Solar Influences Data analysis Center

Data Analysis Service supported by the FAGS

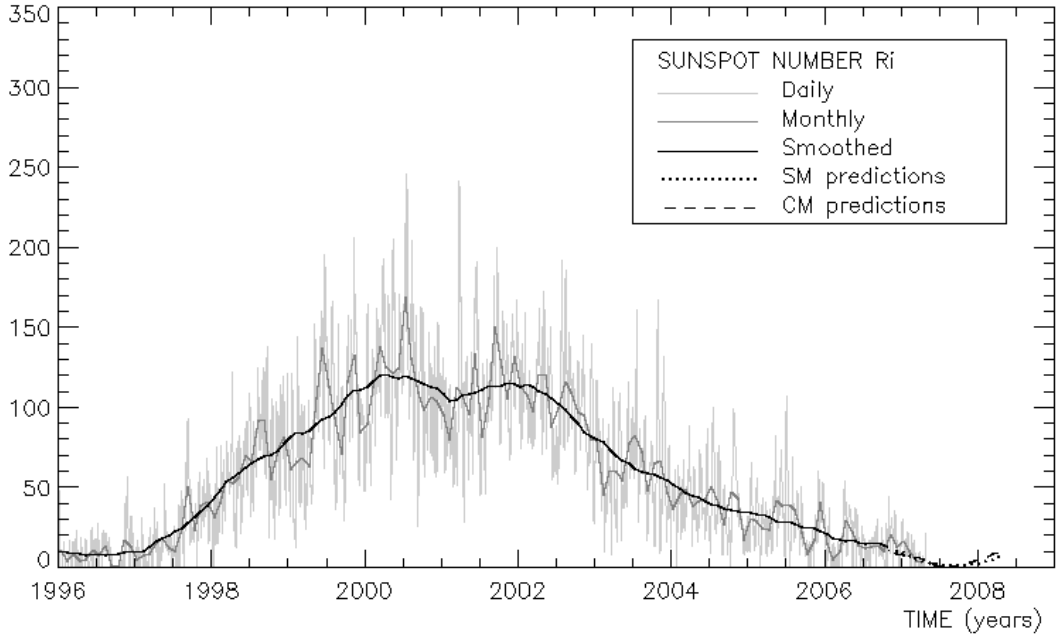
SUNSPOT BULLETIN

2007 n° 4

Provisional international and normalized hemispheric daily sunspot numbers for April 2007

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	10	5	5
2	0	0	0
3	10	5	5
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	7	4	3
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	8	0	8
26	10	0	10
27	11	0	11
28	14	0	14
29	20	0	20
30	21	0	21
Monthly mean	**3.7**	**0.5**	**3.2**
Cooperating stations	**50**	**43**	**43**



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for October 2006 : 14.2 (± 5%)

	SM	CM		SM	CM		SM	CM
2006 Nov	13	12	2007 May	8	5	2007 Nov	2	3
Dec	13	9	Jun	6	2	Dec	2	4
2007 Jan	12	8	Jul	5	2	2008 Jan	2	6
Feb	12	8	Aug	4	2	Feb	2	7
Mar	11	7	Sep	3	1	Mar	3	9
Apr	9	5	Oct	2	1	Apr	4	10

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	0	2	-	73	///	1	/0	6	
1	10	3	-	72	////	0	0/0	28	
2	0	999	-	71	///	0	/0	0	
3	10	2	-	71	////	0	0/0	12	
4	0	999	-	71	///	0	/0	1	
5	0	999	-	71	///	0	/0	4	
6	0	999	-	71	///	0	/0	4	
7	0	999	-	71	///	0	/0	4	
8	0	0	-	///	////	///	///	4	
9	0	0	-	70	////	0	0/0	12	
10	0	999	-	69	///	0	/0	1	
11	0	999	-	69	///	0	/0	5	
12	0	0	-	68	///	0	/0	2	
13	0	999	-	68	///	0	/0	1	
14	0	1	-	68	////	0	0/0	7	
15	0	999	-	69	////	0	0/0	7	
16	0	999	-	69	///	0	/0	1	
17	7	1	-	69	////	0	0/0	11	
18	0	1	-	69	///	0	/0	2	
19	0	999	-	68	///	0	/0	6	
20	0	1	-	69	///	0	/0	3	
21	0	999	-	69	///	0	/0	3	
22	0	0	-	69	////	0	0/0	14	
23	0	999	-	69	///	0	/0	5	
24	0	999	-	73	///	0	/0	6	
25	8	4	-	77	////	0	0/0	5	
26	10	17	-	81	////	0	0/0	10	
27	11	34	-	83	////	1	0/0	20	
28	14	54	-	85	////	0	0/0	29	
29	20	52	-	85	////	0	0/0	22	
30	21	77	-	87	////	1	0/0	14	

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 APRIL 2007

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
1	755	1	4	14	14	0	14	0.3	4	DB
2	1000	0	0	0	0	0	0	0.0	3	OB
3	900	0	0	0	0	0	0	0.0	3	OB
4	1130	0	0	0	0	0	0	0.0	4	OB
5	1010	0	0	0	0	0	0	0.0	4	OB
6	945	0	0	0	0	0	0	0.0	4	OB
7	845	0	0	0	0	0	0	0.0	3	AE
8	1000	0	0	0	0	0	0	0.0	3	AE
9	900	0	0	0	0	0	0	0.0	3	AE
10	830	0	0	0	0	0	0	0.0	3	AE
11	800	0	0	0	0	0	0	0.0	3	AE
12	800	0	0	0	0	0	0	0.0	4	AE
13	1500	0	0	0	0	0	0	0.0	3	AE
16	1015	0	0	0	0	0	0	0.0	4	OB
17	1200	0	0	0	0	0	0	0.0	2	OB
18	1230	0	0	0	0	0	0	0.0	4	OB
19	1240	0	0	0	0	0	0	0.0	4	OB
20	1100	0	0	0	0	0	0	0.0	4	OB
21	825	0	0	0	0	0	0	0.0	3	FC
22	850	0	0	0	0	0	0	0.0	3	DB
23	1315	0	0	0	0	0	0	0.0	2	OB
24	1050	0	0	0	0	0	0	0.0	2	OB
25	1000	1	3	13	0	13	0	2.7	4	OB
26	1000	1	7	17	0	17	0	7.4	4	OB
27	730	1	5	15	0	15	0	13.3	3	LR
28	1330	1	8	18	0	18	0	15.1	3	AE
29	945	2	7	27	0	27	15	19.8	3	AE
30	940	2	22	42	0	42	28	23.1	3	FC

The relative mean sunspot number is 5.2.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR APRIL 2007

K'= 0.784 (*)

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

The normalised relative monthly mean sunspot number is 4.

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

The Sun has been observed 28 days on 30 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR APRIL 2007
E AND F BRUNNER'S TYPE GROUPS

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR MAY 2007
NONE

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Flaring activity of any relevance was absent. Most of the time, the visible surface of the Sun was spotless. As usual in this phase of the solar cycle, several coronal holes transited the solar disk.

Flaring activity was totally absent until Apr 24. From Apr 01 until Apr 23, the X-ray radiation curve was an almost straight line beneath the A-level. The Provisional International Sunspot Number was zero for 21 days between Apr 02 and Apr 24. From Apr 25 onwards, a new sunspot group was visible at the east limb: Catania 32 (NOAA AR 0953). A tiny trailing sunspot was visible on Apr 30. This group was assigned the number 33 (NOAA AR 0954). The X-ray background radiation increased to the A4 level and flaring activity became a little more agitated as a consequence of the appearance of these sunspot groups. GOES registered even a C2.8 flare late on Apr 24. From that day onwards, several B-flares were recorded with mainly Catania 32 as the source region.

We give a summary of all visible coronal holes (CH) influencing the solar wind and the geomagnetic field including the date when the most western border of the hole passes the central meridian (CM), location and recurrences.

1. A first recurrent hole passed early CM on Mar 29 and was located just beneath the equator.
2. On Apr 06, a recurrent southern hole was present centred around 30° latitude.
3. An elongated, skewed coronal hole, spanning 90° longitude and 60° latitude across the equator, passed the CM on Apr 16.
4. Early on Apr 25, a southern hole passed the centre of stage. This hole was the same as CH 1, but in comparison with the previous rotation, the hole had evolved significantly to a bigger size.

II. Geomagnetic Activity

All geomagnetic disturbances were caused by coronal holes except for one confined period of unsettled to active conditions.

We address the four periods of disturbances related to the coronal hole mentioned above. A co-rotating interaction region (CIR) is recognized in solar wind data by an elevated level of density and total magnetic field strength. A CIR is the precursor of the actual high solar wind speed emanating from the coronal hole. The CIR associated with the first coronal hole arrived at Earth late on Mar 31. The CH induced a minor geomagnetic storm for 2 days starting on Apr 01. The north-south (Bz) component of the interplanetary magnetic field (IMF) was predominantly negative for those two days. This induced a stronger coupling between the IMF and the Earth's magnetic field, responsible for the minor storm.

The next CIR arrived late on Apr 08. In first instance, the IMF strength was around 15 nT, but the Bz component was positive, reducing the geomagnetic effect. The result was one period of active geomagnetic conditions on Apr 09. Thereafter, Kp (estimated by NOAA, Boulder) fluctuated between 0 and 3. The next period of geomagnetic disturbances began on Apr 17. The geomagnetic field was only slightly disturbed with one period of Kp equal to 4 on Apr 18. These disturbances were related with an excursion of Bz to negative values and could not directly be linked to a CH fast stream. The solar wind speed was during that period

not typical for a CH with an elevated value but flat curve. The next period of geomagnetic disturbances was related to the third elongated CH. The solar wind picked up speed from Apr 22; the associated CIR arrived slightly earlier on the same day. The north-south component of the IMF was strongly fluctuating between negative and positive values. On Apr 22, the conditions became unsettled and resulted finally in a short minor storm on Apr 23. The last geomagnetic disturbance was the strongest of this month and was induced by the last CH mentioned above. The CIR arrived on Apr 27. At the end of that day, the solar wind speed had reached values above 600 km/s. Several periods of minor storm conditions were measured on Apr 28, 29 and 30. At the beginning of the next month, May, we were still in the aftermath of this recurrent CH.

III. Noticeable solar events

No M- or X-class flares occurred.

IV. Halo CME list

No CME alert was sent.