ARCHIVAL AND APPLICATION OF WSR 88-D (NEXRAD) LEVEL II RADAR DATA FOR CRYSTAL-FACE

Thomas Rickenbach (JCET - UMBC/NASA-GSFC), Larry Belcher (NCSU), Paul Kucera (UND), Larry Carey (NCSU), David O’C. Starr (NASA-GSFC)

1. Goals:

- Study convective and anvil (thickest portion) evolution for priority cases using the WSR 88-D (NEXRAD) radar network.
- Extend NPOL radar precipitation maps to all of South Florida using the NOAA/NWS WSR 88-D (NEXRAD) radar network.

Applications: 1) Verify mesoscale model simulations. 2) Document anvil evolution.

2. Approach:

- Upgrade of 88-D archival system for Key West, Tampa, Miami NEXRAD sites, prior to CRYSTAL-FACE.
- Archive, process and analyze (for priority days) NEXRAD radar data volumes.
- Use NPOL rainfall estimates to “tune” reflectivity-rainrate relations for the overlapping 88-D radar network (see Kucera et al. poster, this meeting).

3. South Florida WSR 88-D Level II Data

- Successful acquisition of complete (> 95%) S. Florida NEXRAD level II radar dataset, via CRYSTAL-FACE contribution to upgrade of NOAA/NCDC radar archival system
  - Prior to CRYSTAL-FACE, only 65% of South Florida NEXRAD data saved due to unreliable exabyte tape archival. Insufficient for short-duration field campaign.
- Partnered with NOAA Project CRAFT (Collaborative Radar Acquisition Field Test - CAPS/Univ. of Oklahoma, NSSL, NWS, NCDC) to achieve internet access to Key West, Tampa, and Miami level II data via NCDC.
- Demonstrated the utility of low cost, fast and reliable DSL and cable modem connections (now used by many CRAFT sites) from NEXRADs to NCDC.
- CRYSTAL-FACE made the current NCDC archival of S. Florida NEXRAD data possible, which continues to benefit many user communities.

4. Evolution and vertical structure of 23 July 2002 case study from NEXRAD

- Image (right) of near-surface reflectivity (2km AGL) shows a squall line forming along sea breeze front at 2016 UTC.
- Superimposed reflectivity contours at 9km AGL show a trailing anvil of precipitation-sized particles (right).

Vertical reflectivity structure (within box):

- Strong convective cells, developing anvil region, at 2016 UTC (right).
- Anvil area peaks at 7km AGL, nicely revealed by NEXRAD volumes.

One hour later…

- Reflectivity image at 2117 UTC showed the rapidly collapsing squall line (right).
- Superimposed reflectivity contours at 9km AGL revealed an expanding anvil region of precipitation-sized particles (right), with little surface stratiform rain.

- Convective cells collapsed one hour later, while anvil has strengthened in upper troposphere (see profiles, right).
- Anvil of precipitation-sized particles has thickened and expanded greatly in area following decay of convective region.

To access CRYSTAL-FACE NEXRAD data: Raw level II data free of charge from NCDC at http://has.ncdc.noaa.gov/ple/lmprod/plsql/HAS.DsSelect Preliminary gridded netCDF volumes for selected radars and days are available from the author at rickenba@umbc.edu