



Sunspot Index and Long-term Solar Observations

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SUNSPOT BULLETIN

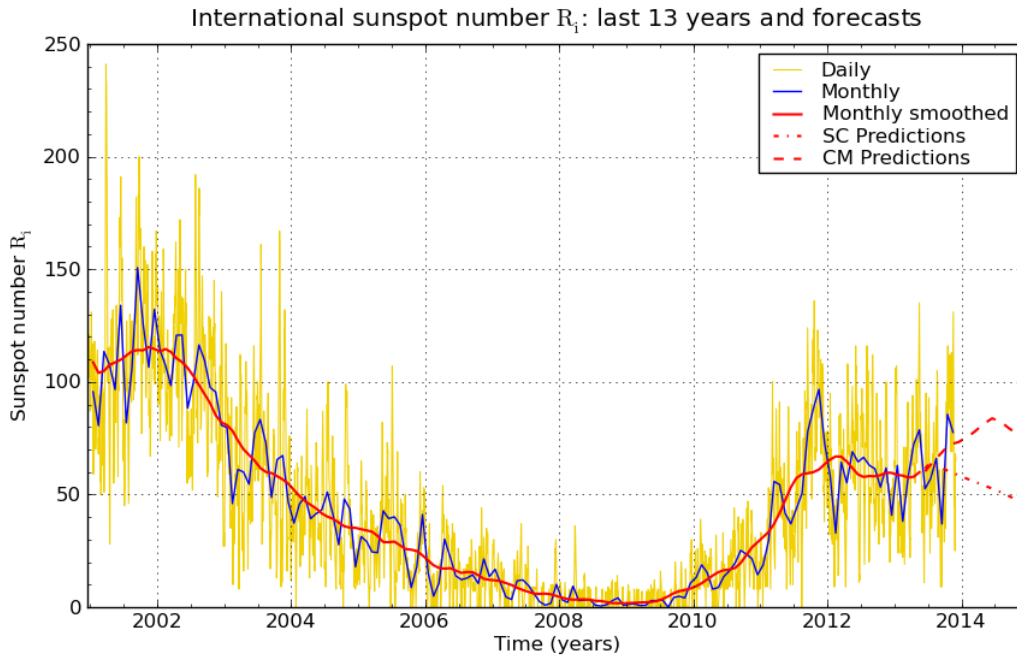
2013

n° 11

Provisional international and normalized hemispheric daily sunspot numbers for November 2013

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	72	8	64
2	69	9	60
3	84	9	75
4	87	16	71
5	83	16	67
6	99	14	85
7	113	12	101
8	97	11	86
9	71	9	62
10	69	12	57
11	77	8	69
12	92	15	77
13	104	15	89
14	118	18	100
15	113	29	84
16	125	35	90
17	131	41	90
18	99	26	73
19	77	19	58
20	57	22	35
21	49	26	23
22	46	23	23
23	45	21	24
24	49	35	14
25	27	12	15
26	25	8	17
27	50	0	50
28	68	8	60
29	67	7	60
30	65	9	56
Monthly mean	77.6	16.4	61.2
Cooperating stations	62	56	56



SILSO graphics (<http://sidc.be>) Royal Observatory of Belgium 01/12/2013

Predictions of the monthly smoothed Sunspot Number
using the last provisional value, calculated for May 2013: 59.9 ($\pm 5\%$)

		SM	CM			SM	CM			SM	CM
2013	Jun	62	60	2013	Dec	59	73	2014	Jun	53	84
	Jul	65	63	2014	Jan	58	75		Jul	52	83
	Aug	63	66		Feb	57	76		Aug	51	81
	Sep	62	69		Mar	56	78		Sep	49	79
	Oct	61	71		Apr	55	80		Oct	48	78
	Nov	60	73		May	54	82		Nov	47	77

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

Date	R' _i	PPSI	600	2800	COS	SFI	XI	Ak	SEA
31	97	123	-	143	////	2	0/0	8	
1	72	121	-	145	////	16	1/0	5	
2	69	103	-	142	////	26	1/0	3	
3	84	83	-	144	////	102	1/0	9	
4	87	119	-	147	////	7	0/0	6	
5	83	154	-	149	////	26	1/1	4	
6	99	161	-	154	////	23	1/0	5	
7	113	178	-	148	////	19	2/0	10	
8	97	178	-	146	////	114	1/1	5	
9	71	131	-	148	////	10	0/0	18	
10	69	94	-	154	////	101	0/1	16	
11	77	93	-	164	////	6	1/0	21	
12	92	118	-	168	////	9	0/0	2	
13	104	97	-	171	////	3	1/0	2	
14	118	160	-	178	////	6	0/0	3	
15	113	208	-	178	////	20	1/0	15	
16	125	194	-	175	////	26	2/0	14	
17	131	219	-	177	////	14	1/0	6	
18	99	194	-	163	////	4	0/0	2	
19	77	176	-	153	////	1	0/1	5	
20	57	109	-	147	////	0	0/0	4	
21	49	115	-	141	////	1	0/0	1	
22	46	82	-	143	////	2	0/0	2	
23	45	71	-	136	////	22	2/0	7	
24	49	33	-	127	////	2	0/0	0	
25	27	22	-	119	////	0	0/0	0	
26	25	20	-	116	////	0	0/0	2	
27	50	31	-	129	////	0	0/0	1	
28	68	75	-	133	////	5	0/0	1	
29	67	79	-	129	////	0	0/0	8	
30	65	74	-	///	////	///	///	(//)	

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

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
3	930	6	22	82	12	70	46	47.0	2	AE
4	1520	5	56	106	23	83	44	90.9	2	OL
9	850	4	53	93	13	80	52	92.4	2	OL
10	1050	6	36	96	22	74	39	78.3	2	OL
11	1015	6	39	99	11	88	0	78.2	2	OB
13	900	9	46	136	24	112	39	54.2	2	OB
20	915	7	11	81	35	46	24	32.9	1	AE
24	1100	7	16	86	52	34	24	10.4	3	AE
27	1235	6	25	85	0	85	34	40.2	2	OL
30	910	6	28	88	16	72	40	46.4	2	OL

The relative mean sunspot number is 95.2.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS $U'=K'U$ FOR NOVEMBER 2013

$$K' = 0.876 (*)$$

1	***	7	***	13	119	19	***	25	***
2	***	8	***	14	***	20	71	26	***
3	72	9	81	15	***	21	***	27	74
4	93	10	84	16	***	22	***	28	***
5	***	11	87	17	***	23	***	29	***
6	***	12	***	18	***	24	75	30	77

The normalised relative monthly mean sunspot number is 83.

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

The Sun has been observed 10 days on 30 possible.