Science & Warning Advancements with Phased Array Radar

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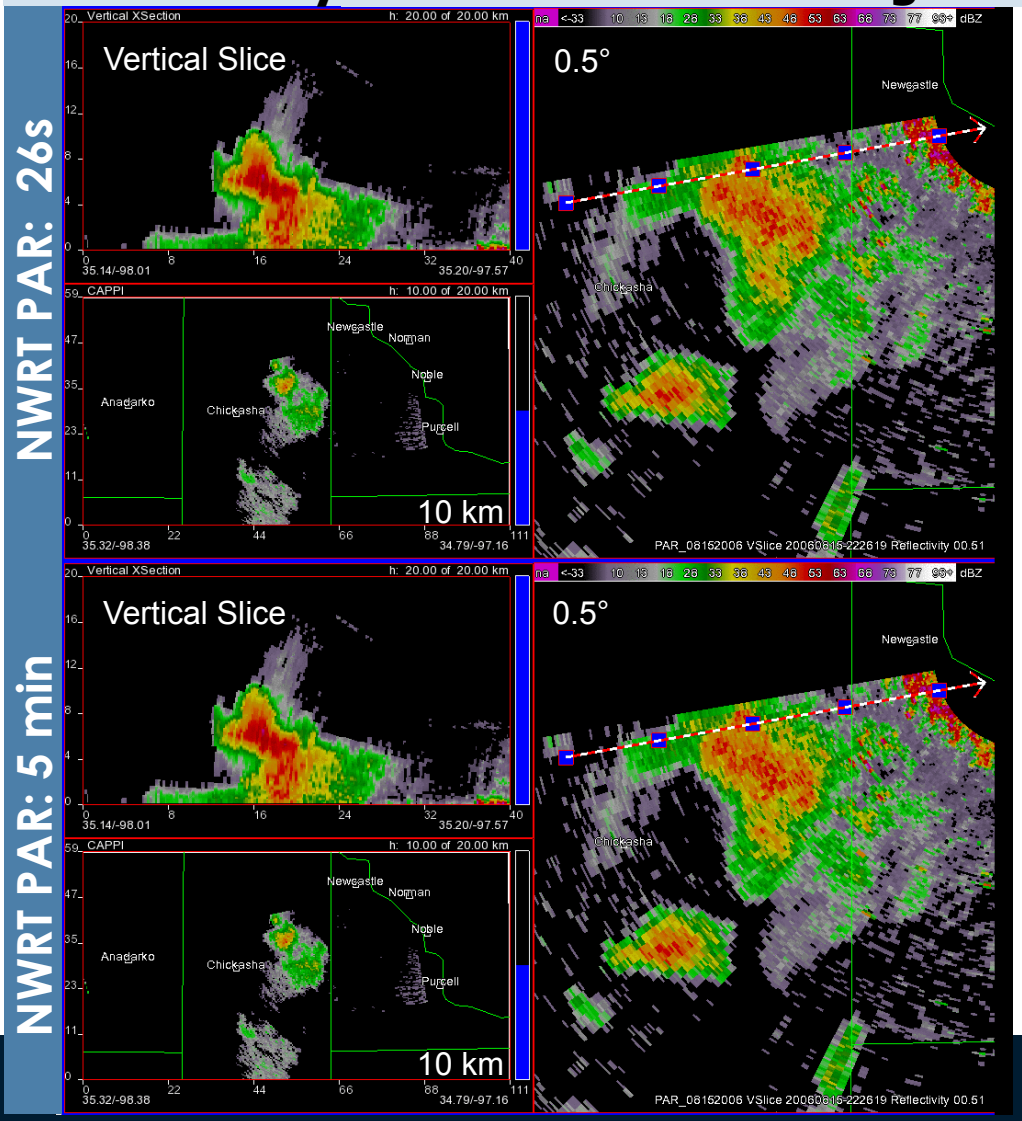
Relevance

NSSL's Mission: "To **understand the causes of severe weather** and **explore new ways to use weather information to assist National Weather Service forecasters** and federal, university and private sector partners."

Science: Does Temporal Sampling Matter?

Reflectivity 2220-2240 UTC 15 Aug 06



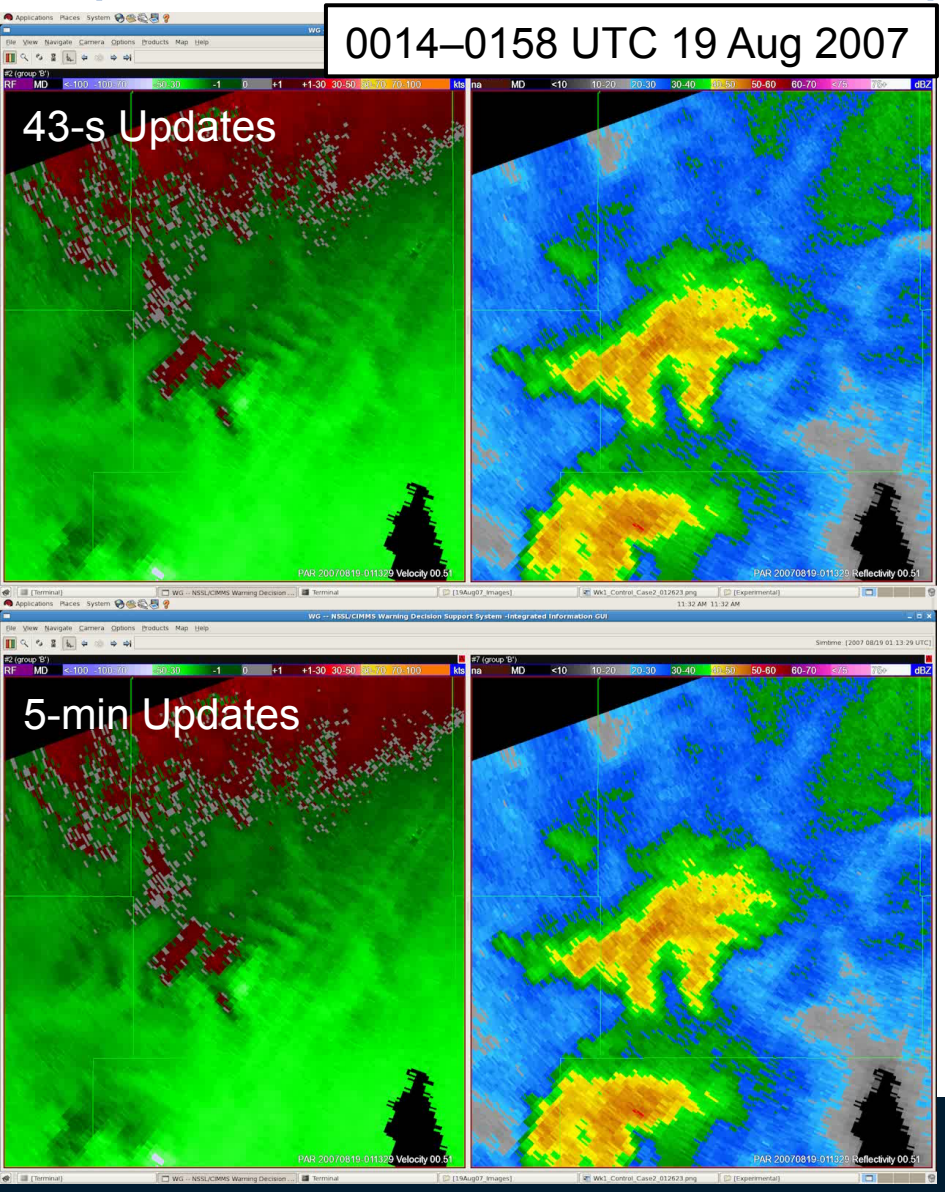
Heinselman and Torres 2011: High-temporal-resolution capabilities of the National Weather Radar Testbed phased-array radar. *J. Appl. Meteor. Climatol.*, **50**, 579–593.

Emersic et al. 2011: Lightning activity in a hail-producing storm observed with phased-array radar. *Mon. Wea. Rev.*, **139**, 1809–1825.

Newman and Heinselman 2012: Evolution of a quasi-linear convective system sampled by phased array radar. *Mon. Wea. Rev.,* **140**, 3467–3486.

Tanamachi et al. submitted: Impacts of a Storm Merger on the 24 May 2011 El Reno, Oklahoma Tornadic Supercell, *Wea. Forecasting.*

Operations: Does Temporal Sampling Matter?



LaDue et al. 2010: Strengths and limitations of current radar systems for two stakeholder groups in the Southern Plains. *Bull. Amer. Meteor. Soc.*, **91**, 899–910.

Phased Array Radar Innovative Sensing Experiment

2010 PARISE

Heinselman et al. 2012: Exploring impacts of rapid-scan radar data on NWS decisions. *Wea. Forecasting*, **27**, 1031–1044.

2012 PARISE

Heinselman et al. 2015: Tornado warning decisions using phased array radar data. *Wea. Forecasting*, in press.

2013 PARISE **Electronic Posters**

Bowden et al. 2015: Impacts of phased array radar data on forecaster performance during severe hail and wind events. *Wea. Forecasting*, in press.

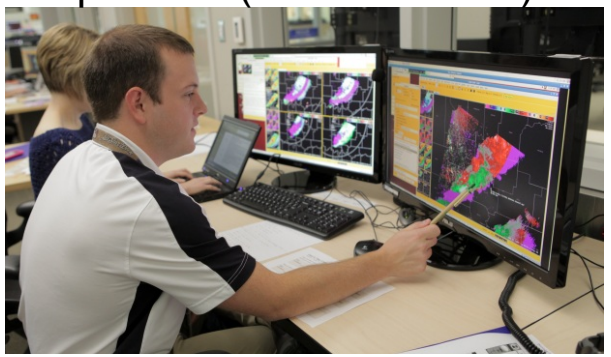
Kuster et al. submitted: 31 May 2013 El Reno Tornadoes: Advantages of rapid-scan phased array radar data from a warning forecaster's perspective.

PARISE 2012

Goal: Assess impacts of 1-min updates on forecasters' performance and warning decision process when working potentially weak tornadic events in displaced real time

1) View weather briefing and work the event using AWIPS 2

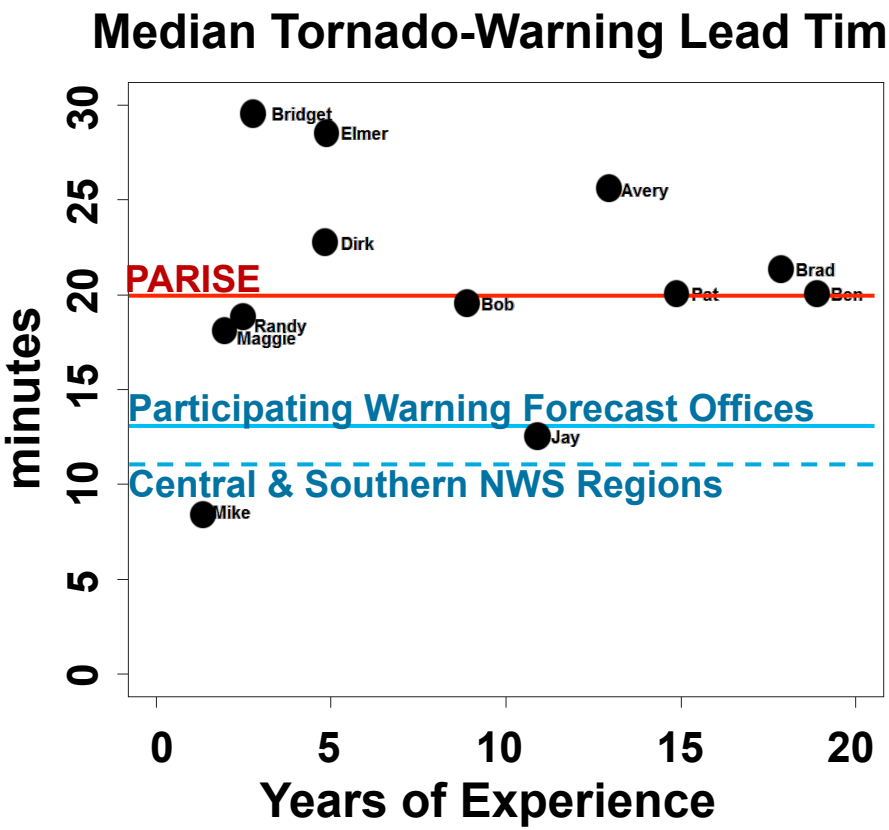
2) Produce detailed timeline of decision process (Hoffman 2005)

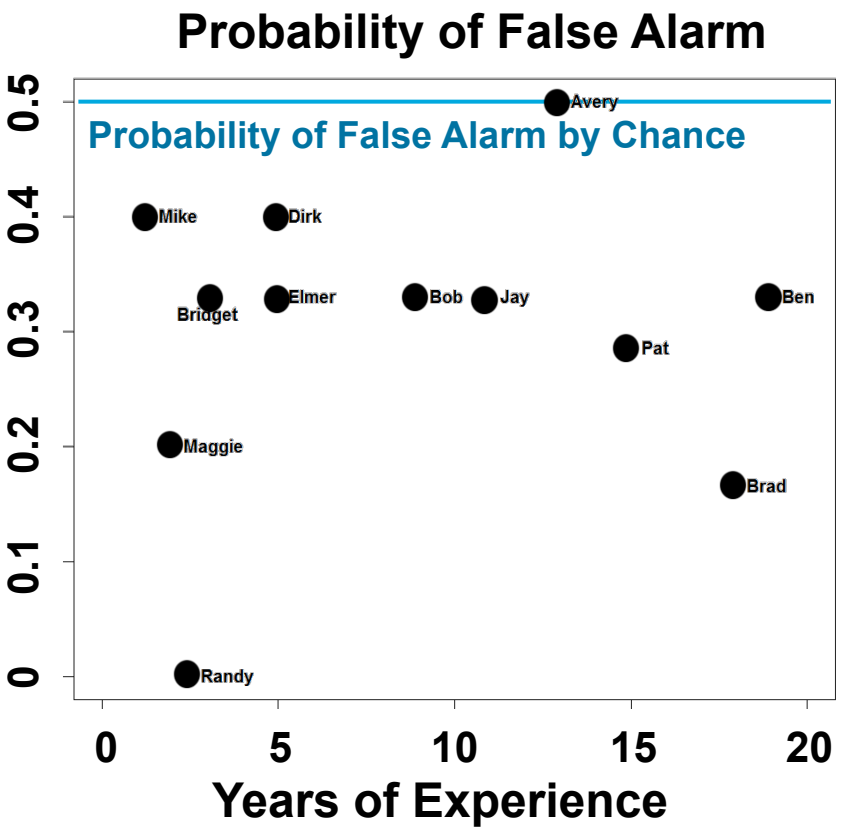


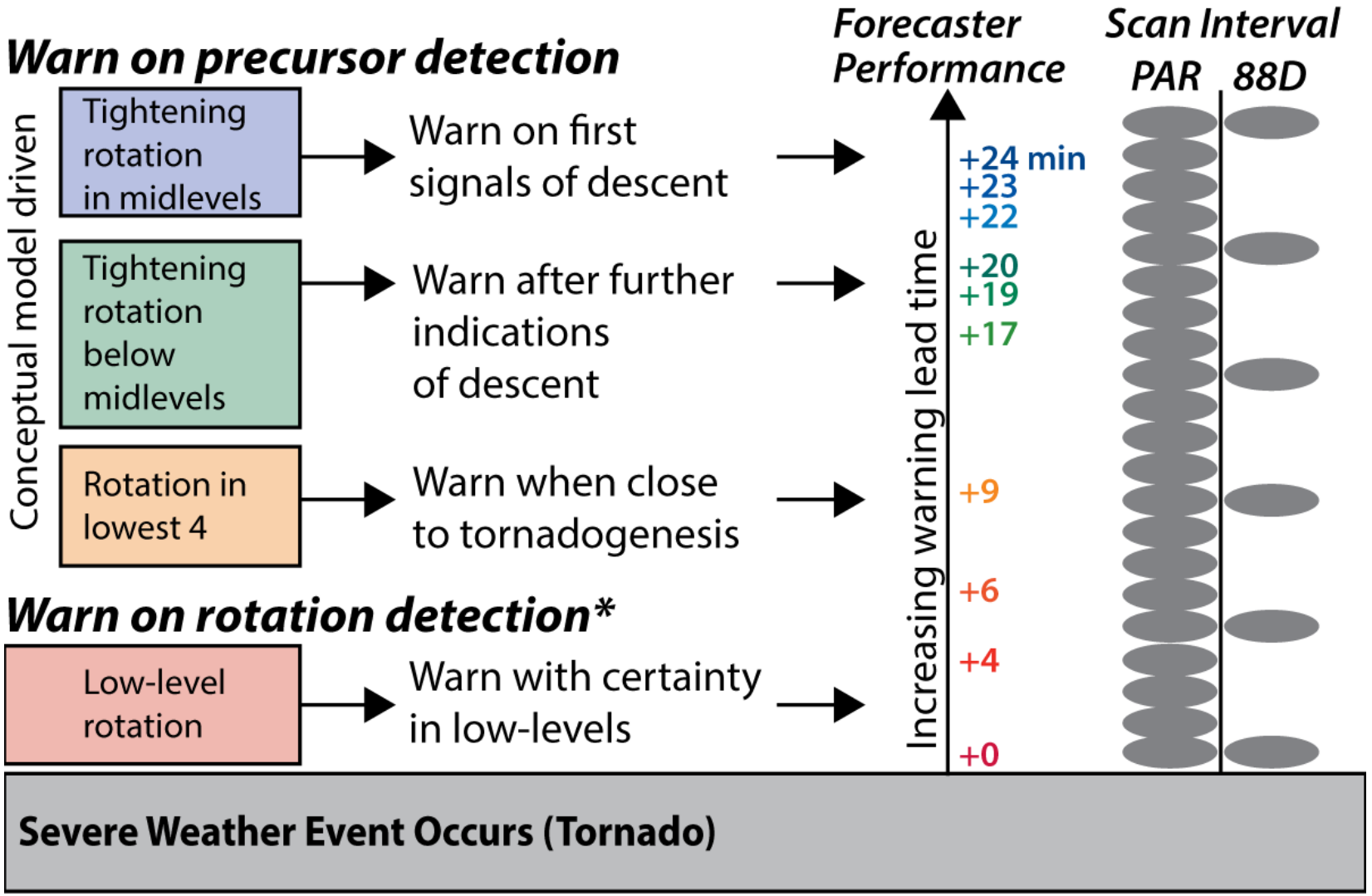
Sweep 1	Sweep 2	Sweep 3
Stimulated retrospective recall	**Review timeline Revise as needed**	**Deepen the timeline with probing questions**

Performance

2 tornadic (EF0/EF1) and 2 non-tornadic events







*At lowest elevation scan

Summary

1-min radar updates have:

- **Improved scientific understanding of storm processes**
- **Aided the warning decision process**

Path Forward

- PARISE 2015: Increase sample size
- Analyze rapid-scan dual-polarization data
  - Understanding of severe weather processes
  - Accuracy and timeliness of warnings