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LIGHT SNOWFALL MEASUREMENTS FROM SATELLITE-BORNE MICROWAVE RADIOMETRS: AN ANALYSIS BASED ON COMBINED OBSERVATIONS AND MODEL SIMULATIONS

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Light precipitation is significant at mid- to high- latitudes where frontal and stratiform systems are dominant; moreover, at high latitudes (ąÝ 60ąã N) a large fraction (ąÝ 50%) of precipitation occurs in a solid form. Therefore, knowledge of snowfall amount and distribution is important for the global water cycle and for several scientific and environmental applications. Yet, there still is an overall lack of snowfall measurements since conventional ground-based measurements suffer from large biases due to wind effects and are basically missing in remote regions. Microwave observations from polar-orbiting satellites may be the only viable means of providing the required global snowfall measurements. However, the potential of these observations has not been yet completely understood and exploited. In this paper, we will analyze the performance of present satellite-borne microwave radiometers for measuring light snowfall, by means of observations from the Advanced Microwave Scanning Radiometer (AMSR) and from the Advanced Microwave Scanning Unit (AMSU) in conjunction with ground-based radar measurements and a model simulation generated by the University of Wisconsin ÍC Non-hydrostatic Modeling System (UW-NMS), for a January 2003 frontal system over north-western Europe that produced light snowfall over the Baltic Sea area. In addition, we will discuss the improvements in snowfall retrieval that would be obtained by the innovative microwave radiometer of the proposed EGPM (European contribution to Global Precipitation Measurement) mission.