

Center

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SUNSPOT BULLETIN

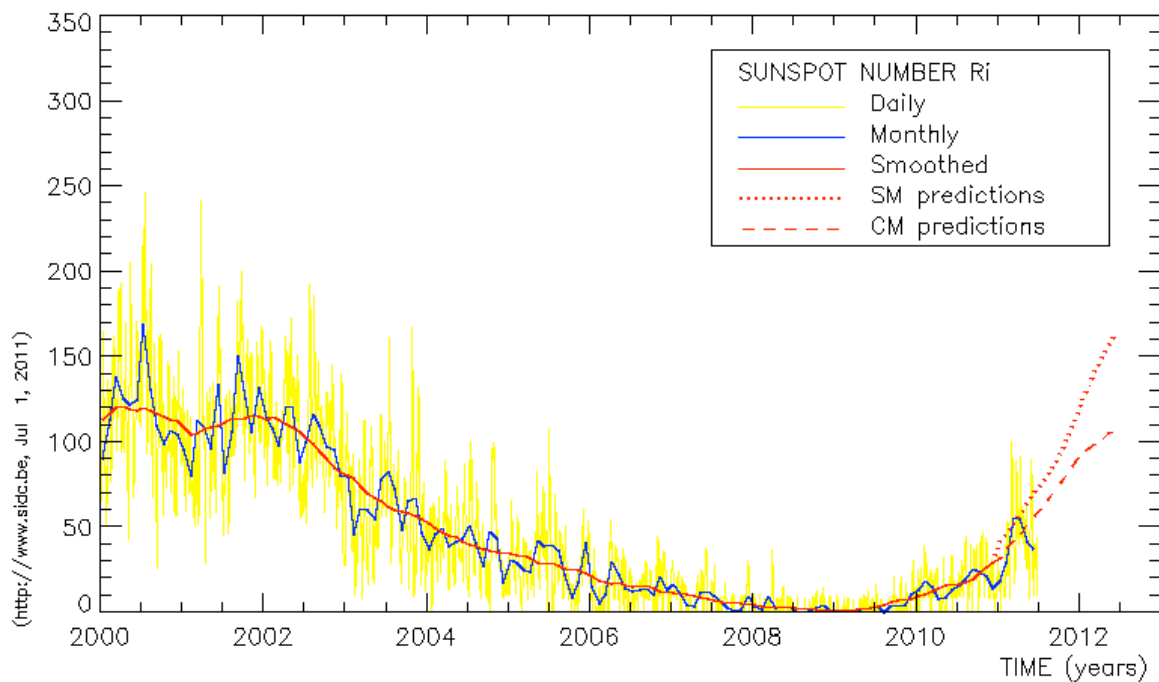
2011

n° 6

Provisional international and normalized hemispheric daily sunspot numbers for June 2011

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	83	52	31
2	89	60	29
3	86	56	30
4	76	46	30
5	53	25	28
6	46	22	24
7	38	22	16
8	30	17	13
9	26	13	13
10	22	9	13
11	15	0	15
12	11	0	11
13	10	0	10
14	24	10	14
15	34	16	18
16	39	19	20
17	39	21	18
18	40	22	18
19	31	15	16
20	26	26	0
21	33	26	7
22	33	23	10
23	38	26	12
24	43	30	13
25	33	25	8
26	18	18	0
27	10	10	0
28	25	17	8
29	27	27	0
30	32	32	0
Monthly mean	37.0	22.8	14.2
Cooperating stations	70	66	66



Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for December 2010: 28.8 ($\pm 5\%$)

		SM	CM			SM	CM			SM	CM
2011	Jan	31	32	2011	Jul	59	61	2012	Jan	95	93
	Feb	33	37		Aug	64	66		Feb	103	96
	Mar	38	42		Sep	70	72		Mar	113	99
	Apr	43	46		Oct	75	77		Apr	124	102
	May	48	52		Nov	81	83		May	134	105
	Jun	53	56		Dec	88	88		Jun	143	107

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 method 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

Brussels, July 1, 2011 13:39 UT
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Ed. Frédéric Clette, Ass. Ed. Petra Vanlommel, with contributions from various members of the SIDC team.
 3, avenue Circulaire, B-1180 Bruxelles, Belgium

Fax: +32(0)2/374.98.22 Tel: +32(0)2/373.02.33 E-mail: arille@oma.be frederic.clette@oma.be

FTP anonymous : omaftp.oma.be, directory: dist/astro/sidcdata
 Web: http://sidc.oma.be, "Sunspots" section in sidebar.

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

Date	R' _i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	76	59	-	112	////	1	0/0	18	
1	83	51	-	114	////	13	0/0	14	
2	89	62	-	112	////	13	0/0	8	
3	86	71	-	107	////	2	0/0	6	
4	76	64	-	103	////	1	0/0	14	
5	53	38	-	103	////	0	0/0	22	
6	46	38	-	100	////	4	0/0	7	
7	38	17	-	96	////	101	1/0	11	
8	30	10	-	90	////	1	0/0	14	
9	26	6	-	88	////	2	0/0	11	
10	22	4	-	87	////	0	0/0	12	
11	15	3	-	85	////	0	0/0	14	
12	11	3	-	85	////	0	0/0	9	
13	10	3	-	87	////	0	0/0	13	
14	24	20	-	99	////	1	1/0	12	
15	34	35	-	102	////	17	0/0	8	
16	39	40	-	103	////	14	0/0	7	
17	39	108	-	104	////	3	0/0	12	
18	40	47	-	99	////	3	0/0	6	
19	31	35	-	99	////	4	0/0	5	
20	26	48	-	96	////	0	0/0	8	
21	33	34	-	///	////	///	///	14	
22	33	21	-	93	////	0	0/0	18	
23	38	30	-	96	////	1	0/0	21	
24	43	37	-	96	////	0	0/0	18	
25	33	13	-	94	////	0	0/0	8	
26	18	5	-	90	////	0	0/0	12	
27	10	2	-	89	////	2	0/0	5	
28	25	3	-	87	////	0	0/0	5	
29	27	14	-	87	////	4	0/0	4	
30	32	19	-	89	////	0	0/0	8	

- 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 : $1 \times \text{Sn} + 10 \times \text{"1"} + 100 \times \text{">1"}$).
- 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 2011

DATE	UT	NUMBER OF		RELATIVE SUNSPOT NUMBERS			PPSI 10-5 WM-2	QUAL	OBS	
		GROUPS	SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	750	5	33	83	42	41	52	40.7	2	OB
2	740	8	49	129	82	47	94	36.1	2	OB
3	745	8	41	121	79	42	86	36.0	3	OB
4	850	7	30	100	61	39	66	34.0	3	OB
5	1105	4	21	61	25	36	38	30.0	2	OB
6	845	4	23	63	29	34	15	29.2	3	OL
7	1016	4	14	54	31	23	14	8.4	3	OL
8	700	4	7	47	25	22	11	3.6	2	OL
9	655	4	6	46	23	23	12	2.4	3	OL
10	945	3	8	38	22	16	0	2.1	2	OL
11	845	3	11	41	22	19	11	1.6	2	OL
12	650	1	9	19	0	19	19	1.2	3	OL
13	1340	1	7	17	0	17	17	1.4	3	OL
14	1325	3	18	48	27	21	33	27.3	2	FC
15	1215	2	22	42	18	24	24	26.3	2	OB
16	600	2	28	48	19	29	0	29.3	2	FC
17	600	3	31	61	23	38	0	30.2	3	FC
18	715	2	28	48	26	22	26	30.2	2	FC
19	825	4	23	63	36	27	48	23.9	3	FC
21	830	1	7	17	17	0	17	5.8	2	OB
22	610	3	15	45	30	15	30	12.4	2	FC
23	705	4	18	58	39	19	45	27.2	3	FC
24	730	4	36	76	51	25	47	6.2	3	OL
26	1130	2	5	25	25	0	13	1.5	2	OB
27	645	1	4	14	14	0	0	1.1	2	AE
28	705	3	10	40	25	15	13	2.4	2	FC
29	1315	2	13	33	33	0	19	8.6	3	AE
30	730	2	13	33	33	0	17	24.2	2	AE

The relative mean sunspot number is 52.5.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR JUNE 2011

K'= 0.741 (*)

1	62	7	40	13	13	19	47	25	***
2	96	8	35	14	36	20	***	26	19
3	90	9	34	15	31	21	13	27	10
4	74	10	28	16	36	22	33	28	30
5	45	11	30	17	45	23	43	29	24
6	47	12	14	18	36	24	56	30	24

The normalised relative monthly mean sunspot number is 39.

(*) 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 2011
E AND F BRUNNER'S TYPE GROUPS

Uccle Nø	East Limb Date	Date and type			West Limb Date
		1st obs	CMP	Last obs	
9-2111	6 13.4	14 D	6 20.1	22 C	6 26.9

PROBABLE RETURN OF MAJOR GROUPS FOR JULY 2011
NONE

NOTE TO THE OBSERVERS: the new individual K scaling coefficients have been updated for 2010. You can access them for your station and other stations by logging in to the usual WOLF data input page, then selecting the "Products New K values" item. To display a full table, then select sub-item "K index values".

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Solar activity started spectacular this month, with fireworks coming in particular from NOAA 1226 and 1227, and gradually decreased in the second half of the month.

The beginning of the period was characterized by a large number of C-flares coming from active regions NOAA 1226 (Cat 98) and NOAA 1227 (Cat 99), that had a beta-gamma-delta classification when they rotated onto the solar disk. Flaring activity on June 1st and 2nd was accompanied with several CMEs heading toward Earth.

On June 4th a large flare was observed by STEREO-A in an active region at the backside as seen from the earth. This flare was associated with a back-sided halo CME. A rise in the proton fluxes was observed, but they remained below the SEP-threshold level, because the active region was too far back-sided to be magnetically connected to the Earth.

On June 07, a prominence between the two active regions became unstable. It erupted in a uniquely, spectacular way: plasma was ejected upwards and fountain wise part of it fell back in the solar corona initiating intensity waves. The plasma cloud was not directed towards Earth. An M2.5 flare was associated to this event. Also proton flux levels made a prompt rise and remained above the event threshold until midday June 08.

A spectacular large filament eruption occurred in the South-East quadrant on June 14 around 8:00UT. This produced a semi-halo CME that was only weakly geo-effective. Later that day, an M1.3 flare erupted from NOAA1236 (peak June 14 21:47UT).

For the remaining of the period, only a long duration C7.7 flare on June 21st was remarkable. It originated from NOAA AR 1236 near the central meridian. The flare was associated with a moderately fast CME (800-1000 km/s), which was observed by the LASCO and COR2 coronagraphs.

II. Geomagnetic Activity

Minor to major storm conditions were observed between June 4 20:00UT and June 5 12:00UT when three interacting ICMEs arrived at Earth, possibly caused by the plasma eruptions on June 1 and 2. Kp had two 3-hour intervals at major storm level 6.

A shock in the solar wind passed at ACE around 10:00UT on June 7, 2011. This magnetic structure is possibly linked with the plasma ejections in the morning of June 5. The estimated Kp index became 5 during the first 3 hours on June 8.

On June 14, the solar wind speed rose to a maximum of 550km/s due to a weak solar wind stream from a small coronal hole. It then returned to a background speed of about 430 km/s. On June 17 around 2:40UT, a shock reaching briefly 550km/s hit the Earth, but there was no associated magnetic cloud. This brief event marked the glancing blow of the June 14 CME.

Towards the end of the period, geomagnetic activity was mostly quiet, with a brief period of active conditions at planetary levels, on June 22 and 23, due to a fast solar wind stream linked to a coronal hole.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	TENCM	TYPE	Cat	NOAA	NOTE
07	0616	0641	0659	S21W54	M2.5	2N	710	II/2,IV/2	98	1226	spectacular filament eruption
14	2136	2147	2210	N15E77	M1.3	SF			10	1236	

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