

## Center

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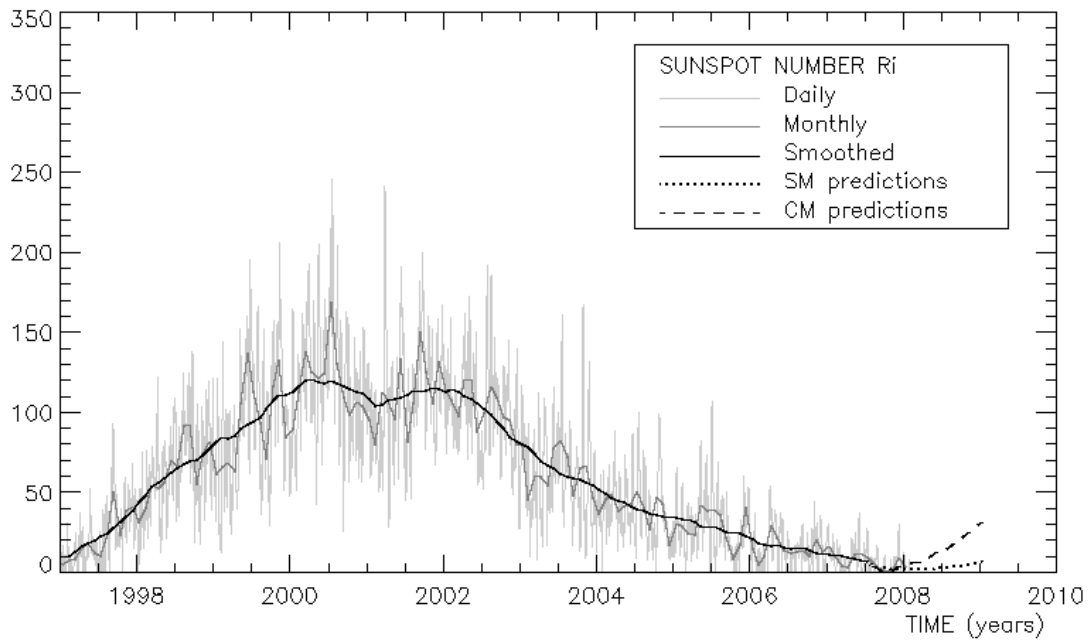
**SUNSPOT BULLETIN**

2008 n° 1

**Provisional international and normalized hemispheric daily sunspot numbers for January 2008**

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	7	4	3
2	7	0	7
3	7	0	7
4	12	6	6
5	10	10	0
6	11	6	5
7	11	6	5
8	9	0	9
9	0	0	0
10	8	4	4
11	8	0	8
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	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	8	0	8
31	8	0	8
<b>Monthly mean</b>	<b>3.4</b>	<b>1.2</b>	<b>2.2</b>
<b>Cooperating stations</b>	<b>61</b>	<b>51</b>	<b>51</b>



**Predictions of the monthly smoothed Sunspot Number**  
using the last provisional value, calculated for July 2007 : 7.0 ( $\pm 5\%$ )

	SM	CM		SM	CM		SM	CM
2007 Aug	6	4	2008 Feb	3	6	2008 Aug	3	17
Sep	6	2	Mar	3	7	Sep	3	20
Oct	5	2	Apr	2	9	Oct	4	23
Nov	4	2	May	2	11	Nov	4	26
Dec	4	4	Jun	2	13	Dec	5	29
2008 Jan	3	5	Jul	3	14	2009 Jan	5	32

**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' <sub>i</sub>	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	0	///	-	77	////	0	0/0	5	
1	7	1	-	79	////	1	0/0	4	
2	7	2	-	80	////	0	0/0	2	
3	7	3	-	79	////	0	0/0	20	
4	12	3	-	79	////	0	0/0	18	
5	10	3	-	80	////	0	0/0	11	
6	11	3	-	79	////	0	0/0	8	
7	11	5	-	78	////	1	0/0	14	
8	9	3	-	76	////	0	0/0	16	
9	0	0	-	77	////	0	0/0	7	
10	8	1	-	76	///	0	0/0	5	
11	8	2	-	76	////	0	0/0	4	
12	0	1	-	76	////	0	0/0	9	
13	0	///	-	75	////	0	0/0	13	
14	0	///	-	75	///	0	0/0	5	
15	0	0	-	74	///	0	0/0	0	
16	0	0	-	73	///	0	0/0	6	
17	0	///	-	74	////	0	0/0	15	
18	0	0	-	71	///	0	0/0	4	
19	0	0	-	71	///	0	0/0	4	
20	0	///	-	70	////	0	0/0	10	
21	0	0	-	72	///	0	0/0	8	
22	0	///	-	70	///	0	0/0	3	
23	0	0	-	71	////	0	0/0	7	
24	0	0	-	71	///	0	0/0	8	
25	0	///	-	71	///	0	0/0	4	
26	0	///	-	73	///	0	0/0	8	
27	0	0	-	72	////	0	0/0	6	
28	0	0	-	71	///	0	0/0	7	
29	0	1	-	72	///	0	0/0	3	
30	8	4	-	73	////	0	0/0	1	
31	8	7	-	72	////	0	0/0	6	

**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 JANUARY 2008

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
2	1330	1	1	11	0	11	0	0.1	2	AE
4	1011	0	0	0	0	0	0	0.0	2	DB
6	1148	1	3	13	0	13	13	0.4	3	OL
7	850	0	0	0	0	0	0	0.0	2	OB
8	1300	0	0	0	0	0	0	0.0	2	OB
9	1230	0	0	0	0	0	0	0.0	2	OB
12	1140	0	0	0	0	0	0	0.0	3	OB
14	1205	0	0	0	0	0	0	0.0	3	SV
22	930	0	0	0	0	0	0	0.0	3	AE
23	1245	0	0	0	0	0	0	0.0	2	AE
25	915	0	0	0	0	0	0	0.0	2	AE
26	1045	0	0	0	0	0	0	0.0	2	AE
27	1100	0	0	0	0	0	0	0.0	2	AE
30	1540	1	5	15	0	15	0	0.3	2	OL
31	930	1	3	13	0	13	0	0.3	1	OL

The relative mean sunspot number is 3.5.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR JANUARY 2008

$K' = 0.882 (*)$

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

The normalised relative monthly mean sunspot number is 3.

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

The Sun has been observed 15 days on 31 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR JANUARY 2008  
E AND F BRUNNER'S TYPE GROUPS

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR FEBRUARY 2008  
NONE

# MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

## ***I. Solar Activity***

*The Sun is still taking a break with 19 sunspotless days. But one tiny sunspot visible for only a few days became THE sunspot with a special mission, namely marking the start of solar cycle 24!*

The year started promising with large bright magnetic loops visible at the east from behind the solar disk in SOHO/EIT195. On Dec 30, 2007, the background X-ray radiation had increased suddenly reaching almost instantaneously a C-flare. Early Dec 31, a long duration C-flare took place. Sunspot group 67 (NOAA AR 0980) was the source. But from Jan 01, 2008, before any violent eruption happened, the group decayed slowly.

After one solar rotation, we could catch again a first glimpse of the magnetic loops on the east-side of the solar disk on Jan 25. Sunspot group 65 (NOAA AR 0982) was only able to create a few A-level peaks in the X-ray radiation on Jan 29 and 30.

On Jan 04 a new sunspot group Catania 66 (AR 0981) was visible. On Jan 07, it fired off a B1.2 flare. Nothing really special if it wasn't that this sunspot heralded the start of the next solar cycle! This sunspot clearly belongs to solar cycle 24. An official definition of the start of a solar cycle does not exist. But, let's give it a try. The solar activity cycle can be quantified by the (daily, monthly, yearly) sunspot number. A next solar cycle manifests itself by the appearance of its first associated sunspots: high-latitude sunspots with a reversed magnetic configuration in comparison with sunspots of the previous cycle. The condition about polarity was added only since magnetic field measurements were done. It is clear that cycles overlap: sunspots belonging to one cycle and sunspots belonging to a next cycle can simultaneously be present. In fact, the next cycle is generally considered to start when a sunspot minimum is reached, which can be quite some time after the first spots of the new cycle have appeared. The point is that we can only afterwards determine the starting time. In December 2007, a high latitude area with the correct magnetic configuration but no sunspot was seen (cf. previous monthly bulletin). Now, a sunspot with the correct magnetic configuration was seen. The appearance of one sunspot isolated in time, even if it has the correct magnetic configuration, can be a false start if this sunspot is not followed by a sequence of sunspots with the correct magnetic configuration. But both the December and January event give a good indication that solar cycle 24 is about to arrive in its full glory.

Four coronal holes transited the mostly quiet solar disk. We list the dates on which the geo-effective coronal holes (CH) passed the central meridian (CM):

- Jan 01: equatorial CH,
- Jan 10: a southern mouth-shaped CH stretched over almost 75° length,
- Jan 22: a small faint equatorial CH,
- Jan 28: again a small equatorial CH.

## ***II. Geomagnetic Activity***

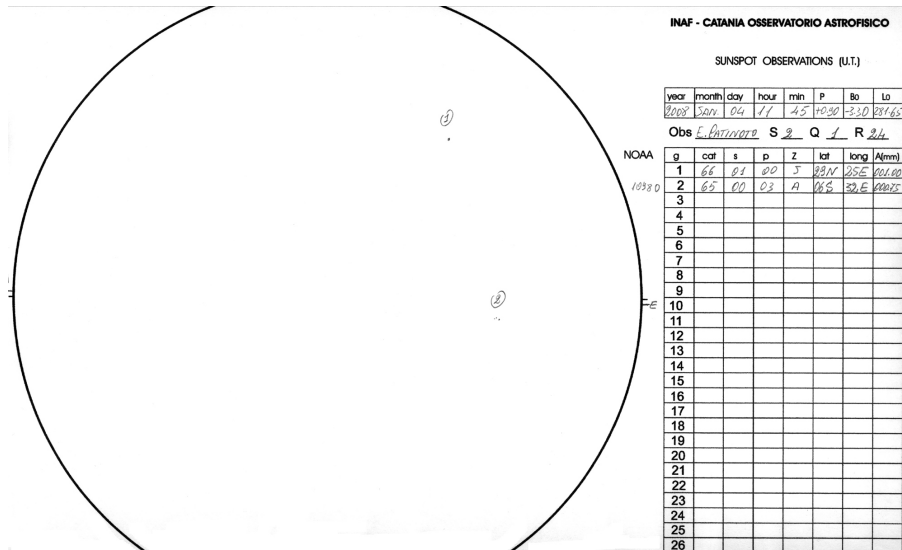
*Four periods of geomagnetic disturbances were measured. They all can be linked to the CH's mentioned in the previous sections.*

We list the arrival of the co-rotating interaction region (CIR). Such a plasma structure is carried by the solar wind and is typically denser and has stronger magnetic field intensity compared to a regular solar wind. A CIR comes previous to an increase in solar wind speed.

- Late Jan 04: a maximum solar wind speed (SWS) of 700 km/s, several active periods (Kp=4) from Jan 05 until Jan 08;
- Jan 12: a maximum SWS of 700 km/s, a stretched solar wind speed profile, only 2 active periods, unsettled conditions from Jan 12 until Jan 20;

- Jan 24: a maximum SWS of 550 km/s, geomagnetic disturbance limited to only Jan 25 with one active period. There was not a clear profile typically for a CH visible in the ACE data;
- Jan 31: the disturbed period began with unsettled conditions reaching finally the storm level in Feb.

### III. Picture of the month



**Figure 1** This drawing is made by an observer of the Catania station on Jan 04, 2008. The next cycle sunspot is indicated with number 66 (NOAA 0981).