

The Sunspot Observations Made In 2006

Hulusi Gülseçen*

Department of Astronomy and Space Sciences, Science Faculty, Istanbul University, Turkey

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In the photospheric observations made at the Istanbul University Observatory, observable sunspots and faculae are drawn on a projected disk of the Sun and the heliographic coordinates of the sunspots are determined from these drawings.

This paper gives the heliographic coordinates for the sunspot groups observed in 2006 and some other results.

The photosphere of the Sun is observed on every clear day at the Istanbul University Observatory. A refracting telescope is used for this purpose; the aperture of the objective and focal length are 13 cm, and 200 cm, respectively. Sunspots and faculae are drawn on a projection disk of a diameter of 25 cm. The heliographic coordinates of the sunspot groups are determined by using the Astronomical Almanac for which the Position Angle of the Sun's axis P_0 , Heliographic Latitude B_0 , Longitude L_0 are calculated for the time that observation was made. Each sunspot group is observed for a single rotation of the Sun and the results obtained during the period are given in Tables and Figures.

In this paper, columns in Table I give the following: (1): Current numbers of the groups; (2) and (3): The mean latitude and longitude of each group respectively; (4) and (5): First and last observations of the groups respectively; (6): Evolution of the groups which are classified according to McIntosh Sunspot Group Classification (Solar-Geophysical Data, 1984). The first upper case letter in column gives "Modified Zurich Class". The second upper case letter gives the penumbra of the largest spot. The third upper case letter in the column gives the sunspot distribution. The Figures after these letters give the number of umbrae in each group. The sing "?" denotes a group which was observed at the edge of the disk and could not be identified in the McIntosh Classification. The sing "X" is used to express that the group probably could not be observed on that day, and "-" that no observation was done on that day because of weather conditions or other reasons.

In 2006, 97 groups were observed; one of them have a latitude of 0° , 18 of them have an average latitude of $+8.5^\circ$ in the North Hemisphere and remained 78 groups have an average latitude -9.0° in the South Hemisphere. The distribution of the groups according to their latitudes is as follows (see Fig. 1).

In Table II, number of groups and umbrae are given by decimal numbers for each day; the integer part of these numbers denotes the numbers of the groups and the fractional part numbers of umbrae. Letters across these numbers are the abbreviations of the observers' names; the complete names are given at the end of the Table II.

Latitude Intervals	North Hemisphere		South Hemisphere
From 00°		1	
From 01° to 05°	6		18
From 06° to 10°	7		34
From 11° to 15°	3		20
From 16° to 20°	1		5
From 21° to 25°	1		1
TOTAL	18	1	78

Table III and Table IV give the relative Wolf Numbers for the Istanbul University Observatory and the distributions of the groups in types, respectively. Data in Table IV are summarized in Figure 2.

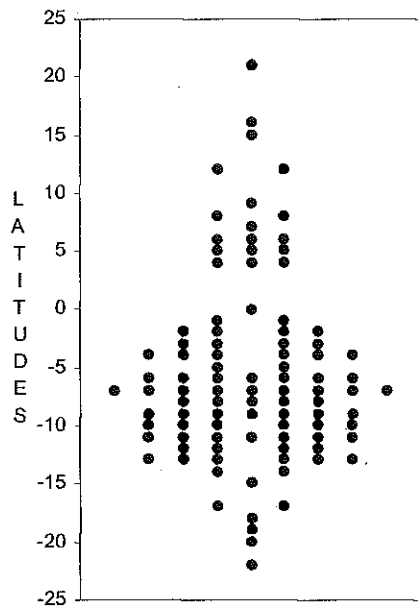


Figure 1: Distribution of the groups according to their latitudes.

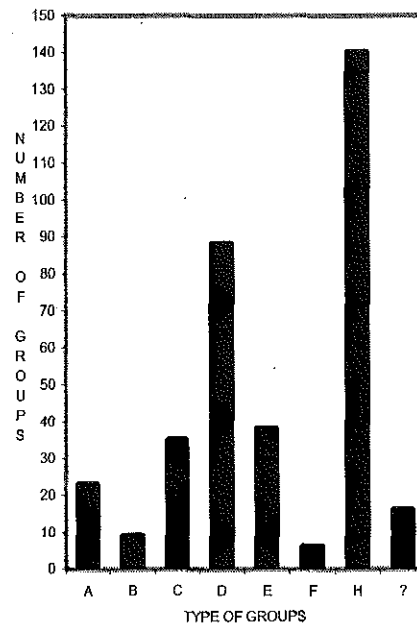


Figure 2: Distribution of the groups in types.

TABLE I

Current Number	Heliographic Coordinates		First Observation	Last Observation	Evolution of the groups
	Latitude	Longitude			
1	+12	256	01.01.06	03.01.06	CHC-2, HA-3
2	+12	235	01.01.06	03.01.06	HR-4, CRO-3, HA-5
3	-03	264	01.01.06	03.01.06	HA-1, HR-1, HA-1
4	+21	88	06.01.06	06.01.06	HA-1
5	+04	071	16.01.06	18.01.06	DAC-7, CAO-3
6	-08	047	16.01.06	18.01.06	DAO-6, DAO-7
7	-18	040	18.01.06	18.01.06	CAO-6
8	-20	321	21.01.06	27.01.06	EAC-22, HA-1
9	-10	120	09.02.06	09.02.06	EAO-3
10	-07	328	15.02.06	15.02.06	DAO-5
11	-10	125	04.03.06	05.03.06	AX-4, HR-4
12	+08	072	05.03.06	06.03.06	CRC-2, AX-1
13	-07	301	19.03.06	22.03.06	DAO-12, DRI-20, EAC-23
14	-11	113	28.03.06	06.04.06	HR-2, DSO-3, EHC-13, EKI-13
15	-06	092	29.03.06	05.04.06	DKC-24, HA-1, HA-2, HA-3, HA-7
16	-17	088	02.04.06	06.04.06	HS-1, HA-4, HA-5, HA-7
17	-07	071	04.04.06	06.04.06	DAC-9, DAO-17, EAI-13, CAI-7
18	-12	029	10.04.06	13.04.06	AX-1, DRC-3, EAI-13
19	-07	336	10.04.06	13.04.06	DAO-10, DAO-6, HA-2, HS-1
20	-06	308	10.04.06	17.04.06	DAO-3, CRO-6, HA-1, HA-2, HA-6, HA-7
21	-02	293	10.04.06	13.04.06	HA-1, HA-1, HA-1, HA-1
22	-06	271	12.04.06	15.04.06	HA-4, HA-4, HA-1
23	-03	300	16.04.06	16.04.06	CAO-2, CAO-4, DAO-8, DSO-4
24	-01	238	20.04.06	21.04.06	HS-1, HS-1, HA-2
25	-10	113	25.04.06	04.05.06	AX-1, AX-1, DAO-4, DAO-12, DAC-11, DAC-13, HA-5, HA-2
26	-15	090	25.04.06	02.05.06	DKI-8, HA-9, HA-1, DAO-7, EAO-8, HR-2

TABLE I (CONT.)

27	-04	092	25.04.06	27.04.06	AX-1,	HA-1,	HA-1	
28	-17	086	26.04.06	27.04.06	HA-1,	HA-3		
29	+16	061	02.05.06	03.05.06	DAO-6,	DAO-9		
30	+15	036	02.05.06	06.05.06	HA-3,	HS-1,	HR-1	
31	-05	341	04.05.06	11.05.06	HA-1,	HS-2,	HA-2,	
					HA-3			
32	-10	314	06.05.06	06.05.06	HR-3			
33	-04	307	06.05.06	00.05.06	AX-1,	HR-2		
34	-13	034	09.05.06	11.05.06	DAO-8,	DAO-6,		
35	-14	303	10.05.06	10.05.06	AX-1	?		
36	-10	322	17.05.06	17.05.06	?			
37	-13	156	19.05.06	24.05.06	AX-2,	DAI-9,	HR-4,	
38	-11	145	20.05.06	26.04.06	DAO-4,	DAI-8,	DAO-18	
					CRO-3	DAI-17,	CAO-7,	
39	+06	116	21.05.06	21.05.06	?			
40	+08	103	23.05.06	01.06.06	DAI-5,	CAO-7,	HS-1,	
					HA-1,	HA-1,		
41	-22	144	23.05.06	23.05.06	AX-1			
42	+05	174	26.06.06	26.06.06	AX-1			
43	-11	046	26.06.06	26.05.06	?			
44	+05	189	27.05.06	27.05.06	DAO-2			
45	-14	113	29.05.06	29.05.06	CRO-7			
46	-02	091	29.05.06	30.05.06	HA-2,	AX-3		
47	-11	047	29.05.06	31.05.06	HR-4,	EAO-6,	HA-2	
48	-11	049	31.05.06	31.05.06	HA-2			
49	-07	285	04.06.06	15.06.06	?	EAI-14,	EKO-17,	
					ESI-8,	HA-1,	EKO-22,	
50	-01	259	07.06.06	12.06.06	DAO-5,	EKO-10,	EAI-29,	
51	00	170	16.06.06	16.06.06	HR-2	DAO-5,	?	
52	-12	152	16.06.06	21.06.06	BXI-6,	HS-5,	HA-1	
53	+07	003	26.06.06	02.07.06	DAO-3,	CRO-10,	DAI-8,	
					AX-3,	CAI-15,	CAO-9	
					CAO-4,	HR-1	DAI-6,	
54	+04	009	29.06.06	01.07.06	CAO-3,	ORO-3		

TABLE I (CONT.)

55	-06	326	29.06.06	09.07.06	HS-3, HK-10, HK-8, DAO-5, AX-1 BXO-2, CAI-15, 7-2, CAI-9, AX-1 CAO-4, HR-1 CRO-4, EKC-6, FKI-20, EKO-18, HA-1 EKO-2, EAO-23, DAI-9 HR-4, AX-2, HK-1, HA-1 AX-2	HK-10, HK-8, DAO-5, DAO-6, CAO-3, EAD-13, HR-1 CRO-4, EKC-6, FKI-20, EAO-10, DAC-13 HA-1, BXO-3, BXO-3, HK-2, CKO-6, HA-1	HK-14, 7-4 DAO-6, CRI-8, DAI-8, DSO-10, DAO-9, BXI-7	HH-5, DAO-4, CRI-9, DAI-8 DSO-10, DAO-9, BXI-7	HK-5, DSO-3, DAI-8 EKO-15, FKI-21 EKO-7, HA-2	HK-7, DRI-5 DAI-10, CSO-14,
56	-04	237	05.07.06	11.07.06	7-3, AX-1	7-4 DAO-6, CRI-8, DAI-8, DSO-10, DAO-9, BXI-7	HH-5, DAO-4, CRI-9, DAI-8	HK-5, DSO-3, DAI-8	HK-7, DRI-5 DAI-10, CSO-14,	
57	-09	321	06.07.06	06.07.06	AX-1	AX-1	DAO-4, CRI-9, DAI-8	DSO-3, DAI-8	DRI-5	
58	-04	139	14.07.06	20.07.06	BXO-2, CAI-15, 7-2, CAI-9, AX-1 CAO-4, HR-1 CRO-4, EKC-6, FKI-20, EKO-18, HA-1 EKO-2, EAO-23, DAI-9 HR-4, AX-2, HK-1, HA-1 AX-2	DAO-6, CAO-3, EAD-13, HR-1 CRO-4, EKC-6, FKI-20, EAO-10, DAC-13 HA-1, BXO-3, BXO-3, HK-2, CKO-6, HA-1	CRI-8, DAI-8, DSO-10, DAO-9, BXI-7	DAI-8 DSO-10, DAO-9, BXI-7	DAI-10, CSO-14,	
59	+06	012	22.07.06	31.07.06	7-2, CAI-9, AX-1 CAO-4, HR-1 CRO-4, EKC-6, FKI-20, EKO-18, HA-1 EKO-2, EAO-23, DAI-9 HR-4, AX-2, HK-1, HA-1 AX-2	CAO-3, EAD-13, HR-1 CRO-4, EKC-6, FKI-20, EAO-10, DAC-13 HA-1, BXO-3, BXO-3, HK-2, CKO-6, HA-1	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
60	+06	005	30.07.06	30.07.06	AX-1	AX-1	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
61	-09	001	30.07.06	31.07.06	CAO-4, HR-1 CRO-4, EKC-6, FKI-20, EKO-18, HA-1 EKO-2, EAO-23, DAI-9 HR-4, AX-2, HK-1, HA-1 AX-2	HR-1 CRO-4, EKC-6, FKI-20, EAO-10, DAC-13 HA-1, BXO-3, BXO-3, HK-2, CKO-6, HA-1	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
62	-10	004	02.08.06	02.08.06	HR-1	HR-1	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
63	-08	157	08.08.06	10.08.06	HR-1	HR-1	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
64	-12	125	09.08.06	19.08.06	7-1, EKI-18, HA-1 EKO-2, EAO-23, DAI-9 HR-4, AX-2, HK-1, HA-1 AX-2	FKI-20, EKO-12, EAO-10, EAC-35, HA-2 HA-1, BXO-3, BXO-3, HK-2, CKO-6, HA-1	FKI-20, EKO-15, FKI-21 EKO-7, HA-2	EKI-20, FKO-10		
65	-13	161	18.08.06	18.08.06	HA-1	HA-1	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
66	-06	326	22.08.06	01.09.06	EKO-2, EAO-23, DAI-9 HR-4, AX-2, HK-1, HA-1 AX-2	EKO-10, EAO-10, EAC-35, HA-2 HA-1, BXO-3, BXO-3, HK-2, CKO-6, HA-1	EKO-12, EAO-10, EAC-35, HA-2 HA-1, BXO-3, BXO-3, HK-2, CKO-6, HA-1	EKO-7, HA-2		
67	-09	320	01.09.06	01.09.06	DAI-9	DAI-9	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
68	-13	159	05.09.06	08.09.06	HR-4, AX-2, HK-1, HA-1 AX-2	HR-4, AX-2, HK-1, HA-1 AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
69	-11	156	05.09.06	13.09.06	AX-2, HK-1, HA-1 AX-2	AX-2, HK-1, HA-1 AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
70	-12	132	05.09.06	17.09.06	HK-1, HA-1 AX-2	HK-1, HA-1 AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
71	-03	160	09.09.06	09.09.06	AX-2	AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
72	-11	157	10.09.06	10.09.06	BXI-10	BXI-10	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
73	-08	334	17.09.06	22.09.06	HA-1, 7-1, HA-1 AX-2	HA-1, 7-1, HA-1 AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
74	+04	189	28.09.06	29.09.06	7-1, HA-2, HA-1 AX-2	7-1, HA-2, HA-1 AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
75	-19	189	28.09.06	06.10.06	7-1, HA-2, HA-1 AX-2	7-1, HA-2, HA-1 AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
76	-06	289	29.09.06	02.10.06	HA-2, DAI-7, HA-1 AX-2	HA-2, DAI-7, HA-1 AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	
77	-09	179	29.09.06	06.10.06	HA-2, DAI-7, HA-1 AX-2	HA-2, DAI-7, HA-1 AX-2	DAI-8, DSO-10, DAO-9, BXI-7	DSO-10, DAO-9, BXI-7	CSO-14,	

TABLE I (CONT.)

78	-09	124	11.10.06	11.10.06	AX-1				
79	-13	106	11.10.06	11.10.06	AX-1				
80	-04	345	19.10.06	23.10.06	DAO-5,			DAI-17	
81	-02	003	23.10.06	23.10.06	CAO-4				
82	-03	305	28.10.06	28.10.06	?-2				
83	-07	139	01.11.06	08.11.06	EAC-16,	FAI-36,		EAI-12,	
84	-13	125	01.11.06	08.11.06	DAO-2,	EAI-8,	EAO-4	DRO-7,	
85	-09	229	02.11.06	02.11.06	AX-2	DAO-8,			
86	-04	003	08.11.06	20.11.06	?-1,	HA-2			
					HK-1,			HK-10,	
					HH-9,			HK-2,	
					HK-1				
87	-07	316	14.11.06	20.11.06	BXD-3,	AX-2,	DAO-5,	DAO-10,	DAO-3,
					HS-1				
88	-05	307	14.11.06	18.11.06	HA-2,	HA-1,	HA-3,	DAO-3,	DAO-5
89	-09	319	23.11.06	23.11.06	AX-1				
90	-08	140	26.11.06	07.12.06	HK-3,	DAO-4,			
					EAC-16,	EAC-10,	CAO-8,	DRI-10,	HA-1
91	+09	129	02.12.06	07.12.06	AX-1	DSO-5,	HS-1,	HS-1,	HA-1
92	-06	179	02.12.06	02.12.06	AX-1				
93	-05	009	05.12.06	17.12.06	?-1,	DKC-9,	HK-10,	HK-9,	HK-10,
					?-5	HK-13,	DKC-16,	DKC-11,	DKC-7,
94	-07	125	26.12.06	26.12.06	HA-1				
95	-07	144	26.12.06	26.12.06	DAO-1				
96	+05	030	31.12.06	31.12.06	HS-1				
97	.02	030	---	---	FKO-2				

TABLE II

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3,07	MS	0,00	İÇ	0,00	İÇ	0,00	İÇ	3,28	---	---	---
2	3,08	MS	0,00	İÇ	4,20	FB	3,20	FB	0,00	TÇ	2,17	İHÇ
3	3,09	İÇ	0,00	SA	4,10	MS	2,07	MS	0,00	FB	3,46	FB
4	---	0,00	0,00	MB	4,12	TÇ	1,10	TÇ	0,00	TG	---	2,16
5	---	---	2,06	MB	4,31	FB	2,06	TÇ	0,00	MB	---	2,13
6	1,01	TG	---	SA	4,36	SA	1,14	MS	3,07	FB	2,19	MB
7	---	---	---	MB	4,33	MB	1,10	SA	3,08	MB	---	3,10
8	---	---	---	---	4,07	---	3,13	FB	0,00	TG	---	3,20
9	---	---	---	---	---	---	2,16	MB	0,00	TG	---	2,11
10	---	---	---	---	---	---	2,27	TG	3,15	MB	---	1,09
11	---	---	---	---	---	---	2,38	FB	2,29	MB	---	1,08
12	---	---	---	---	---	---	2,22	İÇ	3,17	TÇ	---	1,10
13	---	---	---	---	---	---	2,13	TG	3,31	MB	---	---
14	---	---	---	---	---	---	2,02	SA	---	TÇ	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	---	---	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	---	---	---	---
21	---	---	---	---	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
23	---	---	---	---	---	---	---	---	---	---	---	---
24	---	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	---	---	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

Observers: FB: Funda Bostancı, İÇ: İpek Çay, MB: Mevlana Başal, MS: Melahat Sırma, SA: Sinan Aliş, TÇ: Taşkın Çay, TG: Tolga Güver

TABLE III

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	37	0	0	--	--	11	50	0	31	--	37	--
2	36	0	0	58	60	0	27	11	--	34	76	51
3	39	0	0	74	56	0	--	0	0	24	--	36
4	--	0	14	71	52	20	--	0	--	23	--	33
5	--	--	26	76	--	24	28	0	37	25	39	40
6	11	--	11	73	47	20	43	0	36	23	--	50
7	--	--	--	--	--	47	36	0	45	--	--	31
8	--	--	--	--	--	58	32	11	49	--	41	19
9	--	15	0	--	42	42	27	25	47	--	25	18
10	--	--	0	96	41	33	--	29	61	0	--	20
11	--	--	--	57	25	--	15	23	--	22	--	--
12	--	0	--	63	--	22	--	25	29	--	20	--
13	--	--	--	59	--	--	0	24	26	--	--	23
14	--	0	--	--	0	--	13	30	12	--	44	26
15	--	13	--	24	0	11	16	28	11	0	41	21
16	36	--	--	25	0	28	18	30	12	0	48	17
17	--	--	--	11	11	--	19	30	22	--	50	15
18	46	--	--	--	0	20	18	42	11	--	40	0
19	--	--	22	0	12	18	20	20	--	15	--	--
20	--	0	30	16	28	22	25	--	12	--	22	--
21	32	0	30	14	49	19	0	--	--	19	0	--
22	--	0	33	0	36	0	12	12	18	--	0	0
23	--	0	--	--	67	--	13	20	--	41	11	--
24	--	--	--	--	61	0	18	22	--	--	0	--
25	--	--	--	42	34	13	20	20	0	--	--	--
26	--	--	0	55	49	16	19	17	0	--	13	24
27	13	--	0	62	23	25	14	45	--	0	14	--
28	0	--	12	41	-	--	19	33	23	12	--	0
29	0	--	24	--	54	49	23	23	46	0	--	0
30	0	--	--	--	40	49	38	--	40	--	--	--
31	0	--	33	--	35	--	28	--	--	--	--	23
Mean	21	2	14	46	34	23	22	19	26	16	29	22

TABLE IV

Evolution Type	A	B	C	D	E	F	H	?	Total
Number of Groups	23	9	35	88	38	6	140	16	355
Percentage of Numbers	6,5	2,5	9,9	24,8	10,7	1,7	39,4	4,5	100