# A Rare Winter Supercell Produces an EF1 'Snownado’

**David Sills**

*Cloud Physics and Severe Weather Research Section, Toronto, ON*

**Marie-Ève Giguère**

*Meteorological Service of Canada, Montréal, QC*

# Problem du Jour for 23 Nov 2013

WWCN11 CWTO 231541
SEVERE WEATHER BULLETIN
ISSUED BY ENVIRONMENT CANADA
AT 10:41 AM EST **SATURDAY** 23 NOVEMBER 2013.
---
WATCHES/WARNINGS IN EFFECT FOR SOUTHERN ONTARIO...

SNOW SQUALL WATCH FOR:
=NEW= MOUNT FOREST - ARTHUR - NORTHERN WELLINGTON COUNTY
=NEW= ORANGEVILLE - GRAND VALLEY - SOUTHERN DUFFERIN COUNTY
WOODSTOCK - TILLSONBURG - OXFORD COUNTY
NEWMARKET - GEORGINA - NORTHERN YORK REGION
LISTOWEL - MILVERTON - NORTHERN PERTH COUNTY
SHELBURNE - MANSFIELD - NORTHERN DUFFERIN COUNTY
GREY - BRUCE
MIDLAND - COLDWATER - ORR LAKE
ORILLIA - LAGOON CITY - WASHAGO.

SNOW SQUALLS POSSIBLE TODAY AND BECOMING
ISOLATED BUT INTENSIFYING TONIGHT.

SNOW SQUALL WARNING FOR:
WATFORD - PINERY PARK - EASTERN LAMBTON COUNTY
ELGIN
LONDON - MIDDLESEX
GODERICH - BLUEWATER - SOUTHERN HURON COUNTY
WINGHAM - BLYTH - NORTHERN HURON COUNTY
STRATFORD - MITCHELL - SOUTHERN PERTH COUNTY
INNISFIL - NEW TECUMSETH - ANGUS
BARRIE - COLLINGWOOD - HILLSDALE.

SNOW SQUALLS INTENSIFYING THIS AFTERNOON AND TONIGHT.

Courtesy Dave Colvin, Emergency Management London

# But a few days later…?!?



PRESCOTT JOURNAL

The JournalNEWS

## Small twister destroys silo on Charleville Road farm

### *"It felt like being in the Wizard of Oz. It's something I don't ever want to witness again."*

Mother Nature has left an area farmer with a hefty bill and a herd of cattle wondering where their next meal will be coming from.

Around 3:00 pm Saturday afternoon Dwight Shannon had just finishing his daily feeding routine of unloading silage to his beef cattle on the family owned Century Farm located on Charleville Rd. It was certainly not a new experience for Shannon. He had been using the silo since its construction in 1978. What happened next however was most definitely a bit out of the ordinary. A mere fifteen minutes later, a funnel cloud twisted across the farm and destroyed the silo.

For Sheena Goncewski who rents the adjacent farm house, it was a birthday party for children will never forget. "We had been watching the dark clouds across the woods for a while, and just assumed it was the snow we were supposed to be getting. Then it started to hail and the kids went outside to play with it and catch it in their hands. A few minutes later, it was like a complete white out. When the white out ended, the wind started. The wind was so strong that the kids (who had returned indoors) couldn't even push the door shut and had to get an adult to shut it."

It was then that the party guests saw a funnel cloud in the distance making its way towards the farm. One of them commented on the way it was picking up twigs and branches en route towards the barnyard.

"Then I saw it pick up the roof of the silo and lift it into the field.. and then the silo began to collapse in to itself. It was a weird feeling. The whole house was shaking. It felt like being in the Wizard of Oz. It's something I don't ever want to witness again."

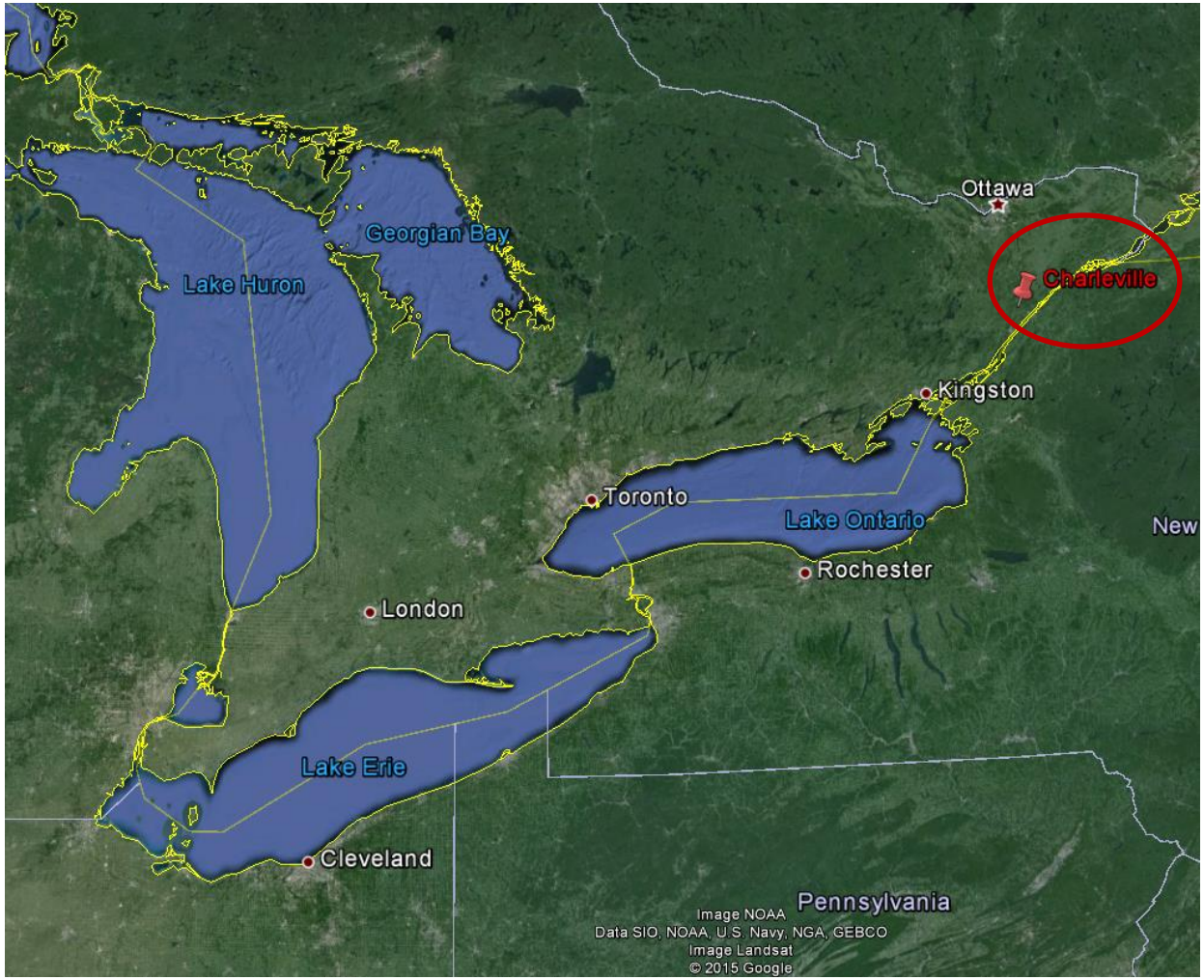
While there was minimal damage to the chimney of the house and also to a few other homes on the stretch of road, it was the silo that sustained the brunt of destruction from the twister. The once 80 ft. structure was reduced to a crumbling mass of concrete slabs and metal. The roof landed a good 100 ft across the pasture. Ontario Hydro workers were called to the scene to deal with the electrical issues caused from the wires supplying the silo being torn from poles.

While the damage is extensive (and he has no insurance for this type of destruction), Dwight Shannon is glad that there were no injuries as a result of the event. Moving forward he awaits the arrival of a team that will share up any immediate danger from the remnants of the storm's effect on the structure, and then move forward with a plan for replacement.

The remnants of a silo roof rests in a field where it was deposited by a twister that destroyed the remainder of the structure on the Shannon Family Farm.

Dwight and grandson Ryan Shannon stand amongst the rubble left behind in the wake of the storm.

# 23 Nov 2013 EF1 @ Charleville



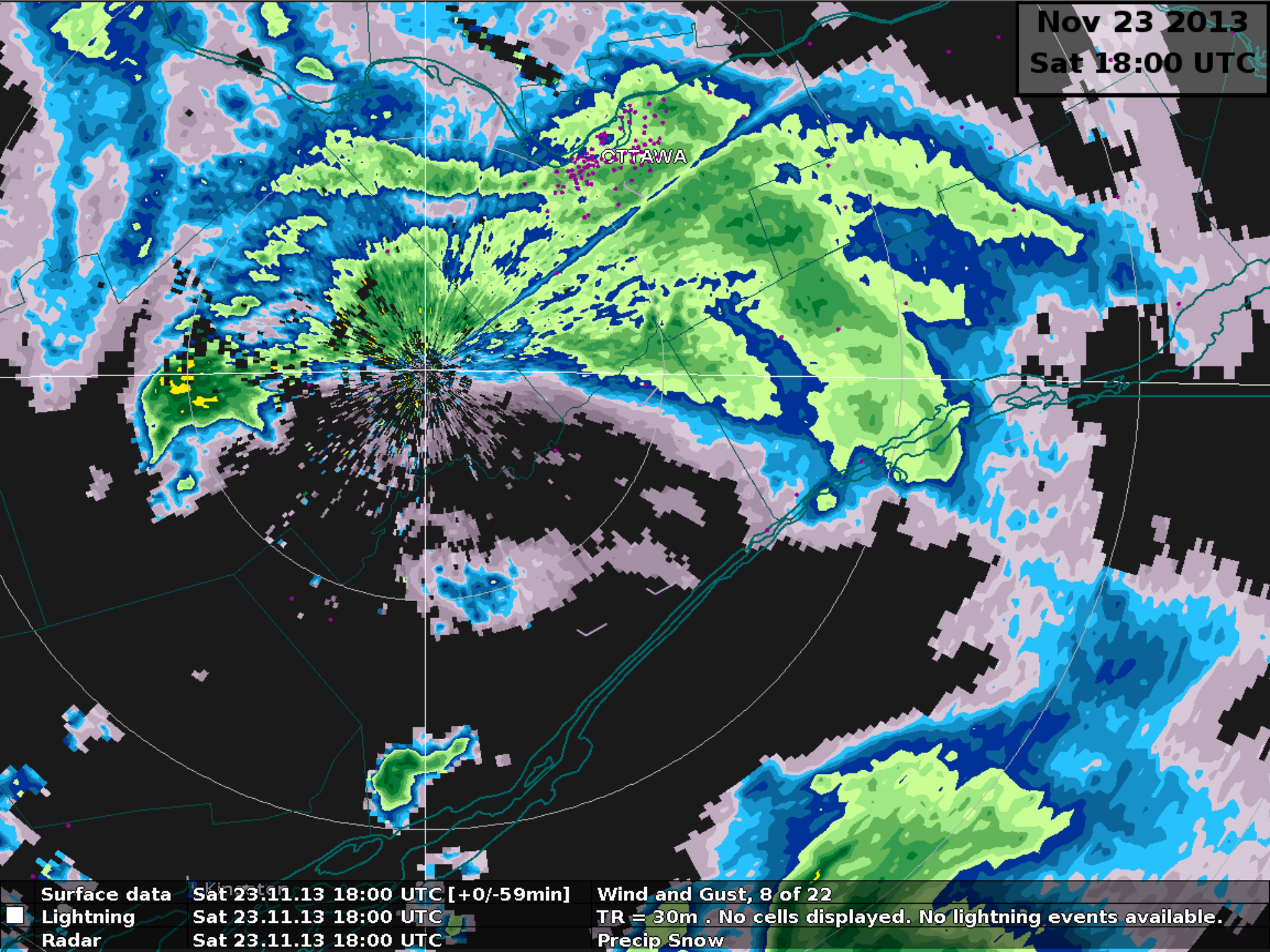
# 23 Nov 2013 EF1 @ Charleville

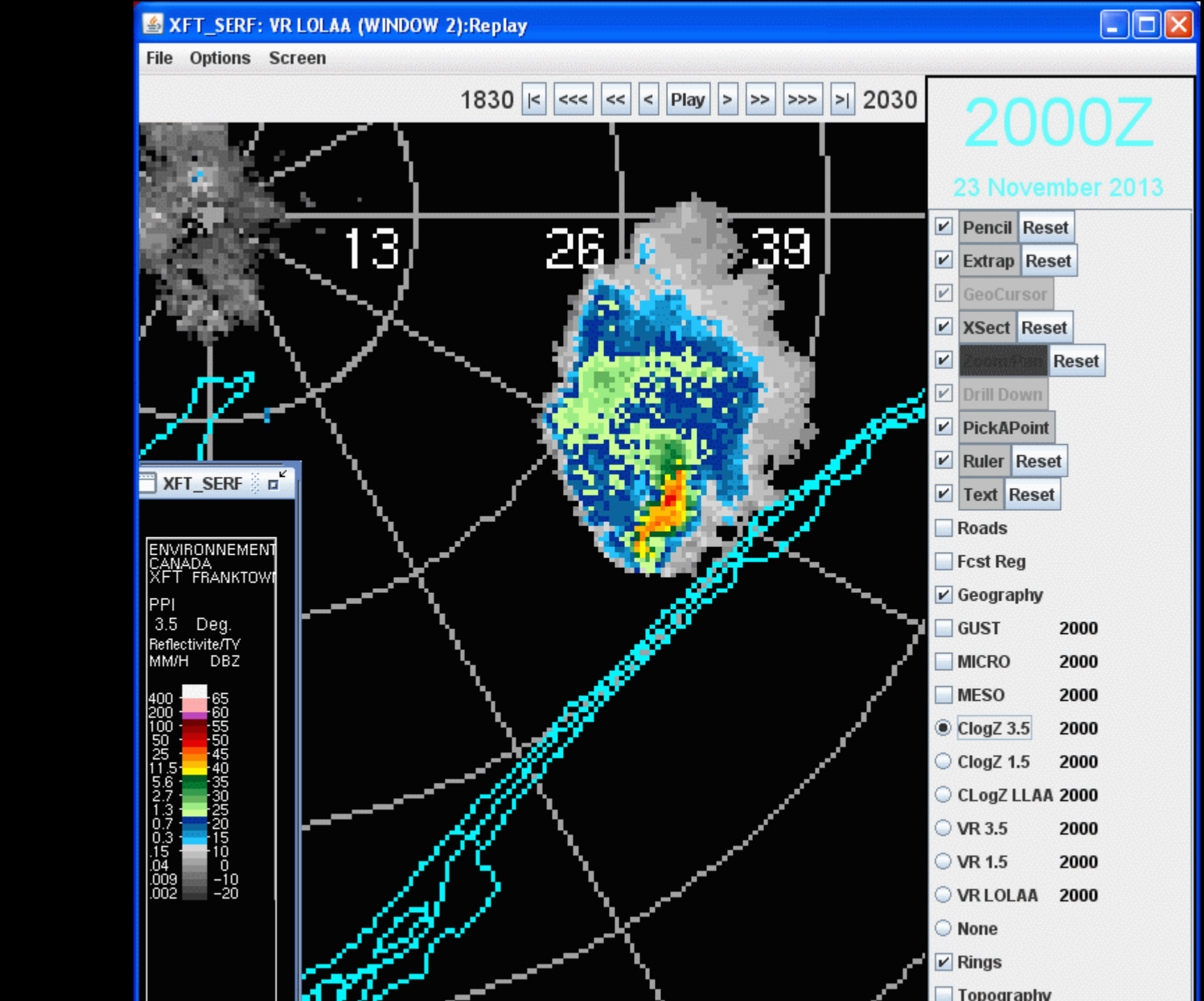
# 23 Nov 2013 EF1 @ Charleville

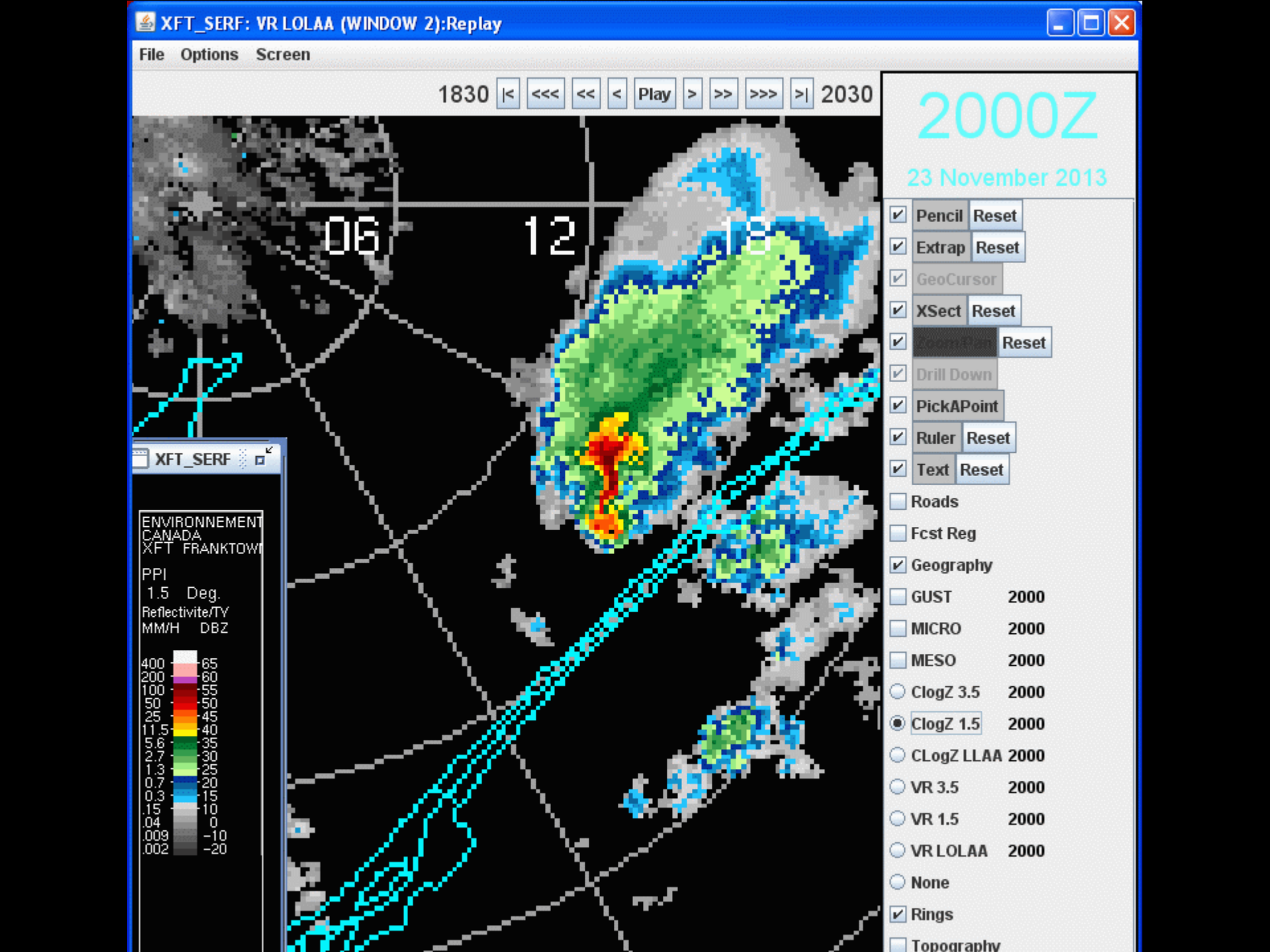

- 270 m track from 325º beginning 3:15 PM local
- Empty portion of 25 m silo (in good condition) destroyed, barn damaged, trees damaged

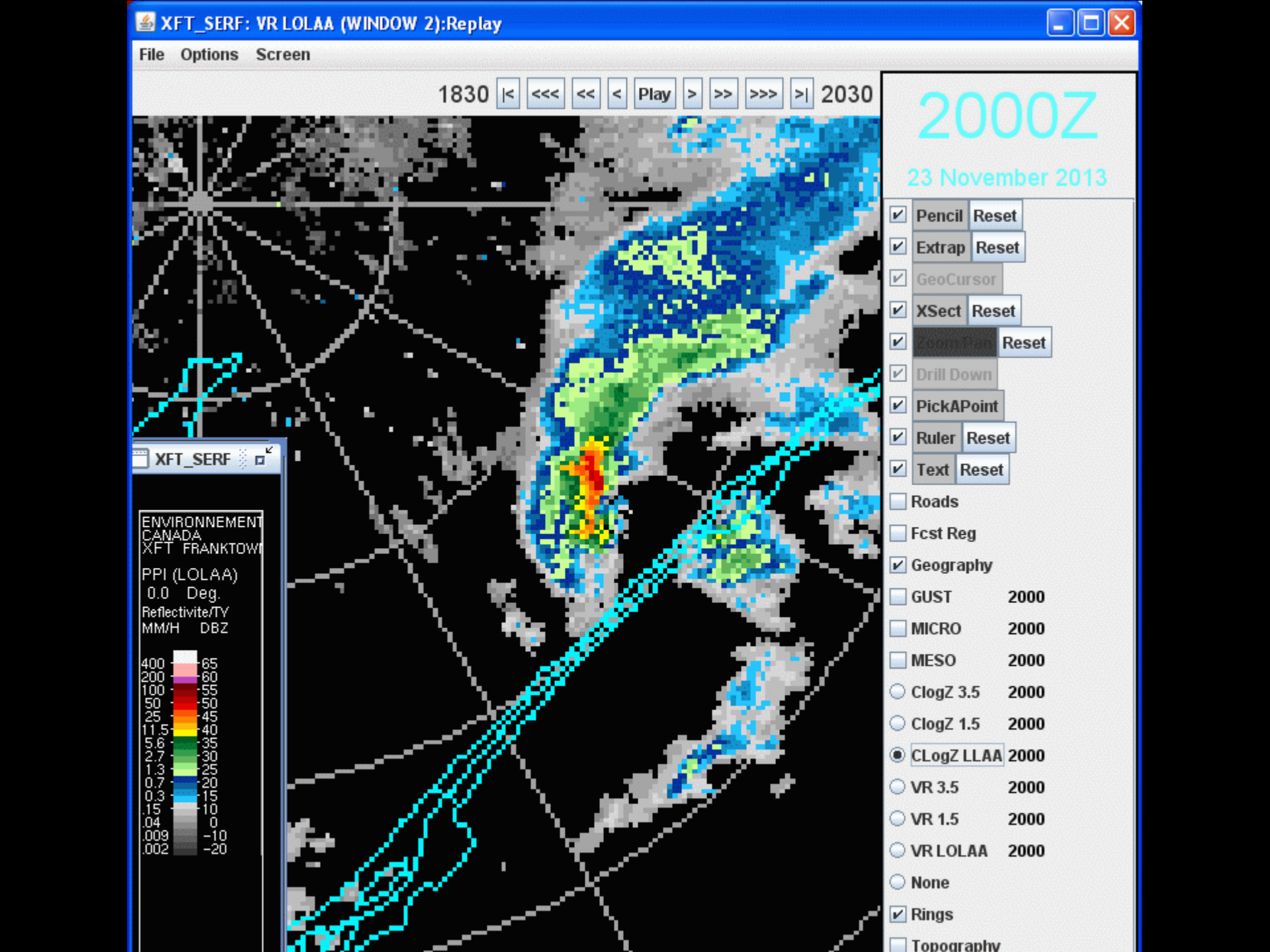
# Eyewitness Descriptions

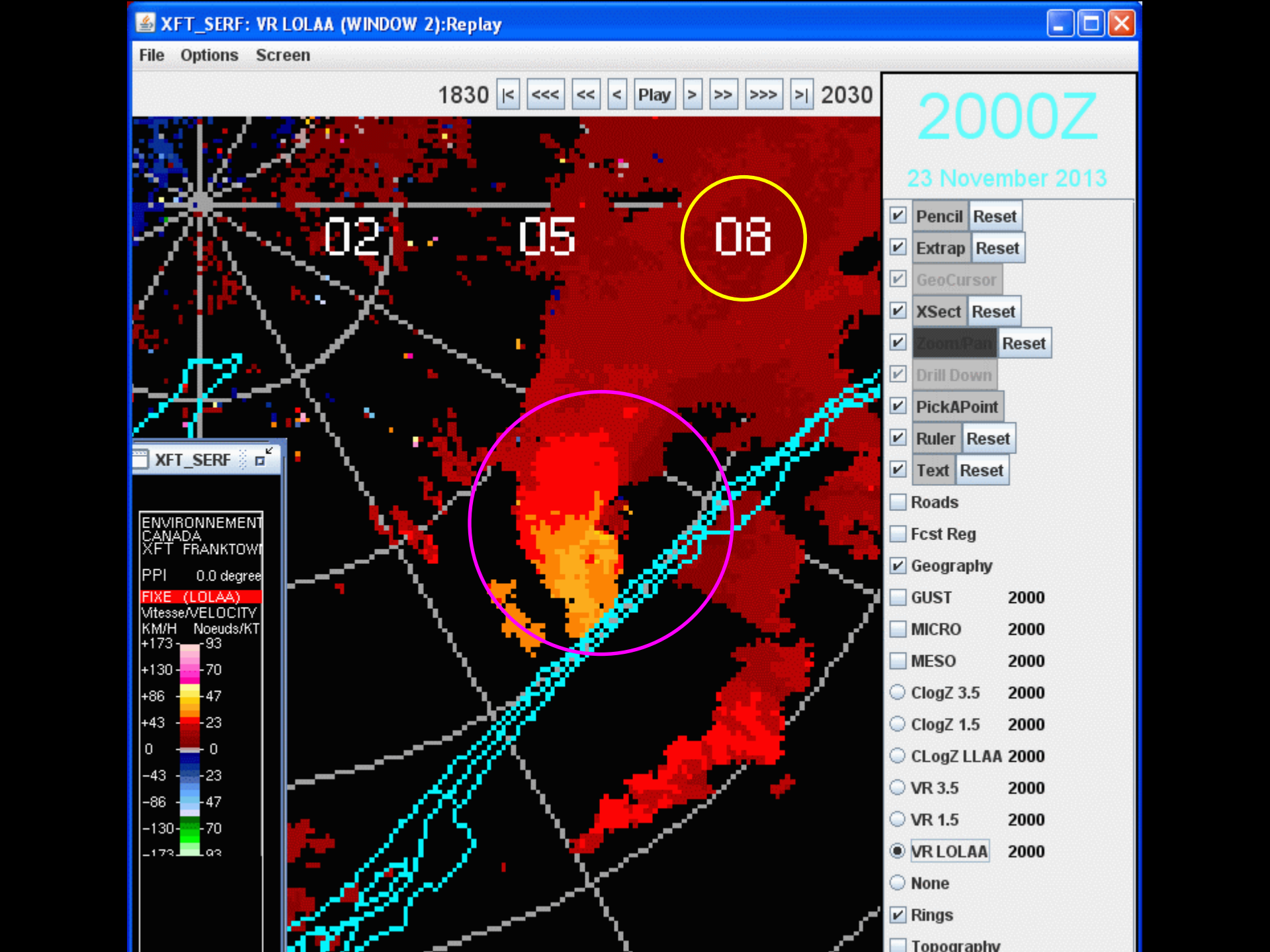
- Children at party let out to catch falling ‘hail’ in mitts
- Wind blowing away from the dark clouds to west then wind suddenly shifted towards them
- Children quickly taken inside as sudden whiteout occurred
- After ‘hail’ stopped, funnel cloud with debris at base ‘came out of nowhere’, damaging barn, house and trees
- Lifted top 60% of 25 m concrete silo 3 m into the air before smashing it to ground
- One witness said no rain at all, only snow/frozen ice particles about 1 cm in diameter (emphasized that they were *not* hail)

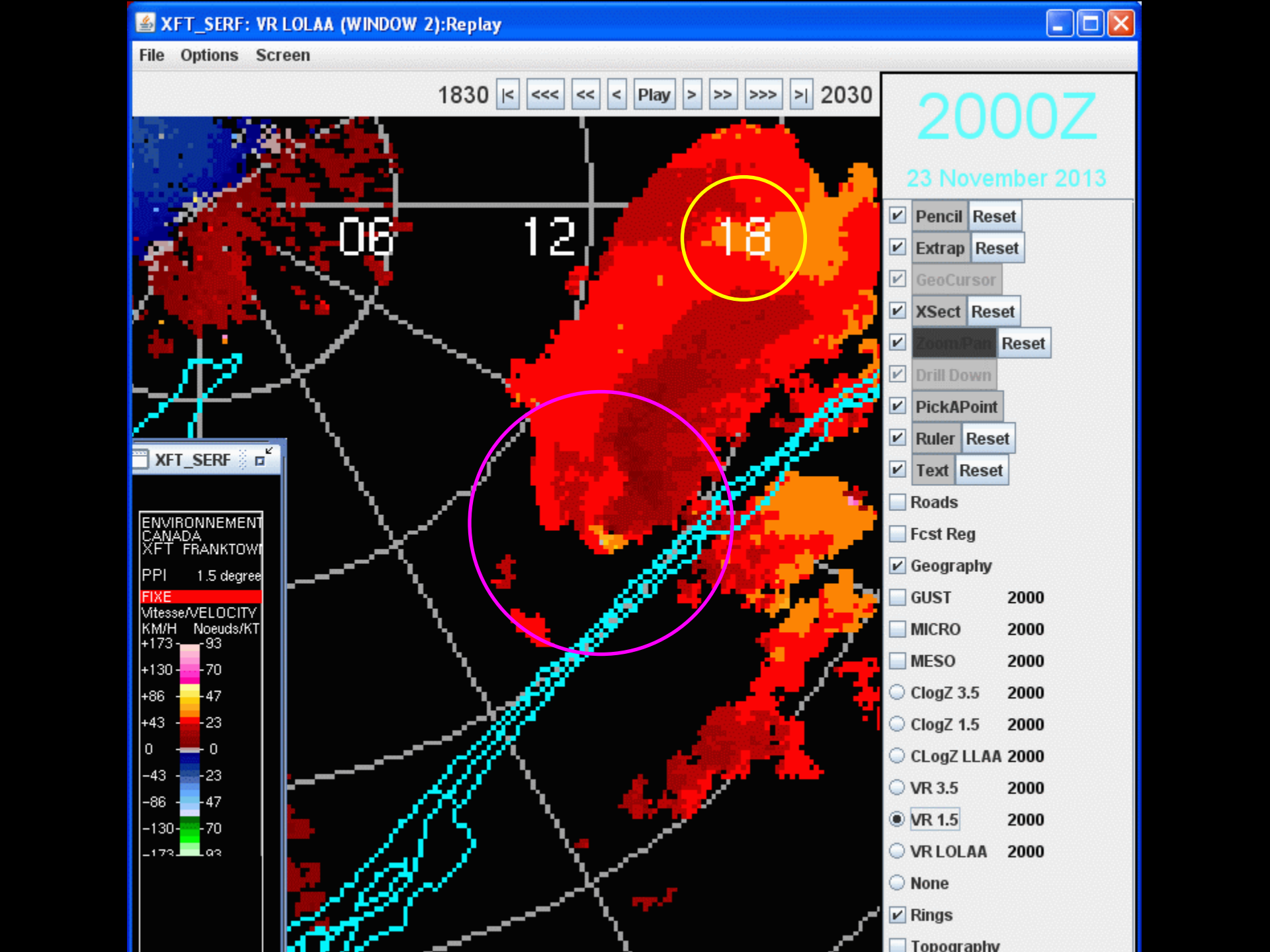

Nov 23 2013
Sat 18:00 UTC
OTTAWA
Surface data Sat 23.11.13 18:00 UTC [+0/-59min]
Wind and Gust, 8 of 22
Lightning Sat 23.11.13 18:00 UTC
TR = 30m . No cells displayed. No lightning events available.
Radar Sat 23.11.13 18:00 UTC
Precip Snow

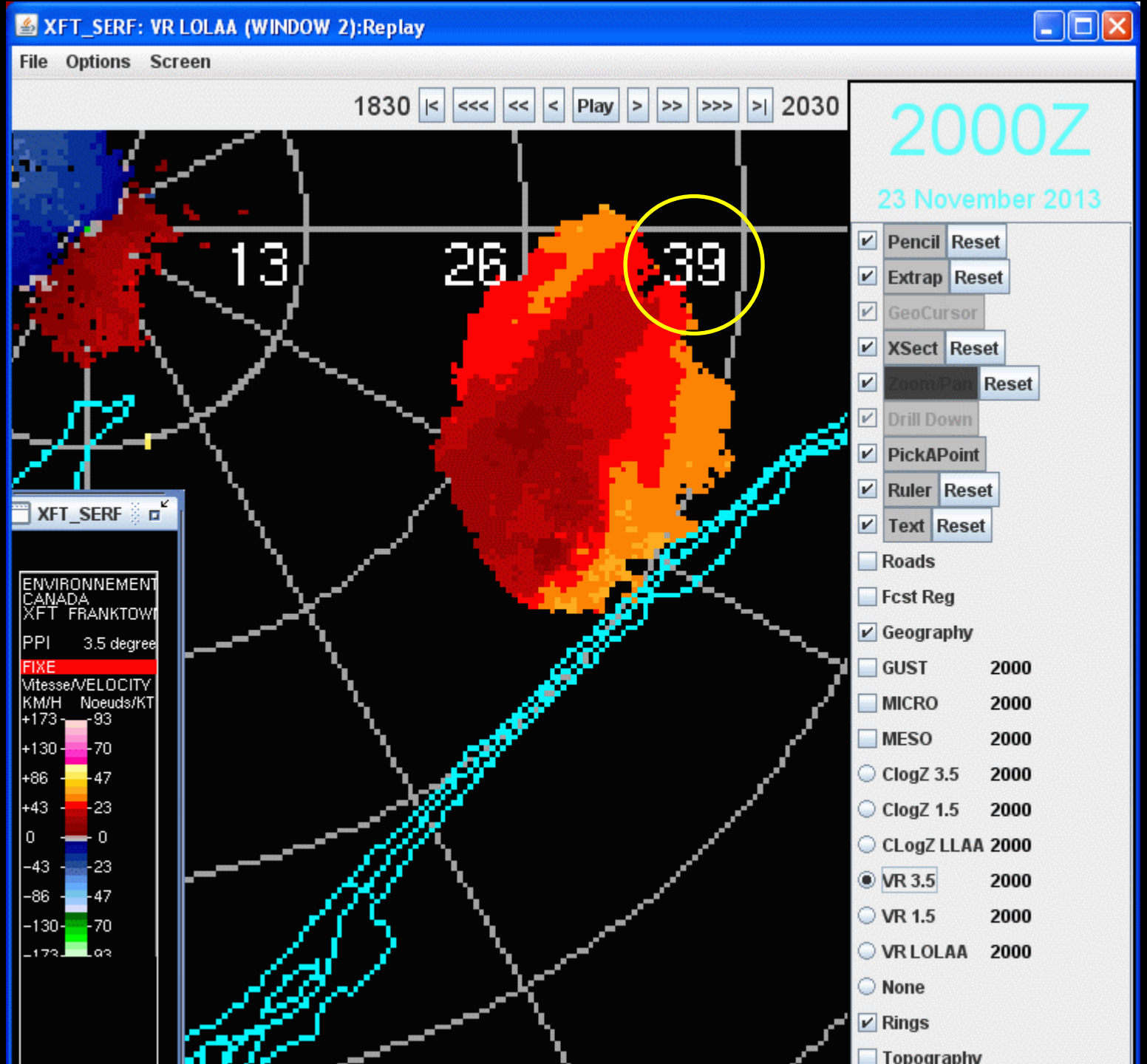

XFT_SERF: VR LOLAA (WINDOW 2):Replay
File
Options
Screen
1830
|<
<<<
<<
<
Play
>
>>
>>>
>|
2030
2000Z
23 November 2013
13
26
39
Pencil
Reset
Extrap
Reset
GeoCursor
XSect
Reset
Reset
Drill Down
PickAPoint
Ruler
Reset
Text
Reset
Roads
Fcst Reg
Geography
GUST 2000
MICRO 2000
MESO 2000
ClogZ 3.5 2000
ClogZ 1.5 2000
CLogZ LLAA 2000
VR 3.5 2000
VR 1.5 2000
VR LOLAA 2000
None
Rings
Topography
XFT_SERF
ENVIRONNEMENT
CANADA
XFT FRANKTOWN
PPI
3.5 Deg.
Reflectivite/TY
MM/H DBZ
400 65
200 60
100 55
50 50
25 45
11.5 40
5.6 35
2.7 30
1.3 25
0.7 20
0.3 15
.15 10
.04 0
.009 -10
.002 -20


XFT_SERF: VR LOLAA (WINDOW 2):Replay
File
Options
Screen
1830
|<
<<<
<<
<
Play
>
>>
>>>
>|
2030
2000Z
23 November 2013
06
12
18
Pencil
Reset
Extrap
Reset
GeoCursor
XSect
Reset
Reset
Drill Down
PickAPoint
Ruler
Reset
Text
Reset
Roads
Fcst Reg
Geography
GUST 2000
MICRO 2000
MESO 2000
ClogZ 3.5 2000
ClogZ 1.5 2000
CLogZ LLAA 2000
VR 3.5 2000
VR 1.5 2000
VR LOLAA 2000
None
Rings
Topography
XFT_SERF
ENVIRONNEMENT
CANADA
XFT FRANKTOWN
PPI
1.5 Deg.
Reflectivite/TV
MM/H DBZ
400 65
200 60
100 55
50 50
25 45
11.5 40
5.6 35
2.7 30
1.3 25
0.7 20
0.3 15
.15 10
.04 0
.009 -10
.002 -20

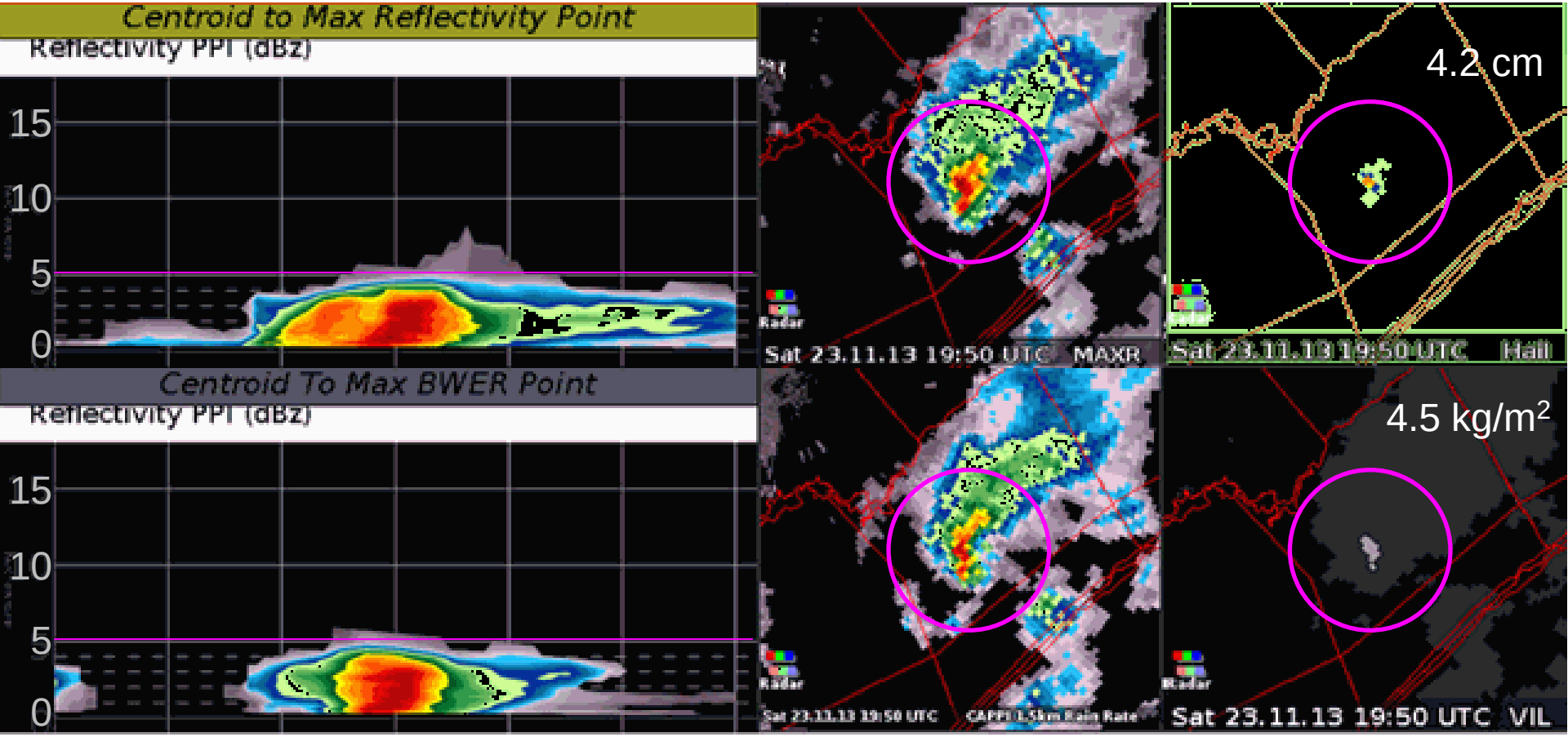

XFT_SERF: VR LOLAA (WINDOW 2):Replay
File
Options
Screen
1830
|<
<<<
<<
<
Play
>
>>
>>>
>|
2030
2000Z
23 November 2013
Pencil
Reset
Extrap
Reset
GeoCursor
XSect
Reset
Reset
Drill Down
PickAPoint
Ruler
Reset
Text
Reset
Roads
Fcst Reg
Geography
GUST 2000
MICRO 2000
MESO 2000
ClogZ 3.5 2000
ClogZ 1.5 2000
CLogZ LLAA 2000
VR 3.5 2000
VR 1.5 2000
VR LOLAA 2000
None
Rings
Topography
XFT_SERF
ENVIRONNEMENT
CANADA
XFT FRANKTOWN
PPI (LOLAA)
0.0 Deg.
Reflectivite/TV
MM/H DBZ
400 65
200 60
100 55
50 50
25 45
11.5 40
5.6 35
2.7 30
1.3 25
0.7 20
0.3 15
.15 10
.04 0
.009 -10
.002 -20


XFT_SERF: VR LOLAA (WINDOW 2):Replay
File
Options
Screen
1830
|<
<<<
<<
<
Play
>
>>
>>>
>|
2030
2000Z
23 November 2013
02
05
08
Pencil
Reset
Extrap
Reset
GeoCursor
XSect
Reset
Zoom/Pan
Reset
Drill Down
PickAPoint
Ruler
Reset
Text
Reset
Roads
Fcst Reg
Geography
GUST 2000
MICRO 2000
MESO 2000
ClogZ 3.5 2000
ClogZ 1.5 2000
CLogZ LLAA 2000
VR 3.5 2000
VR 1.5 2000
VR LOLAA 2000
None
Rings
Topography
XFT_SERF
ENVIRONNEMENT CANADA
XFT FRANKTOWN
PPI 0.0 degree
FIXE (LOLAA)
Vitesse/VELOCITY
KM/H Noeuds/KT
+173 93
+130 70
+86 47
+43 23
0 0
-43 23
-86 47
-130 70


XFT_SERF: VR LOLAA (WINDOW 2):Replay
File
Options
Screen
1830
|<
<<<
<<
<
Play
>
>>
>>>
>|
2030
2000Z
23 November 2013
06
12
18
Pencil
Reset
Extrap
Reset
GeoCursor
XSect
Reset
Zoom/Pan
Reset
Drill Down
PickAPoint
Ruler
Reset
Text
Reset
Roads
Fcst Reg
Geography
GUST 2000
MICRO 2000
MESO 2000
ClogZ 3.5 2000
ClogZ 1.5 2000
CLogZ LLAA 2000
VR 3.5 2000
VR 1.5 2000
VR LOLAA 2000
None
Rings
Topography
XFT_SERF
ENVIRONNEMENT CANADA
XFT FRANKTOWN
PPI 1.5 degree
FIXE
Vitesse/VELOCITY
KM/H Noeuds/KT
+173 93
+130 70
+86 47
+43 23
0 0
-43 23
-86 47
-130 70

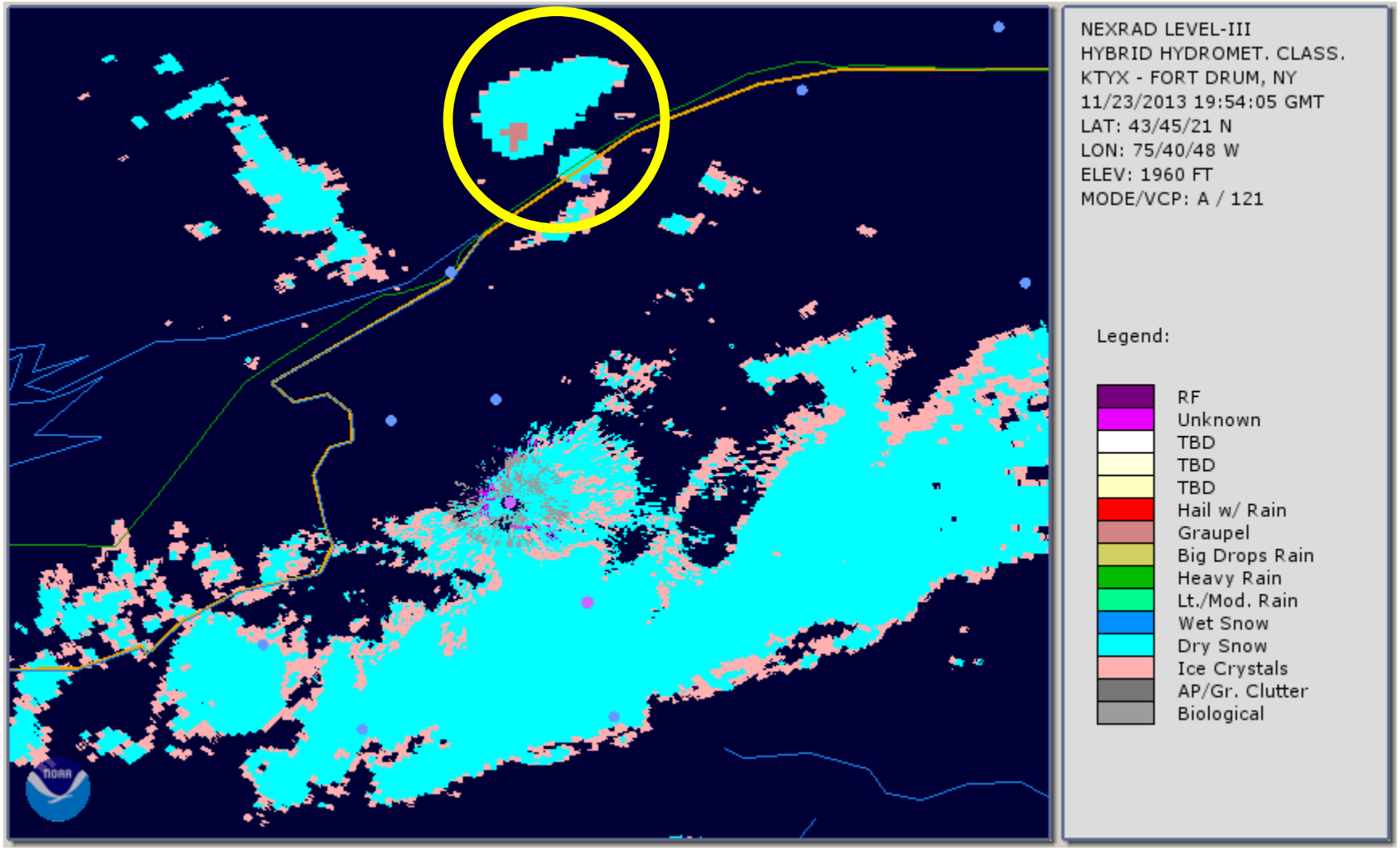

XFT_SERF: VR LOLAA (WINDOW 2):Replay
File
Options
Screen
1830
|<
<<<
<<
<
Play
>
>>
>>>
>|
2030
2000Z
23 November 2013
13
26
39
Pencil
Reset
Extrap
Reset
GeoCursor
XSect
Reset
Zoom/Pan
Reset
Drill Down
PickAPoint
Ruler
Reset
Text
Reset
Roads
Fcst Reg
Geography
GUST 2000
MICRO 2000
MESO 2000
ClogZ 3.5 2000
ClogZ 1.5 2000
CLogZ LLAA 2000
VR 3.5 2000
VR 1.5 2000
VR LOLAA 2000
None
Rings
Topography
XFT_SERF
ENVIRONNEMENT
CANADA
XFT FRANKTOWN
PPI 3.5 degree
FIXE
Vitesse/VELOCITY
KM/H Noeuds/KT
+173 93
+130 70
+86 47
+43 23
0 0
-43 23
-86 47
-130 70

# (Very) Low-topped Supercell



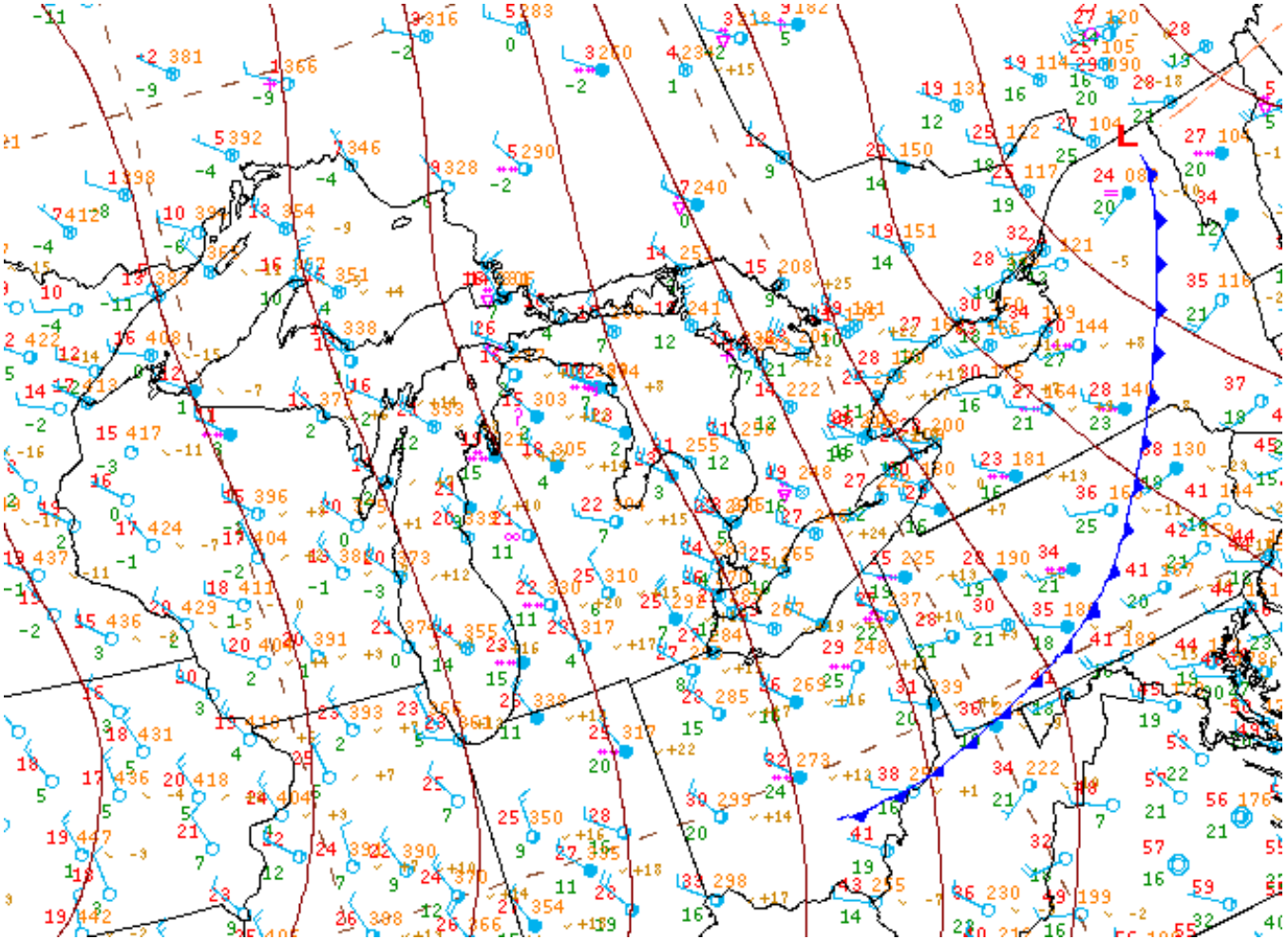

- Echo Top ~ 5 km, weak echo region,
- Hail algorithm = 4.2 cm, Max VIL = 4.5 kg/m$^2$
- 1 MESO detection, no lightning recorded by CLDN

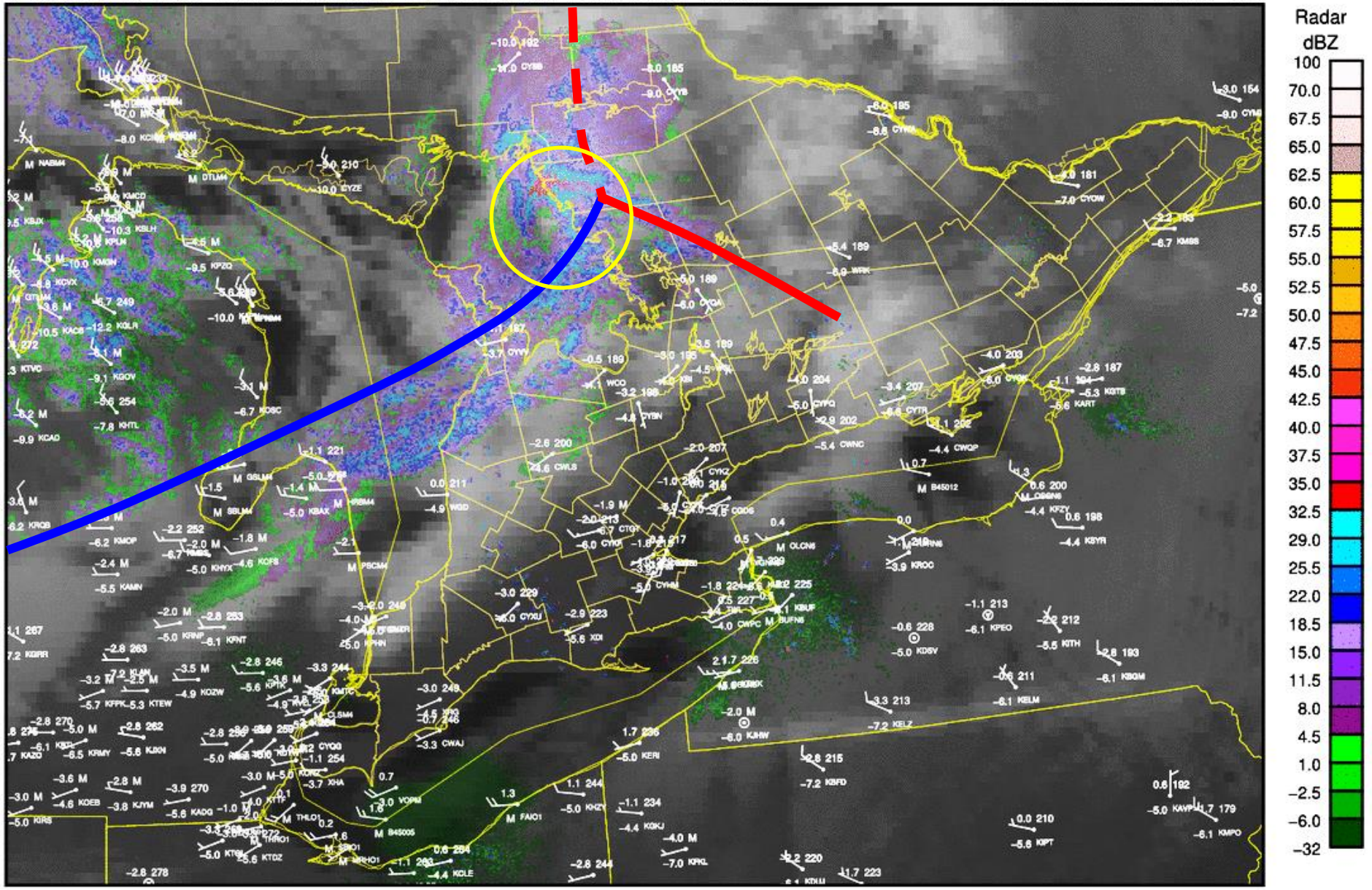
# KTYX Hydrometeor Classification

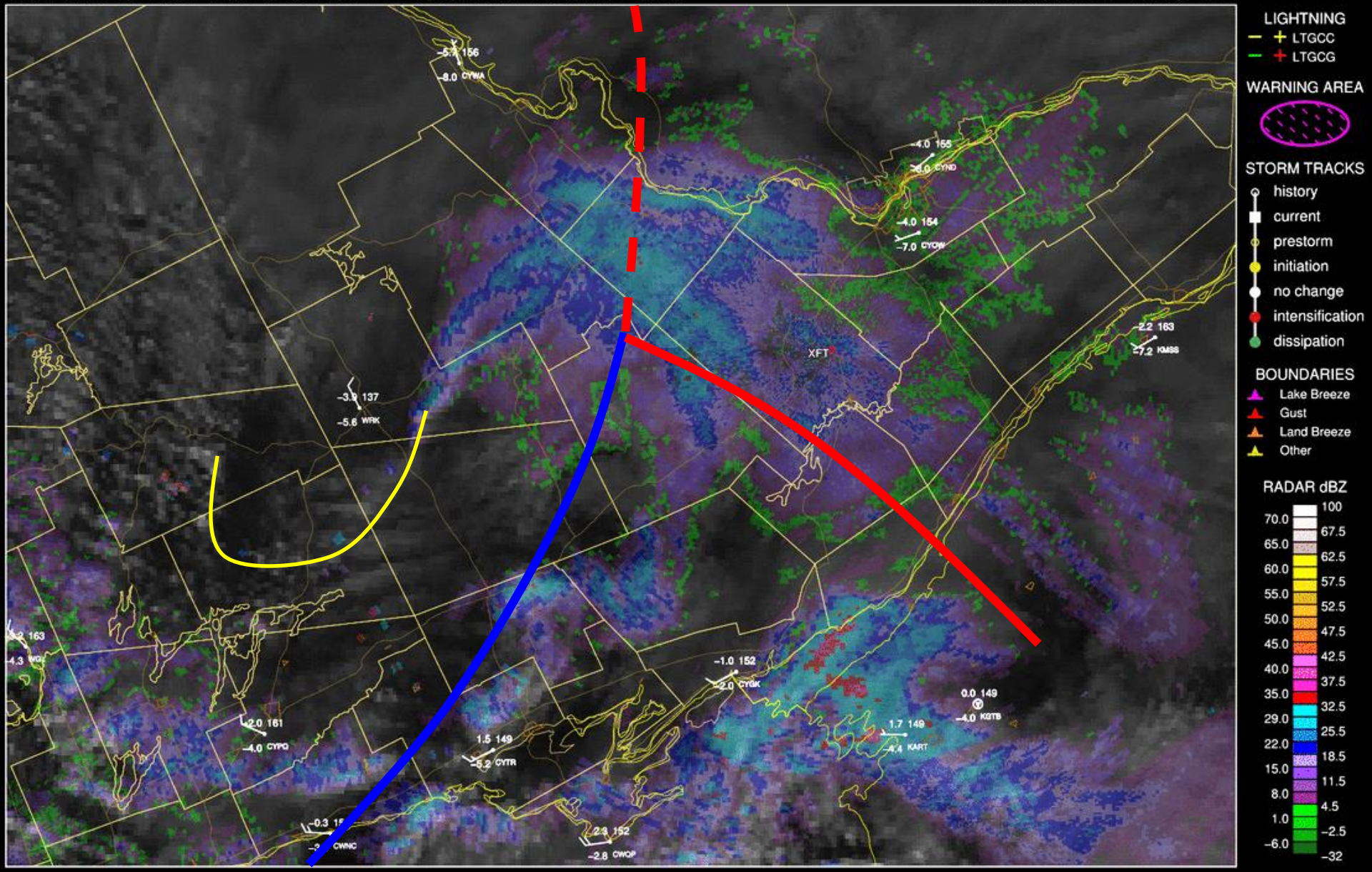


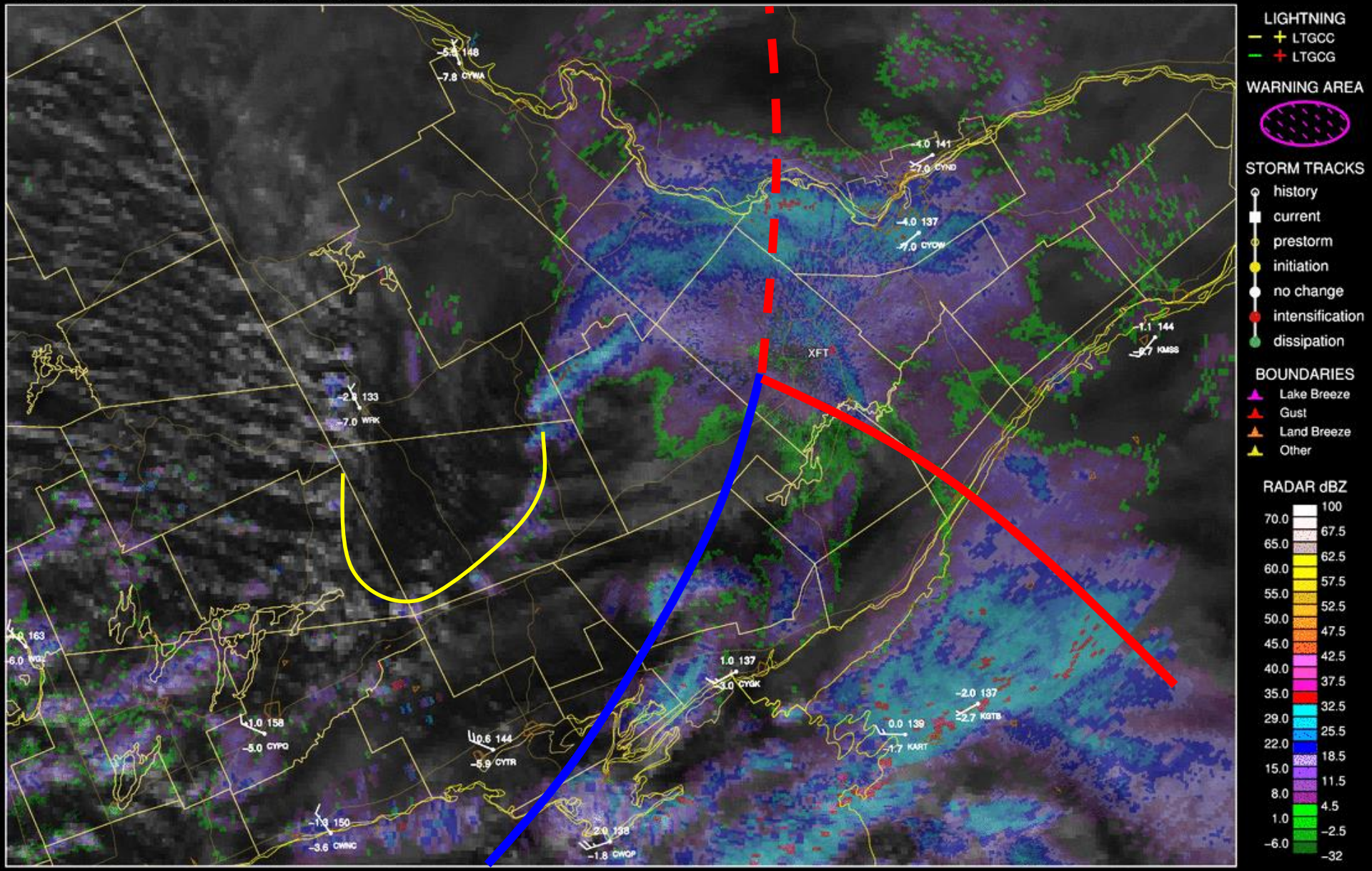

- Dry snow with a graupel core!

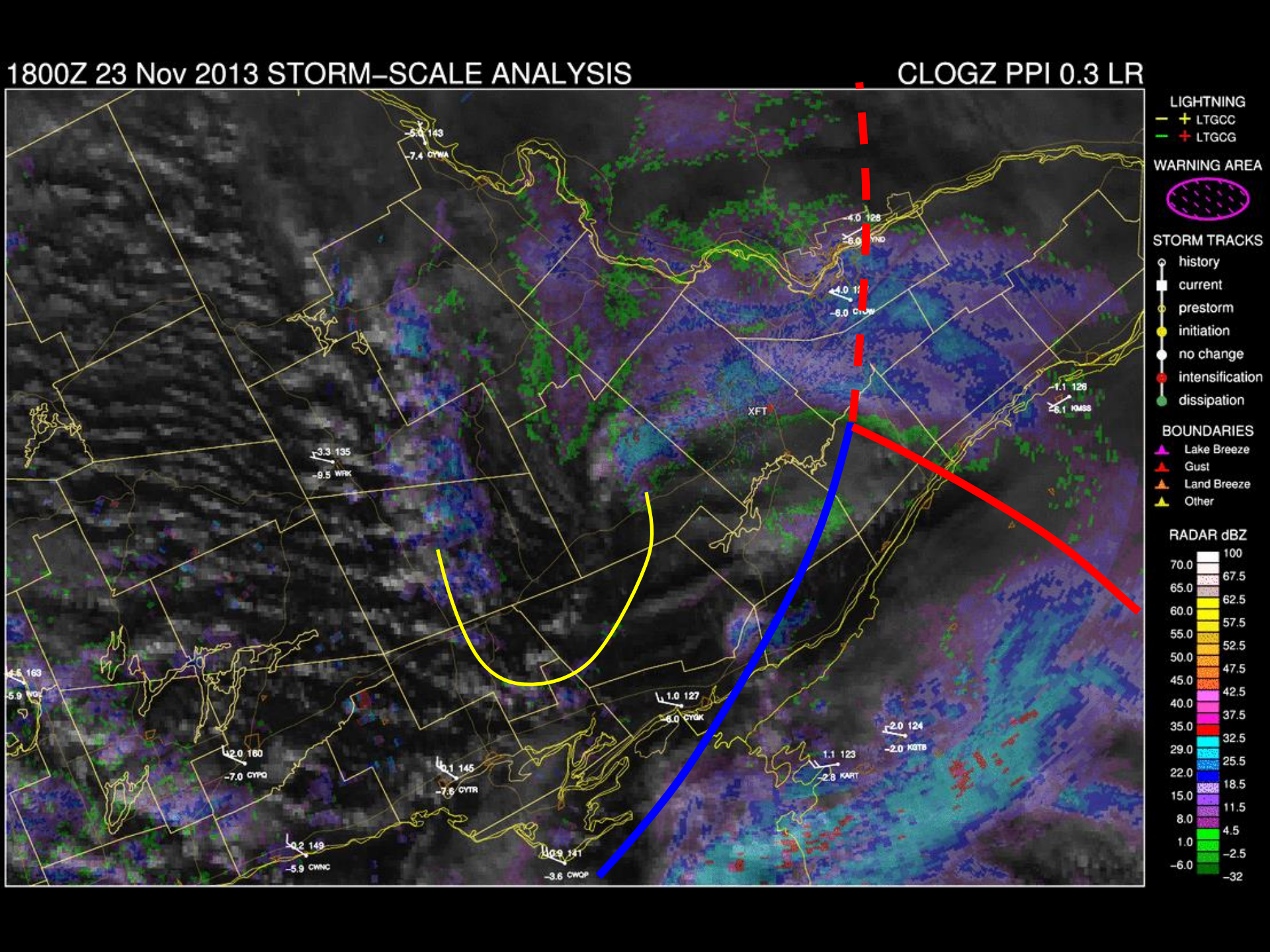
# WPC Surface Analysis @ 21Z

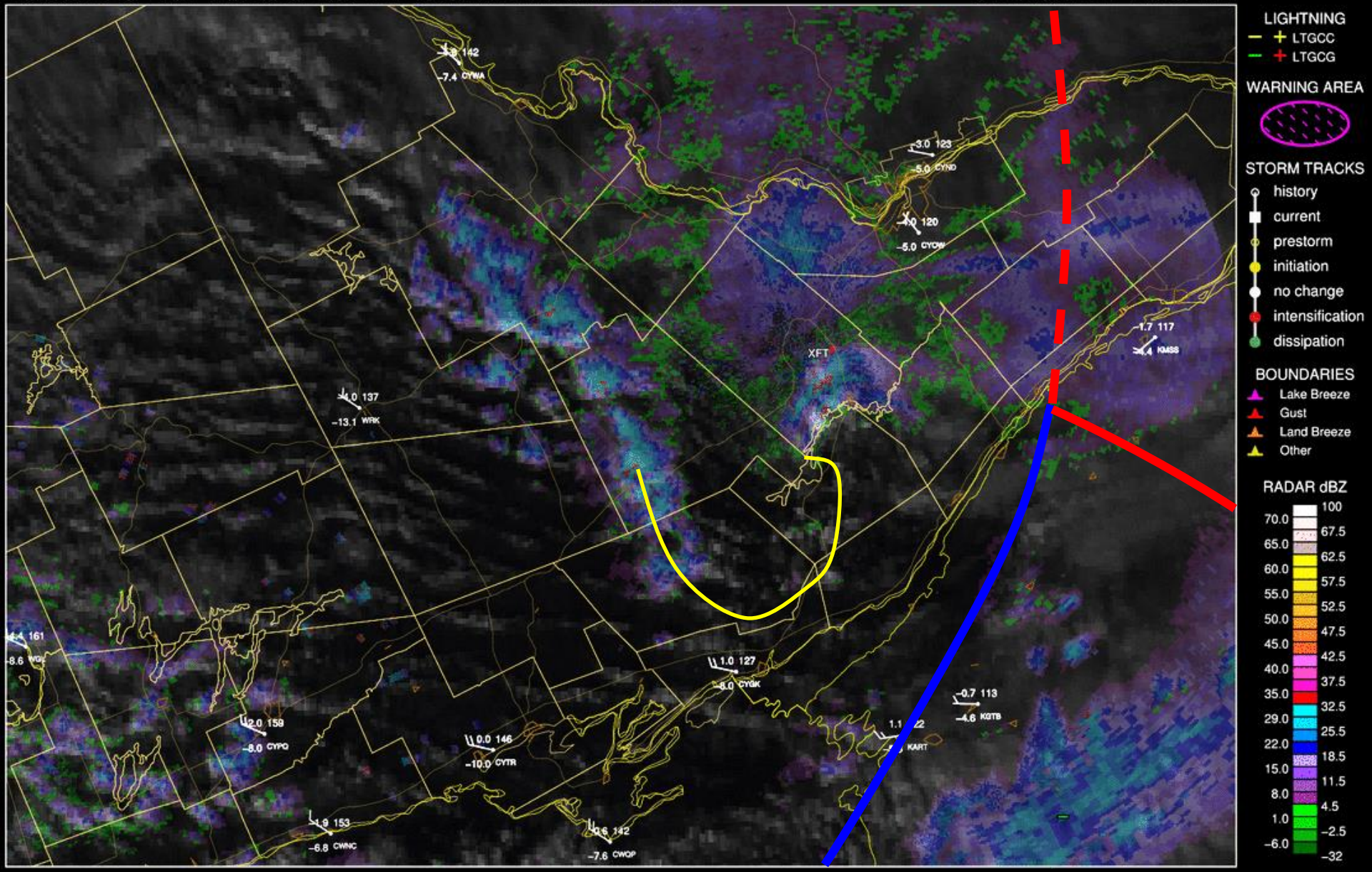


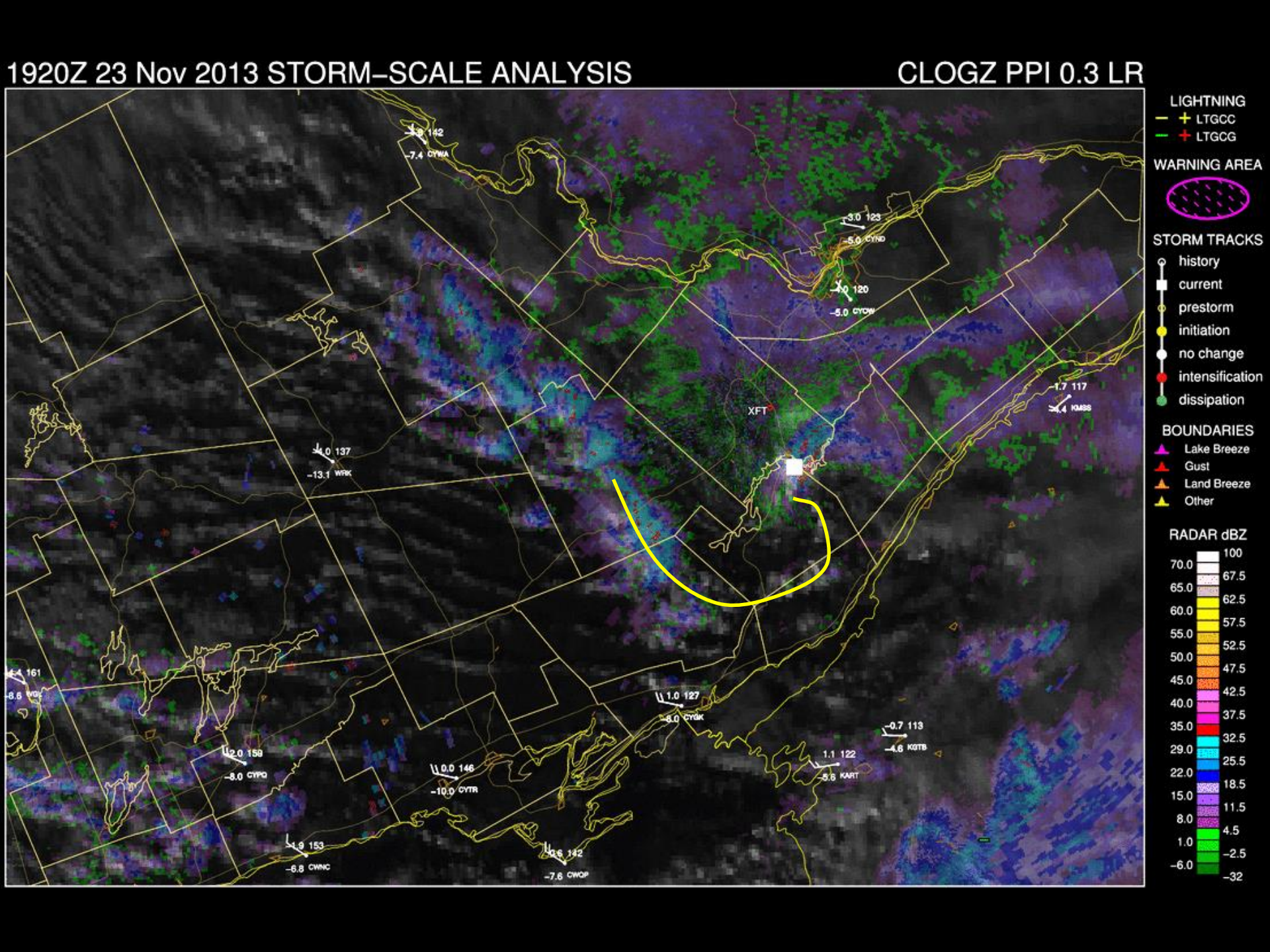

1100Z 23 Nov 2013 MESOANALYSIS / Summer Auto
CLOGZ PPI 0.3 LR
Radar
dBZ
100
70.0
67.5
65.0
62.5
60.0
57.5
55.0
52.5
50.0
47.5
45.0
42.5
40.0
37.5
35.0
32.5
29.0
25.5
22.0
18.5
15.0
11.5
8.0
4.5
1.0
-2.5
-6.0
-32

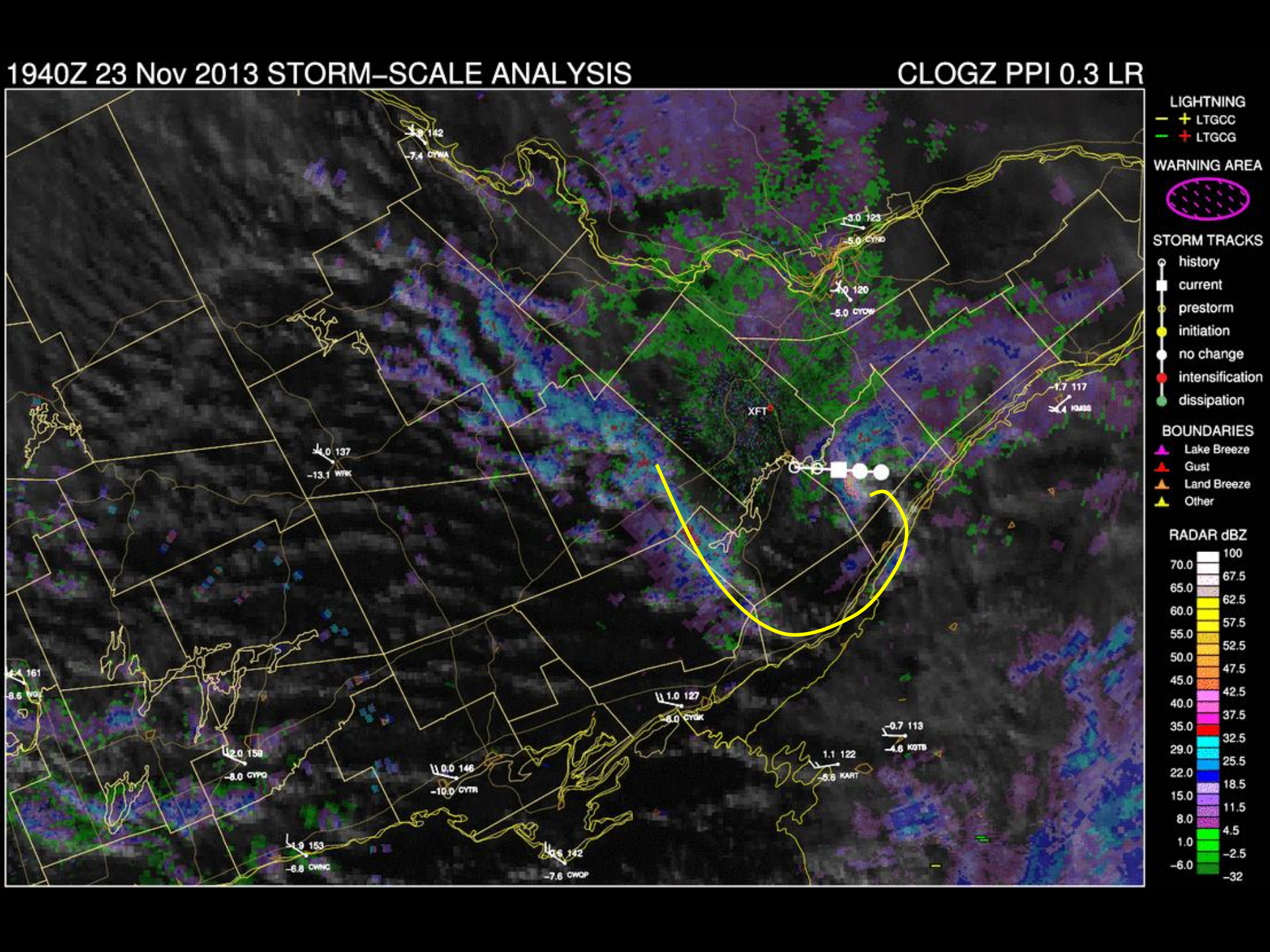

1610Z 23 Nov 2013 STORM–SCALE ANALYSIS
CLOGZ PPI 0.3 LR
LIGHTNING
LTGCC
LTGCG
WARNING AREA
STORM TRACKS
history
current
prestorm
initiation
no change
intensification
dissipation
BOUNDARIES
Lake Breeze
Gust
Land Breeze
Other
RADAR dBZ
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
29.0
22.0
15.0
8.0
1.0
−6.0
100
67.5
62.5
57.5
52.5
47.5
42.5
37.5
32.5
25.5
18.5
11.5
4.5
−2.5
−32
−5.7 156
−8.0 CYWA
−4.0 155
−8.0 CYND
−4.0 154
−7.0 CYOW
−2.2 163
−7.2 KMSS
XFT
−3.9 137
−5.6 WRK
−1.0 152
−2.0 CYGK
0.0 149
−4.0 KGTB
1.7 149
−4.4 KART
2.0 161
−4.0 CYPQ
1.5 149
−5.2 CYTR
−0.3 15
CWNC
2.3 152
−2.8 CWQP

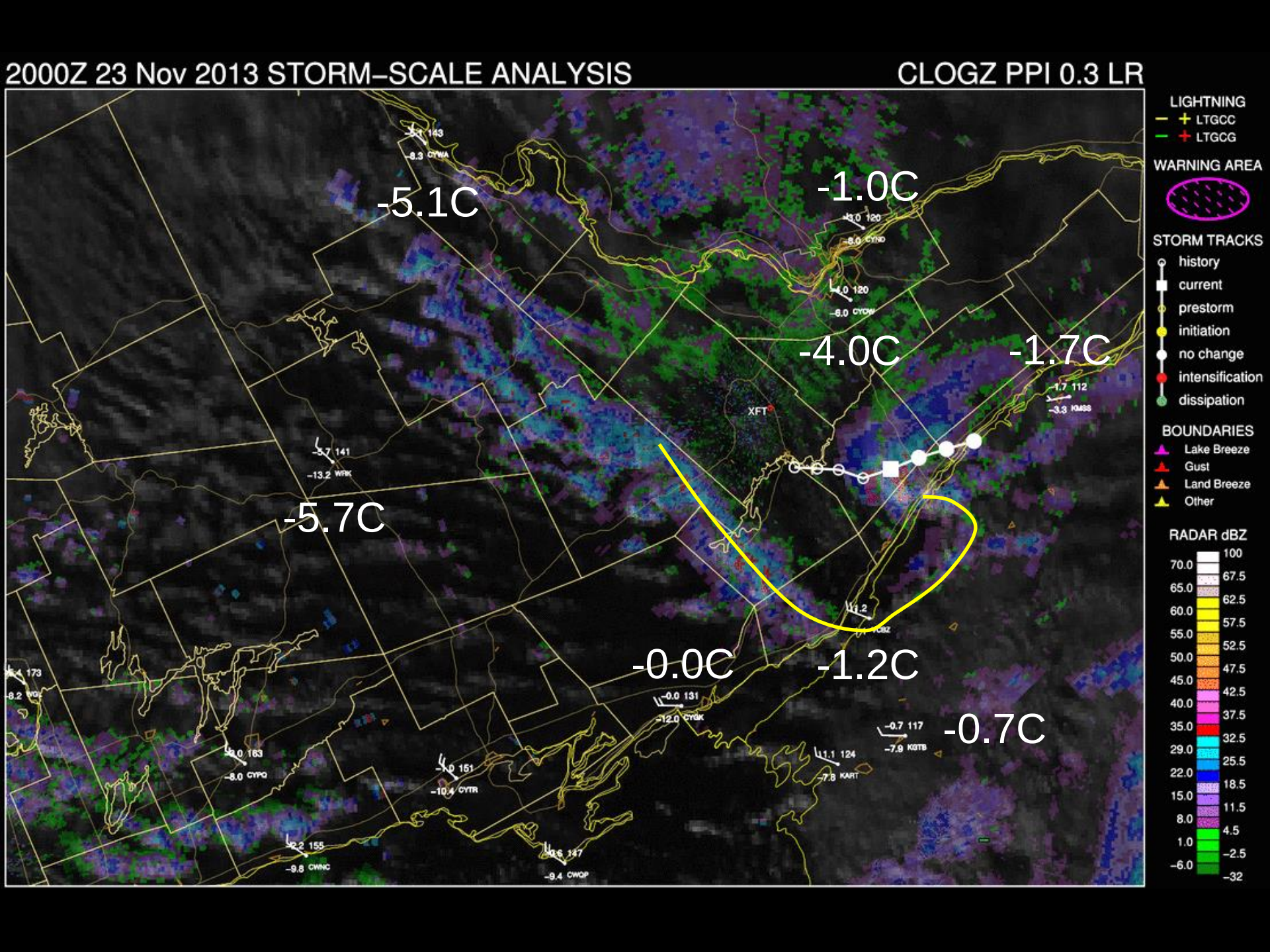

1700Z 23 Nov 2013 STORM–SCALE ANALYSIS
CLOGZ PPI 0.3 LR
LIGHTNING
LTGCC
LTGCG
WARNING AREA
STORM TRACKS
history
current
prestorm
initiation
no change
intensification
dissipation
BOUNDARIES
Lake Breeze
Gust
Land Breeze
Other
RADAR dBZ
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
29.0
22.0
15.0
8.0
1.0
−6.0
100
67.5
62.5
57.5
52.5
47.5
42.5
37.5
32.5
25.5
18.5
11.5
4.5
−2.5
−32
XFT
−4.0 141
−7.0 CYND
−4.0 137
−7.0 CYOW
−1.1 144
−2.7 KMSS
−7.8 CYWA
−2.9 133
−7.0 WRK
1.0 137
−3.0 CYGK
−2.0 137
−2.7 KGTB
0.0 139
−1.7 KART
1.0 158
−5.0 CYPQ
0.6 144
−5.9 CYTR
−1.3 150
−3.6 CWNC
2.0 138
−1.8 CWQP

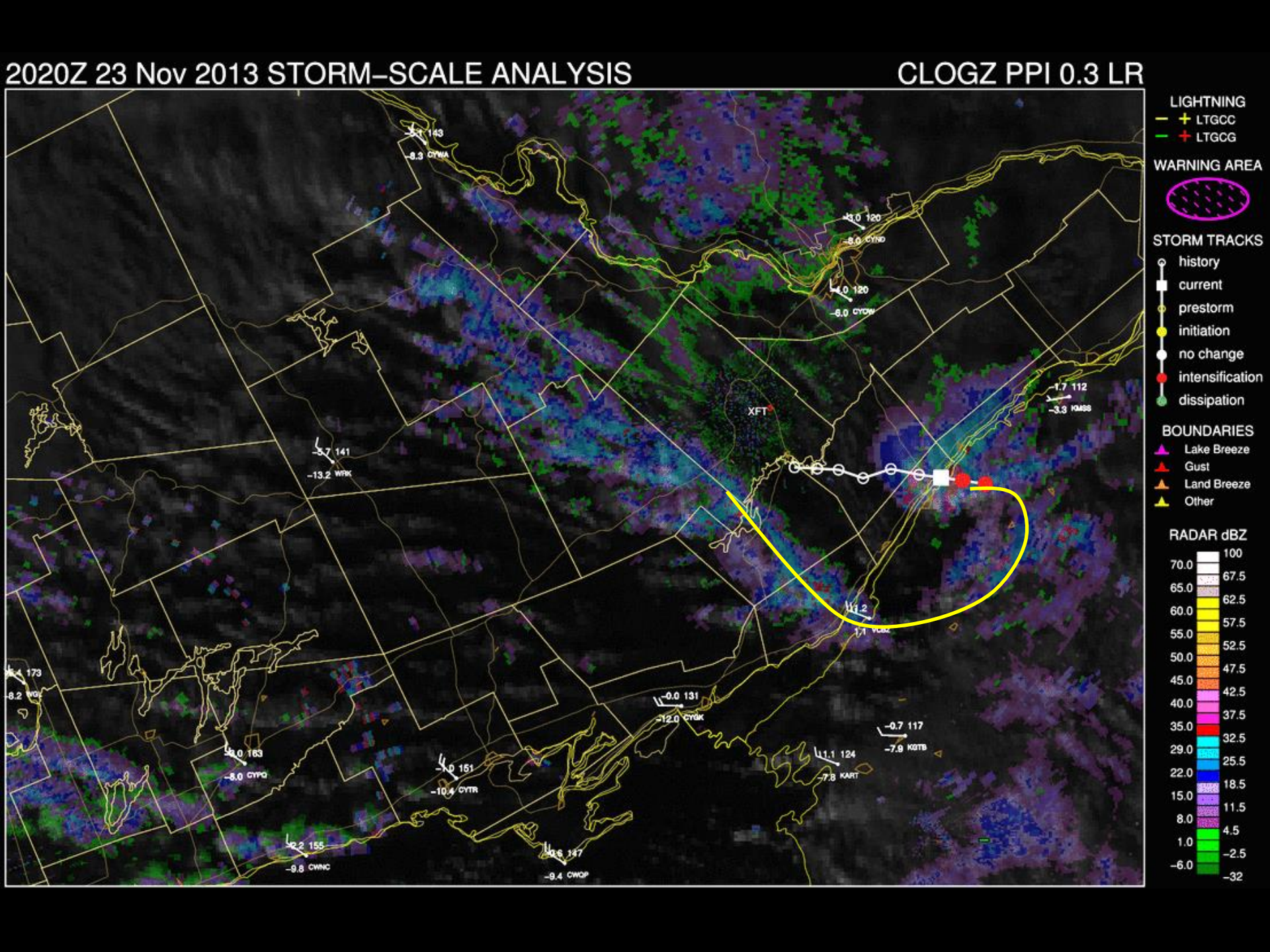

1800Z 23 Nov 2013 STORM–SCALE ANALYSIS
CLOGZ PPI 0.3 LR
LIGHTNING
LTGCC
LTGCG
WARNING AREA
STORM TRACKS
history
current
prestorm
initiation
no change
intensification
dissipation
BOUNDARIES
Lake Breeze
Gust
Land Breeze
Other
RADAR dBZ
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
29.0
22.0
15.0
8.0
1.0
-6.0
100
67.5
62.5
57.5
52.5
47.5
42.5
37.5
32.5
25.5
18.5
11.5
4.5
-2.5
-32
XFT
-5.0 143
-7.4 CYWA
-4.0 128
-6.0 CYND
-1.1 126
-5.1 KMSS
-3.3 135
-9.5 WRK
1.0 127
-6.0 CYGK
2.0 124
-2.0 KGTB
1.1 123
-2.8 KART
2.0 160
-7.0 CYPQ
0.1 145
-7.6 CYTR
0.2 149
-5.9 CWNC
0.9 141
-3.6 CWQP


1900Z 23 Nov 2013 STORM–SCALE ANALYSIS
CLOGZ PPI 0.3 LR
LIGHTNING
LTGCC
LTGCG
WARNING AREA
STORM TRACKS
history
current
prestorm
initiation
no change
intensification
dissipation
BOUNDARIES
Lake Breeze
Gust
Land Breeze
Other
RADAR dBZ
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
29.0
22.0
15.0
8.0
1.0
−6.0
100
67.5
62.5
57.5
52.5
47.5
42.5
37.5
32.5
25.5
18.5
11.5
4.5
−2.5
−32
XFT
CYWA
CYND
CYDN
KMSS
WRK
CYGK
KGTB
KART
CYPQ
CYTR
CWNC
CWQP

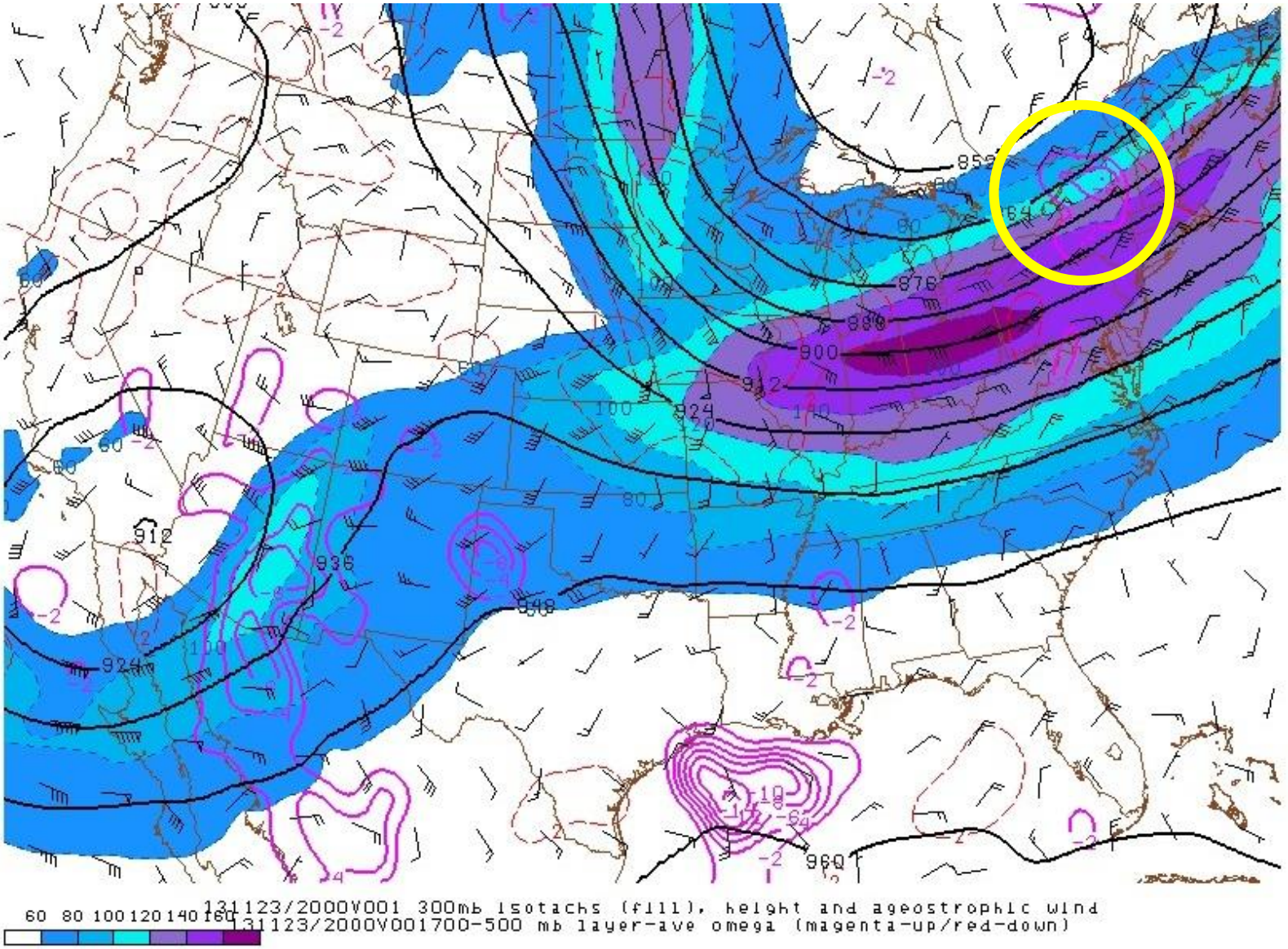

1920Z 23 Nov 2013 STORM–SCALE ANALYSIS
CLOGZ PPI 0.3 LR
LIGHTNING
LTGCC
LTGCG
WARNING AREA
STORM TRACKS
history
current
prestorm
initiation
no change
intensification
dissipation
BOUNDARIES
Lake Breeze
Gust
Land Breeze
Other
RADAR dBZ
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
29.0
22.0
15.0
8.0
1.0
−6.0
100
67.5
62.5
57.5
52.5
47.5
42.5
37.5
32.5
25.5
18.5
11.5
4.5
−2.5
−32
XFT
CYWA
CYND
CYDN
KMSS
WRK
CYGK
KGTB
KART
CYPQ
CYTR
CWNC
CWQP


1940Z 23 Nov 2013 STORM–SCALE ANALYSIS
CLOGZ PPI 0.3 LR
LIGHTNING
LTGCC
LTGCG
WARNING AREA
STORM TRACKS
history
current
prestorm
initiation
no change
intensification
dissipation
BOUNDARIES
Lake Breeze
Gust
Land Breeze
Other
RADAR dBZ
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
29.0
22.0
15.0
8.0
1.0
−6.0
100
67.5
62.5
57.5
52.5
47.5
42.5
37.5
32.5
25.5
18.5
11.5
4.5
−2.5
−32
XFT
CYWA
CYND
CYDW
KMSS
WRK
CYGK
KGTB
KART
CYPQ
CYTR
CWNC
CWQP

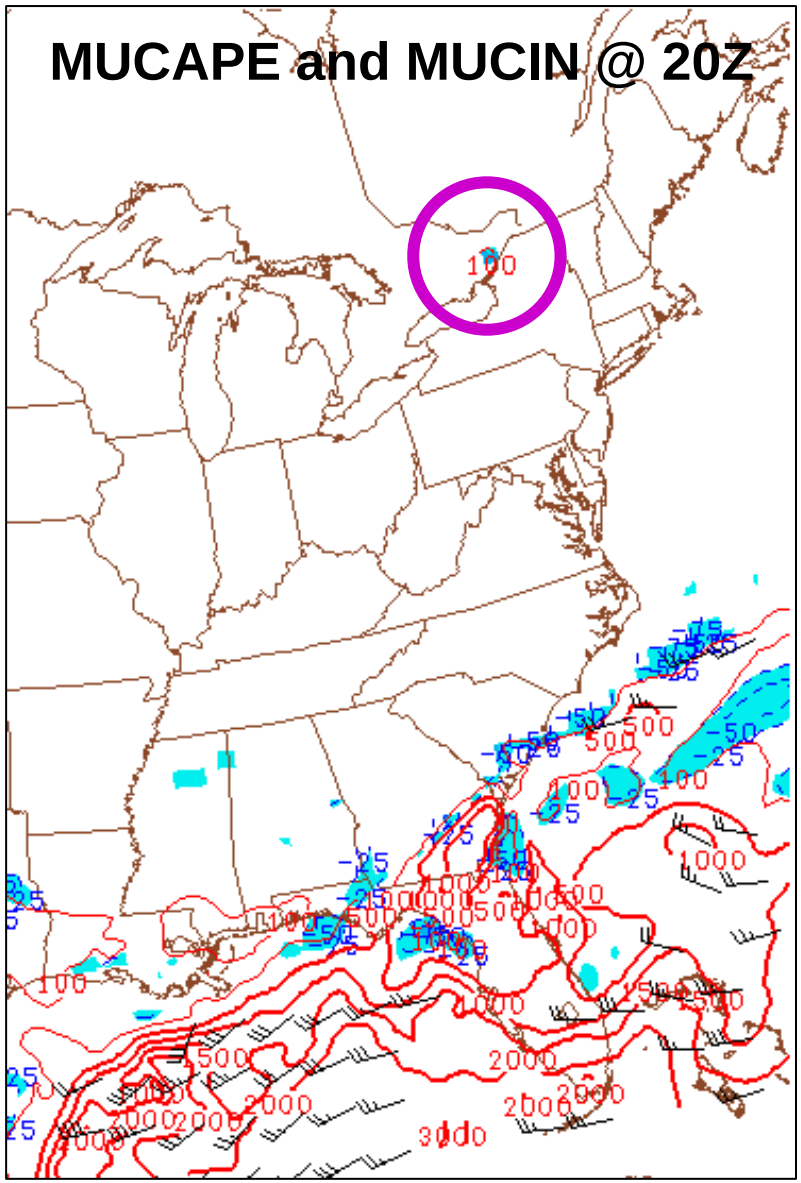

2000Z 23 Nov 2013 STORM–SCALE ANALYSIS
CLOGZ PPI 0.3 LR
-5.1C
-1.0C
-4.0C
-1.7C
-5.7C
-0.0C
-1.2C
-0.7C
XFT
LIGHTNING
LTGCC
LTGCG
WARNING AREA
STORM TRACKS
history
current
prestorm
initiation
no change
intensification
dissipation
BOUNDARIES
Lake Breeze
Gust
Land Breeze
Other
RADAR dBZ
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
29.0
22.0
15.0
8.0
1.0
-6.0
100
67.5
62.5
57.5
52.5
47.5
42.5
37.5
32.5
25.5
18.5
11.5
4.5
-2.5
-32

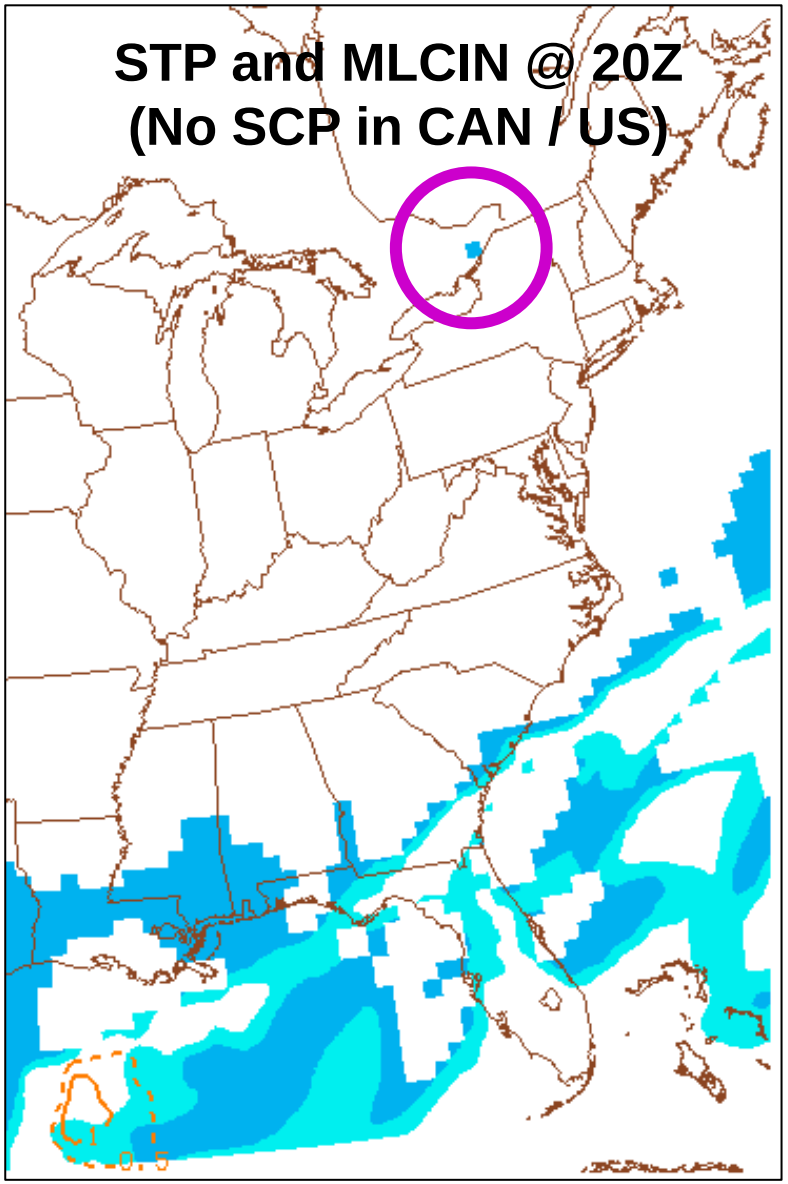

2020Z 23 Nov 2013 STORM–SCALE ANALYSIS
CLOGZ PPI 0.3 LR
LIGHTNING
LTGCC
LTGCG
WARNING AREA
STORM TRACKS
history
current
prestorm
initiation
no change
intensification
dissipation
BOUNDARIES
Lake Breeze
Gust
Land Breeze
Other
RADAR dBZ
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
29.0
22.0
15.0
8.0
1.0
−6.0
100
67.5
62.5
57.5
52.5
47.5
42.5
37.5
32.5
25.5
18.5
11.5
4.5
−2.5
−32
XFT
CYWA
CYND
CYDN
KMSS
WRK
CYPQ
CYTR
CYGK
KGTB
KART
CWNC
CWQP

# SPC Mesoanalysis

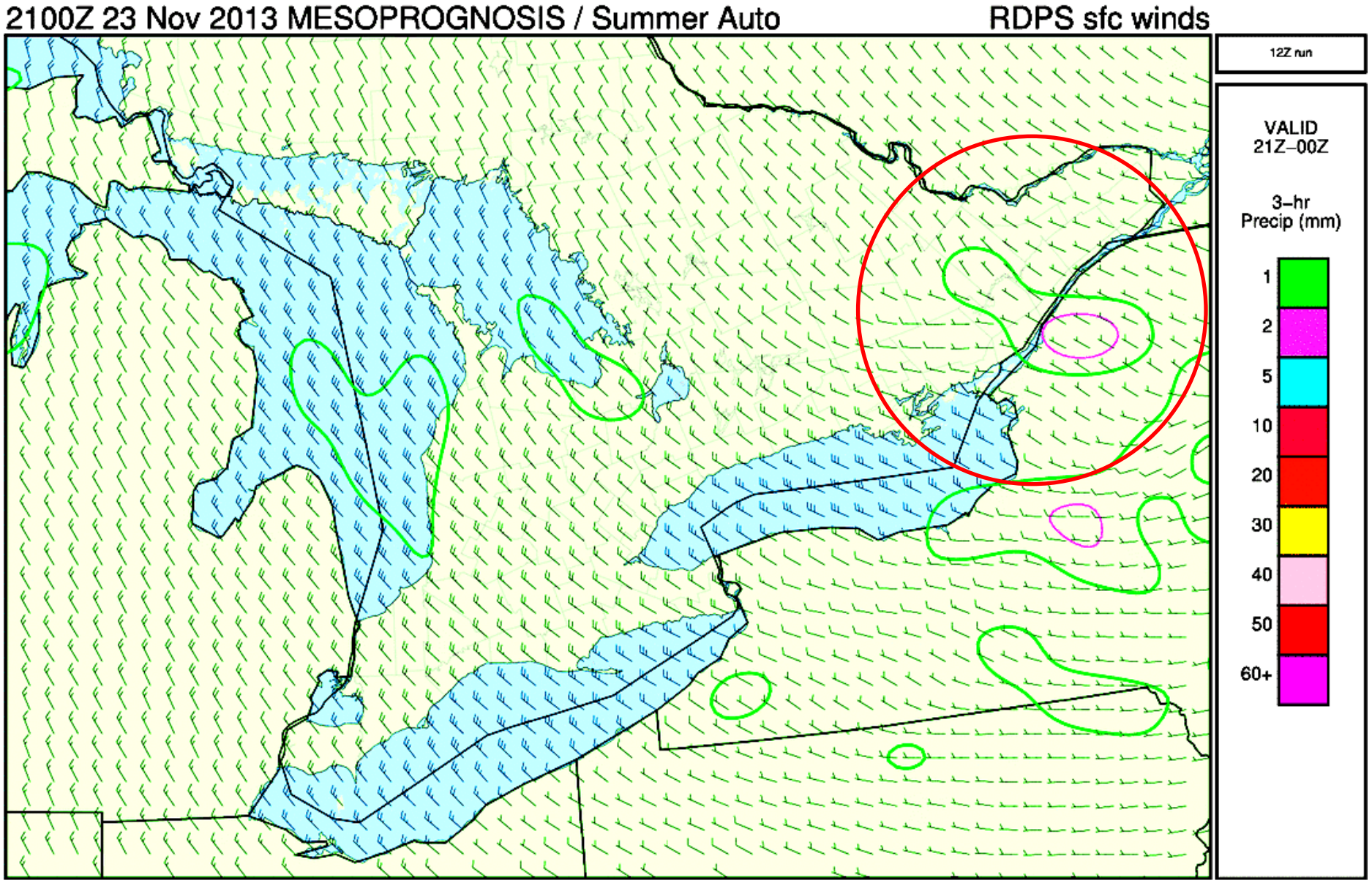


# SPC Mesoanalysis

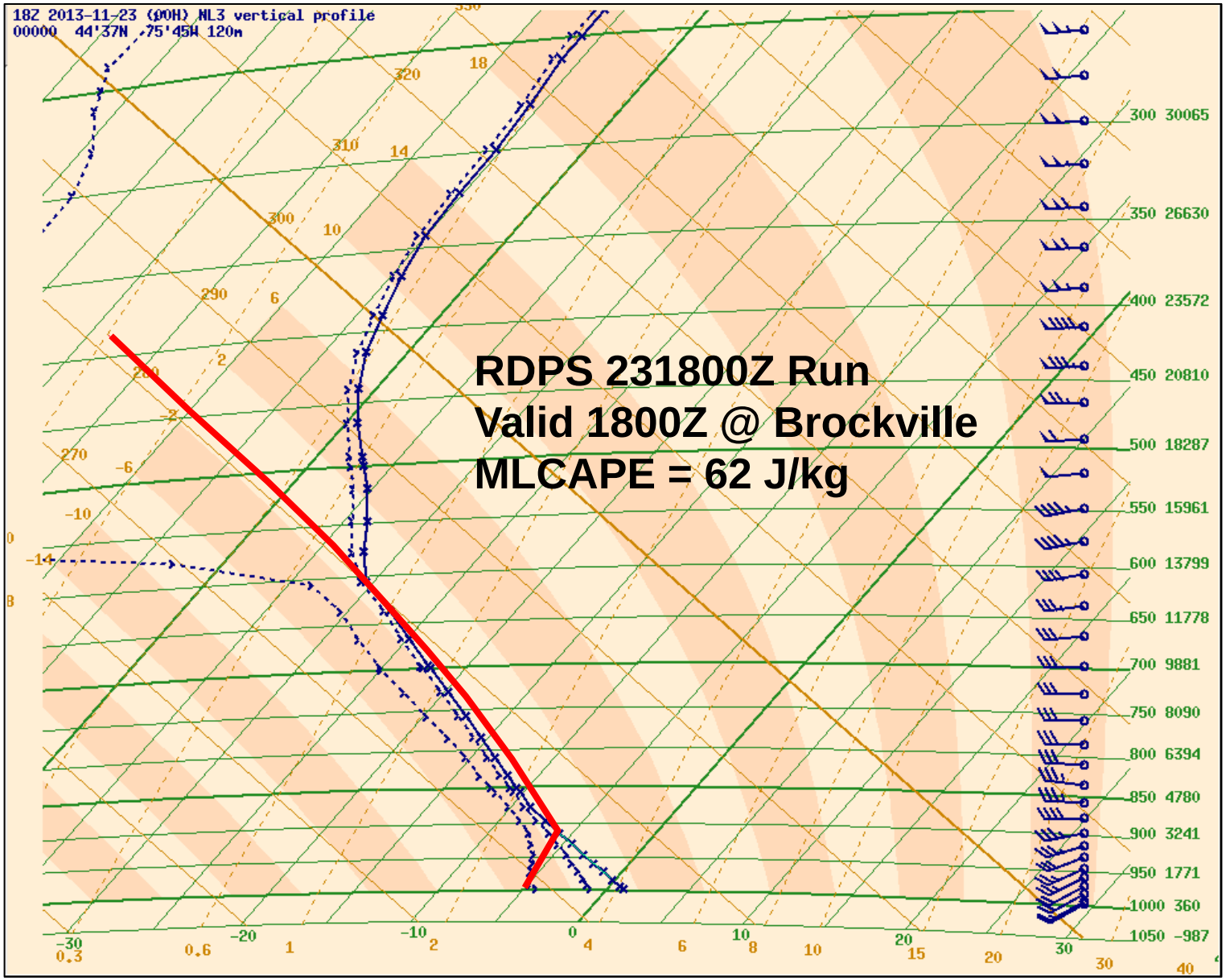


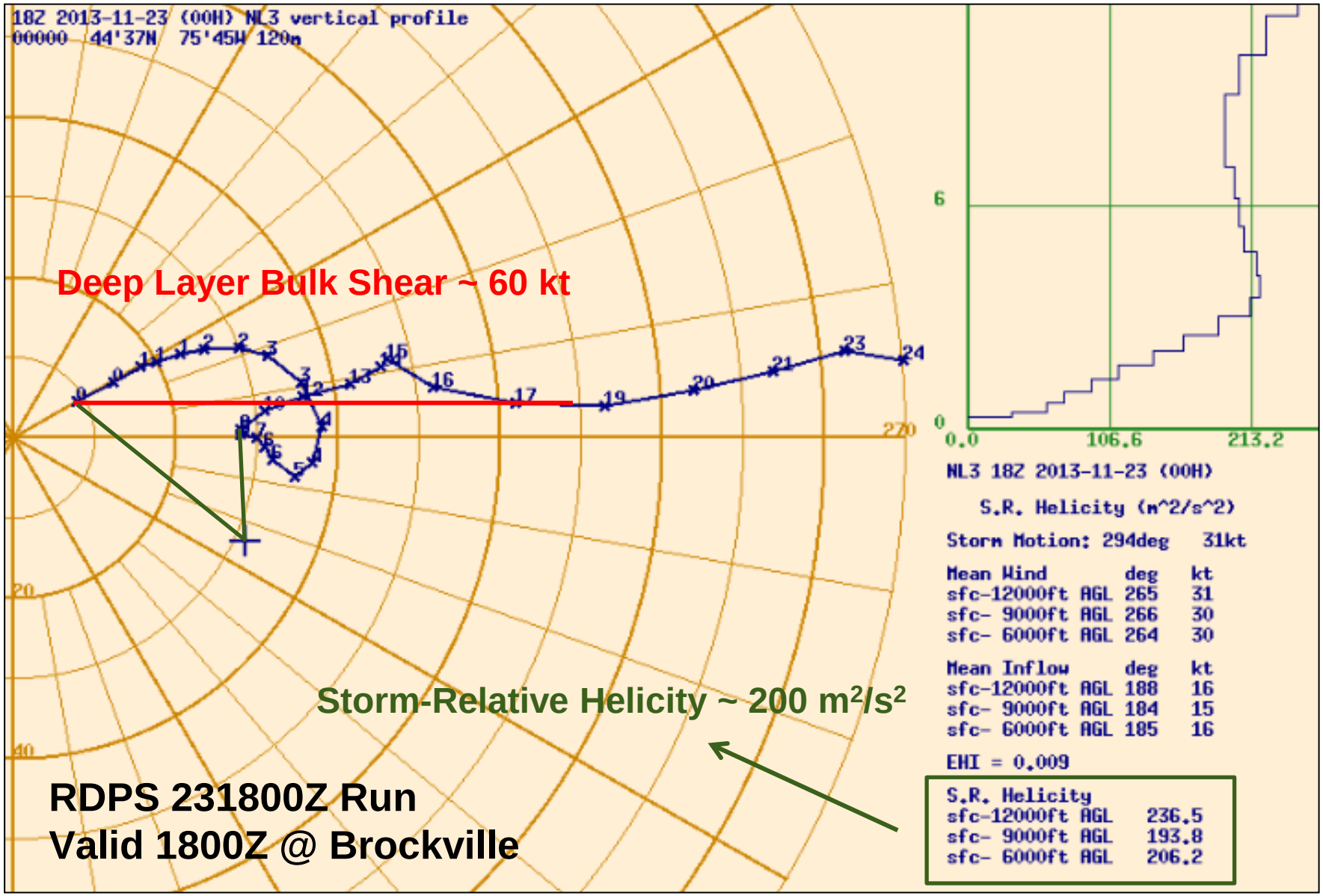
# 12Z 10 km RDPS Run



# RDPS Prog Tephigram



# RDPS Prog Hodograph



# Conclusions (and Questions!)

- Brief EF1 tornado occurred with low-topped supercell in wintery conditions
- Apparently neither supercell thunderstorms nor tornadoes require surface temperatures above 0ºC!
- No liquid precipitation – mostly dry ice crystals with graupel core, large graupel observed by witnesses
  - Given presence of ice crystals and graupel, why no lightning?
- NWP and SPC mesoanalysis indicated marginal potential for convection, but not tornadic supercell
- Forecast-able? Watch/warn-able? Maybe someday…

# Thank you!




David.Sills@ec.gc.ca