
Successes in NEXRAD Algorithm Technology Transfer*

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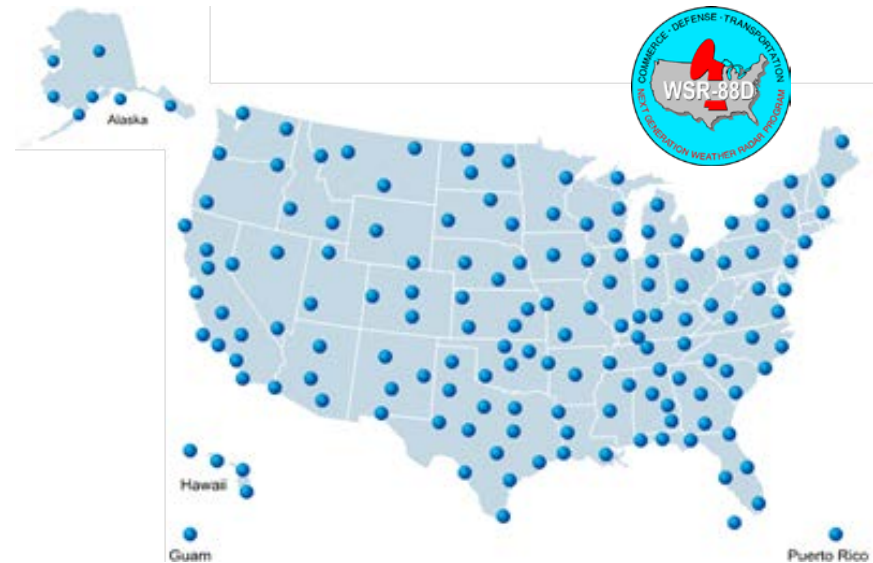
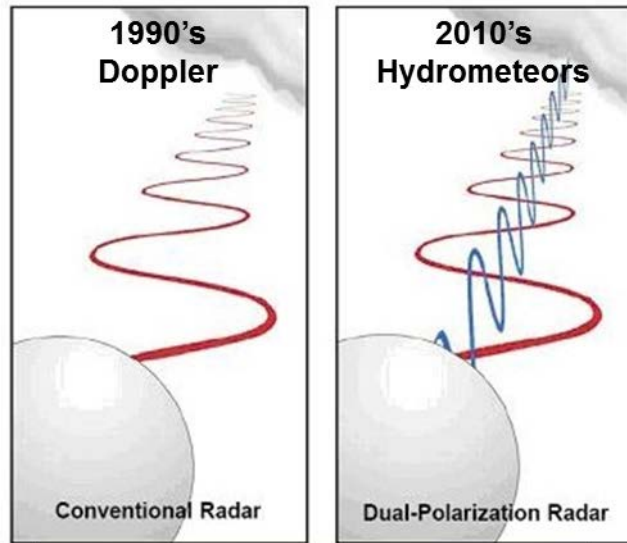
26 Aug 2015





NEXRAD – WSR-88D

Next Generation Weather Surveillance Radar

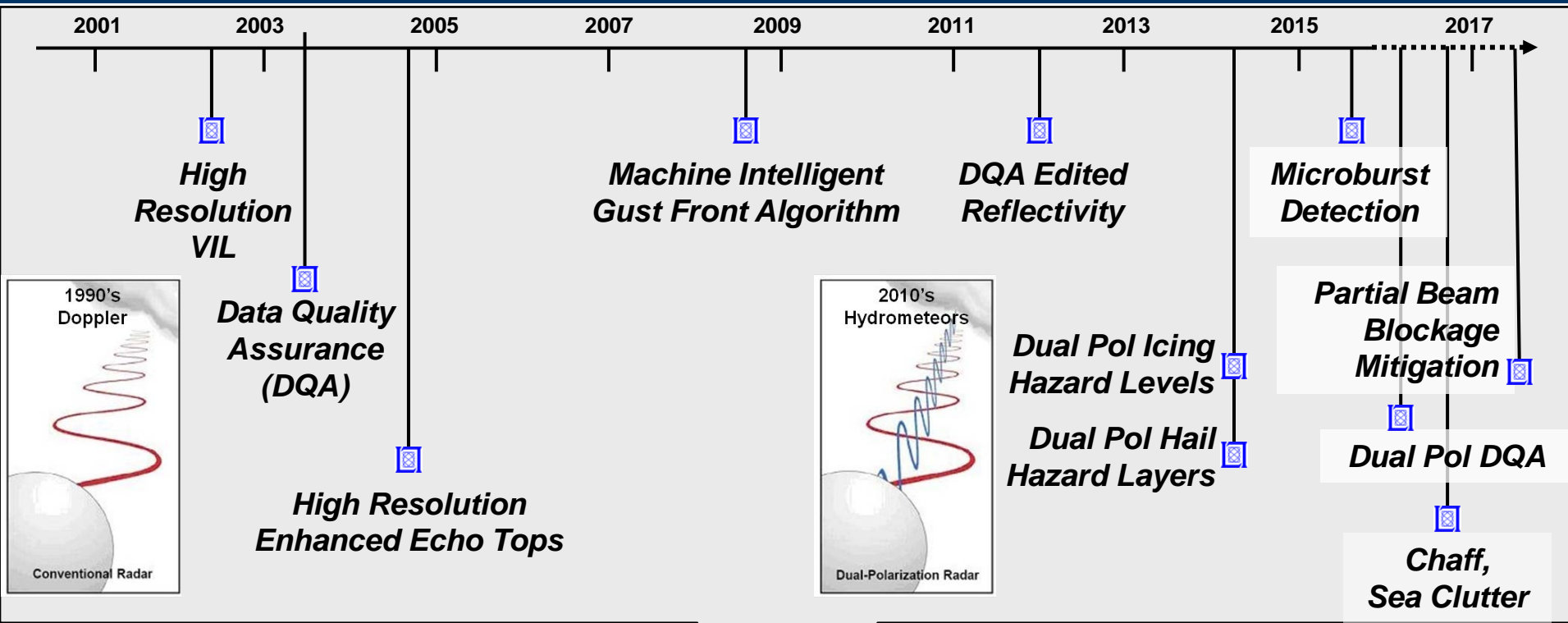


Frequency: 2.7 – 3.0 GHz
Wavelength: 10 cm nom.
Transmitted Pulse: 1 MW
Pulse width: 1.5 μ s, 4.5 μ s
Beam width: 0.95 degree

- **FAA NEXRAD Program Office funding Lincoln Laboratory's NEXRAD Algorithm Enhancements Program since 2001**
 - Eight algorithms developed with seven operational products currently fielded
 - 35+ algorithm enhancements as NEXRAD evolves



NEXRAD Enhancements Benefit FAA Systems





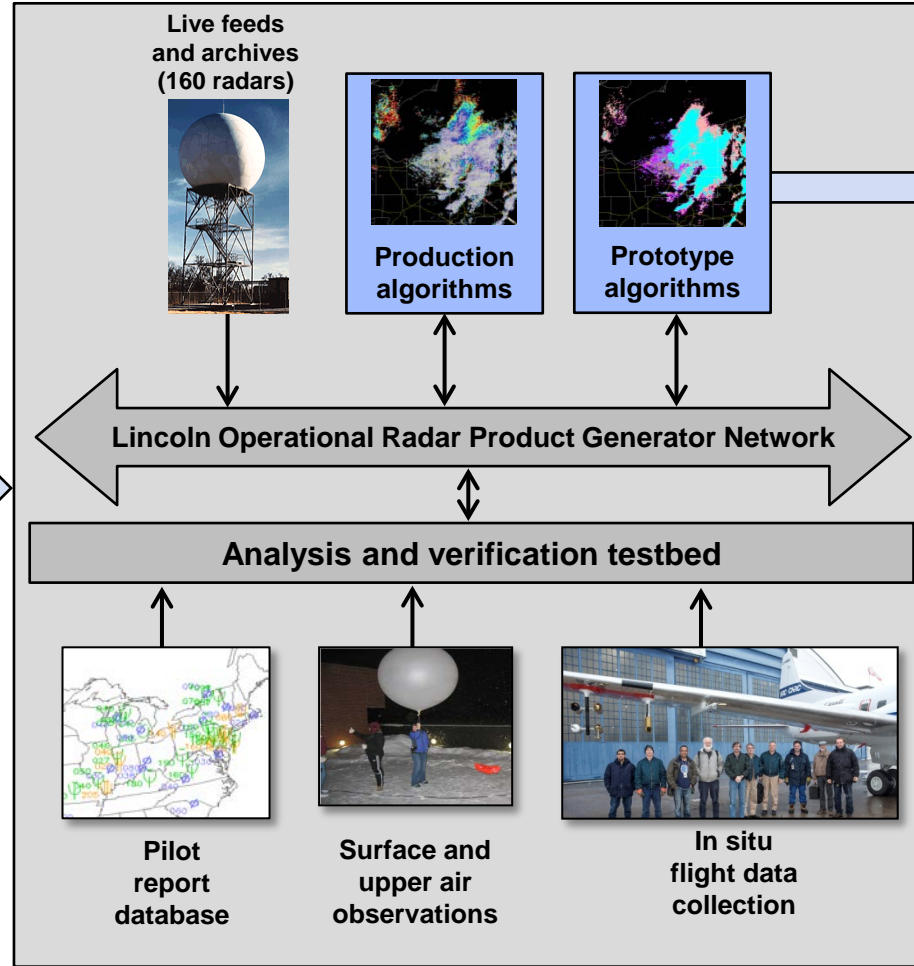
NEXRAD Technology Development and Transfer



Requirement identification (microbursts, icing detection, ...)



User community



External acceptance test (Radar Operations Center)

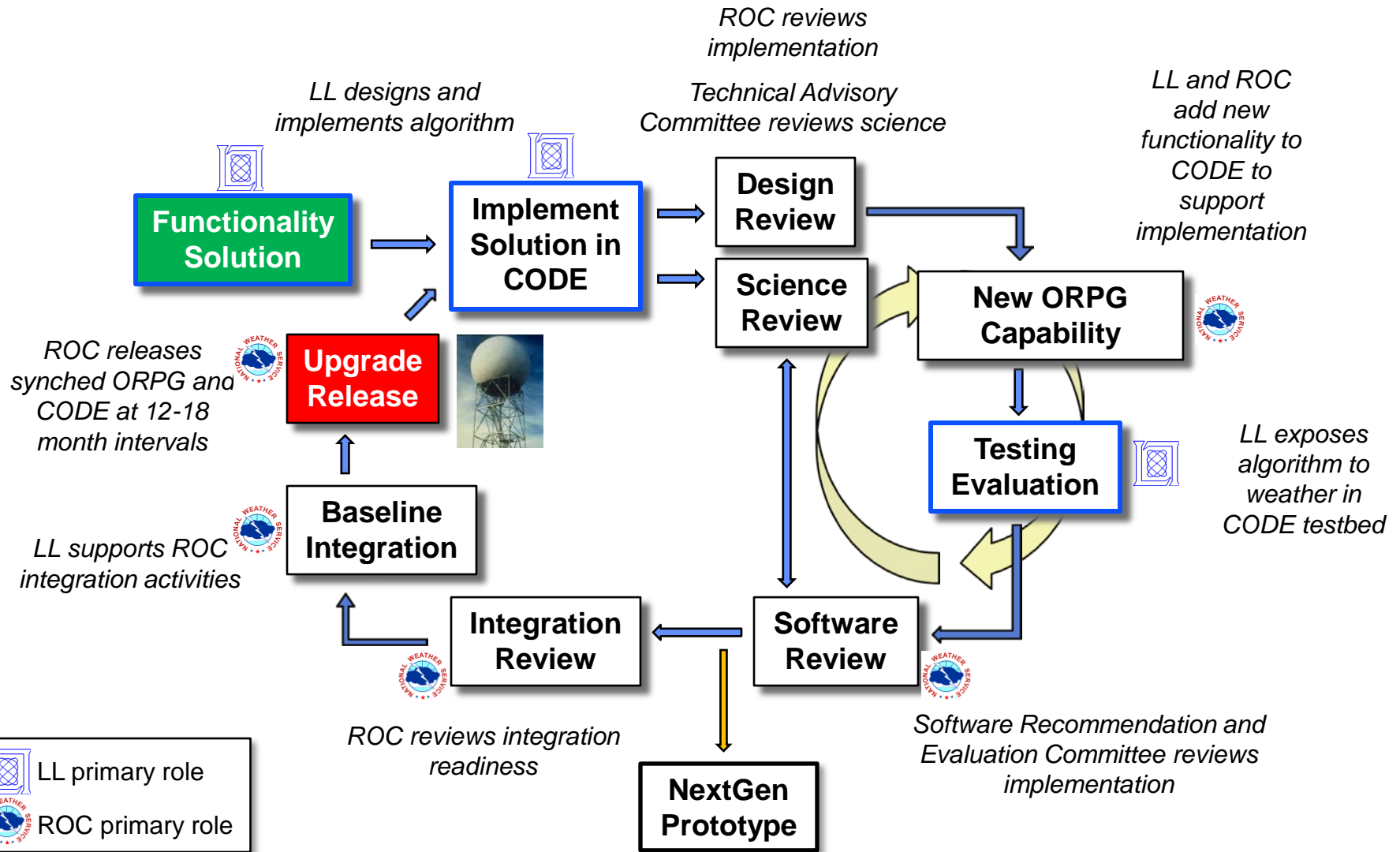


Integration and deployment



Collaborative Tech Transfer Cycle

Enabled by CODE* Environment

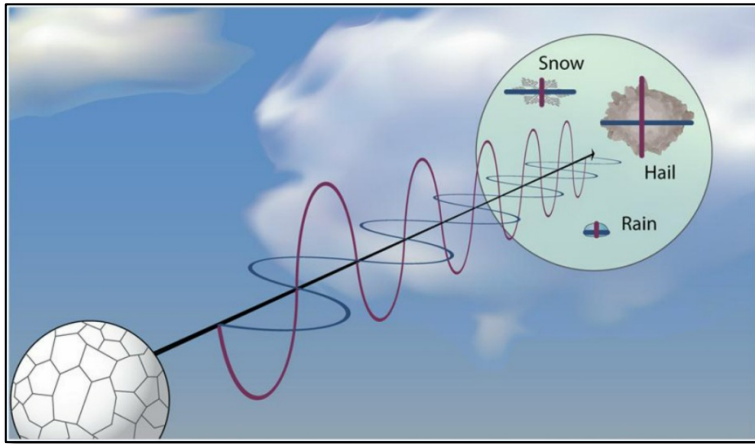


LL primary role

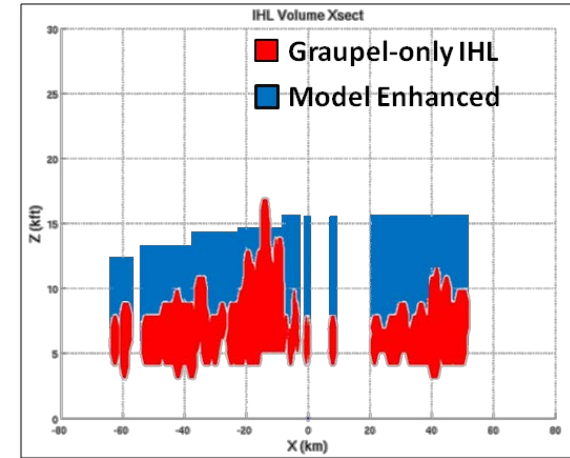
ROC primary role



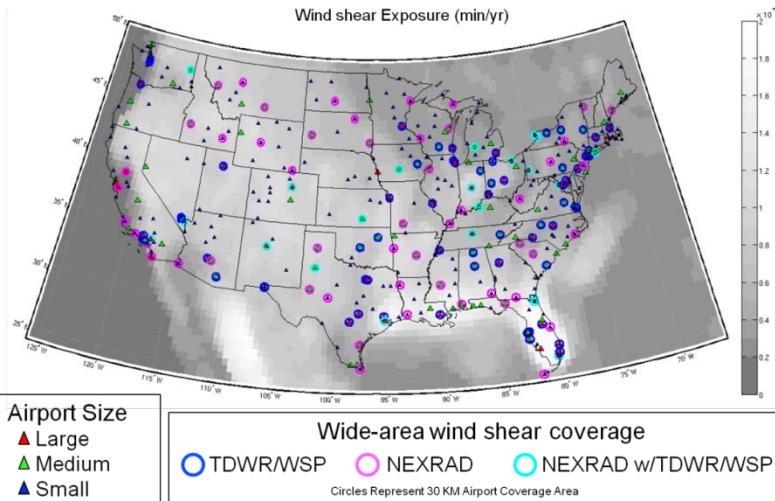
Recent Accomplishments



Dual-pol hydrometeor classification and melting layer improvements



Icing layer improvements deployed and operational



Microburst detection algorithm deployment

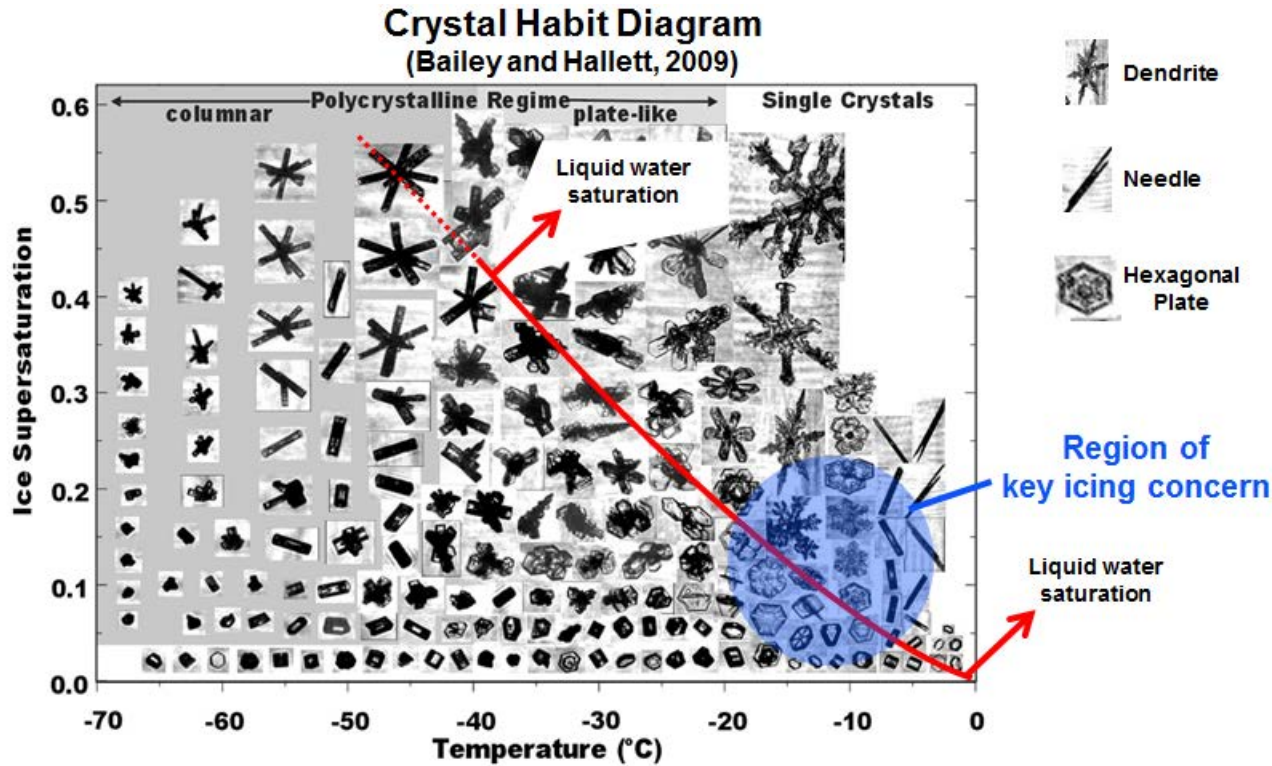


In-situ verification flight tests



Recent Tech Transfer Example

Icing Hazard Level Detection



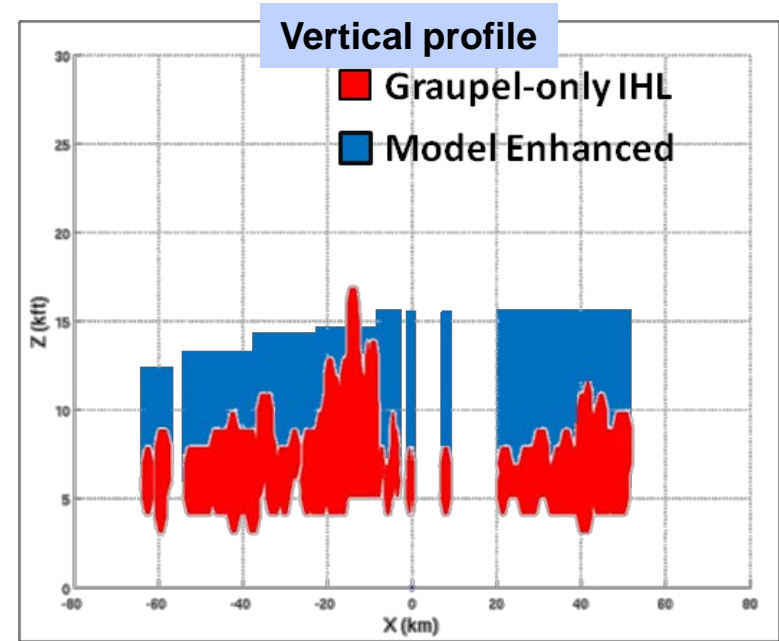
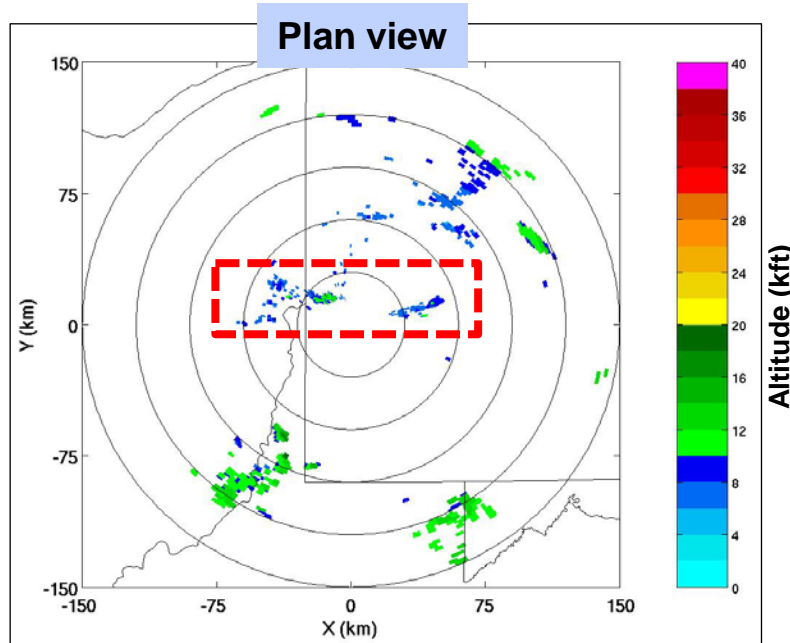
Supercooled water
(icing threat)
causes riming



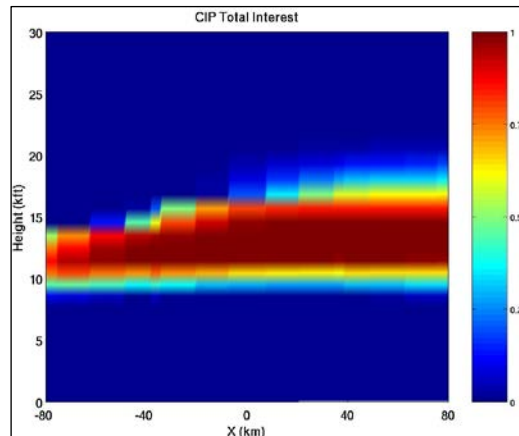
- Crystal habit microphysics identifies key region (blue) of icing hazard concern for aircraft
- Graupel particles represent distinct “low hanging fruit” for dual pol radar detection of icing hazard regions



NEXRAD Icing Product Example



**NOAA RAP
Vertical profile
model interest
(temperature,
relative humidity)**



**High
icing potential**

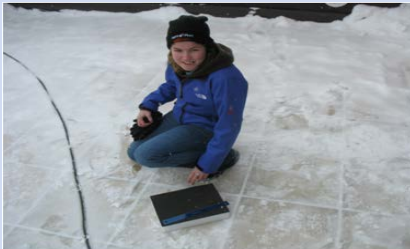
**Low
icing potential**

**Pittsburgh, PA
(KPBZ)
24 February 2012
0509 UTC**

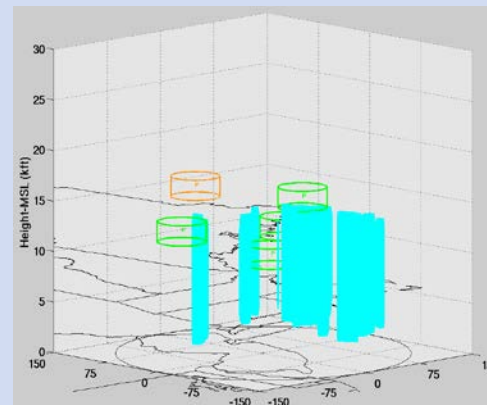
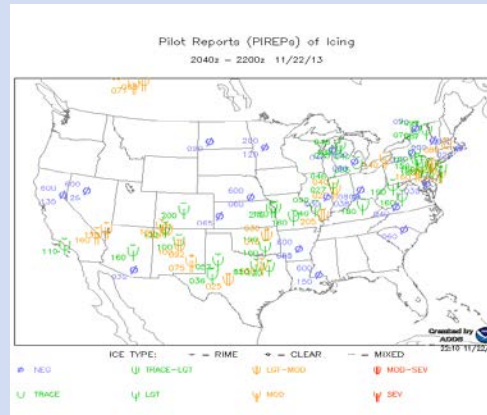


Verification and Shortfall Identification

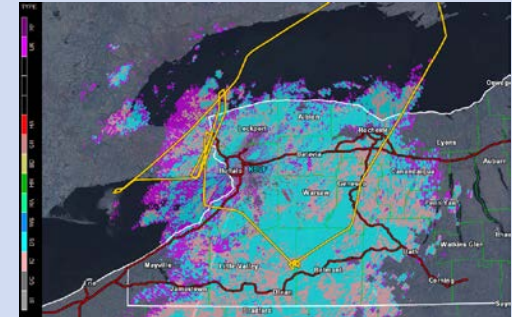
Surface and Upper Air Observations



Pilot Reports of Icing (PIREPs)



In Situ Measurements





Summary

- **MIT Lincoln Laboratory has a 15 year history of delivering operational NEXRAD algorithm products**
- **Multiple FAA weather systems ingest the NEXRAD products to support operations in the NAS**
- **The dual polarization capability has given new opportunity to develop advanced radar-based hazard detection**
- **Anticipate additional detection capabilities through the next five years supporting launch of NextGen Weather Processor**