

Record melt on the Greenland ice sheet in 2010: Russell Glacier

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Russell Glacier in southwest Greenland is Greenland's most studied land-terminating glacier. To investigate the interaction between the atmosphere and the glacier's surface, in the past 15 years three Dutch weather stations have been operating on the glacier at different elevations in the ablation zone. In addition, the Geological Survey of Denmark and Greenland (GEUS), established three more weather station on the 140 km long transect in 2008, one of which in the accumulation zone. This unprecedented station density allows for a detailed study of melt on Russell Glacier. Whereas 2009 was in terms of atmospheric temperatures close to the climatic average at the town of Kangerlussuaq, 2010 was record-setting warm with an average temperature 5°C above normal, well exceeding both the second (2005) and third (2003) warmest years by 2.5°C. The impact on the ice sheet in 2010 was considerable, with meltwater run-off from Russell Glacier twice as much as in the preceding year. Surface energy budget calculations show that the difference is due to both differences in temperature and surface albedo. Good agreement is found between the calculated surface meltwater run-off for the entire Russell catchment area and the volume of water estimated from discharge measurements at the melt river.