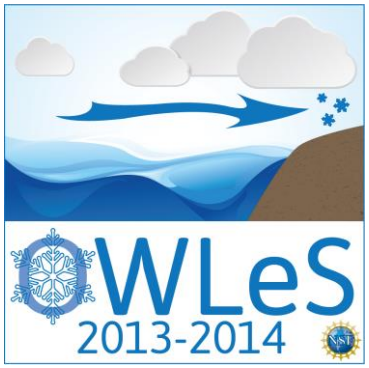
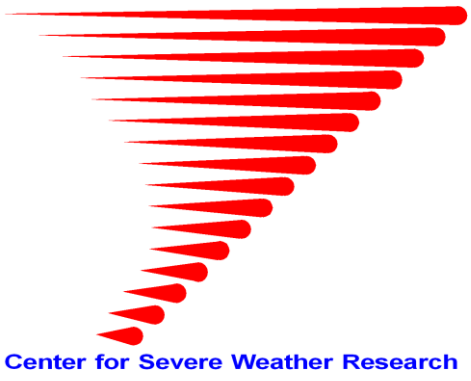
CSWR OWLeS Science Objectives: Analysis of snow band misovortices

Karen Kosiba, Josh Wurman

CSWR





Objectives

- Formation and evolution of misocyclones on convergence lines and/or air mass boundaries (dry line, fronts, etc.)
  - Relate horizontal shear, thermodynamics to vortex strength, spacing, duration
  - Location of vortices relative to band (edge, center)
  - Snow fall, type
- PID between S-band (88D) and X-band (DOW) radars

CSWR Cases of Interest:

Misovortices:

- **IOP4 (12/15/2013)**
- **IOP15 (01/20/2014)**
- **IOP2 (12/10/2014)**
- **IOP7 (01/06/2014)**
- **IOP8 (01/08/2014)**

PID:

- **IOP2 (12/10/2014)**
- **IOP7 (01/06/2014)**

Preliminary Analyses: Using un-QC-ed DOW data

- **Shallow dual-Doppler**
  - **IOP4 (12/15/2013)**
  - **IOP15 (01/08/2014)**

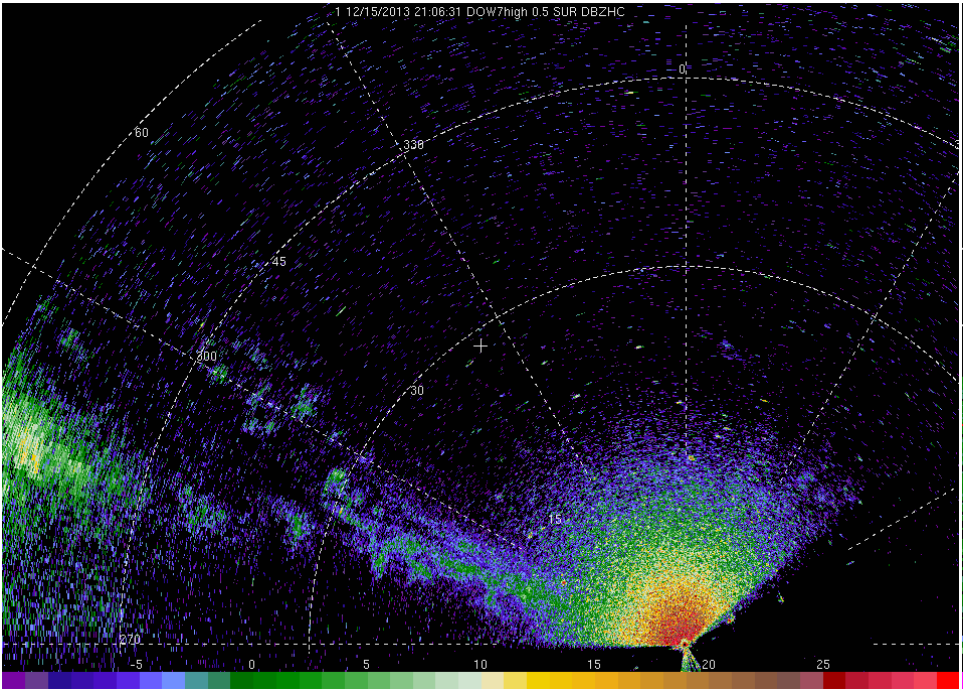
Preliminary Analyses

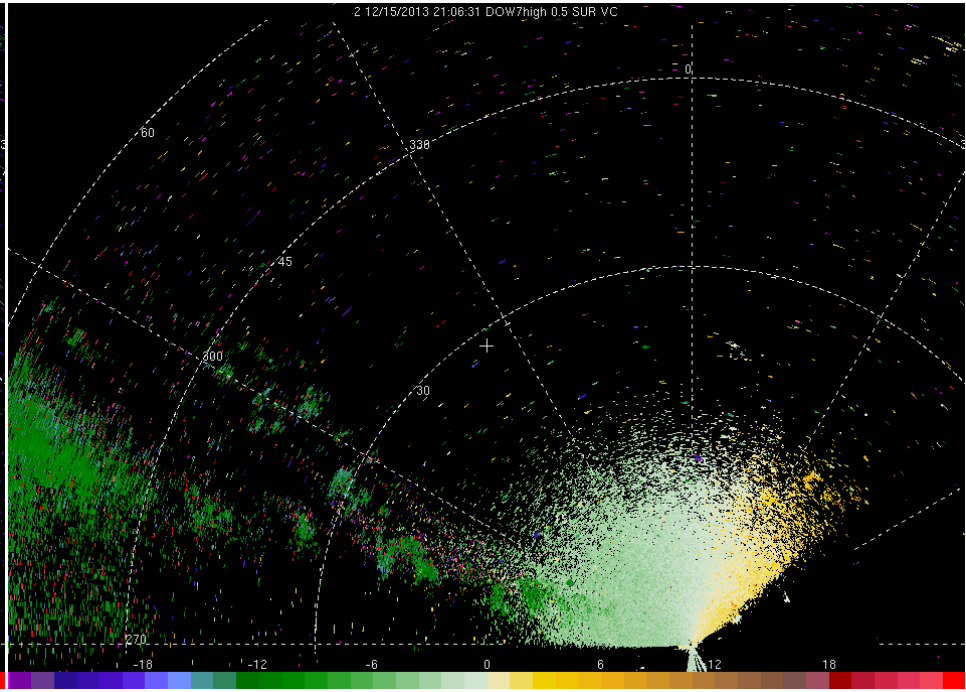
Dual-Doppler Domain:
30 km x 30 km
delta = 100m
20 deg crossing angle

Three Time Periods/Different Morphologies:
2330
0120
0430-0630

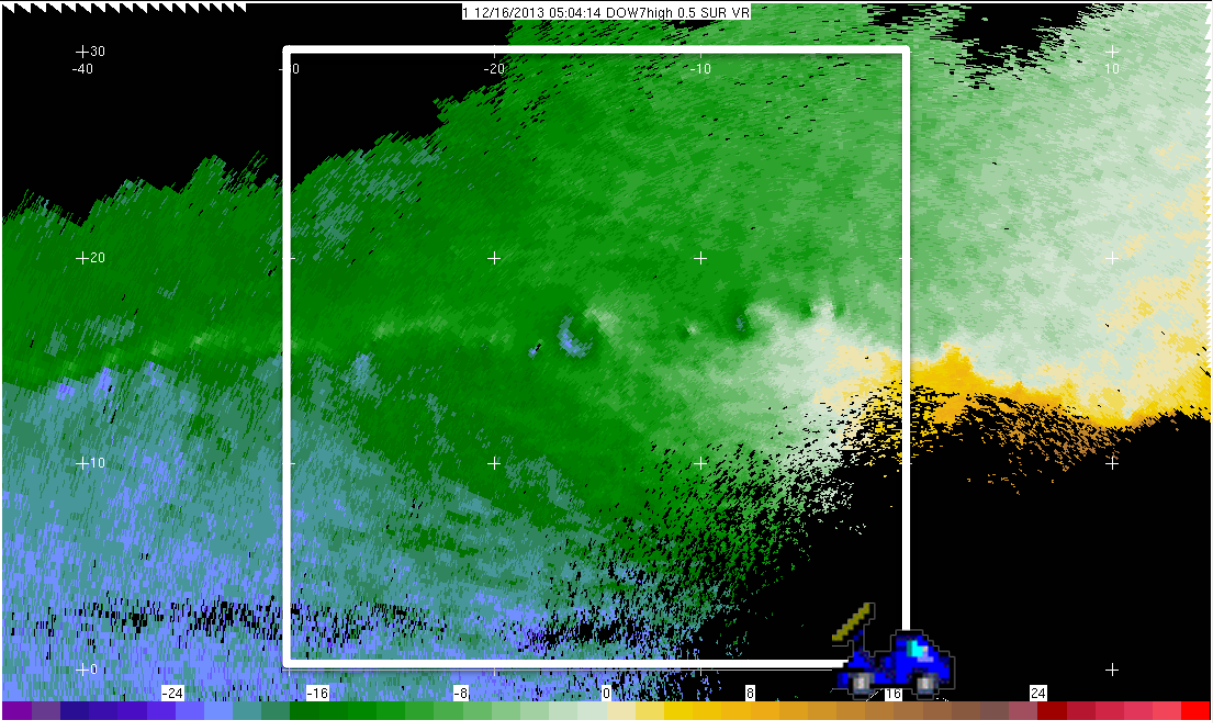
Dual-Doppler:
2300 - 0630

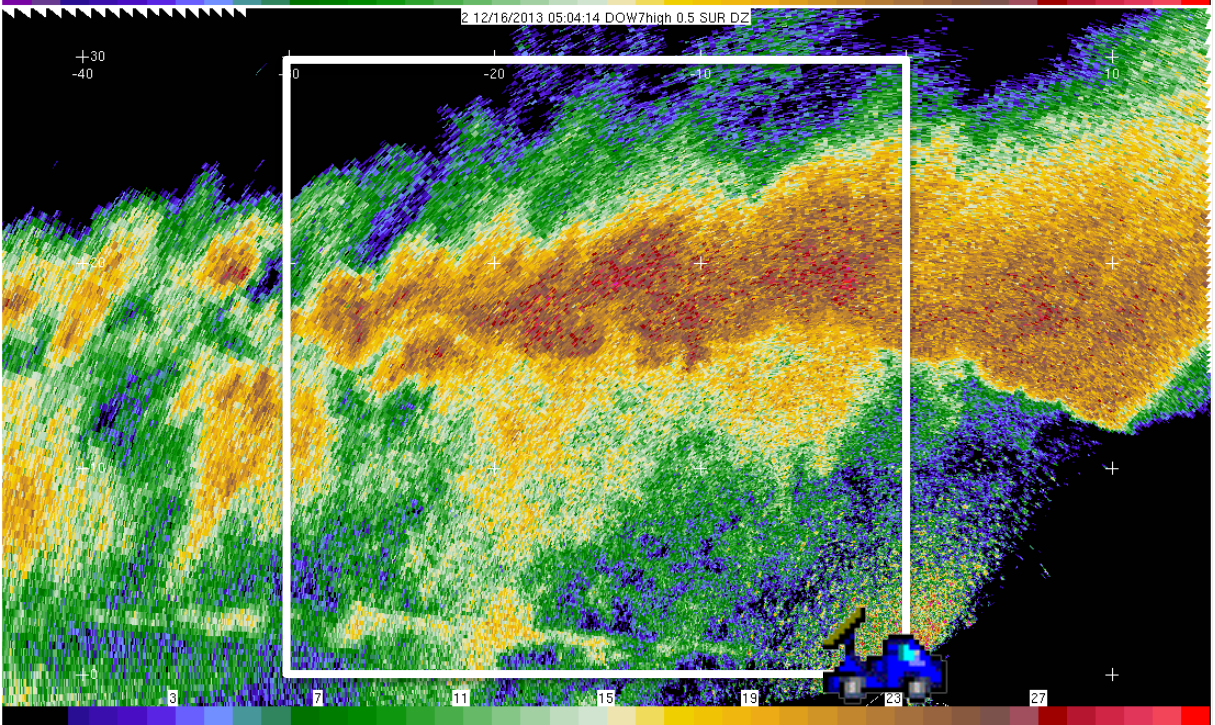
2106 – 0614 UTC





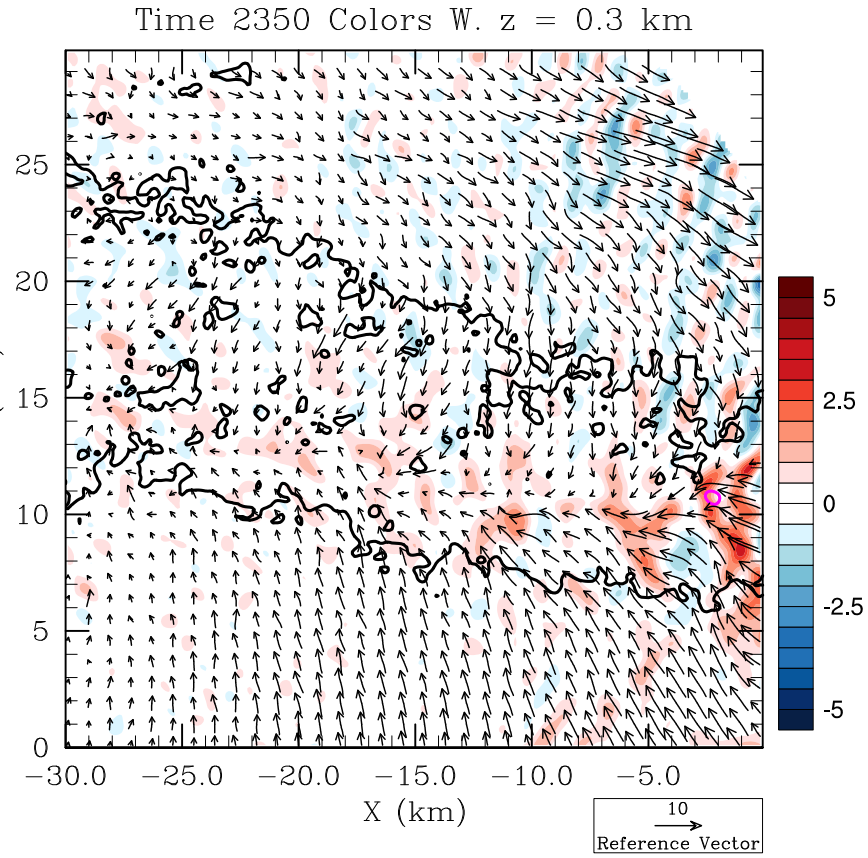
IOP 4: Dual-Doppler Domain



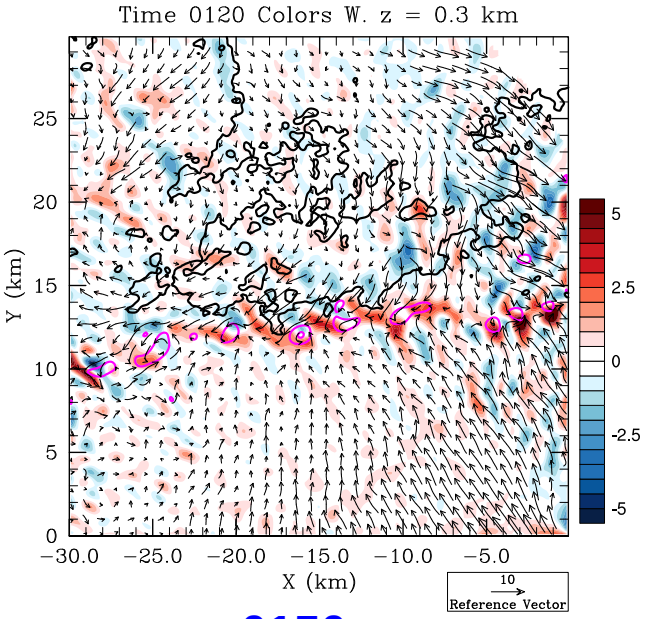


Variation in morphology with time

2350

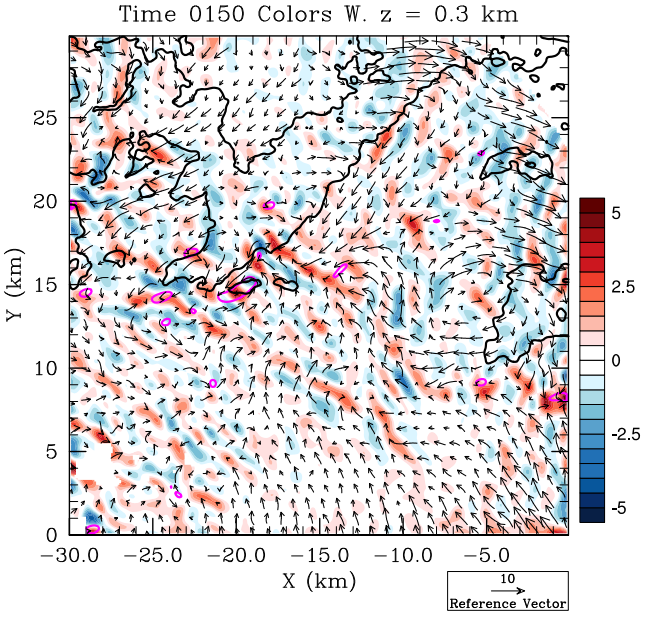


0120



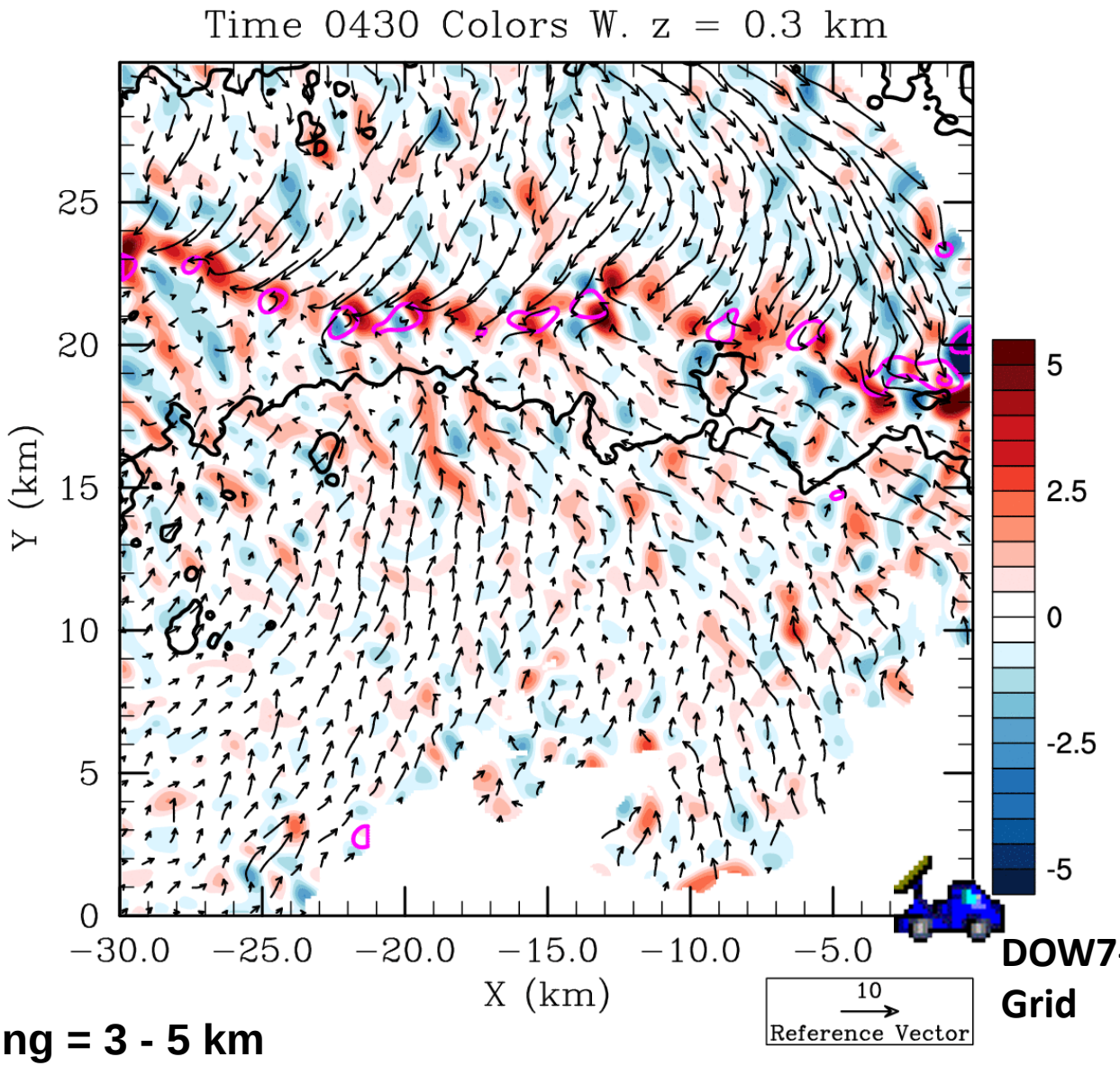
Disorganized….

0150



Reflectivity is black contour (18 dbz),
Vertical vorticity is magenta line contours (.01 - .04),
Vertical velocity is color contours

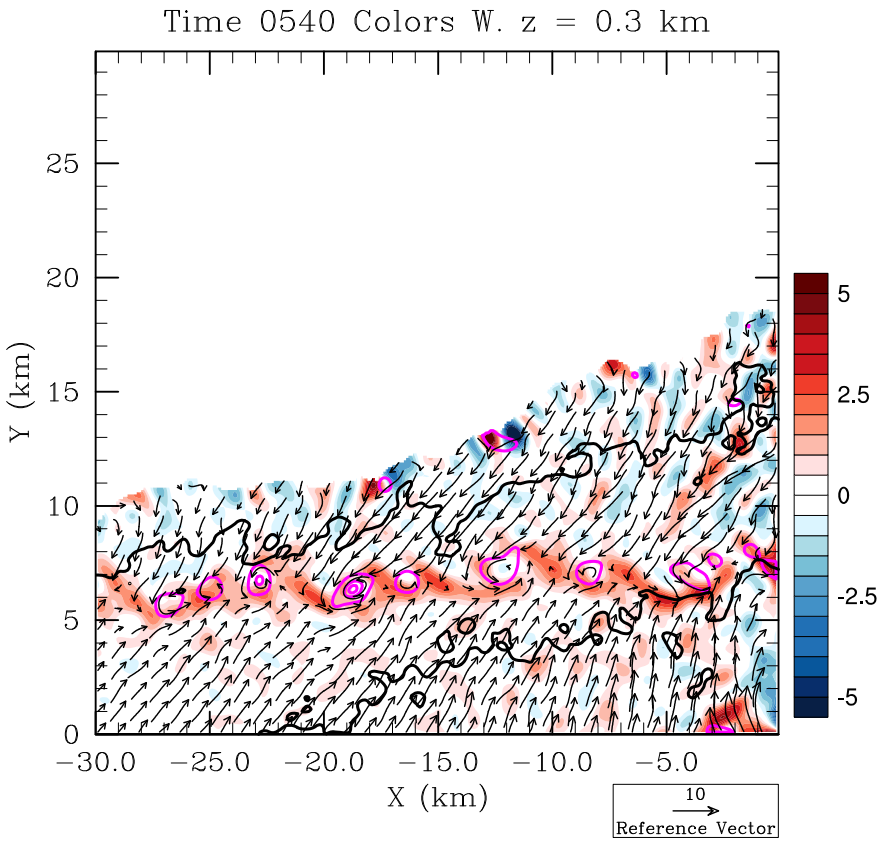
0430 UTC – 0530 UTC: Every 2 min.



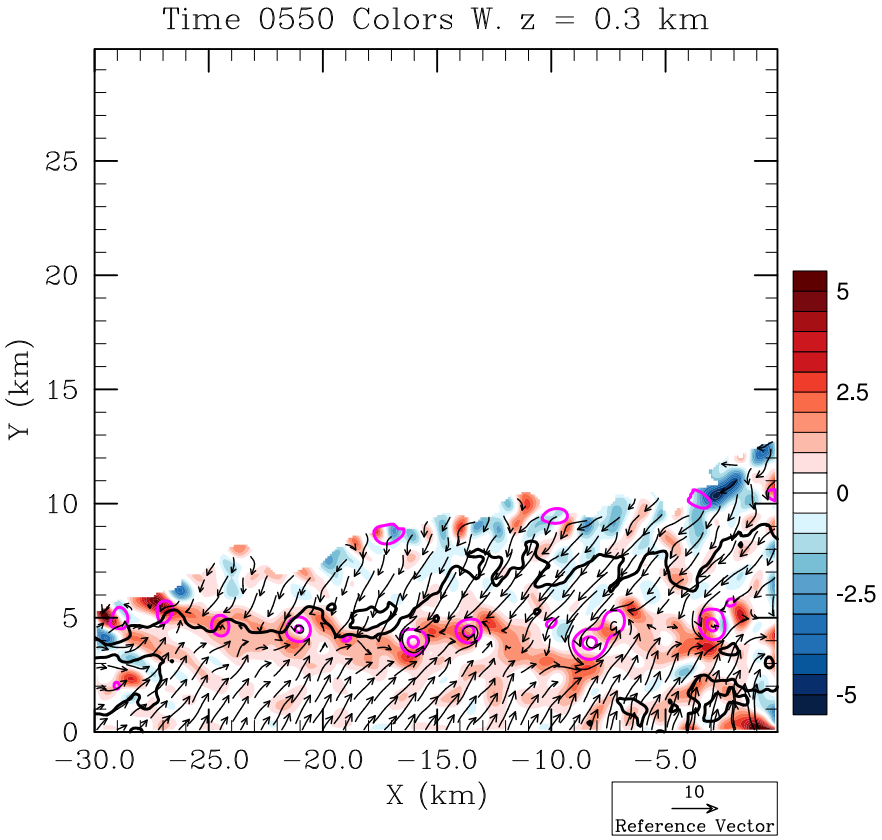
DOW7-relative Grid

Vortex Spacing = 3 - 5 km

0540

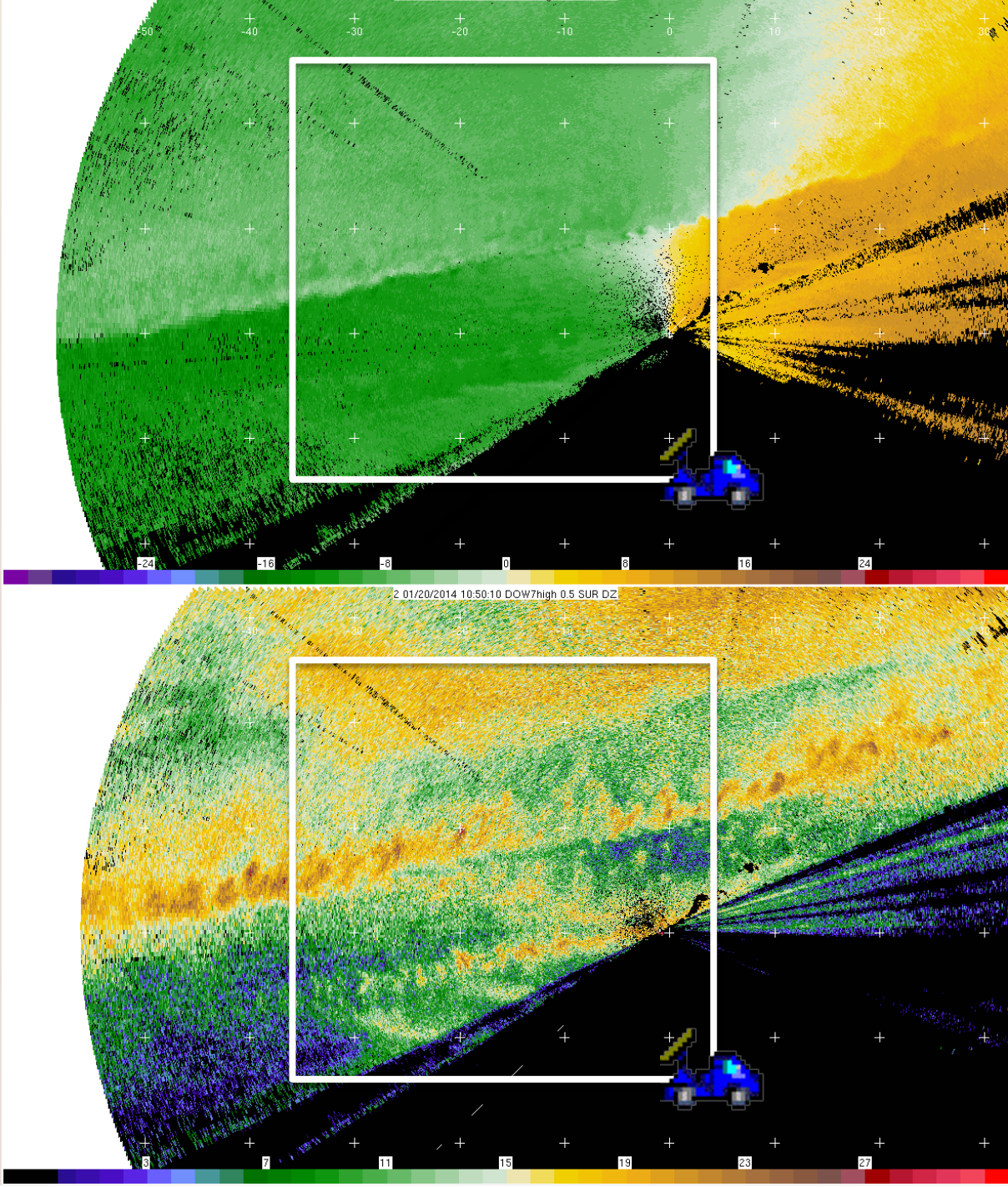

Time 0540 Colors W. z = 0.3 km
Y (km)
X (km)
25
20
15
10
5
0
−30.0
−25.0
−20.0
−15.0
−10.0
−5.0
5
2.5
0
-2.5
-5
10
Reference Vector

0550

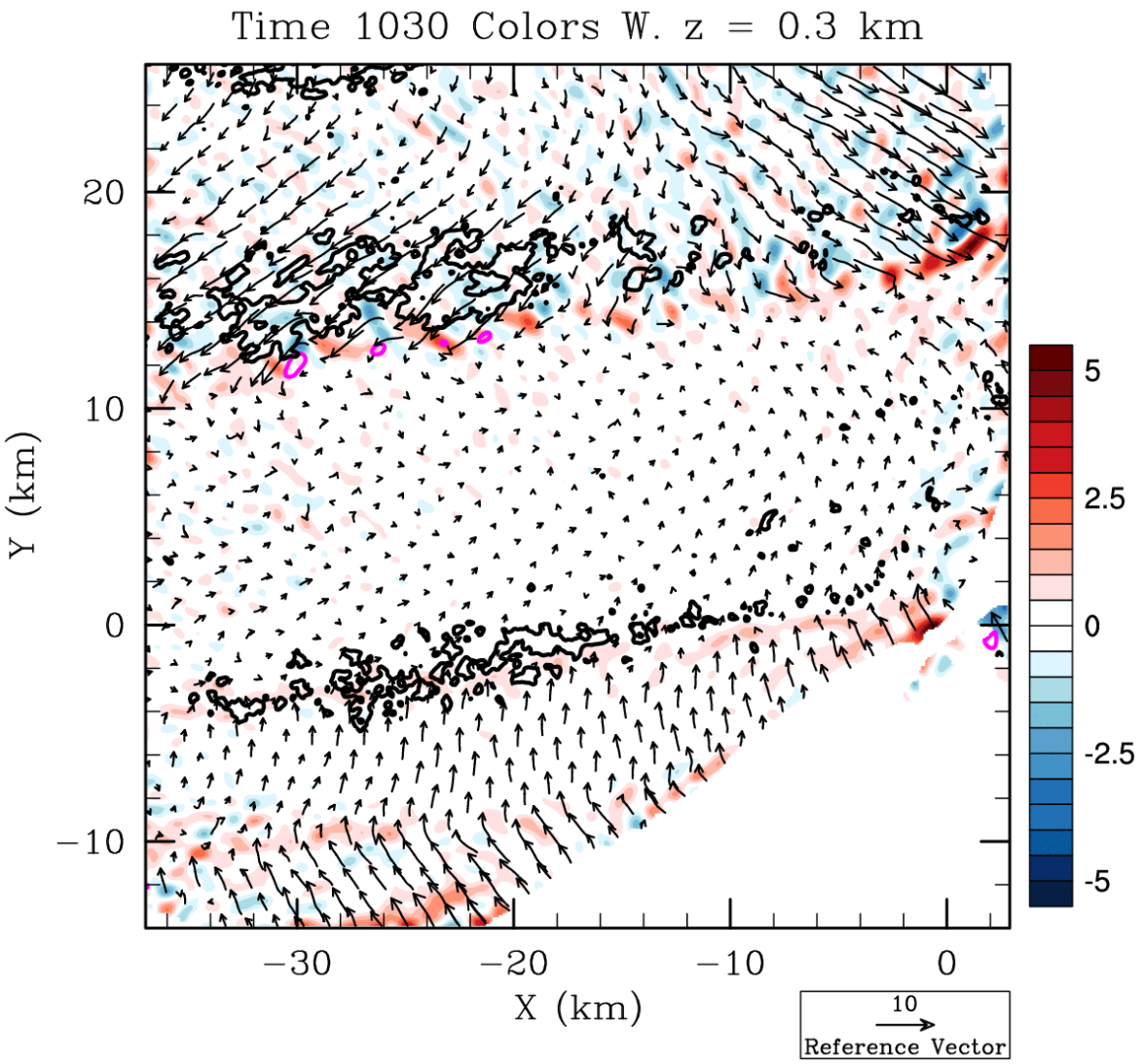

Time 0550 Colors W. z = 0.3 km
Y (km)
X (km)
25
20
15
10
5
0
−30.0
−25.0
−20.0
−15.0
−10.0
−5.0
5
2.5
0
-2.5
-5
10
Reference Vector

IOP 15:
Dual-Doppler Domain

Similar to IOP4 domain



1030 UTC – 1050 UTC



Analysis Plans

- Horizontal Shear Calculations
- Trajectory Calculations
- Vertical Vorticity Maxima and Spacing
- Atmospheric Stability (inside and outside band) and Vertical Shear (Soundings)
- Vortex Line Analysis
- Location within band

- Variation in Dual-Pol Fields

We are interested in collaborations, helping with multi-Doppler and other analyses of other cases/objectives.