

## Center

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**SUNSPOT BULLETIN**

2003 n° 1

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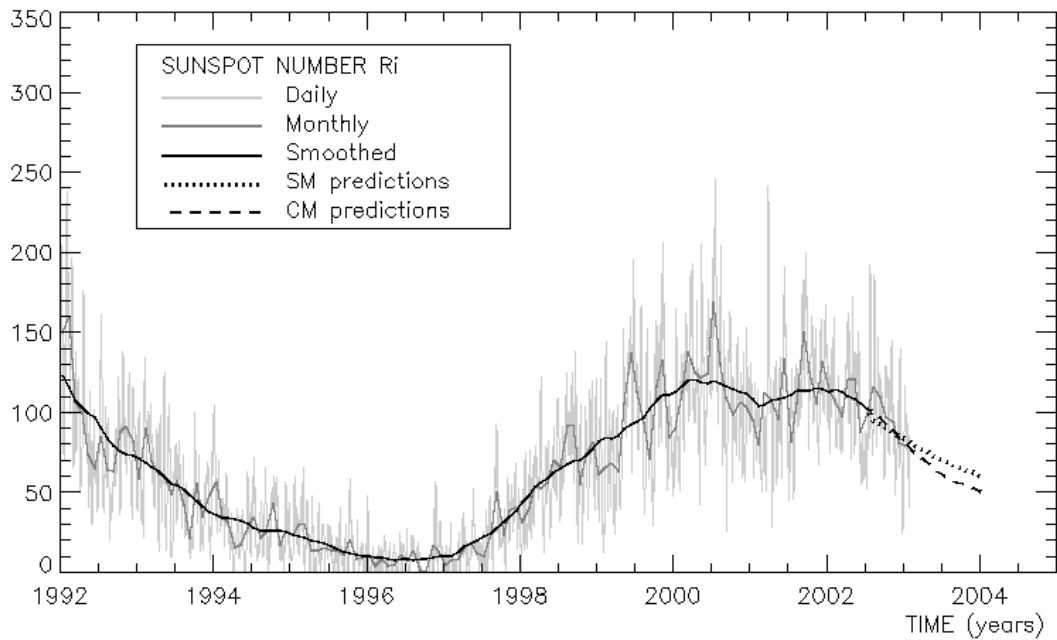
**Provisional international and normalized hemispheric daily sunspot numbers for January 2003**


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

Date	R' <sub>I</sub>	R' <sub>N</sub>	R' <sub>S</sub>
1	31	8	23
2	27	7	20
3	66	14	52
4	65	8	57
5	68	8	60
6	86	18	68
7	90	15	75
8	108	10	98
9	109	8	101
10	117	10	107
11	117	12	105
12	104	9	95
13	94	0	94
14	94	22	72
15	84	25	59
16	84	32	52
17	81	36	45
18	77	38	39
19	87	45	42
20	93	51	42
21	68	34	34
22	86	34	52
23	70	24	46
24	76	22	54
25	59	14	45
26	72	12	60
27	80	21	59
28	85	22	63
29	84	14	70
30	62	13	49
31	41	8	33
<b>Monthly mean</b>	<b>79.5</b>	<b>19.2</b>	<b>60.3</b>
<b>Cooperating stations</b>	<b>39</b>	<b>33</b>	<b>33</b>

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**Predictions of the monthly smoothed Sunspot Number**  
using the last provisional value, calculated for July 2002 : 102. ( $\pm 5\%$ )

		SM	CM			SM	CM			SM	CM
2002	Aug	102	101	2003	Feb	88	77	2003	Aug	74	58
	Sep	99	97		Mar	86	73		Sep	72	57
	Oct	98	93		Apr	84	70		Oct	71	56
	Nov	96	89		May	81	67		Nov	69	54
	Dec	93	85		Jun	79	64		Dec	67	52
2003	Jan	91	81		Jul	77	61	2004	Jan	66	50

**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' <sub>i</sub>	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	33	35	54	115	847	0	0/0	7	
1	31	25	47	115	-	0	0/0	8	
2	27	25	-	118	847	1	0/0	8	
3	66	33	-	138	840	8	0/0	28	
4	65	76	59	143	843	12	0/0	20	
5	68	98	63	148	844	7	0/0	10	
6	86	108	58	162	846	2	0/0	(10)	
7	90	108	61	163	845	17	2/0	8	
8	108	130	-	174	847	22	0/0	4	
9	109	138	-	183	848	39	1/0	4	
10	117	143	-	185	842	2	0/0	16	
11	117	176	-	189	845	11	0/0	12	
12	104	159	-	173	845	2	0/0	8	
13	94	128	-	172	852	4	0/0	8	
14	94	163	59	164	847	0	0/0	12	
15	84	123	59	150	849	1	0/0	7	
16	84	99	57	145	835	20	0/0	6	
17	81	82	57	142	855	1	0/0	6	
18	77	75	-	137	855	0	0/0	15	
19	87	72	54	130	855	1	0/0	21	
20	93	55	51	138	851	4	0/0	18	
21	68	105	-	134	851	5	1/0	21	
22	86	54	53	130	850	13	1/0	21	
23	70	74	-	136	844	29	2/0	17	
24	76	91	53	130	832	23	1/0	22	
25	59	93	53	129	826	1	0/0	25	
26	72	84	51	125	-	1	0/0	22	
27	80	71	50	121	819	2	0/0	12	
28	85	70	-	126	827	0	0/0	16	
29	84	67	52	124	830	1	0/0	21	
30	62	44	52	121	833	10	0/0	20	
31	41	29	50	120	837	0	0/0	15	

- R'<sub>i</sub>** : provisional international sunspot numbers from the S.I.D.C.
- PPSI** : prompt photometric sunspot index from the S.I.D.C. in  $10^{-5} \text{ w/m}^2$  : 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 JANUARY 2003

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-3 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
2	1040	2	9	29	14	15	15	27.0	2	FC
3	930	7	33	103	22	81	15	28.3	2	FC
5	1100	5	54	104	13	91	32	114.8	3	EV
6	1010	7	63	133	24	109	80	188.0	2	OB
8	1030	8	53	133	14	119	77	133.2	2	OB
9	1300	8	93	173	12	161	84	162.3	2	OB
10	1400	8	63	143	11	132	32	129.1	2	ST
11	1000	8	68	148	16	132	39	146.1	2	OB
16	1045	9	24	114	39	75	36	43.5	3	ST
17	1400	9	35	125	54	71	34	45.4	2	OB
21	1300	10	39	139	54	85	32	33.6	3	OB
24	1110	7	61	131	32	99	56	106.1	3	OB
25	900	4	33	73	12	61	61	108.3	2	DB

The relative mean sunspot number is 119.1.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR JANUARY 2003

$$K' = 0.882 (*)$$

1	***	7	***	13	***	19	***	25	64
2	26	8	117	14	***	20	***	26	***
3	91	9	153	15	***	21	123	27	***
4	***	10	126	16	101	22	***	28	***
5	92	11	131	17	110	23	***	29	***
6	117	12	***	18	***	24	116	30	***
								31	***

The normalised relative monthly mean sunspot number is 105.

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

The Sun has been observed 13 days on 31 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR JANUARY 2003  
E AND F BRUNNER'S TYPE GROUPS

Uccle Nø	East Limb Date	Date and type			West Limb Date
		1st obs	CMP	Last obs	
6-1998	12 25.8	3 C	1 1.5	6 E	1 8.3
7-1998	12 31.5	3 D	1 7.3	11 G	1 14.0
8-1998	1 1.2	3 C	1 7.9	11 B	1 14.7
14-1998	1 5.7	8 D	1 12.4	17 B	1 19.2
16-1998	1 7.4	8 D	1 14.2	17 C	1 20.9
1-1999	1 18.3	21 D	1 25.0	25 E	1 31.8

PROBABLE RETURN OF MAJOR GROUPS FOR FEBRUARY 2003

Nø	New East Limb	New CMP	New West Limb
6	1 21.9	1 28.7	2 4.4
7	1 27.8	2 3.6	2 10.3
1	2 14.3	2 21.1	2 27.8

<http://sidc.oma.be>

# MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

## I. Solar Activity

Solar activity was low beginning of the month but increased from Jan 3, with C-flares originated from two new sunspot groups Cat 02 (NOAA 0242) and Cat 03 (NOAA 0244). A non-earth directed CME on Jan 3 was associated with an erupting solar filament. Solar activity became then moderate on Jan 7, with some isolated M-Class flares, produced by active regions Cat 03 (NOAA 0244) and Cat 13 (NOAA 0251). Solar activity remained then low to moderate with Cat regions 02 (NOAA242) and 13 (NOAA0251). The 10.7 cm flux, which has been growing constantly since Jan 1, started to decrease on Jan 13. Solar activity became the low to very low. There was a flareless filament eruption near central meridian on Jan 17 which triggered a semi-halo CME. From Jan 21 to 24, the activity became moderate. Several active regions (Cat 30-NOAA 0269, Cat20-NOAA 0260 and Cat 25- NOAA 0266) produced M class flares. Solar activity remained then low until the end of the month. However, two spectacular prominence eruptions were observed on Jan 27 and 30, the second followed by a full-halo CME.

## II. Geomagnetic Activity

A small trans-equatorial coronal produced active conditions on Jan 3 and 4, with a peak at minor storm level. Similar conditions were observed on Jan 10. From Jan 18 to 25, The field index reached often minor storm levels, also due to coronal hole activity. Two other minor geomagnetic storms were also recorded, on Jan 29-30 and Jan 31 the latter being probably due to CME material arrival. Outside of these activity periods, the field was quiet to unsettled.

## III. noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	TYPE	Cat	NOAA	NOTE
07	0729	0750	0811	S24E07	M1.0	1F		III/1	03	0244	
07	2325	2333	2340	S1 E89	M4.9	SF	81		13	0251	EIT deriv. location
09	0127	0139	0203	S07W24	C9.8	1F		III/1	02	0242	
09	0532	0537	0544	S14E64	M1.0	1N			13	0251	
21	1459	1526	1552	S07E90	M1.9		380		30	0269	EIT deriv. location
22	0435	0444	0450	N15W05	M1.2	1F			20	0260	
23	0442	0448	0456		M1.0				25	0266	
23	1228	1243	1249	S22E17	M2.5	1N	76	II/2	25	0266	
24	0312	0327	0340	S22E10	M1.9	1N	97	II/3, III/2	25	0266	

**Xray:** Xray flare class

**op:** optical flare class

**10 cm:** radio flux on 10 cm

**type:** type of radio-burst

**Cat:** Catania sunspot group identification

**NOAA:** NOAA active region identification

**p:** proton event

**CME:** Coronal Mass Ejection