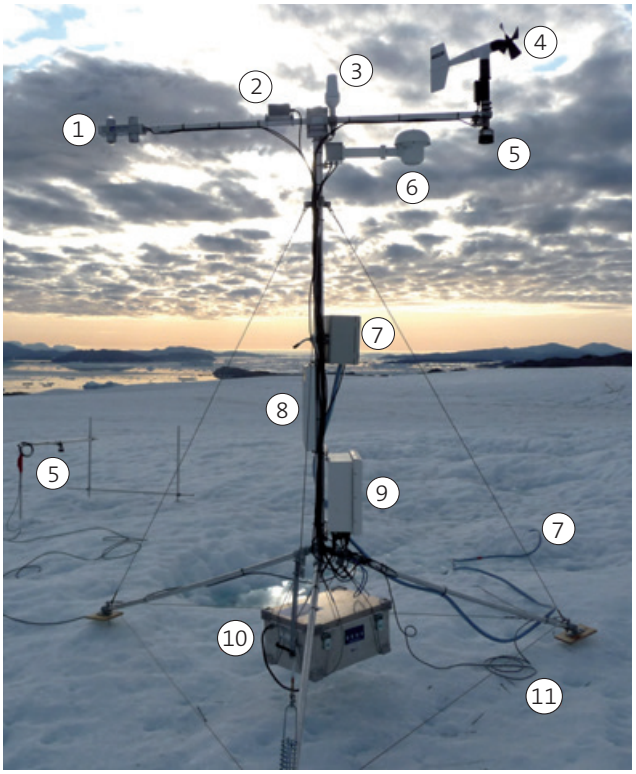
PROMICE NEWSLETTER
Programme for Monitoring of the Greenland Ice Sheet No 1 • 2011

AN EXTREME YEAR FOR THE GREENLAND ICE SHEET

IT IS NOT JUST HOT AIR: 2010 was the worst year so far for the Greenland ice sheet. The year saw a larger and longer summer melt and a record in calving of gigantic icebergs. The extremely warm climate in 2010 broke the earlier records and this confirms that the shrinking sea ice north of Greenland is starting to have an impact on both the melting of the ice sheet and the climate in Europe.



An automatic weather station on the ice near Upernavik. The numbers indicate the various instruments:

1. *short-wave and long-wave radiation (radiometer).*
2. *station tilt (inclinometer).*
3. *satellite communication.*
4. *wind speed and direction (anemometer).*
5. *snow height (sonic height rangers).*
6. *air temperature and relative humidity.*
7. *melting pressure sensor (ablation).*
8. *solar panel.*
9. *control unit (incl. air pressure and ice movement).*
10. *Batteries. 11: Ice temperature in the upper layers.*

2010 was an extreme year for the climate in Greenland, especially for the Greenland ice sheet. The air temperature was higher than ever measured and the ice sheet summer melt lasted longer and was larger than ever before. A warm and dry winter followed by a very warm and dry summer has made 2010 the worst year for the 'health' of the ice sheet, since the measurements started. On top of the melting, calving of gigantic icebergs from the ice sheet's glacier outlets also broke the record.

The Arctic region is warming twice as fast as the remaining world, so there is good reason to keep an eye on how the Greenland ice sheet reacts. The ice sheet contains water sufficient to raise the global sea level by 7 m. And if you compare the scientific analyses made up till now, the ice loss seems to be accelerating. The year 2010 set a new standard for this acceleration. For instance, we expect that the results from our next field trip will confirm a melting of around 9 m on the ice sheet in South Greenland, where normally we would measure 6 m of melting. In 2010, we observed a melting, in West Greenland, which was 70% higher than the more normal year 2009.

A single extreme year does not necessarily give rise to alarm, but 2010 was another record year in a decade of records. The extreme conditions have been most pronounced in the southern and western parts of Greenland. They are caused by a pattern of the atmospheric circulation which was earlier relatively rare, but has now happened three times within the last decade. This pattern attracts warm air to the North Pole between Greenland and Canada, while, in turn, Europe and Asia get to feel the arctic cold. It is possible that this pattern has become more pronounced due to several years of drastic shrinking during summer of the sea ice in the Arctic Ocean. The sunrays, previously reflected by the sea ice, now warm the Arctic Ocean and that influences the circulation of the atmosphere and gives rise to climate changes. In this case, very cold and long winters in, for instance, Denmark and heat waves in Greenland. It is thus likely that the Arctic climate is about to change its pattern permanently – in which case we can expect more extreme years in the future.

REFERENCES

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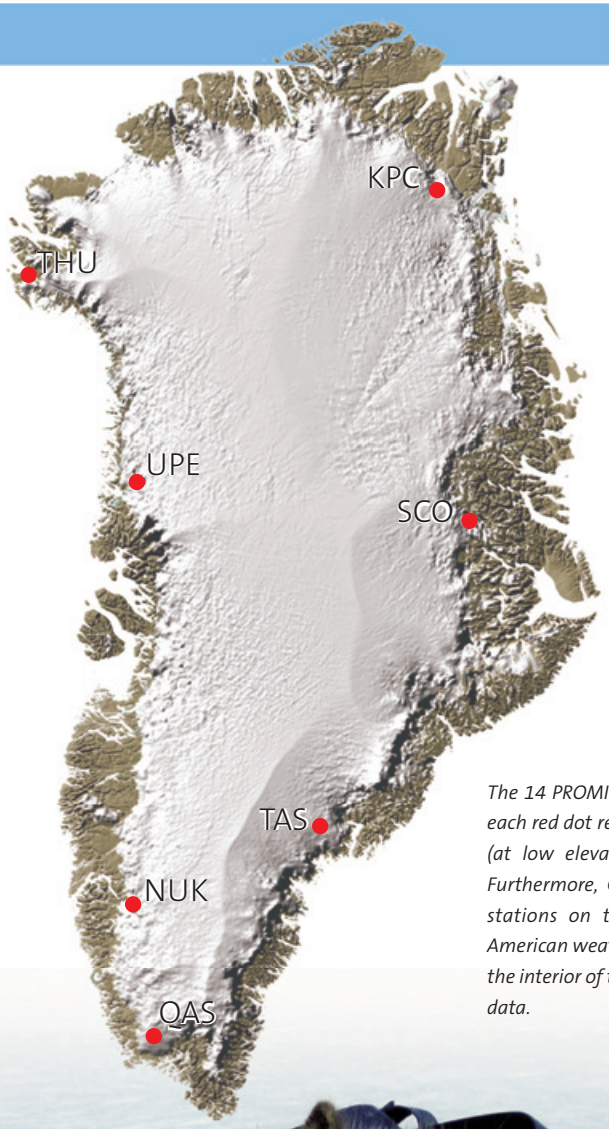

The 14 PROMICE weather stations in 2010 – each red dot represents two weather stations (at low elevation and at high elevation). Furthermore, GEUS has nine extra weather stations on the ice (not shown) and 22 American weather stations mostly located on the interior of the ice sheet to supplement the data.

PROMICE

PROMICE is financed by the Ministry of Climate, Energy and Building through the climate support programme DANCEA (Danish Cooperation for Environment in the Arctic), which is managed by the Danish Energy Agency.

- The purpose of PROMICE is to monitor the mass loss of the Greenland ice sheet, both the melting on the surface and the volume of icebergs calved.
- PROMICE is headed by GEUS in cooperation with DTU Space and Asiaq. Furthermore the programme collaborates with the Danish Meteorological Institute and foreign universities and authorities.
- Read more about PROMICE on *www.promice.dk*, where you can find photos and videos, get direct access to measuring data from the ice sheet and the PROMICE outreach material. On the website you can also subscribe to our newsletter.

Authors
Andreas P. Ahlstrøm, Senior Researcher, GEUS.
Dirk van As, Senior Researcher, GEUS.

Editor
Andreas P. Ahlstrøm, Senior Researcher, GEUS.

Layout
Carsten Egestal Thuesen, GEUS.

Geological Survey of Denmark and Greenland
Øster voldgade 10
DK-1350 Copenhagen K
Denmark

Technical University of Denmark
Anker Engelunds Vej 1, 101A
DK-2800 Kgs. Lyngby
Denmark

Asiaq
Qatserisut 8, P.O. Box 1003
3900 Nuuk
Greenland

Ministry of Climate, Energy and Building
Stormgade 10–12
DK-1470 Copenhagen K
Denmark

Danish Energy Agency
Amaliegade 44
DK-1256 Copenhagen K
Denmark