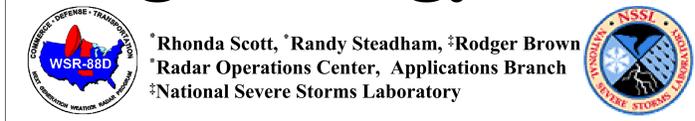


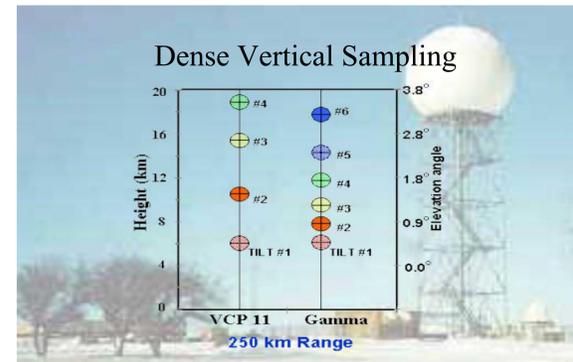
# A New Scanning Strategy for the WSR-88D



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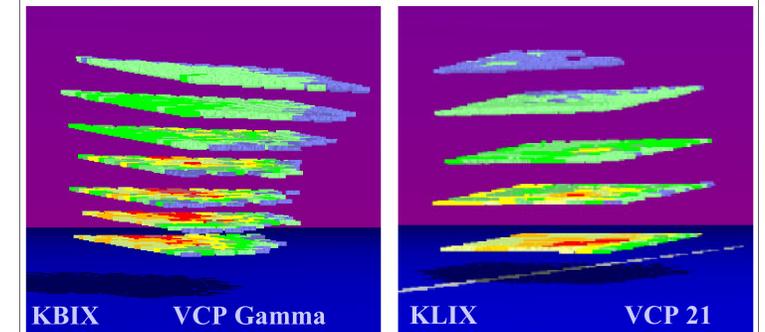
## Introduction

Forecasters have requested volume coverage patterns (VCPs) that are faster and have greater vertical resolution at lower elevation angles. Faster scanning is needed to better monitor fast-evolving severe weather events such as tornadoes and microbursts. Greater vertical resolution at lower elevation angles is needed to provide more accurate surface precipitation estimates, provide better confirmation of microburst and circulation signatures, and provide sufficient data at middle and far ranges to activate severe storm algorithms. During the past several years, the Radar Operations Center (ROC) and the National Severe Storms Laboratory (NSSL) have been investigating experimental VCPs that will provide forecasters with more informative severe weather data.

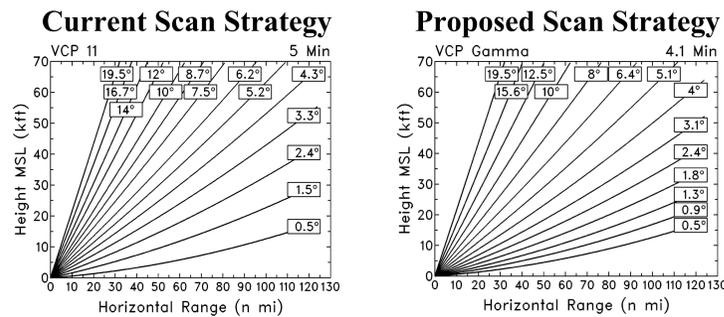


Center of beam height of samples at a range of 250 km for VCP 11 and VCP Gamma VCP. Gamma has 6 vertically stacked points below 20 km (65,000 feet) while VCP 11 has only 4 vertically stacked points.

## 3-D Images of a Storm Using Gamma and VCP 21



Identical storm approximately 80 nmi from the WSR88Ds at Keesler AFB (KBIX) and Slidell (KLIX) using VCP Gamma and VCP 21, respectively.

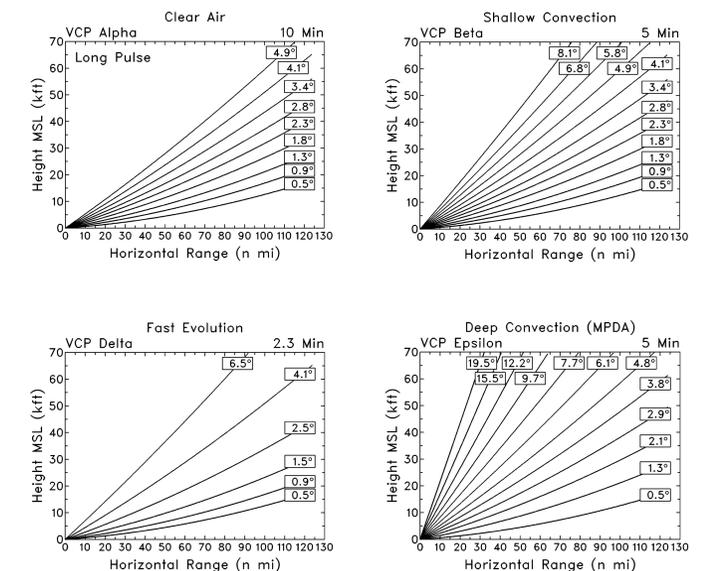


VCP Gamma has 14 unique elevation angles from 0.5° through 19.5° and completes a volume in 4.1 minutes. VCP Gamma will be effective during severe thunderstorm outbreaks.

## Findings from a Field Test of New VCPs

- VCP Gamma provides greater vertical resolution, which leads to improved Storm Cell Identification and Tracking (SCIT) algorithm performance.
- Algorithms start producing output 10- 35 minutes sooner with VCP Gamma than with VCP 11 or 21.
- The vertical resolution of current VCPs results in inconsistent trending.
- Trends of parameters such as cell track, maximum reflectivity, vertically integrated liquid (VIL), probability of hail and severe hail, and maximum hail size are more consistent for a longer period of time.
- Layers and convection aloft are more accurately depicted.
- Rainfall and snowfall estimates are more accurate.

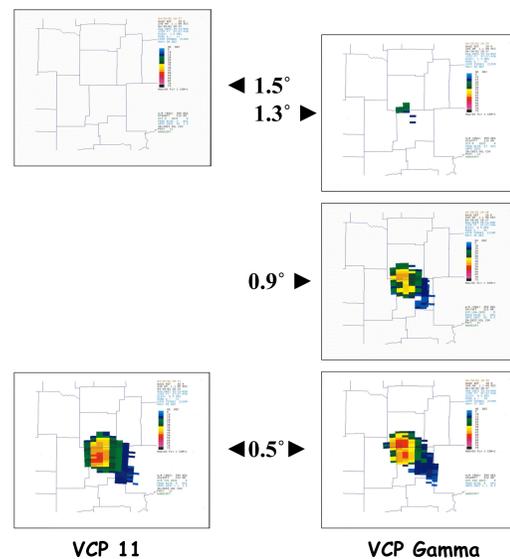
## Additional Experimental VCPs



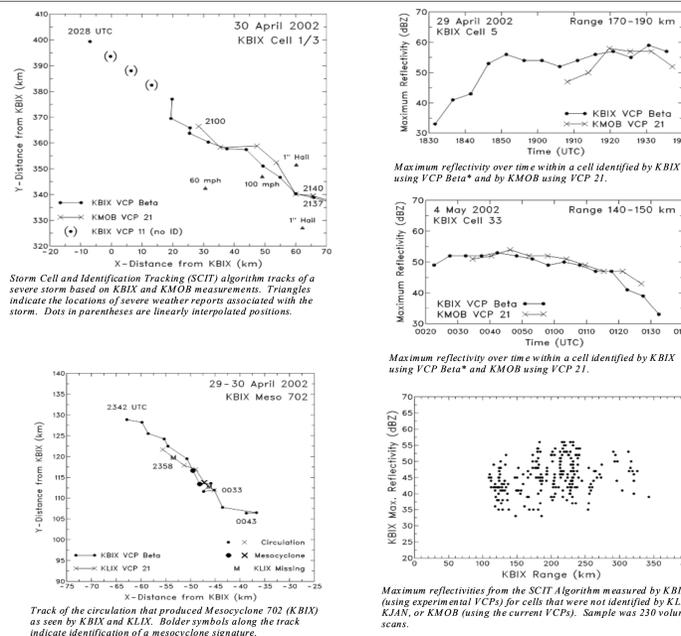
## Other New VCP Characteristics

- VCP Alpha** Clear Air Mode completing 9 unique elevation angles from 0.5 to 4.9° in 10 min (making separate reflectivity and Doppler velocity scans at the lowest three elevation angles).
- VCP Beta** Shallow/Distant Convection Mode completing 12 unique elevation angles from 0.5 to 8.1° in 5 min (making separate reflectivity and Doppler velocity scans at the lowest three elevation angles).
- VCP Delta** Fast Evolution Mode (designed for tornado and microburst monitoring) completing 6 unique elevation angles from 0.5 to 6.5° in 2.3 min (making separate reflectivity and Doppler velocity scans at the lowest three elevation angles).
- VCP Epsilon** Multiple Pulse Repetition Frequency (PRF) Deep Convection Mode completing 12 unique elevation angles from 0.5 to 19.5° in 5 min (making one reflectivity and three Doppler velocity scans, each with a different PRF, at each of the lowest three elevation angles).

## Reflectivity Products from VCP 11 and VCP Gamma



A developing severe thunderstorm is shown in consecutive volume scans using VCP 11 (left column) and VCP Gamma (right column). Dense vertical sampling provides earlier detection of storm structure. This storm later produced 100 mph winds at Columbus AFB.



\*VCP Beta and VCP Gamma lowest elevation angles are the same