

Center

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SUNSPOT BULLETIN

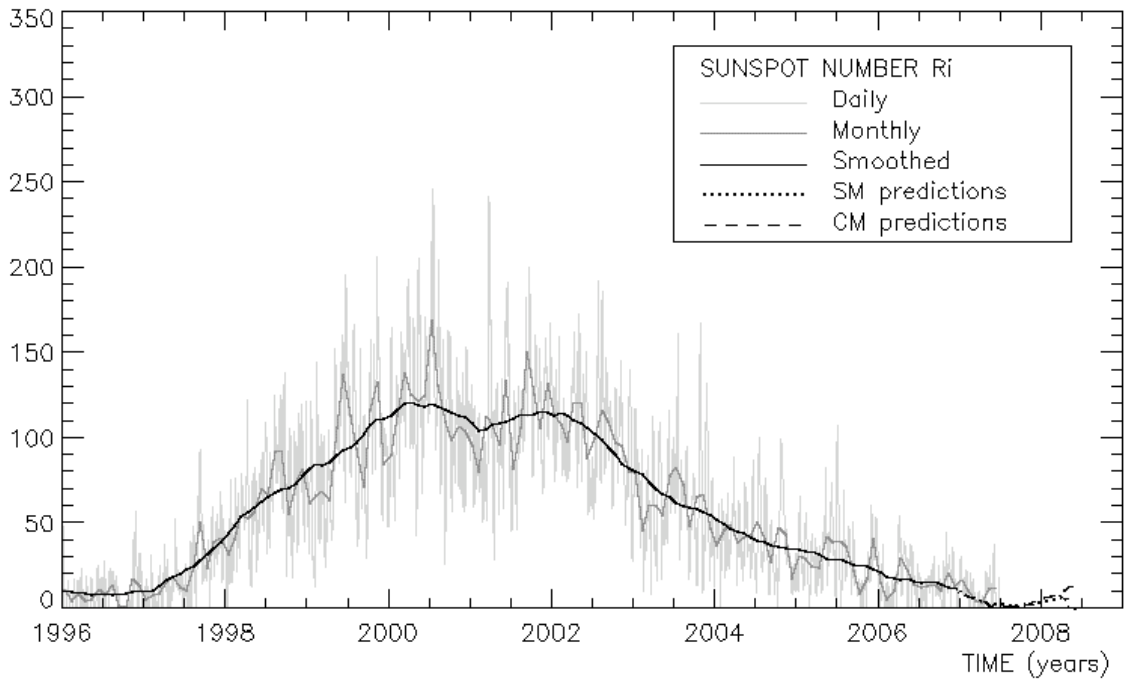
2007

n° 6

Provisional international and normalized hemispheric daily sunspot numbers for June 2007

computed at the *Royal Observatory of Belgium* using observations from an international network with the *Locarno Specola Solare* as reference station.

Date	R _I	R _N	R _S
1	17	0	17
2	25	0	25
3	31	0	31
4	34	0	34
5	35	0	35
6	33	0	33
7	37	0	37
8	34	0	34
9	12	0	12
10	9	0	9
11	9	0	9
12	8	0	8
13	8	0	8
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	7	0	7
26	8	0	8
27	8	0	8
28	9	0	9
29	18	0	18
30	18	0	18
Monthly mean	12.0	0.0	12.0
Cooperating stations	56	48	48



Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for December 2006 : 12.1 ($\pm 5\%$)

	SM	CM		SM	CM		SM	CM			
2007	Jan	12	10	2007	Jul	5	2	2008	Jan	2	6
	Feb	12	7		Aug	4	2		Feb	3	7
	Mar	10	7		Sep	3	1		Mar	3	9
	Apr	9	5		Oct	2	2		Apr	4	11
	May	8	2		Nov	2	3		May	5	13
	Jun	6	2		Dec	2	5		Jun	7	14

SM : SIDC classical method : based on an interpolation of Waldmeier's standard curves; the estimated error ranges from 7% (first month) to 35% (last month)

CM : Combined method : the combined method is a regression technique coupling a dynamo-based estimator with Waldmeier's idea of standard curves, due to K. Denkmayr.

ref. : **K. Denkmayr, P. Cugnon**, 1997 : "About Sunspot Number Medium-Term Predictions", in "Solar-Terrestrial Prediction Workshop V", eds G. Heckman et al., Hiraiso Solar Terrestrial Research Center, Japan, 103

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S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R' _i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	7	0	-	75	///	0	0/0	5	
1	17	5	-	79	////	1	2/0	10	
2	25	25	-	83	////	1	2/0	8	
3	31	41	-	87	////	2	3/0	14	
4	34	45	-	86	////	113	1/0	12	
5	35	75	-	81	////	17	0/0	4	
6	33	78	-	85	////	100	0/0	3	
7	37	55	-	86	////	2	0/0	3	
8	34	45	-	84	////	3	0/0	11	
9	12	28	-	79	////	100	1/0	8	
10	9	18	-	76	////	3	0/0	8	
11	9	7	-	73	////	1	0/0	4	
12	8	3	-	70	////	0	0/0	3	
13	8	1	-	71	////	0	0/0	10	
14	0	///	-	69	///	0	0/0	3	
15	0	///	-	69	///	0	0/0	8	
16	0	///	-	68	///	0	0/0	0	
17	0	0	-	67	////	0	0/0	8	
18	0	///	-	67	///	0	0/0	8	
19	0	///	-	66	///	0	0/0	7	
20	0	///	-	66	///	0	0/0	6	
21	0	///	-	66	///	0	0/0	8	
22	0	///	-	65	///	0	0/0	7	
23	0	///	-	66	///	0	0/0	9	
24	0	1	-	67	////	0	0/0	10	
25	7	1	-	68	////	0	0/0	5	
26	8	3	-	71	////	0	0/0	4	
27	8	12	-	73	////	0	0/0	5	
28	9	21	-	75	////	2	0/0	6	
29	18	16	-	75	////	5	0/0	12	
30	18	32	-	74	////	0	0/0	5	

- R'_i** : provisional international sunspot numbers from the S.I.D.C.
- PPSI** : prompt photometric sunspot index from the S.I.D.C. in 10^{-5} w/m^2 : the quantity to be subtracted from the mean solar constant to account for the sunspot contribution.
- 600** : 600 Mhz solar flux from the station at Humain (Belgium).
- 2800** : 2800 Mhz solar flux from Ottawa (origin : Ursigrams - UGEOI). The 10.7cm Flux data are a service of the National Research Council of Canada.
- COS** : thousands of the cosmic ray counts (origin : Ursigrams - UCOSE Terre Adélie).
- SFI** : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams – UGEOR, evaluation : $1 \times \text{Sn} + 10 \times "1" + 100 \times ">1"$).
- XI** : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams – UGEOR, UGEOI).
- Ak** : geomagnetic index from Wingst, Germany (origin : Ursigrams).
- SEA** : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

SOLAR PHYSICS DEPARTMENT

UCCLE DAILY PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR JUNE 2007

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	1145	2	4	24	0	24	0	3.2	2	AE
2	900	2	13	33	0	33	0	16.7	3	AE
3	848	3	27	57	0	57	11	26.1	3	DB
4	1500	1	41	51	0	51	0	46.2	3	OB
5	1300	2	36	56	0	56	13	57.6	3	OB
6	715	2	34	54	0	54	41	65.1	2	OB
7	1220	3	20	50	0	50	39	25.0	3	OB
8	1230	1	3	13	0	13	13	22.7	1	OB
10	1310	1	2	12	0	12	0	15.8	2	LR
11	1215	1	2	12	0	12	0	3.0	3	AE
12	1230	1	2	12	0	12	0	1.7	3	AE
13	1300	1	1	11	0	11	0	0.0	3	AE
14	1230	0	0	0	0	0	0	0.0	3	OB
15	1430	0	0	0	0	0	0	0.0	3	AE
16	1130	0	0	0	0	0	0	0.0	4	FC
17	845	0	0	0	0	0	0	0.0	3	FC
18	1250	0	0	0	0	0	0	0.0	3	OB
19	1100	0	0	0	0	0	0	0.0	3	OB
20	1110	0	0	0	0	0	0	0.0	3	OB
21	1330	0	0	0	0	0	0	0.0	2	OB
22	950	0	0	0	0	0	0	0.0	3	OB
23	1330	0	0	0	0	0	0	0.0	2	LR
25	1530	1	1	11	0	11	0	0.3	3	AE
26	1400	1	1	11	0	11	0	0.7	2	AE
27	745	1	2	12	0	12	0	12.9	2	AE
28	1445	2	6	26	0	26	0	21.0	3	AE
29	800	2	6	26	0	26	0	2.0	3	AE
30	945	2	5	25	0	25	13	2.4	2	AE

The relative mean sunspot number is 17.7.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS $U'=K'U$ FOR JUNE 2007

$K' = 0.741$ (*)

1	18	7	37	13	8	19	0	25	8
2	24	8	10	14	0	20	0	26	8
3	42	9	***	15	0	21	0	27	9
4	38	10	9	16	0	22	0	28	19
5	41	11	9	17	0	23	0	29	19
6	40	12	9	18	0	24	***	30	19

The normalised relative monthly mean sunspot number is 13.

(*) K' is the mean of the monthly K' for the last five years.

The Sun has been observed 28 days on 30 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR JUNE 2007
E AND F BRUNNER'S TYPE GROUPS

Uccle Nø	East Limb Date	Date and type			West Limb Date
		1st obs	CMP	Last obs	
4-2057	5 31.6	1 D	6 7.4	13 A	6 14.1

PROBABLE RETURN OF MAJOR GROUPS FOR JULY 2007
NONE

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Catania sunspot group 43 (NOAA AR 0960) dominated the flaring activity in the first half of the month. Once the group disappeared, the Sun became spotless until almost the end of the month when a recurrent sunspot group appeared again at the eastern solar limb.

The GOES X-ray flux showed a strongly increasing trend from May 30 onwards. This was a sign for upcoming strong activity. Catania group 43 (NOAA AR 0960) was the last of 3 southern sunspot groups in a row, all located at almost the same latitude. From Jun 01 onwards, group 43 exhibited a series of 10 M-flares. Note that the last M or X flares before this series date back from Dec 2006. From Jun 04 onwards, the magnetic configuration slowly simplified and the subsequent flares were less intensive and less frequent. On Jun 09, a last M1.0 flare took place: small parasitic polarities were clearly distinguishable in magnetograms. At the end of its transit over the solar disk, the group still showed some flaring activity. On Jun 15, a B-flare was measured at the moment the group was already behind the west-limb. None of the flares had an associated proton event. In fact, at the time of most of the M-flares, the group was still located in the eastern solar hemisphere which is less favourable for protons to reach the Earth. No associated halo CMEs were detected.

From the second part of Jun 15 until Jun 26, flaring activity was completely absent. From Jun 27, the background X-ray radiation increased suddenly because of the reappearance of the sunspot groups responsible for the flaring activity in the first half of the month. No new flares above C-level would however be observed.

Five coronal holes (CH) passed the scene this month. We sum some characteristics: the passage at the central meridian (CM) of the most western part of the CH, location, etc.

1. CM passage on May 30, southern, recurrent. The first time a CH was spotted at that place in a regular recurrence pattern was Aug 2006.
2. CM passage on Jun 05, equatorial. This hole was rather faint.
3. CM passage on Jun 10: a small but extended southern CH in the shape of half a circle.
4. CM passage on Jun 17: a recurrent southern CH. The tilted hole stretched over almost 60° east-west and 30° north-south.
5. CM passage on Jun 25, this hole is the same as the first one mentioned.

II. Geomagnetic Activity

The overall geomagnetic activity was low. Kp reached only a few times the value 4.

All geomagnetic disturbances were caused by the coupling of the magnetic field carried by the fast solar wind emanating from CHs with the magnetosphere. There is a one to one relation with the list in the part 'Solar activity' and the geomagnetic disturbances. We list in the same order as above, the arrival of the co-rotating interaction region (CIR). A CIR has a compressed and stronger magnetic field compared with the field carried by the fast coronal solar wind itself. A CIR is in fact the forerunner of this actual high speed solar wind. We indicate the strength of the geomagnetic conditions by the index Kp estimated by NOAA, Boulder.

1. The CIR arrived late May 31. The north-south component of the interplanetary magnetic field was predominantly positive. The solar wind speed reached a maximum value of 550 km. Kp became one 4 on Jun 04.
2. The CIR arrived on Jun 07. The geo-effect of this hole was minor: only unsettled conditions from Jun 08 until Jun 10.
3. The CIR arrived on Jun 13. The solar wind speed reached 600 km/s. Kp was for several periods 4 on Jun 14.
4. The CIR arrived quite abrupt on Jun 21. The influence of this CH was for a long time measurable: from Jun 21 until Jun 24. Active conditions were estimated mainly on Jun 22.
5. The CIR arrived late on Jun 28.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO TYPE	Cat	NOAA	NOTE
09	1330	1348	1405	S10W23	M1.0	2F			43	0960	
04	0506	0513	0516	S07E51	M8.9	3B	130	III/2	43	0960	
03	0151	0159	0204	S10E68	M2.4	SB			43	0960	
03	0206	0212	0216	S10E68	M7.0				43	0960	
03	0636	0641	0643	S06E63	M4.5	SF	330		43	0960	
02	0525	0611	0619	S09E77	M2.5	SF		III/1	43	0960	
02	1028	1035	1041	S09E77	M1.0			III/1	43	0960	
01	0646	0651	0659		M1.0			III/1	43	0960	
01	1435	1459	1511	S08E78	M2.8	SF	100		43	0960	
01	2140	2152	2159	S09E82	M2.1	SF			43	0960	

LOC: approximate heliographic location

XRAY: X-ray flare class

OP: optical flare class

10CM: peak 10 cm radio flux

RADIO TYPE: radio burst type

Cat: Catania sunspot group number

NOAA: NOAA active region number

NOTES: p = proton event

CME = coronal mass ejection

IV. Halo CME list

No CME alert was sent