Solar Influences Data analysis Center

Data Analysis Service supported by the FAGS

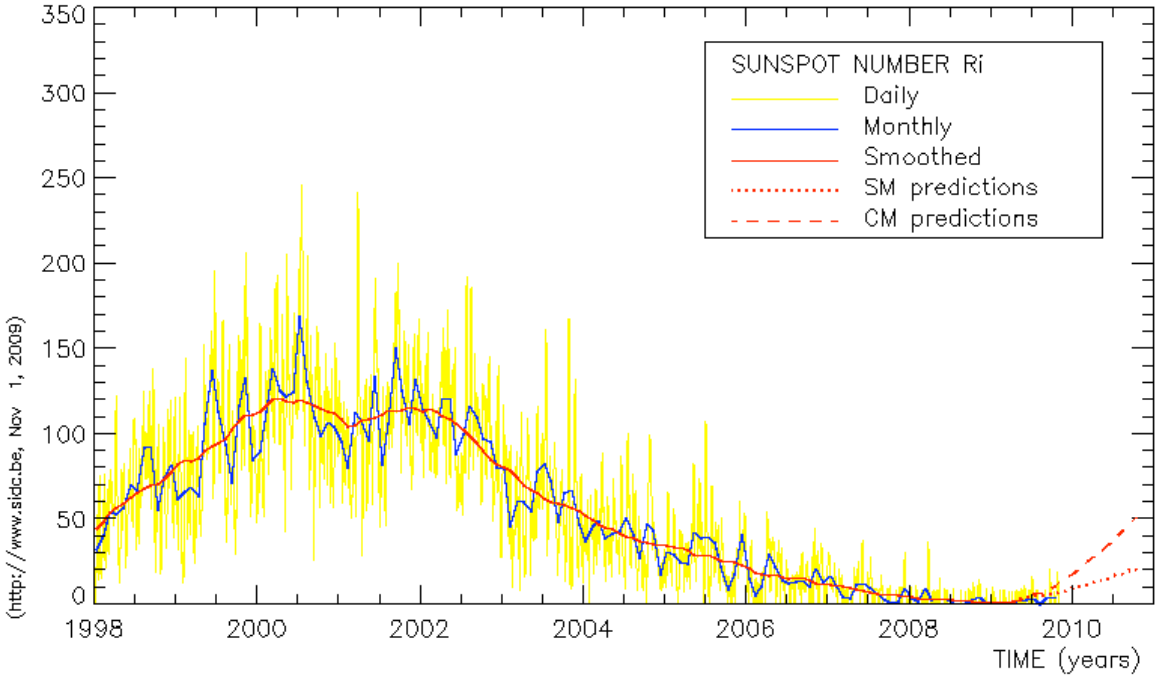
SUNSPOT BULLETIN

2009 n°10

Provisional international and normalized hemispheric daily sunspot numbers for October 2009

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	7	7	0
2	0	0	0
3	0	0	0
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	7	7	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	10	10	0
24	16	16	0
25	19	19	0
26	19	19	0
27	19	19	0
28	19	19	0
29	16	16	0
30	11	11	0
31	0	0	0
Monthly mean	**4.6**	**4.6**	**0.0**
Cooperating stations	**63**	**56**	**56**



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for April 2009 : 2. (± 5%)

	SM	CM		SM	CM		SM	CM
2009 May	2	3	2009 Nov	6	14	2010 May	11	32
Jun	2	5	Dec	6	17	Jun	13	35
Jul	3	6	2010 Jan	7	19	Jul	14	39
Aug	4	7	Feb	8	22	Aug	15	43
Sep	4	9	Mar	9	26	Sep	16	47
Oct	5	11	Apr	10	29	Oct	18	51

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
30	7	1	-	///	////	0	0/0	7	
1	7	0	-	72	////	0	0/0	2	
2	0	999	-	72	////	0	0/0	2	
3	0	0	-	72	////	0	0/0	2	
4	0	0	-	71	////	0	0/0	5	
5	0	0	-	70	////	0	0/0	2	
6	0	0	-	69	////	0	0/0	2	
7	0	999	-	69	////	0	0/0	3	
8	0	999	-	69	////	0	0/0	2	
9	0	999	-	69	////	0	0/0	2	
10	0	999	-	70	////	0	0/0	0	
11	7	3	-	70	////	0	0/0	8	
12	0	999	-	70	////	0	0/0	2	
13	0	999	-	70	////	0	0/0	4	
14	0	0	-	71	////	0	0/0	1	
15	0	0	-	70	////	0	0/0	6	
16	0	0	-	70	////	0	0/0	3	
17	0	1	-	71	////	0	0/0	1	
18	0	0	-	70	////	0	0/0	0	
19	0	999	-	71	////	0	0/0	2	
20	0	1	-	71	////	0	0/0	1	
21	0	0	-	71	////	0	0/0	2	
22	0	999	-	72	////	0	0/0	15	
23	10	8	-	73	////	0	0/0	8	
24	16	19	-	76	////	0	0/0	13	
25	19	26	-	76	////	0	0/0	6	
26	19	31	-	81	////	3	0/0	6	
27	19	33	-	82	////	3	0/0	3	
28	19	23	-	80	////	1	0/0	3	
29	16	19	-	77	////	0	0/0	8	
30	11	7	-	75	////	0	0/0	9	
31	0	0	-	75	////	0	0/0	3	

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 2009

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
1	1025	0	0	0	0	0	0	0.0	2	SV
2	1010	0	0	0	0	0	0	0.0	3	SV
4	820	0	0	0	0	0	0	0.0	3	SV
7	815	0	0	0	0	0	0	0.0	1	OL
8	1350	0	0	0	0	0	0	0.0	3	OL
9	750	0	0	0	0	0	0	0.0	2	OL
10	1130	0	0	0	0	0	0	0.0	3	OL
12	800	0	0	0	0	0	0	0.0	3	AE
13	830	0	0	0	0	0	0	0.0	2	AE
14	800	0	0	0	0	0	0	0.0	3	AE
15	830	0	0	0	0	0	0	0.0	2	AE
16	1100	0	0	0	0	0	0	0.0	2	AE
17	825	0	0	0	0	0	0	0.0	3	FC
18	825	0	0	0	0	0	0	0.0	3	FC
19	850	0	0	0	0	0	0	0.0	1	OB
20	830	0	0	0	0	0	0	0.0	3	OB
21	820	0	0	0	0	0	0	0.0	2	OB
22	1050	0	0	0	0	0	0	0.0	2	OB
25	1355	1	16	26	26	0	26	1.5	2	OB
26	1035	1	22	32	32	0	32	20.4	1	SV
27	940	1	20	30	30	0	0	16.3	1	SV
28	1015	1	23	33	33	0	0	3.0	3	OL
29	915	1	11	21	21	0	0	7.0	1	SV
30	830	1	6	16	16	0	0	1.0	2	OL

The relative mean sunspot number is 6.6.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR OCTOBER 2009

K'= 0.831 (*)

1	0	7	0	13	0	19	0	25	22
2	0	8	0	14	0	20	0	26	27
3	***	9	0	15	0	21	0	27	25
4	0	10	0	16	0	22	0	28	27
5	***	11	***	17	0	23	***	29	17
6	***	12	0	18	0	24	***	30	13
								31	***

The normalised relative monthly mean sunspot number is 5.

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

The Sun has been observed 24 days on 31 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR OCTOBER 2009
E AND F BRUNNER'S TYPE GROUPS

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR NOVEMBER 2009
NONE

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Finally, some solar activity was recorded this month: two clear EIT waves and a few C-level flares. The F10.7 radio flux was even above 80 sfu for two days! The Provisional International monthly mean Sunspot Number for October 2009 is 4.6. This is the highest monthly mean for 2009.

On Oct 16, 16UT and Oct 17, 19UT EIT waves and coronal dimmings were observed in the neighbourhood of a weak active region near the central meridian in the Southern solar hemisphere. An EIT wave is a wave front feature that is seen propagating through the corona while looking at the Sun in the extreme ultraviolet. Its appearance is similar to a circular wave on the surface of water when you drop a stone. An EIT-wave is an on-disk EUV signature for a plasma eruption. In this particular case, it is essential that the source region was located near the central meridian (CM). This means that the plasma eruption is directed towards the Earth.

Flaring activity was present from Oct 24 up to Nov 01. Several C-flares occurred. The source region was Catania Sunspot 22, NOAA AR 1029. On Oct 22, a cluster of magnetic loops popped up at the latitude of 15°N. The structure evolved to a complex magnetic structure (beta-gamma) on Nov 26. When the group approached the west limb, it produced two coronal mass ejections.

Several coronal holes (CH) were spotted. We list the latitude, the extension and the date the leading front of the CH crossed the central meridian (CM):

- 15° north, small, Oct 07
- North polar extension up to 30°, Oct 11
- 40° north, small, Oct 17
- 15° south, small, Oct 18
- 40° north, small, Oct 20
- 40° south, 60° wide, Oct 20

II. Geomagnetic Activity

The conditions were quiet with a Kp of two or less. There were four exceptions: three periods with active conditions and one interval, i.e. 3 hours, with a Kp of 3.

Late Oct 21, a shock was observed in ACE solar wind data: the total magnetic field jumped from less then 5 nT up to 10 nT, Bz turned southward for about 10 hours and the solar wind speed increased suddenly from below 300 km/s to 350 km/s. This shock can be traced back to the eruption near the CM on Oct 17, 19UT. It resulted in active conditions on Oct 22-23.

Active conditions were also seen on Oct 24 and were possibly related to the influence of the CHs that passed the CM on Oct 20.

The single interval with a Kp of 4 on Oct 30 could be linked with a sector boundary crossing: the Earth passed the dynamic heliospheric current sheet going to a region with an oppositely pointing magnetic field.