



Using CloudSat-CPR retrievals to estimate snow accumulation in the Canadian Arctic

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The vast size of the Arctic and its remote nature, make it a region that is both difficult and expensive to measure snow over extended time periods. Satellite observations provided by the Cloud Profiling Radar (CPR) instrument installed on the NASA satellite CloudSat, have been shown to be capable of retrieving snowfall rates from clouds in high latitude regions to estimate surface snow accumulation. A validation of CloudSat terrestrial snow estimates gridded at 1 degree resolution is presented at four Arctic Environment and Climate Change Canada (ECCC) weather stations (Eureka, Resolute Bay, Cambridge Bay and Iqaluit) for the period 2007-2015. Comparisons of monthly snow accumulation climatology at each station display similar seasonal cycles and annual mean snow accumulation. Time series of interannual variability exhibit high correlations and low RMSE at the two highest latitude stations (Eureka and Resolute Bay) with decreasing agreement south of 70 degrees N where monthly correlations fall below 0.5. CloudSat was also found to underestimate annual mean snowfall accumulation at the majority of these sites, suggesting a potential negative bias in CloudSat's snowfall estimates, or underestimation resulting from a decreasing sample size at southern stations. The strong correlations and low RMSE from CPR estimates at stations above 70 degrees N, imply that CloudSat can be used as another perspective towards better understanding snowfall across similar high latitude regions throughout the Canadian Arctic.