Current and Future Global Satellite Precipitation Products with Emphasis on High Latitudes

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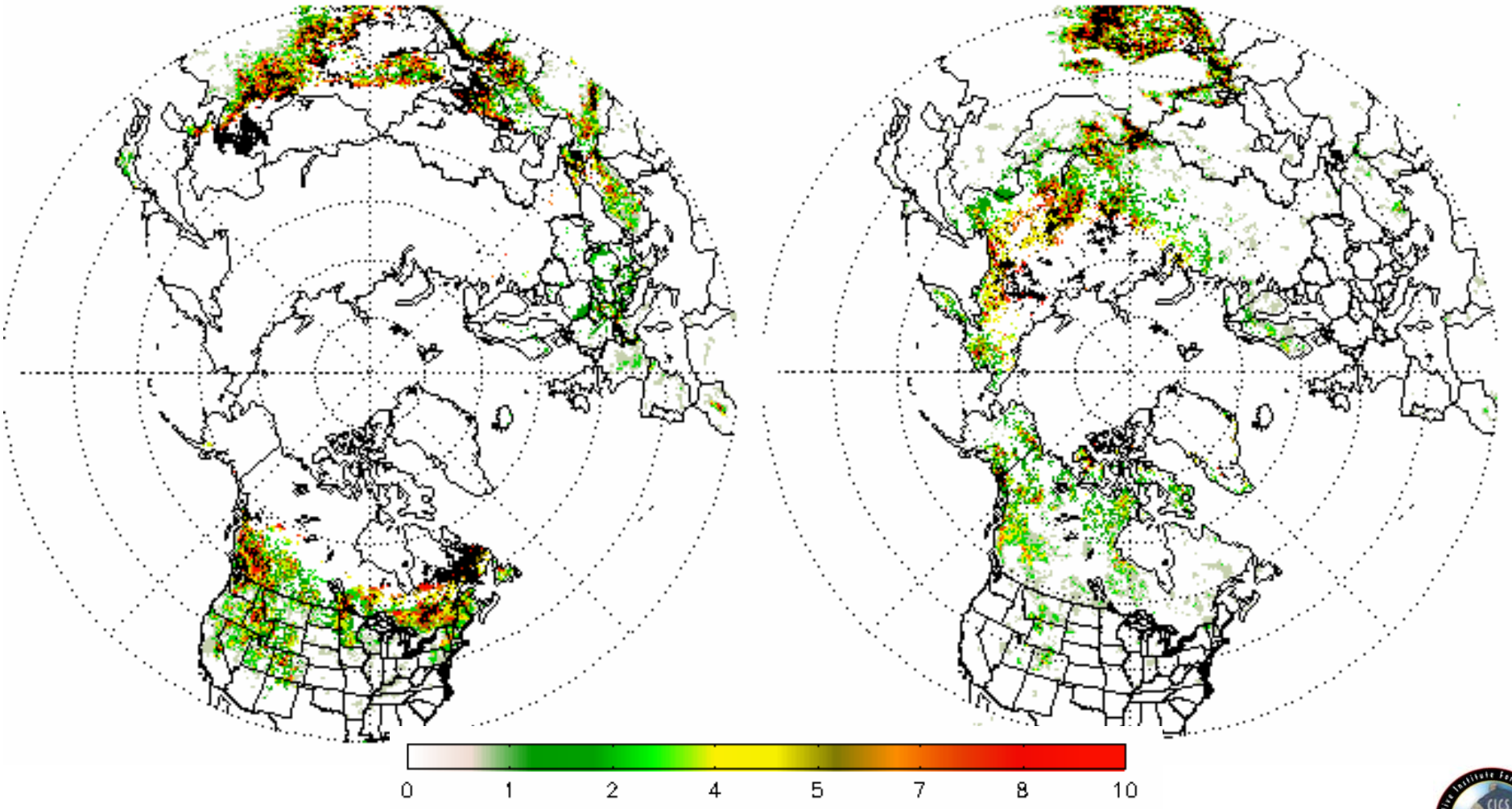
Current Status/Progress

- Excellent potential for cold season precipitation using high frequency, O_2 and H_2O bands
  - NOAA AMSU/MHS operational algorithm (7+ year time series)
    - 89 and 150 GHz bands – IWP and De
    - 50 GHz bands - separate rain from falling snow over land
    - 183 GHz bands - alleviate surface type issues when sufficient water vapor present
    - Snow identification over land
      - Snowfall rates over land under testing
  - Other researchers demonstrating similar potential
    - Skofronick-Jackson, Kim, et al.
    - Liu et al.
    - Bennartz
    - Grecu, Olson
    - Staelin, Chen, et al.
  - Preliminary investigations with SSMIS also promising
    - Development of physical retrieval scheme using full compliment of channels in winter precipitation regimes
      - Current Bayesian approaches severely lack land/winter precipitation regimes
      - Use of recent field campaign and space-borne radar data is vital
        - » C3VP
        - » NOAA's Hydrometeorological Test Bed (HMT)
        - » CloudSat

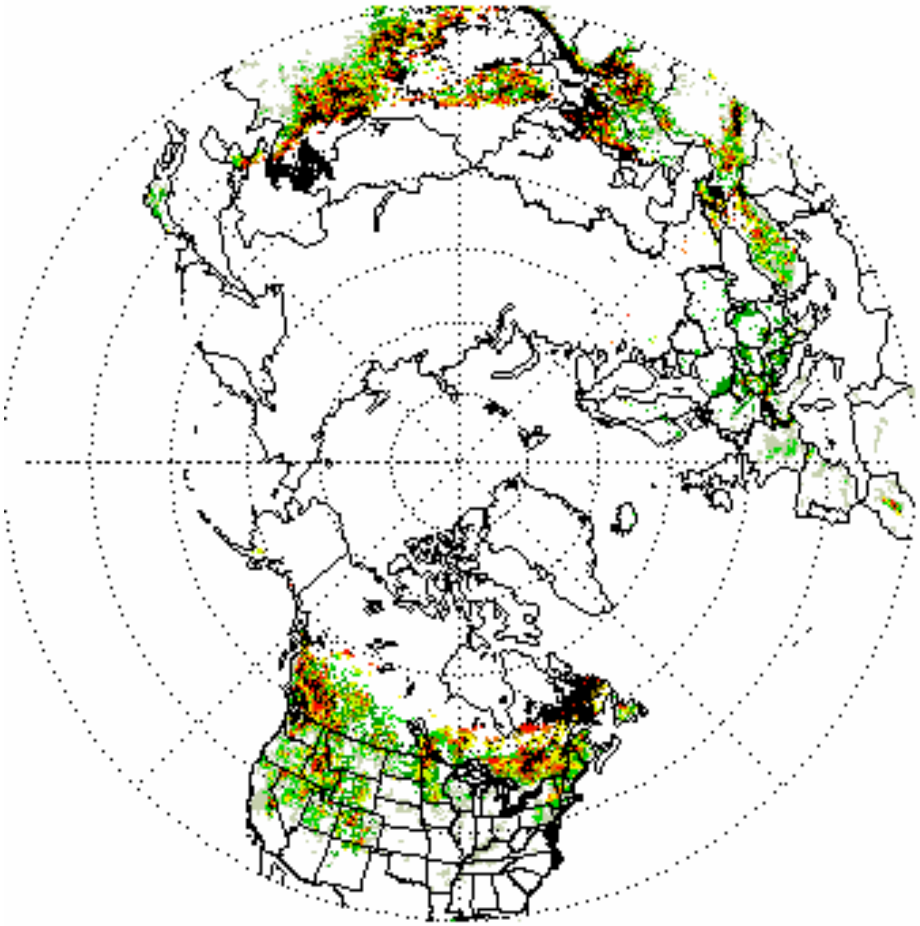
N-15 AMSU Snowfall Frequency

Jan 2006 **Oct 2006**

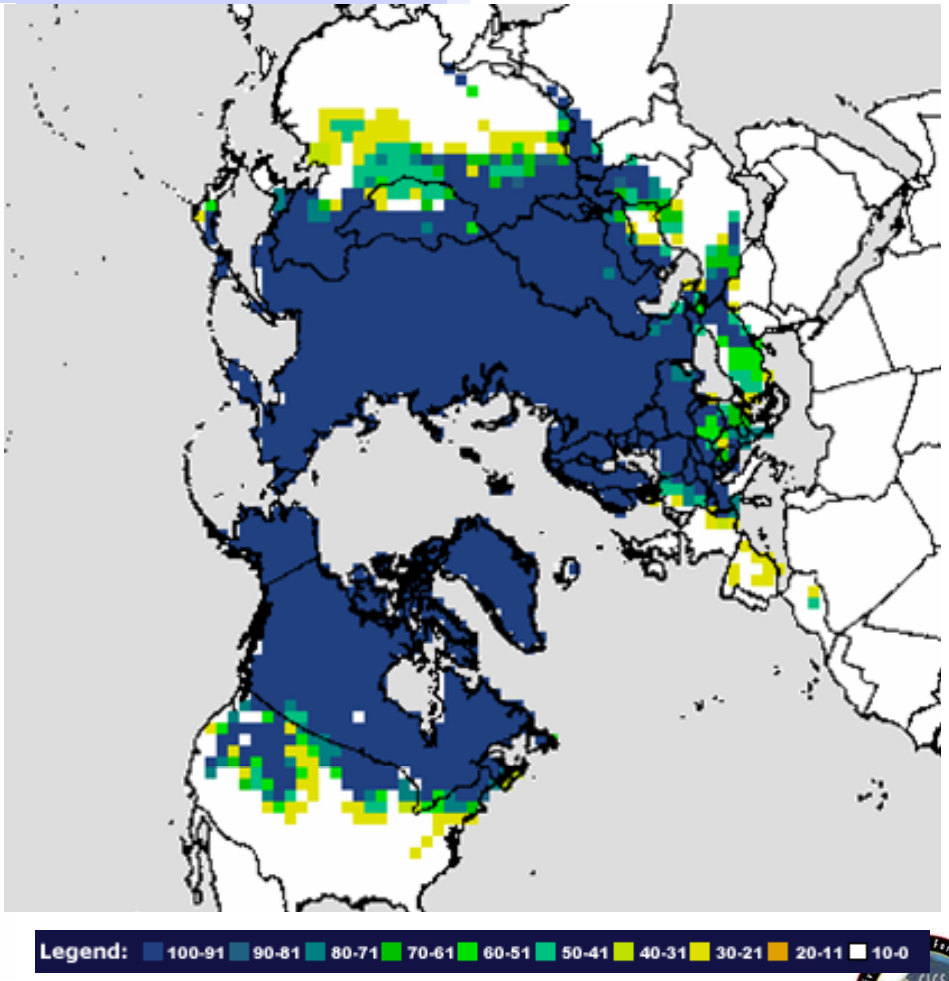


Comparison with Snow Cover

AMSU - Jan 2006

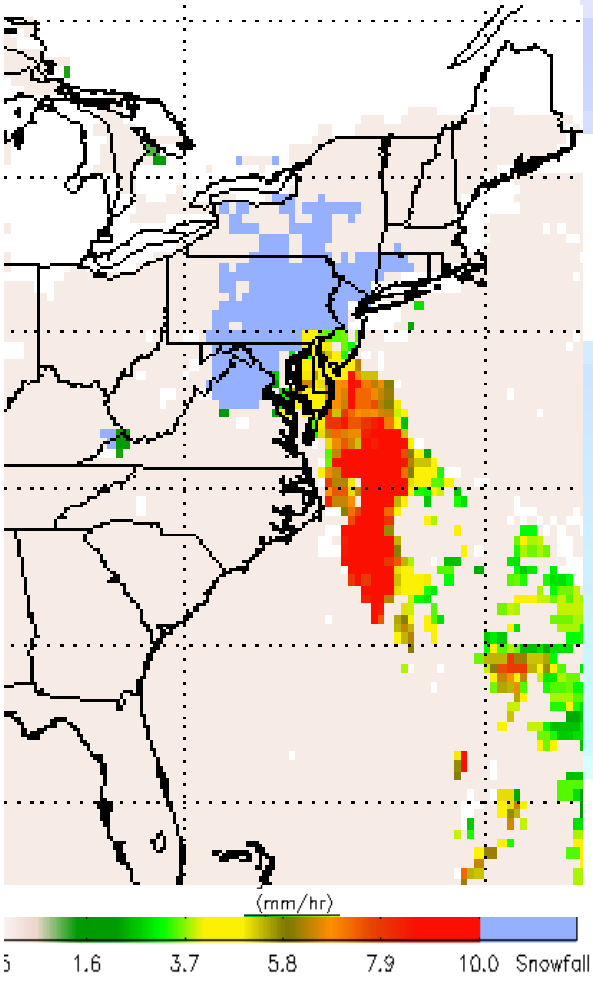


Rutgers Snow Lab – Jan 2006

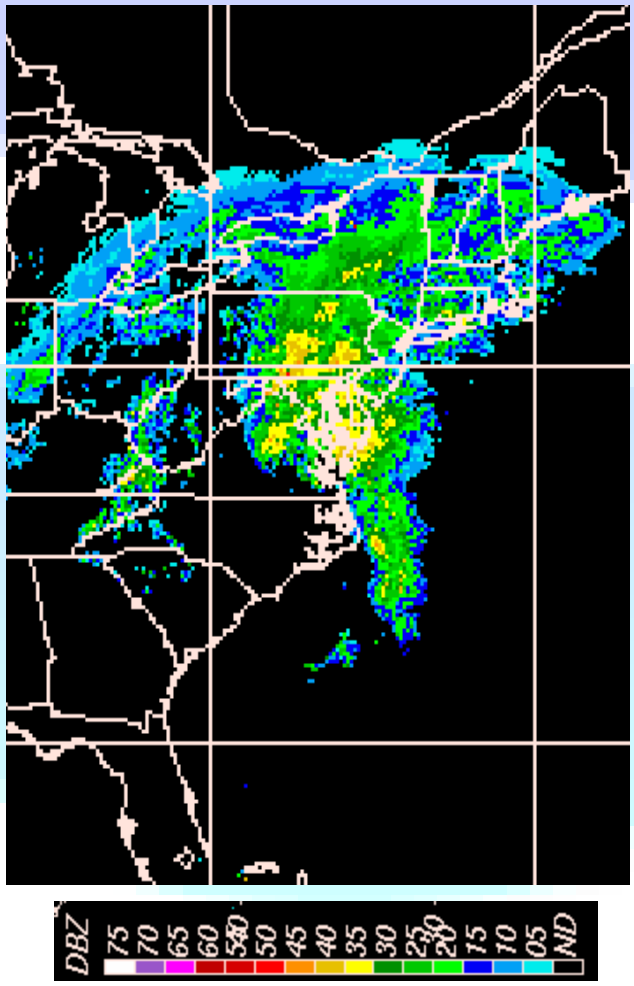


East Coast Snow/Ice Storm – 14 February 2007

NOAA-16
Precipitation Type/Rainfall Rate

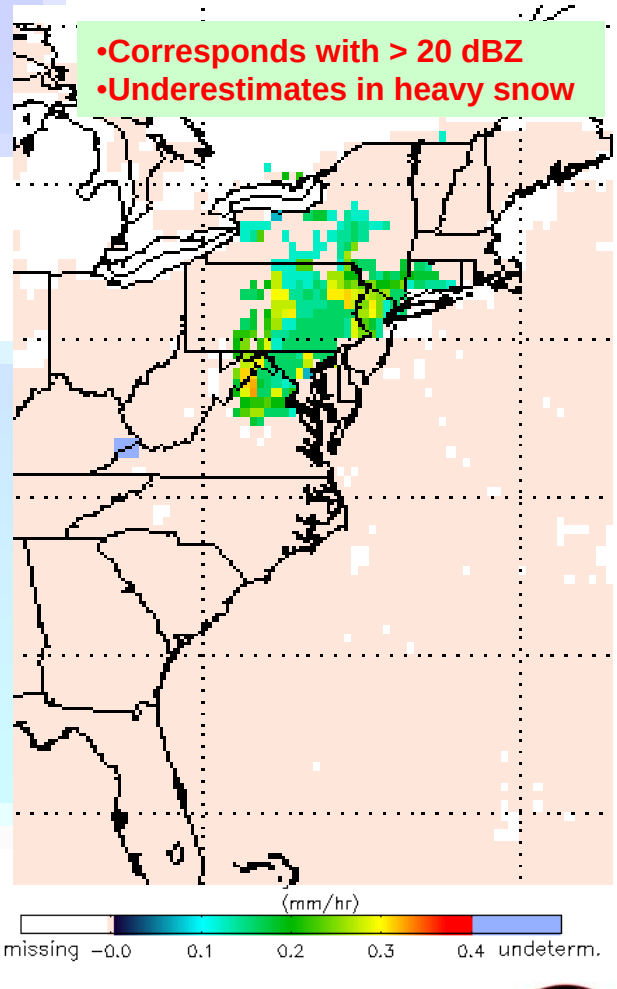


NEXRAD Reflectivity



NOAA-16 Snowfall Rate

- Corresponds with > 20 dBZ
- Underestimates in heavy snow



Current Limitations/Future Direction

- AMSU Snowfall
  - Current scheme is empirical and has limitations
    - "Global" approach
    - Difficult to quantify storm features – cloud thickness and height, moisture content, etc.
    - Snowfall rates also difficult to retrieve and validate

  NEXT STEPS: Use of sophisticated RTM and storm microphysics needed for a wide variety of winter systems to better understand positives and negatives of this approach
- What are contributions of various channels?
  - Use of all channels available has not been thoroughly or systematically evaluated
    - O2 and H2O bands as regime classifiers?

  NEXT STEPS: Use of field campaign (or CRM) and RTM to better understand channel optimization in various storms