

DOW IMPACT ON TORNADO SCIENCE

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The DOW Network Pioneered the Mapping of Tornadoes Using Mobile Radars

1st Mobile Radar Mapping of Tornadoes **And Related Phenomena**

3D Wind Structure Debris Clouds Vertical Cross-sections Multiple Vortices Multiple Wind Maxima, Anticyclonic Tornadoes Wind-Damage Relationships Subsidiary Non-Tornadic Vortices Integration With Surface Measurements



1st Mobile Radar Dual-Doppler Analysis

Measurement of Vorticity Budget Terms Secondary Gust Front and its Role in Genesis/Maintenance Triggers for Tornadogenesis Supercell and Mesocyclone Evolution Assimilation

1st Mobile Radar Climatology

Non-Case-Study Analysis of Tornado Phenomena 170 + Tornadoes Preferred Size, Preferred Intensity Revealed Relationship between Tornado Intensity and 88D Intensity

TORNADO CLIMATOLOGY





TORNADOGENESIS, MAINTENANCE, and SUPERCELL STUDIES

1ST Dual-Doppler fine-scale analysis of tornadic supercell Wurman et al. (2007) Secondary Rear Flank Gust Front, Cyclic Tornadogenesis



Dual-Doppler Study of Tornado Maintenance Marquis et al. (2008) Role of secondary rear flank gust front, location of tornado and evolution



 J6/01
 Marietta, OK
 22:07:42
 52.8
 1.3
 22:14:54
 41.5
 37

 V4/04
 Hebron. NE*
 21:21:10
 80.5
 4.8
 21:11:06
 62.6
 12

22:16:50 108.6 0.4 22:02:00 53 5

06/05/09 County, WY



1ST 3D Dual-Doppler fine-scale analysis of tornadic Wurman et al. (2007) Vorticity Budget Terms, History of Vertical Dependence of Vorticity





EnKF and dual-Doppler study of multiple tornadic supercells Marquis et al. (2012)



Origins of angular momentum and circulation and descending reflectivity core prior to tornadogenesis Markowski et al. (2012)



Evolution of descending reflectivity Cores and low level wind field Byko et al. (2009) Evolution of non-tornadic supercell mesocyclones Beck et al. (2006)





Cross-section of forward flank gust front



TORNADO WIND-DAMAGE RELATIONSHIP





Analysis of non-tornadic supercell mesocyclones Markowski et al. (2011)



y (km)



TORNADO STRUCTURE



1st 3D Mapping of tornado winds, debris cloud, vertical structure Wurman et al. (1996)

1st Mapping of of Multiple Vortices Wurman (2002) Spencer, South Dakota 1998

1st RHI Cross-sections Alexander and Wurman (2005) Spencer, South Dakota 1998



z = 300

(3)/

Rapid evolution of debris ball at tornado landfall Kosiba et al. (2012)



DOW-photogrammetry studies of tornado structure Atkins et al. (2012) Wakimoto et al. (2011)







Non-Tornadic Vortices During Genesis (Richardson et al. (2001)



Simultaneous cyclonic tornadoes Stratford 2003 Wurman (2004)





<u>266° 268° 270° 272° 274° 276° 278° 280° 282° 284° 286° 288° 290° 292° 294</u>° 296°



1st 3D GBVTD retrieval of pressure, Vr, Vt, divergence Lee and Wurman (2005) Radial Wind (m/ a) Tangential Wind(m/s





Mulhall, Oklahoma 1999



Non-Tornadic Vortices exist between one tornado dying and the next tornadogenesis Geary 2004 Wurman (2004)



Non-Tornadic Vortices Near Large Tornado Seward, 2007



Satellite Tornadoes Oklahoma City 1999 Wurman (2004)

Simultaneous cyclonic/anti-cyclonic tornadoes Glen Elder 2008 Wurman (2008)



Concentric Velocity and Debris Structure Wurman (2006)





