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Sentinel-1 data for frozen soil applications

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Frozen soil C-band backscatter has been shown of high value for landcover characterization and soil organic carbon estimation in tundra environments. Due to the incidence angle dependence of Synthetic Aperture Radar (SAR) backscatter values, a normalization to a common incidence angle is required for these applications. Angular signatures of radar backscatter depend on surface roughness and vegetation cover and are thus variable in heterogeneous environments. For the derivation of location specific normalization functions multiple acquisitions from overlapping orbits are required. Within the ESA DUE GlobPermafrost project, which aims at analyzing large regions across the Arctic, we developed a simpler method for C-band Sentinel-1 data which can be applied for single scenes. As stable dielectric properties are necessary in this case, this method of deriving the normalization function is applicable for frozen conditions. Examples which demonstrate the utility of Sentinel-1 derived frozen surface data will be presented.