Observations of Supercell Structures in Hurricane Irene

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Outline

• Background
  – Storm History
  – Project Motivation
• Research topic
• Objectives/Methodology
• Applications

Hurricane Irene near peak-intensity
(Source: National Oceanic Atmospheric Administration)
• Tropical Cyclone (TC) Irene formed east of the Lesser Antilles on August 21, 2011
• Became a hurricane on the 22\textsuperscript{nd} near Puerto Rico
• Reached peaked intensity on the 24\textsuperscript{th} (105 kt, 120 mph)
• Made landfall in North Carolina on the 27\textsuperscript{th} (75 kt, 85 mph)
• Made final landfall on Manhattan on the 28\textsuperscript{th} (55 kt, 65 mph)

Hurricane Irene Best Track
(Source: NOAA/NWS National Hurricane Center)
Background: Project Motivation

• TC Irene produced seven tornadoes total
• Three produced more than $100K in damages
• Tornadoes are difficult to detect within TCs

Tornadoes (red triangles) and Hurricane Irene Best Track (green line)
Created in Google Earth using National Climatic Data Center Storm Event and National Hurricane Center Best Track data
Background: Project Motivation

• TC tornadoes are a modern day challenge
• High-resolution dataset available
• First time for dual Doppler analysis (dual-pol) for TC convective circulations
• Publishable research!

SMART-R2 Radar
(Source: NOAA National Severe Storms Laboratory)
What we want to Accomplish

- Analyze TC convective circulations with dual-pol radar data
- Determine the cause of present differential reflectivity (ZDR) rings
- Discern between tornadic and non-tornadic circulations
Objectives/Methodology

• Evaluate Irene’s environment
• Evaluate and edit radar data
• Categorization of supercell structures
• Dual-Doppler analysis (vertical velocity retrieval)

Dual-Doppler Analysis Lobes
(Source: Biggerstaff, 2011)
Significance of Research

• TC tornadoes are hard to detect
• Some can become strong (EF2+)
• NEXRAD dual-pol upgrade underway
• Improving forecasting techniques

Tornado Watch #811 summary
(Source: NOAA/NWS Storm Prediction Center)
Questions?

Hurricane Irene from the International Space Station (Source: NASA)
References

• Biggerstaff, M. I., 2011: RaXpol Deployment Summary