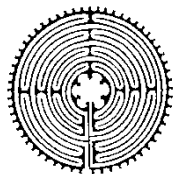


# Solar Influences



# Data analysis

## Center

*Data Analysis Service supported by the FAGS*

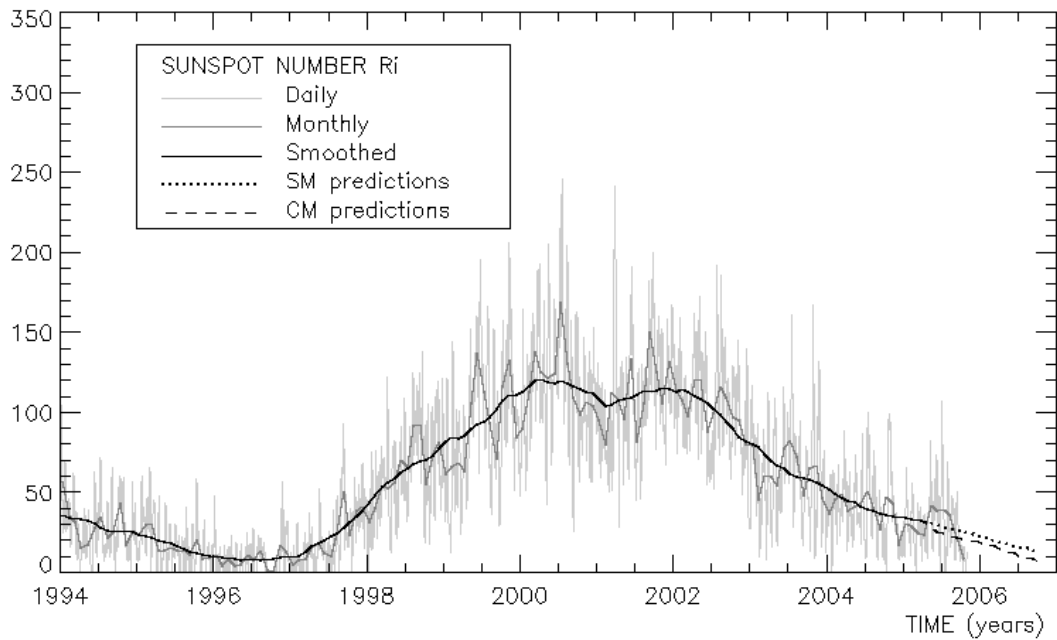
# **SUNSPOT BULLETIN**

2005 n°10

### **Provisional international and normalized hemispheric daily sunspot numbers for October 2005**

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

Date	R' <sub>I</sub>	R' <sub>N</sub>	R' <sub>S</sub>
1	9	9	0
2	8	0	8
3	10	0	10
4	14	0	14
5	17	0	17
6	15	0	15
7	14	0	14
8	12	0	12
9	10	0	10
10	16	0	16
11	9	0	9
12	14	0	14
13	0	0	0
14	8	8	0
15	8	8	0
16	8	8	0
17	8	8	0
18	8	8	0
19	16	9	7
20	9	9	0
21	8	8	0
22	7	4	3
23	8	4	4
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	8	4	4
30	9	0	9
31	12	0	12
<b>Monthly mean</b>	<b>8.5</b>	<b>2.8</b>	<b>5.7</b>
<b>Cooperating stations</b>	<b>45</b>	<b>41</b>	<b>41</b>



**Predictions of the monthly smoothed Sunspot Number**  
using the last provisional value, calculated for April 2005 : 31.6 ( $\pm 5\%$ )

	<b>SM</b>	<b>CM</b>		<b>SM</b>	<b>CM</b>		<b>SM</b>	<b>CM</b>			
2005	May	30	29	2005	Nov	28	20	2006	May	22	13
	Jun	31	26		Dec	27	20		Jun	21	12
	Jul	33	25	2006	Jan	26	19		Jul	19	10
	Aug	32	23		Feb	25	18		Aug	18	10
	Sep	31	22		Mar	24	17		Sep	17	9
	Oct	29	21		Apr	23	14		Oct	16	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, November 1, 2005 10:00 UT

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

Date	R' <sub>i</sub>	PPSI	600	2800	COS	SFI	XI	Ak	SEA
30	7	5	-	72	897	0	0/0	(15)	
1	9	3	-	72	899	0	0/0	15	
2	8	1	-	75	898	0	0/0	19	
3	10	2	-	74	903	0	0/0	8	
4	14	15	-	83	902	0	0/0	4	
5	17	29	-	81	905	2	0/0	4	
6	15	28	-	80	904	0	0/0	5	
7	14	21	-	79	904	0	0/0	16	
8	12	15	-	78	899	0	0/0	28	
9	10	6	-	79	899	0	0/0	12	
10	16	6	-	79	893	0	0/0	11	
11	9	6	-	78	896	0	0/0	12	
12	14	5	-	77	896	1	0/0	2	
13	0	1	-	78	////	0	0/0	6	
14	8	2	-	78	////	0	0/0	3	
15	8	7	-	80	////	0	0/0	2	
16	8	7	-	79	////	0	0/0	11	
17	8	10	-	78	////	0	0/0	16	
18	8	11	-	78	////	0	0/0	6	
19	16	16	-	78	////	0	0/0	8	
20	9	4	-	77	////	0	0/0	5	
21	8	4	-	75	////	0	0/0	2	
22	7	3	-	75	////	0	0/0	9	
23	8	0	-	74	////	0	0/0	2	
24	0	0	-	73	////	0	0/0	6	
25	0	0	-	73	////	0	0/0	24	
26	0	1	-	72	////	0	0/0	20	
27	0	1	-	72	////	0	0/0	15	
28	0	0	-	73	////	0	0/0	6	
29	8	0	-	74	////	0	0/0	4	
30	9	4	-	76	////	0	0/0	7	
31	12	10	-	78	////	0	0/0	24	

**R'<sub>i</sub>** : provisional international sunspot numbers from the S.I.D.C.  
**PPSI** : prompt photometric sunspot index from the S.I.D.C. in  $10^{-5} \text{ w/m}^2$  : 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, UGEOI), evaluation :  $1 \times \text{Sn} + 10 \times "1" + 100 \times ">1"$ .  
**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 2005

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	920	1	2	12	12	0	12	0.4	2	OB
2	815	1	2	12	0	12	0	0.3	3	FC
3	1020	1	1	11	0	11	0	0.2	3	OB
7	1350	1	7	17	0	17	17	5.9	3	FC
8	1530	1	5	15	0	15	15	5.5	2	GL
9	1605	1	2	12	0	12	0	4.6	2	GL
10	750	2	4	24	0	24	12	0.6	3	OB
11	750	1	1	11	0	11	11	0.4	3	OB
12	800	2	6	26	0	26	14	0.7	3	OB
13	800	0	0	0	0	0	0	0.0	3	OB
14	1120	1	3	13	13	0	0	3.6	3	OB
15	1105	1	5	15	15	0	0	9.3	4	OB
16	915	1	2	12	12	0	0	15.2	3	FC
17	800	2	5	25	14	11	11	21.3	3	OB
18	800	1	1	11	11	0	11	26.4	2	OB
19	1215	2	4	24	12	12	24	30.6	2	OB
20	815	1	4	14	14	0	14	0.4	3	OB
23	1418	0	0	0	0	0	0	0.0	1	ST
25	1245	0	0	0	0	0	0	0.0	2	OB
26	830	0	0	0	0	0	0	0.0	2	OB
27	830	0	0	0	0	0	0	0.0	3	OB
28	830	0	0	0	0	0	0	0.0	3	OB
29	1045	0	0	0	0	0	0	0.0	2	AB
30	1030	1	2	12	0	12	0	3.1	3	GL

The relative mean sunspot number is 11.1.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR OCTOBER 2005

$K' = 0.831$  (\*)

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

The normalised relative monthly mean sunspot number is 9.

(\*)  $K'$  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 2005  
E AND F BRUNNER'S TYPE GROUPS

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR NOVEMBER 2005  
NONE

## MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

### I. Solar Activity

*As long as was the monthly bulletin of September 2005, as short is the one of October. The month October was good for a record of quiet days. Two times an all-quiet-alert was broadcast. The first one lasted from Oct 19 up till Oct 22. The second one was sent on Oct 26 and ended on Nov 01.*

The month started with a *flaring silence*. On Oct 04, former group Catania 37 (NOAA 0808), which dominated space weather in September, appeared at the east limb. It pushed the background X-ray radiation up only a little. The returning group did not live up to the expectations as it had seriously decayed. There was even no new group number assigned to it until Oct 09. From Oct 05, we saw a steady decrease of the background X-ray radiation to the A-level, which was reached on Oct 06. The level decreased even further from Oct 14, reaching just below A-level on Oct 21. Only on Oct 28, the level started to increase again, really slowly, finally reaching the A3 level on Oct 31.

A total of 3 C-flares with an intensity not higher than C1.4 (Oct 05, source region Catania 48/ NOAA 0813) occurred during the month. The source of the C-flares of Oct 11 and Oct 12 was the former group Catania 37, now renamed Catania 53/52 (NOAA 0814).

Another indication of this extreme low activity level was the number of spotless days. In the provisional International Sunspot Numbers, we have 6 days with a  $R_i$  equal 0. The *10cm flux*, another index for solar activity, reached a maximum of only 83 sfu (solar flux unit) on Oct 04 and dropped to 72 sfu on Oct 26 and 27. This fluctuation of only 9 sfu over the whole month is really small compared with the flux variation in September, when the maximum was 118 sfu and the minimum 72 sfu.

There was *no proton event* measured, not even a slight rise of the curves of the proton flux.

In the course of the month, one faint full halo CME was seen in LASCO movies. On Oct 22, a LASCO report was sent. CACTus, the SIDC software to detect automatically halo CMEs, did detect the event, but the shock front was split into several parts and no alert was sent. The event was back-sided and not geo-effective.

We finally mention the following geo-effective coronal holes passing the central meridian:

- 1) an equatorial coronal hole with a southern extension on Sept 26,
- 2) a recurrent equatorial coronal hole on Oct 4-5,
- 3) the first part of an elongated southern coronal hole on Oct 11,
- 4) the first part of a rather big (ring shaped) coronal hole extending from the equator to a southern latitude of 45° on Oct 20.

### II. Geomagnetic Activity

*Geomagnetic activity was low, corresponding to the low activity level of the Sun. SEC/NOAA reported 4 periods of active condition related to coronal holes. The estimated planetary K index reached as highest value 4.*

The only disturbances of the month were due to coronal holes. We report the periods of these disturbances in chronological order corresponding to the numbered list of the coronal holes given above.

- 1) Late on Sep 30, the solar wind picked up speed, reaching a peak of 540 km/s on Oct 01. In response to this moderate-speed stream, the geomagnetic activity rose slightly from Sept 30 until Oct 02.
- 2) We had a second period of active conditions on Oct 08. Late on Oct 06, ACE data showed a sector change (angle phi). From that moment, the density of the solar wind increased. A second

- stronger increase was seen on Oct 08 followed by a decrease. This is typical for a coronal hole. The total IMF went up to +20nT and Bz became -15nT, the solar wind speed peaked at 700 km/s.
- 3) Late on Oct 14, the total IMF gradually increased. The clearest sign of the third coronal hole was seen in the angle phi jumping from 0° to 180°, indicating the change of the direction of the magnetic field imbedded in the solar wind. The solar wind speed increased on Oct 15 from 300 to 400 km/s. The last part of the coronal hole was capable of pushing up the planetary K index calculated by Boulder to 4 on Oct 17 for only one period of 3 hours. The rather slow solar wind speed and weak magnetic field was at the base of the small and moderate effects on earth.
  - 4) The first southern part of coronal hole nr 4 was responsible for one period of Kp=4 early on Nov 22. The second part, which was located more to the equator pushed the solar wind speed up to 420 km/s. Bz became -9nT leading to active conditions on Oct 25. The third part of the coronal hole had almost no influence because of its high latitudinal location in the southern part of the solar disk.

### **III. Noticeable solar events**

*No noticeable events were reported this month.*

### **IV. Halo CME list**

<b>onset time</b>	<b>e-mail time CACTus</b>	<b>da</b>	<b>e-mail time LASCO</b>	<b>e-mail time FF</b>	<b>Ass. Events</b>	<b>Consequences</b>
10/22 05:55	-	-	10/22 07:31	-	back-sided	None

**Onset time:** UT time 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