Solar Influences Data analysis Center

Data Analysis Service supported by the FAGS

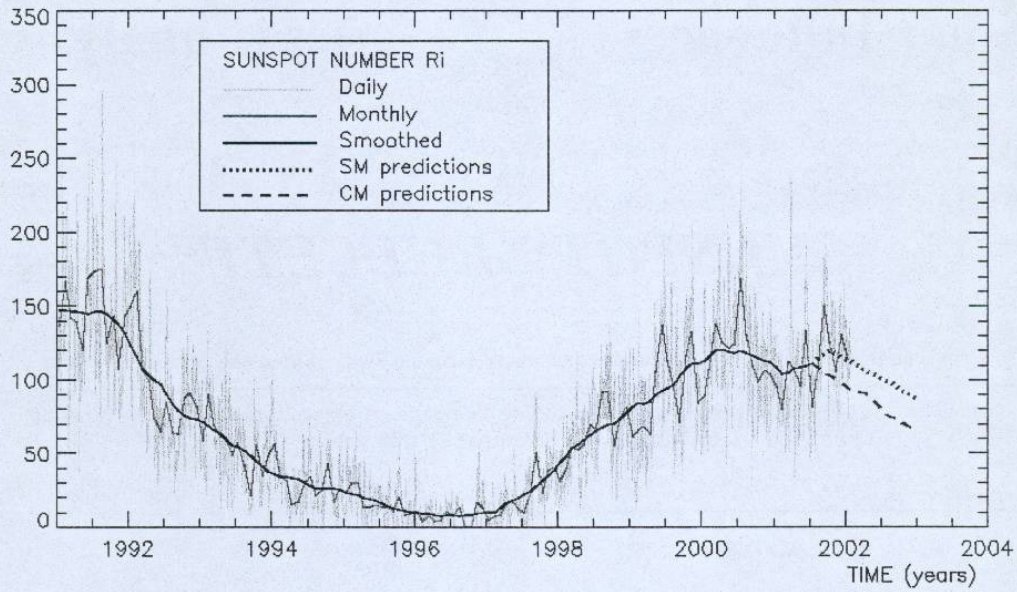
SUNSPOT BULLETIN

2002 n° 1

Provisional international and normalized hemispheric daily sunspot numbers for January 2002

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	136	58	78
2	135	57	78
3	136	50	86
4	142	50	92
5	118	38	80
6	98	38	60
7	90	34	56
8	100	45	55
9	121	54	67
10	115	51	64
11	129	57	72
12	129	57	72
13	124	52	72
14	122	50	72
15	104	46	58
16	87	36	51
17	74	37	37
18	86	40	46
19	93	51	42
20	109	53	56
21	118	55	63
22	120	48	72
23	140	56	84
24	109	36	73
25	103	52	51
26	106	49	57
27	118	57	61
28	121	52	69
29	116	51	65
30	119	45	74
31	112	49	63
Monthly mean	**113.9**	**48.5**	**65.4**
Cooperating stations	**46**	**36**	**36**



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for July 2001 : 111.7 (± 5%)

	SM	CM		SM	CM		SM	CM
2001 Aug	115	109	2002 Feb	112	93	2002 Aug	99	75
Sep	118	106	Mar	110	92	Sep	96	74
Oct	120	103	Apr	107	91	Oct	94	72
Nov	118	101	May	105	88	Nov	92	69
Dec	116	99	Jun	103	84	Dec	89	67
2002 Jan	114	95	Jul	101	79	2003 Jan	87	66

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	135	136	75	246	515	14	0/0	18	
1	136	203	81	232	-	1	0/0	8	
2	135	179	77	231	683	24	2/0	9	
3	136	203	79	220	-	21	0/0	3	
4	142	152	73	218	817	26	1/0	4	
5	118	181	76	212	826	26	1/0	3	
6	98	172	73	197	832	15	0/0	2	
7	90	157	68	189	841	18	0/0	9	
8	100	128	69	199	843	16	0/0	10	
9	121	134	70	229	844	125	2/0	2	
10	115	161	74	225	845	15	0/0	20	
11	129	180	77	229	808	12	1/0	29	
12	129	188	78	233	804	31	4/0	18	
13	124	138	100	241	850	30	2/0	15	
14	122	138	77	229	822	107	4/0	8	
15	104	129	74	218	819	11	0/0	9	
16	87	122	75	216	-	11	1/0	4	
17	74	163	74	212	840	1	0/0	10	
18	86	129	75	211	846	0	0/0	6	
19	93	103	75	214	844	3	1/0	14	
20	109	128	74	222	835	6	0/0	10	
21	118	171	71	225	836	6	0/0	14	
22	120	157	74	229	841	4	1/0	6	
23	140	192	77	227	846	5	0/0	12	
24	109	136	76	231	-	3	0/0	5	
25	103	198	72	235	845	3	0/0	12	
26	106	186	74	240	848	6	1/0	8	
27	118	168	69	248	846	3	0/0	9	
28	121	138	67	260	833	8	0/0	8	
29	116	146	72	261	827	7	0/0	5	
30	119	184	78	256	830	1	0/0	3	
31	112	189	78	243	826	4	1/0	8	

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 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 atmospherics from Uccle & Humain (Royal Observatory, Belgium).

Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.

DEPARTEMENT DE RADIOASTRONOMIE ET PHYSIQUE SOLAIRE

UCCLE DAILY PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR JANUARY 2002

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-3 WM-2	QUAL	OBS
2	955	11	66	176	78	98	62	183.0	3	DC
3	1010	11	58	168	61	107	89	189.6	2	OB
4	815	11	26	136	55	81	58	174.0	1	DC
5	1220	11	58	168	59	109	80	115.6	4	PC
8	1015	10	34	134	58	76	47	94.1	3	DC
9	935	9	79	169	73	96	73	134.7	4	OB
10	1000	8	45	125	49	76	62	139.5	1	DC
13	1045	9	44	134	54	80	17	109.0	1	ST
16	1235	8	42	122	51	71	82	122.3	3	OB
19	1145	7	27	97	44	53	41	111.0	4	ST
22	845	11	49	159	59	100	56	86.0	3	DC
25	850	6	13	73	38	35	24	45.4	1	DC
28	1025	11	50	160	77	83	44	58.5	4	DC
29	840	9	57	147	60	87	64	107.5	3	DC
30	915	9	55	145	54	91	79	113.7	1	DC
31	755	7	77	147	62	85	93	162.3	3	DC

The Sun has been observed 16 days on 31 possible.
The relative mean sunspot number is 141.3.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR JANUARY 2002

K'= .882 (*)

1	***	7	***	13	118	19	85	25	64
2	155	8	118	14	***	20	***	26	***
3	148	9	149	15	***	21	***	27	***
4	119	10	110	16	107	22	140	28	141
5	148	11	***	17	***	23	***	29	129
6	***	12	***	18	***	24	***	30	127
								31	129

The Sun has been observed 16 days on 31 possible.
The normalized relative monthly mean Wolf number is 124.

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

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR JANUARY 2002
E AND F BRUNNER'S TYPE GROUPS

Uccle Nø	East Limb Date	Date and type 1st obs	CMP	Last obs	West Limb Date
21-1984	12 20.2	23 D	12 27.0	2 A	1 2.7
37-1984	12 30.0	2 E	1 5.7	10 H	1 12.5
2-1985	1 3.0	4 C	1 9.7	13 E	1 16.5
21-1985	1 23.9	25 C	1 30.6	31 E	2 6.4
25-1985	1 25.7	28 D	2 1.5	31 E	2 8.2

PROBABLE RETURN OF MAJOR GROUPS FOR FEBRUARY 2002

Nø	New East Limb	New CMP	New West Limb
21	1 16.9	1 23.7	1 30.4
2	1 30.0	2 5.7	2 12.5
21	2 19.8	2 26.5	3 5.3

SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

1. Solar activity:

Solar activity started at moderate levels with a M2.4/1n flare on Jan 2, produced by Catania region 31 (NOAA 9754). A C3.7 flare on Jan 4 was associated with an eruptive prominence near the NE limb and a spectacular CME. The most active region was at that time Catania region 56 (NOAA 9773) which produced a M1/Sf flare on Jan 4 at 17h49 UT, and a M1.9/1f flare on Jan 5. Catania region 49 (NOAA 9767) conserved a beta-gamma complexity, but exhibited low activity. The > 10 MeV proton event that began on Dec 30 remained above threshold until Jan 4. The activity increased then regularly, starting with a C9.6 flare on Jan 8, associated with a prominence eruption and a CME from the NW quadrant. Most of the M-flares that followed were produced by Catania groups 56 (NOAA 9773) with a beta-gamma-delta configuration and 60 (NOAA 9775) which evolved to a beta-gamma configuration. The > 10 MeV proton event that began on Jan 10 reached its maximum on Jan 11 around 6UT, but remained above threshold until Jan 13. The proton flux briefly exceeded again the threshold on 15-16 Jan, before returning to quiet levels. On Jan 14, the Sun produced 4 M-flares, the largest one an M4.4 with an associated coronal mass ejection from behind the solar limb. Thereafter, solar activity fell back to low levels, with only two more M-flares. Solar activity remained at low to moderate levels until the end of the month. Isolated M-flares were observed from Catania regions 81 (NOAA 9791) and 96 (NOAA 9802). Also noteworthy was a C7.1 flare with very long duration and associated CME which originated behind the east limb of the Sun on Jan 24. A filament eruption took place on Jan 28, with associated CME. At the end of the period, Catania regions 93 (NOAA 9800) and 96 (NOAA 9802) developped complex magnetic configurations.

2. Geomagnetic activity:

The geomagnetic field was at quiet to unsettled levels at the beginning of the period. The solar wind velocity peaked around 460 km/s on Jan 8 due probably to the impact of theak halo CME of Jan 4. Because of an extended south equatorial coronal hole, the solar wind started regaining speed on Jan 10 (up to 600 km/s) and caused a minor geomagnetic storm. Active and unsettled conditions were then observed, before the field returned to quiet levels, with brief periods of unsettled conditions on Jan 17 and Jan 19, associated with increased solar wind speed and density on these days. This situation continued untill the end of the month, with brief periods of active conditions observed at Wingst, on Jan 21, 23 and 25.

3. Noticeable events summary

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO TYPE	Cat.	NOAA	NOTE
02	1248	1252	1255	S07W68	M2.4	1N	33		31	9754	
02	2144	2148	2151		M1.1		120				
04	0924	0952	1035	N38E87	C3.7			II/1			NE limb/prom.erup./CME
05	1819	1840	1851	N14E53	M1.9	1F			56	9773	
08	1814	2025	2139		C9.6						likely NW limb/prom.erup./CME
09	1101	1113	1130	N13E08	M1.6	1F			56	9773	
09	1742	1801	1812	N13W02	M9.5	2B	230	III/1	56	9773	
11	0753	0807	0831	S19W79	M1.0	SF	25		49	9767	
12	0307	0322	0338	S07W19	M1.1	SF			60	9775	
12	1505	1519	1533	S05W26	M1.7	1N			60	9775	
12	1832	1843	1903		M3.4						
12	1925	1929	1934	S11W39	M1.3	SF	27		60	9775	
13	0304	0310	0313	N17W40	M1.4	1N	23	III/2	56	9773	partial halo CME?
13	1935	1946	1949	S07W48	M2.2	SF	110		60	9775	
14	0120	0136	0144	S07W52	M1.0	SF			60	9775	
14	0152	0156	0203	N05E44	M1.7	2N	140		70	9782	
14	0529	0627	0825		M4.4			II/1			
14	2235	2246	2258	S05W65	M1.1	SF		III/1	60	9775	
16	1005	1013	1018	S05W75	M1.5	SF			60	9775	
19	1000	1005	1007	S08E64	M1.2	SF	100		77	9787	
22	0852	0900	0903	S02W37	M1.3	1N			81	9791	
26	1926	2005	2034	S15E78	M1.3	SF			96	9802	
31	1436	1444	1450		M3.6						