P19 ENHANCEMENTS TO THE NATIONAL WEATHER RADAR TESTBED PHASED ARRAY RADAR STORM TRACKING FUNCTION

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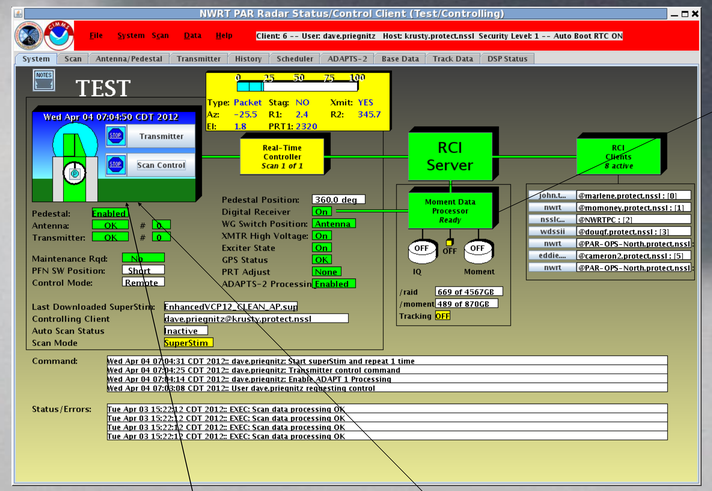
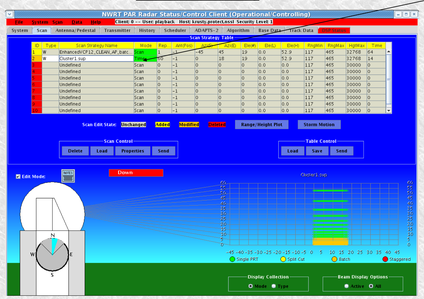
The National Weather Radar Testbed (NWRT) Phased Array Radar (PAR), located in Norman, Oklahoma, consists of a single antenna array capable of electronically scanning a 90-degree azimuthal sector at any given moment. The antenna, mounted on a pedestal that can be commanded to move to any azimuthal position, allows operators to select the center of the best electronically scanned 90-degree sector to follow areas of interesting weather. At the previous IIPS conference, we presented an adaptive pedestal-control algorithm that automates the process of tracking an operator-defined weather feature. The algorithm provides feedback to the radar control software to adjust the antenna pedestal position in order to continuously keep the weather feature in the field of view. In its original version, the tracking was based on the reflectivity field at the lowest elevation angle. Since then, the algorithm has been enhanced in two ways. First, a 3-D option has been added to utilize the reflectivity field from all available tilts making the tracking more robust. New capabilities have been implemented to identify storm clusters and to adaptively change the pulse-repetition-time (PRT) to minimize the occurrence of range folding within the storm-tracking region. This paper describes these new capabilities and illustrates the performance improvements that adaptive scanning can provide on the NWRT PAR.



Scan Scheduling



Operator selects a cluster to track
Sector scan containing cluster is scheduled
Operator controls update frequency
PRT is adjusted to minimize obscuration in cluster sector
Full scan is run periodically to scan lower priority weather
Antenna is adjusted to keep cluster sector in field of view
ADAPTS is active for all scan types to minimize update times

Moment Data Processor

ClusterID

The low level elevation cut reflectivity field is filtered, flattened and transformed into a set of watersheds. The "peak" and "foothill" watersheds are combined into clusters. Each cluster is bound by a pair of azimuths and ranges. This information is passed back to the operator.

WxTrack

The operator selects a cluster to track. The antenna is commanded to a new position to keep the cluster in the field of view. The sector containing this cluster can be scheduled for more frequent updates.

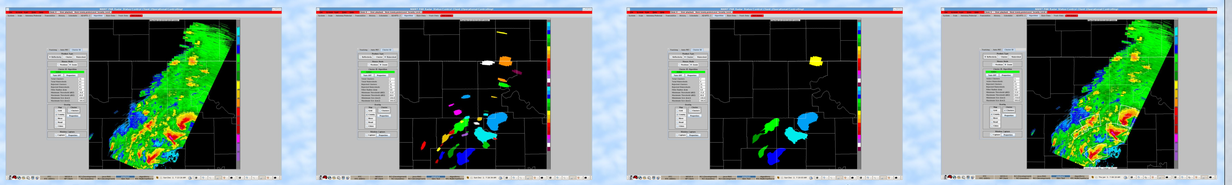
AutoPRT

The filtered power field is used to calculate an optimal short PRT to use in batch and split cuts to minimize range folding in the region containing the cluster. This information is passed to the Real Time Controller where PRTs are adjusted accordingly. Dwell times are preserved.

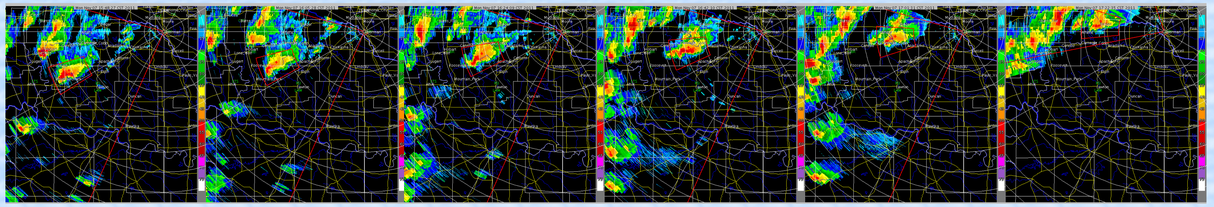
ADAPTS

The ADAPTS algorithm determines which beam positions are significant (contains weather) and passes this information directly to the Real Time Controller. Only "active" beam positions are scanned which allows faster updates.

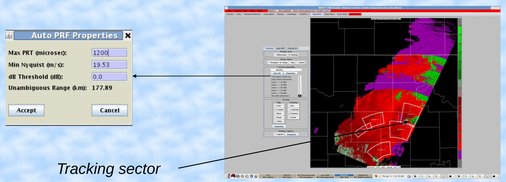
ClusterID Algorithm



Tracking a Tornadic Supercell with the WxTrack Algorithm



Minimizing Range Folding with the AutoPRT Algorithm



Evolution of the Algorithm for Phased-Array Radar Timely Scans (ADAPTS)