



Global snowfall: A combined CloudSat, GPM, and reanalysis perspective.

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Quantitative global snowfall estimates derived from multi-year data records will be presented to highlight recent advances in high latitude precipitation retrievals using spaceborne observations. More specifically, the analysis features the 2006-2016 CloudSat Cloud Profiling Radar (CPR) and the 2014-2016 Global Precipitation (GPM) Microwave Imager (GMI) and Dual-frequency Precipitation Radar (DPR) observational datasets and derived products. The ERA-Interim reanalysis dataset is also used to define the meteorological context and an independent combined modeling/observational evaluation dataset. An overview is first provided of CloudSat CPR-derived results that have stimulated significant recent research regarding global snowfall, including seasonal analyses of unique snowfall modes. GMI and DPR global annual snowfall retrievals are then evaluated against the CloudSat estimates to highlight regions where the datasets provide both consistent and diverging snowfall estimates. A hemispheric seasonal analysis for both datasets will also be provided. These comparisons aim at providing a unified global snowfall characterization that leverages the respective instrument's strengths. Attention will also be devoted to regions around the globe that experience unique snowfall modes. For instance, CloudSat has demonstrated an ability to effectively discern snowfall produced by shallow cumuliform cloud structures (e.g., lake/ocean-induced convective snow produced by air/water interactions associated with seasonal cold air outbreaks). The CloudSat snowfall database also reveals prevalent seasonal shallow cumuliform snowfall trends over climate-sensitive regions like the Greenland Ice Sheet. Other regions with unique snowfall modes, such as the US East Coast winter storm track zone that experiences intense snowfall rates directly associated with strong low pressure systems, will also be highlighted to demonstrate GPM's observational effectiveness. Linkages between CloudSat and GPM global snowfall analyses and independent ERA-Interim datasets will also be presented as a final evaluation exercise.