



Sunspot Index and Long-term Solar Observations

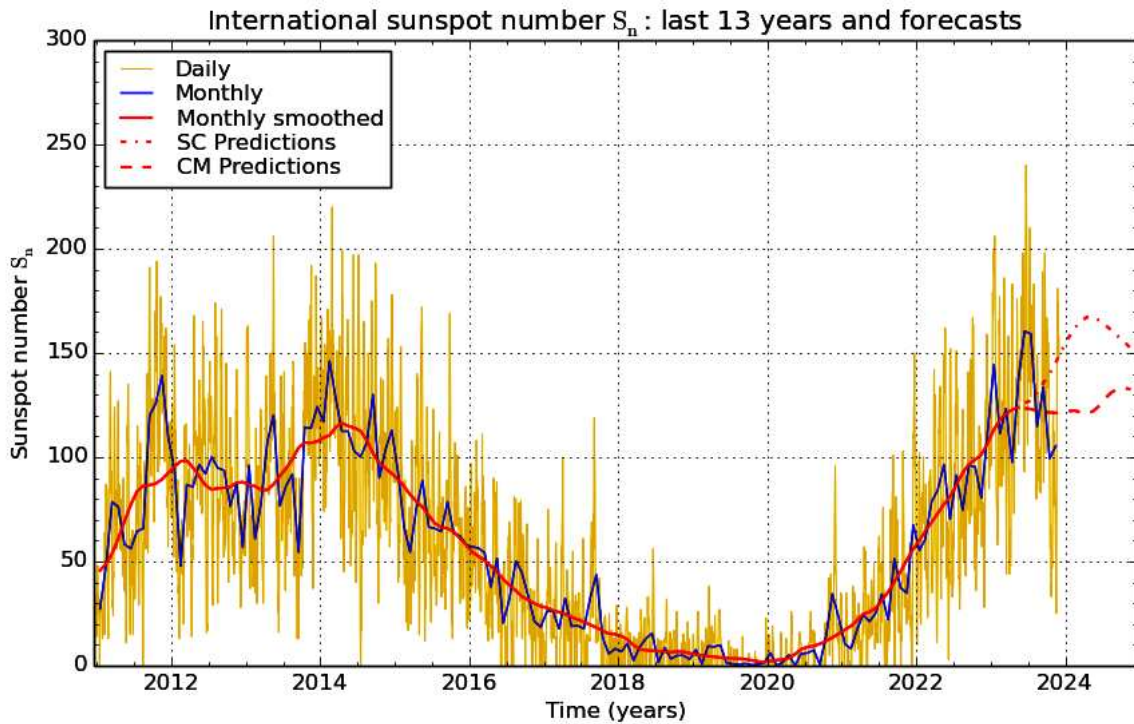
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SUNSPOT BULLETIN 2023 n° 11

Provisional international and normalized hemispheric daily sunspot numbers for November 2023

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

Date	S_n	$S_n(N)$	$S_n(S)$
1	115	59	56
2	120	61	59
3	122	54	68
4	91	41	50
5	91	40	51
6	77	35	42
7	77	37	40
8	112	59	53
9	98	55	43
10	91	34	57
11	79	28	51
12	81	19	62
13	72	15	57
14	57	7	50
15	34	6	28
16	30	6	24
17	25	0	25
18	31	4	27
19	67	46	21
20	95	56	39
21	152	78	74
22	155	85	70
23	181	82	99
24	162	69	93
25	174	76	98
26	165	77	88
27	154	71	83
28	148	60	88
29	158	66	92
30	148	58	90
Monthly mean	105.4	46.1	59.3
Cooperating stations	64	54	54



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2023 December 1

Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for May 2023: 123.9 ($\pm 5\%$)

	SM	CM		SM	CM		SM	CM
2023 Jun	126	124	2023 Dec	152	121	2024 Jun	166	125
Jul	127	123	2024 Jan	157	122	Jul	163	129
Aug	132	122	Feb	162	122	Aug	161	131
Sep	136	122	Mar	165	122	Sep	158	133
Oct	140	122	Apr	167	121	Oct	155	133
Nov	146	121	May	167	122	Nov	152	133

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, designed by 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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Editor: Laure Lefevre
 3, avenue Circulaire, B1180 Bruxelles, Belgium
 Fax: .. /32 / (0) 2 / 374.98.22 Tel: .. /32 / (0) 2 / 790.39.23 Email: silso.info@oma.be

Web: <http://sidc.oma.be/silso>
 FTP anonymous : omaftp.oma.be, directory: dist/astro/sidcdata

Summary of the URSIGRAMs from S.I.D.C.

Date	S _n	PPSI	600	2800	COS	SFI	XI	Ak
31	107	61	-	147	////	1	0/0	6
1	115	39	-	159	////	4	0/0	10
2	120	41	-	158	////	14	1/0	6
3	122	36	-	156	////	0	0/0	2
4	91	32	-	155	////	2	0/0	16
5	91	34	-	155	////	12	2/0	53
6	77	36	-	146	////	1	0/0	36
7	77	35	-	145	////	11	0/0	20
8	112	44	-	146	////	12	0/0	17
9	98	38	-	139	////	1	0/0	12
10	91	25	-	144	////	1	0/0	8
11	79	24	-	142	////	12	1/0	4
12	81	26	-	137	////	3	0/0	8
13	72	21	-	134	////	5	0/0	18
14	57	18	-	124	////	1	1/0	7
15	34	13	-	119	////	0	0/0	16
16	30	7	-	118	////	0	0/0	10
17	25	3	-	120	////	0	0/0	4
18	31	4	-	127	////	0	2/0	2
19	67	13	-	140	////	5	0/0	4
20	95	23	-	157	////	12	1/0	4
21	152	49	-	172	////	7	0/0	18
22	155	76	-	190	////	12	0/0	34
23	181	75	-	194	////	3	1/0	6
24	162	85	-	178	////	28	1/0	10
25	174	107	-	176	////	3	0/0	42
26	165	89	-	180	////	4	0/0	10
27	154	76	-	187	////	2	0/0	8
28	148	69	-	182	////	4	2/0	7
29	158	62	-	171	////	5	0/0	4
30	148	39	-	167	////	0	0/0	5

S_n : 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 : Solar Flare Index from the S.I.D.C. (origin: Ursigrams - UGEOR, evaluation : $1 \times S_n + 10 \times "1" + 100 \times ">1"$).

XI : X-flares index from the Ursigrams (M-flares/X-flares) (origin: Ursigrams - UGEOR, UGEOI).

Ak : geomagnetic index from Wingst, Germany (origin: Ursigrams).

SOLAR PHYSICS DEPARTMENT

UCCLE DAILY PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR NOVEMBER 2023

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	930	8	55	135	75	60	78	55.5	2	SB
3	1105	10	33	133	59	74	36	47.9	2	SB
4	1445	8	23	103	47	56	12	45.1	2	SB
5	1350	7	36	106	39	67	47	47.6	4	SB
6	900	5	21	71	34	37	29	46.4	3	OB
7	1435	5	30	80	39	41	56	51.9	2	OB
8	940	6	39	99	51	48	73	65.8	3	OB
9	920	7	52	122	65	57	85	44.8	3	OB
12	1045	5	30	80	18	62	20	47.0	1	OB
13	1455	5	14	64	12	52	15	35.6	1	SB
15	1100	4	17	57	22	35	11	16.4	4	SB
17	1215	2	6	26	0	26	0	2.3	1	OB
19	930	5	17	67	47	20	0	14.8	2	SB
20	930	5	33	83	49	34	0	22.9	1	CB
22	1030	8	59	139	61	78	39	112.9	1	CB
23	1415	10	60	160	73	87	64	113.9	1	CB
25	1105	11	53	163	72	91	99	165.8	2	CB
28	952	9	49	139	52	87	64	83.4	2	JV
29	920	10	69	169	73	96	90	114.6	3	JV

The relative mean sunspot number is 105.1.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR NOVEMBER 2023

K'= 1.063 (*)

1	144	7	85	13	68	19	71	25	173
2	***	8	105	14	***	20	88	26	***
3	141	9	130	15	61	21	***	27	***
4	109	10	***	16	***	22	148	28	148
5	113	11	***	17	28	23	170	29	180
6	75	12	85	18	***	24	***	30	***

The normalised relative monthly mean sunspot number is 112.

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

The Sun has been observed 19 days on 30 possible.