

Project Report
ATC-456

ECP 0857P Final Report for the NEXRAD
ROC: Modified VCP 35

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18 September 2024

Lincoln Laboratory
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
LEXINGTON, MASSACHUSETTS



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**Massachusetts Institute of Technology
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Modified VCP 35**

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Group 43*

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ABSTRACT

In late 2018, the NEXRAD Radar Operations Center (ROC) enacted Engineering Change Proposal 0857P (ECP0857P) to support development and temporary deployment of a modified Volume Coverage Pattern (VCP) 35. This was done per the request of the Federal Aviation Administration (FAA) to support NEXRAD Icing Hazard Levels (IHL) algorithm development and intended to be available during the FAA's in-flight icing field campaign, which was named In-Cloud ICing and Large-drop Experiment (ICICLE). The ICICLE field campaign was performed from late January through early March of 2019. The campaign base station was located in Rockford, IL. Prior to the field campaign, the Federal Aviation Administration, in concert with MIT Lincoln Laboratory (MIT LL) and the NEXRAD ROC, designed the VCP 35 modification to include an additional 19.5° elevation scan angle; identified ten NEXRAD sites for deployment of the modified VCP 35 (mVCP35) within the planned ICICLE domain; and, with ICICLE, supported the ECP0857P with the ten National Weather Service Weather Forecast Offices (WFO) before the NEXRAD ROC deployed mVCP35.

This document serves as the response to a request by the NEXRAD ROC through the FAA for a summary regarding mVCP35 to close out ECP0857P in their records. It details the motivation for the modification to VCP 35, its deployment, and use coordinated with nearby in situ ICICLE flight missions or independent of those. ICICLE mission goals and the WFO responsibilities were the factors that determined which VCP to use (mVCP35 or otherwise). As per ECP0857P, soon after ICICLE, the mVCP35 was replaced by the standard VCP 35 at the ten NEXRAD sites. This report provides examples and discussion about mVCP35 relating to beneficial winter weather detection, radar sensitivity trade offs, and comparison of currently-available IHL and QVPs (quasi-vertical profile test products). From the effort associated with this ECP0857P, we recommend that this specific mVCP35 not be used in the future. Further, we recommend that the FAA and NEXRAD community consider a new, modified VCP 35 with an additional upper elevation scan angle of about 10° with improved sensitivity at the low elevation scan angles similar to VCP 31. Additionally, we have fulfilled the request for a complete reporting of all times mVCP35 was used in operational scanning by the ten sites (listed in Appendix A).

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ACKNOWLEDGEMENTS

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1. INTRODUCTION

A key feature with the operational use of a Weather Surveillance Radar 1988-Doppler (WSR-88D) or Next Generation Weather Radar (NEXRAD) dual polarization (dual pol) radar is the selection of a Volume Coverage Pattern (VCP) appropriate for the weather conditions within the radar domain. The suite of available NEXRAD VCPs for operators to select from has changed with time since NEXRAD's debut to reflect advances in radar processing, to support NEXRAD weather algorithms, and to address the needs of users. The NEXRAD VCPs have evolved away from the original definitions that featured rigid sets of sequences of elevation scan angles [1] that were not necessarily well-matched to each other or advantageous for algorithms. Modern VCPs now feature a more consistent set of elevation scan angles across suite and mode. They also can accommodate additional scanning within a VCP such as with Supplemental Low Elevation Angle (SLEA), Supplemental Adaptive Intra-Volume Low Level Scan (SAILS), and Mid-Volume Rescan of Low-Level Elevations (MRLE). VCPs can also truncate without scanning some of the upper elevation angles via Automated Volume Scan Evaluation and Termination (AVSET) when automated scan algorithms indicate lack of weather returns expected for the truncated elevation angle scans. Figure 1 is a handy VCP info sheet that describes in more detail some of the flexibility and use-case reasonings for the modern VCPs. It was developed by the La Crosse, Wisconsin's National Weather Service Weather Forecast Office (WFO) with modifications by the NEXRAD Radar Operations Center (ROC) (https://www.roc.noaa.gov/WSR88D/Operations/VCP_Info_Sheet.pdf).

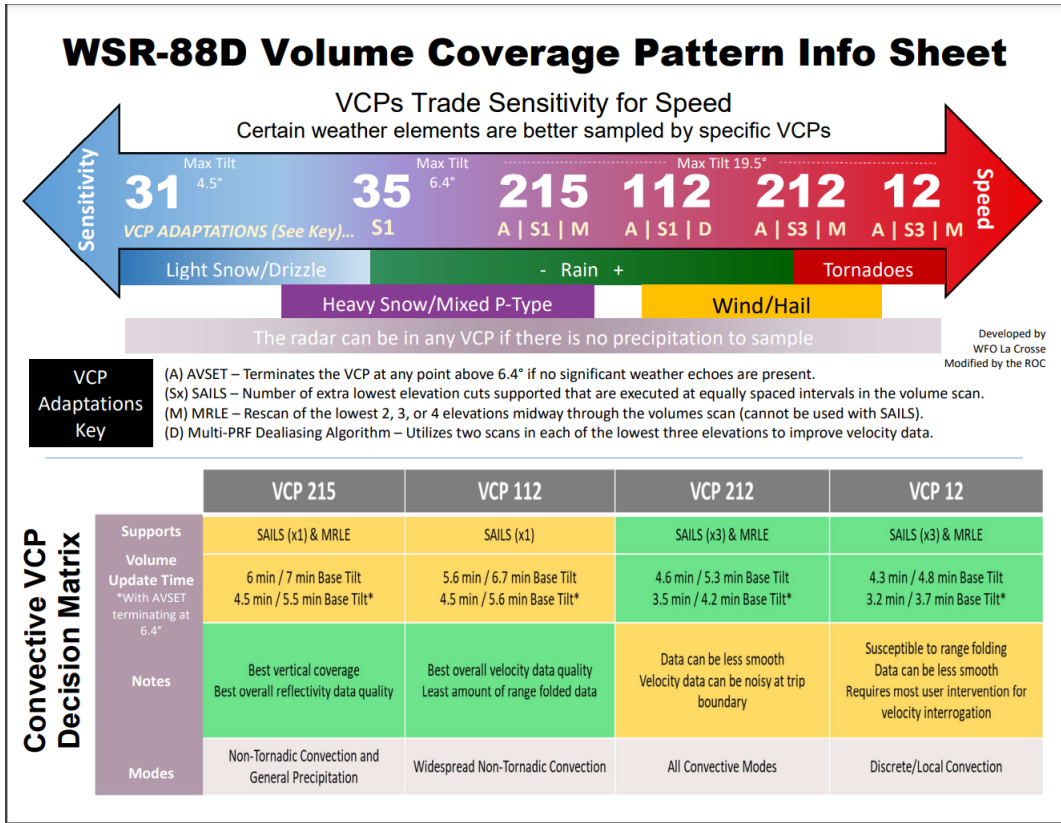


Figure 1. A Guide to current NEXRAD VCP Capabilities and Use Cases.

The VCPs have changed but the two broad classes of NEXRAD VCPs have been maintained: 1) clear air and 2) precipitation mode. The two classes of NEXRAD VCPs combine to provide scan strategy selection choices for effective radar monitoring of the large range of weather conditions that occurs in the United States, its territories, and some overseas sites. To do so, the VCPs span a range in both sensitivity and speed. One use case of the clear air mode VCPs (currently, 31 and 35) is radar monitoring of winter weather where improved sensitivity is favored over scanning speed. For precipitation mode, VCPs intended for heavier, convective weather, scanning speed is favored over sensitivity. VCP 35 is a modern clear air mode VCP that is the default with the operational release of Build 22 by the NEXRAD ROC in late 2023 into 2024. Guidance for its use includes for times of heavier snow and mixed winter precipitation, whereas VCP 31 (the best sensitivity) is preferred for lighter snow or freezing drizzle.

The Federal Aviation Administration (FAA) places importance on the detection and prediction of the icing hazard to notify the aviation populace in the National Air Space (NAS). The FAA NEXRAD Icing Hazard Levels (IHL) algorithm utilizes dual polarization NEXRAD data to make icing hazard detections

tioned to radar features of riming and the mixed phase condition in the dendritic growth zone (DGZ). In situ microphysical data provides important validation and verification (V & V) of the icing hazard for algorithm development. The FAA's NEXRAD Program Office sponsored two in situ icing hazard field campaigns to support the development of IHL at MIT Lincoln Laboratory (MIT LL). The first Buffalo Area Icing and Radar Study, known as BAIRS [2], was conducted in 2013, and a follow-on study, known as BAIRS II [3], was conducted in 2017. Those two studies featured first-ever, real-time directing of the mission aircraft on flight tracks through NEXRAD radar features associated with icing hazard detection to gather V & V microphysical data. Local weather forecast offices at Buffalo, NY and Binghamton, NY supported both BAIRS in situ icing hazard field campaigns and, when operationally possible, changed to requested VCPs. However, for both BAIRS campaigns, the VCP 35 was not an option.

The NEXRAD ROC issued and supported implementation of ECP0857P in late 2018 in response to the FAA request to leverage an opportunity to impact some of their icing hazard initiatives. The FAA-sponsored In-Cloud ICing and Large drop Experiment, or ICICLE [4], was planned for early 2019 over a large domain of the central United States covered by many NEXRADs. The operational VCP 35 was deployed throughout the NEXRAD network starting in May 2018. The FAA NEXRAD IHL development efforts were focused on the potential mixed-phase icing hazard in the DGZ. These factors were the motivation for ECP0857P to provide for a modified VCP35 to ten NEXRAD sites for use during ICICLE with its collection of icing hazard V & V microphysical data.

ICICLE was a more ambitious FAA-sponsored in situ icing hazard field campaign than the two BAIRS in-flight icing campaigns. In particular, ten prioritized environmental conditions were the planned focus of ICICLE missions (column headings in Table 1 below; originally included as Table 5 of the ICICLE science and operations plan report [4]). The top two imperatives (conditions number one and number two) focused on some condition of freezing drizzle or supercooled large drops (SLD) surface to aloft with low ceilings to 600 feet. These were not conditions generally targeted during either BAIRS in situ icing hazard field campaign. They also present a challenge for the NEXRAD suite of VCPs.

Table 1

ICICLE Targeted Mission Cases (from ICICLE report)

Event type (across) Parameter (down)	FZDZ aloft down to sfc	FZDZ aloft only	FZDZ Seeder- Feeder	FZRA	Classical PL	Shallow StCu	High LWC / MVD 30-40	Typical App C	Deep Glaciated	Clear Air
Condition #	1	2	3	4	5	6	7	8	9	10
Priority level	High	High	High	High	Medium	High	Med / High	Low	Low	Low
% flight hr	15	10-15	10	15	5	10-15	5-10	5-10	5	5
Frequency (1-10)	5	5	4	3	2	6	3/1	9	9	10
Sampling Diff. (1-10)	5	5	6	8 (Z vs MEA)	9 (narrow)	3 (Z vs MEA)	8*	2	1	1
T range (°C)	-1 to -20	-1 to -20	-1 to -20	-1 to -13	-1 to -13	-2 to -20	-2 to -20	-2 to -20	0 to -30	0 to -30
Dominated by	Liquid	Liquid	Liquid/SN mix	Varies	Mixed PCP	Liquid	Liquid	Liquid/Mix	Snow	None
LWC (gm ⁻³)	0.1-0.4	0.1-0.4	0.1-0.4	0.1-0.3	0.1-0.2 (FZRA)	0.2-0.8	>1.0 / 0.1-0.4	0.1-0.4	0-0.2	0
MVD (mic)	20-250	20-250	20-250	20-2500	20-2500	10-25	12-20 / 30-40	15-25	10-20	N/A
Dmax (mic) Liquid	200-500	200-500	200-500	>500	>500	15-30	15-25 / 35-60	20-30	20-30	N/A
Depth (kft)	1-5	1-5	1-5	0.2-1.0	0.3-1.5 (FZRA)	1-3	2-6 / 1-5	1-5	3-40	N/A
Length (nm)	10-200	10-200	10-200	10-100	5-250	20-200	5-25 / 10-100	20-500	20-100+	5-100+
Width (nm)	10-200	10-200	10-200	50-250	50-250	20-200	5-50 / 10-100	20-500	20-100+	5-100+
Duration (h)	1-10+	1-10+	1-10+	1-24+	1-24+	2-24+	0.5-3 / 2-24+	4-24+	2-24+	2-24+
Surface Wx Type	FZDZ	DZ/-SN/None	FZDZ/-SN	FZRA, PL, RA	FZRA, PL, RA	None/-SN	SHRA / Varies	None	SN, RA	None
Possible precip mix	-SN/-SG	Varies	Varies	SN + all above	SN + all above	-SG/-RA	Varies	-SN/-SG	SG	N/A
Cloud Cover	OVC	OVC	OVC	BKN-OVC	BKN-OVC	BKN-OVC	SCT-BKN/BKN-	BKN-OVC	BKN-OVC	Varies
Ceiling Height (ft)	200-600	200-600	200-600	200-1000	200-1000	300-800	500-1000	200-1000	200-2000	Varies
Visibility (mi)	0.25-5	0.25-5	0.25-5	0.5-3	0.5-3	3-10	1-10	2-10	0.25-10	Varies
CTT (°C)	-4 to -12	-4 to -12	-4 to -20	-15 to -60	-15 to -60	-5 to -20	-4 to -13	-5 to -20	-15 to -60	Varies
CTZ (kft)	3-6	3-10	3-6/4+	10-30	10-30	2-4	5-15	3-8	10-30	Varies
Clear above sample	Often	Often	Sometimes	Rarely	Rarely	Often	Often	Often	Rarely	Yes
Layers	Occasional	Sometimes	Often	Occasional	Occasional	Sometimes	Sometimes	Sometimes	Sometimes	Sometimes
Warm nose depth	N/A	N/A	N/A	500-3000	200-2000	N/A	N/A	N/A	N/A	N/A
Stability	Semi-stable	Semi-stable	Semi-stable	Stable to FZLVL	Stable to FZLVL	Well mixed	Unstable/Semi-	Varies	Varies	Varies
Start time Z	03-12	03-12	03-12	03-12	Any	Any	16-20 / Any	Any	Any	Any
End time Z	12-16	12-16	12-16	12-16	Any	Any	20-02 / Any	Any	Any	Any
Missed App.	Y	Y	Y	Y	Y	Y	Unlikely / Y	Y	Maybe	Unlikely
Fit. leg length (nm)	30-60	30-60	30-60	50-100	50-100	30-100	10-25 / 20-100	30-60	20-100	10-100+
Bow tie length (nm)	20-40	20-40	20-40	50-100	50-100	50-100	Unlikely / 20-60	20-40	20-100	Unlikely
Sample Every x ft	500-1000	500-1000	500-1000	1000	1000	500	500-1000	500-1000	1000-2000	1000-2000+
Sample Dendritic Zone	N	N	Possibly	YES	YES	Occasional	N	Occasional	YES	N/A
Sample Melt Layer	N	Possibly	N	YES	YES	Possibly	Possibly	Possibly	Possibly	N/A
Sub-cld VFR sample	Difficult	Y w/No PCP	Possibly	N	N	YES	YES	YES	Unlikely	Unlikely
Best Month (Jan-Mar)	Jan-Feb	Feb-Mar	Jan-Feb	Jan-Feb	Mar	Any	Feb-Mar	Any	Any	Any
Typical Synoptics	7-8, 47-48, 52	7-8, 47-48, 52	7-8, 47-48, 52	6-8, 46-48	7-8, 47-48	11,15,12,19	1,4,17/seeFZDZ	Several	Several	Any

In addition to the two primary BAIRS reports, before ICICLE, a third report [5] detailed seven categories with specific recommendations for any future in situ icing hazard field campaigns to consider based on the experience gained from the BAIRS. One of those was to concurrently operate a modified VCP35 in the ICICLE domain gathering V & V microphysical data. The modification was to add an extra high-elevation scan angle to the operational VCP 35 to support further development of IHL mixed-phase detection.

The remainder of this report details the modification to VCP 35, its limited use specific to ICICLE, and concludes with a discussion and recommendation.

2. MODIFIED VCP 35

VCP 35 is now the default clear air scan strategy with Build 22 (circa 2024) following its debut in the spring of 2018 in Build 18. Figure 2 shows the VCP 35 available elevation scan angle set with a defined maximum elevation scan angle of 6.4° . An additional low elevation scan angle of 0.5° can also be enabled in the SAILS mode. That SAILS 0.5° elevation scan angle will be replaced by a lower than 0.5° elevation scan angle for any site that enables a SLEA. The Build 22 FAA NEXRAD IHL algorithm analyzes data for elevation scan angles greater than or equal to 6° to identify the positive differential reflectivity bright band (+zdrbb) radar feature associated with the DGZ and potential icing hazard. In the case of the operational VCP 35, that leaves one elevation scan angle available to IHL for analysis of the DGZ. It is preferable to have more than one elevation scan angle for that part of the algorithm. It was partly anticipation for a preference for using multiple elevation scan angles in the DGZ analysis that led to the proposed modification to the operational VCP 35.

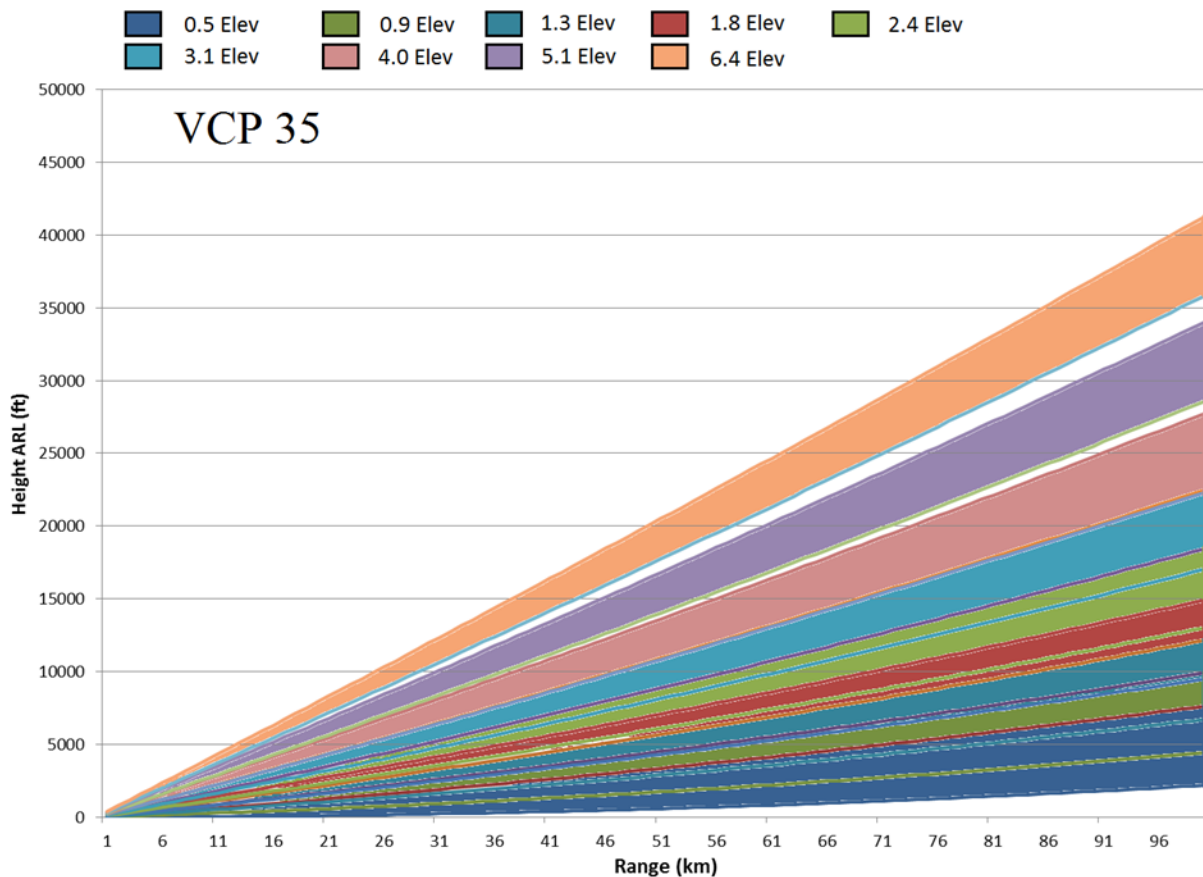


Figure 2. The operational elevation scan angles for VCP 35.

At the NEXRAD ROC, ECP0857P supported the modification to VCP 35, its deployment to ten NEXRAD sites in the ICICLE domain, and its removal from the network upon completion of need. The FAA tasked MIT LL with identification of the modification and ten sites for deployment. Figure 3 shows the elevation angle scan set available with the modified VCP 35 (mVCP35). The modification simply is the addition of the 19.5° elevation scan angle to the set. Table 2 is the definition of the modified VCP 35 provided from the NEXRAD ROC. The additional elevation scan angle adds about 30 seconds to the total scan time of mVCP35. SAILS and SAILS with SLEA remained functional.

Table 2

The scan characteristic of the modified VCP 35 (mVCP35). Wave Form abbreviations are CS – continuous surveillance; CD- continuous Doppler; B- Batch mode; and SZ – Sachdananda-Zrnic mode.

Elev	Wave Form	Surv PRF	Dop PRF	Surv Pulses per Second	Surv Pulses per Radial	Dop Pulses per Second	Dop Pulses per Radial	RPM	Scan Time (Seconds)	Est. SD	Rmax (km)	Rmax (nm)	Vmax (m/s)	Vmax (kts)	Beam Hgt at Rmax (ft)	Cumulative Scan Time (s)
0.5	CS	1		321	64			0.83	72	0.33	467.29	252.16	8.03	15.60	59844	72
0.5	SZ		5			1013	64	2.60	23	0.57	148.08	79.90	25.33	49.23	8905	97
0.9	CS	1		321	64			0.83	72	0.33	467.29	252.16	8.03	15.60	70546	170
0.9	SZ		5			1013	64	2.60	23	0.57	148.08	79.90	25.33	49.23	12296	194
1.3	CS	1		321	64			0.83	72	0.46	467.29	252.16	8.03	15.60	81247	267
1.3	SZ		5			1013	64	2.60	23	0.65	148.08	79.90	25.33	49.23	15687	291
1.8	B	1	5	321	6	1013	48	2.52	24	0.77	467.29	252.16	25.33	49.23	94621	316
2.4	B	2	5	446	6	1013	48	2.74	22	0.77	336.32	181.48	25.33	49.23	70276	339
3.1	B	2	5	446	6	1013	48	2.74	22	0.77	336.32	181.48	25.33	49.23	83741	363
4	B	3	5	644	6	1013	46	3.05	20	0.76	232.92	125.69	25.33	49.23	64850	384
5.1	B	3	5	644	6	1013	46	3.05	20	0.76	232.92	125.69	25.33	49.23	79474	404
6.4	B	3	5	644	6	1013	46	3.05	20	0.79	232.92	125.69	25.33	49.23	96725	425
19.5	CD		8			1282	106	2.00	30		117.00	63.13	32.05	62.30	131000	455

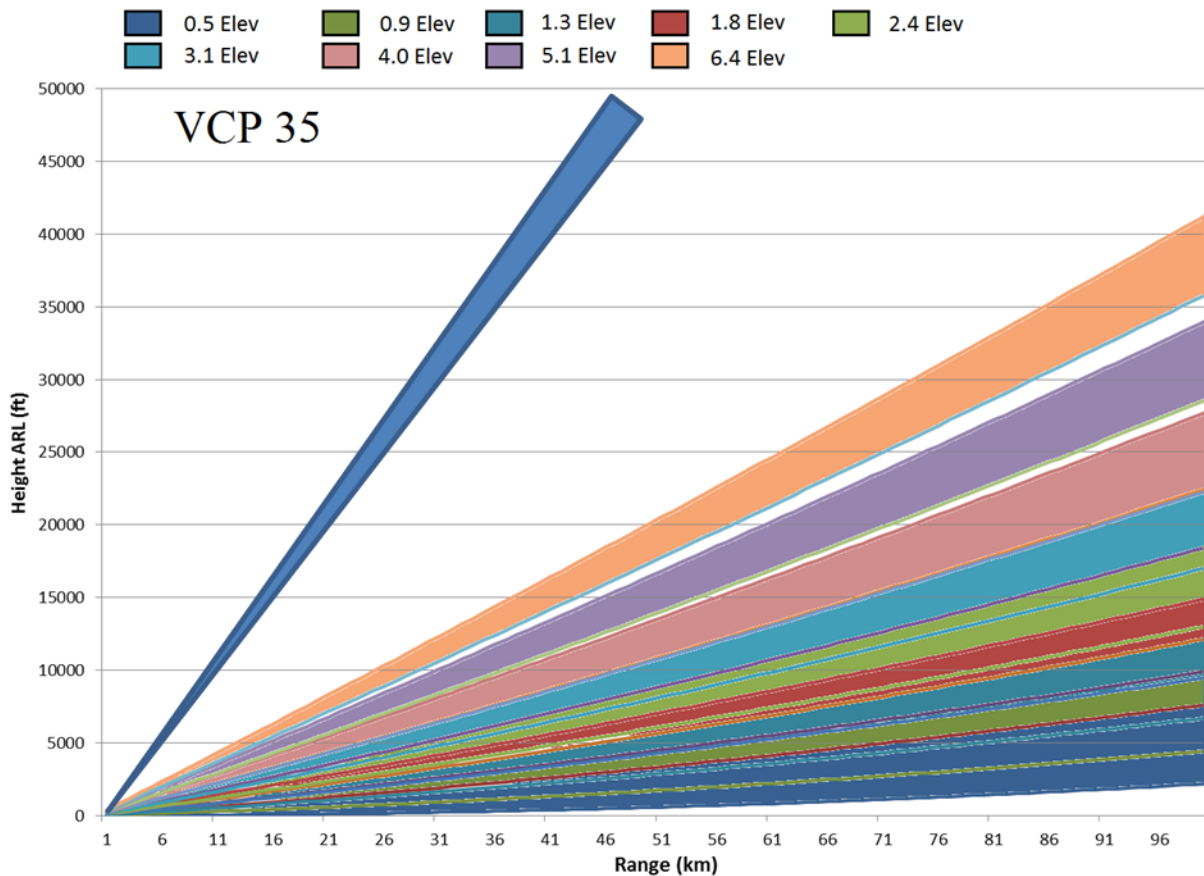


Figure 3. The demonstration elevation scan angles for mVCP35. The 19.5° elevation scan has been added. The other elevation scan angles are the same as for the operational VCP 35.

This extra elevation scan angle obviously added a second angle for the +zdrbb analysis of the DGZ portion of the IHL algorithm. Also, compared to the 6.4° maximum elevation scan angle of VCP 35, the 19.5° elevation scan angle of mVCP35 allows for a scan through the DGZ with a more favorable lesser pulse resolution volume that could contribute to a better analysis. From calculations with the on-line Warning Decision Training Branch Beam Property Calculator (<https://training.weather.gov/wdtd/tools/beamwidth/index.html>), pulse resolution volume sizing can be estimated. Table 3 shows some results comparing the 6.4° and 19.5° elevation scan angle beam properties for a DGZ altitude of about 18 kft. This shows that the beam width for the lower elevation scan angle (the only one currently available to IHL with VCP 35) is about three times larger than if one were available from 19.5° for a DGZ altitude around 18 kft.

Table 3

Calculations of beam position (range and height) related to a typical dendritic growth zone (DGZ) for select elevation scan angles.

Elevation Scan Angle (degrees)	Range from Radar (NM/km)	Beam Center Height (ft)	Beam Top Height (ft)	Beam Bottom Height (ft)	Beam Width (ft)
6.4	26 / 48.2	18040	19310	16770	2560
19.5	9 / 16.7	18250	18670	17830	890

MIT LL identified the ten sites preferred for deployment of mVCP35. The ten NEXRAD sites were in the midwestern United States domain of the planned FAA ICICLE in situ icing field campaign. Thus, the idea where possible was to leverage ICICLE in situ icing mission microphysical insights with radar features of interest relating to potential icing hazard in the DGZ as further aided by mVCP35. The problem at the time, some readers might recall, is that a government shutdown occurred with resultant issues. For a time, it seemed that mVCP35 and ICICLE itself might not happen as planned. It was deemed not to fall within the category of expected work [6]. Through perseverance and the just-in-time end to the government shutdown issues, the NEXRAD ROC was able to work with the ten, local WFOs to upload mVCP35 very soon after the first of the ICICLE missions had started. The sites had to be sure to disable AVSET for mVCP35 to properly complete a radar volume. Figure 4 shows the NEXRAD locations that uploaded and used mVCP35. The radar locations are indicated by an “x” with the NEXRADs capable of operating with the mVCP35 color-coded in magenta. All times any of these sites operated with mVCP35 are cataloged in Appendix A, independent of whether it was specific to an ICICLE mission or ICICLE request. Table 4 lists the ten NEXRAD sites.

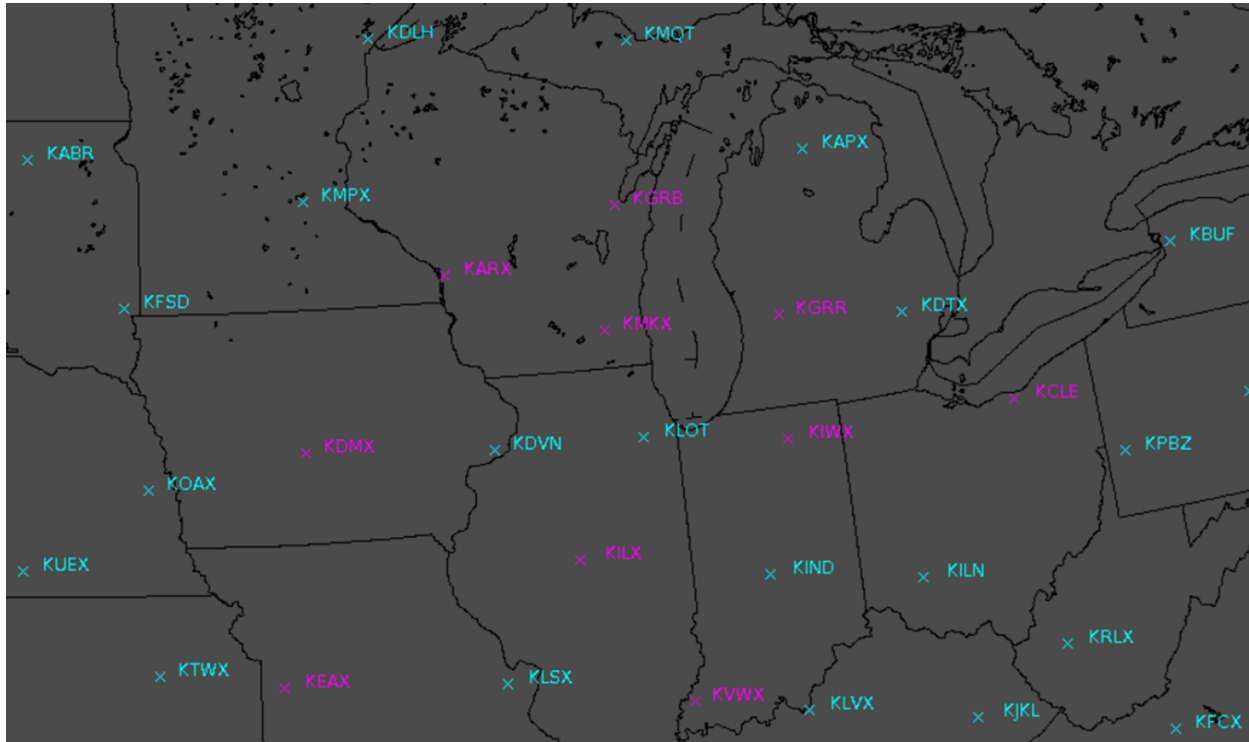


Figure 4. The general operational domain for the ICICLE in-flight icing missions is depicted with NEXRAD radar locations. Magenta labeled radar sites indicate mVCP35 was made available during ICICLE.

Table 4

A List of NEXRAD Sites Configured to Use mVCP35 during ICICLE

NEXRAD Site Mnemonic	Location
KARX	La Cross, WI
KCLE	Cleveland, OH
KDMX	Des Moines, IA
KEAX	Kansas City / Pleasant Hill, MO
KGRB	Green Bay, WI
KGRR	Grand Rapids, MI
KILX	Lincoln, IL
KIWX	North Webster / Fort Wayne, IN
KMKX	Milwaukee, WI
KVWX	Evansville, IN

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3. DISCUSSION

3.1 AN ICICLE MISSION NEAR GREEN BAY

One use of mVCP35 specific to coordination with an ICICLE mission occurred on 7 February 2019. The National Weather Service (NWS) Green Bay WFO complied with a request to switch scanning over to mVCP35. Figure 5 shows that ICICLE mission's flight track (with some time stamps) near and within the Green Bay NEXRAD (KGRB) domain. As viewed by the Gibson Ridge Analyst 2 (GR2A) software display, the left panel shows the KGRB reflectivity for the 0.5° elevation scan angle at 1925 UTC with the multi-hour flight path and time stamps. The right panel of the figure shows that at this time the mission was executing spiral maneuvers (purple trace) near Green Bay. The mission at this time was in an area well north of a surface warm front located further to the south and is considered a favorable area for a potential icing hazard from a synoptic perspective [7] [8].

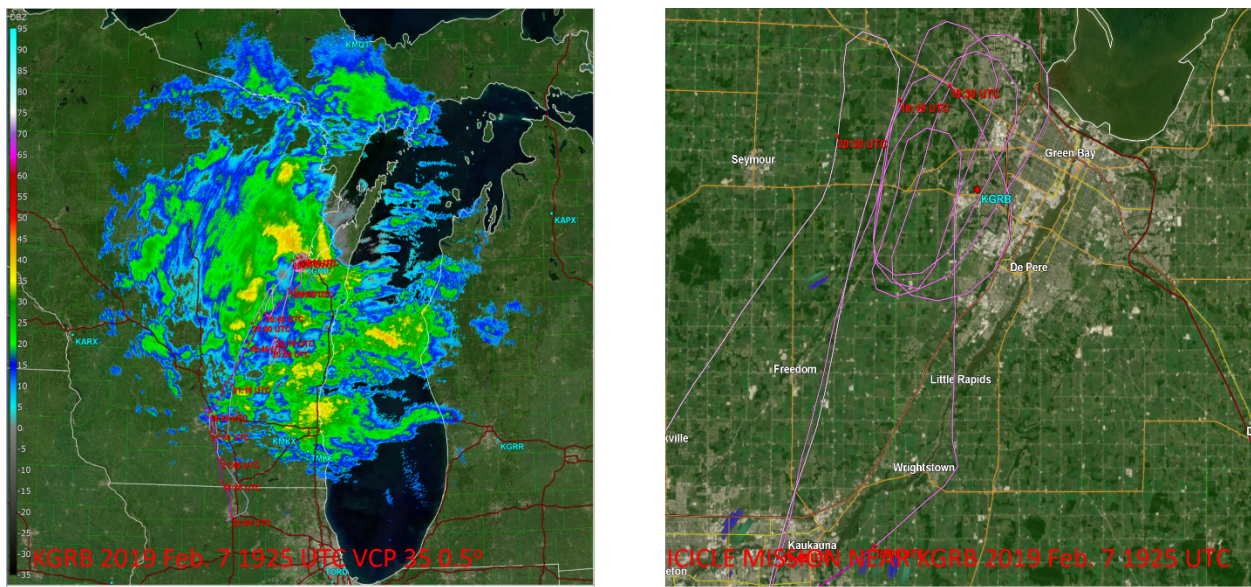


Figure 5. The ICICLE mission of February 7, 2019 near the KGRB Green Bay, WI NEXRAD. The left panel shows the ICICLE flight path over several hours superimposed on the 0.5° elevation scan angle reflectivity data from 1925 UTC. The right panel depicts the flight track without the reflectivity data overlay.

Figure 6 depicts the flight path with the KGRB reflectivity from the 19.5° elevation scan angle at the completion of the mVCP35 volume scan at 1932 UTC. A review of the flight track log indicated the spiral path occurred somewhat below the cloud top height in below freezing conditions (-18° C representative) with on-board scientists' reports of encountering mixed phase and freezing drizzle conditions.

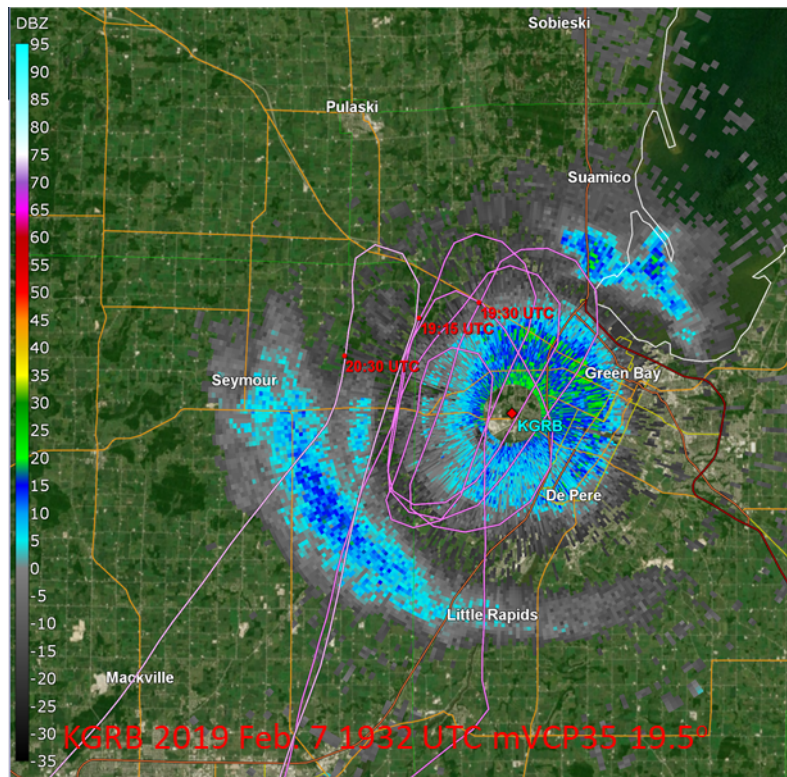


Figure 6. A closer examination of the ICICLE flight track near the KGRB Green Bay, WI NEXRAD.

Roughly in the time for this radar volume to complete (by 1932 UTC after the 19.5° scan), the ICICLE mission had executed a spiral pattern in an altitude range of about 14 to 16 kft. The spiral path of the mission plane is at a range from KGRB of about 4 to 6 nautical miles about the radar location that places it above altitudes with collected radar data with respect to the 6.4° elevation scan angle. However, for the 19.5° elevation scan angle, the radar data just beyond the spiral pattern range from KGRB (see Figure 6) is representative of the altitude of the mission plane at that time with conditions encountered that featured mixed phase reports documented by the scientists on-board. It is suggested that similar radar returns would have been observed if the radar could scan into the altitude area probed by the mission plane. Radar data

collocated with the spiral pattern in Figure 6 are from lower altitudes beneath the mission plane sampling the winter weather.

The reflectivity data for the 19.5° elevation scan angle in Figure 6 is just beyond the area of the spiral flight path with an altitude of about 16 kft found near a range of 7.4 NM. That corresponds to a 730 ft beam width. For the 6.4° elevation scan angle a range of about 22.95 NM corresponds to the 16 kft altitude with a beam width of 2265 ft. As shown with Table 3, the 19.5° elevation scan angle provides for finer pulse resolution volumes through the altitude of interest compared against the 6.4° elevation scan angle. Without this highest elevation scan angle added in for mVCP35, the icing hazard with this storm (and others like it) would not have been revealed by radar for algorithms to interpret or produce potential icing hazard detections. Of course, the presence of the instrumented mission plane in this location at this time provides verification and validation information for icing hazard purposes. This documents the case to be made that the current 2022 operational VCP 35 (with Build 22 the default scan strategy choice for non-convective weather) should be revisited to include permanently an additional high elevation scan angle to support, at least, FAA icing hazard detection objectives.

3.2 VCP 31 VS. VCP 35 FOR DEPICTION OF FREEZING DRIZZLE

The advantage of mVCP35 over VCP 35 is the addition of the 19.5° elevation scan angle. It supports icing hazard algorithms for certain winter weather situations where, without it, a fuller radar assessment is not possible. Compared to VCP 31, however, mVCP35 and VCP35 have a reduced sensitivity. During ICICLE missions, the choice of VCP impacted NEXRAD's capability to optimally support, at times, ICICLE objectives regarding freezing drizzle. Two examples in this regard in personal communication with Stephanie DiVito during ICICLE in 2019:

“We’ve witnessed the drop off in lower reflectivities particularly when the radar switches from VCP31 to VCP35,” said DiVito, 21 February 2019

and,

“Interesting to see more sensitivity from VCP31 than VCP35 with these drizzle signatures. Both yesterday and today when the VCP mode was switched from 31 to 35, we lost the wider spread coverage of drizzle,” said DiVito, 7 February 2019.

These are examples of VCP 31 sensitivity being preferred during ICICLE with it best suited to the freezing drizzle objectives of ICICLE. The improved sensitivity from VCP 31 is around 6 dB by virtue of its “long pulse” that results in increased power density and improved sensitivity from scatterers such as drizzle and ice crystals. This excerpt from the *Federal Meteorological Handbook No. 11* [9] details the pros and cons of VCP 31:

5.3.4.1.2 Strengths/Applications

- Long pulse provides maximum sensitivity to low signals because of the larger number of sample estimates per volume sample

- Excellent for detection of weak returns such as boundaries, fronts, ice crystals, and non-meteorological returns such as smoke and insects and birds
- Algorithms can function in clear air mode
- Often used effectively for dry snow situations

5.3.4.1.3 Limitations

- May not provide unambiguous estimates of the velocity within a low-level jet
- Velocity dealiasing failures occur more frequently, except during light wind conditions, because of the large percentage of velocity dealiasing errors due to a small Nyquist co-interval
- Lack of vertical resolution will restrict usefulness in sampling storms or in supplementing upper air soundings
- Cone of silence above 4.5°
- Lower spatial resolution (750 m pulse width vs. 250 m pulse width for short pulse)
- Volume scan algorithms requiring the full volume data will not function well

Figure 7 shows the 0.5° elevation scan angle KGRB reflectivity in a radar volume-to-volume comparison of VCP 31 (left panel) vs. mVCP35 (right panel). In both panels, the white line is through the 360° azimuth whose cross-section is shown in the lower portion of each panel. The loss of sensitivity with mVCP35 (and also with operational VCP 35) vs. VCP 31 is evident as observed by reduced weaker reflectivity returns (lighter blues) and in some loss in mVCP35 of very weak returns (grays) near the radar. In the cross-sections, this is observed as loss of returns and range in mVCP35. However, in the mVCP35 there is evidence of vertical extension of some returns near the radar (left of the cross-section) by virtue of the additional elevation scan angles above 4.5° in mVCP35 (or VCP 35).

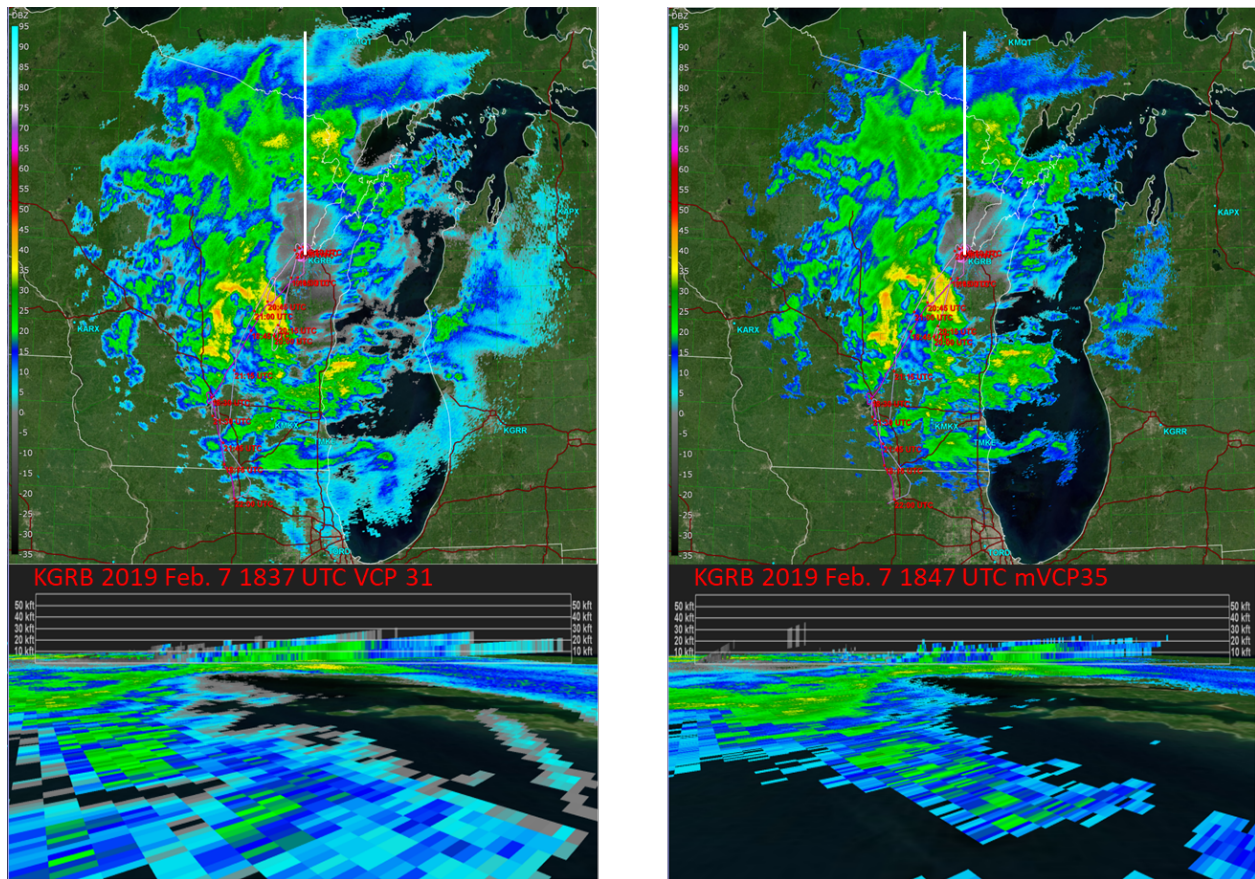


Figure 7. Comparison of detectable reflectivity for VCP 31 vs. modified VCP 35 (mVCP35) in PPI and cross-section view.

Figure 8 is the 0.5° elevation scan angle reflectivity from the Des Moines, IA NEXRAD (KDMX) in a radar volume-to-volume comparison of VCP 31 (left panel) vs. mVCP35 (right panel). In this case, the extent of the low-level freezing drizzle (grays) observed by radar (and being monitored by the ICICLE mission at around 2.9 kft altitude) was reduced with the switch to mVCP35. Prior to the singular VCP 31 radar volume, KDMX was operating in VCP 215 with a similar extent of freezing drizzle detection as mVCP35 (or VCP 35). The general range for the 0.5° elevation scan angle observation of the freezing drizzle contracts by about five nautical miles with mVCP35 vs. VCP 31. With the 0.5° elevation scan angle (the lowest scan), this translates to a loss of knowledge that the freezing drizzle depth actually extends above by at least 800 feet for the ICICLE time stamp position at 2045 UTC. The two examples presented highlight the value of the sensitivity gain provided by VCP 31 in the context of detection of the weakest,

yet pertinent, winter weather returns. This is particularly valuable to the important low-level icing hazard presented to aviation by freezing drizzle.

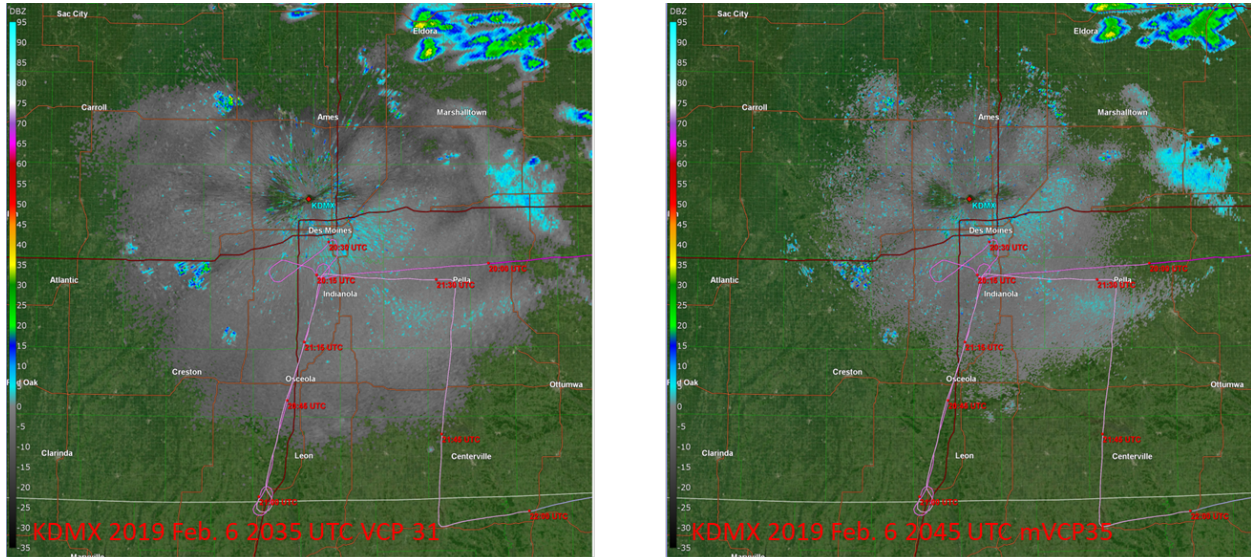


Figure 8. Sensitivity differences of VCP 31 vs. the modified VCP 35 (mVCP35) for data observed by the KDMX Des Moines, IA NEXRAD.

3.3 QUASI-VERTICAL PROFILE (QVP)

In the NEXRAD context at the start of 2019, the development of a QVP product for NEXRAD was on-going. An early-concept version of QVP [10] provided vertical profiles of reflectivity and some dual pol data that capture the time evolution of radar data features. Each of the vertical profiles comprises averages of the data from the full 360° radar scans covering the vertical extent possible from the VCP. At the time of ICICLE, VCP35 seemed to be one of the VCPs being used for QVP study. The mVCP35’s 19.5° elevation scan angle provided QVP with an additional ability to examine winter storms to a deeper depth than possible with, for instance, VCP 31 that has a maximum elevation scan angle of 4.5°. Additionally, in personal communication with Alexander Ryzhkov, he notes that “QVPs from 19.5° should look better than the ones from 6.4° due to weaker impact of horizontal non-uniformity.”

With Build 21 (circa 2022 deployment), QVP had evolved into test demonstration products for reflectivity (product 189), correlation coefficient (product 190), and differential reflectivity (product 191). Figure 9 shows the three QVP products for the KGRB ICICLE case of 7 February 2019 covering from about 1800 UTC through 2152 UTC. QVP is computed from data out to a range of about 50 km from the radar in a range dependent (RD) version. At the start, the radar was operating in VCP 31 whose scan suite shows QVP extending to altitudes round 12 kft. Starting with the radar volume completing at 1847 UTC

the radar operates henceforth with mVCP35. It is apparent the extra depth into the winter storm that QVP provides by virtue of three extra elevation scan angles (5°, 6.4°, and 19.5°) that mVCP35 has beyond the maximum 4.5° with VCP 31. QVPs provide a good visualization of the time evolution of radar features such as the melting layer around 4 kft altitude and the positive differential reflectivity bright band highlighted in the ZDR QVP within the white outline box (see more discussion below).

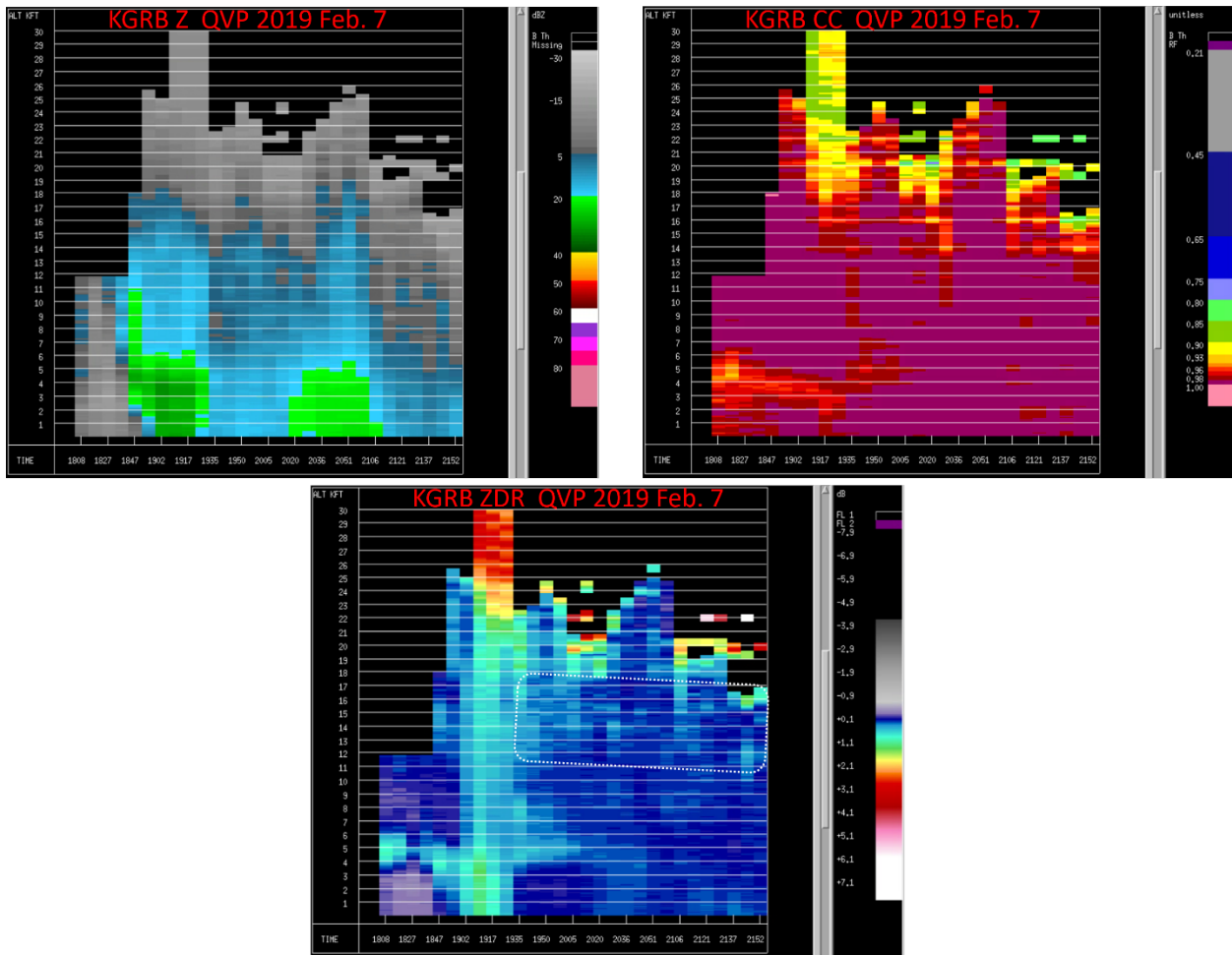


Figure 9. Examples of QVP experimental NEXRAD products for KGRB Green Bay, WI NEXRAD. The three shown are (upper left) reflectivity (Z), (upper right) correlation coefficient (CC), and (lower center) differential reflectivity (ZDR).

The FAA NEXRAD IHL algorithm made its operational debut with Build 14 in 2014. This initial IHL focused on the icing hazard aloft inferred by dual pol data associated with riming as evidenced by the graupel (GR) classification from the NEXRAD Hydrometeor Classification Algorithm (HCA). At the altitudes that the HCA determines GR as the predominant classification to report, it is likely that riming (thus, a potential icing hazard) has been occurring to some altitude extent above the GR altitude. IHL augments the depth of the potential icing hazard as inferred from the GR by adjusting it slightly through an “interest” from a combination of temperature and relative humidity [11].

Another potential icing hazard layer that S-band dual pol radar could make an inference about is that associated with the dendritic growth zone (DGZ). This is a layer approximately situated at an altitude range associated with temperatures ranging from -10° C to -20° C. This is a microphysically favored area for ice crystal growth at the expense of the supply of supercooled liquid water, primarily in the form of cloud droplets. This process is known as the Wegener-Bergeron-Findeisen process (commonly referred to as the Bergeron process). This is, thus, a varying mixed phase layer whose potential of icing hazard is variable and dependent on the conversion process. An observation from the FAA BAIRS II was that a supercooled liquid water maximum might be located just below the DGZ at an altitude with a slightly warmer temperature and a not maximal Wegener-Bergeron-Findeisen process. This area was the central area of what is termed the crystal sandwich from BAIRS II [12] for the instances where differential reflectivity bright bands (relative enhanced values) were evident above it at colder temperatures (with the DGZ) and below it at a still slightly warmer temperature (associated with a much more transient differential reflectivity bright band signature in a needle crystal layer).

In terms of NEXRAD radar returns, this DGZ (and, as noted, to a lesser extent positive ZDR enhancement in the needle layer) can be identified as a positive differential reflectivity (ZDR) bright band (+zdrbb) observed as an area of relatively enhanced ZDR values. The ZDR bright band is evident in QVP data (as noted earlier, refer to within the focus box) and in PPI (plan position indicator) radar data. IHL was upgraded to version 2 with its operational deployment as part of Build 22 in late 2023 to include information as part of the product on the presence of the +zdrbb. Also, a relative “confidence” that includes an aspect of synoptic favorability concurrence is included based on concepts from Bernstein [7] [8]. QVP uses data from all elevation scan angles with the RD version focused out to about 50 km from the radar, while the IHL for the +zdrbb portion focuses on PPI elevation scan angles at 6° or above.

The relationship between QVP (Figure 9) and the Build 22 IHL +zdrbb product information is shown with +zdrbb depictions for KGRB on 7 February 2019 at 1935 UTC (Figure 10) and 2036 UTC (Figure 11). The +zdrbb figures show the top altitude (left) and bottom altitude (right) in kft. Generally, the results show altitude tops of about 17 kft and altitude bottoms of about 13 kft for the +zdrbb layer tied to the DGZ. This altitude range is in good agreement with enhanced ZDR QVP (lighter blues and blue/green) depiction in that same altitude range (focus box in Figure 9). Before 1847 UTC, the IHL +zdrbb showed no detection. This is the same as in QVP. The obvious reason is that was when KGRB was scanning in VCP 31 where all the elevation scan angles were below threshold for the IHL +zdrbb and they did not probe to high enough altitudes for QVP to reveal a positive ZDR bright band.

After 1847 UTC, as noted, both QVP and Build 22 IHL +zdrbb depict a similar altitude range for this radar feature. QVP shows the time evolution of the +zdrbb. At around 1935 UTC, it is quite apparent in ZDR QVP but while still there at about 2036 UTC its appearance is more faded. In comparison, the Build 22 IHL +zdrbb at 1935 UTC shows almost full azimuthal coverage. The faded QVP signature at 2036 UTC tracks with Build 22 IHL +zdrbb showing a reduction in azimuthal coverage. Since QVP averages about the full 360°, a fading (deepening) of the ZDR bright band feature with time should correspond with a decreasing (increasing) of azimuthal coverage in Build 22 IHL +zdrbb. Anecdotally, Build 22 IHL +zdrbb in some cases still has limited azimuthal swaths of ZDR bright band detection while it has completely faded from the related ZDR QVP. Build 22 IHL +zdrbb content (along with a relative “confidence” assessment) is an available product to further illuminate which azimuthal swaths might have a potential icing hazard associated with the mixed phase DGZ and further the interpretation of ZDR QVP.

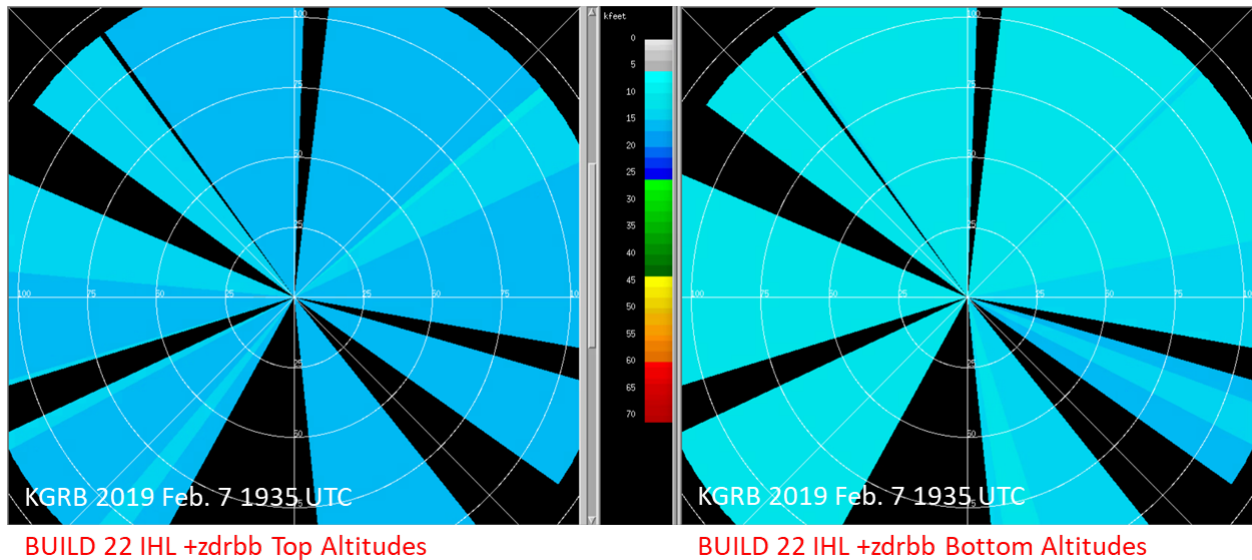


Figure 10. The Build 22 version of the FAA NEXRAD Icing Hazard Levels (IHL) depiction of the DGZ altitude top and bottom bounds via azimuthal distribution.

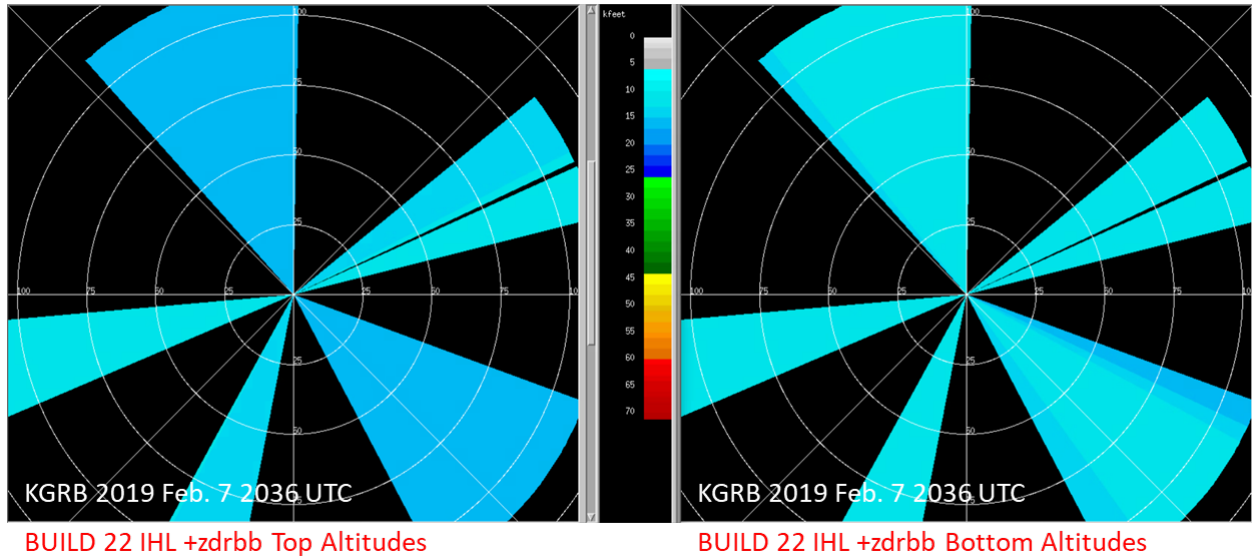


Figure 11. The Build 22 version of the FAA NEXRAD Icing Hazard Levels (IHL) depiction of the DGZ altitude top and bottom bounds via azimuthal distribution.

4. SUMMARY AND RECOMMENDATION

This report serves as a final report on ECP0857P requested of the FAA by the NEXRAD ROC. Ten NEXRAD sites used mVCP35 to varying amounts during a time window from late January 2019 through April 2019 (see Appendix A) after which it was removed from operations. ICICLE (in coordination with MIT LL) did not often request the use of mVCP35. This was likely because the other clear air mode (VCP 31) available had a preferred superior sensitivity for the lower elevation scan angles supportive of ICICLE objectives for freezing drizzle. This report documents the mVCP35. An example of its value is provided in conjunction with an ICICLE mission. Importantly, examples relating to VCP 31 sensitivity vs. mVCP35 (or the operational VCP 35) show that monitoring of important weaker winter weather returns is possible or preferable in some cases (freezing drizzle or full extent of weaker returns from winter systems).

With a fast-forward from 2019 to the current Build 22, aspects of the IHL and QVP were discussed with regard to the potential icing hazard in the variable mixed phase dendritic growth zone. The subsequent icing hazard algorithm development effort since mVCP35 and ICICLE for the FAA at MIT LL has led to deployment with Build 22 of the updated FAA Icing Hazard Levels (IHL) algorithm with the +zdrbb (positive differential reflectivity bright band) capability focused on the DGZ. The QVP provides a different ability to observe the feature. Combined, they provide complimentary information about the potential presence of an icing hazard aloft in the DGZ along with some azimuthal fidelity. The IHL upgrade utilizes non-low-level elevation scan angles (greater than or equal to six degrees) available from any VCP. For VCP 35 (now the operational default), that leaves only one elevation scan angle available for IHL. At least two would be preferable.

As noted, at the time of ICICLE and mVCP35 the specific algorithm design for DGZ analysis in IHL was not developed. With that completed and fielded with Build 22, it is likely beneficial for the DGZ portion of IHL to have VCP 35 include another elevation scan angle beyond the 6.4° maximum. The 19.5° was chosen initially as that is the NEXRAD elevation scan maximum. Better might be to have that added angle in a future mVCP35 be closer to 6.4° such as an additional 10° elevation scan angle. This would preferably lessen the gap between the elevation scan angles and extend their tandem scanning a bit more in range. The Table 5 updates the original Table 3 to include the 10° elevation scan angle as reference.

Table 5

Calculations of beam position (range and height) related to a typical dendritic growth zone (DGZ) for select elevation scan angles with the 10.0° elevation scan angle included for comparison.

Elevation Scan Angle (degrees)	Range from Radar (NM/km)	Beam Center Height (ft)	Beam Top Height (ft)	Beam Bottom Height (ft)	Beam Width (ft)
6.4	26 / 48.2	18040	19310	16770	2560
19.5	9 / 16.7	18250	18670	17830	890
10.0	17 / 31.5	18090	18920	17260	1680

The recommendation to the FAA and the NEXRAD community is that a future study of a modified VCP 35 consider including the additional elevation scan angle such as at 10° instead of 19.5° and to improve the sensitivity of the lower elevation scan angles to be akin to that with VCP 31.

APPENDIX A

This Appendix lists the occurrences of the use of the modified VCP 35 at the ten NEXRAD sites during the first four months of 2019. As previously discussed, usage of modified VCP 35 during a nearby ICICLE mission flight was not common. The following pages document, however, that the modified VCP 35 was implemented operationally quite a bit in the four months. This serves as a resource for those interested to further study use and performance of the modified VCP 35.

The use of modified VCP 35 is documented with either a start/end pairing or a one notation. The pairing notation signifies when there was a continuous sequence of modified VCP 35 scans with the start and end radar volumes noted. A one notation represents a singleton radar volume of modified VCP 35. The format is relatively self-explanatory with the site mnemonic followed by the date with time as [HH:MM:SS] (in UTC). Some Unidata Local Data Manager (LDM) statistics follow with “VCP: 35, Last Elev: 19.5 deg” indicative that the modified VCP 35 was used (as opposed to Last Elev: 6.4 deg). Dur: represents the duration in seconds (s) for the radar volume. Values in the 400s indicate modified VCP 35 without AVSET while values in the 500s indicate modified VCP 35 with AVSET operational (so an extra lowest elevation scan included with the radar volume). The following is an example of a start/end pair and a singleton for the Cleveland, OH NEXRAD:

start: KCLE Feb. 1, 2019 [19:49:33] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s
end: KCLE Feb. 1, 2019 [20:48:50] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s

one: KCLE Feb. 7, 2019 [07:19:36] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s

KARX – LA CROSSE, WI

start: KARX Jan. 31, 2019 [19:09:37] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s
end: KARX Feb. 1, 2019 [09:02:21] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s

start: KARX Feb. 5, 2019 [18:38:33] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KARX Feb. 6, 2019 [14:37:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 426 s

start: KARX Feb. 7, 2019 [17:33:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KARX Feb. 7, 2019 [20:22:05] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

one: KARX Feb. 7, 2019 [21:33:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KARX Feb. 7, 2019 [21:47:49] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KARX Feb. 7, 2019 [22:48:30] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KARX Feb. 23, 2019 [22:51:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KARX Feb. 23, 2019 [23:29:36] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KARX Feb. 23, 2019 [23:51:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KARX Feb. 24, 2019 [08:28:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KARX Feb. 24, 2019 [09:11:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KARX Feb. 24, 2019 [10:19:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KARX Feb. 24, 2019 [11:16:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KARX Feb. 24, 2019 [11:54:37] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

one: KARX Feb. 24, 2019 [12:16:17] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

one: KARX Feb. 24, 2019 [13:43:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

KCLE – CLEVELAND, OH

start: KCLE Feb. 1, 2019 [19:49:33] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s
end: KCLE Feb. 1, 2019 [20:48:50] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s

one: KCLE Feb. 7, 2019 [07:19:36] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s

start: KCLE Feb. 7, 2019 [07:33:44] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s
end: KCLE Feb. 7, 2019 [07:48:33] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 437 s

one: KCLE Feb. 8, 2019 [13:34:27] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s

start: KCLE Feb. 10, 2019 [19:19:27] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KCLE Feb. 10, 2019 [22:29:31] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 11, 2019 [00:39:42] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KCLE Feb. 11, 2019 [01:17:48] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 11, 2019 [04:34:41] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 12, 2019 [03:14:29] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 12, 2019 [03:36:18] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

start: KCLE Feb. 12, 2019 [04:05:12] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 12, 2019 [05:44:11] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 12, 2019 [06:37:21] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KCLE Feb. 12, 2019 [07:00:13] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

one: KCLE Feb. 13, 2019 [04:04:20] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 13, 2019 [04:47:23] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 13, 2019 [05:17:49] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

one: KCLE Feb. 13, 2019 [05:39:38] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

one: KCLE Feb. 13, 2019 [06:08:31] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

one: KCLE Feb. 13, 2019 [07:12:45] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 13, 2019 [08:14:20] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 13, 2019 [09:46:59] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 13, 2019 [10:01:40] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Feb. 13, 2019 [10:23:27] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Feb. 14, 2019 [11:11:00] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
one: KCLE Feb. 14, 2019 [11:25:03] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
one: KCLE Feb. 14, 2019 [11:45:54] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
one: KCLE Feb. 14, 2019 [19:57:40] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s
start: KCLE Feb. 14, 2019 [20:25:17] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
end: KCLE Feb. 14, 2019 [20:32:34] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s
one: KCLE Feb. 14, 2019 [20:46:36] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
start: KCLE Feb. 14, 2019 [21:07:31] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 432 s
end: KCLE Feb. 14, 2019 [21:29:26] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
start: KCLE Feb. 14, 2019 [23:45:59] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 436 s
end: KCLE Feb. 15, 2019 [00:15:15] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s
one: KCLE Feb. 15, 2019 [03:20:35] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
start: KCLE Feb. 15, 2019 [04:38:43] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
end: KCLE Feb. 15, 2019 [05:32:01] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s
one: KCLE Feb. 17, 2019 [12:57:28] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 432 s
start: KCLE Feb. 17, 2019 [13:11:32] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
end: KCLE Feb. 17, 2019 [14:11:50] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
one: KCLE Feb. 17, 2019 [16:53:11] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 432 s
start: KCLE Feb. 17, 2019 [17:07:14] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s
end: KCLE Feb. 17, 2019 [17:22:02] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 436 s
one: KCLE Feb. 18, 2019 [13:03:51] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Feb. 18, 2019 [13:18:34] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 18, 2019 [14:04:14] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
one: KCLE Feb. 20, 2019 [14:37:32] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

one: KCLE Feb. 24, 2019 [02:41:23] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 435 s

one: KCLE Feb. 24, 2019 [03:02:38] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 436 s

one: KCLE Feb. 24, 2019 [18:34:32] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 24, 2019 [19:53:06] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 26, 2019 [04:12:28] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 26, 2019 [04:20:05] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 26, 2019 [06:01:54] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 26, 2019 [06:16:37] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 26, 2019 [06:31:49] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

one: KCLE Feb. 26, 2019 [07:00:43] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 26, 2019 [08:26:21] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 26, 2019 [08:48:09] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 26, 2019 [08:55:46] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 26, 2019 [09:10:29] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 26, 2019 [10:49:28] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 26, 2019 [14:10:26] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 26, 2019 [16:12:13] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

one: KCLE Feb. 27, 2019 [05:14:22] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

start: KCLE Feb. 27, 2019 [05:29:04] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 27, 2019 [05:59:30] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 27, 2019 [07:32:17] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 27, 2019 [09:03:38] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Feb. 27, 2019 [09:18:21] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 27, 2019 [09:40:09] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 27, 2019 [12:27:40] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KCLE Feb. 27, 2019 [12:58:30] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Feb. 27, 2019 [13:06:08] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

one: KCLE Feb. 27, 2019 [20:05:59] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Feb. 27, 2019 [20:27:45] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 1, 2019 [00:55:54] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 1, 2019 [01:10:37] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
start: KCLE Mar. 2, 2019 [13:13:50] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Mar. 2, 2019 [15:08:00] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
start: KCLE Mar. 3, 2019 [15:46:42] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Mar. 3, 2019 [16:17:09] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 3, 2019 [17:42:48] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Mar. 3, 2019 [17:57:30] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Mar. 3, 2019 [18:20:20] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Mar. 3, 2019 [19:21:22] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KCLE Mar. 3, 2019 [19:51:49] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s
one: KCLE Mar. 4, 2019 [05:09:16] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
one: KCLE Mar. 4, 2019 [05:25:53] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 5, 2019 [18:41:13] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
one: KCLE Mar. 6, 2019 [07:53:22] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 437 s
start: KCLE Mar. 6, 2019 [08:28:51] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 437 s
end: KCLE Mar. 6, 2019 [08:51:20] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 7, 2019 [10:08:53] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s
one: KCLE Mar. 7, 2019 [10:30:13] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 436 s
one: KCLE Mar. 11, 2019 [19:36:26] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 545 s
one: KCLE Mar. 13, 2019 [15:32:06] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 545 s
one: KCLE Mar. 15, 2019 [18:10:43] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
one: KCLE Mar. 15, 2019 [19:45:48] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s

one: KCLE Mar. 15, 2019 [20:03:33] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
one: KCLE Mar. 15, 2019 [20:21:15] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
one: KCLE Mar. 15, 2019 [21:04:47] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
one: KCLE Mar. 16, 2019 [03:51:30] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
start: KCLE Mar. 16, 2019 [09:36:13] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
end: KCLE Mar. 16, 2019 [10:32:49] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
one: KCLE Mar. 16, 2019 [22:25:33] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
one: KCLE Mar. 16, 2019 [23:17:43] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
one: KCLE Mar. 18, 2019 [01:29:49] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
start: KCLE Mar. 18, 2019 [01:47:33] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
end: KCLE Mar. 18, 2019 [02:35:08] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
one: KCLE Mar. 18, 2019 [17:23:58] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
one: KCLE Mar. 20, 2019 [18:21:29] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
start: KCLE Mar. 20, 2019 [19:07:03] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
end: KCLE Mar. 20, 2019 [22:00:17] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
start: KCLE Mar. 21, 2019 [09:06:41] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
end: KCLE Mar. 21, 2019 [10:37:52] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 539 s
start: KCLE Mar. 22, 2019 [16:00:34] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
end: KCLE Mar. 22, 2019 [16:18:49] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
start: KCLE Mar. 22, 2019 [18:25:51] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
end: KCLE Mar. 22, 2019 [18:53:14] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
one: KCLE Mar. 22, 2019 [19:47:10] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
start: KCLE Mar. 22, 2019 [20:04:55] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
end: KCLE Mar. 22, 2019 [21:36:11] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s
one: KCLE Mar. 22, 2019 [21:53:54] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
start: KCLE Mar. 22, 2019 [22:28:50] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 538 s

end: KCLE Mar. 22, 2019 [23:14:28] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 537 s
one: KCLE Mar. 24, 2019 [13:35:47] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
start: KCLE Mar. 24, 2019 [14:04:03] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
end: KCLE Mar. 24, 2019 [14:48:00] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s
one: KCLE Mar. 24, 2019 [20:13:49] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s
one: KCLE Mar. 24, 2019 [21:10:11] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Mar. 24, 2019 [22:51:47] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KCLE Mar. 24, 2019 [23:37:26] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Mar. 30, 2019 [04:40:31] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Mar. 30, 2019 [05:26:11] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 30, 2019 [06:02:09] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 31, 2019 [06:52:38] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s
one: KCLE Mar. 31, 2019 [07:54:07] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 432 s
start: KCLE Mar. 31, 2019 [08:36:37] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Mar. 31, 2019 [09:29:53] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 31, 2019 [10:34:13] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 31, 2019 [11:31:30] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 31, 2019 [18:02:39] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Mar. 31, 2019 [19:56:13] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
one: KCLE Mar. 31, 2019 [22:13:00] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Apr. 1, 2019 [01:52:52] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Apr. 1, 2019 [02:07:34] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s
end: KCLE Apr. 1, 2019 [03:31:18] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Apr. 1, 2019 [04:49:47] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s
one: KCLE Apr. 1, 2019 [05:20:32] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KCLE Apr. 4, 2019 [10:09:50] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Apr. 4, 2019 [10:24:32] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Apr. 4, 2019 [14:14:43] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Apr. 4, 2019 [14:36:31] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Apr. 4, 2019 [20:40:16] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
start: KCLE Apr. 4, 2019 [21:46:35] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Apr. 4, 2019 [21:54:11] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
start: KCLE Apr. 4, 2019 [22:08:53] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Apr. 4, 2019 [22:24:06] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
one: KCLE Apr. 4, 2019 [22:45:54] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
one: KCLE Apr. 4, 2019 [23:18:41] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Apr. 4, 2019 [23:33:25] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KCLE Apr. 5, 2019 [00:57:07] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KCLE Apr. 5, 2019 [02:08:44] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KCLE Apr. 5, 2019 [03:09:38] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s
one: KCLE Apr. 5, 2019 [09:50:27] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
start: KCLE Apr. 5, 2019 [10:54:46] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
end: KCLE Apr. 5, 2019 [11:25:13] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
one: KCLE Apr. 7, 2019 [18:39:44] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 426 s
start: KCLE Apr. 7, 2019 [19:14:02] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
end: KCLE Apr. 7, 2019 [20:05:00] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s
one: KCLE Apr. 8, 2019 [10:02:20] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s
one: KCLE Apr. 8, 2019 [11:05:03] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
one: KCLE Apr. 8, 2019 [11:19:45] >> LDM Stats: Ver. 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

KDMX – DES MOINES, IA

start: KDMX Feb. 6, 2019 [15:10:15] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s
end: KDMX Feb. 6, 2019 [17:51:59] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

start: KDMX Feb. 6, 2019 [20:58:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s
end: KDMX Feb. 7, 2019 [12:52:22] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

start: KDMX Feb. 8, 2019 [08:16:37] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s
end: KDMX Feb. 8, 2019 [14:32:06] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s

start: KDMX Feb. 23, 2019 [21:45:39] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s
end: KDMX Feb. 23, 2019 [22:41:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 547 s

one: KDMX Mar. 7, 2019 [10:54:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 547 s

start: KDMX Mar. 7, 2019 [11:12:33] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 546 s
end: KDMX Mar. 7, 2019 [14:01:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 547 s

one: KDMX Mar. 19, 2019 [21:23:03] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

start: KDMX Mar. 19, 2019 [22:34:36] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s
end: KDMX Mar. 19, 2019 [23:27:59] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

one: KDMX Mar. 19, 2019 [23:58:48] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

start: KDMX Mar. 20, 2019 [00:27:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
end: KDMX Mar. 20, 2019 [02:14:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

one: KDMX Mar. 20, 2019 [02:57:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

KEAX – KANSAS CITY / PLEASANT HILL, MO

start: KEAX Jan. 31, 2019 [17:14:28] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s
end: KEAX Feb. 4, 2019 [13:29:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s

start: KEAX Feb. 4, 2019 [17:38:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KEAX Feb. 5, 2019 [19:49:07] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s

start: KEAX Feb. 19, 2019 [16:18:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KEAX Feb. 19, 2019 [22:57:06] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

KGRB – GREEN BAY, WI

start: KGRB Jan. 31, 2019 [20:05:15] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s
end: KGRB Jan. 31, 2019 [21:05:29] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s

start: KGRB Feb. 7, 2019 [18:54:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 442 s
end: KGRB Feb. 7, 2019 [21:52:23] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

start: KGRB Feb. 13, 2019 [15:06:33] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 442 s
end: KGRB Feb. 13, 2019 [21:05:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 434 s

start: KGRB Feb. 23, 2019 [19:24:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Feb. 24, 2019 [04:50:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s

start: KGRB Feb. 24, 2019 [11:18:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Feb. 25, 2019 [06:26:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s

start: KGRB Mar. 7, 2019 [16:46:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 442 s
end: KGRB Mar. 7, 2019 [18:00:17] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 442 s

one: KGRB Mar. 11, 2019 [19:39:22] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 442 s

start: KGRB Mar. 13, 2019 [15:20:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 13, 2019 [20:26:08] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s

start: KGRB Mar. 14, 2019 [14:28:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 14, 2019 [14:36:02] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s

start: KGRB Mar. 14, 2019 [15:14:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 14, 2019 [15:58:28] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 427 s

start: KGRB Mar. 15, 2019 [05:23:33] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KGRB Mar. 15, 2019 [05:31:09] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KGRB Mar. 15, 2019 [06:09:13] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 15, 2019 [08:42:50] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

start: KGRB Mar. 15, 2019 [09:57:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 15, 2019 [11:51:56] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

start: KGRB Mar. 15, 2019 [13:19:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KGRB Mar. 15, 2019 [15:15:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

start: KGRB Mar. 20, 2019 [20:00:23] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 442 s

end: KGRB Mar. 20, 2019 [20:08:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 448 s
start: KGRB Mar. 20, 2019 [20:52:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 20, 2019 [20:59:57] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KGRB Mar. 20, 2019 [21:31:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 442 s
end: KGRB Mar. 20, 2019 [21:54:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KGRB Mar. 21, 2019 [01:52:03] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 22, 2019 [12:37:10] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 428 s
start: KGRB Mar. 26, 2019 [03:45:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 442 s
end: KGRB Mar. 26, 2019 [12:55:13] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 434 s
one: KGRB Mar. 26, 2019 [13:02:41] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
start: KGRB Mar. 26, 2019 [13:58:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 26, 2019 [14:57:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 437 s
start: KGRB Mar. 27, 2019 [04:45:08] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 27, 2019 [05:07:59] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s
start: KGRB Mar. 27, 2019 [05:52:14] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KGRB Mar. 27, 2019 [14:59:49] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 432 s
start: KGRB Mar. 27, 2019 [17:35:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 441 s
end: KGRB Mar. 27, 2019 [23:55:49] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 436 s
start: KGRB Mar. 28, 2019 [03:40:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KGRB Apr. 1, 2019 [06:58:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

KGRR – GRAND RAPIDS, MI

one: KGRR Feb. 14, 2019 [20:10:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 516 s

one: KGRR Feb. 14, 2019 [21:25:35] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 515 s

start: KGRR Feb. 14, 2019 [21:50:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 515 s

end: KGRR Feb. 14, 2019 [22:52:48] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 521 s

start: KGRR Feb. 14, 2019 [23:18:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 533 s

end: KGRR Feb. 14, 2019 [23:37:14] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 15, 2019 [00:21:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

one: KGRR Feb. 15, 2019 [05:28:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 533 s

start: KGRR Feb. 15, 2019 [06:28:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

end: KGRR Feb. 15, 2019 [06:38:10] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

start: KGRR Feb. 15, 2019 [15:10:17] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

end: KGRR Feb. 15, 2019 [15:19:29] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

one: KGRR Feb. 17, 2019 [10:48:53] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 527 s

start: KGRR Feb. 17, 2019 [11:06:33] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

end: KGRR Feb. 17, 2019 [11:35:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 17, 2019 [11:53:47] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

end: KGRR Feb. 17, 2019 [14:11:47] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 17, 2019 [23:37:37] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 534 s

end: KGRR Feb. 18, 2019 [02:41:23] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 18, 2019 [03:16:35] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

end: KGRR Feb. 18, 2019 [04:04:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 18, 2019 [07:24:53] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 20, 2019 [08:57:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

end: KGRR Feb. 20, 2019 [13:07:28] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 20, 2019 [20:08:38] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 532 s

end: KGRR Feb. 20, 2019 [20:35:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 527 s

one: KGRR Feb. 23, 2019 [13:54:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 521 s

one: KGRR Feb. 24, 2019 [15:49:49] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

one: KGRR Feb. 24, 2019 [16:07:41] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

start: KGRR Feb. 24, 2019 [16:25:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 24, 2019 [16:53:09] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 24, 2019 [17:51:22] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 533 s

start: KGRR Feb. 24, 2019 [18:19:30] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 533 s
end: KGRR Feb. 24, 2019 [19:42:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

start: KGRR Feb. 24, 2019 [21:20:24] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 24, 2019 [22:52:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 24, 2019 [23:44:57] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 25, 2019 [00:28:52] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

one: KGRR Feb. 25, 2019 [01:04:07] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 25, 2019 [01:39:21] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

one: KGRR Feb. 25, 2019 [02:49:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 25, 2019 [03:33:15] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s
end: KGRR Feb. 25, 2019 [03:51:38] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

start: KGRR Feb. 25, 2019 [04:18:14] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 25, 2019 [07:03:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 527 s

start: KGRR Feb. 25, 2019 [07:21:09] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 526 s
end: KGRR Feb. 25, 2019 [08:05:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 522 s

one: KGRR Feb. 25, 2019 [10:53:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 516 s

one: KGRR Feb. 26, 2019 [04:46:04] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 26, 2019 [05:03:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s
end: KGRR Feb. 26, 2019 [06:47:15] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

one: KGRR Feb. 26, 2019 [07:13:47] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 26, 2019 [07:40:22] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

start: KGRR Feb. 26, 2019 [13:56:22] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 26, 2019 [14:05:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

start: KGRR Feb. 26, 2019 [19:24:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s
end: KGRR Feb. 26, 2019 [19:33:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 26, 2019 [20:09:09] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 26, 2019 [21:24:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 26, 2019 [21:42:38] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s

start: KGRR Feb. 26, 2019 [22:09:13] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 26, 2019 [23:41:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 27, 2019 [00:18:21] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 533 s
end: KGRR Feb. 27, 2019 [02:17:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

one: KGRR Feb. 27, 2019 [04:20:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

one: KGRR Feb. 27, 2019 [06:06:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 27, 2019 [06:33:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 27, 2019 [09:55:33] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

start: KGRR Feb. 27, 2019 [10:22:07] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 27, 2019 [10:49:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 27, 2019 [13:00:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 27, 2019 [13:48:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

start: KGRR Feb. 27, 2019 [14:06:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 540 s
end: KGRR Feb. 27, 2019 [14:34:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Feb. 27, 2019 [14:51:51] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Feb. 27, 2019 [16:14:39] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

one: KGRR Feb. 27, 2019 [17:58:57] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 517 s

start: KGRR Mar. 1, 2019 [16:27:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 527 s
end: KGRR Mar. 2, 2019 [10:49:27] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KGRR Mar. 2, 2019 [11:26:41] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 533 s
end: KGRR Mar. 2, 2019 [22:40:51] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 521 s

one: KGRR Mar. 6, 2019 [01:49:47] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
one: KGRR Mar. 6, 2019 [16:02:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
one: KGRR Mar. 6, 2019 [19:44:06] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 521 s
one: KGRR Mar. 6, 2019 [21:35:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 526 s
one: KGRR Mar. 7, 2019 [00:16:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 516 s
one: KGRR Mar. 7, 2019 [01:59:27] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
start: KGRR Mar. 7, 2019 [02:16:48] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 527 s
end: KGRR Mar. 7, 2019 [02:25:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 528 s
start: KGRR Mar. 7, 2019 [03:00:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 533 s
end: KGRR Mar. 7, 2019 [03:19:03] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s
start: KGRR Mar. 8, 2019 [16:14:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 516 s
end: KGRR Mar. 9, 2019 [16:59:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 520 s
one: KGRR Mar. 10, 2019 [09:05:23] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
start: KGRR Mar. 10, 2019 [09:23:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KGRR Mar. 10, 2019 [09:32:28] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

KILX – LINCOLN, IL

one: KILX Feb. 24, 2019 [09:38:17] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 447 s

KIWX –NORTH WEBSTER / FORT WAYNE, IN

start: KIWX Feb. 11, 2019 [19:49:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 543 s
end: KIWX Feb. 11, 2019 [20:26:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s

start: KIWX Feb. 12, 2019 [01:44:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 541 s
end: KIWX Feb. 12, 2019 [14:51:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 543 s

start: KIWX Feb. 12, 2019 [18:04:10] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 543 s
end: KIWX Feb. 17, 2019 [08:48:50] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 543 s

start: KIWX Feb. 18, 2019 [11:59:02] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 544 s
end: KIWX Feb. 20, 2019 [19:38:27] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Feb. 21, 2019 [10:26:26] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KIWX Feb. 23, 2019 [14:22:24] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 432 s

start: KIWX Feb. 23, 2019 [15:23:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Feb. 23, 2019 [15:40:22] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 432 s

start: KIWX Feb. 24, 2019 [13:35:53] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Feb. 24, 2019 [16:46:50] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s

start: KIWX Feb. 24, 2019 [17:36:21] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Feb. 27, 2019 [14:18:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

start: KIWX Feb. 27, 2019 [17:09:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 452 s
end: KIWX Feb. 27, 2019 [20:29:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

start: KIWX Feb. 27, 2019 [23:02:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KIWX Feb. 28, 2019 [19:20:29] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

start: KIWX Feb. 28, 2019 [20:50:02] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Feb. 28, 2019 [21:28:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Mar. 1, 2019 [01:55:52] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Mar. 1, 2019 [17:41:28] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

start: KIWX Mar. 1, 2019 [18:24:15] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
end: KIWX Mar. 3, 2019 [16:08:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

start: KIWX Mar. 3, 2019 [17:47:27] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Mar. 6, 2019 [13:39:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

start: KIWX Mar. 6, 2019 [14:24:56] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s
end: KIWX Mar. 9, 2019 [17:05:09] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KIWX Mar. 10, 2019 [07:14:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Mar. 13, 2019 [04:54:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

one: KIWX Mar. 13, 2019 [19:35:21] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KIWX Mar. 13, 2019 [20:44:15] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Mar. 13, 2019 [22:49:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 435 s

start: KIWX Mar. 14, 2019 [00:13:06] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KIWX Mar. 14, 2019 [01:13:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

one: KIWX Mar. 16, 2019 [02:56:39] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 543 s

one: KIWX Mar. 17, 2019 [22:29:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 551 s

one: KIWX Mar. 17, 2019 [23:49:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 551 s

one: KIWX Mar. 20, 2019 [08:06:17] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

one: KIWX Mar. 24, 2019 [06:44:59] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Mar. 24, 2019 [07:28:23] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
end: KIWX Mar. 24, 2019 [07:36:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

start: KIWX Mar. 24, 2019 [08:48:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
end: KIWX Mar. 24, 2019 [10:41:59] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Mar. 24, 2019 [11:29:26] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s
end: KIWX Mar. 24, 2019 [12:06:48] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Mar. 31, 2019 [02:57:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KIWX Mar. 31, 2019 [03:04:51] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

one: KIWX Apr. 2, 2019 [20:45:13] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Apr. 2, 2019 [21:14:18] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s
end: KIWX Apr. 2, 2019 [21:21:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

start: KIWX Apr. 2, 2019 [21:43:53] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
end: KIWX Apr. 2, 2019 [22:06:52] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

one: KIWX Apr. 2, 2019 [22:35:56] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

one: KIWX Apr. 3, 2019 [21:57:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

one: KIWX Apr. 3, 2019 [22:26:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Apr. 3, 2019 [22:40:48] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s
end: KIWX Apr. 3, 2019 [22:55:30] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

one: KIWX Apr. 3, 2019 [23:09:38] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

one: KIWX Apr. 3, 2019 [23:53:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

one: KIWX Apr. 4, 2019 [00:58:14] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Apr. 4, 2019 [01:13:03] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s
end: KIWX Apr. 4, 2019 [02:36:50] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KIWX Apr. 4, 2019 [03:05:52] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s
end: KIWX Apr. 4, 2019 [05:54:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

one: KIWX Apr. 11, 2019 [09:46:08] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

one: KIWX Apr. 11, 2019 [10:15:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

one: KIWX Apr. 11, 2019 [14:12:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

one: KIWX Apr. 11, 2019 [14:26:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

one: KIWX Apr. 16, 2019 [22:23:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

one: KIWX Apr. 17, 2019 [19:09:28] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

start: KIWX Apr. 17, 2019 [19:44:05] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s
end: KIWX Apr. 17, 2019 [19:51:24] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

start: KIWX Apr. 17, 2019 [20:33:38] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s
end: KIWX Apr. 17, 2019 [21:24:59] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

one: KIWX Apr. 19, 2019 [14:16:24] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s

start: KIWX Apr. 19, 2019 [14:30:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 434 s
end: KIWX Apr. 19, 2019 [14:38:03] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

one: KIWX Apr. 22, 2019 [17:31:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

one: KIWX Apr. 22, 2019 [18:19:57] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

start: KIWX Apr. 22, 2019 [18:40:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

end: KIWX Apr. 22, 2019 [20:16:18] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

one: KIWX Apr. 22, 2019 [21:52:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

KMKX – MILWAUKEE, WI

start: KMKX Jan. 31, 2019 [20:38:21] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KMKX Jan. 31, 2019 [20:53:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

start: KMKX Feb. 1, 2019 [01:50:10] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Feb. 1, 2019 [06:09:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Feb. 4, 2019 [08:07:26] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 4, 2019 [08:15:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Feb. 4, 2019 [11:17:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Feb. 4, 2019 [11:47:07] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 4, 2019 [17:46:37] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 4, 2019 [21:06:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 426 s

start: KMKX Feb. 4, 2019 [23:06:47] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 5, 2019 [21:10:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

one: KMKX Feb. 6, 2019 [06:59:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s

start: KMKX Feb. 7, 2019 [05:57:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 7, 2019 [06:34:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 426 s

start: KMKX Feb. 7, 2019 [14:04:07] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Feb. 7, 2019 [14:11:41] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 7, 2019 [21:47:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 8, 2019 [04:28:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 434 s

start: KMKX Feb. 10, 2019 [18:55:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Feb. 10, 2019 [19:33:35] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

one: KMKX Feb. 10, 2019 [20:21:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s

start: KMKX Feb. 10, 2019 [21:41:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KMKX Feb. 10, 2019 [22:42:07] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 12, 2019 [01:01:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KMKX Feb. 12, 2019 [02:55:07] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

start: KMKX Feb. 12, 2019 [03:44:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KMKX Feb. 12, 2019 [04:15:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 12, 2019 [13:12:17] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 12, 2019 [13:44:28] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Feb. 12, 2019 [14:47:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 12, 2019 [14:55:29] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 12, 2019 [21:02:23] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KMKX Feb. 12, 2019 [21:57:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s

one: KMKX Feb. 13, 2019 [02:25:39] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

one: KMKX Feb. 13, 2019 [03:29:38] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

one: KMKX Feb. 13, 2019 [06:25:32] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 13, 2019 [16:05:15] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 425 s
end: KMKX Feb. 15, 2019 [02:19:26] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 425 s

start: KMKX Feb. 15, 2019 [02:56:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Feb. 16, 2019 [15:02:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

start: KMKX Feb. 17, 2019 [06:38:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Feb. 17, 2019 [10:54:05] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 17, 2019 [11:44:17] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Feb. 17, 2019 [12:14:35] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 17, 2019 [14:51:06] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 17, 2019 [14:58:41] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Feb. 17, 2019 [16:01:08] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 17, 2019 [16:23:51] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Feb. 17, 2019 [18:33:47] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 17, 2019 [22:45:36] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Feb. 17, 2019 [23:41:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Feb. 20, 2019 [10:07:13] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Feb. 20, 2019 [12:19:08] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Feb. 21, 2019 [15:22:35] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 426 s

start: KMKX Feb. 21, 2019 [16:29:33] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 424 s
end: KMKX Feb. 21, 2019 [16:37:06] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Feb. 21, 2019 [16:54:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KMKX Feb. 23, 2019 [06:57:23] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s

one: KMKX Feb. 23, 2019 [07:04:51] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s

start: KMKX Feb. 24, 2019 [12:41:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 543 s
end: KMKX Feb. 24, 2019 [13:09:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

start: KMKX Feb. 24, 2019 [14:09:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KMKX Feb. 26, 2019 [20:51:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 542 s

start: KMKX Feb. 27, 2019 [00:05:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 543 s
end: KMKX Mar. 9, 2019 [18:22:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 433 s

start: KMKX Mar. 10, 2019 [06:18:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
end: KMKX Mar. 12, 2019 [21:16:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 426 s

start: KMKX Mar. 13, 2019 [19:36:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Mar. 13, 2019 [20:49:15] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 426 s

one: KMKX Mar. 14, 2019 [13:18:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s

one: KMKX Mar. 15, 2019 [10:45:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Mar. 15, 2019 [11:34:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s
end: KMKX Mar. 15, 2019 [12:05:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s

start: KMKX Mar. 15, 2019 [12:43:05] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Mar. 15, 2019 [12:50:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Mar. 15, 2019 [13:12:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KMKX Mar. 18, 2019 [11:54:28] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 424 s

start: KMKX Mar. 18, 2019 [18:42:13] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Mar. 20, 2019 [11:27:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KMKX Mar. 20, 2019 [13:19:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
end: KMKX Mar. 20, 2019 [21:22:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 446 s

one: KMKX Mar. 24, 2019 [05:49:06] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

one: KMKX Mar. 24, 2019 [06:39:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

start: KMKX Mar. 24, 2019 [09:14:50] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

end: KMKX Mar. 24, 2019 [10:15:29] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
start: KMKX Mar. 24, 2019 [11:33:48] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
start: KMKX Mar. 24, 2019 [16:23:37] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Mar. 24, 2019 [16:31:05] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s
start: KMKX Mar. 29, 2019 [02:17:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
end: KMKX Mar. 29, 2019 [03:22:59] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
start: KMKX Mar. 29, 2019 [03:51:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KMKX Mar. 29, 2019 [04:53:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
start: KMKX Mar. 29, 2019 [22:36:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 429 s
end: KMKX Mar. 29, 2019 [22:44:03] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 434 s
one: KMKX Mar. 29, 2019 [23:39:22] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 438 s
one: KMKX Mar. 30, 2019 [11:21:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 440 s
start: KMKX Mar. 30, 2019 [11:50:16] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KMKX Mar. 30, 2019 [14:00:48] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
start: KMKX Apr. 1, 2019 [13:15:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KMKX Apr. 1, 2019 [15:46:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
one: KMKX Apr. 2, 2019 [05:10:38] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
start: KMKX Apr. 2, 2019 [06:00:35] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KMKX Apr. 2, 2019 [06:46:04] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
start: KMKX Apr. 2, 2019 [07:28:55] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s
end: KMKX Apr. 2, 2019 [08:52:18] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

KVWX – EVANSVILLE, IN

one: KVWX Feb. 5, 2019 [19:15:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s

start: KVWX Feb. 14, 2019 [15:43:31] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

end: KVWX Feb. 14, 2019 [15:50:53] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 432 s

one: KVWX Feb. 14, 2019 [16:11:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

start: KVWX Feb. 15, 2019 [16:48:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s

end: KVWX Feb. 15, 2019 [18:18:53] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s

start: KVWX Feb. 17, 2019 [05:46:56] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

end: KVWX Feb. 17, 2019 [06:16:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 439 s

start: KVWX Feb. 17, 2019 [06:45:50] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

end: KVWX Feb. 17, 2019 [07:33:09] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s

one: KVWX Feb. 17, 2019 [20:15:00] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

one: KVWX Feb. 28, 2019 [19:38:04] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

start: KVWX Feb. 28, 2019 [20:10:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s

end: KVWX Feb. 28, 2019 [21:57:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KVWX Mar. 3, 2019 [01:40:37] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

end: KVWX Mar. 3, 2019 [02:10:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KVWX Mar. 3, 2019 [04:23:11] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

end: KVWX Mar. 3, 2019 [04:30:50] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KVWX Mar. 3, 2019 [05:18:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

end: KVWX Mar. 3, 2019 [05:41:47] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

start: KVWX Mar. 3, 2019 [12:09:59] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s

end: KVWX Mar. 3, 2019 [13:56:58] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

start: KVWX Mar. 7, 2019 [23:09:51] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 445 s

end: KVWX Mar. 8, 2019 [00:34:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

start: KVWX Mar. 8, 2019 [01:48:14] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

end: KVWX Mar. 8, 2019 [02:34:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s

one: KVWX Mar. 8, 2019 [03:17:46] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

one: KVWX Mar. 8, 2019 [05:05:38] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
one: KVWX Mar. 8, 2019 [06:10:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
one: KVWX Mar. 8, 2019 [06:25:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
one: KVWX Mar. 8, 2019 [06:54:34] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s
start: KVWX Mar. 8, 2019 [07:09:23] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
end: KVWX Mar. 8, 2019 [07:17:04] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s
start: KVWX Mar. 8, 2019 [07:39:02] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s
end: KVWX Mar. 8, 2019 [07:46:42] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s
one: KVWX Mar. 8, 2019 [08:29:01] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 436 s
start: KVWX Mar. 8, 2019 [09:25:54] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
end: KVWX Mar. 8, 2019 [10:21:39] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 452 s
one: KVWX Mar. 12, 2019 [21:22:07] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s
one: KVWX Mar. 12, 2019 [21:36:18] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s
start: KVWX Mar. 13, 2019 [15:48:49] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 431 s
end: KVWX Mar. 13, 2019 [18:01:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 435 s
one: KVWX Mar. 13, 2019 [20:51:52] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 430 s
one: KVWX Mar. 17, 2019 [08:28:13] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 549 s
start: KVWX Mar. 17, 2019 [08:46:20] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 549 s
end: KVWX Mar. 17, 2019 [09:42:25] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 550 s
start: KVWX Mar. 17, 2019 [10:18:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 550 s
end: KVWX Mar. 17, 2019 [11:34:43] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 549 s
one: KVWX Mar. 20, 2019 [09:29:45] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s
start: KVWX Mar. 24, 2019 [07:13:04] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KVWX Mar. 24, 2019 [08:06:44] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
one: KVWX Mar. 24, 2019 [08:28:40] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s
start: KVWX Mar. 24, 2019 [09:04:57] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

end: KVWX Mar. 24, 2019 [09:12:37] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s
start: KVWX Mar. 24, 2019 [10:02:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 444 s
end: KVWX Mar. 24, 2019 [10:25:19] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 451 s
one: KVWX Mar. 29, 2019 [13:05:22] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 449 s
one: KVWX Mar. 31, 2019 [04:03:30] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 443 s
one: KVWX Mar. 31, 2019 [04:18:12] >> LDM Stats: Ver: 6, VCP: 35, Last Elev: 19.5 deg, Dur: 450 s

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GLOSSARY

+zdrbb	Positive ZDR bright band content from the NEXRAD IHL
AVSET	Automated Volume Scan Evaluation and Termination
BAIRS	Buffalo Area Icing and Radar Study
CC	Correlation Coefficient
DGZ	Dendritic Growth Zone
ECP	Engineering Change Proposal
FAA	Federal Aviation Administration
GR	Graupel
HCA	Hydrometeor Classification Algorithm
ICICLE	In-Cloud ICing and Large drop Experiment
IHL	Icing Hazard Levels
KDMX	Des Moines, IA NEXRAD
KGRB	Green Bay, WI NEXRAD
MIT LL	Massachusetts Institute of Technology Lincoln Laboratory
MRLE	Mid-Volume Rescan of Low-Level Elevations
NAS	National Air Space
NEXRAD	Weather Surveillance Radar – 88 Doppler
NWS	National Weather Service
PPI	Plan Position Indicator
QVP	Quasi-Vertical Profile
RD	Range Dependent
ROC	Radar Operations Center
SAILS	Supplemental Adaptive Intra-Volume Low Level Scan (up to 3 per volume)
SLD	Supercooled Large Drops
SLEA	Supplemental Low Elevation Angle (scan below 0.5°)
VCP	Volume Coverage Pattern
WFO	Weather Forecast Office
Z	Reflectivity
ZDR	Differential Reflectivity

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