

**Abstract: Improving ATMS Snowfall Rate Retrieval
by Incorporating the Effect of Supercooled
Cloud Liquid Water**

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A snowfall rate (SFR) algorithm was developed for Advanced Technology Microwave Sounder (ATMS) aboard Suomi-NPP, based on the NOAA/NESDIS operational SFR product using AMSU and MHS sensors. This algorithm relies on the scattering signal from ice particles to detect the presence of snowfall and retrieve snowfall rate. High frequency passive microwave measurements, which are used in the SFR algorithms, respond to the scattering effect with decreased values compared to when no precipitation-sized ice particles are present in clouds. However, snowfall often occurs when microwave observations are greater than when there is no precipitation. This is caused by the emission effect of cloud liquid water which often exist in snowing clouds. Emission has the effect of elevating brightness temperatures (T_b) at the microwave frequencies. Precipitating snow and cloud liquid water exert competing effect on microwave measurements and result in complex response at different frequencies depending on the strength of each signal. Since the original algorithm does not include the emission effect from liquid water, it can underestimate snowfall rate when abundant liquid water is present. A new ATMS SFR algorithm has been developed which incorporates both ice and liquid water in its formulation. This presentation will describe the new SFR algorithm and demonstrate its improvement over the existing algorithm.