



Retrieval of sea ice variables from microwave measurements with a combined Fresnel relationship

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The recently published analytical relationship between Fresnel polarized reflectivities enables to provide a power means to retrieve surface variables over the smooth surface. This research intends to retrieve physical temperature, emissivity, and refractive index of the polar sea ice from satellite microwave window channel measurements based on the assumption that sea ice surface is smooth in low frequency channels. The algorithm have been developed theoretically for the polar sea ice using analytical relationship and it has been applied to polar orbiting satellite-based passive microwave measurements. The obtained sea ice concentration shows that the algorithm is capable of reproducing climatologically known features over the polar regions, demonstrating that the method appears to be at least comparable to other well-known sea ice concentration algorithm. Furthermore, surface refractive index and associated surface emissivity, which are not easily available from satellite-borne data, can be retrieved from this approach, and results are consistent with generally accepted values. We see plenty of potential application of derived data for studying climate problems associated with sea ice changes.