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Prosjekt: Storglomfjordutbygginga

Comparison results for the new Glomfjord automatic station versus the present manually run station

REPORT NO. 04/99

Per Øyvind Nordli and Petter Øgland

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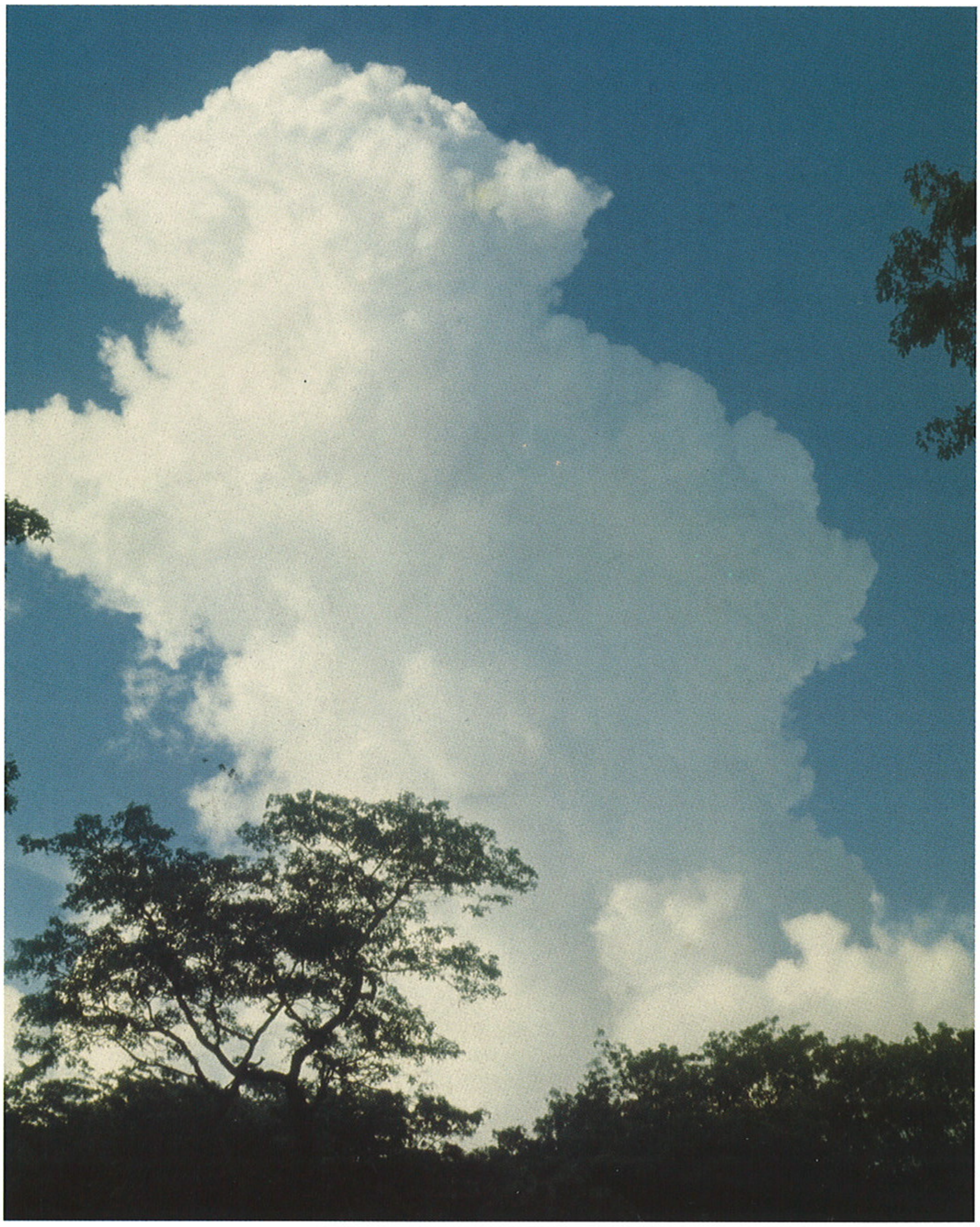

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TITLE

COMPARISON RESULTS FOR THE NEW GLOMFJORD AUTOMATIC STATION VERSUS THE PRESENT MANUALLY RUN STATION

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Statkraft Engineering

SUMMARY

An automatic station was established 19 September 1997 at the same site as a manual one that was established already in 1916. The reason for automaton was to turn to a more cost effective system than the manual station. Thus, the intention is to close the manual station as soon as the automatic station has proved to give sufficient data quality.

Evaluating the automatic station against the manual one, revealed a discrepancy between the temperature observations at the two stations, probably caused by a calibration error of the automatic sensor. Further the sensor for automatic snow depth did not function at all.

Before the closing of the manual station these malfunctions should be corrected.

For precipitation comparison the overlapping period is too short. We recommend that the manual precipitation observations continue until sufficient test result are available.

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KEYWORDS:
Glomfjord automation sensor weather station comparison

COMPARISON RESULTS FOR THE NEW GLOMFJORD AUTOMATIC STATION VERSUS THE OLD MANUALLY RUN STATION

Contents

1 Introduction

The Glomfjord climate station is situated in the inner part of Glomfjord in Meløy municipality to the south of Bodø, very near the polar circle. The instruments are placed on a grass field sloping to the south. The field is intercepted by some birch trees which at some angles shade the temperature screen. The nearest house is the old administrative building of the company that built and run a large, nearby hydroelectric power plant. This building lies in northerly direction to the field and does not shade the thermometer screen.

The measurements started in 1916 at the present site, but in 1955 the old window cage at the administrative building was replaced by a free-standing screen. In general there have been very few changes at the station. No inhomogeneities have been detected neither in the temperature series (Nordli 1997) nor in the precipitation series (Hanssen-Bauer & Førland 1992). The series from Glomfjord are thus important for the study of long term climatic variations and trends.

Nowadays the station is run by the company Statkraft Engineering (SE) and the Norwegian Meteorological Institute (DNMI). The instruments are manually read by three local observers. However, SE has also established an automatic station at the same site. There are plans for closing the manual station as soon as the data from the automatic one are evaluated and found to be of satisfactory quality. The main reason for the automation is that an automatic station is consider to be more cost effective than a manual one.

2 Data

The automatic station was established 19 September 1997. The sensors for temperature and humidity were placed inside the screen of the manual station. This was done as an attempt to keep those weather elements homogenous through the automation, i.e. the differences between automatically logged and manually read weather elements differ from each others by noise only. For the other elements there were short reallocations (precipitation and snow depth) or changes of observational procedures (wind speed and direction, precipitation and snow depth). For those elements inhomogeneities were expected to occur as a consequence of the automation.

As we started the work on the present report, parallel measurements were available in DNMI's database only from February 1998 to 26 October 1998. However, the missing data from the start of the automatic station were transferred to DNMI from Statkraft. Thus, data from 19 September 1997 - 26. October 1998 were available to us for most of the weather elements. However, precipitation and snow depth were available from February 1998 only.

During the data period of the automatic station there has been a few short stops while the data recovery of the manual station was nearly 100 %.

3 Results of the comparisons

3.1 Temperature

The measuring instrument of the automatic station is a Pt-element while the manually run station have three thermometers, a main thermometer and a maximum and minimum thermometer. The two extreme thermometers are read at the morning and evening observations only. Both the sensor and the thermometers are of types typical for the Norwegian station network. The liquid of the main thermometer and the maximum thermometer is mercury, in the minimum thermometer alcohol is used.

The sensor and the three thermometers are placed inside the same screen, MI-46. Since the 1930s this screen has been the most commonly used Norwegian screen (Nordli et al. 1997). The inertia of the screen is consider to be larger than the sensor and the thermometers. Thus the instruments are expected to adopt temperature changes inside the screen very well.

The mean differences between the automatically observed and manually observed temperatures are given in table 3.1 (automatic - manual). The differences were grouped by season and by observation hour. In addition also the mean difference of the daily (from morning to evening) maximum and nightly (from evening to morning) minimum temperatures are shown. For all differences the standard deviations are given in parentheses.

To avoid the influence of misread values on the mean value, differences outside 3 standard deviations were considered as outliers and removed from the data set. Then the mean values and standard deviations were recalculated and in some cases additional outliers were detected. This procedure was repeated until all outliers were removed.

Table 3.1 Mean values and standard deviations (in parentheses) of the temperature difference between automatic and manual observations at 80700 Glomfjord. Differences outside 3 standard deviations from the mean values were removed.

	Winter	Spring	Summer	Autumn
Temperature at 07^h	-0.36 (0.47)	-0.30 (0.25)	-0.23 (0.33)	-0.43 (0.35)
Temperature at 12^h	-0.34 (0.52)	-0.03 (0.69)	0.00 (0.49)	-0.31 (0.51)
Temperature at 18^h	-0.27 (0.45)	-0.20 (0.37)	0.01 (0.27)	-0.40 (0.39)
Daily maximum temperature	-0.21 (0.36)	0.09 (0.27)	0.18 (0.19)	-0.16 (0.39)
Nightly minimum temperature	-0.15 (0.24)	-0.14 (0.17)	-0.15 (0.13)	-0.23 (0.23)

The distributions of the data in table 3.1 are shown in Fig 3.1. (winter and spring) and in Fig. 3.2 (summer and autumn). In most cases the histograms fit well into a normal distribution and normal curves are drawn to visualise the fit.

There are some discrepancies between the automatic and the manual station. In winter and autumn the automatic observations are too cold compared to the manual ones. In summer, however, the differences are tolerable and at the midday and evening observations the differences are zero or very close to zero. In spring and summer the mean maximum temperatures differences are positive, i.e. the sensor is warmer than the thermometer.

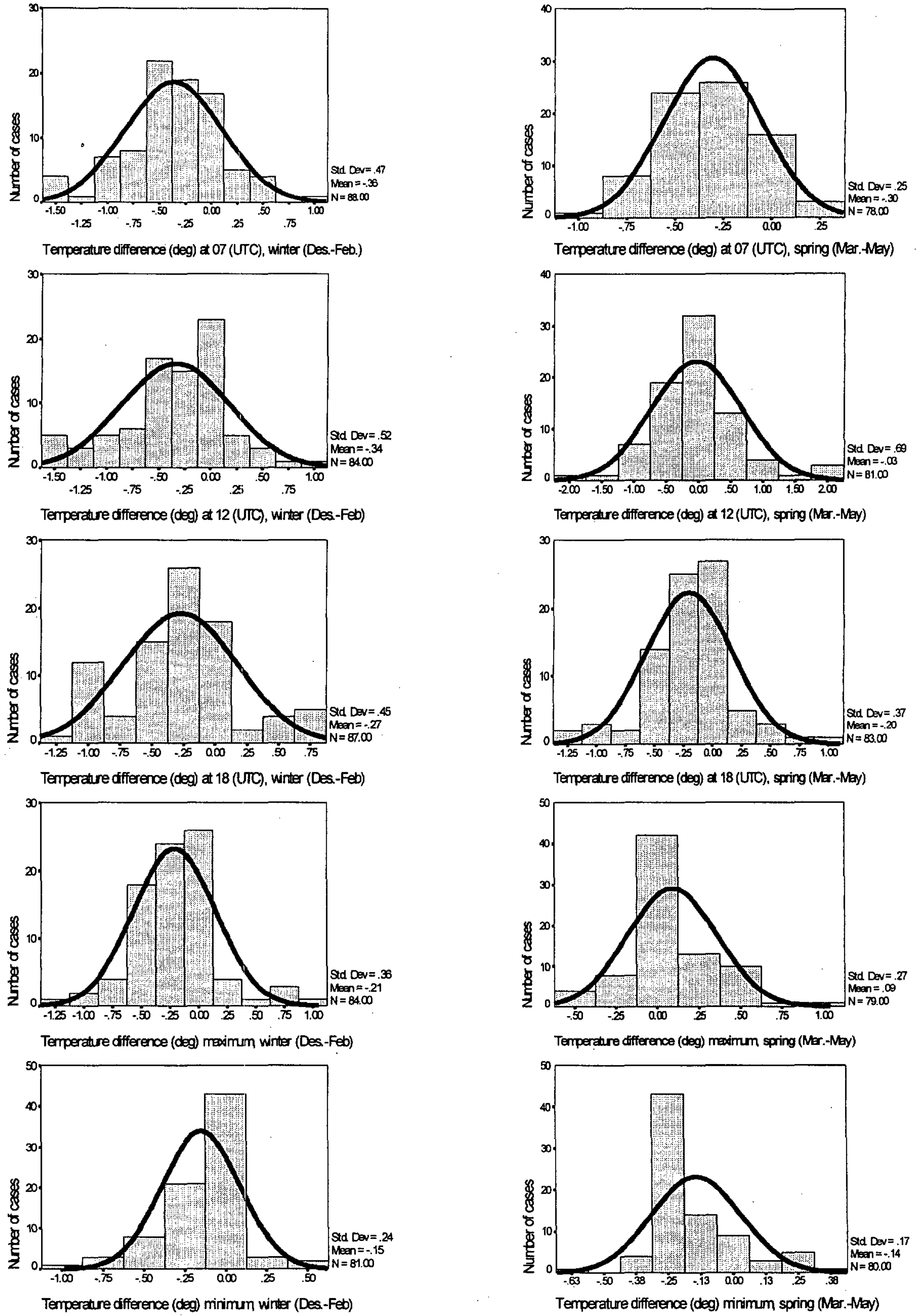


Fig. 3.1 Difference between automatically and manually observed temperatures at 80700 Glomfjord during the winter and spring seasons. Data comprises the period 1 December 1997 - 31 March 1998. There are some missing values.

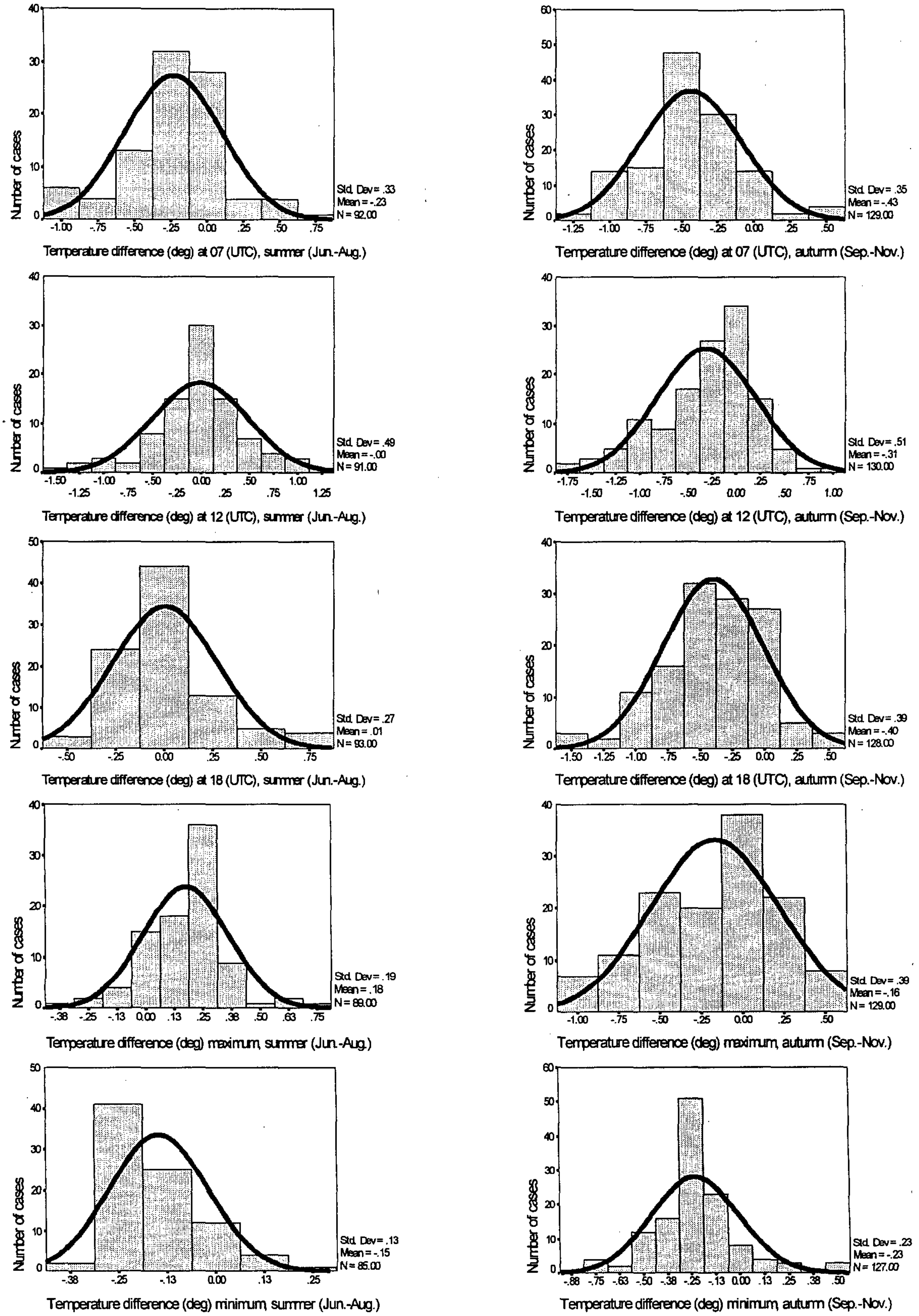


Fig. 3.2 Difference between automatically and manually observed temperatures at 80700 Glomfjord during the summer and autumn seasons. Data comprises the period 19 September 1997 - 26. October 1998. There are some missing values.

The temperature differences of the extremes seem to be smaller than those at the morning and evening observations. One explanation might therefore be that the discrepancies are caused by inaccurate observation times. The morning observation might have been taken too late and the evening observation too early. To come closer to this problem, the mean daily temperature curve was calculated by use of the hourly data from the automatic station. From this curve the temperature trends during the day are listed at the morning and evening observation hours, see table 3.2.

Table 3.2 Mean temperature differences between the observations at 08^h and 07^h (UTC) and between those at 18^h and 17^h (UTC).

	08^h - 07^h (UTC) °C	18^h - 17^h (UTC) °C
Winter	0.11	0.04
Spring	0.76	-0.27
Summer	1.03	-0.43
Autumn	0.35	-0.25

From the table is seen that the temperature increase in the morning and decrease in the evening is largest during summer. During winter, however, the mean temperature increase (decrease) is almost zero. Thus, in summer observations taken systematically too early or too late affect temperature to an intolerable degree while this is not necessarily true in winter. In the actual case the discrepancy between the automatic and manual station is largest in winter and smallest (or non-existent) in summer. Thus, inaccurate observation times do not seem to be a plausible explanation of the discrepancies.

In the screen there are an additional Pt sensor intended for control purposes. Its temperature data were compared with the official one and the follow regression equation was found:

$$Pt_{extra} = 0.999845 \bullet Pt_{ordinary} + 0.000079 \quad (°C). \quad r = 0.99997$$

We see of the equation and the scatter plot in Fig. 3.3 that the sensors are identical for any practical purpose. Thus, no drift in the official sensor hardly could have occurred since calibration. However, calibration errors can not be excluded as an possible explanation of the discrepancies. Systematic calibration errors effecting both Pt-elements could have occurred. Alternatively there could have been a drift of the mercury thermometer since its calibration. An abrupt shift could have occurred for example by a divided mercury string. However, in case of divided string, the differences could hardly be a function of temperature.

The temperature dependence of the differences between the Pt-element and the mercury thermometer was examined by use of the scatter plot shown in Fig. 3.4. The regression line is:

$$Pt = 1.003326 \bullet T_{mercury} - 0.312051 \quad (°C). \quad r = 0.99603$$

The equation estimates the mean difference between the two observation systems to be -0.36°C at -15°C and -0.26°C at +15°C, the automatically logged observations being the coldest ones. The trend in the difference amounts to 0.1°C only for a 30°C change of temperature. Divided string as the reason for the discrepancies is not likely, but can not be excluded. Though being small, the slope is significantly different from zero.

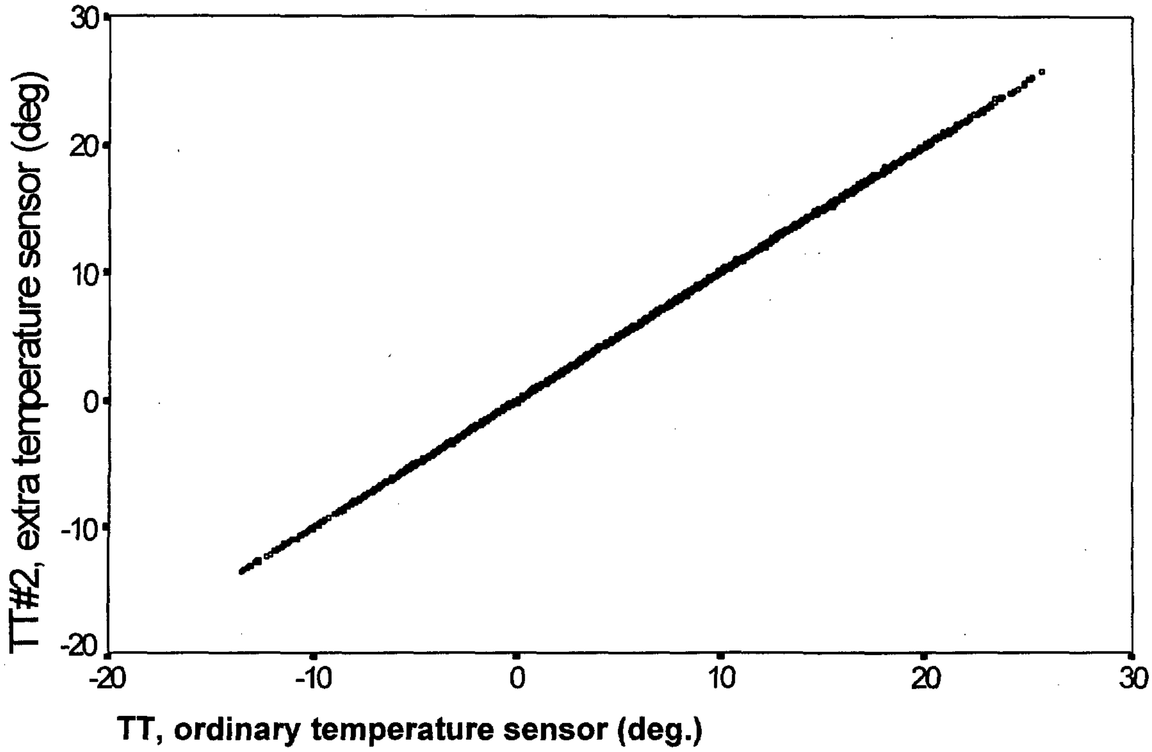


Fig. 3.3 Scatter plot of the ordinary sensor TT and the extra sensor TT#2 both situated inside the same screen at the station 80700 Glomfjord. No outlier is removed from the dataset.

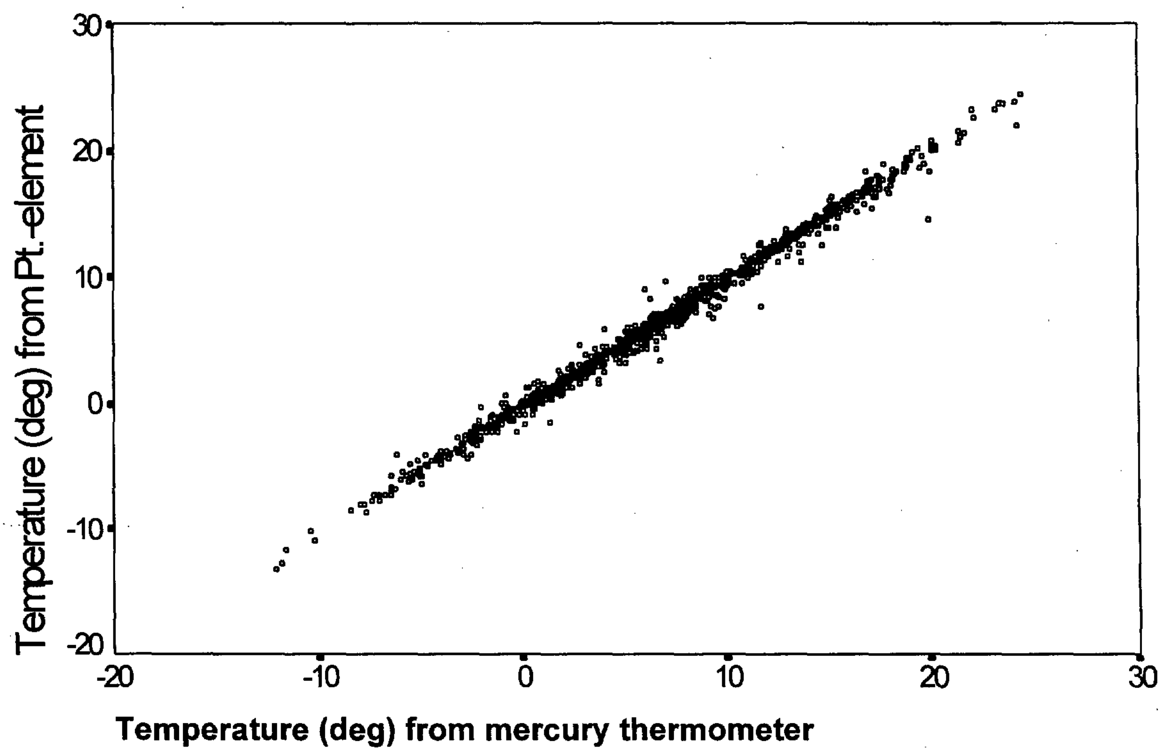


Fig. 3.4 Scatter plot of the automatically logged and manual observed temperature at 80700 Glomfjord. No outlier is removed from the dataset.

3.2 Relative humidity

The sensor for relative humidity are placed inside the free standing screen of the manual station. Suppose that the climate inside the screen does not differ spatially, the two instruments should measure the same humidity. However, humidity is a difficult weather element to measure accurately on routine basis. For instruments having been left at a station for some time, one is forced to tolerate a difference between them of several percents.

In this case the mean differences varies from 1.4% to 6.3%, with the highest values at the automatic stations, and the standard deviation varies from 6.0% to 7.2%. In autumn the mean difference is smaller and the standard deviation higher than in all other seasons.

In Fig. 3.5 is given a scatter plot of the observations together with a logarithmic regression curve that explains 88% of the variance. It is seen that the tendency of higher values at the automatic station applies through out the whole scale with an exception for very wet weather conditions, i.e. as the relative humidity approaches 100%.

Table 3.2 Mean relative humidity difference between the automatically and manually run stations at Glomfjord (automatic - manual) grouped by season.

	Winter	Spring	Summer	Autumn
Mean	5.6	6.3	4.4	1.4
Standard deviation	6.8	6.1	6.0	7.2

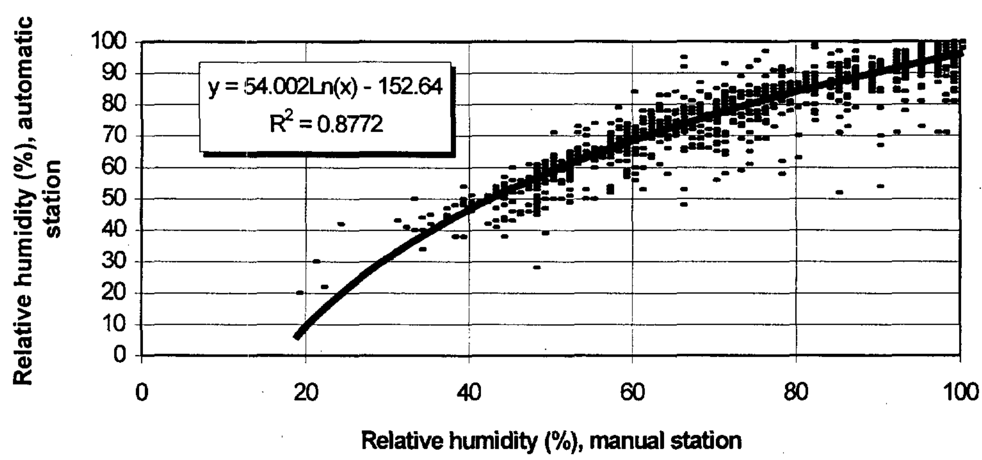


Fig. 3.5 Scatter plot of the automatically logged and manual observed relative humidity at 80700 Glomfjord. No outlier is removed from the dataset.

The difference between the automatically and manually run stations of about 6% in winter and spring is near the upper limit of what should be expected as the two instruments experience the same climate inside a common radiation screen. In summer and autumn the mean differences are lower than 5% and are well inside the tolerance interval.

3.3 Wind speed

At the manual station the wind speed is observed according to the Beaufort Scale. However, in our database each interval of the Beaufort Scale is converted to a fixed value in meter per second.

The wind sensor of the automatic station is placed at standard height, 10 m above the ground. The automation made it possible to pricompute a variety of wind parameters already at the station, e.g. maximum wind speed and maximum gust. The parameter that correspond to the Beaufort Scale is the mean wind during the last 10 minutes before observation time, and our comparison have to be restricted to this parameter only.

In Fig. 3.6 scatter plots of the wind speed from the two observational systems during the four seasons are shown together with the regression lines. These are:

$$FF_{aut} = 0.450 \bullet FF_{man} + 0.73 \text{ (m/s)}, \quad r = 0.78 \quad \text{(Winter)}$$
$$FF_{aut} = 0.438 \bullet FF_{man} + 0.79 \text{ (m/s)}, \quad r = 0.67 \quad \text{(Spring)}$$
$$FF_{aut} = 0.301 \bullet FF_{man} + 0.44 \text{ (m/s)}, \quad r = 0.71 \quad \text{(Summer)}$$
$$FF_{aut} = 0.478 \bullet FF_{man} + 0.39 \text{ (m/s)}, \quad r = 0.82 \quad \text{(Autumn)}$$

Here the wind speed from the automatic station, FF_{aut}, is chosen as predictand and the wind speed from the manual station, FF_{man}, as the predictor. The correlation varies from 0.67 in spring to 0.82 in winter.

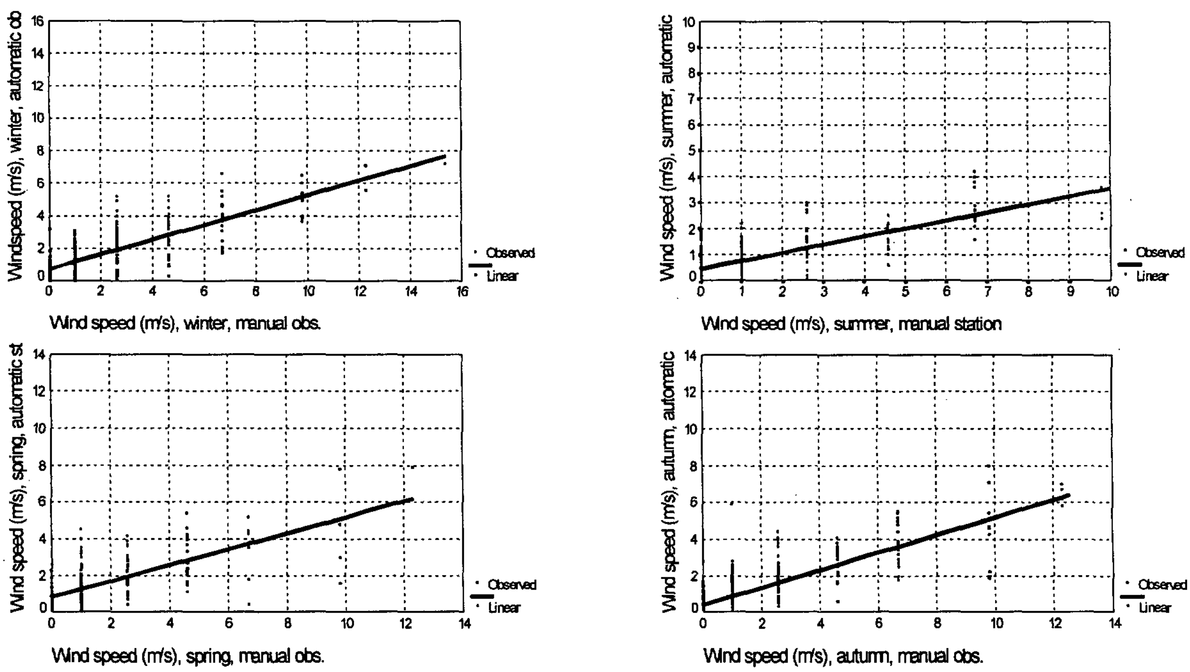


Fig. 3.6 Scatter plots of wind speed for the automatic station versus the manual one in the seasons winter (Dec.-Feb.), spring (Mar.-May), summer (Jun.- Aug.) and autumn (Sep.- Nov.). Computed regression lines are shown.

The remarkable feature of this comparison is the low regression coefficients for all regression lines, varying from 0.3 in summer to 0.5 in autumn. Only for very small wind speeds this is compensated for by the positive constant terms in the regression equations. For most of the actual wind scale the automatic sensor measures only the half or less of the wind speed of the manual station.

The manual station has not been equipped with any instrument for wind speed measurements. Thus, the observers have to rely on the effects the wind has on the trees, on the smoke from the chimneys and probably also on the waves on the fjord's surface. The observation site is surrounded by high birch trees which have a sheltering effect. These shelter the automatic sensor and the wind speed is therefore biased too low compared to the wind speed at a free site. The manual observers, however, use the effect of the wind at a much larger area than the sensor mast and may see some effects of wind that is not too much slowed down of air turbulence.

One should of course be sceptical about manual non-instrumental observations. However, in this case the difference is too large to be ascribed to wrong use of the Beaufort Scale. The difference may be plausibly explained by the sheltering of the wind sensor by high birch trees.

3.4 Wind direction

The relative frequencies of wind direction are calculated for 12 wind sectors shown in Fig. 3.7 in the form of a "wind rose". The data are grouped by season for both the manual and the automatic stations. The agreement between the two observational systems is quite good in summer apart from the fact that the observers do not seem to use the entire variety of directions (36 at all). Some directions do not seem to have been used or are used very seldom. In spring there is a tendency that the observers notice westerly winds more often than are recorded by the automatic station.

However, the great discrepancy between the different observational systems occurs in winter and autumn. Northerly winds are the most commonly recorded direction at the automatic station but seldom observed at the manual one.

The terrain at the station is sloping to the south and in many occasions a shallow drainage flow of cold air is set up during winter and autumn. Thus, the high frequency of northerly winds at the automatic station may be ascribed to this air flow. The manual observers, however, may use a larger scale for their wind observations.

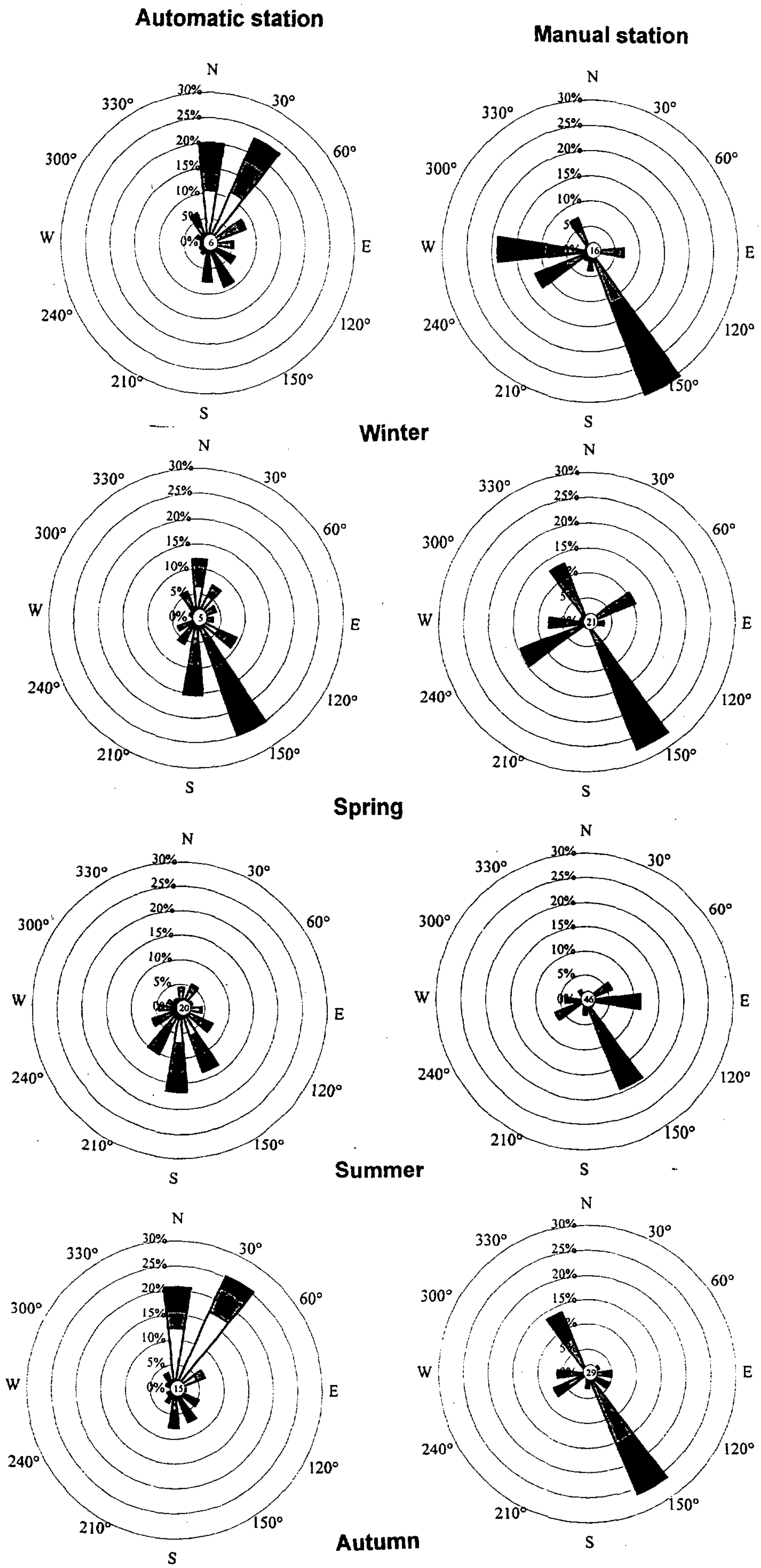
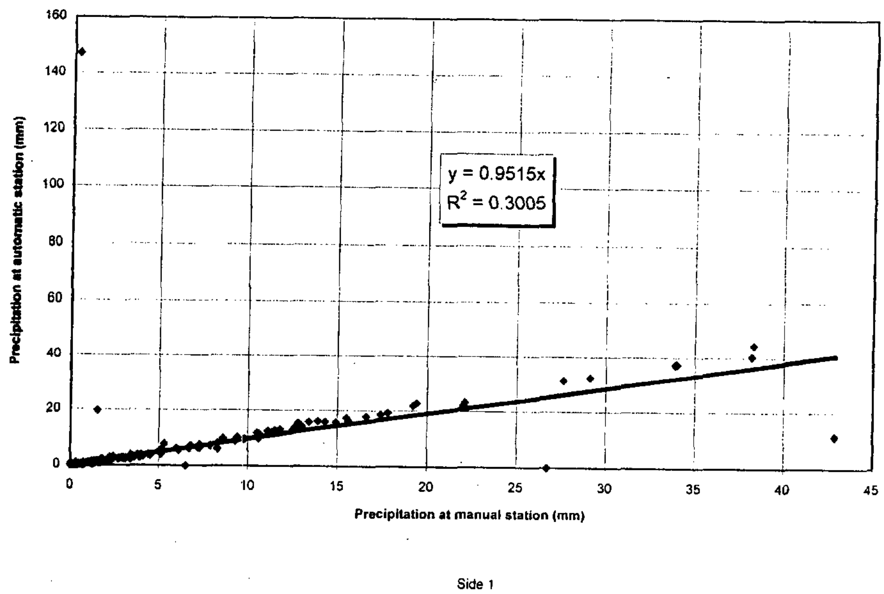


Fig. 3.7. Relative frequency of 12 wind sectors shown as wind roses. The directions at the automatic station are shown in the left column and at the manual station in the right column. The seasons are winter (Dec.-Jan.), spring (Mar.-May), summer (Jun.-Jul.), and autumn (Sep.-Nov.).

3.5 Precipitation

Precipitation measurements at the automatic station is available to us from 1 Mars 1998, hourly observations. At the manual station precipitation is measured only once a day, at the morning observation at 07 UTC. For comparison reasons the 24 hours precipitation at the automatic station is also calculated for the corresponding time interval, 07^h - 07^h UTC.

Scatter plot furnished with a trend line fixed at the zero point is shown in Fig. 3.8a for the 24 hours precipitation. Only 30% of the variance is explained by the regression but apart from some outliers the plotting might be quite well represented by a regression line. The outliers are listed in table 3.3.



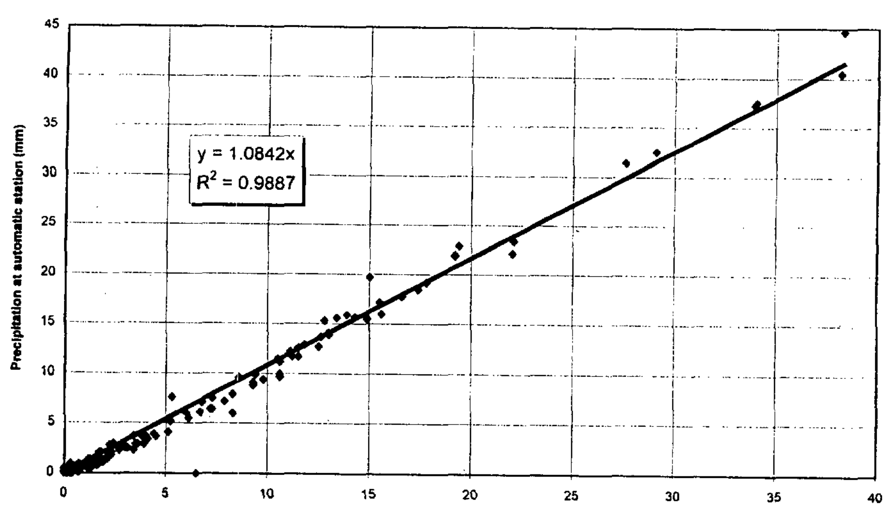


Fig. 3.8 a) Scatter plot of automatically observed against manually observed precipitation at the 80700 Glomfjord. a) All data. b) Four outliers removed or corrected.

Table 3.3. Outliers in the scatter plot in Fig. 3.8a of automatically observed against manually observed precipitation at the 80700 Glomfjord.

Year	Month	Day	Manual station	Automatic station
1998	3	19	1.5	19.7
1998	3	21	42.9	11.5
1998	3	22	26.7	0
1998	3	28	0.3	147.2

It was readily seen that the outlier at 19 Mars origins from a misinterpretation of a decimal point in the diary of the manual station. The figure should have been 15.0 mm rather than 1.5 mm. The other outliers seem to have been caused by a malfunction of the automatic station. After having corrected the decimal point and removed the other outliers, the data were replotted, see Fig. 3.8b. Now 99% of the variance is explained by the regression.

The slope coefficient of the regression line is larger than one, indicating that the automatic station gets more precipitation than the manual one. The precipitation sum for the entire period amounts to 834.6 mm for the manual station and 925.2 mm for the automatic station (the outliers removed) or a surplus for the automatic station of 30.6 mm corresponding to 3.7%. The precipitation was mainly rain in the period of comparison.

The reason for the difference might be either instrumental or it may be caused by spatial differences by the two measuring sites.

3.6 Snow depth

The snow depth sensor did not function at the station during the comparison period, Mars - October 1998.

4 Conclusions

Temperature: The automatically logged temperatures are significantly lower than those read manually during winter, spring and autumn. During summer, however, the difference is tolerable from a climatological point of view. The reason for the significant differences is unknown. Analyses show that it is not likely that inaccurate observation time is the reason.

The difference is large enough to make the temperature time series from the station inhomogenous if a swift over from manual to automatic station is implemented as intended for the 80700 Glomfjord long term series. The Glomfjord series is also intended to serve as a reference series for an ongoing investigation of the temperature climate at Holandsfjord in connection with an evaluation of the impact of the Storglomfjord water course regulation.

Thus, the reason for the discrepancy should be found by control of the sensor, the thermometer and also the temperature recording system. The manual station should be run until sensor/thermometer is recalibrated and the differences are within a tolerance interval.

Relative humidity: The difference between the automatically and manually run stations of about 6% in winter and spring is near the upper limit of what should be expected as the two instruments experience the same climate inside a common radiation screen. In summer and autumn the mean differences are lower and are well inside the tolerance interval.

Wind speed:: The wind speed at the automatic station amounts to only the halves or less of the wind at the manual station. This may be due to the sheltering effect of high birch trees at the measuring site of the automatic station.

Wind direction:: During winter and autumn the distribution of wind directions are very different at the automatic and manual stations. At the automatic station northerly winds are common while at the manual station these directions are seldom observed. In spring and summer the agreement is quite good.

Precipitation: An unknown malfunction of the precipitation sensor of the automatic station led to three huge outliers detected when compared with the manual station. On the other hand one large error was also detected in the data set of the manual station. With four outliers corrected or removed the data from the automatic station seemed to be reliable. Because of quite different sites, the two stations is not expected to measure the same amount of precipitation. In the comparison period the difference was 3.7% mainly for liquid precipitation.

Snow depth: The snow depth sensor did not function at the station during the whole comparison period, Mars - October 1998.

5 References

Førland, E.J. Hanssen-Bauer, I. 1992: Analyse av lange nedbørserier. DNMI-klima, rapport nr. 1/92.

Nordli, P.Ø., H. Alexandersson, P. Frich, E. Førland, R. Heino, T Jónsson, O. E. Tveito. 1997: The effect of radiation screens on Nordic time series of mean temperature. *Int. Journal of Climatology.* **17**, 1667-1681.

Nordli, P.Ø. 1997: Homogenitetstesting av norske temperaturseriar II. *DNMI-raport*, Nr. 29/97Klima, 1-43.

Nordli, P.Ø. & Halvorsen, B. H. 1999. Klimaundersøkelser for Statkraft 1998. Statusrapport for Storglomfjordutbyggingen. *DNMI-rapport*. Rapport nr. 05/99Klima, Oslo, 5 pp.

6 Norsk oppsummering, diskusjon og konklusjonar

6.1 Innleiing

Glomfjord klimastasjon ligg inst i Glomfjorden i Meløy kommune sør for Bodø. Stasjonen er den eldste i området. Han har i det vesentlege stått uendra sidan starten i 1916. Stasjonen er såleis verdfull for studiet av klimaendringar og klimavariasjon. Han tener òg som referansestasjon for undersøkingar i Holandsfjord for eventuelle verknader på grunn av endra utbreiing av fjordis der som ei fylgje av Storglomfjord kraftverk. Om dette sjå statusrapporten for Storglomfjordutbygginga (Nordli & Halvorsen 1999).

Den 19. september 1997 vart det sett i drift automatiske mælingar i Glomfjord på same staden som den manuelle stasjonen. Følarane for temperatur og relativ råme vart sette inn i standard-hytta, MI-46.

Det er om lag 100 m mellom stadene for nedbør- og snødjupne-mælingar på den automatiske og den manuelle stasjonen.

Når det gjeld vind, finst det ikkje instrument på den manuelle stasjonen, medan den automatiske er utstyrt med ei 10 m høg vindmast både for vindfarts- og vindretnings-mælingar.

På den manuelle stasjonen blir det observert snødekke, skyer og vêr. Dette er observasjonar som den automatiske stasjonen ikkje har.

6.2 Jamføringsresultat

Temperatur: Sidan følaren står inn i hytta saman med termometra, skulle ein vente at det ikkje var anna skilnader mellom følar og termometer enn støy. Dette skulle gje svært liten skilnad i middelverdi over lengre tidsrom. Men det viste seg at dei automatisk logga temperaturane var systematisk lågare enn dei manuelt observerte om vinteren, våren og hausten. Om sommaren derimot, var ikkje skilnadene større enn at dei var akseptable frå ein klimatologisk synsstad. Årsaka til skilnadene er ikkje funne, det kan anten vera feilkalibrering av følaren, eller om enn mindre sannsynleg, drift eller feilkalibrering av hovudtermometeret på stasjonen.

Differansen er stor nok til å gjera temperaturserien frå stasjonen inhomogen dersom ein går over frå manuell til automatisk registrerte temperaturar i klimadataserien.

Vidare tener stasjonen som allereie nemnt som referanse for granskingar av klimaverknadene av Storglomfjord-utbygginga. Endring av temperaturreferansen kan skape vanskar for undersøkingane.

Relativ råme: Også følaren for relativ råme var plassert inni hytte MI-46 saman med det manuelle instrumentet. Dei to følarane skulle då i prinsippet vise det same når ein ser bort frå støy. Men råme er eit vanskeleg vêrelement å mæle og i praksis viser det seg at skilnadene mellom ulike instrument fort kan koma opp i fleire prosent.

I det aktuelle tilfellet var middeldifferansen mellom det automatisk registrerte og det manuelt observerte 6% om vinteren og våren. Det er nær opp til grensa for det akseptable. Om våren og sommaren var middeldifferansen godt innafor toleransegrensa.

Vindfart: Vindfarten på den automatiske stasjonen var berre om lag halvparten av det som vart observert etter skjønn på den manuelle utan bruk av instrument. Ved bruk av så ulike observasjonssystem, må ein vente at det blir skilnader. Men i dette tilfelle var skilnadene uvanleg store.

Ein kan ikkje utan vidare seia at det eine er rett og det andre gale. Den automatiske stasjonen har ei vindmast som står mellom høge bjørketre og er dermed skjerma. Observatørane derimot brukar Beauforts vindskala som legg til grunn verknader av vinden ved fastsetjing av styrkegraden. Det er rimeleg at dei ser på verknadene av vind som ikkje fyrst er bremsa av bjørketrea. Det er heller verknaden av vinden på bjørketrea som blir observert. Ein kan heller ikkje sjå bort frå at dei brukar bylgjene på fjorden som indikator for vinden.

Vindretning: Om vinteren og hausten er fordelinga av vindretningane svært ulike for den automatiske og manuelle stasjonen. Nordlege vindar er vanlege på automatstasjonen, men er sjeldan observerte på den manuelle. Om våren og sommaren er samsvaret mellom stasjonane tolleg bra.

Årsaka til skilnadene vinter og haust kan vera kaldluftsdrenasje nedover skråninga stasjonen står i. At ikkje slik vind er vanleg på den manuelle stasjonen, kan koma av at observatørane ikkje er så bundne til sjølve observasjonsstaden, men ser verknaden på området rundt seg, t.d. på fjorden.

Nedbør: På den automatiske stasjonen var nedbørmælaren av typen Geonor. I laupet av dataperioden frå februar til oktober, fanst 3 grove feilobservasjonar. Årsaka til desse er uviss.

Ved gjennomgåing av dagboka for den manuelle stasjonen, synte det seg at desimalteiknet var feiltolka av DNMI. Det førte til at det vart registrert 13,5 mm for lite nedbør i DNMIs database. Dette er no retta.

Med desse feila korrigerte, tyktest observert nedbør både på den automatiske og den manuelle stasjonen å falle vel inn i ein lineær samanheng. Nedbøren på den automatiske stasjonen var 3,7% høgre enn på den manuelle. I jamføringsperioden fall det meste av nedbøren som regn. Sidan både oppstillingane og instrumenta er ulike, er ikkje skilnadene mellom stasjonane større enn det ein kunne vente.

Snødjupn: Alle observasjonane av snødjupn på den automatiske stasjonen vart forkasta som heilt ubrukbare. Instrumentet fungerte ikkje nokon gong i jamføringsperioden februar - oktober 1998.

6.3 Forslag til forbetring

Avvika mellom temperaturfølaren på den automatiske stasjonen og hovudtermometeret på den manuelle viser at det på minst ein av stasjonane må vera ein feil. Årsaka bør finnast så snart som råd ved ei reise oppover til stasjonen gjorde av kompetente personar. I denne samanhengen bør kalibreringa på følar og instrument for relativ råme også sjekkast.

Instrumentet for snødjupn fungerer ikkje og må skiftast ut.

Den automatiske nedbørmælaren hadde 3 alvorlege mælefeil gjennom jamføringsperioden og bør fylgjast nøye opp framover. Jamføringane som vart gjorde så langt, gjeld mest for regn med berre få tilfelle av snø. Jamføringsperioden er altfor stutt for å finne nokon sikker samanheng mellom automatisk og manuell stasjon.

Både vindfart og retning på vinden skil seg mykje frå det manuelt observerte. Omrekning frå eitt systen til eit anna ser ein ikkje som føremålstenleg.

6.4 Forslag til avvikling av den manuelle stasjonen

Feilsøking og utbetring bør skje så raskt som mogleg. Ein bør analysere temperatur- og snødjupnedata på nytt for å sjå om utbetringa har vore vellukka.

Dersom utbetringane har vore vellukka, kan den manuelle stasjonen leggjast ned. Den nye evalueringsperioden bør vera på minst 6 månader etter at utbetringa er gjort. Tidlegast kan dermed den manuelle vêrstasjonen leggjast ned ut på ettersommaren 1999.

Når det gjeld nedbøren, er jamføringsperioden altfor stutt. Vi foreslår difor at evalueringsperioden blir forlenga. Dette kan gjerast ved å halde fram med nedbørmælingane på den manuelle stasjonen. Eller i praksis:

I det den manuelle vêrstasjonen blir avvikla, blir ein manuell nedbørstasjon 80700 Glomfjord sett i drift. Drifta varar til evalueringa av den automatiske nedbørmælinga er ferdig.

Ein nedbørstasjon inneber berre ein morgonobservasjon mot tre på vêrstasjonen, slik at kostnadene i høve til den noverande manuelle stasjonen blir reduserte til ein tredjedel eller kanskje mindre.