Note

Meteorological Observations in 1995 at the Arctic Station, Qeqertarsuaq (Godhavn), Central West Greenland

Ole Humlum, Niels Nielsen, Morten Rasch & Birger Ulf Hansen

In October 1990 an automatic meteorological station was established at the Arctic Station (69°15'N, 53°31'W), Qeqertarsuaq (Godhavn), Central West Greenland, The station register parameters each 20 min, and the parameters have been described in an earlier paper in this journal by Nielsen et al. (1995). The present paper summarises main points of the climate during 1995.

Ole Humlum, Niels Nielsen, Morten Rasch & Birger Ulf Hansen: Institute of Geography, University of Copenhagen, Øster Voldgade 10, 1350 Copenhagen K., Denmark.

Outline of the Meteorological Year 1995

The mean air temperature for 1995 was -4.4°C (Table 1, page 120), which is somewhat above what was measured during 1994 (-5.1°C). Mean temperatures for 1991 were -4.5°C , -6.5°C for 1992 and -6.4°C for 1993. The lowest air temperature (-32.8°C) occurred in March and was close to what is considered normal, while the highest air temperature (16.1 °C) was measured during a Foehn situation in September. The high annual mean air temperature is primarily the result of several foehn gales during October and November (Fig.1 & 2, page 121-22). At these occasions, air temperatures rose to almost +10°C and the autumn snow cover was severely reduced (Fig.1).

During a foehn gale on the 24-25 November with maximum gust wind speed at 26 m/sec, the barrier in front of the Arctic Station was washed over by heavy swells. This resulted in sediments, slush ice and small icebergs larger than 1 m being deposited onto the barrier and some even reached the lagoon behind the barrier.

Liquid precipitation was registered on 79 days from the end of April to the middle of November. A total of 337.3 mm was 93% more than the previous year with a maximum of 95.2 mm in August over 18 days - 23.9 mm on 6 August. Although snow cover was registered on 206 days during 1995, the snow cover was very thin from the middle of January until early May, when the summer started abnormally early as seen from the albedo data (Fig.2). Initially, due to the lack of an isolating snow cover, this situation resulted in lower subsurface temperatures than normal, reaching -30 °C 5 cm below the surface several times during January, February and March. Also, at lower depths, the temperature was below normal as late as in April.

The very long summer, lasting from early May to early September, however, resulted in above normal temperatures in the active layer at the end of the summer. The following autumn foehn situations (Fig.1 and 2), with strong winds from E and NE, significantly delayed the refreezing of the active layer and it is first late in December that all thermistors again recorded subfreezing temperatures. At this time, efficient cooling of the ground is, however, prohibited by a thick snow cover (Fig.1).

Since the establishment of the meteorological station in 1990, the local active layer usually has had a thickness of about 170 cm. Furthermore, during 1990-94 no above freezing temperatures have been measured at the -175 cm thermistor. The long summer of 95, however, resulted in above freezing temperatures (+0.4 °C) at this termistor in early September and the active layer thickness in 1995 reached about 180 cm, that is, about 10 cm thicker than normal.

Summing up, the year 1995 clearly demonstrated the importance of both a reduced snow cover and the strong influence of a change in the start and the length of the snow-free season on the subsurface ground thermal regime. Outlines of the temperature regime are presented in Table 1.

Meteorological data measured at the meteorological station at the Arctic Station are validated at the Institute of Geography and stored in databases and standard spreadsheet formats. The data are available for scientists. Applications for data should be directed to: Arctic Station, the Secretary, c/o Institute of Ecological Botany, Øster Farimagsgade 2D, DK 1353 Copenhagen K., Denmark, and should inform about both postal- and e-mail addresses.

References

Nielsen N., Hansen B.U., Humlum O. & Rasch M. (1995): Meteorological Observations at Arctic Station, Qeqertarsuaq (Godhavn), Central West Greenland. Danish Journal of Geography, 95: 97-104.

Table 1: Selected mean, maximum and minimum values for wind speed and temperatures measured at the Arctic Station 1995.

1995	ARCTIC STATION, QEQERTARSUAQ - GODHAVN, GREENLAND										
	WIND SPEED m/sec	AIR TEMP °C	REL. HUMI %	Si W/m²	Su W/m² (albedo)	PRECIP mm H2O	SNOW cm (day)	TEMP 0 cm °C	TEMP 60 cm °C	TEMP 175 cm °C	TEMP 300 cm °C
JANUARY											
MAX	15.5	-5.3	69.2	81.6	59.3		25	-8.7	-5.9	-2.8	-4.3
MEAN	2.7	-19.7	53.9	1.5	1.1		7.7	-18.5	-9.0	-3.6	-5.3
MIN	0.1	-29.1	27.1	0.0	0.0			-27.6	-13.9	-5.2	-7.2
SUM				(74.4)		0	(31)				
FEBRUARY											
MAX	17.9	-0.3	68.3	288.0	183.8		2	-10.5	-11.7	-5.2	-7.2
MEAN	2.0	-20.2	55.6	22.6	17.2		1.3	-21.7	-13.5	-6.5	-8.8
MIN	0.1	-29.8	34.5	0.0	0.0			-29.4	-15.6	-7.0	-9.5
SUM				(76.3)		0	(28)				
MARCH											
MAX	20.9	-7.9	66.0	491.1	406.7		1	-13.8	-12.8	-7.0	-9.5
MEAN	3.6	-21.1	55.3	79.6	63.6		1.0	-22.0	-14.6	-8.0	-10.7
MIN	0.2	-32.8	38.9	0.0	0.0			-30.2	-15.8	-8.5	-11.3
SUM				(79.9)		0	(31)				
APRIL											
MAX	20.3	10.5	75.0	651.0	476.5		5	8.8	0.0	-1.5	-8.3
MEAN	3.7	-5.4	55.4	161.0	90.9		1.4	-6.5	-8.6	-7.2	-10.2
MIN	0.1	-19.1	25.9	0.0	0.0			-20.9	-13.4	-8.4	-11.1
SUM				(56.4)		10.7	(23)				
MAY											
MAX	19.7	12.9	99.3	745.4	338.7		1	15.6	0.5	-1.6	-3.6
MEAN	3.0	1.5	55.3	185.8	36.1		<0.1	4.5	0.1	-2.3	-5.8
MIN	0.1	-3.8	15.2	0.0	0.0			-0.1	0.0	-3.4	-8.3
SUM				(19.4)		29.1	(2)				
JUNE											
MAX	23.3	13.6	98.2	822.2	164.0		0	22.0	3.1	-0.7	-0.2
MEAN	3.7	6.0	50.6	230.5	39.4		0	9.8	1.5	-1.2	-1.8
MIN	0.1	-0.6	10.9	0.0	0.0			2.5	0.4	-1.7	-3.6
SUM				(17.1)		65.3	(0)				
JULY											
MAX	16.1	15.7	-	866.4	186.5		0	22.7	5.3	0.0	2.3
MEAN	3.7	7.8	-	211.9	37.2		0	12.3	4.3	-0.3	1.1
MIN	0.2	1.0	-	0.0	0.0			6.1	2.5	-0.7	-0.2
SUM				(17.6)		17.7	(0)				
AUGUST											
MAX	16.1	15.3	-	652.7	142.6		0	19.1	5.4	0.2	2.8
MEAN	3.1	5.9	-	115.0	19.7		0	8.0	3.9	0.0	2.7
MIN	0.2	1.6	-	0.0	0.0			3.6	3.2	-0.1	2.3
SUM				(17.2)		95.2	(0)				
SEPTEMBER											
MAX	24.2	16.1	-	530.2	224.2		15	11.5	3.7	0.4	2.8
MEAN	4.5	4.3	-	65.5	16.6		1.7	3.8	2.6	0.3	2.7
MIN	0.1	-2.1	-	0.0	0.0			0.2	0.7	0.2	2.2
SUM				(25.3)		66.5	(8)				
OCTOBER											
MAX	19.1	4.1	-	304.6	229.2		10	2.0	1.0	0.2	2.2
MEAN	4.7	-3.5	-	26.2	17.7		1.6	-3.6	0.0	0.1	1.2
MIN	0.0	-9.9	-	0.0	0.0			-10.5	-1.8	0.0	-0.1
SUM				(67.5)		19.0	(29)				
NOVEMBER											
MAX	26.0	9.5	-	93.1	58.5		15	0.0	-0.2	0.1	-0.1
MEAN	5.3	-1.1	-	2.6	2.0		3.6	-1.6	-0.5	0.0	-0.5
MIN	0.0	-7.7	-	0.0	0.0			-7.8	-1.7	0.0	-0.7
SUM				(77.7)		34.4	(23)				
DECEMBER											
MAX	19.1	2.2	-	0.0	0.0		60	-4.3	-0.4	0.1	-0.6
MEAN	5.1	-7.9	-	0.0	0.0		12.4	-9.2	-3.3	0.0	-1.6
MIN	0.2	-19.2	-	0.0	0.0			-18.8	-5.0	-0.5	-2.9
SUM				(-)		0	(31)				
YEAR											
MAX	26.0	16.1	-	866.2	476.5		60	22.7	5.4	0.4	2.8
MEAN	3.8	-4.4	-	92.2	28.5		2.6	-3.6	-3.0	-2.4	-3.0
MIN	0.0	-32.8	-	0.0	0.0			-30.2	-15.8	-8.5	-11.3
SUM				(51.5)		337.3	(206)				

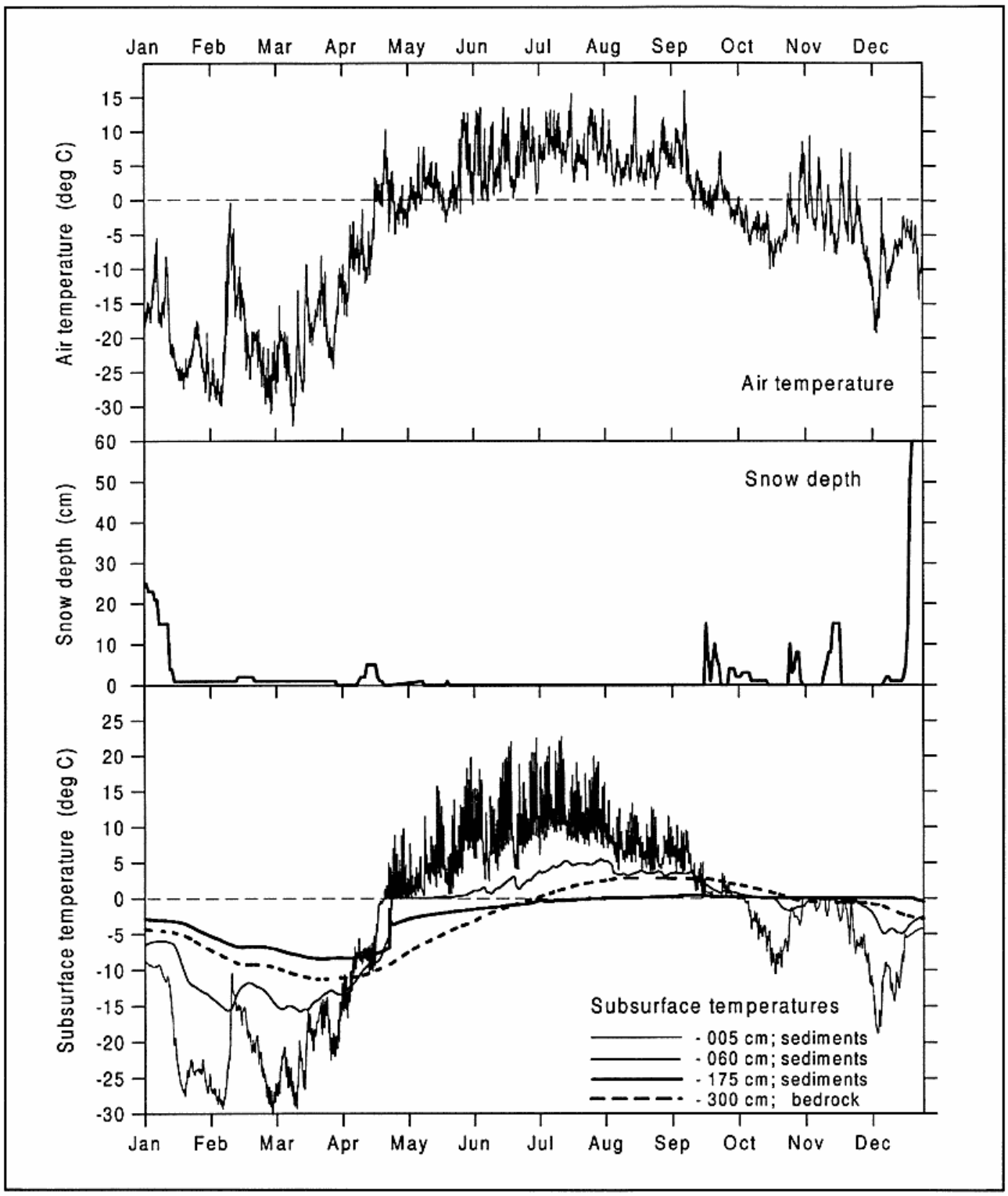

Figure 1: *Diagrams showing snow cover thickness plus air and ground temperatures during 1995. Temperatures were measured at 20 min intervals. Snow cover thickness was measured daily.*

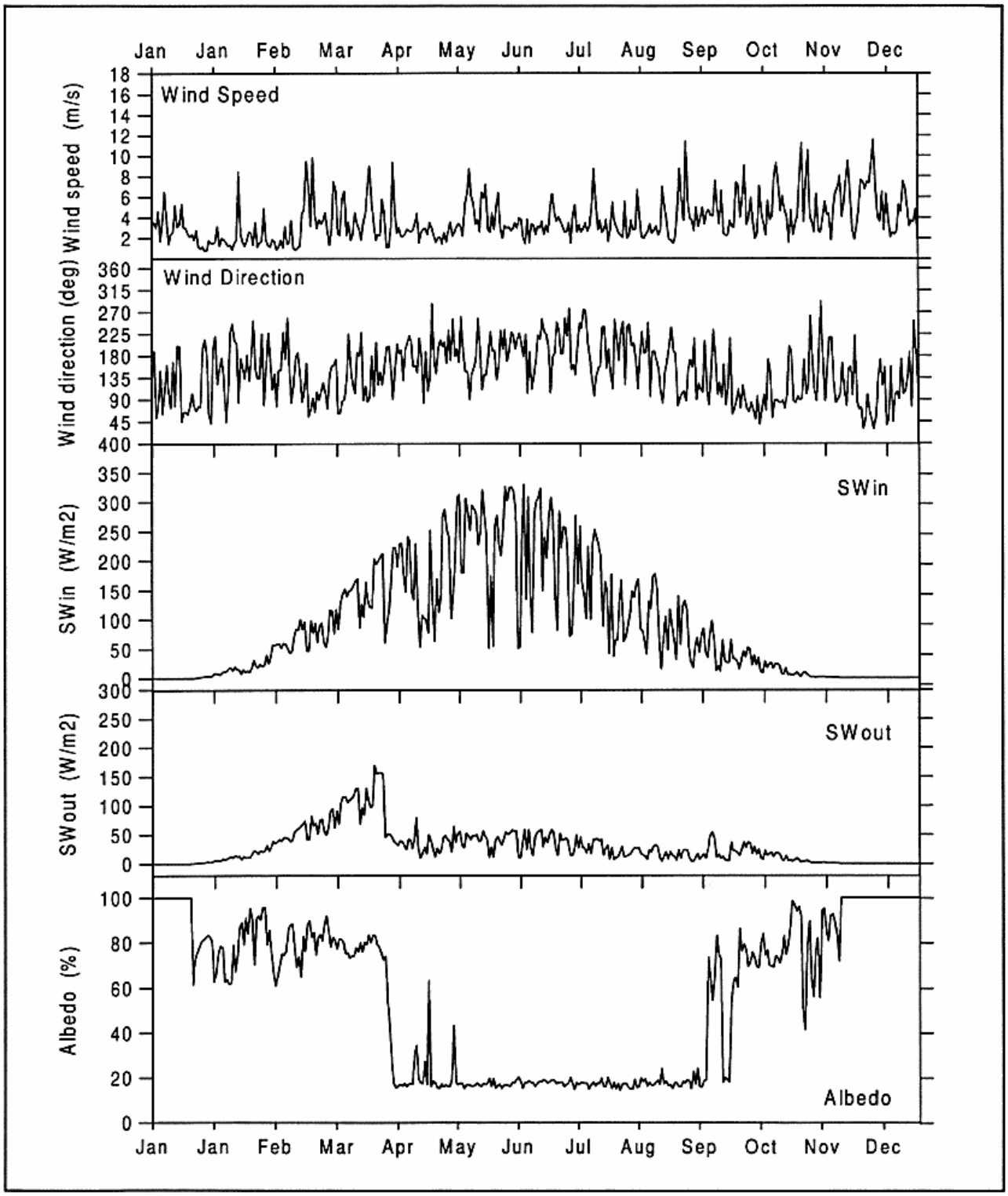

Figure 2: Diagrams showing wind speed, wind direction, SW-radiation and calculated terrain surface albedo during 1995. Parameters were measured at 20 min. intervals.