REMOTE SENSING OF SNOW WITH SEAWINDS SCATTEROMETER

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This paper presents results of snow remote sensing obtained from the SeaWinds Scatterometer on the QuikSCAT satellite. The scatterometer has large swaths covering cold-land regions two time per day at constant incidence angles. These characteristics make the scatterometer applicable to large-scale snow monitoring with a high temporal resolution. We present snow results based on a two-year time-series SeaWinds/ QuikSCAT data on the hemispheric scale. Based on results from the Alaska snow field experiment (March-April 1999) investigating in detail the relationship between Ku-band backscatter and snow properties, we develop initial snow algorithms for application to SeaWinds/QuikSCAT data. We apply the algorithms to derive daily global maps of dry snow extent, wet snow zones, and snow melt/retreat over the global scale on the daily basis. SeaWinds/QuikSCAT snow results compared well with in-situ measurements from the global network of weather stations. Time-series comparison of SeaWinds/QuikSCAT signature with seasonal snow field observations at Ivotuk, Alaska indicates the scatterometer can determine the local snow melt onset time, duration of diurnal melt-refreeze cycles, and snow departure time. We show the evolution of seasonal snow cover over the northern hemisphere in 1999-2001 with time-series SeaWinds/QuikSCAT imagery. Results reveal the anomalous warming event coincident with the 1999 winter solstice in Alaska, and the rapid sweep of snow melting across the Canadian Arctic archipelago in late spring of 2000. Initial geophysical model for snow depth is developed based on the 1999-2000 snow season at Umiat in Alaska, and the model is applied to retrieve snow depth at that region for the 2000-2001 snow season.

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