I. SUNSPOTS

Sunspot Relative-Numbers and Sunspot Areas

Cooperating Observatories for Sunspot Relative-Numbers :

Altamira(Venezuela);Americana(Brasil); Ankara(Turkey);Athens Nat. Obs.(Greece); Attikis Nat. Obs.(Greece); Auckland (New-Zealand); Berlin (West-Germ.); Beyazit (Turkey); Bodenteich (West-Germ.); Boom (Belgium); Boulder (U.S.A.); Bruxelles-Uccle (Belgium); Bucharest (Rumania); Buenos-Aires (Argentina); Campinas (Cap. Obs. Brasil); Caracas (two stat.) (Venezuela); Carapachay (Argentina); Catania (Italy); Cochabamba (two stat.)(Bolivia); Culgoora (Australia); Dinant (Belgium); Dover (U.K.); Godella (Spain); Grimbergen (Belgium); Holloman (U.S.A.); Hembunde (West-Germ.); Huancayo (Peru); Helwan (Egypt); Invercargill (New-Zealand); Inzernhagen(West-Germ.); Jeddah (Saudi Arabia); Kandilli (Turkey); Kanzelhöhe (Austria); Kavlinge (Sweden); Kawaguchi-Saitama (Japan) Kayeme (Venezuela); Kiev (U.R.S.S.); Kislovodsk (U.R.S.S.); Langemark (Belgium); Learmonth (Australia); Locarno (Switzerland); Lunping (Taiwan); Agr.Madrid (Spain); Manila (Philippines); Mosta (Malta); Museros (Spain);Naxxar (Malta); Nijmegen (Netherland); Mie-Ken (Japan); New-York (U.S.A.); Oostende (Belgium); Postdam (East-Germ.); Palea Penteli (Greece); Palehua(Hawai); Prades (France); Puerto-montt (Chile); Pulligny (France); Pyong Yang (North Korea); Quezon-City (Philippines); Ramey (Puerto-Rico); Roma (Italy); Ronse-Renaix (Belgium); Roquetas-Tortosa (Spain); Rotenburg (two stat.)(West- Germ.); San Jose (Argentina); San Miguel (Argentina); Santiago (Chile); Skalnate-Pleso (Czechoslovakia); Sonneberg (East-Germ.); Staden O.N.K. (Belgium); Suwa City (Japan); Taipei Obs. (Taiwan); Taipei Weather Bureau (Taiwan); Tangjungsari (Indonesia); Tashkent (U.R.S.S.); Tokyo-Mitaka (Japan); Tokyo Nat.Science Museum (Japan); Trieste(Italy); Urawa-Saitama (Japan); Valencia(two stat.)(Spain); Vivy(Belgium).

The first column gives the definitive international Sunspot-Numbers for the disk of the sun (R_I) established by the Sunspot Index Data Center-Brussels on the basis of the observations of Locarno station as reference , the second that for the central zone (R_{Ic}) on the basis of the observations of Athens (Nat.Obs.) Bruxelles-Uccle;Grimbergen;Inzernhagen;Kawaguchi-Saitama;Kiev; KisIovodsk; Mie-Ken;Nijmegen; Palea Penteli; Roquetas-Tortosa; Skalnate-Pleso;Suwa-City;Taipei Obs.; Tashkent; Tokyo-Sc. Mus.; Urawa-Saitama.

The diameter of the central zone is half that of sun's projected disk.

The Sunspot-Areas A_C are determined at Catania, A_R at Roma and A_I are evalued by the Sunspot Index Data Center-Brussels on the observations of Athens(Nat. Obs.);Lunping;Helwan;Jeddah;Manila; Palea Penteli;Taipei Obs. and Taipei Weather Bureau rattached to Catania values by a monthly scaling factor.
The apparent total area of the umbra plus penumbra is uncorrected for foreshortening and expressed in millionths of the solar disk.

JANUARY 1987

1987 JAN.	R_I	R_{Ic}	A_C	A_R	A_I
1	19	21	206	−	214
2	15	16	148	−	175
3	13	15	90	−	127
4	12	18	63	−	84
5	11	0	31	−	37
6	10	0	31	−	54
7	11	0	15	0	9
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	−	−	0
11	0	0	0	−	0
12	0	0	0	−	0
13	0	0	0	−	0
14	8	0	0	−	0
15	9	0	21	−	10
16	0	0	−	−	0
17	13	0	10	−	1
18	13	0	42	−	7
19	9	0	21	0	3
20	9	0	5	−	1
21	14	14	63	−	39
22	20	24	127	229	229
23	23	21	89	−	155
24	14	0	53	−	73
25	13	0	26	−	9
26	14	0	42	−	20
27	13	0	42	−	26
28	20	0	105	−	58
29	15	0	26	−	23
30	14	11	0	−	0
31	11	10	−	0	0
MEAN	10.4	4.8	45	38	44

FEBRUARY 1987

1987 FEB.	R_I	R_{Ic}	A_C	A_R	A_I
1	0	0	−	−	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	−	0
5	0	0	−	−	0
6	0	0	−	0	0
7	0	0	0	0	0
8	0	0	0	−	0
9	0	0	0	0	0
10	7	0	15	−	9
11	0	0	0	−	0
12	0	0	0	−	1
13	0	0	−	−	0
14	8	0	−	−	5
15	7	0	15	−	8
16	0	0	0	−	0
17	0	0	0	−	0
18	0	0	0	−	0
19	0	0	−	−	0
20	0	0	0	−	0
21	7	0	0	0	0
22	7	0	0	−	0
23	0	0	−	0	0
24	0	0	0	0	0
25	7	0	41	−	46
26	9	0	36	−	27
27	8	0	−	−	33
28	8	0	−	−	54
MEAN	2.4	0	6	0	7

MARCH 1987

1987 MAR.	R_I	R_{Ic}	A_C	A_R	A_I
1	13	12	42	–	71
2	23	16	84	–	92
3	15	0	31	–	71
4	16	0	52	44	66
5	24	16	42	38	48
6	23	30	–	–	137
7	24	26	137	121	183
8	22	0	233	–	230
9	14	0	212	216	303
10	11	0	127	–	159
11	9	0	0	0	77
12	0	0	0	0	0
13	0	0	0	–	0
14	10	0	–	–	0
15	11	0	21	–	47
16	11	0	21	–	48
17	22	14	21	29	69
18	21	14	31	–	58
19	12	10	206	–	58
20	12	0	0	–	4
21	15	15	–	–	54
22	17	0	–	–	119
23	19	0	–	–	105
24	19	0	–	–	154
25	16	0	–	–	104
26	12	0	0	0	178
27	11	0	0	0	189
28	12	0	–	–	248
29	13	0	–	–	250
30	15	14	–	–	298
31	15	14	424	–	311
MEAN	14.7	5.8	123	50	120

APRIL 1987

1987 APR.	R_I	R_{Ic}	A_C	A_R	A_I
1	14	14	318	445	328
2	12	10	424	414	324
3	10	0	318	–	347
4	13	0	153	280	238
5	28	0	212	–	262
6	47	0	412	700	432
7	56	25	1122	1273	1243
8	64	34	1212	–	1345
9	69	24	1765	1702	1505
10	77	23	1653	–	1772
11	80	45	1579	–	1344
12	80	52	1710	–	1724
13	79	57	1555	–	1378
14	77	54	–	1632	1628
15	78	23	1169	1350	1156
16	60	24	1037	–	949
17	41	0	762	274	784
18	36	0	836	–	820
19	29	0	300	–	736
20	12	0	0	–	4
21	19	11	42	–	41
22	26	13	–	–	93
23	25	13	57	–	76
24	35	10	151	–	158
25	25	8	153	–	190
26	21	10	52	–	146
27	11	11	21	51	131
28	14	11	21	86	50
29	20	21	36	41	56
30	30	16	94	44	120
MEAN	39.6	17.0	613	638	646

MAY 1987

1987 MAY	R_I	R_{IC}	A_C	A_R	A_I
1	39	0	168	−	195
2	40	0	137	−	205
3	27	0	131	−	113
4	23	8	142	−	152
5	24	10	233	−	440
6	27	10	275	−	526
7	34	12	445	−	366
8	25	10	333	477	369
9	23	14	318	−	352
10	25	15	317	−	285
11	26	20	317	356	352
12	23	11	259	375	274
13	22	15	211	−	237
14	13	0	180	280	187
15	39	0	−	−	601
16	50	0	868	202	748
17	68	0	1095	−	1196
18	54	0	1092	546	895
19	65	17	878	541	796
20	46	13	980	−	832
21	41	31	1378	−	847
22	38	16	1378	−	982
23	40	0	1282	1400	1024
24	38	0	−	−	777
25	37	0	996	923	945
26	37	10	492	−	729
27	35	15	550	175	540
28	21	20	169	226	254
29	17	16	127	−	111
30	15	12	127	−	99
31	12	0	79	−	78
MEAN	33.0	8.9	516	500	500

JUNE 1987

1987 JUN.	R_I	R_{IC}	A_C	A_R	A_I
1	15	0	42	−	77
2	11	0	5	−	41
3	0	0	0	0	0
4	0	0	0	0	0
5	10	0	0	0	0
6	0	0	0	0	0
7	0	0	0	−	0
8	0	0	0	0	0
9	0	0	0	−	0
10	0	0	0	0	0
11	80	45	1579	−	0
12	80	52	1710	−	31
13	79	57	1555	−	12
14	77	54	−	1632	11
15	78	23	1169	1350	11
16	60	24	1037	−	2
17	41	0	762	274	32
18	36	0	836	−	125
19	29	0	300	−	138
20	12	0	0	−	157
21	29	9	210	−	201
22	38	20	508	697	391
23	37	23	561	636	460
24	38	26	620	700	500
25	38	21	423	608	400
26	41	12	386	350	350
27	33	0	306	286	275
28	41	0	354	−	262
29	25	0	153	−	178
30	14	0	42	0	70
MEAN	17.4	5.5	134	184	124

JULY 1987

1987 JUL.	R_I	R_{IC}	A_C	A_R	A_I
1	13	0	−	−	15
2	0	0	−	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	−	0
6	0	0	0	0	0
7	9	0	0	−	2
8	12	0	31	0	38
9	13	0	42	−	54
10	11	0	−	0	20
11	0	0	0	0	0
12	0	0	0	−	0
13	0	0	0	0	0
14	0	0	0	0	0
15	13	0	0	0	0
16	17	0	63	0	11
17	14	0	74	−	151
18	17	0	137	153	158
19	23	0	222	−	183
20	38	17	211	287	266
21	67	18	464	1014	671
22	87	17	516	1097	723
23	102	31	755	1114	1036
24	92	30	1159	1356	1174
25	88	21	1354	−	1173
26	85	31	1212	−	1173
27	77	35	655	614	945
28	60	31	503	365	437
29	60	29	279	267	305
30	62	38	258	−	327
31	63	47	314	303	302
MEAN	33.0	11.1	295	313	296

AUGUST 1987

1987 AUG.	R_I	R_{IC}	A_C	A_R	A_I
1	45	32	359	461	367
2	47	25	497	−	417
3	39	25	433	388	362
4	33	24	275	426	330
5	31	26	190	165	248
6	32	22	201	204	214
7	38	42	296	541	410
8	45	0	77	757	594
9	39	0	551	−	542
10	47	0	858	−	791
11	56	0	746	302	0
12	48	11	591	−	0
13	47	0	857	366	0
14	49	0	1001	719	0
15	49	14	1081	−	0
16	55	15	1153	−	11
17	46	0	1165	1348	151
18	43	20	1112	−	158
19	45	23	1017	697	183
20	51	24	878	−	266
21	48	13	836	−	742
22	34	0	635	−	631
23	39	0	640	−	544
24	35	0	201	92	315
25	35	16	180	−	180
26	34	18	381	29	321
27	24	15	148	−	258
28	23	15	47	−	48
29	13	18	21	−	19
30	10	0	21	−	13
31	20	17	47	−	61
MEAN	38.7	13.4	532	464	526

SEPTEMBER 1987

1987 SEP.	R_I	R_{IC}	A_C	A_R	A_I
1	33	11	110	−	162
2	38	13	248	47	248
3	37	0	317	283	358
4	38	11	301	−	340
5	39	44	424	544	434
6	44	27	465	−	421
7	56	46	731	750	672
8	67	48	1123	1159	960
9	64	47	841	719	767
10	56	12	545	461	597
11	58	20	381	9	477
12	44	0	284	111	346
13	25	0	211	−	221
14	20	17	180	124	211
15	21	15	84	153	142
16	24	15	94	121	126
17	25	17	116	115	182
18	30	17	137	111	221
19	35	12	189	143	216
20	38	25	221	−	200
21	32	12	237	359	277
22	23	12	237	−	212
23	26	12	280	286	248
24	25	12	158	185	241
25	12	13	63	51	96
26	12	0	26	38	36
27	19	0	47	−	51
28	22	0	42	−	65
29	26	0	78	−	132
30	26	0	−	−	244
MEAN	33.9	15.3	282	288	297

OCTOBER 1987

1987 OCT.	R_I	R_{IC}	A_C	A_R	A_I
1	34	0	−	−	231
2	25	0	311	−	245
3	31	13	−	541	277
4	58	37	449	−	422
5	54	35	583	−	469
6	48	29	−	−	412
7	39	25	−	−	325
8	55	26	236	−	221
9	50	12	156	−	258
10	51	9	327	−	553
11	63	18	883	−	820
12	53	0	836	856	754
13	74	35	836	922	824
14	92	46	1038	1715	1114
15	101	48	1764	2149	1352
16	101	40	1229	−	1231
17	91	40	1017	1330	1115
18	86	27	847	−	912
19	82	0	698	318	702
20	79	11	273	−	464
21	61	11	163	143	252
22	50	0	169	−	210
23	33	0	116	−	91
24	22	0	21	0	28
25	29	0	137	−	263
26	40	0	390	430	432
27	70	22	567	−	558
28	79	24	910	1065	729
29	82	30	795	−	918
30	85	52	985	303	726
31	62	38	476	−	583
MEAN	60.6	20.3	600	814	564

NOVEMBER 1987

1987 NOV.	R_I	R_{IC}	A_C	A_R	A_I
1	56	29	460	−	413
2	57	13	146	−	417
3	57	0	432	459	379
4	46	0	−	604	441
5	47	0	316	194	322
6	27	0	190	216	145
7	31	21	221	207	175
8	43	34	1352	−	206
9	42	25	211	−	145
10	30	10	−	−	55
11	28	0	78	−	79
12	25	0	233	−	373
13	18	0	487	−	570
14	23	0	763	−	606
15	22	6	−	−	679
16	33	15	826	823	738
17	46	32	1144	−	891
18	48	48	857	1187	838
19	51	28	1091	954	794
20	49	51	−	−	734
21	51	26	847	1590	934
22	70	43	1085	−	862
23	83	56	920	−	937
24	56	41	740	−	700
25	42	14	470	−	567
26	47	14	369	−	418
27	21	28	131	−	147
28	11	0	63	−	23
29	20	0	36	−	18
30	16	15	10	−	13
MEAN	33.9	18.3	480	2693	454

DECEMBER 1987

1987 DEC.	R_I	R_{IC}	A_C	A_R	A_I
1	45	16	53	−	57
2	16	0	42	67	67
3	16	0	−	0	13
4	15	0	−	−	26
5	19	17	−	−	54
6	24	25	159	−	146
7	34	36	158	−	194
8	36	22	195	−	169
9	41	0	242	−	272
10	34	0	105	114	168
11	22	0	74	−	57
12	13	0	0	0	0
13	20	0	84	−	127
14	26	0	200	−	180
15	42	14	263	286	281
16	40	18	438	−	293
17	39	16	381	366	358
18	39	0	412	−	328
19	28	0	359	−	263
20	26	0	307	−	301
21	14	0	275	−	190
22	24	0	328	248	213
23	17	0	211	194	163
24	13	0	84	−	128
25	25	13	190	−	222
26	27	13	391	−	433
27	29	0	615	−	619
28	28	0	699	923	745
29	30	0	784	−	662
30	42	0	783	−	656
31	43	20	−	−	587
MEAN	27.1	6.8	290	244	257