

Center

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SUNSPOT BULLETIN

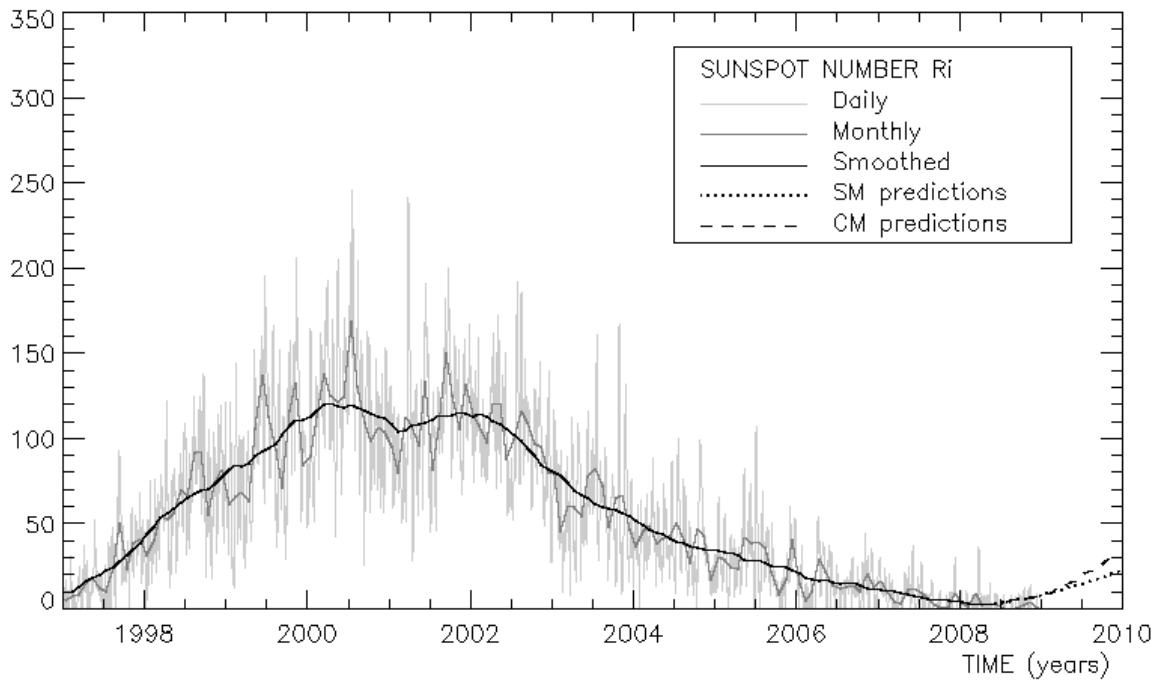
2009

n° 2

Provisional international and normalized hemispheric daily sunspot numbers for February 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	0	0	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	8	0	8
12	7	0	7
13	7	0	7
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	8	8	0
25	8	8	0
26	0	0	0
27	0	0	0
28	0	0	0
Monthly mean	1.4	0.6	0.8
Cooperating stations	58	50	50



Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for August 2008 : 2.7 ($\pm 5\%$)

		SM	CM		SM	CM		SM	CM		
2008	Sep	2	3	2009	Mar	8	8	2009	Sep	15	19
	Oct	2	4		Apr	9	9		Oct	16	21
	Nov	2	5		May	10	11		Nov	17	24
	Dec	6	6		Jun	11	12		Dec	18	26
2009	Jan	6	6		Jul	12	15	2010	Jan	20	29
	Feb	7	7		Aug	13	17		Feb	21	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' _i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	0	///	-	69	////	0	0/0	9	
1	0	0	-	70	////	0	0/0	3	
2	0	///	-	69	////	0	0/0	2	
3	0	0	-	69	////	0	0/0	5	
4	0	0	-	70	////	0	0/0	14	
5	0	0	-	70	////	0	0/0	7	
6	0	///	-	70	////	0	0/0	3	
7	0	0	-	71	////	0	0/0	2	
8	0	0	-	71	////	0	0/0	0	
9	0	0	-	71	////	0	0/0	2	
10	0	0	-	68	////	0	0/0	2	
11	8	0	-	70	////	0	0/0	4	
12	7	2	-	70	////	0	0/0	2	
13	7	2	-	70	////	0	0/0	2	
14	0	///	-	70	////	0	0/0	16	
15	0	0	-	70	////	0	0/0	13	
16	0	0	-	70	////	0	0/0	6	
17	0	0	-	71	////	0	0/0	0	
18	0	0	-	70	////	0	0/0	4	
19	0	0	-	69	////	0	0/0	2	
20	0	0	-	69	////	0	0/0	8	
21	0	0	-	71	////	0	0/0	4	
22	0	///	-	70	////	0	0/0	4	
23	0	0	-	71	////	0	0/0	7	
24	8	3	-	71	////	0	0/0	10	
25	8	3	-	71	////	0	0/0	4	
26	0	1	-	70	////	0	0/0	3	
27	0	0	-	69	////	0	0/0	13	
28	0	///	-	71	////	0	0/0	(//)	

- 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 : $1 \times \text{Sn} + 10 \times \text{"1"} + 100 \times \text{">1"}$).
- 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 FEBRUARY 2009

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5 WM-2	QUAL	OBS
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH			
1	852	0	0	0	0	0	0.0	2	OL
5	1100	0	0	0	0	0	0.0	2	AE
6	830	0	0	0	0	0	0.0	2	AE
8	1215	0	0	0	0	0	0.0	2	AE
11	845	0	0	0	0	0	0.0	2	OB
12	850	1	1	11	0	11	0.2	2	OL
14	830	0	0	0	0	0	0.0	2	OB
15	1010	0	0	0	0	0	0.0	1	OB
25	815	1	2	12	12	0	1.1	2	OL
26	1230	0	0	0	0	0	0.0	1	OL
28	900	0	0	0	0	0	0.0	2	OL

The relative mean sunspot number is 2.1.

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

$K' = 0.926$ (*)

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

The normalised relative monthly mean sunspot number is 2.

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

The Sun has been observed 11 days on 28 possible.

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

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR MARCH 2009
NONE

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Generally speaking, solar activity was very low. The X-ray background radiation was below the measurement level of GOES 10, except for a few moderate peaks associated with two sunspot groups.

On Feb 10 at 23:10 UT, a B1-class flare was observed by GOES. The flare came from Catania sunspot group 95 (NOAA AR 11012). The region released two other B-flares: on Feb 12 a B4.1 and on Feb 13 a B2.3. In STEREO-B extreme ultraviolet images, an “EIT wave” was noticed on Feb 13, around 6:00UT. A running wave in EUV-images is an indicator for a plasma eruption. The active region was located at the central meridian from STEREO-B’s point of view. Due to a CCD bake-out, EIT images were not available. CACTus detected in coronagraph images from the SECCHI/COR2 telescope onboard of STEREO-A two CME's, one on Feb 12 and one on Feb 13. According to CACTus, both CME's were slow: 568km/s and 347 km/s respectively. The region was located in the eastern part of the solar disk seen from Earth. No disturbances near Earth were detected.

On Feb 25, observers reported another sunspot group: Catania 96 (NOAA AR 11013). The group produced an A3.2 flare on Feb 27. It was accompanied by an EUV- wave and dimming event starting at 07:09 UT. The associated CME was weak and narrow. The event is possibly related with an interplanetary shock registered by ACE and SOHO/CELIAS around 05:00 UT on March 3. On Feb 28, the active region degraded to an H-alpha plage.

We list the coronal holes (CH) crossing the central meridian (CM):

1. A recurrent equatorial CH, around Feb 10 (EIT was not available).
2. A faint equatorial CH, Feb 18.
3. A low-latitude weak CH, Feb 27.

II. Geomagnetic Activity

The overall geomagnetic activity was low.

On Feb 04, the earth magnetic field was disturbed ($K_p=4$). This was the consequence of a solar wind shock arriving late on Feb 03. The solar wind speed jumped from 300 km/s to 380 km/s.

The Earth entered the interaction region between a slow and fast solar wind stream, a co-rotating interaction region or CIR, late on Feb 13. The solar wind emanating from the associated CH was fast: 600 km/s. The interplanetary magnetic field carried by the wind peaked at 18 nT. Because of the short time interval in which the B_z component of the IMF was negative, the K_p reached values of only two times 4 on Feb 14 and 15.

Early on Feb 27, a CIR arrived at Earth. The fast solar wind stream was most probably produced by a low-latitude extension of the southern polar coronal hole. The IMF was maximum 10 nT and the B_z was predominantly positive. The geomagnetic field was only slightly disturbed ($K_p=3$).