The Sunspot Observations Made In 2007

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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 2007 and some other results. Recurrent groups also were searched and maximum lifetime for a sunspot group was found as 55 days.

1. Observations

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_o, Heliographic Latitude B_o, Longitude L_o are calculated for the time that observation was made. Each sunspot group is observed for a single rotation mainly and followed for the next rotations of the Sun and results obtained during the period are given in Tables and in Figures.

2. Conclusions

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 sign "?" denotes a group which was observed at the edge of the disk and could not be identified in the McIntosh Classification. The sign "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 2007, 35 groups were observed; only one of them have a latitude of 0°, 11 of them have an average latitude of +4° in the Northern Hemisphere and remained 24 groups have an average latitude −7° in the Southern Hemisphere. The distribution of the groups according to their latitudes is as follows (see also Fig.1).

Latitude Intervals		North Hemisphere	South Hemisphere
From	0° to 05°	7	7
From	6° to 10°	4	14
From	11° to 15°	-	3
From	16° to 20°	-	-
From	21° to 25°	-	-
From	26° to 30°	-	-
From	31° to 35°	-	-
From	36° to 40°	-	-
TOTAL		11	24

In Table II, number of groups and umbrae are given by decimal numbers for each day; the integer part of these numbers denote 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. In the case; there is a name but no number it means at that day observation was done but there was no sunspot.

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

Some statistical results of 2007 observations are also as follows:

1. At 285 days of the 2007 (with good weather conditions) solar observations were done.
2. In 141 days there were no sunspot.
3. Number of possible reccurrent groups are only 7 among 35 groups that their group numbers and their lifetimes are in the following:

No	Group Number	Lifetime in days
1	1	38
2	3	38
3	11	18
4	14	30
5	16	55
6	19	40
7	22	35

The maximum lifetime of the group in the table is 55 days. This duration is not so long when comparing with sunspot groups in 2002 (Esenoglu, private communication). In 2002, very close to solar maximum, observed maximum lifetime for a sunspot group is 177 days (Esenoglu, private communication).

Finally, we see some recurrent groups in 2007 that it can be also studied in future whether exists or not a relation between population of the recurrent groups and the solar magnetic activity.
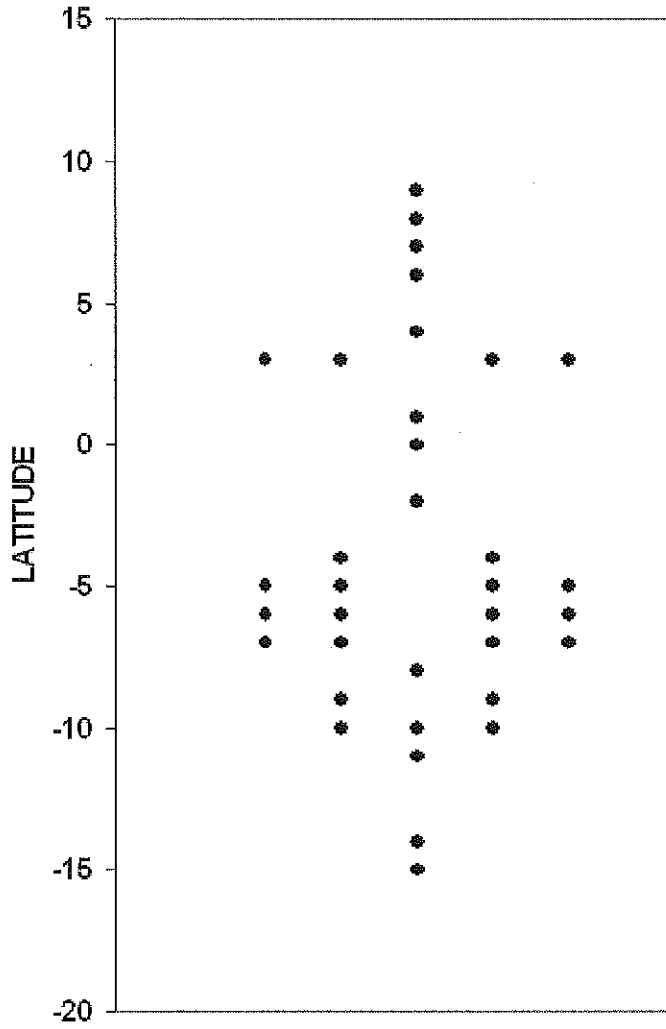
Figure 1. Distribution of groups according to their latitudes.
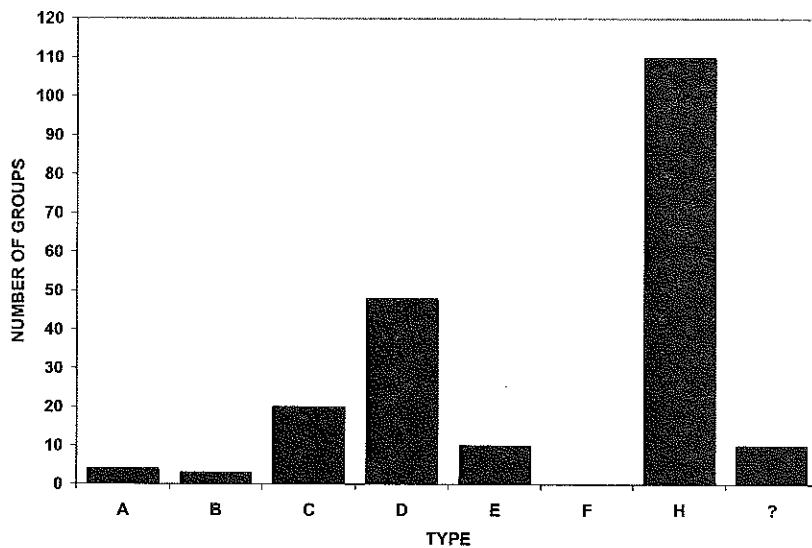
Figure 2. Distribution of the groups in types.

Table I

Current Number	Heliographie Coordinates		First Observation	Last Observation	Evolution of the groups					
	Latitude	Longitude								
1	-04	039	01.I.07	07.II.07	DAO-3,	-,	-,	CHO-6	-,	-,
					HH-3	HH-3	HH-5	HS-6	-,	X,
					-,	X,	-,	X,	-,	X,
					X,	-,	X,	X,	X,	X,
					-,	-,	-,	HH-4	HH-4	HH-7
					-,	DHI-10	-,	HS-4	-,	-,
					HA-1	HK-1				
2	04	035	01.I.07	07.I.07	HA-1	-,	-,	HR-2	-,	-,
					HR-1					
3	-07	008	04.I.07	10.II.07	HH-1	-,	-,	HH-1	HH-1	HH-1
					HK-2	-,	HK-1	-,	?-1	X,
					-,	X,	X,	-,	X,	X,
					X,	X,	X,	-,	-,	-,
					X,	HH-1	HS-7	-,	HS-1	-,
					HS-1	-,	-,	HS-1	HH-1	HH-2
					HH-1	HA-1				
4	-14	348	08.I.07	12.I.07	BXO-3	DRO-6	DAO-3	-,	HR-1	
5	03	225	12.I.07	20.I.07	?-2	-,	CAI-9	CRI-9	-,	CRO-10
					HA-6	-,	HA-1			
6	-05	212	20.I.07	24.I.07	HA-3	DAO-9	DAI-10	DAI-8	DAI-5	
7	00	158	24.I.07	24.I.07	HA-1					
8	-11	132	20.II.07	22.II.07	HR-3	HA-3	AX-2			
9	-07	046	25.II.07	03.III.07	HA-1	HS-2	CSI-8	-,	-,	HA-3
10	-07	007	26.II.07	27.II.07	HA-1	HR-1				
11	08	327	12.III.07	29.III.07	HS-1	X,	-,	X,	X,	X,
					X,	X,	X,	X,	-,	-,
					X,	X,	X,	X,	X,	HR-2
12	-15	159	24.III.07	24.III.07	HA-2					
13	-02	103	26.III.07	27.III.07	HR-6	CRO-2				
14	-10	308	25.IV.07	24.V.07	?-1	HH-3	HK-8	HH-12	HK-8	HK-7
					HK-12	-,	HK-7	HK-6	HK-12	HK-6
					HS-1	X,	X,	X,	X,	X,
					X,	X,	X,	X,	X,	X,
					-,	X	-,	X	?-1	HA-1
15	-06	288	30.IV.07	01.V.07	DAO-5	HR-3				
16	-07	182	08.V.07	01.VII.07	CRO-2	DAI-10	DAO-7	DRI-19	DRI-17	DAO-8
					DAO-9	DAO-2	X,	X,	X,	-,
					X,	-,	X,	X,	X,	X,
					X,	X,	X,	X,	X,	-,
					?-1	DAO-5	DAO-5	DAO-4	DAI-16	DSI-7
					-,	HS-3	DAO-6	HA-2	HA-2	HR-1
					X,	X,	X,	X,	X,	X,
					X,	X,	X,	X,	X,	X,
					X,	X,	X,	-,	CSO-	HS-2

										2	
					HR-2		DAI-		DAI-		
17	01	071	14.V.07	23.V.07	?-4	HK-12	18	DAC-10	27	-,	
					HR-5	-,	HR-4	HR-2			
18	-06	139	16.V.07	18.V.07	AX-3	-,	BXI-7				
19	-10	225	29.V.07	07.VII.07	HR-1	HA-3	-,	X	X,	HA-1	

Table I
(Cont.)

						DAO-	CRO-			
					X.	5	4	-,	AX-1	X,
					X,	X,	X,	X,	X,	X,
					X,	X,	X, .	X,	X,	X,
					X,	X,	X,	?-1	HA-2	HS-1
					-,	HA-5	HS-2	HS-3	HA-9	HA-2
					HA-2	HS-2	-,	HS-2		
						CRO-				
20	-10	204	01.VI.07	08.VI.07	CRO-3	2	HA-2	CAO-2	X,	X,
					-,	CRO-6				
						DKI-	DAI-			
21	-06	174	02.VI.07	13.VI.07	DKI-9	23	34	DAC-33	ESI-23	-,
						DAO-				
					CSO-15	11	HS-2	HS-1	HA-1	HS-1
							EHI-			
22	-05	061	08.VII.07	11.VIII.07	?-4	EHI-9	12	EKI-17	EKI-18	-,
						EAO-	EAO-		CSO-	
					EKI-9	15	9	EAO-12	5	HS-2
					X,	X,	-,	X,	X,	X,
					X,	X,	X,	X,	X,	X,
					X,	X,	X,	HS-1	-,	HS-3
					HS-3	HS-5	HS-7	HS-7	HR-1	
						CRO-				
23	03	087	14.VII.07	16.VII.07	DRI-7	4	HR-2			
24	-09	203	28.VII.07	30.VII.07	HR-2	HS-1	HS-2			
25	06	147	08.VIII.07	08.VIII.07	BXO-4					
26	-05	188	21.VIII.07	01.IX.07	?-1	·HA-2	HA-3	HA-3	HA-2	HA-1
						CSO-	DAO-			
					HA-2	4	6	HA-2	HA-4	DAO-2
27	09	263	24.VIII.07	24.VIII.07	AX-2					
						DAO-	DAO-		DAO-	
28	-06	124	31.VIII.07	06.IX.07	CRO-3	3	3	DAO-5	4	DAO-5
					HR-1					
						DRO-				
29	03	113	28.IX.07	30.IX.07	CRI-7	4	CRI-7			
30	-04	020	07.X.07	07.X.07	DRO-6					
31	03	103	24.XI.07	26.XI.07	DRO-6	-,	HR-1			
32	-08	331	01.XII.07	01.XII.07	DRO-3					
33	-05	291	02.XII.07	04.XII.07	HR-3	HR-1	HA-3			
34	-09	225	08.XII.07	15.XII.07	DAO-13	-,	?-3	EAC-26	DSI-8	-,
						DAC-				
					DAI-7	7				
35	07	330	08.XII.07	08.XII.07	DAO-2					

TABLE II

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.4 SA	2.11 ZFB	-	-	2.15 MB	2.4 ZFB	2.5 ZFB	- TG	2.5 SA	- HE	- ZFB	1.3 HE
2	-	-	-	- SA	-	3.16 ZFB	1.9 SA	- ZFB	1.3 SA	- İHÇ	-	1.3 HE
3	-	2.5 TG	1.3 MB	- MB	1.7 TD	4.31 SA	1.2 İHÇ	- TG	1.5 SA	- ZFB	-	1.1 HE
4	3.9 MB	-	-	- ZFB	1.6 İHÇ	3.40 SA	1.2 ZFB	1.1 SA	1.4 SA	- TG	- MB	1.3 HE
5	-	-	-	- TG	1.12 ZFB	3.54 İHÇ	1.2 SA	-	1.5 SA	- MB	-	-
6	-	2.2 SA	- İHÇ	- İHÇ	1.6 MB	3.34 ZFB	-	1.3 TG	1.1 SA	1.7 MB	-	-
7	3.5 MB	2.2 İHÇ	- SA	- MB	1.1 SA	-	1.2 TG	-	- HE	1.6 İHÇ	- ZFB	-
8	3.7 TG	1.2 MB	- TD	- İHÇ	1.2 SA	4.25 MB	1.4 İHÇ	2.9 ZFB	- HE	- HE	-	2.15 HE
9	3.12 ZFB	1.1 TG	-	- SA	1.10 ZFB	2.17 İHÇ	1.9 SA	1.7 ZFB	- HE	- İHÇ	- MB	-
10	3.11 İHÇ	1.1 SA	-	- İHÇ	1.7 TD	2.4 MB	1.12 MB	1.7 ZFB	- İHÇ	- ZFB	-	1.3 HE
11	-	- MB	-	-	1.19 MB	2.3 ZFB	1.17 ZFB	1.1 TG	- HE	- TG	- İHÇ	1.26 İHÇ
12	3.4 SA	-	1.1 TD	- TG	1.17 SA	2.2 MB	1.18 MB	-	- HE	-	- HE	1.8 ZFB
13	-	- TG	- MB	- MB	1.8 SA	1.1 SA	-	- SA	- İHÇ	-	-	-
14	2.10 TG	- MB	-	- SA	2.13 SA	- TD	2.16 ZFB	- HE	- HE	-	-	1.7 HE
15	1.9 ZFB	-	- TG	- ZFB	2.14 İHÇ	- İHÇ	2.19 MB	- HE	- HE	- HE	- MB	1.7 TG
16	-	- İHÇ	- SA	- SA	2.21 ZFB	- İHÇ	2.11 MB	- HE	- ZFB	- İHÇ		
17	1.10 MB	-	- SA	- MB	1.10 TD	- MB	1.12 İHÇ	- MB	- İHÇ	- TG	- HE	-
18	1.6 İHÇ	-	- SA	- ZFB	2.34 MB	- SA	1.5 ZFB	- MB	- TG	- ZFB	- HE	- HE
19	-	-	- MB	-	-	- TD	1.2 MB	-	- HE	- HE	- HE	-
20	2.4 İHÇ	1.3 ZFB	- ZFB	- İHÇ	1.5 TG	- İHÇ	- TG	- MB	- TG	- MB	-	-
21	1.9 SA	1.3 İHÇ	- SA	- MB	-	- TD	- MB	1.1 İHÇ	- HE	-	-	- TG
22	1.10 SA	1.2 ZFB	-	- TG	1.4 MB	- MB	-	1.2 MB	-	- HE	- TG	- ZFB
23	1.8 TG	-	-	-	2.3 ZFB	- TD	- ZFB	1.3 İHÇ	- TG	- İHÇ	- HE	- TG
24	2.6 İHÇ	-	1.2 ZFB	- İHÇ	1.1 İHÇ	- TD	- İHÇ	2.5 MB	- HE	-	1.6 MB	- İHÇ
25	-	1.1 SA	- TG	1.1 ZFB	- TD	1.1 İHÇ	- ZFB	1.2 İHÇ	- MB	- TG	- ZFB	- HE
26	-	2.3 ZFB	1.6 TG	1.3 TG	- MB	1.2 MB	- İHÇ	1.1 SA	- ZFB	- MB	1.1 HE	- ZFB
27	-	2.9 SA	1.2 MB	1.8 MB	- TD	1.1 TD	- TG	1.2 İHÇ	- MB	- İHÇ	- İHÇ	- TG
28	1.4 ZFB	-	- TD	1.12 SA	- SA	-	1.2 ZFB	1.4 HE	- TG	- HE	- ZFB	-
29	2.5 TG	-	1.2 TG	1.8 İHÇ	1.1 MB	2.7 SA	1.1 TG	1.6 İHÇ	1.4 HE	-	- TG	- TG
30	2.8 ZFB	-	-	2.12 İHÇ	1.3 İHÇ	2.4 SA	1.2 SA	1.2 SA	1.7 ZFB	- İHÇ	- TG	- İHÇ
31	-	-	-	-	-	-	- ZFB	2.7 HE	-	- TG	-	- HE

TABLE III

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	24	31	-	-	35	24	25	-	25	-	-	13
2	-	-	-	-	-	46	19	-	13	-	-	13
3	-	25	13	-	17	71	12	-	15	-	-	11
4	39	-	-	-	16	70	12	11	14	-	-	13
5	-	-	-	-	22	84	12	-	15	-	-	-
6	-	22	-	-	16	64	-	13	11	17	-	-
7	35	22	-	-	11	-	12	13	-	16	-	-
8	37	12	-	-	12	65	14	29	-	-	-	35
9	42	11	-	-	20	37	19	17	-	-	-	-
10	41	11	-	-	17	24	22	17	-	-	-	13
11	-	-	-	-	29	23	27	11	-	-	-	36
12	34	-	11	-	27	22	28	-	-	-	-	18
13	-	-	-	-	18	11	-	-	-	-	-	-
14	30	-	-	-	33	-	36	-	-	-	-	17
15	19	-	-	-	34	-	39	-	-	-	-	17
16	-	-	-	-	41	-	31	-	-	-	-	-
17	20	-	-	-	20	-	22	-	-	-	-	-
18	16	-	-	-	54	-	15	-	-	-	-	-
19	-	-	-	-	-	-	12	-	-	-	-	-
20	24	13	-	-	15	-	-	-	-	-	-	-
21	19	13	-	-	-	-	-	11	-	-	-	-
22	20	12	-	-	14	-	-	12	-	-	-	-
23	18	-	-	-	23	-	-	13	-	-	-	-
24	26	-	12	-	11	-	-	25	-	-	16	-
25	-	11	-	11	-	11	-	12	-	-	-	-
26	-	23	16	13	-	12	-	11	-	-	11	-
27	-	29	12	18	-	11	-	12	-	-	-	-
28	14	-	-	22	-	-	12	14	-	-	-	-
29	25	-	12	18	11	27	11	16	14	-	-	-
30	28	-	-	32	13	24	12	12	17	-	-	-
31	-	-	-	-	-	-	-	27	-	-	-	-
Mean	27	18	13	19	22	37	20	15	16	17	14	19

TABLE IV									
Evolution Type	A	B	C	D	E	F	H	?	Total
Number of Groups	4	3	20	48	10	-	110	10	205
Percentage of Numbers	2,0	1,5	9,8	23,4	4,9	0	53,7	4,9	100

Observers :

SA   : Sinan Aliş   İHÇ: İpek Hamami Çay   TG : Tolga Güver
MB : Mevlana Başal   TD : Tolga Dinçer
ZFB : Z. Funda Bostancı   HE : Hasan Esenoğlu