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Capabilities of scatterometer for detection of diurnal thaw and refreeze of snow cover

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Microwave sensors with short wavelengths such as SeaWinds Quikscat (Ku-band) are sensitive to changes at snow surfaces due to thaw. Especially scatterometer can provide several measurements per day at high latitudes. Diurnal differences are investigated in a range of studies since they indicate exactly when snowmelt is taking place. Large changes in backscatter between morning and evening acquisitions are characteristic for the snowmelt period, when freezing takes place over night and thawing of the surface during the day. A change from volume to surface scattering occurs in case of melting. The actual number of dates of snow thaw is of most interest for glacier mass balance studies but the final disappearance of snow together with the length of spring thaw is required in regions with seasonal snow cover. When significant changes due to freeze/thaw cycling cease, closed snow cover also disappears. The exact day of year of beginning and end of freeze/thaw cycling can be clearly determined using QuikScat with consideration of long-term noise in order to exclude unnatural effects and changes in soil moisture and snow pack characteristics.
SeaWinds Quikscat measurements are available since 1999. The first entire snowmelt period on the northern hemisphere is covered in 2000. A further scatteromter which provides the necessary observation intervals at high latitudes is the Metop ASCAT. It acquires data with %80 daily global coverage but at a longer wavelength (C-band) and different incidence angles since 2007. Comparison examples showing the capabilities of the two different sensors for the purpose of snowmelt detection are presented for high latitude regions and mountainous terrain at mid latitudes (Alps).