



Tarfala Research Station automatic weather station, 1999

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1 Instrumentation

The TRS met station consisted of the following instruments during 1999

Sensor	Serial number	Remark
Pt100		in Stevenson screen
Pt100		in Young screen
T/Rh		at 2 m (Young screen)
Young Wind Monitor		at 3 m
LiCor Li-200SB pyranometer		at 2 m
Tipping bucket precipitation gauge		at 2 m
SR50		at 1.5 m
Ventilated T/Rh		at 2 m
CR10 data logger		

2 Notes on the station data

- Ventilated T/Rh sensor seems extremely unreliable for large parts of the record. Humidity values of 100.0 have been created from real values > 100 and are likely to be considered as NaN unless unventilated sensor provides similar values.
- Precipitation gauge replaced by SR50 on 1999-11-28 00:00:00. SR50 at 1.5 m above ground. Height values registered as snow depth in m.

3 Data coverage

- Relative humidity (only ventilated) data missing from
1999-01-01 01:00:00 to 1999-01-02 22:00:00
1999-01-03 08:00:00 to 1999-01-04 07:00:00
1999-01-04 10:00:00 to 1999-01-04 19:00:00
1999-01-05 06:00:00
1999-01-05 08:00:00 to 1999-01-05 10:00:00
1999-01-05 18:00:00 to 1999-01-06 11:00:00
1999-01-07 05:00:00 to 1999-01-08 19:00:00
1999-01-09 02:00:00
1999-01-09 04:00:00
1999-01-09 09:00:00
1999-02-25 14:00:00
1999-03-02 05:00:00 to 1999-03-02 13:00:00
1999-05-23 09:00:00 to 1999-05-24 13:00:00
1999-05-24 16:00:00 to 1999-05-26 13:00:00
1999-05-26 15:00:00 to 1999-05-27 09:00:00
1999-05-27 11:00:00 to 1999-05-28 11:00:00
1999-05-28 13:00:00
1999-05-28 15:00:00 to 1999-05-28 17:00:00
1999-05-28 19:00:00
1999-05-30 18:00:00 to 1999-05-31 23:00:00
1999-06-01 15:00:00 to 1999-06-01 18:00:00
1999-08-28 23:00:00 to 1999-08-29 07:00:00
1999-08-29 10:00:00 to 1999-08-29 11:00:00
1999-09-29 19:00:00 to 1999-09-30 00:00:00
1999-09-30 02:00:00 to 1999-09-30 06:00:00
1999-10-02 18:00:00 to 1999-10-04 04:00:00
1999-10-05 06:00:00
1999-10-05 09:00:00 to 1999-10-06 00:00:00
1999-10-06 04:00:00 to 1999-10-20 06:00:00
1999-10-20 15:00:00 to 1999-10-23 04:00:00

1999-10-24 03:00:00 to 1999-10-24 04:00:00
1999-10-24 17:00:00 to 1999-10-24 22:00:00
1999-10-25 00:00:00 to 1999-11-12 17:00:00
1999-11-12 21:00:00 to 1999-11-13 06:00:00
1999-11-20 15:00:00

- Temperature (only ventilated) data missing from

1999-04-17 08:00:00
1999-04-19 01:00:00
1999-04-19 03:00:00 to 1999-04-19 04:00:00
1999-04-19 09:00:00 to 1999-04-19 10:00:00
1999-04-19 17:00:00
1999-04-20 07:00:00 to 1999-04-21 06:00:00
1999-04-21 15:00:00 to 1999-04-21 17:00:00
1999-04-30 09:00:00
1999-05-02 10:00:00 to 1999-05-02 15:00:00
1999-05-18 07:00:00 to 1999-05-19 09:00:00
1999-05-19 15:00:00
1999-05-20 00:00:00
1999-05-28 14:00:00 to 1999-06-18 14:00:00
1999-06-18 17:00:00 to 1999-06-20 00:00:00
1999-06-20 17:00:00 to 1999-06-20 18:00:00
1999-06-20 22:00:00 to 1999-06-20 23:00:00
1999-06-21 02:00:00
1999-06-21 11:00:00
1999-06-21 13:00:00 to 1999-06-21 20:00:00
1999-06-22 11:00:00 to 1999-06-22 12:00:00
1999-06-22 14:00:00 to 1999-06-22 22:00:00
1999-06-26 12:00:00 to 1999-06-26 20:00:00
1999-06-27 11:00:00
1999-06-27 14:00:00 to 1999-06-27 15:00:00
1999-06-29 15:00:00
1999-09-02 15:00:00 to 1999-09-02 17:00:00
1999-09-02 20:00:00
1999-09-03 17:00:00 to 1999-09-03 20:00:00
1999-09-05 01:00:00 to 1999-09-08 14:00:00
1999-09-09 10:00:00 to 1999-09-09 15:00:00
1999-09-09 23:00:00 to 1999-09-10 01:00:00
1999-09-10 05:00:00 to 1999-09-11 22:00:00
1999-09-12 00:00:00
1999-09-12 08:00:00 to 1999-09-15 05:00:00
1999-09-15 11:00:00 to 1999-09-17 03:00:00
1999-09-17 11:00:00 to 1999-09-17 22:00:00
1999-09-18 00:00:00
1999-09-18 02:00:00
1999-09-18 10:00:00 to 1999-09-20 05:00:00
1999-09-20 07:00:00 to 1999-09-22 01:00:00
1999-09-22 05:00:00 to 1999-09-22 17:00:00
1999-09-23 09:00:00 to 1999-09-23 17:00:00
1999-09-25 12:00:00 to 1999-09-25 16:00:00
1999-09-26 10:00:00 to 1999-09-26 13:00:00
1999-09-27 09:00:00 to 1999-09-27 20:00:00
1999-09-27 23:00:00 to 1999-09-28 01:00:00
1999-09-28 06:00:00 to 1999-09-28 22:00:00
1999-09-29 00:00:00 to 1999-09-29 02:00:00
1999-10-03 20:00:00
1999-10-04 01:00:00 to 1999-10-04 13:00:00
1999-11-10 18:00:00 to 1999-11-12 09:00:00

1999-11-12 13:00:00 to 1999-11-21 23:00:00
 1999-11-22 17:00:00 to 1999-11-22 18:00:00
 1999-11-24 01:00:00

4 Notes on data storage

Example of hourly data:

101,1999,185,1300,5.307,5.133,5.111,85.1,1.042,316.4,.193,177.2,0,5.099,98.7

Column	Example data	Description
01:	101	ID
02:	1999	Year
03:	185	Day of Year
04:	1300	hour-minute (hhmm)
05:	5.307	2 Pt100 T in Stevenson screen)
06:	5.144	3 T in Young screen
07:	5.111	4 Pt100 in new Young screen
08:	85.1	5 Rh in Young screen
09:	1.042	6 Mean horizontal wind speed
10:	316.4	7 resultant mean wind direction
11:	.193	8 Standard deviation of wind direction
12:	177.2	9 Global radiation
13:	0	10 Precipitation/SR50 (from Nov.)
14:	5.099	11 ventilated T
15:	98.7	12 ventilated Rh

Example of daily data summaries:

124,1999,185,2400,4.46,4.299,4.271,89.4,6.74,5,2.511,2356,7.21,38,1.617,162.2,83,4.32,13.91,4.458,98.8

Column	Example data	Description
01:	124	ID
02:	1999	Year
03:	185	Day of Year
04:	2400	hour-minute (hhmm)
05:	4.46	2 Daily average T in Stevenson screen)
06:	4.299	3 Daily T from T/Rh in Young screen
07:	4.271	4 Daily T from T/Rh in Young screen
08:	89.4	5 daily average humidity in Young screen
08:	6.74	6 Daily maximum temperature in Young screen
10:	5	7 hhmm for maximum daily temperature
11:	2.511	8 Daily minimum temperature in Young screen
12:	2356	9 hhmm for minimum daily temperature
13:	7.21	10 Maximum wind speed
14:	38	11 hhmm for maximum wind speed
15:	1.617	12 Average wind speed
16:	162.2	13 Average wind direction
17:	83	14 Incoming radiation
18:	4.32	15 Totalized precipitation
19:	13.91	16 Battery voltage
20:	4.458	17 Average ventilated temperature
21:	98.8	18 Average ventilated relative humidity

Example of 'Synoptic' output:

103,1999,185,1300,5.309

Column	Example data	Description
01:	103	ID
02:	1999	Year
03:	185	Day of Year
04:	1300	hour-minute (hhmm)
05:	5.309	Pt100 in Young screen

5 Data files and content

TRSmnet1999.csv Raw data file

TRS_met_1999_Precipitation.csv

Date-time, Precipitation

1999-01-01 01:00:00,0.0

TRS_met_1999_Radiation.csv

Date-time, Global radiation

1999-01-01 01:00:00,3.67

TRS_met_1999_Relative_humidity.csv

Date-time, hourly average Rh, ventilated Rh

1999-01-01 01:00:00,72.4,NaN

TRS_met_1999_Snow_depth.csv

Date-time, Snow depth

1999-12-31 23:00:00,0.173

TRS_met_1999_Temperature.csv

Date-time, hourly average T (Stevenson), hourly average T (Young), hourly average T/Rh (Young), ventilated (T/Rh)

1999-01-01 01:00:00,-2.82,-2.67,-2.67,-2.39

TRS_met_1999_Wind.csv

Date-time, Mean horizontal wind speed, resultant mean wind direction

1999-01-01 01:00:00,11.6,299.3,0.0180

TRS_met_1999_Daily_data.csv

Data columns follows description above

1999-01-02 00:00:00,-3.76,-3.62,-3.62,64.3,-0.39,1019,-7.68,2004,18.5,1352,6.2,314.3,4.0,0.0,12.54

TRS_met_1999_Synop_data.csv

Date-time, sample temperature

1999-01-01 01:00:00,-2.36

The data collected during 1999 is summarized the figure 1 and Table 1.

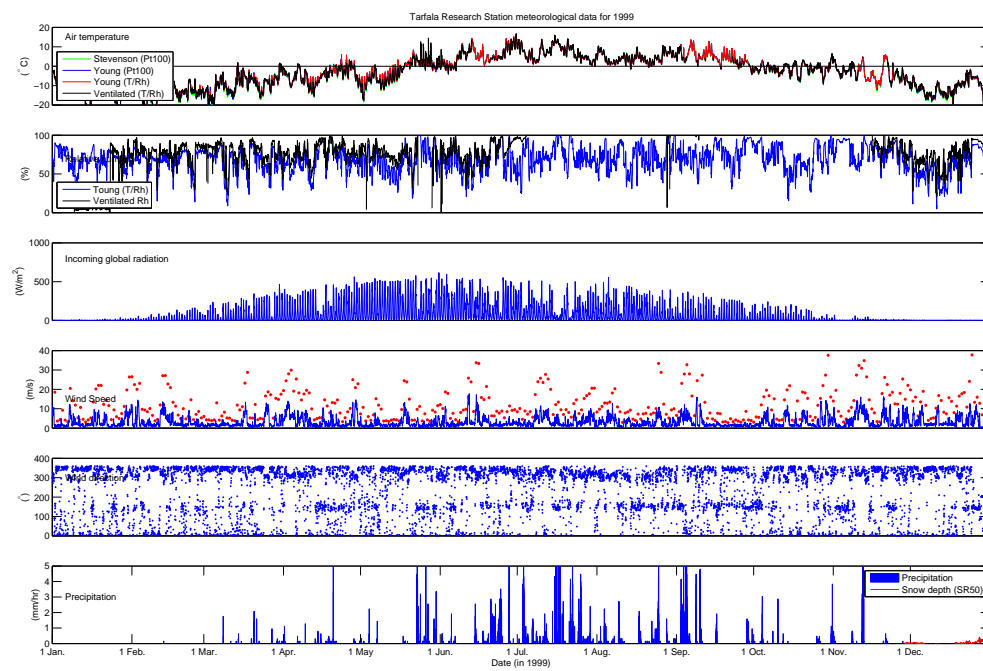


Figure. 1. Summary of meteorological data from Tarfala Research Station automatic weather station 1999.

Table. 1. Monthly averages of meteorological parameters from the Tarfala Research Station automatic weather station 1999.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average air temperature (Stevenson)												
(°C)	−11.3	−12.0	−9.9	−4.8	−2.8	5.2	7.0	4.3	4.6	−1.4	−3.5	−11.2
<i>n</i>	743	671	767	743	743	743	743	767	743	767	743	767
Average air temperature (Young)												
(°C)	−11.1	−11.7	−9.7	−4.7	−2.7	5.2	6.9	4.2	4.7	−1.3	−3.5	−11.1
<i>n</i>	743	671	767	743	743	743	743	767	743	767	743	767
Average air temperature												
(°C)	−10.9	−11.5	−9.4	−4.5	−2.5	5.3	6.9	4.2	4.6	−1.3	−3.4	−10.8
<i>n</i>	743	671	767	743	743	743	743	767	743	767	743	767
Positive degree sum												
(°C)	0	2	13	90	563	3997	5139	3265	3533	347	460	0
<i>n</i>	0	3	16	74	274	661	743	756	687	237	161	0
Average relative humidity												
(%)	68.2	66.5	66.4	67.5	66.3	66.8	73.0	70.6	75.9	71.5	78.5	60.0
<i>n</i>	743	671	767	743	743	743	743	767	743	767	743	767
Average incoming global radiation												
(W m ^{−2})	2.5	13.8	54.1	107.0	175.4	155.7	97.2	92.0	54.2	24.0	4.9	2.0
<i>n</i>	743	671	767	743	743	743	743	767	743	767	743	767
Global incoming energy sum												
(W m ^{−2})	1859	9267	41511	79470	130347	115677	72244	70583	40292	18420	3664	1518
<i>n</i>	735	671	766	736	743	743	743	742	739	725	743	767
Totalized precipitation												
(mm)	0.00	0.16	14.24	22.72	83.68	118.40	276.48	75.68	—	—	—	—
<i>n</i>	743	671	767	743	743	743	743	767	—	—	—	—
Average wind speed												
(m s ^{−1})	3.0	3.5	2.6	3.9	2.2	3.2	3.6	2.9	2.6	3.3	4.2	3.4
<i>n</i>	743	671	767	743	743	743	743	767	743	767	743	767

Logger program

5.1 Program until 28 November

```
;{CR10}
;=====
; TARFALA MET STATION
; downloaded 6. August 1998, 15:21 wintertime
; NEW: VENTILATED TEMPERATURE SENSOR
; Regine Hock
;=====
;{CR10}
```

*Table 1 Program

01: 10.0000 Execution Interval (seconds)

1: Batt Voltage (P10)

1: 10 Loc [Batteri_V]

2: IF (X<=>F) (P89)

1: 10 X Loc [Batteri_V]

2: 4 <

3: 9.7 F

4: 0 Go to end of Program Table

;===== TEMPERATURE 1 - PT100 in weather hut =====

3: 3W Half Bridge (P7)

1: 1 Reps

2: 33 25 mV 50 Hz Rejection Range

3: 1 SE Channel

4: 2 Excite all reps w/Exchan 2

5: 2100 mV Excitation

6: 21 Loc [Rs_Ro_T1]

7: 100 Mult

8: 0.0000 Offset

;===== TEMPERATURE 2 - PT100 in radiation shield =====

4: 3W Half Bridge (P7)

1: 1 Reps

2: 33 25 mV 50 Hz Rejection Range

3: 3 SE Channel

4: 2 Excite all reps w/Exchan 2

5: 2100 mV Excitation

6: 22 Loc [Rs_Ro_T2]

7: 100.00 Mult

8: 0.0000 Offset

;=== calculate Temp 1 and Temp 2 from Rs/Ro =====

5: Temperature RTD (P16)

1: 2 Reps

2: 21 R/R0 Loc [Rs_Ro_T1]

3: 1 Loc [T1_bur__C]

4: 1 Mult

5: 0.0000 Offset

6: Do (P86)

1: 41 Set Port 1 High

```

;===== Temperature Rotronic =====

7: Volt (Diff) (P2)
  1: 1      Repts
  2: 35     2500 mV 50 Hz Rejection Range
  3: 3      DIFF Channel
  4: 3      Loc [ T3_Rot__C ]
  5: 0.1    Mult
  6: 0.0000 Offset

;===== RELATIVE HUMIDITY Rotronic =====

8: Volts (SE) (P1)
  1: 1      Repts
  2: 35     2500 mV 50 Hz Rejection Range
  3: 7      SE Channel
  4: 4      Loc [ rH_Rot___ ]
  5: 0.1    Mult
  6: 0.0    Offset

;===== VENTILATED TEMPERATURE SENSOR (Vaisala PT100) =====

9: 3W Half Bridge (P7)
  1: 1      Repts
  2: 33     25 mV 50 Hz Rejection Range
  3: 11     SE Channel
  4: 3      Excite all reps w/Exchan 3
  5: 2100   mV Excitation
  6: 23     Loc [ Rs_Ro_ven ]
  7: 100    Mult
  8: 0.0000 Offset

10: Temperature RTD (P16)
  1: 1      Repts
  2: 23     R/R0 Loc [ Rs_Ro_ven ]
  3: 11     Loc [ TempVent ]
  4: 1      Mult
  5: 0.0000 Offset

;===== RELATIVE HUMITY (VENTILATED SENSOR) =====

11: Volts (SE) (P1)
  1: 1      Repts
  2: 35     2500 mV 50 Hz Rejection Range
  3: 8      SE Channel
  4: 12     Loc [ HumVent ]
  5: 0.1    Mult
  6: 0.0    Offset

;===== WIND SPEED =====

12: Pulse (P3)
  1: 1      Repts
  2: 1      Pulse Input Channel
  3: 21     Low Level AC, Output Hz
  4: 5      Loc [ Vhast_m_s ]
  5: 0.098  Mult
  6: 0      Offset

```

```

;===== WIND DIRECTION =====
13: Excite-Delay (SE) (P4)
  1: 1      Reps
  2: 5      2500 mV Slow Range
  3: 9      SE Channel
  4: 1      Excite all reps w/Exchan 1
  5: 2      Delay (units 0.01 sec)
  6: 2500   mV Excitation
  7: 6      Loc [ Vrikt____ ]
  8: 0.142  Mult
  9: -135   Offset

14: IF (X<=>F) (P89)
  1: 6      X Loc [ Vrikt____ ]
  2: 4      <
  3: 0      F
  4: 30     Then Do

15: Z=X+F (P34)
  1: 6      X Loc [ Vrikt____ ]
  2: 360    F
  3: 6      Z Loc [ Vrikt____ ]

16: End (P95)

;===== GLOBAL RADIATION =====
17: Volts (SE) (P1)
  1: 1      Reps
  2: 33     25 mV 50 Hz Rejection Range
  3: 10     SE Channel
  4: 7      Loc [ Sol__W_m_ ]
  5: 116.55 Mult
  6: 0.0000 Offset

;===== PRECIPITATION =====
18: Pulse (P3)
  1: 1      Reps
  2: 2      Pulse Input Channel
  3: 2      Switch Closure, All Counts
  4: 8      Loc [ Nederb_mm ]
  5: 0.16   Mult
  6: 0.0    Offset

19: Internal Temperature (P17)
  1: 9      Loc [ Logtemp_C ]

; ===== OUTPUT =====

20: If time is (P92)
  1: 0      Minutes (Seconds --) into a
  2: 60     Interval (same units as above)
  3: 10     Set Output Flag High

21: Set Active Storage Area (P80)
  1: 1      Final Storage Area 1
  2: 101    Array ID

22: Real Time (P77)

```

```

1: 1220      Year,Day,Hour/Minute (midnight = 2400)

23: Average (P71)
1: 4        Reps
2: 1        Loc [ T1_bur__C ]

24: Wind Vector (P69)
1: 1        Reps
2: 1        Samples per Sub-Interval
3: 0        S, é1, & â(é1) Polar
4: 5        Wind Speed/East Loc [ Vhast_m_s ]
5: 6        Wind Direction/North Loc [ Vrikt____ ]

25: Average (P71)
1: 1        Reps
2: 7        Loc [ Sol__W_m_ ]

26: Totalize (P72)
1: 1        Reps
2: 8        Loc [ Nederb_mm ]

27: Average (P71)
1: 2        Reps
2: 11       Loc [ TempVent  ]

28: Serial Out (P96)
1: 71       SM192/SM716/CSM1

; ===== STORAGE DAILY MEANS AT MIDNIGHT =====

29: If time is (P92)
1: 0        Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High

30: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 124      Array ID

31: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

32: Average (P71)
1: 4        Reps
2: 1        Loc [ T1_bur__C ]

33: Maximize (P73)
1: 1        Reps
2: 10       Value with Hr-Min
3: 2        Loc [ T2_skyd_C ]

34: Minimize (P74)
1: 1        Reps
2: 10       Value with Hr-Min
3: 2        Loc [ T2_skyd_C ]

35: Maximize (P73)

```

```

1: 1      Reps
2: 10     Value with Hr-Min
3: 5      Loc [ Vhast_m_s ]

36: Wind Vector (P69)
1: 1      Reps
2: 1      Samples per Sub-Interval
3: 1      S, é1 Polar
4: 5      Wind Speed/East Loc [ Vhast_m_s ]
5: 6      Wind Direction/North Loc [ Vrikt_---- ]

37: Average (P71)
1: 1      Reps
2: 7      Loc [ Sol__W_m_ ]

38: Totalize (P72)
1: 1      Reps
2: 8      Loc [ Nederb_mm ]

39: Sample (P70)
1: 1      Reps
2: 10     Loc [ Batteri_V ]

40: Average (P71)
1: 2      Reps
2: 11     Loc [ TempVent  ]

41: Serial Out (P96)
1: 71     SM192/SM716/CSM1

42: If time is (P92)
1: 60     Minutes (Seconds --) into a
2: 1440   Interval (same units as above)
3: 10     Set Output Flag High

43: Set Active Storage Area (P80)
1: 1      Final Storage Area 1
2: 103    Array ID

44: Real Time (P77)
1: 1220   Year,Day,Hour/Minute (midnight = 2400)

; SAMPLE TEMP FOR COMPARISON WITH 3-HOURLY DATA OF OTHER STATIONS =====

45: Sample (P70)
1: 1      Reps
2: 2      Loc [ T2_skyd_C ]

46: If time is (P92)
1: 240    Minutes (Seconds --) into a
2: 1440   Interval (same units as above)
3: 10     Set Output Flag High

47: Set Active Storage Area (P80)
1: 1      Final Storage Area 1
2: 103    Array ID

48: Real Time (P77)

```

```

1: 1220      Year,Day,Hour/Minute (midnight = 2400)

49: Sample (P70)
   1: 1      Reps
   2: 2      Loc [ T2_skyd_C ]

50: If time is (P92)
   1: 420     Minutes (Seconds --) into a
   2: 1440    Interval (same units as above)
   3: 10      Set Output Flag High

51: Set Active Storage Area (P80)
   1: 1      Final Storage Area 1
   2: 103    Array ID

52: Real Time (P77)
   1: 1220    Year,Day,Hour/Minute (midnight = 2400)

53: Sample (P70)
   1: 1      Reps
   2: 2      Loc [ T2_skyd_C ]

; 3-HOURLY TEMP VALUES TO FILE =====0

54: If time is (P92)
   1: 600     Minutes (Seconds --) into a
   2: 1440    Interval (same units as above)
   3: 10      Set Output Flag High

55: Set Active Storage Area (P80)
   1: 1      Final Storage Area 1
   2: 103    Array ID

56: Real Time (P77)
   1: 1220    Year,Day,Hour/Minute (midnight = 2400)

57: Sample (P70)
   1: 1      Reps
   2: 2      Loc [ T2_skyd_C ]

58: If time is (P92)
   1: 780     Minutes (Seconds --) into a
   2: 1440    Interval (same units as above)
   3: 10      Set Output Flag High

59: Set Active Storage Area (P80)
   1: 1      Final Storage Area 1
   2: 103    Array ID

60: Real Time (P77)
   1: 1220    Year,Day,Hour/Minute (midnight = 2400)

61: Sample (P70)
   1: 1      Reps
   2: 2      Loc [ T2_skyd_C ]

62: If time is (P92)
   1: 960     Minutes (Seconds --) into a

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```

2: 1440      Interval (same units as above)
3: 10        Set Output Flag High

63: Set Active Storage Area (P80)
1: 1         Final Storage Area 1
2: 103       Array ID

64: Real Time (P77)
1: 1220      Year,Day,Hour/Minute (midnight = 2400)

65: Sample (P70)
1: 1         Reps
2: 2         Loc [ T2_skyd_C ]

66: If time is (P92)
1: 1140      Minutes (Seconds --) into a
2: 1440      Interval (same units as above)
3: 10        Set Output Flag High

67: Set Active Storage Area (P80)
1: 1         Final Storage Area 1
2: 103       Array ID

68: Real Time (P77)
1: 1220      Year,Day,Hour/Minute (midnight = 2400)

69: Sample (P70)
1: 1         Reps
2: 2         Loc [ T2_skyd_C ]

70: If time is (P92)
1: 1320      Minutes (Seconds --) into a
2: 1440      Interval (same units as above)
3: 10        Set Output Flag High

71: Set Active Storage Area (P80)
1: 1         Final Storage Area 1
2: 103       Array ID

72: Real Time (P77)
1: 1220      Year,Day,Hour/Minute (midnight = 2400)

73: Sample (P70)
1: 1         Reps
2: 2         Loc [ T2_skyd_C ]

*Table 2 Program
01: 0.0000    Execution Interval (seconds)

*Table 3 Subroutines

End Program

1      [ T1_bur_C ]  RW--  2      1      Start ----- ---
2      [ T2_skyd_C ] RW--  12     1      ----- End
3      [ T3_Rot_C ]  RW--  2      1      Start ----- ---
4      [ rH_Rot_   ]  RW--  2      1      ----- ---

```

5	[Vhast_m_s]	RW--	3	1	-----	-----	---
6	[Vrikt_----]	RW--	4	2	-----	-----	---
7	[Sol__W_m_]	RW--	2	1	-----	-----	---
8	[Nederb_mm]	RW--	2	1	-----	-----	---
9	[Logtemp_C]	-W--	0	1	-----	-----	---
10	[Batteri_V]	RW--	2	1	-----	-----	---
11	[TempVent]	RW--	2	1	-----	-----	---
12	[HumVent]	RW--	2	1	-----	-----	---
13	[-----]	----	0	0	-----	-----	---
14	[-----]	----	0	0	-----	-----	---
15	[-----]	----	0	0	-----	-----	---
16	[-----]	----	0	0	-----	-----	---
17	[-----]	----	0	0	-----	-----	---
18	[-----]	----	0	0	-----	-----	---
19	[-----]	----	0	0	-----	-----	---
20	[-----]	----	0	0	-----	-----	---
21	[Rs_Ro_T1]	RW--	1	1	-----	-----	---
22	[Rs_Ro_T2]	RW--	1	1	-----	-----	---
23	[Rs_Ro_ven]	RW--	1	1	-----	-----	---
24	[-----]	----	0	0	-----	-----	---
25	[-----]	----	0	0	-----	-----	---
26	[_]	----	0	0	-----	-----	---
27	[Rs_lo2]	----	0	0	-----	-----	---
28	[Temp2m]	----	0	0	-----	-----	---
29	[RelHum2m]	----	0	0	-----	-----	---

5.2 Program valid from 28 November (SR50 added)

```
;{CR10}
;=====
; TARFALA MET STATION
; downloaded 6. August 1998, 15:21 wintertime
; NEW: VENTILATED TEMPERATURE SENSOR
; WINTER PROGRAM: SR50 (SNOW DEPTH METER) INSTEAD OF PRECIPITATION !!!
; 28. Nov 1999
; Regine Hock
;=====
;{CR10}
```

*Table 1 Program

01: 10.0000 Execution Interval (seconds)

1: Batt Voltage (P10)

1: 10 Loc [Batteri_V]

2: IF (X<=>F) (P89)

1: 10 X Loc [Batteri_V]

2: 4 <

3: 9.7 F

4: 0 Go to end of Program Table

;===== TEMPERATURE 1 - PT100 in weather hut =====

3: 3W Half Bridge (P7)

1: 1 Reps

2: 33 25 mV 50 Hz Rejection Range

3: 1 SE Channel

4: 2 Excite all reps w/Exchan 2

5: 2100 mV Excitation

6: 21 Loc [Rs_Ro_T1]

7: 100 Mult

8: 0.0000 Offset

;===== TEMPERATURE 2 - PT100 in radiation shield =====

4: 3W Half Bridge (P7)

1: 1 Reps

2: 33 25 mV 50 Hz Rejection Range

3: 3 SE Channel

4: 2 Excite all reps w/Exchan 2

5: 2100 mV Excitation

6: 22 Loc [Rs_Ro_T2]

7: 100.00 Mult

8: 0.0000 Offset

;=== calculate Temp 1 and Temp 2 from Rs/Ro =====

5: Temperature RTD (P16)

1: 2 Reps

2: 21 R/R0 Loc [Rs_Ro_T1]

3: 1 Loc [T1_bur__C]

4: 1 Mult

5: 0.0000 Offset

6: Do (P86)

1: 41 Set Port 1 High

```

;===== Temperature Rotronic =====

7: Volt (Diff) (P2)
  1: 1      Repts
  2: 35     2500 mV 50 Hz Rejection Range
  3: 3      DIFF Channel
  4: 3      Loc [ T3_Rot__C ]
  5: 0.1    Mult
  6: 0.0000 Offset

;===== RELATIVE HUMIDITY Rotronic =====

8: Volts (SE) (P1)
  1: 1      Repts
  2: 35     2500 mV 50 Hz Rejection Range
  3: 7      SE Channel
  4: 4      Loc [ rH_Rot___ ]
  5: 0.1    Mult
  6: 0.0    Offset

;===== VENTILATED TEMPERATURE SENSOR (Vaisala PT100) =====

9: 3W Half Bridge (P7)
  1: 1      Repts
  2: 33     25 mV 50 Hz Rejection Range
  3: 11     SE Channel
  4: 3      Excite all reps w/Exchan 3
  5: 2100   mV Excitation
  6: 23     Loc [ Rs_Ro_ven ]
  7: 100    Mult
  8: 0.0000 Offset

10: Temperature RTD (P16)
  1: 1      Repts
  2: 23     R/R0 Loc [ Rs_Ro_ven ]
  3: 11     Loc [ TempVent ]
  4: 1      Mult
  5: 0.0000 Offset

;===== RELATIVE HUMITY (VENTILATED SENSOR) =====

11: Volts (SE) (P1)
  1: 1      Repts
  2: 35     2500 mV 50 Hz Rejection Range
  3: 8      SE Channel
  4: 12     Loc [ HumVent ]
  5: 0.1    Mult
  6: 0.0    Offset

;===== WIND SPEED =====

12: Pulse (P3)
  1: 1      Repts
  2: 1      Pulse Input Channel
  3: 21     Low Level AC, Output Hz
  4: 5      Loc [ Vhast_m_s ]
  5: 0.098  Mult
  6: 0      Offset

```

```

;===== WIND DIRECTION =====
13:  Excite-Delay (SE) (P4)
    1: 1      Reps
    2: 5      2500 mV Slow Range
    3: 9      SE Channel
    4: 1      Excite all reps w/Exchan 1
    5: 2      Delay (units 0.01 sec)
    6: 2500   mV Excitation
    7: 6      Loc [ Vrikt____ ]
    8: 0.142  Mult
    9: -135   Offset

14:  IF (X<=>F) (P89)
    1: 6      X Loc [ Vrikt____ ]
    2: 4      <
    3: 0      F
    4: 30     Then Do

15:  Z=X+F (P34)
    1: 6      X Loc [ Vrikt____ ]
    2: 360    F
    3: 6      Z Loc [ Vrikt____ ]

16:  End (P95)

;===== GLOBAL RADIATION =====
17:  Volts (SE) (P1)
    1: 1      Reps
    2: 33     25 mV 50 Hz Rejection Range
    3: 10     SE Channel
    4: 7      Loc [ Sol__W_m_ ]
    5: 116.55 Mult
    6: 0.0000 Offset

;===== SR50 SNOW DEPTH METER (INSTEAD OF PRECIPITATION) =====

18:  Do (P86)
    1: 47     Set Port 7 High

19:  Excitation with Delay (P22)
    1: 1      Ex Channel
    2: 1      Delay W/Ex (units = 0.01 sec)
    3: 0      Delay After Ex (units = 0.01 sec)
    4: 0      mV Excitation

20:  Do (P86)
    1: 57     Set Port 7 Low

21:  Pulse (P3)
    1: 1      Reps
    2: 2      Pulse Input Channel
    3: 1      Low Level AC, All Counts
    4: 8      Loc [ Nederb_mm ]
    5: 0.0025 Mult
    6: 0.0     Offset

; subtract measured distance from initial value =====
22:  Z=F (P30)

```

```

1: 1.5      F
2: 00      Exponent of 10
3: 30      Z Loc [ SR50level ]

23: Z=X-Y (P35)
1: 30      X Loc [ SR50level ]
2: 8       Y Loc [ Nederb_mm ]
3: 8       Z Loc [ Nederb_mm ]

;===== SR50 SNOW DEPTH METER (INSTEAD OF PRECIPITATION) END =====

24: Internal Temperature (P17)
1: 9       Loc [ Logtemp_C ]

; ===== OUTPUT =====

25: If time is (P92)
1: 0       Minutes (Seconds --) into a
2: 60      Interval (same units as above)
3: 10      Set Output Flag High

26: Set Active Storage Area (P80)
1: 1       Final Storage Area 1
2: 101     Array ID

27: Real Time (P77)
1: 1220    Year,Day,Hour/Minute (midnight = 2400)

28: Average (P71)
1: 4       Reps
2: 1       Loc [ T1_bur__C ]

29: Wind Vector (P69)
1: 1       Reps
2: 1       Samples per Sub-Interval
3: 0       S, é1, & â(é1) Polar
4: 5       Wind Speed/East Loc [ Vhast_m_s ]
5: 6       Wind Direction/North Loc [ Vrikt____ ]

; CHANGE FOR SR50 - NO LONGER TOTALIZE FOR LOCATION 8 =====
30: Average (P71)
1: 2       Reps
2: 7       Loc [ Sol__W_m_ ]

31: Average (P71)
1: 2       Reps
2: 11      Loc [ TempVent ]

32: Serial Out (P96)
1: 71      SM192/SM716/CSM1

; ===== STORAGE DAILY MEANS AT MIDNIGHT =====

33: If time is (P92)
1: 0       Minutes (Seconds --) into a
2: 1440    Interval (same units as above)

```

```

3: 10      Set Output Flag High

34: Set Active Storage Area (P80)
1: 1      Final Storage Area 1
2: 124    Array ID

35: Real Time (P77)
1: 1220   Year,Day,Hour/Minute (midnight = 2400)

36: Average (P71)
1: 4      Reps
2: 1      Loc [ T1_bur__C ]

37: Maximize (P73)
1: 1      Reps
2: 10     Value with Hr-Min
3: 2      Loc [ T2_skyd_C ]

38: Minimize (P74)
1: 1      Reps
2: 10     Value with Hr-Min
3: 2      Loc [ T2_skyd_C ]

39: Maximize (P73)
1: 1      Reps
2: 10     Value with Hr-Min
3: 5      Loc [ Vhast_m_s ]

40: Wind Vector (P69)
1: 1      Reps
2: 1      Samples per Sub-Interval
3: 1      S, é1 Polar
4: 5      Wind Speed/East Loc [ Vhast_m_s ]
5: 6      Wind Direction/North Loc [ Vrikt____ ]

; CHANGE FOR SR50 - NO LONGER TOTALIZE FOR LOCATION 8 =====
41: Average (P71)
1: 2      Reps
2: 7      Loc [ Sol__W_m_ ]

42: Sample (P70)
1: 1      Reps
2: 10     Loc [ Batteri_V ]

43: Average (P71)
1: 2      Reps
2: 11     Loc [ TempVent ]

44: Serial Out (P96)
1: 71     SM192/SM716/CSM1

45: If time is (P92)
1: 60     Minutes (Seconds --) into a
2: 1440   Interval (same units as above)
3: 10     Set Output Flag High

46: Set Active Storage Area (P80)
1: 1      Final Storage Area 1

```

```

2: 103      Array ID

47: Real Time (P77)
  1: 1220    Year,Day,Hour/Minute (midnight = 2400)

48: Sample (P70)
  1: 1      Reps
  2: 2      Loc [ T2_skyd_C ]

49: If time is (P92)
  1: 240     Minutes (Seconds --) into a
  2: 1440    Interval (same units as above)
  3: 10      Set Output Flag High

50: Set Active Storage Area (P80)
  1: 1      Final Storage Area 1
  2: 103     Array ID

51: Real Time (P77)
  1: 1220    Year,Day,Hour/Minute (midnight = 2400)

52: Sample (P70)
  1: 1      Reps
  2: 2      Loc [ T2_skyd_C ]

53: If time is (P92)
  1: 420     Minutes (Seconds --) into a
  2: 1440    Interval (same units as above)
  3: 10      Set Output Flag High

54: Set Active Storage Area (P80)
  1: 1      Final Storage Area 1
  2: 103     Array ID

55: Real Time (P77)
  1: 1220    Year,Day,Hour/Minute (midnight = 2400)

56: Sample (P70)
  1: 1      Reps
  2: 2      Loc [ T2_skyd_C ]

57: If time is (P92)
  1: 600     Minutes (Seconds --) into a
  2: 1440    Interval (same units as above)
  3: 10      Set Output Flag High

58: Set Active Storage Area (P80)
  1: 1      Final Storage Area 1
  2: 103     Array ID

59: Real Time (P77)
  1: 1220    Year,Day,Hour/Minute (midnight = 2400)

60: Sample (P70)
  1: 1      Reps
  2: 2      Loc [ T2_skyd_C ]

61: If time is (P92)

```

```

1: 780      Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High

62: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 103      Array ID

63: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

64: Sample (P70)
1: 1        Reps
2: 2        Loc [ T2_skyd_C ]

65: If time is (P92)
1: 960      Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High

66: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 103      Array ID

67: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

68: Sample (P70)
1: 1        Reps
2: 2        Loc [ T2_skyd_C ]

69: If time is (P92)
1: 1140     Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High

70: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 103      Array ID

71: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

72: Sample (P70)
1: 1        Reps
2: 2        Loc [ T2_skyd_C ]

73: If time is (P92)
1: 1320     Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High

74: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 103      Array ID

75: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

```

76: Sample (P70)

1: 1 Reps

2: 2 Loc [T2_skyd_C]

*Table 2 Program

01: 0.0000 Execution Interval (seconds)

*Table 3 Subroutines

End Program

1	[T1_bur__C]	RW--	2	1	Start	-----	---
2	[T2_skyd_C]	RW--	12	1	-----	-----	End
3	[T3_Rot__C]	RW--	2	1	Start	-----	---
4	[rH_Rot___]	RW--	2	1	-----	-----	---
5	[Vhast_m_s]	RW--	3	1	-----	-----	---
6	[Vrikt_____]	RW--	4	2	-----	-----	---
7	[Sol__W_m_]	RW--	2	1	-----	-----	---
8	[Nederb_mm]	RW--	3	2	-----	-----	---
9	[Logtemp_C]	-W--	0	1	-----	-----	---
10	[Batteri_V]	RW--	2	1	-----	-----	---
11	[TempVent]	RW--	2	1	-----	-----	---
12	[HumVent]	RW--	2	1	-----	-----	---
13	[_____]	----	0	0	-----	-----	---
14	[_____]	----	0	0	-----	-----	---
15	[_____]	R----	1	0	-----	-----	---
16	[_____]	----	0	0	-----	-----	---
17	[_____]	----	0	0	-----	-----	---
18	[_____]	----	0	0	-----	-----	---
19	[_____]	----	0	0	-----	-----	---
20	[_____]	----	0	0	-----	-----	---
21	[Rs_Ro_T1]	RW--	1	1	-----	-----	---
22	[Rs_Ro_T2]	RW--	1	1	-----	-----	---
23	[Rs_Ro_ven]	RW--	1	1	-----	-----	---
24	[_____]	----	0	0	-----	-----	---
25	[_____]	----	0	0	-----	-----	---
26	[_]	----	0	0	-----	-----	---
27	[Rs_lo2]	----	0	0	-----	-----	---
28	[Temp2m]	----	0	0	-----	-----	---
29	[RelHum2m]	----	0	0	-----	-----	---
101	[_____]	----	0	0	-----	-----	---
103	[_____]	----	0	0	-----	-----	---
124	[_____]	----	0	0	-----	-----	---
30	[SR50level]	RW--	1	1	-----	-----	---