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Simulation of radar backscattering from snowpack at X-band and Ku-band

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This paper presents a multilayer snowpack electromagnetic backscattering model, based on Dense Media Radiative Transfer (DMRT). This model is capable of simulating the interaction of electromagnetic wave (EMW) at X-band and Ku-band frequencies with multilayer snowpack. The air-snow interface and snow-ground backscattering components are calculated using the Integral Equation Model (IEM) by [1], whereas the volume backscattering component is calculated based on the solution of Vector Radiative Transfer (VRT) equation at order 1. Case study has been carried out using measurement data from NoSREx project [2], which include SnowScat data in X-band and Ku-band, TerraSAR-X acquisitions and snowpack stratigraphic in-situ measurements. The results of model simulations show good agreement with the radar observations, and therefore allow the DMRT model to be used in various applications, such as data assimilation [3].

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