



# Sunspot Index and Long-term Solar Observations

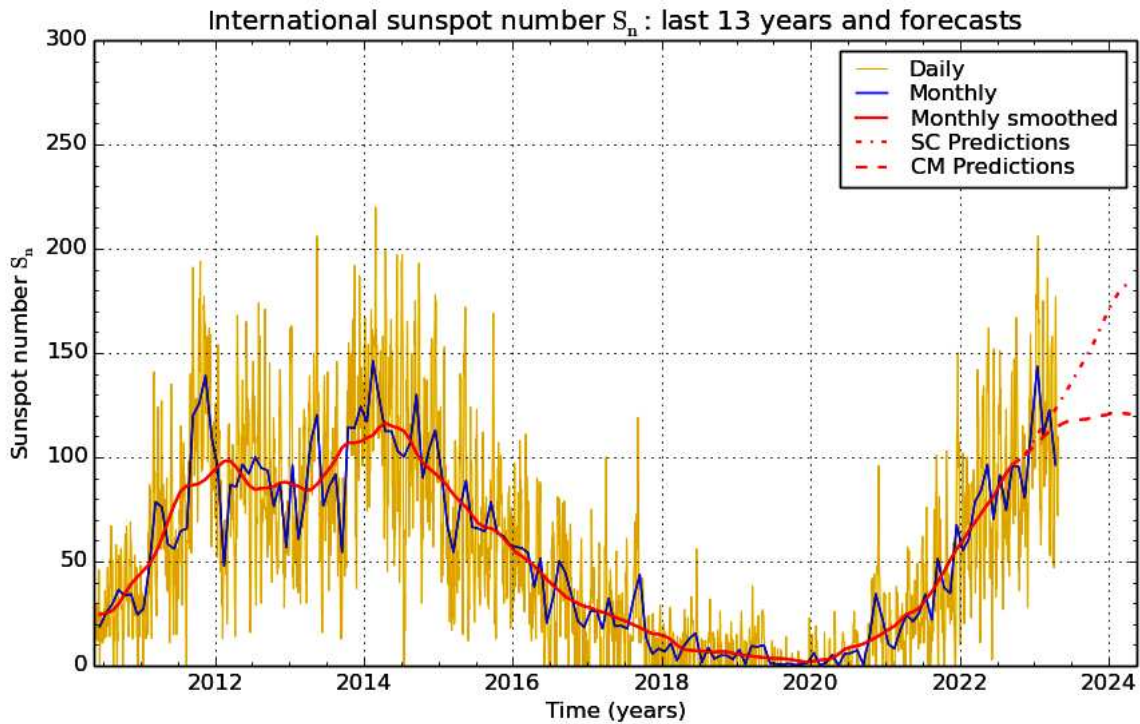
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## ***SUNSPOT BULLETIN*** 2023 n° 04

**Provisional international and normalized hemispheric daily sunspot numbers for April 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	61	36	25
2	49	15	34
3	61	17	44
4	64	19	45
5	52	21	31
6	48	9	39
7	47	7	40
8	48	0	48
9	59	12	47
10	89	39	50
11	106	48	58
12	124	52	72
13	147	37	110
14	159	42	117
15	173	60	113
16	177	62	115
17	145	43	102
18	132	41	91
19	101	33	68
20	101	38	63
21	104	37	67
22	98	29	69
23	80	21	59
24	72	15	57
25	72	18	54
26	96	54	42
27	110	58	52
28	109	52	57
29	108	55	53
30	100	41	59
Monthly mean	96.4	33.7	62.7
Cooperating stations	66	57	57



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

**Predictions of the monthly smoothed Sunspot Number**

using the last provisional value, calculated for October 2022: 98.7 ( $\pm 5\%$ )

	SM	CM		SM	CM		SM	CM
2022 Nov	101	101	2023 May	128	116	2023 Nov	161	120
Dec	106	104	Jun	133	117	Dec	168	120
2023 Jan	111	107	Jul	139	118	2024 Jan	174	121
Feb	115	110	Aug	144	118	Feb	179	122
Mar	119	113	Sep	149	118	Mar	182	121
Apr	123	114	Oct	154	119	Apr	184	121

**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.

Brussels, May 1, 2023 08:45 UT

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

Date	S <sub>n</sub>	PPSI	600	2800	COS	SFI	XI	Ak
31	79	11	-	129	////	1	0/0	23
1	61	4	-	125	////	0	0/0	16
2	49	8	-	127	////	6	0/0	16
3	61	12	-	134	////	1	0/0	14
4	64	20	-	136	////	0	0/0	14
5	52	21	-	137	////	0	0/0	15
6	48	9	-	137	////	0	1/0	10
7	47	8	-	136	////	3	0/0	8
8	48	18	-	136	////	18	1/0	6
9	59	20	-	140	////	7	0/0	7
10	89	27	-	140	////	6	1/0	13
11	106	36	-	143	////	26	1/0	4
12	124	42	-	154	////	9	0/0	3
13	147	47	-	160	////	13	0/0	6
14	159	58	-	171	////	33	2/0	8
15	173	62	-	176	////	43	0/0	8
16	177	90	-	178	////	9	0/0	4
17	145	66	-	167	////	13	0/0	5
18	132	70	-	153	////	3	0/0	16
19	101	56	-	147	////	7	0/0	11
20	101	49	-	147	////	6	0/0	6
21	104	43	-	151	////	102	1/0	13
22	98	31	-	141	////	2	0/0	8
23	80	32	-	135	////	3	0/0	61
24	72	21	-	134	////	1	0/0	50
25	72	23	-	131	////	1	0/0	10
26	96	40	-	137	////	10	0/0	16
27	110	57	-	141	////	7	1/0	21
28	109	60	-	150	////	28	0/0	22
29	108	61	-	156	////	30	0/0	21
30	100	38	-	154	////	1	1/0	12

**S<sub>n</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** : 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 APRIL 2023

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
3	900	5	38	88	23	65	40	23.8	4	OB
4	945	6	34	94	23	71	59	28.8	3	OB
5	710	4	33	73	24	49	12	31.6	3	OB
7	1015	3	30	60	11	49	0	28.0	2	OB
8	1420	3	34	64	0	64	0	36.8	3	OB
9	620	3	29	59	13	46	12	39.4	3	OB
11	650	8	79	159	65	94	102	86.3	3	FC
12	830	9	53	143	58	85	79	98.1	2	FC
13	718	10	94	194	40	154	104	109.3	2	CB
14	736	8	90	170	41	129	41	179.8	2	CB
15	820	10	72	172	58	114	23	67.0	3	FC
17	1450	9	68	158	40	118	93	136.4	2	FC
18	820	8	72	152	41	111	115	136.8	3	FC
19	700	7	51	121	38	83	82	120.5	3	FC
20	1426	5	56	106	39	67	80	120.0	3	GV
21	650	7	44	114	47	67	29	104.3	3	FC
22	835	7	33	103	37	66	28	67.1	1	CB
23	620	6	21	81	19	62	11	77.1	3	LL
24	900	6	20	80	14	66	11	32.5	3	SB
25	852	7	24	94	23	71	44	53.6	2	GV
26	813	8	33	113	74	39	76	78.1	1	GV
27	850	8	45	125	59	66	76	87.0	2	FC
30	800	6	47	107	45	62	20	79.9	3	JV

The relative mean sunspot number is 114.3.

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

$$K' = 0.981 (*)$$

1	***	7	59	13	190	19	119	25	92
2	***	8	63	14	167	20	104	26	111
3	86	9	58	15	169	21	112	27	123
4	92	10	***	16	***	22	101	28	***
5	72	11	156	17	155	23	79	29	***
6	***	12	140	18	149	24	78	30	105

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 23 days on 30 possible.