

METEOROLOGICAL SERVICE



**SOLAR RADIATION OBSERVATIONS**  
**1986**

DUBLIN  
1988

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## C O N T E N T S

	<u>Page</u>
1. Introduction	1
2. Solar Radiation Network	2
3. Instruments used in 1986	3
4. Tables for 1986	
Table 1 Daily Totals of Global Solar Radiation at Valentia	4
Table 2 Daily Totals of Diffuse Solar Radiation at Valentia	5
Table 3 Daily Totals of Radiation Balance at Valentia	6
Table 4 Instantaneous Values of Direct Solar Radiation at Normal Incidences at Valentia	7
Table 5 Daily Totals of Direct Solar Radiation at Normal Incidences at Valentia	11
Table 6 Daily Totals of Long-wave (Infra-Red) Radiation at Valentia	12
Table 7 Daily Totals of Radiation Balance at Kilkenny	13
Table 8 Daily Totals of Global Solar Radiation at Kilkenny	14
Table 9 Daily Totals of Diffuse Solar Radiation at Kilkenny	15
Table 10 Daily Totals of Global Solar Radiation at Birr	16
Table 11 Daily Totals of Diffuse Solar Radiation at Birr	17
Table 12 Daily Totals of Global Solar Radiation at Dublin Airport	18
Table 13 Daily Totals of Diffuse Solar Radiation at Dublin Airport	19
Table 14 Daily totals of Global Solar Radiation at Malin Head	20
Table 15 Daily Totals of Diffuse Solar Radiation at Malin Head	21
Table 16 Daily Totals of Global Solar Radiation at Clones	22
Table 17 Daily Totals of Diffuse Solar Radiation at Clones	23
Table 18 Daily Totals of Global Solar Radiation at Belmullet	24
5. Appendix	
Tables of Daily Total Radiation Balance at Kilkenny, 1982 - 1985	25

## Introduction

Solar radiation observations by the Irish Meteorological Service commenced in 1954 when the first pyranometer was installed at Valentia Observatory. At present, global and diffuse radiation instruments are installed at Valentia Observatory, Kilkenny, Birr, Dublin Airport, Clones and Malin head. Global radiation only is measured at Belmullet. Net radiation balance is measured at Valentia Observatory and at Kilkenny by means of Funk net pyradiometers. Diffuse radiation is measured using a pyranometer and shade ring to screen the pyranometer from the direct sun; correction factors are applied to allow for the portion of the sky obscured by the ring. Kipp and Zonen CM6 pyranometers are used throughout the network. Data are recorded by strip chart recorders and, for all global and some diffuse installations, by electronic integrators.

In addition to the global diffuse and net radiation balance instruments Valentia Observatory is also equipped with the following:-

Eppley Normal Incidence Pyrheliometer and a solar tracker for the measurement of Direct Sun radiation.

Eppley Precision Radiometer (Pyrgeometer) for the measurement of Terrestrial Downward Infra Red radiation.

Kipp and Zonen Linke-Feussner Actinometer No. 93 with OG<sub>1</sub>, RG<sub>2</sub> and RG<sub>8</sub> filters for the measurement of Atmospheric Turbidity.

Volz sun photometer for the measurement of Atmospheric Turbidity.

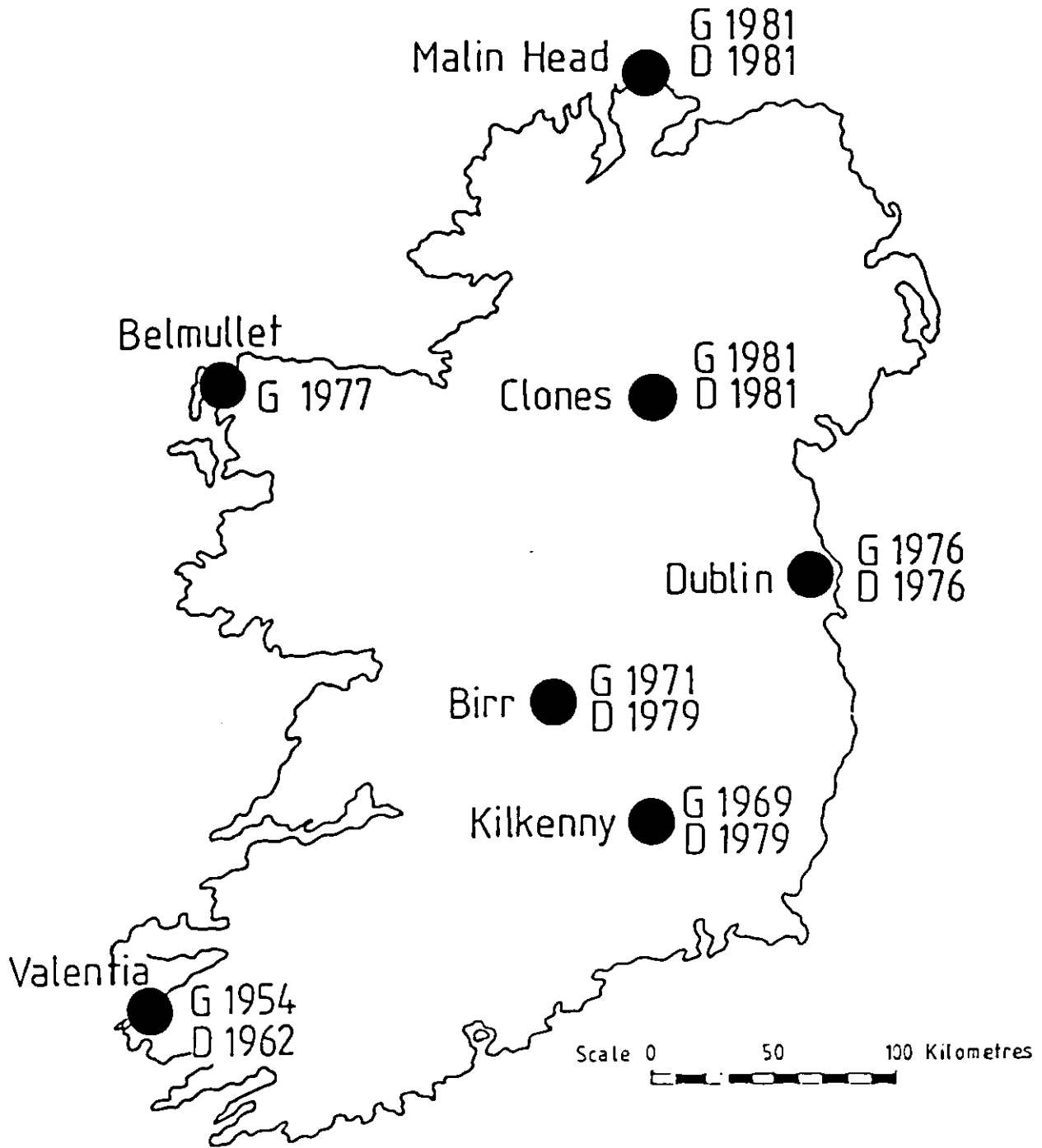
An Angstrom Compensation Pyrheliometer, No. 548, is maintained as a national reference instrument and is regularly calibrated against the World Radiometric Reference standard at World Meteorological Organisation international comparisons. All the network pyranometers and pyrheliometers are calibrated using the Angstrom Pyrheliometer as a standard reference.

A complete list of instruments in use is contained in Page 3. A detailed description of each site, including obstruction diagrams, will be found in [1]. Further information on solar radiation measurements and the Irish network is available in [2].

Only daily totals are published, apart from spot values of direct sun at normal incidence (Table 4). Hourly values may be had, on request, from The Director, Irish Meteorological Service, Glasnevin Hill, Dublin 9.

References [1] "Solar Radiation Observations 1983 and 1984" (Meteorological Service 1981).

[2] "An Introduction to the Nature and Measurement of Solar Radiation" by K.G. Commins (Meteorological Service Internal Memorandum 110/86).



IRISH METEOROLOGICAL SERVICE  
SOLAR RADIATION STATION NETWORK

TABLE OF INSTRUMENTS IN USE - 1986

	<u>SENSOR</u>	<u>RECORDER</u>	<u>INTEGRATOR</u>	<u>DIFFUSE SHADE RING</u>	
				<u>WIDTH (mm)</u>	<u>DIAMETER (mm)</u>
<u>Valentia</u>					
GLOBAL	CM6 816084	BD40 846096	LINTRONIC 717A (1/1-4/2) CC11 830151 (5/2-30/9) CC11 850274 (1/10-31/12)	-	-
DIFFUSE	CM6 838785	No 29	LINTRONIC 484B (1/1-4/2) CC11 830151 (5/2-30/9) CC11 850274 (1/10-31/12)	48	308
BALANCE	FUNK 695	HONEYWELL 68B/2124		-	-
INFRA-RED	EPPLEY 17154F3	-	EPPLEY 411-5879	-	-
DIRECT SUN	EPPLEY 17247E6	-	EPPLEY 411-5880	-	-
<u>Birr</u>					
GLOBAL	CM6 849324	BD40 846097	CC2 750308	-	-
DIFFUSE	CM6 690224	BD8 785761	-	51	305
<u>Kilkenny</u>					
GLOBAL	CM6 849332	XR4 550106	LINTRONIC 2374 (1/1-23/1) EPPLEY 411-4094 (24/1-31/12)	-	-
DIFFUSE	CM6 785154	BD8 816861 (1/1-30/4) BD8 806748 (1/5-31/12)	-	51	305
BALANCE	FUNK 1263	BD40 844848			
<u>Dublin Airport</u>					
GLOBAL	CM6 773731	-	CC2 750338	-	-
DIFFUSE	CM6 752732	PHILIPS 8056	CC2 750262	52	315
<u>Clones</u>					
GLOBAL	CM6 838911	BD8 806739	EPPLEY 411-7093	-	-
DIFFUSE	CM6 807231	BD8 806742	-	51	304
<u>Malin Head</u>					
GLOBAL	CM6 807223	BD8 806738	EPPLEY 411-7092	-	-
DIFFUSE	CM6 807230	BD8 806748 (1/1-14/4) BD8 806738 (15/4-20/4) BD8 806752 (21/4-31/12)	-	51	304
<u>Belmullet</u>					
GLOBAL	CM6 683279	BD8 785742	CC1 680076	-	-

NOTE: All instruments are Kipp and Zonen unless otherwise stated.

Table 1 Valentia Observatory

Daily Totals of Global Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	170	163	880	1619	967	701	1084	715	1704	250	825	268
2	275	149	1162	1660	602	1263	1911	1832	350	1329	174	51
3	296	92	264	2030	218	1936	917	881	1726	1255	486	47
4	119	315	178	1462	2111	806	1108	2024	1812	775	256	43
5	180	404	1014	1857	1715	1667	641	327	831	679	263	305
6	146	497	1111	1259	1572	1342	1316	943	1282	455	257	245
7	224	710	912	1731	1658	2471	960	1643	321	110	89	229
8	305	468	771	358	2043	833	2088	1734	540	549	390	170
9	113	581	890	1604	597	2183	760	1348	1403	632	322	287
10	230	201	460	2154	739	2443	806	1768	944	900	485	36
11	255	109	156	1750	936	2805	867	2172	900	729	584	208
12	323	84	230	1628	1352	359	2327	1745	1795	649	69	35
13	106	227	994	1149	1493	1140	679	1873	1631	599	318	238
14	263	371	382	1219	1890	2402	1160	1329	1835	817	361	145
15	311	343	677	379	2659	2571	550	1807	1711	878	288	170
16	134	186	1155	1139	2720	1843	2020	2011	1621	867	307	174
17	120	353	930	2117	917	1972	1683	1541	1213	293	328	60
18	131	900	1450	1582	1614	1693	1566	1961	1603	255	59	102
19	289	393	513	515	1229	1486	624	1968	1690	449	344	226
20	100	963	1133	1525	1763	620	1020	1172	1450	728	133	208
21	293	243	482	1381	2285	428	1955	1250	1137	171	129	315
22	183	417	517	2420	2213	2214	1777	1458	487	559	286	347
23	299	618	993	2403	2220	1943	471	367	729	821	178	187
24	400	564	629	1944	625	1054	499	1587	1098	447	125	85
25	190	652	1097	2071	890	2456	999	338	583	706	280	217
26	224	744	343	791	2052	2153	1928	1533	1015	278	298	248
27	410	1115	815	1921	2442	1711	647	2181	347	223	192	98
28	232	1154	1076	2181	2873	2623	679	1675	321	425	102	228
29	322		1186	1708	1934	2569	1416	1714	1245	281	94	37
30	201		661	493	372	2421	1767	1478	620	516	104	260
31	104		1378		628		2454	1454		149		100
Total	6948	13016	24439	46050	47329	52108	38679	45829	33944	17774	8126	5369
Mean	224.1	464.9	788.4	1535.0	1526.7	1736.9	1247.7	1478.4	1131.5	573.4	270.9	173.2

Table 2 Valentia Observatory

Daily Totals of Diffuse Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	126	147	431	486	758	696	695	678	757	250	154	226
2	144	141	179	533	593	1235	1251	865	350	313	173	51
3	207	92	258	385	212	948	880	850	635	294	303	41
4	115	298	176	574	1123	797	1080	723	365	495	254	43
5	125	225	395	648	1050	1345	629	320	797	600	237	173
6	146	259	367	946	1114	1257	1229	887	891	442	257	213
7	160	282	526	634	751	999	948	1087	321	110	89	155
8	160	350	444	354	885	810	1132	998	538	491	268	159
9	113	386	557	677	579	1422	757	1043	612	535	314	180
10	161	199	460	463	723	924	788	1086	688	308	251	36
11	178	108	156	729	752	769	858	818	816	466	149	157
12	221	84	230	960	1106	351	1201	802	403	564	69	35
13	106	215	397	915	979	1071	670	806	544	428	173	172
14	190	324	381	712	914	971	1009	920	234	390	182	141
15	238	316	531	367	700	1061	546	943	340	281	213	135
16	134	186	487	749	605	938	830	1019	513	487	224	124
17	120	314	625	613	745	1142	1362	1199	686	276	233	60
18	131	340	425	917	1303	1296	1346	885	352	244	59	101
19	192	380	495	512	1095	1110	605	872	275	417	264	140
20	100	442	549	934	1191	608	988	916	540	356	133	124
21	204	243	454	862	947	415	1270	969	701	171	129	139
22	154	404	510	559	1037	1146	1222	851	484	395	249	73
23	223	334	730	543	1292	1095	463	365	583	338	174	175
24	242	353	606	709	589	979	493	911	605	332	125	85
25	190	431	698	648	626	1205	961	334	542	383	218	167
26	219	441	343	703	1100	1312	1278	854	651	273	194	173
27	254	233	546	995	1042	1225	631	546	347	223	177	98
28	211	268	646	665	812	958	636	699	321	312	102	173
29	227		664	994	1385	1092	1206	923	288	274	94	37
30	193		650	477	365	877	1033	978	472	326	100	183
31	104		631		625		679	967		145		100
Total	5288	7795	14547	20263	26998	30054	28676	26114	15651	10919	5561	3869
Mean	170.6	278.4	469.3	675.4	870.9	1001.8	925.0	842.4	521.7	352.2	185.4	124.8

Table 3 Valentia Observatory

Daily Totals of Radiation Balance (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	-60	-8	-39	483	563	431	584	394	884	114	73	-27
2	46	-40	37	463	323	736	1000	776	110	517	-26	31
3	-177	-36	80	761	104	1003	569	369	552	360	38	2
4	-102	24	120	378	914	421	578	921	713	345	91	8
5	-139	-140	300	577	788	945	270	152	396	279	71	-96
6	-63	-246	343	318	846	743	663	508	606	188	39	-99
7	19	-358	333	559	679	1124	505	795	152	49	-32	-76
8	-111	-107	252	174	1033	500	935	794	270	289	-14	-177
9	13	-1	332	511	385	1011	370	466	479	100		-194
10	-202	12	217	660	437	1230	432	739	316	180	-9	-61
11	-120	10	115	664	476	1336	515	930	243	158	-82	-245
12	12	-45	109	729	680	235	1207	843	453	116		-128
13	-41	-117	410	537	614	676	389	818	339	139	-113	-192
14	-77	-44	229	455	700	1318	659	572	490	152	-80	-51
15	-154	60	253	177	1112	1246	337	788	457	122	-20	-157
16	-21	-203	323	435	1327	863	989	865	457	233	-160	-185
17	31	-158	311	801	595	833	808	654	468	21	-42	-97
18	73	157	433	651	901	776	835	834	469	-11	-47	-147
19	-97	36	155	293	715	780	337	882	550	116	-107	-181
20	-51	242	440	732	1012	241	557	478	491	208	-142	-201
21	-76	31	179	543	1131	217	972	686	437	24	-129	-255
22	32	75	329	1046	1047	1108	940	629	134	87	-89	-251
23	-28	-11	456	1014	1032	955	205	95	364	179	-8	20
24	-96	-95	249	733	281	437	289	654	468	152	82	29
25	91	62	499	878	402	1376	563	181	193	162	-77	45
26	93	43	97	305	960	1118	1016	681	376	-3	-123	-115
27	-66	-9	178	901	1149	661	372	906	227	149	-58	-80
28	-64	97	413	944	1365	1270	373	649	183	70	-84	22
29	-30		539	841	838	1257	687	778	399	4	-71	-8
30	-167		257	273	197	1109	901	568	236	115	-25	-69
31	-134		502		390		1092	583		96		-77
Total	-1666	-769	8451	17836	22996	25956	19949	19988	11912	4710	-1144	-3012
Mean	-53.7	-27.5	272.6	594.5	741.8	865.2	643.5	644.8	397.1	151.9	-38.1	-97.2



Table 4

DIRECT SOLAR RADIATION AT NORMAL INCIDENCES  
INSTANTANEOUS VALUES (mW/cm<sup>2</sup>) 1986

MONTH AND DAY	TIME L.A.T.	ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION				PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
				CLEAR	RED (RG <sub>2</sub> )	YELLOW (OG <sub>1</sub> )	RED (RG <sub>8</sub> )					TYPE	AMOUNT
Feb.				x10 <sup>1</sup>	x10 <sup>1</sup>	x10 <sup>1</sup>	x10 <sup>1</sup>	hPa	°C	hPa	km		Okta
6	1344	71.2	3.08	737	530	629	438	1015	2.5	4.4	30	Sc	2
6	1436	75.5	3.97	615	472	544	394	1015	1.7	5.2	30	Sc	1
7	1116	67.9	2.64	645	487	563	411	1019	0.5	5.1	30	Cu	1
20	1320	65.2	2.37	661	487	570	404	1011	6.4	5.5	20	CuScAc	2
24	0956	67.0	2.55	692	501	595	420	1016	2.1	4.7	20	FcCi	3+
27	0848	73.0	3.41	641	499	566	415	1027	-1.1	4.3	25	Cu	Tr
27	1328	63.2	2.21	790	561	661	467	1025	4.0	4.4	20		0
27	1400	65.5	2.40	730	532	620	445	1025	4.0	4.4	20		0
28	0936	67.4	2.59	698	505	599	423	1022	-0.3	4.9	20	Cu	1
28	1140	60.1	2.00	800	559	660	464	1021	1.8	4.7	20	Sc	2
28	1320	62.4	2.15	807	561	676	464	1019	3.9	4.0	30	FcScCi	2
Mar.													
1	1456	70.4	2.96	662	497	574	418	1018	3.0	4.0	30	Cu	1
2	0856	71.1	3.06	825	589	670	489	1021	1.9	4.0	35		0
2	1000	64.6	2.32	897	619	743	509	1021	4.6	4.3	40		0
2	1300	60.5	2.03	748	540	632	450	1019	7.5	3.6	45	Ci	1
6	0900	69.2	2.80	666	447	552	369	1004	6.5	7.7	30	Cb	1
6	1408	63.7	2.25	745	490	601	399	1006	8.1	8.3	30	Cb	1
7	0856	69.3	2.81	713	477	584	390	1017	7.5	8.5	50	CuSc	4
8	1404	62.7	2.17	617	403	495	329	1007	11.0	9.9	20	Cu	1+
18	1000	58.7	1.92	801	531	649	427	1014	7.6	6.3	35	Cu	2
18	1400	58.6	1.92	775	512	626	415	1015	8.4	7.3	35	Cu	1
18	1540	70.0	2.90	673	465	561	382	1016	7.4	7.3	35	Cu	3

Table 4

DIRECT SOLAR RADIATION AT NORMAL INCIDENCES  
INSTANTANEOUS VALUES (mW/cm<sup>2</sup>) 1986

MONTH AND DAY	TIME L.A.T.	ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION				PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
				CLEAR	RED (RG <sub>2</sub> )	YELLOW (OG <sub>1</sub> )	RED (RG <sub>8</sub> )					TYPE	AMOUNT
				x10 <sup>1</sup>	x10 <sup>1</sup>	x10 <sup>1</sup>	x10 <sup>1</sup>	hPa	°C	hPa	Km		Okta
Apr.													
3	0910	58.3	1.90	827	557	676	452	1017	6.8	6.7	50	Cu	2
3	1330	50.3	1.56	859	561	686	458	1017	8.8	7.1	60	Cu	2
4	0904	58.8	1.93	714	509	608	422	1026	7.5	7.2	60	CuFcCi	2
5	0916	57.0	1.83	836	523	629	432	1027	8.1	7.6	30	CuFc	2
7	0940	53.5	1.68	795	546	659	444	1025	5.5	5.4	40	CuSc	1+
9	1428	53.7	1.69	673	461	556	374	1024	10.8	7.0	25	CuAc	3
11	0824	61.8	2.11	727	497	597	412	1034	5.1	5.5	30	Fc	Tr
11	0916	55.0	1.74	781	523	636	427	1034	6.4	5.0	40	Cu	1
11	1016	48.5	1.51	812	534	657	440	1034	6.8	5.4	40	Cu	1
17	1320	44.6	1.40	864	559	690	458	1011	8.7	6.3	45	CuFc	2
23	1000	46.3	1.45	843	548	673	447	1000	10.8	8.2	40	CuCi	2
23	1246	40.6	1.32	853	554	679	450	1001	11.0	8.5	50	CuFcCi	2
23	1528	57.2	1.84	792	532	646	431	1001	11.5	8.1	50	CuCi	2
28	0928	48.5	1.51	807	522	639	420	1007	8.7	8.4	30	Cu	1
May													
7	1526	53.6	1.68	809	533	649	432	998	11.6	10.5	60	CuCi	3+
28	0920	43.4	1.38	853	538	664	432	1022	11.3	9.3	50	CbSc	3
June													
3	1436	42.1	1.35	836	526	656	426	1019	12.7	11.3	45	CuFc	1
7	0952	38.2	1.27	813	498	618	413	1016	12.5	9.7	40	CuScCi	3+
7	1532	49.7	1.54	784	495	617	401	1016	13.0	8.9	40	CuCi	1+
10	0948	38.4	1.27	916	576	714	467	1007	11.1	10.1	40	Cu	3
11	0852	45.9	1.44	908	573	710	457	1014	13.1	9.5	50	CuCi	1
11	0932	40.4	1.31	937	584	730	473	1015	13.6	9.6	50	Cu	Tr
14	1400	36.7	1.25	904	547	691	439	1025	20.0	17.8	40	FsCu	3
14	1416	38.7	1.28	895	544	690	434	1025	20.0	17.8	40	FsCu	3

Table 4

DIRECT SOLAR RADIATION AT NORMAL INCIDENCES  
INSTANTANEOUS VALUES (mW/cm<sup>2</sup>) 1986

MONTH AND DAY	TIME L.A.T.	ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION				PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
				CLEAR	RED (RG <sub>2</sub> )	YELLOW (OG <sub>1</sub> )	RED (RG <sub>8</sub> )					TYPE	AMOUNT
				x10 <sup>1</sup>	x10 <sup>1</sup>	x10 <sup>1</sup>	x10 <sup>1</sup>	hPa	°C	hPa	Km	Okta	
June													
17	1436	41.2	1.33	916	573	715	465	1019	13.7	10.8	45	CuSc	3+
23	0940	39.1	1.29	902	566	702	460	1009	17.5	13.4	50	CuCi	3
23	1036	32.7	1.19	904	566	701	453	1009	19.0	13.7	50	CuCi	3
25	1408	37.6	1.26	890	552	694	446	1016	17.9	14.7	25	CuCi	2+
30	0932	40.3	1.31	859	537	670	429	1016	16.3	14.7	30	CuScCi	4
30	1024	34.1	1.21	887	547	685	440	1016	16.7	14.8	25	CuScAcCi	2
30	1528	48.8	1.52	837	531	660	426	1017	18.6	15.5	35	Cu	3
30	1544	51.2	1.59	825	526	655	423	1017	18.6	15.5	35	Cu	3
July													
8	1522	48.4	1.50	898	561	702	453	1023	15.7	12.1	50	CuFc	3
8	1544	51.7	1.61	879	552	690	445	1023	15.7	12.1	50	CuFc	3
16	1320	34.2	1.21	883	537	673	429	1017	16.3	14.7	30	Cu	3
31	1244	34.7	1.22	907	567	706	458	1012	16.0	12.8	45	Cb	4
31	1412	42.4	1.35	892	559	693	448	1012	15.9	12.7	45	Cu	2
Aug.													
4	1356	41.6	1.34	892	559	699	456	1012	15.0	12.5	60	Cu	4
4	1504	50.0	1.55	875	552	688	442	1012	14.7	12.2	60	Cu	4
11	1408	44.6	1.40	863	541	676	436	1019	16.8	14.1	50	CuAc	1+
15	1500	52.2	1.63	805	511	637	410	1012	15.6	13.8	40	Cu	4
18	1356	45.3	1.42	885	556	694	448	1017	15.4	12.5	60	CuScCi	2+
22	1444	52.0	1.62	840	534	664	425	1002	18.0	16.2	45	CuSc	5
Sep.													
9	1458	59.3	1.95	816	533	658	428	1021	15.2	13.2	35	Sc	Tr
15	1008	54.1	1.70	900	581	717	467	1017	10.1	8.6	60	FsFc	1
15	1512	63.1	2.20	840	555	683	446	1017	13.0	9.4	60	Cu	1

Table 4

DIRECT SOLAR RADIATION AT NORMAL INCIDENCES  
INSTANTANEOUS VALUES (mW/cm<sup>2</sup>) 1986

MONTH AND DAY	TIME L.A.T.	ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION				PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
				CLEAR	RED (RG <sub>2</sub> )	YELLOW (OG <sub>1</sub> )	RED (RG <sub>8</sub> )					TYPE	AMOUNT
Sep.				x10 <sup>1</sup>	x10 <sup>1</sup>	x10 <sup>1</sup>	x10 <sup>1</sup>	hPa	°C	hPa	Km		Okta
16	0808	68.7	2.74	780	520	636	419	1023	11.0	9.1	60	Cu	1
17	0848	63.7	2.25	856	558	689	448	1027	11.0	10.8	40	Cu	3
19	0948	57.5	1.86	851	565	693	459	1038	12.0	11.5	40	Cu	Tr
19	1244	51.3	1.60	875	576	707	464	1038	14.2	11.4	50	CuCi	1
19	1528	66.5	2.50	758	522	634	421	1036	13.8	12.0	50	FcCi	1
20	0804	70.5	2.98	683	487	583	397	1033	9.0	10.8	40	Ci	3
20	0908	62.1	2.13	744	505	613	408	1033	13.0	12.2	40	Ci	5
29	1404	60.4	2.02	847	534	670	424	1031	18.4	14.5	80	Fc	Tr
29	1454	65.6	2.41	797	514	637	408	1031	18.4	14.5	80	Fc	Tr
Oct.													
2	0916	65.5	2.40	765	497	618	403	1024	12.4	13.6	35	FcScAcCi	2
2	1516	69.2	2.80	706	463	577	372	1023	15.0	12.0	50	FcCi	1-
3	1112	56.8	1.82	723	487	593	392	1022	19.0	14.8	40	Sc	Tr
3	1344	60.2	2.01	718	487	593	394	1019	20.1	14.9	40		0
3	1432	64.6	2.32	699	478	579	390	1019	20.3	14.8	40		0
10	1248	59.4	1.96	774	495	613	398	1014	13.7	11.0	30	CuCb	3
14	1332	63.3	2.22	772	499	624	395	1017	14.1	10.8	30	Cu	2
Nov.													
1	1056	67.8	2.63	872	594	720	481	1018	8.0	7.7	45	Fc	Tr
1	1200	66.3	2.48	886	603	730	486	1019	8.9	7.7	45	Cu	Tr
11	1028	72.2	3.24	695	472	574	378	1009	10.5	9.5	40	Cu	2
11	1232	69.7	2.86	769	517	630	414	1010	11.0	8.2	40	Cu	Tr
Dec.													
22	1044	77.2	4.47	713	514	616	418	1034	4.4	7.0	45	Cu	Tr
22	1340	78.5	4.95	701	516	613	420	1035	6.3	6.7	60	Cu	Tr

Table 5

VALENTIA

DAILY TOTALS OF DIRECT SOLAR RADIATION AT NORMAL INCIDENCES (J/cm )

1986

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	170	44	1165	2147	185	0	475	29	1273	0	N/A	129
2	473	9	2377	2232	6	18	776	1222	0	2047	0	0
3	296	0	74	2935	0	1356	18	34	1841	2052	412	0
4	12	10	12	1614	1271	28	13	1900	2325	406	2	2
5	215	466	1479	2190	732	500	48	0	45	136	97	477
6	0	779	1819	520	512	118	125	33	513	7	0	185
7	219	1355	949	2081	1604	2111	8	663	0	0	0	296
8	648	250	807	4	1630	40	1577	976	0	80	263	105
9	0	419	811	1433	6	991	0	550	1418	232	7	531
10	213	8	101	2883	6	1860	5	1037	385	1163	529	0
11	257	0	41	1921	291	3024	0	1733	138	573	N/A	250
12	296	0	31	949	271	0	1516	1385	2539	167	0	0
13	1	27	1352	287	909	83	2	1621	1880	375	406	291
14	210	126	25	1125	1433	2011	232	650	3034	836	519	29
15	247	64	390	31	2920	1953	0	1223	2538	1462	201	141
16	0	8	1663	521	3192	1146	1515	1226	2072	883	201	221
17	0	85	734	2392	168	1290	298	402	1116	23	270	0
18	0	1290	2140	974	282	387	158	1350	2401	15	0	22
19	338	53	22	5	124	358	4	1429	2815	48	204	383
20	0	1393	1185	769	600	3	21	244	1678	756	0	394
21	302	18	122	814	1637	2	801	300	634	0	0	838
22	7	39	40	3121	1443	1442	637	909	13	342	79	1392
23	233	583	531	3029	1263	1033	0	0	342	1090	0	36
24	557	581	N/A	2085	68	84	0	1024	787	184	0	0
25	0	531	757	2514	520	1579	14	2	79	677	145	N/A
26	14	708	46	291	1130	956	756	1037	524	13	320	N/A
27	445	2191	439	1295	1718	963	2	2587	0	0	28	0
28	56	2121	661	2192	2891	2209	47	1330	0	286	1	164
29	261		832	910	876	1779	200	1075	2032	8	0	0
30	24		20	6	3	2073	964	882	205	N/A	8	258
31	0		1152		0		2625	886		0		0
Total	5494	13158	N/A	43270	27691	29397	12837	27739	32627	N/A	N/A	N/A
Mean	177.2	469.9	N/A	1442.3	893.3	979.9	414.1	894.8	1087.6	N/A	N/A	N/A

Note : "N/A" indicates value not available.

Table 6 VALENTIA DAILY TOTALS OF LONG-WAVE (INFRA-RED) RADIATION (J/cm ) 1986

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	2589	2554	1913	2235	2857	3161	3162	3115	3126	3125	2290	2738
2	2424	2548	1729	2168	2787	3180	3129	2844	3128	2713	2799	3106
3	2182	2597	2707	2217	2792	2840	3276	2949	2606	2753	2656	3011
4	2607	2521	3065	2162	2561	3025	3210	2761	2659	3159	2916	3040
5	2354	2152	2359	2176	2638	3000	3098	3134	3081	3131	2896	2408
6	2588	2083	2375	2227	2775	3082	3049	3234	3104	3218	2738	2524
7	2678	1746	2517	2147	2594	2705	3192	3013	3251	3301	2939	2621
8	2500	2075	2654	2705	2742	3131	2910	2858	3241	3216	2604	2491
9	2947	2190	2631	2396	3113	2881	3173	2858	2806	2883	2859	2381
10	2522	2661	2824	2007	3025	2778	3236	2914	2892	2661	2617	2899
11	2461	2705	3058	2228	2954	2657	3305	2852	2917	2762	2386	2379
12	2752	2679	2907	2620	2867	3184	3195	2973	2332	2810	3021	2753
13	2857	2431	2596	2719	2566	3231	3404	2888	2358	2850	2600	2327
14	2551	2295	3067	2460	2548	3117	3431	2879	2293	2663	2514	2705
15	2380	2577	2797	2676	2377	3087	3385	2970	2323	2477	2715	2547
16	2720	2349	2339	2472	2492	3076	3064	2830	2573	2751	2513	2450
17	2938	2201	2561	2272	3113	2763	3094	2937	2731	2918	2553	2840
18	3049	2096	2284	2650	3025	2855	3192	2837	2368	2868	2922	2581
19	2538	2405	2708	2998	3056	3104	3339	2927	2409	2798	2538	2431
20	2810	2271	2586	2604	2925	3124	3280	3013	2486	2772	2646	2393
21	2474	2519	2884	2660	2617	3229	3089	3187	2851	3053	2694	2180
22	2847	2389	3075	2360	2626	3066	3017	3080	2891	2657	2553	2000
23	2463	2050	2610	2336	2711	2977	3186	3050	3132	2618	2836	2572
24	2249	1999	2560	2432	2979	3018	3306	2724	3011	2931	3164	3113
25	2873	2233	2548	2379	2991	3125	3298	3087	3005	2666	2662	2878
26	2874	2056	2745	2690	2785	3182	3091	2825	2846	2911	2580	2569
27	2243	1632	2428	2653	2719	3049	3278	2629	3266	3286	2828	2742
28	2448	1762	2580	2520	2593	2901	3296	2731	3260	2803	2844	2894
29	2249		2524	2635	2818	2983	3098	2829	2789	2807	2916	3055
30	2328		2655	3054	3062	2979	3092	2689	3063	2864	2974	2744
31	2450		2410		3169		2697	2764		3089		2808
Total	79945	63776	80696	73858	86877	90490	98572	90381	84798	89514	81773	82180
Mean	2578.9	2277.7	2603.1	2461.9	2802.5	3016.3	3179.7	2915.5	2826.6	2887.5	2725.8	2651.0

Table 7 Kilkenny

## Daily Totals of Radiation Balance (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	-163	4	67	627	1157	669	1148	201	772	285	62	-51
2	-60	82	122	728	94	931	818	967	276	382	36	-36
3	-264	-3	54	518	129	641	552	957	819	393	62	-42
4	-125	-44	210	483	430	516	523	589	713	349	27	-6
5	-226	95	180	285	414	N/A	625	398	324	295	-15	-210
6	-115	-122	261	346	485	1077	728	475	355	316	72	-121
7	-18	-16	298	629	559	673	645	648	503	228	54	-109
8	-17	30	-41	45	864	922	972	937	397	57	-82	-111
9	10	126	155	738	836	1218	450	566	606	242	-56	-269
10	-188	-35	175	722	449	759	622	243	385	220	-73	-57
11	-109	-41	156	413	668	1385	507	624	219	273	-64	-149
12	-99	-43	121	478	728	600	885	715	561	256	-32	-101
13	-122	-20	566	530	746	933	459	153	536	289	-63	-251
14	-215	-103	191	610	831	1054	1111	531	631	229	-72	-102
15	-178	45	53	452	980	1435	970	719	492	163	48	-68
16	-132	8	379	210	1268	634	767	387	628	161	-39	-237
17	17	-55	435	579	420	567	899	673	292	251	-78	-260
18	36	29	538	334	1038	1352	635	720	457	71	-65	-262
19	-72	50	351	252	660	552	595	667	553	144	-110	-296
20	-53	60	312	872	1084	304	752	855	371	203	-112	-376
21	-154	148	264	362	1238	225	807	75	460	-16	-86	-419
22	26	67	430	623	1209	952	611	592	471	18	-111	-336
23	-175	-30	485	975	1057	945	728	100	304	66	-3	-2
24	12	124	519	831	621	391	344	737	208	67	67	46
25	-13	297	589	609	946	1091	546	29	233	87	-63	-76
26	113	-17	107	605	1121	1157	901	396	264	99	-125	-208
27	11	30	387	951	N/A	N/A	479	681	233	196	-58	-154
28	23	-43	261	882	1068	923	265	783	522		-16	-153
29	-73		350	1067	841	208	771	553	545	-45	-14	-77
30	45		342	356	443	332	661	512	406	92	-102	-157
31	-8		582		688		860	828		20		-129
Total	-2286	623	8899	17112	N/A	N/A	21636	17311	13536	5391	-1011	-4779
Mean	-73.7	22.3	287.1	570.4	N/A	N/A	697.9	558.4	451.2	173.9	-33.7	-154.2

Note : "N/A" indicates value not available

Table 8 Kilkenny

Daily Totals of Global Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	41	108	890	1631	2477	1166	2149	498	1550	724	777	303
2	85	246	1277	1463	448	1620	1656	1752	653	1234	458	96
3	260	113	389	1628	523	1389	1107	1996	1825	1226	698	36
4	96	98	393	1484	836	1234	2003	1393	1668	942	240	58
5	317	690	1048	1325	978	2221	1217	1017	757	719	279	202
6	226	501	1133	1241	1078	2078	1620	847	909	885	560	281
7	52	350	1258	1552	1219	1404	1283	1215	1256	473	176	137
8	189	275	276	239	1837	1753	2131	2145	1038	303	608	54
9	192	376	700	1724	1491	2199	937	1253	1771	587	195	303
10	275	258	614	1842	904	1618	1118	581	1180	932	598	72
11	331	150	322	1242	1165	2964	1009	1326	814	1194	499	304
12	305	111	263	950	1428	1087	1744	1524	1822	1059	146	74
13	128	706	1258	1030	2002	1632	941	418	1732	826	374	303
14	339	259	448	1270	1661	1977	1871	1506	1807	894	96	219
15	428	521	158	1100	2183	2995	1797	1660	1488	971	516	263
16	140	207	1202	540	2783	1336	1482	1031	1650	813	502	211
17	267	212	1249	1648	705	1362	1736	1511	935	650	503	70
18	180	373	1429	969	1995	2659	1307	1591	1481	465	137	74
19	362	392	1146	511	1383	1220	1162	1526	1695	561	397	285
20	186	557	1207	1808	2113	807	1469	2069	982	864	218	305
21	288	988	754	913	2376	712	1635	339	1140	224	150	340
22	294	819	965	1555	2526	1682	1477	1218	1139	643	332	358
23	285	781	1379	2292	2274	1864	1615	676	787	955	281	117
24	552	982	1468	1959	1274	857	668	1968	617	340	155	143
25	235	954	1622	1668	1686	2152	1068	170	721	817	190	208
26	245	530	589	1499	2209	2290	1812	979	762	542	353	211
27	537	1177	1187	2188	2710	1580	1009	1578	559	426	166	172
28	425	1002	1068	1871	2320	1784	601	1923	1072	497	166	192
29	637		1173	2121	1723	559	1660	1414	1520	456	236	95
30	183		835	779	1014	878	1331	1314	856	681	139	221
31	108		1412		1091		1848	1961		179		170
Total	8188	13736	29112	42042	50412	49079	44463	40399	36186	22082	10145	5877
Mean	264.1	490.6	939.1	1401.4	1626.2	1636.0	1434.3	1303.2	1206.2	712.3	338.2	189.6



Table 9 Kilkenny

Daily Totals of Diffuse Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	38	102	377	629	738	1042	1288	491	730	624	177	226
2	85	225	213	679	446	1251	1273	1204	634	549	366	94
3	174	108	377	610	498	1099	1054	1159	642	236	210	35
4	95	98	392	732	765	1165	1475	1136	728	458	234	58
5	134	220	493	779	928	992	1144	760	755	551	262	131
6	189	339	509	785	982	1396	1323	778	701	593	249	148
7	49	272	324	735	985	1319	1144	994	832	455	175	126
8	153	264	271	236	1118	1349	1149	791	894	298	205	54
9	169	277	559	630	1035	1096	929	1146	492	517	189	133
10	131	248	550	903	861	1012	1078	577	674	404	148	72
11	188	143	321	920	968	709	1001	1136	742	313	160	139
12	175	107	263	840	1081	1057	1003	1115	415	324	146	74
13	128	253	475	858	1106	1296	854	410	557	506	273	127
14	184	230	427	896	928	1419	1299	869	341	392	96	202
15	176	437	157	902	1090	711	1332	986	535	302	156	155
16	140	193	428	534	729	1207	831	889	540	370	172	164
17	238	197	582	958	627	1265	1390	1173	648	400	180	63
18	180	372	580	773	1311	1015	1270	982	548	410	137	64
19	179	363	546	510	1093	1158	1102	1018	295	419	283	162
20	175	359	482	915	1035	744	1329	763	639	248	196	130
21	224	251	650	855	891	703	1342	303	925	219	144	127
22	174	319	703	950	1068	1274	1304	912	746	366	230	101
23	209	448	681	635	1185	1252	1223	674	609	298	238	116
24	221	341	627	945	1056	821	659	800	559	257	151	143
25	210	475	490	738	763	1275	1051	170	618	340	173	157
26	234	409	500	985	1208	1453	1319	930	671	379	179	154
27	219	274	592	948	1032	1088	953	1066	501	383	165	160
28	296	384	700	857	1043	1025	594	656	646	339	134	172
29	126		667	976	1457	523	1239	874	212	325	204	94
30	168		764	739	1006	486	1108	1014	359	304	137	150
31	105		655		1035		1045	726		174		170
Total	5166	7708	15355	23452	30068	32202	35105	26502	18188	11753	5769	3901
Mean	166.6	275.3	495.3	781.7	969.9	1073.4	1132.4	854.9	606.3	379.1	192.3	125.8

Table 10 Birr

## Daily Totals of Global Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	44	108	676	1301	2374	1158	1621	557	1613	455	742	245
2	131	135	1232	N/A	322	1622	1667	1637	502	941	383	131
3	223	55	371	N/A	210	1608	1069	1666	1682	1232	617	73
4	121	91	220	1648	706	1166	1584	953	1747	1055	244	65
5	300	668	946	1221	1151	2014	923	898	529	607	183	234
6	186	616	1034	1034	1406	1842	1291	1068	1007	779	579	240
7	45	319	1207	N/A	1247	1437	1576	668	1320	213	147	142
8	200	402	350	225	1946	1554	2237	2001	1000	323	508	47
9	173	375	689	1701	1261	1939	642	1785	1893	623	307	309
10	274	286	589	1814	926	1631	897	517	1466	984	541	84
11	254	275	354	1189	N/A	3040	1050	792	961	1049	582	280
12	260	168	467	939	N/A	876	1614	1632	1642	888	117	54
13	100	744	1160	885	N/A	1649	585	528	1492	623	493	267
14	280	489	444	1106	1566	2174	1625	1532	1571	853	166	189
15	254	490	212	548	2203	2857	929	1568	1459	997	443	213
16	112	275	1257	N/A	2547	714	1346	1053	1327	544	416	143
17	183	193	1121	N/A	798	1548	1608	1802	880	708	422	60
18	141	317	1247	N/A	1317	2486	1293	1334	1467	474	133	108
19	327	454	1071	530	1828	1033	878	1517	1530	652	276	200
20	140	673	1070	N/A	1719	1166	976	1937	831	796	188	248
21	273	944	606	888	2143	1848	1528	734	535	183	159	329
22	278	956	496	1655	1972	1704	1352	1037	894	491	182	331
23	251	836	1157	1982	1958	1866	1397	726	643	772	245	131
24	474	906	1053	1908	1159	1247	717	1927	458	372	95	107
25	170	738	1114	1699	1503	1852	1202	155	748	593	239	189
26	180	687	605	971	2106	1871	1708	1224	905	577	399	246
27	459	1147	1109	1894	2352	1235	1019	1423	432	229	177	125
28	231	1143	830	N/A	1932	1992	628	1569	491	435	143	164
29	642		1015	N/A	1513	648	1544	1265	1378	418	209	57
30	58		858	639	778	469	1468	1408	1374	554	110	200
31	92		1030		610		1719	1626		248		176
Total	6856	14490	25590	N/A	N/A	48246	39693	38539	33777	19668	9445	5387
Mean	221.2	517.5	825.5	N/A	N/A	1608.2	1280.4	1243.2	1125.9	634.5	314.8	173.8

Note: "N/A" indicates value not available

Table 11 Birr

## Daily Totals of Diffuse Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	41	107	492	682	581	1141	1207	525	748	436	159	193
2	109	124	193	656	316	1295	1248	N/A	497	609	330	130
3	152	55	338	559	207	1063	1007	842	680	238	213	73
4	119	84	220	540	648	1106	1433	846	703	467	243	65
5	131	205	376	695	920	1410	911	809	528	524	183	126
6	165	287	448	777	1141	1389	1201	982	759	487	217	116
7	45	297	293	623	921	1396	1249	645	894	213	143	116
8	96	355	323	222	1113	1361	1016	964	810	305	243	47
9	139	349	495	706	1095	1321	641	1212	267	553	287	114
10	142	260	553	649	865	1120	885	508	590	381	173	81
11	151	262	346	833	1016	623	990	792	695	345	133	113
12	166	167	384	783	1090	842	1068	989	458	358	117	54
13	96	230	493	770	937	1169	571	521	629	485	179	110
14	178	294	401	752	878	1258	1306	728	502	432	166	160
15	179	401	207	448	963	786	883	828	509	264	145	122
16	112	260	456	395	728	693	967	868	546	451	179	121
17	183	189	482	695	652	1424	1332	1016	683	417	228	60
18	132	287	431	820	1081	1158	1248	899	504	328	133	68
19	134	414	506	526	1415	974	851	973	381	370	272	138
20	136	325	475	824	1037	1084	956	825	640	286	186	134
21	189	216	560	835	1017	1284	1280	666	535	177	158	108
22	186	235	484	851	1044	1266	1191	795	673	315	154	125
23	189	322	658	782	1046	1104	1233	713	628	218	218	131
24	173	409	764	963	933	1016	708	791	446	279	95	104
25	164	435	628	960	870	1256	1159	155	648	348	202	178
26	172	432	548	877	1230	1407	1298	923	681	429	185	158
27	214	242	650	933	1028	1018	943	917	359	228	169	116
28	185	286	633	792	1070	981	623	751	449	333	133	142
29	169		626	993	1375	648	1294	983	167	314	121	55
30	55		769	630	772	426	1257	1057	224	303	109	134
31	91		634		607		975	808		240		171
Total	4393	7529	14866	21571	28596	33019	32931	N/A	16833	11133	5473	3563
Mean	141.7	268.9	479.5	719.0	922.5	1100.6	1062.3	N/A	561.1	359.1	182.4	114.9

Note: "N/A" indicates value not available

Table 12 Dublin Airport

Daily Totals of Global Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	47	63	568	1461	2457	1303	2149	653	1631	626	650	279
2	40	104	1172	999	1132	2119	1522	1058	981	953	515	181
3	309	57	601	1662	183	1697	1463	1707	1585	1238	612	48
4	77	25	269	1666	702	1517	1949	998	1566	1050	236	47
5	313	489	914	1651	1555	2228	1250	1166	655	643	221	196
6	217	361	955	1292	1125	2662	1499	1202	1503	845	594	325
7	22	341	1059	935	1704	1366	1687	810	1705	565	164	92
8	127	222	329	201	1686	1847	1671	1896	1073	351	549	37
9	177	328	654	1634	1317	1579	1107	1682	1560	481	195	259
10	251	214	626	1077	1268	853	816	1653	1341	924	489	102
11	288	81	439	1311	1308	2950	924	762	1563	1026	487	283
12	338	226	197	846	2152	1396	1138	1064	1659	833	120	74
13	125	733	597	984	2180	1875	872	486	1594	599	253	255
14	308	137	563	945	1320	2609	1697	1449	1580	739	65	242
15	337	279	699	782	2192	2851	1237	1836	1455	966	499	220
16	147	141	1228	191	2548	1547	1465	1318	1519	733	446	211
17	234	90	1326	789	699	1102	1730	1554	906	845	428	68
18	190	199	1011	1000	1755	2495	1218	1044	1609	421	153	74
19	239	334	1279	525	1316	2371	1012	1576	1551	659	411	273
20	271	813	1232	1844	2021	1917	1493	1877	785	762	290	313
21	256	809	894	461	2148	2497	1665	364	615	280	207	260
22	322	898	800	1781	2361	2180	1523	562	1461	679	300	313
23	440	544	1096	1979	2028	2051	1353	1356	487	833	204	148
24	481	716	1050	2011	1441	1050	618	1798	413	286	111	137
25	268	722	1324	1261	1713	1790	1377	163	1217	507	212	225
26	149	706	789	1599	2149	2315	1789	479	610	455	396	239
27	472	1002	1363	1954	1843	1307	1184	1393	637	342	187	227
28	243	904	833	1558	1966	2063	643	1680	706	353	177	126
29	615		1006	2069	1689	832	1640	1260	1233	501	361	127
30	24		1038	1196	1260	859	1118	1121	1268	664	184	166
31	61		1332		1151		1623	1835		215		153
<b>Total</b>	<b>7388</b>	<b>11538</b>	<b>27243</b>	<b>37664</b>	<b>50369</b>	<b>55228</b>	<b>42432</b>	<b>37802</b>	<b>36468</b>	<b>20374</b>	<b>9716</b>	<b>5700</b>
<b>Mean</b>	<b>238.3</b>	<b>412.1</b>	<b>878.8</b>	<b>1255.5</b>	<b>1624.8</b>	<b>1840.9</b>	<b>1368.8</b>	<b>1219.4</b>	<b>1215.6</b>	<b>657.2</b>	<b>323.9</b>	<b>183.9</b>

Table 13 Dublin Airport

Daily Totals of Diffuse Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	45	61	423	484	329	1195	911	553	718	547	196	180
2	40	103	204	595	1060	1009	1069	841	448	511	328	150
3	92	54	400	537	177	889	1003	958	629	191	171	46
4	74	21	264	536	658	1267	1391	681	697	393	232	45
5	104	187	343	676	1241	1194	1089	856	641	538	200	137
6	172	318	368	712	954	723	1224	893	714	432	172	84
7	20	319	342	665	880	1229	1239	726	438	383	162	88
8	122	219	329	201	1013	1413	1183	916	578	321	166	36
9	166	320	419	826	1001	1071	1049	1147	437	452	195	95
10	129	201	616	825	987	712	808	1158	485	328	163	101
11	133	78	439	840	1022	498	898	757	414	255	173	87
12	137	214	194	755	873	1073	813	877	463	312	118	69
13	122	220	319	820	753	1182	838	485	425	448	238	100
14	162	128	500	745	820	827	1271	738	304	319	63	90
15	156	258	433	675	862	537	1068	796	423	203	100	123
16	144	140	433	191	674	1231	901	973	420	272	171	125
17	202	84	379	694	542	1025	1107	777	546	285	155	67
18	187	199	495	862	1119	892	1166	786	245	383	148	56
19	175	298	405	525	967	1324	1001	1012	256	293	183	132
20	229	277	476	681	1284	1378	1244	647	704	273	151	109
21	179	363	663	458	758	996	1204	364	606	278	164	150
22	189	268	626	754	759	1325	1305	561	705	304	182	69
23	142	385	580	604	964	1328	1087	1088	471	248	197	135
24	130	434	639	598	1000	879	618	720	408	216	111	131
25	241	387	530	890	913	1048	1184	163	479	332	142	111
26	141	361	612	823	1099	1319	1249	466	556	360	111	147
27	169	375	610	851	941	986	1020	802	500	314	176	162
28	226	487	548	774	930	1347	634	645	599	284	137	118
29	147		720	770	1318	753	1160	843	274	290	112	114
30	23		514	1067	1072	709	948	756	253	237	148	123
31	60		676		1036		984	660		215		146
Total	4258	6759	14499	20434	28006	31359	32666	23645	14836	10217	4965	3326
Mean	137.4	241.4	467.7	681.1	903.4	1045.3	1053.7	762.7	494.5	329.6	165.5	107.3

Table 14 Malin Head

Daily Totals of Global Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	92	114	793	1332	2414	947	2184	1179	1561	161	418	156
2	98	187	1016	1645	1393	1791	1799	615	517	855	300	51
3	239	34	590	1474	870	2469	976	1254	1834	641	353	94
4	44	47	199	1677	1715	1876	1305	775	731	622	189	59
5	45	441	761	1935	1446	2331	1637	1593	662	508	258	101
6	189	335	767	1484	1534	2442	1302	1449	1638	699	329	158
7	47	442	1000	1549	635	2354	1928	569	1174	934	130	181
8	49	112	243	1203	1807	754	2837	1719	1780	442	317	70
9	77	352	975	1849	1144	1607	908	2270	1461	769	329	139
10	189	353	1049	2112	843	2009	1140	843	1444	902	301	64
11	166	370	161	829	1657	3078	1207	1700	1739	943	360	167
12	133	289	791	1156	963	850	1403	543	1539	986	77	47
13	91	688	519	899	1619	2328	638	565	1558	634	292	142
14	79	219	208	874	1303	1514	860	1413	1453	617	163	248
15	215	487	255	174	2104	2666	963	1380	1384	824	405	173
16	83	186	992	876	2225	938	1080	1638	1386	837	279	122
17	98	171	1201	1901	604	1635	1671	1155	1420	386	255	68
18	131	421	1393	1496	692	1747	2097	2078	1487	350	190	74
19	154	439	1021	428	1312	2446	618	2070	659	545	268	155
20	76	832	876	1817	1340	2914	2146	1208	1214	521	293	113
21	233	653	836	1970	2099	2624	1907	523	218	227	184	179
22	152	912	191	1791	2245	643	1492	541	767	336	90	175
23	100	794	1085	1521	1948	2086	1910	1830	657	692	140	55
24	252	547	846	2204	1121	691	449	2084	1207	241	67	65
25	244	538	868	1872	1807	1188	1543	590	651	357	215	71
26	98	630	791	633	1945	1140	1380	1703	1004	288	262	136
27	272	810	1148	1829	1601	1684	1822	1518	244	148	151	119
28	123	776	1243	1763	2739	1918	882	1844	298	278	156	84
29	297		763	1821	1736	1412	1554	1182	987	460	186	23
30	169		1364	313	649	1994	533	1601	1138	341	178	115
31	42		667		646		1524	734		226		123
Total	4277	12179	24612	42427	46156	54076	43695	40166	33812	16770	7135	3527
Mean	138.0	435.0	793.9	1414.2	1488.9	1802.5	1409.5	1295.7	1127.1	541.0	237.8	113.8

Table 15 Malin Head

Daily Totals of Diffuse Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	92	113	325	427	462	946	1204	884	669	161	243	123
2	77	177	259	529	1074	1162	1089	597	494	587	269	49
3	78	33	476	563	830	1081	949	1078	418	532	235	90
4	44	46	199	480	1083	1428	1153	728	726	453	186	54
5	43	253	398	311	1113	1101	1339	984	653	415	236	74
6	139	241	340	743	1088	1172	1156	983	568	465	241	113
7	47	246	397	702	629	1121	1212	539	644	431	128	128
8	47	111	230	679	960	753	741	861	432	372	199	69
9	70	306	450	592	836	1230	906	726	506	494	205	98
10	137	256	432	371	716	1256	1079	616	782	311	172	63
11	132	281	161	762	1209	469	1128	1118	272	255	229	102
12	121	249	467	927	866	840	1270	537	637	262	72	44
13	82	183	369	747	1203	1166	633	530	356	382	235	107
14	78	202	208	763	1125	1070	738	765	448	382	156	63
15	118	376	252	174	898	960	878	910	532	265	125	121
16	83	180	395	800	824	790	704	729	456	227	144	101
17	94	165	324	659	579	1256	1286	1041	541	323	155	55
18	124	333	299	761	614	1381	1149	795	287	335	148	64
19	113	380	544	428	1003	1088	614	692	598	321	165	115
20	76	193	492	832	913	803	1067	855	484	278	160	102
21	151	445	630	745	810	1164	1041	513	217	219	151	99
22	139	264	187	799	866	586	1256	490	594	281	84	104
23	95	382	522	1119	1218	1459	1069	881	575	155	135	55
24	154	361	595	681	879	643	437	386	559	207	66	64
25	205	467	476	978	807	951	1182	574	506	292	135	71
26	96	393	609	630	1073	1031	951	848	405	254	154	103
27	201	328	495	896	1012	1065	853	777	244	147	124	103
28	118	326	626	804	781	1454	833	572	297	209	147	79
29	185		579	883	1497	1123	1281	884	241	270	151	19
30	145		512	306	647	991	530	798	318	255	151	73
31	40		562		645		917	680		213		82
Total	3324	7290	12810	20091	28260	31540	30645	23371	14459	9753	5001	2587
Mean	107.2	260.4	413.2	669.7	911.6	1051.3	988.5	753.9	482.0	314.6	166.7	83.5

Table 16 Clones

## Daily Totals of Global Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	53	104	860	1253	2527	923	1930	757	2004	218	685	193
2	54	82	1234	1421	894	2123	1859	793	867	747	419	52
3	237	57	411	1477	407	2200	945	1835	1844	985	474	79
4	71	137	212	1666	665	1794	1611	1063	889	935	212	72
5	140	512	866	1566	1425	2468	1263	1365	803	509	327	233
6	181	497	1020	1452	1086	2322	1331	972	1365	531	480	259
7	33	549	960	1265	1821	1465	1653	506	1652	1111	127	157
8	75	276	370	349	1913	1101	2088	1954	1549	226	455	46
9	74	495	858	1725	1169	1878	991	1897	1824	532	218	205
10	283	364	598	1749	874	1303	1076	917	1064	942	414	130
11	197	433	247	1144	1369	2398	1256	1765	1676	827	470	250
12	184	122	392	826	1462	777	1442	993	1469	968	151	56
13	93	683	638	1032	1949	1728	604	528	1543	382	367	258
14	200	383	275	816	1618	1691	1370	1666	1524	661	122	128
15	272	287	231	304	2304	2791	837	1492	1615	934	453	181
16	79	162	1133	604	2450	880	1180	733	1231	486	387	184
17	165	238	1374	2041	739	777	1634	1534	882	719	389	59
18	127	499	1243	1077	1189	2430	1458	1494	1482	437	173	89
19	204	510	1238	371	1240	2222	803	1553	1124	579	275	165
20	88	646	861	1446	1686	2134	1673	1988	519	607	344	182
21	302	561	760	870	1851	2794	1637	349	340	145	189	261
22	211	655	192	1789	2206	1295	1495	353	1022	504	165	254
23	366	837	1172	1384	1989	1626	2051	1297	836	709	223	83
24	435	939	1052	1357	1072	726	469	1873	476	230	66	49
25	235	334	N/A	1755	1987	1831	1137	344	429	383	261	190
26	172	762	611	804	1912	1772	1522	1173	688	279	250	131
27	347	1053	1436	2050	1411	1444	1496	1320	245	134	101	129
28	197	925	966	1960	2117	2036	1013	1645	434	250	78	133
29	670		951	1510	1523	866	1204	975	1122	493	328	58
30	58		835	303	738	899	1438	1087	1311	549	257	122
31	71		1285		732		1604	1321		210		222
Total	5874	13102	N/A	37366	46325	50694	42070	37542	33829	17222	8860	4610
Mean	189.5	467.9	N/A	1245.5	1494.4	1689.8	1357.1	1211.0	1127.6	555.5	295.3	148.7

Note: "N/A" indicates value not available



Table 17 Clones

## Daily Totals of Diffuse Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	53	102	341	579	514	903	1296	596	516	214	216	164
2	54	81	253	535	854	1250	1261	687	584	595	319	52
3	93	55	338	578	401	1005	880	1060	568	564	229	77
4	71	135	209	486	653	1367	1205	983	858	450	210	70
5	123	190	447	600	1201	1254	1124	934	783	415	253	136
6	156	304	439	920	991	1397	1144	687	697	393	279	118
7	31	302	415	712	1144	1357	1358	452	608	380	127	149
8	73	269	343	341	1013	1018	1011	886	671	223	291	44
9	70	356	537	654	975	1340	975	1170	434	483	210	135
10	176	332	596	776	850	1179	1010	844	858	320	247	126
11	154	391	245	848	1002	945	1172	1092	527	399	189	135
12	142	122	301	747	1158	690	1266	906	607	368	149	56
13	84	245	378	875	991	1256	594	517	572	335	263	110
14	150	328	274	663	1301	1254	1128	843	482	471	120	111
15	156	257	229	293	905	849	816	893	N/A	235	139	120
16	79	161	460	590	978	832	833	678	556	406	170	145
17	158	223	411	663	616	764	1241	978	613	360	169	57
18	121	369	399	787	906	1397	1238	769	421	363	159	68
19	157	299	498	369	1131	1512	702	922	727	317	210	136
20	86	365	568	875	1127	1573	1363	785	492	303	179	133
21	204	418	666	797	898	1028	998	347	315	139	144	116
22	185	343	187	627	1060	1169	1181	350	690	301	151	166
23	151	368	657	1023	1057	1296	1191	1019	610	287	186	83
24	173	380	639	1053	926	675	468	687	466	207	64	49
25	227	323	N/A	949	973	1169	1061	328	415	285	188	145
26	168	468	556	786	1243	1380	1150	972	510	251	150	117
27	244	259	641	1053	855	923	1172	806	239	129	101	119
28	187	388	721	877	1026	1054	884	676	420	219	78	125
29	120		642	924	1328	799	990	809	304	249	183	57
30	58		632	290	726	721	944	895	265	288	157	116
31	70		655		684		1000	889		209		165
Total	3974	7833	N/A	21270	29487	33356	32656	24460	N/A	10158	5530	3400
Mean	128.2	279.8	N/A	709.0	951.2	1111.9	1053.4	789.0	N/A	327.7	184.3	109.7

Note: "N/A" indicates value not available

Table 18 Belmullet

Daily Totals of Global Solar Radiation (J/cm )

1986

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	28	114	870	1207	468	851	1287	414	1332	397	556	259
2	205	164	1107	1602	978	947	1930	1053	548	738	107	49
3	229	70	324	1566	368	2304	544	1498	1685	725	410	118
4	170	277	148	1722	1292	1451	1369	1947	629	366	182	31
5	184	609	835	1463	1138	1354	1347	813	901	701	265	249
6	123	592	800	1335	1699	705	1440	866	1625	320	180	114
7	70	643	909	1660	1564	1856	1200	1711	899	946	100	143
8	294	580	712	767	2188	513	2363	2113	1162	435	369	134
9	70	305	995	1703	1001	1947	610	2092	1747	859	309	237
10	248	297	428	1919	1146	1730	1226	2115	1255	859	417	50
11	150	240	249	798	1656	2501	983	1890	1513	753	414	159
12	103	164	389	1085	949	1213	1881	1555	1680	762	62	34
13	153	619	986	1129	2284	1469	521	1916	1613	715	238	185
14	212	660	224	1247	1726	1861	639	426	1472	837	335	177
15	312	224	748	354	2396	2383	571	1990	1491	889	242	145
16	126	241	924	1492	2181	1425	1599	519	1145	817	227	120
17	110	175	899	1752	936	2033	1649	1732	1266	89	320	69
18	121	754	1282	1644	1395	1773	1349	1342	1432	508	111	94
19	282	275	691	554	1562	1305	510	1633	405	595	239	177
20	100	804	895	1666	2260	1412	1653	1816	998	626	140	137
21	280	734	566	570	2114	2368	1944	170	370	228	93	262
22	245	909	162	1777	2352	1775	1458	628	924	391	116	220
23	325	757	876	1722	2123	1772	1208	920	840	678	196	88
24	403	912	1141	1952	1001	661	548	1052	1039	208	100	83
25	153	487	1008	2042	1368	1938	1277	261	540	532	327	145
26	119	849	423	838	1533	2036	1165	1704	1164	293	267	138
27	280	1038	1167	1503	1928	1164	1847	1697	473	162	171	88
28	241	810	926	1825	2300	2416	430	1667	320	337	165	93
29	309		1056	1277	1682	488	1649	1328	1148	334	171	62
30	127		839	367	489	399	1175	1309	417	541	159	134
31	102		1477		697		2058	760		102		167
Total	5874	14303	24056	40538	46774	46050	39430	40947	32033	16743	6988	4161
Mean	189.5	510.8	776.0	1351.3	1508.8	1535.0	1271.9	1320.9	1067.8	540.1	232.9	134.2

# **APPENDIX**

## **Daily Totals of Net Radiation Balance**

**at Kilkenny**

**1982 -1985**

Kilkenny

Daily Totals of Radiation Balance (J/cm )

1982

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	-119	-7	48	-21	1064	1336	754	385	352	67	81	-137
2	49	21	-93	517	304	740	797	873	787	239	-45	-97
3	-30	-59	148	53	554	698	885	991	352	180	22	-201
4	-240	1	2	389	836	681	1112	224	477	522	2	-121
5	30	-79	101	512	1103	829	649	427	514	168	-17	-193
6	-251	-152	51	432	851	621	696	456	513	8	5	-83
7	-149	-144	232	364	419	1045	739	1055	358	368	87	-122
8	-47	-63	302	742	862	951	844	868	346	116	-38	-151
9	-187	-40	104	486	853	992	468	716	763	84	61	-179
10	-325	105	205	525	602	152	378	917	134	232	-218	-128
11	-406	-20	430	393	1100	1301	646	691	705	161	26	-122
12	-220	-135	330	647	321	1175	714	799	690	55	-98	-197
13	-220	-49	368	922	838	931	388	1015	694	90	-121	-295
14	-19	-52	90	293	201	689	605	659	568	138	-155	28
15	83	-99	249	675	476	656	1045	646	381	192	-103	-86
16	-82	40	297	424	971	948	775	845	535	-32	13	-187
17	-23	-76	210	645	783	784	376	368	314	24	-67	-298
18	-8	3	230	689	988	1246	815	814	118	132	-7	-122
19	-13	97	367	833	379	966	1348	811	93	176	-237	-114
20	-111	31	266	468	744	839	1252	590	473	28	-89	-175
21	-230	6	625	501	243	759	1197	558	617	134	-208	-366
22	-138	92	290	469	1147	371	1273	777	240	222	-176	-283
23	14	2	523	844	1137	491	1327	652	548	220	-94	-44
24	64	27	534	907	665	399	603	393	154	258	-167	-5
25	49	210	504	697	748	611	687	723	251	237	-96	21
26	-120	254	464	941	812	995	954	621	406	122	-130	-95
27	-153	118	432	957	1091	616	1040	644	147	127	-103	-306
28	23	297	37	680	981	1266	1054	868	282	84	-165	-63
29	20		506	271	1469	1296	843	680	442	19	-119	5
30	30		615	372	1399	247	983	787	99	25	-94	-22
31	55		536		961		827	375		49		-49
Total	-2674	329	9003	16627	24902	24631	26074	21228	12353	4445	-2250	-4187
Mean	-86.3	11.8	290.4	554.2	803.3	821.0	841.1	684.8	411.8	143.4	-75.0	-135.1

Kilkenny

## Daily Totals of Radiation Balance (J/cm )

2

1983

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	-136	-46	205	568	153	26	576	887	858	375	124	-14
2	-95	5	158	302	405	615	1368	883	485	90	112	-94
3	-147	-103	115	172	984	527	1499	1247	695	222	210	-93
4	-123	-123	276	480	965	1011	1469	807	639	353	29	-165
5	-42	44	129	298	219	816	1185	696	820	385	176	-84
6	-157	-85	338	592	340	1269	1515	508	762	311	22	-152
7	-199	-152	267	575	1004	258	1372	1122	343	382	18	2
8	-135	-79	245	680	736	657	1237	1116	430	116	-27	-11
9	-122	1	235	640	987	942	967	1137	275	163	-37	-97
10	16	-73	215	6	644	727	478	1038	697	354	-30	-208
11	38	-93	118	641	593	1133	1046	557	423	251	109	-99
12	-31	-36	45	628	750	1158	1199	1168	358	201	118	-230
13	-112	3	336	248	1023	461	1201	1159	451	91	-28	-3
14	24	-92	431	575	660	1056	1309	1188	109	179	-281	-64
15	-82	10	368	982	1023	978	1235	540	633	273	-187	-17
16	16	-61	222	203	258	411	915	283	425	182	-116	-57
17	4	-30	313	733	719	1002	N/A	951	569	-2	54	13
18	-294	28	167	585	789	1458	N/A	517	555	79	-28	-99
19	-242	-44	332	738	610	1323	264	938	441	114	9	-54
20	15	-2	348	643	647	1069	431	166	161	15	-85	-88
21	-106	119	504	454	557	1099	827	462	641	102	-130	-138
22	-154	35	508	472	651	511	798	356	192	108	-54	-18
23	18	-66	416	665	466	990	959	426	546	107	-1	-80
24	-76	181	562	356	694	436	966	518	324	183	5	-71
25	-138	54	477	432	922	1308	662	342	468	284	18	-188
26	-63	120	296	327	1355	1245	529	462	541	116	-46	-108
27	23	104	336	811	1340	800	751	478	255	81	-143	-72
28	-26	272	563	625	424	986	738	689	274	74	-130	32
29	-82		272	159	287	799	1517	615	208	197	-29	-41
30	-89		517	629	629	999	983	963	56	46	92	-190
31	-23		538		1426		537	755		157		-25
Total	-2520	-109	9852	15219	22260	26070	N/A	22974	13634	5589	-256	-2513
Mean	-81.3	-3.9	317.8	507.3	718.1	869.0	N/A	741.1	454.5	180.3	-8.5	-81.1

Notes : "N/A" indicates value not available

Kilkenny

Daily Totals of Radiation Balance (J/cm )

1984

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	-169	31	235	672	969	1080	1132	615	662	517	6	-145
2	-215	-73	229	574	854	972	1028	808	263	233	-9	-74
3	-87	177	272	227	871	993	1070	846	325	485	78	8
4	-149	40	287	130	638	1383	1527	756	497	218	-66	5
5	5	14	256	218	770	206	1445	1136	372	348	-3	-78
6	20	-24	159	716	663	160	1344	1063	429	509	-43	-104
7	-301	94	260	405	1093	1167	1291	694	511	263	3	-110
8	-355	-27	215	670	1166	1539	1067	564	281	329	-14	-149
9	41	602	45	1073	930	1065	504	533	748	230	52	-75
10	34	180	250	772	474	1270	564	1071	549	399	94	-40
11	-37	205	364	700	717	397	992	1035	609	219	-56	-57
12	17	16	281	539	1235	1113	917	623	648	123	-51	-141
13	-115	46	230	471	1236	859	605	813	316	287	37	21
14	-166	53	76	361	1113	638	1109	667	526	201	-44	-37
15	-167	-42	77	821	1219	728	1195	685	720	345	-14	-59
16	-87	-94	79	622	1015	974	476	862	317	128	-142	-66
17	-284	262	116	160	960	988	706	775	554	288	11	-268
18	-272	32	28	302	1156	1087	814	649	241	239	-47	-61
19	-247	20	188	327	879	853	1096	950	288	236	-80	-23
20	-164	-80	335	513	1028	783	977	753	589	107	-110	-135
21	-188	75	149	788	1045	922	1252	442	512	60	-102	-128
22	-34	53	607	1157	422	695	1269	655	503	129	-142	3
23	47	-21	174	977	575	659	1065	946	348	171	-146	8
24	-70	52	471	1093	463	1370	1245	288	306	8	-221	-229
25	-127	94	163	1012	551	1353	843	612	353	87	-216	-148
26	43	73	475	1061	913	1062	1182	535	406	7	-82	-147
27	105	113	576	1070	1099	1174	989	775	376	176	-150	-17
28	-113	380	643	982	1321	1441	1246	663	554	-28	-184	11
29	-148	173	691	1017	1121	1065	1027	930	557	-10	-40	47
30	-62		794	768	1044	1377	491	735	375	-145	-55	-4
31	-61		197		219		928	612		166		-20
<b>Total</b>	<b>-3306</b>	<b>2424</b>	<b>8922</b>	<b>20198</b>	<b>27759</b>	<b>29373</b>	<b>31396</b>	<b>23091</b>	<b>13735</b>	<b>6325</b>	<b>-1736</b>	<b>-2212</b>
<b>Mean</b>	<b>-106.6</b>	<b>83.6</b>	<b>287.8</b>	<b>673.3</b>	<b>895.5</b>	<b>979.1</b>	<b>1012.8</b>	<b>744.9</b>	<b>457.8</b>	<b>204.0</b>	<b>-57.9</b>	<b>-71.4</b>

Kilkenny

Daily Totals of Radiation Balance (J/cm )

1985

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Day 1	-286	42	132	233	517	1416	1344	559	495	144	59	-181
2	-121	90	110	250	1152	1430	1244	945	553	257	111	-93
3	-181	83	110	608	894	1247	938	995	635	338	94	-219
4	-252	-35	240	195	282	1044	1105	491	301	201	78	-140
5	-16	-120	267	739	286	135	1376	734	1028	176	-67	-104
6	-205	97	112	790	837	373	1407	787	699	168	105	-173
7	-214	34	356	204	1178	1201	1317	783	688	116	107	-202
8		51	283	591	866	511	1016	266	523	-39	38	-119
9	-82	28	453	526	913	869	638	954	521	194	-96	31
10	-150	90	386	686	840	799	632	821	915	233	-116	-80
11	-152	97	373	768	555	388	473	358	711	292	3	-94
12	-95	-27	525	329	1127	1082	823	859	131	419	-75	11
13	-112	15	285	701	647	660	392	858	765	170	15	9
14	-155	-3	400	957	934	1253	1285	606	379	267	-67	-82
15	-146	-98	280	718	491	967	455	221	495	227	-38	-58
16	-121	-127	320	963	1089	1217	845	608	370	174	-45	-37
17	-74	114	323	642	1145	324	441	512	656	37	-16	10
18	-36	122	186	977	700	989	1015	409	191	88	-56	-179
19	-2	109	86	660	397	915	1154	850	408	20	-99	-136
20	8	101	100	847	374	693	1366	736	263	8	-36	-101
21	8	189	145	235	181	446	624	363	222	213	-46	-74
22	-250	156	156	927	739	382	952	564	370	-17	-100	-261
23	-163	107	361	745	440	820	889	117	576	110	-36	-165
24	-95	83	405	967	911	1135	1035	783	505	-40	-109	-45
25	-59	61	526	494	364	1028	806	667	296	51	-78	-36
26	-27	264	443	732	486	668	665	588	294	73	-197	-65
27	24	70	306	761	889	710	1082	413	355	168	-196	-342
28	5	43	316	339	975	369	276	551	423	61	-6	-267
29	-30		327	657	1068	1177	545	220	159	63	-9	-116
30	-22		379	874	1355	847	423	775	274	30	29	8
31	-36		467		1397		552	779		-27		-107
Total	-3037	1636	9158	19115	24029	25095	27115	19172	14201	4175	-849	-3406
Mean	-98.0	58.4	295.4	637.2	775.1	836.5	874.7	618.5	473.4	134.7	-28.3	-109.9