

Center

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SUNSPOT BULLETIN

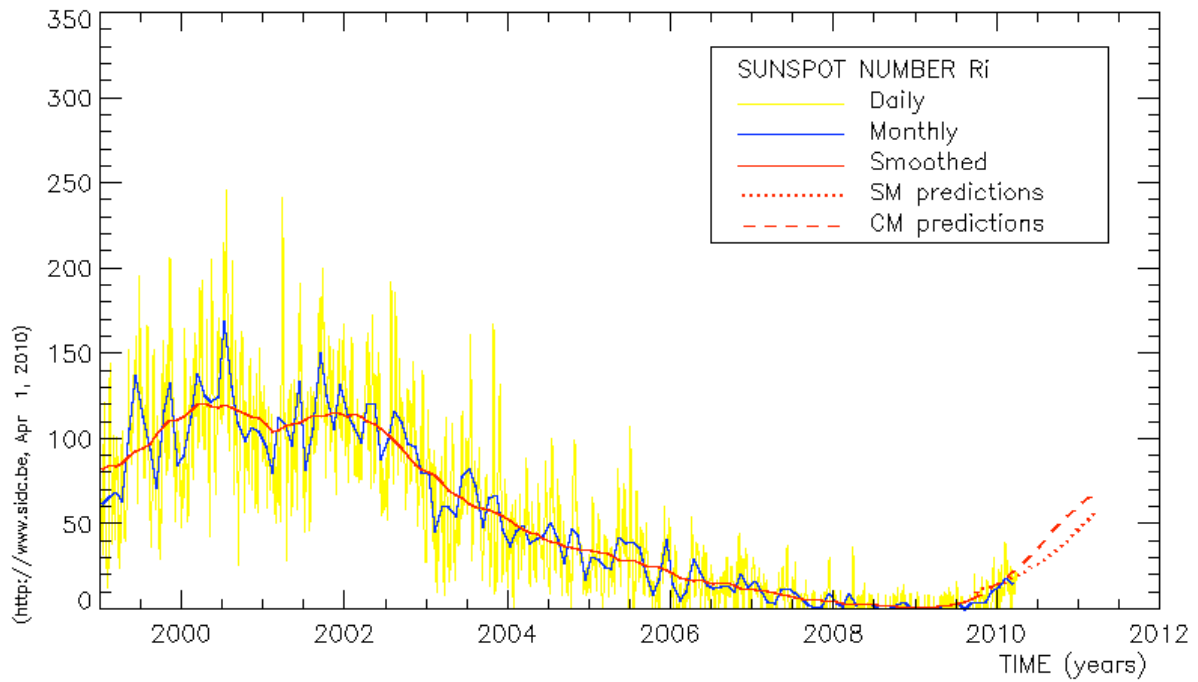
2010

n° 3

Provisional international and normalized hemispheric daily sunspot numbers for March 2010

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

Date	R' ₁	R' _N	R' _s
1	15	8	7
2	24	8	16
3	23	8	15
4	25	8	17
5	18	9	9
6	0	0	0
7	8	8	0
8	11	11	0
9	0	0	0
10	0	0	0
11	22	13	9
12	23	15	8
13	20	20	0
14	21	21	0
15	17	17	0
16	15	15	0
17	18	18	0
18	19	19	0
19	14	14	0
20	9	9	0
21	14	14	0
22	11	11	0
23	9	9	0
24	11	11	0
25	15	15	0
26	14	14	0
27	22	15	7
28	20	13	7
29	21	14	7
30	21	13	8
31	17	9	8
Monthly mean	15.4	11.6	3.8
Cooperating stations	62	57	57



Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for September 2009 : 6. ($\pm 5\%$)

		SM	CM			SM	CM			SM	CM
2009	Oct	7	8	2010	Apr	16	26	2010	Oct	28	51
	Nov	8	11		May	17	29		Nov	31	55
	Dec	10	13		Jun	19	33		Dec	34	58
2010	Jan	12	16		Jul	21	37	2011	Jan	37	62
	Feb	13	19		Aug	23	42		Feb	41	65
	Mar	14	22		Sep	26	47		Mar	45	67

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
28	9	3	-	78	////	0	0/0	3	
1	15	5	-	78	////	0	0/0	4	
2	24	8	-	79	////	0	0/0	5	
3	23	6	-	80	////	0	0/0	10	
4	25	6	-	81	////	1	0/0	8	
5	18	3	-	80	////	0	0/0	3	
6	0	0	-	78	////	0	0/0	5	
7	8	0	-	77	////	0	0/0	5	
8	11	///	-	76	////	0	0/0	3	
9	0	0	-	78	////	0	0/0	4	
10	0	2	-	80	////	0	0/0	14	
11	22	14	-	84	////	1	0/0	12	
12	23	32	-	90	////	1	0/0	11	
13	20	49	-	92	////	2	0/0	5	
14	21	51	-	89	////	3	0/0	7	
15	17	45	-	86	////	0	0/0	4	
16	15	53	-	85	////	0	0/0	6	
17	18	10	-	87	////	0	0/0	8	
18	19	9	-	86	////	0	0/0	6	
19	14	3	-	84	////	0	0/0	6	
20	9	5	-	84	////	0	0/0	6	
21	14	16	-	85	////	0	0/0	2	
22	11	10	-	82	////	0	0/0	0	
23	9	2	-	84	////	0	0/0	2	
24	11	12	-	84	////	0	0/0	4	
25	15	33	-	88	////	1	0/0	8	
26	14	43	-	86	////	0	0/0	5	
27	22	64	-	88	////	2	0/0	4	
28	20	55	-	86	////	1	0/0	(//)	
29	21	72	-	83	////	0	0/0	6	
30	21	66	-	83	////	0	0/0	8	
31	17	49	-	81	////	0	0/0	7	

- 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 MARCH 2010

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	820	2	2	22	11	11	22	2.4	2	FC
2	840	2	10	30	11	19	11	3.2	3	AE
3	845	2	7	27	11	16	11	2.7	2	AE
4	900	3	9	39	11	28	0	2.6	3	AE
5	1015	3	4	34	11	23	0	1.8	2	AE
6	1250	0	0	0	0	0	0	0.0	3	SV
7	820	0	0	0	0	0	0	0.0	3	SV
9	800	0	0	0	0	0	0	0.0	3	SV
10	730	0	0	0	0	0	0	0.0	1	SV
11	1100	2	10	30	17	13	13	8.2	3	SV
15	1350	1	10	20	20	0	20	20.9	3	OL
16	850	1	6	16	16	0	16	19.8	2	OB
17	835	2	10	30	30	0	0	4.7	2	FC
18	1045	2	10	30	30	0	0	1.7	2	OB
19	1145	2	2	22	22	0	0	0.4	2	OB
20	1145	1	3	13	13	0	13	1.3	2	OB
22	1430	1	9	19	19	0	19	5.1	2	OL
23	1450	1	6	16	16	0	0	1.1	3	OL
24	933	1	7	17	17	0	0	5.8	3	OL
25	1235	2	7	27	27	0	0	11.1	4	OL
26	1346	1	12	22	22	0	0	15.4	3	OL
27	745	2	16	36	25	11	0	18.3	4	OL
28	740	2	16	36	25	11	25	21.0	2	OL
29	1530	2	12	32	21	11	21	22.3	3	AE
30	700	2	12	32	20	12	20	21.9	3	FC
31	1109	2	7	27	12	15	0	6.6	4	OL

The relative mean sunspot number is 22.2.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR MARCH 2010

K' = 0.811 (*)

1	18	7	0	13	***	19	18	25	22
2	24	8	***	14	***	20	11	26	18
3	22	9	0	15	16	21	***	27	29
4	32	10	0	16	13	22	15	28	29
5	28	11	24	17	24	23	13	29	26
6	0	12	***	18	24	24	14	30	26
								31	22

The normalised relative monthly mean sunspot number is 18.

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

The Sun has been observed 26 days on 31 possible.

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

NONE

PROBABLE RETURN OF MAJOR GROUPS FOR APRIL 2010
NONE

MONTHLY SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

I. Solar Activity

Solar activity is as expected: several sunspots transited the solar disk, we had only 3 spotless days, the values of the radio 10cm flux stayed above 76 sfu and peaked at 92 sfu. Several C-flares occurred, no M-flares. We had several CME's and long duration flares.

Several long duration flares (LDF) occurred this month. A long duration event is typically associated with a coronal mass ejection.

- A B6.6 LDF peaked at 23:06 UT on Mar 01. The source region was located at the east limb (no Catania or NOAA number). The CME was not geo-effective.
- A B5.2 LDF peaked at 15:02UT on Mar 06. The source region was the same region responsible for the B6.6 flare (but now rotated to a more west ward location). This event gave rise to a coronal dimming. During such an eruption, plasma is ejected. The area from which the material is evacuated is seen as a dark region. The CME was not geo-effective.
- A B3.0 LDF peaked at 07:13UT on Mar 10. The source region without a NOAA or Catania number, was located in the east.
- Another coronal dimming and small plasma eruption was associated with a C2.3 flare peaking at 18:27UT on Mar 12 and a B8.7 flare peaking at 02:58UT on Mar 13. The source region was Catania 52/NOAA AR 1054.
- A C1.5 LDF peaked at 23:41 on Mar 13 and a B7.9 LDF peaked at 12:02UT on Mar 14. The source region was Catania 52/NOAA AR 1054. During this time period, a prominence eruption located more to the west occurred also. These three events together gave the impression of a halo CME.

Another prominent active region was 1057, Catania 54, which rotated on the solar disk on Mar 24. It produced several C-flares and was the source region of several mass ejections. The next relatively active sunspot/AR was Catania 56/NOAA AR 1059 coming on the disk on Mar 28. It was also the source of several CME's from Mar 30 onwards.

II. Geomagnetic Activity

The overall geomagnetic activity was quiet to unsettled. Several coronal hole signatures are seen in ACE-data.

Only on Mar 12 and Mar 17, the Kp was once 4. Those days, the influence of the coronal hole present on the west side of the solar disk was little stronger compared with the rest of the month. Further, no particular interesting events are to be reported.