance. Nothing else besides clutter otherwise.

0225 - Not a big deal but apparently NPOL data ingest was turned off for the last hour, so there will be a data gap for that long. Exactly 0 weather was missed. Restarted 15-min surveillance. Still just insects out there. On the plus side the Internet speed was fixed in the science trailer.

0415 - Still in 15-min surveillance, and still no point in running anything else.

0615 - Halfway thru the shift, nary a hydrometeor to be remotely sensed ...

0842 - Some distance stratiform echo or anvil to our south. Switching to 4-min surveillance cycle.

0947 - Anvil to south continues to remain, areal coverage has slightly increased with time. Maintaining 4-min updates with IPHEX_RAIN.

1039 - Southern anvil continues to fill in. Still mostly beyond 100 km and most visible at 2.0-deg elevation.

1045 - Solar spike from rising sun quite apparent last couple of volumes.

1101 - Now there is some anvil echo far to our north. Must be a mid-level cloud layer, possibly blow-off from a precipitating system situated mostly in Georgia.

1108 - Starting to see some higher reflectivities in the southern echo. This is the northern appendage of the Georgia precip. Still too far to bother with a PPI sector. Trying some RHIs, 5 tilts centered on 180, 2-deg spacing. Some cellular structure apparent, peak Zs in the high 30s/low 40s.

1137 - Minor RHI adjustment, rotating 2 deg to east. Forgot to save, will execute on next round of scans.

1146 - Further eastward rotation, by 4 deg. Trying to follow the strongest core. The convection is all elevated.

1154 - Trying more eastward rotation. Getting close to becoming a possible PPI sector candidate. Will leave that decision for the next shift.

1200 UTC D. Wolff on shift

Some showers to the SE so continue to monitor with 4-min IPHEX_RAIN scans. A few hours of unimpressive RHIs also taken.

1600 UTC

Radar taken down at for engineers to do Z-Auto and other maintenance issues.

2000 UTC

Switch stuck and some arching, but Nathan fixed it. Overall, radar up and down after 1600 for testing, but no precip around anyway.

BORING.

3 May 2014

0000 UTC - Timothy Lang on shift. A solar spike and some scattered 10-15 dBZ far to our south.

0009 UTC - Tonight will likely be dry, but the forecast for the next week looks positively awful for precip science. The inverse of IFloodS.

0348 - Nothing out there besides the nocturnal insects.

0549 - Very weak echoes to our east. Not enough coverage to bother with improving update cycle.

1020 - Still nothing, even those weak echoes from a few hours ago are long gone.

1200 UTC - D. Wolff on shift

1306 UTC - Mike taking over NPOL for solar calcs. After that, we will run 15-min rain scans until 1600 UTC, the shut off transmitter for Open House until approximately 1900 UTC.

1500 UTC - Mike did some solar calcs. Attempted to adjust some el offsets, but made it worse, so went back to what we had, which was within bounds anyway.

1600 UTC - Transmitter is off for media day. Running RCA today using 5/2 as the baseline. 5/1 had different elevations for PPI, so 5/2 should be good.

May 4, 2015 1530 UTC - May 5, 2015 1430 UTC: NPOL down for maintenance and and rest.

May 5, 2014

1530 first scan, IPHEX_RAIN running every 15 minutes. No precip at all. 0. Nada.

May 6, 2014

0000 UTC - Timothy Lang on shift.

0300 UTC - Still no precip. Just insects.

0615 UTC - Over halfway thru this very quiet shift. Scope clear of precip.

1027 - Insects disappearing from the scope.

1200 UTC - D. Wolff on shift. No precip. All quiet.

1210 UTC - Stopping routine IPHEX_RAIN scans to test and log timings of other scans. No precip around.

1330 UTC - IPHEX_RAIN will begin again in 15 minute cycle. Below are the latest times for key scans for IPHEX.

Name	Timing	PulseWidth	PRF	Max Range	Bin Space	Samples	Start	End	#Swp/Azm	PPI/RHI
General Operations										
IPHEX_90NEAR	2:48	0.8	1100	136	125	60	315	45	19	PPS
IPHEX_BB	2:54	0.8	1100	150	125	128	90	90	3	RHI
IPHEX_90FAR	1:54	0.8	1100	136	125	60	315	45	13	PPS
IPHEX_45NEAR	1:58	0.8	1100	136	125	60	45	90	19	PPS
IPHEX_45FAR	1:23	0.8	1100	136	125	60	45	90	14	PPS
IPHEX_RHI	0:45	0.8	1100	135	125	72	205	215	3	RHI
IPHEX_RAIN	1:16	0.8	1000	150	125	60	1	2	3	RHI
GPM Operations										
GPM_SHT	6:12	0.8	1100	135	125	70	0.5	25.5	13	PPS
GPM_MED	6:14	0.8	1100	135	125	70	0	360	13	PPI
GPM_FAR	2:50	0.8	1100	135	125	70	150	330	10	PPS
GPM_RHI	1:16	0.8	1100	135	125	72	0	25	5	RHI

1652 UTC - Due to contract scheduling restrictions, we have decided to not run shifts tonight and will resume operations at 1400 UTC tomorrow morning. Place NPOL in IPHEX_RAIN 10 minute updates, but do not expect any good weather coming along. A very slight (10%) chance of rain in the mountains tomorrow. Better chances this weekend with a slow moving trough over the deep south moving into the area by late weekend.

1300 UTC: D. Wolff back on shift. Ran 10-minute IPHEX_RAIN scans all night. No problems, but no rain.

1600 UTC: Stopped IPHEX_RAIN scans to work on sphere cal. D3R successfully pinged balloon, and NPOL might have as well. Will send the I/Q data to Joseph Hardin @ CSU

1800 UTC - Ran 3-minute IPHEX_RAIN scans, interrupted by SPHERECAL scans. After 1800, ran 3-minute scans (to show off antenna motion to Melissa LeFevre (FOX/Charlotte)) and continued in that mode until 2100 UTC.

2100 UTC - Back to 10-minute IPHEX_RAIN scans. All in all, no rain, but possibly a good sphere cal. No rain expected tonight or tomorrow. M. Watson will be excused from his shift, but on call just in case. D. Marks in tonight (science) with J. Bashor (Engineer).

Maybe some rain Friday afternoon west and in mountains.... please?



May 7, 2014

David Marks on shift.

0000 UTC - No precip within range. Running IPHEX_RAIN on 10 minute schedule. D3R shut down.

0300 UTC - Nothing - Quiet

0700 UTC - Nothing

1200 UTC - Nothing

Shift Summary - IPHEX_RAIN on 10 minute schedule all night. No issues. No rain. D3R not operating.

D. Wolff on shift

1200 - 2359 UTC - No precip within range. IPHEX_RAIN on 10 minute schedule

May 8, 2014

David Marks on shift

0000 UTC - No precip within range. IPHEX_RAIN on 10 minute schedule.

0400 UTC - AP bloom

0800 UTC - Nothing

1100 UTC - Showers are beginning to show up to the West near 125 km range. This is the leading edge of the system moving through the Mid-West.

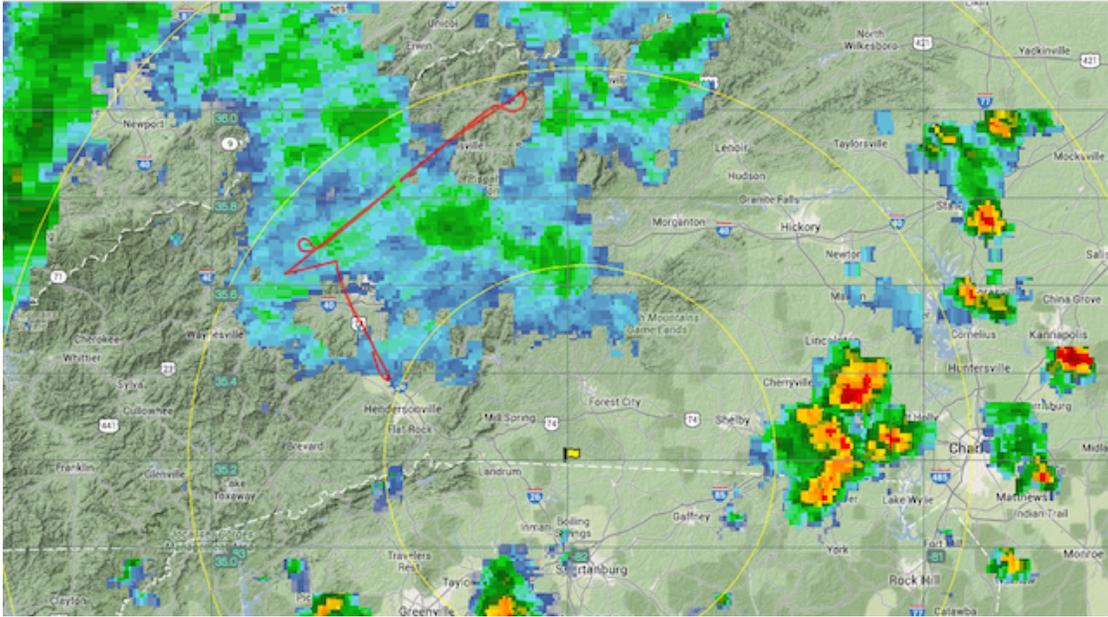
1200 UTC - D. Wolff on shift

Some light showers to the W & NW. Going into 3-minute IPHEX_RAIN scans. Once it gets closer, will add IPHEX_DSD, which are RHIs over 2DVD.

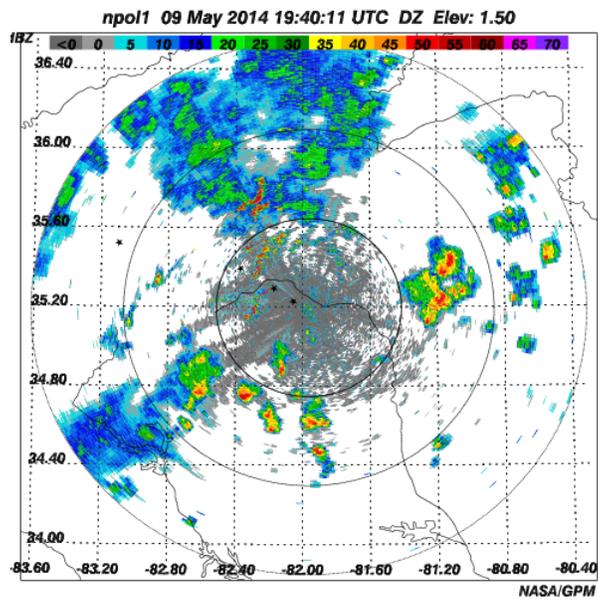
1800 UTC

Rain getting close, within about 100 km. Running 4-min IPHEX_RAIN, and have added IPHEX_DSD (3-ray RHI over 2DVD).

1900 UTC - Began IPHEX_RAIN and IPHEX45_FAR cycling every 4 minutes for Citation ops over some light rain (310-355 and then 320-005). Citation doing bow-ties.

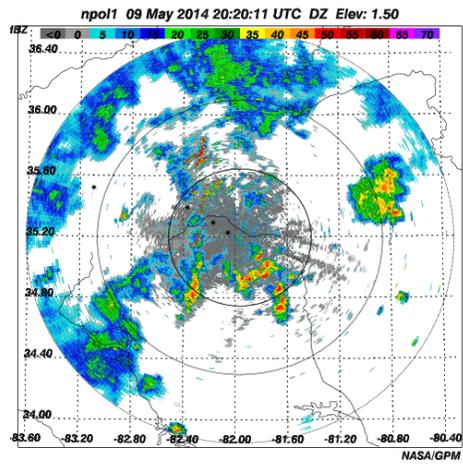


Screenshot roughly 1942 UTC



2026 UTC

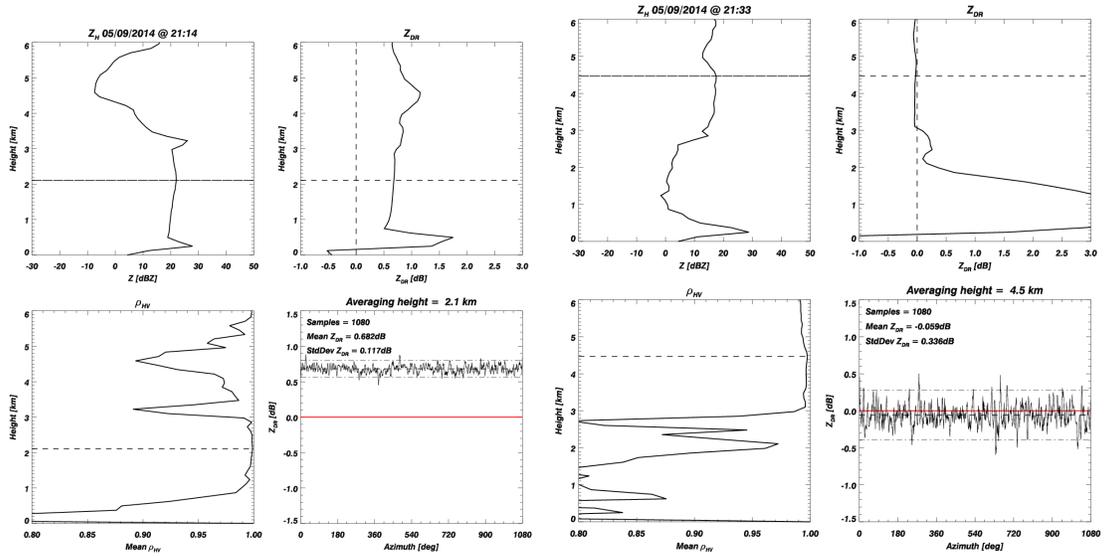
Citation taking more southerly track, but parallel to original, then RTB. NPOL is same scan sequences.



2108 UTC - Stopped IPHEX45_FAR as there is no more precip that Citation is flying through. Started IPHEX_RAIN and IPHEX_DSD back on 4 minute cycle.

2113 UTC - Light rain at radar, going to force a birdbath.

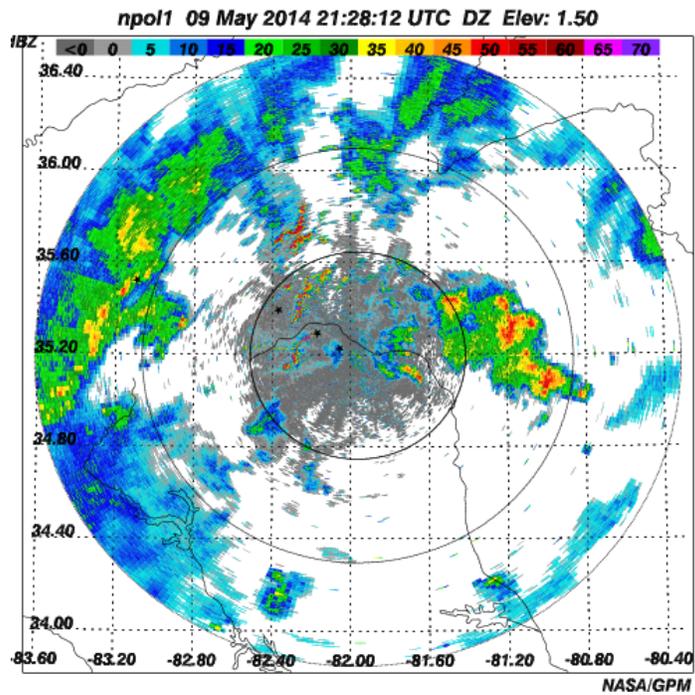
2121 UTC - Got a birdbath in. Hot by about 0.7 dB. Adjusted GDR to -1.12 and restarting IRIS.



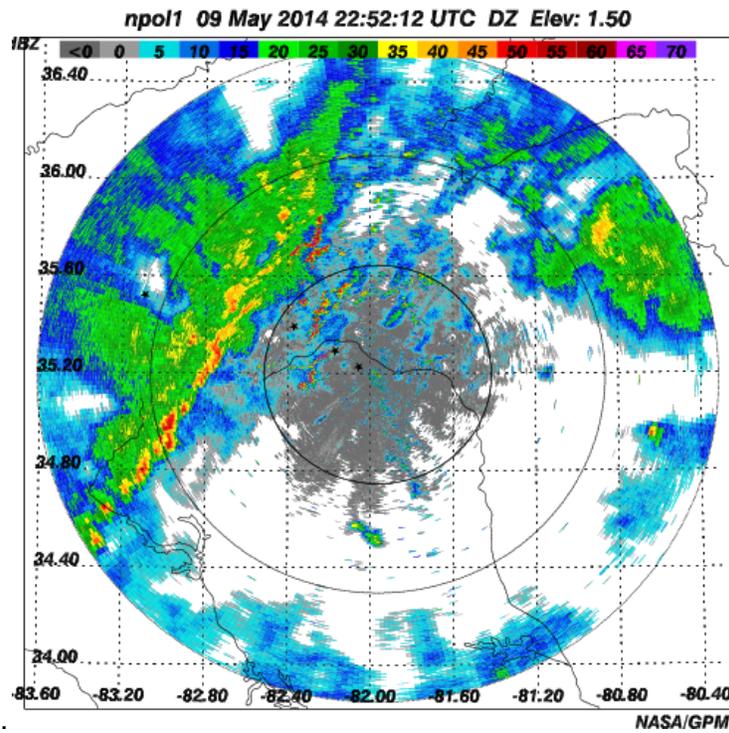
Left panel before. Right panel with $GDR = -1.12$. Noisy but still looks promising. Will keep an eye on it.

2145 UTC - Switched to IPHEX_RAIN and IPHEX45 (310-355) to catch incoming squall line.

2156 UTC - Running IPHEX_RAIN, IPHEX45_FAR, IPHEX_DSD and IPHEX_BB. IPHEX_DSD is a 3-azimuth RHI over 2DVDs. Trying for a 4-min cycle.



2300 UTC - Nice squall line approaching NPOL Just at 50 km to west now. Running IPHEX_RAIN and IPHEX45_NEAR on a 4-minute cycle. Should be a good night for DMarks.



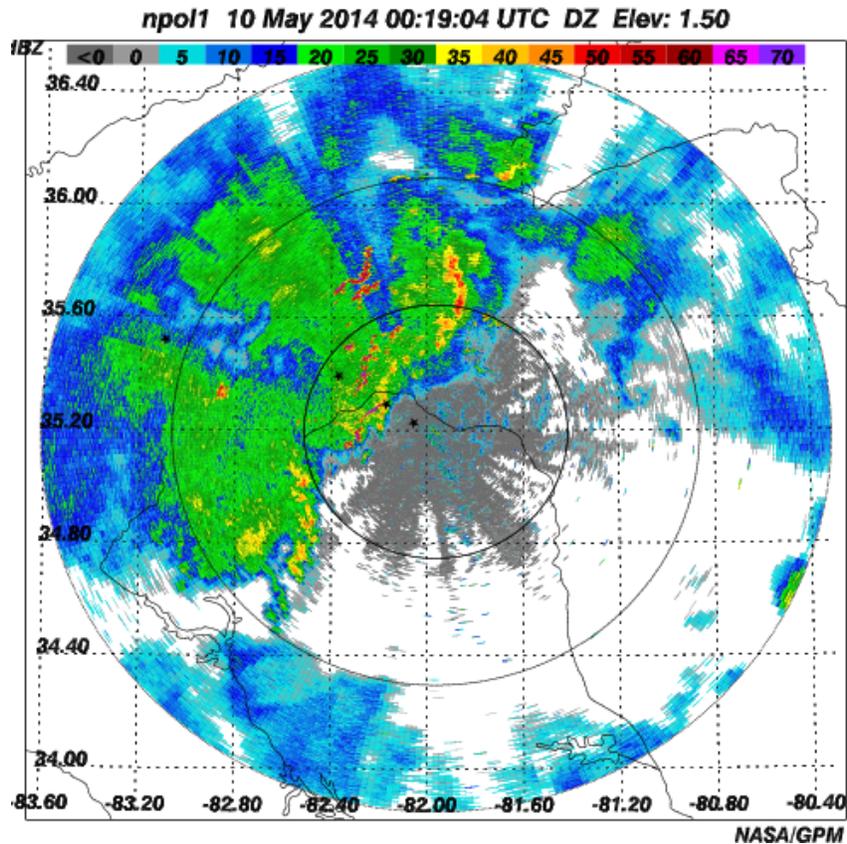
2315 UTC - heavier precip past Pigeon, so switched to IPHEX_DSD to sample over DSDs during squall line passage.

2333 UTC - Last entry of the day! I changed the cycle for IPHEX_RAIN and IPHEX_DSD to 3-min from 4-min.

May 10 2014

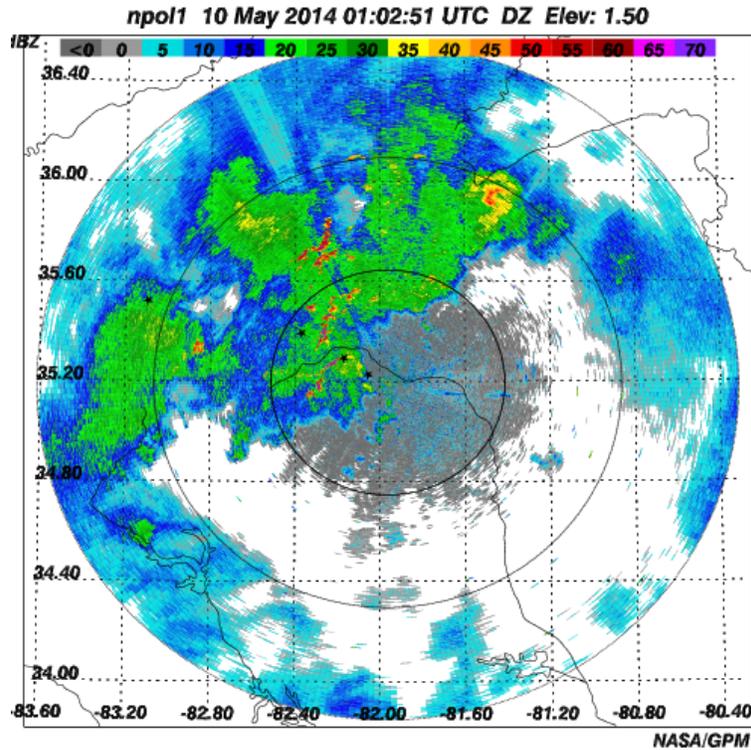
David Marks on shift

0000 UTC - Line of showers and convection approaching from the West. Leading edge about 20 km West of NPOL. Line is oriented NE/SW. Bow echo to the North is advancing the line. Currently running IPHEX_RAIN and IPHEX_DSD on 3 minute cycle. BB running now (per schedule), but will run another BB in about 20 minutes.



0030 UTC - Precip shifted North of NPOL, but additional showers rapidly approaching from the SW. **D3R status is RED** - Manuel and Aaron troubleshooting. Rain shield primarily to the N and W of NPOL. Echo continues over 2DVD radial, so continuing IPHEX_DSD and IPHEX_RAIN.

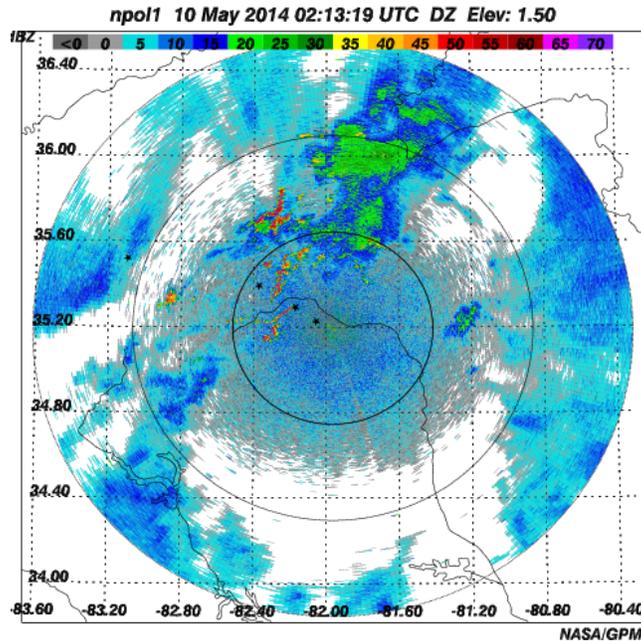
0100 UTC - IPHEX_BB running, but precip may dodge NPOL. Hope to force a BB soon. Significant showers over SN25 and SN35. No lightning.



0130 UTC - Precip has missed NPOL directly, so hopefully will have data aloft for Zdr check with BB. Precip continues from NE to SW with light echo over the 2DVDs.

0144 UTC - Precip rapidly diminishing in coverage and intensity. Will turn off IPHEX_DSD in a few minutes. Running a few IPHEX_90FAR scans to capture precip over the Catawba Basin as precip is in favored sector (315-45 deg) from 25-100 km range. Total run time for 90FAR and RAIN is about 3:15. **D3R status is GREEN.**

0216 UTC - Precip rapidly diminishing. Running IPHEX_RAIN and IPHEX_90FAR on 3:30 schedule. The only interesting echo is to the NE from 25-75 km range.



0300 UTC - Most precip echo has diminished. Running IPHEX_RAIN on 3 minute cycle. Light echo persists to NE and SW mainly beyond 100 km range.

0352 UTC - Light showers from 75-150 km. Showers appear to be mainly aloft and are diminishing. IPHEX_RAIN scanning continues. Significant AP flare-up to S and E.

0455 UTC - Light showers (most likely aloft) beyond 100 km range. IPHEX_RAIN scanning continues. Interesting AP patterns with pulsing intensities.

0609 UTC - A few light showers mostly beyond 100 km.

0710 UTC - No significant precip echo within range. Set IPHEX_RAIN scan schedule to 10 minute repeat.

0901 UTC - No precip echo within 100 km range. Light precip echo (probably aloft) from 100-150 km range. IPHEX_RAIN with 10 minute schedule.

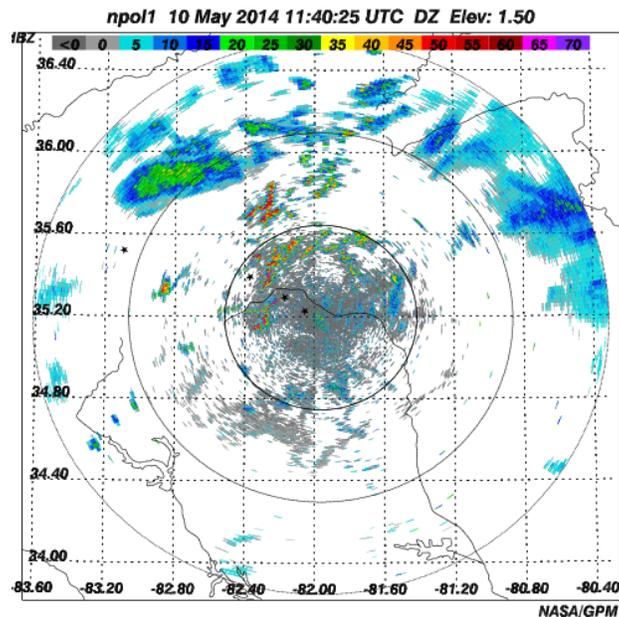
1032 UTC - Light precip echo beyond 100 km range.

1100 UTC - Showers beginning to increase in coverage and intensity to the NW from 80-90 km range

Shift Summary - We watched as an approaching band of showers and possible convection completely fell apart between 00Z-03Z. Ran IPHEX90_FAR scans over the Catawba Basin and IPHEX_DSD RHIs over the 2DVDs. After 03Z, most precip echo remained beyond 100 km range. Ran IPHEX_RAIN scans at 3 minute and 10 minute intervals for the remainder of the shift.

1147 UTC - D. Wolff on shift

Changed IPHEX_RAIN to 4 minute cycle as there is precip, albeit aloft, on the scope. Have instructed D. Marks to run in 4-minute cycle unless it is "severe clear".

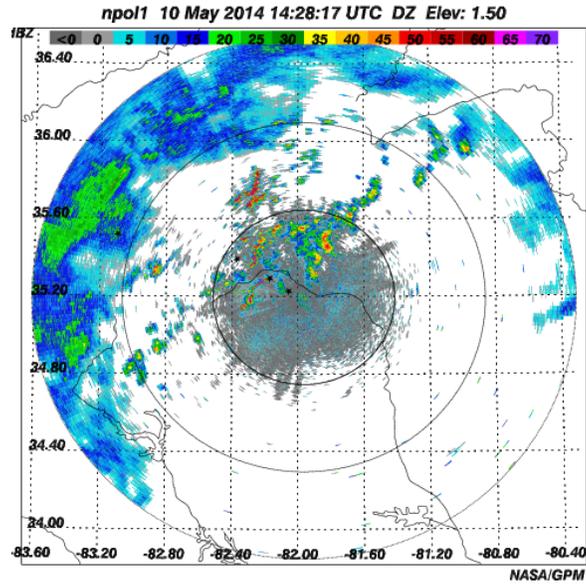


1200 UTC

Taking NPOL down for a bit to do a solar cal to check Zdr results. Should be back up in 20 minutes.

1215 UTC - Back to 4-minute IPHEX_RAIN

1433 UTC - Adding IPHEX45_FAR to 4-minute cycle as precip is getting within 100 km.



1600 UTC - Citation en route to showers/convection to NW. Running 3-min cycle of IPHEX_RAIN and IPHEX45_FAR

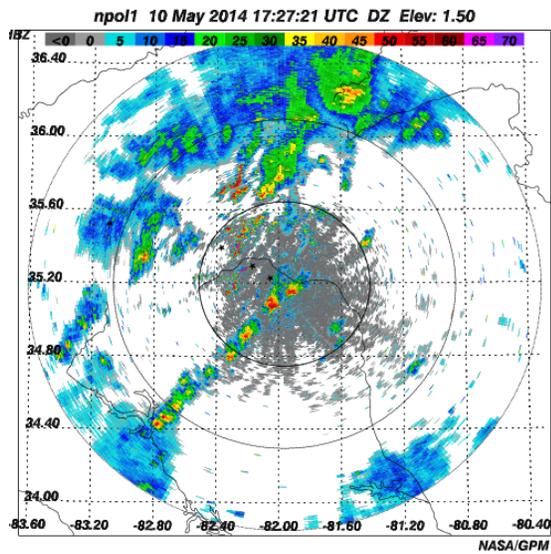
1610 - Changed IPHEX45_FAR to scan 260-305 for Citation Ops. Still on 3-minute cycle.

Threw in one IPHEX90_FAR, but it took 1:56 to complete, so back to IPHEX45_NEAR

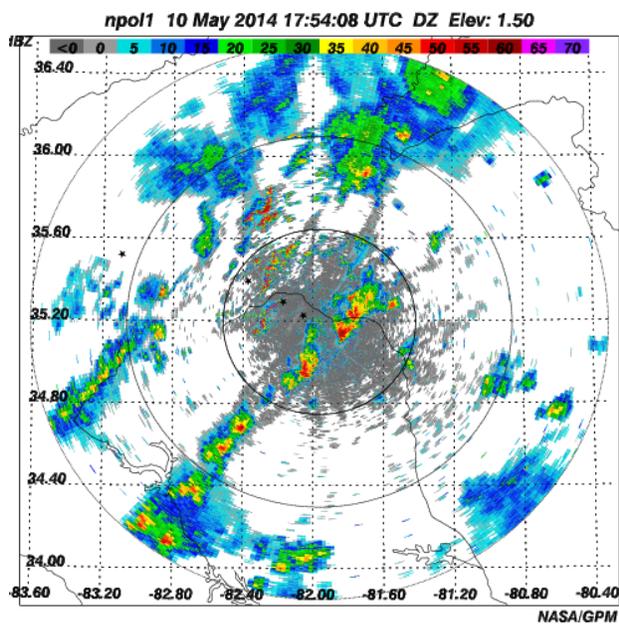
1700 UTC - Still scanning same with Citation crossing line @ 285 degrees.

1733 UTC - Nice line coming from southwest. Will stop Citation ops in a few minutes when they RTB. Thunder and drops at the radar.

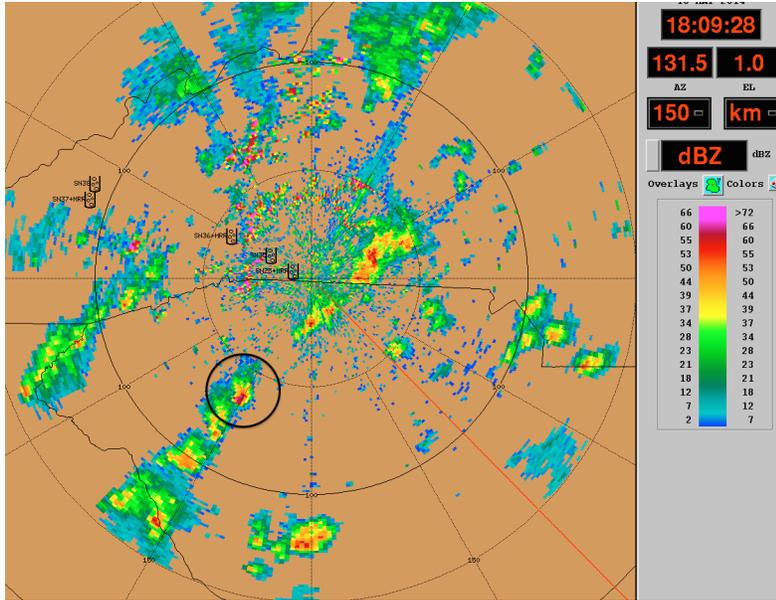
1741 UTC - NPOL area under severe storm warning. Citation is RTB. Ran one BB and going back to



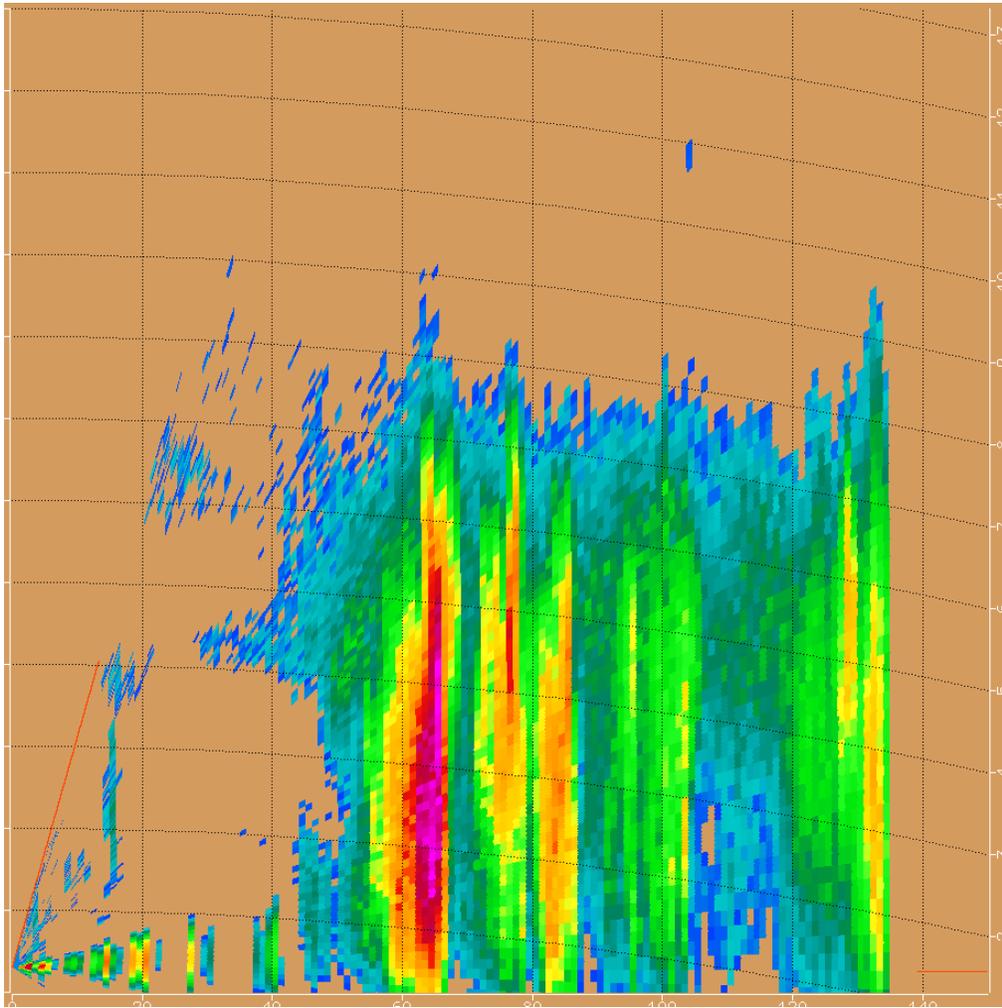
1754 UTC - Coordinating some RHI scans (210-220 deg x 2 deg) on 3-min cycle.



1800 UTC - RHI @ 213 degrees shows a nice, but small hail core at about 5 km height and 60-65 km in range



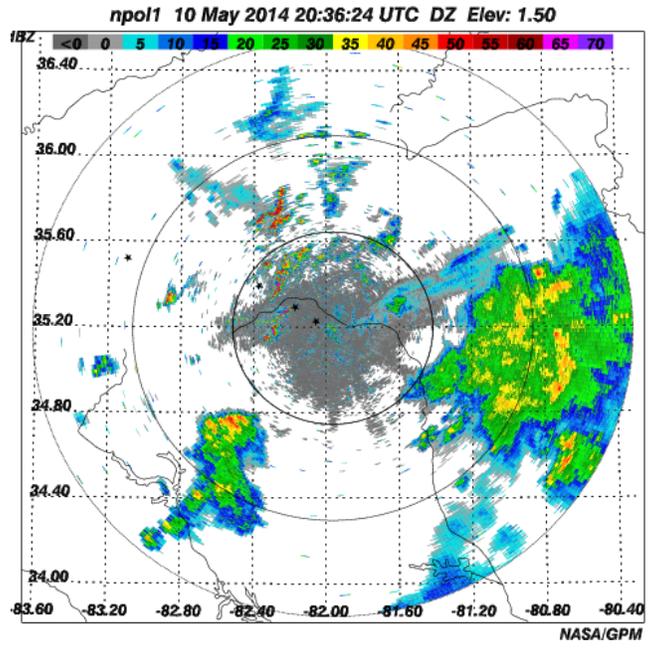
1814 UTC - Switching to a 58, 60, 62 RHI to catch cell to NE. No precip in D3R range. Still running 3-min cycle with IPHEX_RAIN mandatory.



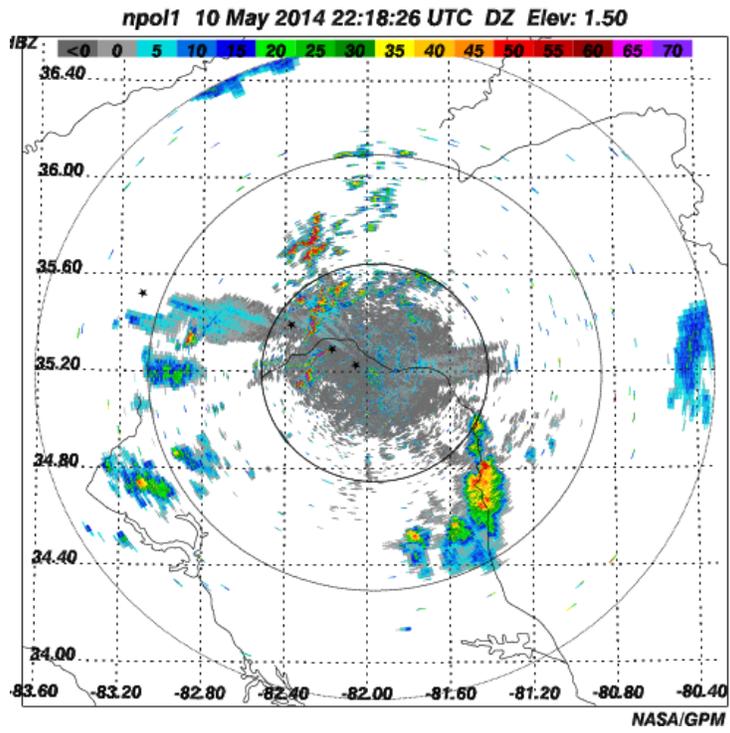
1909 UTC - Rotating in IPHEX45_NEAR [200-245]

1945 - Switching to SE quadrant as precip is closer and more impressive there [IPHEX45_FAR; 125-170 deg] + IPHEX_RAIN @ 3 minute cycle.

2006 uTC - Cell to SW at about 120-80 km depth is heading this way, so will concentrate there.



2040 UTC - Switching to IPHEX45_NEAR [190-235] to catch cell to SW.



2223 UTC - Going to sample some cells SE with IPHEX45_FAR [200-245]. Still running 3-min IPHEX_RAIN.

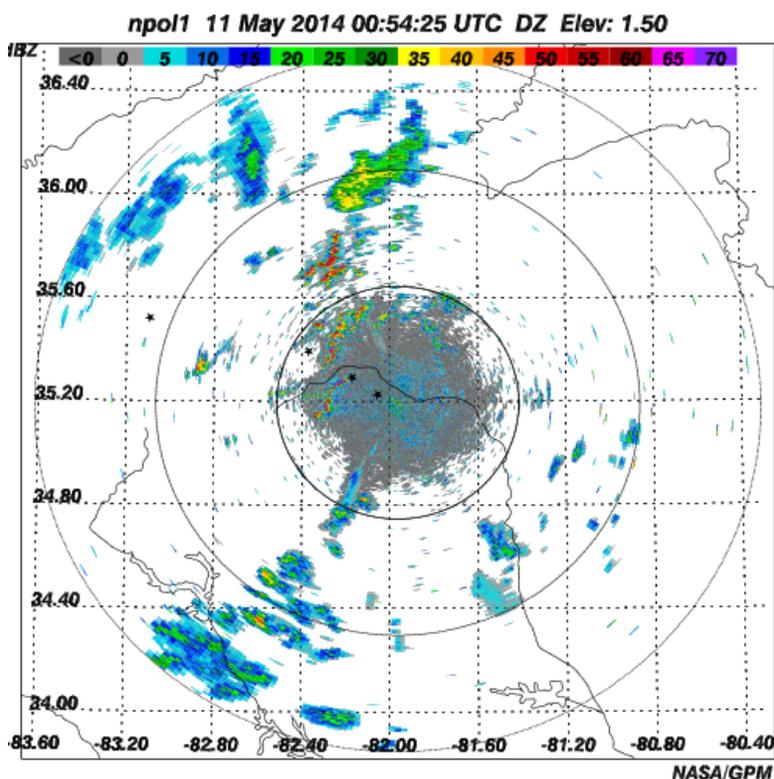
May 11 2014

David Marks on shift

0000 UTC - Showers to the East beyond 100 km range. Showers to NW and N 100-150 km range. Running IPHEX_RAIN with 3 minute repeat. Showers approaching SN37/38.

0030 UTC - Sampling showers to the N/NW with IPHEX_45FAR (315-000 deg) and IPHEX_RAIN on combined 3 minute repeat. Showers are being topped by 6 deg elevation. Additional showers have developed to the SW from 80-150 km range.

0058 UTC - IPHEX_45FAR set to 330-15 deg. + IPHEX_RAIN on combined 3 minute repeat.



0130 UTC - showers diminishing. Nocturnal AP bloom quickly developing. Running IPHEX_RAIN on 3 minute repeat.

0231 UTC - A few light showers to the N and S mostly beyond 100 km range. A couple showers have developed near 210 deg between 60-90 km range.

0413 UTC - A few light showers to the S between 80-150 km range....dissipating. Looks like another long, quiet night ahead.

0519 UTC - No precip echo in range.

0800 UTC - No precip echo in range.

0924 UTC - Nothing.....

1107 UTC - All quiet

Shift Summary - A few showers early in the shift were sampled with IPHEX_45FAR and RAIN on 3 minute repeat. Showers dissipated during the 02Z hour. No activity for the remainder of the night.

1200 UTC - D. Wolff on shift

Just a few very light echoes, diminishing rapidly. Continuing 3-min IPHEX_RAIN scans.

1432 UTC - Switching to 4-minute cycle for IPHEX_RAIN. No echoes.

1600 UTC NPOL will begin a soft-down. Will run IPHEX_RAIN @ 4-minute cycle, but radar will not be staffed. Will monitor for problems via web. Will resume operation on 05/12/2014 @ 1200 UTC. Scheduled ER-2 offshore flight, but that will not affect NPOL operations. Overall looks pretty dry until Wednesday evening, although a chance of mountain showers and a few air-mass Cb might be possible.

May 12, 2104 @ 1200 UTC

D. Wolff on shift. NPOL was on soft-down from 5/11 @ 1600 UTC until 5/12 @ 1200 UTC. Radar ran well all night and images successfully copied to Wallops/PRF web site. No precip echoes currently, just clutter and mountains.

1214 UTC - Radar down for solar cals and will do a full cal check. Will also check wires to see if any are loose, as there was some noise evident in the Zdr on 5/10.

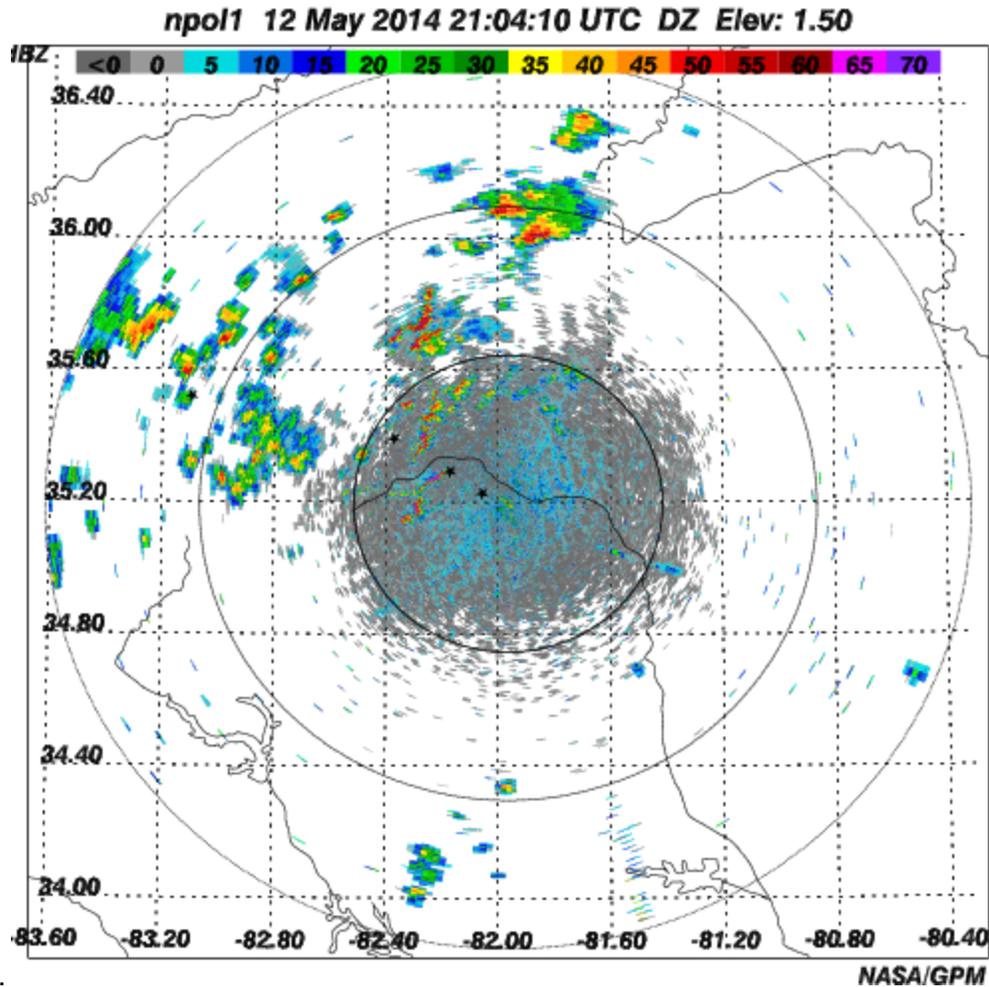
1620 UTC - Radar still in 4-minute IPHEX_RAIN mode. No echoes over the mountains yet. If they pop, will add IPHEX45_FAR in cycle.

1701 UTC - Some mountain showers, very weak starting, but going to kick in an IPHEX90_FAR on the 4-minute cycle. Ran at 210-300 until 1856 UTC, then switched to 225-315.

1954 UTC - Mountain convection popping to the WNW. Can see anvil in the distance. Switched to IPHEX90_NEAR to catch one at about 200°/75 km, but way overshooting, so going back to IPHEX90_FAR but actually running it 270 - 030 to get some convection to the north and NNE as well.

2031 UTC - Cell to NNE @ about 100 km is almost 14 km ($y = \tan(8.7^\circ) * 100 \text{ km}$) = 13.8 km

2111 UTC - Cell to NNE seems to be weakening, but it is warned as severe. Very little movement of these storms, so where it's raining, it's wet. A bit more development and mergers



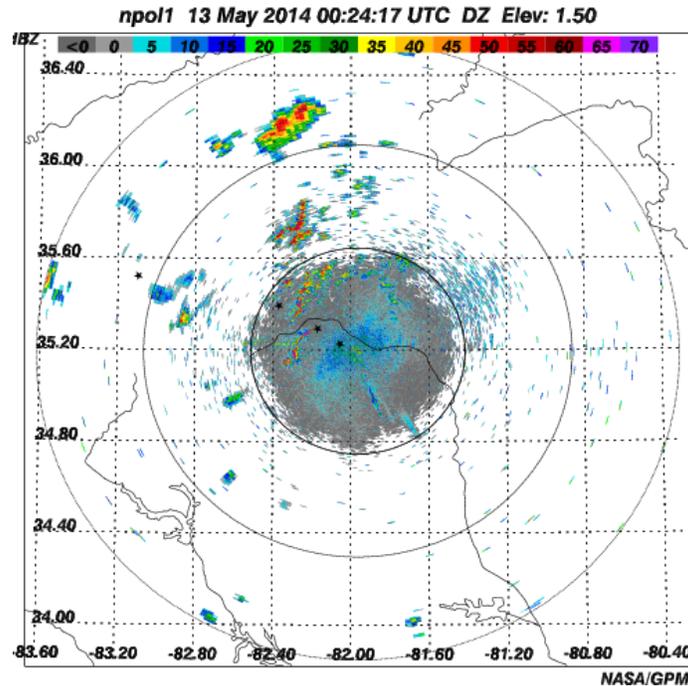
2117 UTC - Some small cells popping up at about 190°/120-140 km, but will maintain IPHEX_RAIN and IPHEX90_FAR to watch the slow moving storms in the western and NE quadrants.

2330 UTC - Dave Marks on shift.

May 13, 2014

0024 UTC - Light showers to the S and W are dissipating. Larger/stronger shower about 125 km N (in Eastern TN). Running IPHEX_45FAR and IPHEX_RAIN on combined 3 minute repeat. Strong shower has reflectivity ≥ 50 dBZ extending to about 8.5 km in height (3.5 deg elev).

Storm is completely topped at about 16 km height (7 deg elev). No activity close enough for D3R. Time loop indicates that this storm is strengthening and is stationary.



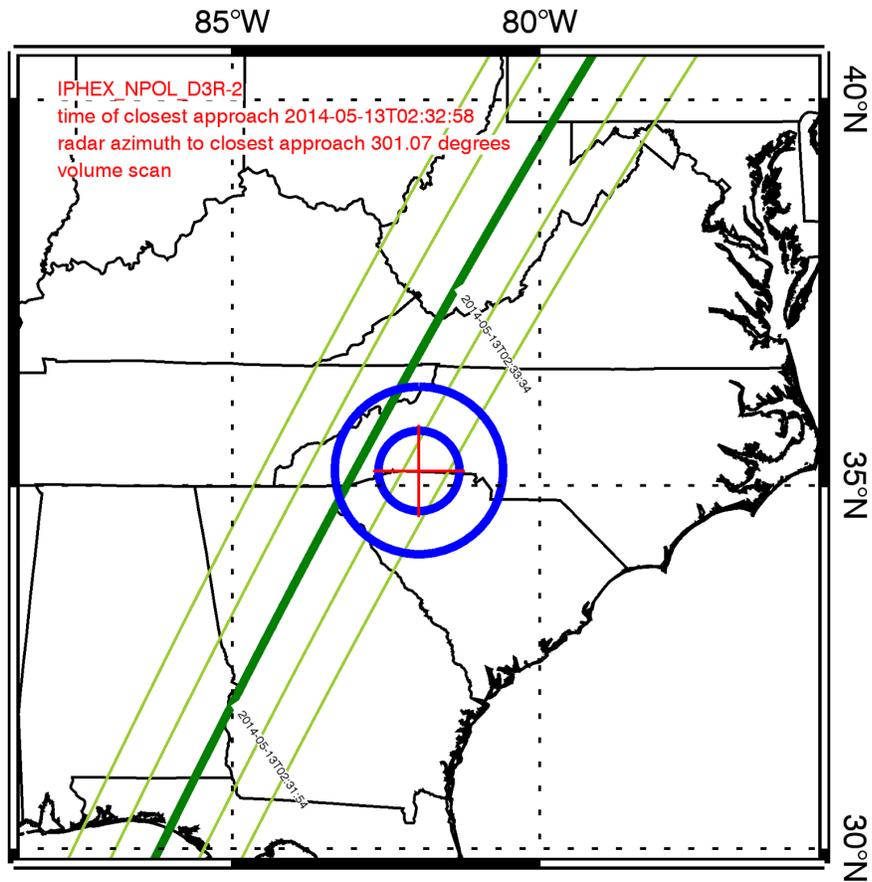
0116 UTC - Large cell about 125 km N continues to pulse in strength - increasing coverage also - lightning seen from NPOL. Another area of showers has come into view at far range to the WNW (in East Central TN). A small shower has developed SW near 60 km range. Nocturnal AP bloom.

There will be a GPM core overpass this morning at 0232 UTC that may capture the cells to the W & NW with Ka and Ku (if it persists). Testing IPHEX_RHI with 3 angles - cross-track with DPR (343.0, 345.0, 347.0 degrees) together with IPHEX_RAIN (3 min combined repeat). RHIs look good with precip echo extending to near 13 km height. Strong cores have weakened.

0148 UTC - transmitter stopped in wedge from 330 deg to 30 deg - unknown why - one scan only - will keep an eye on it. Scheduled IPHEX_45FAR with IPHEX_RAIN.

0222 UTC - Running back-to-back IPHEX_RAIN and IPHEX_RHI (354.0, 356.0, 358.0) for GPM overpass (0232 UTC) for the next 20 minutes. Echo to the North near 125 km range extending to near 12 km height and max reflectivity about 35 dBZ.

0242 UTC - Running IPHEX_45FAR and IPHEX_RAIN. Showers continue to the N from 100-125 km range, and to the WNW near 125 km range. All other sectors quiet.



0327 UTC - Showers diminishing. Continuing IPHEX_45FAR on showers to the North and IPHEX_RAIN with combined 3 minute repeat. Showers to the North are completely embedded in AP bloom at the 1.0 and 1.5 deg elevations. Shower to the West has almost completely dissipated - no longer visible at our sampling elevation angles.

0405 UTC - showers have mostly dissipated. Running IPHEX_RAIN on 3 minute repeat.

0503 UTC - No precip echo within range

0609 UTC - No precip echo within range

0704 UTC - No precip echo within range. The waxing gibbous moon and Mars are setting together on the western horizon.

0800 UTC - No precip echo within 150 km range, and none expected. No additional GPM core overpasses during the remainder of this shift. No scheduled flights for this shift. **Per new guidelines, overnight shift is ending at 0800 UTC.** NPOL is running IPHEX_RAIN on 4 minute repeat cycle for the slight chance of early morning mountain initiation.

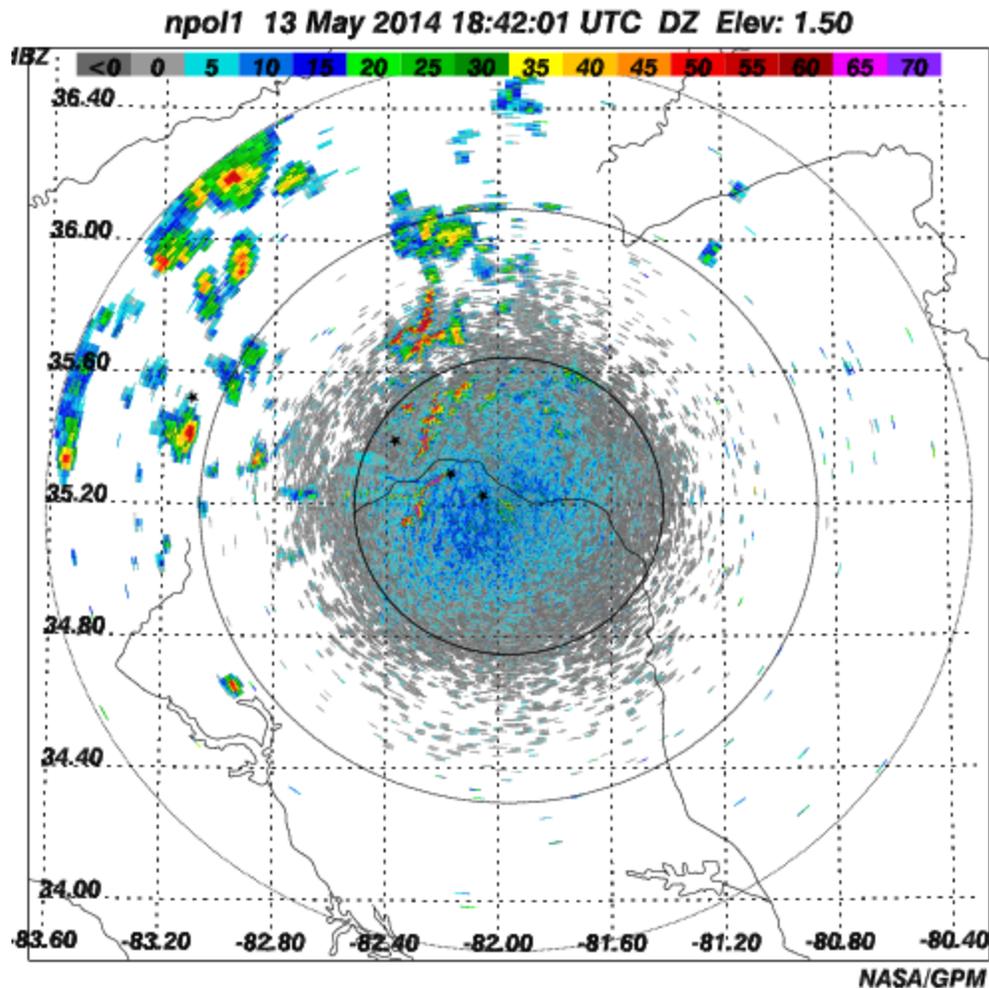
Shift Summary - isolated showers and convection near 125 km range during the 00-02 UTC hours. GPM core overpass with Ka and Ku coverage of these showers at 0232 UTC. NPOL ran IPHEX_45FAR before/after overpass, with IPHEX_RHI (cross-track to DPR) during overpass. IPHEX_RAIN scanning continued on 3 min. cycle. Shift ended at 0800 UTC with RAIN scanning on 4 min cycle.

1200 UTC - D. Wolff on **LAST** shift

IPHEX_RAIN running on 4-minute cycle.

1315 UTC - Few popcorn in mountains. Adding IPHEX90_FAR to 4-minute cycle.

1842 UTC - Still some mountain convection in NW quadrant. Continuing rain scans and 90° sector volume.



May 14, 2014 - David Marks on shift

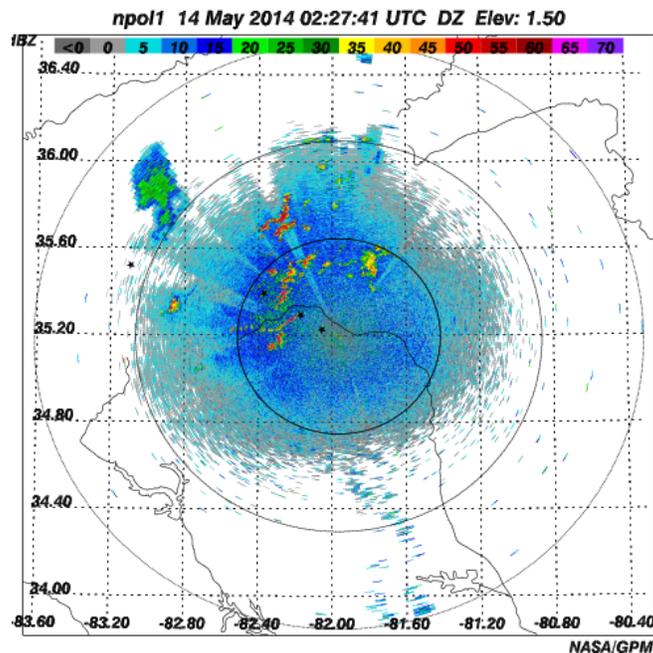
0027 UTC - Scattered showers in the mountains from 270 deg to 30 deg mostly beyond 100 km range. Running IPHEX_90FAR (modified for 120 deg) and IPHEX_RAIN on combined 4 minute repeat. Expecting echo to dissipate within the next couple hours - then a quiet night..... Next GPM core overpass is May 14 1122 UTC.

0108 UTC - Running IPHEX_DSD to capture cells over SN37 and SN38 near 115 km range. Modified azimuths to 288, 289, 290. Echo extends to about 12 km in height. Also running IPHEX_RAIN on combined 3 minute repeat. Cells also present due North near 125 km range.

0145 UTC - Cell to the NW has moved away from SN37 and SN38. Running IPHEX_34FAR (285-330 deg) and IPHEX_RAIN with combined 3 minute repeat. Cells to the North are moving out of range.

0222 UTC - New (rapid) cell development NE from 30-50 km range. Max reflectivity near 50 dBZ. Scheduled IPHEX_45NEAR from 0-45 deg. for a couple scans. Running IPHEX_RHI (3 angles - 20.0, 22.0, 24.0. Echo to 10 km height with 30+ dBZ echo up to 8 km height. Running back-to-back with IPHEX_RAIN on 3 minute combined repeat. New smaller cells are developing near the primary cell. Cells are not in a good location to be scanned by D3R.

0236 UTC - 50 dBZ core now showing up near 2.5 km height. Cell is between two distinct areas of ground clutter.



Showers to the NW near 100 km range are now dissipating.

0251 UTC - Newly formed cells to the NE are now rapidly diminishing. Going back to IPHEX_RAIN with 3 minute repeat.

0412 UTC - No precip echo within 150 km range. Running IPHEX_RAIN with 4 minute repeat.

0540 UTC - No precip echo within 150 km range. Running IPHEX_RAIN with 4 minute repeat.

0704 UTC - Very light showers to the WNW 140-150 km range (East Central TN). Regional radar shows these showers to be light and isolated. I don't expect anything significant to develop within 125 km of NPOL.

0741 UTC - showers to the far west are moving north and staying beyond 125 km range. They are trying to approach the Pigeon Basin, so the decision has been made to stay at least until 10Z (0600 EST).

0848 UTC - showers have mostly moved out of range. A few speck showers remain to the NW from 125-150 km range. No further development expected. Continuing IPHEX_RAIN on 4 minute cycle.

0916 UTC - Showers have moved out of range to the North. All other sectors quiet.

0928 UTC - SKUNK!!! Whew - that's bad!!

1000 UTC - Overnight shift ending. No precip occurring or expected. No GPM core overpass or scheduled flights.

Shift Summary - A few scattered showers and cells during this shift.

Amber Emory on Shift @ 1130 UTC

1221 UTC: All clear currently. Thunderstorms forecasted for tonight.

1420 UTC: Radar down for calibration. Should have back up after lunch. We want to make sure that everything is running well for operations to start later this evening.

1609 UTC: Radar back up and scanning using IPHEX_RAIN scanning strategy again.

1625 UTC: Bugs...bugs...and more bugs on the PPI.

1835 UTC: Still clear in terms of precip showing up anywhere on the radar display. Visually, shallow puffy Cu clouds outside.

1841 UTC: Looking at the CONUS radar loop, large portions of Alabama are currently experiencing either convective or stratiform rain. Convective cells are starting to pop in southern Georgia and beginning to organize. Precipitation will converge on the NPOL/D3R radar site from both the South and West in the next several (guessing 5-6) hours.

1941 UTC: Wave structure in insect field at low-levels on NPOL PPI scans

2050 UTC: Looking at CONUS radar loop, most radars ahead of impressive precipitation field associated with advancing warm front have lots of wave structure oriented NW to SE in clear air WSR-88D scans.

2058 UTC: Impressive convection firing in southern Georgia.

2217 UTC: Cirrus deck overhead outside. Good chance that we will be hit by an East-West oriented line of convection with very little trailing stratiform rain to its south.

2238 UTC: Convection moving N from southern Georgia is weakening and merging with larger N-S oriented area of precipitation ahead of the cold front.



2245 UTC: First range folding of precipitation to S showing up on NPOL PPI scans. Our max unambiguous range is 150 km, so we will have to wait until precipitation at least crosses into South Carolina.

2250 UTC

It was noticed that IFLOODS RAIN SCAN instead of IPHEX RAIN SCAN was entered in the Description of the IPHEX_RAIN Task. This was changed to IPHEX RAIN SCAN

MRW

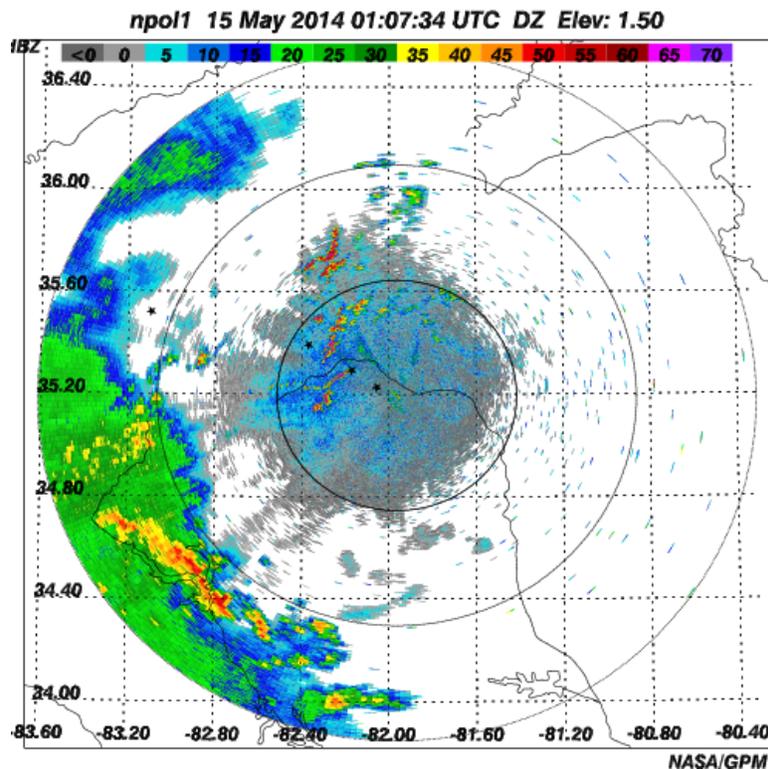
2338 UTC

IPHEX_BB Description changed from WFF to IPHEX.

IPHEX_RHI Description changed from IFLOODS to IPHEX. These changes affect file header info only.

May 15, 2014 - David Marks on shift

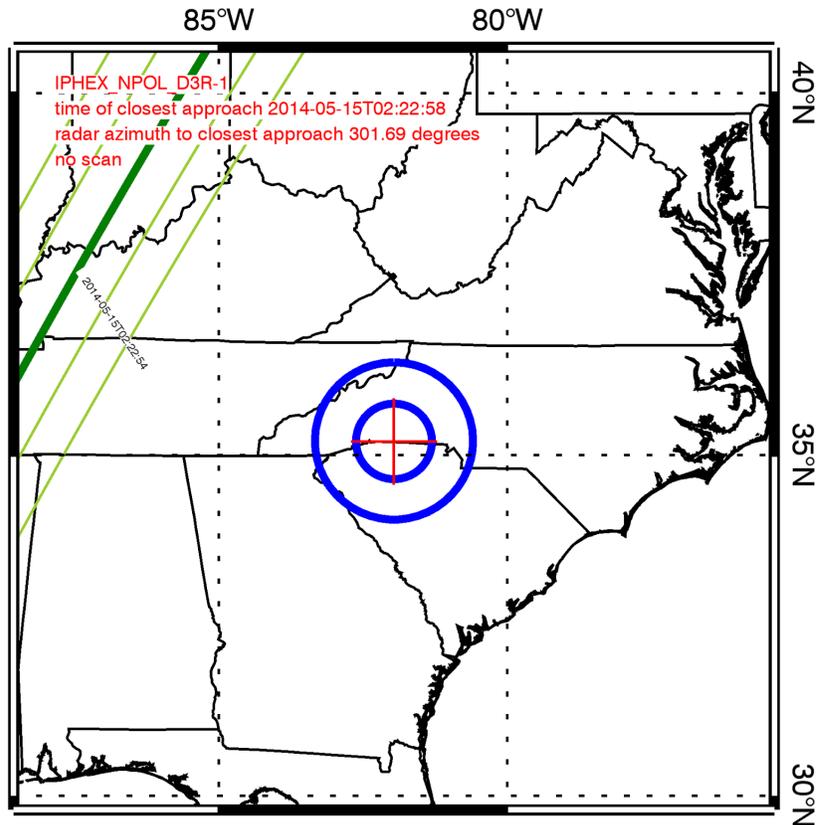
0052 UTC - Broad shield of rain with embedded convection approaching from the W and SW - leading edge near 100 km. Individual cells developing ahead of the rain shield. Running IPHEX_90FAR from 180-270 deg (will shift that to Pigeon Basin in a while) and IPHEX_RAIN.



0130 UTC - leading edge near 80 km range. Additional cells are developing to the S near 75 km range.

0139 UTC - Running IPHEX_90FAR over Pigeon Basin (260-350 deg). Running IPHEX_DSD with 3 angles (289, 293, and 298 deg). Note: 289 and 293 deg are for SN37 and SN38 while 298 deg is for the other 2DVDs. Also running IPHEX_RAIN. Combined repeat time is 4:40 - too long so will turn off IPHEX_DSD until better coverage.

GPM core passing too far west at 0222 UTC for NPOL and D3R, however there may be good precip in OH, IN, and KY for 88D comparisons.

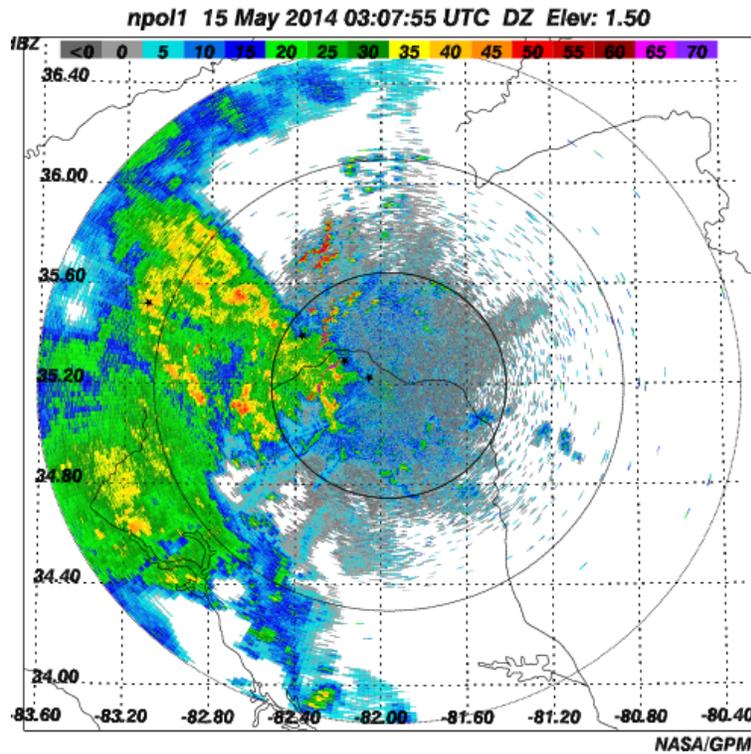


Switched to IPHEX_RAIN and IPHEX_90FAR (190-280) with 3:15 combined repeat. Not enough precip in Pigeon at this point - but that will change soon.

0225 UTC - leading edge about 35 km SW of NPOL and D3R. Running coordinated sectors with D3E to SW.

0254 UTC - IPHEX_90FAR angles modified to 220-310 deg to capture moderate/heavy rain as it approaches and moves through the Pigeon Basin. Running together with IPHEX_RAIN. Rain approaching 2DVD locations -

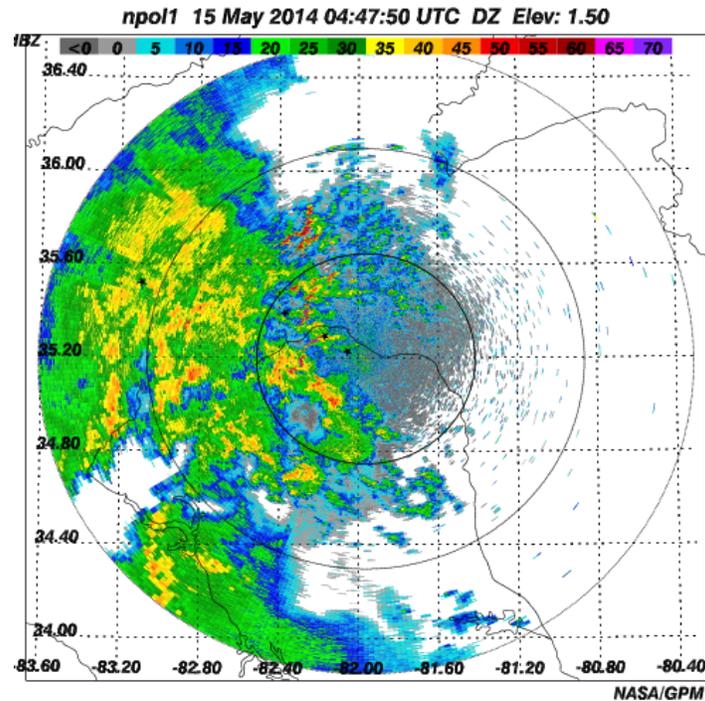
Adding IPHEX_DSD (3 angles) at 0303 UTC and temporarily suspended IPHEX_90FAR. RHIs do not show a discernable bright-band, so probably convective.



Precip continues primarily in western half of scope. Not expecting anything directly over NPOL, so no BB scan until later - however Zdr field looks close to where it should be.

0341 UTC - precip has moved away from 2DVDs, so have stopped IPHEX_DSD. Running IPHEX_90FAR (240-330 deg) over Pigeon and IPHEX_RAIN. Significant precip shield continues in western half of scope with new showers developing and moving into view to the South. RH field shows a thick bright band from 70-100 km range with 2.7 deg elevation - that's about 3.5 km in height. Heavy rain continues in GA and is moving NE.

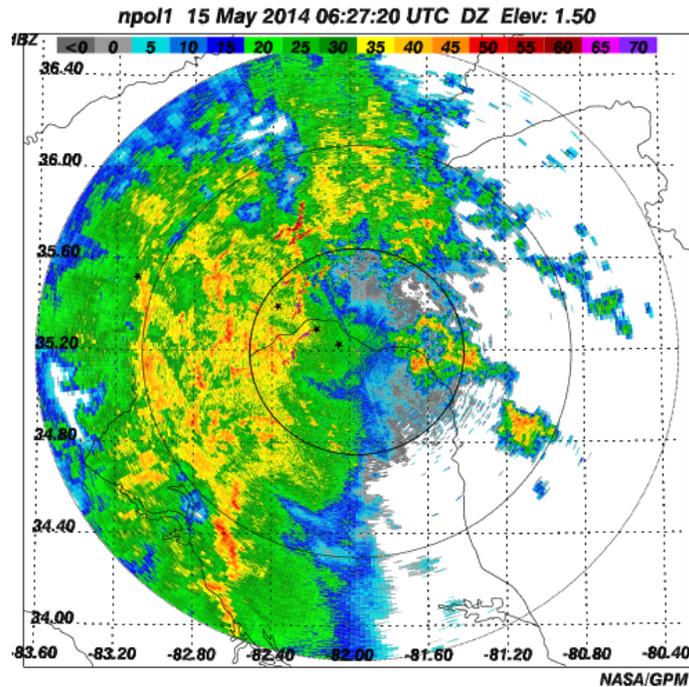
0442 UTC - precip continues in western and southern quadrants - moving North. Stronger echo now approaching NPOL from the South. Running IPHEX_DSD with 292, 298, and 299 deg - (this is the best fit for 2DVD coverage) with IPHEX_RAIN. Alternating between running IPHEX_90FAR and IPHEX_DSD depending if there is echo over the disdrometer locations. Should be able to run a BB scan within 30 minutes.



RHIs show bright band near 4 km height.

0526 UTC - running IPHEX_BB. Additional showers now developing to the SE of NPOL. All echo moving North. Raining heavier at NPOL - running another BB (0536 UTC). NPOL Zdr appears cold by approx. 0.4 dB (see image below). I do not want to adjust GDR in mid-event. It's much easier to adjust for the bias for the entire event in post processing.

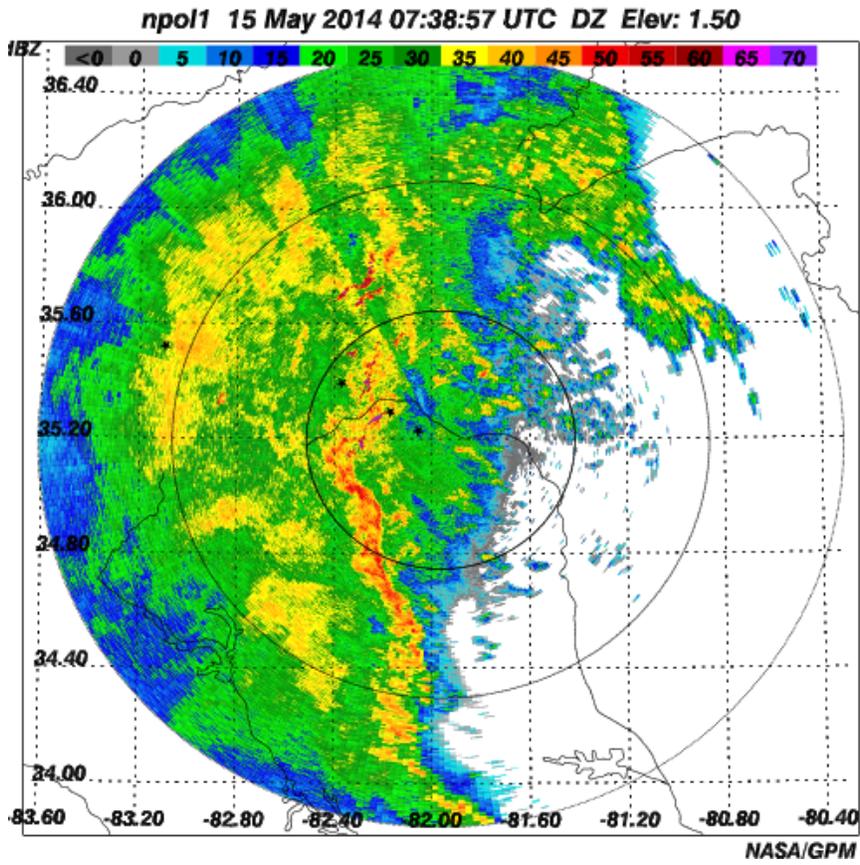
0627 UTC - solid shield of precip in western quadrants with scattered showers to the East. Continuing to run IPHEX_DSD and IPHEX_RAIN.

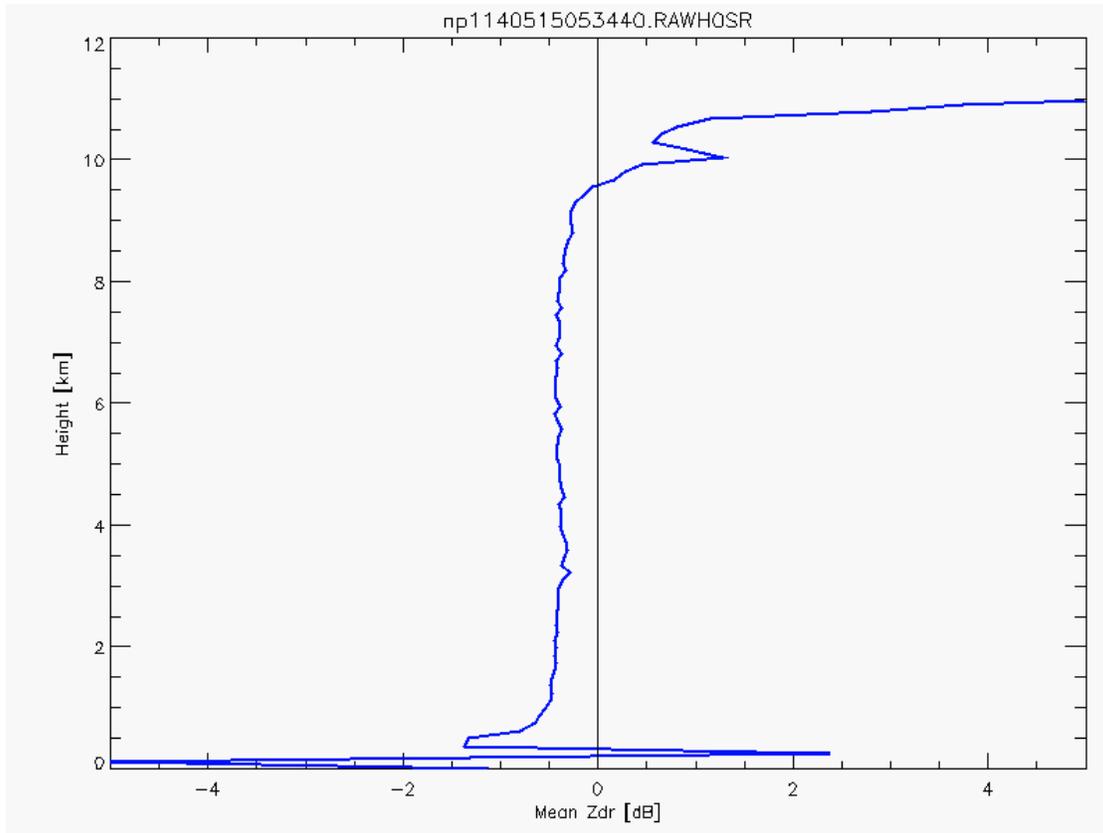


0640 UTC - **D3R is RED**. Ka transmitter failure. Aaron is working on it.

0700 UTC - Solid shield of precip continues in the western quadrants and has developed to the NE. Running IPHEX_90FAR (290-20 deg) over Pigeon and Catawba, IPHEX_RAIN, (3:35 combined repeat) and IPHEX_BB (top of hour schedule).

0738 UTC - N/S oriented embedded band of heavy rain approaching NPOL and two closest disdrometers. Rain is moving North approx. 25-30 m/s, but very slowly progressing to the East. Flash flooding is a real threat.



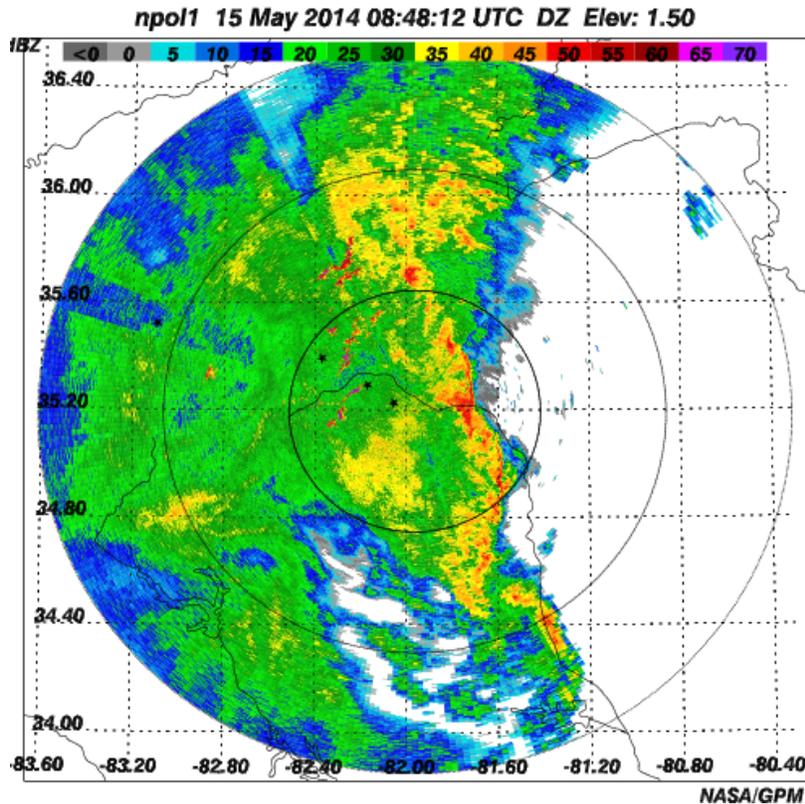


0753 UTC - **D3R is green.**

0805 UTC - IPHEX_RAIN + IPHEX_DSD on combined 3 minute repeat. RHIs show 30 dBZ echo to about 8 km height with ~45 dBZ echo to near 4 km height. There is some indication of a bright band just under 4 km. Heavier rain now over SN25 and SN35 and should be arriving at NPOL within the next 20 minutes. Azimuth 292 deg shows an embedded cell with about 50 dBZ echo extending to near 6 km height near 15 km range. Bright band is more pronounced near 4 km height.

0815 UTC - Heavy rain, in-cloud lightning and gusty south winds arrive at NPOL. Appears to be a lot of big drops mixed within the small. D3R Ka is almost completely attenuated, while Ku also shows significant attenuation. Embedded line of heavy rain is advancing East at a faster pace now - slight indication of bowing.

0852 UTC - Running IPHEX_90FAR (330-60 deg) over Catawba with IPHEX_RAIN on 3:35 repeat. BB will run at the top of the hour. Vortmax is located SW of NPOL near 80 km range



0924 UTC - modified IPHEX_90FAR (350-80 deg) to better capture embedded line of heavy rain to N and E in the Catawba Basin.

1035 UTC - Light rain continues in all quadrants with the leading edge of heavier rain East of NPOL near 100 km range. Running IPHEX_90FAR to N and E over Catawba with IPHEX_RAIN.

1052 UTC - IPHEX_DSD + IPHEX_RAIN on 3 minute cycle. Back edge of rain to the West near 100 km.

Amber Emory on Shift starting at 1130 UTC

1245 UTC: ER-2 took off about 20 minutes earlier than expected this morning.

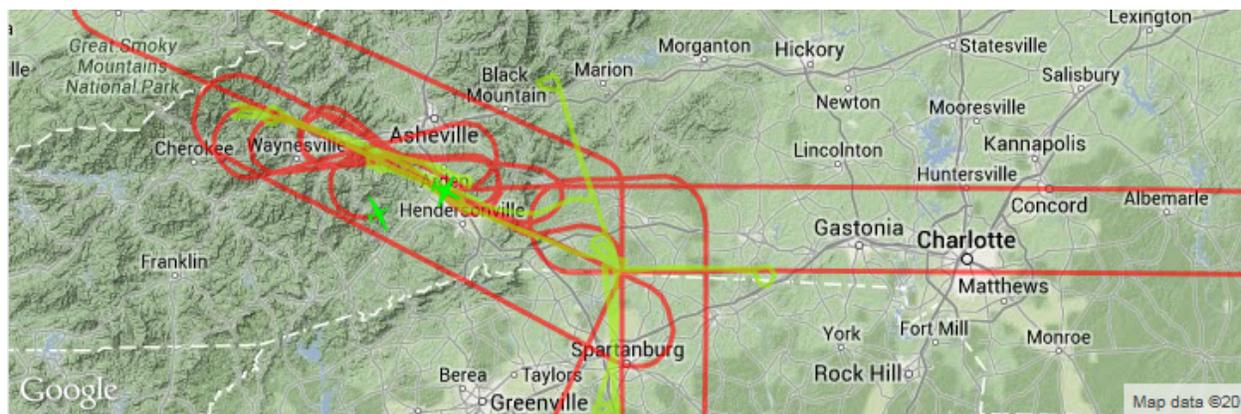
1402 UTC: Problem with communicating with D3R Ka-band transmitter.

1431 UTC: Running 45 degree sector scan centered on 90 as well as RHI on 90 deg in combination with ER-2 and Citation. Nice bright band signature at 90 - 120 km range from NPOL.

1440 UTC: D3R Ka transmitter is back up. Not a problem with hardware (thank goodness), just software with communicating with radar. Connection reestablished in a relatively short amount of time.

1523 UTC: After running E-W legs between NPOL and over Charlotte, both aircraft headed back into mountains. Both NPOL and D3R are doing sector scans with RHI centered on 295 radial. Investigating elevated cells over the mountains, perhaps initiated by orographic enhancement?

1533 UTC: Citation and ER-2 flying bowties centered on 295 radial. Looks good.



1605 UTC: Thin line of convection advancing towards radar. Both aircraft are continuing bowties toward NPOL as they stay with the line.

1655 UTC: Citation is returning to base.

1804 UTC: ER-2 returning to base. Signed off MTS

1807 UTC: Setting up a 90 deg scan centered at 270 deg, running IPHEX_90 NEAR scanning strategy.

1844 UTC: Switched IPHEX_RHI to 210 deg as line of precipitation associated with cold front approached NPOL radar. The cell was nicely topped by the RHI scan.

1911 UTC: Stopping IPHEX_90NEAR and IPHEX_RHI until the line of precip crosses over us. Will start again once it is a little further E. Interestingly, the trough has dug deep enough that there is slow eastward progression of the line. Many of the cells in the line are "stretched" to the North. This case is interesting in that there really isn't as widespread/stagnant/flood-producing precipitation field as the models yesterday tended to suggest.

1920 UTC: Started IPHEX_RHI scanning strategy again at 10 deg. This cut along the passing line shows a nice tight grouping of discrete cells.

1923 UTC: We are currently looking at the northern portion of the convective line crossing over the NPOL radar site. I switched the IPHEX_90NEAR scanning strategy back on from 315 to 45 degrees. D3R is scanning in the same pattern that NPOL is. The Ka-band is attenuated out past ~17 km from the radar.

1953 UTC: Decided to turn off the RHI scans since the line is falling apart in terms of organization. I switched the IPHEX_90NEAR scanning strategy to 10 to 100 degrees. The northern portion of the line relative to NPOL is the most interesting. There is a tornado warning in Mecklenburg county just NE of Charlotte, NC.

2026 UTC: Any organization in the line of precipitation with the cold front is gone now.

2053 UTC: Switching scanning strategies from IPHEX_90NEAR to IPHEX_90FAR still with 10 and 100 deg as start/stop azimuths. Decided to throw in an RHI at 90 deg just to take a look at the developing stratiform rain region to the East. Shows fairly thick bright band from 80 to 120 km range. Interestingly, on PPIs or sector scans, it looks like stratiform rain but there is a chance that there is embedded convection.

2120 UTC: Mike Watson requested a birdbath scan since precip will be clearing out of range over the NPOL radar probably by the end of the shift.

2208 UTC: D3R is now stowed. Transmitter is still turned on, but radar is not scanning currently.

2212 UTC: RHI along 90 deg radial shows ~ 5-10km diameter cells that look pretty weak. Max reflectivity looks to be about 35 dBZ.

2240 UTC: Animation of 90 deg radial shows nice propagation of small embedded cells in stratiform rain moving off to the East.

2324 UTC: Precip is moving off to the N/NE. Getting some range folding.

May 16, 2014 - David Marks on shift

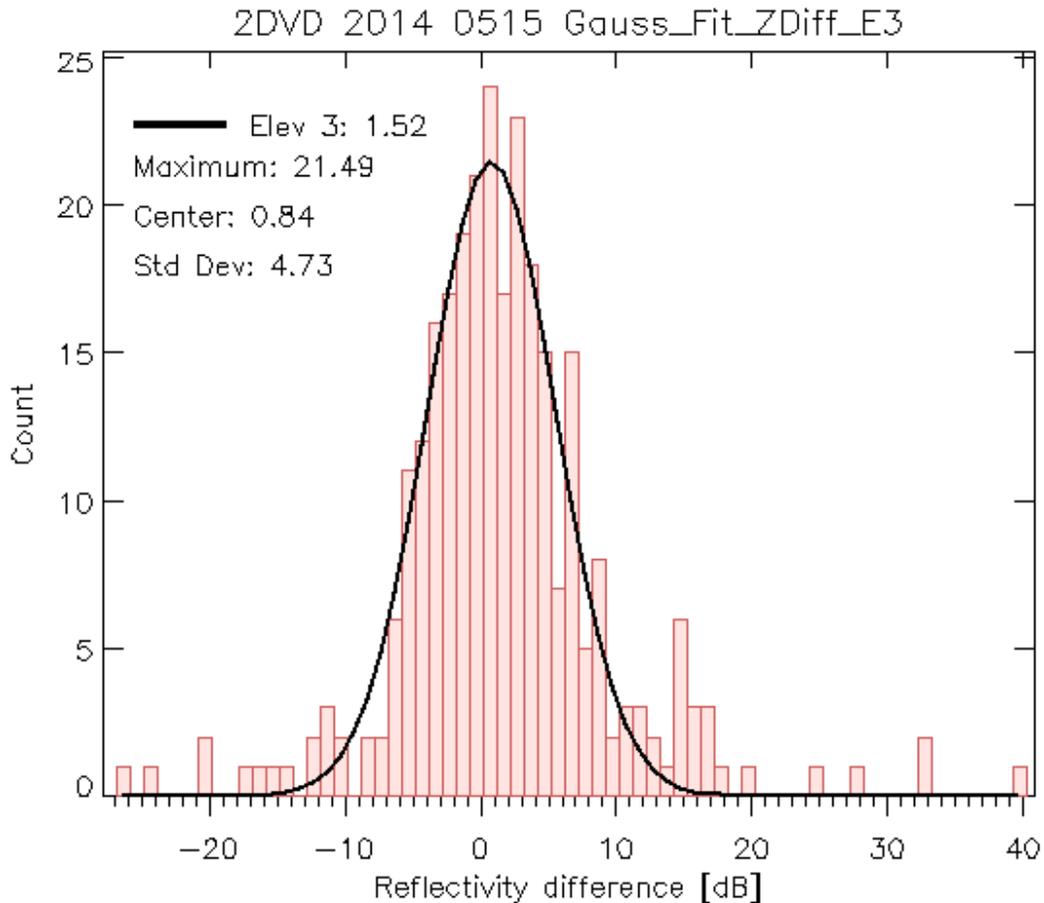
0000 UTC - Showers to the East are moving NE out of the NPOL field of view. Multiple-trip also present to the East. No precip echo in the Western quadrants. Running IPHEX_RAIN on 3 minute repeat.

0136 UTC - A few showers exiting the NPOL domain to the East. Watching showers and convection move into western KY and TN in association with strong vorticity in the Mid-Mississippi Valley. Precipitation probably won't hold together through the mountains, but will be watching - very dry air has arrived at the NPOL site. Running IPHEX_RAIN on 3 minute cycle.

0440 UTC - A few light remnant showers East beyond 100 km range. No precip echo elsewhere.

Reflectivity Comparison between 2DVD and NPOL: May 15, 2014 rain event

The plot below shows the histogram and Gaussian fit of the *difference* in reflectivity between 2DVDs (combined) and NPOL from the rain event on May 15, 2014. The difference is calculated as 2DVD-NPOL. A positive difference indicates 2DVD > NPOL. The elevation selected to be mostly above blockage is near 1.5 degrees. The center of the Gaussian fit indicates that NPOL reflectivity is slightly “cold” relative to combined 2DVDs --- but by less than 1 dB. This specific result shows NPOL cold by about 0.8 dB. Results from other elevations (1.3 to 1.9 deg) are consistent, and range from 0.6 to 1.1 dB cold.



0540 UTC - A couple very light stray showers to the East...no other precip echo within 150 km range.

0713 UTC - No precip echo within 150 km range.

0800 UTC - Early morning NPOL shift ending at this time. No precip, no overpasses, no flights.

Amber Emory on shift 1140 UTC

1420 UTC: Mike running tests on radar so suspending IPHEX_RAIN scanning strategy for the moment.

1435 UTC: Continuing to do IPHEX_RAIN scanning strategy on repeat every 4 minutes. Cold, clear, dry morning with dewpoints in the low to mid 30s.

1543 UTC: Weak line of precip generating around Knoxville, TN associated with upper-level low. We'll see how well it holds together. Still continuing to do IPHEX_RAIN scanning strategy every 4 minutes.

1629 UTC: Shallow puffy Cu out to the West.

1802 UTC: Birdbath scan

1806 UTC: Turning on 90 degree sector scan from 270 to 360/0 using IPHEX_90FAR scanning strategy

1906 UTC: The first wave of precipitation to come over the mountains is breaking apart. Still using sector scans with IPHEX_RAIN.

1911 UTC: Surveillance scans showing lines of cells moving into 40 km range for D3R. Switching over to IPHEX_90FAR, which is probably fine to top cells in the 210 to 300 deg sector scan.

1924 UTC: Line regenerating after coming off the mountain. Notified D3R that there is a nice cell within close range to sample.

1928 UTC: Looks like "reconvection" being channeled by mountains at approximately 25 to 27 km range between 330 and 360 deg.

1952 UTC: There is a little light rain and gusty winds at the radar site. Going to do a NE quadrant sector scan (0 to 90 degrees) with IPHEX_90FAR. Cells will be topped easily even though they are not far in range so it's not worth the time spent on additional higher tilts. D3R will not be scanning the same because it can't scan from 30 deg to 160 deg due to box on back of trailer platform.

2020 UTC: D3R has stopped scanning since it cannot look at the same precip that NPOL is.

2056 UTC: Another cell has initiated out to the West, but doesn't look promising.

2108 UTC: Turned off NE quadrant sector scan.

2117 UTC: Set up 1 RHI to take at 270 deg to look for D3R. Small cell.

2124 UTC: D3R wants to do a 45 degree sector scan centered on 270 degrees. NPOL will use IPHEX_45FAR. Turned off RHI scan.

2130 UTC: Ran IPHEX_45NEAR scan accidentally. D'oh! Starting IPHEX_45FAR. Very shallow precipitation.

2201 UTC: Next flight opportunity is Monday, May 19. The objective is to do an offshore satellite underpass.

2303 UTC: Went back to just IPHEX_RAIN scanning strategy. Very little precip of note, and what there is is extremely shallow and topped by a 3 deg elevation angle anywhere greater than 40 km range from the radar site.

David Marks on shift

2330 UTC: A couple shallow showers.

May 17, 2014

0030 UTC: Shallow showers have mostly dissipated. Lone shower E near 100 km range. Running IPHEX_RAIN on 3 minute repeat.

0126 UTC: No precip echo within 150 km range. IPHEX_RAIN on 4 minute repeat.

0400 UTC: No precip echo within 150 km range. IPHEX_RAIN on 4 minute repeat.

0536 UTC: No precip echo within 150 km range. IPHEX_RAIN on 4 minute repeat.

0709 UTC: No precip echo within 150 km range. IPHEX_RAIN on 4 minute repeat.

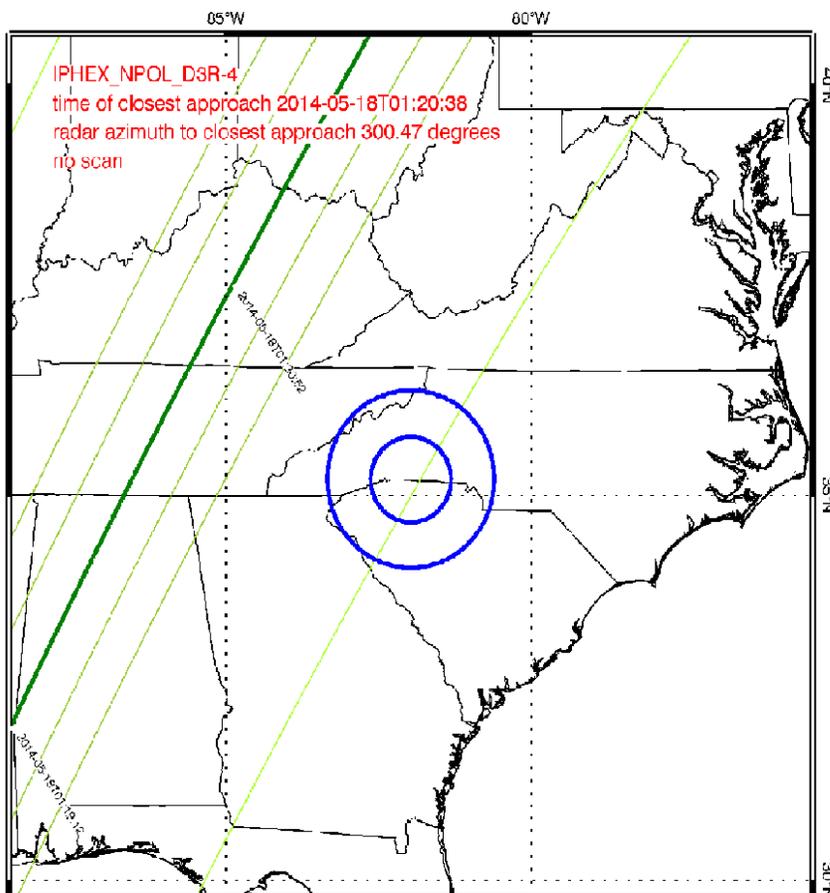
0800 UTC: Early morning NPOL shift ending at this time. No precip, no overpasses, no flights.

Amber Emory on Shift at 1158 UTC

1158 UTC: Loosely organized MCS moving across E. Arkansas and northern half of Mississippi and Alabama. Should be here by this afternoon. Aircraft is on hard down day. Will probably do sector scans as well as RHIs over disdrometers when precip arrives.

1300 UTC: There is a 55 to 60 dBZ cell embedded within stratiform rain on both sides of an E-W oriented MCS (unusual) riding just north of a stationary front. Soundings show moist upper levels, but low dewpointss in the mountains. The 4 km resolution NAM model shows precip within range from 1600 to 2200 UTC later today.

1322 UTC: There will be a TRMM overpass later tonight at 05/18/2014 01:20:38 UTC. Approximately $\frac{2}{3}$ of NPOL coverage is within TMI's overpass. (Nothing within the DPR overpass though.) Not likely that there will be precip here though.



1423 UTC: Can already see cirrus building over mountains as system west of the Appalachians continues to propagate towards us. It is still roughly the same size, but convection has weakened somewhat.

1426 UTC: There is also be a 1632 UTC TRMM overpass over the NPOL radar site on 21 May 2014.

1434 UTC: There is a possibility that we may have an early morning flight tomorrow. The forecasters are waiting for latest model runs to come out before mission science will make the decision to alert the aircraft crew.

1613 UTC: Did RHI to investigate precip along the 260 degree azimuth radial.

1617 UTC: Started IPHEX_45FAR scanning strategy, scanning between 247.5 and 292.5 degrees. Will switch over to using IPHEX_DSD (RHIs at 292, 298, and 299 corresponding to placement of disdrometers relative to NPOL radar site) once precipitation is within range. D3R is also waiting until rain is within 40 km range before commencing scans.

1622 UTC: Targeting disdrometers today. Looks like precip is stalling in the push over the mountains.

1711 UTC: Switched off IPHEX_RHI at 260 degrees and started IPHEX_DSD scanning strategy because precip looks to be over disdrometers at 292 degrees azimuth at just over 100 km range from the radar.

1720 UTC: Thickening cloud cover overhead outside of radar container.

1727 UTC: **7:00 AM EDT ER-2 takeoff tomorrow morning.**

1733 UTC: Switching to IPHEX_90FAR scanning strategy from 210 to 300 deg

1744 UTC: Some echoes on screen appeared very "radial", but I checked against the CONUS NEXRAD radar loop, and this appears not to be range folded. Getting nice RHIs, but no indication of rainfall at the surface yet over disdrometers. Rainfall reaching the surface is probably occurring 4 counties to our west.

1806 UTC: Reflectivity signatures reaching closer to the ground on 299 deg RHI scan

1815 UTC: Modified the azimuths for IPHEX_90FAR to 220 deg to 310 deg just to make sure that NPOL is scanning on either side of the disdrometer locations for the sector volumes. The scan period on D3R is not responding (software issue again). Haonan is working on it.

1820 UTC: Precipitation is evaporating around us and not surviving the passage over the mountains :/

1835 UTC: RHIs indicate that rain is just starting to reach the surface (maybe?). This will be nice to compare with the disdrometer data. Possibility of a faint bright band signature at ~2.4 to 2.5

km altitude. The Greensboro, NC (KGSO) sounding from this morning had the melting level at 800 mb (~2.2 or 2.3 km altitude). It is probably best to check soundings launched from the Asheville site.

1852 UTC: D3R had to restart. The radar would complete a sector volume scan fine, but just not initiate the next one to follow.

1857 UTC: Light rain at the radar site.

1924 UTC: Switched from IPHEX_90FAR to IPHEX_45NEAR scanning strategy from 265 to 310 deg to monitor any precipitation still over the disdrometers.

1933 UTC: Returning to just IPHEX_RAIN, RHIs are showing almost no precipitation anywhere. There are small droplets falling outside of the radar, which the RHIs picked up, but there is no longer anything over the disdrometer sites. Would be nice to see the disdrometer data from this afternoon. There is a chance for more precipitation to move into the region if it survives passage over the mountain. It is currently about 3 counties to our west right now.

2048 UTC: Starting IPHEX_DSD and IPHEX_45FAR from 265 to 310 degrees again because a second wave of (weak) precipitation is coming into range.

2056 UTC: RHI reflectivities over the disdrometers aren't anything to write home about yet.

2109 UTC: Is the weak precipitation actually splitting around the 3 closest disdrometers and radar site?

2116 UTC: Out to the West, rain is falling apart.

2143 UTC: Turned off the sector scans and RHIs over the disdrometers. The precipitation that remains is rather pathetic if I do say so myself. West of the Appalachians, dewpoints are in the low 50s, but East of the Appalachians, dewpoints are in the low 40s, which probably explains evaporation of any precipitation that survives over the mountains.

2149 UTC: I have to say that the NAM model prediction was just about perfect for rain in range of NPOL from 1600 to 2200 UTC.

David Marks on shift

2330 UTC: No precip echo within 150 km of NPOL. Running IPHEX_RAIN on 4 minute repeat.

May 18, 2014

0100 UTC: Possible light shower to the SW near 125 km range. GPM core overpass far to the West of NPOL at 0120 UTC passing over central TN and KY. NPOL just barely in the GMI swath, but to no avail.....

0317 UTC: No precip echo within 150 km range.

0420 UTC: No precip echo within 150 km range.

NPOL Self-Consistency reflectivity calibration check with May 15 data:

NPOL self-cons. calibration check using data from May 15 (06 and 07Z) shows NPOL Zh is cold within the range of 0.0 → 0.8 dB. [Note: This result takes into account the Zdr bias of approx. -0.35 dB computed from BB.] Here are some details: Data used are from IPHEX_RAIN scans from 180-250 deg azimuth (avoiding ground clutter and blockage). Data range: 20-80 km. SC equation used is from WFF (2DVD based).

Sweep 0 (1.0 deg elev) result: 0.83 dB cold

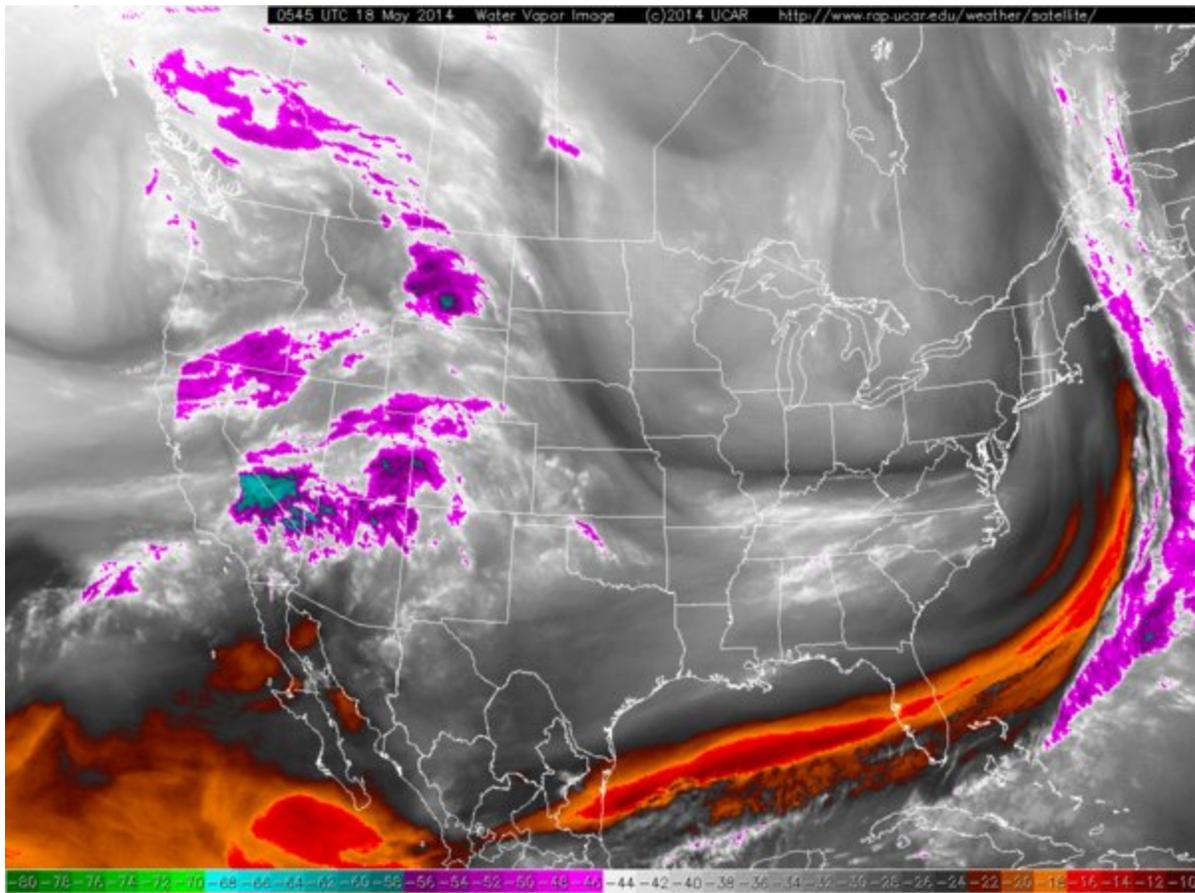
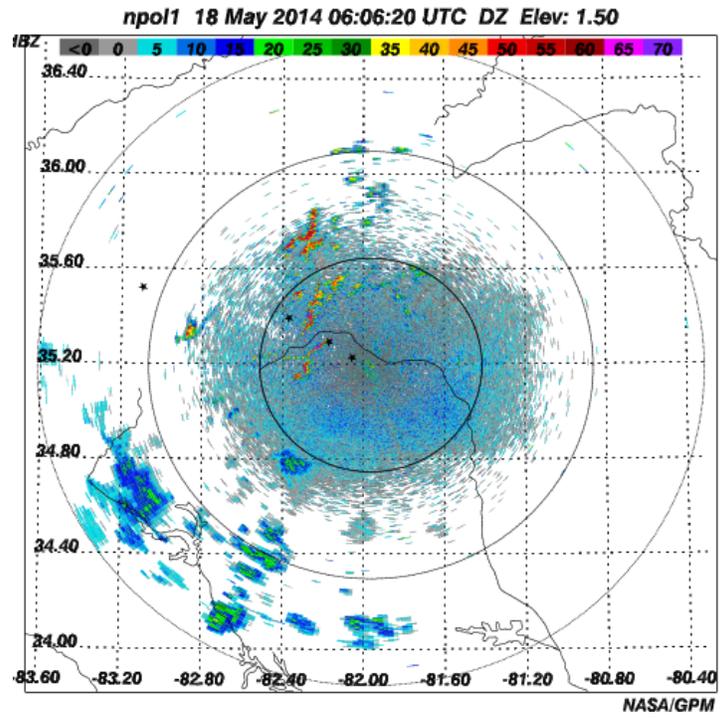
Sweep 1 (1.5 deg elev) result: 0.00 dB cold

Sweep 2 (2.0 deg elev) result: 0.19 dB cold

SC result is in very good agreement and consistent with the 2DVD comparisons shown earlier (approx 0.8 dB cold).

0540 UTC: A few light showers have developed and moved into view to the S and SW of NPOL from 80-150 km range. Running IPHEX_RAIN on 3 minute repeat.

0558 UTC: Showers becoming more numerous and coverage increasing to the S and SW. Have started IPHEX_90FAR fro 170-260 in addition to IPHEX_RAIN. Showers are shallow - topped by 3 deg elevation at 100 km range...that's about 5.2 km altitude. An elongated E/W oriented line of showers extends from Western TN through Eastern GA in response to a disturbance in the base of of the trough in the eastern US.

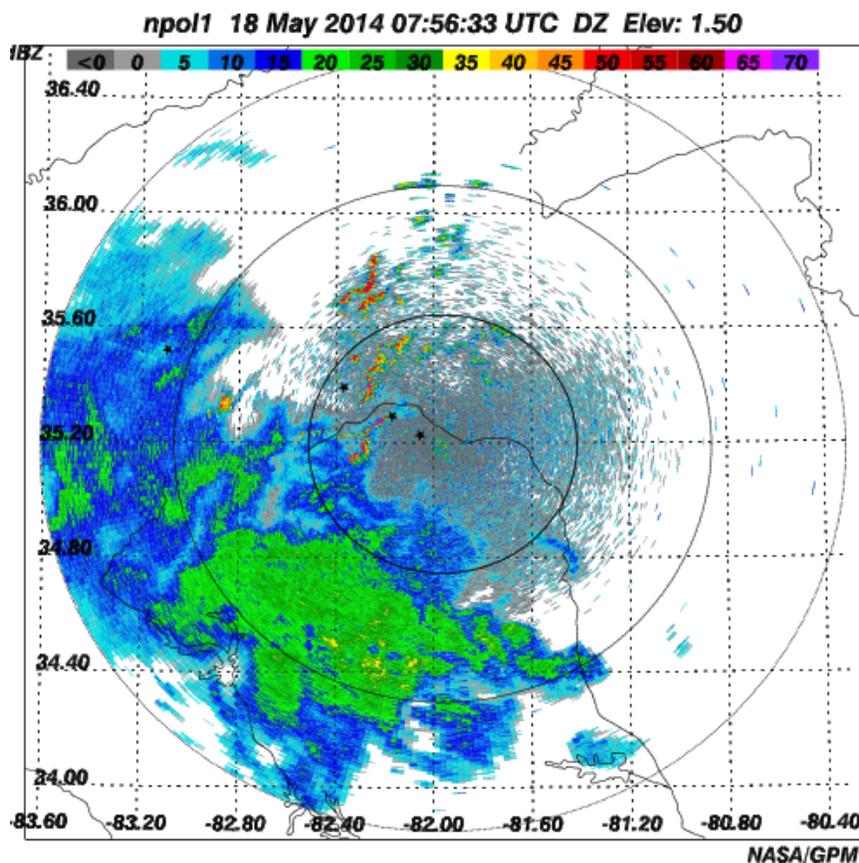


0639 UTC: Showers increasing in coverage and intensity in the southwestern quadrant from 80-150 km range. Maximum reflectivity is about 35 dBZ. Running IPHEX_90FAR and IPHEX_RAIN. Will be starting D3R soon.

0654 UTC: Showers now about 50 km range to W and SW. Have started D3R with PPI surveillance (3x) scans on 3 minute repeat. The D3R image displays are shut off - attempts to turn them on result in error messages. Scans are running, but I just can't see the displays. Checked img and netcdf directories - images and files being generated with current timestamps. Based on that, I'm thinking that there are no problems.

0707 UTC: Widespread shield of light rain to the W and SW. NPOL running IPHEX_90FAR and IPHEX_RAIN while D3R running PPI surv (3x). Light rain approaching SN37 and SN38, but probably not reaching the ground (<15 dBZ).

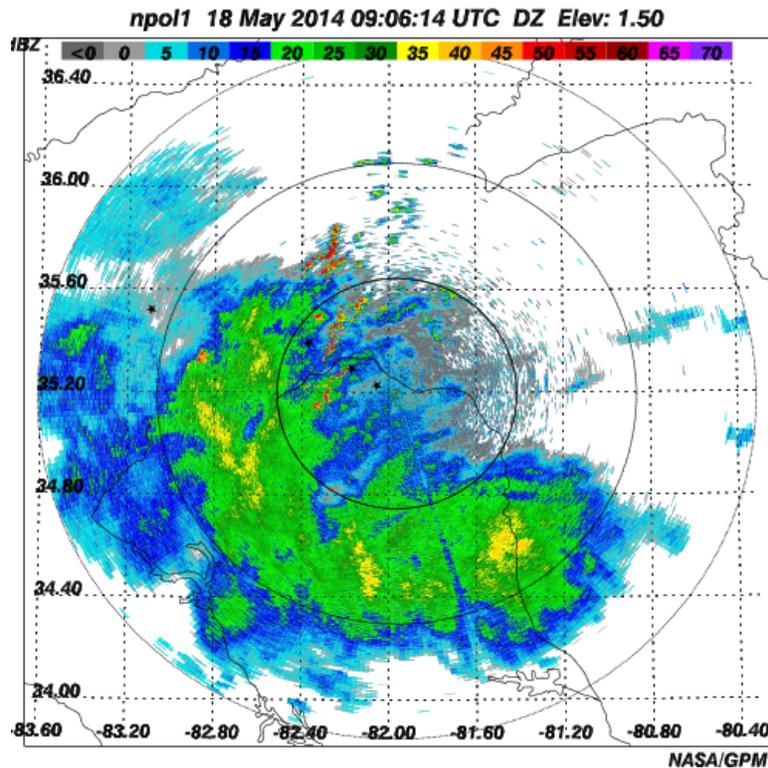
0756 UTC: Rain shield continuing to increase on coverage and intensity. RHI at 210 deg shows melting level near 3 km with echo tops near 6 km.



0830 UTC: Light rain primarily in southern half of the scope with strongest echoes near 50 km range. Very light showers (sprinkles) over 2DVD locations. Light shower at NPOL - not heavy enough for BB....yet. Running IPHEX_90FAR (170-260), IPHEX_RHI (180 deg), and IPHEX_RAIN. D3R running PPI surv (3x).

0838 UTC: Changed IPHEX_90FAR to 220-310 deg. Precip now moving into Pigeon Basis. Running IPHEX_DSD as heavier precip approaching closest 2DVDs. Will hopefully run a BB in a few minutes.

0903 UTC: D3R running RHI_DISD and PPI Surv (3x) in coordination with NPOL IPHEX_DSD and IPHEX_RAIN. Shield of light/mod rain continues to the South and West. RHIs show melting level near 2.5 km height.



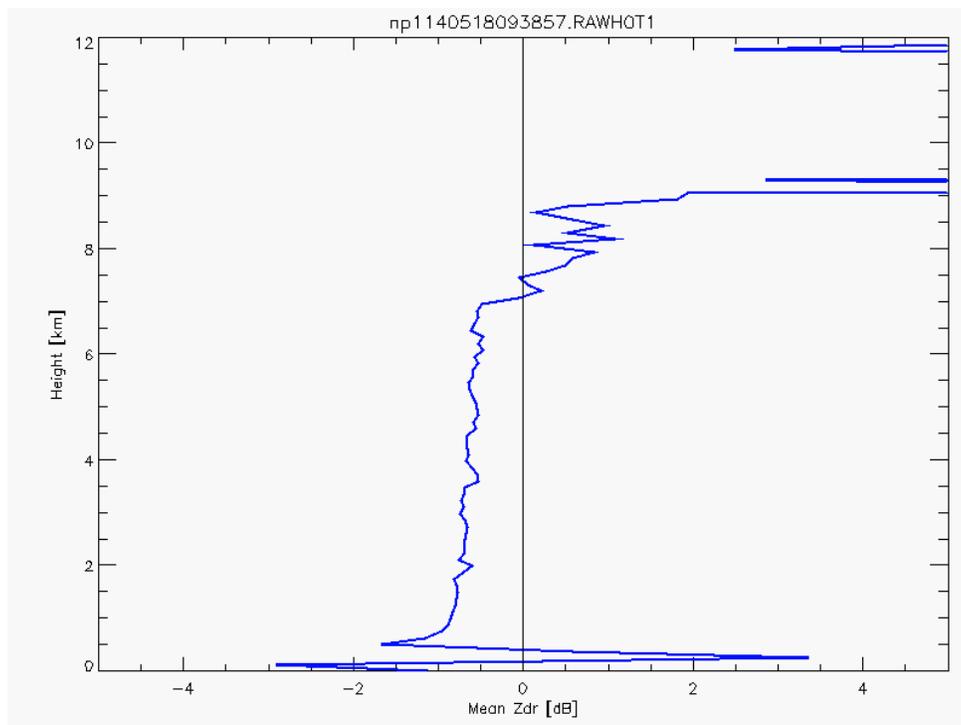
0928 and 0938 UTC: IPHEX_BB scan

0938 UTC: D3R BB scan

NPOL BB result shows Zdr bias is now approx. -0.75 dB. This is double what it was on May 15. Has GDR been adjusted (maybe the wrong way) since the May 15 rain?

The GDR offset is -1.12 as set on 09 May. I will look into it the next opportunity.

MRW



1012 UTC: Light rain continues primarily in the southern half of the scope. Running IPHEX_DSD and IPHEX_RAIN on 3 minute repeat. Having trouble with D3R - repeat cycle stopped working after 45 scans, so have to select to run scans every few minutes.

Amber Emory on shift 1031 UTC

1039 UTC: Flights scheduled to begin within the hour (11 UTC). ER2 took off at 1030 UTC.

1040 UTC: Mission Science requested a 60 degree sector scan centered on 285. Although I can do this, by altering azimuths, I would prefer to remain doing either 45 or 90 degree sector scans. We agreed to do a 90 degree scan centered around 285 (240 to 330 degrees).

1101 UTC: Turned IPHEX_DSD scanning strategy off because aircraft are not flying over them today and flight ops requesting RHIs to follow aircraft.

1107 UTC: NPOL added an RHI at 270 degrees azimuth.

1114 UTC: D3R is now ready to scan. Citation aircraft is up in the air.

1134 UTC: 90 degree sector scan, IPHEX_RHI at 270 deg, and IPHEX_RAIN total time=4:19

1205 UTC: Just completed another RHI along 270 with NPOL.

1225 UTC: Seeing some interesting vertical spread in Zdr values at approximately 64 to 70 km range from the radar. Almost looks like melting level arcs down a bit.

1316 UTC: Loops of spectrum width show 2 distinct undulations at ~3.1 and 1.7 to 1.8 km altitude over approximately last hour.

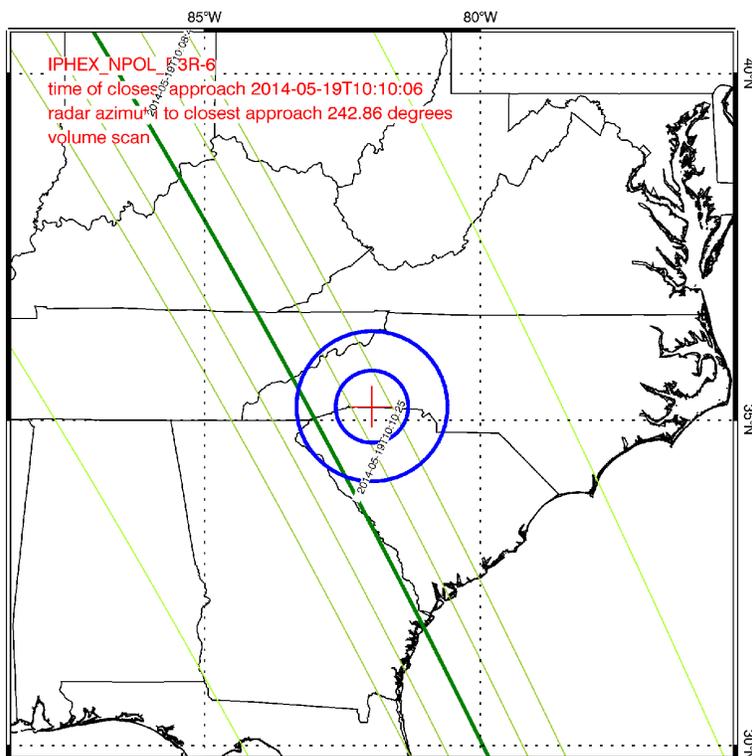
1318 UTC: Similar thing showing up with Zdr. Best guess it that is must be due to forcing by mountains.

1334 UTC: Still running RHIs at 270 degrees azimuth while aircraft are on that heading. Just switched the 90 degree sector scan to cover 180 to 270 degrees.

1347 UTC: RHIs out to West aren't picking up to much precipitation anymore. The rain W of the Appalachians is moving more ESE now. RHI along 270 stopped. Rain stopped in the Pigeon Basin around 8:30 this morning.

There is a 1741 UTC TRMM overpass today.

Also there is a 19 May 2014 0027 UTC GPM overpass that is of interest because nadir site comes within range of NPOL. Unfortunately, there will probably not be any precip around the site at that time. =(



1440 UTC: Still scanning what little precip is still within 40 km range. Both NPOL and D3R have stopped doing RHIs along 270 since ER-2 is doing a leg down the spine of the Appalachians.

1542 UTC: ER-2 is RTB.

1545 UTC: Can see stationary front boundary South of precipitation on CONUS radar mosaic.

1618 UTC: D3R has stopped scanning because there is almost no precip within 40 km range.

1619 UTC: Switching from IPHEX_90NEAR to IPHEX_90FAR scanning strategy, although keeping the same SW quadrant. Undulations in bright band too as precipitation comes down off the mountains. Very interesting case. What's causing this?

1641 UTC: D3R transmitter stopped and radar put into standby mode. D3R operated well today.

1811 UTC: Precipitation continues to skirt around Southern side of radar.

1902 UTC: Continuing to do IPHEX_90FAR scan strategy from 180 to 270 degrees. Still seeing echo above the 5 degree elevation scan, although all precipitation is south of the radar.

1928 UTC: Rain to the south of the radar site continues to move further south and will be out of range in the next hour or 2.

1941 UTC: NPOL switched the 90 degree sector scan to be centered over 180 degrees azimuth because the most interesting precip has moved directly south of the radar site. Still some suggestion of undulations within the precipitation rain shield.

2028 UTC: We need to do a birdbath calibration the next time we have uniform stratiform rain over the NPOL radar. No precip for tomorrow, but Mike with work on the radar tomorrow to see if he can fix the higher Zdr bias.

2058 UTC: Moderate band of loosely organized precip sinking to the South.

2140 UTC: Rain is far enough to the south (>100 km range from the radar) that I'm going to set NPOL back to just doing surveillance scans with the IPHEX_RAIN scanning strategy.

2229 UTC: Almost all precip beyond 150 km range from the radar. Interestingly, a few small thunderstorms have developed just W and S of Robins Air Force Base.

David Marks on shift

2300 UTC: A couple small showers well S of NPOL near max range.

May 19, 2014

0100 UTC: No precip echo within 150 km range. Running IPHEX_RAIN on 4 minute repeat.

0230 UTC: Severe clear

0430 UTC: Severe clear

0600 UTC: Severe clear

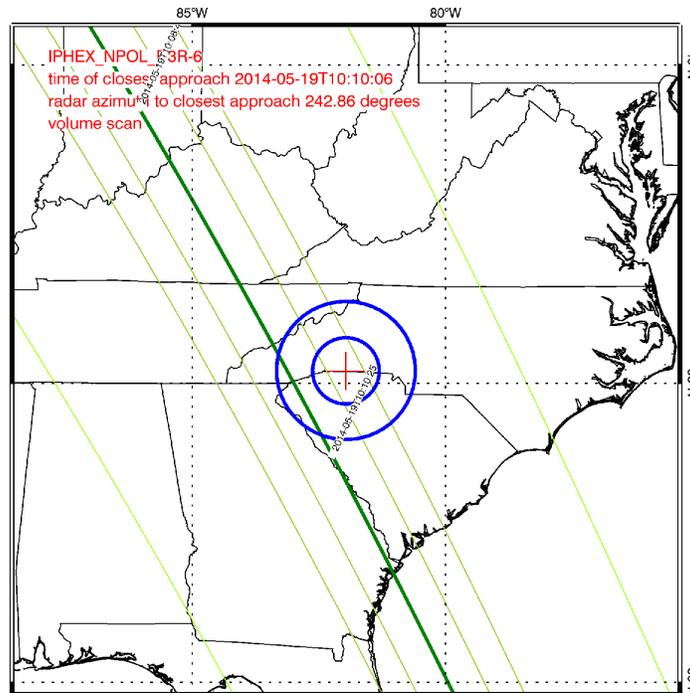
0800 UTC: **NPOL shift ending.** No precip within range and none expected. Flights will be offshore for 1010 UTC overpass, and out of NPOL range. NPOL running IPHEX_RAIN on 4 minute repeat.

Flights Day 1 - Monday

Offshore flight in southern offshore box to catch GPM overpass at 1020 Z

ER-2 takeoff 9 UTC

Citation staging for 945 UTC on station offshore of Savannah, GA



Amber Emory on shift

1202 UTC: Clear outside with very thin cirrus overhead.

1207 UTC: ER-2 and Citation currently offshore for 1010 UTC GPM satellite overpass.

1249 UTC: Continuing to do IPHEX_RAIN surveillance scan strategy every 4 minutes, although there is no precipitation within 150 km range of the radar.

1253 UTC: High pressure parked over the Carolinas tomorrow. High probability for a (much needed) down day. From my own look at the forecast models, it looks like we are just at the edge of possible light precipitation on 00Z Wednesday. Made the decision that after today's shift everyone should rest and we will resume operations with Tuesday night's shift. I will keep 4 minute scans going for the duration.

1447 UTC: Sun calibration

1614 UTC: NPOL back on 4 minute surveillance scan mode.

1744 UTC: Still staring at an echo free radar screen. Since there is no precip within 150 km of the radar and Mike needs to do some additional measurements, we are going to stop the IPHEX_RAIN scanning strategy for a little while.

1834 UTC: Resuming IPHEX_RAIN scanning strategy.

2106 UTC: Some puffy Cu outside. Don't get your hopes up - the closest rain is in Northern Indiana. Bugs, bugs, lots of bugs, but no precip.

2109 UTC: **Switched to 10 minute repeat for IPHEX_RAIN scanning strategy. TUESDAY NIGHTSHIFT: Please switch back to 4 minute repeat.**

2154 UTC: Mike set IMS 4000 security/monitoring system to run, which will send him an e-mail and text if any temperature, RH, etc. thresholds are exceeded. Calling an end to this dayshift. NPOL crew rest for Monday nightshift and Tuesday dayshift. Operations resuming with Tuesday nightshift.

Tuesday May 20th

Jason Pippitt and David Marks on shift

2330 UTC: IPHEX_RAIN on 4 minute repeat, no precip within 150 km.

Wednesday May 21st

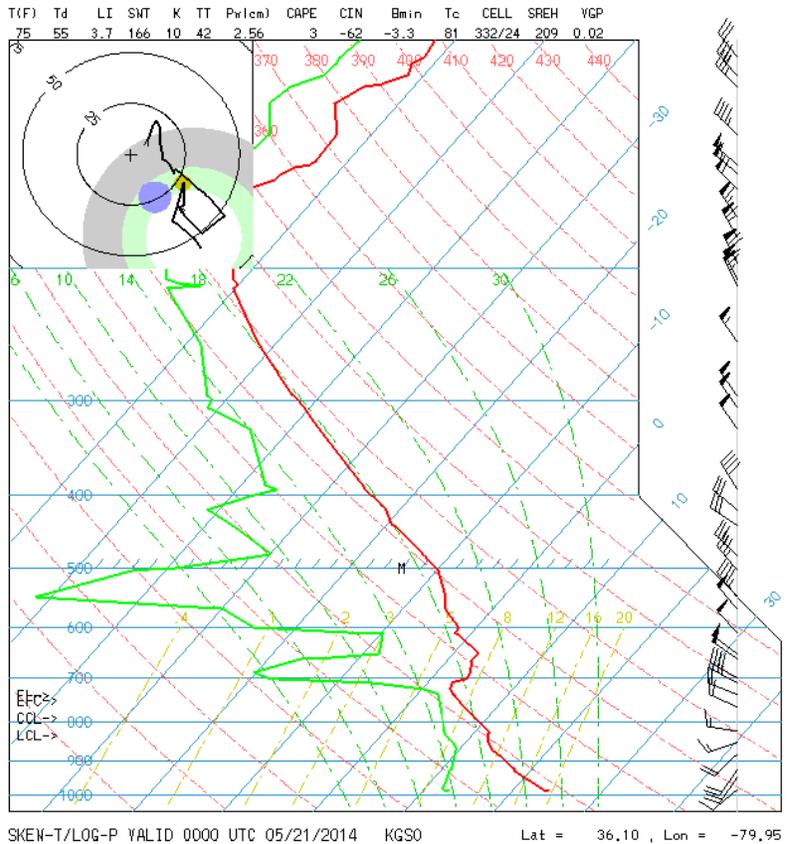
0212 UTC: No precip. NPOL running IPHEX_RAIN 4 minute repeat.

0444 UTC: Severe clear continues!

0800 UTC: **NPOL shift ending.** No precip within range and none expected. NPOL running IPHEX_RAIN on 4 minute repeat.

Amber Emory on shift 1200 UTC Wednesday 21 May 2014

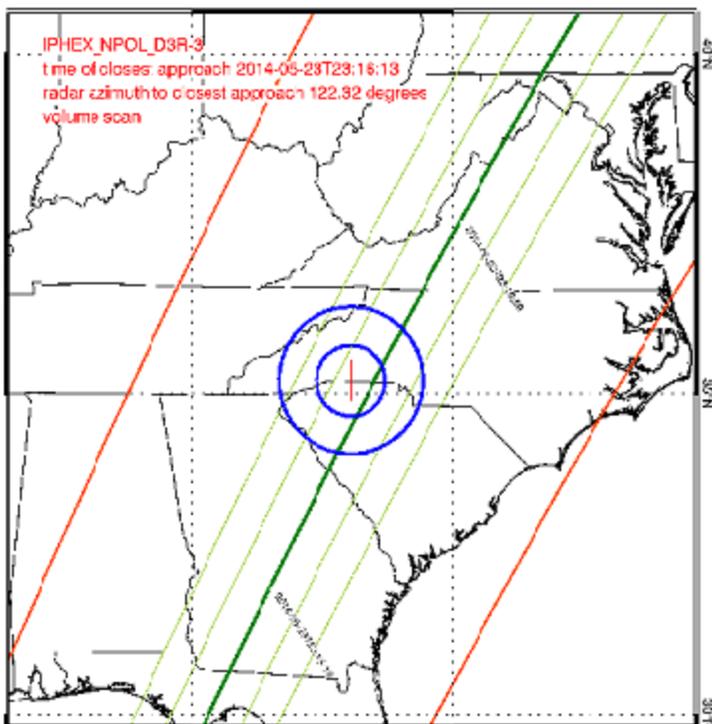
1232 UTC: Looks like radar beam refraction from 40 to 80 degrees azimuth. Here's the 0000 UTC skew-T from Greensboro, NC (KGSO):



This explains why we have virtually no clouds and dry conditions with NW flow aloft.

1404 UTC: Radar beam refraction gone from radar screen.

1451 UTC: Heads up from forecast discussion earlier today. High CAPE (up to 4500 J/kg) progged for tomorrow afternoon W of Appalachians. Dry in upper-levels, but there is question as to how well anything that forms W of mountains will survive. There was also mention that this may be setting up as a derecho event, but no need to get overly concerned just yet. As newer model runs come out, the certainty on tomorrow's forecast will increase. The next GPM overpass will be Friday night. There is a science flight planned for that time. Hopefully we will have precip in range of NPOL and D3R because DPR tracks right over the radar site.



1529 UTC: Lots of bugs showing up on the radar screen.

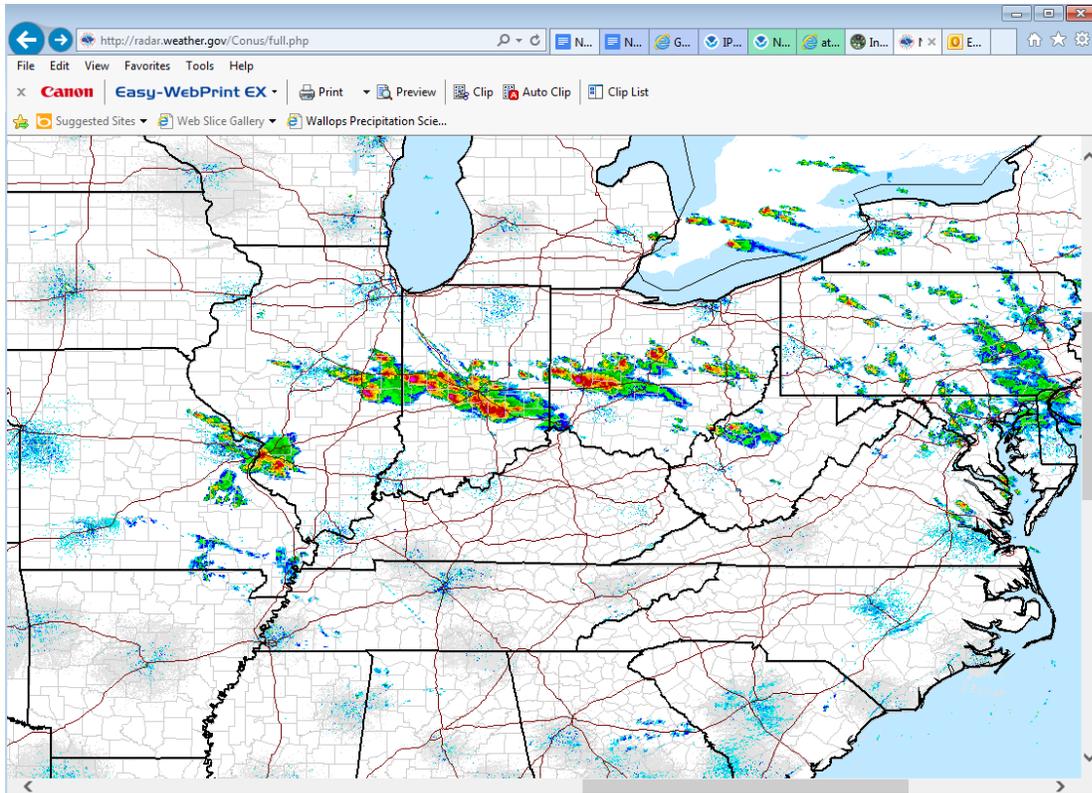
1716 UTC: Weak precip showing up to the SW along boundary moving S over TN and western NC.

1916 UTC: Similar weak showers showing up at 70 degrees azimuth and > 120 km range from the radar.

2005 UTC: Weak precip to the E at 100+ km range has dissipated. Showers off to the SW still lingering. CAPE values looking pretty “juicy” (up to 3500 J/kg) from Ohio all the way back to Kansas. Thunderstorms already popping near Champagne, Illinois and Indianapolis. For us, it’s just bugs for the (near) foreseeable future.

2036 UTC: Nice little boundary off the mountains in the animation loop.

2127 UTC: HUGE MCSs taking shape in Illinois, Indiana, and Ohio. RAP model runs suggest that there is enough CAPE even through the mountains (up to 1500 J/kg) for these beasts to hold together and make it this side of the Appalachians overnight. However, it also flip flops between whether the MCS will merge/hold together/etc. Not sure if these may organize into a derecho later. Keep your eyes on them.



2255 UTC: Linearly organized cells not progressing very fast at all. Slight indication of weakening but not much. If these do survive the mountains, they will probably wait for me to get back for the AM shift.

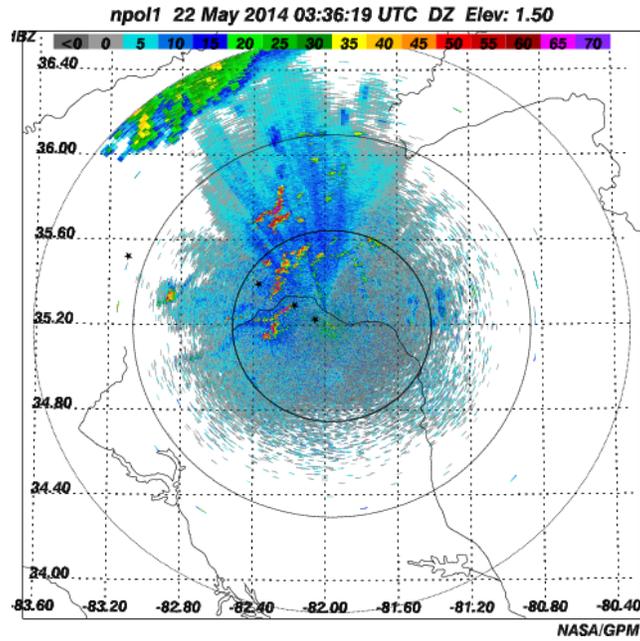
2309 UTC: While storms continue far off to the north in Illinois, Indiana, and Ohio, we are watching exciting bugs on the radar screen!

Jason Pippitt on shift

2330 UTC: NPOL continues to run IPHEX_RAIN on 4 minute repeat, no precp within 150 km. Keeping an eye on the storms over Illinois, Indiana, and Ohio.

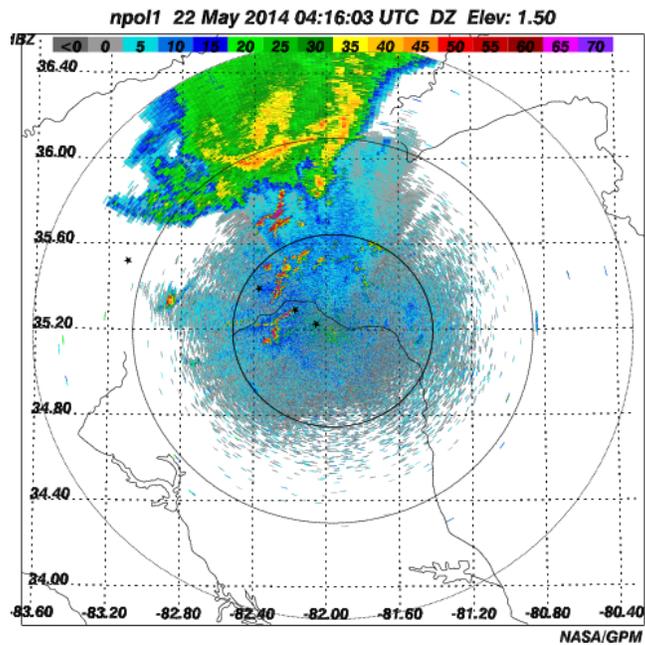
Thursday May 22nd

0136 UTC: MCS now moving into Kentucky and West Virginia. This could get interesting. Possible NPOL multiple trip echo to the north. NPOL continues IPHEX_RAIN on 4 minute repeat.



0407 UTC: NPOL running IPHEX_RAIN, IPHEX_90FAR from 300-30 deg, and IPHEX_RHI 345 deg. Severe thunderstorm warnings issued for northern North Carolina. .

0420 UTC: Trying to capture cells to the north. NPOL running IPHEX_RAIN, IPHEX_90FAR from 300-30 deg, and IPHEX_RHI (358, 0, 2 deg).



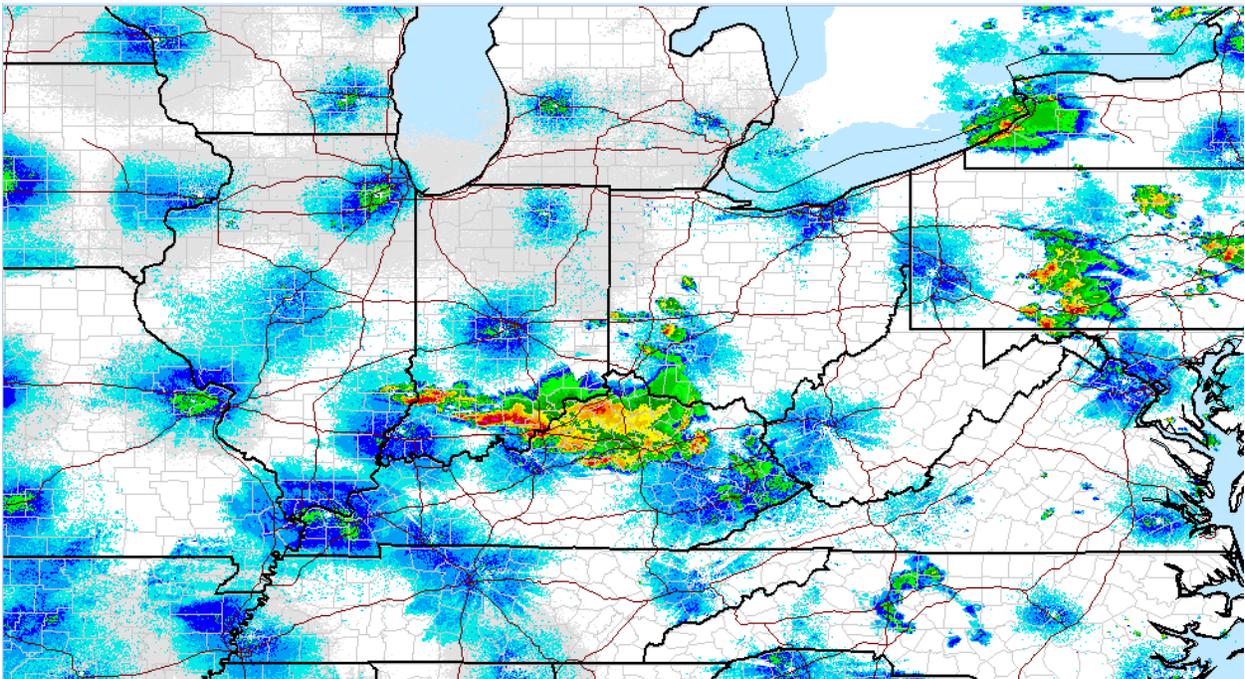
0445 UTC: Convective cells moving by to our north are affecting the Catawba basin.. NPOL running IPHEX_RAIN, IPHEX_90FAR from 315-45 deg, and IPHEX_RHI (12, 14, 16 deg).

0511 UTC: Showers affecting the Catawba basin.. NPOL running IPHEX_RAIN and IPHEX_90FAR from 330-60 deg. IPHEX_RHI stopped. Severe thunderstorm warnings were canceled. Showers did not reach D3R's range.

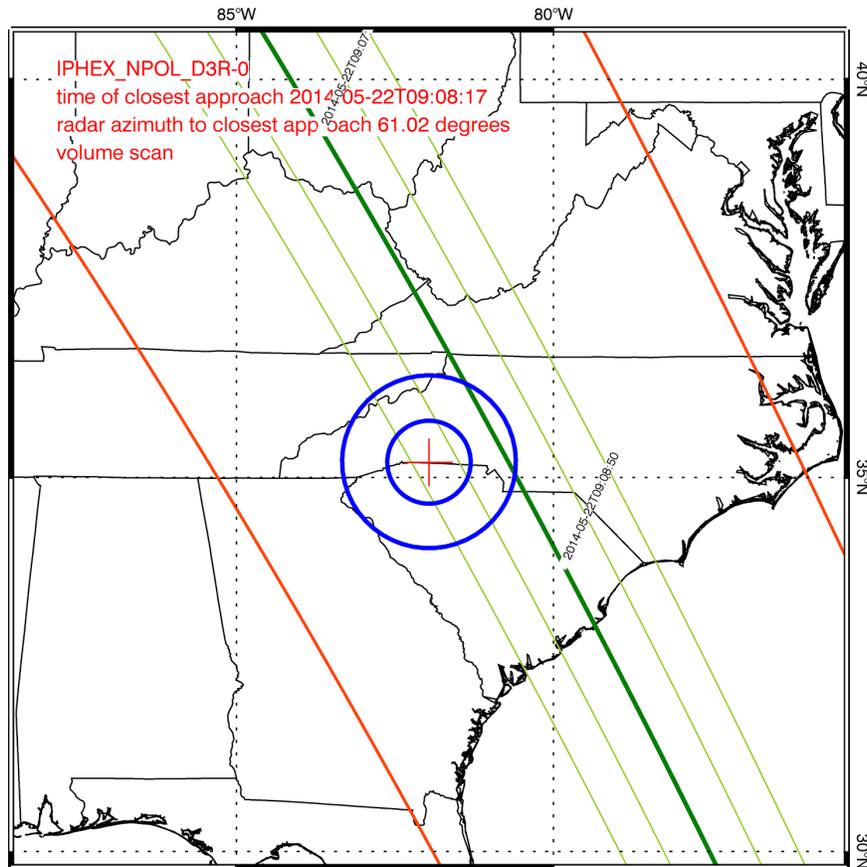
0532 UTC: Showers dissipating over the Catawba basin.. NPOL running IPHEX_RAIN and IPHEX_90FAR from 345-75 deg.

0602 UTC: Showers lingering over the Catawba basin.. NPOL running IPHEX_RAIN and IPHEX_90FAR from 0-90 deg.

0730 UTC: A few isolated showers remain. NPOL running IPHEX_RAIN in 3 minute repeat. MCS in Kentucky may affect our region.



0908 UTC: No precip at NPOL during the GPM overpass, missed by a few hours. MCS over Kentucky is approaching Virginia state line.



1022 UTC: Showers moving in from the North. NPOL running IPHEX_RAIN in 3 minute repeat.

1055 UTC: NPOL running IPHEX_RAIN and IPHEX_90FAR from 315-45 deg to capture showers over the Catawba basin.

1130 UTC: Shift summary: A decaying MCS moved into Catawba basin around 330 UTC and slowly dissipated over the next four hours. GPM overpass at 908 UTC was rain free. Showers associated with another decaying MCS entered the Catawba basin around 1020 UTC.

Amber Emory on Shift 1127 UTC 22 May 2014

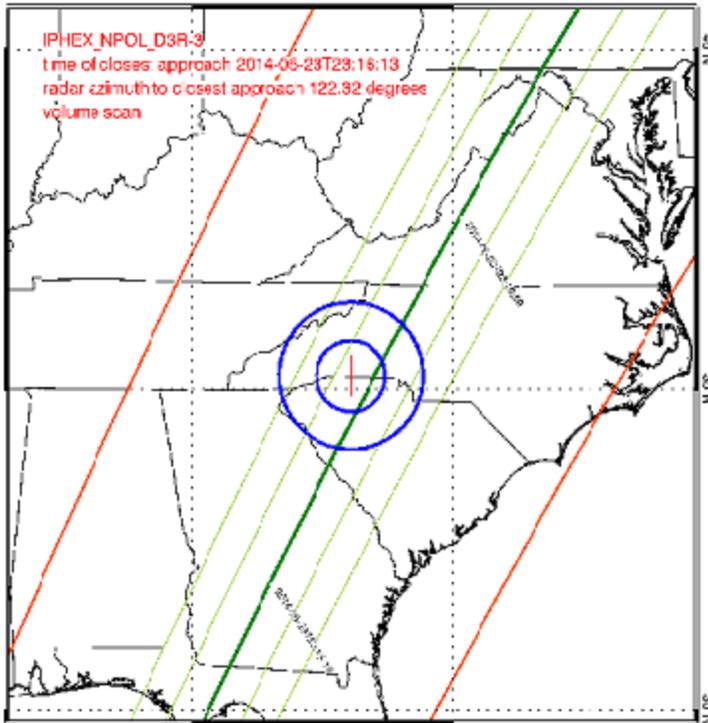
1131 UTC: Thin lines of convective precipitation continuing to move closer to the radar from the north. Lots of anvil around on the drive in this morning. No rain at the radar site though.

1138 UTC: Continuing to do IPHEX_90FAR and IPHEX_RAIN scanning strategies.

1145 UTC: Lines of convective precipitation running E into mountains having difficulty holding together. On the larger scale, the rest of the MCS in Kentucky is also falling apart.

1156 UTC: Precip to the N is dissolving. Disappointing!

1224 UTC: The next GPM overpass is Friday evening 05/23/2014 at 23:16:13 UTC. At this point (before the morning forecast briefing), science flights are still on for tomorrow late afternoon/evening. There is also a 1536 UTC TRMM overpass today, but there will almost certainly be no precip in the region.



1240 UTC: Turned off IPHEX_90FAR scanning strategy because there is almost no precipitation to the N of the radar.

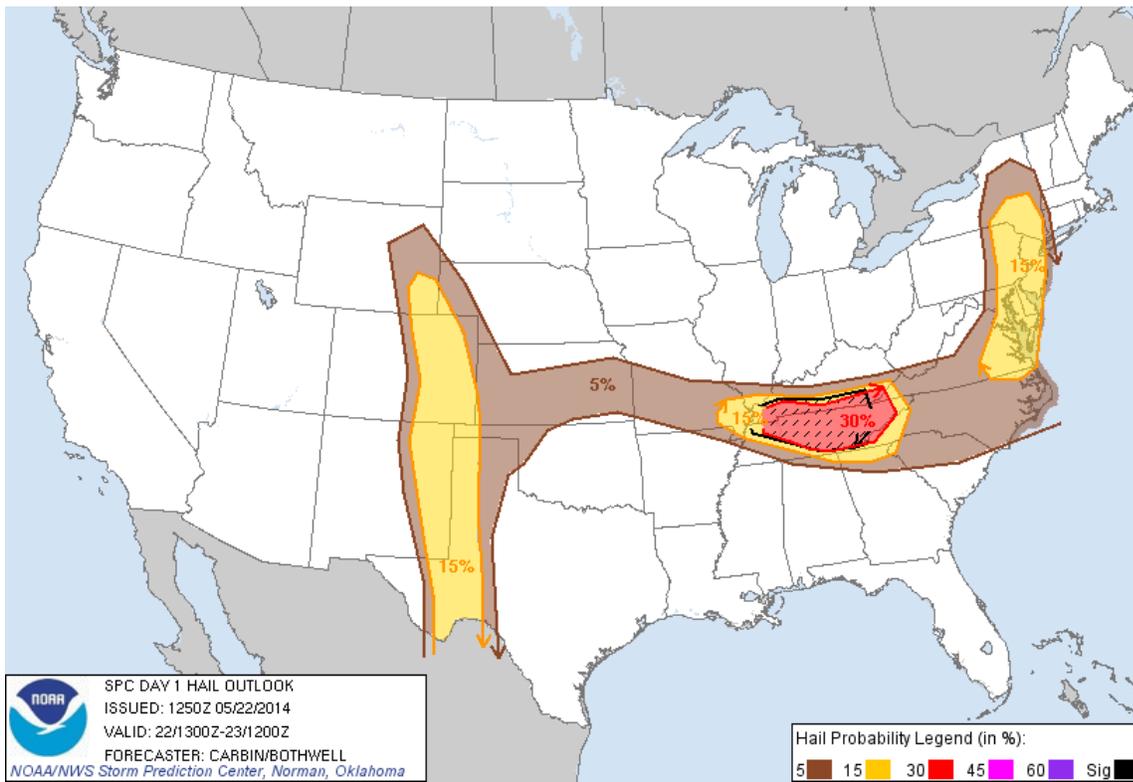
1334 UTC: Looking at the CONUS radar loop for Kentucky, Tennessee, NC, and SC, any precipitation that is coming over the mountains is dissolving. Hoping that cloud cover clears out soon, so that surface can start warming, reach convective temperature by the afternoon, and fire up some storms.

Surveillance scans show some showers at 100+ km range in the NE sector, but looks like reflectivities are smeared out a bit as radar beam sweeps through. Will keep an eye on it.

1411 UTC: Quick summary from the Daily Forecast Briefing:

- Super adiabatic lapse rates from the surface on the NAM 21Z forecast skew-T in eastern TN, 4000 J/kg of CAPE forecasted in eastern TN for 0400 UTC 23 May 2014
- Models suggesting initiation 00Z (tonight) or later, possible fast moving hail producers should develop along a boundary oriented NW from the NC/SC state border

From our friends at SPC:



Upcoming Flight Opportunities:

2100 UTC Friday 23 May 2014 takeoff to fly strong convection moving offshore with ER-2

Saturday will be a 2 hour clear air flight with the ER-2 only

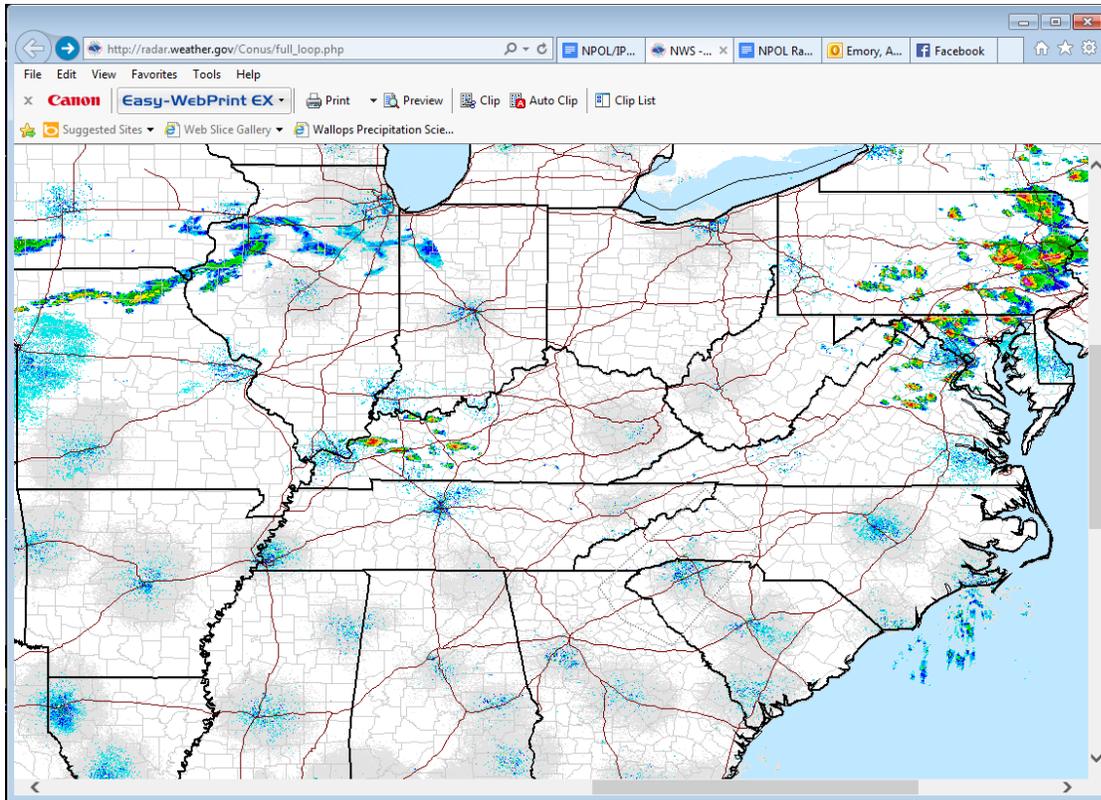
Sunday is possible flight for upslope flow induced precip

1432 UTC: Mike needed the radar for a bit to do some maintenance checks.

1616 UTC: Mike finished necessary work and NPOL is back doing surveillance scans with IPHEX_RAIN repeating every 4 minutes. Not much of anything out there. Temps and humidity are on the rise. Dewpoints have climbed into the high 60s/low 70s in Western Tennessee and SW Kentucky. This side of the Appalachians, the dewpoints are (only) in the upper 50s, which is enough to support convection but storms that cross mountains later today won't have as much fuel to tap into. Still high clouds (anvil) overhead in most areas due to blow off from this morning's MCS.

1842 UTC: Nothing but mountains and bugs on the radar scope...

1934 UTC: Cells initiating in SW Kentucky as shown here:



1949 UTC: Playing the watch and wait game. Gerry Heymsfield, one of the current Mission Scientists, called to ask if we had anything on our scope...Nope, just bugs so far. I looked into it a little after we got off the phone. There are cells initiating ahead of the cold front that sags through PA, southern Ohio, and along the Illinois/Kentucky state line. The southernmost cell to initiate by 1913 UTC was near Charlottesville, VA. My vote was to put the Citation up once cells cross the VA/NC state line, which would put them close to being on station around the radar site here at ~0000 UTC. Mission Science will wait an hour or 2 before calling off the flight. It is too dangerous to fly strong cells at night. Would require lots of bob and weave maneuvers around fast-moving, likely hail-producing storms.

2033 UTC: In a (sort of) unrelated topic: Hail spike signatures abound on the Sterling, VA radar with the number of strong cells initiating along this same cold front in place from Pennsylvania to Missouri.

2100 UTC: Getting second trip echoes for convection firing 200 to 300 km NW of here in SE Kentucky, north of Bristol, VA.

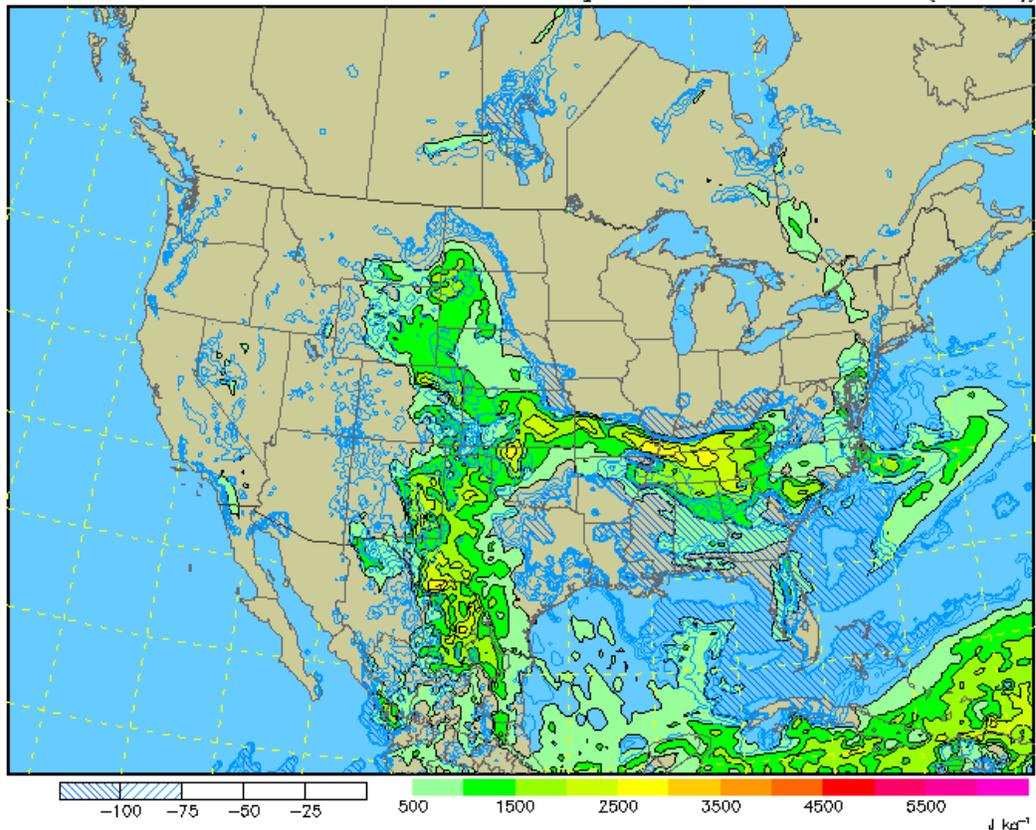
2148 UTC: Second trip continues from line of cells initiating just north of Kentucky/Virginia state border. The first cell to initiate within the state of NC is just over the border and still out of range.

These MIGHT hold together tonight. CAPE continues (although diminished to ~1000 J/kg) crossing the Appalachians at 0000 UTC.

CAPE / CIN (J/kg)

04-hour forecast valid 0000 UTC Fri 23 May 2014

RAP (20z 22 May)



2218 UTC: Cells are just coming into range of Greer, SC WSR-88D. Will turn on 90 deg sector scan from 280 to 10 degrees (most likely) once the storms cross the NC/TN border.

2227 UTC: Severe thunderstorm warning on cell to the NE of Knoxville - 2 counties from the state border. Getting ready to start sector scans soon.

2247 UTC: Started IPHEX_90FAR scanning strategy on with a sector from 280 to 10 degrees. It is difficult to separate second trips and real in real time although it looks like there are some real echoes now starting to show up with range folded echoes. Double checking against Greer, SC WSR-88D.

Shift Summary: NPOL scanned remnants of a dissolving MCS to our north at the beginning of the shift. Other than that, it has been clear all day with nothing but bugs on the radar screen. It has been a day of sitting and waiting for convection to finally fire. Dewpoints were in the high 60s/low 70s in W. Tennessee and SW Kentucky. Cells initiated in SW Kentucky around 1930 UTC ahead of a cold front that sags from NY down to Missouri. As might be expected, second

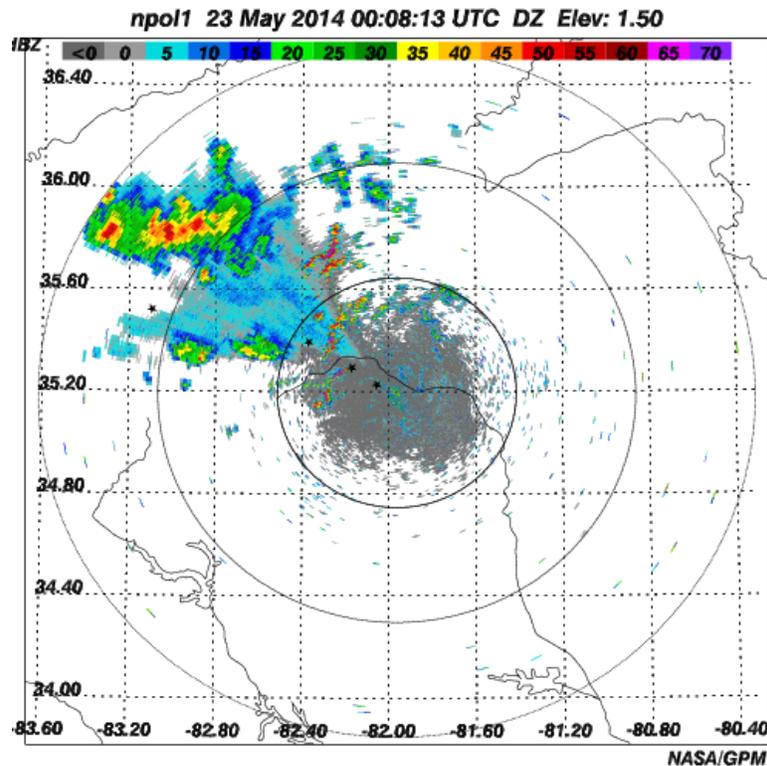
trip echoes started to appear an hour and a half later at 2100 UTC. I started the IPHEX_90FAR scanning strategy with a 280 to 10 degree sector at 2247 UTC.

Jason Pippitt on shift

2330 UTC: NPOL running IPHEX_RAIN and IPHEX_90FAR from 270-360 deg to capture storms coming over the mountains. Severe thunderstorm warnings issued for these cells.

May 23 2014

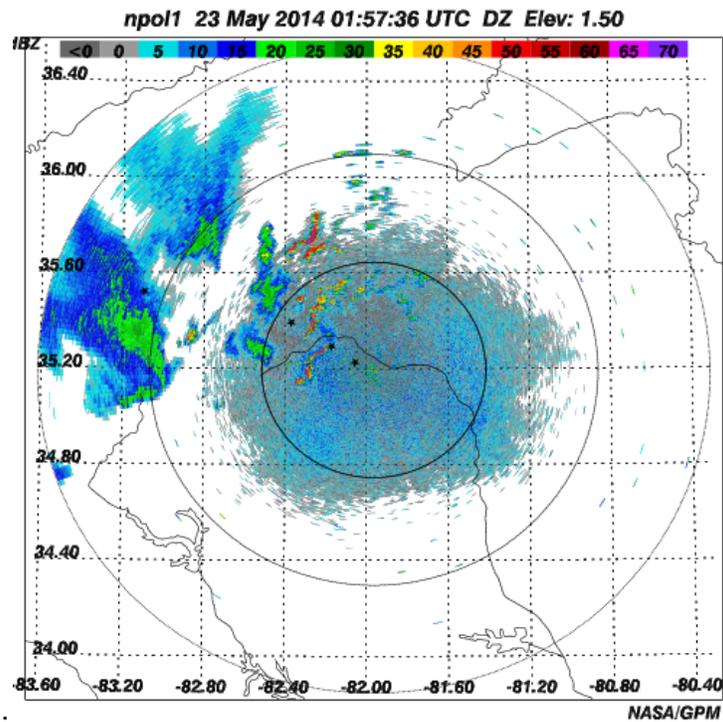
0007 UTZ:: Convective cells to the northwest. NPOL running IPHEX_RAIN, IPHEX_90FAR from 270-360 deg, and IPHEX_RHI (308, 310, 312 deg)



0027 UTC: Showers moving over the Pigeon basin. NPOL running IPHEX_RAIN, IPHEX_90FAR from 270-360 deg, and IPHEX_DSD. D3R running PPI scan.

0111 UTC: Showers are moving south, 90 deg sector changed to accommodate.. NPOL running IPHEX_RAIN, IPHEX_90FAR from 245-335 deg, and IPHEX_DSD. D3R running PPI scan.

0156 UTC: Showers are now dissipating over the Pigeon basin. Once again the mountains dissipated the showers. NPOL running IPHEX_RAIN and IPHEX_90FAR from 245-335 deg

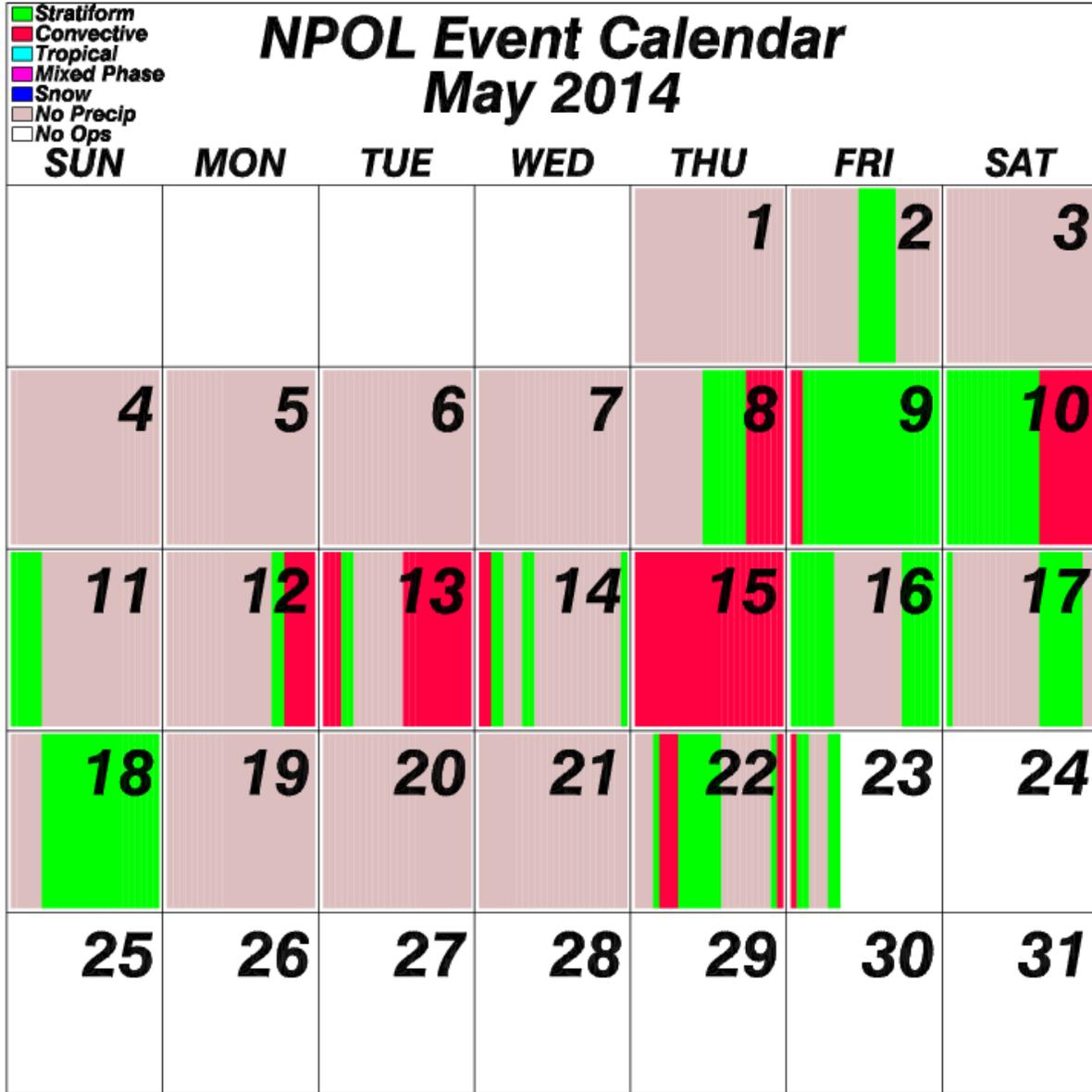


0233 UTC: Showers have dissipated. NPOL running IPHEX_RAIN in 4 min repeat.

0500 UTC: Dry period continues. NPOL running IPHEX_RAIN in 4 min repeat.

0600 UTC: Few small showers to the north. NPOL running IPHEX_RAIN in 4 min repeat.

0748 UTC: A few small showers to the north. Posted below is a preliminary IPHEX NPOL event calendar. Once all the NPOL data is processed a more accurate calendar will be created.



0815 UTC: Showers to the north have dissipated. Will monitor showers over southern Kentucky, if they do not pose a threat shift will end at 10 UTC.

0949 UTC: Showers and convection associated with a front are now over south central Kentucky and appear to have increased progression. .Shift will continue to monitor showers.

1010 UTC: Second trip echoes to the west. NPOL running IPHEX_RAIN in 4 min repeat

1040 UTC: Severe thunderstorm warning issued in eastern Tennessee.

1100 UTC: A few small showers to the west.

Shift summary: Isolated showers and convective cells dissipated over the mountains during the 23-02 UTC. A few small showers to the north during the 07-08 UTC period. Showers and convection associated with front approaching area toward end of the shift.

Amber Emory on shift

1138 UTC: There are 2 thin lines of convection coming in from Knoxville. I have my doubts if they will survive the mountains though. I am starting the IPHEX_45FAR scanning strategy with a sector from 270 to 315 degrees. There is second trip and actual echo at approximately 300 degrees. The convection is easily topped by the 8.5 degree elevation scan.

1146 UTC: Switching scanning strategy to IPHEX_90FAR from 270 to 0.

1205 UTC: Just received word that the Mission Scientists plan for the Citation to fly within the next hour to catch this precipitation.

1252 UTC: I have shifted the 90 degree sector scan from 285 to 15 as well as starting RHIs along 328, 330, and 332.

1258 UTC: Precipitation is not looking too healthy here. RHIs show the leading edge has precipitation up to 10-12 km, but no reflectivities >50 dBZ.

1300 UTC: Switched to using IPHEX_90NEAR with a 300 to 30 degree sector scan.

1330 UTC: Again, tilting the sector scan to follow the mostly stratiform precipitation. The new sector scan will be from 330 to 60 degrees. D3R will continue doing 300 to 30 degree sector scans because they can't scan past 30 degrees.

1345 UTC: Citation is flying overhead.

1408 UTC: D3R has stopped doing 90 degree sector scans.

1421 UTC: There is stratiform rain in the NE sector. Doing RHIs from 63 - 67 degrees.

1444 UTC: Starting 90 degree sector scans to the NE again. Still have RHIs running from 63 to 67 degrees.

1450 UTC: Switching from IPHEX_90NEAR to IPHEX_90FAR as we watch the tail end of the stratiform rain move to the East.

1455 UTC: Turned off RHI scans

1504 UTC: Also turned off sector scan.

1544 UTC: Stratiform rain off to the East. All quiet here. The next GPM overpass is 23:16:13 today.

1907 UTC: Random cell popping up out to SW. Starting IPHEX_45FAR scanning strategy from 202.5 to 247.5 degrees azimuth. Also taking RHIs at 223, 224, 225, 226, and 227.

1911 UTC: To cover a larger area because cells are initiating along a boundary, I switched the scanning strategy to IPHEX_90FAR with a sector from 180 to 270 degrees. The 227 deg RHI shows a 65 dBZ core. This cell also has a severe thunderstorm warning on it.

1916 UTC: Moved the sector scan to 150 to 240 deg, and RHIs now are along 208, 210, and 212 degrees azimuth.

1923 UTC: The first cell to initiate is splitting.

1924 UTC: Hail spike! (From the first cell to initiate, which is currently undergoing a split.) The 210 deg azimuth RHI has 55 dBZ reflectivities up to 9 km altitude.

1926 UTC: Changing RHIs to 205, 206, 207, 208, 209, and 210 deg.

1939 UTC: RHIs now at 203, 205, and 207 degrees azimuth.

1940 UTC: Running IPHEX_90NEAR from 150 to 240 degrees.

1950 UTC: Did an RHI straight down 180 deg azimuth. Had 65 dBZ up to 7 km altitude

1954 UTC: Focusing on 2 cells to the SE of the radar with IPHEX_45NEAR from 127.5 to 172.5 degrees. Also doing an RHI along 170, 173 and 175 of storm because the last RHI missed the core of the storm.

2005 UTC: It looks like a boundary just south of mountains is setting off these storms.

2009 UTC: D3R is doing a 90 degree sector scan from 160 to 250, while NPOL is doing a 90 degree sector scan from 210 to 120 degrees to investigate cells initiating off of a gust front 30 km SSE from the radar site.

2031 UTC: Focusing on a single cell that initiated off of the gust front just south of the radar site since D3E is also scanning it.

2042 UTC: ***RHIs down 180 degree azimuth with both NPOL and D3R***

2102 UTC: Nice boundary setting up from NC into SC with afternoon seabreeze.

2105 UTC: Dropping RHIs down 160 (as far as D3R can go) and 150 degrees to catch main core with NPOL. This cell has also developed nicely off of a gust front and now has a severe thunderstorm warning on it.

2119 UTC: ER-2 aircraft is now inbound to the radar site.

2150 UTC: Doing RHI along 120 deg azimuth with ER-2. The aircraft will then commence a racetrack flight pattern. NPOL will do a 90 degree sector scan from 100 to 190 degrees.

2153 UTC: Backed off sector scans from 100 to 190 deg azimuth. Should cover everything, including the ER-2 flight path. D3R is doing a 45 degree sector scan from 160 to 205 degrees. There are lots of cells initiating off of the gust front outflows.

2200 UTC: 90 degree sector scan topped by the 22 deg elevation angle, so stopping short to run RHIs.

2223 UTC: ***RHI along 105 degree azimuth has 70+ dBZ core at 3 km altitude***

2235 UTC: This was a jackpot day if I may be so bold. We had convection firing near enough to radar site to sample both with D3R and NPOL as well as ER-2 overflights of very strong convection.

2243 UTC: Hail spike from RHI at 105 degrees azimuth. The core is impressive!

2318 UTC: I think I got so excited that I exited the MTS chatroom, but I am proud to report that NPOL obtained gorgeous RHIs of 65+ dBZ cores at 141 deg azimuth at 100 km range.

2320 UTC: D3R stopped scanning in standby mode.

Jason Pippitt on shift

2343 UTC: Showers and convective cells quickly exiting our region. NPOL running IPHEX_RAIN, IPHEX_90FAR (90-180 deg), and IPHEX_RHI (135, 136, 137, 138, 139 deg)

May 24 2014

0008 UTC: A few showers remain on far southeast corner of the scope. NPOL running IPHEX_RAIN and IPHEX_90FAR (90-180 deg).

0030 UTC: Showers have dissipated. NPOL running IPHEX_RAIN on 4 minute repeat.

0500 UTC: No precip. Meteor Shower???

0800 UTC: **NPOL shift ending.** No precip within range and none expected. NPOL running IPHEX_RAIN on 4 minute repeat. GPM overpass at 0858 UTC no precip expected.

Amber Emory on shift 1200 UTC 05-24-2014

1213 UTC: After so much excitement yesterday, today will be a much calmer one. Fog in a few of the valleys between hills on the drive in as well as gently rolling cirrus overhead. Conditions noticeably drier and cooler with NW flow this morning. The radar scope is clear except for some bugs.

1504 UTC: Next GPM overpass is 25 May 2014 08:05:35

1632 UTC: All clear on the scope.

1912 UTC: A small cell with max reflectivity values of 30 dBZ just initiated near the intersection of GA, NC, and SC.

2004 UTC: Cell did not survive.

2233 UTC: There is a cell to the SSW at 100 km that is pretty weak. I am hesitant to even start a 45 degree sector scan.

2313 UTC: NPOL is investigating a lone cell at 70 km range due west of the radar site. I have started an IPHEX_45FAR from 247.5 to 292.5 with an RHI at 270. The RHI is pretty pathetic. Will keep scanning just in case it eventually develops.

Jason Pippitt on Shift

2330 UTC: A few cells to the west. NPOL running IPHEX_RAIN, IPHEX_45FAR from 247.5 to 292.5 and IPHEX_RHI at 260.

2350 UTC: Still tracking cell to the west. NPOL running IPHEX_RAIN, IPHEX_45FAR from 230 to 275 and IPHEX_RHI at 260.

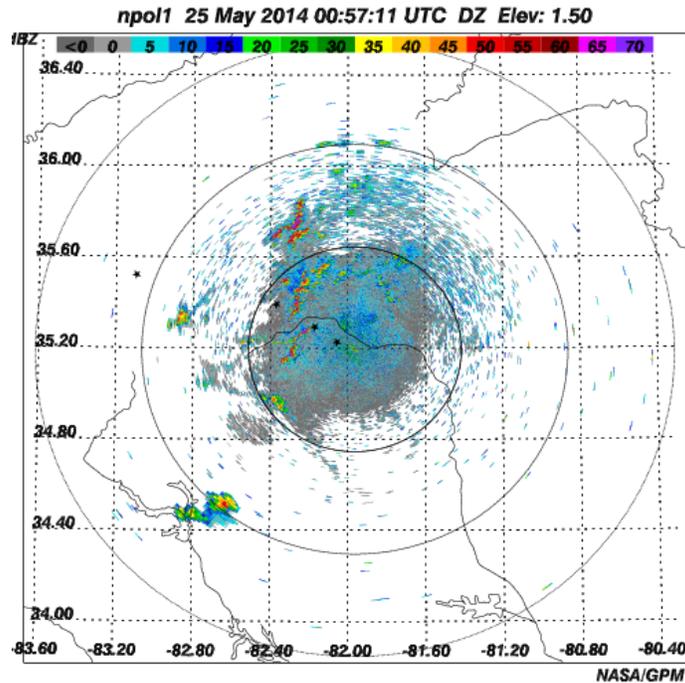
May 25 2014

0005 UTC: Still tracking cell to the west. NPOL running IPHEX_RAIN, IPHEX_45FAR from 220 to 265 and IPHEX_RHI at 250.

0026 UTC: Shower near 50 km dissipated focusing on a small shower 100 km away. NPOL running IPHEX_RAIN, IPHEX_45FAR from 195 to 240 and IPHEX_RHI at 226..

0046 UTC: Tracking cell to the southwest, ER-2 will fly over in the next 10 minutes. NPOL running IPHEX_RAIN, IPHEX_45FAR from 195 to 240 and IPHEX_RHI at 220..

0058 UTC: Tracking cell to the southwest. NPOL running IPHEX_RAIN, IPHEX_45FAR from 195 to 240 and IPHEX_RHI at 217, 219, 221 deg.



0110 UTC: Original cell has regenerated. NPOL running IPHEX_RAIN, IPHEX_45FAR from 195 to 240 and IPHEX_RHI at 222, 224, 226 deg.

0119 UTC: More showers are forming to the south increasing sector to 90 deg. NPOL running IPHEX_RAIN, IPHEX_90FAR from 150 to 240 and IPHEX_RHI at 222, 224, 226 deg.

0148 UTC: Scans changed slightly to capture showers. NPOL running IPHEX_RAIN, IPHEX_90FAR from 160 to 250 and IPHEX_RHI at 209, 211, 213 deg.

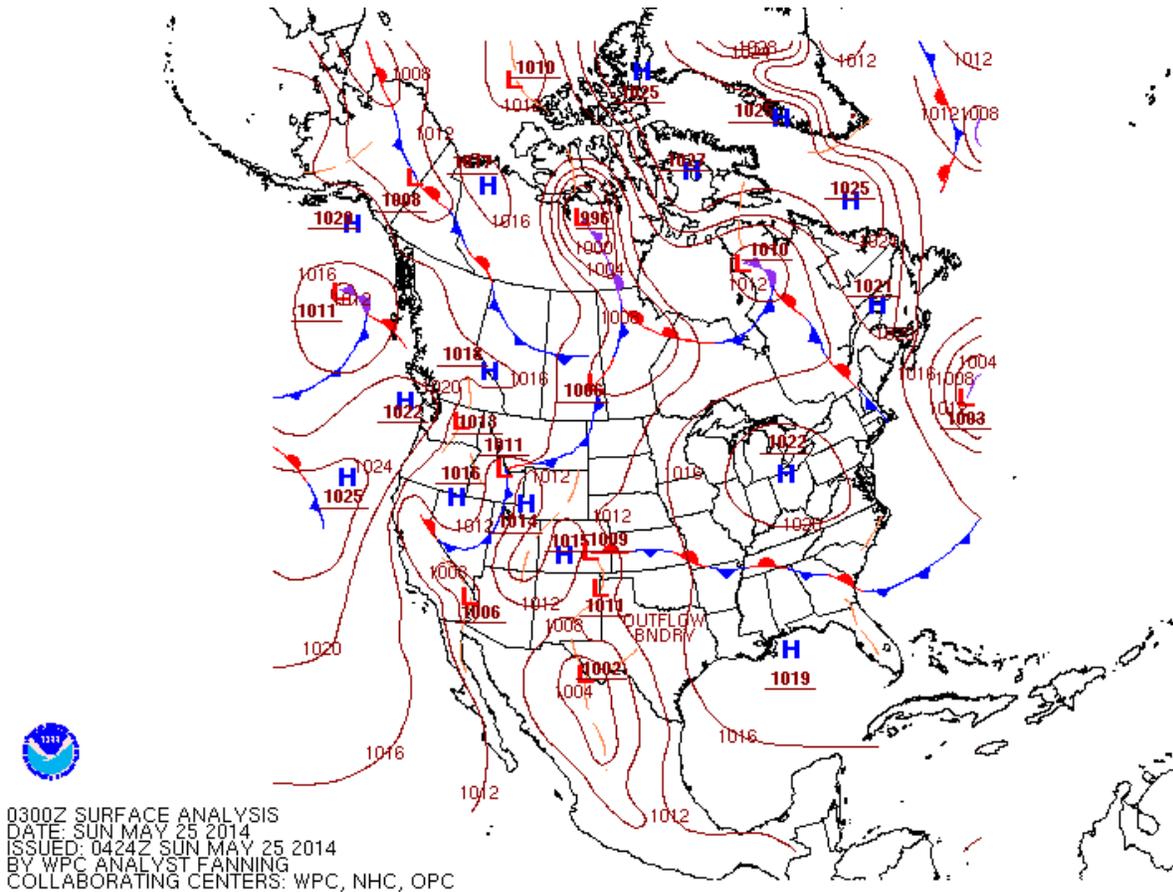
0255 UTC: Scans changed slightly to continue capturing showers. NPOL running IPHEX_RAIN, IPHEX_90FAR from 135 to 225 and IPHEX_RHI at 176, 178, 180 deg

0345 UTC: Showers are dissipating. NPOL running IPHEX_RAIN, IPHEX_45FAR from 140 to 185 and IPHEX_RHI at 164, 166, 168 deg.

0410 UTC: Isolated showers to the south. NPOL running IPHEX_RAIN and IPHEX_45FAR from 140 to 185.

0500 UTC: Isolated showers continue, adjusting sector and starting IPHEX_RHI. NPOL running IPHEX_RAIN, IPHEX_45FAR from 150 to 195, and IPHEX_RHI at 183, 185, 187 deg.

0537 UTC: Isolated showers continue to develop north of a stationary front. NPOL running IPHEX_RAIN and IPHEX_45FAR from 150 to 195.

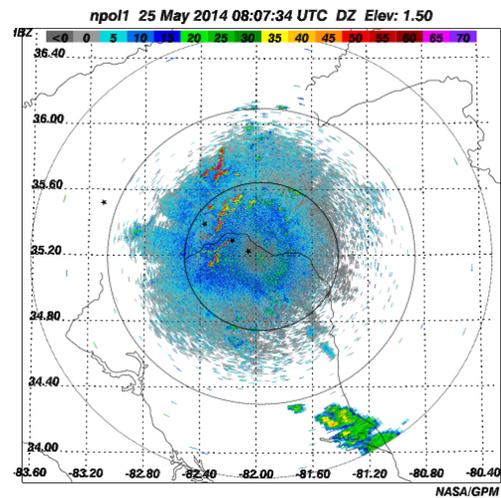
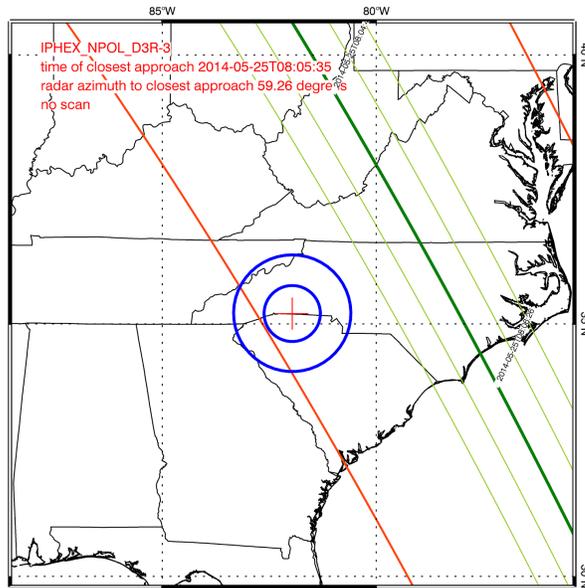


0552 UTC: More showers are forming to the south, increasing sector to 90 deg. NPOL running IPHEX_RAIN and IPHEX_90FAR from 135 to 225.

0630 UTC: Showers are diminishing, decreasing sector to 45 deg. NPOL running IPHEX_RAIN and IPHEX_45FAR from 145 to 190.

0728 UTC: Showers still to the south, adjusting sector. NPOL running IPHEX_RAIN and IPHEX_45FAR from 135 to 180.

0805 UTC: GPM overpass at 0805 UTC. GMI in range to capture the few remaining showers.



0827 UTC: A few showers remain beyond 100 km. NPOL running IPHEX_RAIN.

1020 UTC: Showers have dissipated. NPOL running IPHEX_RAIN 4 minute repeated.

Shift Summary: Isolated showers and convective cells developed to the south along a stationary front. The showers persisted for about 10 hours. ER-2 flew over one cell around 0056 UTC. Numerous RHIs and sector scans were recorded. GPM overpass at 0805 UTC was out of range.

Amber Emory on Shift 1200 UTC 5-25-2014

1218 UTC: All clear on the radar scope, except for bugs...

1340 UTC: There is a tiny cell initiating off a boundary 2 counties south of Spartanburg. Not scanning because it is almost out of range of radar.

1620 UTC: Second trip showing up. Some real echo may be mixed in. Just starting to show up on Greer, SC WSR-88D starting IPHEX_90FAR scanning strategy with a 240 to 330 degree sector.

1716 UTC: 3 small cells have just initiated just over the NC/SC state border.

1721 UTC: D3R starting to scan. Nothing on the scope just yet as the cells are still out of range.

1817 UTC: Citation will take off at 1900 UTC for a 3 hour flight. Cells initiating out ahead of a loosely organized line coming over the mountain.

1844 UTC: Looks like Citation will be over to fly nice developing stratiform rain region. Still holding off on setting up sector scans with D3R.

1914 UTC: There is a stronger leading convective line at 255 deg azimuth and 120 to 140 km range. An RHI at 298 shows a 55 dBZ core.

1920 UTC: Enhanced reflectivities associated with a bright band at 110 km range between 300 and 280 degrees with 1.5 degree elevation tilt. Law of sines puts BB at ~2.8 km altitude.

1935 UTC: Most precipitation is still 60+ km range, except for a few cells near the radar site. Precipitation appears to be struggling once again to make it over the mountains at this point. Hope things look better near NOXP in the mountains.

1937 UTC: Adding in an RHI along 249 degrees.

1946 UTC: The cells near NPOL extend up to ~12 km max and are dying out quickly. Pops of convection could still be problematic for the Citation aircraft.

1952 UTC: D3R reporting a brightband at 2.9 km for the group of weakly organized group of cells headed this way. The cell near the triple point of GA, NC, and SC has the best chance to make it over the mountains in my opinion.

1955 UTC: RHI at 260 degrees.

2003 UTC: The cell to the NW of NPOL extends to just over 12 km altitude and has a tilted updraft. I have changed the RHI elevation to 45 degrees. An RHI at 285 degrees azimuth shows the melting level to be just above 3 km altitude. The Citation is on its way to the radar site. We are focusing on a cell to the NW looking at RHIs at 285, 310, and 315 degrees azimuth. Sector scans show disorganized field of weak stratiform precipitation with "popcorns" of convection throughout.

2027 UTC: The convective cells are small, quickly evolving, but NPOL is not getting much of interest out of the RHIs. D3R as well as NPOL are dropping back to doing the IPHEX_DSD scan strategy.

2032 UTC: We are switching the sector scan to 210 to 300 degrees azimuth and still doing IPHEX_DSD RHIs.

2054 UTC: We have done an extended period of time doing the IPHEX_DSD scanning strategy to take a look over the disdrometers with a 210 to 300 degrees azimuth sector scan. At this point, convection is firing too rapidly, although the cells are small in the horizontal scale (<10 km), for the Citation to get near.

2111 UTC: There is a small, weak cell about 20 km from the radar site. There was weak precipitation before at the radar site, but I chose to put off doing the birdbath for Zdr calibration.

2115 UTC: Now switching 90 degree sector scan to 270 to 0 degrees to catch rain over the Catawba basin. We still have the IPHEX_DSD scanning strategy running.

2128 UTC: Brightband is located at 3.5 km altitude.

2144 UTC: Adding in RHIs along 294, 295, and 296 in addition to 292, 298, and 299 for the disdrometers. The Citation aircraft is inbound along 294 radial between NOXP and NPOL.

2148 UTC: Convection is a bit stronger to the south of us. Most of the precipitation around the radar site and out to just shy of 40 km to our south is stratiform in nature.

2200 UTC: Precipitation is rapidly dissolving to the N of us over the Catawba basin.

2204 UTC: Switched to scan more promising (i.e., widespread) precipitation in 165 to 255 degree sector. Still keeping set of 6 RHIs (292, 294, 295, 296, 298, and 299) in support of disdrometers and Citation aircraft.

2215 UTC: There is no interest from Mission Science to return scanning over the Catawba basin. We continue doing sector scans of precipitation to the south, but one cell holds on at 15 to 20 degrees azimuth just beyond 80 km range.

2226 UTC: Citation is RTB. NPOL is continuing to investigate precipitation to the south with 165 to 255 degree sector scan and RHIs at 180, 185, and 190 degrees.

Shift Summary: From the forecast discussion this morning, there was an alert for convection this afternoon through the evening hours. Tomorrow looks like it will be active as well. During the science flight this afternoon with the Citation aircraft, NPOL and D3R did coordinated 90 degree sectors from 210 to 300 degrees azimuth with RHIs over the disdrometers. We did this for almost an hour, trying to cover disdrometers as well as convection to the South.

Jason Pippitt on shift

May 26 2014

0000 UTC: Showers to the south are slowly exiting the area. NPOL running IPHEX_RAIN, IPHEX_90FAR from 120-210 deg, and IPHEX_RHI at 170, 175, and 180 degrees.

0022 UTC: RHI's changed to 150, 155, and 160 deg to follow exiting precip.

0132 UTC: Showers almost out of range. RHIs stopped. NPOL running IPHEX_RAIN and IPHEX_90FAR from 120-210 deg.

0150 UTC: Showers on edge of scope. NPOL running IPHEX_RAIN.

0300 UTC: No precip.

0644 UTC: No precip. Models indicate precip could develop in the mountains after 0900 UTC.

0800 UTC: A few small showers popping up in the mountains.

0910 UTC: Isolated small mountain showers. NPOL running IPHEX_RAIN and IPHEX_45FAR from 255 to 300 deg.

1010 UTC: A few more showers developed, sector changed to 265-310 deg.

1105 UTC: Sector changed to 275-320 deg.

Shift Summary: Showers exited the area during the 0000-0300 UTC period. Isolated mountain showers developed around 0800 UTC and remained until the end of the shift.

Amber Emory on Shift 1130 UTC 26 May 2013

1136 UTC: Showers/light precip over the mountains at 100 km range and 300 degrees azimuth.

1202 UTC: Showers weakening quickly.

The next GPM overpass is at 22:13:24 26 May 2014 just out of range of the DPR path, but NPOL has full coverage for TMI.

1320 UTC: Turned off sector scans. Nothing there anymore.

1434 UTC: Slowly moving, loosely organized MCS moving E in northern Georgia.

1737 UTC: Setting up IPHEX_45FAR scan with RHIs at 253, 255, and 257 for 3 cells initiating along NC/SC state border near the triple point with Georgia.

1750 UTC: An RHI at 257 deg azimuth shows cell core with reflectivities approaching 60 dBZ

1751 UTC: Another cell has initiated at 25 to 30 degrees azimuth at roughly 100 km range.

1810 UTC: Moving RHIs to scan at 248, 250, and 252 degrees azimuth.

1822 UTC: NOXP and NPOL watching cell now with reflectivities >60 dBZ. Located at 248 degrees azimuth and 85 km range from NPOL/D3R radar site.

1831 UTC: Cell at 40 to 45 degrees azimuth and 100 to 120 km range still continuing to hold together to our NW. The reflectivities of cells to the SW of the radar site are slightly weakened from what they were before.

1834 UTC: Just completed RHIs at 240, 250, and 260 to investigate cells just SW of radar site. The RHI at 260 degrees azimuth shows 50+ dBZ reflectivities extending to 5 km altitude.

1843 UTC: D3R is on and in surveillance mode just waiting for precipitation to come within 40 km range.

1847 UTC: Last set of RHIs at 240, 250, and 260 degrees azimuth were not overly impressive, reflectivities up to 45 dBZ.

1851 UTC: Shutting off 45 degree sector and adding is an RHI at 233 degrees azimuth.

1905 UTC: The cell at 275 degrees azimuth and just over 60 km range looks the best out of this bunch.

RHI at 249 deg has 45 dBZ up to 7.5 km altitude.

RHI at 251 deg has 45 dBZ up to 8.5 km altitude. Looks like this heading is the best choice. Along the 280 degree azimuth RHI at 80 km range, there is a 60 dBZ core. It was topped by the 8.1 deg elevation scan. In honesty, the convection is so small that it is sometimes hard to differentiate from the mountains, except when using a loop.

1939 UTC: An RHI along 299 degrees azimuth over the disdrometers shows a cell with near 65 dBZ reflectivities up to 3 km altitude at 55 to 60 km range.

1941 UTC: This cell looks to be spreading out along some kind of boundary.

1944 UTC: At 292 degrees and 60 km range from the radar, the cell extends up to 13.5 km altitude. The 221 degree azimuth RHI has 2 cells at approximately 15 and 23-28 km extending up to 7 km.

1955 UTC: There is another boundary initiated at 350 to 0 degrees azimuth and 50 km range.

1956 UTC: What kind of weather stations are there up in the mountains (particularly where these boundaries are initiating convection)? Would be nice to see differences on either side of a valley.

2004 UTC: Set a sector scan from 200 to 290 degrees azimuth and RHIs at 208, 210, and 212. The RHI at 210 deg azimuth shows a cell with a 60 dBZ core just 15 SSW of the radar site. D3R is also scanning in concert.

2007 UTC: I increased the RHI elevation to 85 degrees to make sure to top cells that are so close to the radar.

2010 UTC: ER-2 is flying over Greenville. D3R shows a cell near the radar site at 197 degrees azimuth. Changed 90 degree sector scan to 170 to 260 degrees azimuth. Cells are rapidly developing at 100 km from 260 to 300 degrees azimuth. Doing RHIs at 180 and 175 for convection firing along what appear to be convective rolls.

2032 UTC: Doing RHIs at 0 and 150 degrees to capture convection to the N and SE of the radar site. Have also opened up the IPHEX_90NEAR sector scan from 270 to 45 degrees azimuth. The RHI along the 0 degree shows 45 dBZ reflectivity at 35 to 45 km range from the radar reaching 9 km. The big cell from 355 to approximately 30 degrees azimuth is not very well organized although it extends up to 12 km altitude. A 60 dBZ core in that cell extends up to 5.5 km altitude.

2057 UTC: A loop of reflectivity shows that convection initiating off of another boundary is backfeeding into an already established cell.

2101 UTC: There is another nice cell, although not as big) has initiated at 100 km range at 60 degrees azimuth.

2136 UTC: The core of this storm has weakened significantly, with no reflectivities over 35 dBZ.

2146 UTC: We are currently doing RHIs at 10, 20, and 30 degrees RHI. The RHI along the 10 degrees azimuth looks like just weak disconnected anvil.

2150 UTC: Turning off 10 degree azimuth RHI.

2229 UTC: Citation RTB after GPM overpass. We will continue to target the "beast to the east" with a 45 degree sector scan from 53 to 98 degrees and RHIs along 63, 65, 67, 69, 71, and 73. Along the 67 degree RHI, the 60 dBZ reflectivity extended up to ~4 km at 88 km range.

2312 UTC: The "beast the east" is weakening.

2320 UTC: Turned off RHIs because storm is moving out of range and has weakened quite a bit.

Shift Summary: There was quickly initiating convection in the mountains this afternoon. Some of the convection appeared to initiate and then spread out along boundaries. I am not entirely sure where these boundaries were coming from - differential heating from one side of a valley to another??? NPOL and D3R supported both the Citation and ER-2 aircraft on science flights this afternoon. ER-2 had to RTB because lightning was in the vicinity of Warner Robins AFB. Citation investigated a dying cell and leftover anvil during the GPM overpass (we were only covered by

GMI, no DPR today). NPOL finished the day by scanning the “beast to the east” with a 45 degree sector scan and a handful of RHIs.

Jason Pippitt on shift 2330 UTC

May 27 2014

0040 UTC: NPOL was down from 0008-0037 UTC due to a power fluctuation. A few cells developing to the south. NPOL is back up and running IPHEX_RAIN, IPHEX_45FAR (160 to 205 deg), and IPHEX_RHI (185, 187, 189 deg).

0110 UTC: A few showers to the south. NPOL running IPHEX_RAIN and IPHEX_45FAR (140 to 185 deg).

0144 UTC: NPOL down again, Gary is powering it back up.

0256 UTC: NPOL back up! Nothing major was missed, just some decaying showers. NPOL running IPHEX_RAIN.

0325 UTC: Shower redevelopment occurring to the south, sector and RHI scans started. NPOL running IPHEX_RAIN, IPHEX_45FAR (105 to 150 deg), and IPHEX_RHI (127, 129, 131 deg).

0423 UTC: Showers moving further away, RHIs turned off. NPOL running IPHEX_RAIN and IPHEX_45FAR (90 to 135 deg).

0548 UTC: A few small showers, sector scan turned off. NPOL running IPHEX_RAIN.

0755 UTC: GPM overpass. A few very small mountain showers during the overpass.

0900 UTC: Mountain showers forming. NPOL running IPHEX_RAIN and IPHEX_45FAR (270 to 315 deg).

0909 UTC: Showers and convective cells are developing in the northwest sector and along the Tennessee/North Carolina border. NPOL running IPHEX_RAIN and IPHEX_90FAR (270 to 360 deg).

1028 UTC: NPOL went down again, in process of bring it back up.

1116 UTC: NPOL back up. Showers to the west NPOL running IPHEX_RAIN and IPHEX_45FAR (270 to 315 deg).

Shift Summary: NPOL went down 3 times during the shift 0008-0037, 0144-0256, and 1028-1116 UTC. The NPOL engineers are diagnosing the cause. Isolated showers and a few convective cells were observed from 0000-0700 UTC. Mountain showers developed and moved east during the 0800-1200 UTC period. A GPM overpass at 0755 UTC was rain free.

Amber Emory on Shift 1130 UTC 27 May 2014

1416 UTC: Investigating precipitation over the mountains. Starting a 280 to 325 degree sector scan with RHIs at 300, 317, and 324. The RHI at 300 degrees azimuth from 50 to 80 km range shows weak echo, with a few gates of 35 dBZ.

1429 UTC: Another cell has initiated at almost 150 km range from 350 to 360 degrees azimuth.

1430 UTC: Not much at 324 degrees azimuth RHI. Virtually nothing making it to the surface out of 20-25 dBZ reflectivities.

1435 UTC: Along the 310 degrees azimuth RHI, there is a 45 dBZ core at 70 to 80 km range.

1436 UTC: There is a wide bright band signature along the 317 degree RHI between 3 and 4 km altitude. Not all of it, but the bright band is probably 500 to 600 m deep.

1439 UTC: 90 degree sector still from 280 to 325, starting RHIs from 302 to 312 every 2 degrees.

1442 UTC: 302 degree azimuth RHI doesn't show much. 35 dBZ reflectivities at 65 km and 3.8 km altitude.

1443 UTC: NOXP showing bright band is from 3.5 to 4.0 km, while NPOL showing 3.2 to 3.8 km. Very spread out.

1448 UTC: Precip is disappearing to the east of the furthest out disdrometers.

1510 UTC: Updating the sector to 285 to 330 deg azimuth.

1519 UTC: Opening to a 90 degree sector for the NW quadrant.

1528 UTC: RHIs showing weak precipitation aloft, not much reaching the surface. Very weak precipitation on the 1.0 degree elevation surveillance scan at least for precipitation over the mountains where the Citation is flying, max reflectivity = 28 dBZ.

1540 UTC: Looks like Citation is RTB. Turning off RHIs. Very weak precip out there.

1556 UTC: Turning 90 degree sector scan off

1731 UTC: Turned IPHEX_90FAR on again from 290 to 20 degrees azimuth to investigate convection firing in the mountains.

1813 UTC: Diurnal convection continues to initiate cells in the mountains.

1836 UTC: Started a set of RHIs at 305, 310, and 315 to investigate organizing cell to the NW. Along the 310 deg azimuth at 85 km range, 40 dBZ reflectivities extended from 2.5 to 4.5 km altitude. Along the 315 deg azimuth, there is a 55-60 dBZ core at 90 km range.

1848 UTC: Tightening RHIs over cell of interest to the NW to 313, 315, 317.

1913 UTC: Turning off RHIs because cell has dissipated.

2011 UTC: Switched to IPHEX_90NEAR with a sector from 225 to 315 with RHIs at 257 and 278 along lines of convective storms. The RHI at 257 degrees azimuth shows a 60 dBZ core.

2023 UTC: Switching focus to IPHEX_DSD and turned off RHIs at 257 and 278. Along the 292 degree azimuth RHI at 40 km range there is a deep core reaching above 10 km altitude with 45+ dBZ (probably not over DSD though)

2042 UTC: Along 298 deg RHI there is a 60 dBZ core at 6 km altitude about 35 to 40 km range.

2141 UTC: Still have rain over disdrometers.

2240 UTC: Turned off 90 degree sector scans to bring time of surveillance scan repeat back down to 4 minutes (5 minutes previously).

Shift Summary: This morning we started a 45 degree sector scan looking out to the NW with RHIs and gave updates to the Citation aircraft. Diurnal convection initiated early in the mountains today, but there were no aircraft flights this afternoon to rest up for an offshore mission tomorrow. We had some light showers/storms with decently strong cores (~60dBZ), although they weren't very big in the horizontal. D3R sampled some weak precipitation over the disdrometers as well as NPOL.

Jason Pippitt on shift

2330 UTC: Showers moving over DSD network. NPOL running IPHEX_RAIN, IPHEX_DSD, and IPHEX_45NEAR (260 to 305 deg).

May 28 2014

0022 UTC: Showers dissipated over DSD network. NPOL running IPHEX_RAIN, IPHEX_RHI (183, 185, 187 deg), and IPHEX_45NEAR (255 to 300 deg).

0056 UTC: Some decaying showers moving over DSD network. NPOL running IPHEX_RAIN, IPHEX_DSD, and IPHEX_45NEAR (255 to 300 deg).

0121 UTC: Sector changed to better capture showers. NPOL running IPHEX_RAIN, IPHEX_DSD, and IPHEX_45NEAR (270 to 315deg).

0154 UTC: Showers diminishing. NPOL running IPHEX_RAIN and IPHEX_45NEAR (270 to 315 deg).

0213 UTC: A few small showers. NPOL running IPHEX_RAIN.

0710 UTC: No precip.

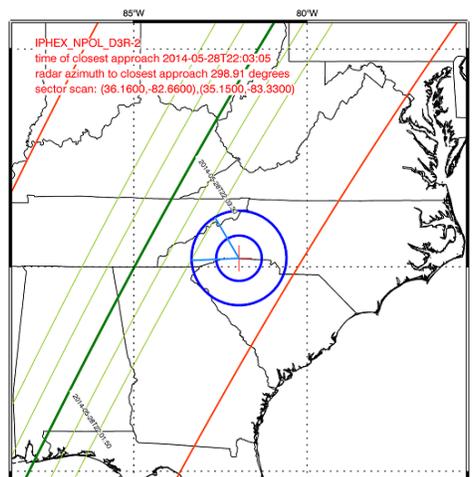
0900 UTC: No precip. Models indicate possible early morning mountain showers similar to the past two mornings. We will see!

Shift Summary: Showers and convective cells dissipated during the 00-02 UTC period. A few small showers were on the scope during the 03-06 UTC period. The models let us down this morning, no mountain showers developed. No precip during the 07-12 UTC period.

Piotr D. on shift

1137 UTC: No precip. NPOL in IPHEX_RAIN and 4min update mode.

1200 UTC We have a GPM overpass today at 22:03 UTC that will barely clip NPOL.



1630UTC We had 4 groups of 10-graders visit the radar (total 80 students) this morning. The last group left just minutes ago. Luckily there was no precipitation in the area, so NPOL continues with the IPHEX_RAIN escan very 4 min. An isolated weak cell is visible ~120km due North.

1653UTC Just a few very weak isolated cells moving north of NPOL (100-130km) ~25 dBZ max core values. We maintain the surveillance scan.

1712UTC Multi-cell diurnal convection popping up mostly over Tennessee with a few isolated cells showing up due East from NPOL.

1720UTC The IPHEX_45FAR has been added going from 270 deg to 315 deg to focus on some of the cells with NPOL reach.

1805UTC Removing the IPHEX_45FAR since the targets are rather weak and dissipate fast. Back to 4min IPHEX_RAIN

1820UTC As more isolated cells pop-up we are adding the IPHEX_90FAR scan to the mix (275-05 deg). This will allow for a better look at the development of those cells.

1908UTC The IPHEX_90FAR has been removed. There are some weak isolated cells in the area, but usually with a short life cycle. Also, we are testing if the 90FAR scan can be triggering an error in the TX system.

1936UTC IPHEX_90FAR between 250 and 360 deg has been added. A group of cells developed due East and is moving towards the disdrometer line...not there just yet. D3R is on stand-by waiting for echoes to move a bit closer and within its range.

2012UTC NPOL is going **DOWN** for an engineering test to be performed by Nathan Gears and prof. V. Chandrasekar. Estimated down time is ~15 min.

2033UTC NPOL is back **UP** in the surveillance mode IPHEX_RAIN.

2055UTC IPHEX_90FAR between 250 and 360 deg is added. We are once again focusing on a group of isolated cells that can potentially move over the DSD line.

2135UTC IPHEX_90FAR is replaced with IPHEX_DSD. We will try to capture the moment when the isolated cells move over the DSD line...if they don't dissipate before. D3R is up and scanning a sector due North East.

2210UTC A nice convective system developed ~50km due North. A 90deg sector from 300 to 30 deg is now employed to track the system. IPHEX DSD is off since the cells - we initially were hoping to scan - died out before reaching the instruments. (IPHEX_RAIN + IPHEX_90FAR).

2235UTC An RHI scan has been added at 10, 12 and 14 deg to take a look at an interesting 'bow' like convection about 100km North from NPOL.

2250UTC Back to IPHEX_RAIN + IPHEX_90FAR (300-30 deg).

2315UTC The IPHEX_90FAR has been replaced by IPHEX_45FAR with 15 deg to 60 deg sector.

Shift summary: PM showers moved North and East within NPOL coverage, but nothing made it over to the DSD line. IPHEX_RAIN has been supplemented with a number of sector and RHI scans through the day to focus on some isolated, stronger cells. There was a ~15 min down time to accommodate a calibration procedure requested by prof. V. Chandrasekar.

Jason Pippitt on shift

2330 UTC: NPOL continues to track showers to the northeast. NPOL running IPHEX_RAIN and IPHEX_45FAR (15 to 60 deg).

May 29 2014

0041 UTC: Sector changed to follow showers. NPOL running IPHEX_RAIN and IPHEX_45FAR (30 to 75 deg).

0100 UTC: A few cells are popping to the west. NPOL running IPHEX_RAIN and IPHEX_45FAR (255 to 300 deg).

0320 UTC: Shower over 192 deg DSD location. NPOL running IPHEX_RAIN, IPHEX_45FAR (255 to 300 deg), and IPHEX_RHI at 192 deg. Shower is insignificant.

0344 UTC: RHI stopped , a few showers to the west. NPOL running IPHEX_RAIN and IPHEX_45FAR (255 to 300 deg).

0410 UTC: Sector changed to follow shower to the west. NPOL running IPHEX_RAIN and IPHEX_45FAR (270 to 315 deg).

0535 UTC: Sector scan turned off. A few small showers on the scope. NPOL running IPHEX_RAIN.

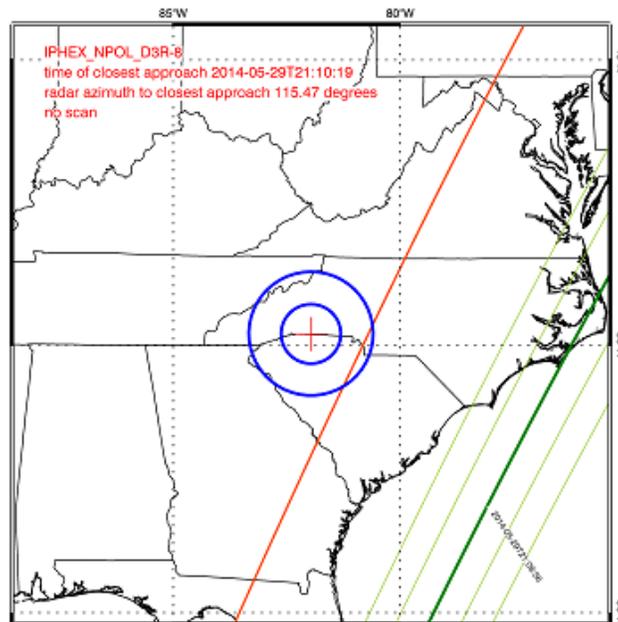
0600 UTC: No precip. NPOL running IPHEX_RAIN.

0800 UTC: **Night shift ending.** No precip expected.

Piotr D. on shift

1130 UTC No precip. NPOL running IPHEX_RAIN.

1238 UTC Quick look at today's GPM overpass. The track is outside of NPOL's coverage.



1500 UTC First isolated and weak cell shows up on NPOL PPI at ~100km range and 3 deg azimuth. We continue the surveillance scans.

1530 UTC Nathan added a few RHI scans just to test the displays.

1540 UTC The RHI scans have now been removed.

1558 UTC Isolated shower cell over SN38. IPLEX_RAIN (4-min) + IPHEX_DSD have been started.

1615 UTC Switching over to IPHEX_RAIN (4) + IPHEX_90FAR (270-0). This will provide coverage for a group of cells developing in the area. Aircraft mission starting soon.

1627 UTC Aircraft Ops are about to start, we are awaiting instructions from Asheville.

1645 UTC RHI at 285 deg added to support the aircraft mission.

1650 UTC Additional RHI scans added at 290 and 295 as requested by the mission ops.

1655 UTC The RHI scan now includes 300 deg (4 scans total) in addition to IPHEX_RAIN and a 90 deg sector.

1712 UTC Update in the scanning routine: IPHEX_RAIN + IPHEX_90FAR (260-315) + RHI (290, 295, 300)

1730 UTC. The above set has been supplemented with an RHI at 285 deg

1815 UTC Update in the scanning routine: IPHEX_RAIN + IPHEX_90FAR (260-350) + RHI (295)

1920 UTC Dropping the RHI scan per mission ops request.

1925 UTC To capture the full extent of the system and cover aircraft tracks, IPHEX_90FAR has been modified to 265 - 5 deg + IPHEX_RAIN

2011 UTC Adding an RHI due south (180). There are some cells within D3R range.

2035 UTC NPOL is now working a 335 - 35 deg sector and continues IPHEX_RAIN and a single 180 deg RHI.

2045 UTC To support aircraft operations a set of RHI (44 45 46 deg) is added.

2050 UTC. The core of the storm moved over to 49 deg so we are adjusting RHIs to 48 49 50 deg.

2057 UTC Moving RHI over again to follow the system core (49 50 51)

2110 UTC. Another adjustment to the RHI (52 54 56). PPI cover the Catawba basin.

2120 UTC RHIs added (52 54 18 23) to take a look at some cores closer to NPOL.

2148 UTC PPI sector (IPHEX_90FAR) shifted to 345 - 75 deg. RHIs at 25 30 62.

2208 UTC PPI adjusted to provide coverage of a cell at 75 deg..(0-100).

2230 UTC ER2 is making an approach towards NPOL at 57 deg. Adding RHI at that radial now.

2245 UTC ER2 on an outbound leg at 0 deg, shifting RHI over that way and dropping the sector for now.

2250 UTC ER2 making final leg towards NPOL and D3R at 345. IPHEX_RAIN + RHI (343 345 347).

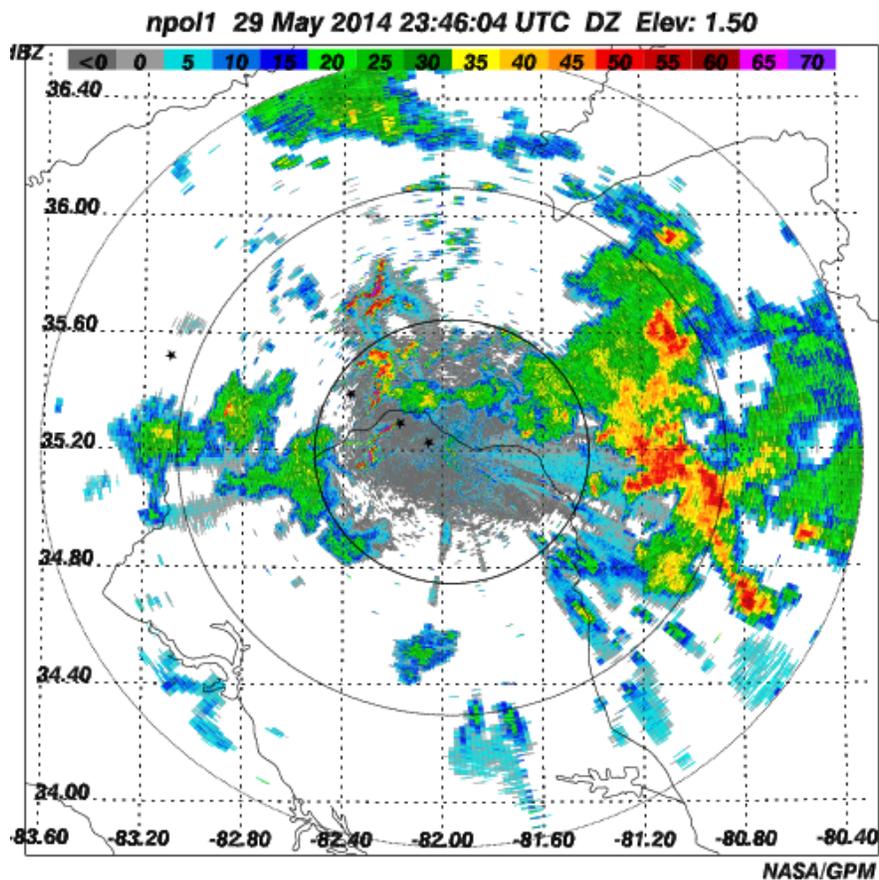
2300 UTC Aircraft ops are over for the day. NPOL goes back to a sector IPHEX_90FAR + IPHEX_RAIN.

Shift summary: A very busy afternoon. Rain developing in many sectors including Pigeon and Catawba. Scanning mostly in support of the aircraft mission. Notes could be a bit chaotic due to how busy it got at times, but I hope we got some good data today.

Jason Pippitt on shift

2330 UTC: Area of rain with embedded convective cells to the east. NPOL running IPHEX_RAIN, IPHEX_90FAR (40 to 130 deg), and IPHEX_RHI (88, 90, 92 deg).

2350 UTC: IPHEX_RHI updated to 94, 96, 98 deg.

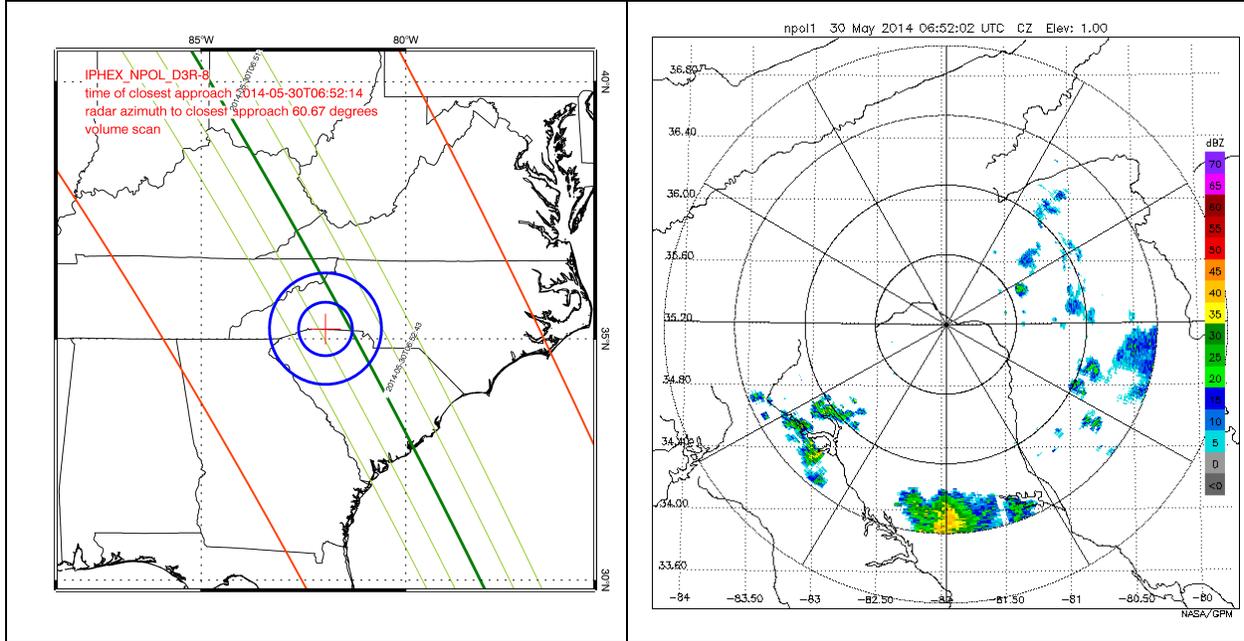


May 30 2014

0110 UTC: Embedded convective cells have diminished, RHI scan turned off. NPOL running IPHEX_RAIN and IPHEX_90FAR (40 to 130 deg).

0343 UTC: Most precip beyond 100 km, sector scanning turned off. NPOL running IPHEX_RAIN.

0652 UTC: GPM overpass captured a few showers.



1000 UTC: **NPOL night shift ending**, no precip and none expected.

Shift Summary: An area of rain and convection to the east slowly dissipated during the 00-04 UTC period. Isolated showers prevailed during the 05-09 UTC period. A GPM overpass at 0652 UTC captured a few showers.

Piotr D. on shift

1215 UTC Currently no precip. IPHEX_RAIN providing surveillance.

1219 UTC NO GPM OVERPASS DURING THIS SHIFT.

1500 UTC Still no precipitation. IPHEX_RAIN. We are expecting some showers to start in about ~1+ hours...

1548 UTC Some first small cells at the far ranges of NPOL start to show up.

1635 UTC IPHEX_90FAR gets scheduled between 245 and 335 deg azimuth to capture quickly developing cells. Once again we are hopeful some of the precip will go over the DSD line.

1710 UTC Things are starting to pop up in a number of sectors. Looks like orographically enhanced precip over the mountains. There is a chance for some of the cells to go over the DSD line. IPHEX_RAIN + modified IPHEX_90FAR (250-310) - notice this is a 60 deg sector + IPHEX_DSD.

1722 UTC The Catawba basin is seeing some precipitation, but NPOL for now is focusing on the DSD line, hoping for a good dataset over the instruments.

1745 UTC Missed about 5-8 min of IPHEX_90FAR (one or two volumes). The "schedule" procedure was not applied on time. Operator's mistake.

1805 UTC Opening up the sector scan to provide more coverage to the more widespread now system. IPHEX_90FAR (235 - 325) deg.

1900 UTC Still combining the RAIN 90FAR and DSD scans hoping for the system to clip some of the instruments. D3R is coordinating scans in the same area.

1922 UTC HALLELUJAH! Rain over SN35 and SN36 and both D3R and NPOL and working RHIs over the DSD line. Also we are switching to IPHEX_45NEAR (275- 320) + IPHEX_RAIN.

2025 UTC Rainfall transitioned into a nice stratiform tail. NPOL and D3R are collecting sector and RHI scans.

2055 UTC The system moved over the gauges. A good number of RHI and scans together with D3R have been collected. Now switching to IPHEX_RAIN + IPHEX_90FAR (335 - 65) + we will maintain RHI over DSD line until the rest of the storm clear (+IPHEX_DSD).

2100 UTC A rare opportunity - rain over NPOL...running IPHEX_BB

2124 UTC Rain over the DSD line has died out. The IPHEX_DSD scan has been removed. We continue with IPHEX_RAIN and a 90 deg sector towards NNE.

2215 UTC Shifting IPHEX_90FAR to 280 - 10 deg sector, as the system moves closer to NPOL. We may have another possibility for a Zdr calibration scan soon.

2230 UTC. A small cell has a chance to go over the closest 2DVD site. IPHEX_DSD now added. D3R is ready to start a coordinated RHI set.

2240 UTC Conducting a single IPHEX_BB scan - light rain on site.

2305 UTC Replacing the IPHEX_90FAR with the IPHEX_45FAR at (275 - 320) deg. This is more less centered over the DSD line.

2324 UTC Engineer reports a **problem** with the transmitter. We are not radiating. Estimated down time ~10 minutes.

Shift Summary: It turned to be a busy day in part because of widespread precipitation and in part because of a number of visitors that came to tour the site. We had probably a dozen of people coming at different times throughout the day. Rain started around 17 UTC as a number of isolated cells started appearing over the mountains in the NE direction. Eventually precipitation changed from convective to more widespread stratiform rain. From ~19 UTC NPOL and D3R were conducting coordinated sector and RHI scans over the DSD line. As the rain moved over NPOL, a few IPHEX_BB calibration scans were completed. Another line of light precipitation is near SN36. Towards the end of the shift a potential transmitter problem reported by Nathan.

Jason Pippitt on shift

May 31 2014

0001 UTC: NPOL is back up, down from 2319-0001 UTC. A few showers passing over the DSD locations. NPOL running IPHEX_RAIN, IPHEX_45FAR (275 to 320 deg), and IPHEX_DSD.

0035 UTC: Isolated showers, RHIs and sector scans turned off. NPOL running IPHEX_RAIN.

0053 UTC: NPOL down again, spinning but not radiating, attempting to stop runaway radar.

0209 UTC: NPOL back up, down from 0053-0209 UTC. Isolated showers to the northeast. NPOL running IPHEX_RAIN.

0241 UTC: Sector scan started to capture showers to the northeast. NPOL running IPHEX_RAIN and IPHEX_90FAR (0 to 90 deg).

0626 UTC: NPOL down again. Very warm inside the transmitter cabinet. Air filters were very dirty, Gary cleaned both and reinstalled.

0724 UTC: NPOL back up, down from 0626-0724 UTC. Showers to the northeast. NPOL running IPHEX_RAIN and IPHEX_90FAR (0 to 90 deg).

0757 UTC: Sector changed slightly to follow showers. NPOL running IPHEX_RAIN and IPHEX_90FAR (15 to 105 deg).

0829 UTC: Sector changed to follow showers. NPOL running IPHEX_RAIN and IPHEX_90FAR (40 to 130 deg).

1030 UTC: Sector changed to follow showers. NPOL running IPHEX_RAIN and IPHEX_90FAR (60 to 150 deg).

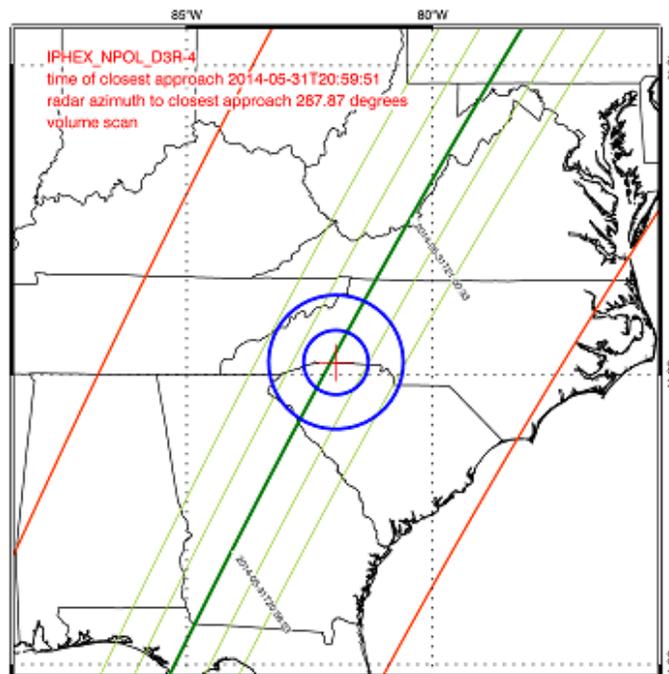
Shift Summary: NPOL went down 3 times during the shift (2319-0001, 0053-0209, and 0053-0209 UTC). Possible cause, overheated transmitter. Isolated showers to the east during the majority of the shift.

Piotr D. on Shift

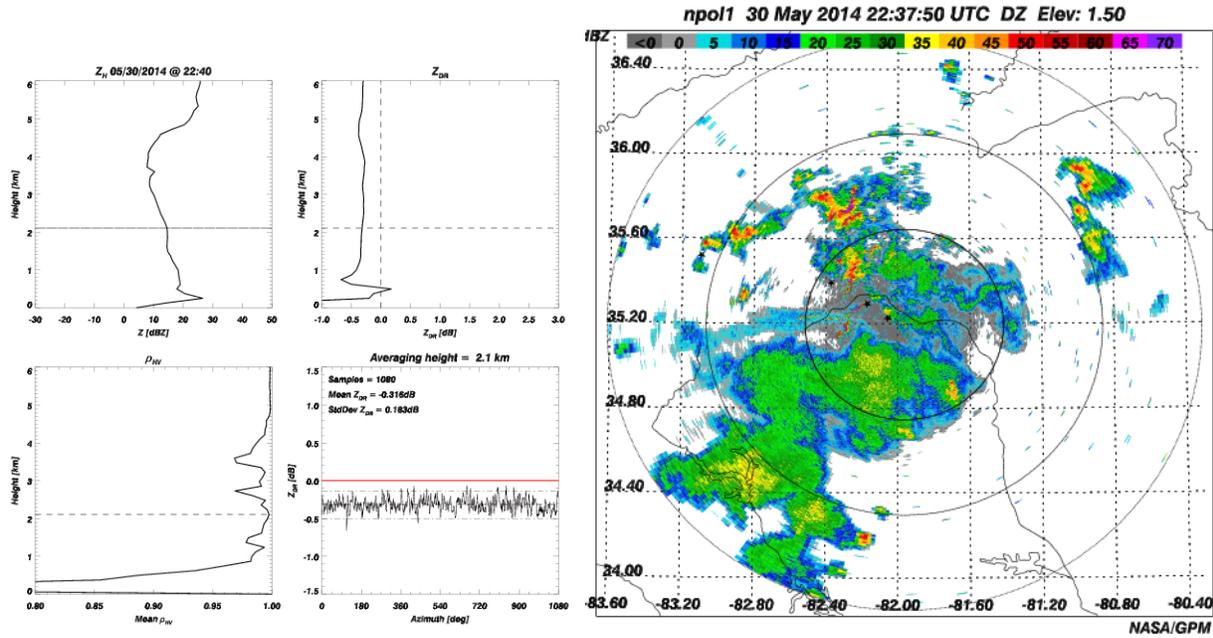
1146 UTC Some lingering showers due East slowly leaving NPOL coverage area.

1237 UTC The IPHEX_90FAR scan has been removed. Very weak echoes and almost out of the range.

1307 UTC A spot on overpass today at 1700 local time (2100 UTC).

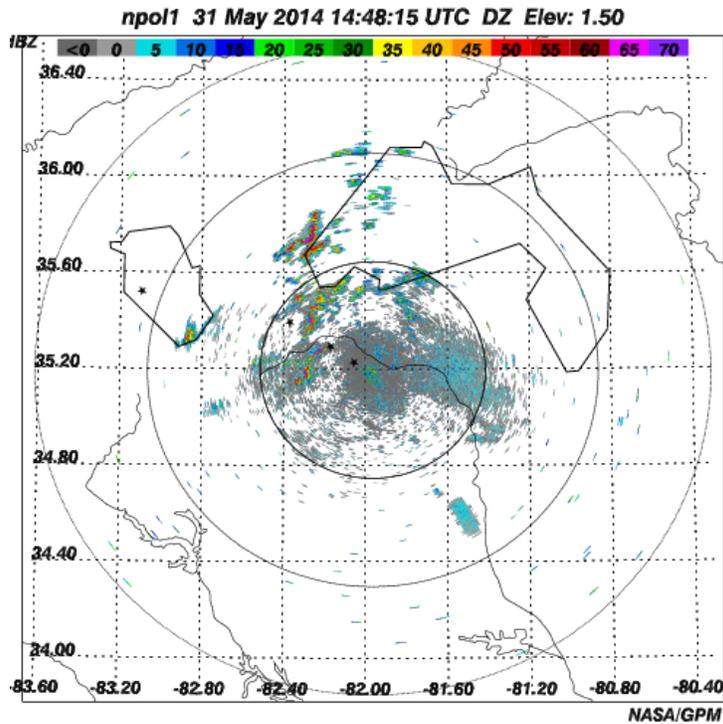


1435 UTC Based on Zrd calibration scans from yesterday, the GDR constant in IRIS is adjusted by -0.3. GDR offset from -1.12 to -0.81. First new scan is @ 1444 UTC.



1450 UTC Adding a single IPHEX_BB with just clouds overhead. This is just a scientific exercise during no-rain period.

1454 UTC - Added outlines of Catawba and Pigeon basins to NPOL images.



1600 UTC Still no precip, but the flow of visitors continues at a steady rate keeping us busy.

1730 UTC Some second-trip echoes developed due south.

2000 UTC There is a small group of cells almost stationary about 100km due East. It got a bit stronger in the last few scans so not IPHEX_90FAR is added between 250 and 340 deg.

2100 UTC GPM overpass with no significant precipitation targets in range. Some 30 dBZ echo at 142km due East. NPOL continues to collect a sector scan over that area.

2200 UTC NPOL continuous surveillance scans and a sector scan, but the precipitation covered by the sector scan is >140km away small and weak (~30dBZ).

Shift summary: Nothing significant materialized over NPOL today. We had a great GPM overpass but nothing to see at the time for NPOL. Lots and lots of visitors came visit the site.

Jason Pippitt on shift

2342 UTC: A few small showers on the western edge of the scope, sector scan turned off. NPOL running IPHEX_RAIN.

June 1 2014

0130 UTC: No precip within range. NPOL running IPHEX_RAIN.

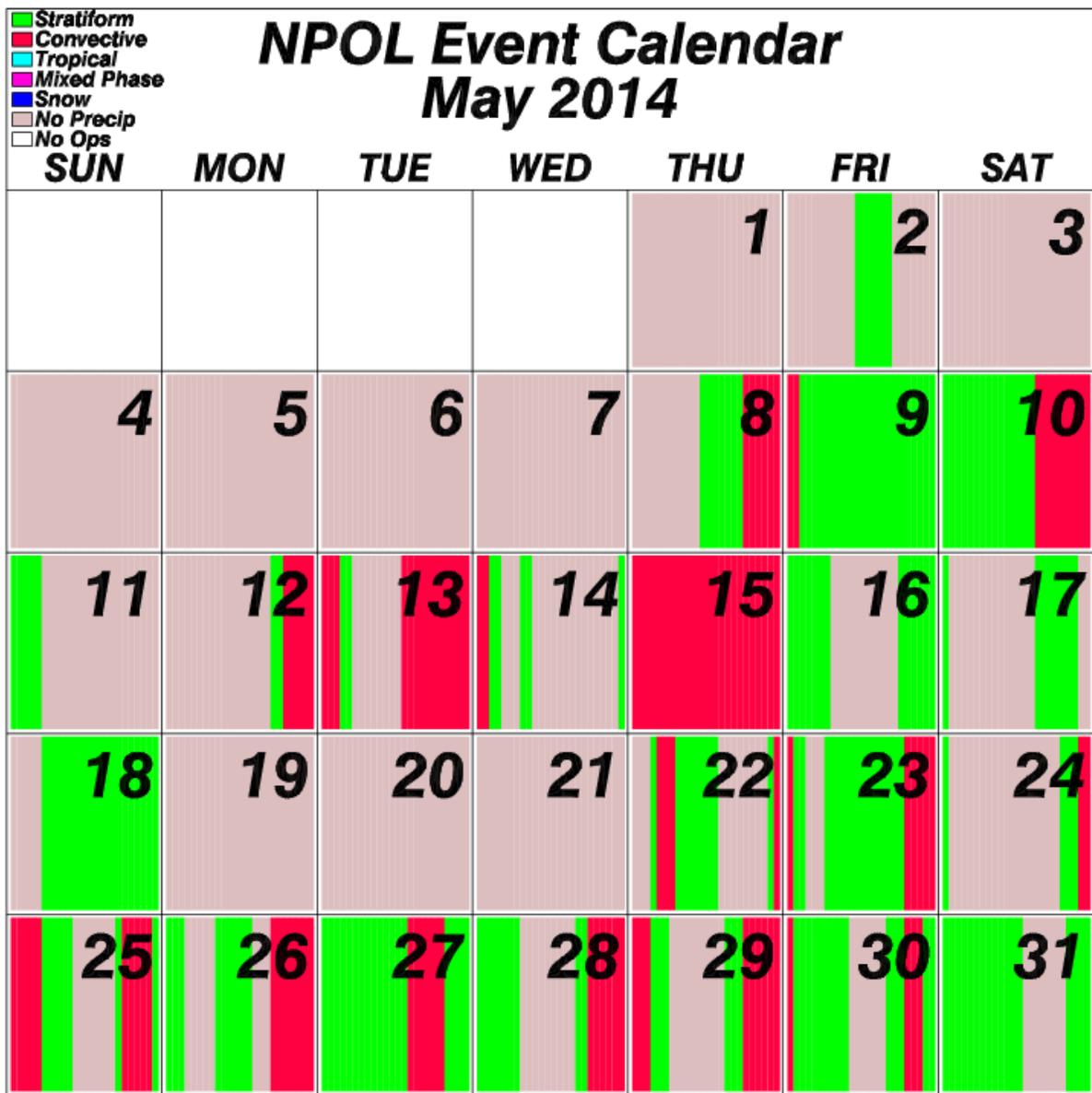
0504 UTC: NPOL IPHEX event calendar for May 2014.

<http://gpm-gv.gsfc.nasa.gov/Radar/5-2014.png>

0700 UTC: No precip.

0800 UTC: **Night shift ending.** No precip and none expected. Sunday June 1st is a down day for NPOL, radar set to IPHEX_RAIN 10 min repeat. Day crew will resume normal operations (IPHEX_RAIN 4 min repeat) at 12 UTC on June 2nd.

Shift Summary: A few small showers to the west during the 00-02 UTC period. No precip during the remainder of the shift



Piotr D. on shift

1200 UTC NPOL resumes after a soft down. We maintain 10 min update time. No precipitation in range.

1500 UTC NPOL will be on soft down again. The night shift will be here at 0730PM local to shift to hand over responsibilities from Jason Pippitt to Joseph Hardin. Day shift to resume at 0730AM local in time to get ready for aircraft mission and rainfall in range.

1445 UTC NPOL is on soft down, we are locking it up now.

Jason Pippitt and Joe Hardin on shift

2330 UTC: NPOL continues to run IPHEX_RAIN on 10 minute repeat.

0353 UTC: Still no sign of any weather. Jason noticed an electrical burn smell, but we were unable to find a source and it appears to have gone away now.

0554 UTC: Still all quiet out here.

1121 UTC: Piotre is here so taking off. All in all it was a quiet night with no activity.

Piotr D. on shift.

1200 UTC NPOL is on a 10-min IPHEX_RAIN. No precip in range.

1223 UTC SOLAR CAL

1320 UTC A weak line formed due North, but we maintain the 10 min cycle to allow for solar calibration to be performed in between scans by Nathan.

1345 UTC In preparation for the upcoming event and the aircraft ops the IPHEX_RAIN scan is now at 4-min update time. Still no precip in range.

1536 UTC Rainfall (~15-25 dBZ echoes) in the N direction and ~140km away. We maintain 4 min surveillance.

1709 UTC THE IPHEX_90FAR with 340-70 range has been started. This is to track some very weak line propagating within NPOL's coverage. No precip on site.

1925 UTC The weak precipitation line is fading away leaving very little reason to keep the sector over it...

1948 UTC Getting ready for the GPM overpass but there is nothing to focus on really...

1958 UTC Adding an RHI scan along 70 72 74 azimuths timed to capture the GPM overpass. Nothing really there except a single cell at 30 dBZ. This is a single RHI run.

2013 UTC IPHEX_RAIN + IPHEX_90FAR between 45 and 135 deg azimuths. There are two small cells that started developing a few minutes ago. The cores show ~50 dBZ.

2045 UTC More convective cells started developing fast in the E and W direction. It will be hard to cover both areas with a sector, so staying where we are for now. D3R is running RHI scans to capture some of the closes echoes.

2050 UTC to coordinate with D3R NPOL is now also making RHI cuts at 250 255 260 deg. Let's see if we catch anything there.

2110 UTC. Now the RHI scans have been removed and the IPHEX_90FAR sector has been shifted to 180 270 deg.

Joe Hardin on Shift 2218 UTC June 3

2225 UTC: All Seems quiet for now, a few small stationary cells to the southwest.

2209 UTC: Went back to just 10 minute rain scans

0809 UTC: Calling a Soft Down for NPOL until morning shift at 12Z. No precipitation is close to the site and nothing inbound for quite a ways. Locking up NPOL.

Piotr D. on shift

1123 UTC NPOL remains in the 4 min surveillance for now. (I'm not sure if it was intended for NPOL to be on a 10-min or a 4-min update by previous shift, but the radar has been running on a 4-min cycle this morning).

1500 UTC Still no precip and none expected. Updating to 10-min IHEX_RAIN

1540 UTC 30 min pause in operation for NPOL. Forgot to set it to go after changing to 10-min update. No precipitation in range.

1710 UTC IPHEX_RAIN at 4-min update. Looks like we might be getting some rain after all.

1847 UTC There is some precipitation entering the NW sector and NPOL is now IPHEX_RAIN + IPHEX_90FAR 260-350 deg.

2045 UTC Rainfall dissipated and the IPHEX_90FAR has been removed.

Joe Hardin on Shift 2130 UTC

2139 UTC: Added a 90FAR scan from 330 to 60 to catch some of the incoming clouds. They're not much, but nothing else to look at.

2301 UTC: There is a little more becoming visible, moving in from the northwest. Sticking to 90FAR unless it gets within range of D3R.

2337 UTC: There is a cell to the north with 30+ dBZ, though it is small and isolated. Looks to be a bit of a larger mass moving in behind it.

0108 UTC: Changed 90FAR to be 320 to 50 to catch the right edge of the storm.

0257 UTC: Northern storm passing out of range so switching to focus on an incoming cell from the west.

0348 UTC: Added DSD scan as storm is moving over the disdrometers.

05:15 UTC: Tracking the storm to the west still, it's finally starting to get to close to D3R's range. When it moves in a little we'll move to the NEAR scans if we have time before the plane flight.

0608 UTC: Plane is in the air, Currently scanning 315-45

0650 UTC: Still not much visible. Large stratiform-ish cell to the north, and we might be seeing the leading edge of the large MCS moving through Tennessee, but not sure just yet.

0659 UTC: It appears that is indeed the leading edge of the storm, going to switch from monitoring the northern cell to the incoming western MCS.

0722 UTC: Adding in RHI scans as per mission science orders. Starting with 266-270 and will track storm as it moves.

1013 UTC: We did a few scans, but essentially all the storms fizzled before they got within range of us. All in all a fairly disappointing night.

Piotr D. on shift

1200 UTC NPOL is in IPHEX_RAIN nothing of interest in the domain.

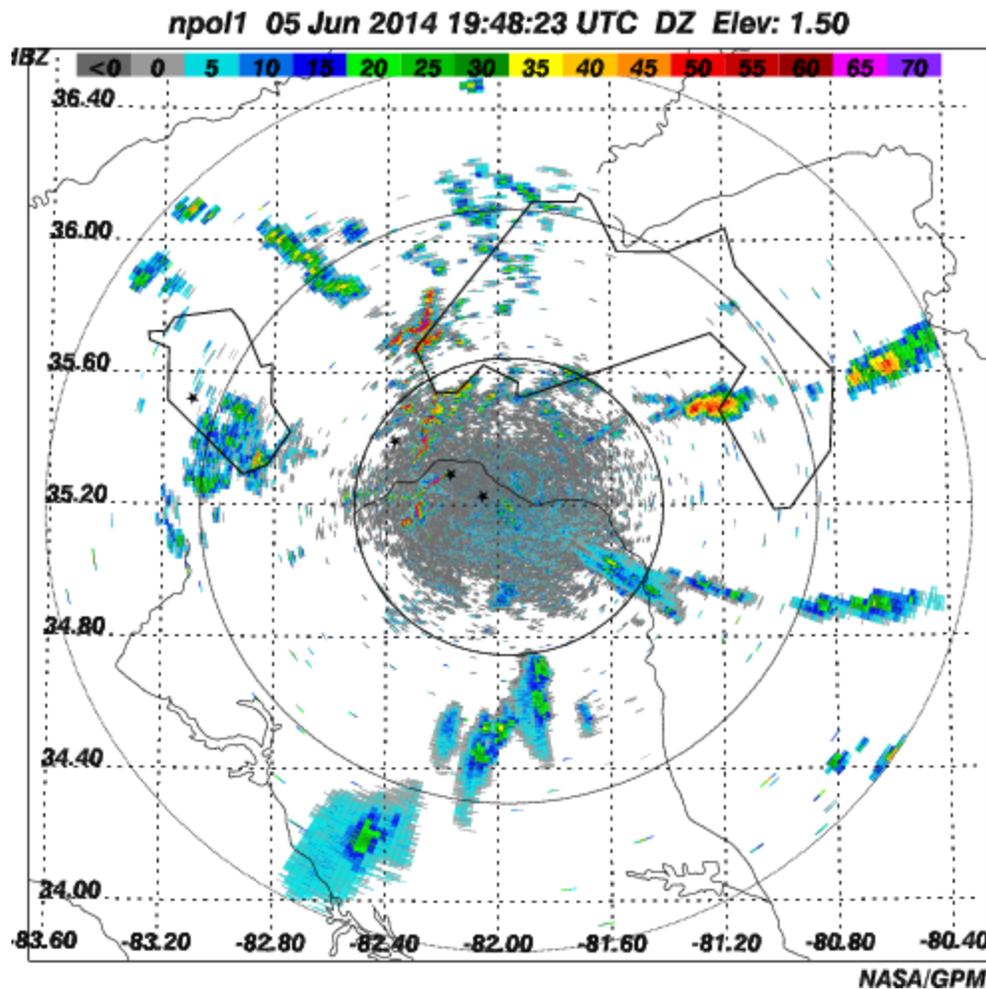
1337 UTC Adding the IPHEX_90FAR 315-45 so directly North from NPOL to look at some of the precipitation over the NC-TN state line/

1509 UTC THE IPHEX_90FAR sector has been shifted by 30 deg to 345 - 75 deg.

1620 UTC Back to the previous sector orientation for IPHEX_90FAR (315-45). Still very little to observe as far as precipitation goes but this is all we've got.

1915 UTC We are stopping the IPHEX_90FAR sector to take another look at some of the redeveloping cells due South. FO for now just IPHEX_RAIN at 4-min.

1949 UTC GPM OVERPASS. RHI scans at 320 322 324 along the only feature that happens to be covered by the GMI at this time.



1956 UTC The RHI scan was a single one during the GPM overpass, now only running the IPHEX_RAIN scan.

1958 UTC Adding the IPHEX_45FAR over the convective feature between 45 and 90 deg (see pic above).

2041 UTC Thinking about priorities here..so the convective cells are still over the Catawba basin, but there is also a line developing over the Pigeon basin - less intense though. It does have a chance to cross the disdro line, so for now the IPHEX_45FAR is at 270 - 315 deg sector.

2227 UTC ow there is a chance the more stratiform precip will go over the SN36 site and maybe propagate all the way to the NPOL site. Starting IPHEX_DSD together with the IPHEX_FAR and IPHEX_RAIN already in place.

Joseph Hardin on Shift 2333 UTC:

2340 UTC: A few light sprinkles at the radar. If it increases at all we'll go ahead and run a birdbath scan.

2350 UTC: Ran a birdbath scan, though calling what we're getting drizzle would be overgenerous.

0130 UTC: Light sprinkles at the radar, still not enough to get a birdbath however.

0204 UTC: A cell is moving in range of NPOL and D3R, starting coordinated RHIs. Core reaching 5km, about 50-50 dbz. Range of about 40km.

0445 UTC: 90 FAR to the east to coincide with GPM overpass. Not really anything to see however.

0342 UTC: Nothing in range and nothing inbound, we're going to call a soft down for the night until the morning shifts arrival.

Piotr D. on shift

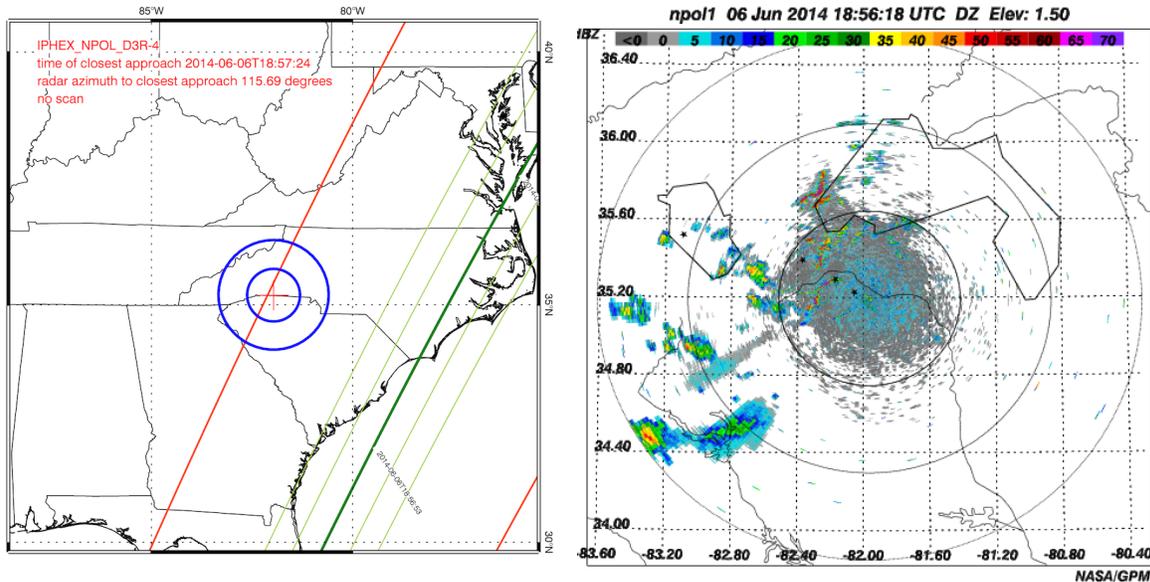
1145 UTC IPHEX_RAIN in 4-min update cycle. A few light reflections in the SE direction leaving NPOL domain.

1527 UTC NO rain expected for now. IPHEX_RAIN @ 10-min update.

1820 UTC. Updating the surveillance scan to 4-min.

1831 UTC Also, Adding the IPHEX_90FAR sector between 225 and 315 deg. Some convective activity in that region developing fast.

1900 UTC GPM overpass with nothing to target for NPOL.



1918 UTC Starting D3R to conduct some PPI surveillance.

2011 UTC Hard to justify keeping D3R running. Back to stand-by for now.

2035 UTC. Opening up the IPHEX_90FAR by 20 deg. This is to continue monitoring some convective cells moving SE while still keeping an eye on the DSD line.

2108 UTC Shifting the IPHEX_90FAR sector once again to 190 - 280 deg. Following a line of convective initiation SSW from NPOL location.

2200 UTC Adjusting the sector scan again: 170 - 280 deg, so this is a bit more than 90deg, but trying to cover two area at once.

Joseph Hardin on shift 2320 UTC:

2327 UTC: Nothing really visible on radar, though outside we can see a cumulus cloud to the north east. Looks like another cumulus moving in from southwest though it's on track to stay at 100km+

0013 UTC: Weakly organized storms to the southwest, sticking around 60km.

0123 UTC: Convective storm popped up in range, doing 45 near with D3R, 0-90 degrees.

0128 UTC: Storm intensified fairly well, adding in RHI's with D3R.

0145 UTC: D3R Down for a little bit.

0203 UTC: D3R Back up, storm out of range now on NE side.

0227 UTC: D3R Back down for some checks, only one weak storm in range of it

0237 UTC: D3R back up

0320 UTC: Still tracking the cell to the SE, though it's moving out of range

0427 UTC: Cells are incredibly slow moving, the eastmost one appears to be intensifying at about 100 km.

0632 UTC: Same little cell is still just sitting there. 45 NEAR scan being run on it for lack of something else.

0750 UTC: The little cell here dissipated and not likely to see anything else tonight so calling a soft shutdown until the morning crew.

Piotr D. on shift

1200 UTC Rain in the SE sector. Adding IPHEX_90FAR 75 - 165 deg.

1646 UTC OK, so for the past couple hours we were running both the 90 and 45 sector (on top of IPHEX_RAIN). This was a mistake as only the 90 sector was intentional.

1800 UTC Shifting IPHEX_90FAR to 235 - 325 deg sector. There is some new convective cells developing there and the SE sector rainfall is slowly moving out of the domain.

1953 UTC We remain hopeful that the small cell in line with the DSDs will make it over the mountains and make it rain. IPHEX_RAIN + IPHEX_45FAR (265 - 310) + IPHEX_DSD for now.

2110 UTC Once cell made it over the SN36 site before it died out. We conducted some coordinated RHIs over the DSD line, but it is all over now. Back to IPHEX_RAIN at 4-min with nothing to exciting in the domain.

Joseph Hardin on Shift, 2250 UTC

2319 UTC: Some cells moving in from the west, adding a 90 FAR scan.

2350 UTC: Cells from the west are intensifying and might actually make it over us.

0050 UTC: Storms drifting southward and still not in range of D3R. Adding a set of RHI's through the storm at about 247 degrees.

0130 UTC: The RHI's show the storm is topping out around 12km, with the core reaching up to 10km. It's still out of range of D3R unfortunately.

0300 UTC: Storms in range of D3R. Both are doing 90 degree and rhi's over disdrometers .

0320 UTC: Storm is threading between the disdrometers....

0540 UTC: All is pretty quiet. There is another system moving in from southwest after previous storm dissipated. A fairly large squall line is set up to our west but it should hit our anti-weather bubble any minute now.

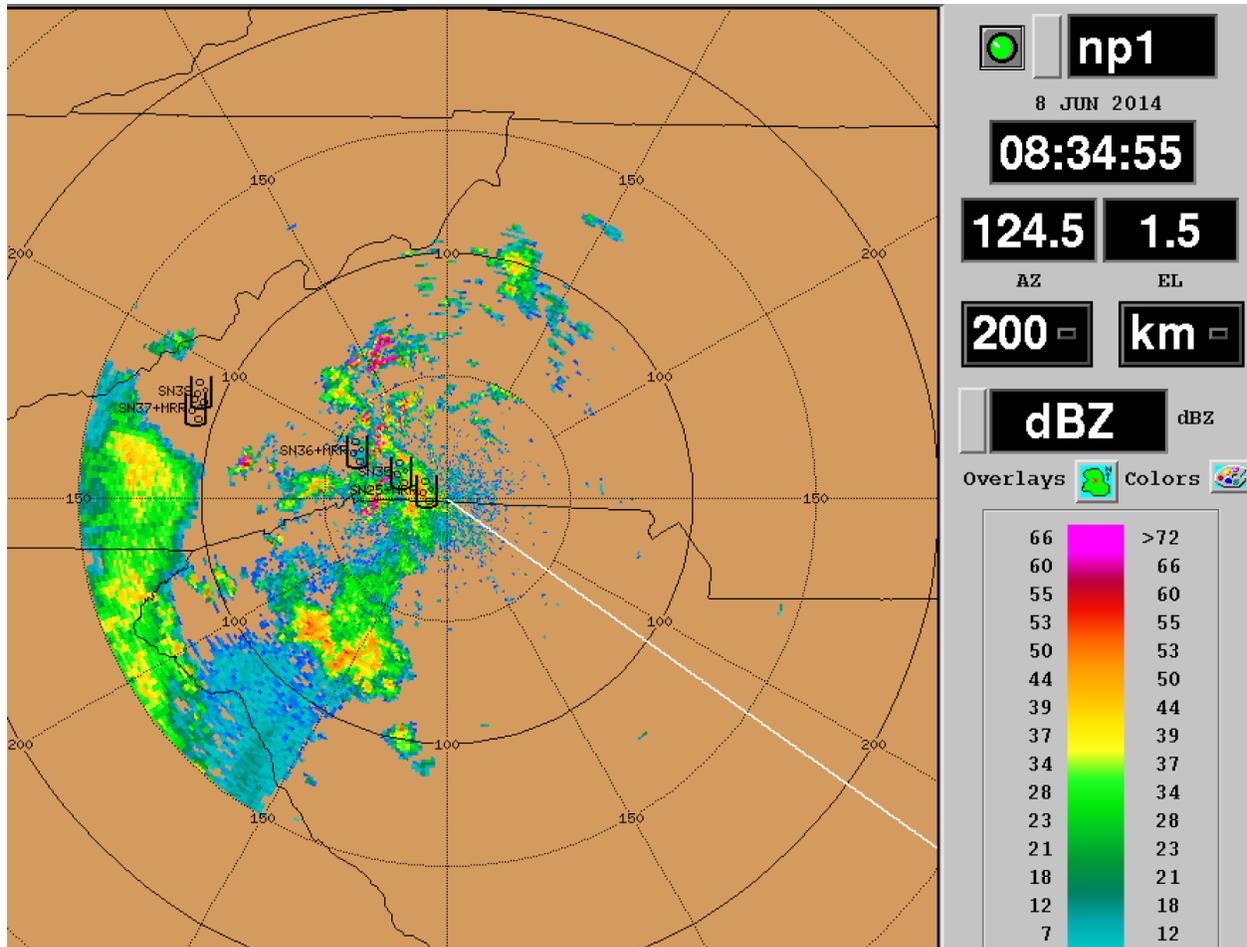
0643 UTC: MCS Seems to have cleared the first part of the mountains, we might finally get some weather here.

0744 UTC: Starting coordinated scans with D3R, 90FAR as the storm to our southwest is in range, and there is an incoming MCS from the west.

0819 UTC: Core about to move over us, switching to 90 near. Going to get as much of incoming MCS as possible while still capturing the closer storm system. Also picking up a rhi or two over disdrometers to see if anything is there yet.

0829 UTC: Rain appears to be over disdrometers. D3R and NPOL coordinated scanning. The SW storm should be pushing over us soon, and then the MCS from the west should be colliding shortly thereafter.

0833 UTC: Lightning at site.



0848 UTC: Very light rain at site. Did a birdbath, hoping to get some more.

0859 UTC: Great Scott!!! Finally got to do a birdbath with some proper drizzle at the radar. We're probably about .15 db hot, though that's less than the standard deviation so can't really make much of a statement.

0942 UTC: Rain off and on at radar. Primarily a very light sprinkle. Took off the disdrometer scans until something moves in. Going to increase 90 NEAR to try and capture both storms.

1000 UTC: A few cells visible, but things are starting to dissipate. The sun is out so I expect most of this will start to burn off. There are 3 cells that don't all fit, so I'm choosing the west storm as NOXP is currently scanning it as well.

0Z June 7-12Z June 8 Shift Summary:

Tonight was a much more active night than usual. We got some rain at the radar, and quite a few nice cells that tracked in range of both radars. Unfortunately the main body of the MCS decoupled and moved south towards the end of the shift. Additionally there was considerable overlap in the scanning between NPOL and NOXP towards the end of the shift. We were also able to get a few ZDR calcs done during brief periods of rain at the radar.

Piotr D. on shift

1140 UTC Shifting the IPHEX_90NEAR to 215 - 305. Rain over the DSD line.

1205 UTC Rain on site. Adding the IPHEX_BB scan ASAP.

1216 UTC Removing the IPHEX_90NEAR. There is just not enough there right now.

1218 UTC Adding another BB scan since we still have some rain on site...and it stopped raining just before we started the scan.

1255 UTC We are removing the IPHEX_DSD scan at this time. Only a few scattered echoes in the NPOL domain. IPHEX_RAIN at 4-min update.

1302 UTC Putting D3R back to stand-by.

1358 UTC very light rain on site. IPHEX_BB to test if there is enough dBZ.

1447 UTC Another chance for IPHEX_BB with light drizzle on site.

1455 UTC A line of convective cells is has developed due SE. IPHEX_RAIN + IPHEX_90FAR (80-170) deg.

1505 UTC Shifting the IPHEX_90FAR sector a bit (50-140) deg.

1505 UTC Also adding another BB since some more rain on site.

1625 UTC There are some small convective cells over the Catawba basin, so to cover that together with the more widespread and intense system due East, we are shifting the 90FAR sector and opening it up to 120 deg (20-140 deg).

1724 UTC ER-2 is in the air. RHIs at 88 90 92 deg as requested by Asheville.

1726 UTC Adding another RHI at 55 deg.

1728 UTC The 90FAR sector is back to 90 deg with 45-135 deg range

1730 UTC everything is losing intensity and moving out of NPOL's range right now.

1737 UTC shifting one on the RHI from 55 to 58 deg to follow the highest intensity.

1740 UTC RHIs now at 75 80 85 as requested by Asheville.

1827 UTC An RHI at 105 has been added to the mix.

1833 UTC RHIs now at 67 71 75 as requested by Asheville.

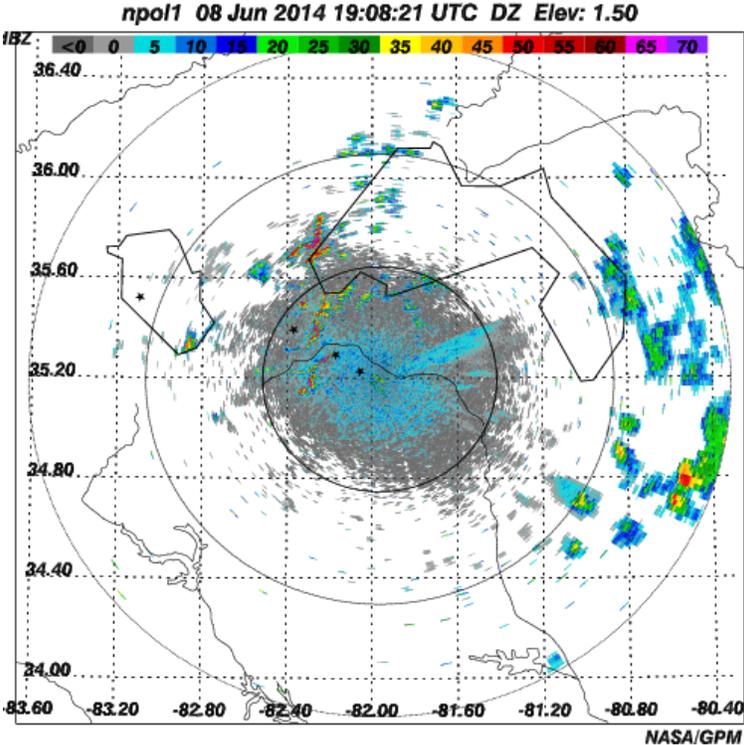
1851 UTC RHIs now at 60 65 70 75 as requested by Asheville.

1852 UTC Removing the 90FAR sector. Not much besides weak stratiform rain over 130km away.

1905 Adding RHIs at 108 108.5 109 to take a look at a single convective cell at 130km.

1908 UTC NPOL is back to surveillance scan IPHEX_RAIN at 4-min.

GPM Overpass at 1847UTC - the conditions for NPOL were very much similar to the image below.



1934 UTC Starting to see some development North from NPOL. Adding IPHEX_90FAR between 300 and 30 deg.

2016 UTC RHI at 325 as requested by Asheville.

2022 UTC Replacing the 90deg sector with the IPHEX_45FAR (300 - 345).

2030 UTC RHI set now has 315 320 325 deg members.

2039 UTC As the stronger convective cells are getting closer we are switching to IPHEX_45NEAR (300-345) to top the system.

2040 UTC D3R is coordinating RHI scans.

2100 UTC Shifting RHIs to 305 310 315.

2110 UTC Now shifting RHIs over two of the DSD sites (298, 299) and additional scan at 305.

2135 UTC The IPHEX_45NEAR is now removed as the system gets within 5km. IPHEX_RAIN + IPHEX_RHI (298, 299, 305) remain.

2200 UTC Rain on site. We are expecting strong rainfall in a few minutes here.

2205 UTC IPHEX_BB with rain on site. Could be a bit strong.

2220 UTC Removing RHI scans. The storm is to close and just moved past the DSD line.

2220 UTC Starting a sector over the Catawba basin with IPHEX_45FAR (15-60) deg.

2317 UTC Shifting the sector to 30-75 deg as we keep tracking the convective line over the Catawba basin.

Shift summary: We did not get much to work with during the GPM overpass, but later in the afternoon, a strong, convective cell went by NPOL and over the DSD line. A number of PPI, sector and RHI scan were collected. Also, we reported rainfall on site during the day so BB scans were completed. D3R collected some coordinated sector and RHI scans. NPOL might have missed some of the RHI scans over the DVD site that is ~10km from here.

Joseph Hardin on shift, 1132 UTC:

0124 UTC: Stopping 45 FAR as storm is moving out of range. That is probably the last thing we'll see for the night.

0358 UTC: Bringing NPOL down to test a change to the real time display.

0418 UTC: NPOL Back up. Displays should now be higher resolution and have a deeper bit depth(Switched to transmit version 2). Additionally I set it so that any new computer that joins the network can tap into the displays(by enabling multicast). Finally it should reduce the data load on the local network(As it does not have to replicate the screens)

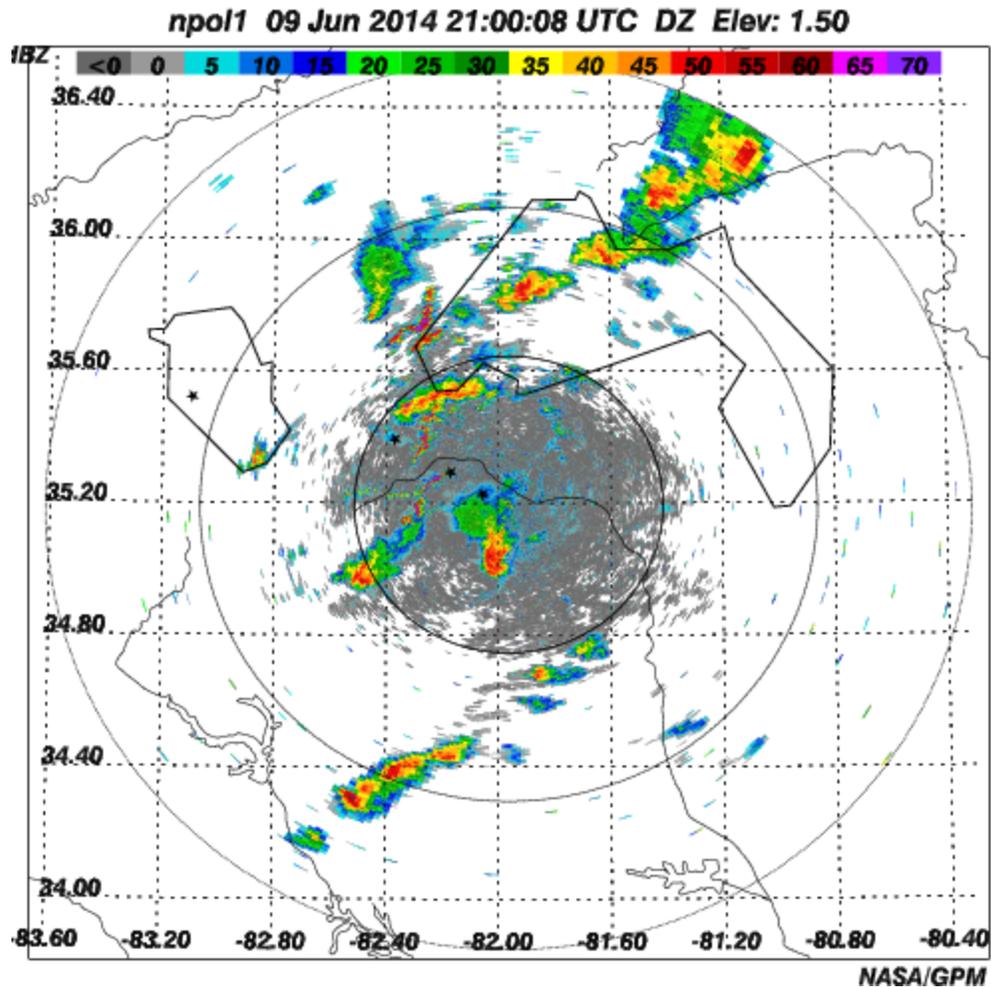
0733 UTC: Still nothing visible all night.

0800 UTC: Radar is down for a soft shutdown until NEXT morning shift(Starting tuesday morning).

1418 UTC: DBW switched to 4 minute IPHEX_RAIN scans remotely. First 4-minute scan began @ 1424 UTC.

1636 UTC: DBW... all convection dying over mountains so went back to 10 min scan. First 10-minute scan at 1640 UTC.

2118 UTC: DBW... Fast developing storms, a couple of severe in area. Some nice cells in Catawba. Am going to go back to 4-minute scans. Will leave it to Piotr if shifts should be called in.



2121 stopped scans. First 4-minute scan @ 2128 UTC.

2145 UTC Piotr back on NPOL and D3R person is here as well. Running IPHEX_90FAR over the Catawba basin 340-70 deg.

2157 UTC The cells to the south are moving so quickly we may not be able to get D3R ready to get any coordinated scans.

2217 UTC Convective cells developing over Catawba so we keep the sector there. Nothing for D3R to see at this time.

2253 UTC Shifting the sector to 0-90 deg in order to keep the storms in the center of the scan as they keep moving NE.

2313 UTC Once again the IPHEX_90FAR sector is adjusted by 20deg (20-110) to follow the storm.

1835 UTC One small cell developed North ~130km in range. We maintain the surveillance with 4-min update time.

2030 UTC Some second trip echoes showing up due West from the strong system over TN and AL.

2100 UTC Starting a 45 deg sector scan (340-25 deg) to capture the single cell north from NPOL and just North from the Catawba basin.

2142 UTC Replacing the 45 deg sector with IPHEX_90FAR (290-20 deg). Most of the rain is over 40km away, but over the mountains so always interesting.

2155 UTC. Removing the sector scan for now. The rainfall we were following moved out to 140+km. IPHEX_RAIN.

2156 UTC Switching over to an isolated convective cell directly East from NPOL at ~ 90km range. IPHEX_45FAR (45 - 90).

Joseph Hardin on shift: 2222 UTC

2340 UTC: Running 90 FAR, we increased the view to 120 degrees to accommodate the squall line.

0049 UTC: Squall line approaching radar, currently at about 50 km.

0102 UTC: Lightning to SW visible at site, Line is too wide for scans so reduced back to 90 degrees on FAR, and added RHI's over disdrometers. We're going to miss quite a bit of it, but we'll grab as much as we can.

0113 UTC: Seeing 60 + dbz with embedded hail in the Sq.Line . Should be fairly small hail, but keeping an eye on it nonetheless.

0117 UTC: Line now starting to pass over disdrometers.

0123 UTC: Switching to 90 NEAR.

0143 UTC: Storm now starting to pass over NPOL, gusts at 40 mph, sus 30mph.

0150 UTC: Heavy rain on sight, doing a birdbath.

0158 UTC: As storm passes over us, switching to 300-30 deg 90 NEAR.

0225 UTC: Storm finally moving past us, almost out of D3R range. Switching from 90 near to far.

0250 UTC: RHI's over disdrometers stopped, not much weather currently visible. There is a few large cells moving in from south at longer ranges as seen on KGSP.

0511 UTC: A small cell has popped up in range of D3R at around 210 degrees.

0516 UTC: Rain on site, subsided by 0519 UTC:

0600 UTC: Southern Storm has moved into range.

0622 UTC: Switching to 90 near.

0642: Storm is passing over us. Sticking with south sector until the bulk of the storm has passed over us.

0809 UTC: Storm starting to pass, adjusting 90 NEAR to be 90 to 180.

0958 UTC: Storm has fully dissipated at this point, resuming 4 min rain mapping.

0000-12000 UTC Shift Summary:

All in all a pretty active night. We had multiple systems push through caused by the low pressure system that moved across the US through the night. Multiple 55+dbz returns were seen. We had lightning at the site, as well as rain which enabled us to conduct several birdbaths scans. A lot of embedded hail, and some fairly high winds as well were seen. Additionally there was a good amount of coincident scanning with D3R of storms as they passed over the radar from south to east.

Piotr D. on shift

1200 UTC No precipitation in range at this time.

1532 In support of the ER-2 we are setting up a sector scan between 270-315 deg. IPHEX_RAIN + IPHEX_90FAR.

1601 UTC Firing up D3R for a PPI surveillance scan. First scan did not give anything, so waiting for now.

1615 UTC D3R up in PPI mode.

1700 UTC Asheville requests RHIs at 298.5 and in 300-310 sector.

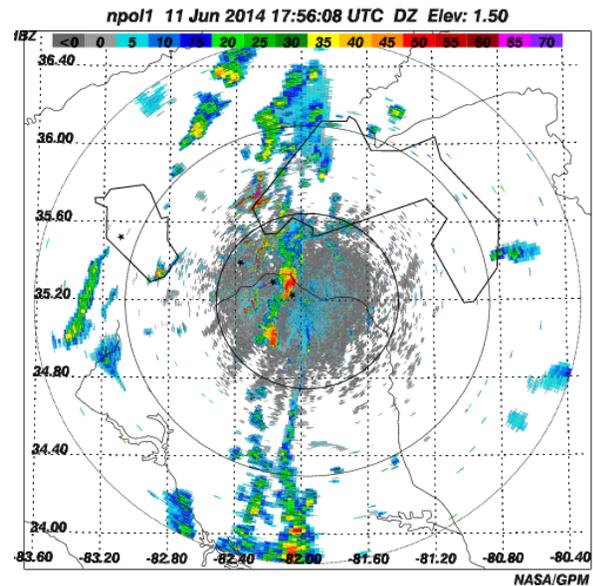
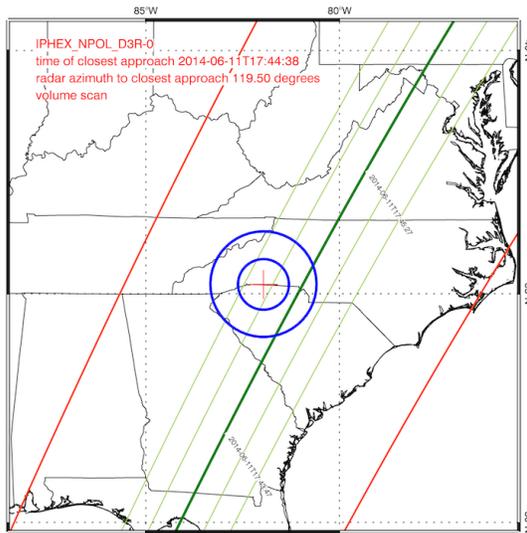
1710 UTC removing the 298.5 RHI and now only 300 305 310.

1727 UTC RHIs now at 299 300 305

1732 UTC RHIs now at 298 299 300

1743 UTC RHIs now ar 296 297 298.5 299

1744 UTC GPM Overpass



1748 UTC Switching to 298 298.5 299

1815 UTC Switching to 90NEAR from 90FAR sector. This is to top off the storms. Also opening up another 10 deg. (230 -10).

18030 UTC. Rain on site.

1832 UTC Switching the IPHEX_RHI with custom azimuths to IPHEX_DSD to capture precip in Maggie Valley.

1841 UTC. Shifting The 90NEAR sector also to 270-20 deg.

1852 UTC. Shifting The 90NEAR sector also to 280-30 deg.

1858 UTC Switching the sector from NEAR mode to FAR mode. Still 280-30 deg.

1912 UTC Rain leaving Maggie Valley. Moving RHIs over to 5, 10, 15 deg.

1923 UTC. The sector IPHEX_90FAR gets shifted to 300 - 35 deg. Also, shifting RHIs to 15 20 25.

1939 UTC The IPHEX_90FAR is now 330 - 60.

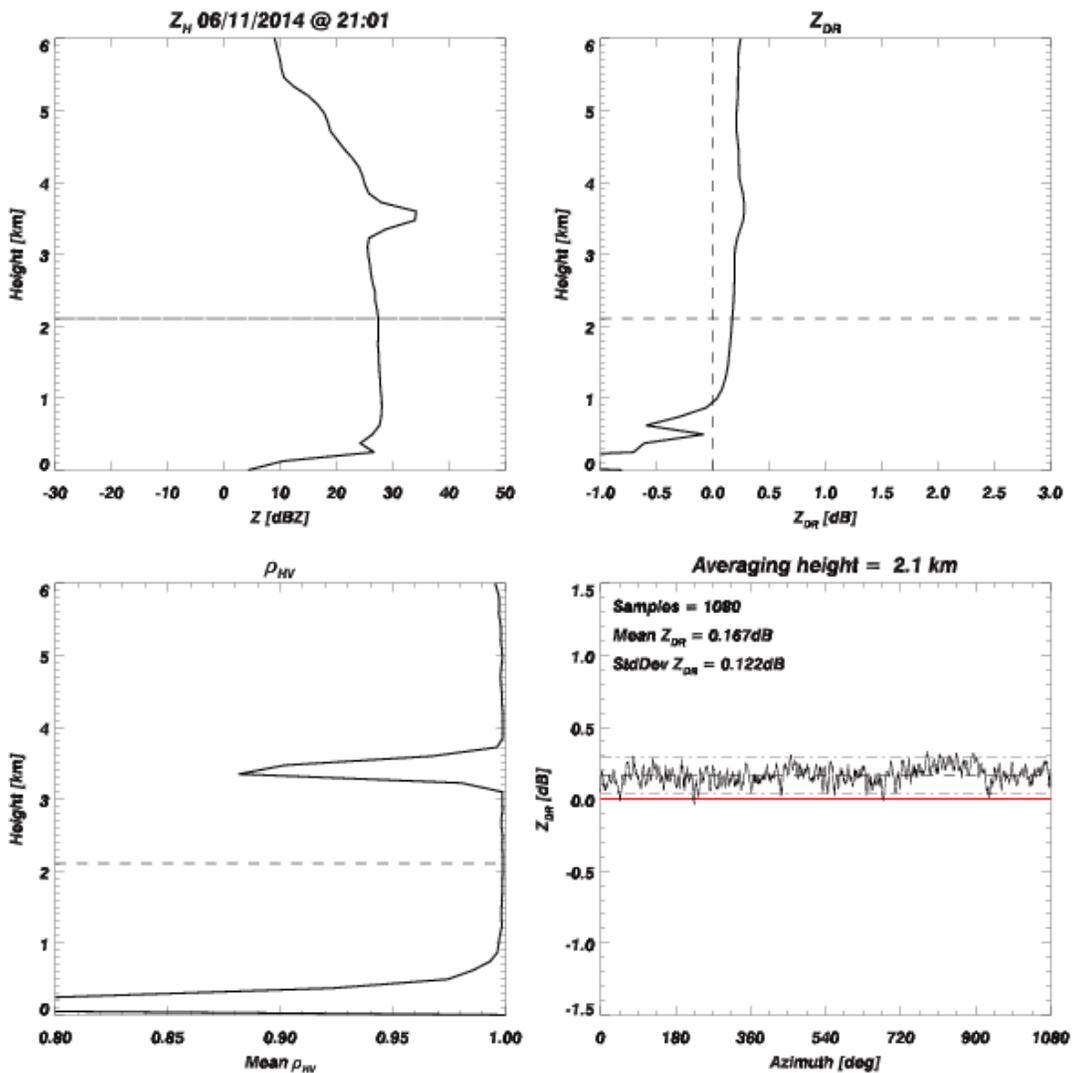
2027 UTC. Stopping RHIs. IPHEX_RAIN + IPHEX_90FAR for now.

2032 UTC. Shifting the sector to look over the stratiform + convective (90-220) deg.

2037 UTC. In support of the Citation RHI has been scheduled at 133 135 137 deg.

2100 UTC light-moderate rain on site. Running IPHEX_BB coordinated with D3R.

2101 UTC - [DBW] Nice birdbath, showing $Z_{DR} +0.17$ dB (hot).



2121 UTC Cutting the sector back to 90deg. (90-180 deg).

2126 UTC Replacing the 90FAR scan with a 45FAR scan between 95 and 140 deg.

2146 UTC RHIs at 298.5 and 300.

2152 UTC. We are dropping both RHIs and the sector. Taking a good look before setting something new up.

2155 UTC. The new sector will be 210 - 260. IPHEX_45FAR + IPHEX_RAIN.

2200 UTC Moving the IPHEX_45FAR sector by 5 deg. 215 - 256. Also adding RHIs at 298 299 over SN36 - some light rain there.

2210 UTC Change of strategy. With the ER-2 out of range we will focus on the Catawba basin. IPHEX_RAIN + IPHEX_90FAR (wide) 330-90 deg.

2211 UTC Also, with some light precip over SN36 we will do a single RHI at 299 deg - this is a scheduled scan currently, not a one time run.

Shift summary: In summary, this was a busy day with both aircrafts sampling within NPOL's domain. We had a chance to do some coordinated scans with D3R over the DSD line during GPM overpass at 1744UTC. Also, a few BB scan when rainfall was present on site. A number of RHIs along ER-2 track over a widespread stratiform system with convective edges. Should be a great dataset.

Joe Hardin on Shift 2300 UTC:

0019 UTC: Currently running scans from 215 to 325 degrees with rain scan.

0025 UTC: Narrowing scan back to 90 degrees and adding in an RHI over the DSD as a few cells pass over them.

0124 UTC: Pretty strong convective cell moving northwards at about 250 degrees, maybe 75 km.

0133 UTC: Rain mapping is running a little behind schedule so taking out the DSD RHI's until the main convective cell moves over the disdrometers.

0138 UTC: There is a nice line starting to organize itself to our southwest. KGSP shows embedded hail, through that part of the storm is still a fair distance away.

0203 UTC: Storm setting up about 50km away, Switching to 90 near as it appears we are not topping the storm anymore.

0245 UTC: Adding back in RHI over the DSD's. This will push us over 5 minute rain mapping a little bit unfortunately.

0312 UTC: Small amount of rain on site as the outside edge of the storm clips us.

0351 UTC: Storms have moved off disdrometers so removing RHI over DSD's

0415 UTC: Storm passed over and dissipated. Another wave is coming in from southwest.

0616 UTC: Adding RHI DSD as cell moves over the disdrometer radial.

0640 UTC: Rain on site from the world's smallest cloud.

0644 UTC: Doing a birdbath. The cell on top of us appears to be growing fairly quickly.

0715 UTC: Changing scan to 265 to 355 to keep storm in view.

0755 UTC: Taking off DSD RHI(Probably should have taken it off earlier). Precipitation starting to move out of range.

0809 UTC: Taking off 90 NEAR and going back to 4 minute rainscan while we wait to see if the line organizing in georgia is able to reach the radar or dissipate.

0958 UTC: We have stayed here so far to watch an incoming cell that was intensifying. As expected however, it is dissipating right as it reaches NPOL range.

0000-1200Z Shift Summary(Joseph Hardin):

Fairly active night(Especially compared to the rest of the experiment). We had several different lines push through, though very little rain on site. Nonetheless we were able to get a few birdbaths in and some coordinated scanning with D3R.

Piotr D. on shift.

1200 UTC No precipitation in range.

1230 UC. Expecting a group of about 55 school kids to arrive soon.

1448 UTC A sell building over the Pigeon basin. Adding IPHEX_45FAR centered over the basin 275-320.

1522 UTC More activity in NPOL NW sector, so we are replacing the 45 deg sector with IPHEX_90FAR (260-350).

1619 UTC. A small convective cell right over NPOL.

1634 UTC We are adding a single RHI scan at 298.5. Looks like rain is over the SN36 site.

1638 UTC We are opening up the sector to 260-10

1648 UTC IPHEX_DSD +IPHEX_90FAR (270-0) +IPHEX_RAIN

1725 UTC Removing IPHEX_DSD for now.

1933 UTC Now adding IPHEX_DSD focusing mainly on the Pigeon basin.

2025 UTC Moving the IPHEX_90FAR sector over to 250-340.

2053 UTC Adjusting the sector once again to 250 - 310.

2128 UTC The IPHEX_90FAR sector is now at 270-340

2134 UTC Cutting the sector a bit more - 280-340.

2141 UTC Now switching the IPHEX_90FAR for IPHEX_45FAR with 270-315 deg coverage.

Shift summary: Another eventful day at NPOL with precipitation present in the domain through the day. We mostly followed the aircraft operations by providing sector scans. In addition to sector and PPI scans we used every opportunity to collect RHI scans over the DSD line. Good day.

0000Z Joseph Hardin on Shift

0000 UTC: Large Storm system set up to our south, Switching to 90 near. Lightning on site as well as off and on heavy rain. Finally getting to hear some rumbles of thunder.



0033 UTC: Storm about halfway over us atm.

0045 UTC: Storm passing over to NE. Switching to 30 to 120 far.

0109 UTC: Switching to 330-90. Might push rain mapping up a little but I'd like to see more of the storm structure.

0140 UTC: Switching sector scan to 245 to 330 to get some coincident scanning with D3R. Still running rainmaps and DSD RHI's.

0144 UTC: Semi-stationary Cell seems to be entrained over us. It's making it a pain to scan.

0205 UTC: Switched to scanning NE quadrant to capture the intensifying cell.

0228 UTC: Cell still trained over us, though starting to diminish just a little.

0330 UTC: Storm still entrained directly over us, though it's finally in the last of it's death throes.

0349 UTC: Storm fully dissipated. Currently all is quiet on the western front.

0800 UTC: There is an MCS several hundred km to the west, but the northern part of it is already disappearing, and the southern part is breaking off and will miss the radar field of view entirely. We're gonna go ahead and call a soft down.

Shift Summary:

Very active evening followed by a period of quiet. We have a beautiful storm move through (Picture above) generated quite a bit of rain and lightning. It then proceeded to stall right over us giving us a chance to get quite a bit of scanning in before it finally dissipated around 0400 UTC. After that, the night was pretty quiet until the soft down.

1200 UTC: D. Wolff on shift

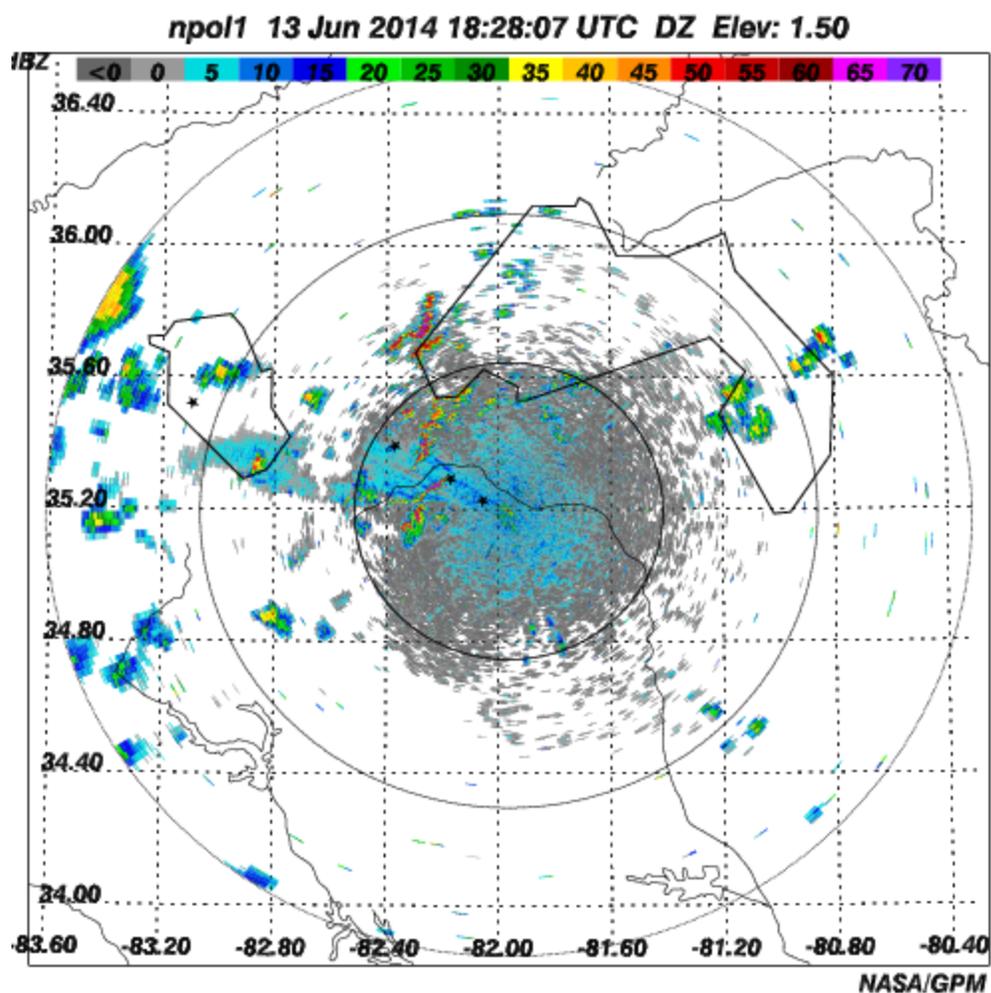
NPOL operating in 4-minute IPHEX_rain scan. There is some echo, albeit light, over the Catawba, so adding an IPHEX45_FAR (340° to 025°) to the mix. Need to make sure that night shift doesn't leave too early in this very humid air mass. Nathan and I will work to gather all of IPHEX/NPOL data together and create a master LDA over the next couple of days.

1410 UTC: Precip decaying, but shifted IPHEX45_FAR to 350-035 degrees.

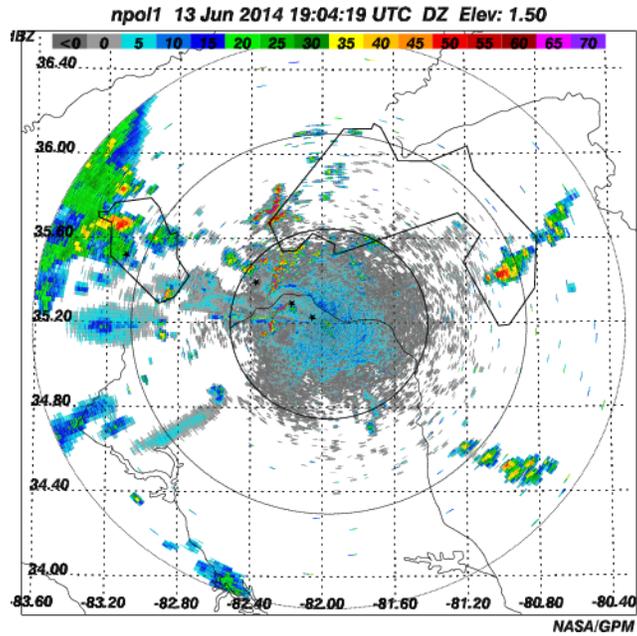
1448 UTC: Stopped IPHEX45_NEAR scans. Going to switch IPHEX_RAIN to 3-minute to catch convective initiation if/when it occurs. First scan should start at 1451 UTC.

1658 UTC: Some small showers to SW and NW, so adding IPHEX90_FAR (240-330) and returning to 4-minute rain scan.

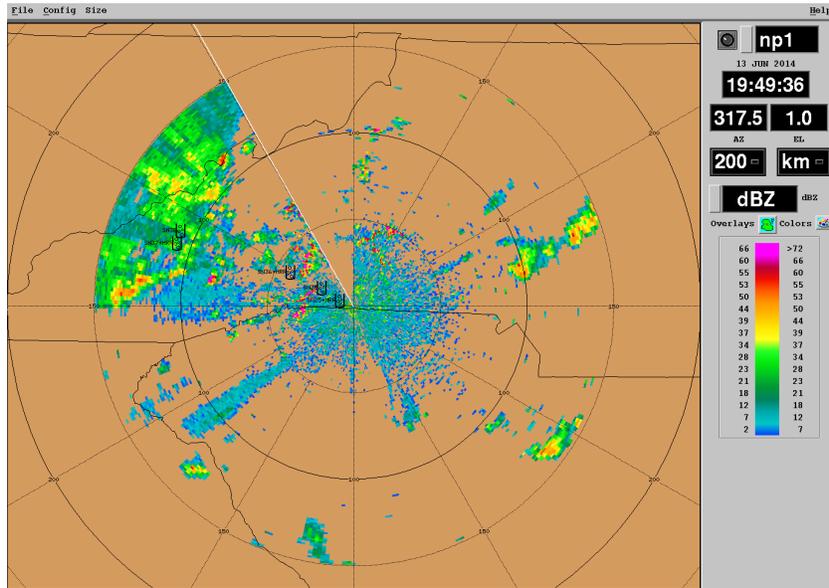
1828 UTC: Getting more active. A small cell in and and better cells entering Pigeon.

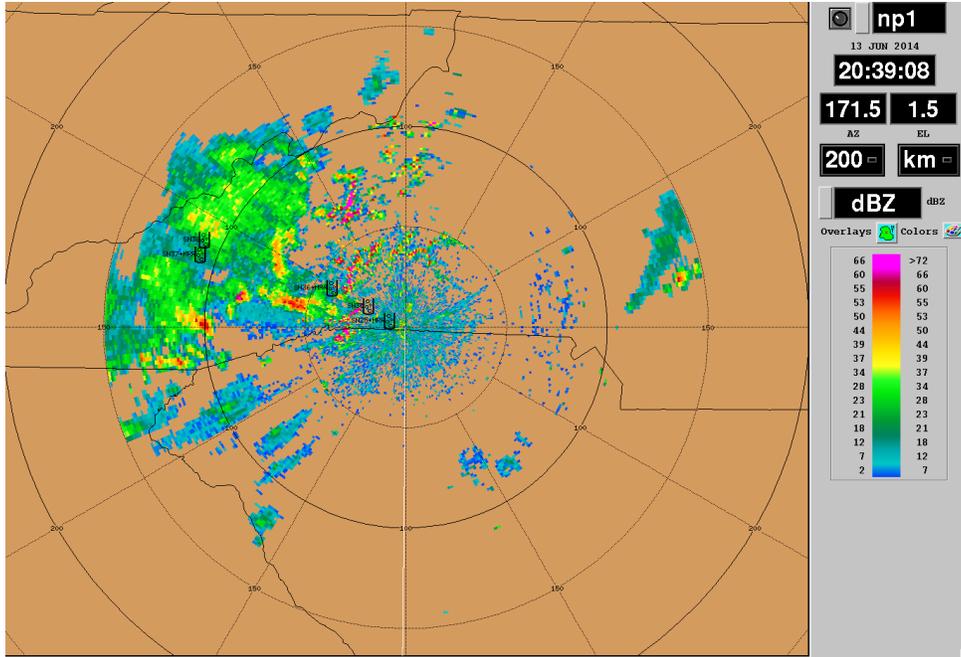


1904 UTC: Good cell heading into Pigeon, adjusting to 45° [280-325] and adding DSD/RHI.

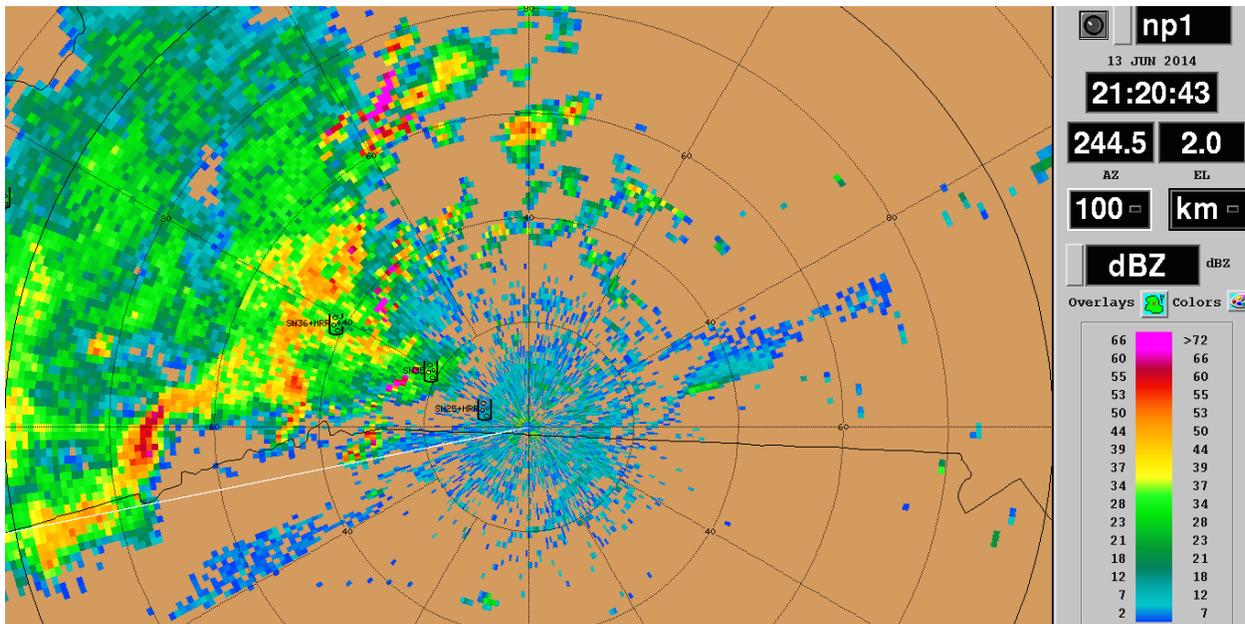


Web images not updating due to issues with IRIS product output.

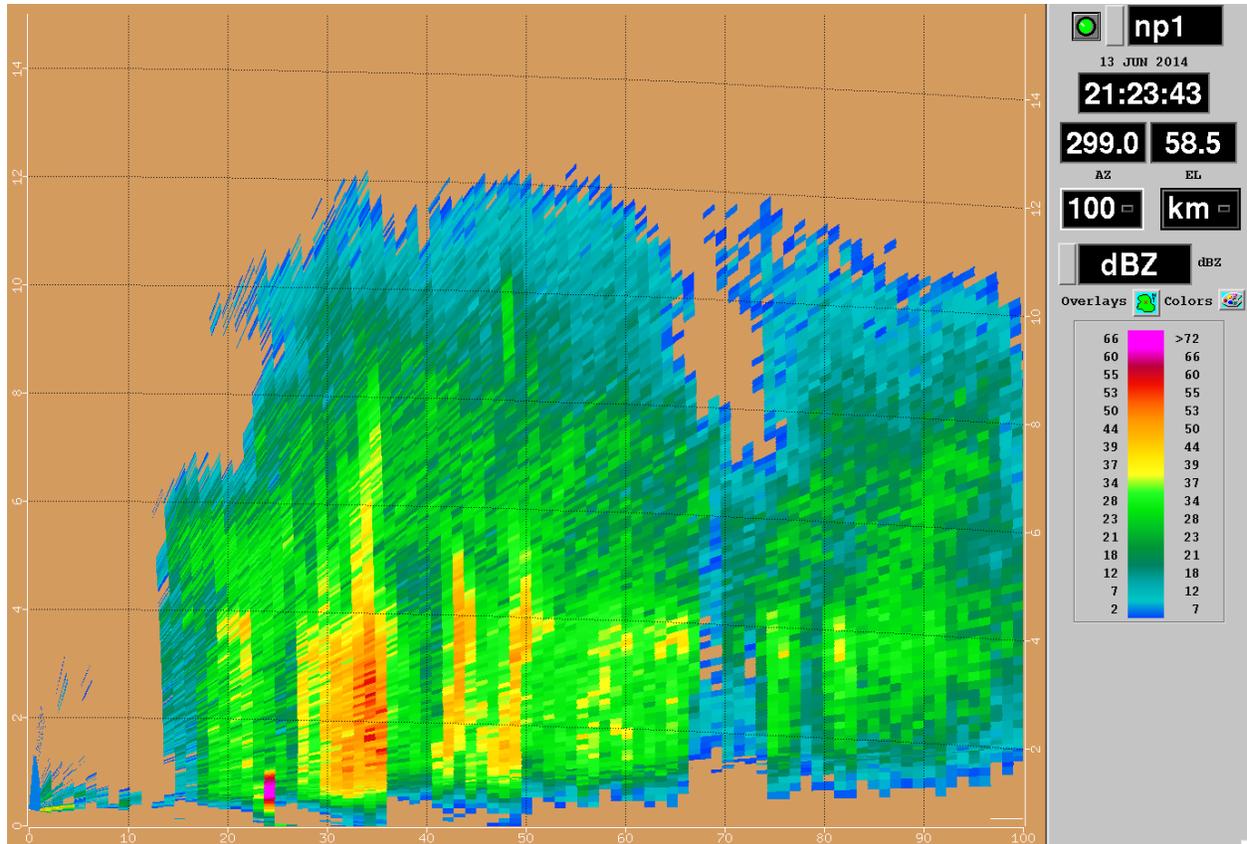




2039 UTC: Storm over Henderson county to WNW is now severe. Winds to 60 mph and quarter sized hail.

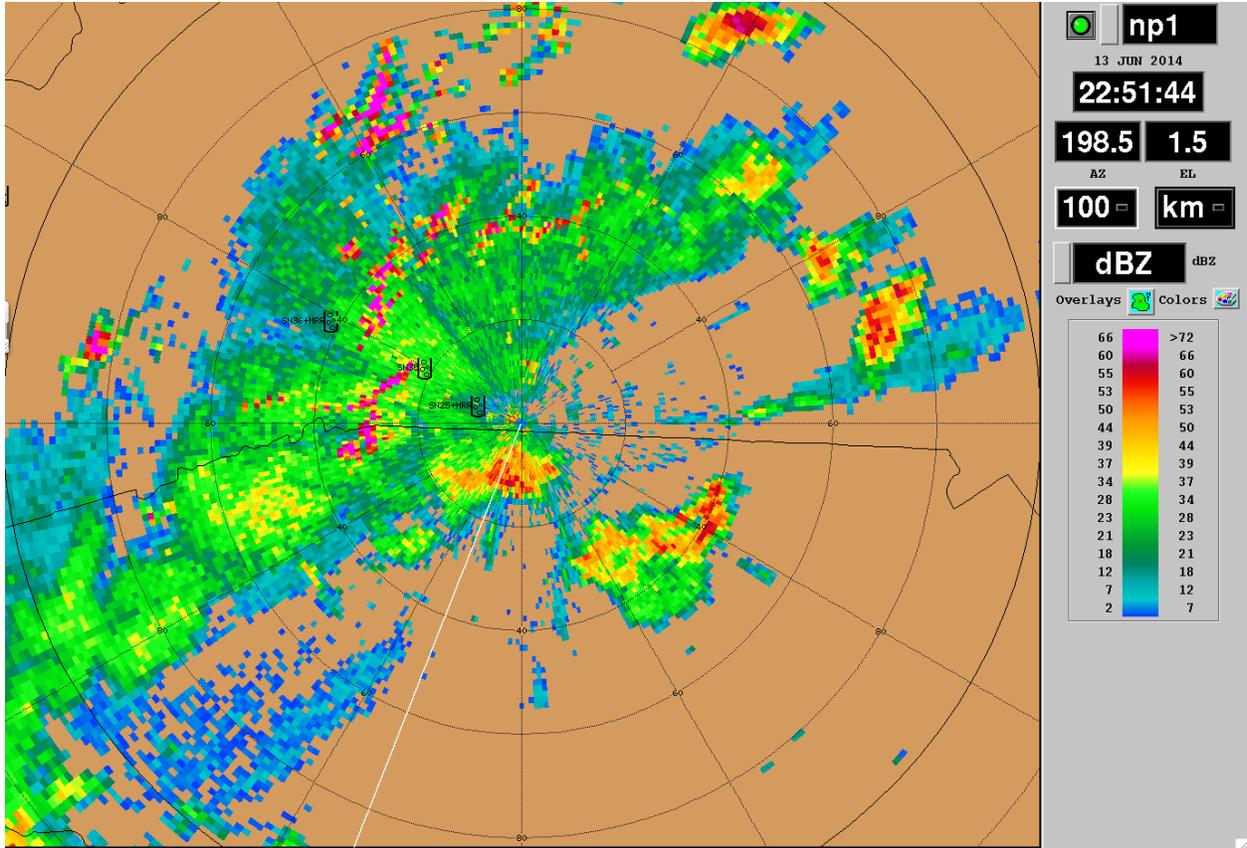


2123 UTC: Excellent DSD/RHI case...



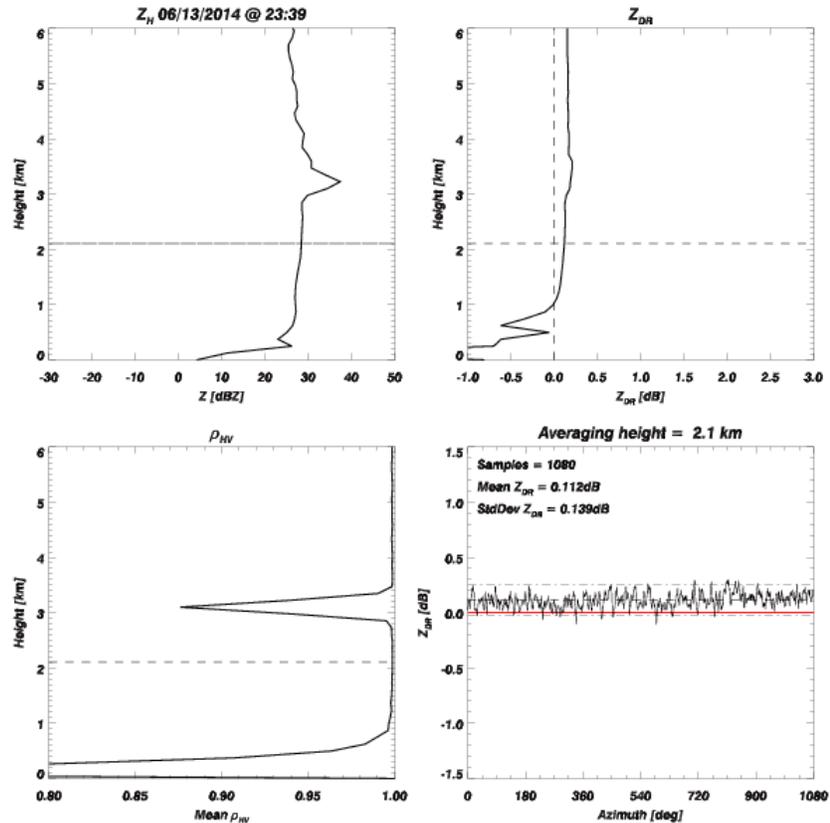
2152 UTC: There is some heavier convection on the southern edge of Catawba, but it's sliding southeast and we are getting an excellent Pigeon case, along with DSD/RHI so will stick with what we are doing.

2251 UTC: Switching to Catawba as Pigeon is clear. Maintaining RHI/DSD.



2338 UTC: Running Birdbath ASAP as light rain is above radar.

Good birdbath @ 2343 UTC. About +0.11 hot, so will leave alone.



0000 UTC Joseph Hardin on Shift

0000 UTC: Switching to 90 FAR to capture the convective cell to the NE.

0021 UTC: Still able to see the stratiform area trailing the convective edge. After this, it looks to be another quiet night.

0253 UTC: Taking off 90FAR as storm has completely dissipated.

0425 UTC: We had some fairly drunk individuals stop by that were quite possibly under the influence of something else. We gave them a very abbreviated tour and kept an eye on them. Nonetheless it was very unsettling. Morning staff should do a quick visual inventory of the site in the morning just to be sure everything is okay.

0800 UTC: Shift Summary

Monitored the tail end of the precipitation present in the previous shift. Other than that the only thing observed at NPOL was drunk people wanting a tour after midnight. They were however nice enough to explain how we could replace the radar with a dowsing rod. We recommend that D3R look into this new technology.

1200 UTC D. Wolff on shift

Did a surveillance of site and no problems seen. Visitors probably long asleep (or passed out) by now.

Nothing but clutter on the scope this morning. Told Nathan to delay arrival until 1400 UTC, but DBW is here. Will monitor today and check forecast to consider a soft down tonight. If no weather probable, might be good so that J. Hardin can get some rest and then come in tomorrow AM so that he, Rob, Nathan and I can try a sphere cal. No more BBs were done last night but the one referenced earlier looks pretty good, although still about 0.112 dB hot.

1403 UTC: Nada. Zilch. Zero.

1604 UTC: Non c'è nulla

1701 UTC: nic

1800 UTC: Es gibt, nitchts

1900 UTC: não há nada

2000 UTC: 何も無い

2009 UTC: Stopped scanning to try a sphere cal. Balloon went almost straight upwards, then into only.cloud.in.the.sky so doesn't look promising.

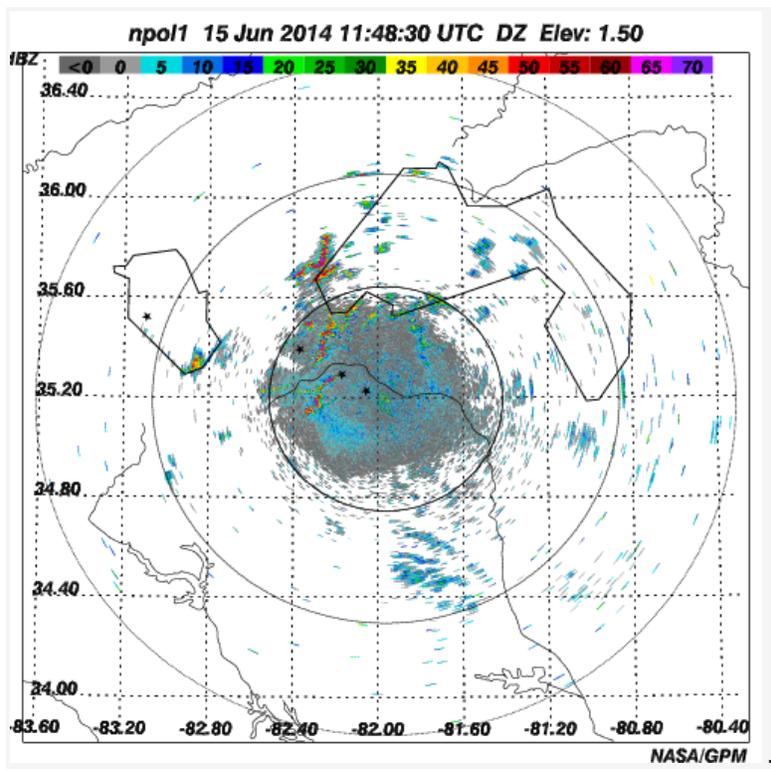
Does not appear that any appreciable precip is going to occur, so will go soft down from 06/14/2014 @ 2200 UTC to 06/15/2014 @ 1200 UTC or later if no precip still around. Plan tomorrow is to get everyone here 06/15 afternoon to do some prep-work prior to crane arrival on Monday (move fences, start picking up loose ends, etc.). D3R did detect balloon, again, but IRIS is too slow. Need a better solution.

2140 UTC: Back to 4 minute scans. Soft down until tomorrow morning.

From habbug.org (predictor)

2014 Jun 15 @ 1150 UTC: D. Wolff on shift

It looks like IPHEX_DSD was run instead of IPHEX_RAIN overnight, but from what I can tell, we did not miss any rain. IPHEX_RAIN @ 3 minute cycle invoked at 1148 UTC. Currently nothing but clutter present. There are some towering Cu in the area, but capped pretty quickly. Forecast looks like diurnal precip over mountains, but doubt enough to get over the mountains later today, but will keep an eye on things.



1616 UTC: Not.

1700 UTC: Stopped scanning temporarily to work near antenna. No precipitation echoes within 200 km.

1715 UTC: Radar back on-line. Still nothing to see.

1846 UTC: Setting NPOL to run IPHEX_RAIN on a 4-min cycle for remainder of day and end with birdbath at just before 0000 UTC (6/16). Once we wrap up a few things outside will call it a day and a campaign!