Satellite Scatterometer Applications to Cold Regions

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ABSTRACT

This paper presents satellite scatterometer applications to cold regions. The SeaWinds scatterometer on the QuikSCAT satellite has been acquiring global backscatter data at Ku band (13.4 GHz) for both horizontal and vertical polarizations since July 1999. Unique features of the satellite scatterometer allow new applications over ocean, land, and ice. The scatterometer has: (1) very wide swaths up to 1800 km covering 92% of the globe in one day and the full coverage for two times per day at latitudes above 40 degrees, (2) capability to obtain relatively high resolution backscatter data in the order of 7 km x 25 km, (3) very high relative radiometric accuracy of 0.2 dB, and (4) constant incidence angle of 46 degrees for the horizontal polarization and 54 degrees for the vertical polarization enabling simple and accurate determination of physical parameters. With such advantageous features compared to past satellite scatterometers, new results are obtained, compared, and verified with numerous in-situ measurements and observations from field experiments. The results includes: (1) global snow detection and monitoring, (2) melt region mapping on the Greenland ice sheet, (3) accurate timing of sea ice albedo transitions, (4) sea ice cover monitoring over the Arctic, (5) lake ice cover monitoring over the Great Lakes and other large lakes, (6) daily mapping of wind fields over the Great Lakes, and (7) ringed seal surveys along the north coast of Alaska.