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NEW ZEALAND METEOROLOGICAL SERVICE

Sunshine Normals 1951 to 1980

STATIONS IN NEW ZEALAND, THE COOK ISLANDS,
KIRIBATI, TONGA, TUVALU, FIJI,
AND WESTERN SAMOA

CORRIGENDA

N.Z. Met. S. Misc. Pub. 181

Climatological Extremes for New Zealand

Page 3 - LOWEST RAINFALL, CONSECUTIVE MONTHS

Top line of South Island table should read:

3 months 10 Blenheim Jan. 1935

Page 4 - RAINLESS PERIODS

Second line of table should read:

Moa Creek (S. Otago) 68 19 Mar. 1950 - 25 May 1950

Page 10 - HIGHEST GUST RECORDED IN EACH MONTH

Second line of table should read:

Feb. 140 Roundtop Hill (Canterbury) 14 Feb. 1979

Fourth line of table should read:

Apr. 135 Mt. John (Canterbury) 18 Apr. 1970

Tenth line of table should read:

Oct. 102 Mt. Cook (Canterbury) 11 Oct. 1973

Page 11 - HIGHEST WIND RUN IN ONE DAY

Second line of table should read:

Feb. 1703 Makara 3 Feb. 1966

Page 12 - HIGHEST RECORDED MEAN SEA LEVEL PRESSURE, 1960-1980

Last line of North Island table should read:

Dec. 1032.5 Auckland Airport 13 Dec 1966

Page 13 - LOWEST RECORDED MEAN SEA LEVEL PRESSURE, 1960-1980

Fourth line of North Island table should read:

Apr. 967.9 Rotorua Airport 10 Apr. 1968

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This publication was compiled in the Climate section of the New Zealand Meteorological Service by C.S. Thompson. A.C. Penney prepared the tables of sunshine normals.

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Wellington

CONTENTS

Inset *

SUNSHINE NORMALS 1951 - 1980

Summary

This publication contains monthly and annual average sunshine normals for the period 1951 to 1980. These normals are also expressed as percentages of the possible sunshine duration at the actual site.

Many of the normals are estimates, as some stations did not cover the full 30-year period. Estimates of the appropriate monthly values were made by intercomparisons between full length and short record stations. When this was not possible, period averages were used. A quality code derived from mean correlations was used to categorise the estimates; these were determined on the basis of highest explained variance.

A supplementary table gives the astronomically possible sunshine duration for specified latitudes.

INTRODUCTION

Normals are average values of a climatological parameter covering a period of 30 consecutive years (WMO, 1983). The 30 year period should begin on the first day of a new decade e.g. 1 January 1951. Adjusted values are used when short period data does not cover the full normal period. The normals presented in this publication are the best estimates available, but they are not all equally reliable or accurate.

Measurement of the hourly or daily duration of sunshine are made in New Zealand with a Campbell-Stokes pattern sunshine recorder (Fig.1). This sunshine recorder was adopted by the World Meteorological Service in 1962 as the reference standard instrument (Meteorological Office (U.K.), 1981). The Campbell-Stokes sunshine recorder focusses radiation from the sun to burn a trace on a card situated approximately 20 mm behind the sphere. The length of the burn measures the duration of bright sunshine. The performance of the recorder can be impaired by incorrect adjustment of the level of orientation, or by contamination on the glass.

The site of a sunshine recorder is selected so as to have a minimumal horizontal obstruction, the ideal being a profile with no obstruction more than three degrees of elevation above the horizontal at sunrise and sunset. Fixed obstructions such as buildings and hills can be allowed for, but horizon profile records of nearby growing vegetation are maintained through regular site inspections.

DATA

Daily sunshine totals are obtained from scaled cards scaled by observers at the stations). Since 1935 these have been checked at the Meteorological Office Kelburn, Wellington, to ensure a uniform standard between stations.

Fig. 1. Campbell-Stokes pattern sunshine recorder.

Monthly totals of bright sunshine duration are held on magnetic tape files. All available data from 1935 to 1982 was used. Thirty-four locations were classified as being Type 1 records, in that there were monthly values for the full 30 year period (1951-1980), or had only up to 9 months of missing records. These 34 stations became the 'reference normals' set for the calculation of normals for all records of shorter

shorter length. The estimations of the 'reduced normals' were based on regression techniques.

METHOD OF CALCULATING SUNSHINE NORMALS

Other stations with at least 4 years of data over the period 1951 to 1980, or falling partially within the same period were designated as short period stations. Each short period station was compared with one or more reference stations. Regression equations were calculated for each month for a reference - short period comparison, and monthly correlation coefficients (R) were determined. A mean monthly R^2 derived from 12 monthly R^2 values was calculated. The reference station - comparison station pairing providing the highest explained variance (R^2) of this mean value was selected as giving the best estimation of the 'reduced' normal. The corresponding 12 regression equations were used to provide estimates of the long period normals from short records.

For five stations with short period records (Te Teko, Port Ohope, Opotiki, Mangere and Auckland Airport) further intercomparisons were made using nearby stations where reduced normals had been previously calculated. These reduced normal stations became 'second-order reference' locations, and regression normals were determined for each month. New mean monthly R^2 values were obtained.

Period averages only were computed for comparison stations when there were no suitable reference stations available for intercomparison.

From the latitude of the station, maximum possible sunshine duration for a level horizon was calculated as the time difference between effective sunrise and sunset summed for the days in each month in the year. Effective sunrise (sunset) was taken as being 15 minutes after (before) the centre of the sun's disc was 0^{o} 50' below horizontal, thus allowing for the diameter of the sun, refraction, and the average time when the solar beam was too attenuated to burn the sunshine recorder's card. Maximum possible sunshine durations for five degree latitude bands are given in Table 1.

From the actual horizon profile an estimate was made of the potential monthly loss of sunshine, and therefore an estimate of the possible bright sunshine duration at the station. Each sunshine normal is also expressed in the tables as a percentage of the possible duration at the site.

In the tabulated results which follow, the heading gives the length of record of available sunshine data for each station. The years given in the 'standard deviation' line are those which define the data period from which the normal was derived. Some stations did not have any horizon profile

Table 1. Monthly duration of astronomically possible sunshine hours (less 0.5 hours per day).

South lat.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	360	325	360	348	360	348	360	360	348	360	348	360
5	368	330	361	345	353	340	353	355	347	363	355	369
10	376	334	361	341	346	332	344	350	346	366	362	378
15	385	339	362	338	338	323	336	345	345	369	369	387
20	394	343	363	334	331	313	327	339	344	373	376	397
25	403	349	364	330	322	303	318	333	342	377	384	408
30	414	354	365	326	314	292	308	327	342	381	393	420
35	425	361	366	321	304	280	296	320	341	386	403	433
40	439	368	368	316	292	266	283	312	339	391	414	448
45	455	377	370	310	279	250	268	303	338	398	428	466
50	475	387	372	303	263	229	249	292	336	405	443	489

information and in such cases an 'ideal' horizon profile has been assumed. These stations have been marked by asterisks in the tables.

THE QUALITY OF THE NORMALS

The quality code (QC) of the normals was assessed on the basis of the mean monthly R^2 value, and whether the normal was derived from first or second order intercomparisons. The R^2 is a measure of the predictive ability of the regression relationships. Since sunshine records of short length generally

occurred within the 1951-1980 normals period it means that the quality code is based on statistical significance. The quality codes of the computed normals are presented in Table 2.

Table 2. Sunshine normals quality code for stations with at least four years of data

QC	
1:	Record with only 9 months or less of missing data in the period 1951-1980.
2:	$R^2 > 0.95$
3:	$0.85 < R^2 \leq 0.95$
4:	$0.75 < R^2 \leq 0.85$
5:	$0.65 < R^2 \leq 0.75$
6:	$R^2 \leq 0.65$
7:	Period averages with more than 9 months missing data and no intercomparison possible.

For the five stations (Te Teko, Port Ohope, Opotiki, Mangere and Auckland Airport) where second-order intercomparisons were made, the R^2 values were higher when a 'reduced' normal rather than a 'reference' normal was used. It was therefore not possible to use the quality code classification of Table 1 directly. The quality code was determined on the basis of the lowest of the two R^2 values displayed in Table 3.

Table 3. Quality code assessment for second-order intercomparison.

Comparison	Reduced normal	R^2	Reference normal used to compute reduced normal	R^2	QC
Te Teko	Whakatane	0.95	Tauranga	0.87	3
Port Ohope	Whakatane	0.95	Tauranga	0.87	3
Opotiki	Whakatane	0.95	Tauranga	0.87	3
Mangere	Auckland City	0.89	Ruakura	0.78	4
Auckland Air.	Auckland City	0.94	Ruakura	0.78	4

SUNSHINE NORMALS AND AN APPLICATION

Climatic data including sunshine normals are often more useful when they are expressed in terms of specific probabilities or return periods. If it is assumed that the sunshine distribution is normal or near normal, then by using the mean and standard deviation it is possible to estimate the recurrence interval from the following equation,

$$X_t = X_N \pm KS$$

where X_t is the value to be estimated for the desired return period (T), X_N is the sunshine normal or sample mean, K is a normal frequency factor from Table 4, and S is the standard deviation.

As an example, suppose that the February sunshine with a 20-year return period is needed for Kelburn, Wellington. From the tables of sunshine normals, the February normal and standard deviation are 237 hours and 36 hours respectively, and the bright sunshine total expected to occur at least once in 20 years is 296 hours, or 178 hours.

i.e. $X_T = 237 \pm (36 \times 1.65)$

Table 4. Annual recurrence interval, normal frequency factors for specific return periods.

Annual recurrence interval (e.g. 1 event in 5,10... 100 years) T	Probability of occurrence (%)	Normal frequency factor K
5	20.0	0.84
10	10.0	1.28
20	5.0	1.65
25	4.0	1.75
50	2.0	2.05
75	1.3	2.23
100	1.0	2.33

References

Meteorological Office, (U.K.), 1981. Handbook of meteorological instruments, vol 6: measurement of sunshine and solar and terrestrial radiation, 2nd ed., HMSO, London, pp. 61.

World Meteorological Organisation, 1983. Guide to Climatological Practices, 2nd ed., WMO. no. 100.

APPENDIX - List of stations

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

TE HAPUA; TE PAKI STN A42581 Lat 34 30S Long 172 48E Height 64 metres Data period 1935-1973

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	229	181	176	162	144	119	135	150	168	185	209	220	2078
Standard deviation (1951-1973)	hours	37	32	33	30	25	24	22	20	27	26	27	36	114
Possible loss from horizon obstruction	hours	19	19	9	9	6	11	9	8	6	14	24	21	155
Possible sunshine at site	hours	405	341	357	313	299	270	288	313	335	371	378	410	4082
Normal as percent of possible		57	53	49	52	48	44	47	48	50	50	55	54	51

KAITAIA AIRPORT A53021 Lat 35 4S Long 173 17E Height 80 metres Data period 1951-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	234	191	179	163	149	127	144	155	169	184	201	217	2113
Standard deviation (1951-1980)	hours	40	32	24	23	25	21	21	20	22	25	26	32	85
Possible loss from horizon obstruction	hours	3	1	2	2	4	3	4	3	2	2	2	4	32
Possible sunshine at site	hours	422	360	364	319	300	277	292	317	339	384	401	429	4205
Normal as percent of possible		55	53	49	51	50	46	49	49	50	48	50	51	50

KERIKERI A53291 Lat 35 14S Long 173 57E Height 73 metres Data period 1938-1973

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	226	171	158	151	137	121	135	144	154	174	205	212	1988
Standard deviation (1951-1973)	hours	39	34	27	31	30	20	23	17	30	23	22	40	104
Possible loss from horizon obstruction	hours	10	11	23	22	13	4	4	17	23	19	11	9	166
Possible sunshine at site	hours	416	350	344	299	290	276	292	303	318	367	392	424	4071
Normal as percent of possible		54	49	46	51	47	44	46	48	48	47	52	50	49

KAIKOHE A53482 Lat 35 25S Long 173 49E Height 204 metres Data period 1973-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	210	172	157	145	136	109	127	131	141	165	184	203	1880
Standard deviation (1973-1982)	hours	34	42	23	27	15	21	10	19	17	22	31	34	105
Possible loss from horizon obstruction	hours	18	14	8	2	0	0	0	1	6	11	15	17	92
Possible sunshine at site	hours	408	348	359	319	303	279	295	319	335	375	389	417	4145
Normal as percent of possible		51	49	44	45	45	39	43	41	42	44	47	49	45

WAIPOUA FOREST A53651 Lat 35 39S Long 173 33E Height 88 metres Data period 1935-1964

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 5	hours	180	164	141	119	97	76	98	113	133	145	162	177	1605
Standard deviation (1951-1964)	hours	31	28	20	23	19	13	17	21	27	19	25	23	97
Possible loss from horizon obstruction	hours	45	30	37	14	54	78	71	24	30	36	33	55	507
Possible sunshine at site	hours	382	332	330	307	248	200	224	295	310	351	371	380	3730
Normal as percent of possible		47	49	43	39	39	38	44	38	43	41	44	47	43

DARGAVILLE A53982 Lat 35 57S Long 173 50E Height 20 metres Data period 1943-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	224	184	174	144	130	102	124	139	151	171	193	213	1949
Standard deviation (1965-1982)	hours	38	47	28	24	23	23	14	16	17	21	27	40	126
Possible loss from horizon obstruction	hours	3	3	0	0	0	0	0	0	0	2	4	1	13
Possible sunshine at site	hours	425	359	367	320	302	278	294	319	340	385	401	435	4224
Normal as percent of possible		53	51	47	45	43	37	42	44	44	44	48	49	46

WAITANGI FOREST A54201 Lat 35 15S Long 174 4E Height 55 metres Data period 1977-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	230	186	186	165	133	114	142	149	162	185	205	226	2083
Standard deviation (1977-1982)	hours	39	36	32	18	18	20	11	12	19	20	38	22	104
Possible loss from horizon obstruction	hours	26	9	16	20	23	23	26	21	23	10	15	49	261
Possible sunshine at site	hours	400	352	351	301	280	257	270	299	318	376	388	384	3976
Normal as percent of possible		58	53	53	55	48	44	53	50	51	49	53	59	52

WHANGAREI A54734 Lat 35 44S Long 174 18E Height 29 metres Data period 1954-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	218	170	158	146	133	113	130	140	151	171	193	200	1923
Standard deviation (1954-1982)	hours	39	32	25	28	24	24	20	18	27	22	23	40	129
Possible loss from horizon obstruction	hours	11	12	16	11	6	8	7	9	14	15	11	10	130
Possible sunshine at site	hours	416	350	351	310	296	270	287	310	326	372	393	425	4107
Normal as percent of possible		52	49	45	47	45	42	45	45	46	46	49	47	47

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

LEIGH A64282 Lat 36 16S Long 174 48E Height 27 metres Data period 1967-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	229	196	177	159	136	125	140	154	157	184	209	227	2093
Standard deviation (1967-1982)	hours	35	44	31	22	24	26	17	20	23	19	28	40	120
Possible loss from horizon obstruction	hours	33	19	8	1	0	0	0	0	4	16	27	35	143
Possible sunshine at site	hours	396	344	359	319	301	277	293	318	336	371	379	402	4094
Normal as percent of possible		58	57	49	50	45	45	48	48	47	50	55	56	51

WHENUAPAI A64761 Lat 36 47S Long 174 38E Height 26 metres Data period 1954-1969

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	226	191	182	155	131	112	131	146	157	185	203	220	2039
Standard deviation (1954-1969)	hours	35	28	18	28	22	19	24	22	28	27	17	36	88
Possible loss from horizon obstruction	hours	0	0	0	0	3	7	7	1	0	0	0	0	18
Possible sunshine at site	hours	430	364	367	320	297	268	285	316	340	388	407	438	4219
Normal as percent of possible		53	52	50	48	44	42	46	46	46	48	50	50	48

AUCKLAND; ALBERT PARK * A64871 Lat 36 51S Long 174 46E Height 49 metres Data period 1935-1955

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	210	181	172	148	125	112	117	129	137	171	197	205	1904
Standard deviation (1946-1955)	hours	34	30	27	28	22	19	18	16	23	24	30	25	134
Possible loss from horizon obstruction *	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site *	hours	430	364	367	320	300	275	291	317	340	388	407	438	4237
Normal as percent of possible *		49	50	47	46	42	41	40	41	40	44	48	47	45

* *Ideal horizon assumed*

AUCKLAND; MECHANICS BAY A64872 Lat 36 51S Long 174 47E Height 4 metres Data period 1950-1962

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	235	198	194	165	137	122	134	151	157	190	203	228	2114
Standard deviation (1950-1962)	hours	45	23	25	32	23	17	27	18	34	25	19	36	139
Possible loss from horizon obstruction	hours	2	1	1	0	0	0	0	0	1	1	1	2	9
Possible sunshine at site	hours	428	363	366	320	300	275	291	317	339	387	406	436	4228
Normal as percent of possible		55	55	53	52	46	44	46	48	46	49	50	52	50

AUCKLAND CITY A64878 Lat 36 51S Long 174 46E Height 45 metres Data period 1962-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	227	196	180	160	139	113	137	149	157	181	200	228	2067
Standard deviation (1962-1982)	hours	37	43	26	21	22	24	21	19	18	22	24	32	103
Possible loss from horizon obstruction	hours	3	0	0	0	0	1	0	0	0	1	1	2	8
Possible sunshine at site	hours	427	364	367	320	300	274	291	317	340	387	406	436	4229
Normal as percent of possible		53	54	49	50	46	41	47	47	46	47	49	52	49

THAMES B75152 Lat 37 8S Long 175 32E Height 3 metres Data period 1946-1980

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	213	180	167	138	121	101	117	128	137	163	193	200	1858
Standard deviation (1959-1980)	hours	33	33	26	25	19	24	22	21	21	23	21	32	85
Possible loss from horizon obstruction	hours	2	5	7	15	19	15	18	18	10	6	3	1	119
Possible sunshine at site	hours	429	359	360	304	280	259	273	299	330	382	405	438	4119
Normal as percent of possible		50	50	46	45	43	39	43	43	42	43	48	46	45

WAIHI B75381 Lat 37 23S Long 175 51E Height 91 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	215	179	167	151	125	108	122	126	146	173	192	203	1907
Standard deviation (1933-1982)	hours	42	31	26	31	23	21	20	20	25	26	33	34	119
Possible loss from horizon obstruction	hours	11	7	11	17	33	49	32	23	15	8	10	11	227
Possible sunshine at site	hours	421	357	356	302	265	225	258	294	325	380	398	429	4011
Normal as percent of possible		51	50	47	50	47	48	47	43	45	46	48	47	48

TAURANGA AIRPORT B76621 Lat 37 40S Long 176 12E Height 4 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	244	202	192	178	155	131	150	153	169	194	220	229	2217
Standard deviation (1951-1980)	hours	37	32	29	31	23	23	26	19	25	31	25	27	101
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site	hours	433	365	367	319	298	273	289	316	340	389	409	441	4238
Normal as percent of possible		56	55	52	56	52	48	52	48	50	50	54	52	52

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

WHAKATANE B76993 Lat 37 58S Long 176 57E Height 2 metres Data period 1957-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	244	208	204	191	166	142	161	168	183	207	223	228	2325
Standard deviation (1957-1982)	hours	33	33	26	23	20	23	26	18	26	30	26	26	97
Possible loss from horizon obstruction	hours	2	3	1	0	0	0	0	0	1	3	1	2	13
Possible sunshine at site	hours	431	362	366	318	297	272	289	316	339	386	409	440	4225
Normal as percent of possible		57	57	56	60	56	52	56	53	54	54	55	52	55

PORT OHOPE B77911 Lat 37 59S Long 177 7E Height 9 metres Data period 1979-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	242	208	199	193	161	148	176	170	198	213	227	229	2364
Standard deviation (1979-1982)	hours	45	21	12	28	13	15	9	21	15	12	24	34	168
Possible loss from horizon obstruction	hours	8	2	0	0	0	0	0	0	0	0	8	10	28
Possible sunshine at site	hours	425	363	367	318	297	272	289	316	340	389	402	432	4210
Normal as percent of possible		57	57	54	61	54	54	61	54	58	55	56	53	56

TE TEKO B86083 Lat 38 2S Long 176 49E Height 8 metres Data period 1964-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	230	198	191	178	154	133	150	155	169	198	212	213	2181
Standard deviation (1964-1982)	hours	34	27	28	24	17	23	21	21	27	23	26	29	100
Possible loss from horizon obstruction	hours	26	32	29	16	23	19	21	21	23	29	34	28	301
Possible sunshine at site	hours	408	333	338	302	274	253	267	294	317	360	376	414	3937
Normal as percent of possible		56	59	57	59	56	53	56	53	53	55	56	51	55

WHAKAREWAREWA B86124 Lat 38 10S Long 176 16E Height 307 metres Data period 1935-1977

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	209	173	169	152	128	106	123	125	143	168	184	192	1872
Standard deviation (1949-1977)	hours	40	31	28	29	22	24	28	19	26	28	29	27	106
Possible loss from horizon obstruction	hours	19	14	9	3	2	6	6	2	5	13	17	20	116
Possible sunshine at site	hours	415	352	358	315	295	265	282	313	335	376	393	422	4122
Normal as percent of possible		50	49	47	48	43	40	44	40	43	45	47	45	45

ROTORUA AIRPORT B86131 Lat 38 7S Long 176 19E Height 287 metres Data period 1976-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	247	201	192	171	156	116	140	145	149	191	216	227	2151
Standard deviation (1976-1982)	hours	42	26	41	23	17	13	16	9	9	15	23	26	114
Possible loss from horizon obstruction	hours	3	0	5	0	0	0	5	0	10	3	3	5	34
Possible sunshine at site	hours	431	366	362	318	297	272	283	315	330	386	407	437	4204
Normal as percent of possible		57	55	53	54	53	43	49	46	45	49	53	52	51

TAUPO B86602 Lat 38 41S Long 176 4E Height 376 metres Data period 1949-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	232	193	180	160	133	107	122	132	152	187	204	213	2015
Standard deviation (1951-1980)	hours	37	29	26	25	17	20	21	20	29	29	28	29	103
Possible loss from horizon obstruction	hours	11	6	5	5	5	5	6	4	3	7	6	15	78
Possible sunshine at site	hours	424	360	363	313	291	265	281	310	337	383	405	429	4160
Normal as percent of possible		55	54	50	51	46	40	43	43	45	49	50	50	48

OPOTIKI B87023 Lat 38 0S Long 177 17E Height 6 metres Data period 1962-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	226	196	195	184	157	131	153	156	169	194	208	209	2178
Standard deviation (1962-1982)	hours	37	37	27	20	19	21	26	21	24	27	26	27	89
Possible loss from horizon obstruction	hours	2	1	0	0	0	0	0	0	0	1	2	2	8
Possible sunshine at site	hours	431	364	367	318	297	272	288	316	340	388	408	440	4230
Normal as percent of possible		52	54	53	58	53	48	53	49	50	50	51	48	51

AUCKLAND; MANGERE C64971 Lat 36 58S Long 174 47E Height 4 metres Data period 1963-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	224	193	175	153	133	108	127	144	152	178	193	224	2004
Standard deviation (1963-1982)	hours	37	43	24	22	23	23	25	20	17	23	23	31	121
Possible loss from horizon obstruction	hours	0	0	2	0	0	0	0	0	1	1	0	0	4
Possible sunshine at site	hours	431	364	365	319	299	275	291	317	339	387	407	439	4233
Normal as percent of possible		52	53	48	48	44	39	44	45	45	46	47	51	47

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

AUCKLAND AIRPORT C74082 Lat 37 1S Long 174 48E Height 8 metres Data period 1969-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	237	198	182	158	134	114	134	149	155	184	207	239	2091
Standard deviation (1969-1982)	hours	40	44	23	21	22	22	22	22	17	18	26	29	107
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site	hours	431	364	367	319	299	275	291	317	340	388	407	439	4238
Normal as percent of possible		55	54	50	50	45	41	46	47	46	47	51	54	49

PUKEKOHE C74282 Lat 37 12S Long 174 52E Height 82 metres Data period 1970-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	203	173	161	143	125	110	126	133	139	156	177	199	1845
Standard deviation (1970-1982)	hours	39	39	23	21	23	25	23	20	15	23	24	37	134
Possible loss from horizon obstruction	hours	4	2	1	0	0	0	0	0	0	1	2	4	14
Possible sunshine at site	hours	427	362	366	319	299	274	291	317	340	387	406	435	4224
Normal as percent of possible		48	48	44	45	42	40	43	42	41	40	44	46	44

TE KAUWHATA C75412 Lat 37 25S Long 175 8E Height 32 metres Data period 1962-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	207	182	166	150	125	105	126	135	147	168	190	205	1906
Standard deviation (1962-1982)	hours	35	36	21	19	20	24	22	18	14	19	26	33	107
Possible loss from horizon obstruction	hours	4	5	5	5	3	0	1	5	5	5	5	1	44
Possible sunshine at site	hours	428	359	362	314	295	274	289	311	335	383	403	439	4194
Normal as percent of possible		48	51	46	48	42	38	44	43	44	44	47	47	45

HAMILTON; RUAKURA C75731 Lat 37 47S Long 175 19E Height 40 metres Data period 1936-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	225	187	179	159	124	104	120	138	152	174	200	219	1981
Standard deviation (1951-1980)	hours	35	30	26	24	22	24	24	19	22	29	26	30	116
Possible loss from horizon obstruction	hours	10	13	15	1	2	0	2	0	10	18	10	10	91
Possible sunshine at site	hours	423	352	352	318	296	273	287	316	330	371	399	431	4147
Normal as percent of possible		53	53	51	50	42	38	42	44	46	47	50	51	48

WHATAWHATA C75801 Lat 37 49S Long 175 5E Height 104 metres Data period 1952-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	220	186	172	143	115	96	112	126	143	167	191	206	1877
Standard deviation (1952-1982)	hours	35	32	25	24	21	20	21	18	21	28	28	33	108
Possible loss from horizon obstruction	hours	11	9	11	12	12	14	12	11	12	10	10	11	135
Possible sunshine at site	hours	422	356	356	307	286	258	277	305	328	379	399	430	4103
Normal as percent of possible		52	52	48	47	40	37	40	41	44	44	48	48	46

RUKUHIA C75831 Lat 37 50S Long 175 18E Height 66 metres Data period 1946-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	225	189	174	154	125	105	122	133	148	174	197	211	1957
Standard deviation (1951-1980)	hours	35	33	24	24	23	26	25	20	25	27	27	30	101
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	1	1
Possible sunshine at site	hours	433	365	367	319	297	272	289	316	340	389	409	440	4237
Normal as percent of possible		52	52	47	48	42	39	42	42	44	45	48	48	46

TE KUITI C85314 Lat 38 20S Long 175 9E Height 61 metres Data period 1962-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	202	171	154	137	114	90	103	112	126	148	173	187	1717
Standard deviation (1962-1982)	hours	31	37	28	18	20	24	26	18	20	23	28	30	101
Possible loss from horizon obstruction	hours	20	14	15	9	13	16	15	14	13	14	27	22	192
Possible sunshine at site	hours	414	352	352	309	283	255	273	301	327	375	383	421	4046
Normal as percent of possible		49	49	44	44	40	35	38	37	39	39	45	44	42

TAUMARUNUI C85821 Lat 38 52S Long 175 16E Height 171 metres Data period 1947-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	211	178	155	131	96	74	89	108	120	155	174	195	1686
Standard deviation (1951-1980)	hours	33	34	26	19	17	16	23	18	24	26	29	28	95
Possible loss from horizon obstruction	hours	3	5	9	3	5	8	7	4	5	8	2	5	64
Possible sunshine at site	hours	433	362	359	314	290	262	279	310	335	382	410	440	4174
Normal as percent of possible		49	49	43	42	33	28	32	35	36	41	42	44	40

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

NEW PLYMOUTH C94001 Lat 39 4S Long 174 5E Height 49 metres Data period 1935-1973

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	239	204	188	166	136	109	134	150	156	178	197	225	2082
Standard deviation (1947-1973)	hours	37	43	26	22	21	20	23	20	27	35	40	35	91
Possible loss from horizon obstruction	hours	0	2	3	0	0	0	0	0	1	3	0	1	10
Possible sunshine at site	hours	436	365	365	317	295	269	286	314	339	387	412	444	4228
Normal as percent of possible		55	56	52	52	46	41	47	48	46	46	48	51	49

NEW PLYMOUTH AIRPORT C94011 Lat 39 1S Long 174 11E Height 27 metres Data period 1972-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	241	214	194	175	147	120	133	149	160	192	202	230	2157
Standard deviation (1972-1982)	hours	38	35	33	22	18	23	32	23	15	24	44	44	124
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site	hours	436	367	368	317	295	269	286	314	340	390	412	445	4238
Normal as percent of possible		55	58	53	55	50	45	47	47	47	49	49	52	51

TURANGI C95085 Lat 39 0S Long 175 48E Height 366 metres Data period 1976-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	220	189	185	162	150	127	126	135	151	179	188	193	2005
Standard deviation (1976-1982)	hours	28	28	39	15	17	26	12	13	14	25	12	15	114
Possible loss from horizon obstruction	hours	13	14	8	0	3	0	3	0	3	13	18	10	85
Possible sunshine at site	hours	423	353	360	317	292	269	283	314	337	377	394	435	4153
Normal as percent of possible		52	54	51	51	51	47	45	43	45	47	48	44	48

WOODVILLE; BALLANTRAE 1 D05383 Lat 40 18S Long 175 50E Height 347 metres Data period 1970-1974

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 5	hours	209	189	174	122	113	82	89	115	116	147	200	200	1756
Standard deviation (1970-1974)	hours	41	24	34	41	23	14	23	16	19	12	53	44	61
Possible loss from horizon obstruction	hours	1	0	0	0	0	1	0	0	0	0	1	2	5
Possible sunshine at site	hours	439	369	368	316	292	264	282	312	339	392	414	447	4234
Normal as percent of possible		48	51	47	39	39	31	32	37	34	38	48	45	41

MASTERTON; WAINGAWA D05964 Lat 40 59S Long 175 37E Height 114 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	231	194	178	145	112	101	102	123	149	196	208	205	1944
Standard deviation (1951-1980)	hours	37	34	36	27	26	25	20	24	33	33	34	34	118
Possible loss from horizon obstruction	hours	0	1	3	0	0	0	0	0	1	3	0	0	8
Possible sunshine at site	hours	442	369	365	315	290	263	280	311	338	389	417	452	4231
Normal as percent of possible		52	53	49	46	39	38	36	40	44	50	50	45	46

WAIPUKURAU D06051 Lat 40 0S Long 176 32E Height 137 metres Data period 1945-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	206	179	174	151	132	117	124	135	156	192	199	187	1952
Standard deviation (1951-1980)	hours	39	28	34	32	29	26	22	26	32	30	31	27	118
Possible loss from horizon obstruction	hours	5	3	4	8	10	4	7	12	2	4	4	5	68
Possible sunshine at site	hours	433	365	363	308	282	262	276	300	337	387	410	442	4170
Normal as percent of possible		48	49	48	49	47	45	45	45	46	50	49	42	47

DANNEVIRKE D06212 Lat 40 13S Long 176 7E Height 207 metres Data period 1963-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	205	182	168	136	106	91	96	109	127	171	183	185	1759
Standard deviation (1963-1982)	hours	36	33	36	24	22	22	18	23	25	23	29	28	103
Possible loss from horizon obstruction	hours	0	0	0	2	5	6	6	3	1	0	0	0	23
Possible sunshine at site	hours	440	369	368	314	287	260	277	309	338	392	415	449	4216
Normal as percent of possible		47	49	46	43	37	35	35	35	38	44	44	41	42

MARTINBOROUGH D15243 Lat 41 13S Long 175 27E Height 30 metres Data period 1968-1971

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	243	208	193	153	121	116	117	134	167	198	233	225	2108
Standard deviation (1968-1971)	hours	51	34	46	25	22	25	16	23	16	25	26	31	84
Possible loss from horizon obstruction	hours	1	1	4	1	20	11	18	9	3	2	1	5	76
Possible sunshine at site	hours	442	369	364	314	269	251	262	301	336	391	416	447	4164
Normal as percent of possible		55	56	53	49	45	46	45	45	50	51	56	50	51

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

GISBORNE; MANUTUKE D87683 Lat 38 41S Long 177 53E Height 9 metres Data period 1945-1956

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 2	hours	226	194	188	163	141	128	135	146	174	203	223	213	2134
Standard deviation (1945-1956)	hours	50	28	22	28	28	25	22	23	18	28	48	38	120
Possible loss from horizon obstruction	hours	0	2	6	6	5	6	6	6	6	5	1	0	49
Possible sunshine at site	hours	435	364	362	312	291	264	281	308	334	385	410	444	4189
Normal as percent of possible		52	53	52	52	48	48	48	47	52	53	54	48	51

GISBORNE AIRPORT D87692 Lat 38 40S Long 177 59E Height 4 metres Data period 1937-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	239	201	190	162	141	124	135	144	172	208	230	227	2173
Standard deviation (1951-1980)	hours	41	26	34	33	34	24	27	27	25	38	28	29	109
Possible loss from horizon obstruction	hours	7	7	7	4	3	3	4	4	5	9	6	7	66
Possible sunshine at site	hours	428	359	361	314	293	267	283	311	335	381	405	437	4172
Normal as percent of possible		56	56	53	52	48	46	48	46	51	55	57	52	52

MAKAHU SADDLE D96241 Lat 39 17S Long 176 24E Height 974 metres Data period 1969-1974

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	179	148	165	132	114	98	97	116	144	185	171	139	1688
Standard deviation (1969-1974)	hours	26	18	19	39	36	15	24	26	36	29	19	67	175
Possible loss from horizon obstruction	hours	41	43	57	48	43	45	45	43	55	52	40	43	555
Possible sunshine at site	hours	396	324	311	269	251	223	240	271	284	338	373	403	3683
Normal as percent of possible		45	46	53	49	45	44	40	43	51	55	46	34	46

NAPIER D96591 Lat 39 30S Long 176 55E Height 2 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	237	198	196	164	145	127	137	147	175	214	225	222	2187
Standard deviation (1951-1980)	hours	41	26	31	30	30	23	24	25	28	31	31	28	123
Possible loss from horizon obstruction	hours	3	1	1	0	3	7	6	1	0	1	2	3	28
Possible sunshine at site	hours	434	367	367	317	291	261	279	312	339	390	411	443	4211
Normal as percent of possible		55	54	53	52	50	49	49	47	52	55	55	50	52

HAVELOCK NORTH D96689 Lat 39 40S Long 176 53E Height 9 metres Data period 1977-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	233	193	181	149	135	120	122	137	161	202	216	208	2057
Standard deviation (1977-1982)	hours	29	25	47	28	14	14	4	29	34	15	32	32	94
Possible loss from horizon obstruction	hours	2	0	0	8	18	55	57	18	9	5	0	3	175
Possible sunshine at site	hours	436	368	368	309	275	212	227	295	330	386	413	444	4064
Normal as percent of possible		53	52	49	48	49	57	54	46	49	52	52	47	51

WAIROA D97043 Lat 39 3S Long 177 25E Height 20 metres Data period 1959-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	234	200	192	158	134	113	124	143	168	204	226	221	2117
Standard deviation (1959-1982)	hours	34	30	36	31	33	29	21	31	31	34	28	28	117
Possible loss from horizon obstruction	hours	4	6	1	2	1	3	1	1	3	2	6	0	30
Possible sunshine at site	hours	432	361	367	315	294	266	285	313	337	388	406	445	4208
Normal as percent of possible		54	55	52	50	46	42	44	46	50	53	56	50	50

PARAPARAUMU AIRPORT E04991 Lat 40 54S Long 174 59E Height 7 metres Data period 1953-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	235	202	184	157	128	115	122	139	159	184	198	220	2043
Standard deviation (1953-1982)	hours	36	35	32	27	21	21	22	24	32	25	39	39	105
Possible loss from horizon obstruction	hours	5	3	0	2	4	6	4	3	0	1	4	5	37
Possible sunshine at site	hours	437	367	368	313	286	257	277	308	339	391	413	446	4202
Normal as percent of possible		54	55	50	50	45	45	44	45	47	47	48	49	49

OHAKEA E05231 Lat 40 12S Long 175 23E Height 48 metres Data period 1954-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	241	211	185	158	128	111	121	138	158	190	208	225	2074
Standard deviation (1954-1982)	hours	34	31	32	23	21	16	24	20	30	26	33	34	96
Possible loss from horizon obstruction	hours	0	1	1	0	0	3	1	0	0	1	0	0	7
Possible sunshine at site	hours	439	368	367	316	292	263	282	312	339	390	415	449	4232
Normal as percent of possible		55	57	50	50	44	42	43	44	47	49	50	50	49

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

PALMERSTON N; KAIRANGA E05343 Lat 40 20S Long 175 28E Height 15 metres Data period 1970-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	234	201	178	157	128	108	121	134	150	183	197	218	2009
Standard deviation (1970-1982)	hours	30	27	41	24	22	19	25	22	20	24	36	34	158
Possible loss from horizon obstruction	hours	0	0	0	3	4	5	5	4	0	0	0	0	21
Possible sunshine at site	hours	440	369	368	313	288	260	277	308	339	392	415	449	4218
Normal as percent of possible		53	54	48	50	44	42	44	44	44	47	47	49	48

PALMERSTON N; DSIR E05363 Lat 40 23S Long 175 37E Height 34 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	207	186	167	136	108	93	100	118	129	158	172	190	1764
Standard deviation (1951-1980)	hours	37	32	32	22	21	17	22	23	30	28	35	34	125
Possible loss from horizon obstruction	hours	5	6	8	10	8	5	6	10	9	7	5	5	84
Possible sunshine at site	hours	435	363	360	306	284	260	276	302	330	385	410	444	4155
Normal as percent of possible		48	51	46	44	38	36	36	39	39	41	42	43	42

FOXTON E05421 Lat 40 28S Long 175 17E Height 3 metres Data period 1954-1979

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	230	202	183	154	130	110	119	139	152	182	197	213	2011
Standard deviation (1954-1979)	hours	37	30	29	21	18	16	27	24	30	26	32	35	82
Possible loss from horizon obstruction	hours	1	1	0	0	0	0	0	0	0	0	1	1	4
Possible sunshine at site	hours	439	368	368	316	291	265	282	312	339	392	414	449	4235
Normal as percent of possible		52	55	50	49	45	42	42	45	45	46	48	47	47

LEVIN E05622 Lat 40 39S Long 175 16E Height 46 metres Data period 1955-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	211	188	166	147	119	106	117	129	140	163	172	196	1854
Standard deviation (1955-1982)	hours	38	29	35	23	21	18	26	24	32	25	37	37	114
Possible loss from horizon obstruction	hours	10	17	7	2	2	5	3	2	1	18	7	6	80
Possible sunshine at site	hours	431	352	361	314	289	259	278	309	338	374	409	444	4159
Normal as percent of possible		49	53	46	47	41	41	42	42	41	44	42	44	45

LOWER HUTT; TAITA E14192 Lat 41 11S Long 174 58E Height 65 metres Data period 1970-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	225	194	170	140	103	90	95	119	141	179	185	208	1849
Standard deviation (1970-1982)	hours	26	34	40	34	22	18	15	24	22	25	36	42	126
Possible loss from horizon obstruction	hours	30	21	19	20	27	30	30	23	19	14	26	33	292
Possible sunshine at site	hours	413	349	349	295	262	232	250	287	320	379	391	419	3948
Normal as percent of possible		54	56	49	47	39	39	38	41	44	47	47	50	47

WELLINGTON; KELBURN E14272 Lat 41 17S Long 174 46E Height 125 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	237	200	183	150	115	105	107	127	161	194	209	220	2008
Standard deviation (1951-1980)	hours	36	34	29	28	19	22	16	23	30	30	38	33	98
Possible loss from horizon obstruction	hours	10	1	1	6	8	8	9	8	3	1	6	13	74
Possible sunshine at site	hours	433	370	367	309	281	254	270	302	336	392	412	440	4166
Normal as percent of possible		55	54	50	49	41	41	40	42	48	49	51	50	48

MAKARA E14273 Lat 41 15S Long 174 42E Height 279 metres Data period 1963-1975

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	195	164	152	126	102	101	102	108	132	158	168	177	1685
Standard deviation (1963-1975)	hours	36	27	34	26	19	15	20	26	28	29	38	39	83
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site	hours	443	370	368	315	289	262	279	310	339	393	417	452	4240
Normal as percent of possible		44	44	41	40	35	39	37	35	39	40	40	39	40

KAITOKE E15011 Lat 41 5S Long 175 11E Height 223 metres Data period 1967-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	221	181	170	129	95	78	81	101	132	166	180	192	1726
Standard deviation (1967-1982)	hours	32	35	43	28	23	21	10	24	25	29	38	43	143
Possible loss from horizon obstruction	hours	12	8	27	36	48	56	54	43	28	16	15	13	356
Possible sunshine at site	hours	430	362	341	279	242	207	226	267	311	377	402	439	3883
Normal as percent of possible		51	50	50	46	39	38	36	38	42	44	45	44	44

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

WALLACEVILLE E15102 Lat 41 8S Long 175 3E Height 56 metres Data period 1939-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	227	191	174	143	109	95	95	119	143	175	191	206	1868
Standard deviation (1951-1980)	hours	33	35	32	29	20	20	15	20	30	29	39	37	116
Possible loss from horizon obstruction	hours	18	11	11	9	10	16	11	10	13	14	16	22	161
Possible sunshine at site	hours	424	359	357	306	280	247	269	300	326	379	401	430	4078
Normal as percent of possible		54	53	49	47	39	38	35	40	44	46	48	48	46

STRATFORD DEMO FARM E94333 Lat 39 20S Long 174 18E Height 311 metres Data period 1963-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	234	199	173	153	127	104	119	128	145	183	193	220	1978
Standard deviation (1963-1982)	hours	35	35	38	27	17	21	30	27	23	21	27	31	92
Possible loss from horizon obstruction	hours	10	0	0	5	0	3	2	3	2	0	4	11	40
Possible sunshine at site	hours	427	367	368	312	294	265	283	310	337	391	409	435	4198
Normal as percent of possible		55	54	47	49	43	39	42	41	43	47	47	51	47

MANAIA DEMO FARM E94512 Lat 39 32S Long 174 9E Height 98 metres Data period 1968-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	237	202	176	151	124	103	115	132	145	180	198	224	1987
Standard deviation (1968-1982)	hours	36	31	37	21	18	23	28	28	16	25	36	37	115
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site	hours	438	368	368	317	294	268	284	313	339	391	413	447	4239
Normal as percent of possible		54	55	48	48	42	38	40	42	43	46	48	50	47

OHAKUNE E95444 Lat 39 24S Long 175 25E Height 610 metres Data period 1962-1974

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	216	187	169	136	102	80	97	120	127	165	182	191	1772
Standard deviation (1962-1974)	hours	27	36	31	30	23	20	38	25	23	34	35	26	98
Possible loss from horizon obstruction	hours	1	0	1	3	4	12	9	3	1	1	0	5	40
Possible sunshine at site	hours	436	367	367	314	290	256	276	310	338	390	413	441	4199
Normal as percent of possible		50	51	46	43	35	31	35	39	38	42	44	43	42

WANGANUI E95902 Lat 39 56S Long 175 3E Height 22 metres Data period 1937-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	236	208	181	158	125	104	117	139	154	184	207	220	2033
Standard deviation (1951-1980)	hours	32	32	33	23	21	20	23	21	27	29	30	33	98
Possible loss from horizon obstruction	hours	7	4	2	3	8	5	5	6	2	3	6	6	57
Possible sunshine at site	hours	432	364	366	313	285	262	278	307	337	388	408	442	4182
Normal as percent of possible		55	57	49	50	44	40	42	45	46	47	51	50	49

TAKAKA; PATONS ROCK F02772 Lat 40 47S Long 172 45E Height 3 metres Data period 1969-1974

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	251	220	197	183	159	149	157	168	188	213	219	234	2338
Standard deviation (1969-1974)	hours	49	46	25	33	28	21	23	25	37	31	32	45	190
Possible loss from horizon obstruction	hours	15	9	6	4	2	3	3	3	5	8	12	18	88
Possible sunshine at site	hours	426	361	362	311	289	261	278	308	334	384	404	433	4151
Normal as percent of possible		59	61	54	59	55	57	56	55	56	55	54	54	56

WESTPORT AIRPORT F11752 Lat 41 44S Long 171 35E Height 2 metres Data period 1937-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	216	190	165	145	117	110	122	143	148	160	175	202	1893
Standard deviation (1951-1980)	hours	41	38	33	38	24	22	24	29	37	28	36	31	124
Possible loss from horizon obstruction	hours	6	5	1	2	0	0	0	1	1	2	6	6	30
Possible sunshine at site	hours	438	366	368	312	288	261	278	308	338	391	413	448	4210
Normal as percent of possible		49	52	45	46	41	42	44	46	44	41	42	45	45

ARAPITO F12213 Lat 41 16S Long 172 10E Height 20 metres Data period 1979-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	183	157	152	137	119	101	113	128	137	127	128	168	1650
Standard deviation (1979-1982)	hours	40	22	30	41	23	31	6	22	33	9	21	35	115
Possible loss from horizon obstruction	hours	5	7	10	5	0	3	0	8	10	10	10	10	78
Possible sunshine at site	hours	438	363	358	310	289	259	279	302	329	383	408	443	4162
Normal as percent of possible		42	43	42	44	41	39	41	42	42	33	31	38	40

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

HOKITIKA SOUTH * F20791 Lat 42 43S Long 170 57E Height 4 metres Data period 1935-1963

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	210	177	161	135	114	106	123	138	141	157	170	198	1830
Standard deviation (1937-1963)	hours	36	33	26	30	30	23	20	30	30	29	38	37	126
Possible loss from horizon obstruction *	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site *	hours	448	373	369	313	285	257	275	307	339	395	421	458	4241
Normal as percent of possible *		47	47	44	43	40	41	45	45	42	40	40	43	43

* *Ideal horizon assumed*

HOKITIKA AIRPORT F20793 Lat 42 43S Long 170 59E Height 39 metres Data period 1964-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	203	180	160	145	122	115	122	150	155	161	174	202	1889
Standard deviation (1964-1982)	hours	39	35	40	28	26	23	26	32	29	24	35	27	114
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	1	1
Possible sunshine at site	hours	448	373	369	313	285	257	275	307	339	395	421	457	4240
Normal as percent of possible		45	48	43	46	43	45	44	49	46	41	41	44	45

GREYMOUTH F21422 Lat 42 28S Long 171 12E Height 4 metres Data period 1947-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	190	167	151	125	105	97	108	131	138	142	154	180	1688
Standard deviation (1947-1982)	hours	41	36	33	28	27	23	25	30	33	30	40	32	143
Possible loss from horizon obstruction	hours	13	13	15	11	8	9	9	10	14	15	13	12	142
Possible sunshine at site	hours	434	360	354	302	278	249	267	298	325	379	408	445	4098
Normal as percent of possible		44	46	43	41	38	39	40	44	42	37	38	40	41

HAAST F39801 Lat 43 52S Long 169 0E Height 4 metres Data period 1943-1976

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 5	hours	206	172	153	141	124	121	131	145	146	160	168	188	1855
Standard deviation (1943-1976)	hours	41	39	30	28	27	22	26	33	24	31	43	35	108
Possible loss from horizon obstruction	hours	11	9	6	4	4	3	5	4	5	9	10	12	82
Possible sunshine at site	hours	440	366	363	308	278	251	266	301	333	387	414	450	4159
Normal as percent of possible		47	47	42	46	45	48	49	48	44	41	41	42	45

MOTUEKA; RIWAKA G12191 Lat 41 6S Long 172 58E Height 8 metres Data period 1965-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	269	232	208	184	161	145	153	170	193	226	234	248	2423
Standard deviation (1965-1982)	hours	39	36	37	31	19	28	15	23	31	33	34	31	131
Possible loss from horizon obstruction	hours	11	13	13	18	20	20	21	20	16	12	12	10	186
Possible sunshine at site	hours	431	357	355	297	270	243	259	290	323	381	405	442	4053
Normal as percent of possible		62	65	59	62	60	60	59	59	60	59	58	56	60

NELSON AIRPORT G13222 Lat 41 17S Long 173 14E Height 2 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	263	222	200	183	162	148	158	167	191	217	223	238	2372
Standard deviation (1951-1980)	hours	37	36	27	28	20	25	24	23	32	31	30	32	93
Possible loss from horizon obstruction	hours	10	9	8	5	5	3	5	6	6	9	10	11	87
Possible sunshine at site	hours	433	362	360	310	284	259	274	304	333	384	408	442	4153
Normal as percent of possible		61	61	56	59	57	57	58	55	57	57	55	54	57

NELSON; PRINCES DRIVE G13223 Lat 41 17S Long 173 15E Height 168 metres Data period 1961-1966

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 2	hours	258	225	203	190	166	153	164	174	196	221	224	240	2414
Standard deviation (1961-1966)	hours	44	27	23	15	13	9	34	17	28	43	27	34	102
Possible loss from horizon obstruction	hours	12	3	6	4	0	0	0	3	6	3	8	13	58
Possible sunshine at site	hours	431	368	362	311	289	262	279	307	333	390	410	440	4182
Normal as percent of possible		60	61	56	61	57	58	59	57	59	57	55	55	58

BLENHEIM AIRPORT G13581 Lat 41 31S Long 173 52E Height 27 metres Data period 1947-1950

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 2	hours	250	192	194	184	158	145	156	173	193	231	232	233	2341
Standard deviation (1947-1950)	hours	46	11	19	26	26	8	18	16	13	59	29	36	58
Possible loss from horizon obstruction	hours	9	4	4	7	10	12	13	8	5	4	8	11	95
Possible sunshine at site	hours	435	367	365	308	279	249	266	302	334	389	410	442	4145
Normal as percent of possible		57	52	53	60	57	58	59	57	58	59	57	53	56

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

BLENHEIM G13592 Lat 41 31S Long 173 57E Height 4 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	260	228	208	191	165	154	161	177	194	234	239	238	2449
Standard deviation (1951-1980)	hours	33	35	31	23	23	29	25	23	32	33	29	31	118
Possible loss from horizon obstruction	hours	5	0	0	1	4	5	6	3	1	0	3	5	33
Possible sunshine at site	hours	439	371	369	314	285	256	273	307	338	393	415	448	4207
Normal as percent of possible		59	61	56	61	58	60	59	58	57	60	58	53	58

VERNON LAGOONS G14501 Lat 41 32S Long 174 2E Height 2 metres Data period 1969-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 2	hours	242	212	191	174	151	143	147	165	178	215	220	225	2263
Standard deviation (1969-1982)	hours	31	32	29	27	20	28	21	29	30	23	24	31	108
Possible loss from horizon obstruction	hours	4	0	0	0	0	2	1	0	0	0	2	5	14
Possible sunshine at site	hours	440	371	369	315	289	259	278	310	339	393	416	449	4226
Normal as percent of possible		55	57	52	55	52	55	53	53	53	55	53	50	54

LAKE GRASSMERE G14711 Lat 41 44S Long 174 9E Height 2 metres Data period 1947-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	234	207	187	171	150	142	145	163	183	211	216	218	2227
Standard deviation (1951-1980)	hours	31	31	26	23	19	26	24	21	32	28	29	27	96
Possible loss from horizon obstruction	hours	1	0	0	0	0	0	0	0	0	0	1	4	6
Possible sunshine at site	hours	443	371	369	314	288	261	278	309	339	393	418	450	4234
Normal as percent of possible		53	56	51	54	52	54	52	53	54	54	52	48	53

HANMER FOREST G22581 Lat 42 31S Long 172 51E Height 387 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	212	186	169	148	109	93	104	132	158	189	188	193	1881
Standard deviation (1951-1980)	hours	35	29	30	28	22	20	19	21	33	28	35	36	97
Possible loss from horizon obstruction	hours	40	32	35	51	58	64	65	56	41	33	36	41	552
Possible sunshine at site	hours	407	341	334	262	228	194	211	252	298	361	385	416	3688
Normal as percent of possible		52	55	51	56	48	48	49	52	53	52	49	46	51

KAIKOURA G23471 Lat 42 25S Long 173 42E Height 108 metres Data period 1960-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	218	188	170	159	132	125	128	151	169	208	212	207	2067
Standard deviation (1960-1982)	hours	38	31	29	31	25	27	18	27	32	28	29	28	98
Possible loss from horizon obstruction	hours	2	13	17	9	4	5	5	5	15	16	4	0	95
Possible sunshine at site	hours	445	359	352	304	282	253	271	303	324	378	417	457	4145
Normal as percent of possible		49	52	48	52	47	49	47	50	52	55	51	45	50

MT COOK; THE HERMITAGE H30711 Lat 43 44S Long 170 6E Height 765 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	181	164	140	118	84	73	78	108	124	145	147	168	1530
Standard deviation (1951-1980)	hours	34	27	27	26	15	14	15	19	26	26	36	29	94
Possible loss from horizon obstruction	hours	100	81	96	94	116	124	121	103	91	93	94	107	1220
Possible sunshine at site	hours	351	294	273	218	167	130	151	203	247	303	330	355	3021
Normal as percent of possible		52	56	51	54	50	56	52	53	50	48	45	47	51

MT JOHN H30941 Lat 43 59S Long 170 28E Height 1027 metres Data period 1964-1980

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	259	232	207	183	152	142	145	172	189	220	233	250	2384
Standard deviation (1964-1980)	hours	44	41	41	32	17	21	24	22	21	28	30	36	101
Possible loss from horizon obstruction	hours	6	6	7	6	7	8	7	7	5	6	7	6	78
Possible sunshine at site	hours	446	369	362	306	275	245	264	298	333	390	418	456	4163
Normal as percent of possible		58	63	57	60	55	58	55	58	57	56	56	55	57

RUDSTONE * H31562 Lat 43 33S Long 171 41E Height 371 metres Data period 1937-1953

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	210	187	169	159	132	124	136	155	171	198	208	207	2056
Standard deviation (1937-1953)	hours	34	34	28	33	24	16	19	25	31	26	38	36	125
Possible loss from horizon obstruction *	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site *	hours	450	374	369	312	283	255	272	306	338	396	424	461	4241
Normal as percent of possible *		47	50	46	51	47	49	50	51	51	50	49	45	48

* *Ideal horizon assumed*

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

HIGHBANK POWER STN H31572 Lat 43 35S Long 171 44E Height 336 metres Data period 1954-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	211	187	166	157	137	132	137	156	172	198	203	209	2065
Standard deviation (1954-1982)	hours	35	36	29	26	17	25	21	25	32	28	31	37	106
Possible loss from horizon obstruction	hours	4	0	0	5	10	13	12	7	3	0	2	3	59
Possible sunshine at site	hours	446	375	369	307	273	242	260	299	335	396	422	458	4182
Normal as percent of possible		47	50	45	51	50	55	53	52	51	50	48	46	49

ASHBURTON H31971 Lat 43 54S Long 171 45E Height 101 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	198	171	149	147	126	122	126	145	155	185	188	197	1909
Standard deviation (1951-1980)	hours	34	32	32	27	18	23	21	25	33	30	31	30	89
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site	hours	451	375	369	312	282	253	271	305	338	396	425	462	4241
Normal as percent of possible		44	46	40	47	45	48	46	48	46	47	44	43	45

ASHLEY FOREST H32252 Lat 43 15S Long 172 35E Height 107 metres Data period 1968-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	208	186	161	148	121	109	119	139	159	193	194	208	1945
Standard deviation (1968-1982)	hours	33	33	38	26	22	26	19	28	30	31	26	23	101
Possible loss from horizon obstruction	hours	17	12	24	27	33	50	44	27	27	16	16	21	314
Possible sunshine at site	hours	432	362	345	285	251	206	229	280	311	379	407	439	3927
Normal as percent of possible		48	51	47	52	48	53	52	50	51	51	48	47	50

CHRISTCHURCH AIRPORT H32451 Lat 43 29S Long 172 32E Height 30 metres Data period 1949-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	209	184	161	150	127	120	122	142	162	200	205	210	1992
Standard deviation (1951-1980)	hours	33	34	30	27	20	23	22	25	31	31	30	29	97
Possible loss from horizon obstruction	hours	0	0	0	0	0	2	0	0	0	0	0	0	2
Possible sunshine at site	hours	450	374	369	312	283	253	273	306	338	396	423	461	4239
Normal as percent of possible		46	49	44	48	45	47	45	46	48	51	48	46	47

SUMNER; CLIFTON H32572 Lat 43 34S Long 172 45E Data period 1935-1955

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	194	171	146	142	124	110	108	134	159	188	197	197	1870
Standard deviation (1949-1955)	hours	32	31	26	27	28	20	29	26	26	36	44	23	141
Possible loss from horizon obstruction	hours	35	17	11	18	28	47	35	19	15	12	28	40	305
Possible sunshine at site	hours	415	357	358	294	255	208	237	287	323	384	396	421	3936
Normal as percent of possible		47	48	41	48	49	53	46	47	49	49	50	47	48

LINCOLN H32641 Lat 43 39S Long 172 28E Height 11 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	220	192	169	151	123	116	118	143	167	204	210	219	2032
Standard deviation (1951-1980)	hours	31	30	28	26	19	24	22	25	33	29	25	27	89
Possible loss from horizon obstruction	hours	4	3	5	4	7	8	9	5	5	5	4	4	63
Possible sunshine at site	hours	447	372	364	308	276	246	263	301	333	391	420	457	4178
Normal as percent of possible		49	52	46	49	45	47	45	48	50	52	50	48	49

DUVAUCHELLE BAY; ONAWE H32791 Lat 43 46S Long 172 56E Height 46 metres Data period 1939-1972

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	214	183	161	137	100	91	93	125	163	199	203	208	1877
Standard deviation (1939-1972)	hours	35	27	29	29	17	24	22	22	28	35	31	34	114
Possible loss from horizon obstruction	hours	27	23	21	28	40	46	41	32	21	24	29	25	357
Possible sunshine at site	hours	424	352	348	284	243	208	231	274	317	372	395	437	3884
Normal as percent of possible		50	52	46	48	41	44	40	46	51	53	51	48	48

LAKE TEKAPO H40041 Lat 44 1S Long 170 28E Height 683 metres Data period 1935-1981

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	255	225	200	170	129	100	111	154	183	214	229	249	2219
Standard deviation (1951-1980)	hours	34	36	35	30	18	19	19	23	30	28	34	36	108
Possible loss from horizon obstruction	hours	9	10	18	25	39	64	47	27	17	16	9	9	290
Possible sunshine at site	hours	443	365	351	287	243	189	224	278	321	380	416	454	3951
Normal as percent of possible		58	62	57	59	53	53	50	55	57	56	55	55	56

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

FAIRLIE * H40182 Lat 44 6S Long 170 49E Height 306 metres Data period 1935-1946

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	179	158	154	141	127	117	124	142	152	175	179	169	1817
Standard deviation (1930-1946)	hours	38	35	31	34	26	21	15	26	29	31	30	30	89
Possible loss from horizon obstruction *	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site *	hours	452	375	369	311	282	253	271	305	338	396	425	463	4241
Normal as percent of possible *		40	42	42	45	45	46	46	47	45	44	42	37	43

* *Ideal horizon assumed*

TIMARU H41421 Lat 44 25S Long 171 15E Height 17 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	184	164	140	137	123	120	124	136	152	179	183	186	1828
Standard deviation (1951-1980)	hours	31	35	29	26	19	25	22	25	25	29	30	35	88
Possible loss from horizon obstruction	hours	18	1	2	4	2	7	6	4	2	2	8	20	76
Possible sunshine at site	hours	435	375	368	307	279	245	264	300	336	395	418	444	4166
Normal as percent of possible		42	44	38	45	44	49	47	45	45	45	44	42	44

WAIMATE H41701 Lat 44 44S Long 171 3E Height 61 metres Data period 1935-1976

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	171	153	131	131	124	118	121	133	147	165	165	163	1722
Standard deviation (1930-1976)	hours	33	32	32	26	23	21	19	26	26	30	34	36	130
Possible loss from horizon obstruction	hours	16	12	9	12	14	17	16	14	10	12	12	16	160
Possible sunshine at site	hours	438	365	361	299	266	234	253	290	328	385	415	449	4082
Normal as percent of possible		39	42	36	44	47	50	48	46	45	43	40	36	42

OAMARU AIRPORT I41901 Lat 44 58S Long 171 5E Height 30 metres Data period 1961-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	183	160	146	135	123	122	118	134	145	170	175	182	1793
Standard deviation (1961-1982)	hours	17	28	39	30	24	27	25	25	21	28	15	42	118
Possible loss from horizon obstruction	hours	6	0	0	0	1	0	0	1	0	0	4	8	20
Possible sunshine at site	hours	449	377	370	310	279	250	268	302	338	398	423	458	4222
Normal as percent of possible		41	42	39	44	44	49	44	44	43	43	41	40	42

OMARAMA; TARA HILLS I49591 Lat 44 32S Long 169 54E Height 488 metres Data period 1951-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	231	199	182	161	136	122	129	155	171	191	202	216	2095
Standard deviation (1951-1980)	hours	41	38	35	30	16	25	19	25	28	28	32	41	132
Possible loss from horizon obstruction	hours	21	19	17	7	7	9	9	6	13	21	21	21	171
Possible sunshine at site	hours	432	357	353	304	274	242	260	298	325	376	405	443	4071
Normal as percent of possible		53	56	52	53	50	50	50	52	53	51	50	49	51

RANFURLY I50113 Lat 45 8S Long 170 6E Height 427 metres Data period 1975-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	205	189	157	127	105	88	93	127	146	173	187	189	1786
Standard deviation (1975-1982)	hours	31	24	40	25	18	11	17	23	16	28	31	34	77
Possible loss from horizon obstruction	hours	18	0	16	3	10	30	26	0	23	0	3	21	150
Possible sunshine at site	hours	437	377	354	307	269	219	242	303	315	398	425	446	4092
Normal as percent of possible		47	50	44	41	39	40	38	42	46	43	44	42	44

OAMARU * I50192 Lat 45 6S Long 170 58E Data period 1935-1953

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	175	156	143	132	120	112	121	133	150	164	181	161	1748
Standard deviation (1930-1953)	hours	30	29	29	25	22	16	18	26	23	28	40	32	110
Possible loss from horizon obstruction *	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site *	hours	455	377	370	310	279	249	268	303	338	398	428	467	4242
Normal as percent of possible *		38	41	39	43	43	45	45	44	44	41	42	34	41

* *Ideal horizon assumed*

WAIPIATA I50212 Lat 45 14S Long 170 8E Height 472 metres Data period 1935-1966

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	222	199	180	152	124	98	114	143	166	194	202	217	2011
Standard deviation (1930-1966)	hours	28	30	24	23	23	22	18	21	27	22	31	32	113
Possible loss from horizon obstruction	hours	16	11	4	2	2	15	3	2	3	9	12	17	96
Possible sunshine at site	hours	440	366	366	308	277	234	264	301	335	389	416	450	4146
Normal as percent of possible		50	54	49	49	45	42	43	48	50	50	49	48	49

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

PALMERSTON I50471 Lat 45 29S Long 170 43E Height 21 metres Data period 1969-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	187	174	149	137	125	115	119	135	148	175	173	182	1819
Standard deviation (1969-1982)	hours	32	33	34	28	23	21	27	21	26	34	28	38	109
Possible loss from horizon obstruction	hours	14	1	1	1	2	6	3	1	1	0	8	19	57
Possible sunshine at site	hours	443	377	369	309	276	242	263	301	337	398	421	449	4185
Normal as percent of possible		42	46	40	44	45	48	45	45	44	44	41	41	43

TAIERI; INVERMAY 1 I50831 Lat 45 51S Long 170 22E Height 24 metres Data period 1950-1962

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	175	160	140	123	100	92	99	120	138	162	157	175	1641
Standard deviation (1950-1962)	hours	30	22	22	26	18	17	8	19	30	21	31	41	97
Possible loss from horizon obstruction	hours	2	5	6	8	11	12	11	10	5	6	3	2	81
Possible sunshine at site	hours	456	374	364	301	266	234	254	291	333	393	427	468	4162
Normal as percent of possible		38	43	38	41	38	39	39	41	41	41	37	37	39

TAIERI; INVERMAY 2 I50835 Lat 45 52S Long 170 23E Height 30 metres Data period 1978-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 2	hours	189	169	144	132	101	90	99	121	133	166	164	177	1685
Standard deviation (1978-1982)	hours	33	20	12	25	23	10	26	17	26	24	28	22	119
Possible loss from horizon obstruction	hours	10	7	8	5	8	5	5	3	8	10	10	8	87
Possible sunshine at site	hours	448	372	362	304	269	241	260	298	330	389	420	462	4156
Normal as percent of possible		42	45	40	43	38	37	38	41	40	43	39	38	41

DUNEDIN AIRPORT I50921 Lat 45 56S Long 170 12E Height 1 metre Data period 1962-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	182	165	141	127	104	97	102	126	141	164	168	177	1694
Standard deviation (1962-1982)	hours	32	26	26	27	21	14	24	18	16	28	25	32	86
Possible loss from horizon obstruction	hours	5	1	1	11	21	23	22	16	6	5	9	11	131
Possible sunshine at site	hours	454	378	369	298	255	223	243	285	332	394	422	459	4112
Normal as percent of possible		40	44	38	43	41	43	42	44	42	42	40	39	41

DUNEDIN; MUSSELBURGH I50951 Lat 45 54S Long 170 31E Height 2 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	180	157	137	120	98	94	101	120	137	158	164	179	1645
Standard deviation (1951-1980)	hours	30	27	25	27	22	15	18	20	27	26	22	33	86
Possible loss from horizon obstruction	hours	5	3	5	7	6	5	6	7	5	4	4	6	63
Possible sunshine at site	hours	454	376	365	302	271	241	259	294	333	395	426	464	4180
Normal as percent of possible		40	42	38	40	36	39	39	41	41	40	38	39	39

OAMARU; IONA HOSPITAL I51002 Lat 45 4S Long 171 0E Height 14 metres Data period 1967-1975

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	191	165	145	144	126	119	125	140	151	188	175	184	1853
Standard deviation (1967-1975)	hours	36	39	26	28	16	18	16	16	25	33	25	19	104
Possible loss from horizon obstruction	hours	25	19	20	18	17	22	16	17	19	20	24	26	243
Possible sunshine at site	hours	430	358	350	292	262	228	252	286	319	378	404	440	3999
Normal as percent of possible		44	46	41	49	48	52	50	49	47	50	43	42	46

TE ANAU I57473 Lat 45 25S Long 167 44E Height 215 metres Data period 1973-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	212	185	146	107	82	57	69	111	135	171	188	194	1657
Standard deviation (1973-1982)	hours	38	26	26	28	12	14	7	16	14	23	35	40	90
Possible loss from horizon obstruction	hours	16	12	10	8	5	13	2	5	10	16	13	18	118
Possible sunshine at site	hours	441	366	360	302	273	235	264	297	328	382	416	450	4124
Normal as percent of possible		48	51	41	35	30	24	26	37	41	45	45	43	40

QUEENSTOWN I58061 Lat 45 2S Long 168 40E Height 329 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	235	199	174	125	88	73	82	114	158	185	200	232	1865
Standard deviation (1951-1980)	hours	37	30	23	21	15	10	12	16	22	23	27	33	95
Possible loss from horizon obstruction	hours	63	68	70	75	88	120	91	83	69	73	70	51	921
Possible sunshine at site	hours	392	309	300	235	191	130	177	220	269	325	358	415	3321
Normal as percent of possible		60	64	58	53	46	56	46	52	59	57	56	56	56

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

CROMWELL I59021 Lat 45 2S Long 169 12E Height 213 metres Data period 1979-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	254	215	186	150	122	88	106	147	176	206	227	239	2116
Standard deviation (1979-1982)	hours	20	23	25	21	31	13	12	16	8	22	22	28	130
Possible loss from horizon obstruction	hours	5	6	9	13	16	10	13	13	16	13	8	5	127
Possible sunshine at site	hours	450	371	361	297	263	240	255	290	322	385	420	461	4115
Normal as percent of possible		56	58	52	51	46	37	42	51	55	54	54	52	51

ALEXANDRA I59234 Lat 45 16S Long 169 23E Height 141 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	230	204	185	153	120	93	99	144	171	201	207	227	2034
Standard deviation (1951-1980)	hours	32	30	24	24	21	20	15	20	24	24	29	32	90
Possible loss from horizon obstruction	hours	28	18	19	21	20	16	17	21	25	17	25	30	257
Possible sunshine at site	hours	428	360	351	289	259	233	250	282	313	381	403	437	3985
Normal as percent of possible		54	57	53	53	46	40	40	51	55	53	51	52	51

OTAUTAU I68102 Lat 46 10S Long 168 0E Height 55 metres Data period 1956-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	179	166	138	110	92	82	92	120	135	162	167	174	1617
Standard deviation (1956-1982)	hours	28	22	26	20	15	18	19	20	21	23	25	34	114
Possible loss from horizon obstruction	hours	15	9	12	24	25	14	23	25	17	10	11	12	197
Possible sunshine at site	hours	445	370	358	285	251	231	241	276	320	389	420	459	4046
Normal as percent of possible		40	45	39	39	37	35	38	43	42	42	40	38	40

WINTON I68133 Lat 46 9S Long 168 20E Height 44 metres Data period 1964-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	189	174	143	118	101	89	104	130	143	170	174	188	1723
Standard deviation (1964-1982)	hours	25	24	21	22	16	15	23	18	19	23	27	39	112
Possible loss from horizon obstruction	hours	0	0	1	0	2	0	2	0	1	0	0	0	6
Possible sunshine at site	hours	459	379	369	309	274	245	262	301	336	399	431	471	4237
Normal as percent of possible		41	46	39	38	37	36	40	43	43	43	40	40	41

GORE I68191 Lat 46 6S Long 168 56E Height 72 metres Data period 1941-1971

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	182	166	138	114	98	85	96	129	139	165	168	185	1665
Standard deviation (1941-1971)	hours	26	18	23	22	17	16	20	17	20	18	27	26	97
Possible loss from horizon obstruction	hours	5	1	4	6	3	6	4	6	4	4	4	9	56
Possible sunshine at site	hours	454	378	366	303	273	239	260	295	333	395	427	462	4187
Normal as percent of possible		40	44	38	38	36	36	37	44	42	42	39	40	40

GORE; DSIR I68192 Lat 46 7S Long 168 54E Height 123 metres Data period 1971-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 4	hours	192	170	145	117	99	85	101	128	141	161	169	185	1693
Standard deviation (1971-1982)	hours	34	29	21	26	16	15	20	17	22	22	36	37	99
Possible loss from horizon obstruction	hours	0	1	1	0	0	0	0	0	0	2	0	0	4
Possible sunshine at site	hours	459	378	369	309	276	245	264	301	337	397	431	471	4239
Normal as percent of possible		42	45	39	38	36	35	38	43	42	41	39	39	40

INVERCARGILL AIRPORT I68433 Lat 46 25S Long 168 20E Height 0 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	180	165	135	102	88	73	88	121	134	156	169	184	1595
Standard deviation (1951-1980)	hours	28	19	19	21	19	13	14	21	25	21	22	27	84
Possible loss from horizon obstruction	hours	4	0	0	0	0	0	0	0	0	0	2	6	12
Possible sunshine at site	hours	457	380	370	308	275	244	263	300	337	400	430	467	4231
Normal as percent of possible		39	43	36	33	32	30	33	40	40	39	39	39	38

BALCLUTHA; FINEGAND I69273 Lat 46 16S Long 169 44E Height 6 metres Data period 1964-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 3	hours	187	167	139	119	93	90	98	122	136	165	170	182	1668
Standard deviation (1964-1982)	hours	30	25	23	25	16	14	20	19	15	27	29	40	107
Possible loss from horizon obstruction	hours	1	0	1	1	0	0	0	1	1	0	1	2	8
Possible sunshine at site	hours	459	380	369	308	275	245	263	300	336	400	431	470	4235
Normal as percent of possible		41	44	38	39	34	37	37	41	40	41	39	39	39

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

KIRIBATI; BANABA J53300 Lat 0 54S Long 169 33E Height 66 metres Data period 1977-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 7 - - -	hours	179	162	143	166	222	191	201	220	214	212	176	127	2213
Standard deviation (1977-1982) - - -	hours	24	30	22	54	21	46	58	55	42	48	52	39	233
Possible loss from horizon obstruction	hours	10	12	8	8	8	8	8	8	8	8	13	5	104
Possible sunshine at site - - - - -	hours	351	314	352	340	351	339	351	351	340	353	337	356	4135
Normal as percent of possible - - - - - -		51	52	41	49	63	56	57	63	63	60	52	36	54

KIRIBATI; TARAWA J61000 Lat 1 21N Long 172 56E Height 2 metres Data period 1977-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 7 - - -	hours	180	172	170	186	239	205	234	239	253	246	223	160	2507
Standard deviation (1977-1982) - - -	hours	53	41	57	45	24	44	68	55	28	42	45	27	184
Possible loss from horizon obstruction	hours	10	12	8	8	10	7	10	8	8	12	10	3	106
Possible sunshine at site - - - - -	hours	348	312	352	341	352	344	352	353	341	347	337	355	4134
Normal as percent of possible - - - - - -		51	55	48	55	68	60	66	68	74	71	66	45	61

TUVALU; FUNAFUTI J64300 Lat 8 31S Long 179 12E Height 1 metre Data period 1977-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 7 - - -	hours	175	134	186	201	206	197	208	205	194	219	168	172	2265
Standard deviation (1977-1982) - - -	hours	22	40	26	21	30	47	28	45	43	41	38	43	70
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site - - - - -	hours	373	333	361	342	348	333	346	351	346	365	360	374	4235
Normal as percent of possible - - - - - -		47	40	52	59	59	59	60	58	56	60	47	46	54

FIJI; NADI AIRPORT J68000 Lat 17 45S Long 177 27E Height 19 metres Data period 1947-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1 - - -	hours	208	180	187	195	216	208	219	239	216	225	224	230	2547
Standard deviation (1951-1980) - - -	hours	37	30	35	26	27	24	24	29	33	23	41	39	126
Possible loss from horizon obstruction	hours	0	0	1	1	0	3	1	0	1	0	0	0	7
Possible sunshine at site - - - - -	hours	390	341	362	335	334	314	330	342	344	371	373	393	4229
Normal as percent of possible - - - - - -		53	53	52	58	65	66	66	70	63	61	60	59	60

W.SAMOA; APIA J76200 Lat 13 48S Long 171 47W Height 2 metres Data period 1935-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1 - - -	hours	175	159	178	191	207	205	220	228	229	199	189	175	2355
Standard deviation (1951-1980) - - -	hours	31	32	38	35	32	24	27	31	29	41	34	38	204
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site - - - - -	hours	382	337	362	339	340	324	337	346	345	369	367	384	4232
Normal as percent of possible - - - - - -		46	47	49	56	61	63	65	66	66	54	51	46	56

TONGA; FUA'AMOTU J79200 Lat 21 14S Long 175 9W Height 38 metres Data period 1979-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 7 - - -	hours	193	184	159	164	164	139	161	141	160	205	196	240	2106
Standard deviation (1979-1982) - - -	hours	77	12	61	12	35	30	8	36	41	39	8	14	158
Possible loss from horizon obstruction	hours	0	0	0	0	0	0	0	0	0	0	0	0	0
Possible sunshine at site - - - - -	hours	396	345	363	333	329	311	325	338	344	374	378	400	4235
Normal as percent of possible - - - - - -		49	53	44	49	50	45	50	42	47	55	52	60	50

COOK IS; RAROTONGA J84300 Lat 21 11S Long 159 48W Height 7 metres Data period 1955-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 7 - - -	hours	181	178	186	169	159	162	174	179	178	188	179	181	2114
Standard deviation (1955-1982) - - -	hours	40	37	33	38	34	26	24	35	25	38	39	48	144
Possible loss from horizon obstruction	hours	1	0	0	0	1	1	1	0	0	0	0	3	7
Possible sunshine at site - - - - -	hours	395	345	363	333	328	310	324	338	344	374	378	397	4228
Normal as percent of possible - - - - - -		46	52	51	51	48	52	54	53	52	50	47	46	50

RAOUL IS J99700 Lat 29 15S Long 177 55W Height 38 metres Data period 1940-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1 - - -	hours	202	160	171	168	150	123	150	160	156	187	193	204	2024
Standard deviation (1951-1980) - - -	hours	37	32	39	27	23	23	16	21	25	27	30	35	91
Possible loss from horizon obstruction	hours	24	15	15	13	3	2	5	7	16	14	23	31	168
Possible sunshine at site - - - - -	hours	388	339	350	314	312	292	304	321	326	366	369	387	4067
Normal as percent of possible - - - - - -		52	47	49	54	48	42	49	50	48	51	52	53	50

SUNSHINE NORMALS

Average Duration of Bright Sunshine for Standard Period 1951-1980

CAMPBELL IS K94400 Lat 52 33S Long 169 9E Height 15 metres Data period 1941-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 1	hours	102	80	59	36	18	8	12	26	56	70	91	96	654
Standard deviation (1951-1980)	hours	19	18	12	14	7	4	4	7	11	16	19	19	65
Possible loss from horizon obstruction	hours	32	16	9	26	70	110	87	30	12	10	25	39	466
Possible sunshine at site	hours	456	378	365	273	183	106	150	255	323	400	430	465	3783
Normal as percent of possible		22	21	16	13	10	8	8	10	17	18	21	21	17

CHATHAM IS; WAITANGI K98600 Lat 43 57S Long 176 34W Height 44 metres Data period 1957-1982

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal (1951-1980) - Type 7	hours	187	142	123	97	83	63	79	94	108	139	156	159	1430
Standard deviation (1957-1982)	hours	41	28	23	20	14	15	18	20	20	24	22	35	101
Possible loss from horizon obstruction	hours	1	0	0	0	1	0	1	0	0	0	0	5	8
Possible sunshine at site	hours	451	375	369	312	281	253	270	305	338	396	425	457	4233
Normal as percent of possible		41	38	33	31	30	25	29	31	32	35	37	35	34

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