



Sunspot Index and Long-term Solar Observations

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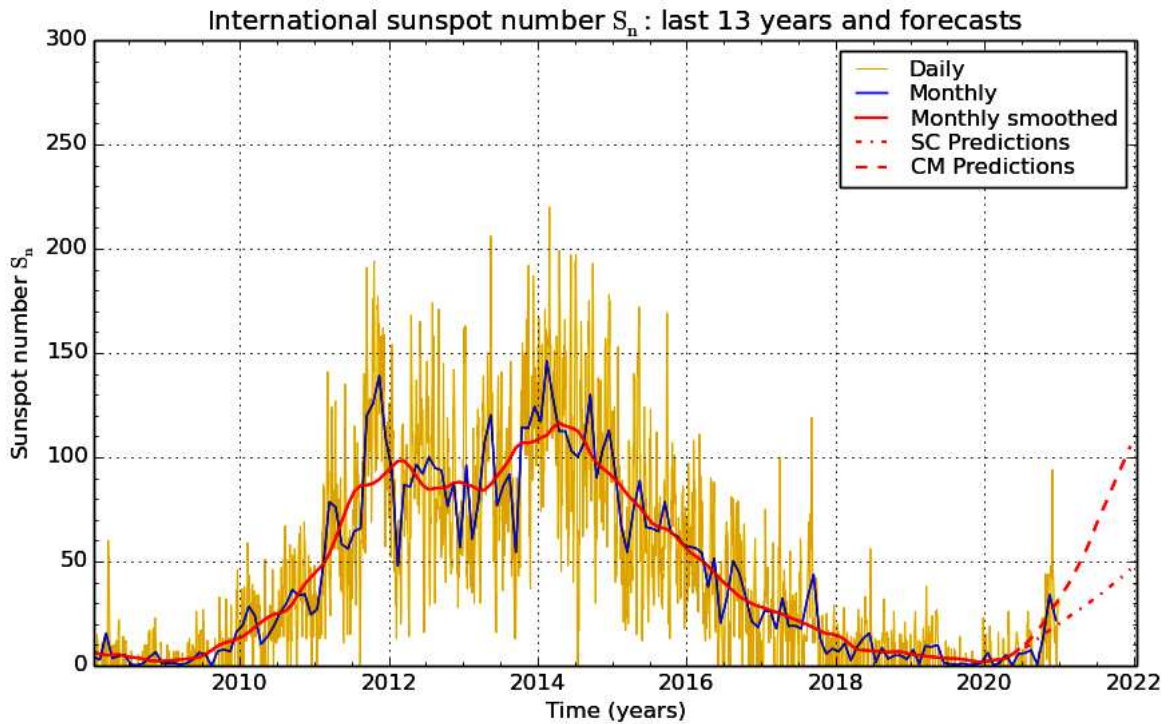
SUNSPOT BULLETIN

2020 n° 12

Provisional international and normalized hemispheric daily sunspot numbers for December 2020

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	50	0	50
2	46	0	46
3	43	0	43
4	39	0	39
5	36	0	36
6	22	0	22
7	20	0	20
8	13	0	13
9	13	0	13
10	12	0	12
11	11	0	11
12	11	0	11
13	11	0	11
14	13	0	13
15	19	0	19
16	13	0	13
17	12	0	12
18	7	0	7
19	0	0	0
20	0	0	0
21	11	0	11
22	11	0	11
23	23	0	23
24	27	0	27
25	29	0	29
26	32	0	32
27	31	0	31
28	29	0	29
29	30	0	30
30	29	0	29
31	32	2	30
Monthly mean	21.8	0.1	21.7
Cooperating stations	68	56	56



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2021 January 4

Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for June 2020: 7.8 ($\pm 5\%$)

	SM	CM		SM	CM		SM	CM
2020 Jul	9	10	2021 Jan	21	34	2021 Jul	34	72
Aug	10	13	Feb	23	39	Aug	36	78
Sep	13	17	Mar	26	45	Sep	39	85
Oct	15	21	Apr	27	50	Oct	41	92
Nov	17	25	May	30	56	Nov	44	98
Dec	19	30	Jun	32	64	Dec	46	105

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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We wishes you a happy, healthy and sunny new year in 2021 !

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

Date	S _n	PPSI	600	2800	COS	SFI	XI	Ak
30	85	80	-	109	////	2	0/0	7
1	50	52	-	104	////	3	0/0	2
2	46	40	-	105	////	1	0/0	3
3	43	36	-	103	////	3	0/0	2
4	39	25	-	96	////	1	0/0	0
5	36	13	-	100	////	1	0/0	4
6	22	10	-	91	////	1	0/0	7
7	20	10	-	90	////	12	0/0	2
8	13	6	-	82	////	0	0/0	4
9	13	5	-	82	////	0	0/0	10
10	12	3	-	82	////	0	0/0	7
11	11	2	-	83	////	0	0/0	7
12	11	0	-	82	////	0	0/0	5
13	11	0	-	81	////	0	0/0	5
14	13	1	-	83	////	1	0/0	2
15	19	1	-	83	////	2	0/0	2
16	13	3	-	82	////	0	0/0	2
17	12	3	-	82	////	0	0/0	1
18	7	1	-	82	////	0	0/0	2
19	0	0	-	82	////	0	0/0	5
20	0	0	-	84	////	0	0/0	4
21	11	3	-	80	////	0	0/0	14
22	11	6	-	86	////	0	0/0	14
23	23	12	-	86	////	0	0/0	11
24	27	19	-	87	////	0	0/0	11
25	29	30	-	88	////	0	0/0	4
26	32	47	-	88	////	0	0/0	6
27	31	41	-	88	////	0	0/0	6
28	29	67	-	87	////	0	0/0	8
29	30	38	-	84	////	1	0/0	8
30	29	32	-	83	////	0	0/0	10
31	32	15	-	81	////	0	0/0	3

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 DECEMBER 2020

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	1345	3	20	50	0	50	28	35.5	3	FC
4	1040	3	8	38	0	38	0	11.8	2	FC
8	1025	1	1	11	0	11	11	1.9	1	CB
10	1242	1	1	11	0	11	0	1.2	1	CB
13	1130	1	2	12	0	12	0	0.1	1	OB
14	1425	1	1	11	0	11	0	0.2	2	SB
15	1403	1	4	14	0	14	0	0.2	3	SB
16	935	1	2	12	0	12	0	3.6	2	SB
17	1000	1	3	13	0	13	0	4.8	3	SB
18	945	1	1	11	0	11	11	0.4	2	SB
20	950	0	0	0	0	0	0	0.0	2	SB
22	1110	1	1	11	0	11	0	0.8	1	SB
24	1400	2	6	26	0	26	0	9.4	3	SB
25	925	2	9	29	0	29	11	13.5	3	SB
26	925	2	7	27	0	27	11	45.7	2	CB
28	1320	2	7	27	0	27	27	50.0	1	CB
29	905	2	7	27	0	27	16	47.3	1	CB
30	1200	2	7	27	0	27	16	39.8	2	OB

The relative mean sunspot number is 19.8.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS $U'=K'U$ FOR DECEMBER 2020

$K'= 1.203 (*)$

1	60	7	***	13	14	19	***	25	35
2	***	8	13	14	13	20	0	26	32
3	***	9	***	15	17	21	***	27	***
4	46	10	13	16	14	22	13	28	32
5	***	11	***	17	16	23	***	29	32
6	***	12	***	18	13	24	31	30	32
								31	***

The normalised relative monthly mean sunspot number is 24.

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

The Sun has been observed 18 days on 31 possible.