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The role of albedo and accumulation in the 2010 melting record in Greenland.

Marco Tedesco (1,2), Xavier Fettweis (3), Michiel van den Broeke (4), Roderik van de Wal (4), Paul Smeets (4), Willem Jan van de Berg (4), Mark Serreze (5), Jason Box (6,7)

(1) CUNY, CCNY, EAS, NY, United States (mtedesco@sci.ccny.cuny.edu), (2) The Graduate Center, CUNY, New York, NY, USA, (3) University of Liege, Liege, Belgium, (4) Utrecht University, Institute for Marine and Atmospheric research Utrecht (IMAU) Utrecht University, Utrecht, The Netherlands, (5) National Snow and Ice Data Center, Boulder, CO, USA, (6) Department of Geography, The Ohio State University, Columbus Ohio, USA, (7) Byrd Polar Research Center, Columbus Ohio State University, USA

In 2010, Greenland set new records for air temperatures, ice loss by melting, and marine-terminating glacier area loss.

In this study we report analyses of remote sensing data, surface observations and output from a regional atmosphere model and analyze records in 2010 for surface melt and albedo, runoff, the number of days when bare ice is exposed. Early melt onset in spring, triggered by above-normal near-surface air temperatures, contributed to accelerated snowpack metamorphism and premature bare ice exposure, rapidly reducing the surface albedo. Warm conditions persisted through summer, with the positive albedo feedback mechanism being a major contributor to large negative surface mass balance anomalies. Summer snowfall was below average. This helped to maintain low albedo through the 2010 melting season, which also lasted longer than usual.