REC-PDA: Decision Briefing

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TAC, 27 March 2007

Outline

- TAC decision request
- Science overview
- Update of REC testing
- Summary
- Recommendation

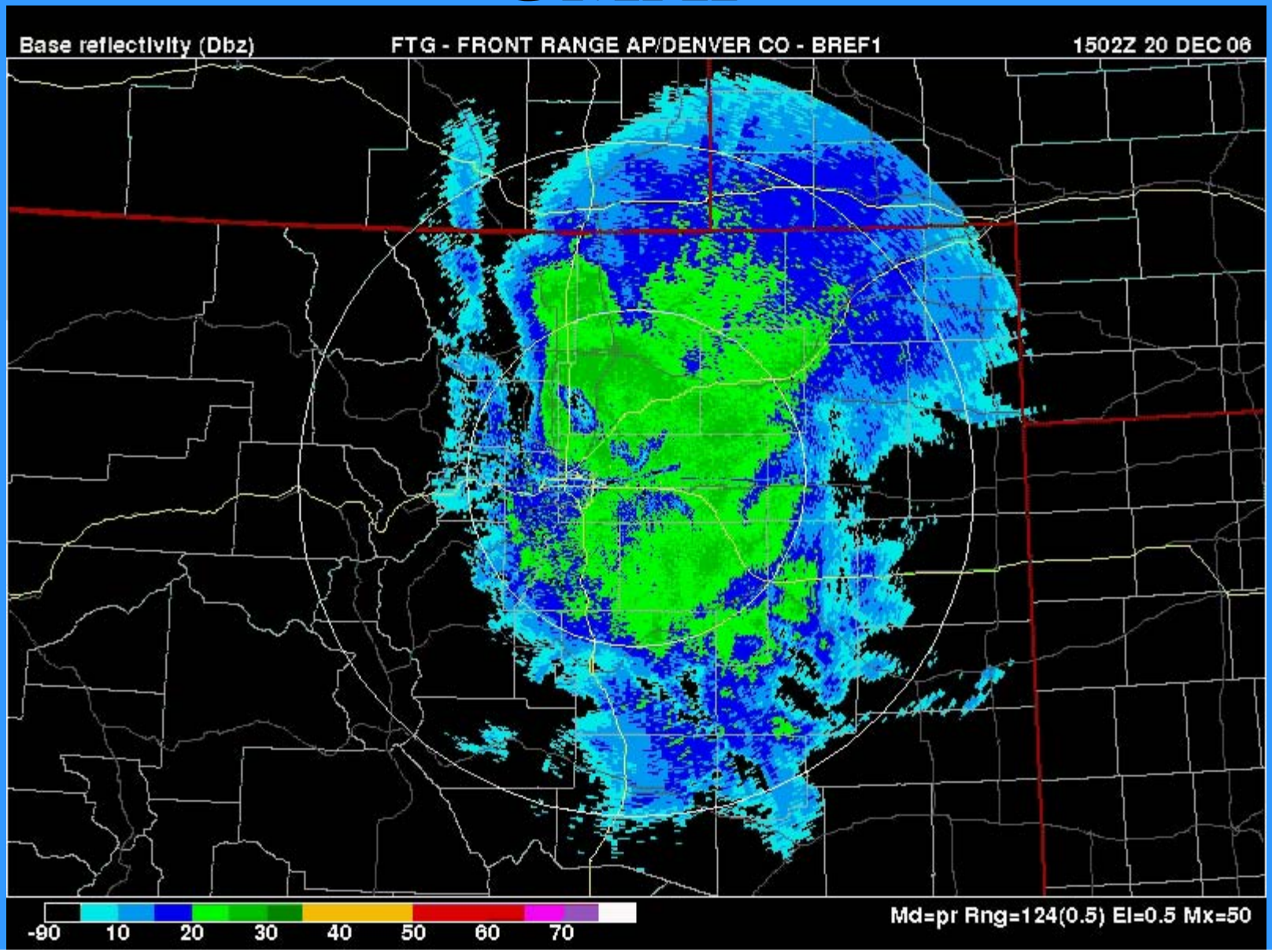
TAC Decision

- Upgrading Radar Echo Classifier (REC)
  - Fixes to APDA
  - Addition of PDA

TAC Decision: Benefits

- Benefit to upgrading REC
  - Improved precipitation estimates through mitigation of ground clutter contamination
  - Do not need to run GMAP everywhere to eliminate clutter
    - GMAP does not bias high spectrum width weather (convective)
    - GMAP biases low spectrum width weather (stratiform)

KFTG example of bias from GMAP



Science Overview

- REC is a Modular Fuzzy Logic algorithm, that includes:
  - APDA (AP clutter Detection Algorithm)
  - PDA (Precipitation Detection Algorithm)
- REC operates in RPG with Z, V and W
- The current REC was envisioned as an interim solution until spectral variables and dual-polarimetric variables became available

Science Overview

- EPRE produces Hybrid Scan Reflectivity using REC output to include only precipitation echoes
- REC Designed to use a combination of APDA and PDA within EPRE
  - APDA is designed to identify pure clutter
  - PDA is designed to identify pure weather
    - Excludes clutter mixed with weather
- The REC is partially implemented
  - Includes only APDA
  - APDA has implementation errors

Science Overview

- Operational REC needs upgrades and fixes
- Changes to ORPG required to upgrade REC functionality
  - APDA
    - Correct SPIN calculation
    - Do not use SIGN variable
  - Add PDA
  - Add logic to include PDA within EPRE construction of Hybrid Scan Reflectivity
- These changes have been made by ROC and NCAR within ORPG environment

Science Overview

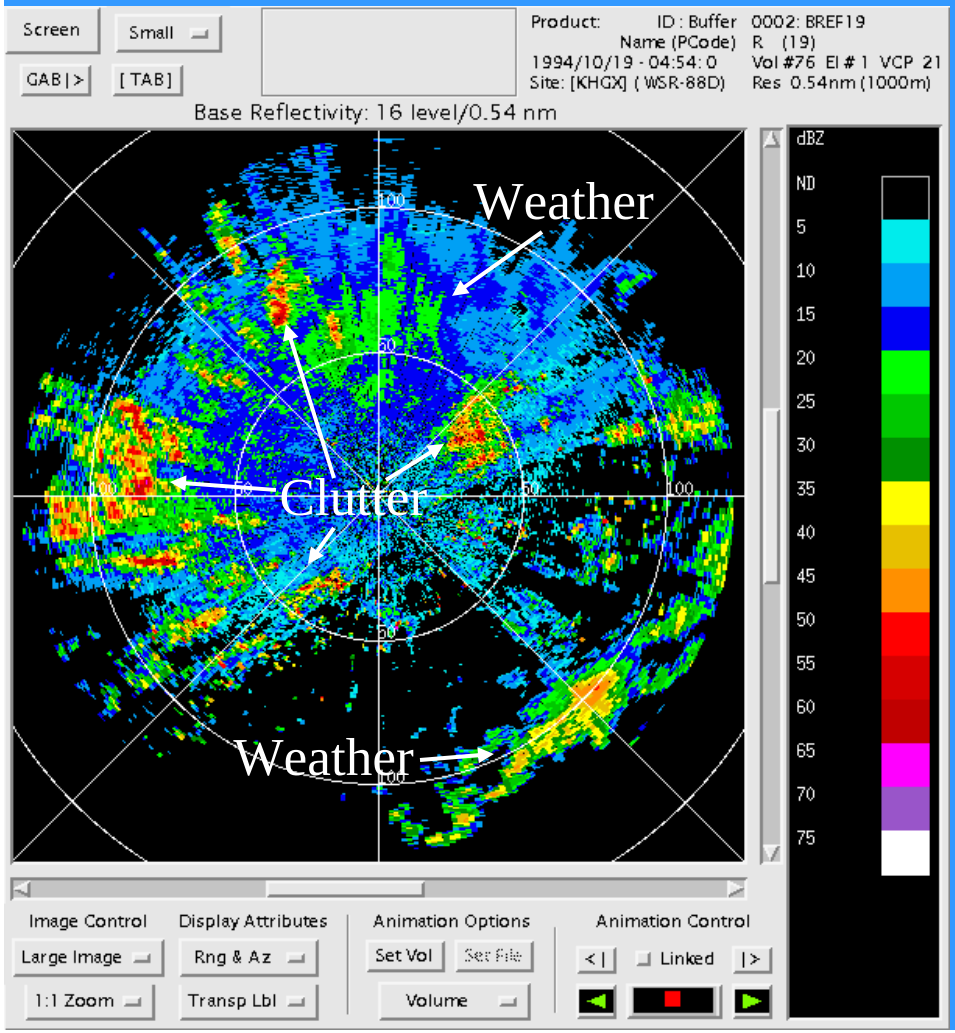
- Testing performed on Archive II data with the RPG CODE
  - Important to demonstrate algorithm on WSR-88D radars and within the RPG environment
  - Ease of implementation

List of Test cases Since Fall TAC

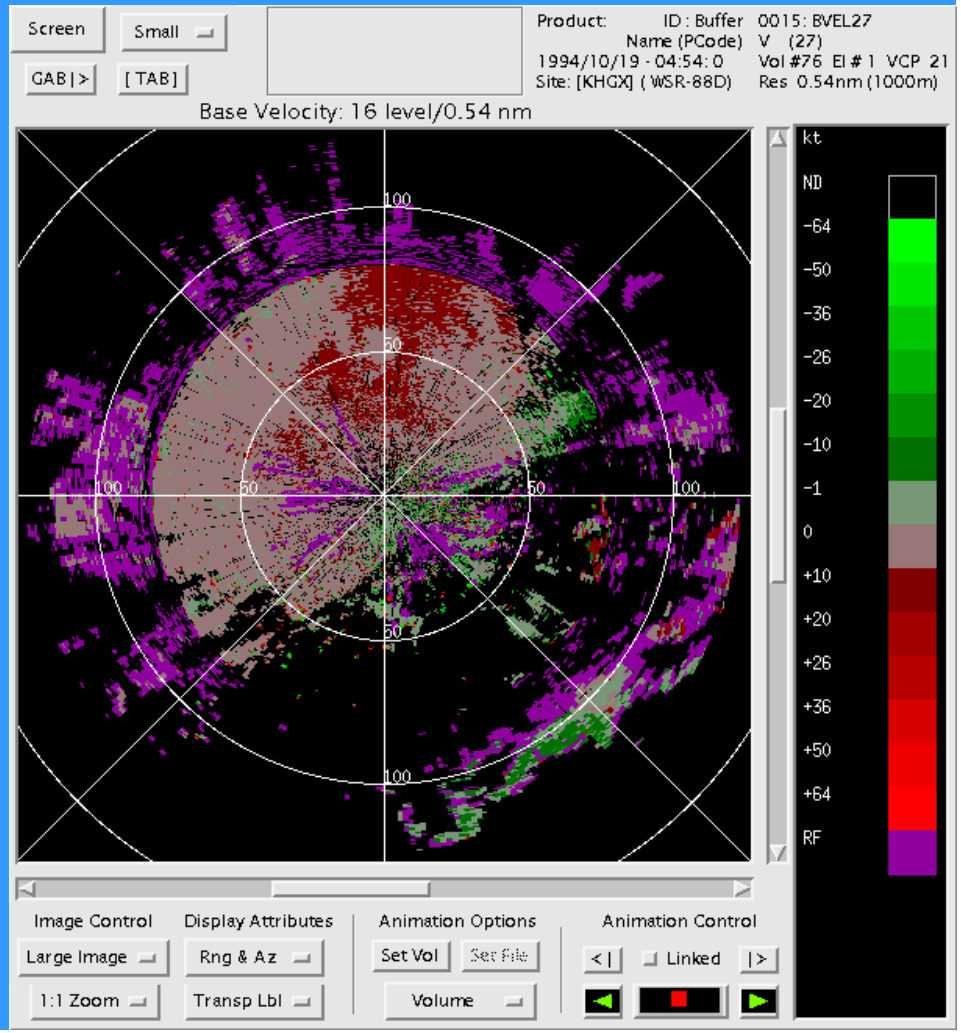
Station	Date	Precip type	Accumulation time
KBOX	07/14/03	Strat rain	8 Hours
KMLB	03/25/92	Conv rain	6 Hours
KHGX	10/18/94	Conv/strat	9 Hours
KLWX	04/29/03 01/25/04	Conv/strat Snow	4 Hours 13 Hours
KBUF	01/11/03	Snow	24 Hours
KCCX	02/16/03	Snow	24 Hours
KFTG	02/16/03	Snow	32 Hours
KSRX	02/24/07	Conv/strat	24 Hours

KHGX Base data

Base Reflectivity (dBZ)

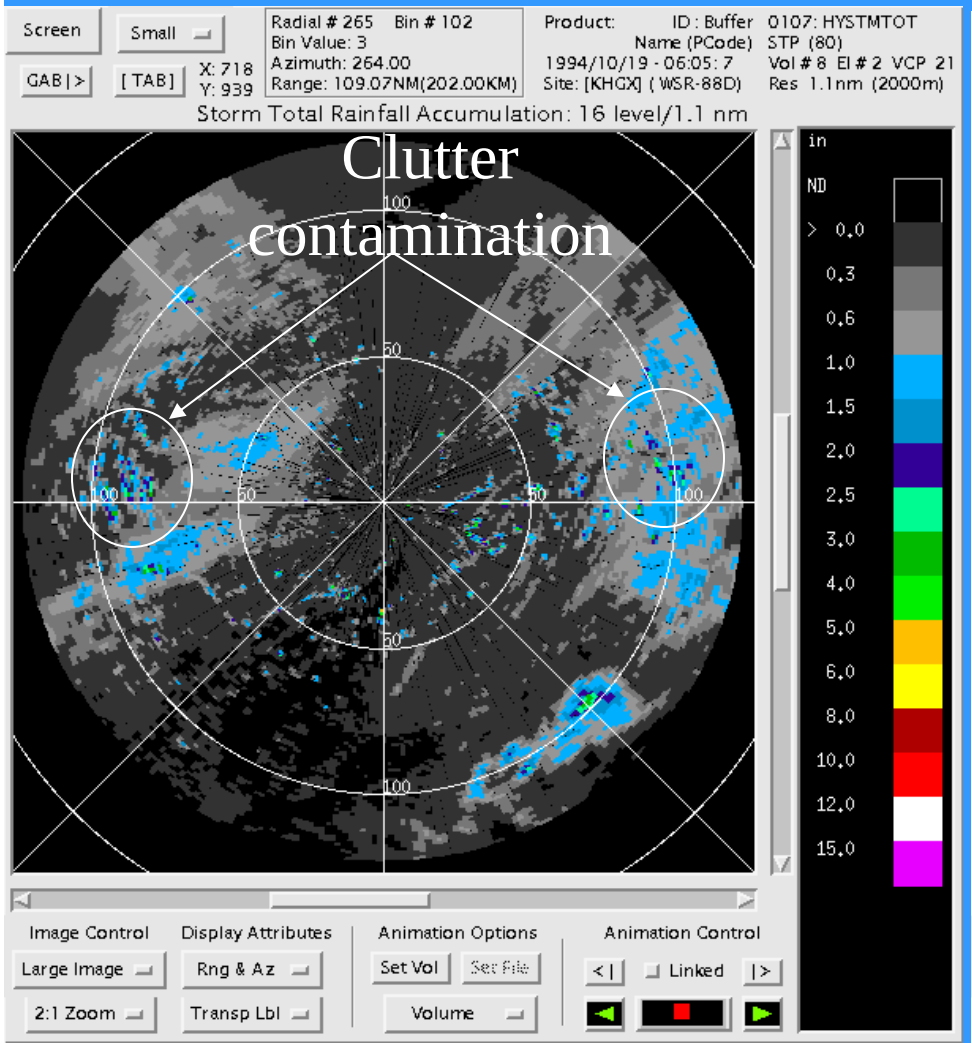


Base Velocity (kt)

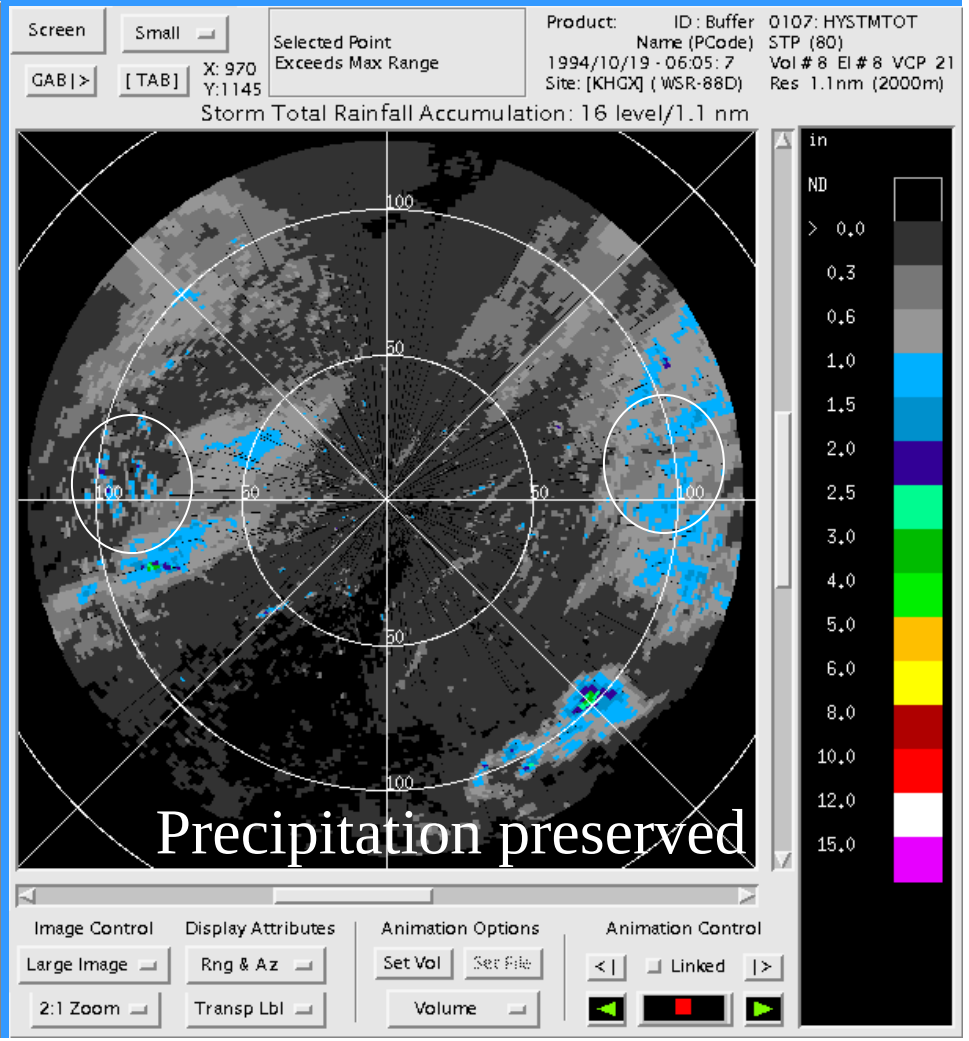


KHGX 9 Hour Rainfall Accumulation

Current REC

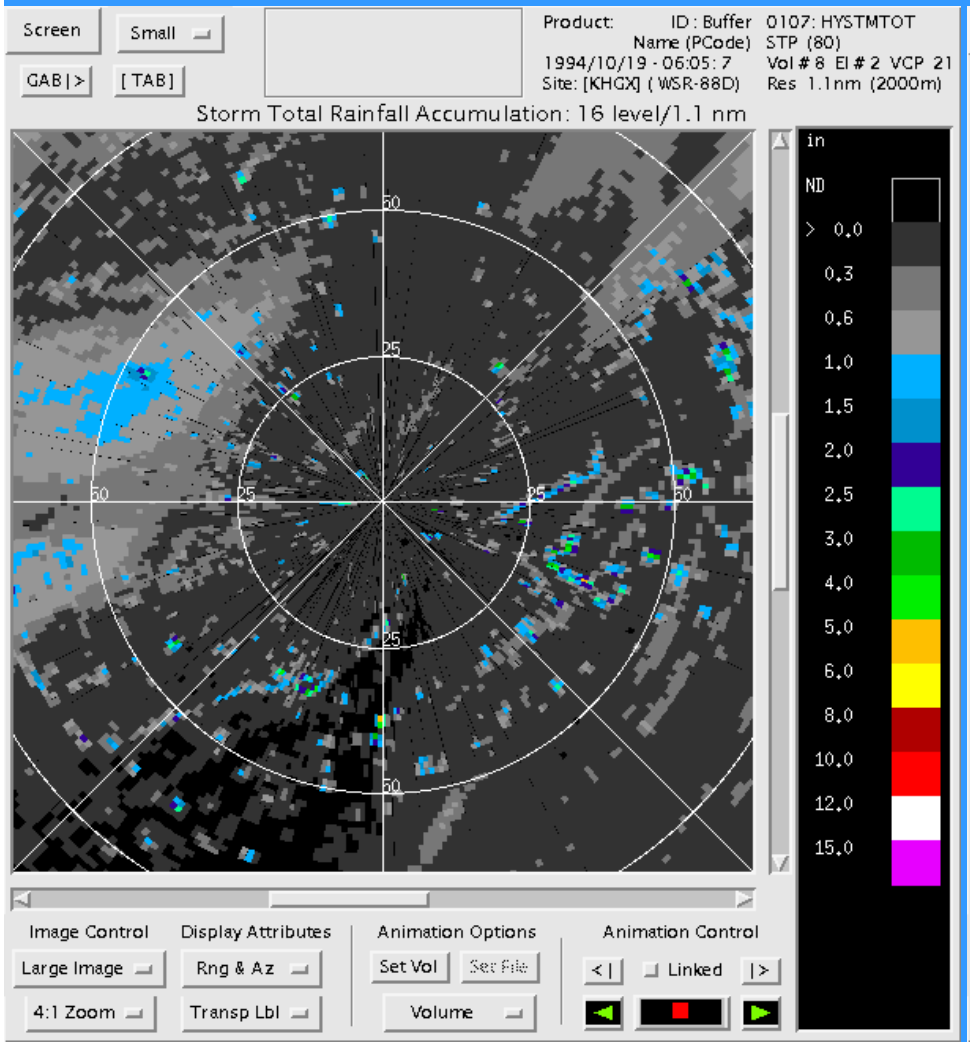


Updated REC

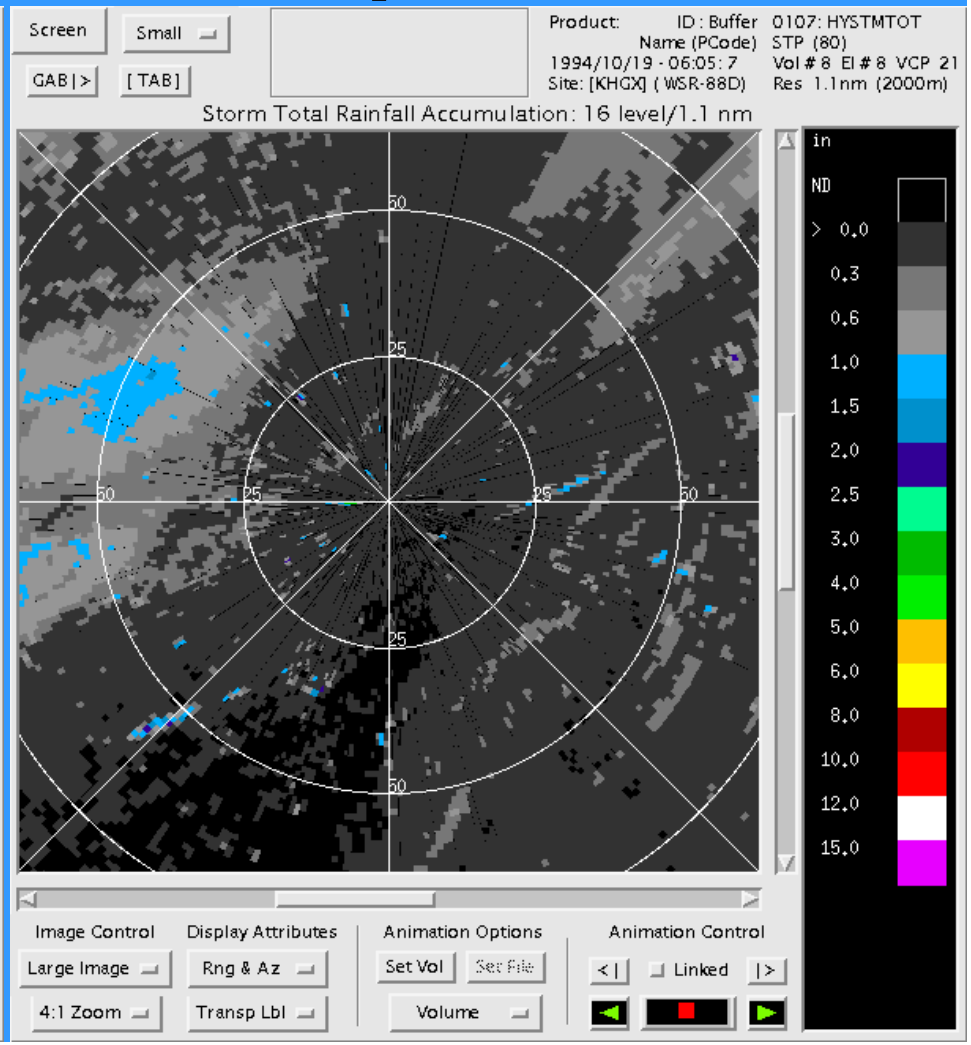


KHGX 9 Hour Rainfall Accumulation

Current REC

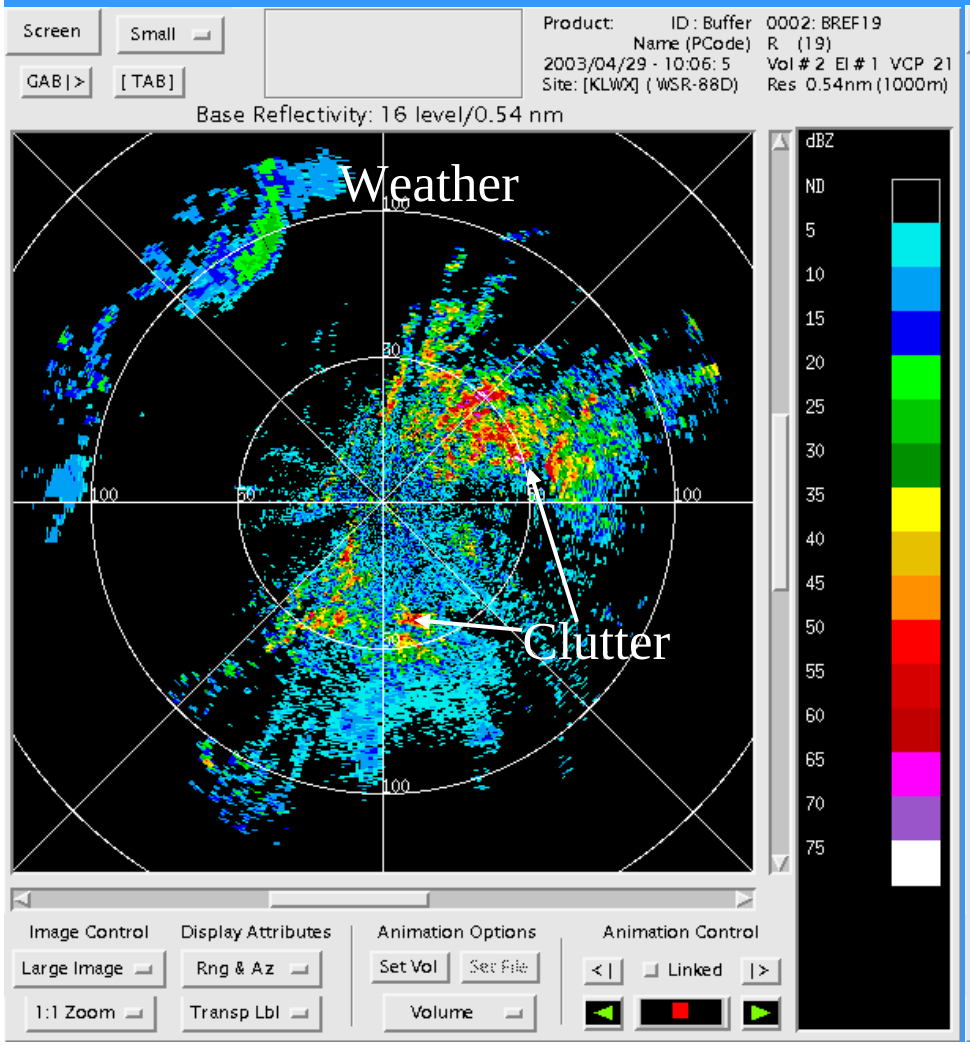


Updated REC

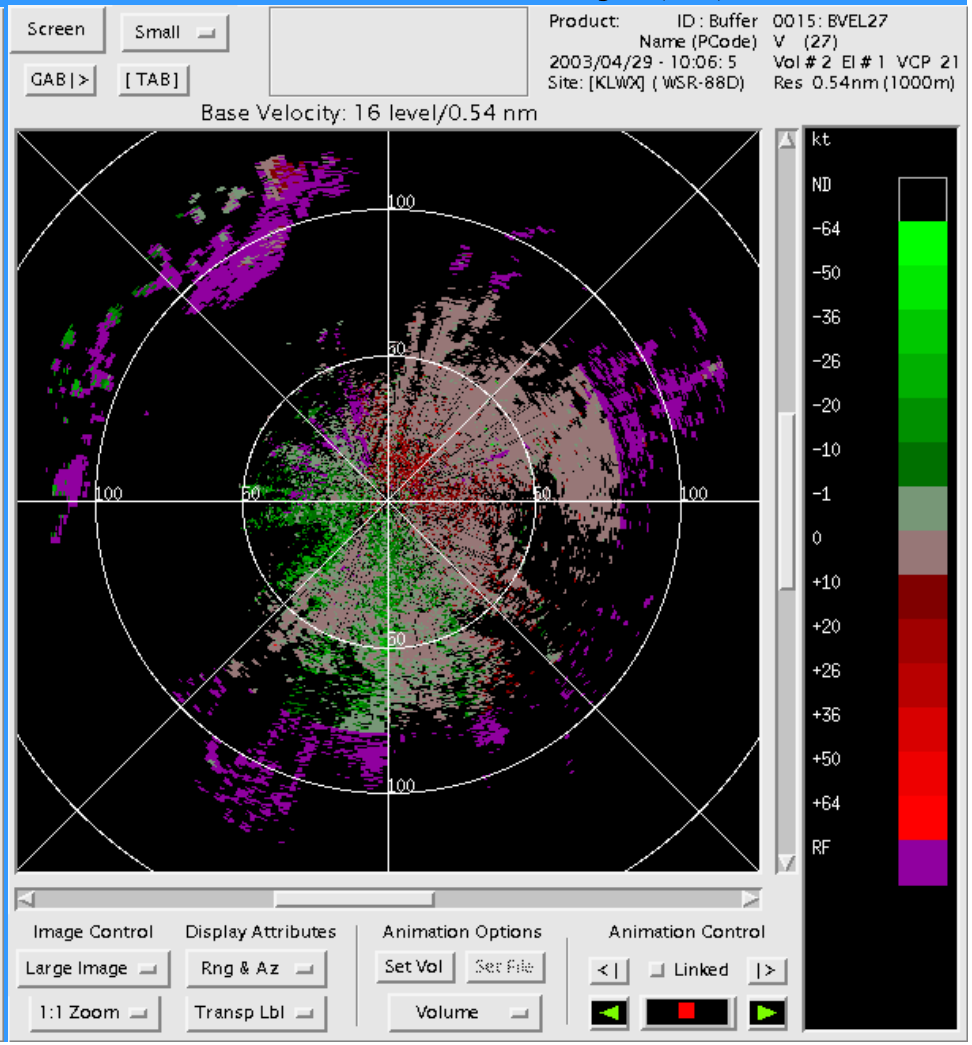


KLWX Base data

Base Reflectivity (dBZ)

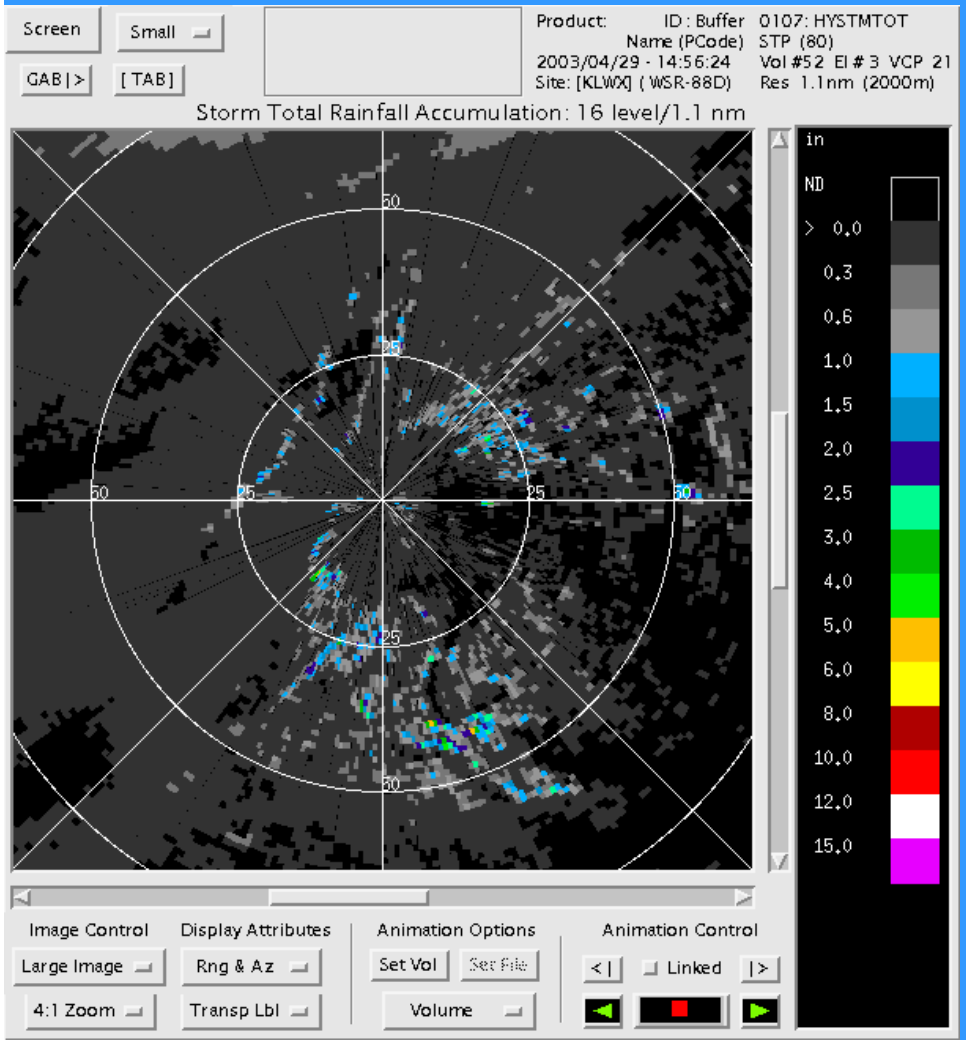


Base Velocity (kt)

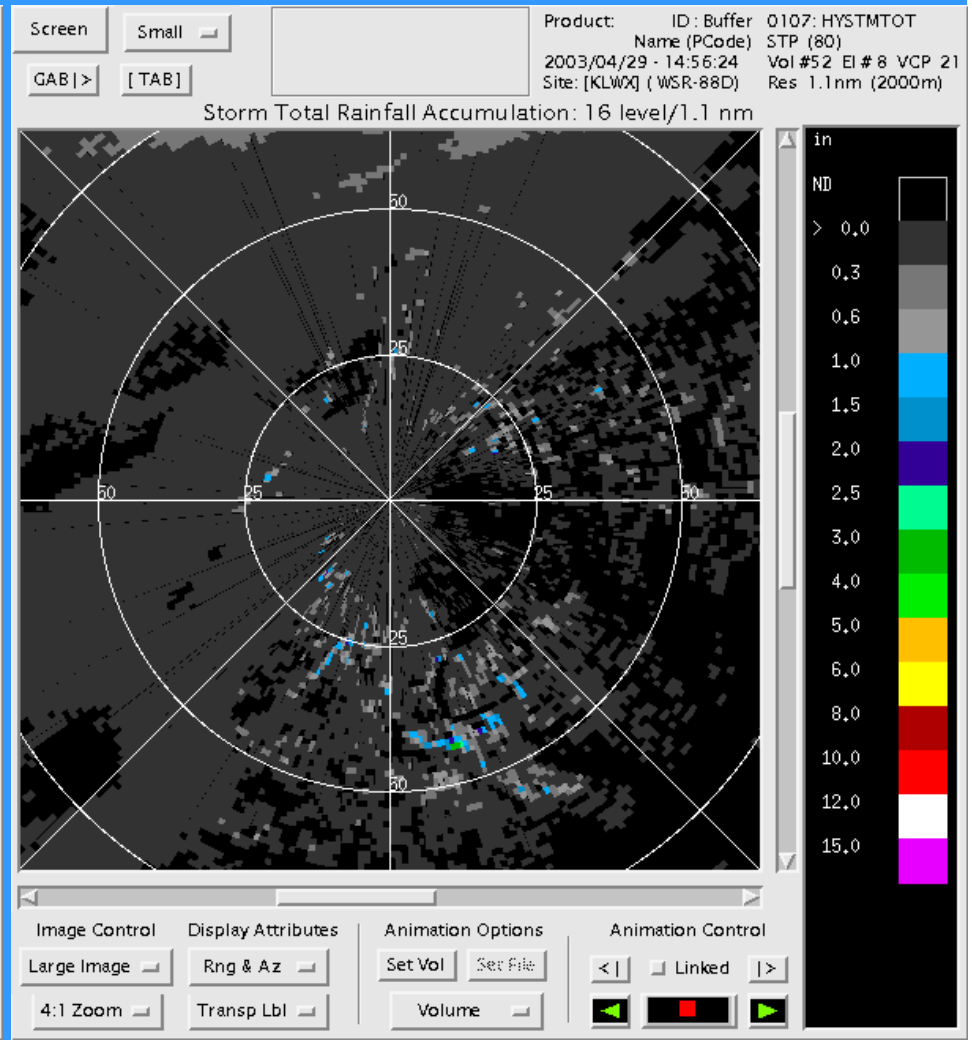


KLWX 4 Hour Rainfall Accumulation

Current REC

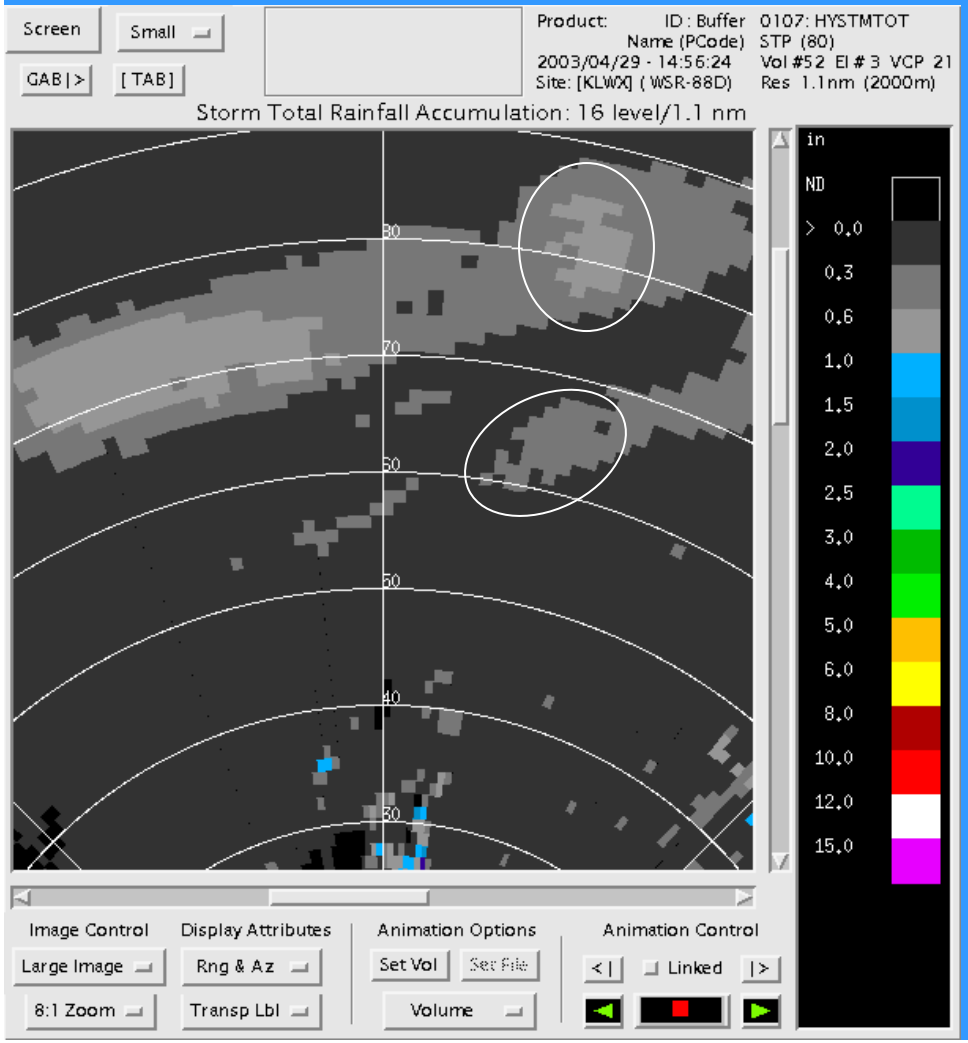


Updated REC

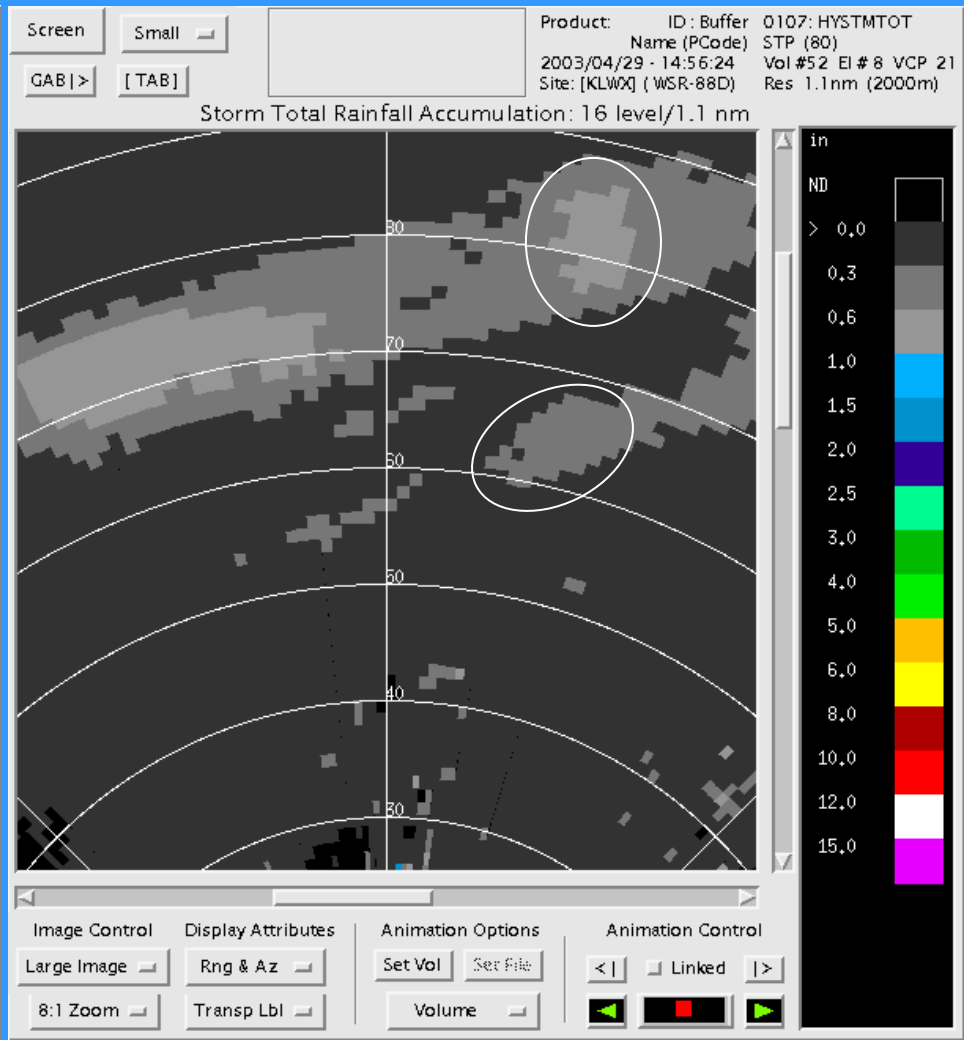


KLWX 4 Hour Rainfall Accumulation

Current REC

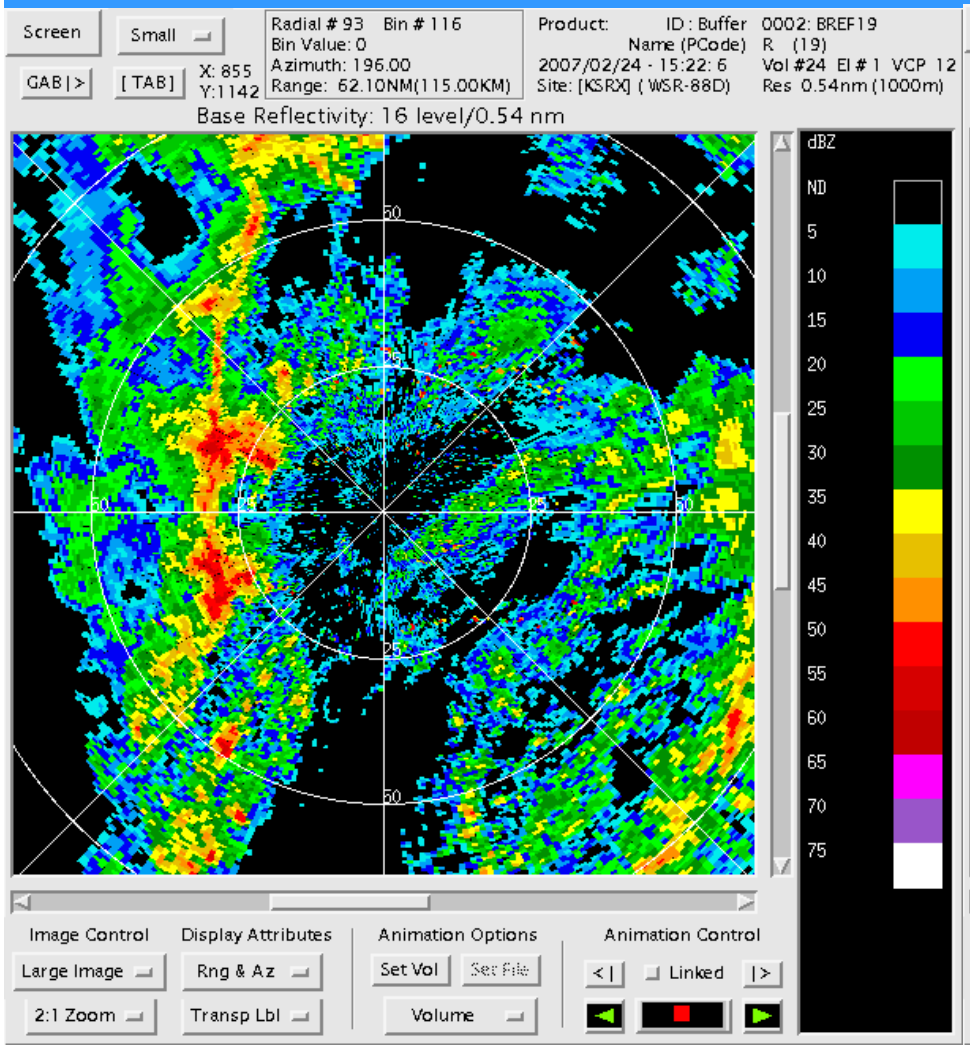


Updated REC

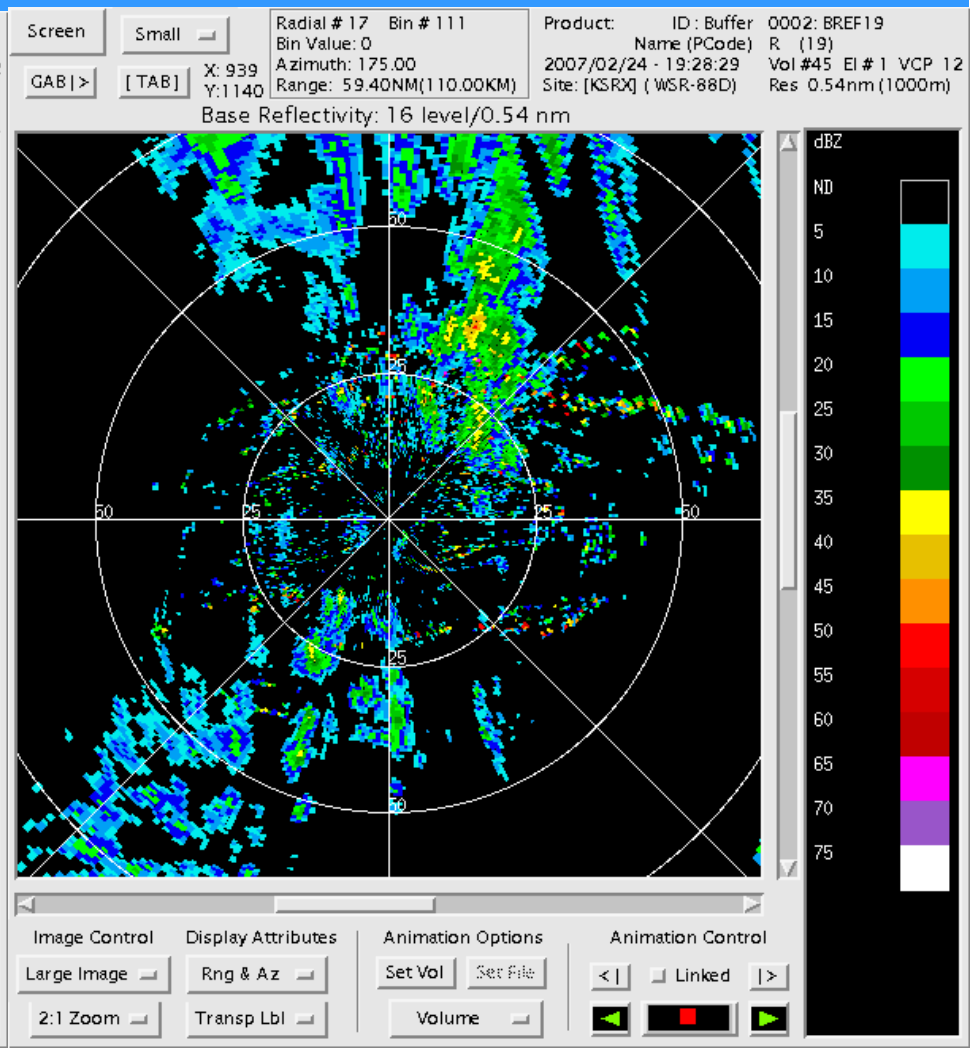


KSRX Base Reflectivity

15:22 UTC

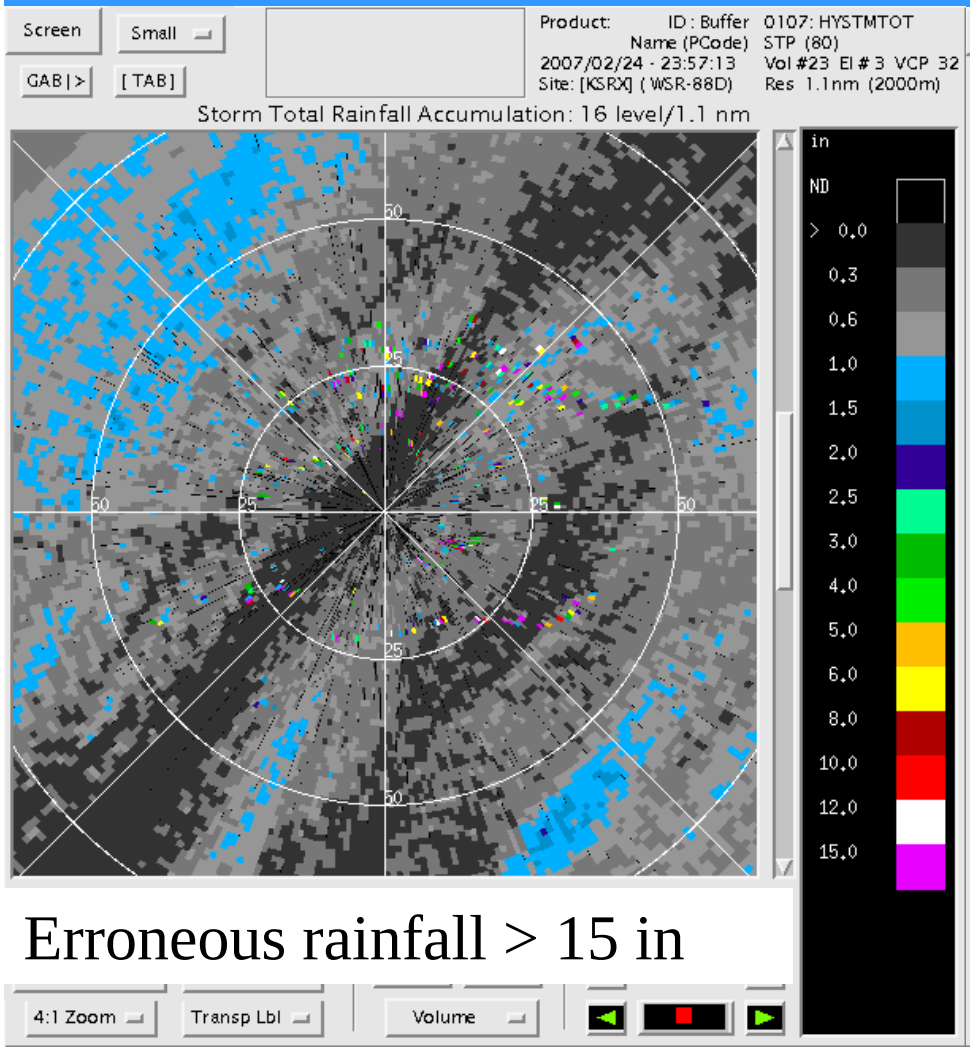


19:28 UTC



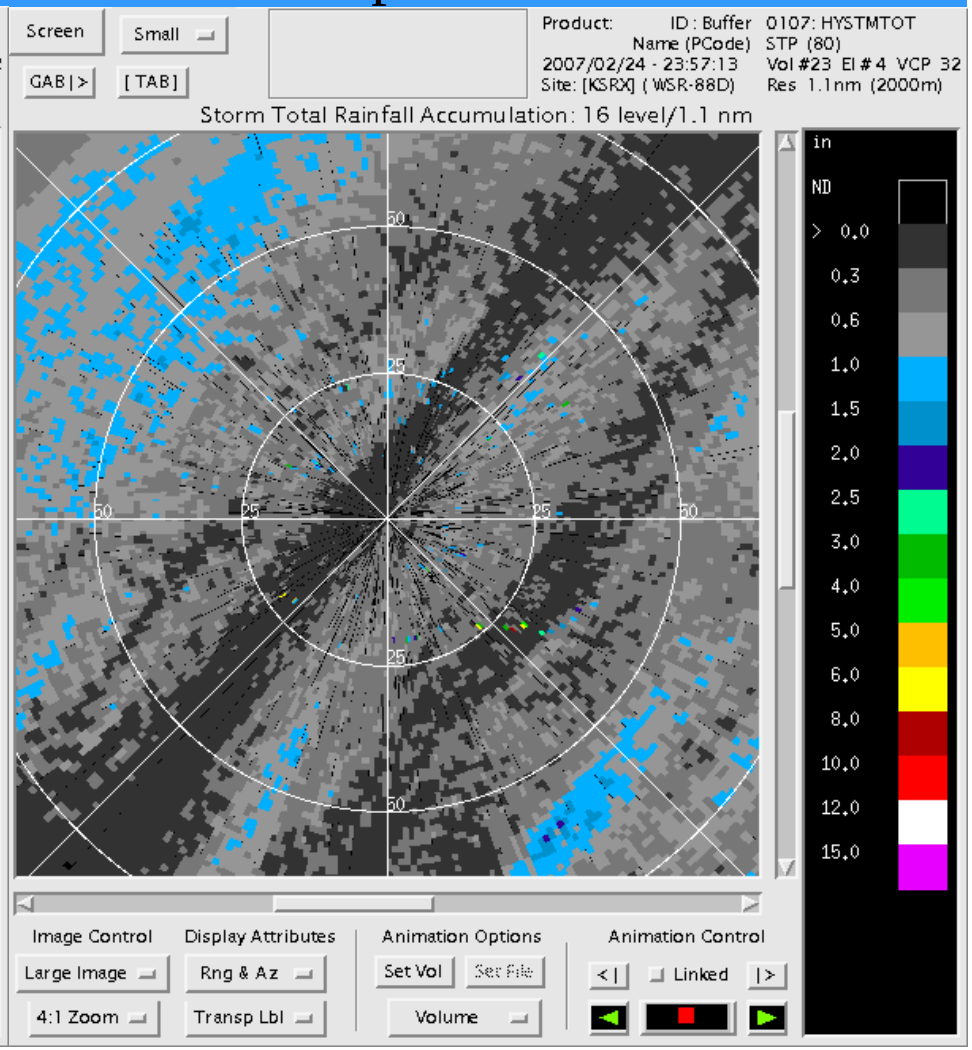
KSRX 24 Hour Rainfall Accumulation

Current REC



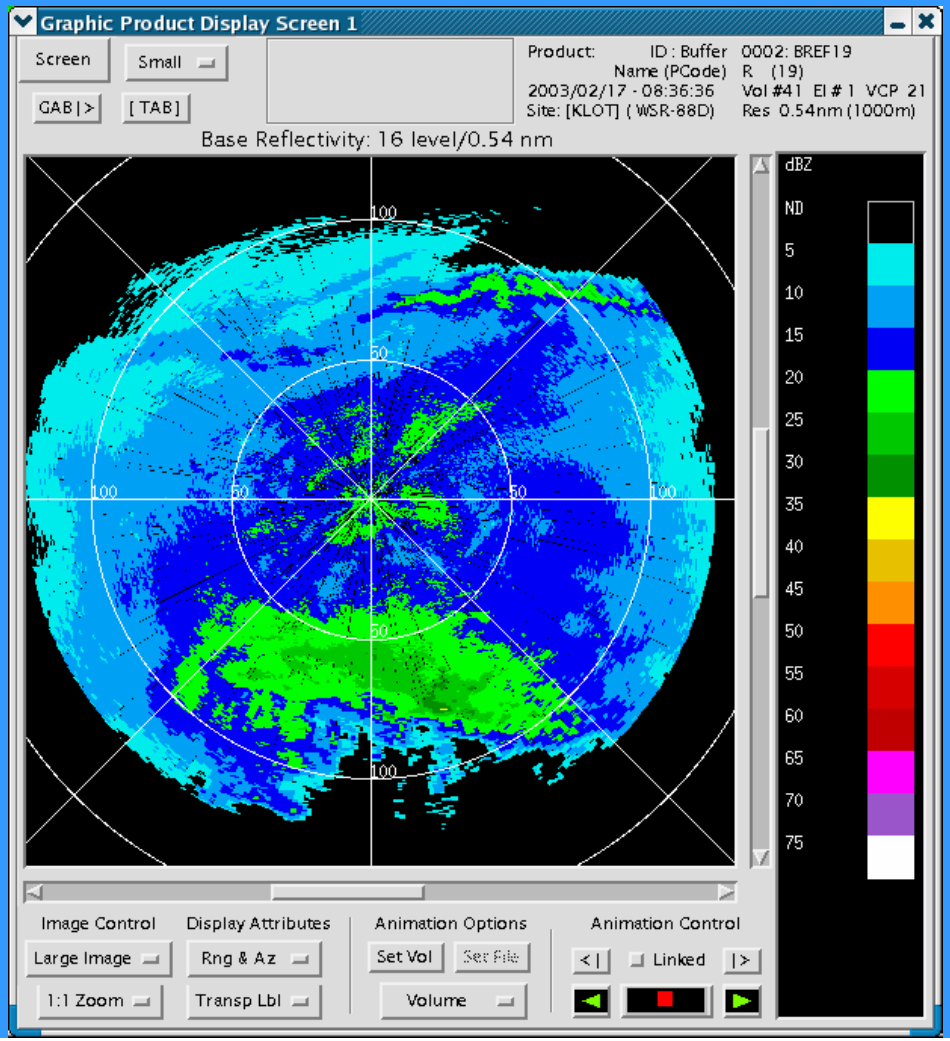
Erroneous rainfall > 15 in

Updated REC

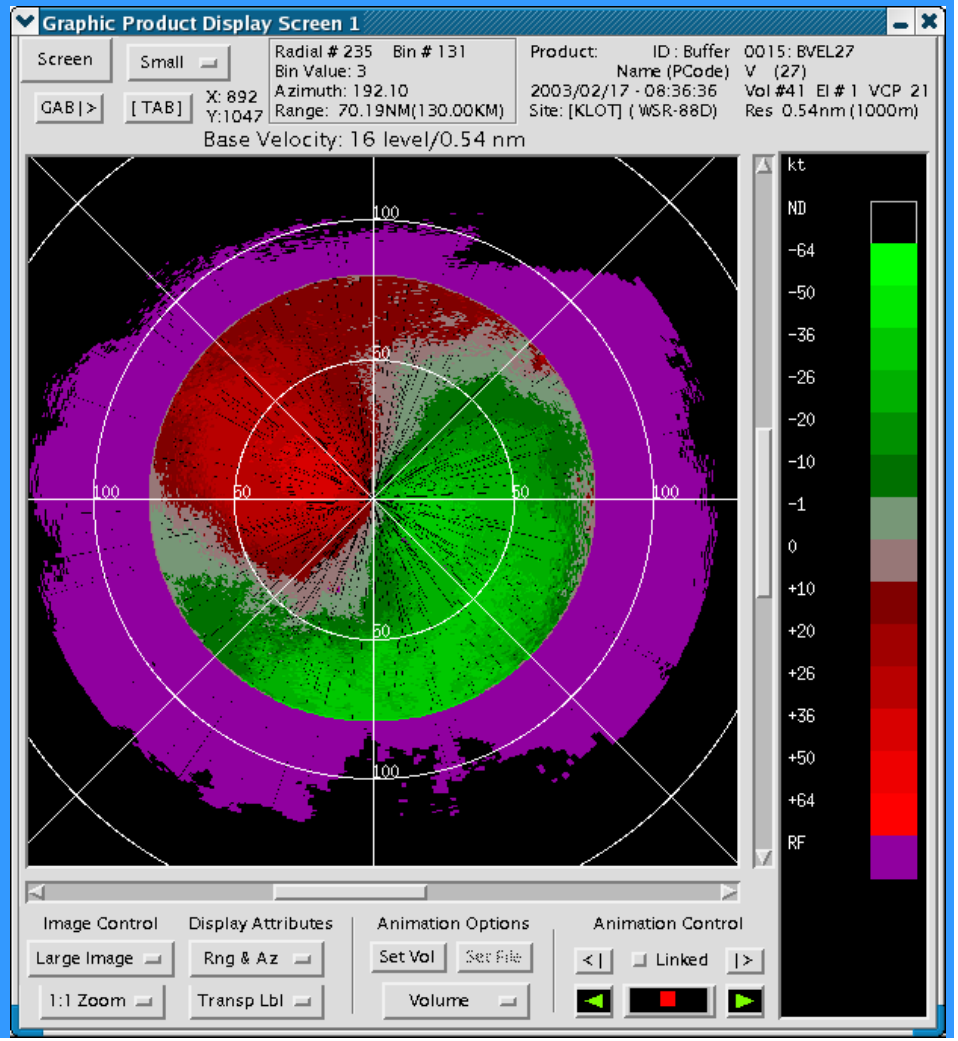


KCCX Base data

Base Reflectivity (dBZ)

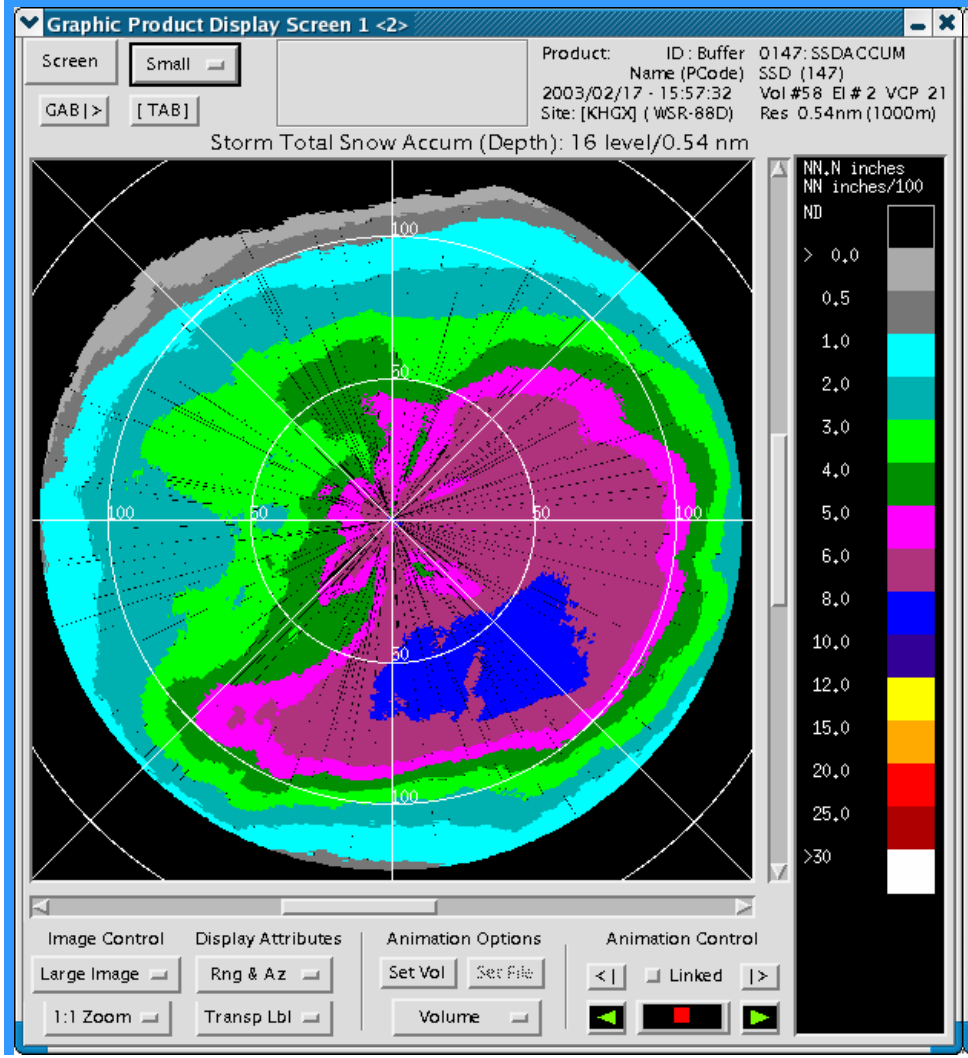


Base Velocity (kt)

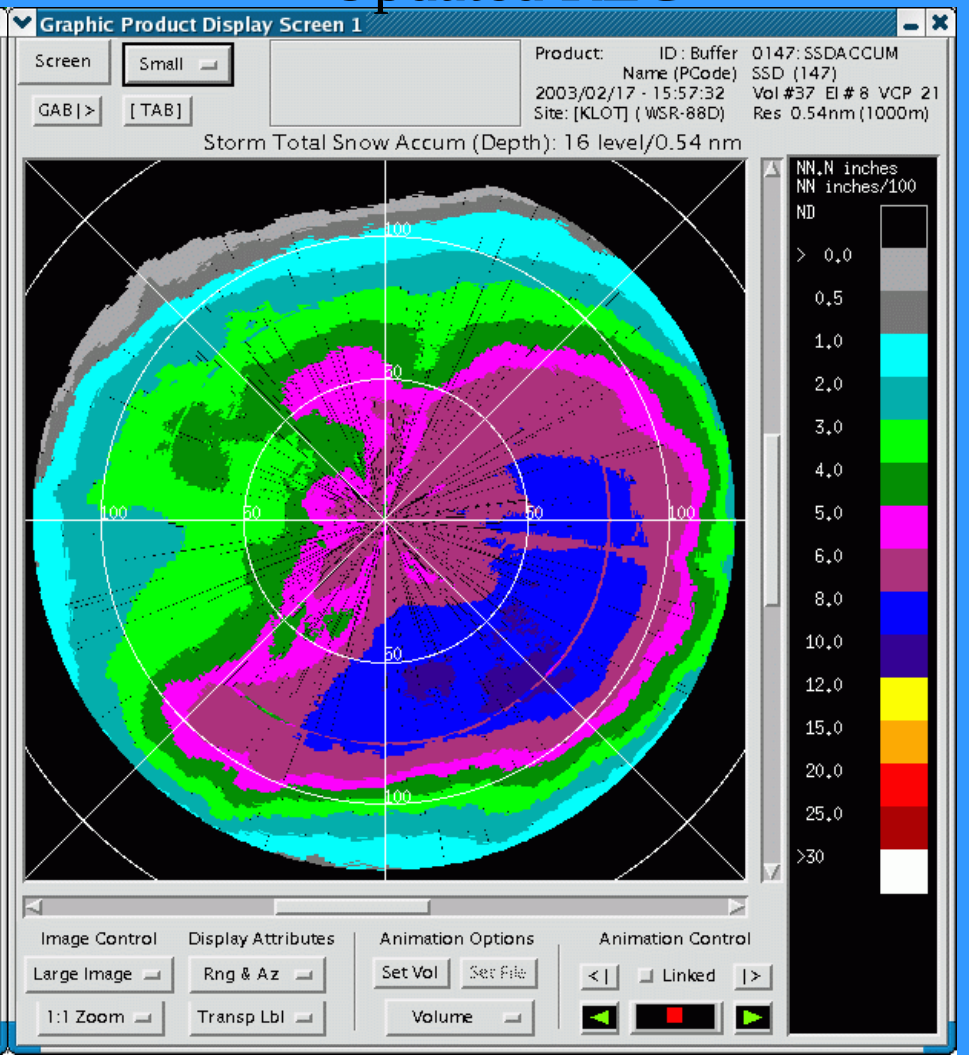


KCCX 24 Hour Snow Accumulation

Current REC



Updated REC



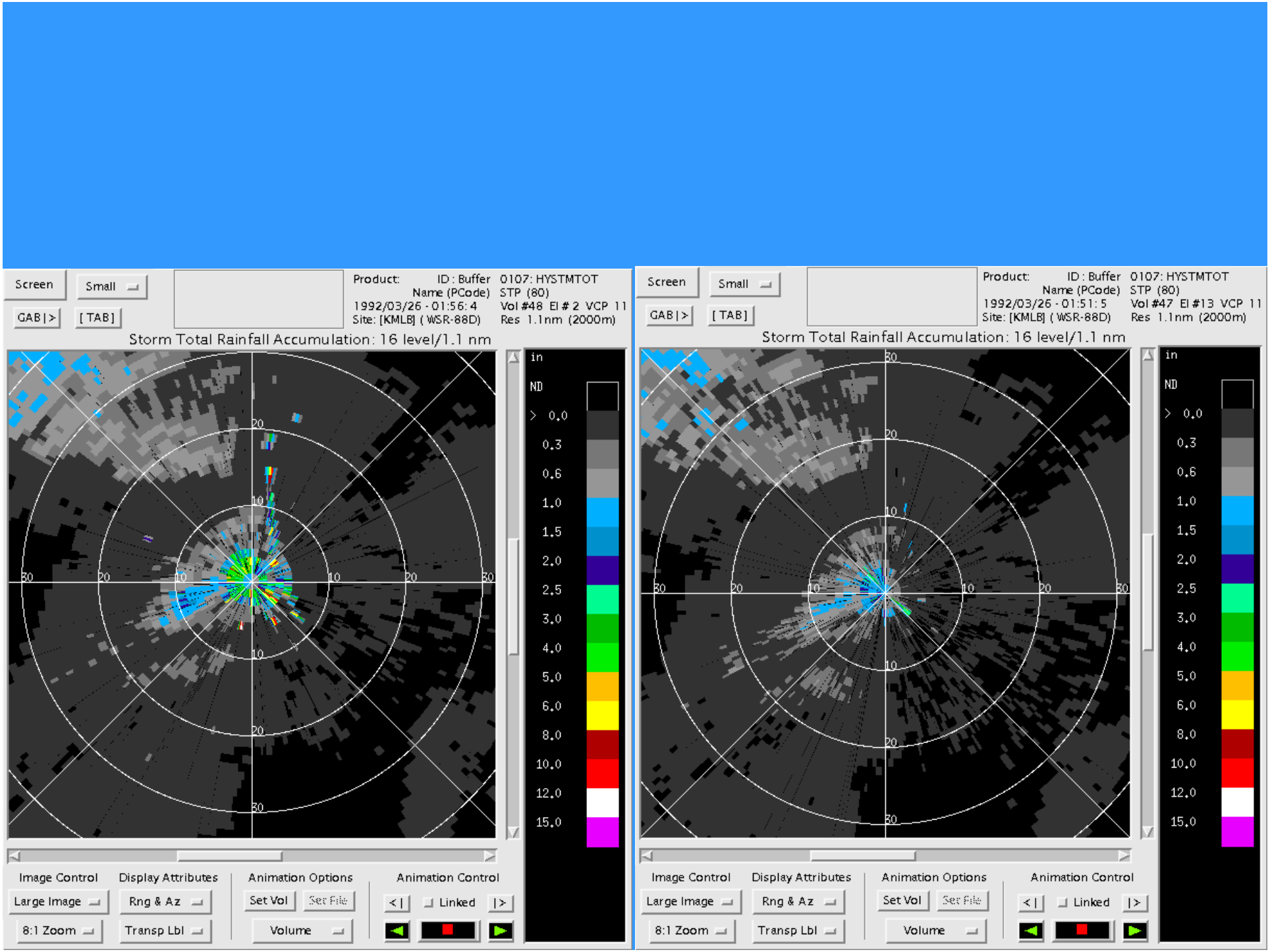
Summary

- Current REC performance below expectations
- REC upgrades have been coded and are ready for verification and deployment
  - Fixed APDA
  - Added PDA
- Upgrades have been shown to improve precipitation estimates

Summary

- Recommendation: Implement upgrades to REC

- Optimal usage
  - Use GMAP in convective situations
  - In stratiform apply GMAP only to clutter bypass map and use REC to determine AP


Screen
Small
GAB|>
[TAB]
Product: ID: Buffer 0107: HYSTMTOT
Name (PCode) STP (80)
1992/03/26 - 01:56:4 Vol #48 El # 2 VCP 11
Site: [KMLB] (WSR-88D) Res 1.1nm (2000m)
Storm Total Rainfall Accumulation: 16 level/1.1 nm
in
ND
> 0.0
0.3
0.6
1.0
1.5
2.0
2.5
3.0
4.0
5.0
6.0
8.0
10.0
12.0
15.0
Image Control
Large Image
8:1 Zoom
Display Attributes
Rng & Az
Transp Lbl
Animation Options
Set Vol
Set File
Volume
Animation Control
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Linked
|>
Screen
Small
GAB|>
[TAB]
Product: ID: Buffer 0107: HYSTMTOT
Name (PCode) STP (80)
1992/03/26 - 01:51:5 Vol #47 El #13 VCP 11
Site: [KMLB] (WSR-88D) Res 1.1nm (2000m)
Storm Total Rainfall Accumulation: 16 level/1.1 nm
in
ND
> 0.0
0.3
0.6
1.0
1.5
2.0
2.5
3.0
4.0
5.0
6.0
8.0
10.0
12.0
15.0
Image Control
Large Image
8:1 Zoom
Display Attributes
Rng & Az
Transp Lbl
Animation Options
Set Vol
Set File
Volume
Animation Control
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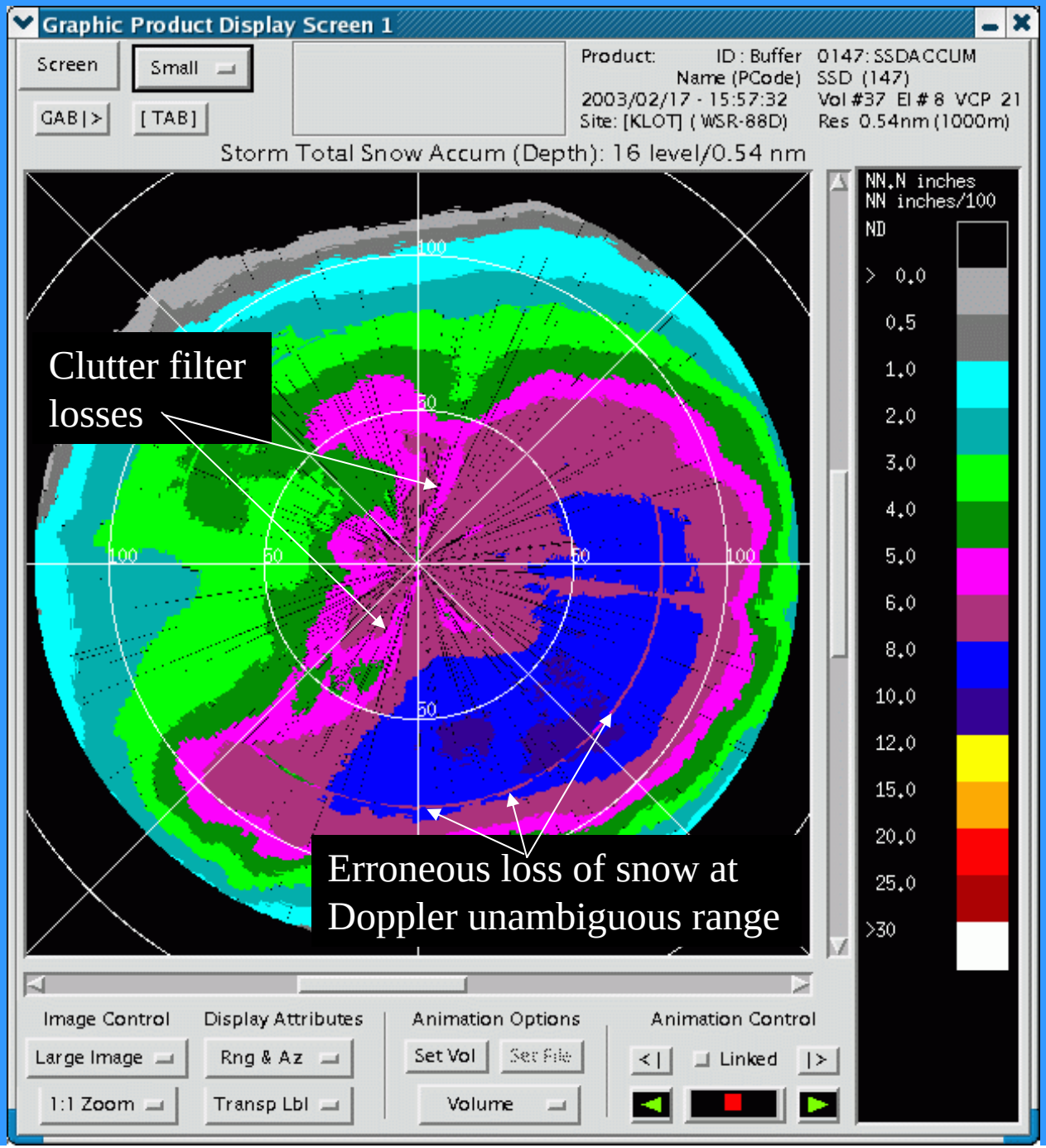
Graphic Product Display Screen 1
Screen
Small
GAB|>
[TAB]
Product: ID: Buffer 0147: SSDACCUM
Name (PCode) SSD (147)
2003/02/17 - 15:57:32 Vol #37 El # 8 VCP 21
Site: [KLOT] (WSR-88D) Res 0.54nm (1000m)
Storm Total Snow Accum (Depth): 16 level/0.54 nm
NN.N inches
NN inches/100
ND
> 0.0
0.5
1.0
2.0
3.0
4.0
5.0
6.0
8.0
10.0
12.0
15.0
20.0
25.0
>30
Clutter filter losses
Erroneous loss of snow at Doppler unambiguous range
Image Control
Large Image
1:1 Zoom
Display Attributes
Rng & Az
Transp Lbl
Animation Options
Set Vol
Set File
Volume
Animation Control
<|
Linked
|>