Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05465, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05465
EGU General Assembly 2008

The causes of Greenland's Record Surface Melt in 2007

M. Tedesco1, M. Serreze2 and X. Fettweis3

1University of Maryland, Baltimore County, Baltimore, MD, 21250, USA and NASA Goddard Space Flight Center, Greenbelt, MD, 20771, USA, 2Cooperative Institute for Research in Environmental Sciences University of Colorado, Boulder, CO 80309, USA, 3 Université de Liège, Liège, Belgium

Observing snow melt extent and duration over the Greenland ice sheet is fundamental for understanding how Greenland is contributing to current sea level rise and affecting Earth's energy budget. Some of the liquid water from snowmelt flows into the ocean, directly contributing to sea level rise while other might percolate at the bottom of the ice sheet. Also, after melting, snow changes its properties of absorbing and reflecting the energy irradiated by the sun, with melted/refrozen snow absorbing up to four times more energy than fresh/unthawed snow, strongly affecting Earth's energy budget.

Analysis of passive microwave brightness temperatures from the space-borne Special Sensor Microwave Imager (SSM/I) documents a record surface snowmelt over high elevations of the Greenland ice sheet during summer of 2007. To interpret this record, results from the SSM/I are examined in conjunction with atmospheric fields from the National Centers for Environmental Prediction/National Center for Atmospheric Research reanalysis, satellite-derived cloud fraction from the Moderate Resolution Imaging Spectro-radiometer and output from the Modèle Atmosphérique regional (MAR) regional climate model.

The pronounced surface melt is consistent with southerly airflow promoting persistent positive temperature anomalies through the summer season (June-August). Cloud radiative forcing appears to have played a lesser role though available data are insufficient to draw firm conclusions. No significant trend is observed with respect to the shortwave incoming radiation. Positive (negative) anomalies of longwave incoming radiation (albedo) suggest that also these two components might have contributed for

setting the melting record.