

## Center

*Data Analysis Service supported by the FAGS*

**SUNSPOT BULLETIN**

2009

n° 3

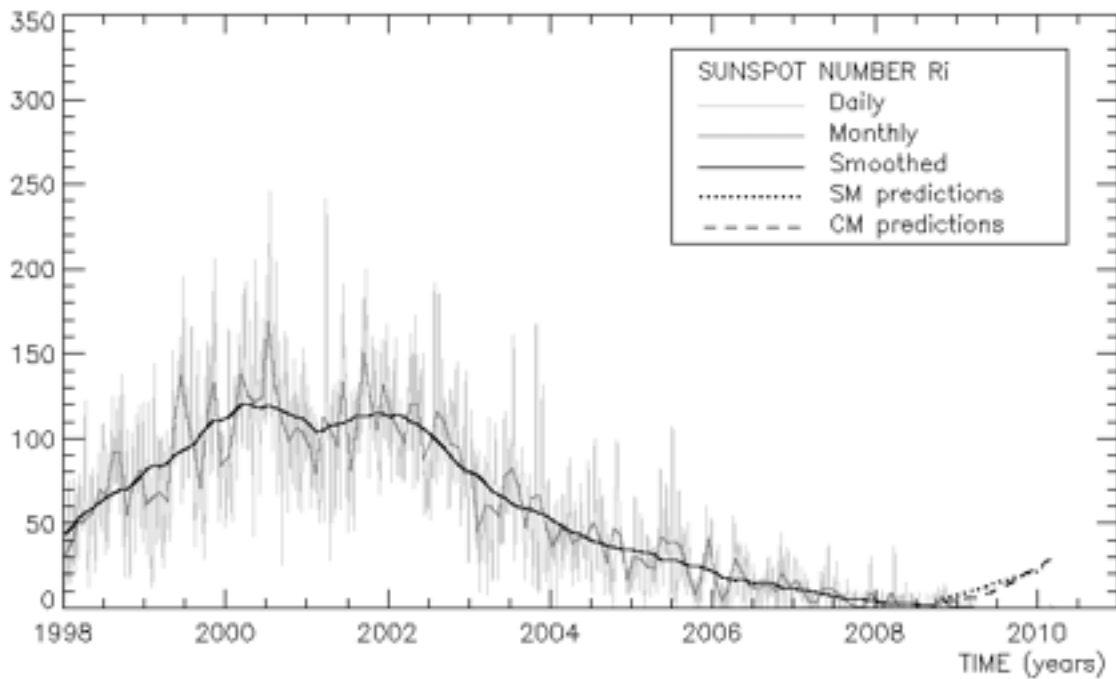
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**Provisional international and normalized hemispheric daily sunspot numbers for March 2009**


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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	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	8	0	8
7	8	0	8
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	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	7	7	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
<b>Monthly mean</b>	<b>0.7</b>	<b>0.2</b>	<b>0.5</b>
<b>Cooperating stations</b>	<b>64</b>	<b>56</b>	<b>56</b>



**Predictions of the monthly smoothed Sunspot Number**  
 using the last provisional value, calculated for September 2008 :  $2.3 (\pm 5\%)$

		<b>SM</b>	<b>CM</b>			<b>SM</b>	<b>CM</b>			<b>SM</b>	<b>CM</b>
2008	Oct	2	3	2009	Apr	9	8	2009	Oct	16	19
	Nov	2	4		May	10	9		Nov	17	21
	Dec	2	5		Jun	11	10		Dec	18	23
2009	Jan	6	5		Jul	12	12	2010	Jan	20	25
	Feb	7	6		Aug	13	14		Feb	21	28
	Mar	8	7		Sep	15	16		Mar	22	31

**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
28	0	///	-	71	////	0	0/0	(//)	
1	0	0	-	69	////	0	0/0	3	
2	0	0	-	69	////	0	0/0	1	
3	0	///	-	69	////	0	0/0	10	
4	0	///	-	70	////	0	0/0	12	
5	0	0	-	69	////	0	0/0	5	
6	8	1	-	69	////	0	0/0	3	
7	8	1	-	69	////	0	0/0	2	
8	0	0	-	69	////	0	0/0	10	
9	0	0	-	68	////	0	0/0	2	
10	0	///	-	69	////	0	0/0	4	
11	0	0	-	69	////	0	0/0	7	
12	0	///	-	69	////	0	0/0	8	
13	0	0	-	68	////	0	0/0	21	
14	0	0	-	69	////	0	0/0	14	
15	0	0	-	68	////	0	0/0	10	
16	0	0	-	69	////	0	0/0	7	
17	0	0	-	69	////	0	0/0	7	
18	0	0	-	68	////	0	0/0	3	
19	0	0	-	69	////	0	0/0	6	
20	0	0	-	69	////	0	0/0	5	
21	0	0	-	70	////	0	0/0	10	
22	0	0	-	69	////	0	0/0	7	
23	0	0	-	68	////	0	0/0	3	
24	0	0	-	69	////	0	0/0	8	
25	0	///	-	69	////	0	0/0	12	
26	7	1	-	69	////	0	0/0	8	
27	0	0	-	72	////	0	0/0	9	
28	0	0	-	71	////	0	0/0	4	
29	0	0	-	71	////	0	0/0	4	
30	0	0	-	71	////	0	0/0	6	
31	0	0	-	71	////	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 :  $1 \times \text{Sn} + 10 \times "1" + 100 \times ">1"$ ).  
**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 MARCH 2009

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5	QUAL	OBS
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH			
1	830	0	0	0	0	0	0.0	2	OL
2	930	0	0	0	0	0	0.0	3	AE
5	1000	0	0	0	0	0	0.0	2	AE
6	900	1	2	12	0	12	0.4	2	AE
7	930	1	1	11	0	11	0.4	3	AE
8	1145	0	0	0	0	0	0.0	3	AE
9	810	0	0	0	0	0	0.0	2	OB
11	840	0	0	0	0	0	0.0	3	OB
13	900	0	0	0	0	0	0.0	2	OB
14	940	0	0	0	0	0	0.0	2	OB
15	830	0	0	0	0	0	0.0	2	OB
16	1050	0	0	0	0	0	0.0	3	SV
17	800	0	0	0	0	0	0.0	1	SV
18	745	0	0	0	0	0	0.0	3	SV
19	1200	0	0	0	0	0	0.0	3	SV
20	830	0	0	0	0	0	0.0	3	SV
21	750	0	0	0	0	0	0.0	3	SV
22	940	0	0	0	0	0	0.0	1	SV
23	900	0	0	0	0	0	0.0	2	OL
24	830	0	0	0	0	0	0.0	2	OL
27	1155	0	0	0	0	0	0.0	1	OL
28	1015	0	0	0	0	0	0.0	2	OL
29	815	0	0	0	0	0	0.0	3	OL
30	810	0	0	0	0	0	0.0	3	AE
31	705	0	0	0	0	0	0.0	4	FC

The relative mean sunspot number is 0.9.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR MARCH 2009

$K'= 0.811$  (\*)

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

The normalised relative monthly mean sunspot number is 1.

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

The Sun has been observed 25 days on 31 possible.

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

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR APRIL 2009  
NONE

# MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

## **I. Solar Activity**

*The global solar activity was low: the background X-ray radiation stayed below the measurement level of GOES, the F10cm radio flux was between 68 and 72 sfu, the monthly mean of the International Sunspot Index was only 0.7.*

Two sunspot groups were seen during the period. The first one was reported on Mar 06 and 07: Catania 97, NOAA AR 1014. It produced no flares. The second one was reported as Catania 98 on March 26. Some small peaks in the GOES X-ray flux were measured on the same day.

A few coronal structures with open magnetic fields, coronal holes (CH), passed the view this month. We mention the date the structure passed the central meridian.

- An equatorial CH, Feb 27.
- An equatorial CH, Mar 09.
- A CH stretched along the equator, Mar 17

## **II. Geomagnetic Activity**

*The overall magnetic activity was low to moderate. All disturbances were caused by coronal holes.*

The first CH mentioned in the previous section had only a limited influence on Earth. The total interplanetary magnetic field (IMF) increased up to 10nT but the Bz component was mainly positive. The maximum solar wind speed was only 400 km/s. Consequently, the Kp became maximum 3 on Mar 04.

An extension of a southern polar CH was probably the cause of the small increase in strength of the total IMF and the increase of the solar wind speed on Mar 08 leading to a Kp of 3.

Late Mar 11, a co-rotating interaction region arrived. The Bz component of the IMF dragged with the flow, became +10nT. Suddenly, early Mar 13, the total IMF increased further, while the Bz became negative for almost the whole remaining day. The solar wind speed increased up to 600 km/s. The combination of a negative Bz and a relatively high solar wind speed disturbed the geomagnetic field. Kp became once 5 and two times 4 on Mar 13. The geomagnetic field stayed only slightly disturbed on Mar 14, 15 and 16.

The third equatorial CH was faint. In the solar wind data of ACE we see fragments of the CH: the solar wind reaching the Earth alternated between low and higher values ranging from 300 km/s up to 500km/s. The geomagnetic conditions were quiet to unsettled from Mar 21. Only on Mar 25, the strongest disturbance led two times to a Kp of 4 on Mar 25. The solar wind speed peaked at 500 km/s at that moment.