

18 MAR 1959

Decimal Index
551.524.3: 551.571.3(422)

METEOROLOGICAL OFFICE
CLIMATOLOGICAL SERVICES (M.O.3.)
CLIMATOLOGICAL MEMORANDA, No.14

Superseded by Clim. Memo. No. 82

COMBINED DISTRIBUTION OF HOURLY VALUES OF DRY-BULB AND WET-BULB
TEMPERATURES, MANCHESTER, 1946-1955

By J. G. COTTIS and H. J. GROOM

INTRODUCTION

Hourly observations of dry-bulb and wet-bulb temperature (to one tenth of a degree Fahrenheit) made at Manchester during the ten years 1946-1955 were analysed to obtain combined frequency distributions within ranges of two degrees F., for each month, for each of the quarters December-January-February, March-April-May, etc. and for the whole year. A ten-year period, giving 87,648 observations of each element, was considered to be the shortest which would give useful averages. Ranges of 2°F. were selected because they are sufficiently small to give a fairly detailed indication of frequencies at the higher and lower temperature limits of the distributions - often the regions of greatest interest.

METHOD OF TABULATION OF RESULTS

Tables I to XII are combined frequency tables of dry-bulb and wet-bulb temperatures for the months January to December respectively. Tables XIII to XVI are the corresponding tables for the four quarters, December-January-February, etc. Table XVII gives the corresponding annual frequencies. Table XVIII gives the frequencies of dry-bulb temperatures irrespective of wet-bulb temperatures, and Table XIX gives the frequencies of wet-bulb temperatures irrespective of dry-bulb temperatures.

The tabulations were made for the two degree ranges 20.1-22.0°F., 22.1-24.0°F., etc. For brevity in the tables, the range of dry-bulb temperatures in the first column is indicated by T but refers to the range T-0.9 to T+1.0 degrees F. Similarly, the values T, T-2, T-4, etc. (second, third and fourth columns, respectively, of Tables I-XVII) of wet-bulb temperatures refer to the ranges T-0.9 to T+1.0, T-2.9, to T-1.0, T-4.9 to T-3.0 etc., where the value of T for any frequency in the table is given by the figure in the first column in the same row. For example, if T (first column) is 45°F.

the range of dry-bulb temperature is 44.1 to 46.0°F., and
" " " wet-bulb " is 44.1 to 46.0°F. (second column, T)
42.1 to 44.0°F. (third column, T-2)
40.1 to 42.0°F. (fourth column, T-4)
etc.

For any given ranges of dry-bulb and wet-bulb temperature, two frequencies are indicated. The upper figure is the percentage frequency of occurrence within the given ranges; the lower figure is the cumulative percentage frequency of dry-bulb temperature and associated wet-bulb temperature greater than or equal to the lower values in the ranges indicated.

All percentage frequencies are corrected to one place of decimals except that frequencies less than 0.1 per cent are corrected to two places of decimals. Frequencies less than 0.005 per cent but greater than zero are entered as 0.0, while .. signifies that no occurrence was observed within the given range. The entry of 0.0 can occur only in the quarterly and annual summaries of frequencies but not in the monthly tables, where a single occurrence (that is, at one hourly observation) gives a frequency of 0.01 per cent approximately. The cumulative frequencies shown are merely the sums of the appropriate individual frequencies, corrected to one place of decimals, and entered as 0.0 if less than 0.05 but greater than zero.

MO Dup 3A

Example:-

For January (see Table 1), the percentage frequency of hours with dry-bulb temperature in the range 44.1 to 46.0°F. and associated wet-bulb temperature in the range 40.1 to 42.0°F. is obtained by locating the value 45 for dry-bulb temperature in column one (T) and then locating the frequency in the row opposite 45 and in the wet-bulb column T-4. The value of this percentage frequency is 1.0.

Again, for January (see Table 1), the percentage frequency of hours with dry-bulb temperature 44.1°F. and wet-bulb temperature 40.1°F. is obtained by locating the value 45 for dry-bulb temperature in column one (T) and then locating the cumulative frequency in the row opposite 45 and in the wet-bulb column T-4. The value of this cumulative percentage frequency is 22.5.

Accumulated temperatures

Table XVIII, which gives the percentage frequency of occurrence of hourly values of dry-bulb temperature within given ranges, may be used to obtain the average number of degree-hours (and thus degree-days) to be expected above or below any base temperature. The number of degree-hours above a base "b" °F. (where b is an even number) is given by the sum of the products obtained by multiplying the values given in each of the columns which refer to temperatures greater than b °F. (i.e. to the right of the column with a temperature range whose upper limit is b) by $N/100$, $3N/100$, $5N/100$, etc. respectively, where N is the number of hours in the month.

When b is an odd number, the above procedure should be carried out for $(b-1)$ °F. and $(b+1)$ °F., and the mean of these two derived values will give a good approximation to the number of degree-hours above the base b°F.

To obtain the number of degree-hours below a given base b°F. (where b is an even number), the procedure is the same except that the columns to be used are all those which would not be used in the above computation for degree-hours above the given base.

To obtain the number of degree-hours below a given base b°F. where b is an odd number, the procedure is to calculate the number of degree hours below base $(b-1)$ °F. and $(b+1)$ °F. and to take the mean of these two derived values.

Since hourly observations have been used in the present work, averages of accumulated temperature derived in the above manner would be more accurate than those derived by using more approximate methods, as for example in Brit. Clim. Branch Memo. No.5. It should be pointed out, however, that the averages given in Branch Memo. No. 5) relate to the 30-year period 1921-50 whereas the figures in Table XVIII are based on the 10-year period 1946-55.

Other Related Memoranda

Climatological Memo. No.10, entitled "Combined distribution of hourly values of dry-bulb and wet-bulb temperatures, Croydon, 1946-1955", is similar in format to the present Memo, but includes a series of ogives which express Tables I to XVII graphically. Climatological Memoranda Nos. 11, 12 and 13 relate to Renfrew, Driffield and Boscombe Down respectively, but without the ogives.

Other related memoranda now being prepared, and all dealing with combined distribution of hourly values of dry-bulb and wet-bulb temperatures will be numbered as follows:-

15. Stornoway
16. Lympne
17. Elmdon
18. Aldergrove
19. Pembroke Dock
20. Mildenhall

TABLE I. PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER JANUARY

DRY-BULB TEMP. T(°F.)	Associated wet-bulb temp. (°F.)				
	T	T-2	T-4	T-6	T-8
13	0.01 99.9	0.01 99.9	..	..	..
15	0.04 99.8	0.03 99.9	..	..	..
17	0.2 99.7	0.09 99.8	..	..	..
19	0.2 99.5	0.03 99.5	..	..	..
21	0.4 99.2	0.08 99.3	..	..	..
23	0.8 98.6	0.2 98.8	..	..	..
25	1.2 97.2	0.5 97.8	0.01 97.8	..	..
27	1.7 94.8	1.1 96.0	0.07 96.1	..	..
29	2.6 90.9	1.9 93.1	0.1 93.2	..	..
31	3.0 84.2	3.7 88.3	0.3 88.6	..	..
33	3.9 75.2	5.1 81.2	0.4 81.6	..	..
35	3.7 64.1	5.8 71.3	0.8 72.2	0.04 72.2	..
37	3.7 53.1	6.4 60.4	1.3 61.8	0.05 61.9	0.01 61.9
39	3.8 42.5	6.1 49.4	0.9 50.3	0.1 50.4	..
41	2.5 32.7	5.1 38.7	0.8 39.5	..	..
43	2.9 24.4	4.8 30.3	0.8 31.1	0.05 31.1	..
45	2.3 16.4	4.3 21.5	1.0 22.5	0.01 22.6	..
47	1.8 10.1	3.3 14.1	0.8 14.9	0.01 14.9	..
49	1.7 5.2	2.5 8.3	0.6 9.0	0.08 9.0	..
51	0.8 1.4	1.8 3.5	0.5 4.1	0.07 4.2	..
53	0.05 0.1	0.4 0.6	0.3 0.9	0.05 1.0	..
55	..	0.07 0.1	0.07 0.1	0.04 0.2	0.01 0.2

TABLE II. PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER
FEBRUARY

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)					
	T	T-2	T-4	T-6	T-8	T-10
13	0.06 99.9	..	..	..	..	..
15	0.09 99.8	0.01 99.8	..	..	..	..
17	0.07 99.7	0.04 99.7	..	..	..	..
19	0.1 99.6	0.06 99.6	..	..	..	..
21	0.4 99.4	0.03 99.5	..	..	..	..
23	0.5 98.8	0.2 99.0	..	..	..	..
25	1.1 97.7	0.6 98.3	..	..	..	..
27	2.0 94.2	2.3 96.6	0.01 96.6	..	..	..
29	2.4 88.1	3.7 92.2	0.1 92.3	0.01 92.3	..	..
31	2.8 80.6	4.3 85.7	0.4 86.1	..	..	0.01 86.1
33	3.3 70.5	5.7 77.8	0.7 78.6	..	..	..
35	2.8 60.2	5.6 67.2	1.5 68.8	0.07 68.9	..	..
37	3.2 50.4	5.2 57.4	1.2 58.8	0.1 58.9	..	..
39	2.5 39.7	5.7 47.2	1.4 49.0	0.2 49.2	0.01 49.2	..
41	2.0 30.7	4.9 37.2	1.5 39.0	0.4 39.4	..	..
43	2.3 22.3	4.4 28.7	1.4 30.3	0.3 30.6	0.01 30.6	..
45	2.1 14.6	3.7 20.0	1.7 22.0	0.2 22.2	..	..
47	2.1 8.2	3.2 12.5	1.6 14.2	0.2 14.5	0.06 14.5	..
49	0.5 3.4	1.8 6.1	0.8 7.2	0.1 7.3	0.07 7.4	..
51	0.1 0.9	1.4 2.9	0.6 3.8	0.2 4.1	0.03 4.1	..
53	..	0.4 0.8	0.5 1.4	0.3 1.7	0.09 1.8	..
55	..	..	0.3 0.4	0.06 0.5	0.01 0.5	..
57	..	..	0.03 0.0	0.07 0.1	..	..

TABLE III PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER

MARCH

DRY-BULB TEMP. T(°F)	Associated wet-bulb temperature (°F.)									
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18
13	0.01 99.9	..	..	..	..	..	..	..	..	..
15	0.03 99.9	..	..	..	..	..	..	..	..	..
17	0.05 99.8	0.03 99.8	..	..	..	..	..	..	..	..
19	0.1 99.7	0.05 99.8	..	..	..	..	..	..	..	..
21	0.07 99.6	0.04 99.6	..	..	..	..	..	..	..	..
23	0.3 99.4	0.07 99.5	..	..	..	..	..	..	..	..
25	0.6 98.8	0.3 99.1	..	..	..	..	..	..	..	..
27	1.0 97.7	0.5 98.2	..	0.01 98.2	..	..	..	..	..	..
29	1.4 95.4	1.1 96.7	0.03 96.7	..	..	..	..	..	..	..
31	2.4 91.3	2.1 94.0	0.2 94.2	..	..	..	..	..	..	..
33	2.5 82.8	4.3 88.9	0.5 89.5	..	..	..	..	..	..	..
35	2.1 73.9	4.6 80.3	1.6 82.1	0.03 82.2	0.01 82.2	..	..	..	..	..
37	2.4 64.5	4.6 71.8	1.4 73.6	0.2 73.9	..	..	..	..	..	..
39	2.3 54.8	4.3 62.1	1.8 64.8	0.4 65.2	0.04 65.3	..	..	..	..	..
41	2.4 45.7	4.3 52.5	1.7 55.5	0.8 56.4	0.03 56.4	..	..	..	..	..
43	2.4 35.4	4.6 43.3	1.4 45.8	1.0 47.1	0.1 47.2	..	..	..	..	..
45	1.9 24.8	4.8 33.0	2.2 36.3	0.8 37.4	0.3 37.7	..	..	..	..	..
47	1.5 16.2	3.4 22.9	2.0 26.3	0.8 27.4	0.2 27.7	0.01 27.7	..	..	..	..
49	0.6 8.6	2.9 14.7	1.9 18.0	1.0 19.1	0.2 19.7	0.05 19.8	..	..	..	..
51	0.3 3.5	2.2 8.0	1.8 11.2	1.0 12.6	0.3 13.0	0.1 13.1	..	..	..	..
53	0.01 1.0	0.5 3.2	1.1 5.5	0.8 6.9	0.3 7.3	0.1 7.4	0.01 7.4	..	..	..
55	..	0.08 1.0	0.7 2.7	0.7 3.9	0.3 4.5	0.08 4.6	0.01 4.6	..	..	..
57	..	..	0.07 0.9	0.4 1.9	0.3 2.4	0.1 2.7	..	0.01 2.7	..	..

TABLE III PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

MARCH

DRY-BULB TEMP. T(°F.)	Associated wet-bulb temperature (°F.)									
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18
59	0.04 0.4	0.09 0.9	0.2 1.4	0.1 1.6	0.08 1.8	..	..	..
61	0.04 0.3	0.05 0.7	0.2 1.1	0.07 1.2	0.05 1.3	0.03 1.3	..
63	0.03 0.3	0.2 0.6	0.05 0.8	0.04 0.8	0.04 0.9	0.01 0.9
65	0.04 0.2	0.01 0.3	0.07 0.4	0.03 0.5	..	0.01 0.5
67	0.05 0.1	0.07 0.2	0.05 0.3	0.07 0.4	0.01 0.4
69	0.05 0.1	0.03 0.1	0.03 0.1	0.01 0.1	..

TABLE IV PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

APRIL

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)								
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16
25	0.01 100.0	..	..	..	..	..	..	..	..
27	0.04 100.0	..	..	..	..	..	..	..	..
29	0.07 99.9	0.04 99.9	..	..	..	..	..	..	..
31	0.4 99.6	0.2 99.8	0.01 99.8	..	..	..	..	..	..
33	0.7 98.7	0.4 99.2	0.01 99.2	..	..	..	..	..	..
35	1.4 96.2	1.4 98.0	0.1 98.1	..	..	..	..	..	..
37	2.2 91.1	2.8 94.8	0.3 95.2	0.01 95.2	..	..	..	..	..
39	1.9 82.2	4.2 88.9	0.7 89.8	0.06 89.9	..	..	..	..	..
41	1.8 69.9	5.5 80.3	1.7 82.8	0.2 83.0	0.04 83.0	..	..	..	..
43	1.6 57.0	4.8 68.1	3.1 73.0	0.7 73.8	..	..	..	..	..
45	1.4 42.5	5.1 55.4	3.5 61.7	1.4 63.5	0.08 63.6	..	..	..	..
47	1.4 29.6	4.2 41.1	4.0 48.9	2.1 51.7	0.3 52.1	0.03 52.1	..	..	..
49	1.3 19.1	3.5 28.2	2.7 35.5	2.4 39.3	0.6 40.0	0.04 40.1	..	..	..
51	0.8 10.3	2.6 17.8	2.2 23.4	2.3 28.0	1.2 29.4	0.1 29.5	..	..	..
53	0.3 5.5	1.6 9.5	2.0 14.4	1.7 17.8	1.5 20.1	0.2 20.3	..	..	..
55	..	0.9 5.1	1.0 7.6	1.1 10.5	1.1 12.2	0.6 13.0	0.06 13.0	..	..
57	0.01 1.0	0.2 2.7	0.6 4.3	0.6 5.7	0.9 7.5	0.5 8.1	0.2 8.3	..	..
59	..	0.01 1.0	0.4 2.5	0.4 3.4	0.3 4.3	0.6 5.2	0.06 5.3	..	..
61	..	..	0.06 1.0	0.3 2.0	0.2 2.6	0.4 3.2	0.2 3.5	0.01 3.5	..
63	..	..	0.01 0.3	0.2 0.9	0.3 1.7	0.2 2.1	0.1 2.2	0.07 2.3	0.01 2.3
65	..	..	..	..	0.1 0.7	0.3 1.2	0.1 1.4	0.04 1.4	0.04 1.4
67	..	..	..	..	0.04 0.3	0.2 0.6	0.1 0.8	0.03 0.9	..
69	..	..	..	..	0.01 0.1	0.1 0.3	0.08 0.4	0.04 0.4	0.06 0.5
71	..	..	..	..	..	0.03 0.1	0.06 0.2	0.01 0.2	..
73	..	..	..	..	..	..	0.04 0.0	0.06 0.1	..

TABLE V PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

MAY

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)									
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18
31	0.1 99.9	0.01 99.9	..	..	..	..	..	..	..	..
33	0.4 99.7	0.09 99.8	..	..	..	..	..	..	..	..
35	0.5 99.1	0.2 99.3	..	..	..	..	..	..	..	..
37	0.6 97.8	0.7 98.6	..	..	..	..	..	..	..	..
39	0.8 94.9	1.7 97.2	0.1 97.3	0.01 97.3	..	..	..	..	..	..
41	0.9 90.4	2.4 94.1	0.5 94.7	0.01 94.7	..	..	..	..	..	..
43	1.0 83.3	3.2 89.5	1.0 90.8	0.1 90.9	..	..	..	..	..	..
45	1.6 74.0	3.8 82.3	1.9 85.3	0.2 85.6	..	..	..	..	..	..
47	2.6 62.2	4.8 72.4	2.4 76.9	0.8 78.0	0.1 78.1	..	..	..	..	..
49	1.7 48.4	4.8 59.6	2.6 65.0	1.5 67.1	0.2 67.4	..	0.01 67.4	..	..	..
51	1.0 34.6	4.7 46.7	3.0 53.1	1.7 55.9	0.5 56.5	0.01 56.6	..	..	..	..
53	1.0 23.7	3.1 33.6	3.2 41.0	1.7 44.4	0.9 45.5	0.1 45.7	0.01 45.7	..	..	..
55	0.5 14.6	2.0 22.7	2.7 29.5	2.1 33.7	1.3 35.4	2 35.6	0.07 35.7	..	..	..
57	0.09 8.1	0.8 14.1	1.8 20.2	1.9 24.3	1.1 26.4	0.3 26.8	0.01 26.8	..	..	..
59	0.04 4.1	0.4 8.0	1.3 13.2	1.9 17.5	1.0 19.7	0.6 20.7	0.07 20.8	..	..	..
61	0.01 2.2	0.2 4.1	0.6 7.6	1.5 11.5	1.0 13.9	0.7 15.1	0.3 15.5	0.01 15.5	..	..
63	0.01 1.2	0.03 2.2	0.4 3.9	0.7 6.8	1.1 9.1	0.6 10.5	0.4 11.1	0.04 11.1	..	..
65	0.01 0.7	0.05 1.2	0.1 2.1	0.4 3.4	0.8 5.6	0.8 6.9	0.5 7.7	0.08 7.9	0.01 7.9	..
67	..	0.01 0.7	0.1 1.1	0.2 2.0	0.3 2.9	0.8 4.3	0.3 4.7	0.2 5.1	0.04 5.1	..
69	..	..	0.05 0.7	0.09 1.0	0.1 1.7	0.2 2.3	0.3 2.9	0.1 3.0	0.1 3.1	0.03 3.2
71	..	..	..	0.08 0.6	0.07 0.9	0.2 1.4	0.2 1.8	0.2 2.1	0.08 2.2	0.01 2.2
73	..	..	0.03 0.1	0.05 0.4	0.03 0.5	0.09 0.7	0.2 1.1	0.1 1.3	0.09 1.4	..
75	..	..	..	..	0.08 0.3	0.01 0.4	0.07 0.5	0.1 0.7	0.08 0.8	..

TABLE V PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

MAY

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)									
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18
77	0.01 0.1	0.05 0.2	0.04 0.3	0.01 0.3	0.07 0.4	0.01 0.4
79	0.01 0.1	0.07 0.2	0.04 0.2	0.01 0.2	..
81	0.01 0.0	0.01 0.1	0.05 0.1	0.01 0.1	..
83	0.03 0.0	..	..

TABLE VI PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER JUNE

T (°F.)	T	Associated wet-bulb temperature (°F.)									
		T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18	T-20
37	100.0	0.04	..	..	..	..	..	..	..	..	..
39	99.8	0.08	0.04	..	..	..	..	..	..	..	..
41	99.4	0.2	0.2	0.06	..	..	..	..	..	..	..
43	98.5	0.7	0.5	0.1	..	..	..	..	..	..	..
45	95.4	0.8	1.5	0.1	0.03	..	..	..	..	..	..
47	90.6	1.7	2.6	0.6	0.08	..	..	..	..	..	..
49	81.5	2.4	4.3	0.8	0.3	0.01	..	..	..	..	..
51	67.1	2.2	5.8	1.8	0.3	0.06	..	..	..	..	..
53	52.0	2.2	4.6	2.9	0.5	0.2	..	..	..	..	..
55	36.4	2.0	4.9	3.1	1.9	0.5	0.08	..	..	..	..
57	22.9	0.7	3.4	3.1	2.3	0.9	0.2	0.03	..	..	..
59	14.2	0.5	2.5	3.1	2.2	2.0	0.3	0.03	..	..	..
61	8.9	0.3	1.3	1.8	2.2	1.8	0.6	0.2	..	..	..
63	4.8	0.03	0.7	1.2	1.5	1.3	1.0	0.2	0.01	..	..
65	2.4	0.04	0.3	0.6	0.9	1.2	0.7	0.2	0.07	..	..
67	..	..	0.2	0.5	0.8	0.7	0.6	0.2	0.07	0.07	..
69	..	..	..	0.2	0.6	0.7	0.5	0.2	0.2	..	..
71	..	..	0.07	0.3	0.4	0.4	0.2	0.07	0.3	0.1	..
73	..	..	1.1	2.0	3.0	3.9	4.2	4.3	4.7	4.8	..
75	..	..	..	0.1	0.2	0.2	0.3	0.08	0.03	0.08	0.03
77	..	..	..	0.4	0.8	1.2	1.5	1.7	1.7	1.8	..
79	..	..	..	..	0.1	0.1	0.2	0.07	0.01	..	..
81	..	..	..	..	..	0.08	0.07	0.01	0.01	..	..
83	..	..	..	..	..	0.2	0.3	0.3	0.3	..	..
85	..	..	..	..	..	0.04	0.04	0.01	..	..	..
						0.1	0.06	..	..	..	..
						..	..	0.01	0.0	..	..

TABLE VII PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

JULY

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)										
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18	T-20
41	0.01 99.9	..	..	..	..	..	..	..	..	..	..
43	0.09 99.9	..	..	..	..	..	..	..	..	..	..
45	0.3 99.8	0.04 99.8	..	..	..	..	..	..	..	..	..
47	0.9 99.1	0.4 99.5	..	..	..	..	..	..	..	..	..
49	1.4 96.1	1.4 98.1	0.04 98.2	..	..	..	..	..	..	..	..
51	2.1 89.9	2.7 94.7	0.4 95.3	0.01 95.4	..	..	..	..	..	..	..
53	2.6 77.7	5.5 87.8	1.3 89.9	0.2 90.1	..	..	..	..	..	..	..
55	2.5 62.0	6.0 75.1	2.5 79.7	0.6 80.5	0.03 80.5	..	..	..	..	..	..
57	2.0 46.5	4.9 59.5	3.3 66.5	1.3 68.7	0.2 68.9	0.01 68.9	..	..	..	..	..
59	2.1 34.5	4.5 44.5	3.3 52.6	2.4 56.3	0.7 57.2	0.03 57.2	..	..	..	..	..
61	1.0 19.8	3.9 32.5	2.9 37.9	2.5 42.7	1.0 44.1	0.1 44.2	..	..	..	..	..
63	0.3 12.1	1.7 18.8	2.6 27.5	1.9 30.1	1.7 32.4	0.3 32.7	0.03 32.8	..	..	..	..
65	0.04 6.4	1.5 11.8	1.5 16.8	1.6 20.9	1.6 23.6	0.5 24.2	0.04 24.3	..	..	..	..
67	0.01 2.9	0.3 6.4	1.1 10.3	1.3 13.8	1.5 16.3	0.8 17.3	0.1 17.5	0.01 17.5	..	..	..
69	..	0.1 2.9	0.7 6.1	0.8 8.9	0.9 11.1	0.7 12.1	0.2 12.3	0.01 12.3	..	..	..
71	..	0.03 1.1	0.2 2.7	0.5 5.3	0.8 7.3	0.6 8.6	0.2 8.9	0.03 8.9	..	..	..
73	..	0.04 0.7	0.01 1.1	0.4 2.5	0.6 4.5	0.6 5.7	0.2 6.4	0.1 6.6	..	..	..
75	..	..	..	0.1 1.0	0.2 2.1	0.5 3.5	0.4 4.1	0.3 4.6	0.03 4.6	0.01 4.6	..
77	..	..	0.01 0.2	..	0.1 0.9	0.4 1.8	0.5 2.7	0.1 2.9	0.07 3.1	..	..
79	..	..	0.01 0.1	..	0.1 0.6	0.07 0.8	0.2 1.3	0.3 1.7	0.1 1.8	0.1 1.9	0.01 1.9
81	..	..	..	0.03 0.1	0.01 0.2	0.09 0.5	0.09 0.6	0.2 0.9	0.09 1.0	0.03 1.0	0.01 1.0
83	..	..	..	..	0.01 0.0	0.05 0.1	0.08 0.4	0.01 0.4	0.04 0.5	0.01 0.5	..
85	..	..	..	..	..	0.01 0.0	0.05 0.1	0.07 0.2	0.03 0.3	0.01 0.3	..
87	..	..	..	..	..	..	..	0.01 0.0	0.09 0.1	..	..

TABLE VIII PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER AUGUST

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)										
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18	T-20
41	0.07 99.9	..	..	..	..	..	..	..	..	..	..
43	0.09 99.8	..	..	..	..	..	..	..	..	..	..
45	0.3 99.5	0.2 99.7	..	..	..	..	..	..	..	..	..
47	0.8 98.8	0.4 99.2	..	..	..	..	..	..	..	..	..
49	1.6 96.9	0.9 98.0	..	..	..	..	..	..	..	..	..
51	2.8 91.6	2.9 95.3	0.2 95.5	..	..	..	..	..	..	..	..
53	3.4 80.4	5.6 88.8	0.7 89.6	0.01 89.6	..	..	..	..	..	..	..
55	2.7 63.9	6.7 77.0	1.8 79.8	0.1 79.9	..	..	..	..	..	..	..
57	2.6 44.8	6.4 61.2	3.2 67.6	0.7 68.6	0.05 68.6	..	..	..	..	..	..
59	1.8 29.3	5.2 42.2	4.7 52.2	1.8 55.4	0.2 55.7	..	..	..	..	..	..
61	1.2 17.9	3.5 27.5	3.3 35.2	3.0 40.5	1.0 41.9	0.05 42.0	..	..	..	..	..
63	0.2 9.4	1.9 16.7	2.1 22.9	2.3 27.2	1.8 29.5	0.3 29.9	0.01 29.9	..	..	..	..
65	0.04 4.3	0.8 9.2	1.4 14.5	1.7 18.7	1.4 20.7	0.4 21.2	0.08 21.3	0.01 21.3	..	..	..
67	0.01 1.9	0.2 4.2	1.0 8.4	1.5 12.3	1.5 14.7	0.6 15.4	0.08 15.5	..	..	..	..
69	..	0.05 1.8	0.4 4.0	1.0 7.2	0.9 9.6	0.6 10.5	0.05 10.6	0.01 10.6	0.01 10.6	..	..
71	..	0.01 0.8	0.1 1.8	0.3 3.6	0.5 5.7	0.7 7.3	0.2 7.5	..	..	..	..
73	..	..	..	0.2 1.7	0.5 3.2	0.7 4.8	0.5 5.6	0.01 5.7	0.01 5.7	..	..
75	..	..	0.01 0.1	0.03 0.7	0.2 1.5	0.4 2.5	0.5 3.4	0.2 3.7	0.03 3.8	..	..
77	..	..	..	..	0.08 0.7	0.2 1.2	0.2 1.8	0.3 2.3	0.1 2.4	0.05 2.5	..
79	..	..	..	..	0.01 0.1	0.1 0.6	0.2 1.0	0.3 1.3	0.1 1.5	0.01 1.5	0.01 1.5
81	..	..	..	..	..	0.01 0.1	0.2 0.5	0.1 0.7	0.08 0.7	0.07 0.8	..
83	..	..	..	..	..	..	0.05 0.1	0.1 0.3	0.03 0.3	..	..
85	..	..	..	..	..	..	..	0.03 0.1	0.09 0.2	..	..
87	..	..	..	..	..	..	..	0.01 0.0	0.03 0.0	..	..

TABLE IX PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER
SEPTEMBER

DRY-BULB TEMP T (°F.)	Associated wet-bulb temperature (°F.)								
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16
35	0.08 99.9	0.06 99.9	..	..	..	..	..	..	..
37	0.2 99.7	0.06 99.8	..	..	..	..	..	..	..
39	0.3 99.1	0.4 99.5	..	..	..	..	..	..	..
41	0.4 98.5	0.3 98.8	0.01 98.9	..	..	..	..	..	..
43	0.7 97.3	0.6 98.1	0.04 98.1	..	..	..	..	..	..
45	1.2 95.0	1.2 96.6	0.08 96.8	..	..	..	..	..	..
47	2.2 90.9	2.0 93.8	0.2 94.2	0.04 94.3	..	..	..	..	..
49	2.6 82.2	4.4 88.7	0.6 89.6	0.1 89.8	0.08 89.9	..	..	..	..
51	2.2 70.0	5.5 79.6	1.4 81.7	0.2 82.0	0.1 82.1	0.01 82.1	..	..	..
53	2.4 55.0	6.5 67.8	2.4 71.9	0.5 72.6	0.06 72.7	..	..	..	..
55	2.1 38.8	6.4 52.6	3.4 58.9	1.3 60.6	0.2 60.8	0.01 60.8	..	..	..
57	1.6 25.3	4.8 36.7	4.2 44.1	1.8 47.0	0.4 47.4	0.03 47.4	..	..	..
59	1.0 14.7	3.7 23.7	3.3 30.3	2.2 33.5	1.0 34.6	0.01 34.6	..	..	..
61	0.2 7.2	2.6 13.7	2.5 19.0	2.1 22.3	0.7 23.3	0.1 23.4	..	..	..
63	0.2 3.2	1.4 7.0	1.6 10.9	1.7 13.7	0.9 14.9	0.2 15.2	..	..	..
65	0.08 1.1	0.6 3.0	0.9 5.4	1.0 7.7	0.7 8.8	0.3 9.1	0.03 9.2	0.01 9.2	..
67	..	0.1 1.0	0.6 2.3	0.6 3.9	0.7 5.2	0.3 5.5	0.01 5.5	0.01 5.6	..
69	..	..	0.08 0.9	0.3 1.6	0.5 2.5	0.4 3.2	0.07 3.2	..	..
71	..	..	0.06 0.4	0.1 0.8	0.2 1.2	0.3 1.7	0.2 1.9	0.01 1.9	..
73	..	..	..	0.08 0.3	0.2 0.6	0.2 0.9	0.1 1.0	0.01 1.0	..
75	..	..	..	..8	0.07 0.2	0.1 0.4	0.03 0.4	0.03 0.4	..
77	..	..	..	..	..	0.1 0.2	0.03 0.2	..	0.01 0.2
79	..	..	..	..	..	0.03 0.0	0.03 0.1	..	..

TABLE X PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER
OCTOBER

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)								
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16
25	0.08 100.0	0.01 100.0	..	..	..	..	..	..	..
27	0.2 99.9	0.03 99.9	..	..	..	..	..	..	..
29	0.4 99.6	0.1 99.7	..	..	..	..	..	..	..
31	0.4 98.9	0.3 99.2	..	..	..	..	..	..	..
33	0.6 97.8	0.6 98.5	..	..	..	..	..	..	..
35	0.7 96.5	0.6 97.2	0.07 97.3	..	..	..	..	..	..
37	0.6 94.7	0.8 95.8	0.07 95.9	..	..	..	..	..	..
39	1.3 92.1	1.5 94.1	0.3 94.4	0.01 94.4	0.01 94.4	..	..	..	..
41	1.9 88.3	1.6 90.8	0.3 91.3	0.04 91.3	..	..	..	..	..
43	2.3 81.4	3.1 86.4	0.6 87.3	0.1 87.5	..	..	..	..	..
45	3.0 71.6	4.9 79.1	1.5 81.0	0.3 81.3	0.04 81.3	..	0.01 81.4	0.01 81.4	..
47	3.2 58.3	6.8 68.6	1.9 71.2	0.4 71.6	0.04 71.6	..	..	..	..
49	2.9 45.3	6.1 55.1	2.7 58.6	0.6 59.3	0.01 59.3	..	..	..	..
51	1.6 32.5	5.2 42.4	2.8 46.1	0.8 46.9	0.04 47.0	..	..	..	..
53	1.8 23.7	4.1 30.9	3.0 35.6	0.7 36.5	0.05 36.5	..	..	..	..
55	1.5 15.6	3.8 21.9	1.8 25.0	1.2 26.7	0.2 26.9	..	..	..	..
57	0.8 9.3	2.5 14.1	1.8 16.6	1.0 17.9	0.4 18.4	..	0.01 18.4	..	..
59	0.2 4.2	2.3 8.5	1.7 10.8	0.6 11.5	0.2 11.8	0.1 11.9	..	..	..
61	0.1 1.3	1.1 4.0	1.4 6.0	0.5 6.6	0.1 6.7	0.01 6.8	..	..	..
63	0.03 0.2	0.4 1.2	1.0 2.8	0.5 3.4	0.09 3.5	..	..	..	..
65	..	0.01 0.2	0.4 0.8	0.5 1.3	0.1 1.5	0.04 1.5	0.01 1.5	..	..
67	..	..	0.03 0.1	0.1 0.3	0.07 0.4	0.04 0.5	..	..	0.01 0.5
69	..	..	..	0.04 0.1	0.1 0.2	..	..	..	..
71	..	..	..	0.03 0.1	0.03 0.1	..	..	..	..
73	..	..	..	0.01 0.0	0.01 0.0	..	..	..	..

TABLE XI PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER

NOVEMBER

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)					
	T	T-2	T-4	T-6	T-8	T-10
19	0.06 99.9	0.01 100.0	..	..	..	..
21	0.1 99.9	..	..	..	..	..
23	0.2 99.8	0.01 99.8	..	..	..	..
25	0.4 99.5	0.03 99.6	..	..	..	..
27	0.5 98.9	0.2 99.1	..	..	..	..
29	0.9 98.1	0.3 98.4	..	..	..	..
31	1.4 96.5	0.6 97.2	..	..	..	..
33	1.7 93.7	1.2 95.1	0.07 95.2	..	..	..
35	1.7 89.8	2.0 92.0	0.2 92.2	..	..	..
37	2.6 84.6	2.8 88.1	0.1 88.3	0.04 88.3	..	..
39	3.4 77.7	3.4 82.0	0.7 82.7	0.08 82.8	..	..
41	3.4 68.7	4.4 74.3	0.9 75.2	0.01 75.2	..	..
43	4.0 55.9	6.7 65.3	1.1 66.5	0.04 66.5	..	..
45	3.4 41.3	7.8 51.9	2.2 54.5	0.1 54.7	..	..
47	2.6 27.7	7.9 37.9	2.5 40.7	0.4 41.1	..	..
49	2.0 18.5	4.9 25.1	2.0 27.3	0.3 27.7	0.1 27.7	0.01 27.8
51	1.5 10.7	4.4 16.5	1.5 18.1	0.3 18.5	..	..
53	0.7 5.6	3.0 9.2	1.2 10.5	0.2 10.7	..	..
55	0.4 2.7	1.5 4.9	0.6 5.5	0.1 5.7	..	..
57	0.2 0.7	1.2 2.3	0.6 3.0	0.06 3.0	0.03 3.1	..
59	0.01 0.0	0.5 0.5	0.3 0.9	0.04 1.0	..	..
61	..	..	0.04 0.0	0.03 0.1	..	..
63	..	..	..	..	0.03 0.0	..
65	..	..	..	..	..	0.01 0.0

TABLE XII PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER
DECEMBER

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)						
	T	T-2	T-4	T-6	T-8	T-10	T-12
13	0.03 99.9	..	..	..	..	..	..
15	0.04 99.9	..	..	..	..	..	..
17	0.1 99.9	..	..	..	..	..	..
19	0.2 99.8	0.01 99.8	..	..	..	..	..
21	0.4 99.5	0.1 99.6	..	..	..	..	..
23	0.4 99.0	0.07 99.1	..	..	..	..	..
25	1.0 98.4	0.2 98.6	..	..	..	..	..
27	1.2 97.0	0.4 97.4	..	..	..	..	..
29	1.9 95.2	0.6 95.8	..	..	..	..	..
31	2.5 91.3	1.7 93.3	0.04 93.3	..	..	..	..
33	3.6 84.5	3.0 88.7	0.3 89.1	..	..	..	..
35	3.1 76.1	4.4 80.9	1.2 82.1	..	..	..	..
37	3.6 67.4	4.6 73.0	0.4 73.4	0.01 73.5	..	..	..
39	3.8 55.8	6.9 63.8	1.0 64.8	0.03 64.8	0.01 64.8	..	..
41	3.3 44.1	6.6 52.0	1.0 53.1	0.01 53.1	0.01 53.1	0.01 53.1	0.01 53.1
43	3.3 33.1	5.7 40.8	1.2 42.1	0.04 42.2	..	..	..
45	3.4 24.2	4.5 29.8	1.8 31.8	0.1 31.9	..	..	..
47	1.9 14.0	5.9 20.8	1.0 21.9	0.2 22.1	0.01 22.1	..	..
49	1.7 7.5	3.8 12.1	0.9 13.0	0.1 13.1	..	..	..
51	0.5 2.7	2.9 5.8	0.7 6.6	0.03 6.6	..	..	..
53	0.1 0.8	1.1 2.2	0.2 2.4	0.05 2.5	0.01 2.5	..	..
55	0.1 0.2	0.4 0.7	0.3 1.0	0.03 1.0	..	..	..
57	..	0.1 0.1	0.07 0.2	0.03 0.2	..	..	..

TABLE XIII PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

DECEMBER-JANUARY-FEBRUARY

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)						
	T	T-2	T-4	T-6	T-8	T-10	T-12
13	0.03 99.8	0.0 99.8	..	..	..	..	..
15	0.06 99.8	0.01 99.8	..	..	..	..	..
17	0.1 99.7	0.05 99.7	..	..	..	..	..
19	0.2 99.5	0.03 99.6	..	..	..	..	..
21	0.4 99.3	0.08 99.3	..	..	..	..	..
23	0.6 98.8	0.1 98.9	..	..	..	..	..
25	1.1 97.7	0.4 98.2	0.0 98.2	..	..	..	..
27	1.7 95.3	1.2 96.6	0.03 96.7	..	..	..	..
29	2.3 91.3	2.0 93.7	0.08 93.7	0.0 93.7	..	..	..
31	2.7 85.3	3.2 89.1	0.3 89.3	..	..	0.0 89.3	..
33	3.6 76.7	4.6 82.6	0.5 83.1	..	..	..	..
35	3.2 66.7	5.3 73.1	1.2 74.4	0.04 74.5	..	..	..
37	3.5 56.9	5.4 63.5	1.0 64.6	0.07 64.7	0.0 64.7	..	..
39	3.4 46.0	6.2 53.4	1.1 54.6	0.1 54.7	0.01 54.7	..	..
41	2.6 35.7	5.6 42.6	1.1 43.8	0.1 43.9	0.0 43.9	0.0 43.9	0.0 43.9
43	2.8 26.5	5.0 33.1	1.2 34.4	0.1 34.5	0.0 34.5	..	..
45	2.6 18.3	4.2 23.7	1.5 25.3	0.1 25.4	..	..	..
47	1.9 10.7	4.2 15.7	1.1 16.9	0.1 17.0	0.02 17.0	..	..
49	1.3 5.4	2.7 8.8	0.7 9.6	0.1 9.7	0.02 9.7	..	..
51	0.5 1.7	2.0 4.1	0.6 4.8	0.08 4.9	0.01 4.9	..	..
53	0.06 0.3	0.7 1.2	0.3 1.6	0.1 1.7	0.03 1.7	..	..
55	0.05 0.1	0.1 0.2	0.2 0.5	0.04 0.5	0.01 0.5	..	..
57	..	0.05 0.1	0.03 0.1	0.03 0.1	..	..	..

TABLE XIV PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES
MANCHESTER MARCH-APRIL-MAY

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)									
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18
13	0.0 99.9	..	..	..	..	..	..	..	..	..
15	0.01 99.9	..	..	..	..	..	..	..	..	..
17	0.02 99.9	0.01 99.9	..	..	..	..	..	..	..	..
19	0.05 99.9	0.02 99.9	..	..	..	..	..	..	..	..
21	0.02 99.8	0.01 99.8	..	..	..	..	..	..	..	..
23	0.1 99.8	0.02 99.8	..	..	..	..	..	..	..	..
25	0.2 99.6	0.1 99.7	..	..	..	..	..	..	..	..
27	0.4 99.2	0.2 99.4	..	0.0 99.4	..	..	..	..	..	..
29	0.5 98.3	0.4 98.8	0.01 98.8	..	..	..	..	..	..	..
31	1.0 96.8	0.8 97.8	0.06 97.9	..	..	..	..	..	..	..
33	1.2 93.5	1.6 95.8	0.2 96.0	..	..	..	..	..	..	..
35	1.3 89.4	2.1 92.3	0.6 93.0	0.01 93.0	0.0 93.0	..	..	..	..	..
37	1.7 84.1	2.7 88.1	0.6 88.9	0.07 89.0	..	..	..	..	..	..
39	1.7 77.0	3.4 82.5	0.9 83.7	0.2 83.9	0.01 83.9	..	..	..	..	..
41	1.7 68.4	4.1 75.3	1.3 77.3	0.3 77.7	0.02 77.7	..	..	..	..	..
43	1.6 58.4	4.2 66.7	1.8 69.5	0.6 70.3	0.05 70.3	..	..	..	..	..
45	1.7 47.1	4.5 56.8	2.5 60.9	0.8 61.9	0.1 62.1	..	..	..	..	..
47	1.9 35.9	4.1 45.4	2.8 50.6	1.2 52.2	0.2 52.4	0.01 52.5	..	..	..	..
49	1.2 25.3	3.7 34.0	2.4 39.4	1.6 41.8	0.3 42.2	0.03 42.2	0.0 42.2	..	..	..
51	0.7 16.0	3.2 24.1	2.3 29.1	1.7 32.1	0.7 32.9	0.07 33.0	..	..	..	..
53	0.4 9.9	1.7 15.3	2.1 20.2	1.4 22.9	0.9 24.2	0.1 24.3	0.01 24.3	..	..	..
55	0.2 5.8	1.0 9.5	1.5 13.2	1.3 16.0	0.9 17.3	0.3 17.7	0.05 17.7	..	..	..
57	0.04 2.9	0.3 5.6	0.9 8.3	1.0 10.5	0.8 12.0	0.3 12.4	0.08 12.5	0.0 12.5	..	..
59	0.01 1.4	0.1 2.8	0.6 5.2	0.8 7.1	0.5 8.3	0.4 8.9	0.07 9.1	..	..	..

TABLE XIV PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

MARCH-APRIL-MAY

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)									
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18
61	0.0 0.8	0.08 1.4	0.2 2.7	0.6 4.5	0.4 5.5	0.4 6.3	0.2 6.5	0.03 6.6	0.01 6.6	..
63	0.0 0.4	0.01 0.8	0.1 1.3	0.3 2.4	0.5 3.6	0.3 4.3	0.2 4.6	0.05 4.6	0.02 4.7	0.0 4.7
65	0.0 0.2	0.02 0.4	0.05 0.7	0.1 1.2	0.3 2.0	0.4 2.7	0.2 3.1	0.05 3.2	0.02 3.2	0.0 3.2
67	..	0.0 0.2	0.04 0.3	0.07 0.7	0.1 1.1	0.3 1.5	0.2 1.9	0.08 2.0	0.04 2.0	0.0 2.0
69	..	..	0.02 0.2	0.03 0.3	0.05 0.6	0.1 0.9	0.1 1.0	0.07 1.1	0.06 1.2	0.01 1.2
71	..	..	..	0.03 0.2	0.02 0.3	0.07 0.5	0.1 0.7	0.06 0.7	0.03 0.8	0.0 0.8
73	..	..	0.01 0.0	0.02 0.1	0.01 0.2	0.03 0.2	0.07 0.3	0.05 0.4	0.03 0.5	..
75	..	..	..	..	0.03 0.1	0.0 0.1	0.02 0.1	0.05 0.2	0.03 0.2	..
77	..	..	..	..	0.0 0.0	0.02 0.1	0.01 0.1	0.0 0.1	0.02 0.1	0.0 0.1
79	..	..	..	..	..	0.0 0.0	0.02 0.1	0.01 0.1	0.0 0.1	..
81	..	..	..	..	..	0.0 0.0	0.0 0.0	0.02 0.0	0.0 0.0	..
83	..	..	..	..	..	..	..	0.01 0.0	..	..

TABLE XV PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

JUNE-JULY-AUGUST

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)										
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18	T-20
37	0.01 100.0	..	..	..	..	..	..	..	..	..	..
39	0.03 100.0	0.01 100.0	..	..	..	..	..	..	..	..	..
41	0.1 99.9	0.05 99.9	0.02 99.9	..	..	..	..	..	..	..	..
43	0.3 99.5	0.2 99.8	0.03 99.8	..	..	..	..	..	..	..	..
45	0.5 98.2	0.6 99.2	0.04 99.3	0.01 99.3	..	..	..	..	..	..	..
47	1.1 96.1	1.1 97.7	0.3 98.1	0.03 98.1	..	..	..	..	..	..	..
49	1.8 91.5	2.2 95.0	0.3 95.5	0.08 95.6	0.0 95.6	..	..	..	..	..	..
51	2.4 82.9	3.8 89.7	0.8 91.0	0.1 91.2	0.02 91.2	..	..	..	..	..	..
53	2.7 70.0	5.2 80.5	1.6 83.5	0.2 84.0	0.06 84.1	..	..	..	..	..	..
55	2.4 54.3	5.9 67.3	2.5 72.5	0.9 74.0	0.2 74.3	0.03 74.3	..	..	..	..	..
57	1.8 38.2	4.9 51.9	3.2 59.0	1.4 61.7	0.4 62.3	0.06 62.4	0.01 62.4	..	..	..	..
59	1.5 25.5	4.1 36.4	3.7 45.2	2.1 49.1	0.9 50.5	0.1 50.6	0.01 50.6	..	..	..	..
61	0.8 15.6	2.9 24.0	2.7 30.8	2.6 35.9	1.2 37.7	0.3 38.1	0.07 38.2	..	..	..	..
63	0.2 8.9	1.4 14.8	2.0 20.3	1.9 24.4	1.6 26.9	0.5 27.5	0.06 27.7	0.0 27.7	..	..	..
65	0.04 4.3	0.9 8.7	1.2 13.2	1.4 16.7	1.4 18.9	0.6 19.8	0.1 19.9	0.03 20.0	..	..	..
67	0.01 1.8	0.3 4.2	0.9 7.7	1.2 11.1	1.2 13.2	0.6 13.9	0.1 14.2	0.03 14.3	0.02 14.3	..	..
69	..	0.06 1.7	0.4 3.9	0.8 6.5	0.8 8.7	0.6 9.6	0.1 9.7	0.06 9.9	0.0 10.0	..	..
71	..	0.01 0.8	0.1 1.7	0.4 3.5	0.6 5.3	0.6 6.6	0.2 6.9	0.03 7.0	0.1 7.1	0.04 7.1	..
73	..	0.01 0.3	0.0 0.8	0.2 1.6	0.4 2.9	0.5 4.2	0.4 4.9	0.07 5.0	0.01 5.0	0.03 5.1	0.01 5.1
75	..	..	0.0 0.3	0.08 0.7	0.2 1.4	0.4 2.3	0.4 3.1	0.2 3.4	0.02 3.4	0.02 3.4	..
77	..	..	0.0 0.1	..	0.1 0.7	0.2 1.1	0.3 1.7	0.2 2.0	0.07 2.1	0.01 2.1	..
79	..	..	0.0 0.0	..	0.04 0.3	0.09 0.6	0.1 0.8	0.2 1.1	0.1 1.2	0.04 1.2	0.01 1.2

TABLE XV PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

JUNE-JULY-AUGUST

DRY-BULB TEMP.	Associated wet-bulb temperature (°F.)										
T (°F.)	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18	T-20
81	0.01 0.0	0.0 0.1	0.05 0.3	0.1 0.4	0.1 0.6	0.06 0.6	0.03 0.7	0.0 0.7
83	0.0 0.0	0.02 0.1	0.06 0.2	0.05 0.3	0.02 0.3	0.0 0.3	..
85	0.0 0.0	0.02 0.0	0.04 0.1	0.04 0.1	0.0 0.1	..
87	0.01 0.0	0.04 0.1	..	..

TABLE XVI PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

SEPTEMBER-OCTOBER-NOVEMBER

DRY-BULB TEMP.	Associated wet-bulb temperature (°F.)								
T (°F.)	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16
19	0.02 99.9	0.0 99.9	..	..	..	..	..	..	..
21	0.04 99.9	..	..	..	..	..	..	..	..
23	0.07 99.9	0.0 99.9	..	..	..	..	..	..	..
25	0.1 99.8	0.03 99.8	..	..	..	..	..	..	..
27	0.2 99.6	0.07 99.7	..	..	..	..	..	..	..
29	0.4 99.2	0.2 99.4	..	..	..	..	..	..	..
31	0.6 98.5	0.3 98.8	..	..	..	..	..	..	..
33	0.8 97.2	0.6 97.9	0.02 97.9	..	..	..	..	..	..
35	0.8 95.4	0.9 96.4	0.07 96.5	..	..	..	..	..	..
37	1.1 93.1	1.2 94.6	0.05 94.7	0.01 94.7	..	..	..	..	..
39	1.7 89.7	1.8 92.0	0.3 92.3	0.03 92.3	0.0 92.3	..	..	..	..
41	1.9 85.1	2.1 88.0	0.4 88.5	0.02 88.5	..	..	..	..	..
43	2.3 78.1	3.5 83.2	0.6 84.0	0.05 84.1	..	..	..	..	..
45	2.5 69.3	4.6 75.8	1.3 77.4	0.2 77.6	0.01 77.6	..	0.0 77.6	0.0 77.6	..
47	2.7 58.9	5.6 66.8	1.5 68.7	0.3 69.0	0.01 69.0	..	..	..	..
49	2.5 48.5	5.2 56.2	1.8 58.5	0.3 58.9	0.06 58.9	0.0 58.9	..	..	..
51	1.8 37.4	5.1 45.9	1.9 48.5	0.5 49.0	0.06 49.1	0.0 49.1	..	..	..
53	1.6 27.8	4.6 35.6	2.2 39.1	0.5 39.7	0.04 39.7	..	..	..	..
55	1.3 18.8	3.9 26.2	1.9 29.4	0.9 30.7	0.1 30.8	0.0 30.8	..	..	..
57	0.9 11.6	2.8 17.5	2.2 21.0	0.9 22.3	0.3 22.7	0.01 22.7	0.0 22.7	..	..
59	0.4 6.1	2.2 10.7	1.8 13.8	0.9 15.1	0.4 15.5	0.04 15.5	..	..	..
61	0.1 2.7	1.2 5.7	1.3 8.1	0.9 9.4	0.3 9.8	0.05 9.8	..	..	..

TABLE XVI PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTERSEPTEMBER-OCTOBER-NOVEMBER

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)								
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16
63	0.08 1.1	0.6 2.6	0.9 4.4	0.7 5.5	0.3 5.9	0.05 6.0	..	..	..
65	0.03 0.4	0.2 1.0	0.4 1.9	0.5 2.8	0.3 3.2	0.1 3.3	0.01 3.3	0.0 3.3	..
67	..	0.03 0.3	0.2 0.8	0.2 1.3	0.2 1.7	0.1 1.8	0.0 1.8	0.0 1.8	0.0 1.8
69	..	..	0.03 0.3	0.1 0.5	0.2 0.9	0.1 1.0	0.02 1.1	..	..
71	..	..	0.02 0.1	0.04 0.3	0.07 0.4	0.1 0.6	0.05 0.6	0.0 0.6	..
73	..	..	..	0.03 0.1	0.07 0.2	0.05 0.3	0.03 0.3	0.0 0.3	..
75	..	..	..	..	0.02 0.1	0.04 0.1	0.01 0.1	0.01 0.1	..
77	..	..	..	..	..	0.04 0.1	0.01 0.1	..	0.0 0.1
79	..	..	..	..	..	0.01 0.0	0.01 0.0	..	..

TABLE XVII PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

ANNUAL

T (°F.)	Associated wet-bulb temperature (°F.)									
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18
13	100.0	100.0	..	..	..	..	..	..	..	..
15	100.0	100.0	..	..	..	..	..	..	..	..
17	99.9	99.9	..	..	..	..	..	..	..	..
19	99.9	99.9	..	..	..	..	..	..	..	..
21	99.8	99.8	..	..	..	..	..	..	..	..
23	99.7	99.7	..	..	..	..	..	..	..	..
25	99.5	99.5	99.5	..	..	..	..	..	..	..
27	98.5	98.9	98.9	98.9	..	..	..	..	..	..
29	97.2	97.9	97.9	97.9	..	..	..	..	..	..
31	95.1	96.4	96.5	..	..	96.5	..	..	..	..
33	91.9	94.0	94.2	..	..	..	..	..	..	..
35	88.0	90.5	90.9	90.9	90.9	..	..	..	..	..
37	83.7	86.7	87.2	87.2	87.2	..	..	..	..	..
39	78.3	82.1	82.8	82.9	82.9	..	..	..	..	..
41	72.5	76.6	77.6	77.7	77.7	77.7	77.7	..	..	..
43	65.9	70.9	72.1	72.4	72.4	..	..	..	..	..
45	58.4	64.1	65.9	66.2	66.3	..	66.3	66.3	..	..
47	50.6	56.6	58.7	59.3	59.3	59.3	..	..	..	..
49	43.0	48.7	51.0	51.7	51.9	51.9	51.9	..	..	..
51	34.8	41.3	43.6	44.6	44.9	44.9	..	..	..	..
53	27.3	33.5	36.5	37.4	37.8	37.9	37.9	..	..	..
55	19.9	26.1	29.3	30.7	31.1	31.2	31.2	..	..	..

TABLE XVII PERCENTAGE FREQUENCIES OF DRY-BULB AND ASSOCIATED WET-BULB TEMPERATURES

MANCHESTER

ANNUAL

DRY-BULB TEMP. T (°F.)	Associated wet-bulb temperature (°F.)										
	T	T-2	T-4	T-6	T-8	T-10	T-12	T-14	T-16	T-18	T-20
57	0.7 13.3	2.0 18.9	1.6 22.3	0.9 24.0	0.4 24.6	0.1 24.7	0.02 24.7	0.0 24.7	..	..	..
59	0.5 8.4	1.6 12.6	1.5 16.1	1.0 18.0	0.5 18.8	0.1 19.0	0.02 19.0	..	..	..	..
61	0.2 4.9	1.1 7.9	1.0 10.5	1.0 12.5	0.5 13.4	0.2 13.7	0.07 13.8	0.01 13.8	0.0 13.8	..	..
63	0.07 2.7	0.5 4.7	0.7 6.6	0.7 8.2	0.6 9.3	0.2 9.6	0.06 9.7	0.01 9.7	0.0 9.7	0.0 9.7	..
65	0.02 1.2	0.3 2.6	0.4 4.1	0.5 5.3	0.5 6.2	0.3 6.7	0.09 6.8	0.02 6.9	0.0 6.9	0.0 6.9	..
67	0.0 0.5	0.07 1.2	0.3 2.3	0.4 3.4	0.4 4.1	0.3 4.5	0.03 4.7	0.03 4.7	0.02 4.7	0.0 4.7	..
69	..	0.01 0.5	0.1 1.1	0.2 1.9	0.3 2.6	0.2 2.9	0.08 3.0	0.03 3.1	0.02 3.1	0.0 3.1	..
71	..	0.0 0.2	0.04 0.5	0.1 1.0	0.2 1.6	0.2 2.0	0.08 2.1	0.03 2.1	0.03 2.2	0.01 2.2	..
73	..	0.0 0.1	0.0 0.2	0.07 0.5	0.1 0.9	0.2 1.2	0.1 1.4	0.03 1.5	0.01 1.5	0.01 1.5	0.0 1.5
75	..	..	0.0 0.1	0.02 0.2	0.07 0.4	0.1 0.7	0.1 0.9	0.07 1.0	0.01 1.0	0.01 1.0	..
77	..	..	0.0 0.0	..	0.03 0.2	0.08 0.3	0.09 0.5	0.04 0.6	0.02 0.6	0.0 0.6	..
79	..	..	0.0 0.0	..	0.01 0.1	0.03 0.1	0.04 0.2	0.05 0.3	0.03 0.3	0.01 0.3	0.0 0.3
81	..	..	..	0.0 0.0	0.0 0.0	0.01 0.1	0.03 0.1	0.03 0.1	0.02 0.2	0.01 0.2	0.0 0.2
83	..	..	..	..	0.0 0.0	0.0 0.0	0.02 0.0	0.02 0.1	0.01 0.1	0.0 0.1	..
85	..	..	..	..	..	0.0 0.0	0.0 0.0	0.01 0.0	0.01 0.0	0.0 0.0	..
87	..	..	..	..	..	..	..	0.0 0.0	0.01 0.0	..	..

TABLE XVIII PERCENTAGE NUMBER OF HOURS WITH

MANCHESTER

(hourly observations)

DRY-BULB

	12.1 to 14.0	14.1 to 16.0	16.1 to 18.0	18.1 to 20.0	20.1 to 22.0	22.1 to 24.0	24.1 to 26.0	26.1 to 28.0	28.1 to 30.0	30.1 to 32.0	32.1 to 34.0	34.1 to 36.0	36.1 to 38.0	38.1 to 40.0	40.1 to 42.0	42.1 to 44.0	44.1 to 46.0
JANUARY	0.03	0.07	0.3	0.2	0.5	1.0	1.7	2.9	4.7	6.7	9.5	10.3	11.5	10.9	8.4	8.6	7.5
FEBRUARY	0.06	0.1	0.1	0.2	0.4	0.7	1.7	4.4	6.2	7.5	9.6	10.0	9.8	9.8	8.9	8.3	7.7
MARCH	0.01	0.03	0.08	0.2	0.1	0.4	1.0	1.5	2.5	4.7	7.3	8.3	8.6	8.8	9.2	9.5	9.9
APRIL	..	..	..	..	..	..	0.01	0.04	0.1	0.6	1.1	2.9	5.3	6.8	9.2	10.2	11.6
MAY	..	..	..	..	..	..	..	..	..	0.1	0.5	0.7	1.2	2.5	3.8	5.3	7.5
JUNE	..	..	..	..	..	..	..	..	..	..	..	..	0.04	0.1	0.4	1.3	2.5
JULY	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0.01	0.09	0.4
AUGUST	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0.07	0.09	0.5
SEPTEMBER	..	..	..	..	..	..	..	..	..	..	..	0.1	0.2	0.7	0.7	1.3	2.4
OCTOBER	..	..	..	..	..	..	0.09	0.3	0.5	0.8	1.2	1.3	1.5	3.1	3.5	6.1	9.8
NOVEMBER	..	..	..	0.07	0.1	0.2	0.4	0.7	1.2	2.0	2.9	3.9	5.5	7.7	8.7	11.8	13.6
DECEMBER	0.03	0.04	0.1	0.2	0.5	0.5	1.1	1.7	2.5	4.2	6.9	8.6	8.7	11.6	11.0	10.3	9.8
DEC. JAN. FEB.	0.04	0.07	0.2	0.2	0.5	0.7	1.5	2.9	4.4	6.2	8.6	9.6	10.0	10.8	9.4	9.1	8.3
MAR. APR. MAY	0.0	0.01	0.03	0.06	0.04	0.1	0.3	0.5	0.9	1.8	3.0	4.0	5.0	6.1	7.4	8.3	9.6
JUN. JUL. AUG.	..	..	..	..	..	..	..	..	..	..	..	..	0.01	0.04	0.2	0.5	1.1
SEPT. OCT. NOV.	..	..	..	0.02	0.04	0.08	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.8	4.4	6.4	8.6
ANNUAL	0.09	0.02	0.05	0.07	0.1	0.2	0.5	0.8	1.4	2.1	3.1	3.8	4.2	5.2	5.3	6.1	6.9

DRY-BULB TEMPERATURE WITHIN RANGES OF 2°F.

1946-1955)

TEMP. ($^{\circ}\text{F.}$)

46.1 to 48.0	48.1 to 50.0	50.1 to 52.0	52.1 to 54.0	54.1 to 56.0	56.1 to 58.0	58.1 to 60.0	60.1 to 62.0	62.1 to 64.0	64.1 to 66.0	66.1 to 68.0	68.1 to 70.0	70.1 to 72.0	72.1 to 74.0	74.1 to 76.0	76.1 to 78.0	78.1 to 80.0	80.1 to 82.0	82.1 to 84.0	84.1 to 86.0	86.1 to 88.0
5.9	4.9	3.2	0.8	0.2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7.2	3.3	2.3	1.2	0.3	0.1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7.9	6.7	5.7	2.9	1.8	1.0	0.6	0.4	0.3	0.2	0.3	0.1	..	..	..	..	..	..	..	..	..
12.0	10.5	9.1	7.2	4.6	3.1	1.8	1.2	1.0	0.6	0.4	0.3	0.1	0.1	..	..	..	..	..	..	..
10.7	10.8	10.9	10.0	8.9	6.1	5.2	4.4	3.2	2.8	1.9	1.1	0.8	0.6	0.4	0.2	0.1	0.09	0.03	..	..
4.9	7.8	10.2	10.4	12.5	10.8	10.6	8.2	5.9	4.0	3.2	2.4	1.7	1.2	0.9	0.5	0.2	0.1	0.06	0.01	..
1.3	2.9	5.2	9.5	11.6	11.8	13.0	11.4	8.5	6.7	5.1	3.5	2.4	2.0	1.5	1.2	0.9	0.5	0.2	0.2	0.1
1.2	2.5	5.9	9.7	11.4	12.9	13.7	11.9	8.6	5.9	4.8	2.9	1.9	1.9	1.4	1.0	0.7	0.5	0.2	0.1	0.01
4.4	7.7	9.5	11.9	13.5	12.7	11.2	8.3	5.9	3.7	2.4	1.3	0.8	0.6	0.2	0.2	0.06	..	..	..	..
12.3	12.3	10.4	9.7	8.5	6.5	5.1	3.2	2.0	1.1	0.3	0.1	0.05	0.03	..	..	..	..	..	..	..
13.4	9.3	7.7	5.1	2.6	2.1	0.8	0.07	0.03	0.01	..	..	..	..	..	..	..	..	..	..	..
9.0	6.5	4.1	1.5	0.9	0.2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7.4	4.9	3.2	1.2	0.5	0.1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10.2	9.3	8.6	6.7	5.1	3.4	2.5	2.0	1.5	1.2	0.8	0.5	0.3	0.2	0.1	0.07	0.05	0.03	0.01	..	..
2.5	4.4	7.1	9.9	11.8	11.8	12.4	10.5	7.7	5.6	4.4	3.0	2.0	1.7	1.3	0.9	0.6	0.4	0.2	0.1	0.05
10.1	9.8	9.2	8.9	8.2	7.1	5.7	3.9	2.6	1.6	0.9	0.5	0.3	0.2	0.08	0.05	0.02	..	..	..	..
7.5	7.1	7.0	6.6	6.4	5.5	5.2	4.1	3.0	2.0	1.5	0.9	0.7	0.5	0.4	0.3	0.2	0.09	0.04	0.03	0.01

TABLE XIX PERCENTAGE NUMBER OF HOURS WITH

(hourly observations)

WET-BULB

MANCHESTER

	10.1 to 12.0	12.1 to 14.0	14.1 to 16.0	16.1 to 18.0	18.1 to 20.0	20.1 to 22.0	22.1 to 24.0	24.1 to 26.0	26.1 to 28.0	28.1 to 30.0	30.1 to 32.0	32.1 to 34.0	34.1 to 36.0	36.1 to 38.0	38.1 to 40.0	40.1 to 42.0	42.1 to 44.0
JANUARY	0.01	0.04	0.1	0.2	0.2	0.6	1.4	2.4	4.0	6.3	9.0	11.2	11.0	10.7	9.7	8.3	8.1
FEBRUARY	..	0.07	0.1	0.1	0.2	0.6	1.2	3.5	6.1	7.4	10.2	10.3	9.7	10.7	9.1	8.4	7.6
MARCH	..	0.01	0.05	0.1	0.2	0.1	0.7	1.2	2.3	4.0	8.5	8.9	9.4	9.8	9.1	10.1	10.6
APRIL	0.01	0.1	0.3	0.9	2.5	5.2	8.9	12.3	12.9	14.4
MAY	0.01	0.2	0.6	1.3	2.9	4.5	7.0	9.4
JUNE	0.1	0.4	1.0	3.1
JULY	0.01	0.1
AUGUST	0.07	0.3
SEPTEMBER	0.06	0.1	0.6	0.6	1.2	2.2
OCTOBER	0.01	0.1	0.4	0.7	1.1	1.3	1.7	2.6	3.9	7.0	9.7
NOVEMBER	0.01	0.06	0.1	0.3	0.5	0.8	1.5	2.8	3.8	5.3	6.9	9.0	12.8	14.6
DECEMBER	..	0.03	0.04	0.1	0.3	0.5	0.6	1.4	1.9	3.9	6.6	8.5	8.7	11.6	11.6	11.0	9.0
DEC. JAN. FEB.	0.0	0.05	0.1	0.2	0.2	0.6	1.0	2.4	3.9	6.0	8.5	10.0	9.8	11.0	10.2	9.2	8.2
MAR. APR. MAY	..	0.0	0.02	0.04	0.06	0.05	0.2	0.4	0.8	1.5	3.2	4.0	5.3	7.2	8.6	10.0	11.4
JUN. JUL. AUG.	0.05	0.1	0.3	1.1
SEPT. OCT. NOV.	0.0	0.02	0.04	0.1	0.2	0.4	0.7	1.3	1.7	2.4	3.4	4.5	7.0	8.8
ANNUAL	0.0	0.01	0.03	0.05	0.08	0.2	0.3	0.7	1.3	2.0	3.1	3.9	4.3	5.4	5.8	6.5	7.4

WET-BULB TEMPERATURE WITHIN RANGES OF 2° F.

1946-1955)

TEMP. (°F.)

44.1 to 46.0	46.1 to 48.0	48.1 to 50.0	50.1 to 52.0	52.1 to 54.0	54.1 to 56.0	56.1 to 58.0	58.1 to 60.0	60.1 to 62.0	62.1 to 64.0	64.1 to 66.0	66.1 to 68.0	68.1 to 70.0	70.1 to 72.0	72.1 to 74.0	74.1 to 76.0
6.3	4.8	3.8	1.3	0.1	..	..	..	..	..	..	..	..	..	..	..
6.4	4.8	2.3	0.9	0.03	..	..	..	..	..	..	..	..	..	..	..
8.7	7.6	5.2	2.4	0.6	0.2	0.1	0.05	..	..	..	..	..	..	..	..
12.9	10.4	8.7	4.9	2.9	1.6	0.7	0.3	0.08	..	..	..	..	..	..	..
11.9	13.7	13.9	11.0	9.0	6.4	3.9	2.1	1.1	0.5	0.3	0.3	0.09	0.01	..	..
4.9	9.0	14.4	15.1	15.6	13.6	8.6	5.5	4.0	2.4	1.4	0.6	0.3	0.1	..	..
0.8	2.9	6.2	12.3	15.6	15.4	14.1	12.7	7.7	5.8	3.6	1.7	0.5	0.5	0.1	0.07
0.3	1.8	5.4	11.1	16.5	19.2	15.4	11.4	8.4	5.2	2.4	1.2	0.6	0.1	0.01	..
4.1	8.6	12.3	15.1	16.1	13.6	10.6	7.5	4.2	2.1	0.7	0.3	0.03	..	..	..
13.3	13.0	12.9	8.7	8.1	6.3	5.1	2.8	1.1	0.1	0.04	0.01	..	..	..	..
13.7	9.3	7.7	5.2	2.9	1.9	0.8	0.01	..	..	..	..	..	..	..	..
10.2	6.5	4.9	1.9	0.5	0.3	..	..	..	..	..	..	..	..	..	..
7.6	5.4	3.7	1.4	0.2	0.1	..	..	..	..	..	..	..	..	..	..
11.1	10.6	9.3	6.1	4.2	2.7	1.6	0.8	0.4	0.2	0.1	0.1	0.03	0.0	..	..
2.1	4.5	8.6	12.8	15.9	16.1	12.7	9.9	6.7	4.5	2.5	1.2	0.5	0.2	0.05	0.02
10.4	10.3	11.0	9.6	9.0	7.3	5.5	3.4	1.7	0.7	0.2	0.1	0.01	..	..	..
7.8	7.7	8.2	7.5	7.4	6.6	5.0	3.6	2.1	1.3	0.7	0.4	0.1	0.06	0.01	0.01