Winter Precipitation Measurements in New England: Results from the Global Precipitation Measurement Ground Validation Campaign in Connecticut
GPM Mission

- International collective effort to use satellites to observe rain and snow across the globe
- GPM deployed in 2014 building off TRMM success
- Expanded observations to ±68°
- Core observatory equipped with Dual-Frequency (Ka and Ku) Precipitation Radar and GPM Microwave Imager
Why Ground Validation?

• Necessary for refinement and development of satellite algorithms
• Focus on specific troublesome areas and environments for satellite retrievals
• How?
  – Ground observations
  – Airborne observations
UConn Ground Validation

- First GPM validation campaign in Northeast United States
- Focused on variety of winter weather conditions
- Overlapped with IMPACTS in 2021-2022 and 2022-2023
  - Consistent ground observations (in situ and remote sensing instruments)
- Continued ongoing deployment in 2023-2024
Instrumentation

• 2021-2022
  – One site (GAIL)
• 2022-2023
  – Two sites (GAIL and D3R)
  – 70m of elevation changes
  – 3.2km apart
• 2023-2024 (Ongoing)
  – One site (GAIL)
Dataset Collected

- Over 90+ precipitation events to date
- Variety of storm types and impacts
  - Heavy rain & wind events
  - Freezing rain and sleet
  - Nor’easters/ heavy snow
  - Multi-phase transitions
Case Study - February 28, 2023

- Heavy snow event in Connecticut (6-8 inches)
- IMPACTS overlap and GPM Overpasses
Case Study - February 28, 2023

Graphs showing the Particle Size Distribution (PSD) and Particle Induction Parameter (PIP) for GAIL and D3R at different times of the day.
Summary

- Ground validation is necessary for improving satellite observations
- Wide array of precipitation, radar and microphysical observations were collected in Connecticut for the winters of 2021-2024
- Multi-purpose dataset helpful across a variety of atmospheric applications
Ongoing Research

- BAMS Overview Article: Filipiak and Coauthors, in review
- Focusing on precipitation type identification
- Satellite snowfall validation
- Applying microphysical observation to NWP
- More at AMS (Thursday 3-4:30PM):
  - D3R Snow Observations during IMPACTS (ePoster)
  - Radar Snowfall Estimation (Poster)
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