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Detection of ice crust formation on snow with satellite data

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Short term thawing of the snow surface and subsequent refreeze can lead to the formation of ice crusts. These events are related to specific meteorological conditions such us rain-on-snow events and/or temporary increase of air temperature above zero degree Celsius. The structure change in the snow pack has adverse effect especially on wild life and also the local community related to reindeer herding.

Active microwave satellite data can be used to monitor changes of snow related to thawing. So far they have been mostly employed for spring thaw detection. Coarse spatial resolution sensors such as scatterometer feature short revisit intervals. Seawinds QuikScat (Ku-band, 25km, 1999-2009) acquired data several times per day at high latitudes. This allows precise detection of the timing of thaw events. Also the change of structure in the snow itself impacts the backscatter. Values increase significantly. A method has been developed to monitor these events at high latitudes (>60°N) on circumpolar scale. Validation is carried out based on air temperature records and snow course data over Northern Eurasia. Events during midwinter of the last nine years (November - February 2000/1 - 2008/9) have been frequent in northern Europe, European Russia and Alaska. They have occurred up to once a year in central Siberia, the Russian Far East and most of northern Canada. Monitoring is important as such events are discussed in relation to climate change especially over Northern Eurasia.