Sunspot Index and Long-term Solar Observations

World Data Center supported by the ICSU - WDS

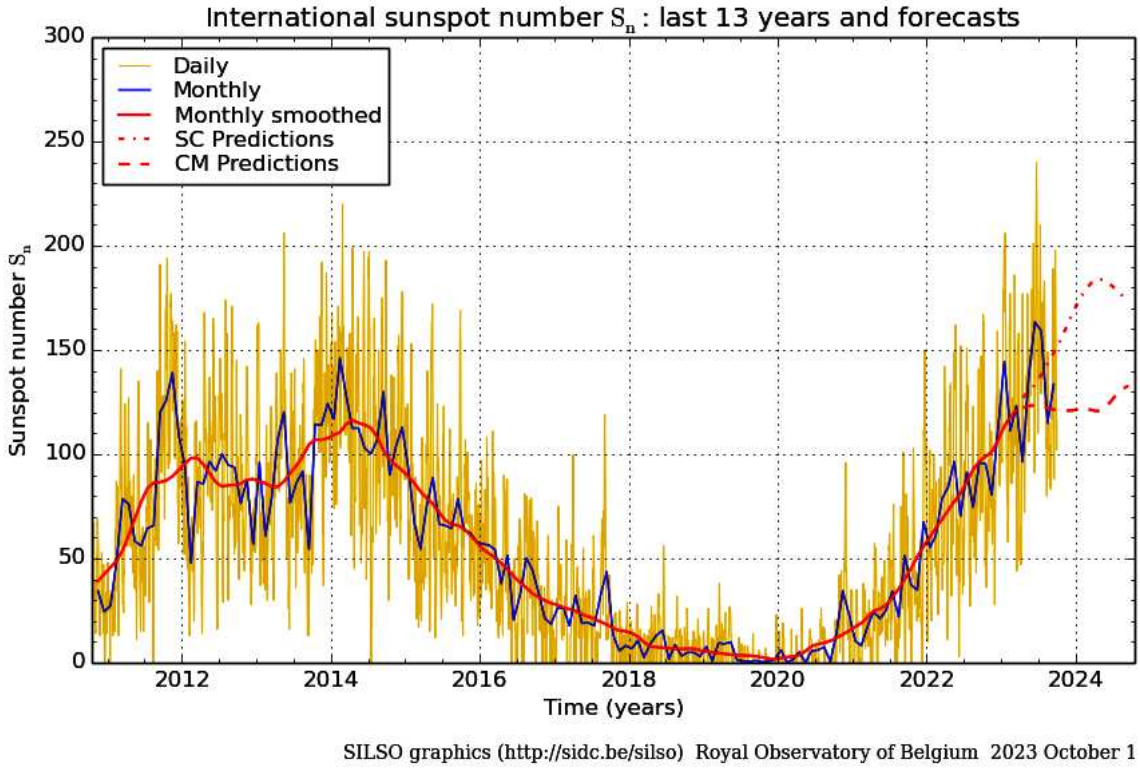
SUNSPOT BULLETIN

2023 n° 09

Provisional international and normalized hemispheric daily sunspot numbers for September 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	86	33	53
2	83	39	44
3	92	42	50
4	103	67	36
5	115	81	34
6	120	101	19
7	131	110	21
8	117	106	11
9	136	109	27
10	174	118	56
11	189	123	66
12	145	94	51
13	129	87	42
14	132	95	37
15	109	89	20
16	88	74	14
17	90	77	13
18	126	98	28
19	149	110	39
20	168	122	46
21	189	136	53
22	198	136	62
23	195	129	66
24	175	111	64
25	168	90	78
26	140	71	69
27	131	64	67
28	113	59	54
29	102	54	48
30	116	67	49
Monthly mean	133.6	89.7	43.9
Cooperating stations	67	57	57



Predictions of the monthly smoothed Sunspot Number

using the last provisional value, calculated for March 2023: 121.2 (± 5%)

	SM	CM		SM	CM		SM	CM
2023 Apr	127	122	2023 Oct	154	121	2024 Apr	184	121
May	131	123	Nov	161	121	May	184	122
Jun	133	123	Dec	168	121	Jun	182	125
Jul	139	123	2024 Jan	174	122	Jul	179	129
Aug	144	122	Feb	179	122	Aug	176	131
Sep	149	121	Mar	182	121	Sep	173	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 Lefèvre
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	90	34	-	140	////	0	0/0	7
1	86	22	-	136	////	2	1/0	16
2	83	16	-	131	////	3	1/0	33
3	92	12	-	131	////	1	0/0	26
4	103	24	-	136	////	9	0/0	8
5	115	28	-	143	////	38	3/0	10
6	120	42	-	147	////	21	0/0	8
7	131	47	-	161	////	25	1/0	7
8	117	40	-	161	////	12	0/0	7
9	136	57	-	161	////	32	0/0	9
10	174	60	-	164	////	20	0/0	3
11	189	72	-	176	////	56	3/0	6
12	145	55	-	154	////	123	2/0	21
13	129	43	-	143	////	2	0/0	20
14	132	38	-	145	////	4	3/0	23
15	109	29	-	139	////	21	1/0	7
16	88	29	-	140	////	26	2/0	10
17	90	20	-	145	////	1	0/0	16
18	126	27	-	155	////	7	0/0	31
19	149	40	-	166	////	3	3/0	40
20	168	57	-	156	////	5	1/0	18
21	189	47	-	168	////	1	1/0	12
22	198	70	-	176	////	28	4/0	10
23	195	65	-	173	////	16	0/0	10
24	175	67	-	174	////	21	2/0	21
25	168	46	-	170	////	10	0/0	24
26	140	44	-	165	////	5	0/0	24
27	131	46	-	156	////	7	0/0	16
28	113	34	-	148	////	6	1/0	6
29	102	32	-	155	////	7	0/0	10
30	116	28	-	159	////	45	1/0	12

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 x Sn+10 x "1"+100 x ">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 SEPTEMBER 2023

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
1	1230	6	34	94	31	63	28	45.2	3	SB
2	935	7	44	114	41	73	49	40.2	3	SB
3	915	8	28	108	51	57	56	25.1	2	SB
4	830	7	51	121	79	42	109	47.2	3	OL
5	650	8	38	118	79	39	79	62.6	2	FC
6	650	9	61	151	117	34	53	112.0	3	FC
7	810	8	77	157	134	23	54	98.1	2	OL
8	805	6	85	145	134	11	46	50.1	3	OL
9	810	8	87	167	130	37	73	121.5	3	OL
10	715	11	89	199	145	54	84	96.4	3	OL
11	730	12	132	252	165	87	141	165.9	4	OB
12	800	9	102	192	134	58	66	101.4	3	OB
13	805	7	76	146	108	38	71	91.1	3	OL
14	730	9	103	193	146	47	92	110.0	4	OB
15	745	7	55	125	111	14	47	83.5	4	OB
16	900	6	49	109	94	15	65	100.3	3	OB
17	1050	7	35	105	94	11	54	53.3	2	OB
18	745	9	47	137	109	28	57	47.9	2	GV
19	820	12	64	184	137	47	37	57.0	2	SB
22	810	15	103	253	179	74	96	94.8	3	SB
23	930	13	91	221	147	74	94	88.5	2	SB
24	830	11	100	210	133	77	120	81.4	4	SB
25	905	10	92	192	91	101	108	45.6	2	OL
26	930	8	70	150	65	85	97	49.2	2	OL
27	1100	7	68	138	65	73	0	62.1	3	OL
28	841	8	46	126	60	66	23	21.9	3	OL
30	825	8	47	127	77	50	46	49.3	3	OL

The relative mean sunspot number is 156.8.

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

K'= 0.980 (*)

1	92	7	154	13	143	19	180	25	188
2	112	8	142	14	189	20	***	26	147
3	106	9	164	15	123	21	***	27	135
4	119	10	195	16	107	22	248	28	123
5	116	11	247	17	103	23	217	29	***
6	148	12	188	18	134	24	206	30	124

The normalised relative monthly mean sunspot number is 154.

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

The Sun has been observed 27 days on 30 possible.