



Estimation of surface melt intensity using MODIS optical and thermal measurements over Western Greenland

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Accelerated ice flow near the equilibrium zone of west-central Greenland Ice Sheet has been attributed to an increase in infiltrated surface melt water as a response to climate warming. The assessment of surface melting events must be more than the detection of melt onset, which can be ephemeral. Retrieval of surface melt magnitude is necessary to improve understanding of ice sheet flow and surface melt coupling. Cloud-free dates of June 10, July 5, 7, 9, and 11, 2001 MODIS daily reflectance Band 5 (1.230-1.250 μ m) and surface temperature images rescaled to 1km over western Greenland were used in a retrieval algorithm. An optical-thermal feature space partitioned as a function of melt intensity was derived using a one-dimensional thermal snowmelt model (SNTHERM). SNTHERM was forced by hourly meteorological data from the Greenland Climate Network (GC-Net) at reference sites spanning dry, percolation, and wet snow facies in the Jakobshavn drainage basin.