Cloud-Atmospheric Boundary Layer-Surface Interactions on the Greenland Ice Sheet

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The fate of the Greenland Ice Sheet (GIS) in a warming world will impact climate globally. For example, if the entire GIS melts, sea level is predicted to rise by up to 7 meters, thereby increasing flooding of coastal land, causing saltwater intrusion into groundwater, and potentially impacting ocean circulations through increased freshwater fluxes.

Over the past two decades there has been a trend towards increasing GIS melt and mass loss, leading to a number of record melt years and providing increasing contributions to sea-level rise. This presentation is focused on the recent extreme melt event of July 2012, where over 90% of the GIS surface experienced melt, even at Summit Station (hereafter Summit, 3216 meters above sea level), which previously experienced melt 126 years before in 1889.

Surface energy balance models have been used to demonstrate that melt at the top of the GIS would not have occurred in July 2012 without the warming effect of low-level thin mixed-phase clouds. We present results of the impact of clouds at Summit from measurements taken during The Integrated Characterization of Energy, Clouds, Atmospheric State and Precipitation at Summit (ICECAPS) campaign. We then explore the July 2012 extreme melt event in detail with limited-area model simulations that allow us to go beyond cloud radiative effect estimates and to investigate the coupled feedbacks related to these low-level clouds that influence surface energy fluxes, and therefore the energy available for melt, at Summit and across the GIS.

This seminar will be webcast live at:
http://ucarconnect.ucar.edu/live

Recorded seminar link can be viewed here:
https://www.mmm.ucar.edu/events/seminars

Thursday, 19 January 2017, 3:30 PM
Refreshments 3:15 PM
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