

23. Jan. 1948

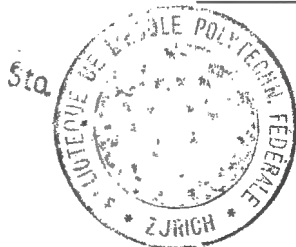
No. 77.

International Astronomical Union

January/March 1947.

# QUARTERLY BULLETIN ON SOLAR ACTIVITY

Published by the Eidgen. Sternwarte in Zürich



## I. SUNSPOTS

### 1. Sunspot Relative-Numbers.

Co-operating Observatories: Arcetri-Firenze, Arosa, Catania, Granada, Greenwich, Istanbul, Locarno, Madrid, Potsdam, Roma-Monte Mario, South Hadley, Skalnaté Pleso, Uccle, Valencia, Wellington, Zurich.

1947	January	February	March
1	76	64	103
2	62	90	134
3	54	85	110
4	53	94	163
5	47	115	175
6	56	110	198
7	87	120	207
8	94	130	210
9	91	153	212
10	102	162	195
11	119	213	206
12	121	206	164
13	115	192	150
14	150	199	115
15	187	166	96
16	174	157	76
17	191	154	59
18	199	130	46
19	192	110	34
20	183	125	47
21	161	100	83
22	155	92	91
23	157	93	121
24	150	96	115
25	135	129	113
26	111	158	111
27	85	156	130
28	72	135	130
29	56		138
30	67		141
31	84		151
Mean	115.7	133.4	129.8

## 2. Evolution-tables of sunspot-groups.

The relative sunspot-numbers, which till now have alone been given in this bulletin, convey merely an integrated picture of sunspot-activity. It has been increasingly felt of late, that in the study of solar-terrestrial relationships the position of the different groups of sunspots should likewise be taken into consideration. We shall therefore in future give "evolution-tables", similar to the more detailed ones published in the "Publications of the Federal Observatory". These tables, which are described below, permit to determine, for every day, the distribution of the separate sunspot-groups over the disc of the sun as well as their approximate dimensions. The first column contains the number of the rotation period (in Carrington's notation) and further the number of each group within this rotation period, in the order of decreasing heliographic longitudes. The two next columns give the heliographic latitudes  $\varphi$  and the longitude  $L$  of the centre of the group, the fourth — the time of transit through the central meridian and lastly, the fifth and sixth columns — the dates on which the group was seen for the first and for the last time. The following 14 columns correspond to the 14 segments formed by solar meridians in intervals of  $13^\circ$ , into which the visible solar hemisphere can be subdivided. (The two segments nearest to the limb have a breadth of only  $12^\circ$ .) As a conse-

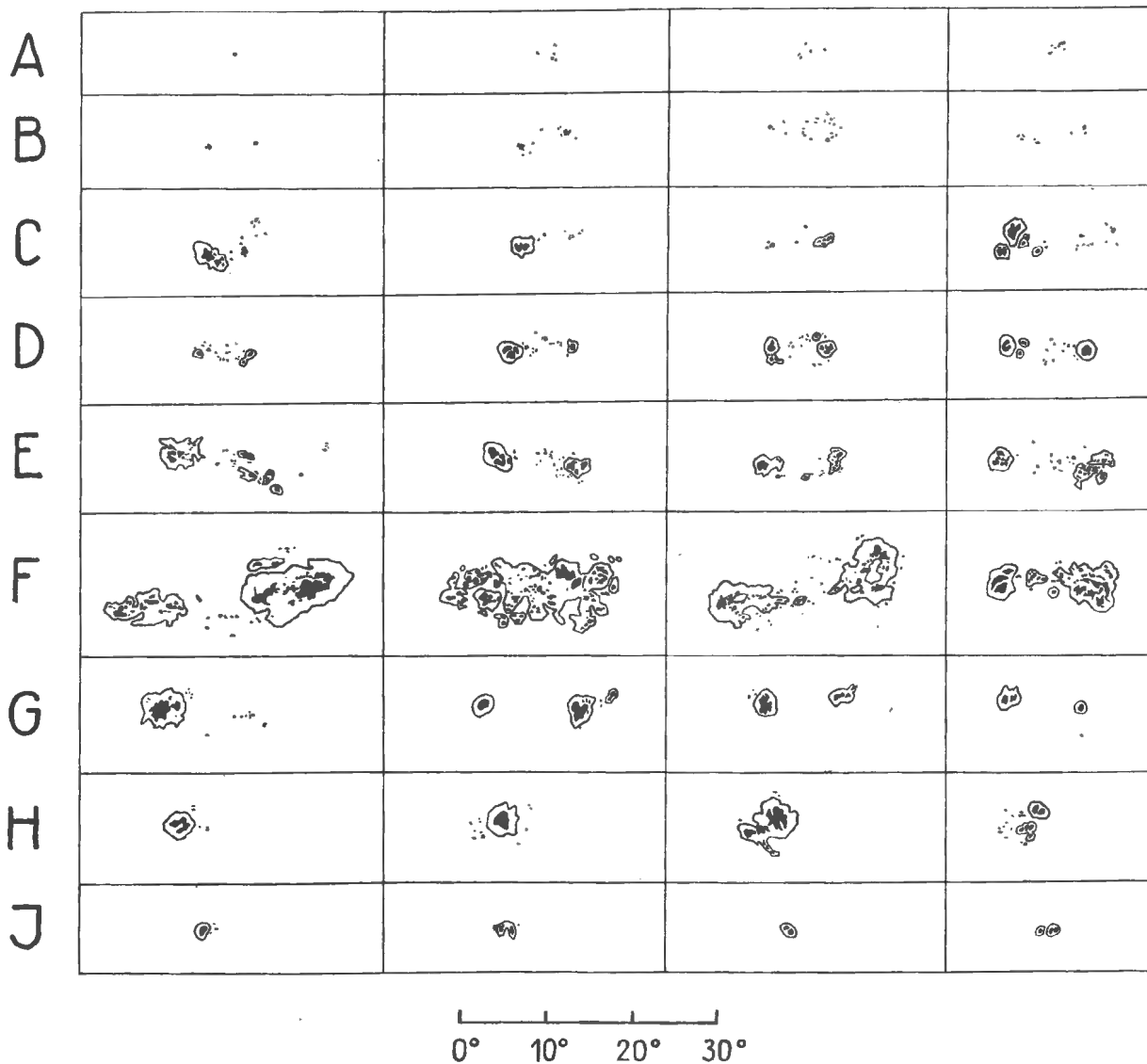


Fig. 1. Classification of sunspot-groups.

quence of the solar rotation, each sunspot suffers a daily displacement corresponding to the width of one such segment. The first figure in each column gives the classification of the group (A, B, . . . J), the second its distance from the centre in percent of the solar radius (for 12<sup>h</sup> world-time). This, together with the heliographic latitude and the distance from the central meridian, determines the position of the group with sufficient accuracy. An arrow indicates a shift from one segment to another. Such shifts occur either as a consequence of proper motions of the spots, or through a displacement of the centre of gravity of a group, produced by the disappearance of sunspots or the formation of new ones. For the same reasons it sometimes happens that one and the same group occurs in the same segment on two succeeding days.

The classification of sunspot-groups follows the principles layed down by M. Waldmeier in *ZS. f. Astrophysik*, **16**, 286, 1938. This system has since been used in the Publications of the Federal Observatory. 4 samples for each of the 9 classes in use are given in Fig. 1. It is seen that the separate classes represent the normal stages of the evolution of a large sunspot-group. The characteristics of the separate classes are as follows:

- A: an isolated spot or group of spots without penumbra or bipolar structure;
- B: group of sunspots in bipolar configuration, penumbra lacking;
- C: bipolar spot-group, only one of the principal spots (the P- or F-spot) being surrounded by a penumbra;
- D: bipolar spot-group, both spots showing penumbras; at least one of the spots should possess a simple structure. Length usually  $< 10^\circ$ ;
- E: Large bipolar sunspot-group, both principal spots having penumbras, usually of complicated structure. Intermediate region occupied by small sunspots. Total length of the group at least  $10^\circ$ ;
- F: very large bipolar or complex sunspot-group, length at least  $15^\circ$ ;
- G: Large bipolar group without intermediate spots. Length at least  $10^\circ$ ;
- H: unipolar sunspot surrounded by a penumbra. Diameter  $> 2^{\circ},5$ ;
- J: unipolar sunspot surrounded by a penumbra. Diameter  $< 2^{\circ},5$ .

From these data, conjointly with the date of transit through the central meridian, the position of every group on the sun's disc and its approximate size and structure can be determined for any given day. In the zones bordering on the limb, for which  $|\vartheta| = 78^\circ - 90^\circ$ , the classification is rendered impracticable by the very strong perspective foreshortening.

Cooperating Observatories: Zürich, Locarno, Istanbul, Kanzelhöhe, Potsdam, Skalnaté Pleso, Tsinan, Uccle

No	$\varphi$	L	cent. mer. passage	first seen	last seen	E-side							W-side						
						90°	78°	65°	52°	39°	26°	13°	0°	13°	26°	39°	52°	65°	78°
						—	—	52°	39°	26°	13°	0°	13°	26°	39°	52°	65°	78°	90°
1248/5	-17°	326°	XII. 27. 8	XII. 23.	I. 2.			D85	D74	D54	D42	D26	D27	C44	C61	C76	B92	A97	
8	+16	323	XII. 28. 0	XII. 22.	I. 2.		G96	G90	G78	G61	G46	G32	G31	G43	H60	H75	H89	H97	
9	+26	310	XII. 29. 0	I. 1.	I. 2.											A81	A90		
12	-18	299	XII. 29. 8	XII. 24.	I. 1.		97	D89	D80	D59	C47	C29	C28	C40	B58				
13	+15	288	XII. 30. 6	I. 3.	I. 4.											C80	A88		
14	-25	279	XII. 31. 3	I. 3.	I. 4.											C71	C85		
15	-19	268	I. 1. 2	XII. 31.	I. 1.							B33	B29						
16	-12	263	I. 1. 5	I. 5.	I. 7.											A77	A97		
17	-24	263	I. 1. 5	I. 5.	I. 5.											A79			
18	+16	261	I. 1. 7	XII. 26.	I. 7.	99	H92	H86	H73	H59	H44	H32	H37	H50	J65	J77	J90	J98	
19	+33	246	I. 2. 8	XII. 27.	I. 8.	97	D94	D91	D82	D75	D62	D60	C60	C66	C75	C86	C95	98	
20	+12	222	I. 4. 7	I. 8.	I. 8.											A77			
21	+27	219	I. 4. 9	I. 4.	I. 4.							A51							
22	+25	181	I. 7. 8	I. 3.	I. 2.			A97											
23	-23	175	I. 8. 2	I. 1.	I. 12.	99	G94	G86	G72	G60	G48	G35	G32	J41	J57	J71	J87		
24	-9	172	I. 8. 5	I. 8.	I. 9.								A8	A22					
25	+14	152	I. 10. 0	I. 7.	I. 7.														
26	+38	151	I. 10. 1	I. 5.	I. 8.			B95	B87	B80	A72								
27	-20	121	I. 12. 3	I. 6.	I. 15.		G98	G91	G81	H65	H53	H34	H27	H33	H50	J66			
28	-5	117	I. 12. 6	I. 6.	I. 18.	99	J93	J80	J67	J50	J29	J3	J17	J38	J57	J73	J89	J96	
29	-20	110	I. 13. 2	I. 6.	I. 18.	99	E96	E87	E77	E62	E46	E32	G27	G38	H55	H70	H85	A95	
30	-11	109	I. 13. 2	I. 10.	I. 19.					D61	D42	E18	E10	E29	E48	E63	E80	D92 99	
31	-4	105	I. 13. 5	I. 14.	I. 15.									A20	A41				
32	-17	100	I. 13. 9	I. 12.	I. 12.							A38							
33	-11	96	I. 14. 2	I. 14.	I. 15.								A12	A28					
34	+22	95	I. 14. 3	I. 8.	I. 20.		E97	E92	E83	E72	E56	F47	E44	F50	G59	H74	J86	J95 99	
35	-27	92	I. 14. 5	I. 17.	I. 18.										A67	B80			
36	-20	77	I. 15. 7	I. 20.	I. 20.											A88			
37	+12	76	I. 15. 8	I. 10.	I. 20.		J96	J87	J72	J57	J41	J29	J30	J45	J61	J77	J88		
38	-14	75	I. 15. 8	I. 15.	I. 21.							C21	D16	E39	E57	E77	D87	C97	
39	-25	74	I. 15. 9	I. 11.	I. 21.			C87	C73	C63	D47	C37	C37	C47	C59	C75	A86	A94	
40	-11	64	I. 16. 7	I. 19.	I. 19.										A61				
41	+20	61	I. 16. 9	I. 15.	I. 17.						C52	B42	A41						
42	+11	49	I. 17. 8	I. 11.	I. 23.	99	J93	J86	J73	J58	J42	J28	J30	J47	J60	J75	J88	J96	
43	-14	48	I. 17. 9	I. 14.	I. 15.				A74	A57									
44	+16	40	I. 18. 5	I. 18.	I. 19.														
45	-20	30	I. 19. 2	I. 16.	I. 22.					C64	C48	C31	C27	D36	C50	A69			
46	-16	28	I. 19. 4	I. 13.	I. 22.		E97	E92	E81	E65	E48	E30	E20	E29	G46	G62	G79	G90 { 97 99	
47	-22	22	I. 19. 9	I. 14.	I. 22.		A95	C86	C72	C59	A43	A29	A32	A43	A57				
48	-13	10	I. 20. 8	I. 15.	I. 27.		E96	E86	E72	E55	E30	E17	E20	E39	E60	E78	G89	G95 99	
49	-24	2	I. 21. 4	I. 23.	I. 23.										A52				
50	-24	0	I. 21. 5	I. 18.	I. 18.				A70										
1249/1	+25	359	I. 21. 6	I. 15.	I. 26.	99	J95	J88	J77	J64	H57	H51	J55	J60	J71	J82	A89		
2	+13	354	I. 22. 0	I. 16.	I. 27.		J95	J88	G75	G60	G47	G33	H33	H44	H59	J75	J83	J97	
3	+17	352	I. 22. 1	I. 18.	I. 28.			A87	C71	C61	C47	C36	C39	D43	D49	D71	E81	E93 98	
4	+9	348	I. 22. 4	I. 19.	I. 25.					A63		A36	C25	D31	C50	A66			
5	-18	347	I. 22. 5	I. 20.	I. 20.					A51									
6	+23	343	I. 22. 8	I. 18.	I. 28.			A89	J77	J67	J57	J48	J48	J56	A68			A97	
7	-33	333	I. 23. 6	I. 17.	I. 26.	96	C92	D82	D73	D62	D50	C48	B49	B56	B60				
8	-16	330	I. 23. 8	I. 22.	I. 29.						B37	D24	E21	E39	E57	G85	G95		
9	+21	327	I. 24. 0	I. 22.	I. 24.						C55	A46	A45						
10	+14	323	I. 24. 3	I. 25.	I. 25.									A40					
11	+16	320	I. 24. 6	I. 20.	I. 21.			A85	A74										
12	-20	318	I. 24. 7	I. 24.	I. 24.							A28							
13	+14	311	I. 25. 2	I. 24.	I. 24.							A38							
14	-21	289	I. 26. 9	I. 23.	II. 2.				D77	E61	E43	E30	E29	E37	E56	G68	G85	G93 98	
15	+19	285	I. 27. 2	I. 21.	I. 28.		D97	D90	D82	D70	C58	B47	A42	A51					
16	-12	280	I. 27. 6	I. 28.	I. 28.								A24						
17	-20	253	I. 29. 7	I. 30.	I. 30.								A29						



34	+13	87	III. 10. 6	III. 4.	III. 16.	99	E96	E86	E75	E57	F41	E35	E40	G48	G68	G82	G91	G99
35	-15	83	III. 10. 9	III. 4.	III. 15.	99	J96	J85	J69	H52	G34	H15	H18	H34	H57	A74	A86	
36	+ 7	81	III. 11. 0	III. 9.	III. 9.						A42							
37	-23	69	III. 12. 0	III. 8.	III. 16.				A68	A53	A43	D29	D29	D43	C60	A74	A89	
38	-28	60	III. 12. 6	III. 14.	III. 14.									A53				
39	-11	57	III. 12. 9	III. 6.	III. 15.	99	C93	C82	D70	C50	C32	A5	A20	A40	A57			
40	-14	53	III. 13. 2	III. 7.	III. 19.		J96	J88	H74	J58	H39	H19	J13	J32	J49	J70	J83	J94
41	+21	30	III. 14. 9	III. 17.	III. 17.									A68				99
42	-18	27	III. 15. 1	III. 14.	III. 15.							A23	A18					
43	-19	15	III. 16. 0	III. 10.	III. 21.		J95	J87	J75	H60	H39	J23	J22	J35	J52	J68	J81	A92
44	+15	9	III. 16. 5	III. 11.	III. 14.		A95	A85	A70	A54								
1251/1	-21	328	III. 19. 6	III. 21.	III. 24.									A44		B78	A89	
2	-16	314	III. 20. 6	III. 15.	III. 26.		A93	B81	B63	B42	A28	B17	D22	D42	E58	G75	H90	97
3	-14	303	III. 21. 5	III. 15.	III. 27.	98	J92	J78	H65	H45	II28	H14	J25	J43	J62	J78	J93	J98
4	-19	302	III. 21. 6	III. 16.	III. 21.		A96	A84	B69		A30	A21						
5	-21	298	III. 21. 9	III. 22.	III. 23.								A26	A36				
6	- 7	297	III. 22. 0	III. 24.	III. 26.										B50	A69	A82	
7	-18	293	III. 22. 3	III. 21.	III. 23.							B30	B19	B27				
8	-21	281	III. 23. 2	III. 19.	III. 19.				A76									
9	+20	279	III. 23. 3	III. 24.	III. 28.										A50	A63	A81	A91
10	-12	273	III. 23. 8	III. 17.	III. 25.	99	J95	J84	J70	J52	J32	J15	B16	A47				A97
11	+16	272	III. 23. 9	III. 22.	III. 29.						C49	D41	C41	C55	→	J74	J84	J92
12	+15	256	III. 25. 1	III. 26.	III. 30.									D47	D62	C75	J89	99
13.	-10	253	III. 25. 3	III. 21.	III. 21.				A79									
14	-12	252	III. 25. 4	III. 23.	III. 29.						B35	A20	C8	C35	J48	J62	A78	
15	-21	249	III. 25. 6	III. 20.	III. 21.		A93	A82										
16	-20	240	III. 26. 3	III. 23.	IV. 1.					B67	B50	B33	A23	C37	D49	D65	C84	J95
17	-13	227	III. 27. 3	III. 22.	III. 22.			A90										99
18	+13	226	III. 27. 3	III. 21.	III. 26.		J98	J98	J84	A71	A58	A39						
19	-20	226	III. 27. 3	III. 28.	III. 28.									A33				
20	+19	220	III. 27. 8	III. 21.	IV. 3.	99	J96	J89	J78	J66	J48	J43	J43	J52	J69	J81	J88	J97
21	-11	202	III. 29. 2	III. 23.	IV. 4.		H97	H90	H77	H53	G35	G20	G7	H32	H53	H66	H82	H92
22	+22	195	III. 29. 7	III. 27.	IV. 2.					A64			A51	A63	A70	A82		
23	+12	191	III. 30. 0	III. 24.	IV. 4.		A97	A90	D74	D61	D50	E38	E37	E49	G61	H79	J90	J98
24	-14	186	III. 30. 4	III. 31.	III. 31.									A30				
25	-23	175	III. 31. 2	III. 26.	IV. 6.			C75	D73	D62	E48	E30	E26	E35	G50	G65	G81	H95
26	+11	154	IV. 1. 8	III. 26.	IV. 7.	98	C92	C87	D76	D57	D40	D33	D38	D48	D66	D83	D88	D98
27	-39	149	IV. 2. 2	III. 30.	IV. 3.					A69	C61	D56	B51	B57				
28	-26	137	IV. 3. 1	III. 27.	IV. 8.	99	C95	C88	A70	A54	B50	B36	D34	D45	D61	D69	C82	B89
30	- 3	123	IV. 4. 2	III. 29.	IV. 10.		A97	A88	A72	A58	A38			A32	C48	C66	C81	D93
38	-24	85	IV. 7. 0	III. 30.	IV. 14.	{ <sup>99</sup> <sub>97</sub>	F94	F83	F75	F58	F41	F35	F30	F40	F54	F70	F79	F90

Zurich, November 8, 1947.

M. Waldmeier.

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Published by the Eidgen. Sternwarte in Zürich

## I. SUNSPOTS

### 1. Sunspot Relative-Numbers.

Co-operating Observatories: Arcetri-Firenze, Arosa, Catania, Granada, Greenwich, Istanbul, Locarno, Madrid, Potsdam, Roma-Monte Mario, South Hadley, Skalnaté Pleso, Uccle, Valencia, Wellington, Zurich.

1947	April	May	June
1	168	169	221
2	170	159	206
3	194	177	167
4	194	188	137
5	182	149	136
6	212	158	154
7	226	162	158
8	212	158	132
9	182	154	104
10	171	159	100
11	143	165	100
12	120	171	91
13	92	147	96
14	108	133	96
15	98	114	117
16	75	130	155
17	78	155	190
18	85	169	228
19	87	211	270
20	96	206	251
21	90	224	242
22	81	258	222
23	95	295	219
24	110	300	193
25	222	323	186
26	198	321	151
27	191	290	146
28	216	273	144
29	214	264	163
30	185	225	143
31		233	
Mean	149.8	201.3	163.9











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Co-operating Observatories: Arcetri-Firenze, Arosa, Catania, Granada, Greenwich, Istanbul, Locarno, Madrid, Potsdam, Roma-Monte Mario, South Hadley, Skalnaté Pleso, Uccle, Valencia, Wellington, Zurich.

1947	July	August	September
1	145	134	231
2	129	152	196
3	148	196	230
4	136	204	183
5	131	192	196
6	135	204	198
7	166	243	240
8	128	253	272
9	165	297	232
10	167	311	195
11	136	303	185
12	135	283	184
13	163	283	156
14	193	273	140
15	202	269	126
16	197	246	120
17	200	203	145
18	179	174	128
19	210	138	100
20	203	124	88
21	210	100	92
22	195	85	94
23	177	70	102
24	161	78	122
25	153	90	142
26	152	88	167
27	133	117	187
28	123	151	195
29	105	177	207
30	105	201	229
31	113	213	
Mean	157.9	188.8	169.4

2. Evolution-tables of sunspot-groups <sup>1)</sup>.

Cooperating Observatories: Zürich, Locarno, Istanbul, Kanzelhöhe, Potsdam, Skalnaté Pleso, Tsinan, Uccle

No	$\varphi$	L	cent. mer. passage	first seen	last seen	E-side						W-side					
						90° 78°	78° 65°	65° 52°	52° 39°	39° 26°	26° 13°	13° 0°	0° 13°	13° 26°	26° 39°	39° 52°	52° 65°
1254/66	-13°	69°	VI. 28.9	VII. 2.	VII. 2.												
77	-19	27	VII. 2.1	VII. 4.	VII. 4.												A77
78	-40	27	VII. 2.1	VII. 1.	VII. 6.												B60
79	-12	22	VII. 2.5	VII. 3.	VII. 3.						A65						B72 D80 B84 A94
80	-23	22	VII. 2.5	VII. 3.	VII. 3.												A34
81	-7	19	VII. 2.7	VII. 3.	VII. 3.												A48
82	-15	16	VII. 2.9	VII. 1.	VII. 4.												A25
83	+14	8	VII. 3.5	VII. 3.	VII. 3.						B46 B32						A48
86	+9	0	VII. 4.1	VII. 3.	VII. 3.						A20						B20
1255/3	+21	352	VII. 4.7	VII. 6.	VII. 7.												A48 A68
5	-13	345	VII. 5.3	VII. 5.	VII. 6.												A28 A40
6	-20	345	VII. 5.3	VII. 5.	VII. 11.												A39 A47 C59 B80 B88 B95 99
7	+16	342	VII. 5.5	VII. 1.	VII. 3.												
8	-18	338	VII. 5.8	VII. 4.	VII. 4.						A82 C63 B47						A47
9	+25	337	VII. 5.9	VII. 7.	VII. 7.												A50
11	+28	329	VII. 6.5	VII. 5.	VII. 7.												A45
12	-21	327	VII. 6.6	VII. 4.	VII. 11.												C44 J58 J73 J85 J93
13	+23	325	VII. 6.8	VII. 6.	VII. 6.						A64 D49 C40						A35
14	+20	320	VII. 7.2	VII. 5.	VII. 6.												A48 A32
15	+27	317	VII. 7.4	VII. 4.	VII. 7.						A70						A40
16	+8	310	VII. 7.9	VII. 9.	VII. 12.												A37 A57 A74 A86
17	-16	310	VII. 7.9	VII. 6.	VII. 7.												A41 B34
18	-28	308	VII. 8.1	VII. 9.	VII. 10.												B60 B70
19	+26	299	VII. 8.7	VII. 7.	VII. 9.												A41
20	+16	298	VII. 8.8	VII. 2.	VII. 12.	99	C95	D86	D70	D54	D40	B20	D28	C44	A59	A76	
21	+2	295	VII. 9.0	VII. 12.	VII. 12.												B70
22	+18	288	VII. 9.6	VII. 3.	VII. 15.	99	C91	D81	C67	C51	A38						A78 C90 J96
23	-12	286	VII. 9.7	VII. 12.	VII. 12.												A63
24	-16	283	VII. 10.0	VII. 8.	VII. 11.												A45
25	-3	280	VII. 10.2	VII. 14.	VII. 14.												
26	+14	277	VII. 10.4	VII. 12.	VII. 12.												
27	+24	276	VII. 10.5	VII. 9.	VII. 11.												
28	-13	276	VII. 10.5	VII. 4.	VII. 16.	98	G91	G83	G70	G53	G37	G30	A38	A35	B40		
29	-18	274	VII. 10.6	VII. 5.	VII. 14.												
30	-10	268	VII. 11.1	VII. 7.	VII. 15.												
31	-18	258	VII. 11.8	VII. 9.	VII. 10.												
32	-6	256	VII. 12.0	VII. 16.	VII. 16.												
33	+12	252	VII. 12.3	VII. 13.	VII. 13.												
34	+20	250	VII. 12.4	VII. 12.	VII. 12.												
35	-13	250	VII. 12.4	VII. 14.	VII. 14.												
36	-1	248	VII. 12.6	VII. 14.	VII. 14.												
37	-8	241	VII. 13.1	VII. 13.	VII. 13.												
38	+10	240	VII. 13.2	VII. 7.	VII. 16.												
39	+26	236	VII. 13.5	VII. 13.	VII. 13.												
40	+31	231	VII. 13.9	VII. 14.	VII. 14.												
41	+7	228	VII. 14.1	VII. 8.	VII. 18.												
42	-13	225	VII. 14.3	VII. 8.	VII. 17.												
43	-29	224	VII. 14.4	VII. 15.	VII. 16.												
44	+18	223	VII. 14.5	VII. 14.	VII. 14.												
45	+19	216	VII. 15.0	VII. 15.	VII. 17.												
46	+14	212	VII. 15.3	VII. 10.	VII. 16.												
47	+13	210	VII. 15.5	VII. 13.	VII. 13.												
48	-31	210	VII. 15.5	VII. 9.	VII. 21.												
49	+21	202	VII. 16.1	VII. 9.	VII. 22.												
50	-21	196	VII. 16.5	VII. 15.	VII. 15.	99	G97	G92	G86	G76	G69	G62	G59	G61	H70	H78	{ G88 H94
51	+29	191	VII. 16.9	VII. 10.	VII. 23.	98	H91	H85	H76	H64	H52	G41	G40	H49	H61	H75	J87
52	-12	190	VII. 17.0	VII. 15.	VII. 16.												
53	-15	188	VII. 17.1	VII. 14.	VII. 17.												
54	-12	184	VII. 17.4	VII. 17.	VII. 19.												
55	+18	179	VII. 17.8	VII. 18.	VII. 21.												
56	+12	177	VII. 18.0	VII. 12.	VII. 24.												

<sup>1)</sup> Explications are given in „Quarterly Bulletin on Solar Activity“ No. 77, page 48.









No	φ	L	cent. mer. passage	first seen	last seen	E-side							W-side						
						90° 78°	78° 65°	65° 52°	52° 39°	39° 26°	26° 13°	13° 0°	0° 13°	13° 26°	26° 39°	39° 52°	52° 65°	65° 78°	78° 90°
6	-18	326	IX. 26.4	IX. 20.	X. 1.	C97	C91	C84	C71	C58	C47	J40	J48	J61	J73	J85	J94		
7	-21	314	IX. 27.3	IX. 27.	IX. 28.							A30	A50						
8	-6	311	IX. 27.6	IX. 23.	IX. 23.		A82												
9	-26	311	IX. 27.6	IX. 24.	IX. 24.			A78											
10	-7	309	IX. 27.7	IX. 28.	IX. 28.							A43							
11	+21	307	IX. 27.9	IX. 29.	IX. 29.								A41						
12	+19	299	IX. 28.5	IX. 25.	X. 4.				A61	B40	B27	B20	B31	D48	D64	E80	D91 98		
13	-11	297	IX. 28.6	IX. 24.	X. 4.		A86	D73	D55	D38	D31	D35	C50	B63	B81	C93	C98		
14	+14	295	IX. 28.8	IX. 28.	IX. 28.						A14								
15	+10	294	IX. 28.8	IX. 30.	X. 4.								B39	B56	A71		A97		
16	-18	291	IX. 29.1	IX. 25.	X. 1.			A80	A62	A48	A45	B44	A50	A59					
17	+19	290	IX. 29.1	IX. 27.	IX. 28.				A43	A25									
18	+15	288	IX. 29.3	IX. 23.	X. 4.	C97	C90	C81	C61	C43	C25	C13	C30	C50	J69	J83	A92		
19	+9	280	IX. 29.9	IX. 30.	X. 1.							A13	A36						
20	-10	280	IX. 29.9	IX. 25.	X. 1.		A89	A77	A60	A42	A30		A45						
21	+19	278	IX. 30.0	IX. 25.	X. 6.		C85	C70	D56	D39	D25	C23	C40	C56	J73	J87	A96 99		
22	-4	278	IX. 30.0	IX. 27.	IX. 27.				A59										
23	+16	277	IX. 30.1	IX. 27.	X. 1.				A60			A18	A32						
24	+9	276	IX. 30.2	IX. 28.	X. 6.					A41	B17	A 7	A28		C68	C81	D94 98		
26	+18	272	IX. 30.5	IX. 29.	X. 2.						A28	A20	A29	A45					
27	-20	271	IX. 30.6	IX. 29.	IX. 29.					B50									
28	-29	271	IX. 30.6	IX. 25.	X. 1.	A94	C86	C76	C70	B62	A59	A64							
29	+24	265	X. 1.0	IX. 30.	IX. 30.						A30								
30	-2	262	X. 1.3	IX. 30.	X. 7.						A20	B14	B30	D51	D68	E83	D92 98		
31	+21	261	X. 1.3	IX. 30.	IX. 30.						A30								
33	-3	254	X. 1.9	IX. 27.	IX. 27.		A84												
34	-15	253	X. 1.9	IX. 30.	X. 5.					B47	B38	C39	C50	C62	B79				
35	-12	252	X. 2.0	IX. 27.	IX. 27.		A89												
36	+12	251	X. 2.1	IX. 29.	X. 4.					A54	A20		B37	B57					
37	-8	243	X. 2.7	IX. 26.	X. 8.	98	D91	D83	D70	D52	D36	D27	D32	D47	D66	D79	D90 C97		
45	-13	220	X. 4.4	IX. 28.	X. 10.		E97	E91	E82	E70	E53	E40	E34	G41	G53	G72	G82 J94 99		
49	+25	210	X. 5.2	IX. 30.	X. 11.			A84	C74	D61	E47	E34	D30	D41	C52	C70	A80 A91 99		
54	+19	186	X. 7.0	IX. 30.	X. 13.	98	D92	E86	E71	F57	F39	F24	F24	F39	F57	G71	G87 G95 99		

Zurich, June 15, 1948.

M. Waldmeier.

# QUARTERLY BULLETIN ON SOLAR ACTIVITY

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## I. SUNSPOTS

### 1. Sunspot Relative-Numbers.

Co-operating Observatories: Arcetri-Firenze, Arosa, Catania, Granada, Greenwich, Istanbul, Locarno, Madrid, Potsdam, Roma-Monte Mario, South Hadley, Skalnaté Pleso, Uccle, Valencia, Wellington, Zurich.

1947	October	November	December
1	221	101	110
2	225	98	91
3	250	74	102
4	275	80	94
5	238	81	94
6	250	76	103
7	179	83	120
8	184	69	107
9	152	72	96
10	140	50	111
11	121	59	105
12	105	90	122
13	84	97	115
14	84	107	131
15	104	192	136
16	106	168	98
17	113	160	127
18	123	175	118
19	130	180	114
20	128	182	138
21	128	190	97
22	146	180	94
23	183	171	92
24	220	180	114
25	229	190	109
26	233	193	170
27	201	160	156
28	169	132	142
29	127	123	140
30	117	126	126
31	107		139
Mean	163.6	128.0	116.5







No	$\varphi$	L	cent. mer. passage	first seen	last seen	E-side								W-side							
						90° 78°	78° 65°	65° 52°	52° 39°	39° 26°	26° 13°	13° 0°	0° 13°	13° 26°	26° 39°	39° 52°	52° 65°	65° 78°	78° 90°		
18	+15°	278°	XII. 21. 0	XII. 15.	XII. 26.		97	D90	D78	C63	C48	J29	J29	J41	J57	J73	J87	A96			
19	+11	272	XII. 21. 4	XII. 26.	XII. 26.													A92			
20	+17	262	XII. 22. 2	XII. 16.	XII. 22.		J97	J90	J77	J63	J50	J37	A31								
21	-15	247	XII. 23. 3	XII. 23.	XII. 26.								A27								
22	+20	238	XII. 24. 0	XII. 17.	XII. 29.	99	C93	C87	D75	E66	E50	D40	D39	D49	C63	J80	J91	J98			
23	- 2	236	XII. 24. 2	XII. 19.	XII. 20.				A87	A73											
24	-22	233	XII. 24. 4	XII. 22.	XII. 30.						C58	D43	D34	E40	E54	E67	E81	E92	97		
25	+12	230	XII. 24. 6	XII. 19.	XII. 25.		97	C87	J71	J53	A33	A28	A36								
26	+13	225	XII. 25. 0	XII. 24.	XII. 31.							A30	B30	B45	C59	D75	D88	E96	99		
27	-16	225	XII. 25. 0	XII. 26.	XII. 27.									B39	A58						
28	+11	209	XII. 26. 2	XII. 26.	XII. 26.									A23							
29	-23	204	XII. 26. 6	XII. 20.	XII. 27.	98	93	J86	J72	J56	J43	C36	A39								
30	+11	201	XII. 26. 8	XII. 21.	XII. 21.			A93													
31	+ 7	201	XII. 26. 8	XII. 26.	XII. 26.								A18								
32	-27	197	XII. 27. 1	XII. 22.	XII. 30.			J88	J80	J67	J55	J43	J40	A49	A61	A76					
33	-13	190	XII. 27. 6	XII. 26.	XII. 26.							A32									
34	-12	178	XII. 28. 6	XII. 30.	XII. 30.									A44							
36	-23	176	XII. 28. 7	XII. 24.	I. 3.			D83	E68	E53	E40	E32	E37	E49	G63	G79	G89	G96			
37	+11	151	XII. 30. 6	XII. 25.	I. 5.		A93		A69	D49	D36	D26	C30	C45	D64		D81	D92	98		
38	-13	151	XII. 30. 6	XII. 24.	I. 6.	99	G92	G81	G67	G50	G34	G18	G28	G43	G60	G80	G90	G97	99		
39	+26	145	XII. 31. 1	XII. 30.	I. 4.							A48	C47	D57	D68	D81	C90				
40	-18	137	XII. 31. 7	XII. 26.	I. 6.		C93	D81	D68	D54	E38	E26	E31	G47	G63	G79	G90	G97			
41	+13	111	I. 2. 6	XII. 29.	I. 8.			A82	A69	C53	D40	D29	D33	D50	D68	D81	91	98			
45	- 7	71	I. 5. 7	XII. 31.	I. 4.		J93	J81	J67	J49	J29										
46	+ 5	67	I. 6. 0	XII. 31.	I. 9.		J94	J85	J71	J52	J35	J18	J20	J39	A55	A71					

Zurich, June 15, 1948.

M. Waldmeier.