



Sunspot Index and Long-term Solar Observations

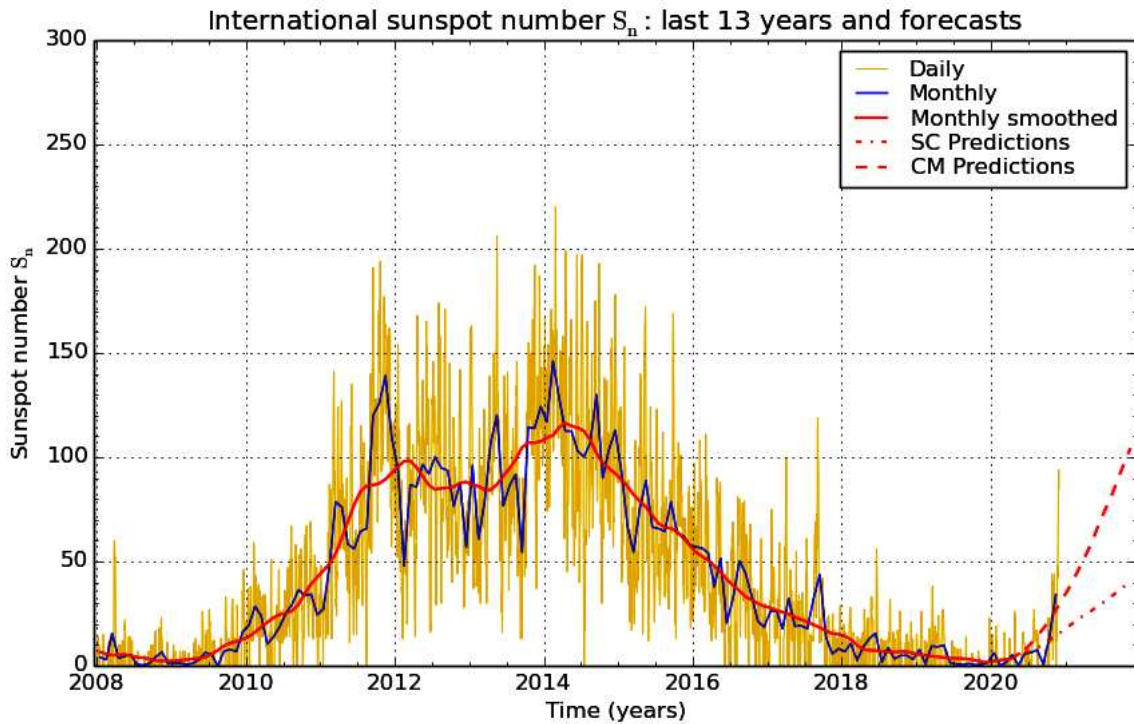
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SUNSPOT BULLETIN 2020 n° 11

Provisional international and normalized hemispheric daily sunspot numbers for November 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	3	0	3
2	8	8	0
3	16	0	16
4	24	0	24
5	31	4	27
6	41	12	29
7	38	5	33
8	44	13	31
9	28	0	28
10	27	0	27
11	31	0	31
12	30	0	30
13	25	0	25
14	22	0	22
15	6	0	6
16	0	0	0
17	12	0	12
18	12	0	12
19	12	0	12
20	12	0	12
21	25	13	12
22	37	15	22
23	48	4	44
24	42	0	42
25	51	0	51
26	57	0	57
27	75	6	69
28	84	10	74
29	94	11	83
30	85	11	74
Monthly mean	34.0	3.7	30.3
Cooperating stations	69	55	55



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2020 December 1

Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for May 2020: 5.6 ($\pm 5\%$)

	SM	CM		SM	CM		SM	CM
2020 Jun	6	8	2020 Dec	17	32	2021 Jun	29	69
Jul	7	11	2021 Jan	19	37	Jul	31	75
Aug	9	14	Feb	21	42	Aug	33	82
Sep	10	18	Mar	23	48	Sep	36	90
Oct	12	22	Apr	25	54	Oct	38	97
Nov	15	27	May	27	61	Nov	40	104

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	26	3	-	77	////	0	0/0	6
1	3	0	-	77	////	0	0/0	10
2	8	0	-	82	////	0	0/0	3
3	16	1	-	83	////	1	0/0	2
4	24	11	-	88	////	16	0/0	3
5	31	28	-	91	////	22	0/0	5
6	41	31	-	94	////	15	0/0	9
7	38	31	-	91	////	7	0/0	12
8	44	32	-	90	////	12	0/0	4
9	28	24	-	90	////	0	0/0	0
10	27	23	-	87	////	1	0/0	1
11	31	16	-	88	////	2	0/0	4
12	30	6	-	85	////	1	0/0	3
13	25	4	-	82	////	0	0/0	4
14	22	1	-	80	////	0	0/0	4
15	6	1	-	79	////	0	0/0	3
16	0	0	-	77	////	0	0/0	0
17	12	1	-	79	////	0	0/0	2
18	12	2	-	77	////	0	0/0	4
19	12	3	-	77	////	0	0/0	3
20	12	6	-	82	////	10	0/0	8
21	25	7	-	85	////	1	0/0	15
22	37	9	-	88	////	1	0/0	32
23	48	16	-	96	////	11	0/0	8
24	42	25	-	100	////	0	0/0	3
25	51	39	-	104	////	3	0/0	9
26	57	70	-	106	////	7	0/0	8
27	75	79	-	106	////	5	0/0	7
28	84	79	-	110	////	5	0/0	12
29	94	97	-	116	////	2	0/0	3
30	85	80	-	109	////	2	0/0	7

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 2020

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
2	1055	1	1	11	11	0	0	0.1	1	OB
3	900	1	3	13	0	13	0	0.8	3	JV
4	905	1	10	20	0	20	0	16.8	3	JV
5	1445	2	10	30	11	19	0	33.8	3	JV
6	1010	2	23	43	12	31	12	42.7	3	OB
7	1300	1	18	28	0	28	0	53.5	3	OB
8	1020	2	24	44	12	32	44	60.0	2	OB
10	1032	1	19	29	0	29	29	57.0	1	CB
11	921	1	8	18	0	18	0	51.1	1	CB
12	935	3	8	38	0	38	0	1.9	3	CB
14	1015	2	2	22	0	22	0	0.7	1	CB
18	900	1	1	11	0	11	0	0.7	3	SB
19	1045	1	1	11	0	11	0	1.1	2	SB
20	900	1	1	11	0	11	0	1.5	2	SB
21	945	2	3	23	12	11	0	5.6	2	SB
23	1105	4	20	60	11	49	27	23.7	3	OL
24	1010	3	8	38	0	38	15	28.3	2	OL
25	910	3	12	42	0	42	0	8.3	2	OL
26	1150	3	19	49	0	49	0	69.4	3	OL
27	1040	5	30	80	11	69	13	79.6	3	OL
28	1010	4	34	74	11	63	52	91.0	3	OL

The relative mean sunspot number is 33.1.

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

$$K' = 1.075 (*)$$

1	***	7	30	13	***	19	12	25	45
2	12	8	47	14	24	20	12	26	53
3	14	9	***	15	***	21	25	27	86
4	22	10	31	16	***	22	***	28	80
5	32	11	19	17	***	23	65	29	***
6	46	12	41	18	12	24	41	30	***

The normalised relative monthly mean sunspot number is 36.

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

The Sun has been observed 21 days on 30 possible.