

SIGMET / GMAP Evaluation

Robert Lee – ROC Applications Branch

Rich Ice – RSIS

Jim Schofield – ROC Operations Branch

TAC Briefing - 30 March 2004

Overview

- Test Plan
 - Three Phase Approach
 - Project Responsibilities
 - Project Goals
 - Project Plan
- Progress Report

Three Phase Approach

- Phase 1 - Engineering Studies
- Phase 2 - Base Data Evaluation
- Phase 3 - Algorithm Evaluation

Project Responsibilities

- ROC Applications Branch
 - Manage the project
 - Evaluate algorithm output
 - Write up algorithm evaluation results
 - OPEN RDA-RVP8 Signal Processing Part 2 – Actual Radar Data
- ROC Operations Branch
 - Evaluate base data
 - Write up and provide results to ROC Apps
- ROC Engineering / RSIS
 - OPEN RDA-RVP8 Signal Processing Part 1 – Simulated Data
 - Perform engineering studies
 - Collect data with ORDA
 - Write up and provide results to ROC Apps

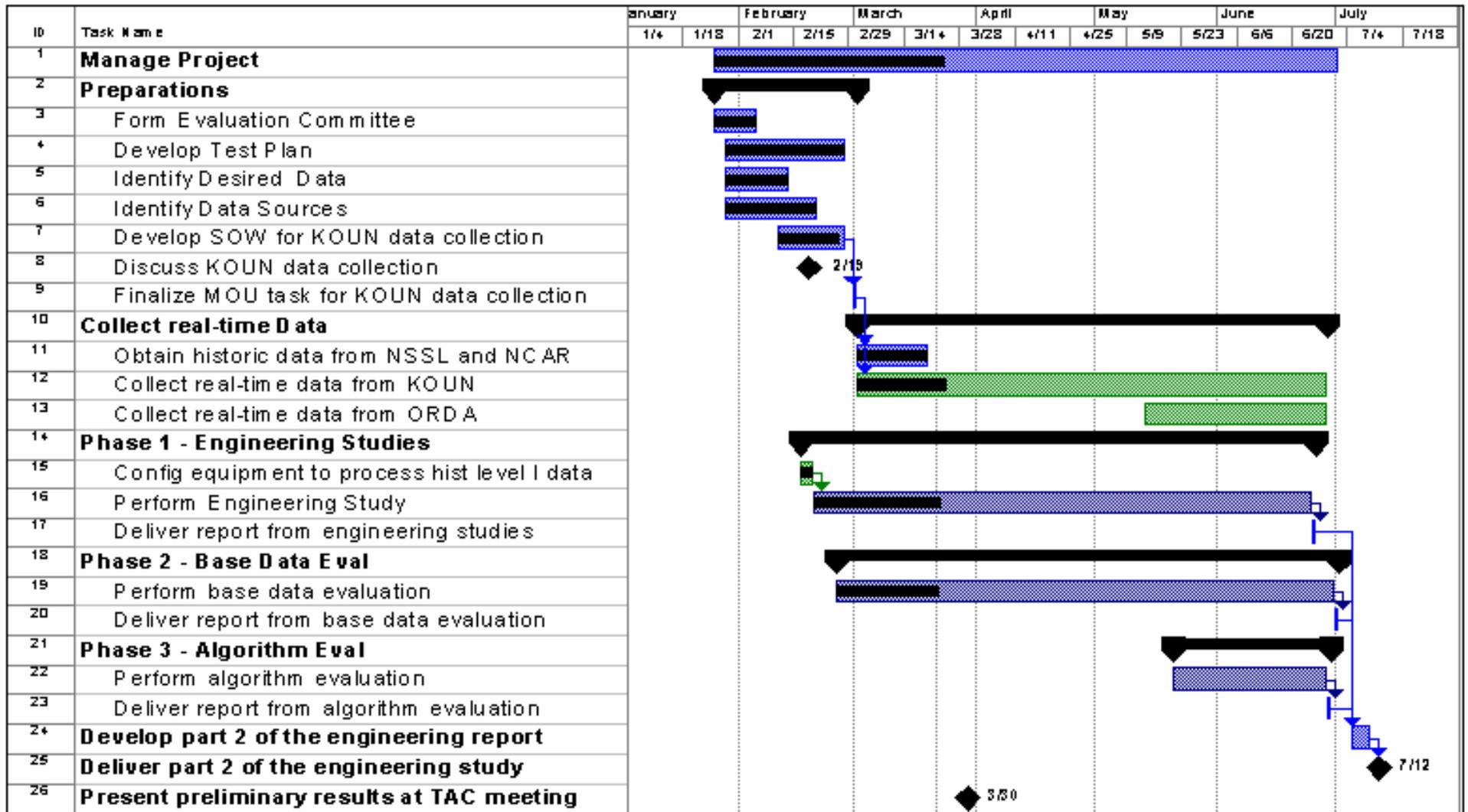
Project Goals

- Collect historical and real time data
 - KNQA (NCAR), KOUN (NSSL), KCRI (ORDA)
- Perform engineering studies
 - Clutter and AP in clear air
 - Clutter and AP in weather
 - Clutter in wide spread stratiform rain
 - Clutter in convective weather
 - Suppression tests
 - Clutter map development
 - Verify Expected Signal Estimate Biases and Variances

Project Goals (cont'd)

- Evaluate base data
 - Compare SIGMET and legacy products
 - Compare products with GMAP on and off
- Evaluate algorithms
 - MDA, TDA, SCIT, Gridded VIL, Cell VIL, POH, POSH, VWP, STP, OHP, THP, Max Echo Tops, REC, Snow

Project Plan



Progress : Phase 1

Engineering Studies

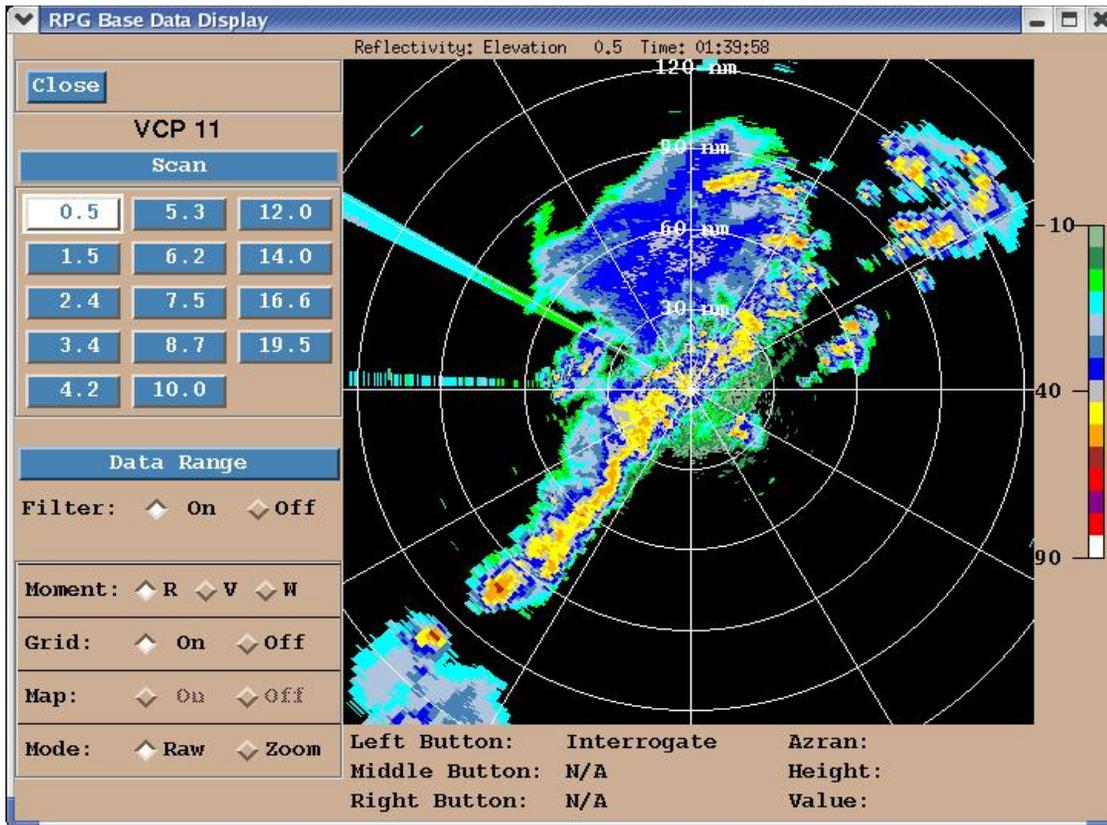
- Obtain data from NSSL and NCAR
 - NSSL, NCAR, WSR-88D Legacy (KNQA)
 - Special Engineering Data (KOUN)
 - 30 + DVD's of Time Series Data Provided by NSSL (KOUN radar, RRDA Source)
- Configure equipment to process level I data
 - Local Engineering Computer Network in Place
 - Four Linux Workstations, RVP8, RCP8, RAID
 - Linux Hosted ORPG and NSSL RRAT Installed

Progress – Engineering Studies (cont'd)

- Configure equipment to process level I data
 - Most Conversion Utilities Done
 - RRDA to L1RP, RVP8 to ORPG Pipe, Legacy to L1RP
 - To Do: ORPG display of legacy A1 generated data
 - WSR-88D Level 2 to MATLAB conversion done
 - Quantitative Analysis (MATLAB) regression plots
 - ORPG Compatible Output
- Level 2 Data Sets Provided to Meteorologists
- Obtained WSR-88D Level 2 data from NCDC

Data Cases On Hand

- June 28, 1997 – storms with AP (KNQA, legacy)
- Oct 8, 2002 - stratiform rain
- Feb 13, 2003 – light rain/drizzle
- Mar 5, 2003 – widespread storms
- May 8, 2003 – OKC/Moore Tornado
- June 11, 2003 – squall line
- Feb 24, 2004 – wide spread stratiform rain
- Mar 3, 2004 – severe storms
- Mar 4, 2004 – squall line



June 11. 2003
Squall Line Passage

KTLX 1:35:00Z
From NCDC

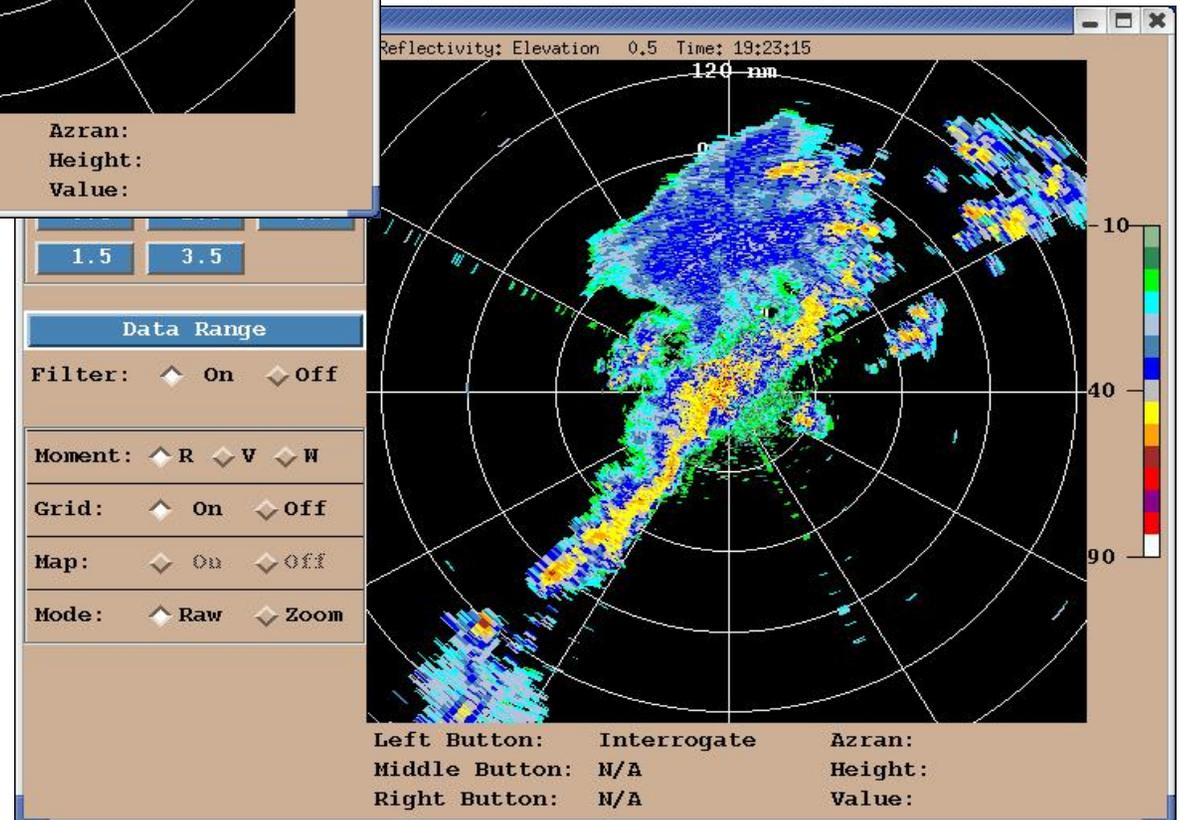


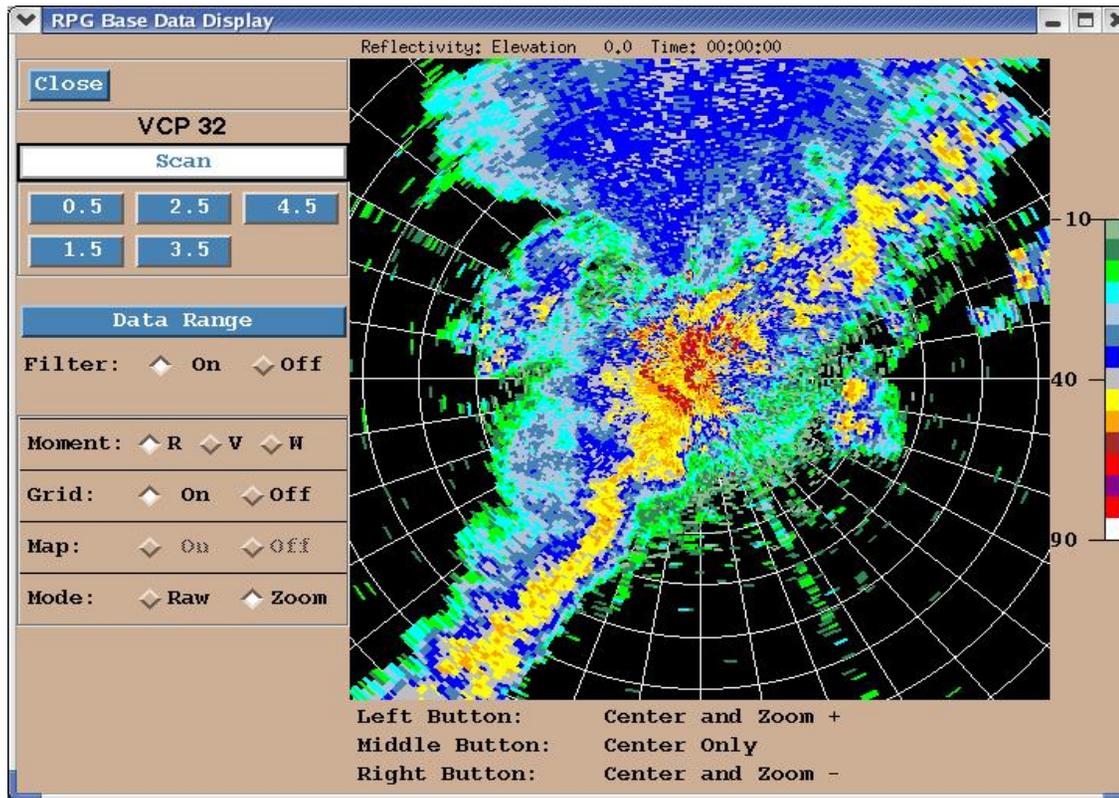
KOUN 1:37:00Z
RVP8 Processed Time Series
(GMAP Filtered)



No Issues Observed

TAC - March 04



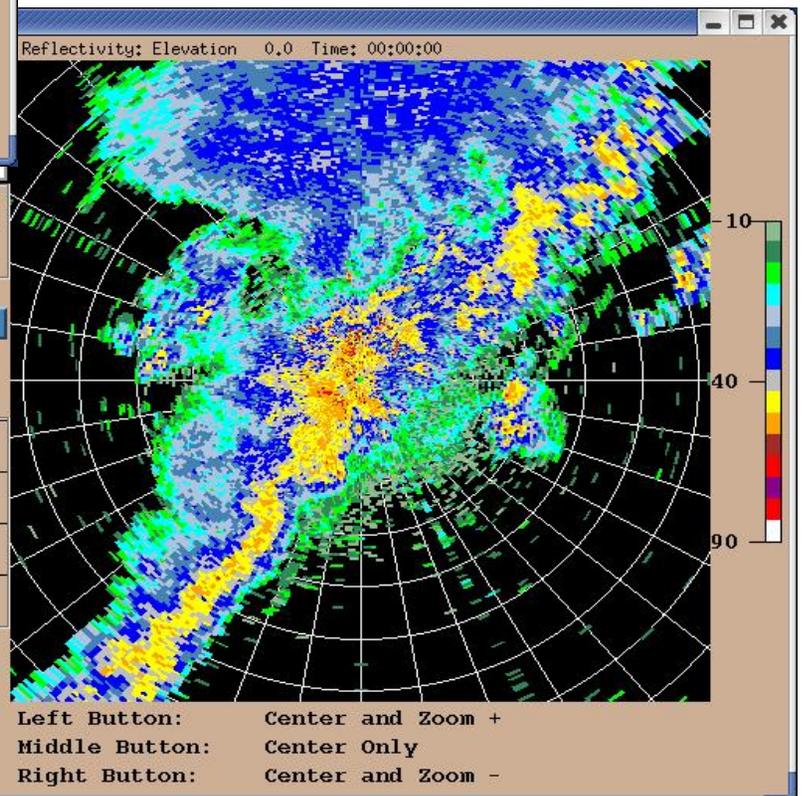


KOUN 6/11/2003

1:37:00Z

RVP8 Processed Time Series

No Clutter Filter

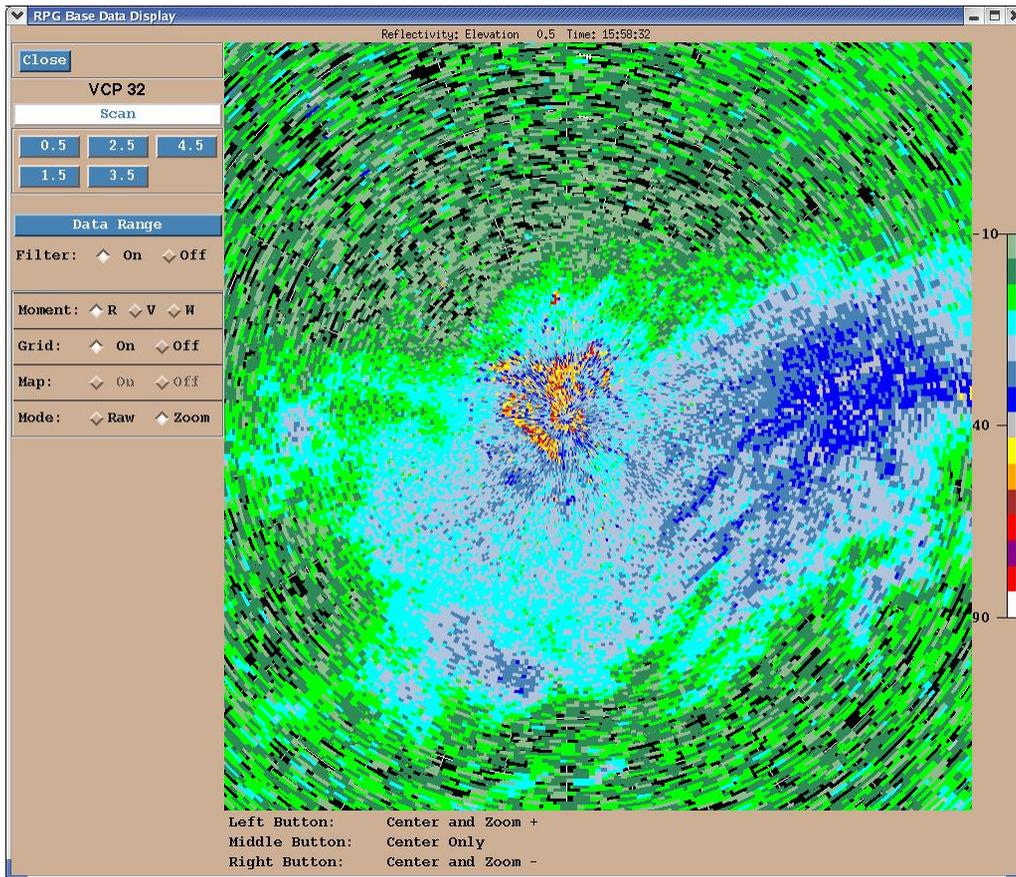


GMAP Clutter Filter

$$W = 0.3 \text{ ms}^{-1}$$



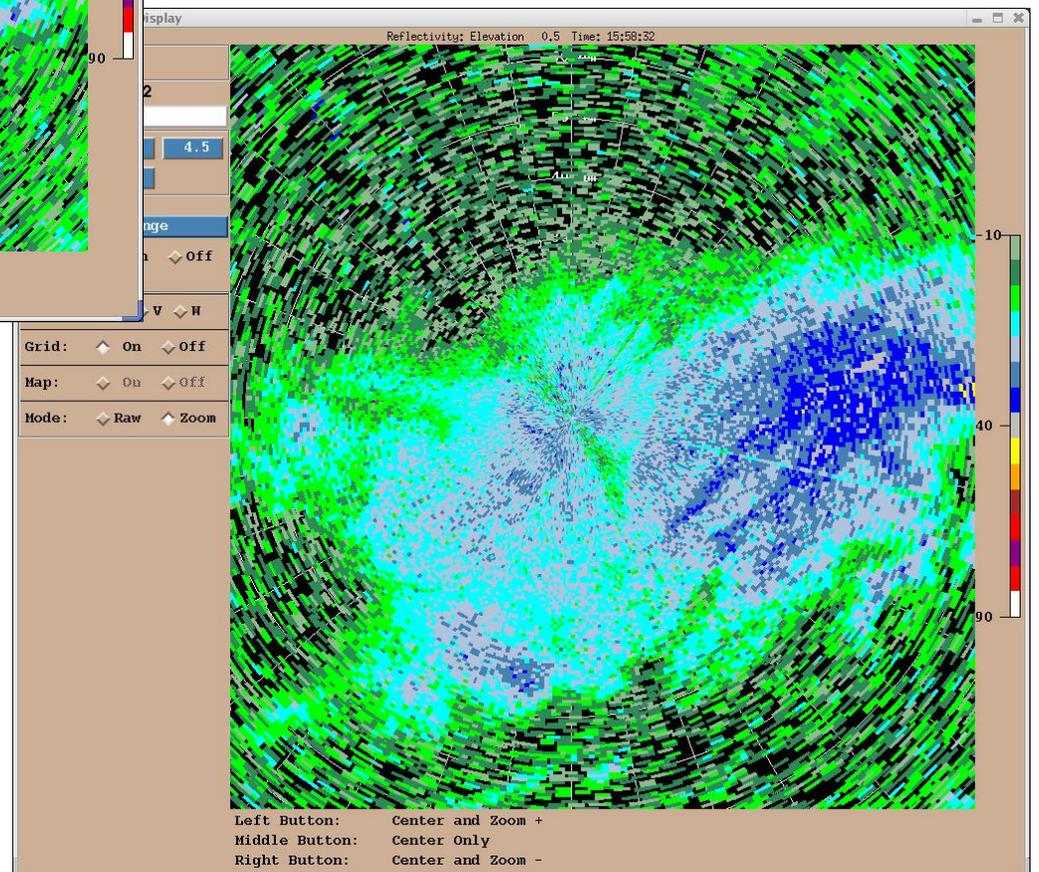
TAC - March 04



Stratiform Rain Case

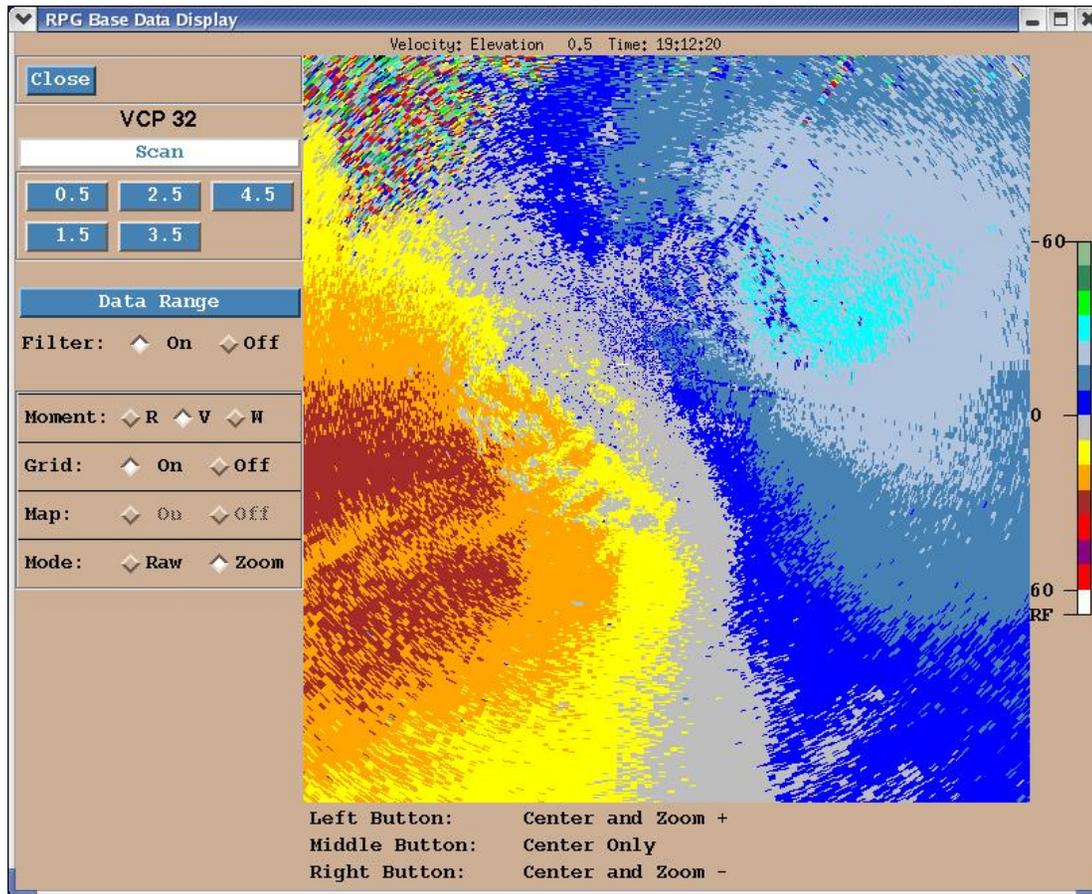
KOUN 2/24/2004 01:30:20Z
RVP8 Processed Time Series
Reflectivity

No Clutter Filter



GMAP Clutter Filter
filter width = 0.3 ms^{-1}



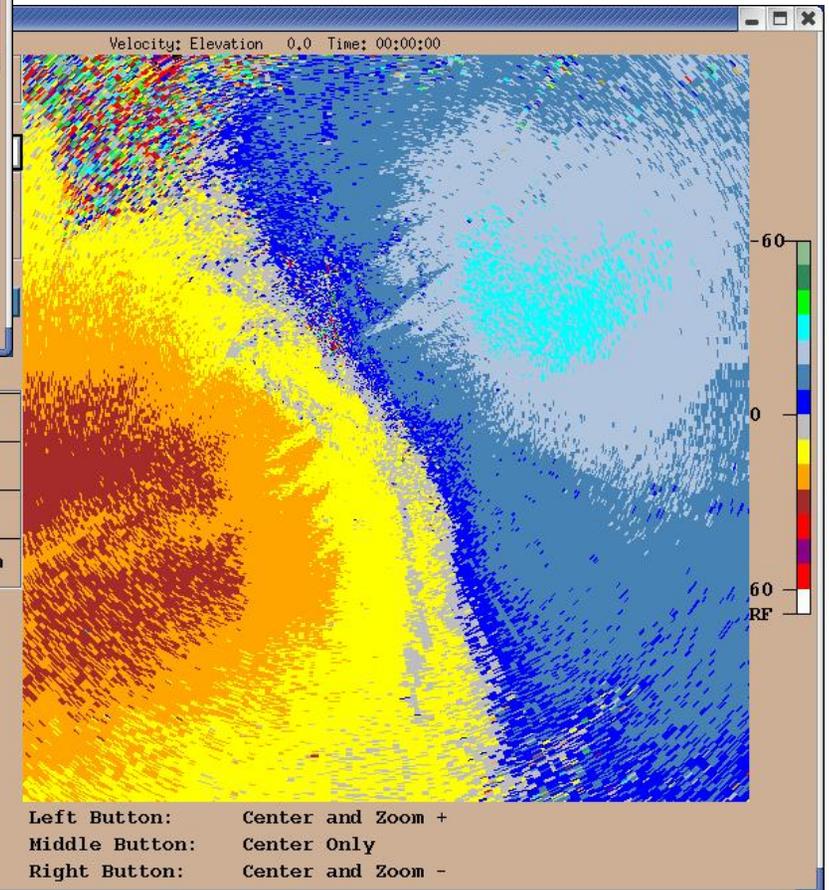


KOUN 2/24/2004

01:30:20Z

RVP8 Processed Time Series
Velocity

No Clutter Filter



GMAP Clutter Filter
filter width = 0.3 ms^{-1}



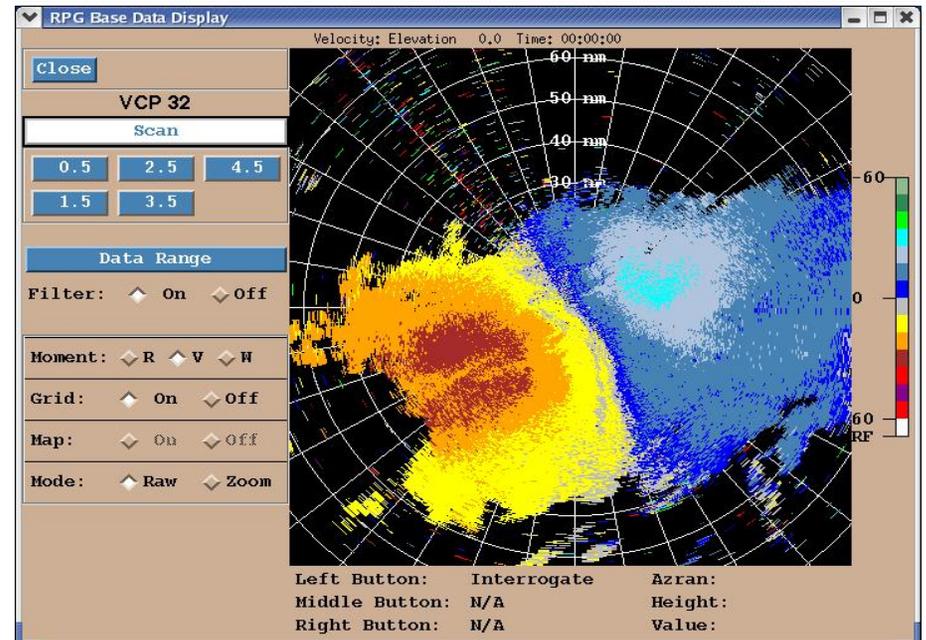
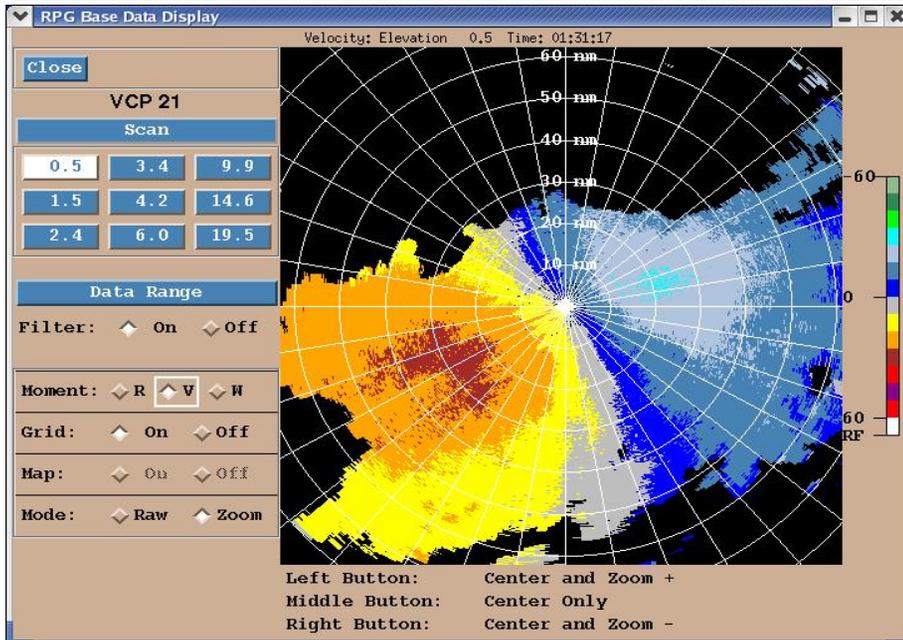
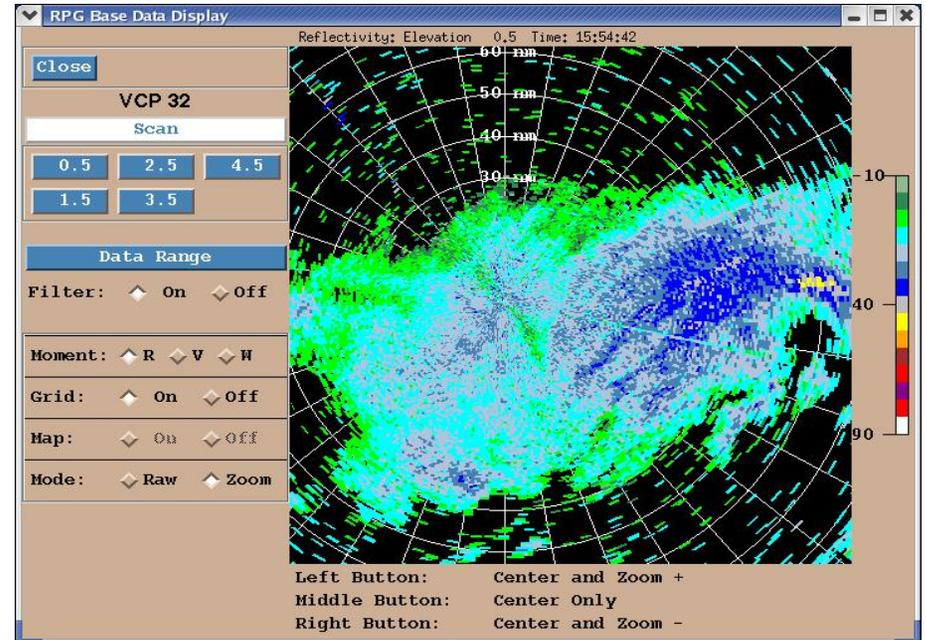
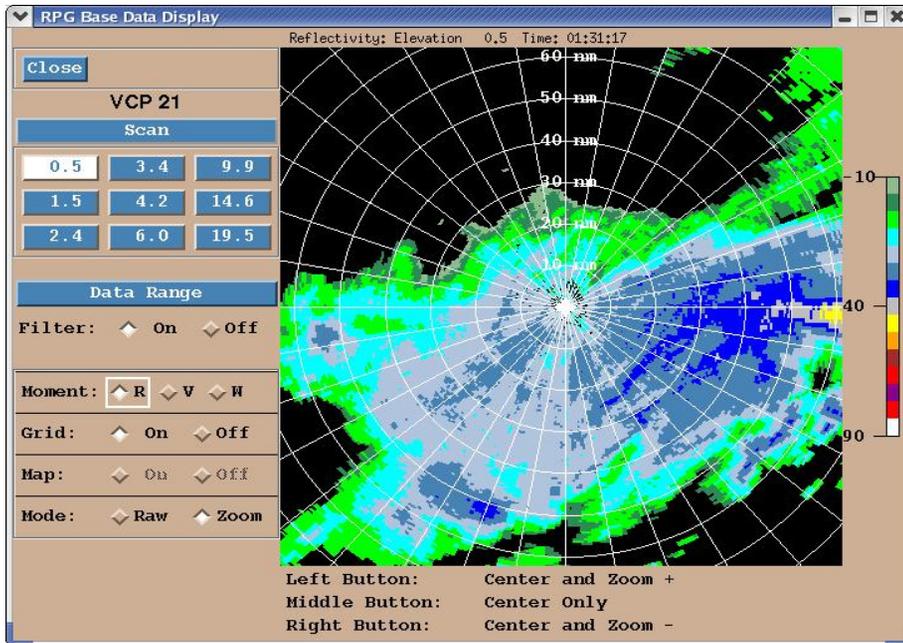
TAC - March 04

KTLX 01:31:17Z

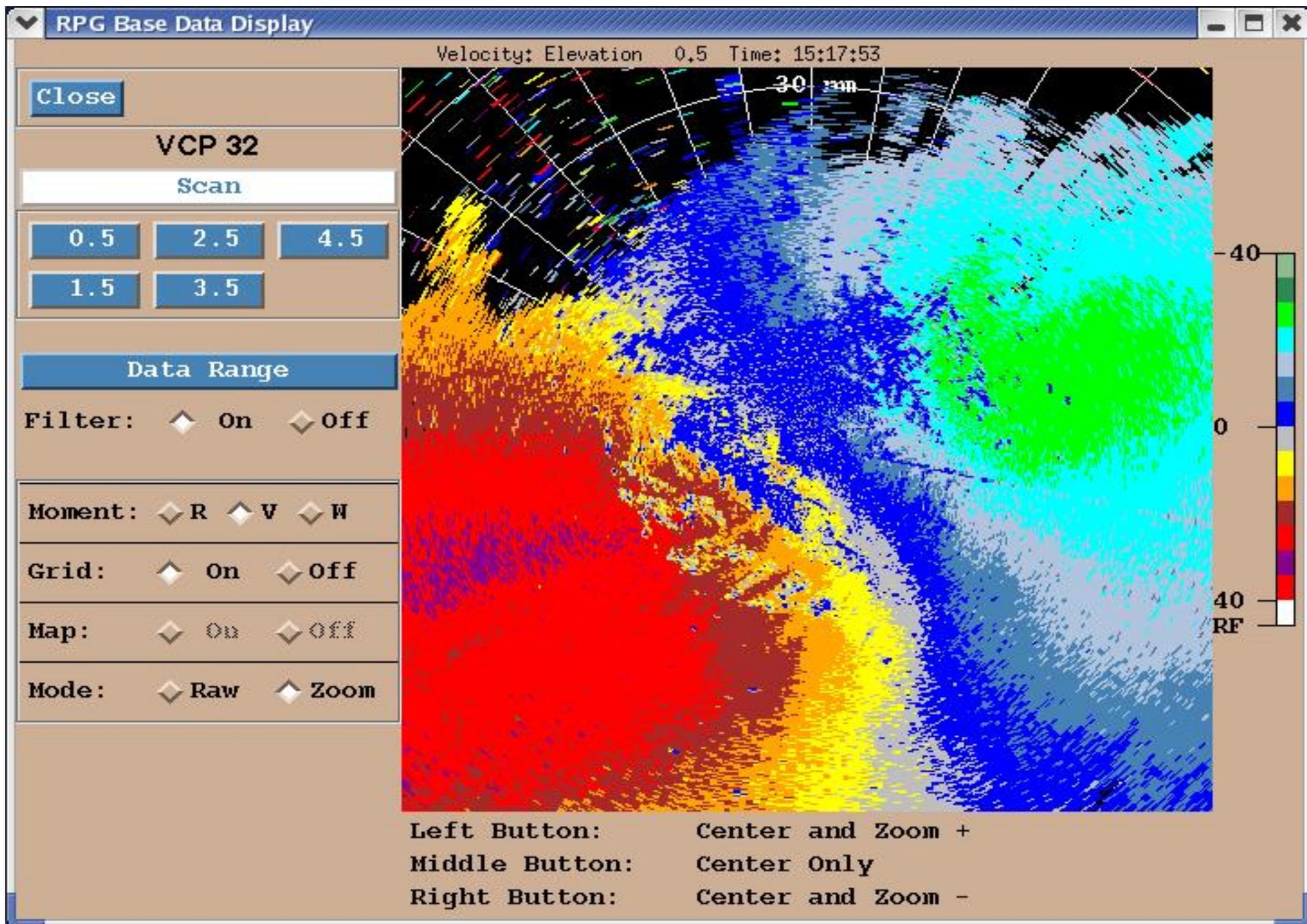
KTLX - KOUN

Feb 24, 2004

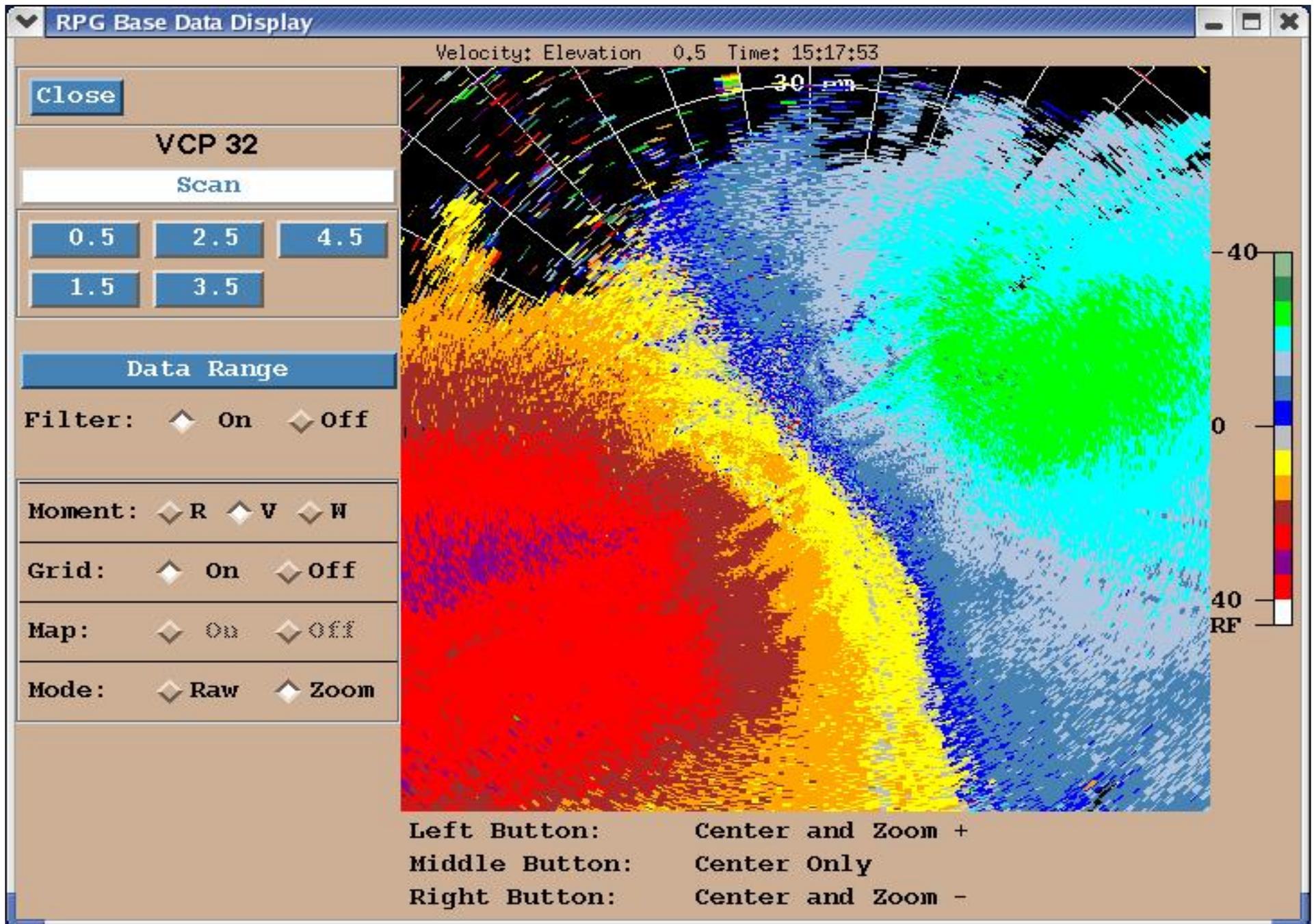
KOUN 01:30:20
GMAP Filtered & Thresholded



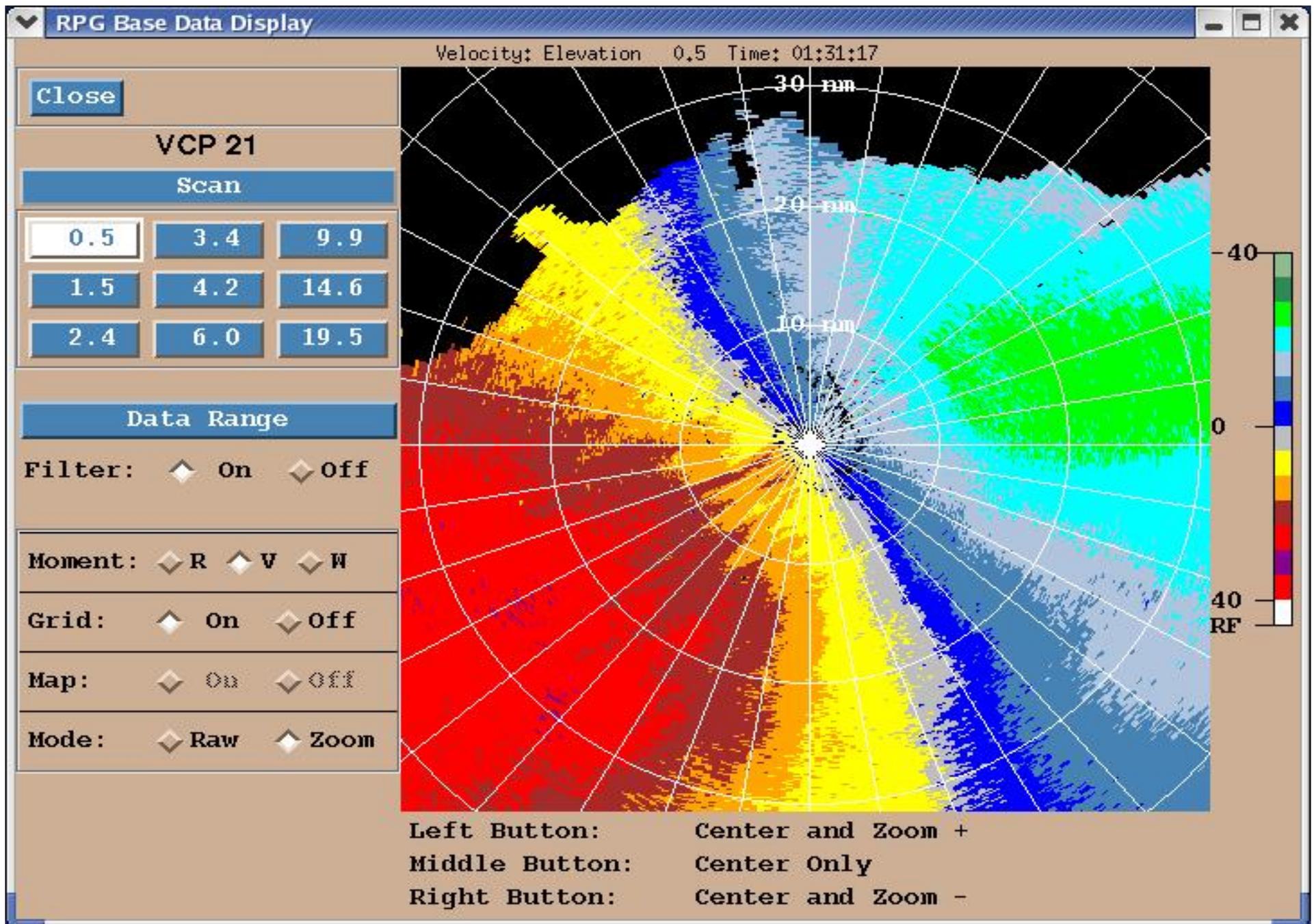
KOUN Feb 24, 2004, 01:30:20Z No Filtering



KOUN Feb 24, 2004, 01:30:20Z, GMAP filter and Threshold



KTLX Feb 24, 2004, 01:30:17

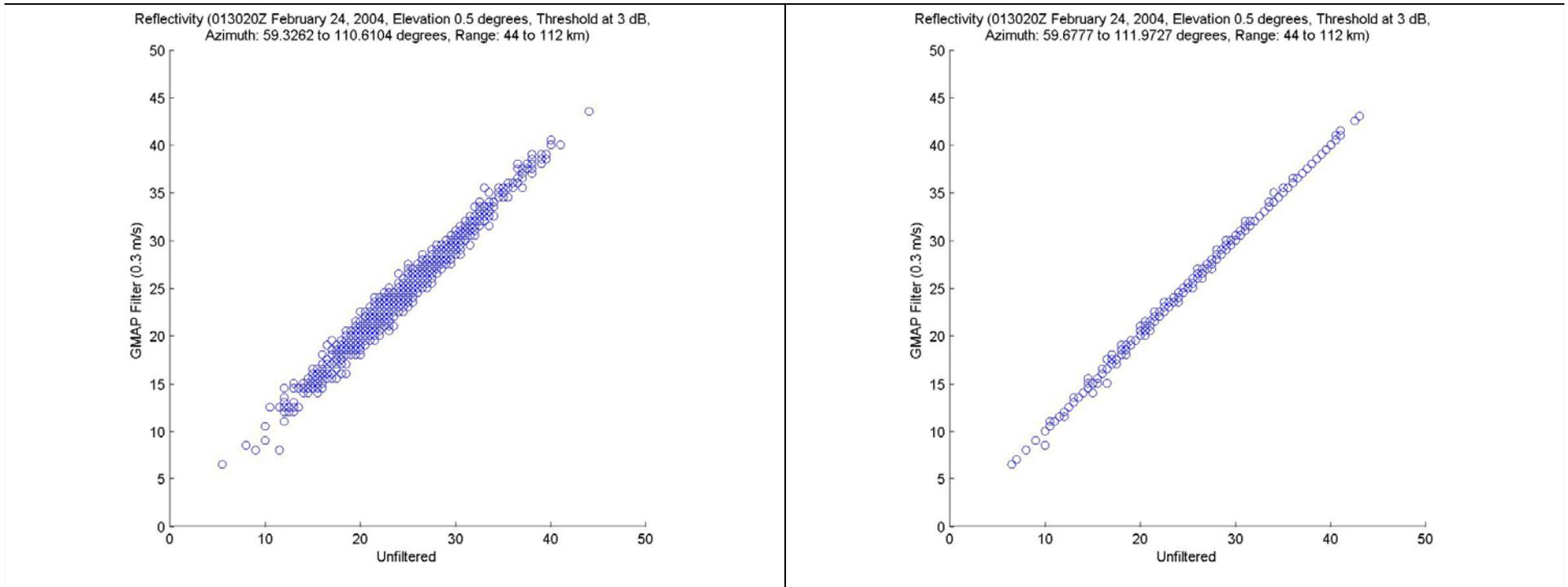


Reflectivity Scatter Plots

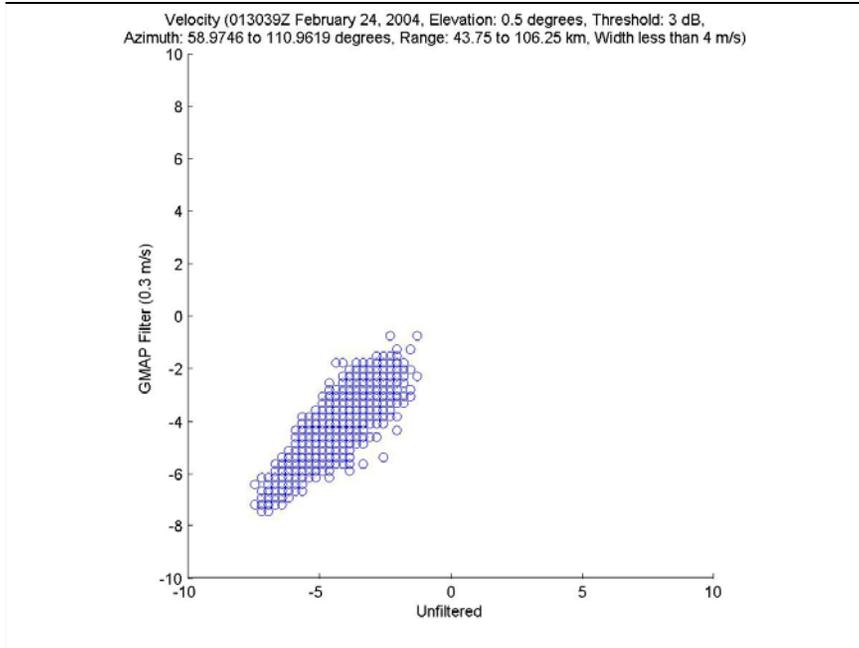
Feb 24, 2004 Case 60 to 110 degrees, 44 to 112 km

Original Processing Method

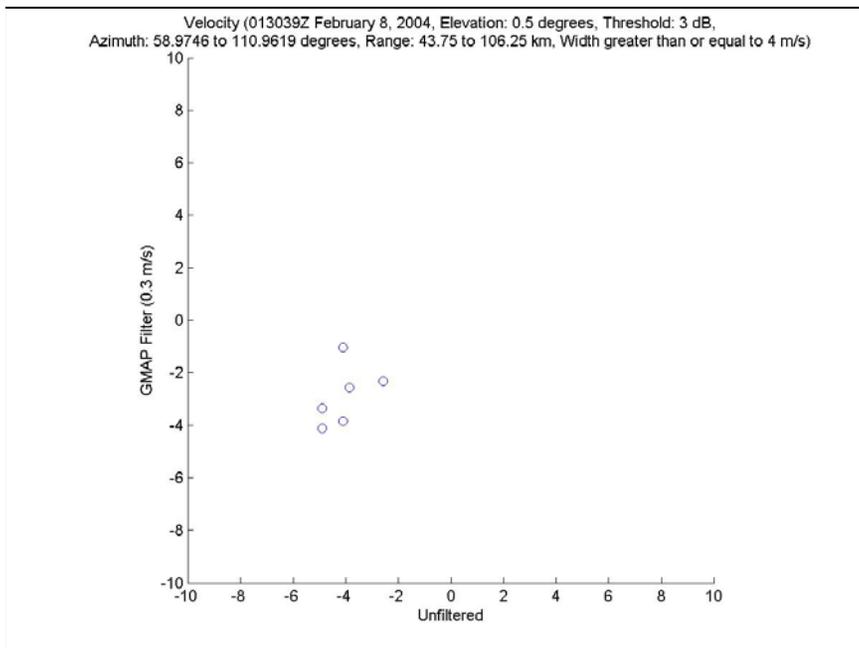
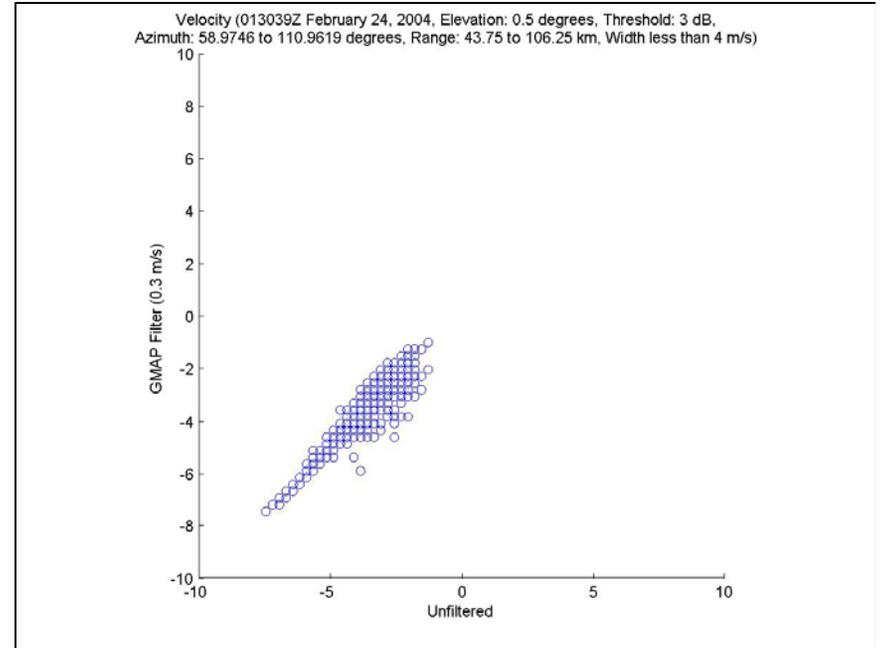
Modified Processing Method



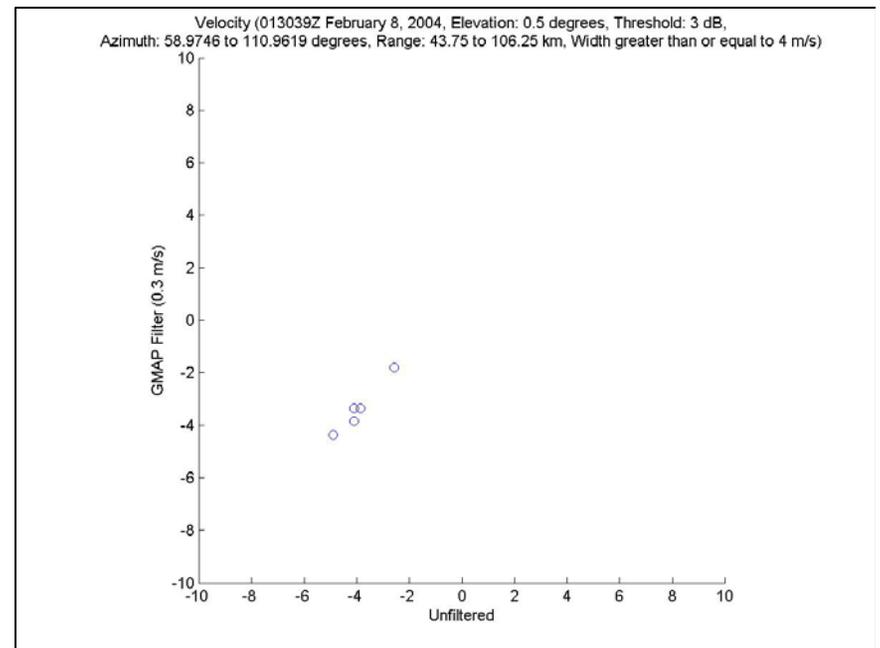
Velocity Scatter Plots



$< 4\text{ms}^{-1}$



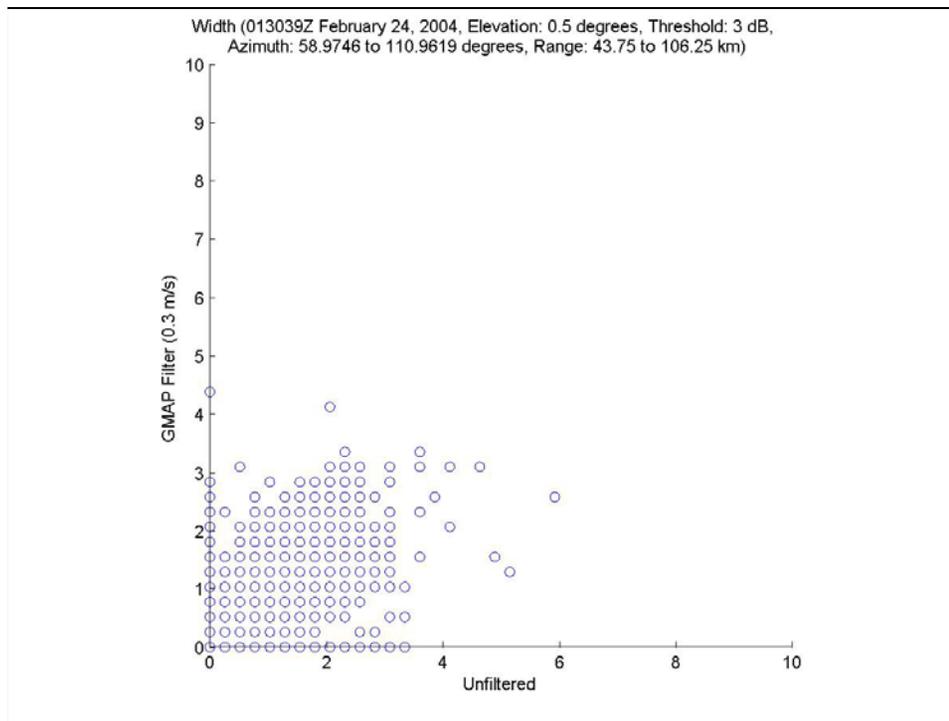
$> 4\text{ms}^{-1}$



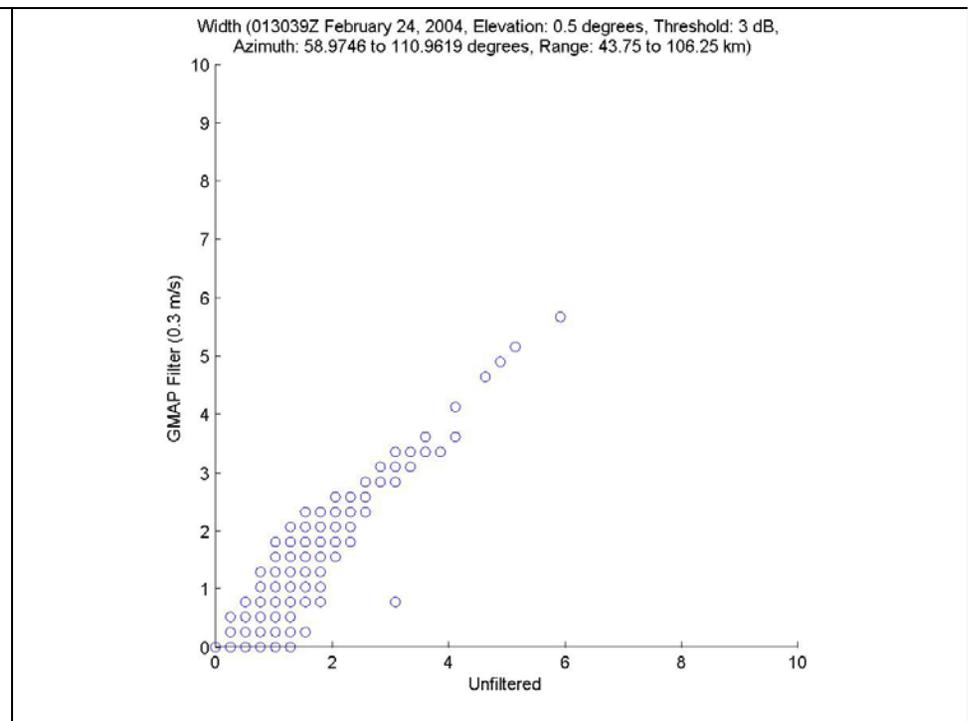
Spectrum Width Scatter Plots

Feb 24, 2004 Case 60 to 110 degrees, 44 to 112 km

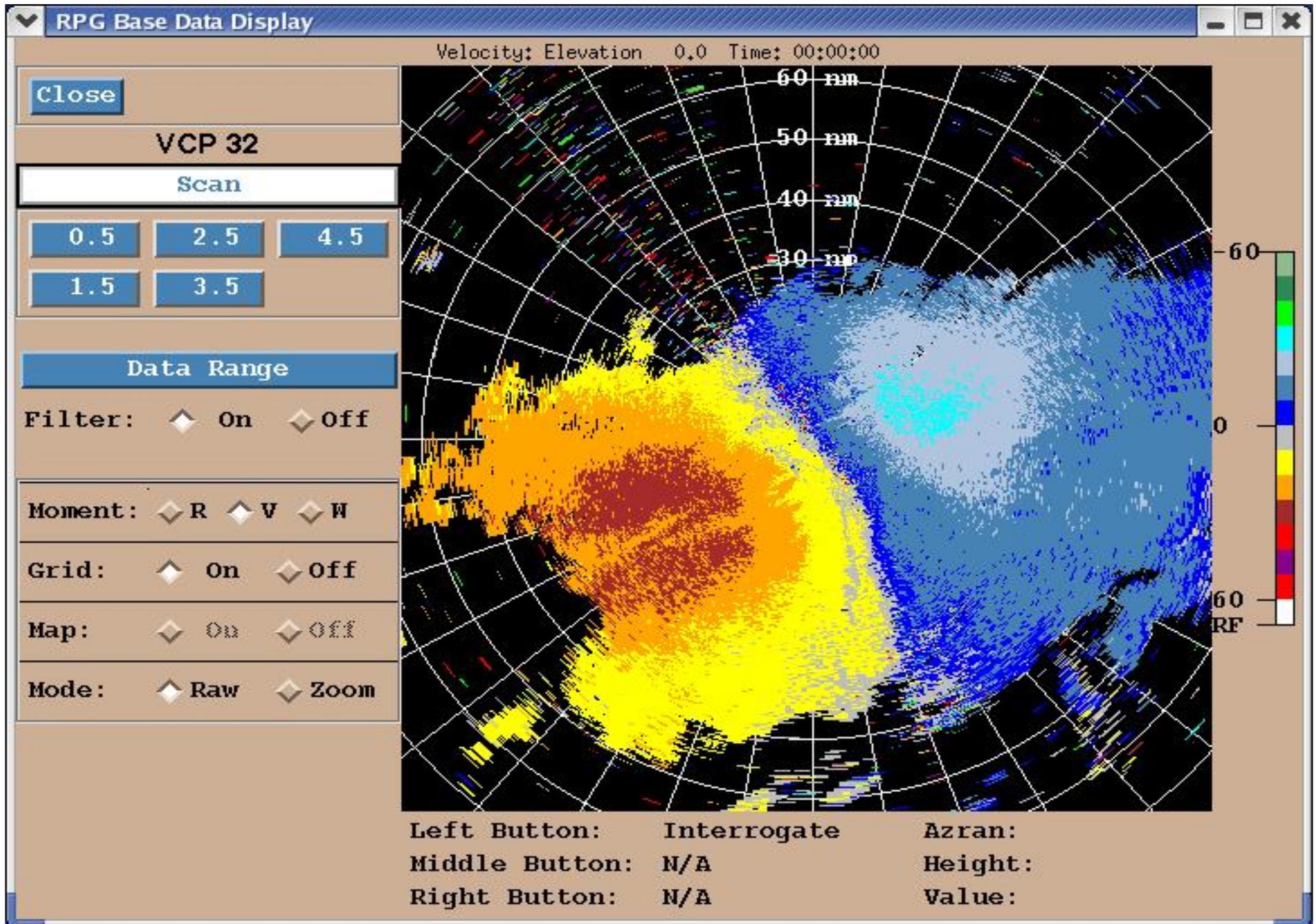
Original Processing Method



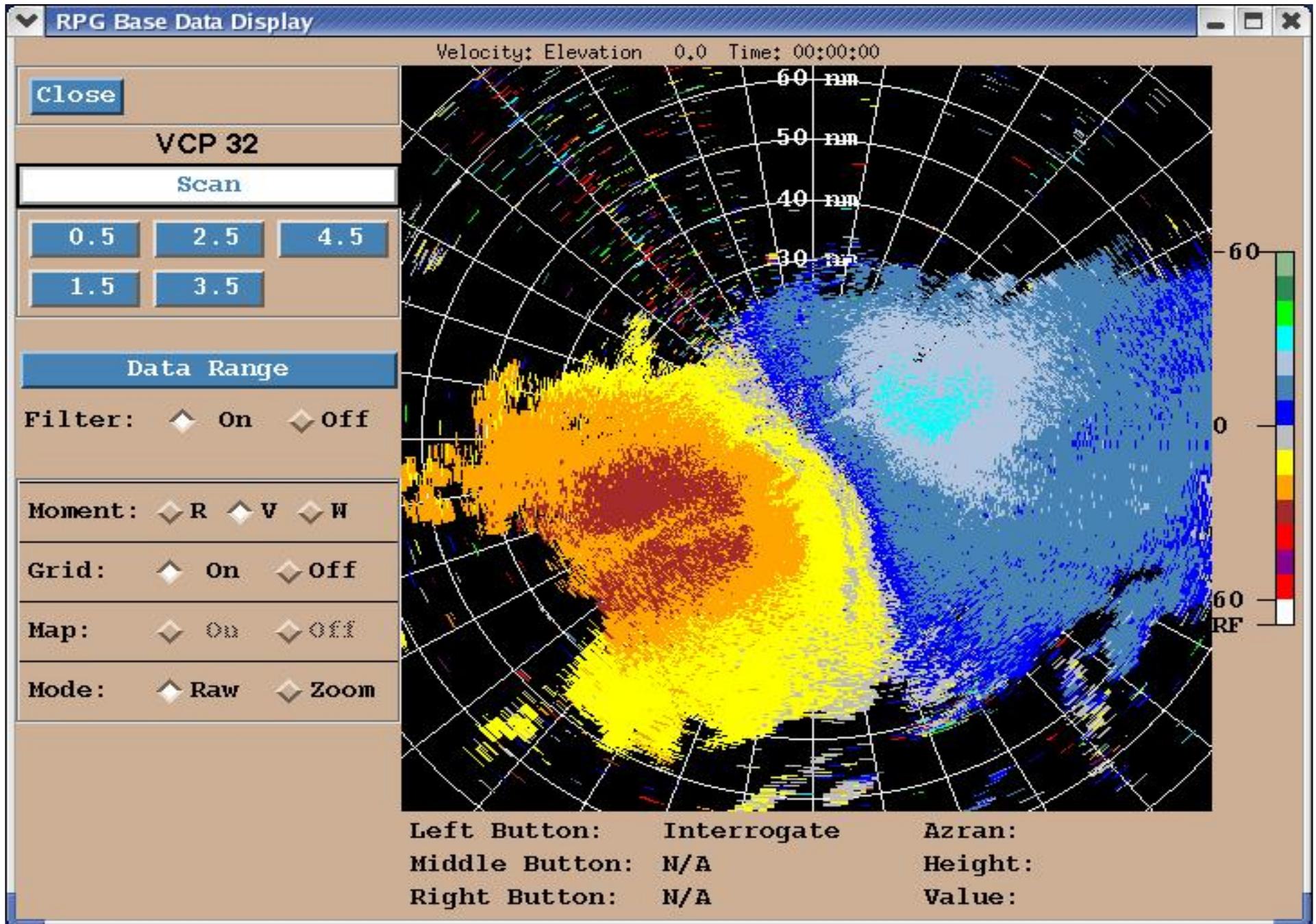
Modified Processing Method



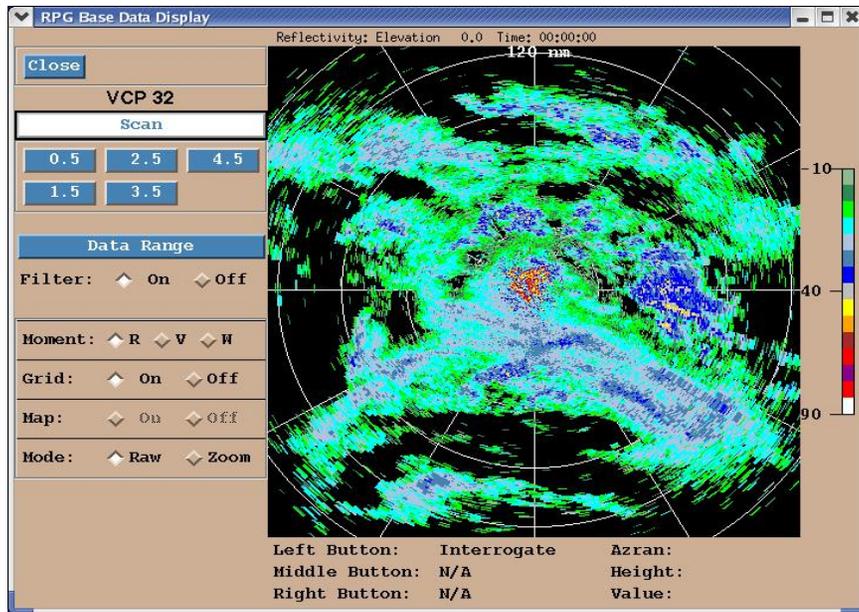
RVP8 Process Method Issue – Velocity Example from Original Processing Approach



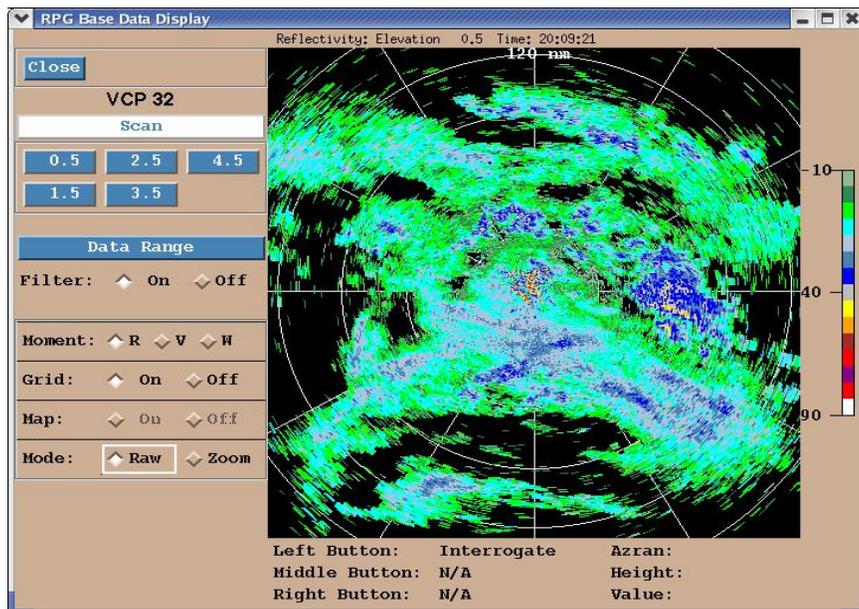
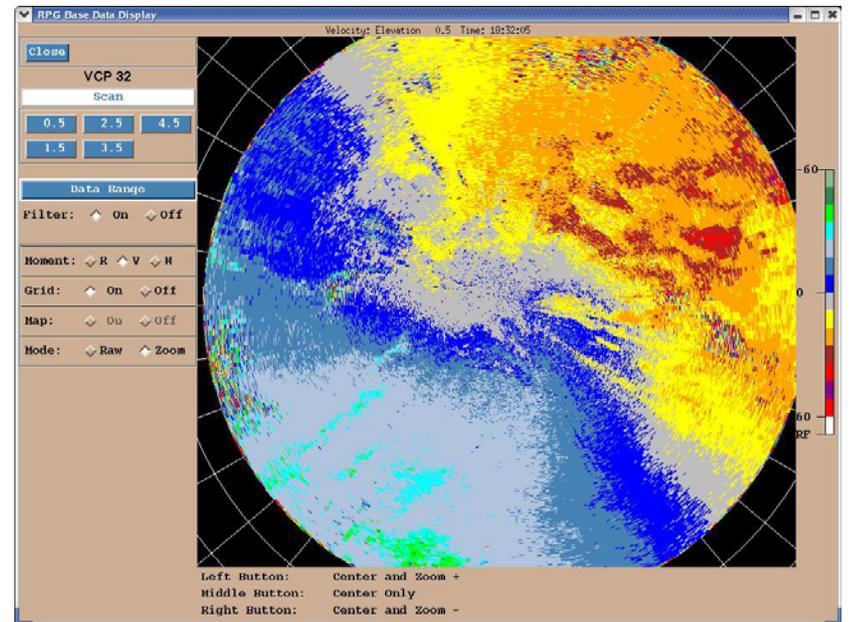
Velocity from Modified RVP8 Processing Approach



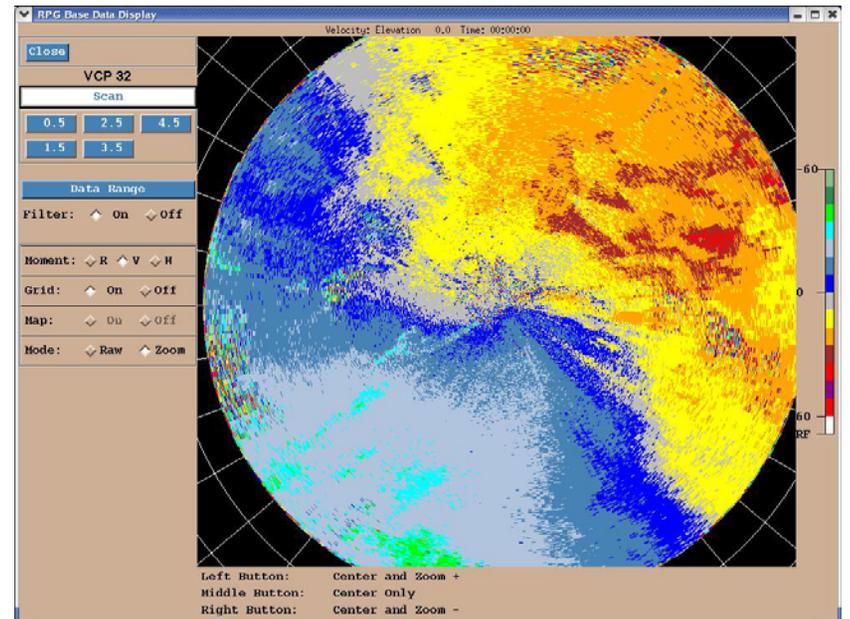
Feb 13, 2003, 20:51:05Z, Light Rain and Drizzle Near Radar



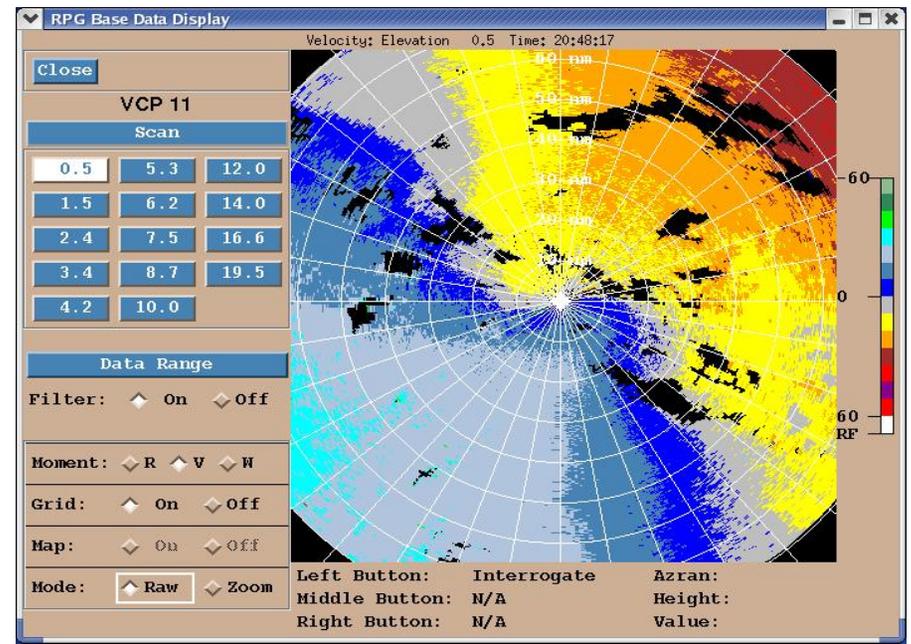
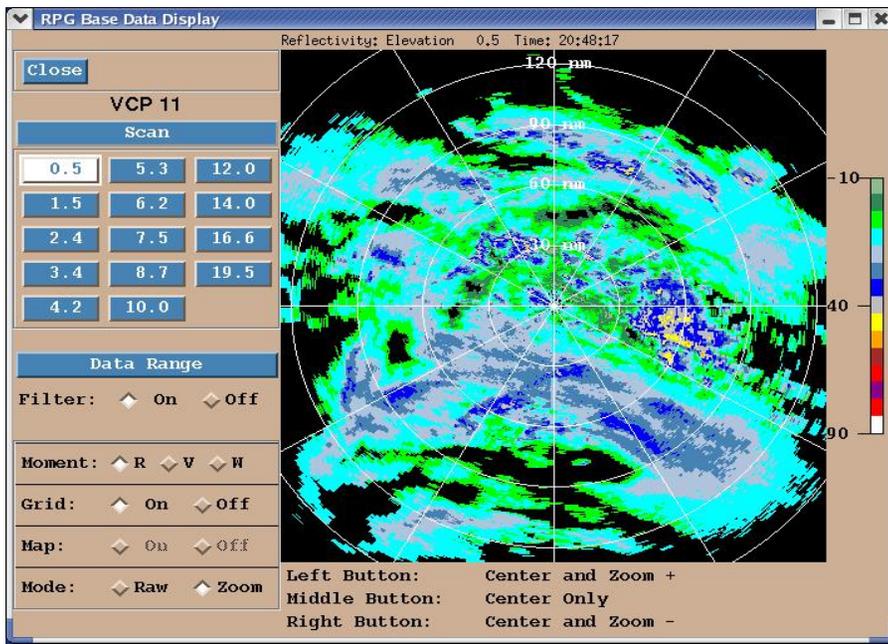
No
Filtering



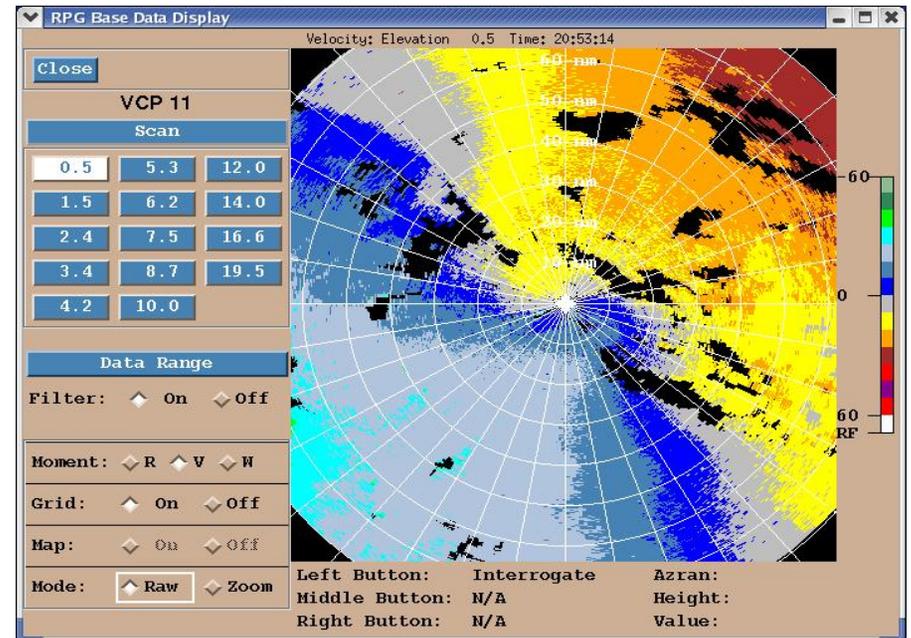
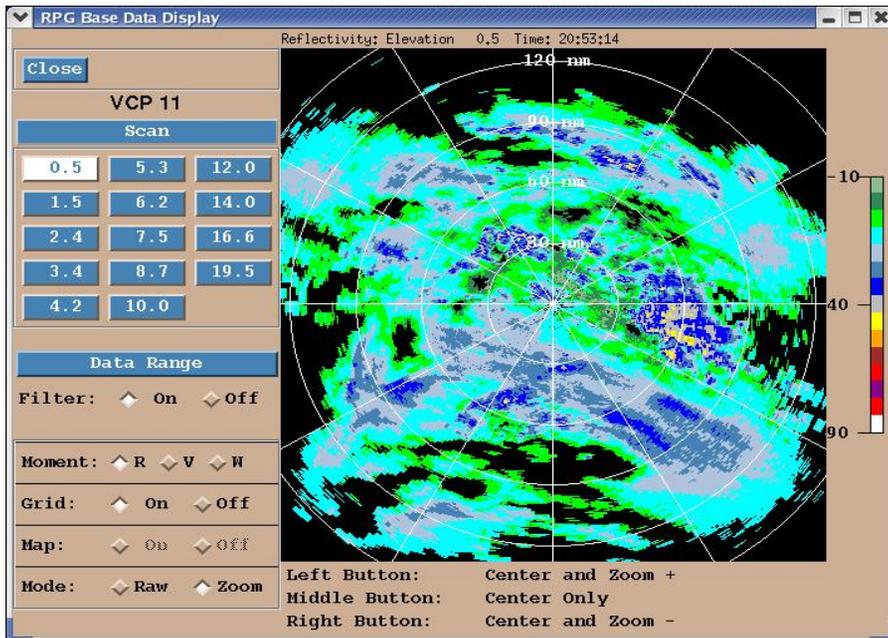
GMAP
Filtering

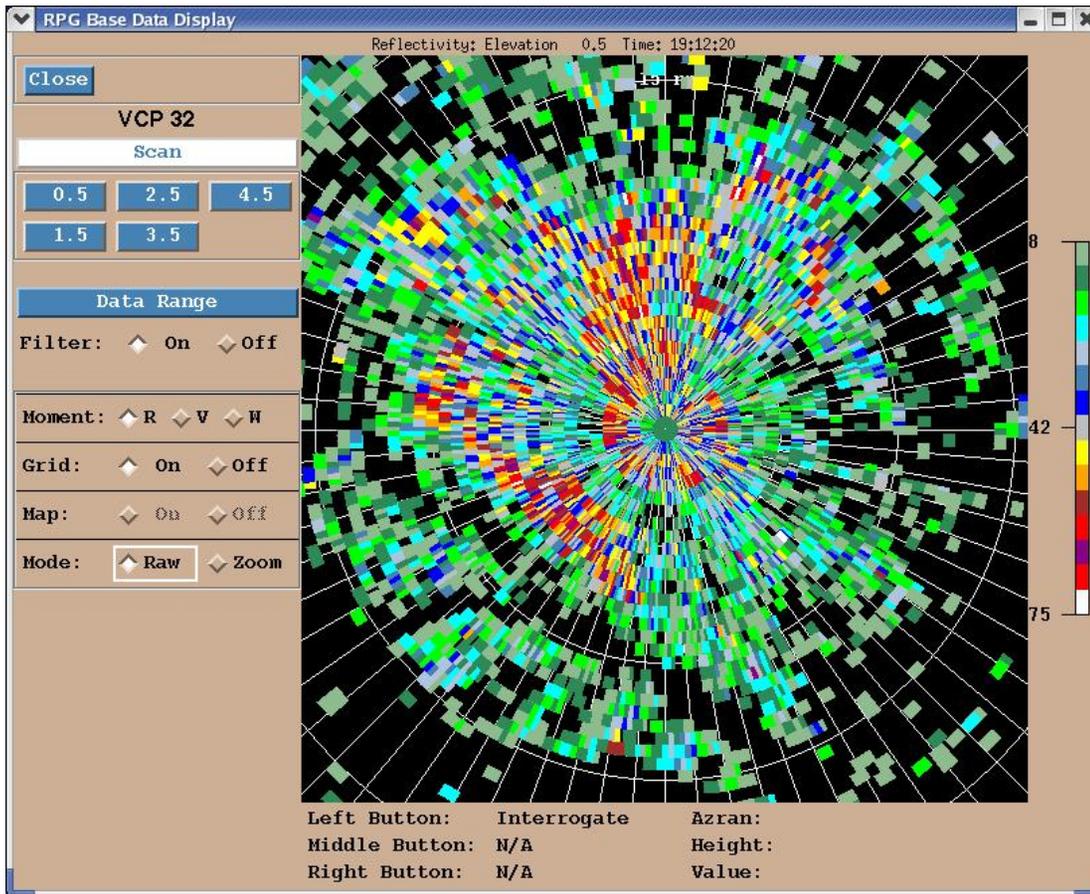


KTLX Feb 13, 2003 20:48:17Z



KTLX Feb 13, 2003 20:53:14Z

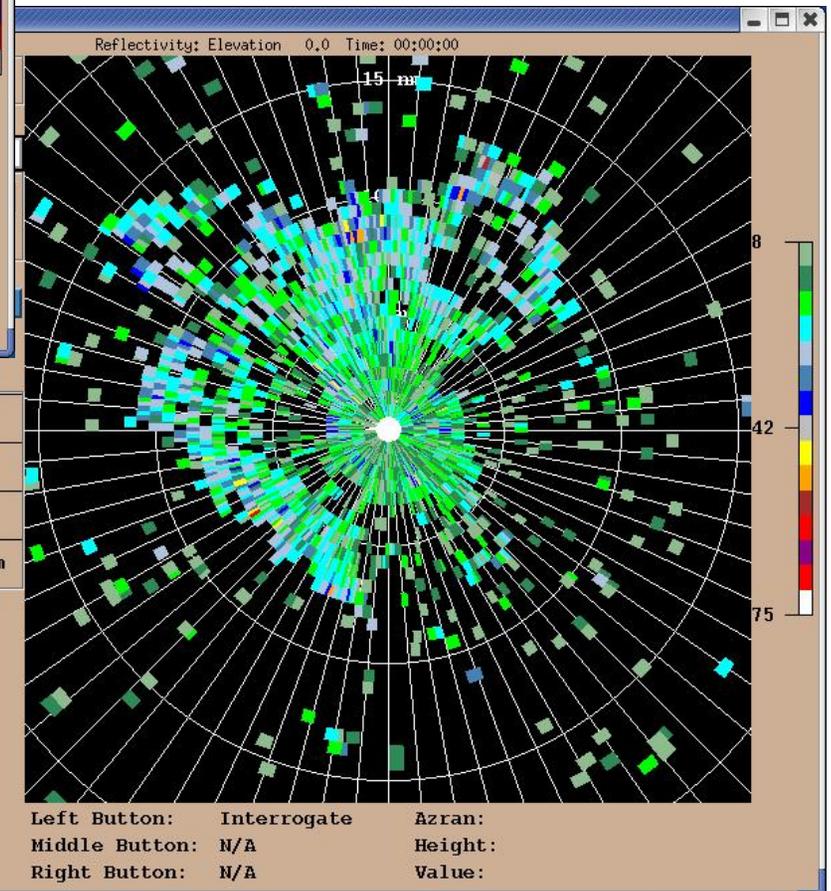




Suppression Analysis

KOUN 3/08/2004 16:24:16Z
RVP8 Processed Time Series

No Clutter Filter



GMAP Filter 5
filter width = 0.3 ms^{-1}

TAC - March 04

Continued Engineering Tasks

- Analyze and refine playback parameters:
 - System noise level, thresholds, reflectivity calibration constant
- Focus on numerical analysis
 - Regressions and histograms
 - Bias, variance, suppression level
- Improve process for legacy A1 data (Memphis AP case)
- Work with NSSL and ROC/Apps
 - Define any needed additional data collections
 - Process additional cases for meteorological analysis
- Document level 1 data acquisition and playback process
 - Future use for signal processing enhancements

Progress : Phase 2

Base Data Evaluation

- Level 2 Data Sets Processed on RPG standalone system
- ORPG Base Data Display used to view products generated with RVP8 datasets
 - RVP8 processed data, no clutter filtering
 - RVP8 processed data with clutter filtering
 - To Do: compare RVP8 products with corresponding KTLX products

Progress : Phase 3

Algorithm Evaluation

- Algorithm evaluation will have to wait until ORDA collects some real time data.
- Algorithm products collected with ORDA will be compared with algorithm products collected with KOUN.