Solar Influences Data analysis Center

Data Analysis Service supported by the FAGS

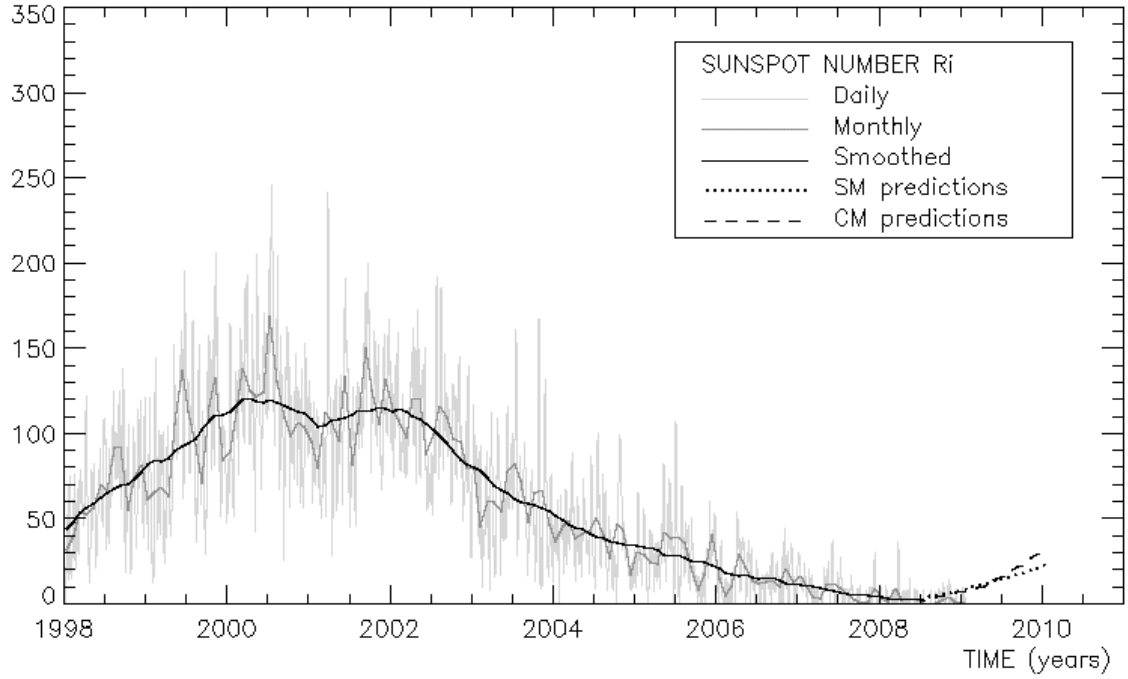
SUNSPOT BULLETIN

2009 n° 1

Provisional international and normalized hemispheric daily sunspot numbers for January 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	7	7	0
10	9	9	0
11	10	10	0
12	8	8	0
13	7	7	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	7	0	7
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	0	0	0
31	0	0	0
Monthly mean	**1.5**	**1.3**	**0.2**
Cooperating stations	**60**	**54**	**54**



Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for July 2008 : 2.8 (± 5%)

	SM	CM		SM	CM		SM	CM
2008 Aug	2	3	2009 Feb	7	9	2009 Aug	13	20
Sep	2	4	Mar	8	10	Sep	15	22
Oct	2	5	Apr	9	11	Oct	16	24
Nov	5	6	May	10	13	Nov	17	27
Dec	6	7	Jun	11	15	Dec	18	30
2009 Jan	6	8	Jul	12	17	2010 Jan	20	33

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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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'_i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	0	///	-	69	////	0	0/0	16	
1	0	///	-	69	////	0	0/0	8	
2	0	0	-	70	////	0	0/0	6	
3	0	///	-	70	////	0	0/0	13	
4	0	///	-	69	////	0	0/0	6	
5	0	///	-	69	////	0	0/0	6	
6	0	0	-	69	////	0	0/0	3	
7	0	2	-	69	////	0	0/0	3	
8	0	///	-	69	////	0	0/0	3	
9	7	2	-	70	////	0	0/0	6	
10	9	7	-	71	////	0	0/0	5	
11	10	5	-	70	////	0	0/0	1	
12	8	3	-	69	////	0	0/0	0	
13	7	2	-	71	////	0	0/0	6	
14	0	0	-	71	////	0	0/0	7	
15	0	///	-	71	////	0	0/0	8	
16	0	0	-	71	////	0	0/0	4	
17	0	0	-	72	////	0	0/0	2	
18	0	2	-	71	////	0	0/0	2	
19	7	4	-	71	////	0	0/0	9	
20	0	0	-	70	////	0	0/0	5	
21	0	0	-	69	////	0	0/0	4	
22	0	///	-	69	////	0	0/0	2	
23	0	///	-	70	////	0	0/0	2	
24	0	0	-	69	////	0	0/0	1	
25	0	0	-	70	////	0	0/0	2	
26	0	0	-	70	////	0	0/0	12	
27	0	0	-	70	////	0	0/0	5	
28	0	///	-	70	////	0	0/0	2	
29	0	0	-	69	////	0	0/0	3	
30	0	///	-	69	////	0	0/0	5	
31	0	///	-	69	////	0	0/0	9	

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 x Sn+10 x "1"+100 x ">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 2009

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
3	1000	0	0	0	0	0	0	0.0	2	AE
6	900	0	0	0	0	0	0	0.0	2	AE
8	1000	0	0	0	0	0	0	0.0	2	AE
9	930	1	2	12	12	0	0	0.9	2	AE
10	945	1	6	16	16	0	0	1.2	2	AE
11	1030	1	7	17	17	0	17	1.3	2	AE
15	1000	0	0	0	0	0	0	0.0	3	OB
20	940	0	0	0	0	0	0	0.0	1	SV
23	930	0	0	0	0	0	0	0.0	2	SV
24	1055	0	0	0	0	0	0	0.0	1	SV
25	915	0	0	0	0	0	0	0.0	2	SV
27	1235	0	0	0	0	0	0	0.0	2	OL
28	1247	0	0	0	0	0	0	0.0	3	OL
29	1230	1	1	11	11	0	0	0.3	2	OL
30	1236	0	0	0	0	0	0	0.0	2	OL
31	900	0	0	0	0	0	0	0.0	2	OL

The relative mean sunspot number is 3.5.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR JANUARY 2009

K'= 0.882 (*)

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

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 16 days on 31 possible.

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

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR FEBRUARY 2009
NONE

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Solar activity was low this month. The 10cm flux stayed between 69 and 71 solar flux units (sfu). The global X-ray radiation stayed beneath the GOES measurement level, except for the peaks of a few weak flares.

Two sunspot groups were visible this month. The active region (NOAA AR1010) associated with the first sunspot group, Catania 93, popped up on Jan 09 as a clear white dot in the southern hemisphere and on the east side of the solar disk in EIT195 images. It produced several A and B-flares on Jan 09 and 10 and a last A-flare on Jan 12. Before turning behind the west limb on Jan 19, the group degraded to a plage on Jan 15. The second sunspot group, Catania 94 (NOAA AR 1011) was reported on Jan 19. As soon as the group appeared, it degraded to a H-alpha plage without sunspots. It produced no flaring activity.

Five coronal holes (CH) were visible in EIT195. We list them and the date the CH crossed the central meridian (CM):

1. A southern CH, Dec 30, 2008,
2. A Y-shaped faint CH. The lowest part was situated near the equator and passed the CM on Jan 04.
3. A faint equatorial CH reached the CM on Jan 14,
4. A recurrent equatorial CH, Jan 23,
5. A southern CH, Jan 27.

II. Geomagnetic Activity

Geomagnetic conditions were overall quiet this month. The solar wind associated with the coronal holes transiting the solar disk did not disturb the Earth's magnetosphere in a significant way.

The solar wind emanating from the first CH had a maximum speed of around 550 km/s. The magnetic field dragged along with the solar wind was not strong: maximum 8 nT. On Jan 03, Kp reached the value of 4, i.e. active conditions, during one three-hour interval.

The ACE signature of the second CH was small with almost no variation in the magnetic field and wind speed parameters. There was no geomagnetic response.

A magnetic sector crossing of Earth caused unsettled conditions from Jan 14-15.

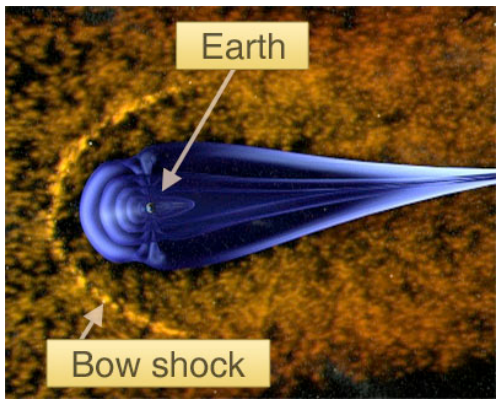
A co-rotating interaction region between a slow and fast solar wind arrived late Jan 18. It was the precursor of the fast solar wind emanating from the third CH listed in the previous section. Early Jan 19, Kp reached once 4. Compared with previous rotation, the maximum speed of the solar wind decayed from 600 km/s to 500 km/s.

The fast solar wind stream associated with the fourth CH of the list arrived at Earth late Jan 25. This stream was weaker compared to the previous rotation during which the solar wind speed was above 500 km/s for a long period. Now, the solar wind speed did not pass above 400 km/s. In response, the Earth's magnetosphere remained globally quiet with only Kp equals 3 on Jan 26.

Probably because of the high latitude of the fifth CH, the ACE signature was confined in time. The typical increase in the magnetic field parameters was seen from late Jan 30 up to Jan 31, while the solar wind speed shows the typical bulb on Jan 31 and the first half of Feb 01. No geomagnetic influence was seen: the Kp value was 2 or less.

III. News of the Month: Visit of E. Parker

We have the honour to welcome E. Parker in June 2009 at the Solar-Terrestrial Center of Excellence. This will be an occasion to speak to the world's top expert on the solar wind. It was in the 1950s that Parker developed his theory about the solar wind.



Parker suggested that the corona, the exterior part of the solar atmosphere is continuously expanding. This spherically symmetric expansion is called the solar wind. This wind is an everlasting plasma stream. By the time the wind reaches Earth, it has become supersonic and leads to the typical form of the dipolar Earth magnetosphere. This is our magnetic protection with the compressed bulb at the day-side and the stretched tail at the night-side.

The solar wind is associated with open magnetic field lines. Coronal holes are solar structures with this typical open magnetic field configuration. The wind drags with it the solar magnetic field lines. The plasma and the magnetic field stick together. Thinking further, Parker understood how the Sun's magnetic field should look in space. He came to the concept of a spiral, the famous Parker spiral. The spiral is a way to picture the open magnetic field lines emanating from the Sun, how they reach out in space and how they are bended because of the solar rotation.

It was also Parker who proposed a solution for the heating problem of the corona. The corona is much hotter compared with for example, the solar surface. Nano-flares could be the key in solving this problem.

Parker was born in 1927. His science dates from before and after the space age. His theories developed before the space age, were confirmed by spacecrafts, contrary to all the skepticism. No magic or crystal ball, but clever and open for new ideas.

We are looking forward to his visit and his talk!