



## Center

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**SUNSPOT BULLETIN**

2013

n° 4

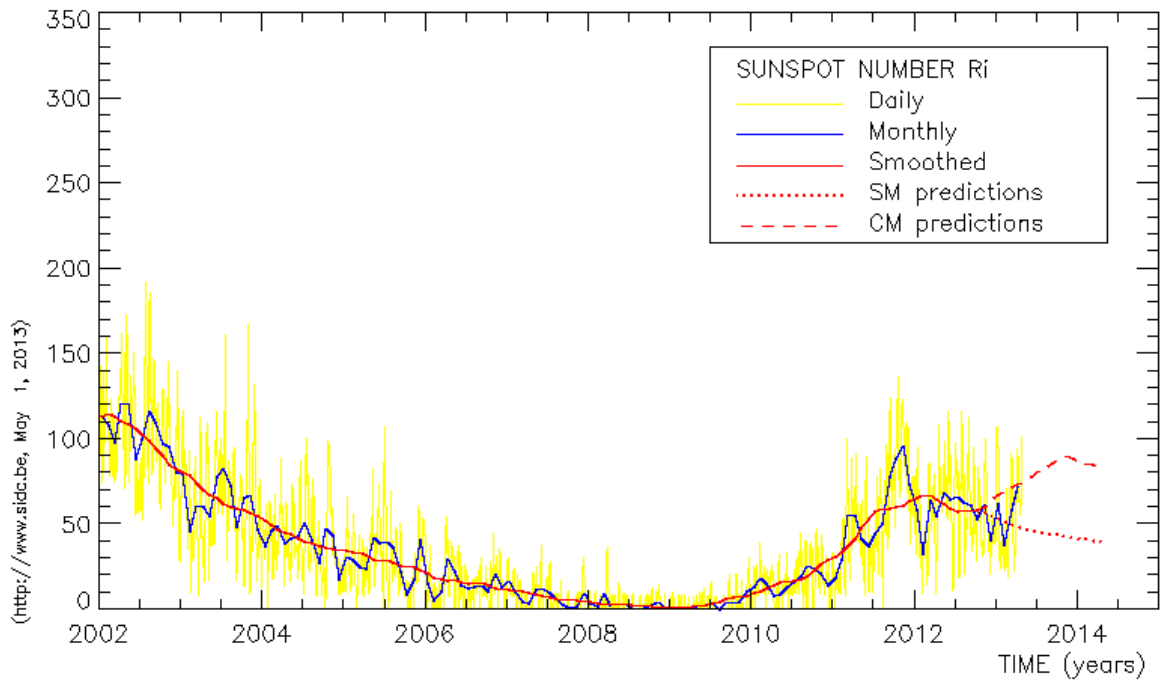
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**Provisional international and normalized hemispheric daily sunspot numbers for April 2013**


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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>1</sub>	R' <sub>N</sub>	R' <sub>S</sub>
1	53	24	29
2	66	38	28
3	68	38	30
4	63	39	24
5	77	44	33
6	76	56	20
7	85	66	19
8	82	64	18
9	92	63	29
10	94	61	33
11	85	51	34
12	84	51	33
13	79	44	35
14	74	29	45
15	63	17	46
16	63	9	54
17	64	10	54
18	57	8	49
19	59	16	43
20	61	42	19
21	63	52	11
22	60	41	19
23	55	41	14
24	66	46	20
25	75	55	20
26	71	51	20
27	72	39	33
28	69	32	37
29	95	39	56
30	101	40	61
<b>Monthly mean</b>	<b>72.4</b>	<b>40.2</b>	<b>32.2</b>
<b>Cooperating stations</b>	<b>70</b>	<b>62</b>	<b>62</b>



**Predictions of the monthly smoothed Sunspot Number**  
 using the last provisional value, calculated for October 2012: 58.6 ( $\pm 5\%$ )

		SM	CM			SM	CM			SM	CM
2012	Nov	57	60	2013	May	48	75	2013	Nov	43	90
	Dec	56	64		Jun	47	78		Dec	43	88
2013	Jan	54	67		Jul	46	81	2014	Jan	42	87
	Feb	52	70		Aug	45	83		Feb	41	86
	Mar	50	72		Sep	45	86		Mar	41	85
	Apr	49	74		Oct	44	89		Apr	40	84

**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 method 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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 Web: http://sidc.oma.be, "Sunspots" section in sidebar.

## S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R' <sub>i</sub>	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	70	34	-	113	////	0	0/0	6	
1	53	51	-	119	////	0	0/0	6	
2	66	63	-	122	////	3	0/0	6	
3	68	108	-	127	////	3	0/0	4	
4	63	103	-	129	////	0	0/0	6	
5	77	121	-	134	////	1	1/0	3	
6	76	127	-	137	////	10	0/0	6	
7	85	70	-	138	////	6	0/0	5	
8	82	96	-	139	////	3	0/0	2	
9	92	122	-	147	////	6	0/0	3	
10	94	109	-	148	////	9	0/0	6	
11	85	115	-	137	////	114	1/0	5	
12	84	134	-	138	////	10	1/0	5	
13	79	82	-	125	////	5	0/0	7	
14	74	62	-	117	////	1	0/0	13	
15	63	56	-	113	////	2	0/0	6	
16	63	66	-	113	////	11	0/0	5	
17	64	60	-	108	////	3	0/0	3	
18	57	41	-	105	////	1	0/0	2	
19	59	24	-	99	////	3	0/0	2	
20	61	45	-	105	////	6	0/0	3	
21	63	66	-	109	////	40	0/0	4	
22	60	80	-	113	////	2	1/0	6	
23	55	66	-	118	////	21	0/0	8	
24	66	67	-	115	////	12	0/0	24	
25	75	49	-	119	////	1	0/0	14	
26	71	60	-	122	////	3	0/0	18	
27	72	70	-	127	////	0	0/0	9	
28	69	65	-	132	////	23	0/0	9	
29	95	97	-	142	////	15	0/0	4	
30	101	148	-	154	////	14	0/0	10	

- 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 :  $1 \times \text{Sn} + 10 \times \text{"1"} + 100 \times \text{">1"}$ ).
- 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 APRIL 2013

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	750	6	22	82	36	46	42	28.4	3	FC
2	730	7	30	100	57	43	27	30.1	3	OL
3	855	7	20	90	50	40	42	55.7	2	OL
4	915	6	34	94	56	38	82	61.2	3	OL
7	745	7	36	106	83	23	41	74.9	3	OL
8	800	6	33	93	80	13	23	72.4	2	AE
12	715	5	43	93	57	36	48	60.1	2	AE
13	820	5	43	93	58	35	51	39.5	2	SV
14	1120	5	25	75	30	45	19	31.8	3	SV
15	1130	5	25	75	11	64	52	27.4	1	SV
17	915	5	27	77	13	64	25	43.4	2	SV
18	715	5	25	75	12	63	36	18.8	2	SV
19	845	5	15	65	12	53	42	8.8	3	SV
20	725	5	25	75	49	26	24	35.6	3	FC
21	1400	4	33	73	60	13	34	79.0	3	AE
22	840	3	31	61	50	11	0	59.1	2	OB
23	1300	4	33	73	62	11	24	45.0	2	OB
24	710	4	34	74	60	14	26	34.6	3	OB
25	800	6	34	94	66	28	12	28.6	3	OB
27	915	5	27	77	33	44	33	38.4	2	OB
28	1015	5	34	84	36	48	38	20.3	2	OB
29	1055	7	54	124	43	81	73	62.7	2	OL
30	830	7	68	138	52	86	52	114.2	3	OL

The relative mean sunspot number is 86.6.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR APRIL 2013

$$K' = 0.784 (*)$$

1	64	7	83	13	73	19	51	25	74
2	78	8	73	14	59	20	59	26	***
3	71	9	***	15	59	21	57	27	60
4	74	10	***	16	***	22	48	28	66
5	***	11	***	17	60	23	57	29	97
6	***	12	73	18	59	24	58	30	108

The normalised relative monthly mean sunspot number is 68.

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

The Sun has been observed 23 days on 30 possible.

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR APRIL 2013  
E AND F BRUNNER'S TYPE GROUPS

Uccle Nø	East Limb Date	Date and type			West Limb Date
		1st obs	CMP	Last obs	
2-2136	4 13.9	19 B	4 20.7	25 E	4 27.4
9-2136	4 23.9	25 D	4 30.7	30 E	5 7.4

PROBABLE RETURN OF MAJOR GROUPS FOR MAY 2013

Nø	New East Limb	New CMP	New West Limb
2	5 10.8	5 17.6	5 24.3