

Overview: Storm-scale sampling during VORTEX2-2009

M. I. Biggerstaff¹, D. Burgess²,
E. Mansell³, L. J. Wicker³, and C. Ziegler³

¹ School of Meteorology, University of Oklahoma, National Weather Center,
Norman, OK 73072

² Cooperative Institute for Mesoscale Meteorological Studies, National Weather
Center, University of Oklahoma, Norman, OK, 73072

³ National Severe Storms Laboratory, National Weather Center, Norman, OK
73072

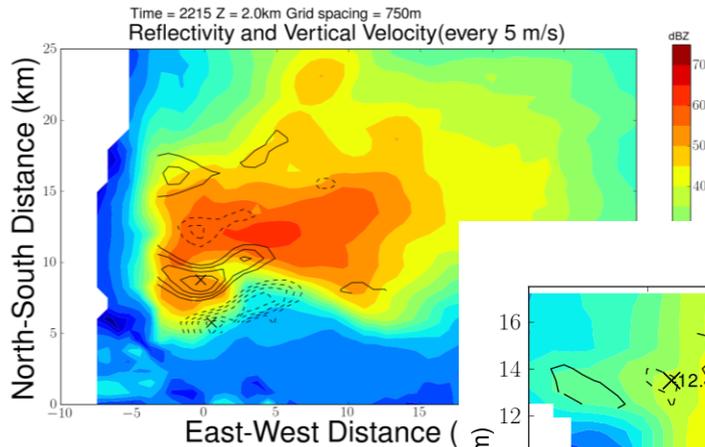
With significant assistance from Dan Betten and Gordon Carrie

Data Summary

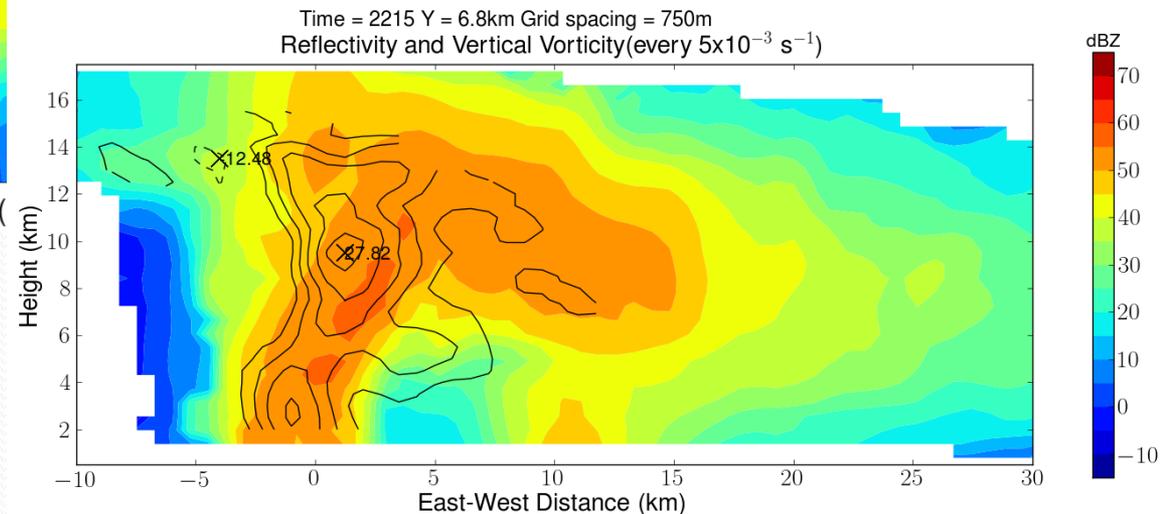
- SR1
 - Operated during 14 non-consecutive days
 - 25.7 hours of data
 - 15.2 hours of 3-D volumes (304 volume scans)
 - 10.5 hours of surveillance
- SR2
 - Operated during 10 non-consecutive days
 - 19.1 hours of data
 - 11.1 hours of 3-D volumes (222 volume scans)
 - 8 hours of surveillance
- 120 “good” coordinated dual-Doppler volumes
- All data sent to NCAR archive

Data Summary

- 5-6 June 2009: Wyoming tornado (48 km baseline)
 - 25 dual-Doppler volumes (2215-2306; 0006-0024)
 - 5 dual-Doppler analyses completed thus far



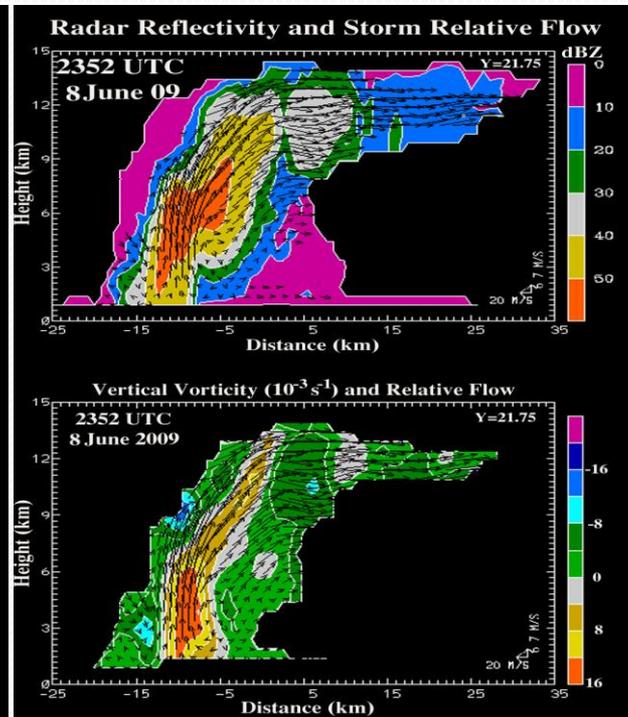
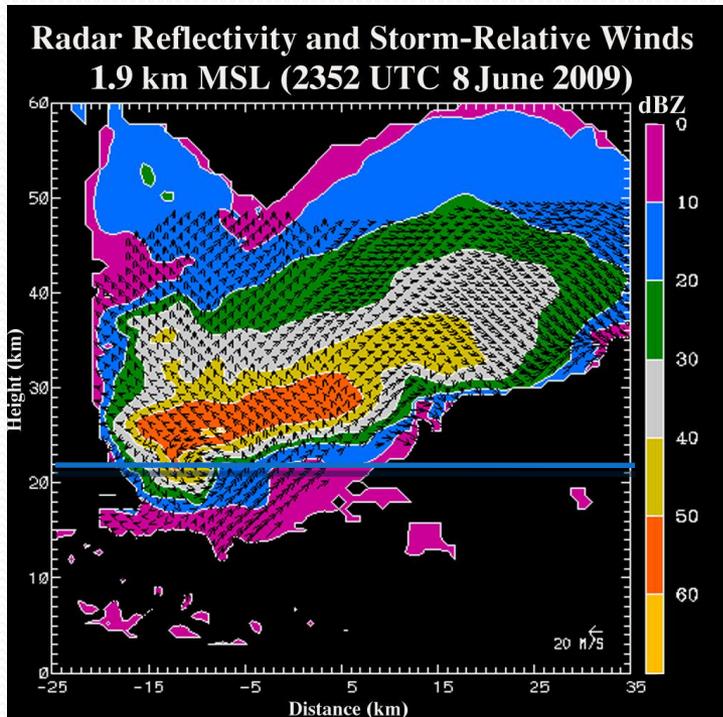
Tornado ended around 2224 UTC; no apparent strong RFD (data issue?)



Both mid and low level mesocyclones are evident

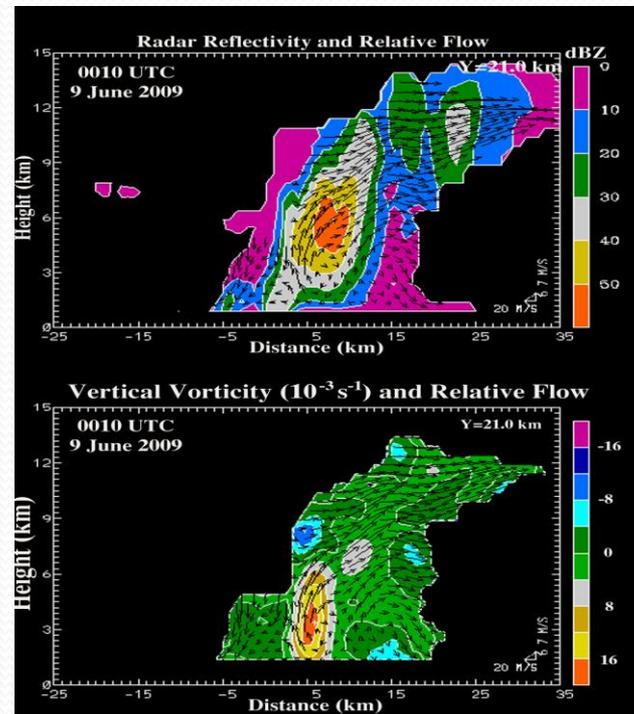
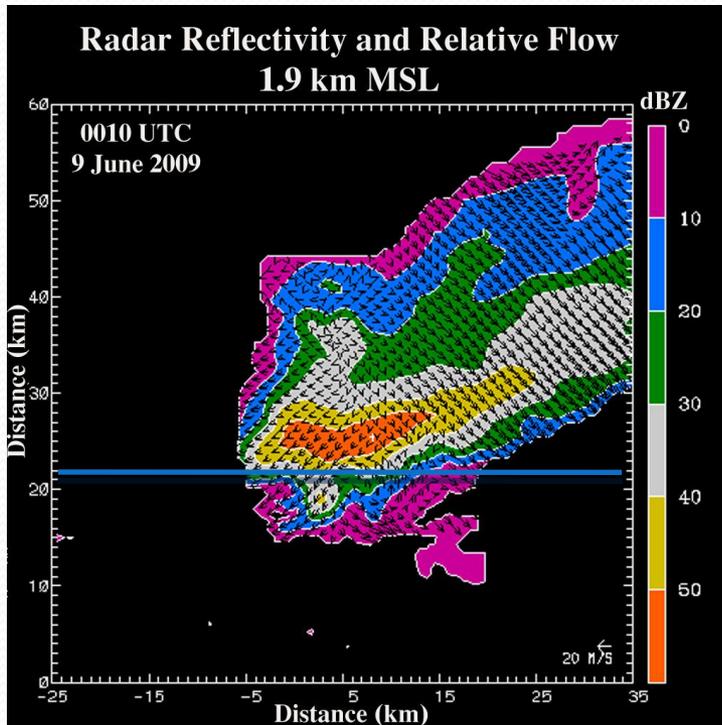
Data Summary

- 9-10 June 2009: Greenburg, KS (28 km baseline)
 - 15 dual-Doppler volumes (2345-0024)
 - All preliminary dual-Doppler analyses completed



Data Summary

- Storm weakened throughout period
 - Environmental flow poorly aligned
 - Moved into drier air mass; mesocyclone exposed

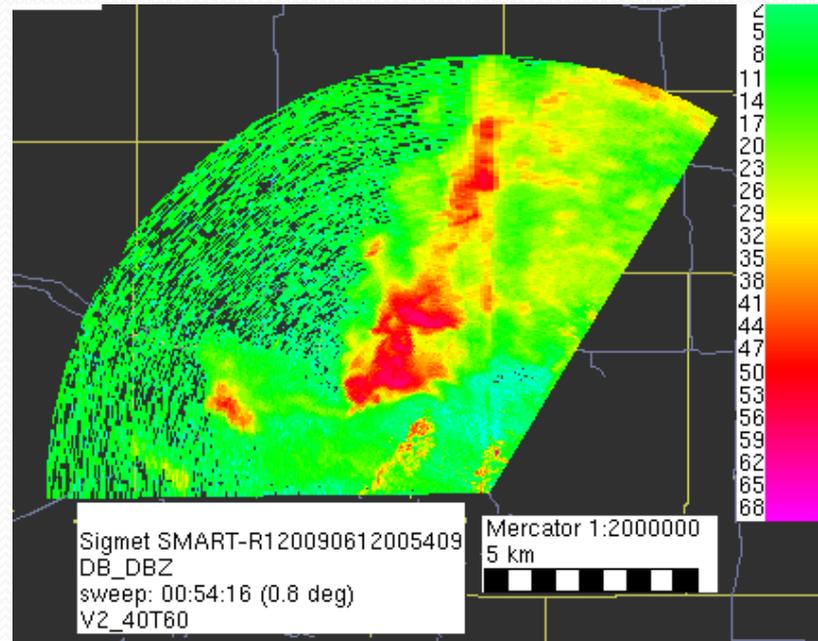


Data Summary

- 11-12 June 2009: Las Animas, CO (single radar)
 - 46 3D-volumes (0030-0245)
 - Data unedited

Good example of
cell-cell interaction

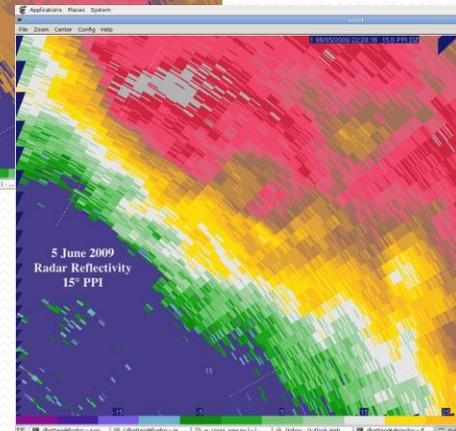
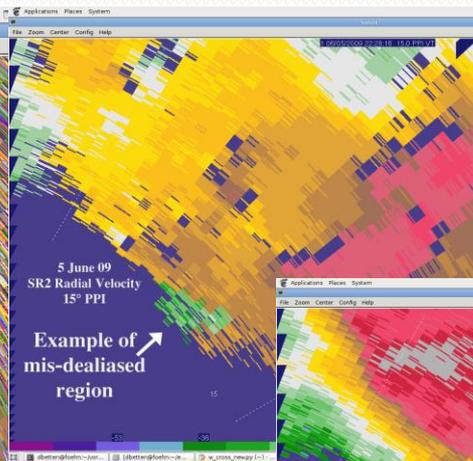
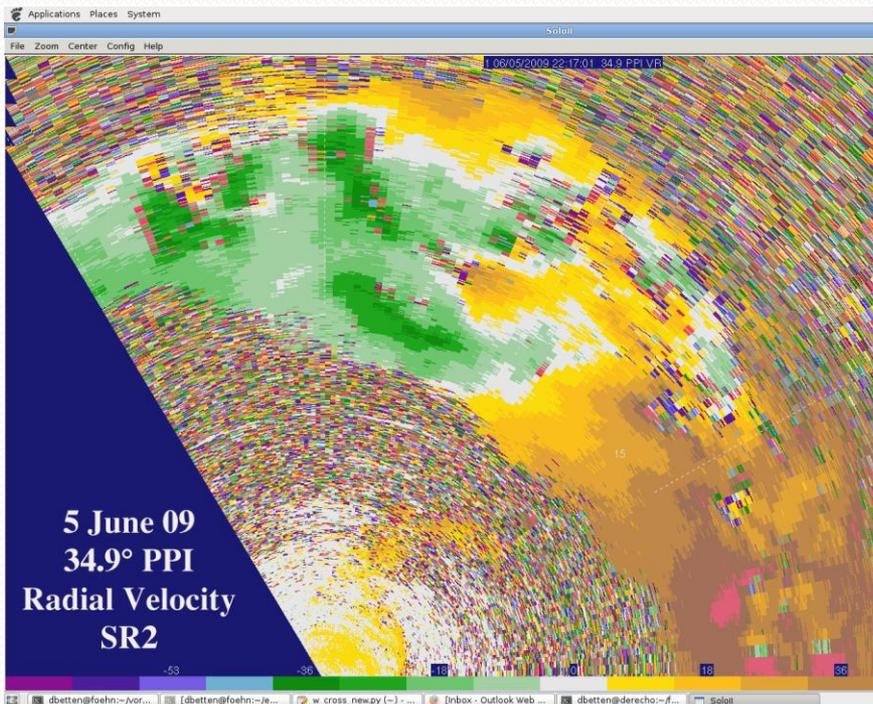
Prolific hail producer



DATA ISSUES

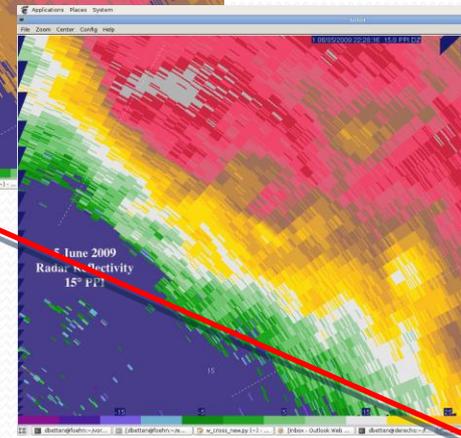
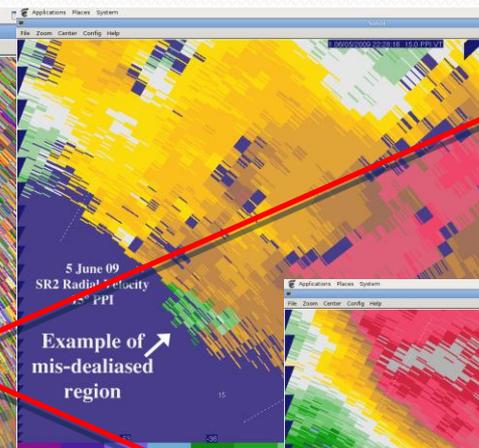
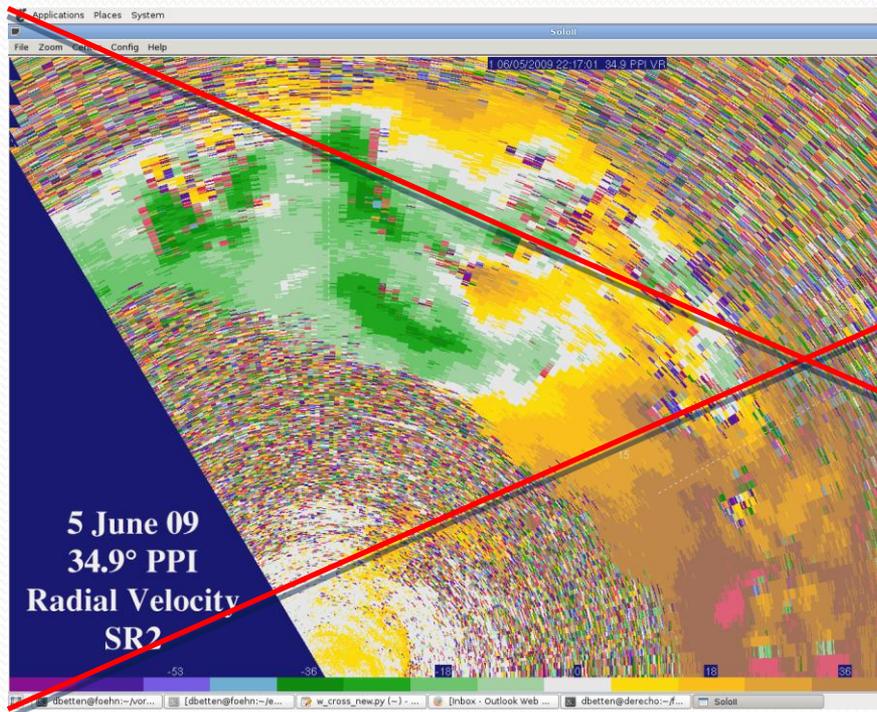
Staggered-PRT Method

Sends out two pulses at one PRT, then 2 pulses at another PRT and repeats pattern to get average needed (the same volume is sampled). Velocities from both PRFs are dealiased independently and then averaged to provide a single velocity estimate covering the ray.

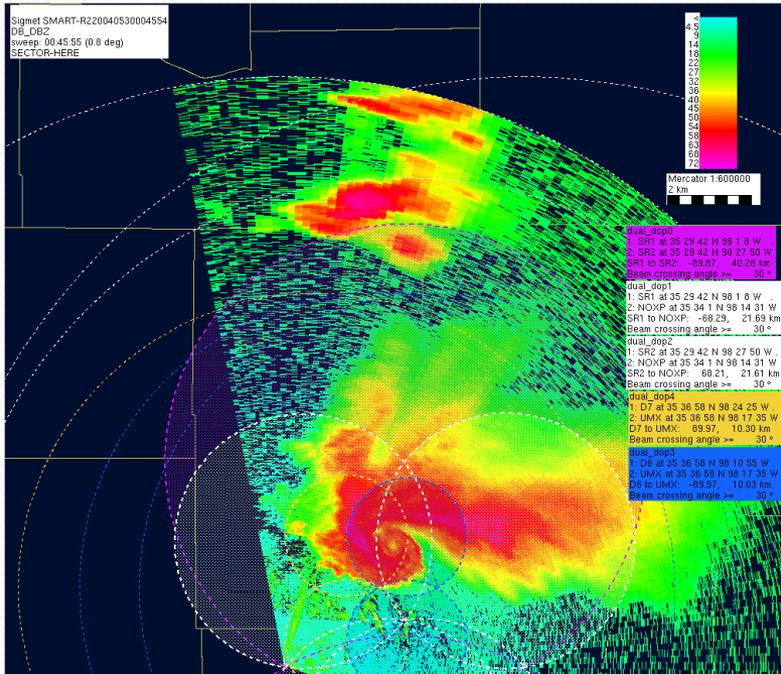


RECOMMEND

NO Staggered-PRT for SRs in 2010!!



DATA ISSUES: Current Deployment Strategy



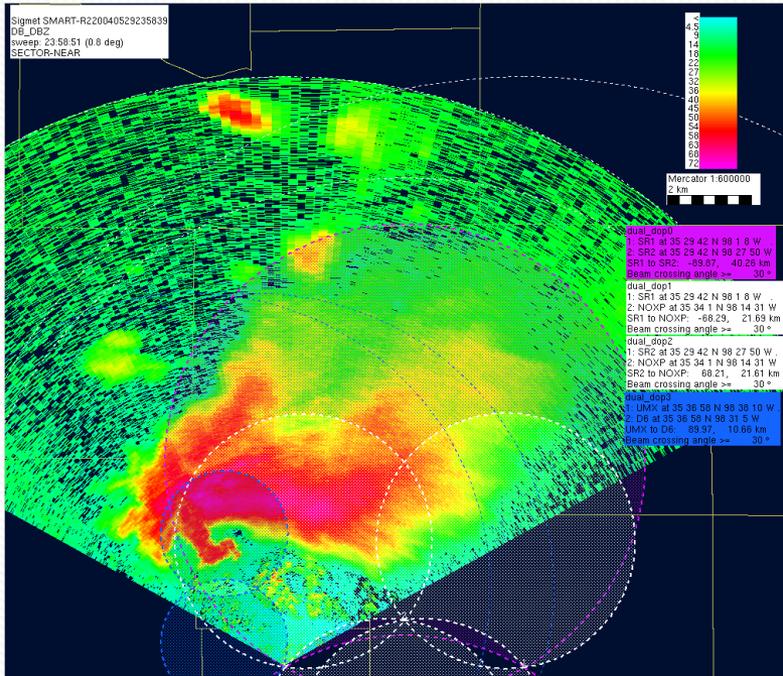
Target declaration typically after organizational stage (after mid-level mesocyclone or shear formed)

- storm-scale objectives benefit from observing organizational stage (esp. marginal events)
- storm-scale sampling area ~16 times mesocyclone-scale
- C-bands can sample/survey early and adjust to target as needed

Point-divergent deployment

- Requires both C-bands to deploy farther than rest of platforms (delays coordinated sampling)
- Reduces time that storm is in dual-Doppler coverage
- Limits period of nested multiscale sampling
- Difficult to adjust once initial decision is made

Recommended Deployment Strategy



Marginal supercell environments require deploying storm-scale network early as storm tends to exhibit supercellular structure only briefly. We had several marginal environments in 2009.

Storm-scale sampling begins earlier

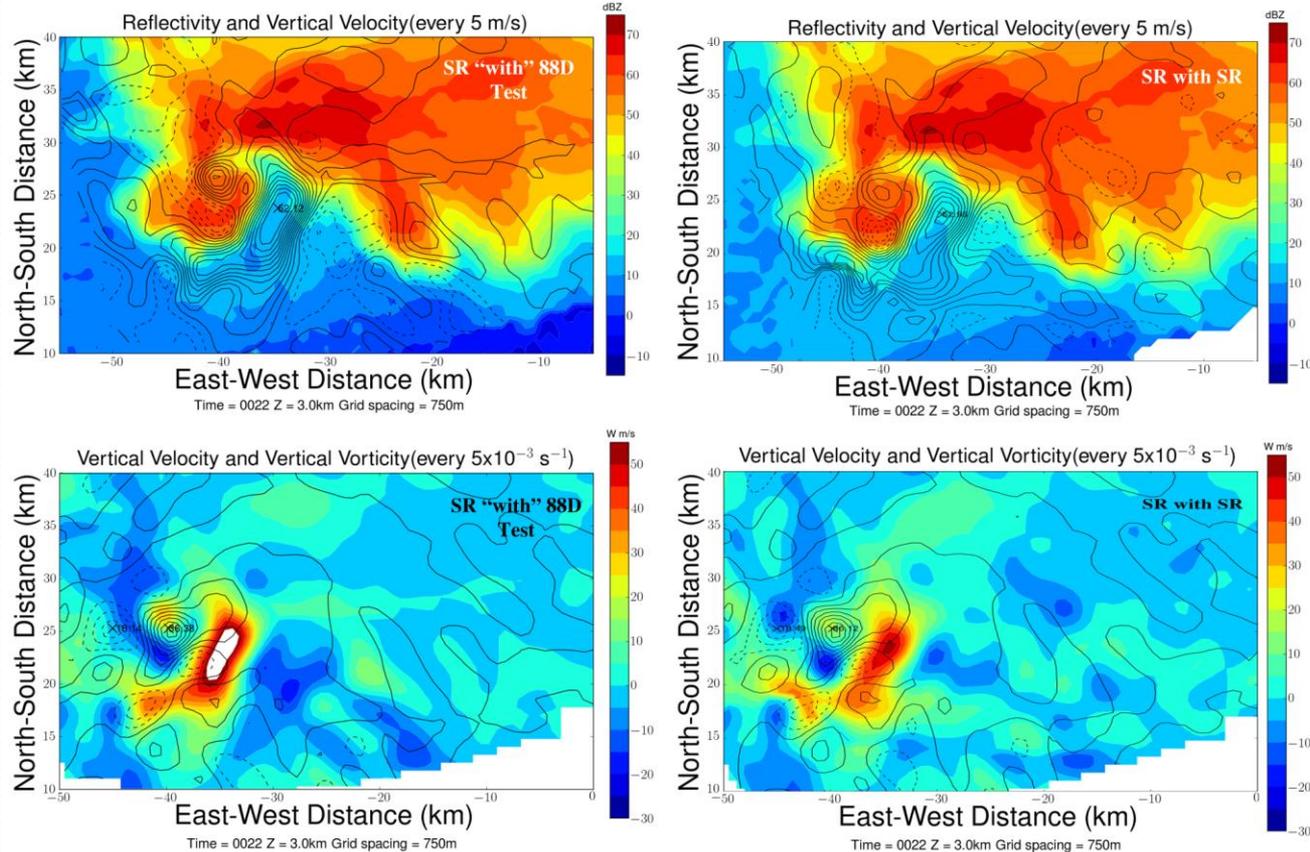
- sample organizational stage
- provide some guidance as to target
- adjust to optimize sampling after target declaration

If intercepting rather than waiting, setup with storm just inside western edge of dual-Doppler area

- Maximizes period in lobe
- Maximizes nested sampling with other radars
- easier to adjust to target
- quicker setup time

DO NOT RECOMMEND

Splitting storm-scale radars to coordinate with 88Ds



Qualitative pattern preserved, but quantitative differences are large. Vertical structure of wind retrieval only up to ~ 6km due to elevation limits on 88D.

Deployment Decisions



Deployment Decisions-2009

HISTORY

- NSSL paid for SR1
- OU paid for SR2
- Coordination split between OU/NSSL with FC and CSWR input (lots of cooks)

- Different deployment strategies + limited communications = suboptimal deployments

- Conditions improved as weather became more robust and project gained experience

Deployment Decisions-2010

NEW PLAN

- Streamline decision process to improve timing
- Single agency coordination between C-bands
 - NSSL leads deployments during May
 - OU leads deployments during June
- Improvements
 - Single POC for FC
 - Increased flexibility
 - extended daily ops
 - experimental options

EXPECTATIONS for 2010

Weather can't be much worse
+
Radar performance should be
greatly improved
+
Seasoned field operators



EXPECTATIONS for 2010

Weather can't be much worse
+
Radar performance should be
greatly improved
+
Seasoned field operators
=
Bones for all!

