Solar Influences Data analysis Center

Data Analysis Service supported by the FAGS

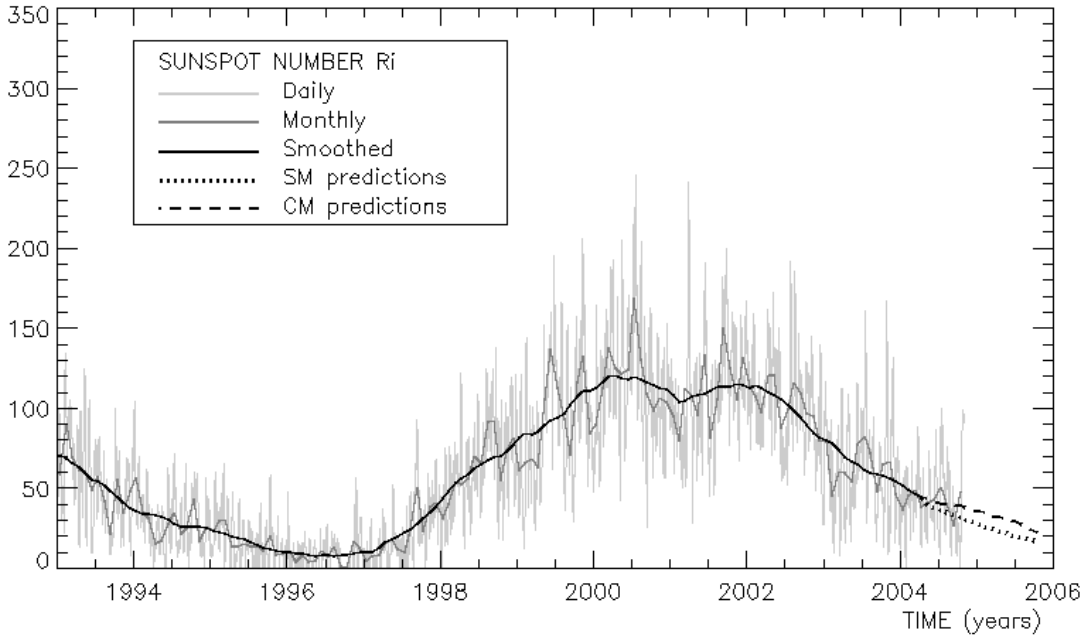
SUNSPOT BULLETIN

2004 n°10

Provisional international and normalized hemispheric daily sunspot numbers for October 2004

computed at the *Royal Observatory of Belgium* using observations from an international network with the *Locarno Specola Solare* as reference station.

Date	R'_I	R'_N	R'_S
1	20	0	20
2	16	0	16
3	28	9	19
4	27	8	19
5	21	0	21
6	17	0	17
7	22	0	22
8	23	9	14
9	10	10	0
10	0	0	0
11	12	6	6
12	12	12	0
13	20	10	10
14	20	8	12
15	16	0	16
16	18	0	18
17	44	0	44
18	54	0	54
19	60	7	53
20	66	10	56
21	76	18	58
22	80	28	52
23	93	41	52
24	99	54	45
25	90	59	31
26	91	64	27
27	94	56	38
28	96	60	36
29	89	55	34
30	96	51	45
31	91	43	48
Monthly mean	**48.4**	**19.9**	**28.5**
Cooperating stations	**45**	**39**	**39**



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for April 2004 : 45.5 (± 5%)

	SM	CM		SM	CM		SM	CM
2004 May	42	44	2004 Nov	36	38	2005 May	27	32
Jun	42	42	Dec	34	37	Jun	25	31
Jul	41	41	2005 Jan	33	36	Jul	24	29
Aug	40	41	Feb	31	35	Aug	23	27
Sep	39	41	Mar	30	34	Sep	22	25
Oct	37	40	Apr	28	33	Oct	21	23

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

Brussels, November 1, 2004 10:56 UT

Ed. Ronald Van der Linden, avenue Circulaire, 3 B-1180 BRUXELLES - BELGIUM
Fax 32-(0)2-373 02 24 Tel 32-(0)2-373 04 91
e-mail : arille@oma.be, ronald@oma.be
ftp anonymous : omaftp.oma.be, directory dist/astro/sidcdata
http://sidc.oma.be

S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R'_i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
30	31	36	37	88	909	0	0/0	4	
1	20	31	37	88	909	0	0/0	4	
2	16	34	39	88	909	0	0/0	10	
3	28	34	39	89	912	0	0/0	16	
4	27	26	39	91	915	0	0/0	16	
5	21	17	40	91	919	0	0/0	6	
6	17	9	40	92	919	0	0/0	3	
7	22	5	39	94	920	0	0/0	2	
8	23	5	38	91	919	0	0/0	6	
9	10	2	39	88	915	0	0/0	7	
10	0	1	39	89	918	0	0/0	12	
11	12	1	41	87	920	0	0/0	14	
12	12	2	40	88	925	0	0/0	12	
13	20	7	39	87	922	0	0/0	31	
14	20	20	39	91	920	0	0/0	24	
15	16	28	37	89	920	0	0/0	14	
16	18	39	37	92	921	0	0/0	4	
17	44	43	38	92	922	0	0/0	2	
18	54	50	38	96	928	0	0/0	4	
19	60	52	40	99	929	0	0/0	6	
20	66	71	40	111	923	1	1/0	12	
21	76	83	40	112	924	9	0/0	9	
22	80	86	42	123	931	13	1/0	8	
23	93	118	42	132	930	4	0/0	4	
24	99	141	45	135	927	14	1/0	12	
25	90	179	45	140	918	3	0/0	13	
26	91	169	41	137	918	1	0/0	1	
27	94	177	46	130	923	1	0/0	4	
28	96	151	47	///	925	5	0/0	3	
29	89	166	47	129	925	4	0/0	8	
30	96	160	100	136	925	16	4/1	21	
31	91	215	48	139	921	3	2/0	18	

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.

SOLAR PHYSICS DEPARTMENT

UCCLE DAILY PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR OCTOBER 2004

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
1	913	2	2	22	0	22	11	33.4	2	VI
2	830	2	2	22	0	22	11	33.8	1	FC
3	820	3	12	42	14	28	42	36.8	3	FC
4	1110	3	9	39	12	27	16	30.8	2	OB
6	910	3	7	37	13	24	0	8.3	3	OB
8	1215	2	4	24	13	11	11	1.4	2	OB
9	850	1	1	11	11	0	0	0.8	1	AZ
10	800	0	0	0	0	0	0	0.0	1	ER
11	850	0	0	0	0	0	0	0.0	2	OB
12	1050	0	0	0	0	0	0	0.0	3	OB
13	830	2	13	33	16	17	16	1.6	2	OB
14	750	2	15	35	13	22	0	9.6	2	OB
15	825	1	18	28	0	28	0	12.6	3	OB
17	1140	3	48	78	0	78	31	26.4	2	OB
18	1300	4	33	73	0	73	44	33.2	2	OB
19	840	4	32	72	0	72	58	35.9	3	OB
21	820	6	53	113	21	92	52	92.0	3	OB
22	1018	6	41	101	33	68	36	80.9	3	VI
24	1000	8	49	129	73	56	56	94.4	3	ER
25	835	6	81	141	105	36	86	125.5	2	OB
26	830	8	53	133	99	34	97	100.0	3	OB
27	1055	8	43	123	75	48	112	98.5	3	OB

The relative mean sunspot number is 57.1.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR OCTOBER 2004

K'= 0.831 (*)

1	18	7	***	13	27	19	60	25	117
2	18	8	20	14	29	20	***	26	111
3	35	9	9	15	23	21	94	27	102
4	32	10	0	16	***	22	84	28	***
5	***	11	0	17	65	23	***	29	***
6	31	12	0	18	61	24	107	30	***
								31	***

The normalised relative monthly mean sunspot number is 47.

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

The Sun has been observed 22 days on 31 possible.

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

Uccle Nø	East Limb Date	Date and type 1st obs	CMP	Last obs	West Limb Date
2-2022	10 11.8	13 C	10 18.5	22 E	10 25.3
8-2022	10 18.7	22 D	10 25.5	27 E	11 1.2

PROBABLE RETURN OF MAJOR GROUPS FOR NOVEMBER 2004

Nø	New East Limb	New CMP	New West Limb
8	11 15.6	11 22.3	11 29.1

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

October started with a long period of very low solar activity accompanying a nearly spotless sun. Things took a very steep turn, however, in the second half of the month, with sunspot number and flaring activity rapidly rising due to the development of some large and active groups. Towards the end of the month, this culminated in an X1.2 flare amidst a sequence of M-flares.

Solar activity was very low at the start of the month. A few small sunspot groups produced small B-flares, while the X-ray background hovered near the A5 level. From Oct 04 onwards, a plage area without observed sunspots pushed up the X-ray background level and produced a C-class flare every day on Oct 04m, 05 and 06. A large filament erupted on Oct 07, producing a slow CME (median speed v=225 km/s) with an angular width of about 94 degrees directed to the S-SW. Late in the UT day on Oct 07, the X-ray background increased further to low B-level, but no significant flares were seen on Oct 07-08. On Oct 09-10 Catania sunspot group 35 (NOAA 0678) produced a sequence of B- and small C-flares while turning off-disk. With the disappearance of this sunspot group, the solar X-ray output and flaring activity strongly decreased, while the sun became spotless for a brief period. The International Sunspot Number was 0 for the second time this year on Oct 10!

On Oct 13-14, a sunspot group at the east limb boosted solar activity. Two C-flares originated from this new group, Catania 39 (NOAA 0682, probable return of NOAA 0673). The sun became very quiet again for a few days thereafter, but following this, it took a new start. On Oct 17 several sunspot groups started developing. The flaring activity and background X-ray radiation started to increase on Oct 19. On Oct 20, sunspot group 49 (NOAA 0687) rotated over the east limb and generated a short duration M2.6 flare. Late on Oct 21, it produced a C9.9 flare, and on Oct 22, an M2.1 flare. On Oct 23, once again a C9.9 flare occurred and on Oct 24 an M2.3 flare. Several eastward CMEs accompanied these flares; none of them were geo-effective.

Solar activity was relatively low from Oct 25 to 29, with occasional C-flares. Catania 49, which had a beta-gamma magnetic configuration, remained the dominant group until Oct 27, but it started to decay after this day, and only produced a few more C-flares. Another medium-sized active region (Catania 57, NOAA 0693) appeared at the SE limb on Oct 27, but again it only produced C-flares. A third active region of smaller extent, Catania 52 (NOAA 0691), had taken a complex beta-gamma-delta configuration, but with hardly any flaring activity until Oct 29. Then, new opposite polarities emerged around the leading sunspot, triggering a fast succession of M-flares and an X1.2 flare at 11:38UT on Oct 30, the largest flare of the month.

A slow halo-CME was detected on Oct 27 without a clearly identified source. At least one semi-halo CME was associated with the multiple M-flares of Oct 30. A small enhancement of the > 10MeV proton flux was observed on Oct 30, but it did not reach the event threshold.

II. Geomagnetic Activity

October was a fairly quiet month for geomagnetic activity, with only occasional active conditions (K=4) on Oct 02-04 and after Oct 20, and minor storm conditions on Oct 13-14.

All was quiet on Oct 01, with a solar wind speed down to 300km/s on Oct 02, after which it jumped again to about 380km/s. Most probably, this marked the arrival at Earth of the Sep 28 CME. The associated southward fluctuations of the IMF lasted for two days (Oct 02-03) and

induced active geomagnetic conditions on those two days. Geomagnetic conditions remained quiet during the next week, with a solar wind speed varying between 280 and 450 km/s.

On Oct 12, from 18:00UT, the solar wind coming from a small southern coronal hole reached the earth. The coronal hole wind reached a maximum of 550 km/s on Oct 14. The IMF peaked on Oct 13, with a Bz down to -10nT. From Oct 12, at the end of the day until Oct 14 lead to perturbed geomagnetic conditions. Niemegk (Germany) measured geomagnetic activity indices up to 5, NOAA estimated the same maximum value for Kp.

The influence of another small coronal hole was first visible in ACE data late on Oct 18. On Oct 20, another northern coronal hole passed the central meridian. From Oct 23, it started to push the solar wind speed up which reached a maximum value of 500 km/s in the period between late Oct 24 and the end of Oct 25. The first hole was a recurrent one, which on the last rotation disturbed the geomagnetic field up to values of 5 for K (Niemegk) and Kp (NOAA estimated). This time, the strength of the coronal hole was less: from late Oct 20 until Oct 21, the Niemegk K-index and the estimated Kp reached 4 a few times. The second, non-recurrent coronal hole had the largest influence on Oct 24-25 with Kp reaching 4. The influence of the coronal hole decayed slowly from Oct 26 to Oct 29, when the solar wind speed reached a minimum of 280km/s. The geomagnetic field remained quiet until Oct 29.

Thereafter, the Earth entered a new stream originating in another low-latitude coronal hole. On Oct 30 and 31, the wind speed increased to 430km/s, with negative excursions of the Bz component of the interplanetary magnetic field. In response, the geomagnetic field became active on Oct 30-31.

Several slow semi-halo CMEs detected on Oct 22, 23, 24 and 27 had no or very weak geomagnetic influences.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO TYPE	600 (Humain)	Cat	NOAA	NOTE
20	1043	1051	1056	N11E68	M2.6		71	III/2	1048	49	0687	accompanying CME, SXI derived location
22	0752	0811	0816	N09E44	M2.1	1N	110	II/2,IV/1	0809	49	0687	
23	1622	1654	1708	N11E33	C9.9	SF	56	III/1		49	0687	EIT dimming, semi-halo CME
24	2017	2028	2035	N10E15	M2.3	1N		III/1		49	0687	semi-halo CME
30	0323	0333	0337	N14W15	M3.3	SF	120	II/2		52	0691	
30	0608	0618	0622	N14W21	M4.2	SF	130	III/2,II/2		52	0691	
30	0909	0928	0930	N15W23	M3.7	1N	63	II/1	0915,0927	52	0691	
30	1138	1146	1150	N12W18	X1.2	SF	720	II/1,IV/2	1143	52	0691	
30	1618	1633	1637	N15W20	M5.9	SN	300	V/2,II/1		52	0691	
31	0204	0226	0232	N12W35	M1.1			III/3		52	0691	SXI-derived loc.
31	0523	0532	0539	N13W34	M2.3	SF	190	III/3,II/2,II/1,IV/1		52	0691	

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

Obituary: Pierre Cugnon 1940-2004

It is with great sadness that we inform you of the sudden death of Pierre Cugnon on October 17, due to complications following heart surgery.

Pierre Cugnon was born on April 17, 1940, in Bertrix, a small city in the Belgian Ardennes. He conducted nearly his whole scientific career in the Solar Physics Department of the Royal Observatory of Belgium (ROB). After studies at the University of Liège, where he obtained his PhD in the field of interstellar polarization, he obtained a position in the Department in 1968. Working first on photometric and chromospheric observations from the Uccle station, he then developed a program of coronal polarimetry that led him to participate personally to 4 total solar eclipse expeditions from 1980 to 1998. In 1990, Pierre played a key role in promoting the Belgian participation to the SOHO EIT instrument, allowing the ROB solar team to become, over the last decade, the prominent group that it is now in solar space research.

In 1994, Pierre Cugnon became simultaneously Head of the Department, as well as the Director of the SIDC, hosted by the ROB since 1981. Over the last decade, he spent most of his time and energy leading his team and services with dedication, leaving his personal imprint and vision. For instance, he developed, jointly with K. Denkmayr, the Combined Method still used now to improve the sunspot index forecasts and he introduced a quality control for the SIDC data products. A major step was the addition to the SIDC of the European Regional Warning Center of the ISES, previously hosted by Paris-Meudon. Since then, this operational center has continuously expanded its services under a new name, “Solar Influences Data analysis Center”. In the framework of those activities, Pierre Cugnon was also an active member of several committees and organizations (including IAU Commission 10, ISES, FAGS, URSI and the CRAF).

He will be also remembered for his rich culture and his humble, gentle and patient manner of interacting with colleagues and leading his team. Pierre Cugnon leaves a wife and two daughters.