Analysis of the microwave radiative transfer process in a snow layer on sea ice using the "Two-Flow" theory.

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Abstract

This paper discusses the method to estimate the effect of glaciological parameters such as the snow thickness on the microwave radiative transfer processes in a snow layer on sea ice. The method is based on the measurement of surface brightness temperature, which is the only physical parameter that can be accurately measured by remote sensing. Measurements taken at 6.7 and 18.6 GHz have shown that the microwave radiation from a snow layer on sea ice is almost Lambertian (i. e., isotropic radiation), due to the multiple scattering effect. We therefore assumed that isotropic radiation occurs through the snow layer, and applied the "Two-Flow" theory proposed by P. Kubelka and C. Munk to estimate the effect of snow layer on the microwave radiative processes. The theory enabled us to estimate the values of back-scattering, absorption, and attenuation coefficients at 6.7 and 18.6 GHz. We could also estimate every glaciological effect on the microwave radiative process at these two frequencies using these values through the snow layer.