

## Center

*Data Analysis Service supported by the FAGS*

**SUNSPOT BULLETIN**

2010

n°11

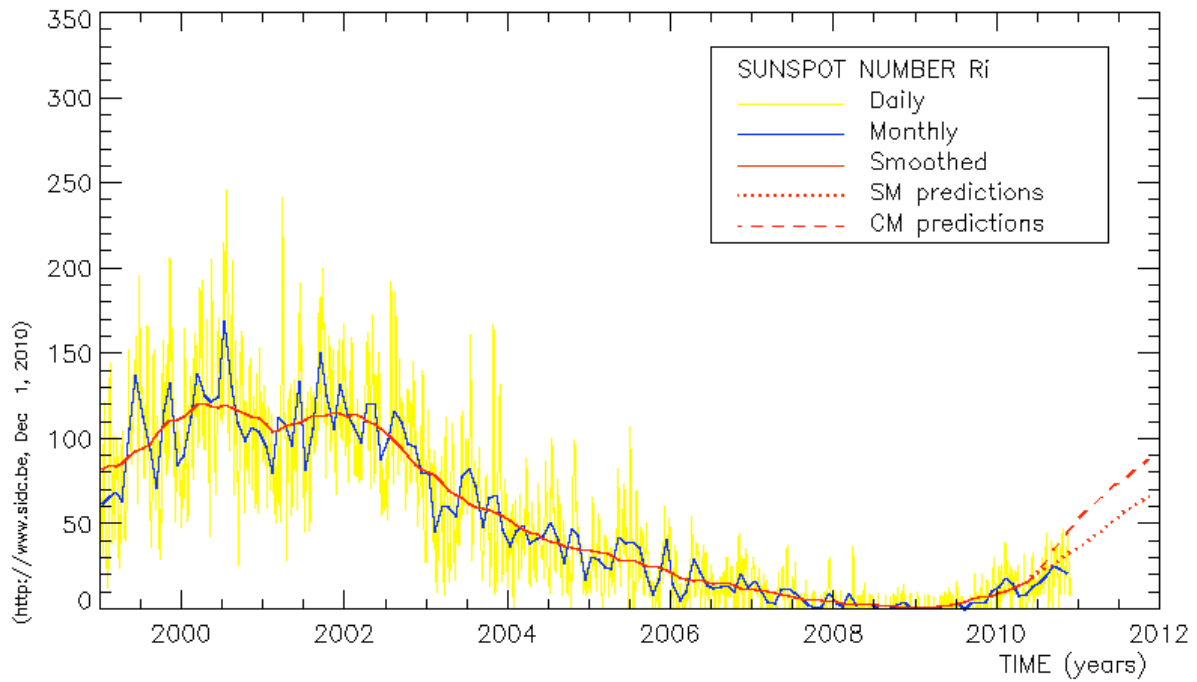
---

**Provisional international and normalized hemispheric daily sunspot numbers for November 2010**


---

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

Date	R' <sub>1</sub>	R' <sub>N</sub>	R' <sub>S</sub>
1	13	13	0
2	11	11	0
3	11	11	0
4	9	9	0
5	17	10	7
6	22	8	14
7	23	9	14
8	23	10	13
9	19	8	11
10	30	13	17
11	32	16	16
12	30	17	13
13	43	23	20
14	38	21	17
15	38	24	14
16	37	24	13
17	35	22	13
18	29	19	10
19	26	16	10
20	18	8	10
21	17	8	9
22	15	8	7
23	16	16	0
24	8	8	0
25	15	8	7
26	14	14	0
27	8	4	4
28	17	11	6
29	18	18	0
30	15	15	0
<b>Monthly mean</b>	<b>21.6</b>	<b>13.4</b>	<b>8.2</b>
<b>Cooperating stations</b>	<b>65</b>	<b>62</b>	<b>62</b>



**Predictions of the monthly smoothed Sunspot Number**  
using the last provisional value, calculated for May 2010: 15. ( $\pm 5\%$ )

	<b>SM</b>	<b>CM</b>		<b>SM</b>	<b>CM</b>		<b>SM</b>	<b>CM</b>
2010 Jun	17	19	2010 Dec	27	50	2011 Jun	44	73
Jul	17	24	2011 Jan	30	55	Jul	47	75
Aug	19	30	Feb	32	59	Aug	50	79
Sep	21	35	Mar	35	62	Sep	53	82
Oct	23	40	Apr	38	66	Oct	56	85
Nov	25	45	May	41	70	Nov	59	88

**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, 2010 08:18 UT

Reproduction permitted if source mentioned.

Ed. Ronald Van der Linden, Ass. Ed. Petra Vanlommel

Editing contributions from various members of the SIDC team

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' <sub>i</sub>	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	24	20	-	81	////	1	0/0	6	
1	13	10	-	79	////	0	0/0	4	
2	11	9	-	79	////	0	0/0	3	
3	11	7	-	79	////	0	0/0	6	
4	9	3	-	79	////	1	1/0	3	
5	17	6	-	83	////	3	1/0	2	
6	22	10	-	89	////	12	1/0	2	
7	23	11	-	85	////	10	0/0	3	
8	23	14	-	84	////	0	0/0	4	
9	19	10	-	84	////	0	0/0	2	
10	30	12	-	86	////	4	0/0	5	
11	32	22	-	85	////	7	0/0	20	
12	30	19	-	85	////	3	0/0	18	
13	43	31	-	85	////	4	0/0	10	
14	38	30	-	86	////	1	0/0	10	
15	38	36	-	91	////	8	0/0	10	
16	37	58	-	92	////	0	0/0	8	
17	35	44	-	91	////	1	0/0	5	
18	29	16	-	87	////	0	0/0	7	
19	26	24	-	84	////	0	0/0	6	
20	18	21	-	80	////	0	0/0	2	
21	17	16	-	78	////	0	0/0	4	
22	15	14	-	75	////	0	0/0	6	
23	16	13	-	75	////	0	0/0	11	
24	8	8	-	76	////	0	0/0	8	
25	15	4	-	78	////	0	0/0	4	
26	14	4	-	76	////	0	0/0	2	
27	8	3	-	77	////	0	0/0	18	
28	17	8	-	80	////	0	0/0	10	
29	18	23	-	83	////	0	0/0	6	
30	15	35	-	86	////	0	0/0	4	

- 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, evaluation :  $1 \times \text{Sn} + 10 \times \text{"1"} + 100 \times \text{">1"}$ ).
- 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 2010

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
10	1230	3	13	43	12	31	14	6.0	2	SV
15	1115	2	14	34	17	17	17	23.2	2	AE
20	1015	2	5	25	12	13	0	17.7	3	AE
25	1448	2	2	22	11	11	0	1.5	2	OL
27	855	2	4	24	12	12	0	1.1	4	OL
28	925	2	13	33	20	13	20	1.8	2	OL

The relative mean sunspot number is 30.2.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR NOVEMBER 2010

$K' = 0.876$  (\*)

1	***	7	***	13	***	19	***	25	19
2	***	8	***	14	***	20	22	26	***
3	***	9	***	15	30	21	***	27	21
4	***	10	38	16	***	22	***	28	29
5	***	11	***	17	***	23	***	29	***
6	***	12	***	18	***	24	***	30	***

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 6 days on 30 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR NOVEMBER 2010  
E AND F BRUNNER'S TYPE GROUPS

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR DECEMBER 2010  
NONE

# MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

## I. Solar Activity

*Flaring activity was on a higher level compared with the previous months with 3M-flares. Several filaments erupted.*

A filament eruption near the solar central meridian (CM) in the southern hemisphere was observed by SDO/AIA 304 between 01:00 UT and 02:00 UT on Nov 03. It was accompanied by a coronal dimming visible in SDO/AIA 193. The corresponding CME was detected by SECCHI COR1 and COR2 coronagraphs onboard STEREO.

Catania sunspot group 59/NOAA AR 1121 was the most active group of this month. Even before it rotated on the solar disk on Nov 04, it was in a flaring mood. It produced an M1.6 flare on Nov 04, an M1.0 flare on Nov 05 and an M5.4 flare on Nov 06.

The X-ray flux curve from GOES shows several thin peaks reaching the C-level from Nov 10 up to Nov 13 at noon. Several mass outflows were detected by STEREO A-B COR2. The source regions Catania 59/NOAA AR 1121 and Catania 62/NOAA AR 1123 were situated near the CM on Nov 11. Since the plasma clouds were ejected under the ecliptic as visible in STEREO COR2 images, a direct impact on the Earth was excluded. A large magnetic loop with plasma was ejected from this source region on Nov 12. The plasma structure is visible in SDO/AIA 304 images. The ejection was also in this case directed under the ecliptic.

On Nov 07, a very small northern CH reached the CM. A second large but faint CH was present at the CM in an equatorial position on Nov 11. A third duo of CHs, one northern and one south polar CH extension reached the CM on Nov 24-25.

## II. Geomagnetic Activity

*There were only two periods with significant geomagnetic disturbances.*

The ICME corresponding to the filament eruption of Nov 03 arrived at the Earth on Nov 08. The geomagnetic response was very small since the Bz component was (negative, but) small. The plasma arriving at the Earth had also a relatively small speed: less than 400 km/s. Kp did not exceed 2.

Geomagnetic conditions have been quiet with active intervals on Nov 11-12. The interplanetary magnetic field oscillated between +10 and -10 nT and the wind speed reached values around 500 km/s. These perturbations may be linked with the small northern coronal hole.

The second coronal hole mentioned in the previous section is possibly responsible for the unsettled conditions from Nov 14 up the first hours of Nov 17. The solar wind speed was relatively high: above 600 km/s. The Bz was small resulting in only unsettled conditions.

Late on Nov 27, the co-rotating interaction region preceding the fast solar wind emanating from the coronal hole itself arrived. The fast solar wind reached speeds of 500 km/s. The arrival of the CIR caused a short but intense period of magnetic disturbances: Kp reached a maximum of 6.

## III. Noticeable solar events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	TENCM	TYPE	Cat	NOAA	NOTE
04	2330	2358	0012	S20E76	M1.6	SF			59	1121	
05	1243	1329	1406	S20E75	M1.0				59	1121	
06	1527	1536	1544	S19E58	M5.4	1N	100		59	1121	

**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. Product Release: CombiSWAP**

The new COMBISWAP is available. COMBISWAP is a visualisation of the Sun that combines a PROBA2/SWAP-image, the NOAA determination of active regions and the Catania sunspot groups. By clicking on the Catania Numbers, you get an estimate of how big the chance is for a flare caused by this particular sunspot group. The probability calculation is based on statistics of sunspot groups.

Go to <http://www.sidc.be/LatestSWData/LatestSWData.php>

