Weather Radar Research Overview

Michael Jain (Acting Division Chief, RRDD)

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National Weather Center

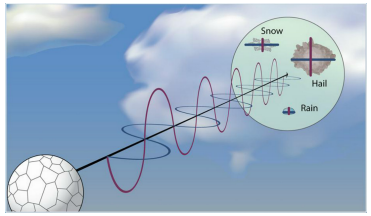
Norman, Oklahoma

Weather Radar Research & Development

WSR-57

Doppler

NEXRAD
WSR-88D

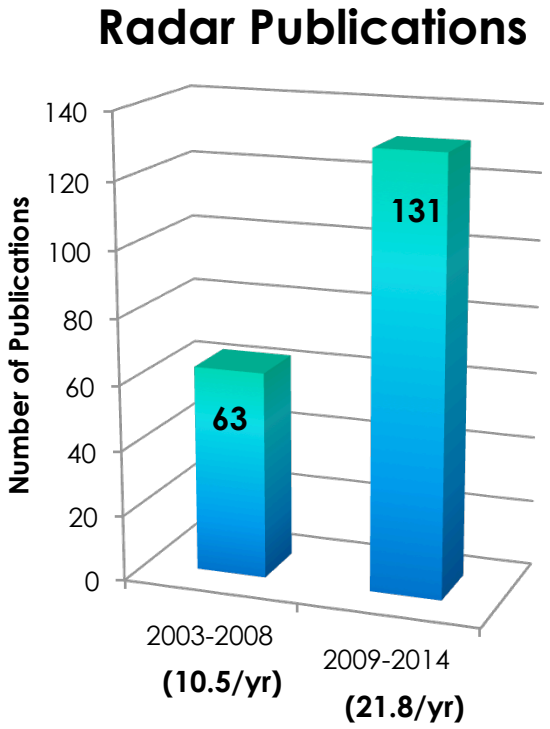


Dual
Polarization

Phased Array
Weather Radar

- NOAA's primary weather radar laboratory with strong scientific and engineering leadership in dual polarization and phased array weather radar
- Primary Research to Operations (R2O) Entity for the Operational NEXRAD Radar Network
- Co-Technical Lead for the Multifunction Phased Array Radar (MPAR) Program

Quality: Radar Publications

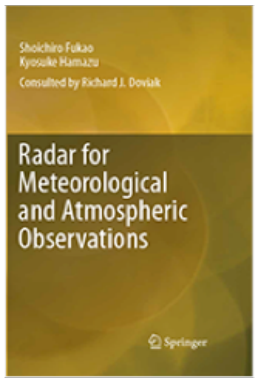


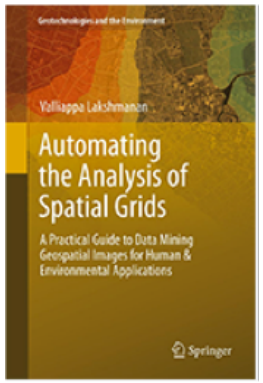
Publication Awards (2009-2014)

- **1 – International Recognition**: WMO Vaisala Award for an Outstanding Research Paper (2010)
- **2** – NOAA Research Outstanding Scientific Paper (2011, 2008)

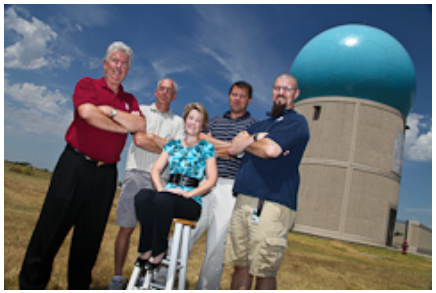
Publication Awards (2004-2008)

- **2** – NOAA Research Outstanding Scientific Paper (2007, 2004)





Quality: Radar Researchers



Staff Awards (2009-2014)

- NOAA Distinguished Career Award (2014)
- NOAA Research Employee of the Year (2010)
- NOAA Employee of the Month (2010)
- AMS Fellow (2014)
- AMS Remote Sensing Prize (2009)
- Council of NOAA Fellow (2012)

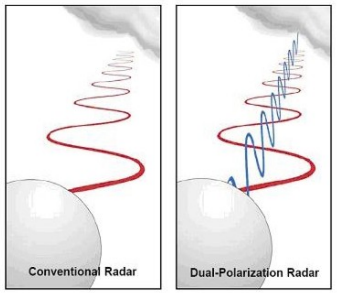
Staff Awards (2004-2008)

- White House Presidential Early Career Award for Scientists and Engineers (2008)
- Presidential Rank Award (2004)
- NOAA Administrator's Award (2007)
- NOAA Team Member of the Month (2008)
- AMS Editor's Award (2007)

Quality: Radar Technology

Technology Awards (2009-2014)

- **2 - DOC Gold Medals**
  - 2014 – Dual Polarization
  - 2011 – Phased Array Weather Radar
- **2 - NOAA Technology Transfer Awards** (2013, 2010)



Technology Awards (2004-2008)

- **1 - NOAA Bronze Medal** (2008)
- **2 - NOAA Technology Transfer Awards** (2004, 2008)
- **1 - NOAA High Performance Computing & Communication Tech Award** (2004)

Relevance to NOAA Administrator's Top Priorities

1. **Provide information and services to make communities more resilient**
   - Dual Polarization & Radar Data Quality enhancements to WSR-88D
   - mPING (Crowdsourcing App – **M**eteorological **P**henomena **I**dentification **N**ear the **G**round)
2. **Evolve the Weather Service**
   - Evolving Operational Radar Technologies
3. **Invest in observational infrastructure**
   - MPAR, WSR-88D, Mobile Radars
4. **Achieve organizational excellence**
   - Professional diversity (meteorologists, engineers, software developers, technicians) working closely together to effectively further NOAA Mission

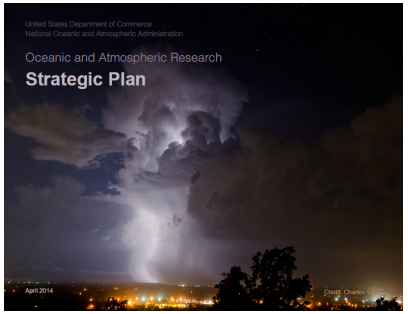
Relevance to OAR Mission

OAR's Mission …

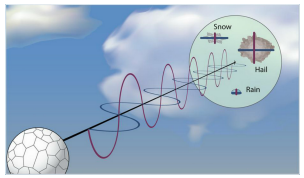
- ***Conduct research*** *to understand & predict the Earth system*
  - ✓ *Understanding microphysical processes through polarimetric radar observations & numerical models*

- ***Develop technology*** *to improve NOAA science, service and stewardship*
  - ✓ *Polarimetric-based applications for Hydrometeor Classification, Precipitation Estimation, Data Assimilation*
  - ✓ *Improved Operational Radar Data Quality*
  - ✓ *Phased Array Weather Radar Technology*
  - ✓ *mPING*

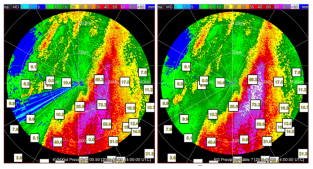
- ***Transition*** *the results so they are useful to society.*
  - ✓ *Scientific and Engineering Improvements to the NEXRAD Radar Network*
  - ✓ *MPAR – next generation of Weather Radar*



Performance



- Technology Transfer (a sampling)
  - Dual Polarization Upgrade to NEXRAD Network
  - Addressing Deficiencies Revealed though Operations
  - Improvements in Data Quality through Signal Processing Techniques
  - Improvements in Polarimetric Applications
  - Technical Support to Warning Decision Training Branch (WDTB) for Developing Training Materials



Performance

- Engaging Customers & Partners
  - Coordination with NWS on Planning and Feedback
    - Long-Standing R2O Agreements
      - NWS/Office of Science & Technology (OST)
      - NWS/Radar Operations Center (ROC)
      - Involve NWS Counterparts in Planning Future Research Elements
    - Phased Array Radar Innovative Sensing Experiment (PARISE)
      - Engage NWS Forecasters in Assessment of Rapid Scan Radar Data
  - NSSL Co-Technical Lead with FAA MPAR Program
    - Engaged with FAA Counterparts in Planning and Executing MPAR Program

Performance

MPAR Collaborations

Polarimetric, X & C Band Radar Collaborations

Radar Signal Processing Collaborations

Performance

- Major Ongoing Activities
  - Sustain & Improve Existing Technology
    - NEXRAD WSR-88D Service Live Extension Program (SLEP)
  - Working Toward the Future
    - Multi-Function Phased Array Radar (MPAR)

- Challenges
  - Balancing Resources & Efforts to Support Existing and Future Technologies
  - Sustaining Funding for Both Technologies

Weather Radar Research (e-posters)

Wednesday 2/25/15

- Advantages of Rapid-scan Phased Array Radar Data (Charles Kuster)
- Adaptive Scanning on the **N**ational **W**eather **R**adar **T**estbed (NWRT) PAR (David Priegnitz)
- Increasing the value of NEXRAD's dual-polarization upgrade by improving the quality of correlation coefficient (Igor Ivić)

Thursday 2/26/15

- PARISE (Katie Bowden)
- PAR to the rescue - Improving clutter mitigation with spatial filtering (Chris Curtis)
- Using Bragg Scattering for ZDR (Differential Reflectivity) Calibration (Valery Melnikov)