

Overview of Geophysical and Biological Applications of SeaWinds Scatterometer on QuikSCAT Satellite

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ABSTRACT

This paper presents an overview of geophysical and biological applications of the SeaWinds scatterometer on the QuikSCAT satellite. The scatterometer 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°, (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° for the horizontal polarization and 54° 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) monsoon flood detection and monitoring, (5) detection of drought regions, (6) soil wetness application at large scale, (7) remote sensing of ecosystem dynamics in relation with seasonal ocean wind patterns, (8) daily mapping of wind fields over the Great Lakes, (9) lake ice cover monitoring in large lakes, and (10) ringed seal surveys along the north coast of Alaska.

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