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METEOROLOGICAL DATA FROM THE AURORA PROGRAMME JANUARY - JUNE 1993

INGER HANSSEN-BAUER

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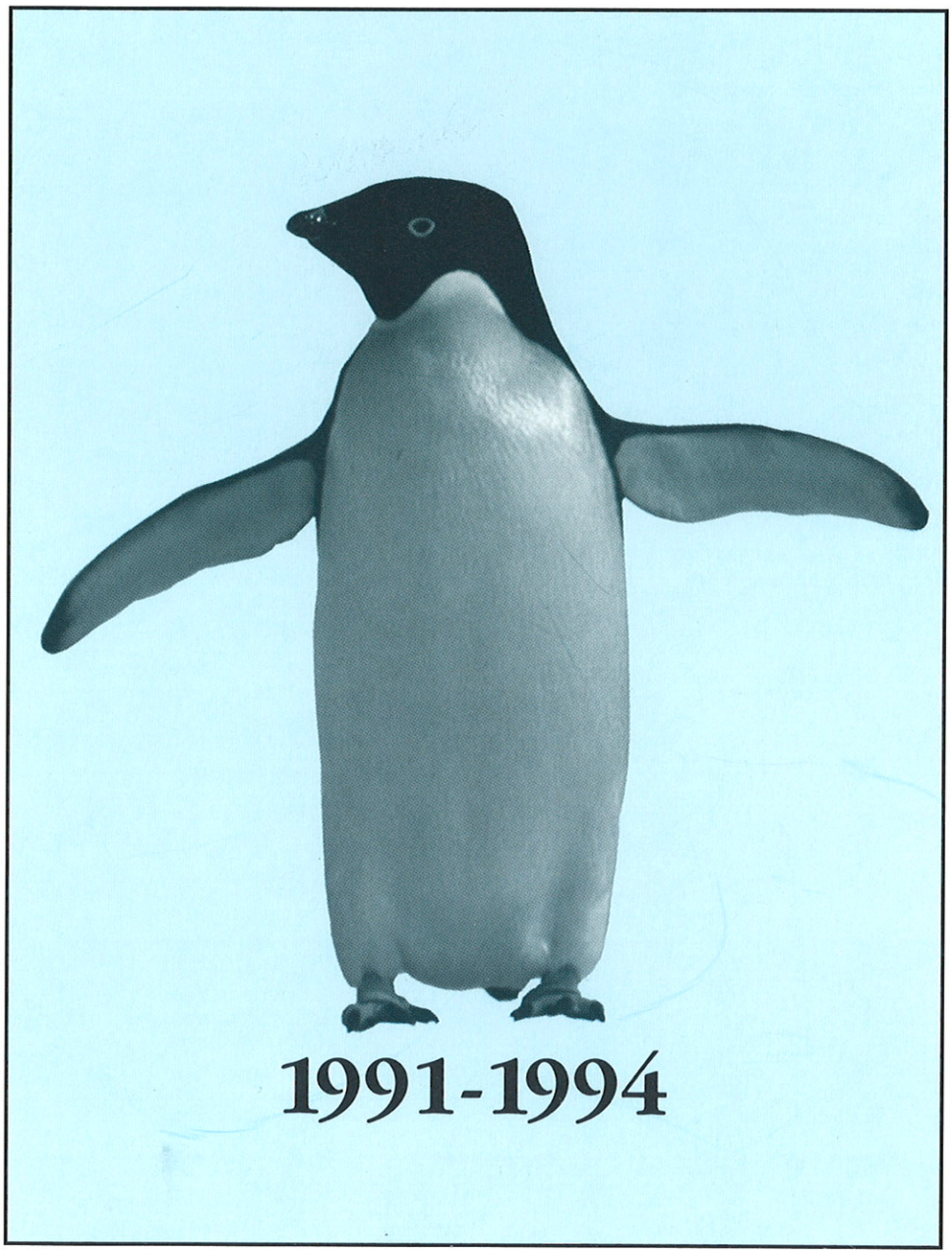

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UTARBEIDET AV

I. Hanssen-Bauer

OPPDRAGSGIVER

DNMI - KLIMAAVDELINGEN

SAMMENDRAG

The present data report contains time series for the period January -June 1993 of meteorological parameters measured at "New Haven" and "Troll" in Antarctica. Some preliminary statistics are presented. The station at "Snowhenge" was replaced with a non-transmitting type. Data from this station will be published after the field season 1993-94.

UNDERSKRIFT

Inger Hanssen-Bauer
SAKSBEHANDLER

Bjørn Aune
FAGSJEF

METEOROLOGICAL DATA FROM THE AURORA PROGRAMME JANUARY - JUNE 1993

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1. INTRODUCTION

The present data report covers meteorological data transmitted via the Argos system from the Aurora stations and from the Norwegian automatic station at Troll (figure 1), during the period January - June 1993. The data presented in the report are available on ASCII-files and as SAS-datasets. Data from the Aurora stations are free of charge for Aurora programme participants, while others will have to pay handling charges for this information. Further information about the stations and the data handling were given in the data report for the period February - June 1992 (Hanssen-Bauer, 1992a).

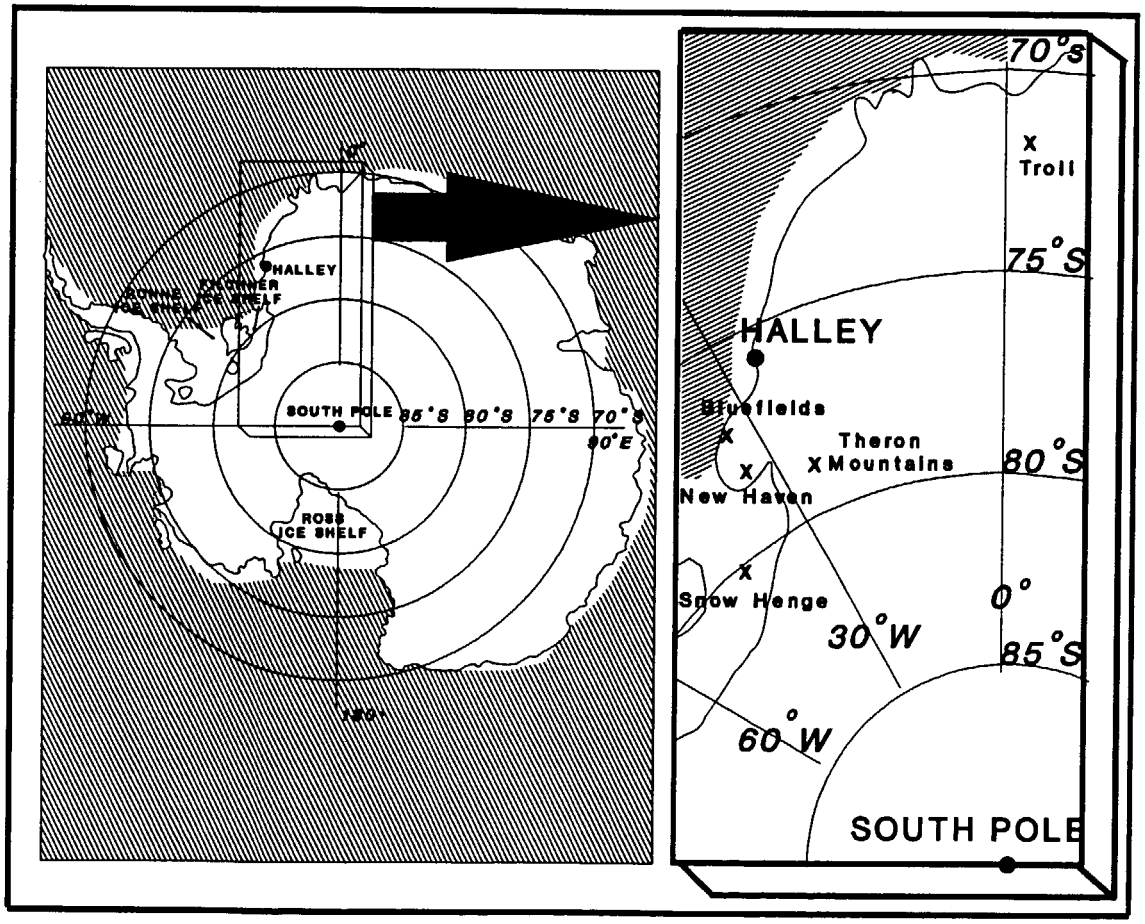

Figure 1. Map of Antarctica (left) and of the station area (right).

2. AVAILABLE DATA JANUARY - JUNE 1993.

2.1 Snowhenge.

Because of problems with temperature measurements at Snowhenge during 1992 (Hanssen-Bauer 1992a and 1993), a new station was established at January 8 1993 (Pedersen, 1993). The wind sensors (speed and direction) from the old Snowhenge station were transferred to the new one, but new sensors were installed for measuring Tg (snow temperature 8.1 m below surface) and Ta (air temperature). Data from the new station are only stored locally, and they will be published after next field season, together with the 1993-data from Blåenga.

The old station was, however left at the site, and the capsules internal temperature (Ti) and air pressure (p) were transmitted via Argos during January and February. These data are presented here, as well as wind data for January 1-8. Note that the capsule was covered by snow until the field party dug at out at January 8 (Pedersen, 1993). The temperatures measured before this date are thus not actually air temperature.

2.2 New Haven.

New Haven was closed down at January 17 1993 (Pedersen, 1993). The temperature have been missing for some time, and only air pressure data for the first part of January are available.

2.3 Theron Mountains.

All data from this station are available, i.e. internal temperature of the capsule (Ti), maximum and minimum temperature every 12th hour (Tx and Tn) and air pressure (p). This capsule was not visited during the field season 1992-93, but the temperature measurements do not indicate that it has been

buried by snow. In accordance with measurements from December 1992, however, they clearly indicate the presence of a radiation error around local midday in the summer.

2.4 Troll.

Air pressure and internal temperature of the capsule are available at this station. In January, the capsule was replaced by a new one by the Norwegian Polar Institute. The old capsule was not covered by snow (Jon Ove Hagen pers. comm.). There is, however, probably a radiation error in the middle of sunny summer days at this station.

3. PRESENTATION OF DATA FROM JANUARY-JUNE 1993

3.1 Monthly means and extreme values.

Table 1 shows monthly mean values and extreme values for some of the measured variables. January was the warmest month recorded so far at Snowhenge and Troll. At Theron Mountains, however, the mean temperature was higher in December 1992 (Hanssen-Bauer 1993). It is not clear if this is caused by the radiation error or if it is real. At Halley (fig. 1), January is normally the warmest month , but the average January temperature for the period 1957-89 is only 0.6°C above the average December temperature (Hanssen-Bauer, 1992b).

There are no major differences between the temperature averages observed so far in 1993 and those observed in first part of 1992.

The highest maximum temperatures observed at Theron Mountains in January and February are **not** representative for the air temperature. As for the high Tmax values in the end of 1992, they are caused by radiation error.

Table 1. Some monthly mean and extreme values.

PARAMETER	STATION	JAN	FEB	MAR	APR	MAY	JUN
MEAN AIR TEMPE-RATURE	SNOWHENGE	-7.3	-17.3	-	-	-	-
	THERON M.	-7.3	-14.5	-19.8	-24.6	-25.0	-29.8
	TROLL	-4.2	-9.8	-16.7	-20.9	-21.7	-21.9
HIGHEST MAX.TEMP.	THERON M.	7.8	4.6	-9.2	-13.4	-13.1	-12.7
LOWEST MIN.TEMP.	THERON M.	-22.9	-31.1	-35.7	-42.4	-39.2	-43.1
MEAN AIR PRESSURE	SNOWHENGE	988.3	978.4	-	-	-	-
	NEW HAVEN	934.2*	-	-	-	-	
	THERON M.	894.8	884.3	881.8	885.4	877.2	878.2
	TROLL	846.9	835.8	835.2	835.7	832.7	832.5
MEAN WIND SPEED	SNOWHENGE	4.2**	-	-	3.4	4.0	3.2

* New Haven: Station closed down at January 17 1993.
** Snowhenge: Wind transferred to new station at January 8.

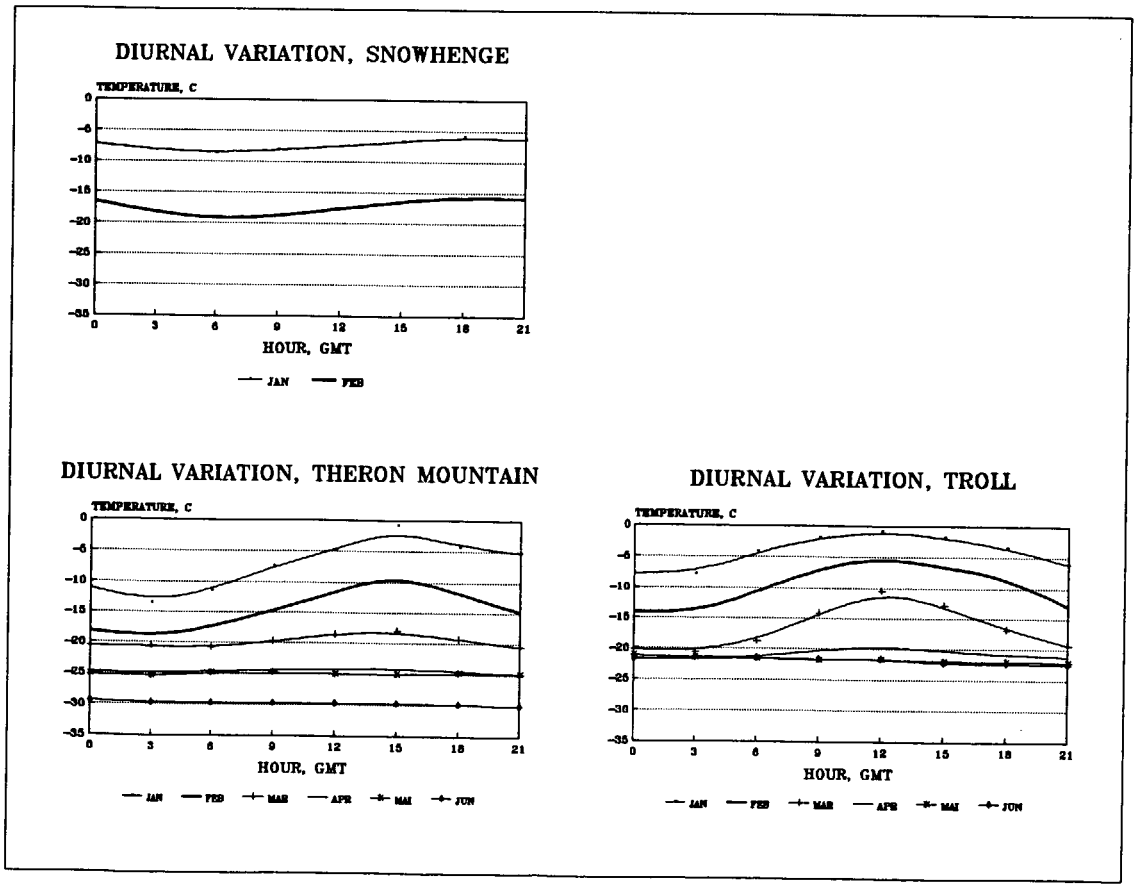

Figure 2. Diurnal temperature variation at each station.

The average diurnal temperature variation for each month, and at the different stations are shown in figure 2. At Snowhenge, the average January amplitude is about half the expected value. The reason for this is that the capsule was buried by snow the first 8 days of the month.

At Theron Mountains, the diurnal temperature amplitudes for January and February are more than twice the similar long term monthly averages at Halley (Hanssen-Bauer, 1992b). This is somewhat more than expected, and it is certainly the result of the radiation error mentioned earlier.

The monthly averaged diurnal temperature amplitudes at Troll for January and February are roughly 2 times the long term mean amplitudes for the same months at Halley . This is reasonable, and indicated that the effect of an eventual radiation error has been small during these months. The value for march is, however, considerably larger than expected. The reason for this is not clear.

3.2 Time series.

Figure 3a shows time series of temperature from all stations during January 1.-15. 1993. Figure 3b shows series of air pressure from all stations during the same period. Figures 3c and d show wind speed and direction, respectivly, at Snowhenge for january 1.-8. Figures 4 to 14 show time series of temperature (a) and air pressure (b) respectively, for the rest of the period treated by this report.

3.3 Correlation analysis - temperature.

Correlation coefficients were computed between the temperature series at the different stations for every month separately, and for the whole period (table 2). To avoid "noise" because

of differences in diurnal variation, daily mean temperatures were used in these analyses. As long as temperature was measured at Snowhenge, the temperature at Theron Mountains was better correlated to this temperature than to the temperature at Troll. This is in accordance with earlier results. The correlation coefficients for individual months vary, however, considerably.

Table 2. Pearson correlation coefficients between daily mean temperatures at different stations for individual months and for the whole period February-June.

STATION:		SNOWHENGE	THERON M.	TROLL
PERIOD	STATION			
JAN	SNOWHENGE	1.00	0.47	0.29
	THERON M.	0.47	1.00	-0.07
	TROLL	0.29	-0.07	1.00
FEB	SNOWHENGE	1.00	0.90	0.80
	THERON M.	0.90	1.00	0.63
	TROLL	0.80	0.63	1.00
MAR	THERON M.	.	1.00	0.08
	TROLL	.	0.08	1.00
APR	THERON M.	.	1.00	0.71
	TROLL	.	0.71	1.00
MAY	THERON M.	.	1.00	0.48
	TROLL	.	0.48	1.00
JUN	THERON M.	.	1.00	0.44
	TROLL	.	0.44	1.00
JAN	SNOWHENGE	1.00	0.89*	0.84*
-	THERON M.	0.89*	1.00	0.81
JUN	TROLL	0.84*	0.81	1.00

* Correlation coefficients based on shorter period.

3.4 Correlation analysis - air pressure.

Table 3 shows that air pressure is very well correlated at Snowhenge, New Haven and Theron Mountains (R=0.89-0.98). The correlation coefficients between the pressure at these stations and the pressure at the more distant station Troll are lower. This is in accordance with earlier results.

Table 3. Pearson correlation coefficients between air pressure at different stations for individual months and for the whole period February-June.

	STATION	SNOWHENGE	NEW HAVEN	THERON M.	TROLL
PERIOD	STATION				
JAN	SNOWHENGE	1.00	0.96	0.96	0.83
	NEW HAVEN	0.96	1.00	0.98	0.86
	THERON M.	0.96	0.98	1.00	0.75
	TROLL	0.83	0.84	0.75	1.00
FEB	SNOWHENGE	1.00	.	0.89	0.64
	THERON	0.89	.	1.00	0.85
	TROLL	0.64	.	0.85	1.00
MAR	THERON	.	.	1.00	0.79
	TROLL	.	.	0.79	1.00
APR	THERON	.	.	1.00	0.26
	TROLL	.	.	0.26	1.00
MAY	THERON	.	.	1.00	0.48
	TROLL	.	.	0.48	1.00
JUN	THERON	.	.	1.00	0.76
	TROLL	.	.	0.76	1.00
JAN - JUN	SNOWHENGE	1.00	0.95*	0.96*	0.84*
	NEW HAVEN	0.95*	1.00	0.98*	0.75*
	THERON	0.96*	0.98*	1.00	0.75
	TROLL	0.84*	0.75*	0.75	1.00

* Correlation coefficients based on shorter period.

4. FINAL REMARKS

This report is mainly a data report from the stations Theron Mountains and Troll. The statisical analyses conducted should be considered as preliminary. Further analyses of the data set will be done later, when longer time series and data from other stations (Blåenga, Snowhenge and Halley) are available.

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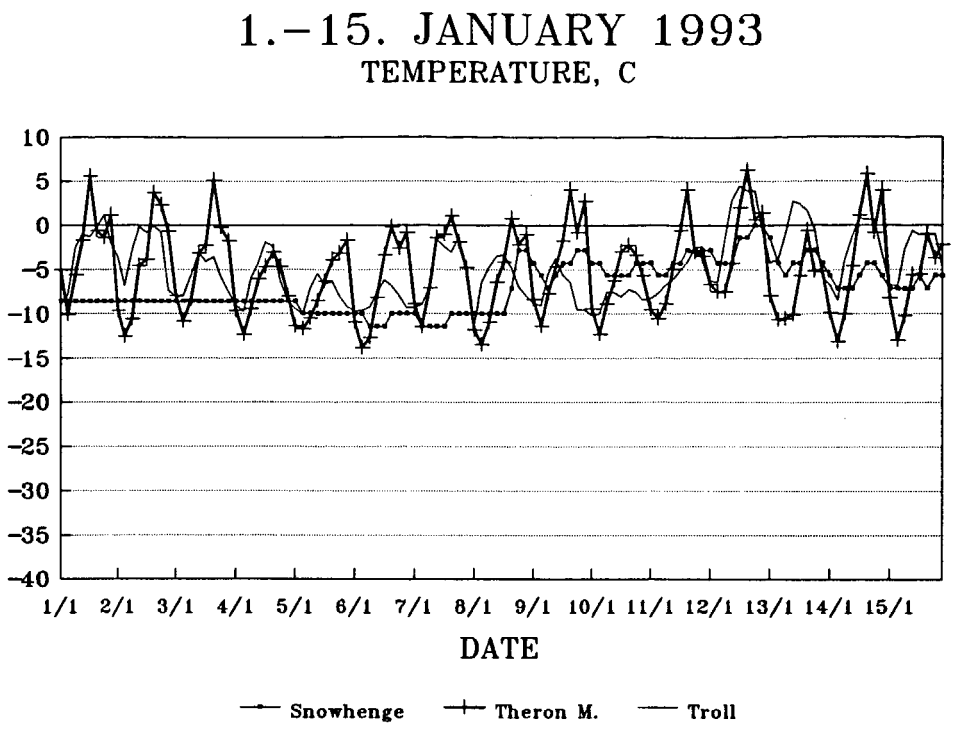


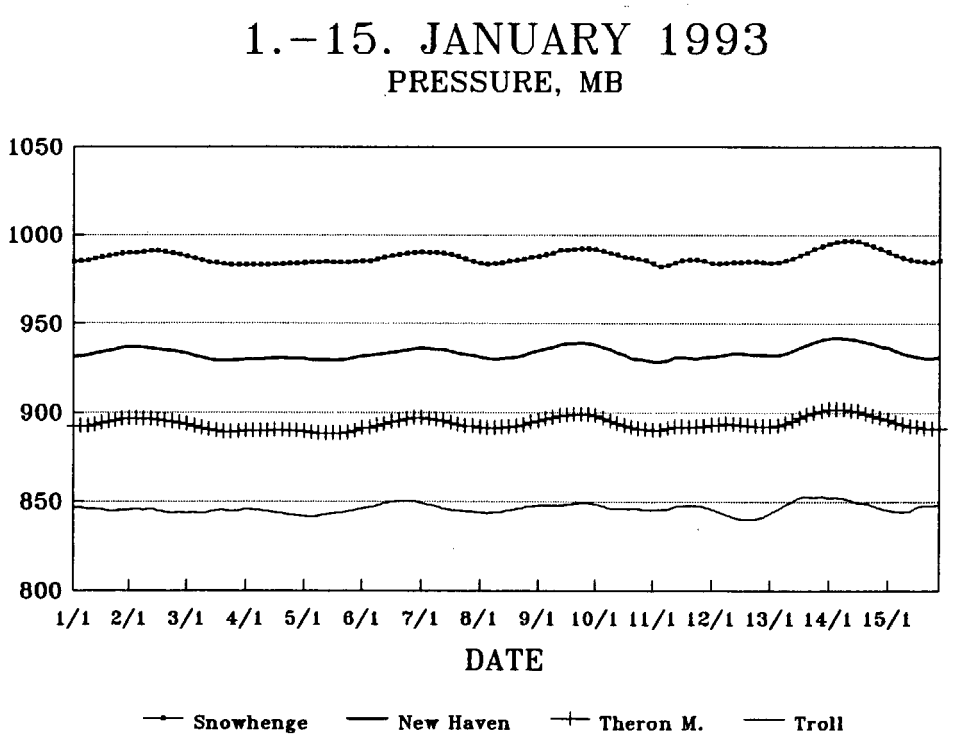
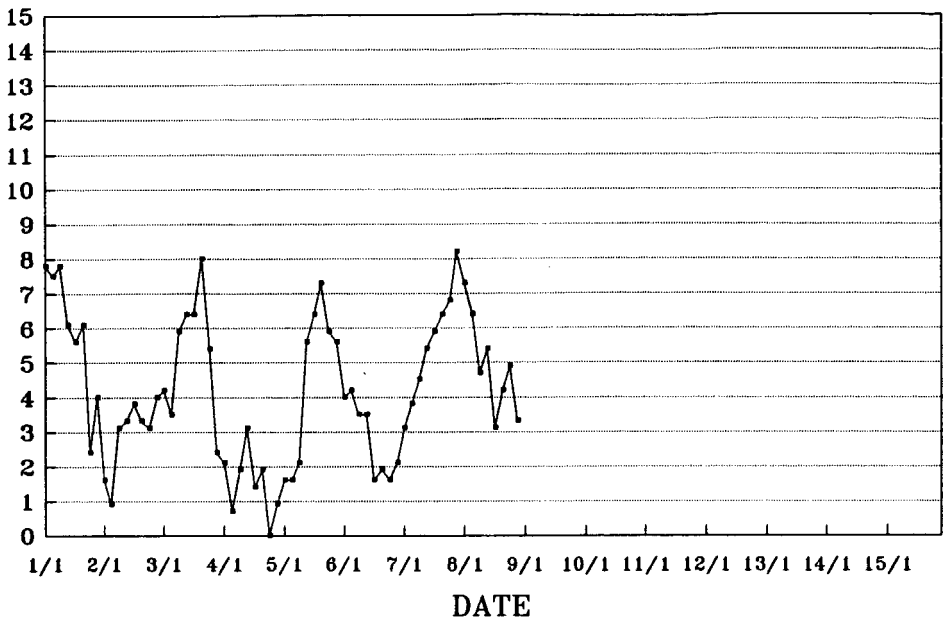


Figure 3. Time series of temperature (a) and air pressure (b) from all stations January 1 - 15 1993.



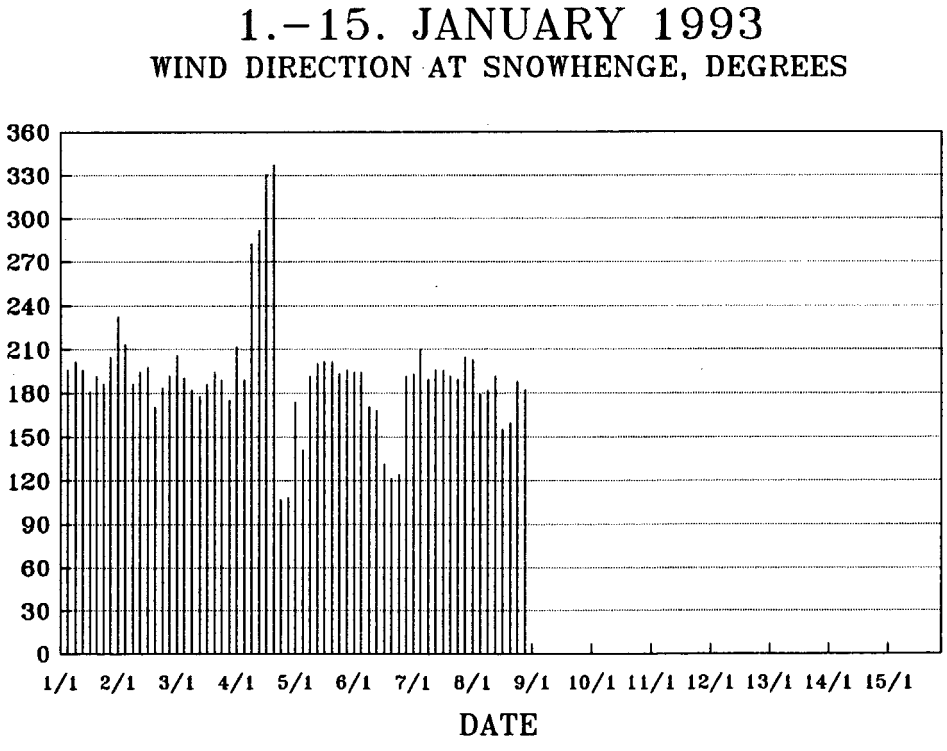
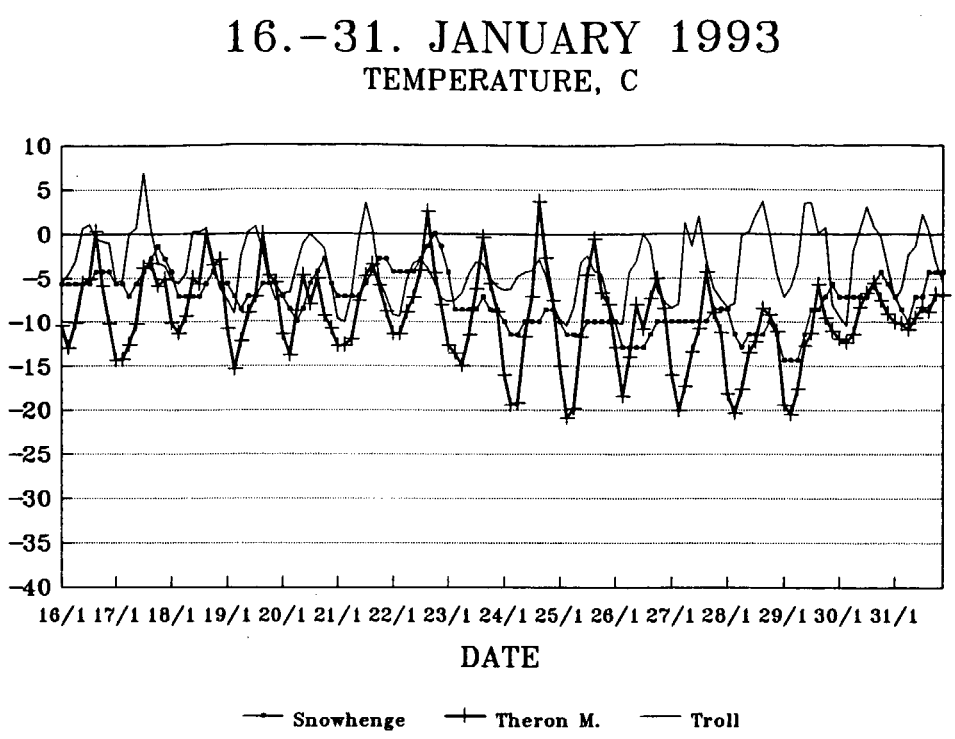


Figure 3.(cont.) **Time series of** wind speed (c) **and direction (d) from Snowhenge** January 1 - 8 **1993.**



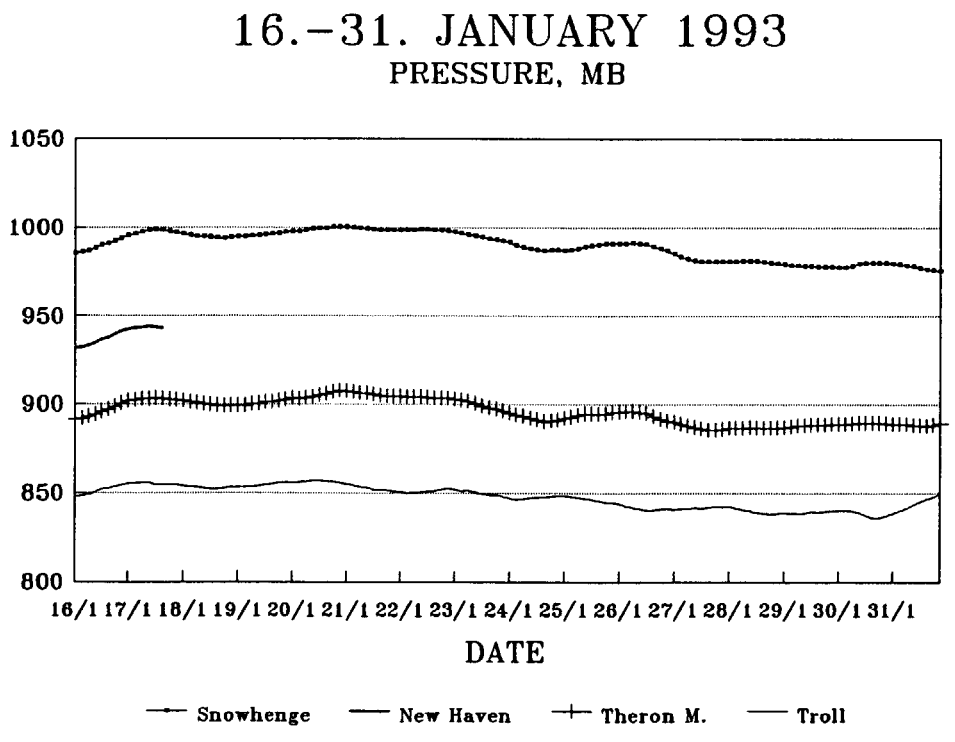
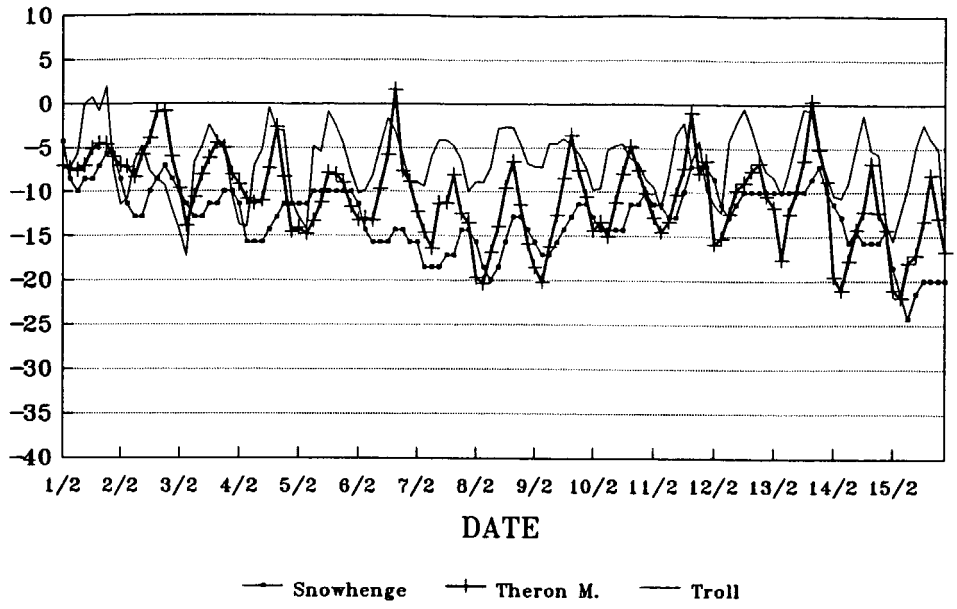


Figure 4. Time series of temperature (a) and air pressure (b) from all stations January 16 - 31 1993.



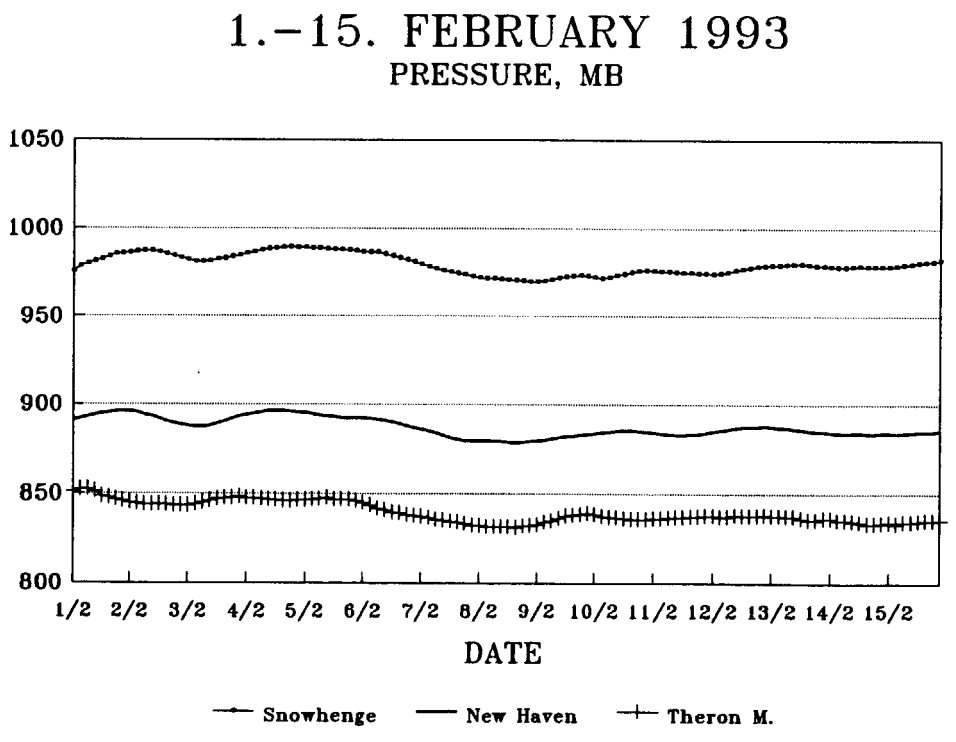
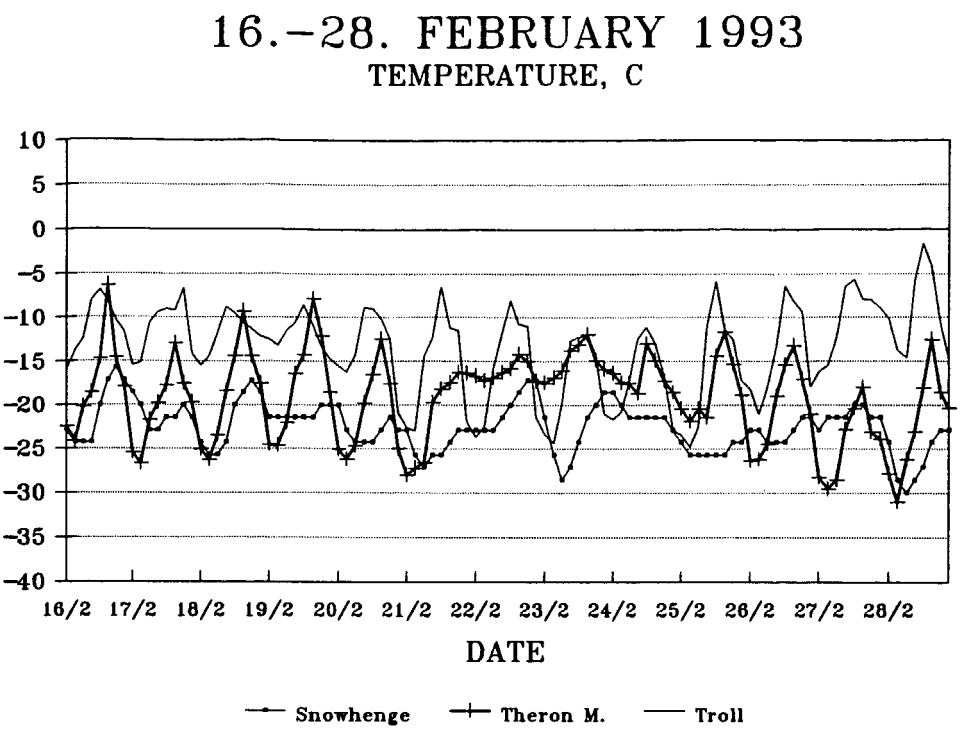


Figure 5. Time series of temperature (a) and air pressure (b) from all stations February 1 - 15 1993.



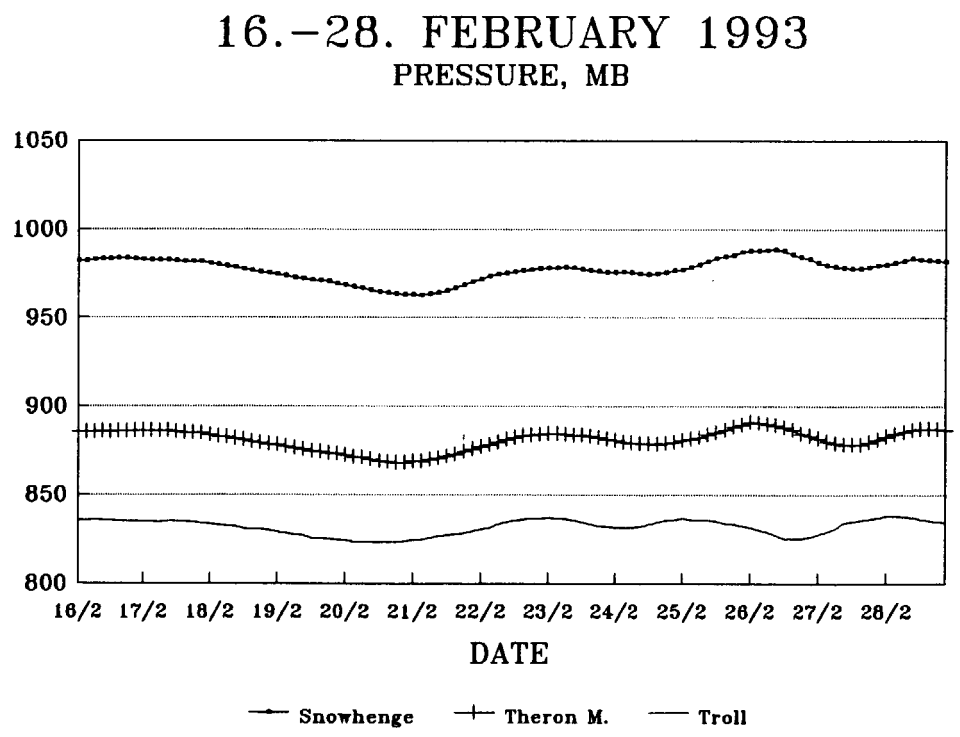
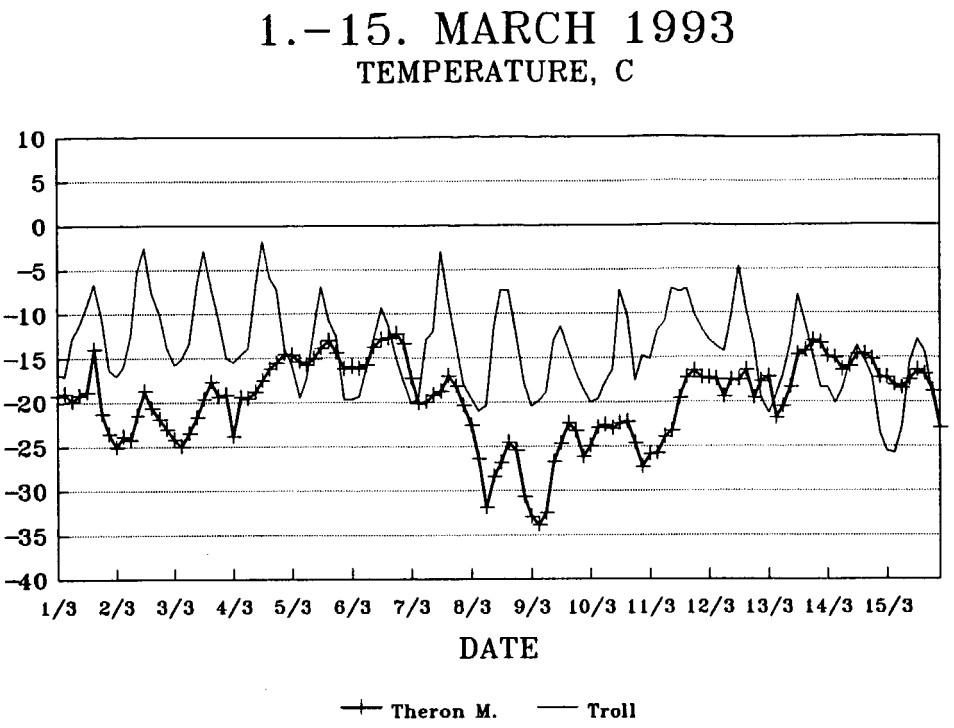


Figure 6. Time series of temperature (a) and **air pressure (b) from all stations February** 16 - 28 **1993.**



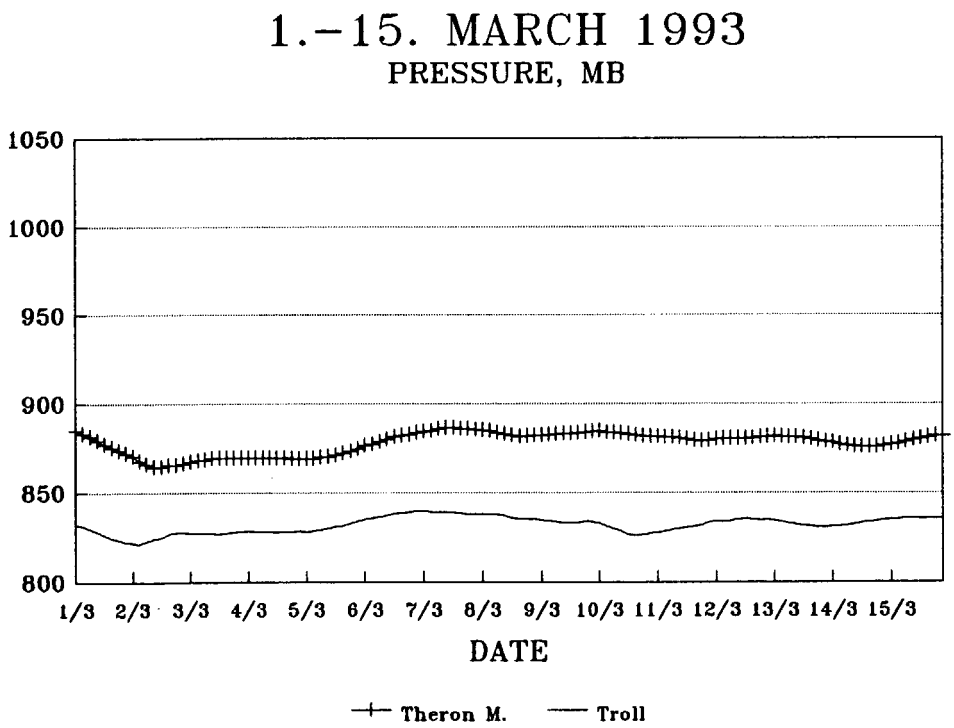
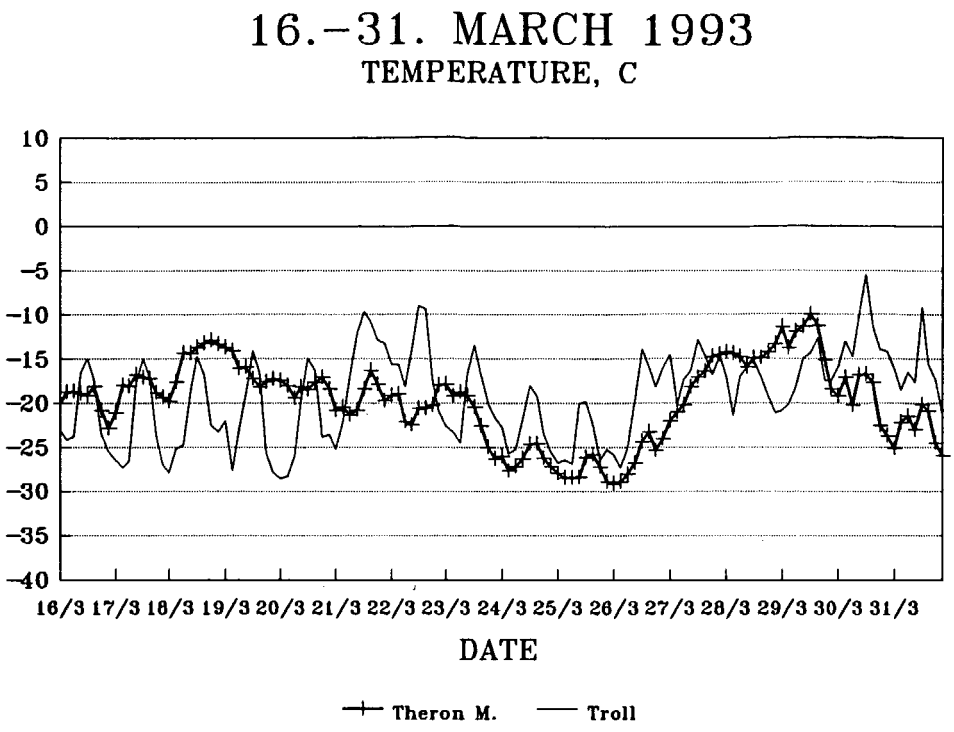


Figure 7. Time series of temperature (a) and air pressure (b) from all stations March 1 - 15 1993.



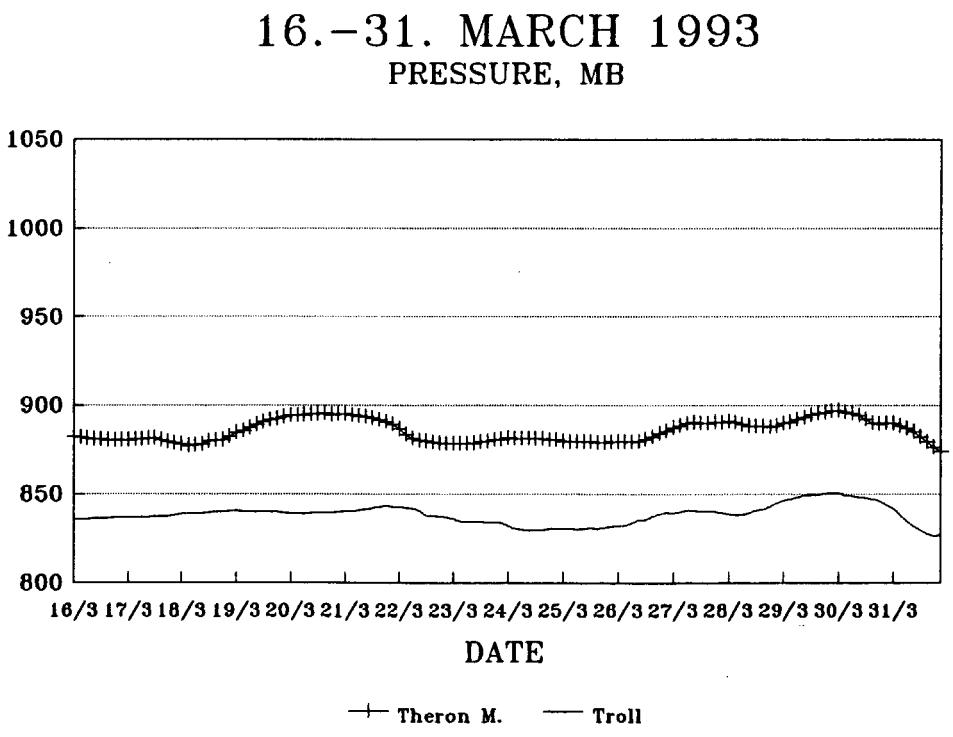
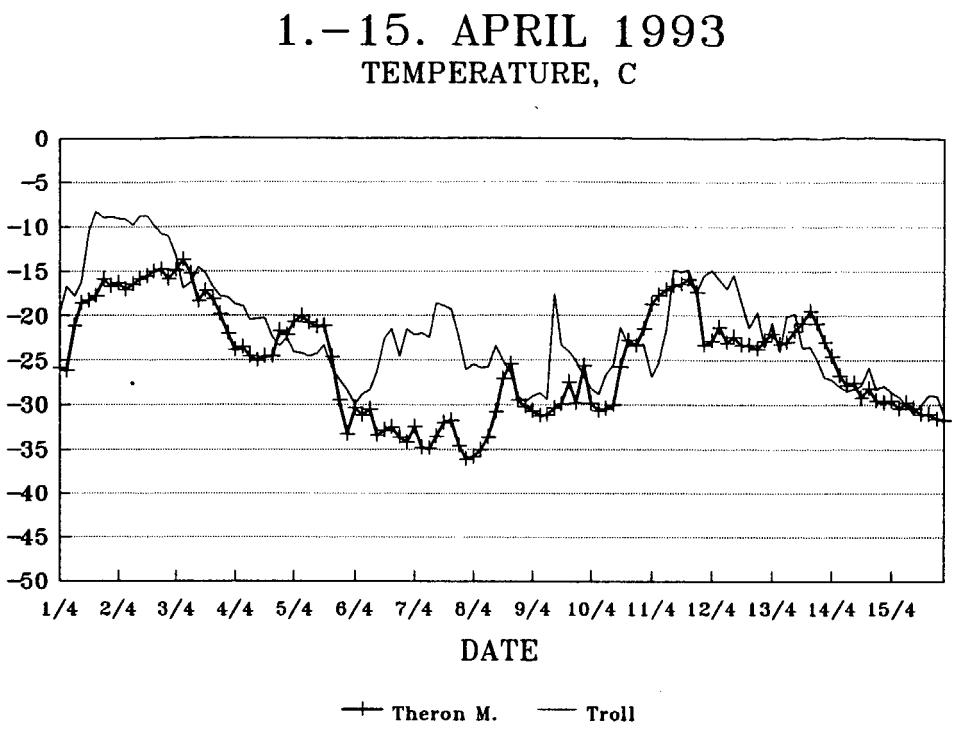


Figure 8. Time series of temperature (a) and air pressure (b) from all stations March 16 - 31 1993.



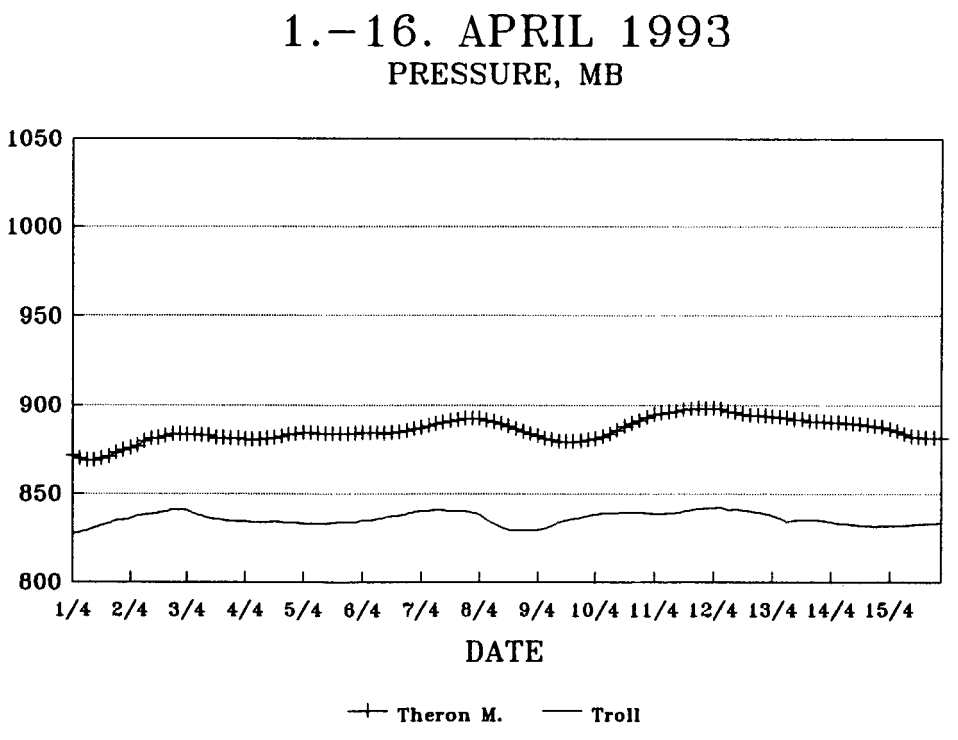
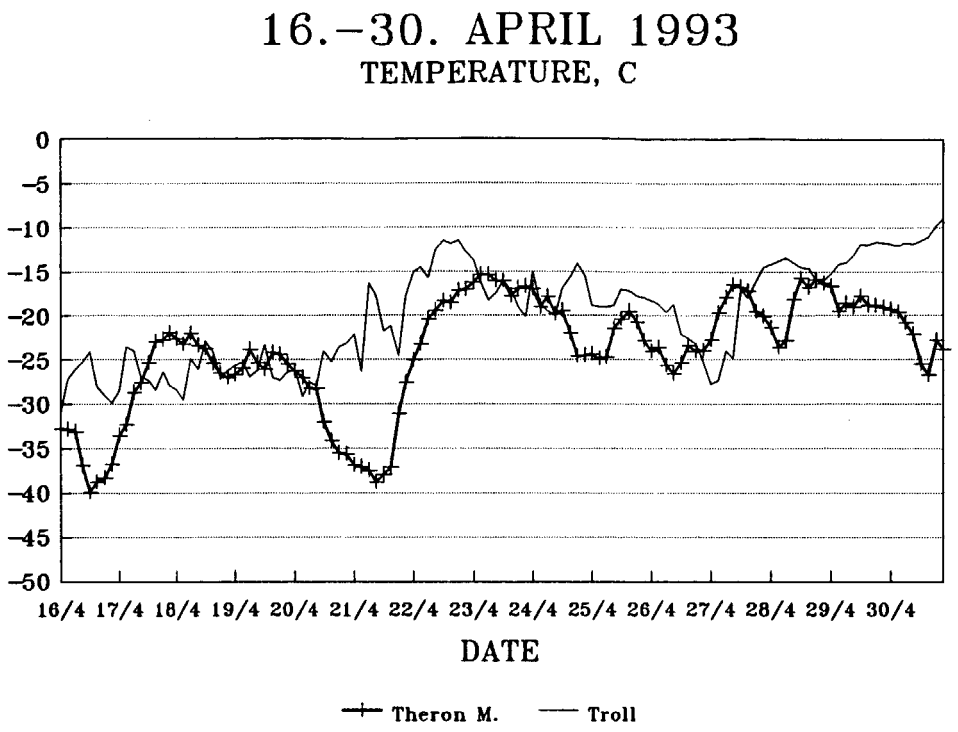


Figure 9. Time series of temperature (a) and air pressure (b) from all stations April 1 - 15 1993.



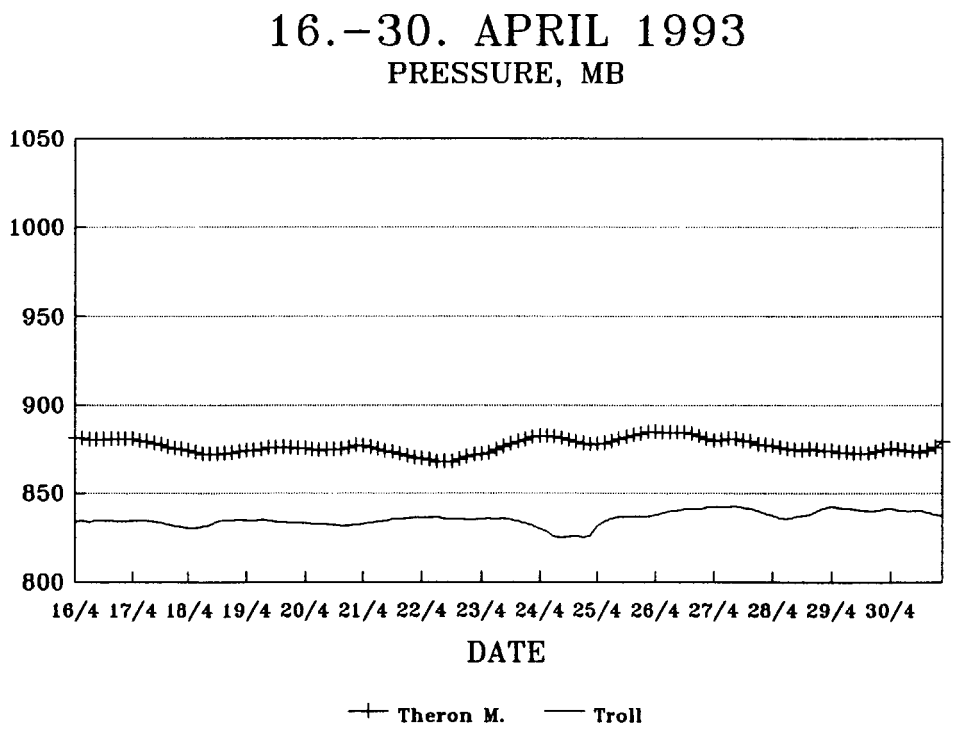
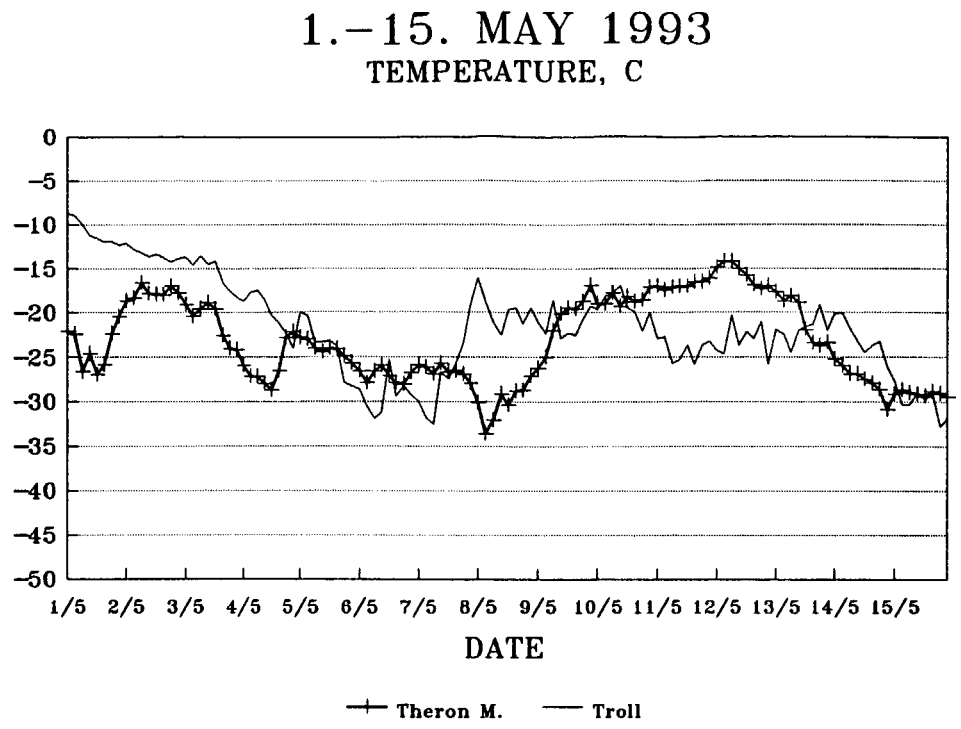


Figure 10. Time series of temperature (a) and air pressure (b) from all stations April 16 - 30 1993.



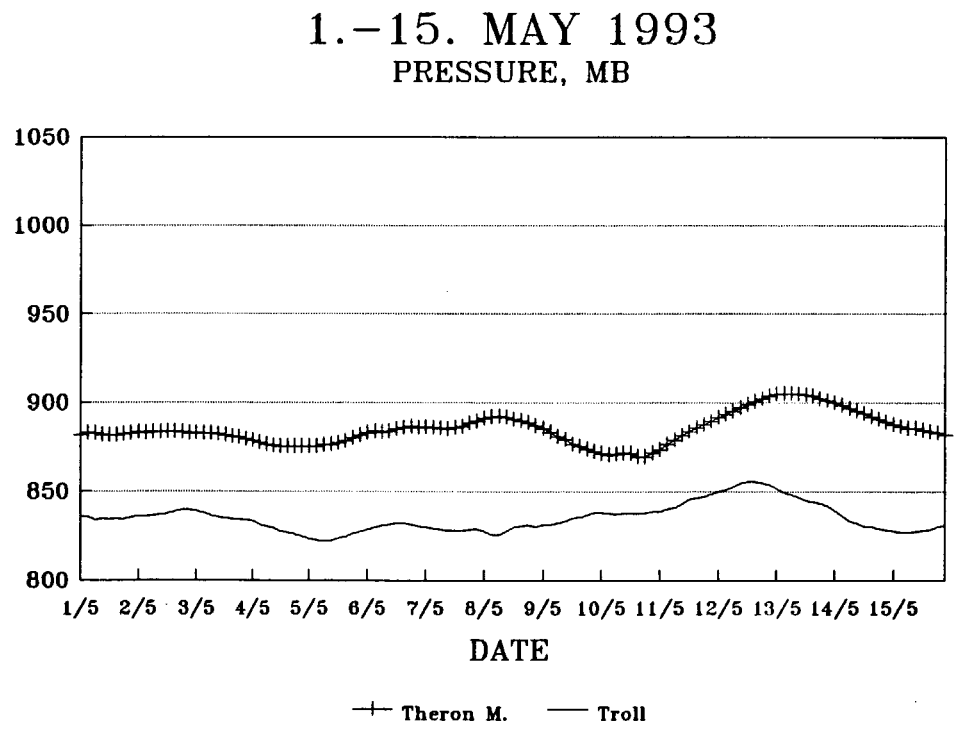
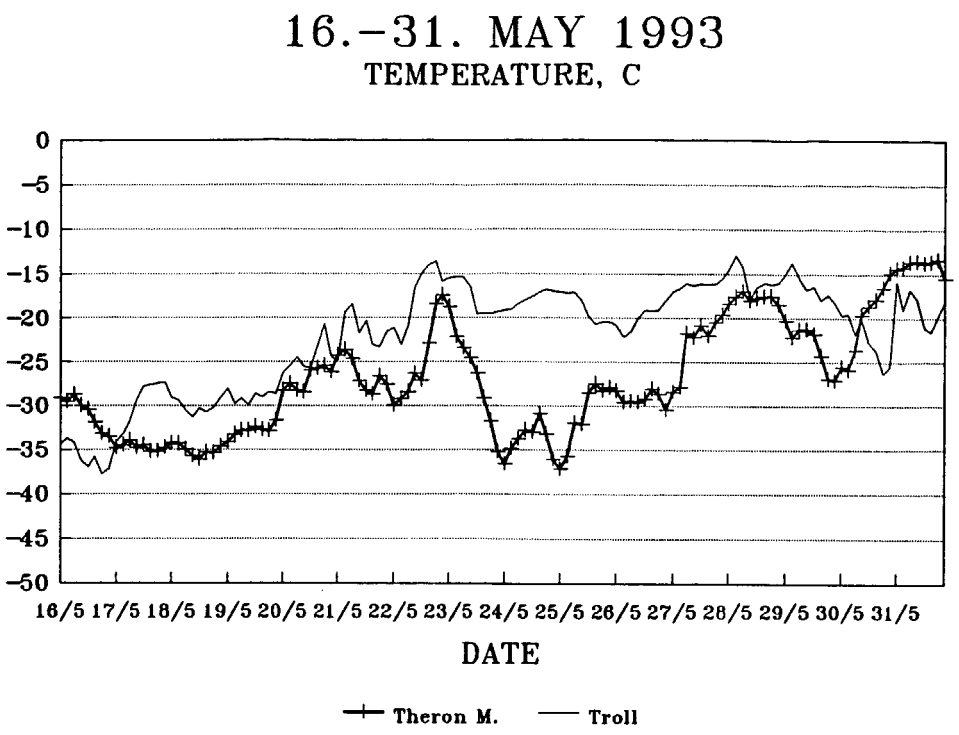


Figure 11. Time series of temperature (a) and air pressure (b) from all stations May 1 - 15 1993.



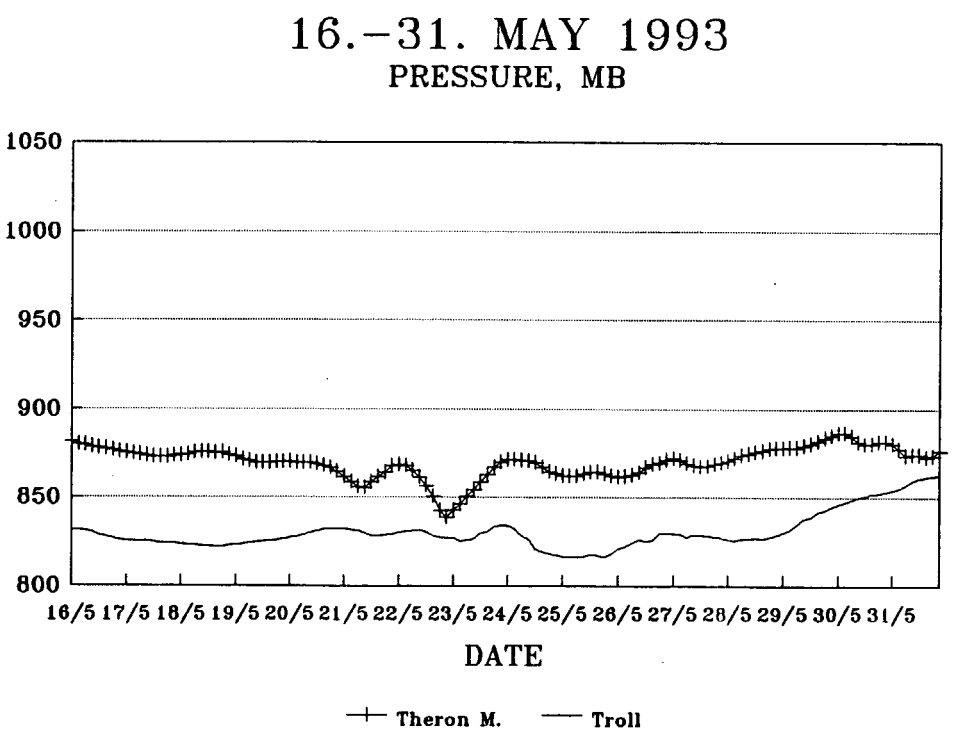
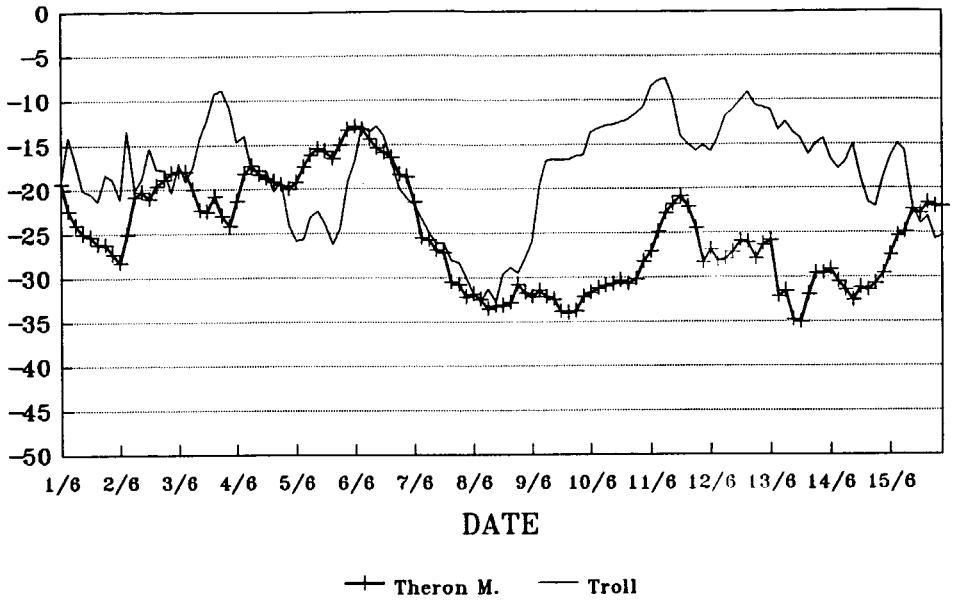


Figure 12. Time series of temperature (a) and air pressure (b) from all stations May 16 - 31 1993.



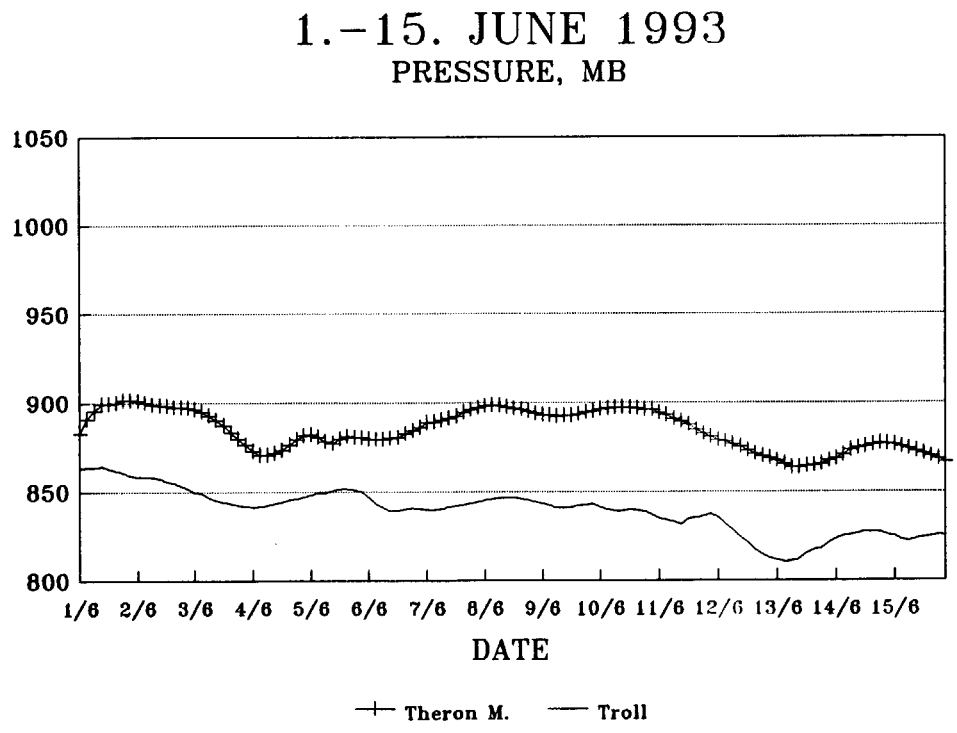
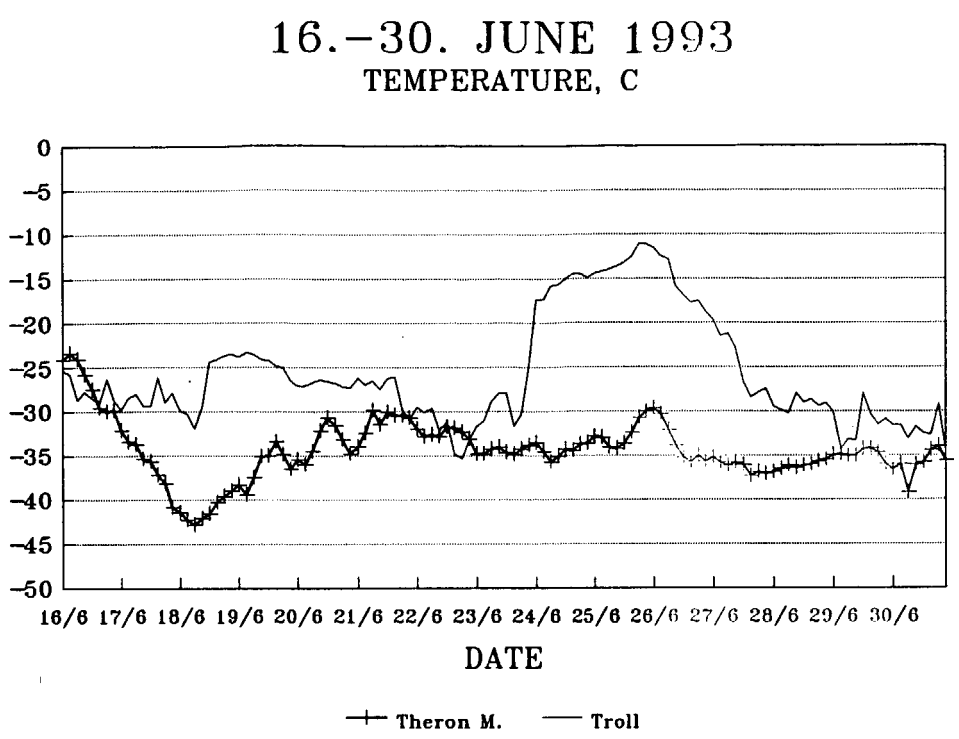


Figure 13. Time series of temperature (a) and air pressure (b) from all stations June 1 - 15 1993.



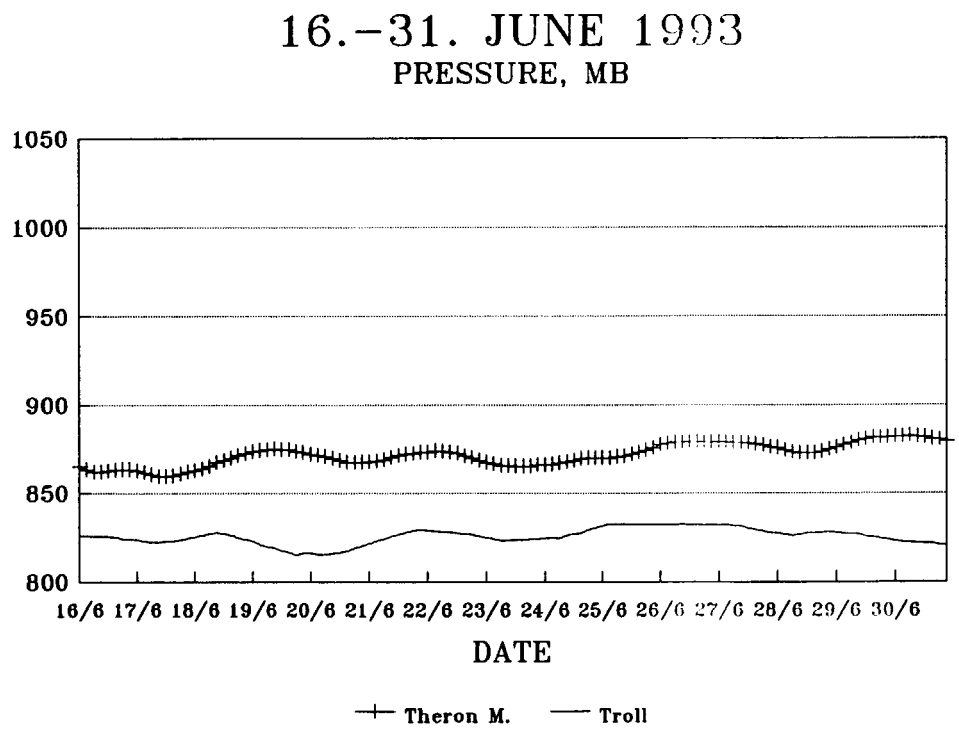


Figure 14. Time series of temperature (a) and air pressure (b) from all stations June 16 - 30 1993.