

## **Workflow Development for Snowfall Retrieval Quality Assessment**

*Lisa Milani, Andrea Camplani, Daniele Casella, Leo Pio D'Adderio, Marco Petracca, Paolo Sano', Giulia Panegrossi*

Validation of satellite snowfall rate retrieval products is critical for ensuring the accuracy and reliability of precipitation measurements in cold regions and high-latitude environments where ground-based observations are sparse or entirely absent. Unlike rainfall, snowfall poses unique challenges for remote sensing due to the complex microphysical properties of ice particles, variable snowflake size distributions, and the weak scattering signatures that snow produces compared to liquid precipitation. Rigorous validation through comparison with ground-based and satellite-based instruments is essential to quantify retrieval uncertainties, identify systematic biases, and refine the algorithms used to convert satellite observations into meaningful snowfall estimates.

During the 2024 International Precipitation Working Group (IPWG) meeting held in Tokyo, Japan, the snowfall focus group reached a consensus on the need to establish a standardized validation framework that would enable equitable and consistent evaluation of existing global satellite-derived snowfall products.

The objective of this work is to establish a comprehensive quality assessment framework for evaluating satellite snowfall retrievals from the newly developed EUMETSAT H SAF (Satellite Application Facility on Support to Operational Hydrology and Water Management) global Level 2 and Level 3 precipitation rate products, which utilize data from both conical-scanning and cross-track-scanning passive microwave (PMW) radiometers. This investigation encompasses two complementary validation strategies: 1) a global-scale approach leveraging W-band spaceborne radar snowfall retrievals from the NASA CloudSat and the ESA/JAXA EarthCARE missions, with particular emphasis on polar and high-latitude regions; 2) a regional-scale approach employing ground-based radar networks to conduct detailed quality assessments and case study analyses. Both space-based and surface-based validation methodologies are being explored to ensure comprehensive product evaluation.