

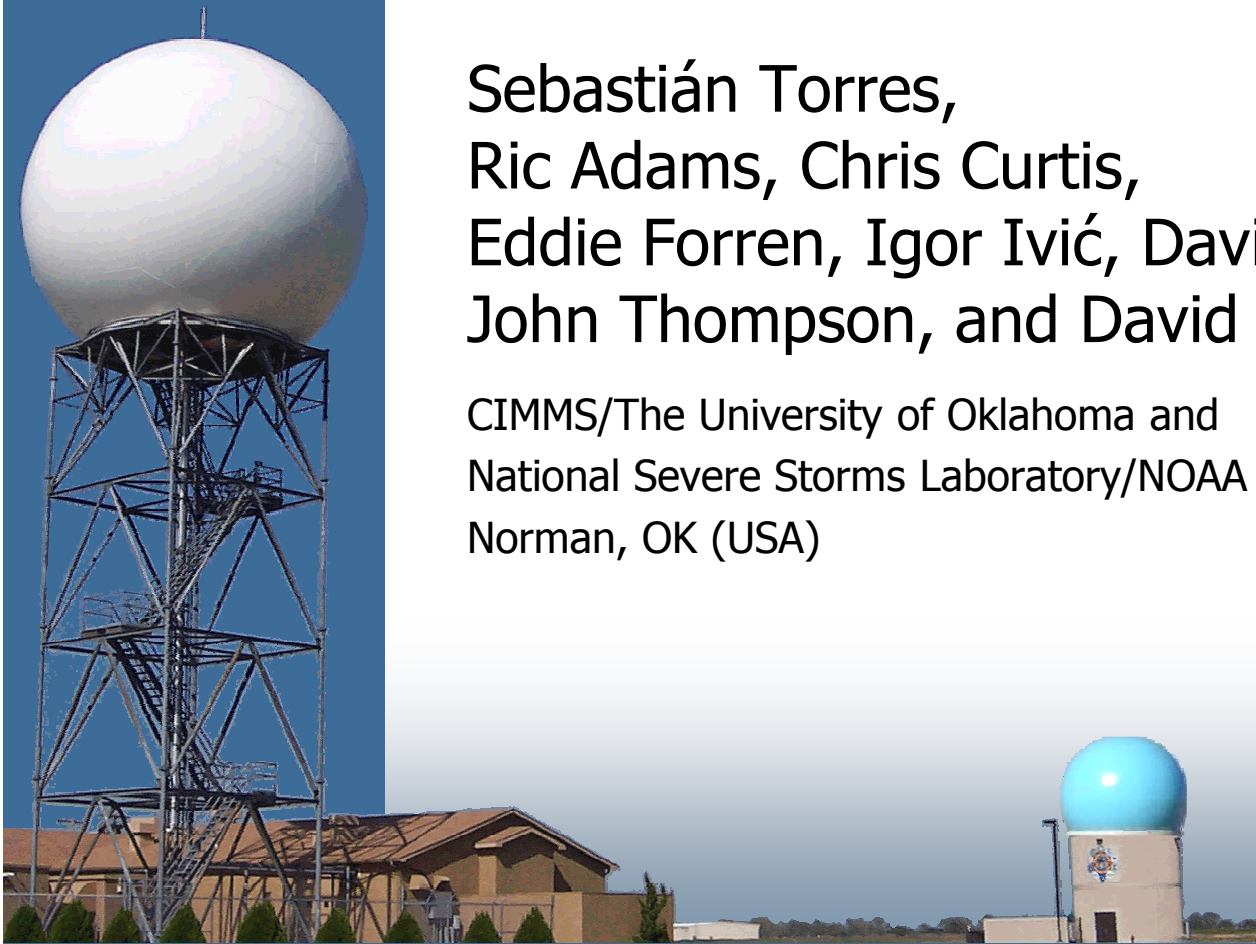


New weather-surveillance capabilities for NSSL's phased-array radar

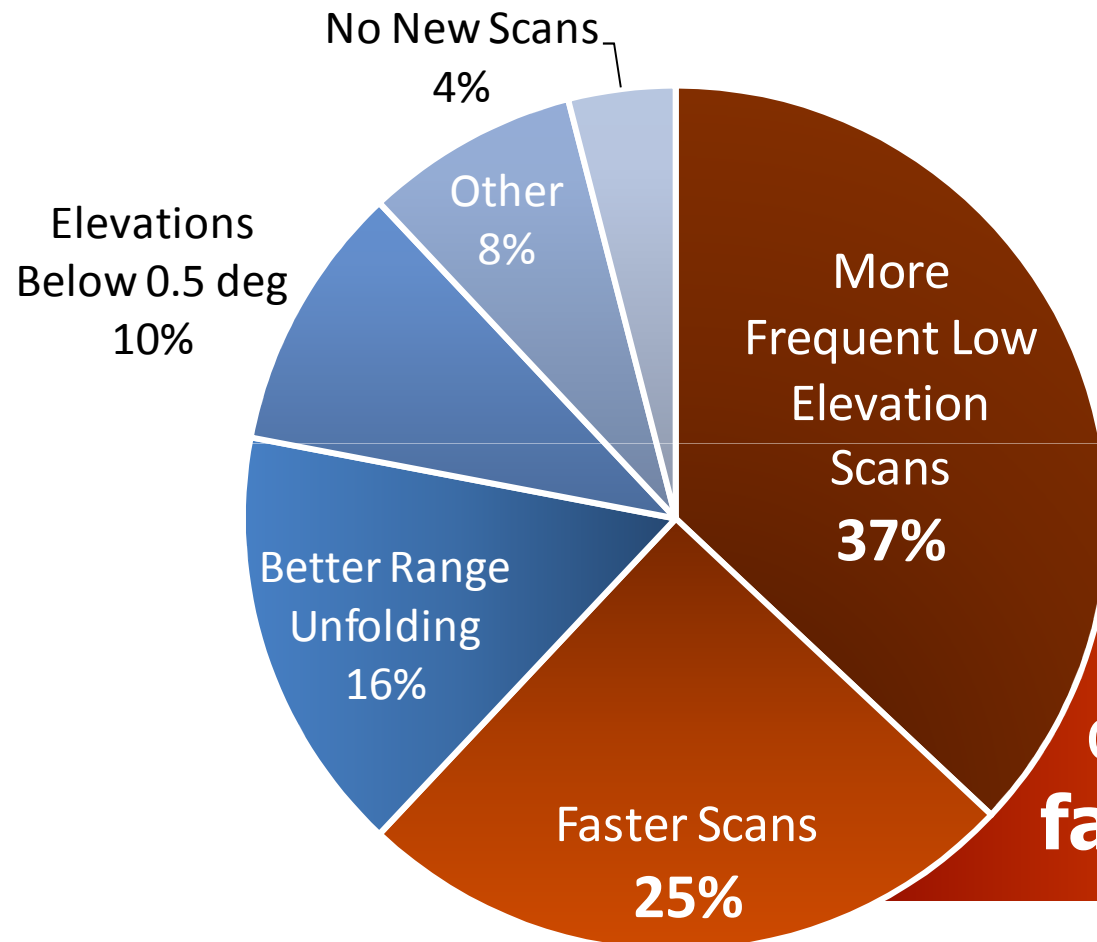
Sebastián Torres,
Ric Adams, Chris Curtis,
Eddie Forren, Igor Ivić, David Priegnitz,
John Thompson, and David Warde

CIMMS/The University of Oklahoma and
National Severe Storms Laboratory/NOAA
Norman, OK (USA)

ERAD 2012
Toulouse, France
28 June, 2012



what do users want?

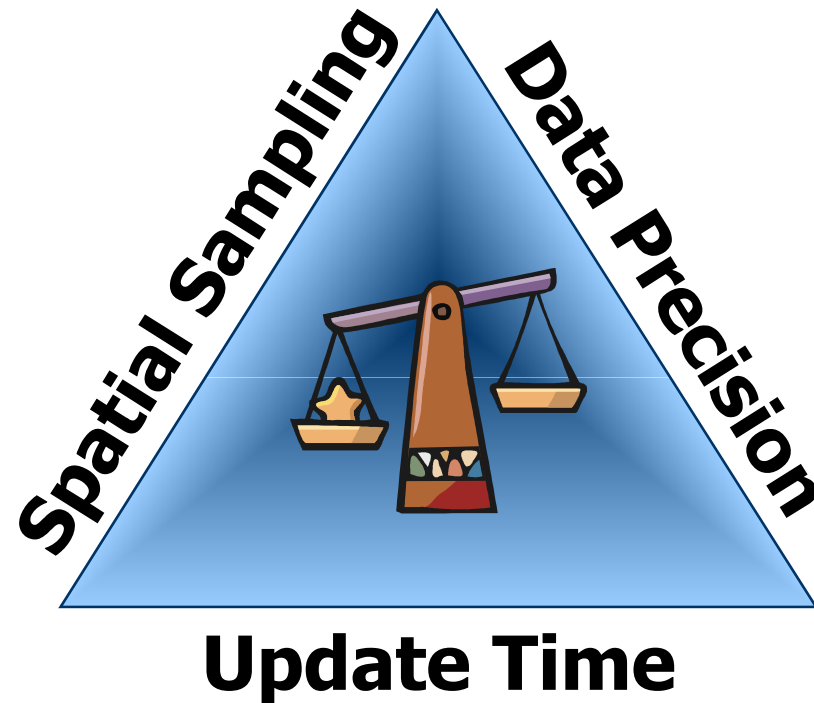


62%
of forecasters* want
faster updates



**US National Weather Service survey on radar scanning strategy needs (2008)*

fundamental trade-offs



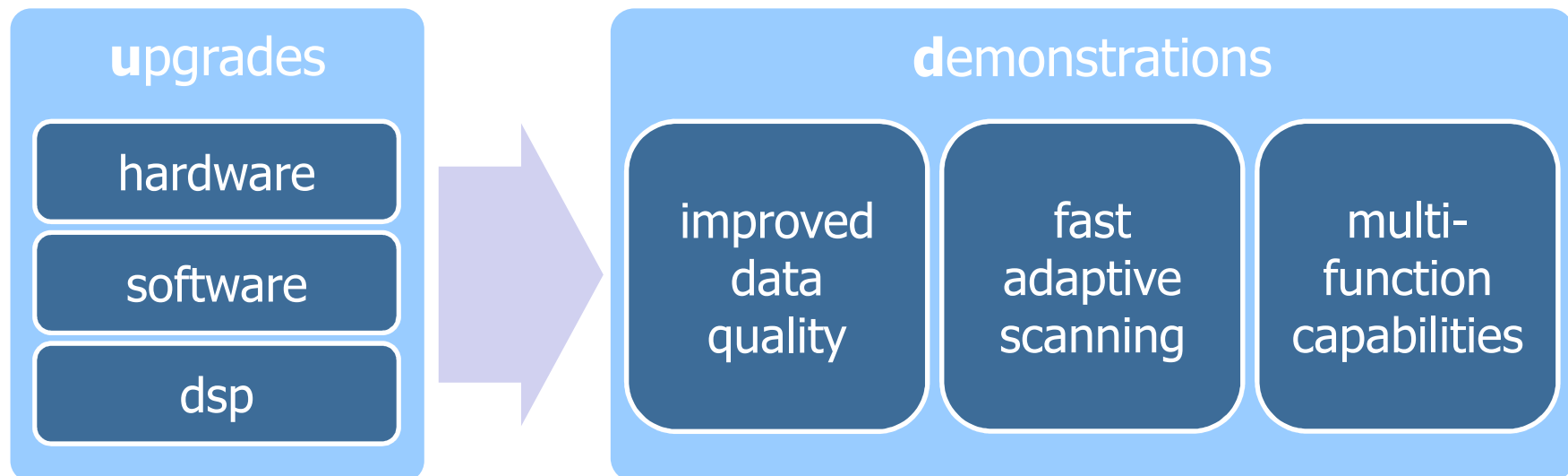
For example, if we want **faster updates**,
we can't have both
better **spatial coverage** and **better precision**.



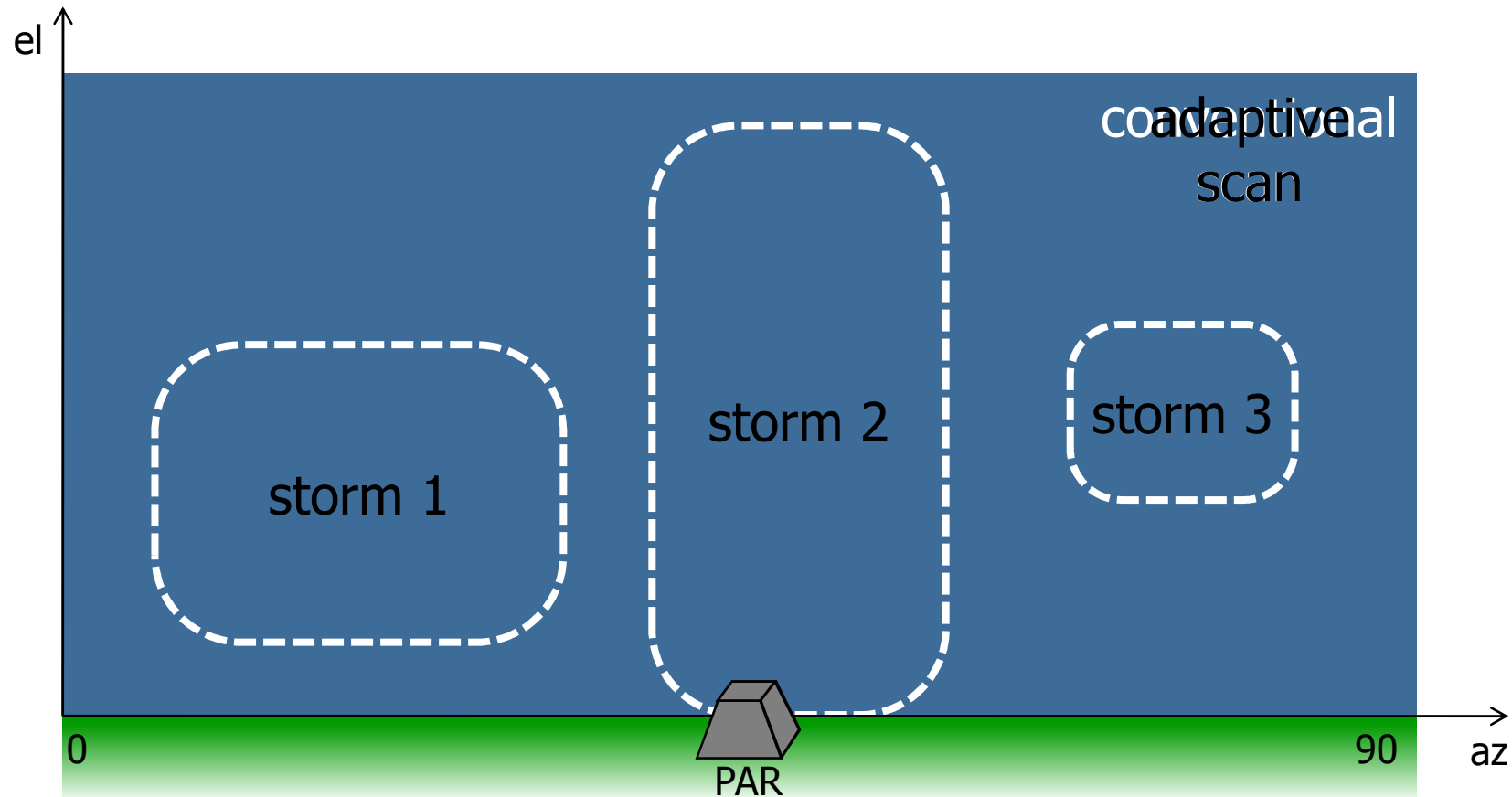
mission: MPAR



the **NWRT PAR** is being exploited to **demonstrate improved** weather surveillance **capabilities**



focused observations $\Rightarrow$ faster updates



it's all about
cutting the "waste"!



from www.gapolitico.com

ADAPTS

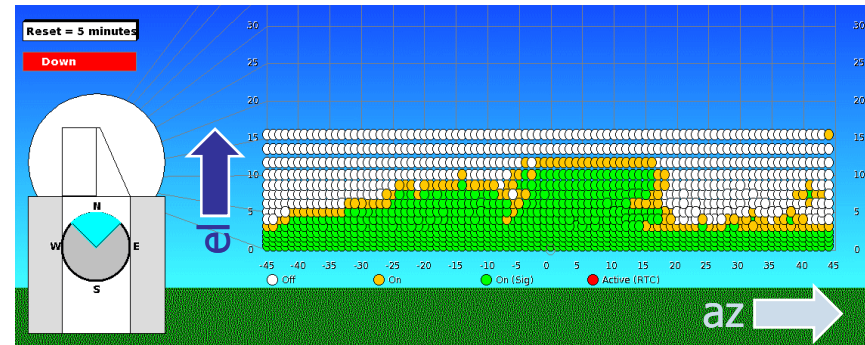


ADAPTS classifies beam positions as **active** or **inactive**

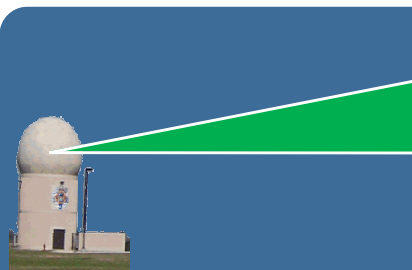
active beam positions meet one or more criteria

- Elevation angle
- Significance
- Neighborhood

Adaptive DSP Algorithm for PAR Timely Scans

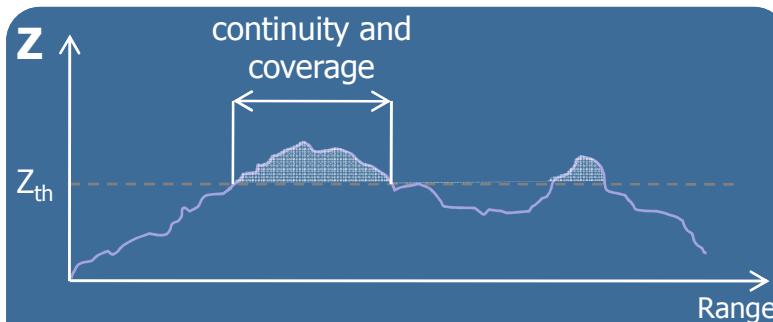


Real-time display of active beam positions



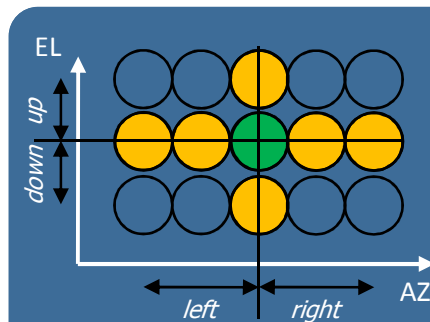
Always scan at the lower elevations

1st Criterion



Determine significant weather signals

2nd Criterion



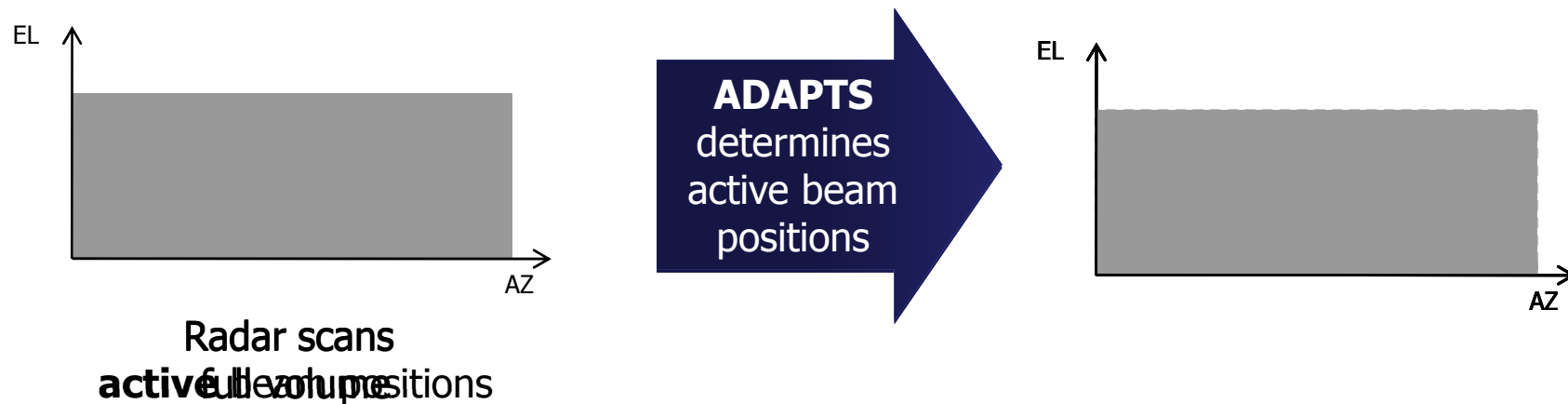
Look around to respond to storm evolution

3rd Criterion

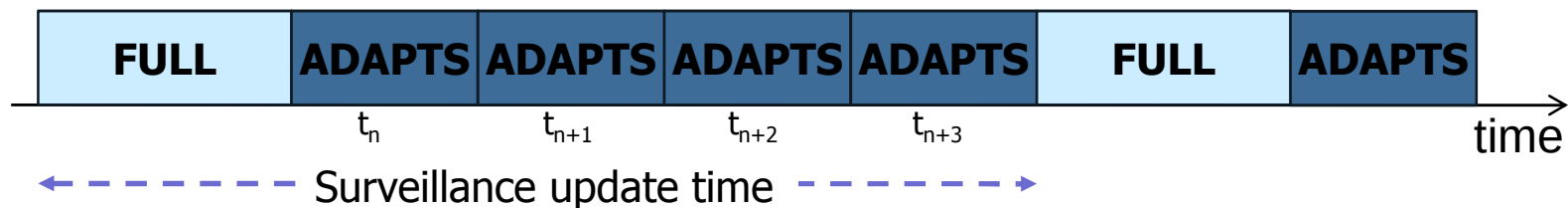
ERAD '12



ADAPTS cuts the “waste”!



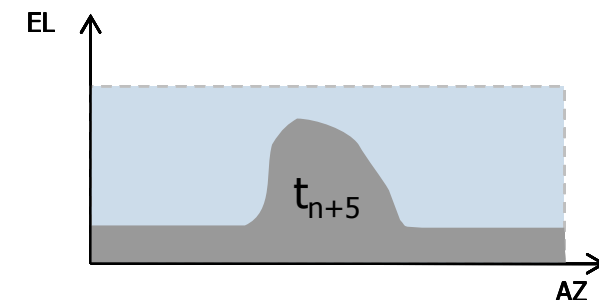
Scanning strategy schedule: periodic surveillance



ADAPTS “keeps an eye” on the sky



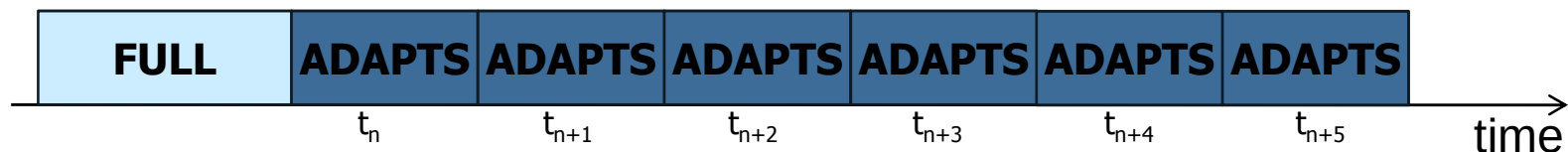
ADAPTS
redetermines
active beam
positions



Radar scans

active beam positions with full dwells and
inactive beam positions with short dwells

Scanning strategy schedule: continuous surveillance



periodic vs. continuous surveillance



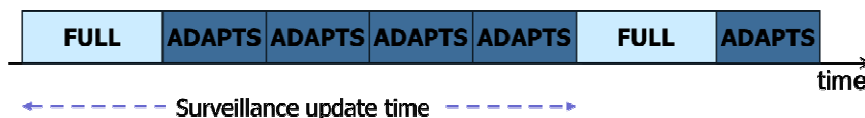
Periodic Full Scans

- inactive beam positions **not continuously** scanned
 - need **periodic surveillance**
 - a full scan runs every ~5 min
 - delayed** detection of developing storms
 - beam positions at low-elevation angles **forced** to be active

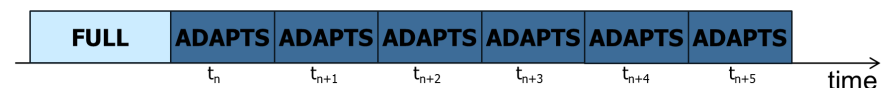
Continuous Surveillance

- inactive beam positions **continuously** scanned with shorter dwell times
 - achieve **continuous surveillance**
 - data used for detection only
 - timely** detection of developing storms
 - beam positions at low-elevation angles **may** be active

Scanning strategy schedule: **periodic surveillance**



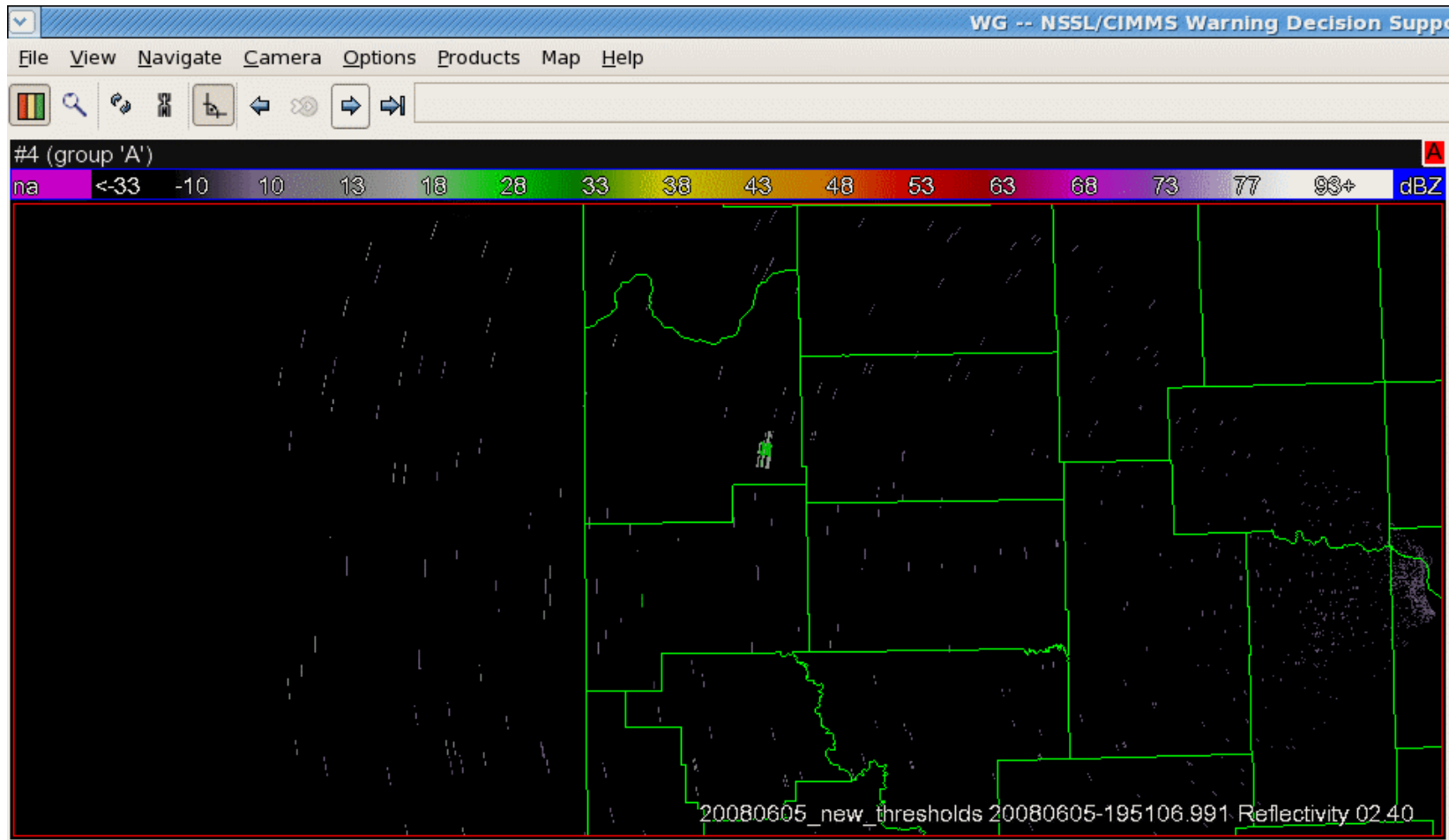
Scanning strategy schedule: **continuous surveillance**



ADAPTS reduces update times

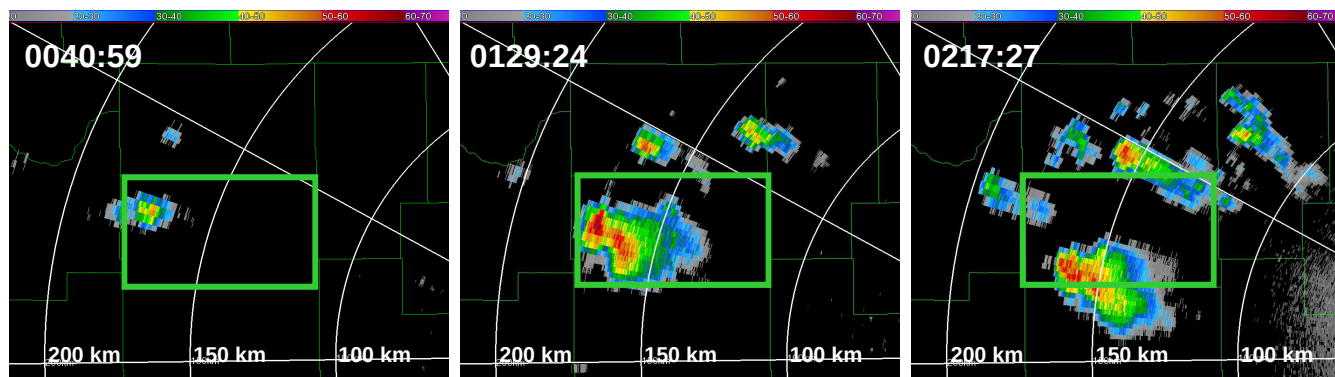
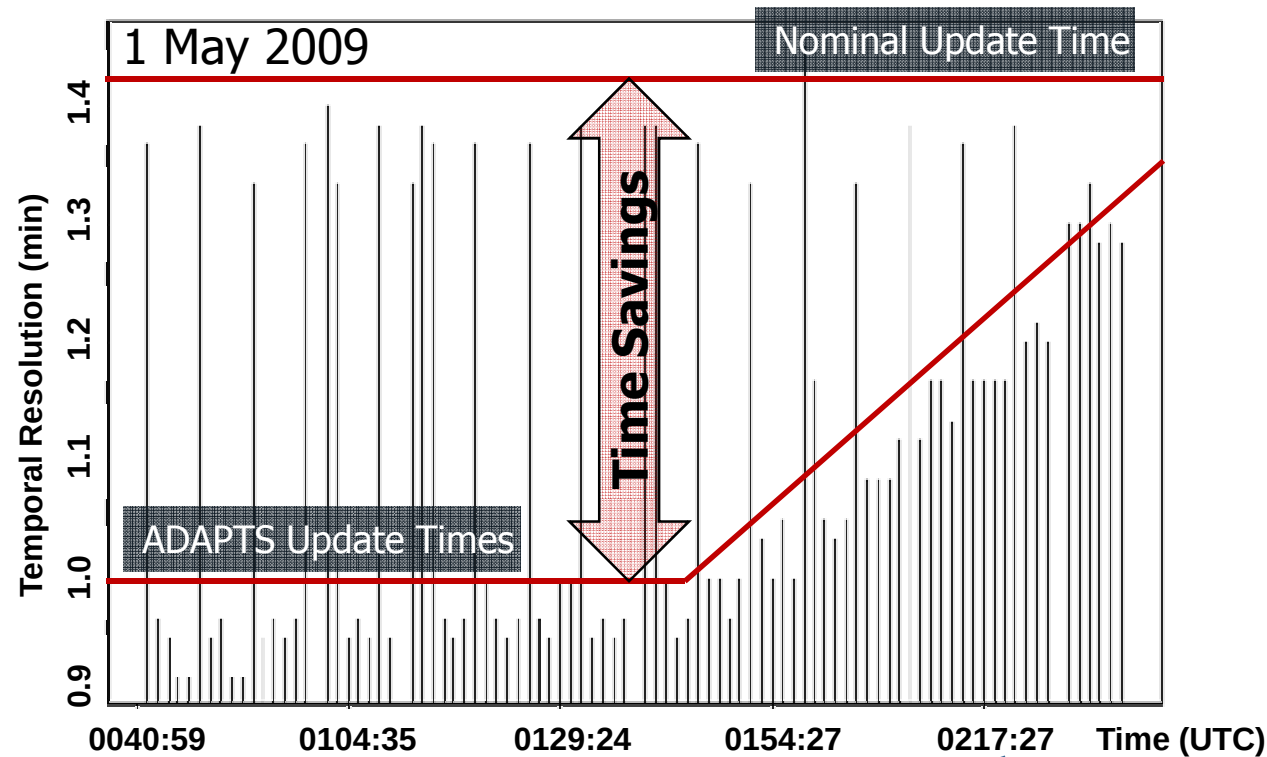


NWRT PAR – 05 Jun 2008 – 19:51 to 20:45 UTC

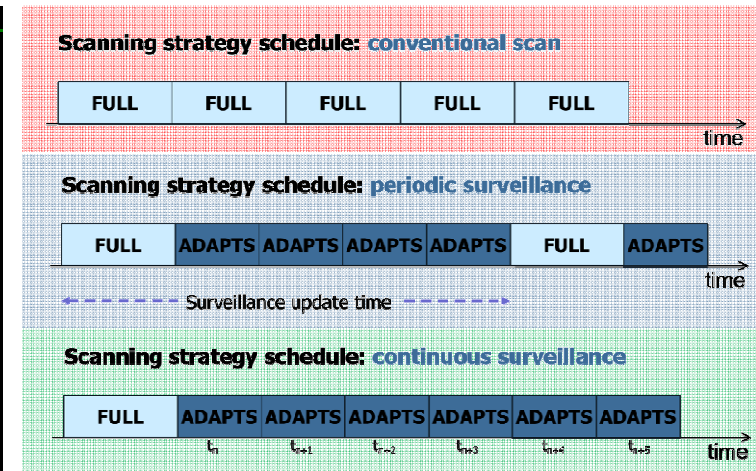
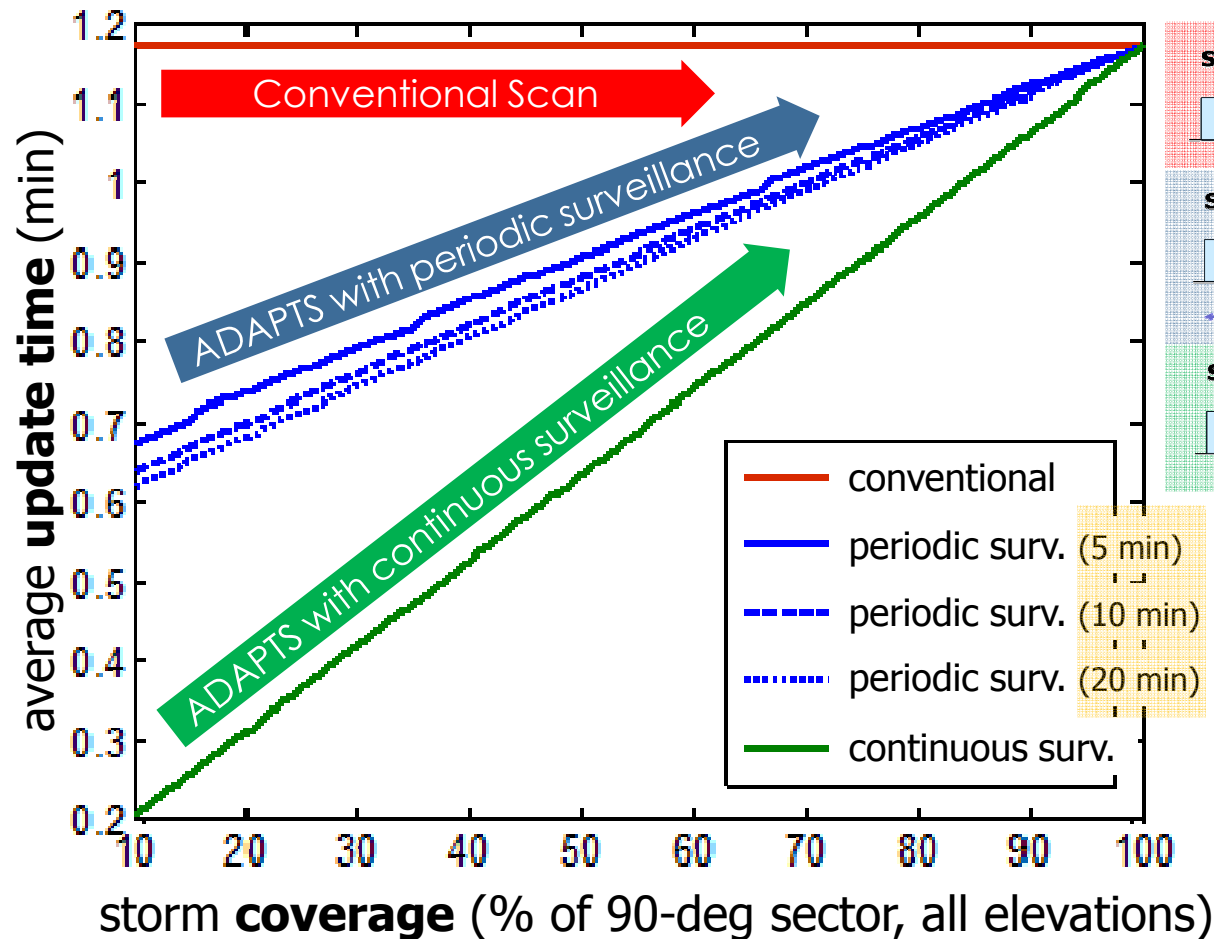


a line of storms develops along a cold front over central OK

time savings depend on size and location of storms



theoretical performance



ADAPTS with **continuous surveillance** provides the **fastest updates** and the **most timely detection** of new storms.

summary



- **users want faster updates**
 - focused observations result in faster updates with no loss in data quality or spatial coverage
- **phased-array radars are suited to perform adaptive focused observations**
 - not constrained by mechanical inertia
 - **ADAPTS** demonstrates that PARs can achieve performance levels not feasible with current operational technology



for more information:

<http://cimms.ou.edu/~torres/par.html>