

NSSL-OU Research Objectives

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

Why did we do VORTEX2?



Why did we do VORTEX2?



The devil made me do it

OU-NSSL Goals During VORTEX2

(i) Tornadogenesis

- Low-level vorticity dynamics **C, X, O**
- Evolution of polarimetric signatures within tornadic and non-tornadic supercells **C, X, O**
- Precipitation and thermodynamics of the rear-flank downdraft **C, X, O**

(ii) Near-ground wind field in tornadoes

- Role of angular momentum transfer on tornadogenesis **X, O**

(iii) Relationships between tornadic storms and their environments

- Role of cell mergers **C, X, O**
- Impact of environmental heterogeneity (including boundaries) on storm evolution **C, X, O**

(iv) Storm-scale data assimilation and NWP

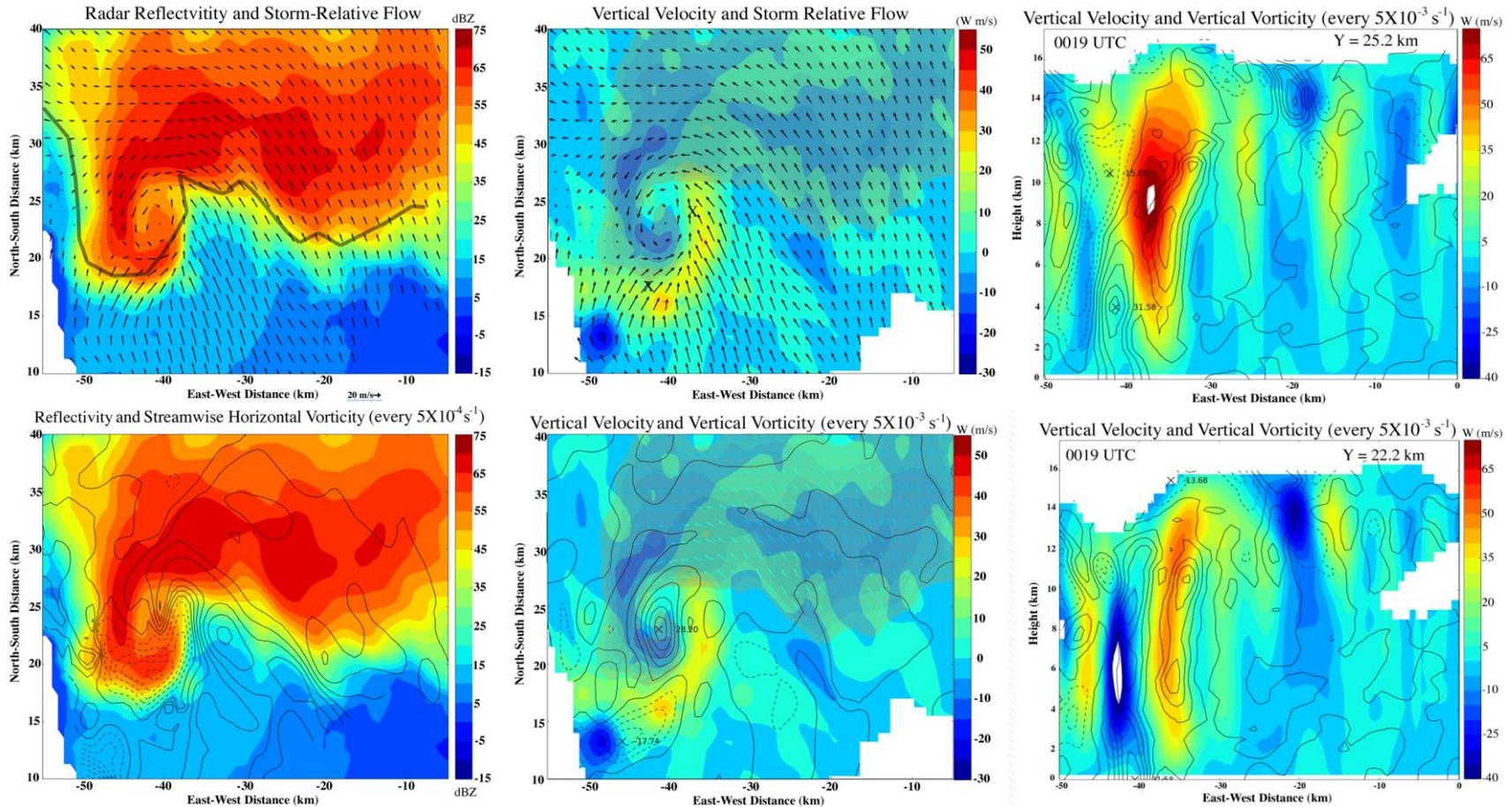
- Improvements in the analysis and forecasting of tornadic storms through the use of ensemble Kalman-filtering data assimilation

C, X, O

C = SMART radars needed **X** = X-band needed

O = Other VORTEX2 platforms needed

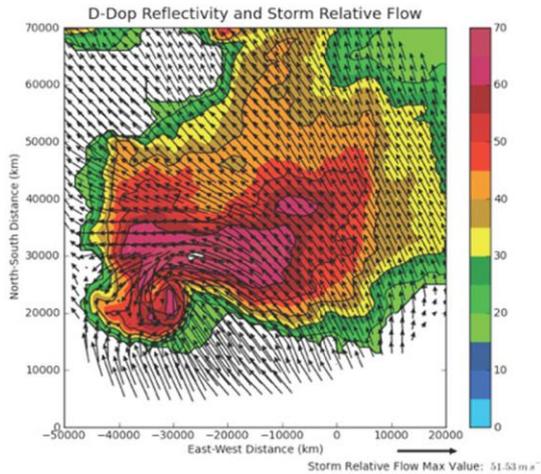
Example of vorticity dynamics and RFD Objectives: RFD evolution from Geary dual-Doppler analyses



Betten et al. (2009, ECSS)

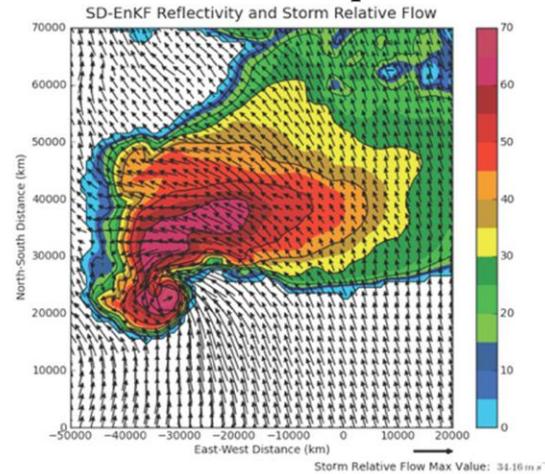
Example of EnKF Research Objectives: EnKF comparisons with dual-Doppler from Geary storm

Observed Winds



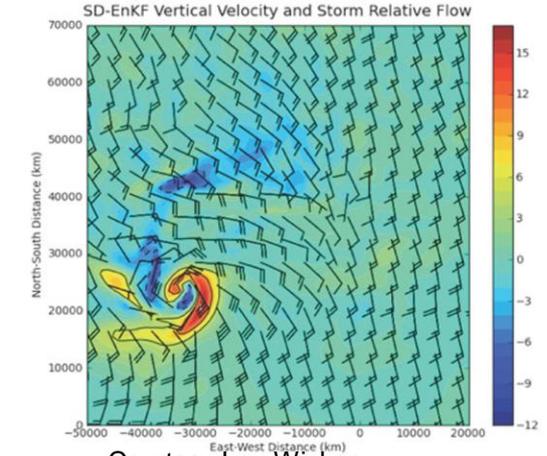
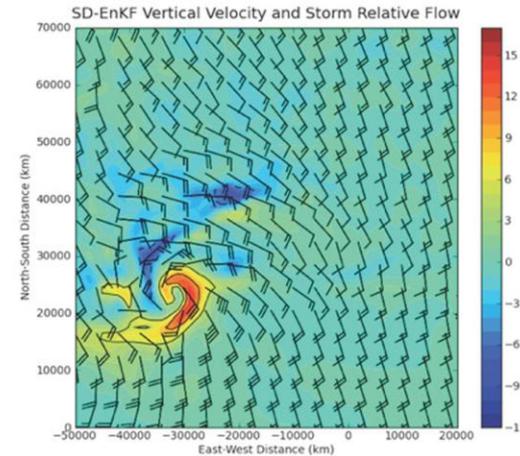
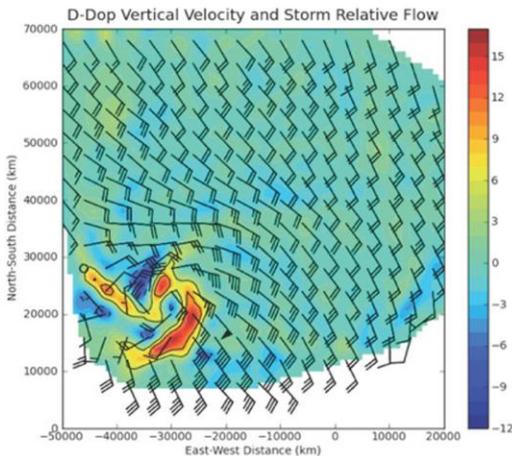
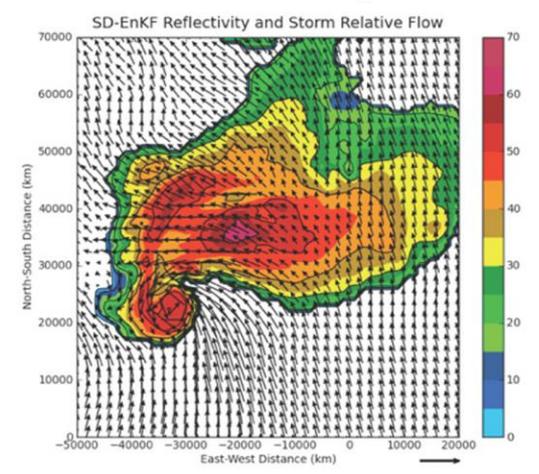
EnKF— LFO

Hail Parameter Experiment



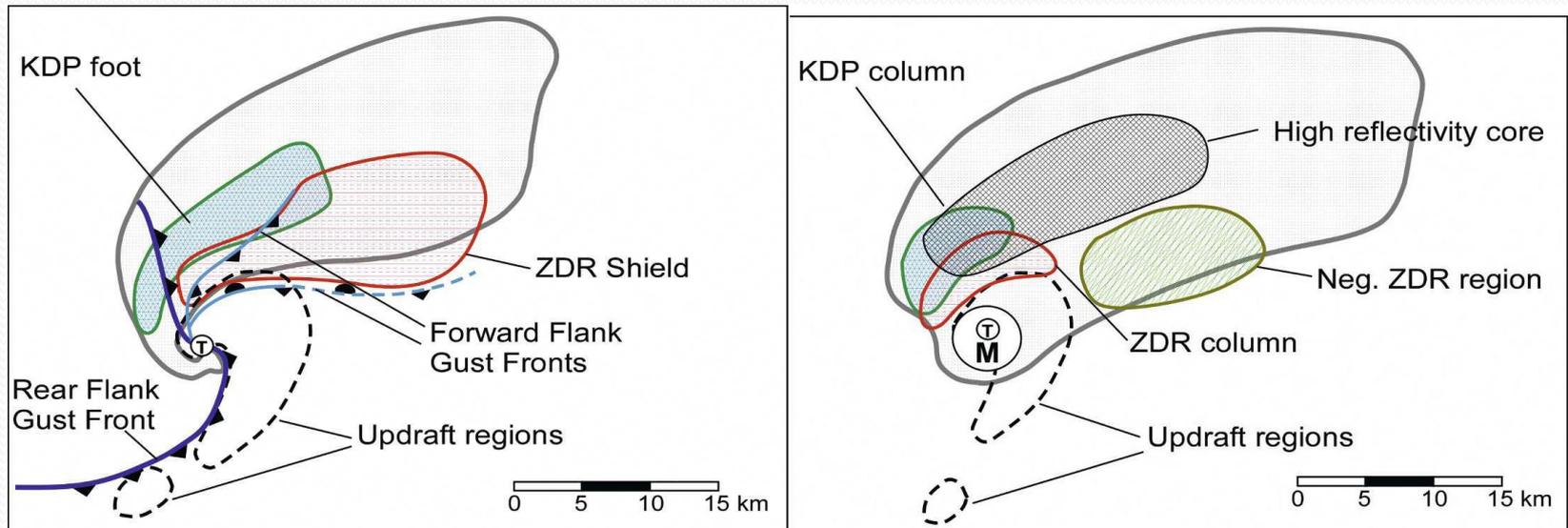
EnKF— ZVD

Hail 2 Moment Experiment



Courtesy Lou Wicker

Example of dual-polarimetric objectives: Dual-pol signatures as possible precursors



From Romine et al. (2008)

In Other Words...

When it comes to
tornadoes... we want to
throw everything at it...
including...



Courtesy of NOAA photo library

In Other Words...

When it comes to
tornadoes... we want to
throw everything at it...
including...

The kitchen sink!



In Other Words...

~~When it comes to
tornadoes... we want to
throw everything at it...
including ...~~

~~The kitchen sink!~~

HOLD ON... that person is
doing down the drain...

Maybe it is better to
collaborate?!



Collaborative Goals for 2009 Data

5 June La Grange, WY tornadic supercell

- Merge storm-scale and mesocyclone-scale radar data to obtain flow field needed to understand tornado demise
- Add mobile mesonet and sticknet data for RFD thermodynamics
- Use soundings for EnKF modeling studies
- Edited/analyzed SR data available to collaborating parties
- Willing to perform and share EnKF runs (Trying to add CYS 88D to other SR2 obs)

9 June Greenburg, KS supercell

- Merge storm-scale and mesocyclone-scale radar data to obtain flow field needed to understand supercell demise
- Add mobile mesonet and sounding data to document inflow and RFD thermodynamics
- Edited/analyzed SR data available to collaborating parties

Collaborative Goals for 2009 Data

11-12 June Las Animas, CO double-supercell

- Merge single SR storm-scale, mesocyclone-scale radar data, mobile mesonets, sticknets and soundings to understand and address the following general goals (applicable to all cases):
 - cold pool dynamics, microphysics, and evolution
 - morphology and evolution of multiple forward-flank and rear-flank downdraft boundaries
 - impact of cold pool and outflow boundaries on low-level mesocyclone dynamics and evolution
 - impact of spatial variations of low-level stability on simulated supercell life cycles
- Willing to perform and share EnKF runs if someone wants to edit the radar data
- Other general goals
 - Impact of spatial variations of low-level stability on simulated supercell life cycles

Seeking Collaborators!

