Geophysical Research Abstracts
Vol. 18, EGU2016-6225, 2016
EGU General Assembly 2016

Non-radiative energy fluxes dominated exceptional melt episodes in the ablation area for the Greenland ice sheet in 2012

Robert Fausto (1), Dirk van As (1), Jason Box (1), William Colgan (2), Peter Langen (3), and Ruth Mottram (3)

(1) Geological Survey of Denmark and Greenland (GEUS), Marine geology and glaciology, Copenhagen, Denmark (rsf@geus.dk), (2) York University, 4700 Keele Street, Toronto, M3J 1P3, Canada, (3) Danish Meteorological Institute (DMI), Lyngbyvej 100, 2100 Copenhagen, Denmark

Two exceptional melt events occurred on the Greenland ice sheet in July 2012. Observations from automatic weather stations (AWSs) in Greenland reveal exceptional daily melt rates (up to 0.28 m ice eq. d-1) on the surface of the ice sheet. The largest melt event resulted in ∼8% of the largest recorded annual ablation total (∼8.5 m ice eq.). These melt events comprise roughly 6% of the melt season. We run a surface energy balance model with AWS observations as input to quantify the contributing energy fluxes. During the melt events, hourly turbulent heat exchange reached values of up to 560 Wm-2, contributing over 80% of the energy available for surface melt, at a time and place where melt is usually governed by shortwave radiative fluxes. This study illustrates how synoptic scale weather events can significantly increase annual surface ablation, and that accurate calculation of the non-radiative fluxes would become increasingly important to predict surface mass loss in a warming climate.