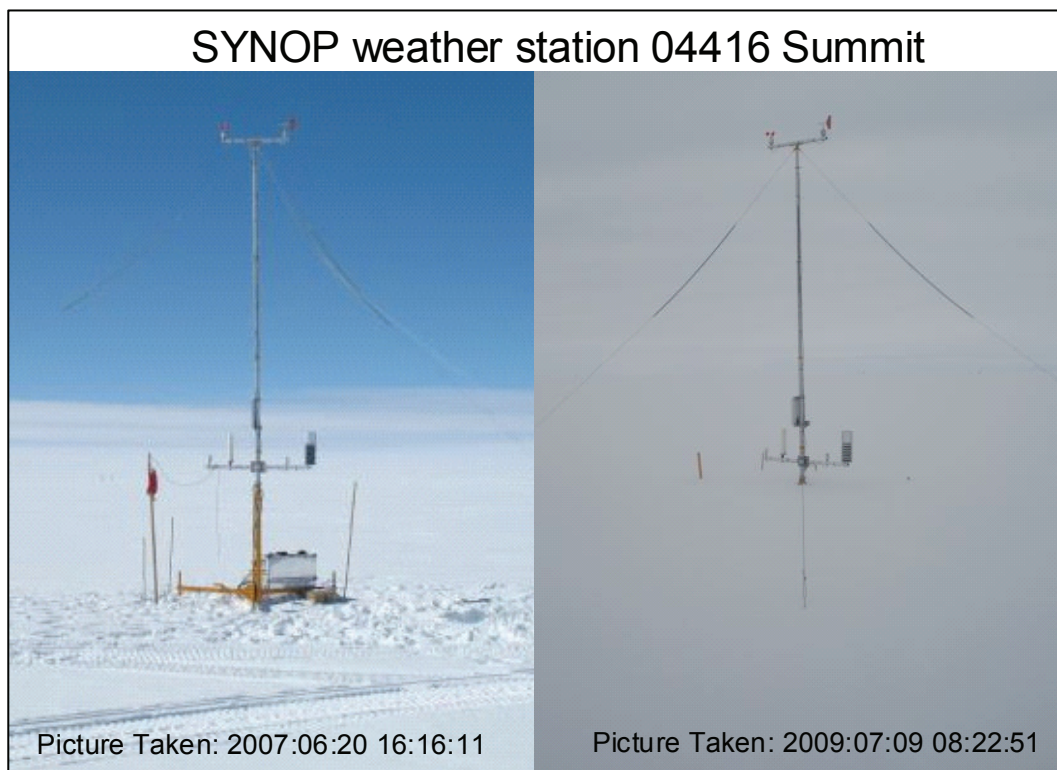




Technical Report 10-09

DMI SYNOP AWS 04416 Summit. Data status March 2010.

Ellen Vaarby Laursen



Colophon

Serial title:
Technical Report

Title:
DMI SYNOP AWS 04416 Summit.

Subtitle:
Data status March 2010.

Author(s):
Ellen Vaarby Laursen

Other contributors:

Responsible institution:
Danish Meteorological Institute

Language:
English

Keywords:

Url:
www.dmi.dk/dmi/tr

ISSN:
1399-1388

Version:
April 8th 2010

Website:
www.dmi.dk

Copyright: DMI

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Introduction

At the moment a weather report (SYNOP) from the DMI automatic weather station 04416 Summit is issued into the GTS every 3 hours for the benefit of the international meteorological infrastructure, as organized by WMO. Station 04416 Summit is part of the WMO Regional Basic Synoptic Network (RBSN). This DMI Technical Report concerns the data quality of the DMI automatic weather station 04416 Summit.

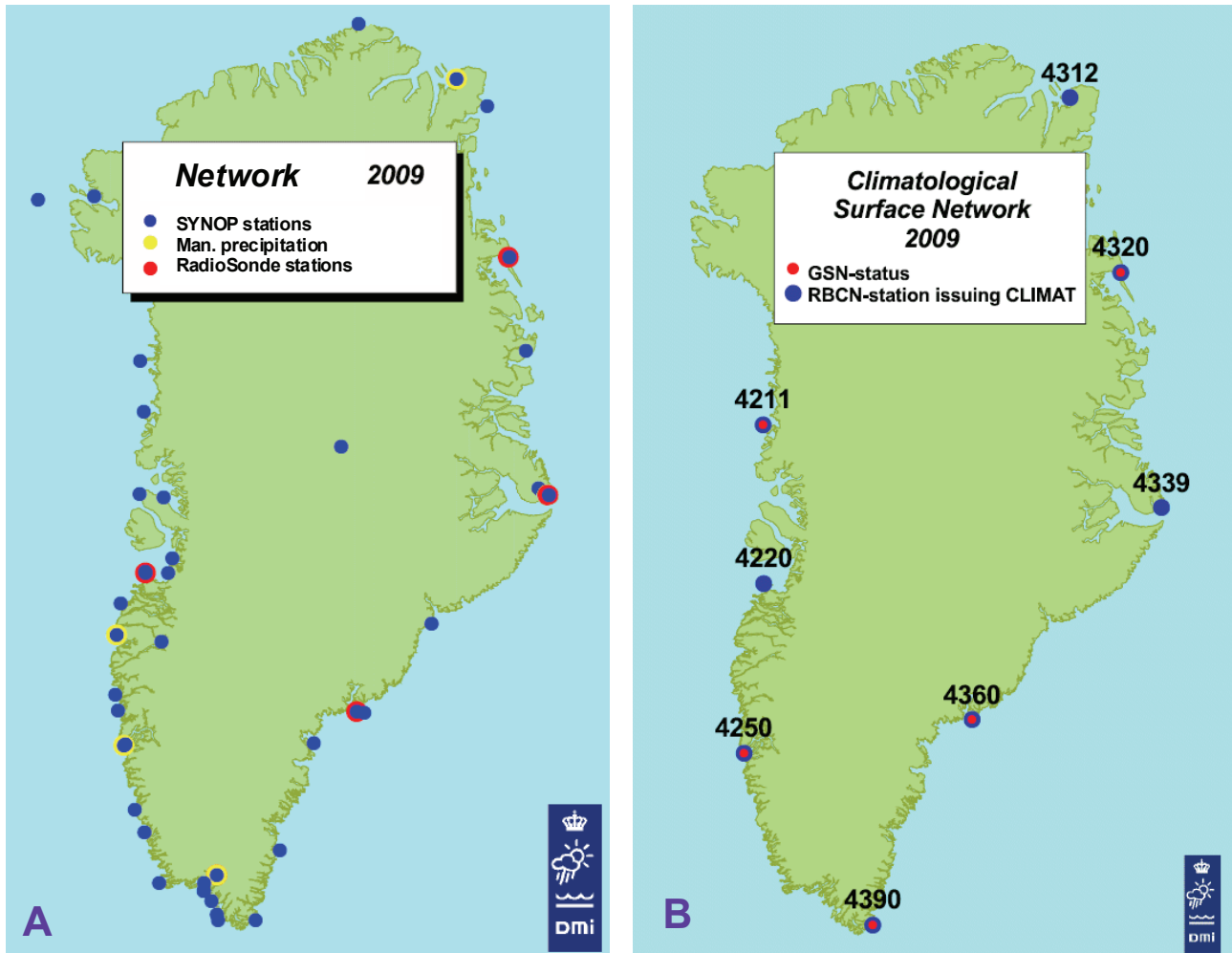


Figure 1.

A: Blue dots show the position of the weather stations issuing SYNOP in Greenland. All the SYNOP's are received at DMI, and most are then transmitted into the GTS for further distribution. Station 04416 Summit is the synop-station in the interior of Central Greenland, positioned on the top of the Greenland Icesheet. The 04416 Summit synop's at 00, 06, 12 and 18 UTC are issued for global distribution, and the synop's at 03, 09, 15 and 21 UTC are issued for regional distribution.

B: CLIMAT-issuing stations. The CLIMAT is a monthly report from a SYNOP station. The shown 8 stations are the Greenlandic land stations chosen to be part of RBCN (WMO's Regional Basic Climatological Network). The 5 stations marked by a red dot are additionally chosen to be part of the GSN (GSN: GCOS Surface Network. GCOS: Global Climate Observing System, as defined by WMO/IOC/ICSU/UNEP).



The non-static station position

The DMI WMO synop weather station 04416 Summit is situated on top of the Greenland Icesheet, approx. 3200 meters above sea level, on top of approx. 3 kilometres of ice. This is a position in motion, as the weight of the overlying new snow causes the old snow to transform into ice, and the gravity forces the ice to flow downwards, and outwards, towards the ice margin. The scientific location 'Summit' was originally chosen as ice-core deep drilling site, because of it's position on top of the ice sheet ice divide, which means that at Summit there's ideally only a downward, vertical motion of the ice.

The non-static nature of the surface of the Greenland Icesheet is illustrated by the continuous burial of the manmade structures, raised and fixed at the surface of the Greenlandic Icesheet, please cf. Figure 2 and Figure 3.

DYE 3, US radar station, SouthGreenland



Copy from: <http://www.lswilson.ca/dye-3.jpg> , <http://www.lswilson.ca/DYE3-apr6-06.jpg>,

Figure 2. Illustration of the downward motion through decades of what was once at the surface of the Greenland Icesheet. The photo on the left is not dated, but may be from the early 1980'ies. The pictures show the burial of the very large American radar station, DYE 3, in the southern part of the Greenland Icesheet.

04416 Summit, Summit Central Greenland Icesheet



Photo: DMI

Figure 3. Two years worth of downward motion, or burial, of the DMI weather station 04416 Summit on top of the Greenland Icesheet.

The official station position, as reported in the WMO Vol. A, is listed in the Table 1 below.

WMO station	Name	Start	latitude (decimal degrees N)	longitude (decimal degrees W)	Elevation (meters above sealevel)
04416	SUMMIT	22-08-1997	72,583	38,45	3202

Table 1. Official position of station 04416 Summit as of March 17 2010.

Station parameters

Measurements

Station	Wind	Temperature	Humidity	Airpressure
04416 SUMMIT	Malling, ED 882 / Aanderaa 2750	Aanderaa 3444	Lambrecht 800N100	Vaisala PTB100

Table 2. Measurement equipment at 04416 Summit, as of 14-nov-2007.

SYNOP

The SYNOP¹ from 04416 Summit is issued every three hours (hours 00, 03, 06, 09, 12, 15, 18 and 21 UTC).

Due to the set-up as ‘remote station’, the SYNOP from 04416 Summit is issued with the following limited number of parameters: Wind direction and wind speed (10 min average), Air temperature (instantaneous), dew-point (instantaneous), air pressure at station level, air pressure tendency. For details, please cf. with Table 3.

SYNOP group or parameter	Contents
M _i M _i M _i M _i	Identification letters (AAXX: Land station SYNOP)
YYGGi _w	Date (day of month, UTC), hour (UTC), windindicator (4: Wind speed obtained from anemometer, wind speed in knots)
IIiii	WMO block number and WMO station number (IIiii: 04416)
i _R	Indicator for inclusion or omission of precipitation data (i _R =4: Precipitation data are reported in none of the two Sections 1 and 3, group 6RRRt _R is Omitted (precipitation amount not available).
i _x	Indicator for type of station operation (manned or automatic) and for present and past weather data (i _x =6: Automatic, group 7wwW ₁ W ₂ or 7w _a w _a W _{a1} W _{a2} : Omitted (no observation, data not available)).
dd	True direction in tens of degrees, from which wind is blowing (or will blow)
ff	Wind speed, in units indicated by i _w .
s _n	Sign of the data (0: Positive or zero. 1: Negative)
TTT	Air temperature, in tenths of a degree Celsius, its sign being given by s _n .
s _n	Sign of the data (0: Positive or zero. 1: Negative)
T _d T _d T _d	Dew-point temperature, in tenths of degrees Celsius, its sign being given by s _n .
P ₀ P ₀ P ₀ P ₀	Pressure at station level, in tenths of a hectopascal, omitting thousands digit of hectopascals of the pressure value.
a	Characteristic of pressure tendency during the three hours preceding the time of observation.
ppp	Amount of pressure tendency at station level during the three hours preceding the time of observation, expressed in tenths of a hectopascal.

Table 3. Details on the SYNOP parameters issued from 04416 Summit every three hours, as of 01-mar-2010.

¹ SYNOP: FM 12-XII Ext. SYNOP Report of surface observation from a fixed land station. The SYNOP is defined by the WMO Publication No. 306: Manual on Codes. International Codes. Volume 1.1 Part A –Alphanumeric Codes.

CLIMAT

Currently no CLIMAT² is issued from 04416 Summit.

Due to the limited number of parameters measured at 04416 a CLIMAT from 04416 Summit would only have potential to hold the information listed in Table 4.

CLIMAT parameter	Contents
P ₀ P ₀ P ₀ P ₀	Monthly mean pressure at station level, in tenths of a hectopascal, omitting thousands digit.
s _n	Sign of the data (0: Positive or zero. 1: Negative)
TTT	Monthly mean air temperature, in tenths of a degree Celsius, its sign being given by s _n .
s _t s _t s _t	Standard deviation of daily mean values relative to the monthly mean air temperature, in tenths of a degree Celsius.
eee	Mean vapour pressure for the month, in tenths of a hectopascal.
m _p m _p	Number of days missing from the records for pressure
m _T m _T	Number of days missing from the records for air temperature
m _e m _e	Number of days missing from the records for vapour pressure

Table 4. Due to the limited number of parameters measured at 04416 Summit, a CLIMAT from 04416 Summit would only have potential to hold the CLIMAT-parameters listed in this table.

² CLIMAT: FM 71-XII CLIMAT Report of monthly values from a land station. The CLIMAT is defined by the WMO Publication No. 306: Manual on Codes. International Codes. Volume 1.1 Part A –Alphanumeric Codes.

Data overview, observed synop, 1997-2010

Pressure at station level

04416 Summit, air pressure at station level every three hours

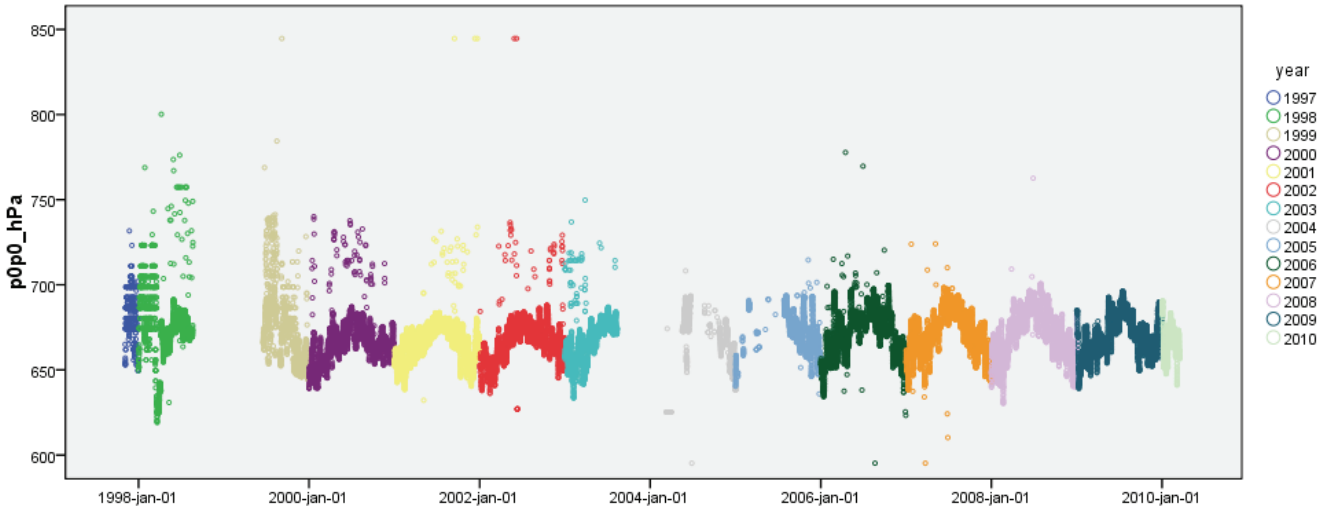


Figure 4. Observed air pressure at station level every three hours. Please note that the observations contains errors, some of which are not visible in the plot due to the pressure scale.

Pressure tendency during latest three hours

04416 Summit, pressure tendency (0,1 hPa) at station level during latest three hours, every three hours

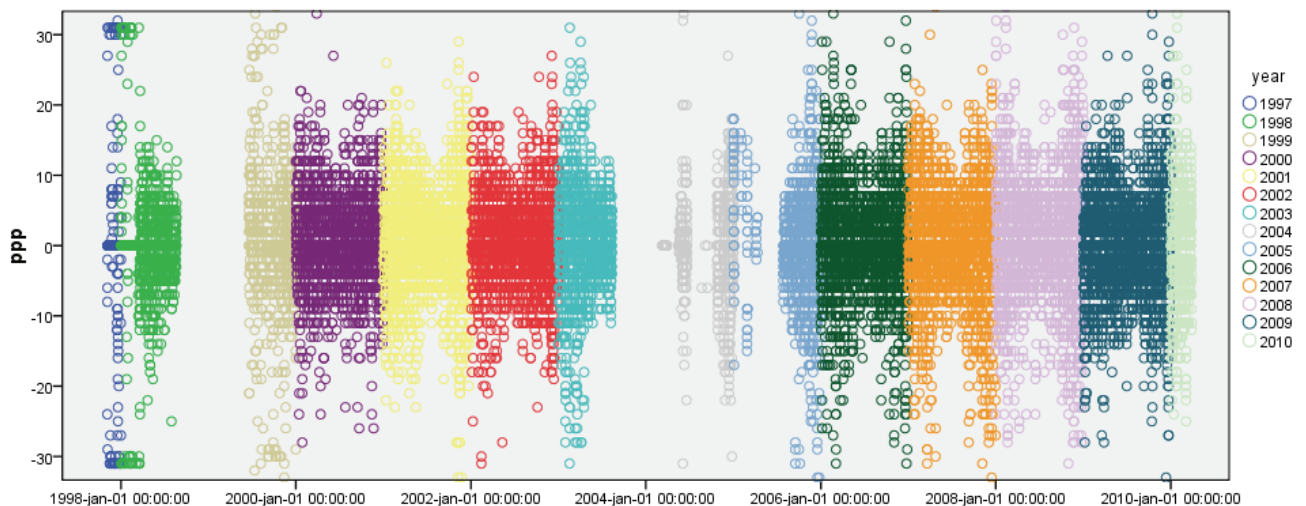


Figure 5. Observed pressure tendency at station level during the latest three hours, every three hours. Please note that the observations contains errors, most of which are not visible in the plot due to the pressure scale.



Air temperature

04416 Summit, air temperature every three hours

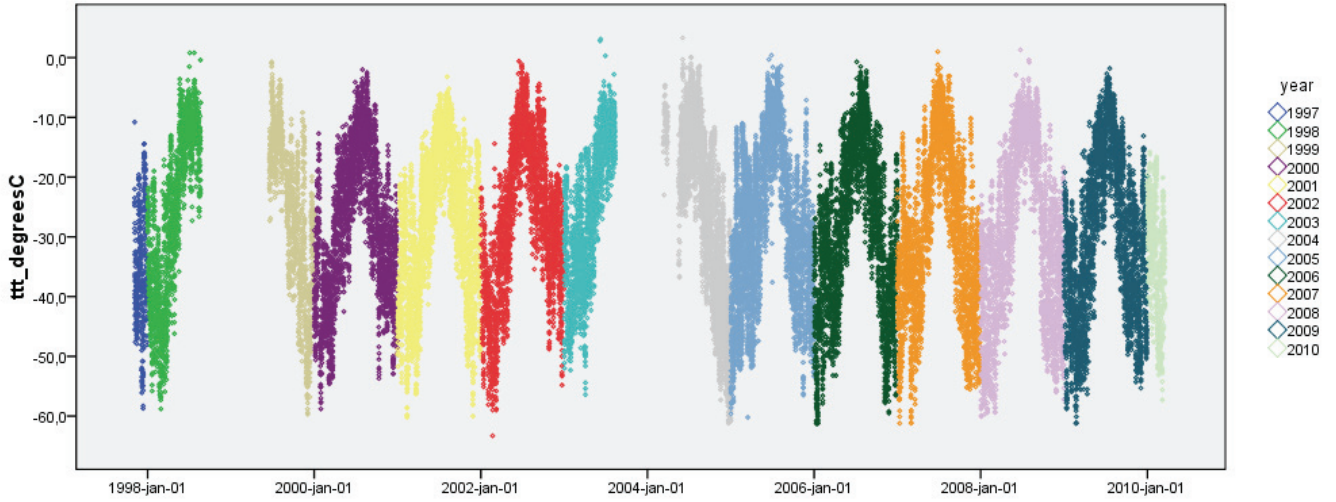


Figure 6. Observed air temperature.

Humidity

04416 Summit, RH every three hours

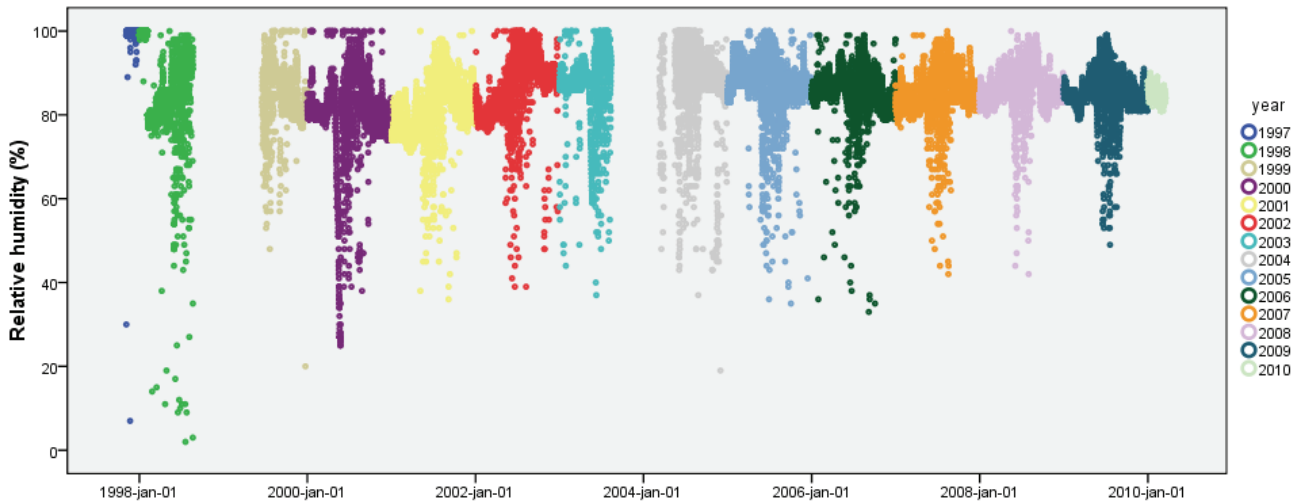


Figure 7. Observed relative humidity.

Wind direction

04416 Summit, wind direction (true) every three hours

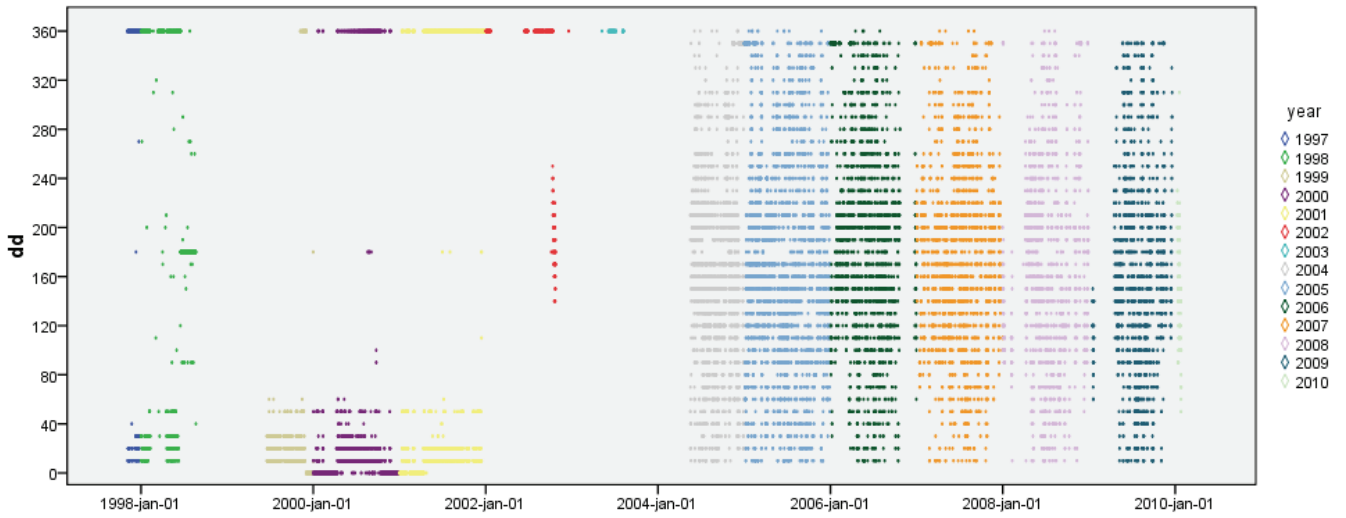


Figure 8. Observed wind direction (10 min. average).

Wind speed

04416 Summit, wind speed (10 min. average) every three hours

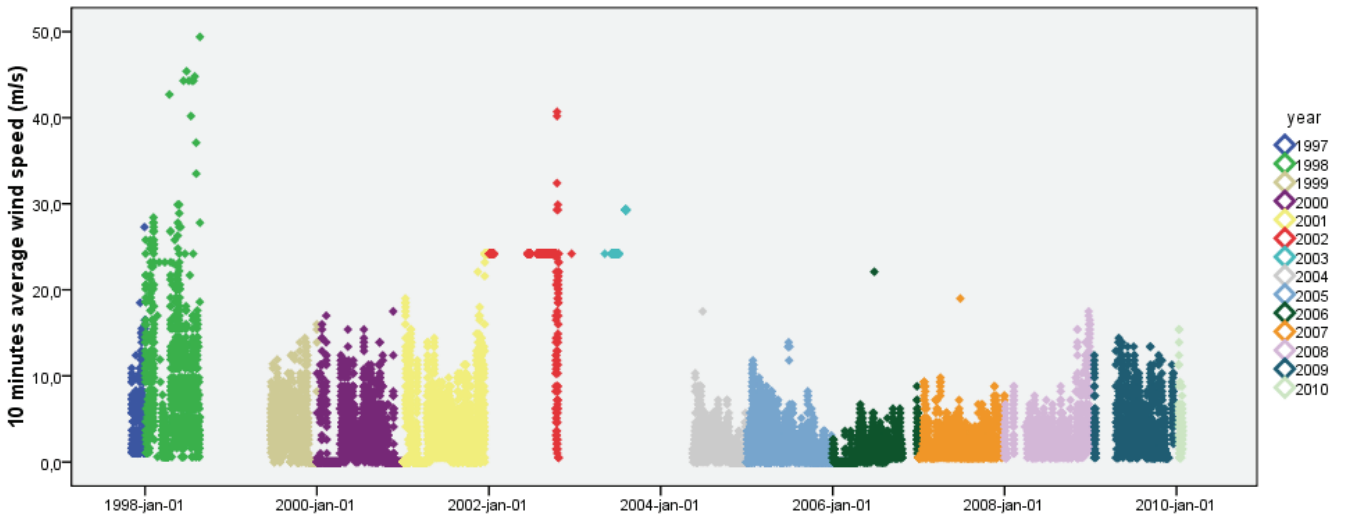


Figure 9. Observed wind speed (10 min. average).

Availability 1998-2009

Year	Availability SYNOP (%)	Average monthly availability (%)			
		pressure	wind	temperature	humidity
1998	59,1	59,0	46,9	58,8	57,0
1999	42,5	42,1	42,2	42,2	41,6
2000	88,1	88,0	88,0	88,0	87,8
2001	95,9	96,0	95,7	96,0	95,8
2002	91,5	91,4	22,0	91,3	91,0
2003	60,9	61,1	4,4	61,1	60,9
2004	48,6	17,6	40,3	48,2	48,2
2005	83,6	42,9	83,4	83,6	83,5
2006	95,0	95,0	72,3	95,0	94,9
2007	92,5	92,5	64,6	92,5	92,3
2008	88,3	88,3	48,5	88,2	88,2
2009	99,9	99,9	54,3	99,8	99,8

Table 5. Availability of the expected 00, 03, 06, 09, 12, 15, 18, 21 UTC SYNOP received from station 04416 Summit during 1998-2009. Also shown are the average monthly availability of the individual parameters received in the SYNOP's.

Table 5 gives an overview of the availability 1998-2009. Details of individual months 1997-2010 are given in Table 6.

The low availability of 1998, 1999, 2003 and 2004 reflect that the station 04416 Summit actually was completely down during the period starting 21-aug-1998 and ending 18-jun-1999, and the period starting 12-aug-2003 and ending 09-mar-2004. These years aside, the availability is far above the required minimum for a WMO Regional Basic Synoptic Network station (50% availability), and even close to or above the target availability of 95-100%.

Year	Month	Availability (%)					
		synop	Pressure (p0p0)	Pressure difference (ppp)	Wind (dd)	Temperature (ttt)	Humidity (tdtdtd)
1997	11	86,7	86,7	80,0	86,7	85,4	85,4
1997	12	98,4	98,0	88,7	98,0	97,2	79,4
1998	1	98,0	98,0	86,3	98,0	97,6	95,2
1998	2	97,3	96,9	86,2	29,9	96,4	88,8
1998	3	97,6	96,4	87,5	54,4	96,8	85,9
1998	4	96,7	95,4	87,1	61,7	95,4	95,4
1998	5	97,6	97,2	85,9	97,6	96,8	96,8
1998	6	87,5	87,5	75,0	86,7	87,1	87,1
1998	7	82,3	81,9	69,8	80,2	81,9	81,5
1998	8	54,4	54,4	45,6	49,2	53,6	53,6
1998	9	0,0	0,0	0,0	0,0	0,0	0,0
1998	10	0,0	0,0	0,0	0,0	0,0	0,0
1998	11	0,0	0,0	0,0	0,0	0,0	0,0
1998	12	0,0	0,0	0,0	0,0	0,0	0,0
1999	1	0,0	0,0	0,0	0,0	0,0	0,0
1999	2	0,0	0,0	0,0	0,0	0,0	0,0



Year	Month	Availability (%)					
		synop	Pressure (p0p0)	Pressure difference (ppp)	Wind (dd)	Temperature (ttt)	Humidity (tdtdtd)
1999	3	0,0	0,0	0,0	0,0	0,0	0,0
1999	4	0,0	0,0	0,0	0,0	0,0	0,0
1999	5	0,0	0,0	0,0	0,0	0,0	0,0
1999	6	34,6	33,8	29,2	34,6	34,6	32,1
1999	7	89,1	89,1	67,7	89,1	89,1	85,9
1999	8	47,6	47,6	36,7	47,6	47,6	47,6
1999	9	78,8	78,3	65,0	78,8	78,3	77,5
1999	10	80,2	80,2	69,0	80,2	80,2	79,8
1999	11	88,3	87,9	75,4	87,9	87,9	87,9
1999	12	88,7	88,7	75,4	88,7	88,7	88,7
2000	1	82,3	81,9	70,2	81,9	81,9	81,5
2000	2	85,7	85,7	74,1	85,7	85,7	85,7
2000	3	87,9	87,5	74,2	87,9	87,5	87,5
2000	4	85,8	85,4	73,8	85,8	85,4	85,4
2000	5	85,9	85,9	73,4	85,9	85,9	85,9
2000	6	88,3	88,3	75,4	88,3	88,3	87,5
2000	7	85,5	85,5	73,0	85,5	85,5	85,1
2000	8	88,3	88,3	73,0	88,3	88,3	87,9
2000	9	92,1	92,1	79,6	92,1	92,1	92,1
2000	10	95,6	95,6	84,3	95,6	95,6	95,6
2000	11	87,5	87,5	76,3	87,5	87,5	87,5
2000	12	91,9	91,9	79,0	91,9	91,9	91,9
2001	1	91,9	91,9	83,9	91,9	91,9	91,9
2001	2	97,8	97,8	87,9	97,8	97,8	97,8
2001	3	98,0	98,0	87,9	98,0	98,0	97,6
2001	4	99,2	99,2	92,5	99,2	99,2	99,2
2001	5	98,4	98,4	90,3	98,4	98,4	98,4
2001	6	99,2	99,2	90,0	99,2	99,2	99,2
2001	7	97,2	97,2	87,9	97,2	97,2	97,2
2001	8	98,4	98,4	90,7	98,4	98,4	98,4
2001	9	92,1	92,1	77,5	92,1	92,1	91,7
2001	10	97,2	97,2	83,5	94,0	97,2	97,2
2001	11	97,5	97,5	85,4	97,1	97,5	97,5
2001	12	84,7	84,7	73,4	84,7	84,7	83,9
2002	1	70,6	70,2	58,5	44,4	70,6	70,6
2002	2	78,1	78,1	67,9	0,0	78,1	78,1
2002	3	81,0	81,0	69,4	0,0	81,0	81,0
2002	4	87,5	87,5	76,3	0,0	87,5	86,7
2002	5	97,6	97,6	89,1	0,0	97,6	97,2
2002	6	96,3	96,3	85,4	28,3	93,8	93,3
2002	7	98,4	98,4	87,9	13,7	98,4	98,4
2002	8	94,8	94,8	87,1	57,7	94,8	94,8
2002	9	95,8	95,8	89,2	50,0	95,8	95,8
2002	10	98,0	98,0	95,2	69,0	98,0	97,2
2002	11	99,6	99,6	96,7	0,0	99,6	99,6
2002	12	100,0	100,0	98,8	0,4	100,0	99,6
2003	1	99,6	99,6	96,0	0,0	99,6	99,6
2003	2	100,0	100,0	95,5	0,0	100,0	98,2



Year	Month	Availability (%)					
		synop	Pressure (p0p0)	Pressure difference (ppp)	Wind (dd)	Temperature (ttt)	Humidity (tdtdtd)
2003	3	100,0	100,0	96,8	0,0	100,0	99,6
2003	4	99,6	99,6	97,9	0,0	99,6	99,6
2003	5	100,0	100,0	98,8	0,4	100,0	100,0
2003	6	99,6	99,6	98,3	36,3	99,6	99,6
2003	7	97,6	97,6	95,6	6,5	97,6	97,6
2003	8	36,3	36,3	35,1	9,7	36,3	36,3
2003	9	0,0	0,0	0,0	0,0	0,0	0,0
2003	10	0,0	0,0	0,0	0,0	0,0	0,0
2003	11	0,0	0,0	0,0	0,0	0,0	0,0
2003	12	0,0	0,0	0,0	0,0	0,0	0,0
2004	1	0,0	0,0	0,0	0,0	0,0	0,0
2004	2	0,0	0,0	0,0	0,0	0,0	0,0
2004	3	29,4	29,4	11,7	0,0	29,4	29,4
2004	4	0,0	0,0	0,0	0,0	0,0	0,0
2004	5	33,5	30,2	30,6	32,3	33,5	33,1
2004	6	55,0	43,8	24,2	53,3	55,0	54,6
2004	7	56,0	0,0	0,0	50,0	56,0	56,0
2004	8	69,0	0,8	0,4	54,4	69,0	69,0
2004	9	81,3	2,5	2,1	50,0	81,3	81,3
2004	10	81,9	13,3	10,5	70,2	81,9	81,9
2004	11	85,0	31,3	21,3	85,0	85,0	85,0
2004	12	87,9	59,7	49,6	87,9	87,9	87,9
2005	1	79,4	9,7	7,7	79,4	79,4	79,4
2005	2	88,4	9,4	7,1	88,4	88,4	88,4
2005	3	79,8	1,6	0,4	79,8	79,8	79,4
2005	4	77,5	1,3	0,4	77,5	77,5	77,5
2005	5	54,0	1,2	0,8	54,0	54,0	54,0
2005	6	65,8	1,3	0,0	65,8	65,0	64,6
2005	7	81,0	12,1	10,1	80,2	81,0	81,0
2005	8	87,9	87,9	76,6	86,3	87,9	87,9
2005	9	93,8	93,8	89,2	92,9	93,8	93,8
2005	10	97,6	97,6	93,1	97,6	97,6	97,6
2005	11	98,8	98,8	96,3	98,8	98,8	98,8
2005	12	100,0	100,0	98,4	100,0	100,0	100,0
2006	1	100,0	100,0	98,0	100,0	100,0	100,0
2006	2	100,0	100,0	96,9	100,0	100,0	100,0
2006	3	98,4	98,4	95,6	98,4	98,4	98,4
2006	4	86,3	86,3	71,3	86,3	86,3	85,8
2006	5	95,6	95,6	87,5	95,6	95,6	95,6
2006	6	88,3	88,3	75,8	88,3	87,9	87,5
2006	7	91,9	91,9	81,0	91,9	91,9	91,9
2006	8	93,1	93,1	84,3	90,3	93,1	92,7
2006	9	97,9	97,9	90,0	53,8	97,9	97,9
2006	10	90,7	90,7	74,6	38,3	90,7	90,7
2006	11	98,8	98,8	85,4	0,0	98,8	98,8
2006	12	99,2	99,2	89,5	24,6	99,2	99,2
2007	1	99,2	99,2	98,0	56,0	99,2	99,2
2007	2	100,0	100,0	100,0	37,9	100,0	100,0



Year	Month	Availability (%)					
		synop	Pressure (p0p0)	Pressure difference (ppp)	Wind (dd)	Temperature (ttt)	Humidity (tdtdtd)
2007	3	94,0	94,0	90,3	75,4	94,0	93,5
2007	4	82,5	82,5	70,0	75,8	82,5	82,5
2007	5	90,3	90,3	80,6	89,5	90,3	89,9
2007	6	77,9	77,9	67,5	73,3	77,9	77,1
2007	7	96,0	96,0	92,3	87,1	96,0	95,6
2007	8	86,7	86,7	74,6	68,5	86,7	86,7
2007	9	89,6	89,6	81,7	63,3	89,6	89,6
2007	10	94,4	94,4	89,1	49,6	94,4	94,4
2007	11	99,6	99,6	99,2	70,8	99,6	98,8
2007	12	100,0	100,0	100,0	27,8	100,0	100,0
2008	1	99,2	99,2	98,8	27,0	99,2	98,8
2008	2	98,7	98,7	94,6	15,6	98,7	98,7
2008	3	85,5	85,5	73,8	0,4	85,1	85,1
2008	4	83,3	83,3	72,5	70,4	83,3	83,3
2008	5	84,3	84,3	70,6	79,4	84,3	84,3
2008	6	80,8	80,8	64,2	76,3	80,0	80,0
2008	7	74,2	74,2	63,7	71,4	74,2	74,2
2008	8	86,3	86,3	73,4	70,2	86,3	86,3
2008	9	75,0	75,0	65,0	53,8	75,0	75,0
2008	10	92,7	92,7	83,9	14,9	92,7	92,7
2008	11	100,0	100,0	99,6	65,0	100,0	100,0
2008	12	100,0	100,0	100,0	37,5	100,0	100,0
2009	1	99,6	99,6	99,6	19,0	99,6	99,6
2009	2	100,0	100,0	100,0	0,0	99,1	99,1
2009	3	100,0	100,0	98,8	0,0	100,0	100,0
2009	4	99,2	99,2	98,8	29,2	99,2	98,8
2009	5	100,0	100,0	100,0	98,8	100,0	100,0
2009	6	100,0	100,0	100,0	99,2	100,0	100,0
2009	7	100,0	100,0	100,0	100,0	100,0	100,0
2009	8	100,0	100,0	100,0	98,0	100,0	100,0
2009	9	100,0	100,0	100,0	91,3	100,0	100,0
2009	10	99,6	99,6	99,6	31,5	99,6	99,6
2009	11	100,0	100,0	100,0	62,9	100,0	100,0
2009	12	100,0	100,0	100,0	21,4	100,0	100,0
2010	1	99,6	99,6	99,6	49,2	99,6	99,6
2010	2	99,1	99,1	99,1	0,0	99,1	99,1

Table 6. Details on monthly availability of 00, 03, 06, 09, 12, 15, 18, 21 UTC SYNOP's from station 04416 Summit as of 28th of February 2010.



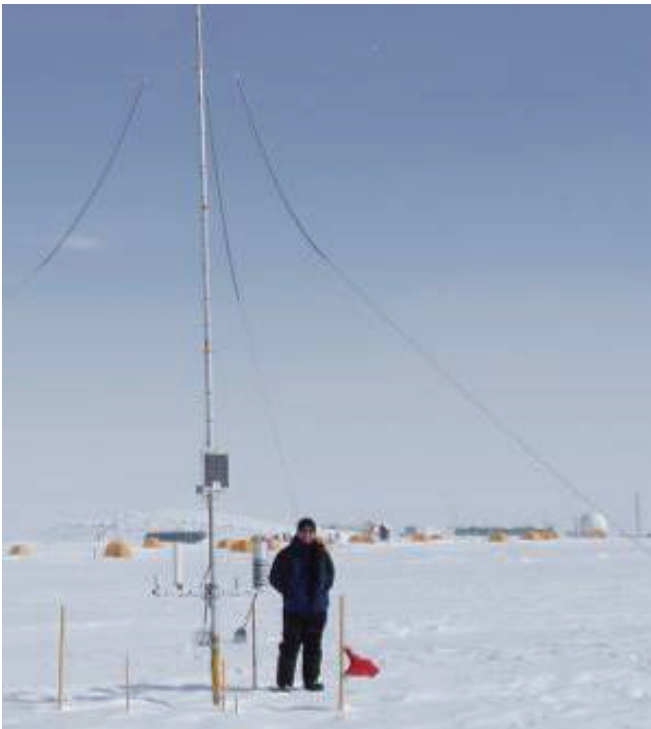
Station environment changes

The snow falling is causing the ongoing burial/downward motion of the station. The rate of change of the distance from the measurement instruments to the ground is thus not fixed, but given by the precipitation patterns. Below the resulting change in measuring height is documented by annual/biannual station visit photos 2005-2009. Also shown are plots of the observed measurements five days before and five days after the replacement of the station at each station visit.

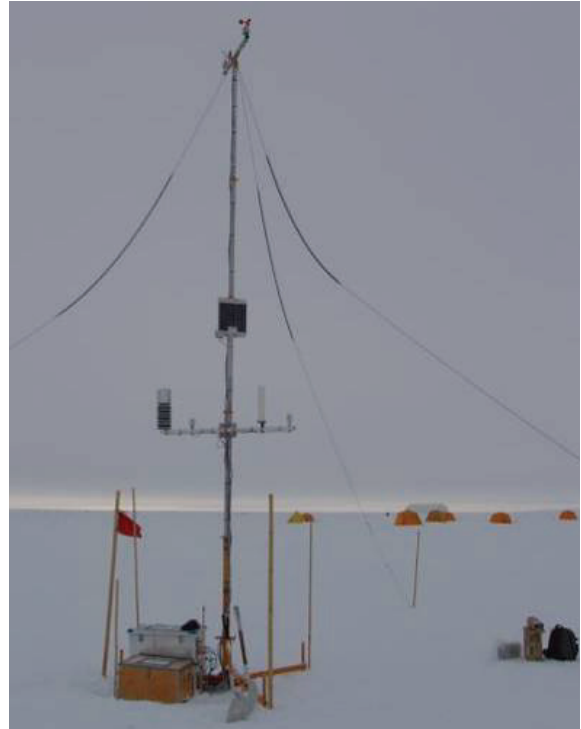
The most current dates for routine relocation of station from old buried position to new position at the surface:

13-jul-2005 – 14-jul 2005
20-aug-2006 – 21-aug 2006
19-jun-2007 – 19-jun 2007
10-jul-2009 – 10-jul-2009

Station visit 2005



Picture Taken: 2005:07:13 15:18:33



Picture Taken: 2005:07:14 01:13:46

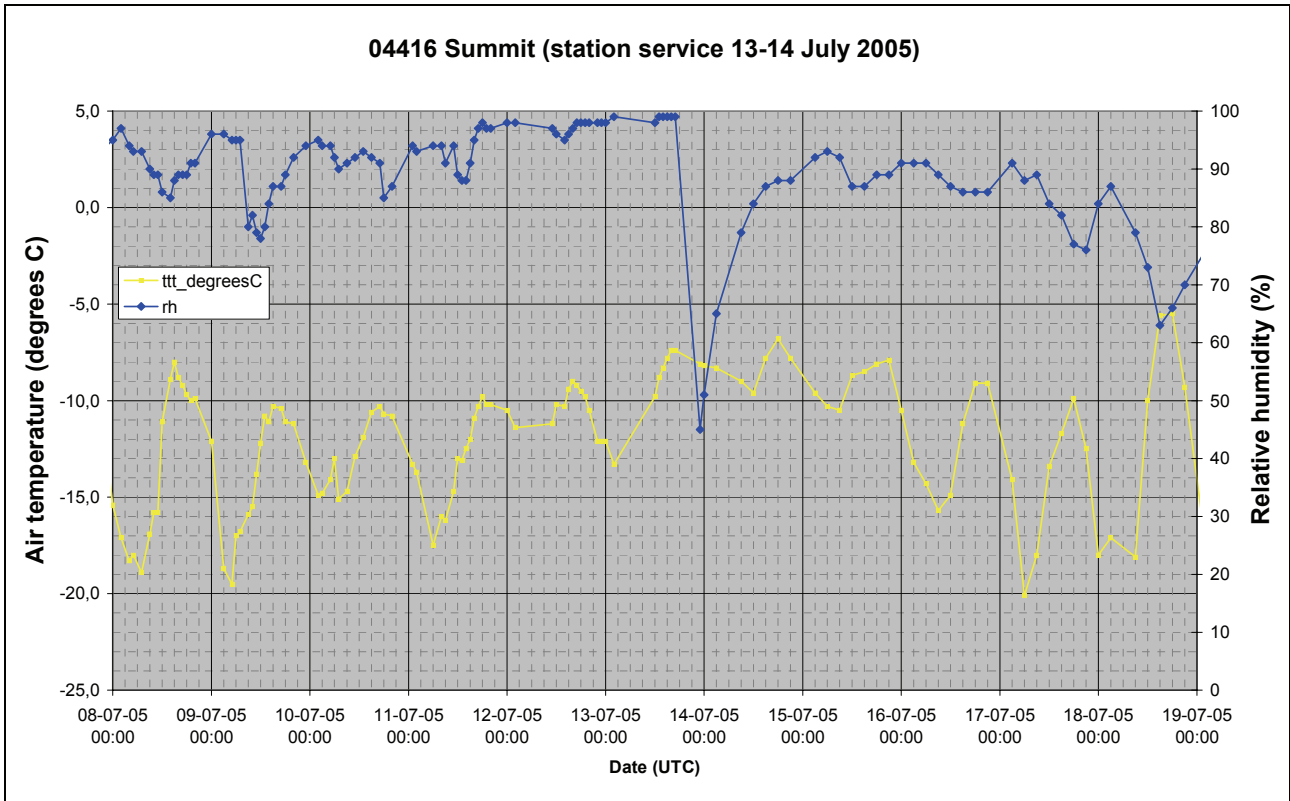


Figure 10. Observed Air temperature and relative humidity five days before and after station relocation 2005.



Station visit 2006



Picture Taken: 2006:08:20 23:41:57



Picture Taken: 2006:08:21 13:05:05

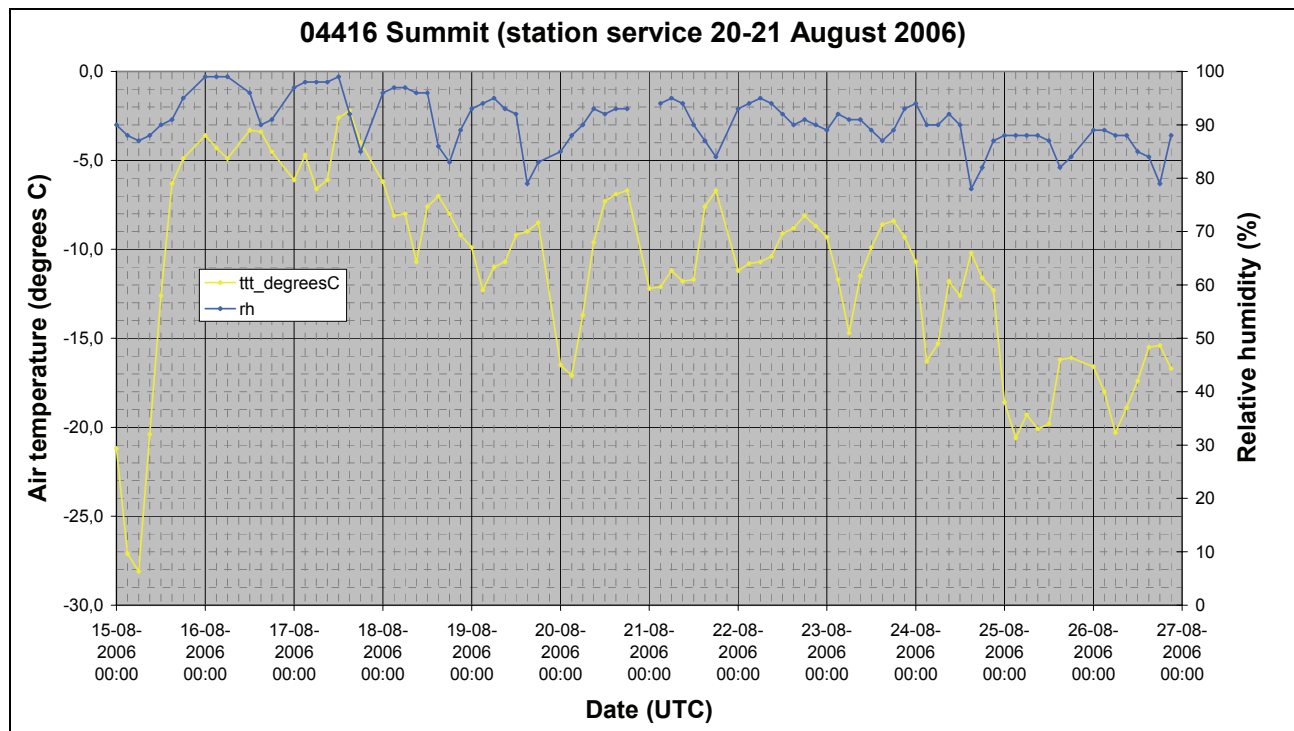


Figure 11. Observed air temperature and relative humidity five days before and after station relocation 2006.

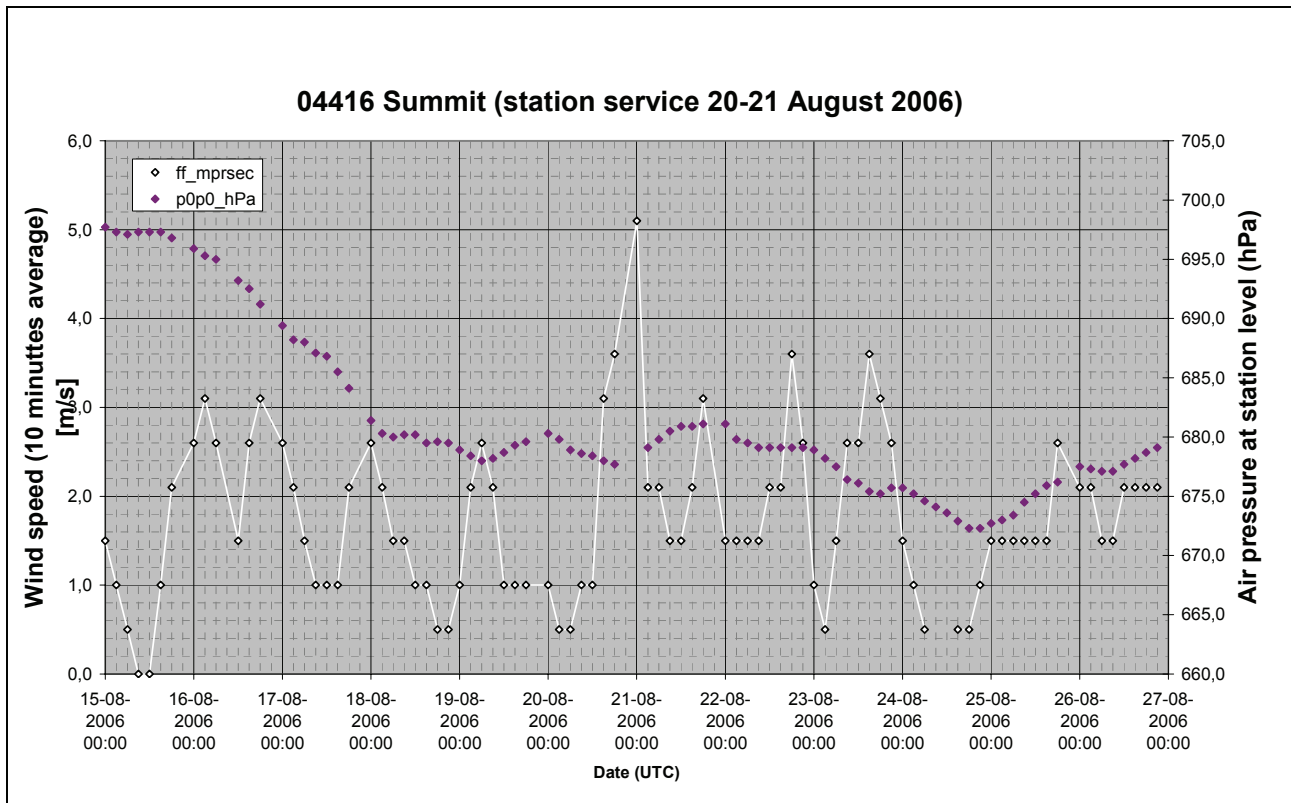


Figure 12. Observed air pressure and wind speed five days before and after station relocation 2006.



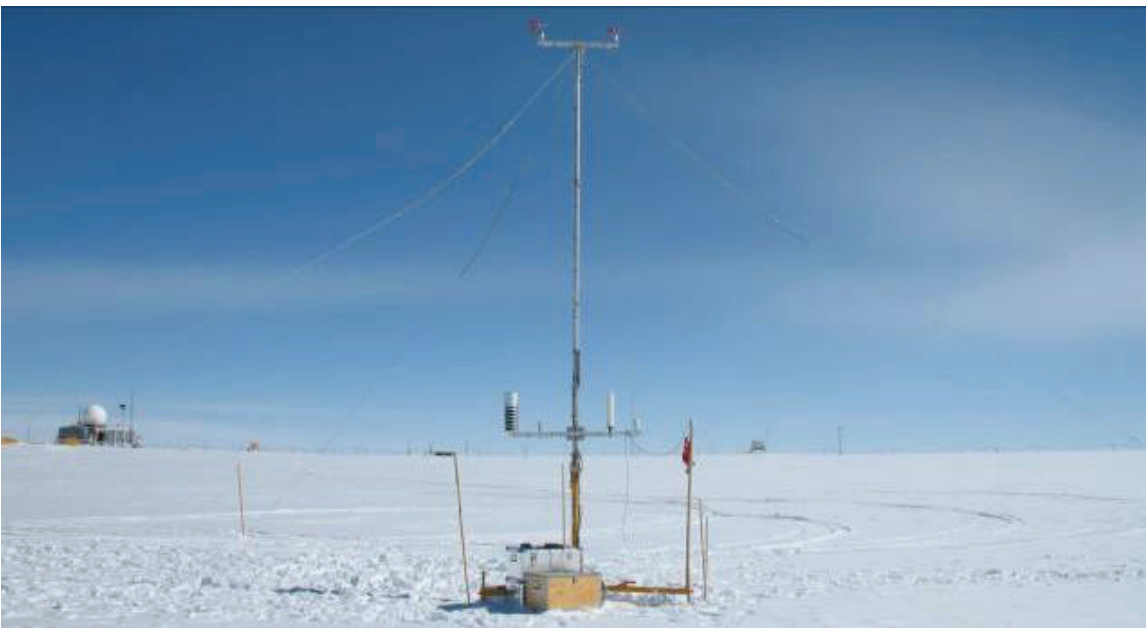
Station visit 2007



Picture Taken: 2007:06:19 18:52:40



Picture Taken: 2007:06:19 20:47:20



Picture Taken: 2007:06:20 16:17:27

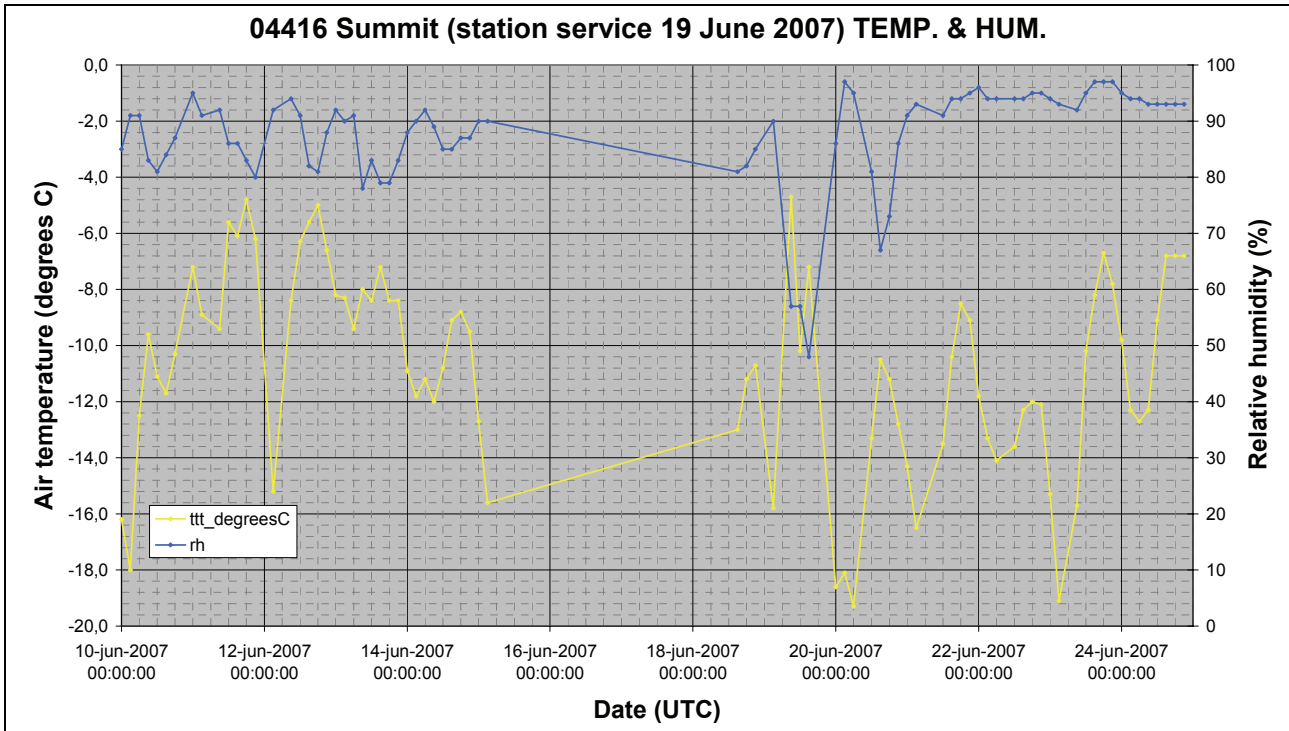


Figure 13. Observed air temperature and relative humidity five days with observations before and after station relocation 2007.

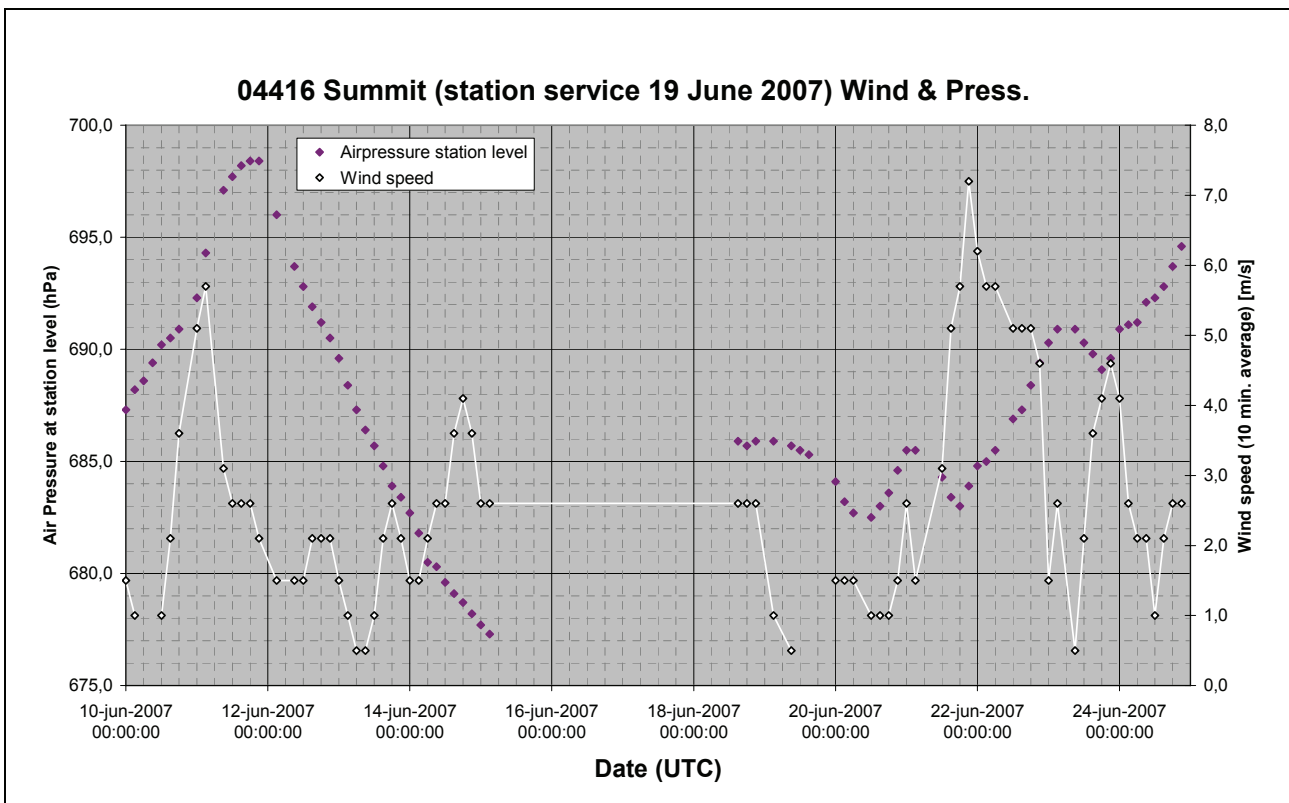
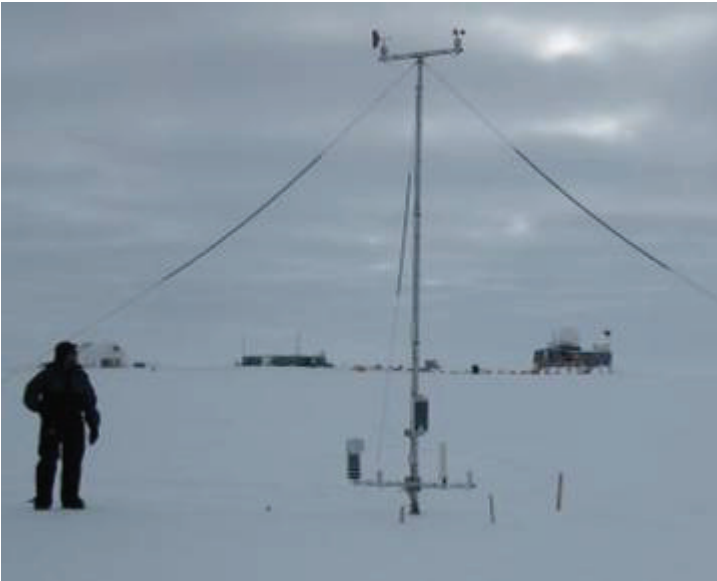


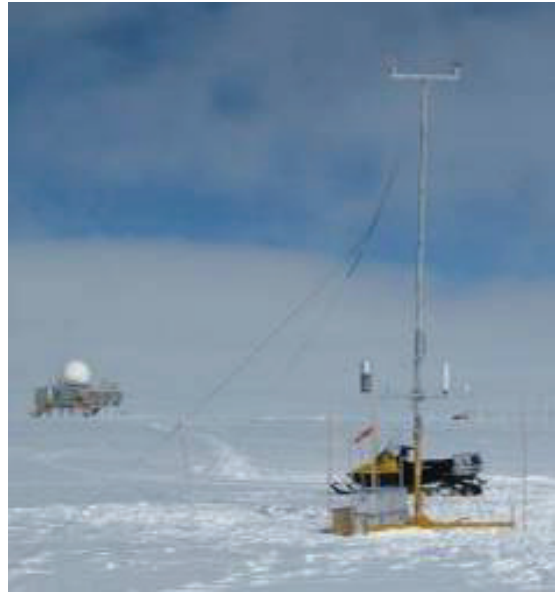
Figure 14. Observed air pressure and wind speed five days with observations before and after station relocation 2007.



Station visit 2009



Picture Taken: 2009:07:09 09:26:32



Picture Taken: 2009:07:11 19:06:16

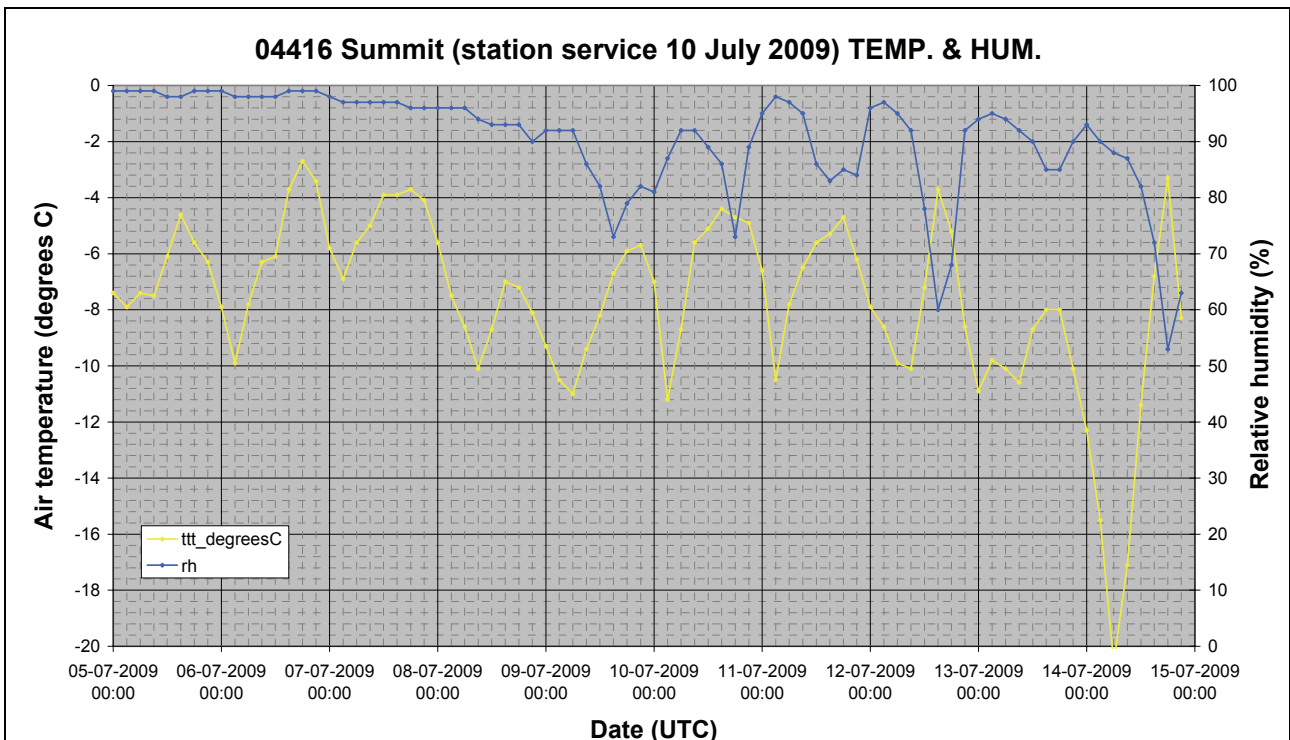


Figure 15. Observed air temperature and relative humidity five days before and after station relocation 2009.

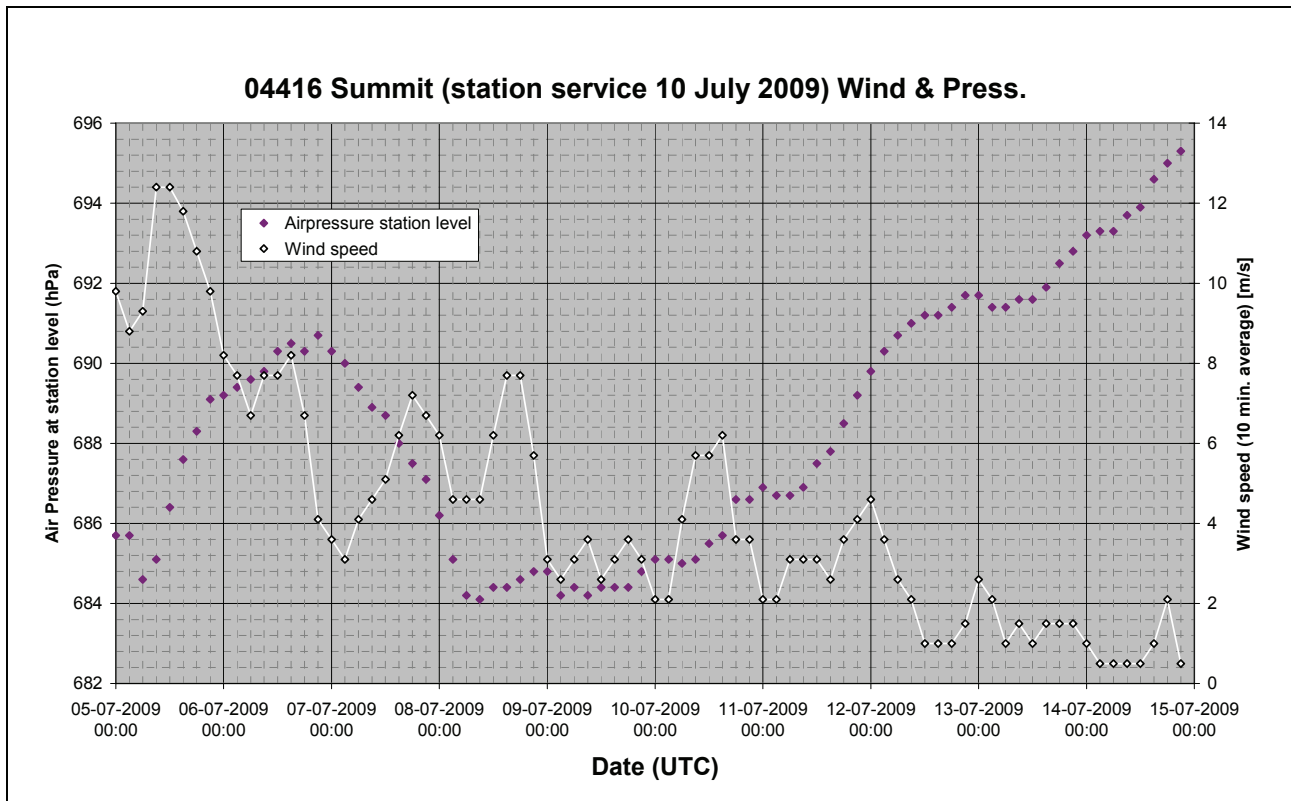


Figure 16. Observed air pressure and wind speed five days before and after station relocation 2009.

Recommendations

Generally, great care should be taken when using the observations from station 04416 Summit, since the observations are influenced by:

- Extreme climatic exposure of the station measurement equipment (the extreme cold causing e.g. low availability of wind observations during winter)
- Non static barometer elevation above sea level, due to the Greenland Ice sheet flow-patterns
- Non static height of measurements above ground, due to burial of the station by snow falling

None the less, the observations of temperature, humidity and wind (see Figure 10 - Figure 16) show no great, obvious shift in level or variance, at the individual station relocations in 2005, 2006, 2007 and 2009.

Any existing bias due to change in measuring height above ground, might be difficult to identify since:

- 04416 Summit only issues synop every three hours.
- There's no direct measurement of the ongoing change in actual measuring height above ground, in-between station relocations.
- Change in weather conditions might produce the same signal in the observations
- Natural variability shows e.g. great temperature variance during winter compared to summer, please confer with the early attempt at investigation of temperature variance in Figure 17.

It is worth noting, that since the station is relocated to it's proper position at the surface at the annual station visit, any artificial dampening, cooling or other influence on e.g. the temperature signal, will only be temporary, and will not accumulate from one year to the next. Therefore such problems might not pose difficulties when interpreting the 04416 Summit observation trend over decades for climate change investigation purposes.

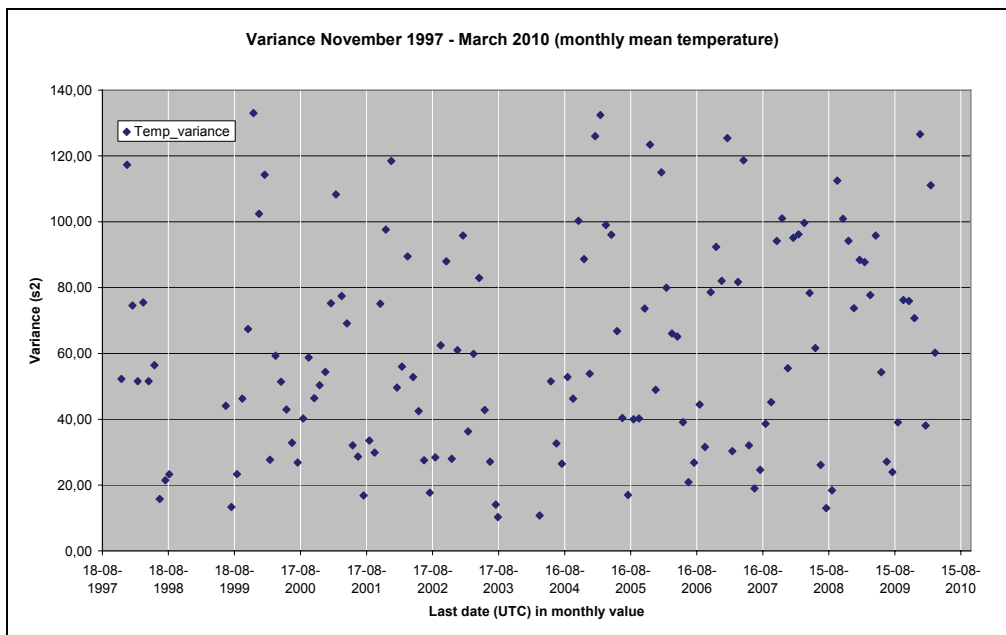


Figure 17. An early attempt at investigating any possible bias in temperature variability. The variance in the monthly mean temperature show most notably the expected greater variability during winter compared to summer.

How to order 04416 Summit historical data

Data requests are handled by:

The DMI Data & Climate Information

Phone +45 39157500, Monday -Friday hours 9-15 (UTC +1, summer: UTC +2),
or use the contact formula (in Danish) at www.dmi.dk.

A guide to data directly available from the DMI website is found in:

DMI Technical report No. 09-07

John Cappelen (ed)

Guide to Climate Data and Information from the Danish Meteorological Institute

Updated July 2009

Link to pdf-version: <http://www.dmi.dk/dmi/tr09-07.pdf>

For research purposes a copy of Greenland SYNOP data may be borrowed, see conditions and procedure in:

DMI Technical Report No. 10-08

Lone Seir Carstensen and Bent Vraae Jørgensen

Weather and Climate Data from Greenland 1958-2009

Dataset available for research and educational purposes

Descriptions and Documentation of Observations of Temperature, Precipitation, Wind, Cloud Cover, Air Pressure, Humidity and Depth of Snow

Link to pdf-version: <http://www.dmi.dk/dmi/tr10-08.pdf>

Previous reports

Previous reports from the Danish Meteorological Institute can be found on:

<http://www.dmi.dk/dmi/dmi-publikationer.htm>