



Sunspot Index and Long-term Solar Observations

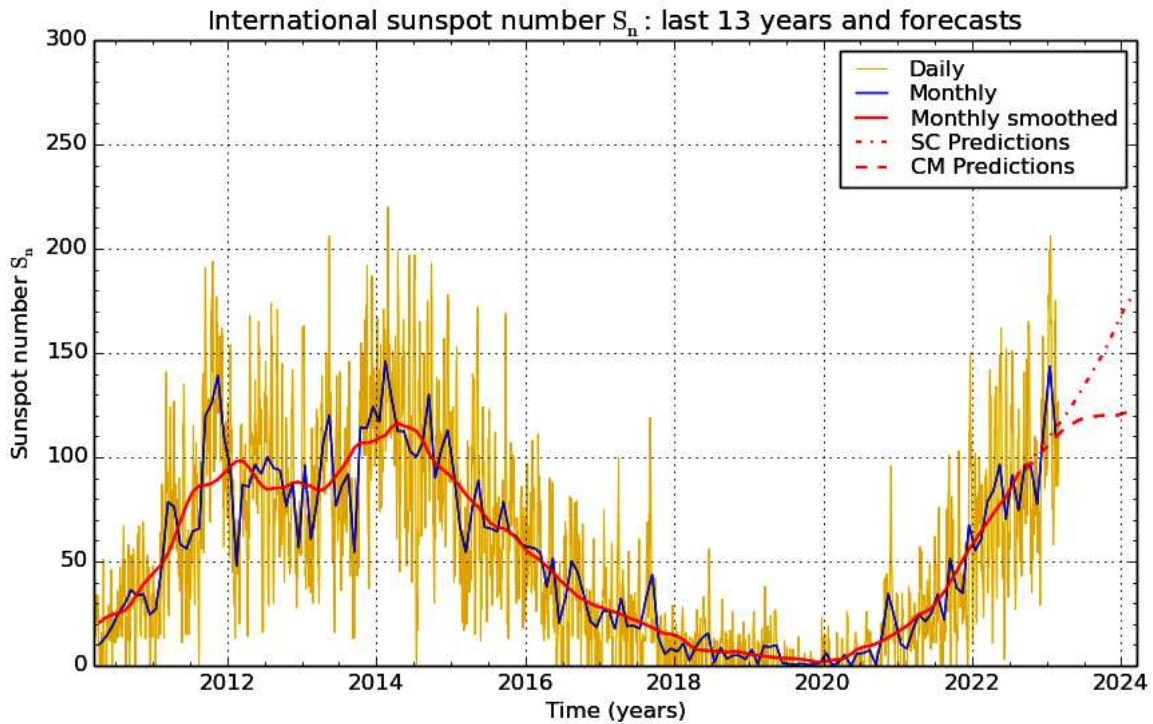
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SUNSPOT BULLETIN 2023 n° 02

Provisional international and normalized hemispheric daily sunspot numbers for February 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	71	34	37
2	58	27	31
3	64	23	41
4	70	19	51
5	73	16	57
6	113	60	53
7	106	76	30
8	124	86	38
9	128	92	36
10	164	121	43
11	165	111	54
12	156	100	56
13	175	103	72
14	160	87	73
15	122	70	52
16	92	49	43
17	86	49	37
18	104	54	50
19	106	59	47
20	110	74	36
21	104	78	26
22	86	61	25
23	89	65	24
24	117	69	48
25	126	77	49
26	118	65	53
27	127	69	58
28	92	52	40
Monthly mean	110.9	65.9	45.0
Cooperating stations	67	58	58



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

Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for August 2022: 92.3 ($\pm 5\%$)

	SM	CM		SM	CM		SM	CM
2022 Sep	96	94	2023 Mar	118	113	2023 Sep	147	120
Oct	98	97	Apr	122	115	Oct	152	120
Nov	103	100	May	127	117	Nov	158	120
Dec	107	103	Jun	132	118	Dec	165	120
2023 Jan	110	106	Jul	137	119	2024 Jan	171	121
Feb	114	110	Aug	142	119	Feb	176	122

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

Date	S _n	PPSI	600	2800	COS	SFI	XI	Ak
31	77	10	-	137	////	8	0/0	10
1	71	7	-	134	////	4	0/0	6
2	58	8	-	135	////	0	0/0	6
3	64	9	-	135	////	13	0/0	10
4	70	18	-	139	////	1	0/0	6
5	73	10	-	144	////	3	0/0	4
6	113	31	-	158	////	5	0/0	16
7	106	34	-	185	////	30	2/0	18
8	124	48	-	192	////	133	4/0	18
9	128	70	-	215	////	34	6/0	21
10	164	80	-	208	////	156	5/0	18
11	165	90	-	210	////	193	7/1	8
12	156	86	-	200	////	29	4/0	10
13	175	66	-	189	////	19	2/0	4
14	160	92	-	180	////	23	2/0	6
15	122	86	-	174	////	13	0/0	27
16	92	74	-	163	////	13	1/0	21
17	86	60	-	343	////	111	0/1	6
18	104	59	-	167	////	30	0/0	8
19	106	46	-	169	////	10	0/0	8
20	110	46	-	160	////	19	1/0	9
21	104	34	-	161	////	17	2/0	13
22	86	37	-	152	////	6	2/0	10
23	89	51	-	148	////	12	2/0	28
24	117	80	-	164	////	117	2/0	5
25	126	94	-	152	////	100	2/0	14
26	118	83	-	159	////	0	0/0	29
27	127	67	-	161	////	2	0/0	68
28	92	50	-	161	////	2	1/0	27

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 FEBRUARY 2023

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	915	7	33	103	39	64	14	4.7	3	OB
2	1230	5	33	83	38	45	21	6.6	2	OB
5	1220	5	40	90	18	72	38	8.9	2	OL
6	1205	9	32	122	70	52	24	57.3	2	FC
7	920	9	57	147	92	55	31	57.7	3	FC
8	930	9	55	145	97	48	40	44.8	3	FC
9	1020	9	73	163	121	42	29	95.2	3	FC
13	930	15	118	268	164	104	114	98.8	3	OB
14	915	14	95	235	127	108	116	154.2	3	OB
15	915	10	100	200	117	83	169	166.8	3	OB
16	1230	7	66	136	79	57	92	102.2	3	OB
24	1141	8	63	143	92	51	78	109.9	1	JV
25	1020	9	77	167	109	58	96	134.4	3	JV
26	855	9	75	165	92	73	62	136.1	3	JV
27	835	8	71	151	79	72	60	116.6	2	GV
28	838	6	59	119	56	63	24	79.0	4	GV

The relative mean sunspot number is 152.3.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS $U'=K'U$ FOR FEBRUARY 2023

$K' = 1.121 (*)$

1	115	7	165	13	300	19	***	25	187
2	93	8	163	14	263	20	***	26	185
3	***	9	183	15	224	21	***	27	169
4	***	10	***	16	152	22	***	28	133
5	101	11	***	17	***	23	***		
6	137	12	***	18	***	24	160		

The normalised relative monthly mean sunspot number is 171.

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

The Sun has been observed 16 days on 28 possible.