

Center

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SUNSPOT BULLETIN

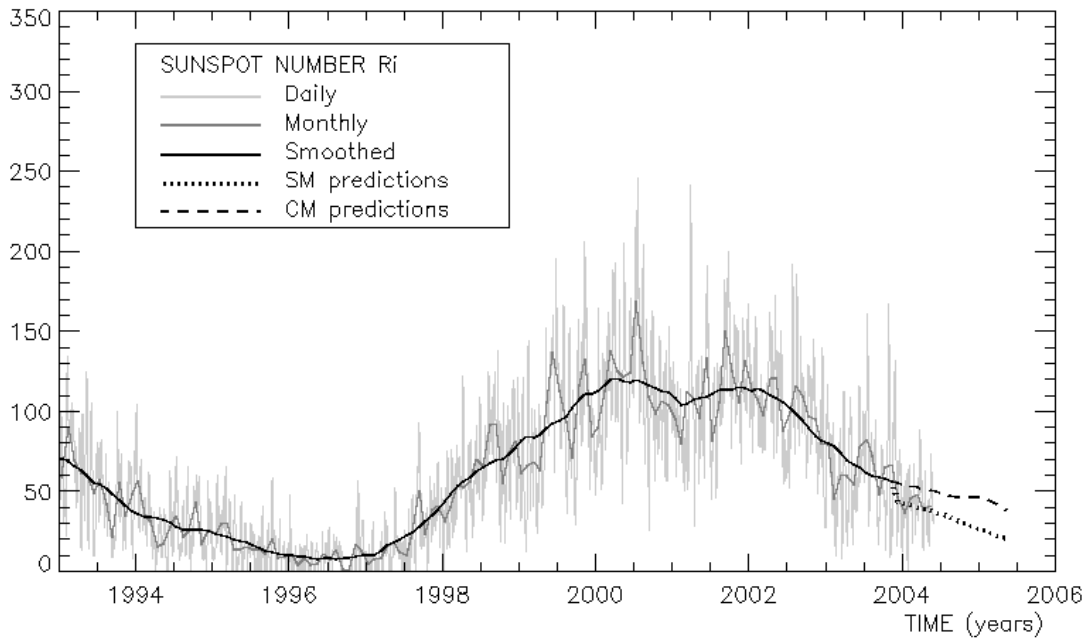
2004

n° 5

Provisional international and normalized hemispheric daily sunspot numbers for May 2004

computed at the *Observatoire Royal de Belgique* using observations from an international network with the *Locarno Specola Solare* as reference station.

Date	R' _I	R' _N	R' _S
1	44	8	36
2	28	0	28
3	32	0	32
4	33	0	33
5	29	0	29
6	20	0	20
7	16	0	16
8	17	0	17
9	24	0	24
10	29	0	29
11	25	0	25
12	40	0	40
13	37	0	37
14	54	12	42
15	58	16	42
16	73	29	44
17	69	24	45
18	60	19	41
19	58	19	39
20	59	17	42
21	52	9	43
22	47	14	33
23	59	9	50
24	62	8	54
25	55	8	47
26	43	8	35
27	32	8	24
28	30	0	30
29	31	0	31
30	35	0	35
31	34	0	34
Monthly mean	41.5	6.7	34.8
Cooperating stations	41	35	35



Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for November 2003 : 56.7 ($\pm 5\%$)

		SM	CM			SM	CM			SM	CM
2003	Dec	53	56	2004	Jun	41	50	2004	Dec	33	47
2004	Jan	49	55		Jul	40	49	2005	Jan	31	47
	Feb	45	54		Aug	38	48		Feb	30	45
	Mar	44	53		Sep	37	47		Mar	28	43
	Apr	43	52		Oct	36	47		Apr	27	41
	May	42	51		Nov	34	47		May	25	39

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
30	34	15	38	89	////	0	0/0	//	
1	44	31	38	94	////	1	0/0	//	
2	28	42	39	98	////	3	0/0	//	
3	32	32	39	91	////	0	0/0	//	
4	33	25	38	87	////	0	0/0	//	
5	29	32	39	89	////	0	0/0	//	
6	20	22	39	86	////	0	0/0	//	
7	16	10	39	85	////	1	0/0	//	
8	17	18	38	87	////	0	0/0	//	
9	24	16	38	93	////	0	0/0	//	
10	29	20	39	93	////	0	0/0	//	
11	25	43	-	90	////	0	0/0	//	
12	40	40	40	99	////	1	0/0	//	
13	37	87	42	101	////	2	0/0	//	
14	54	103	42	110	////	0	0/0	//	
15	58	138	42	115	////	0	0/0	//	
16	73	129	41	118	////	0	0/0	//	
17	69	129	41	111	////	2	0/0	//	
18	60	112	-	108	////	12	0/0	//	
19	58	84	40	109	////	3	0/0	//	
20	59	69	40	105	////	0	0/0	//	
21	52	56	40	107	////	1	1/0	//	
22	47	69	40	102	////	2	0/0	//	
23	59	79	40	104	////	3	0/0	//	
24	62	90	38	105	////	0	0/0	//	
25	55	92	39	102	////	0	0/0	//	
26	43	83	39	103	////	2	0/0	//	
27	32	71	38	102	////	1	0/0	//	
28	30	60	36	102	////	3	0/0	//	
29	31	58	35	101	////	0	0/0	//	
30	35	42	35	100	////	0	0/0	//	
31	34	26	36	95	////	1	0/0	//	

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/m² : 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 x Sn+10 x "1"+100 x ">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 atmospheric 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 2004

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-3 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
2	800	1	17	27	0	27	0	15.9	3	DB
3	1150	2	19	39	0	39	0	34.0	3	OB
4	750	4	23	63	12	51	32	25.7	3	OB
5	655	3	19	49	0	49	24	21.5	3	FC
6	820	2	10	30	0	30	30	26.5	3	OB
9	1135	3	8	38	0	38	0	3.6	2	OB
10	1240	3	6	36	0	36	0	6.6	3	OB
12	800	4	19	59	0	59	41	7.3	2	FC
14	750	4	36	76	17	59	65	78.9	3	OB
15	812	4	38	78	22	56	67	92.8	3	SG
16	832	6	43	103	37	66	56	100.0	2	SG
17	815	5	49	99	34	65	40	97.3	3	OB
18	650	6	35	95	29	66	29	96.9	3	FC
19	700	7	31	101	36	65	31	82.3	3	OB
20	915	6	30	90	23	67	48	68.0	2	AZ
21	1250	5	31	81	14	67	25	45.3	2	AZ
22	750	4	32	72	11	61	11	45.3	3	FC
23	835	4	51	91	14	77	14	61.6	3	FC
24	950	4	34	74	11	63	39	70.8	3	OB
25	645	4	49	89	11	78	53	74.0	3	FC
26	647	3	46	76	11	65	54	71.5	3	OB
27	757	2	47	67	11	56	56	62.7	3	OB
28	730	1	27	37	0	37	0	51.6	3	OB
29	945	2	16	36	0	36	0	36.8	2	ER

The relative mean sunspot number is 66.9.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS $U'=K'U$ FOR MAY 2004

$K' = 0.779$ (*)

1	***	7	***	13	***	19	79	25	69
2	21	8	***	14	59	20	70	26	59
3	30	9	30	15	61	21	63	27	52
4	49	10	28	16	80	22	56	28	29
5	38	11	***	17	77	23	71	29	28
6	23	12	46	18	74	24	58	30	***
								31	***

The normalised relative monthly mean sunspot number is 52.
 (*) K' is the mean of the monthly K' for the last five years.

The Sun has been observed 24 days on 31 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR MAY 2004
 E AND F BRUNNER'S TYPE GROUPS

Uccle Nø	East Limb Date	Date and type			West Limb Date
		1st obs	CMP	Last obs	
18-2015	4 22.8	30 A	4 29.6	5 E	5 6.3
5-2016	5 8.2	9 C	5 15.0	21 E	5 21.7
14-2016	5 19.1	20 C	5 25.8	29 E	6 1.6

PROBABLE RETURN OF MAJOR GROUPS FOR JUNE 2004

Nø	New East Limb	New CMP	New West Limb
18	5 19.9	5 26.7	6 2.4
5	6 5.0	6 11.7	6 18.5
14	6 15.0	6 21.8	6 28.5

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Solar activity was rather on the low side during May 2004. On many days the solar X-ray output remained at the B-level, and only one M-class flare was observed over the whole of the month: an M2.6 flare peaked at 23:52UT on May 21. No enhancements of the high-energy proton fluxes were observed this month.

At the end of April, Catania sunspot group 18 (NOAA 0601) had suddenly popped up from nowhere and grew really fast into a beta-configuration. This group was the source of two active periods on May 1 and May 2, with as largest flares respectively a C9.5 and a C8.3. Thereafter, its activity decreased as fast as it had grown, and the X-ray background dropped to A-level even before the group rotated behind the west limb on May 06. From May 03 until May 12, only B-flares and a single C1.0 flare (on May 07) were produced. On May 10 a partial halo CME was seen, probably associated with a B1.9 flare from Catania sunspot group 21 (NOAA 0604) peaking at 03:55UT.

From May 12 on, sunspot group 26 (NOAA 0609) entered on the scene releasing a C1.3 flare. Until May 16, this group was the only notable flaring source. It produced three more C-flares on May 13, including a C7.7. The fast growth of this group is worth mentioning: the group consisted of only a few small dots on May 12, but on May 14 it was already visible with the naked eye! On May 15, it generated 2 more C-flares, but thereafter it became quieter, even though it continued to grow in area for a few more days. On May 16, sunspot group 31 (NOAA 0614) developed at the western side of the solar disk, producing a C7.0 flare on May 17, just before leaving the solar disk.

The next day, another sunspot group made its flaring entry while rotating over the east limb. It was group 34 (NOAA 0618), which grew to a beta-gamma-delta magnetic configuration on May 23. It dominated the flaring scene on the sun for the last 10 days of the month. On May 21, it released an M2.6 event at 23:52UT, the only large flare in May 2004. The group was also the seat of many C-class flares (more than 20), though there were also several days when only B-class flares were observed.

Two filament eruptions were seen on May 19 and May 20. The first one was ejected in the north-west direction, the second one north-east. These two CMEs were clearly visible in the LASCO images of that period. On the night of 24-25 May a northern filament across the central meridian erupted. On May 27 another filament erupted from the centre of the disk. No corresponding CMEs were seen at the time.

II. Geomagnetic Activity

Geomagnetic conditions were mostly quiet this month, with occasional active periods. On May 11-12, a short stretch of minor storm conditions ($K=5$) was observed in the geomagnetic observatories of Wingst, Niemeck and Izmiran.

At the start of the month the solar wind speed was decreasing, down to 350 km/s on May 02. Starting on May 04, a trans-equatorial coronal hole directed a weak high-speed stream towards the Earth. It reached a peak velocity of about 580km/s late on May 05, and then slowly decayed. This stream finally ended late on May 09. The geomagnetic field remained

mostly quiet during this period. Active conditions were temporarily recorded on May 05 and May 07.

The solar wind speed stayed at a plateau slightly above 400 km/s from May 10 until May 14. On May 15 it started to decrease to 300 km/s. In this period, short active intervals (K=4) occurred frequently. On May 11-12, minor geomagnetic storm conditions (K=5) were recorded in Wingst, Niemeck and Izmiran, although the estimated Kp index in NOAA reached at most 4 on these days. From May 15 to May 19, geomagnetic conditions remained quiet.

On May 19, the solar wind speed increased from below 350 km/s up to 530 km/s. From May 22 onwards the speed decreased a bit but it stayed near 500 km/s until May 25. Two coronal holes were the possible cause for this enhancement. The first one was situated in the southern hemisphere, near the meridian. The second hole possibly connected with the first one (since they had the same polarity looking at MDI) was situated more to the left and in the northern hemisphere. The fact that two holes were in the game explains the stretched form of the solar wind speed curve. The most active day in this period was May 20 at the moment that the fast coronal hole wind stream pushed the speed to higher values. The north-south component of the interplanetary magnetic field reached at that time values down to -10nT. Boulder reported a Kp index of 5 on May 20, Wingst had indices of 5 on May 19 and 4 on May 20 and 21.

From May 25 onwards, the solar wind speed fell back from 500 to 350 km/s. K-indices stayed at quiet levels until May 29. On May 28 the Earth entered the influence zone of a northern high wind stream coronal hole, leading to active intervals with K=4 on May 29, 30 and 31.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO	TYPE	600 (Humain)	Cat	NOAA	NOTE
21	2337	2352	0024	S11E55	M2.6	SF	220						34 0618 EIT derived loc.

loc: approximate heliographic location
Xray: X-ray flare class
op: optical flare class
10 cm: 10 cm radio flux
type: type of radio burst

600: peak time (UT) of 600 Mhz radio bursts in Humain
Cat: Catania sunspot group identification
NOAA: NOAA active region identification
p: proton event
CME: Coronal Mass Ejection