Solar Influences Data analysis Center

Data Analysis Service supported by the FAGS

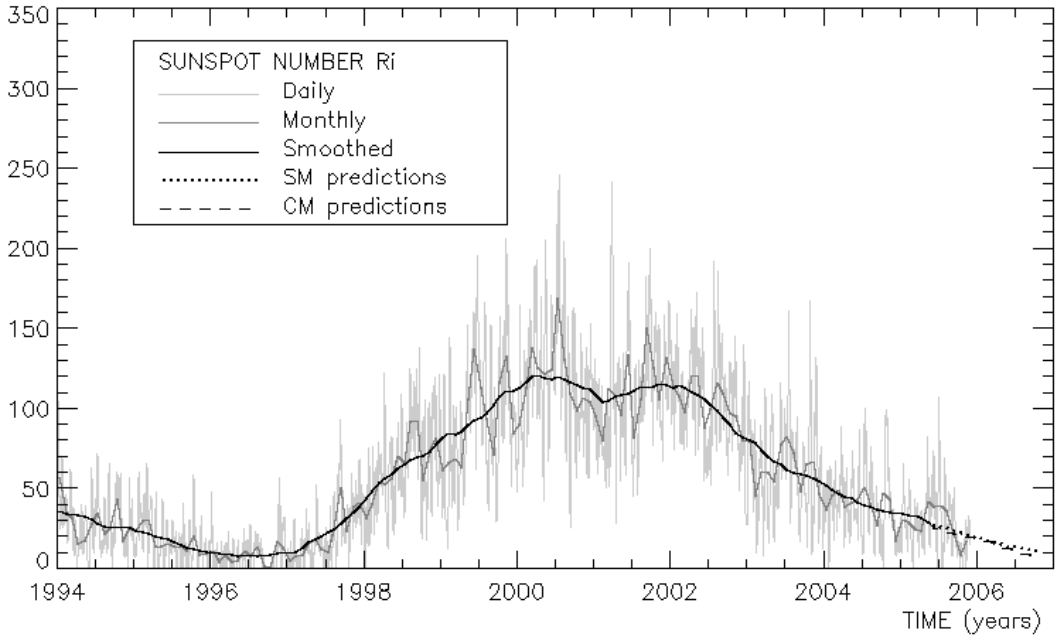
SUNSPOT BULLETIN

2005 n°11

Provisional international and normalized hemispheric daily sunspot numbers for November 2005

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	18	0	18
2	19	0	19
3	9	0	9
4	12	0	12
5	12	0	12
6	14	0	14
7	30	0	30
8	8	0	8
9	8	0	8
10	0	0	0
11	0	0	0
12	10	5	5
13	12	0	12
14	19	0	19
15	20	0	20
16	23	0	23
17	24	0	24
18	26	0	26
19	26	0	26
20	33	0	33
21	27	0	27
22	25	0	25
23	24	0	24
24	27	0	27
25	20	0	20
26	15	0	15
27	16	0	16
28	17	0	17
29	16	0	16
30	30	0	30
Monthly mean	**18.0**	**0.2**	**17.8**
Cooperating stations	**46**	**41**	**41**



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for May 2005 : 28.9 (± 5%)

	SM	CM		SM	CM		SM	CM
2005 Jun	29	27	2005 Dec	25	20	2006 Jun	19	12
Jul	29	25	2006 Jan	24	19	Jul	17	10
Aug	29	23	Feb	23	18	Aug	16	10
Sep	28	22	Mar	22	17	Sep	15	9
Oct	27	21	Apr	21	14	Oct	14	6
Nov	26	20	May	20	13	Nov	14	6

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, December 1, 2005 11:44 UT

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

Date	R'_i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	12	10	-	78	////	0	0/0	24	
1	18	12	-	77	////	0	0/0	12	
2	19	14	-	78	////	0	0/0	10	
3	9	3	-	77	////	1	0/0	24	
4	12	6	-	77	////	0	0/0	22	
5	12	6	-	79	////	0	0/0	16	
6	14	9	-	82	////	0	0/0	19	
7	30	10	-	79	////	0	0/0	8	
8	8	5	-	79	917	0	0/0	4	
9	8	1	-	78	919	0	0/0	3	
10	0	999	-	78	926	0	0/0	3	
11	0	2	-	79	924	0	0/0	6	
12	10	0	-	83	921	0	/0	6	
13	12	8	-	88	922	3	1/0	16	
14	19	30	-	92	////	15	3/0	10	
15	20	76	-	100	923	1	1/0	6	
16	23	109	-	94	924	0	0/0	4	
17	24	125	-	101	923	1	0/0	2	
18	26	124	-	101	929	2	1/0	5	
19	26	128	-	102	924	1	0/0	14	
20	33	116	-	96	916	0	0/0	10	
21	27	85	-	95	917	0	0/0	4	
22	25	51	-	93	921	0	0/0	9	
23	24	34	-	90	924	0	0/0	8	
24	27	24	-	87	922	0	0/0	14	
25	20	19	-	80	////	0	0/0	16	
26	15	16	-	81	611	0	0/0	6	
27	16	12	-	81	672	0	0/0	3	
28	17	14	-	82	////	0	0/0	9	
29	16	9	-	85	927	1	0/0	11	
30	30	20	-	///	////	///	///	(//)	

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 NOVEMBER 2005

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
1	900	1	12	22	0	22	22	1.4	3	OB
3	850	1	1	11	0	11	11	0.4	3	OB
5	820	2	8	28	0	28	28	1.6	3	SG
6	935	1	7	17	0	17	0	1.1	4	SG
7	1230	2	8	28	0	28	0	0.9	3	OB
8	910	1	1	11	0	11	0	0.1	2	OB
10	850	0	0	0	0	0	0	0.0	2	OB
13	1240	1	9	19	0	19	0	11.4	2	EP
14	1230	1	28	38	0	38	0	25.4	3	OB
16	940	1	47	57	0	57	0	74.2	3	OB
17	920	1	39	49	0	49	49	91.2	2	OB
18	830	1	39	49	0	49	49	98.7	4	OB
22	900	2	18	38	0	38	0	27.5	2	OB
23	1240	2	19	39	0	39	0	18.1	3	OB
27	1245	1	5	15	0	15	15	5.7	2	AZ
29	1400	3	8	38	11	27	0	4.2	3	OB
30	1335	3	21	51	40	11	0	7.8	3	OB

The relative mean sunspot number is 30.0.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR NOVEMBER 2005

K'= 0.876 (*)

1	19	7	25	13	17	19	***	25	***
2	***	8	10	14	33	20	***	26	***
3	10	9	***	15	***	21	***	27	13
4	***	10	0	16	50	22	33	28	***
5	25	11	***	17	43	23	34	29	33
6	15	12	***	18	43	24	***	30	45

The normalised relative monthly mean sunspot number is 26.

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

The Sun has been observed 17 days on 30 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR NOVEMBER 2005
E AND F BRUNNER'S TYPE GROUPS

Uccle Nø	East Limb Date	Date and type 1st obs	CMP	Last obs	West Limb Date
5-2036	11 12.3	13 E	11 19.0	23 G	11 25.8

PROBABLE RETURN OF MAJOR GROUPS FOR DECEMBER 2005
NONE

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

It was a quiet month with one active period from Nov 12 until Nov 20, dominated by Catania sunspot group 65 (NOAA 0822). From Nov 30 onwards, Catania sunspot group 70 (NOAA 0826) played the leading role in a second short active excursion.

The first half of November was quiet marked by a background X-ray radiation below A6 and no noticeable events. From Nov 12 onwards, a sunspot group at the very east heralded a more agitated period. Catania sunspot group 65 (NOAA 0822) fired 6 M-flares. From Nov 19, the group cooled down and disappeared behind the limb on Nov 26. Another group, Catania 70 (NOAA AR 0826) signed up for a second disturbed period. Still located in the east, it showed off with a series of B-flares, one M-flare on Nov 30 and a row of 4 M-flares on Dec 02.

Two filament eruptions with a CME that could easily be linked to CACTus output were reported. On Nov 08 a filament erupted near the central meridian. H-alpha images showed the disappearance of a long filament and a coronal dimming was seen in an EIT image sequence. The corresponding faint CME was split in different parts in the CACTus detections. The second reported filament eruption occurred on Nov 16 and was also accompanied by a coronal dimming. This eruption resulted in a partial halo CME with a speed of around 220 km/s as measured by CACTus. The plasma cloud was ejected mainly to the west. We mention three additional CMEs that were detected by CACTus and the LASCO-operation scientist in the halo CME list below. The source of two of them was unclear. The one of Nov 20 triggered a CACTus alert. This CME was determined to be backsided.

Four coronal holes (CH) were noticed this month. They passed the central meridian on: Nov 01, an equatorial CH; Nov 07, a northern CH; Nov 20, again a northern CH and Nov 28, a large low-latitude CH.

The last to report is the easiest: no proton flux enhancements were recorded this month.

II. Geomagnetic Activity

This month, almost all geomagnetic disturbances felt on Earth were caused by the enhanced solar wind stream emanating from coronal holes.

Late on Nov 02, solar wind picked up speed from 350 km/s to 650 km/s. The interplanetary magnetic field increased shortly before this change in solar wind speed. These profiles in wind speed and IMF were imposed by the equatorial coronal hole (CH) that passed the central meridian on Nov 01. From Nov 03 until Nov 05, we experienced active geomagnetic conditions and one time interval of minor storm conditions. Kp was estimated to be 5 early Dec 03, i.e. when the density in the solar wind is the highest.

Early on Nov 11, a shock arrived at the L1 point. This shock front can possibly be related to the CME/filament eruption of Nov 08. The impact however was limited: geomagnetic conditions stayed quiet to unsettled with two excursions of Kp to the value 4 on Nov 13 and Nov 14. The arrival of the shock front masqueraded the first signature in ACE data of the northern CH wind stream. This was the CH passing the central meridian on Nov 07. The geomagnetic conditions at that time were probably a combination of the arrival of the shock front and the enhanced coronal hole wind stream. The solar wind peaked slightly above 400 km/s and decayed steadily from Nov 15 onwards until a minimum of 270 km/s was reached on Nov 18.

The Earth crossed a sector boundary late Nov 18 and solar wind speed picked up again. The southward orientation of Bz induced the active geomagnetic conditions in the second half of Nov 19. The ring-shaped Nov 20 CH is probably responsible for the isolated active periods of Kp=4 on Nov 25 and Nov 28. The shape of the hole can explain the two bulbs in ACE-data and as a consequence the 2 distinct periods of active conditions.

The fast solar wind flow emanating from the Nov 28 CH was registered near the Earth starting from Nov 30. The interaction region between the slow and fast solar wind flow arrived the day before, in the evening of Nov 29. We stayed until the end of Dec 03 inside this fast stream. Only active geomagnetic conditions were observed during this period.

III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO TYPE	Cat	NOAA	NOTE
30	1746	1752	1755	S03E35	M1.4			III/1	70	0826	GOES-12/SXI derived location
18	0024	0034	0046	S09E14	M1.2	SF			65	0822	
15	1722	1751	1804	S06E48	M1.4				65	0822	
14	0416	0421	0427	S07E68	M2.6	SF	180	CTM/1	65	0822	
14	1416	1421	1423	S06E60	M3.9		90	II/1	65	0822	
14	2153	2200	2204	S06E52	M1.0	SF	64		65	0822	
13	1429	1451	1456	S07E77	M2.5				65	0822	

LOC: approximate heliographic location
XRAY: X-ray flare class
OP: optical flare class
10CM: peak 10 cm radio flux

RADIO TYPE: radio burst type
Cat: Catania sunspot group number
NOAA: NOAA active region number
NOTES: **p** = proton event
CME = coronal mass ejection

IV. Halo CME list

onset time	e-mail time CACTus	da	e-mail time LASCO	e-mail time FF	Ass. Events	consequences
11/08	-	-	-	-	Filament eruption in center, dimming	None, shock arrival
11/16 15:30	-	-	11/1714:06	09/03 23:17	Filament eruption in NW	None
11/19 08:06	-	-	11/21 15:13	09/05 18:55	?	None
11/19 15:06	-	-	11/21 15:13	09/05 20:58	?	None
11/19 15:06	11/21 20 :14	210	11/21 22 :18	09/07 17:08	Backsided?	None

Onset time: Utime first visible in C2 field of view
CACTus: Computer Aided CME Tracking (software developed by the SIDC)
LASCO: SOHO-LASCO Operations, G. Stenborg

FF: Fearless Forecast (a NOAA trial service)
e-mail time CACTus/LASCO/FF: Utime alert e-mail sent by group
da: angular width of CME, measured by CACTus
Ass. Events: Associated Events, Long Duration Event, flare class