

Center

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SUNSPOT BULLETIN

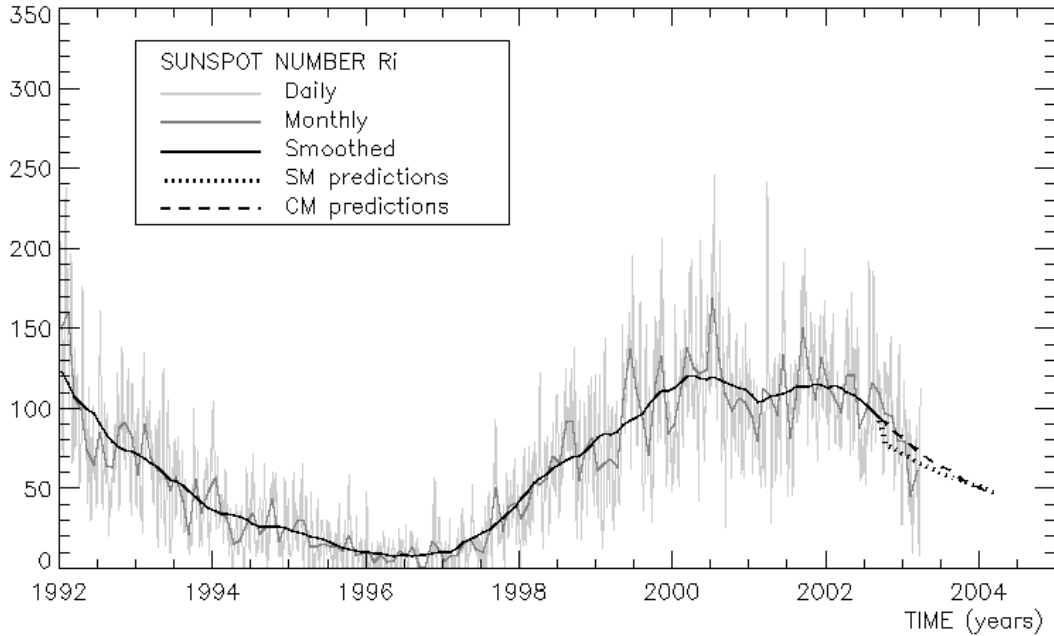
2003

n° 3

Provisional international and normalized hemispheric daily sunspot numbers for March 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	48	14	34
2	59	19	40
3	62	25	37
4	80	40	40
5	72	44	28
6	63	39	24
7	79	49	30
8	66	35	31
9	89	45	44
10	71	30	41
11	69	38	31
12	56	35	21
13	45	34	11
14	58	33	25
15	63	33	30
16	62	29	33
17	41	14	27
18	43	14	29
19	39	11	28
20	29	8	21
21	23	0	23
22	8	0	8
23	30	15	15
24	33	25	8
25	52	37	15
26	75	50	25
27	81	54	27
28	91	56	35
29	112	58	54
30	106	53	53
31	102	49	53
Monthly mean	61.5	31.8	29.7
Cooperating stations	43	36	36



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for September 2002 : 94.6 ($\pm 5\%$)

		SM	CM			SM	CM			SM	CM
2002	Oct	90	92	2003	Apr	72	71	2003	Oct	60	56
	Nov	88	88		May	70	68		Nov	58	54
	Dec	81	84		Jun	67	66		Dec	57	52
2003	Jan	78	81		Jul	65	64	2004	Jan	55	50
	Feb	76	78		Aug	63	62		Feb	54	49
	Mar	74	74		Sep	61	59		Mar	53	48

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
28	34	20	-	125	851	2	0/0	(//)	
1	48	28	-	138	855	2	0/0	19	
2	59	46	-	147	851	5	0/0	15	
3	62	62	-	149	854	0	0/0	31	
4	80	84	-	146	847	0	0/0	32	
5	72	90	-	149	852	2	0/0	21	
6	63	77	-	150	853	0	0/0	26	
7	79	78	-	150	865	0	0/0	16	
8	66	81	-	148	856	2	0/0	9	
9	89	95	-	153	852	6	0/0	16	
10	71	78	-	144	848	1	0/0	21	
11	69	93	-	142	856	1	0/0	14	
12	56	92	-	138	852	1	0/0	10	
13	45	100	-	134	856	1	0/0	14	
14	58	101	-	139	852	0	0/0	24	
15	63	115	-	131	847	1	0/0	29	
16	62	117	-	129	844	2	0/0	31	
17	41	86	-	125	845	11	0/1	45	
18	43	61	-	118	849	45	2/1	24	
19	39	41	-	108	842	225	4/0	14	
20	29	14	-	97	831	11	1/0	25	
21	23	4	-	91	839	0	0/0	28	
22	8	3	-	89	850	0	0/0	19	
23	30	5	-	93	853	0	0/0	25	
24	33	17	-	98	851	0	0/0	8	
25	52	24	-	109	833	5	0/0	4	
26	75	44	-	127	850	3	0/0	8	
27	81	104	-	141	846	0	0/0	21	
28	91	129	-	147	838	0	0/0	29	
29	112	123	-	155	837	16	0/0	38	
30	106	139	-	155	832	1	0/0	38	
31	102	132	-	160	831	2	0/0	39	

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 MARCH 2003

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-3 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
3	1315	6	23	83	45	38	26	52.5	3	OB
4	1050	6	35	95	53	42	30	64.2	2	OB
6	1445	5	15	65	39	26	53	65.9	3	OB
7	820	8	32	112	70	42	65	70.3	3	OB
8	1010	8	42	122	71	51	92	72.3	3	FC
9	1245	12	49	169	89	80	46	84.7	3	FC
10	1100	4	10	50	35	15	0	53.7	1	OB
12	1000	7	31	101	69	32	57	96.9	3	OB
13	1400	5	25	75	61	14	49	94.8	3	OB
14	850	5	38	88	51	37	64	83.0	3	OB
15	950	6	54	114	56	58	89	134.7	2	ST
16	1000	5	51	101	46	55	42	115.9	2	ST
17	820	3	39	69	19	50	0	92.7	3	FC
18	1500	3	41	71	17	54	0	57.4	3	OB
19	1430	3	27	57	12	45	0	38.8	3	OB
20	1000	3	16	46	14	32	14	17.2	3	OB
21	1104	1	1	11	0	11	11	5.0	3	JY
22	820	1	1	11	0	11	11	5.8	3	DB
23	927	3	15	45	15	30	13	7.2	3	DB
24	1350	4	18	58	43	15	15	27.7	3	OB
25	1100	4	13	53	41	12	0	25.8	2	OB
26	845	7	38	108	68	40	49	53.6	3	OB
27	940	7	69	139	98	41	68	147.7	3	OB
28	1045	7	55	125	83	42	56	147.5	4	OB
29	1130	8	88	168	85	83	82	157.6	3	OB
30	1100	8	58	138	67	71	85	158.4	3	OB
31	900	8	70	150	70	80	81	188.2	4	OB

The relative mean sunspot number is 89.8.

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

$$K' = 0.811 (*)$$

1	***	7	91	13	61	19	46	25	43
2	***	8	99	14	71	20	37	26	88
3	67	9	137	15	92	21	9	27	113
4	77	10	41	16	82	22	9	28	101
5	***	11	***	17	56	23	36	29	136
6	53	12	82	18	58	24	47	30	112
								31	122

The normalised relative monthly mean sunspot number is 73.

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

The Sun has been observed 27 days on 31 possible.

<http://sidc.oma.be>

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Solar activity was low to very low until March 16, however with a few big active regions which came rotating into the view at the solar limb. They produced only a few C-flares. The largest active regions were NOAA0296 (Beta-gamma) and NOAA0306, which passed the East limb on March 7. The activity increased then abruptly to high levels, due to the development of active region NOAA0314 to a beta-gamma-delta configuration, which produced two X-class and several M-class flares, as well as numerous C-flares. The group remained by far the dominant source of solar activity until it rotated from view on March 21. By that time however, its activity had already dwindled to much lower levels. Many CMEs were observed, including several that were associated with flares from AR 314. The two halo CMEs observed on March 18 and 19 were determined to be back-sided. On March 18 a spectacular filament eruption occurred from the southwest quadrant of the sun. A nearly simultaneous eruption from the east limb was captured in beautiful pictures made by the EIT instrument in the 304 and 195 passbands (see picture of the month). The sunspot index increased then sharply. In fact, a large activity complex consisting of NOAA AR 0321, 0323, 0319 and 0318 dominated the solar corona. Except NOAA0318, all these active regions went through a phase of beta-gamma magnetic configuration, but the activity remained at low level until the end of the month.

A large filament on the NE limb erupted in a peculiar arch like appearance, late on March 28. There were no halo CMEs during the period.

II. Geomagnetic Activity

The geomagnetic field was mostly unsettled to active at the beginning of the month, with brief minor storms on March 3 and March 6. This elevated activity was due to southward oscillations of the interplanetary magnetic field. The Earth was under the influence of a high speed solar wind stream (550 km/s) between March 3 and March 7, because of the presence of a low-latitude coronal hole in the N-W quadrant of the solar disc. The geomagnetic activity continued to be governed essentially by coronal hole activity. From 14 onwards, the Bz component of the IP field was predominantly negative and the solar wind velocity between 600 and 700 km/sec. As a consequence, the geomagnetic field was mostly active with peaks at minor storm level. A high activity was recorded on March 17, when the Wingst K-index reached 6. The solar wind speed was high, reaching up to nearly 900km/s, while the Bz component of the interplanetary magnetic field was oscillating. The geomagnetic field became quiet on March 24 to 26, but the influence of another coronal hole began late March 26 up till late March 29. The maximum solar wind speed, of about 500 km/s, was reached on March 27, and brought the geomagnetic activity minor storm levels during the last days of the month.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	TYPE	Cat	NOAA	NOTE
17	1850	1905	1916	S14W39	X1.5	1B	520	III/2		0314	CME
18	0030	0037	0042	S14W44	M1.6	1N		III/3		0314	
18	0551	0600	0602	S14W46	M2.5	1B	36	III/1		0314	
18	1151	1208	1220	S15W46	X1.5	1B	1400	III/2, II/3, IV/2		0314	CME
19	0258	0307	0421		M1.5		52	III/1			CME
19	0636	0646	0649	S12W60	M1.6	2F				0314	
19	0934	0953	1000	S15W57	M3.7	1N	30			0314	
19	1325	1332	1338	S07W61	M1.4	2F	34			0314	
20	1125	1131	1137	S04W75	M1.5	1F	210			0314	

Xray: Xray flare class

op: optical flare class

10 cm: radio flux on 10 cm

type: type of radio-burst

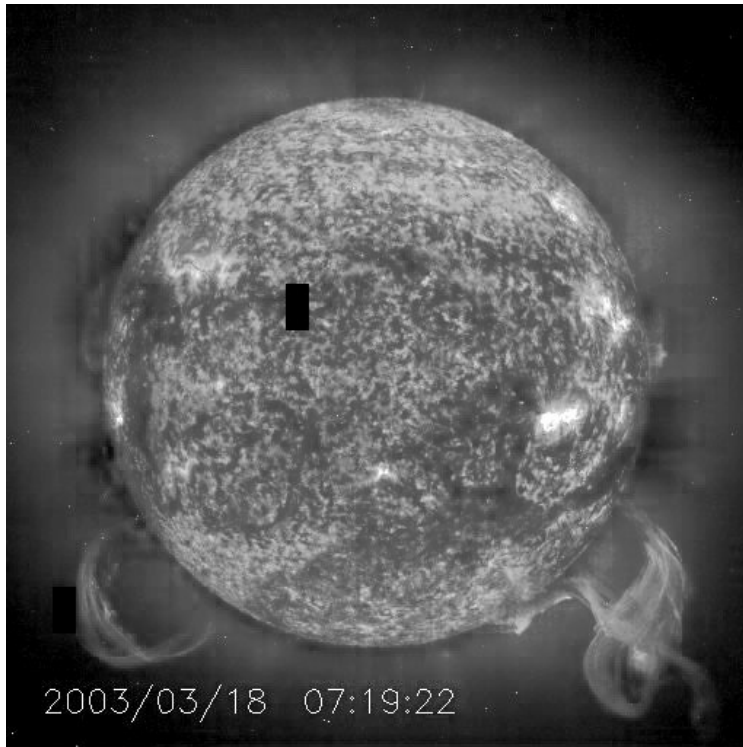
Cat: Catania sunspot group identification

NOAA: NOAA active region identification

p: proton event

CME: Coronal Mass Ejection

IV. Picture of the month



The spectacular prominences observed at the solar limb on March 18 by the EUV telescope EIT on board SOHO, in the passband 304 Å. The erupting prominence at the S-W limb was associated with a CME.