



# International Precipitation Working Group

## **Snowfall Focus Group**

### **Wrap up**

Co-chairs

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## Major challenges:

- Inadequate sensitivity of satellite observations to snowfall (resolution, frequencies etc.)
- Inadequate reference data for development and validation; need high quality, high resolution data with good geographic coverage including mountainous regions
- Supercooled liquid water detection including active and passive observations, and incorporation of the effect in RTM and retrieval algorithms
- Improved microphysics and RTM simulations to account for spatiotemporal variability of ice and snow
- Special snowfall modes: orographic, lake effect, shallow convective (e.g. over ocean) etc.
- Connection between in-cloud snowfall retrieval and surface snowfall

## Direction of the future snowfall remote sensing science

- Adaptation to next generation microwave observations (high frequencies only, higher frequencies, smallsats, resolution? etc.)
- Finding/collecting additional reference data
- Quantify uncertainties
- ML-dominant algorithms, explainable ML
- Collaboration with particle scattering community on improving RTM simulation of future sensors capabilities
- User engagement and applications, e.g., hydrology, nowcasting, climatology

# Recommendations to IPWG and CGMS

- The Particle Scattering FG has requested to combine with the Snowfall FG
- The Snowfall FG will develop certain validation criteria, e.g. climatology comparison using CloudSat snow data
- Promote future passive microwave sensors with wide channel spectrum including frequencies lower than 88 GHz (for background information and supercooled liquid water) and sub-mm wave channels (for higher sensitivity to snowfall)
- Support space-borne cloud and precipitation radars with dual frequencies, e.g. W and Ku/Ka, especially W band with swath
- Maintain continuity of microwave imager with dual-polarization at high frequency, e.g. 166 GHz
- Foster international collaboration in satellite constellation to establish and sustain observations with adequate spatial and temporal resolutions for global snowfall estimation
- Global coordination in collecting snowfall reference data (in-situ, ground-based and space-borne radar observations, including improving radar snowfall estimation)
- Support collaboration of the international satellite precipitation community for the advancement of precipitation science as a global effort, e.g. data sharing and data utilization

# Interested in joining the Snowfall FG ?

**Snowfall FG web site**

**<https://ipwg-snowfall-fg.umd.edu>**

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