

Center

Data Analysis Service supported by the FAGS

SUNSPOT BULLETIN

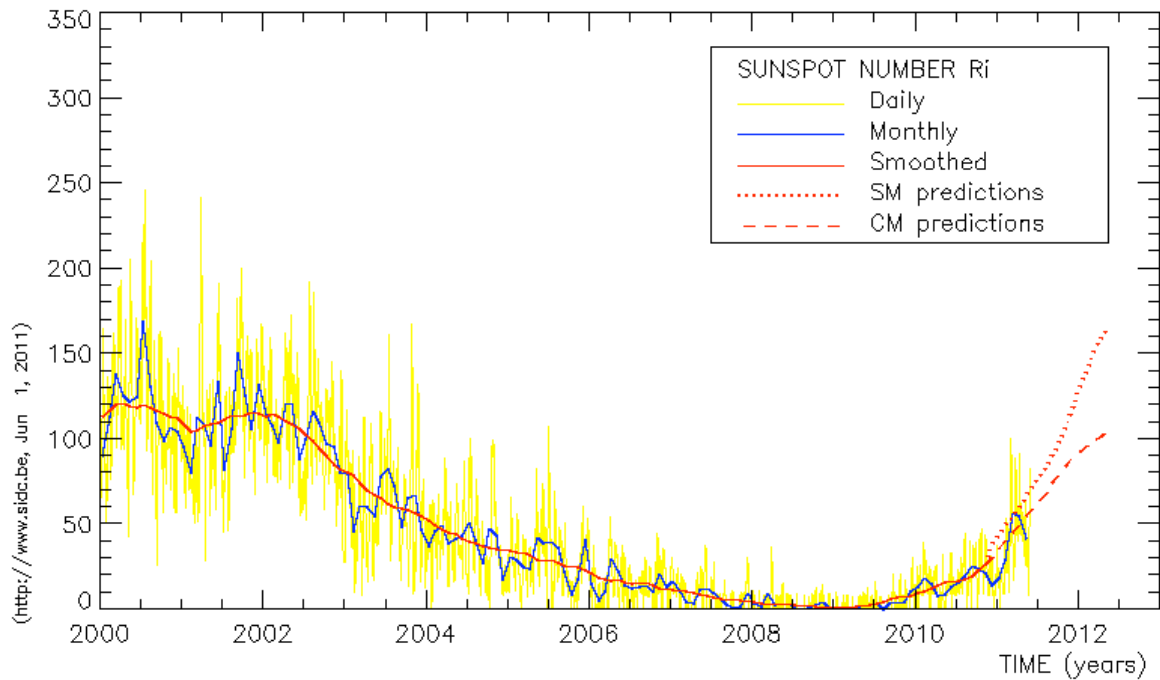
2011

n° 5

Provisional international and normalized hemispheric daily sunspot numbers for May 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	50	38	12
2	39	31	8
3	51	41	10
4	54	45	9
5	54	54	0
6	32	32	0
7	31	31	0
8	45	45	0
9	60	52	8
10	64	64	0
11	47	47	0
12	33	33	0
13	26	26	0
14	37	19	18
15	41	23	18
16	41	12	29
17	36	9	27
18	29	0	29
19	26	0	26
20	25	0	25
21	26	0	26
22	40	19	21
23	22	9	13
24	8	0	8
25	17	9	8
26	30	9	21
27	45	23	22
28	52	24	28
29	70	39	31
30	82	50	32
31	76	43	33
Monthly mean	41.6	26.7	14.9
Cooperating stations	72	69	69



Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for November 2010: 26.5 ($\pm 5\%$)

	SM	CM		SM	CM		SM	CM
2010 Dec	29	30	2011 Jun	56	59	2011 Dec	92	91
2011 Jan	31	35	Jul	61	64	2012 Jan	101	93
Feb	34	41	Aug	67	69	Feb	110	96
Mar	39	45	Sep	73	75	Mar	121	99
Apr	44	50	Oct	79	80	Apr	133	102
May	50	55	Nov	85	85	May	143	105

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, June 1, 2011 09:09 UT
 Reproduction permitted if source mentioned.

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
30	57	23	-	110	////	5	0/0	(32)	
1	50	19	-	106	////	1	0/0	20	
2	39	17	-	110	////	4	0/0	22	
3	51	35	-	107	////	1	0/0	18	
4	54	37	-	107	////	0	0/0	6	
5	54	33	-	105	////	1	0/0	8	
6	32	41	-	102	////	0	0/0	4	
7	31	30	-	102	////	0	0/0	9	
8	45	25	-	102	////	1	0/0	3	
9	60	34	-	104	////	3	0/0	5	
10	64	28	-	98	////	0	0/0	14	
11	47	23	-	94	////	0	0/0	7	
12	33	16	-	93	////	0	0/0	3	
13	26	6	-	92	////	1	0/0	4	
14	37	13	-	91	////	1	0/0	6	
15	41	20	-	95	////	4	0/0	14	
16	41	22	-	92	////	1	0/0	17	
17	36	19	-	92	////	1	0/0	13	
18	29	19	-	91	////	0	0/0	8	
19	26	22	-	84	////	0	0/0	5	
20	25	18	-	84	////	0	0/0	3	
21	26	15	-	84	////	0	0/0	5	
22	40	14	-	85	////	0	0/0	6	
23	22	13	-	84	////	0	0/0	5	
24	8	8	-	82	////	0	0/0	10	
25	17	7	-	80	////	0	0/0	4	
26	30	13	-	83	////	1	0/0	8	
27	45	22	-	90	////	1	0/0	14	
28	52	29	-	101	////	10	1/0	38	
29	70	40	-	111	////	25	1/0	33	
30	82	56	-	112	////	7	0/0	9	
31	76	59	-	112	////	1	0/0	18	

- 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 MAY 2011

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	745	4	8	48	35	13	24	5.0	3	AE
2	720	4	9	49	35	14	0	5.6	2	OB
3	810	5	17	67	54	13	26	7.6	2	OB
4	630	4	9	49	37	12	26	8.2	3	OB
5	630	6	20	80	80	0	45	9.1	3	OB
6	750	2	12	32	32	0	32	7.7	2	OB
7	915	2	10	30	30	0	19	21.5	3	AE
8	945	4	13	53	53	0	0	21.6	2	AE
9	1200	6	25	85	74	11	34	24.8	2	SV
10	815	5	23	73	73	0	38	26.3	3	SV
11	650	5	25	75	75	0	51	28.0	3	OL
12	835	2	3	23	23	0	12	24.2	2	SV
13	655	2	3	23	23	0	12	1.7	3	SV
14	1020	3	9	39	23	16	28	2.7	2	SV
15	730	3	20	50	28	22	22	22.0	3	SV
17	855	3	20	50	12	38	27	6.5	3	OL
18	1115	3	14	44	0	44	0	5.6	2	OL
20	705	3	3	33	0	33	11	3.0	3	OL
21	640	3	3	33	0	33	11	2.9	3	OL
22	720	5	10	60	25	35	22	3.6	4	OL
23	730	2	4	24	13	11	11	7.7	2	AE
24	815	1	1	11	0	11	0	1.9	2	AE
25	740	2	3	23	12	11	12	1.9	3	AE
26	715	3	8	38	11	27	16	2.6	3	FC
28	745	4	16	56	29	27	29	7.7	1	OB
29	1050	5	29	79	44	35	0	14.2	2	OB
30	710	7	35	105	66	39	11	22.7	2	OB
31	1310	6	37	97	49	48	11	27.1	2	OB

The relative mean sunspot number is 51.0.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS $U'=K'U$ FOR MAY 2011

$K'=0.779$ (*)

1	37	7	23	13	18	19	***	25	18
2	38	8	41	14	30	20	26	26	30
3	52	9	66	15	39	21	26	27	***
4	38	10	57	16	***	22	47	28	44
5	62	11	58	17	39	23	19	29	62
6	25	12	18	18	34	24	9	30	82
								31	76

The normalised relative monthly mean sunspot number is 40.

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

The Sun has been observed 28 days on 31 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR MAY 2011
E AND F BRUNNER'S TYPE GROUPS

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR JUNE 2011

NONE

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

There were plenty of C-flares this month and two M-flares. Several CME's ran through the heliosphere.

The background X-ray radiation was situated between the B1 and B2-level from May 01 until May 18. It dropped even to the A-level from May 19 until May 26. From May 27, the radiation picked up (B5-level) with NOAA AR 1226/Cat 98 turning over the East limb of the Sun. The region had a complex magnetic configuration: beta-delta and produced an M-flare on May 28 and May 29.

Worth mentioning is the C5.4 flare of May 09 from a source region behind the east limb. According to the radiation curve, it was classified as a long duration event. The flare was indeed associated with a plasma ejection and a EUV-wave. The source region did not get a NOAA or Catania number in the course of the following week. The event happened in the corona and not at the photospheric level. The post flare loops caused the increase in radiation.

A faint earth-directed CME was observed by STEREO B/COR2 on May 25th. It came into the field of view around 13:24UT. This CME can be linked with the plasma outburst in the NE of the solar disk around that time: see SDO/AIA 304 and 193. At that moment, another outburst is also seen in the SW.

II. Geomagnetic Activity

Three periods with elevated geomagnetic activity occurred. In all three, a coronal hole (CH) was involved. The last disturbance was also partially caused by an interplanetary CME arrival at the magnetosphere.

On Apr 29, a co-rotating interaction region arrived at the ACE spacecraft. From Apr 30, the earth was under the influence of a high speed CH wind stream leading to a period with Kp 5 on Apr 30 and May 02. The influence of the CH faded away during the second half of May 03.

The next geomagnetic disturbance was also introduced by a CH of which the co-rotating interaction region with a compressed magnetic field arrived on May 14. The north-south component of the magnetic field measured by ACE fluctuated between positive and negative values leading to unsettled and active periods from May 15 until May 17.

The last geomagnetic disturbance of this month was caused by the interaction of the fast CH wind stream and an ICME clashing on the magnetosphere. The solar wind rose smoothly from May 27. On May 28, we see a slow rotation of the Bz component of the interplanetary magnetic field from at the L1 point where ACE is monitoring the solar wind. The fact that Bz was negative for a longer period on May 29 and the fact that the kinetic pressure was high (a solar wind speed of more than 700 km/s together with high density) introduced a minor storm during these two days: Kp was 5 for 6 periods.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	TENCM	TYPE	Cat	NOAA	NOTE
28	2109	2150	2201	S20E71	M1.1	SF			98	1226	
29	1008	1033	1108	S22E65	M1.4	1F		II/1	98	1226	CME ~ 550 km/s

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