

Center

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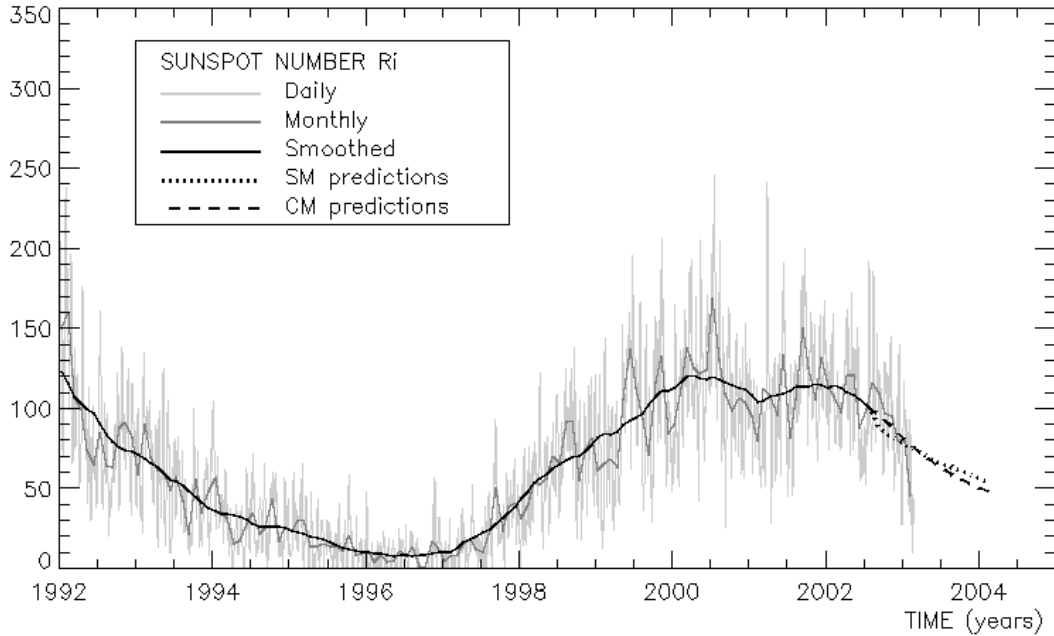
SUNSPOT BULLETIN

2003 n° 2

Provisional international and normalized hemispheric daily sunspot numbers for February 2003

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	40	7	33
2	43	0	43
3	36	0	36
4	35	0	35
5	54	11	43
6	68	14	54
7	82	23	59
8	87	31	56
9	93	32	61
10	73	22	51
11	73	27	46
12	71	29	42
13	59	28	31
14	45	22	23
15	31	23	8
16	22	22	0
17	10	10	0
18	20	20	0
19	33	33	0
20	44	37	7
21	46	37	9
22	34	26	8
23	28	28	0
24	28	28	0
25	32	22	10
26	30	21	9
27	43	10	33
28	34	11	23
Monthly mean	46.2	20.5	25.7
Cooperating stations	38	33	33



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for August 2002 : 98.7 ($\pm 5\%$)

	SM	CM		SM	CM		SM	CM
2002 Sep	97	97	2003 Mar	81	74	2003 Sep	68	57
Oct	93	93	Apr	79	71	Oct	66	56
Nov	91	89	May	76	68	Nov	65	54
Dec	88	85	Jun	74	65	Dec	63	52
2003 Jan	86	81	Jul	72	63	2004 Jan	61	50
Feb	83	78	Aug	70	60	Feb	60	49

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	41	29	50	120	837	0	0/0	15	
1	40	27	-	126	843	3	1/0	21	
2	43	28	-	127	840	5	0/0	48	
3	36	48	-	133	830	0	0/0	29	
4	35	50	-	135	848	1	0/0	31	
5	54	49	-	140	855	3	0/0	16	
6	68	53	-	150	854	26	1/0	14	
7	82	47	-	147	856	2	0/0	15	
8	87	43	-	139	862	0	0/0	18	
9	93	51	-	141	862	2	0/0	24	
10	73	35	-	136	857	0	0/0	16	
11	73	37	-	135	853	2	0/0	10	
12	71	39	-	132	856	14	0/0	20	
13	59	21	-	131	852	3	0/0	11	
14	45	17	-	131	850	0	1/0	20	
15	31	9	-	124	845	1	0/0	24	
16	22	7	-	119	846	0	0/0	21	
17	10	3	-	112	842	0	0/0	13	
18	20	4	-	110	829	0	0/0	24	
19	33	29	-	116	822	7	0/0	15	
20	44	71	-	118	826	2	0/0	21	
21	46	73	-	120	829	3	0/0	16	
22	34	70	-	107	841	5	0/0	13	
23	28	63	-	104	840	0	0/0	12	
24	28	43	-	102	845	1	0/0	7	
25	32	27	-	102	846	2	0/0	5	
26	30	18	-	109	849	1	0/0	12	
27	43	14	-	118	851	0	0/0	32	
28	34	20	-	125	851	2	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/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, UGEOI).
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 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 FEBRUARY 2003

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-3 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
4	905	2	23	43	0	43	17	26.3	2	OB
10	850	8	35	115	42	73	91	19.8	2	OB
11	1025	8	28	108	36	72	68	26.8	4	VI
13	1115	7	10	80	25	55	33	10.2	2	ST
14	1405	6	16	76	40	36	37	11.5	3	OB
15	1115	1	4	14	14	0	0	0.5	2	RV
16	945	7	16	86	61	25	26	3.5	2	OB
17	1110	1	7	17	17	0	0	0.7	2	OB
18	845	2	6	26	26	0	0	1.2	3	ST
19	1320	3	7	37	37	0	12	48.7	2	OB
20	1325	4	24	64	64	0	24	87.8	2	OB
21	1345	4	43	83	66	17	83	63.7	3	OB
22	1030	3	34	64	52	12	64	63.2	3	EV
23	1004	2	35	55	55	0	43	59.3	3	EV
24	1405	2	24	44	44	0	0	51.6	3	OB
25	930	3	13	43	29	14	14	44.5	3	OB
26	1310	3	5	35	24	11	11	12.4	3	OB
27	1445	5	15	65	11	54	0	6.7	3	OB
28	905	4	15	55	11	44	0	3.8	3	OB

The relative mean sunspot number is 58.4.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR FEBRUARY 2003

$$K' = 0.926 (*)$$

1	***	7	***	13	74	19	34	25	40
2	***	8	***	14	70	20	59	26	32
3	***	9	***	15	13	21	77	27	60
4	40	10	106	16	80	22	59	28	51
5	***	11	100	17	16	23	51		
6	***	12	***	18	24	24	41		

The normalised relative monthly mean sunspot number is 54.

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

The Sun has been observed 19 days on 28 possible.

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

Uccle Nø	East Limb Date	Date and type			West Limb Date
		1st obs	CMP	Last obs	
4-2000	2 15.5	19 D	2 22.3	25 E	3 1.0

PROBABLE RETURN OF MAJOR GROUPS FOR MARCH 2003
NONE

<http://sidc.oma.be>

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SIDC DEFINITIVE INTERNATIONAL AND HEMISPHERIC SUNSPOT NUMBERS FOR 2002

Date	OCTOBER			NOVEMBER			DECEMBER		
	Ri	Rn	Rs	Ri	Rn	Rs	Ri	Rn	Rs
1	58	39	19	124	98	26	72	24	48
2	70	44	26	115	77	38	66	32	34
3	67	41	26	123	78	45	64	37	27
4	60	39	21	107	62	45	80	51	29
5	76	41	35	122	64	58	82	53	29
6	81	41	40	137	76	61	82	54	28
7	79	40	39	145	70	75	79	49	30
8	101	57	44	122	48	74	98	53	45
9	106	51	55	129	51	78	107	53	54
10	129	76	53	126	43	83	94	24	70
11	121	79	42	114	29	85	74	26	48
12	122	78	44	100	9	91	65	18	47
13	119	70	49	94	9	85	75	25	50
14	114	61	53	104	24	80	124	48	76
15	116	54	62	102	34	68	119	54	65
16	128	52	76	89	23	66	129	69	60
17	110	42	68	91	23	68	140	71	69
18	118	40	78	83	24	59	134	59	75
19	120	46	74	74	10	64	134	51	83
20	122	62	60	94	22	72	124	50	74
21	93	52	41	82	23	59	112	41	71
22	88	52	36	79	19	60	104	32	72
23	77	51	26	77	16	61	75	19	56
24	73	55	18	67	19	48	57	18	39
25	77	61	16	56	19	37	35	18	17
26	81	59	22	49	23	26	32	15	17
27	84	59	25	68	35	33	29	14	15
28	87	53	34	70	37	33	27	20	7
29	114	66	48	61	36	25	31	20	11
30	120	81	39	61	25	36	29	14	15
31	110	86	24				33	9	24
MEAN :	97.5	55.7	41.8	95.5	37.5	58.0	80.8	36.2	44.6

The Definitive yearly Sunspot Number for 2002 is 104.0

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Solar activity was very low to low during the whole month, with some isolated peaks at moderate level. The large Catania sunspot group 39 (NOAA 0276) reached a beta-gamma configuration but produced only a significant C4.5 limb event on Feb 15, before disappearing.

Catania group 44 (NOAA0278) produced a M-flare on Feb 6, but showed no other significant activity. Two other groups of some importance were Catania 45 (NOAA0280) and 51 (NOAA0284). The first produced a C8.7 on Feb 12 accompanied by a CME partly earth-directed. On Feb 14 a few C-flares due to the second occurred in at the western solar limb, culminating in a M1.2 flare. The last significant event was a beautiful prominence eruption observed by EIT from the SW limb on Feb 26.

II. Geomagnetic Activity

The most prominent geomagnetic event ($K_p = 5-6$) was a storm that started on Feb 1 and was ongoing the following day. This storm was caused by the full halo CME that left the Sun on Jan 30. During the whole month, several peaks at active to minor storm levels were observed, essentially due to coronal hole activity (on Feb 3-4, 9, 12, 14, 19, 26-28). A small shock due to the arrival of the Feb 12 CME contributed also to the geomagnetic activity on Feb 14.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	TYPE	Cat	NOAA	NOTE
01	0848	0905	0938	S15E71	M1.2				39	0276	
06	0330	0349	0401	N19E63	M1.2				44	0278	EIT-location
14	0908	0918	0921	N13W86	M1.2	SF			51	0284	

Xray: Xray flare class

op: optical flare class

10 cm: radio flux on 10 cm

type: type of radio-burst

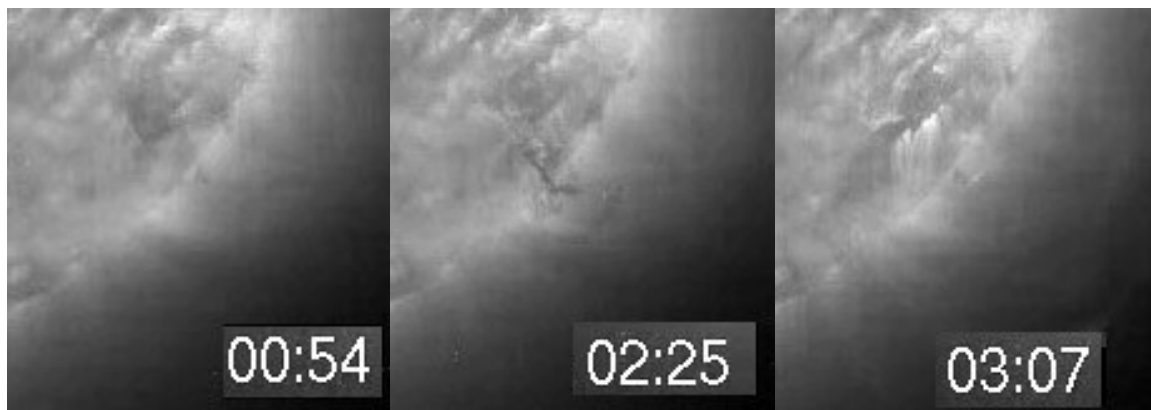
Cat: Catania sunspot group identification

NOAA: NOAA active region identification

p: proton event

CME: Coronal Mass Ejection

IV. Picture of the month



The prominence eruption of February 26 2003, observed by EIT at 195 Å.