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Incidence Angle Dependence and Evolution of Drifting Multi-year Sea Ice During the Onset of Freeze-up in the Marginal Ice Zone of the Western Beaufort Sea

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Abstract Text:

Backscattering coefficients of Sentinel-1 C-Band synthetic aperture radar (SAR) of drifting multi-year sea ice in the marginal region of the western Beaufort Sea are analyzed during the onset of freeze-up in 2019. The sea ice floe is tracked down using a GPS tracker, installed on the surface during a field campaign in August 2019. A total of 24 Sentinel-1 EW images spanning 17 days are used and the incidence angle dependence in HH- and HV-polarization is analyzed in a 1 km by 1 km region centered at the tracker location. The dependences are -0.24 dB/deg and -10 dB/deg for HH- and HV-polarization, respectively. Hummocks and recently frozen melt ponds seem to caused the mixture behavior of surface and volume scattering. After removing the incidence angle dependencies, the backscattering coefficients in HH-polarization shows gradual increase in time at a rate of 0.15 dB/day, whereas the HV-polarization is relatively flat. The air temperature from the ERA5 hourly reanalysis data solely has a strong negative relation with HH-polarization. The result of this study is expected to complement other previous studies which focused on winter or summer seasons in other regions of the Arctic Ocean.

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