



# Sunspot Index and Long-term Solar Observations

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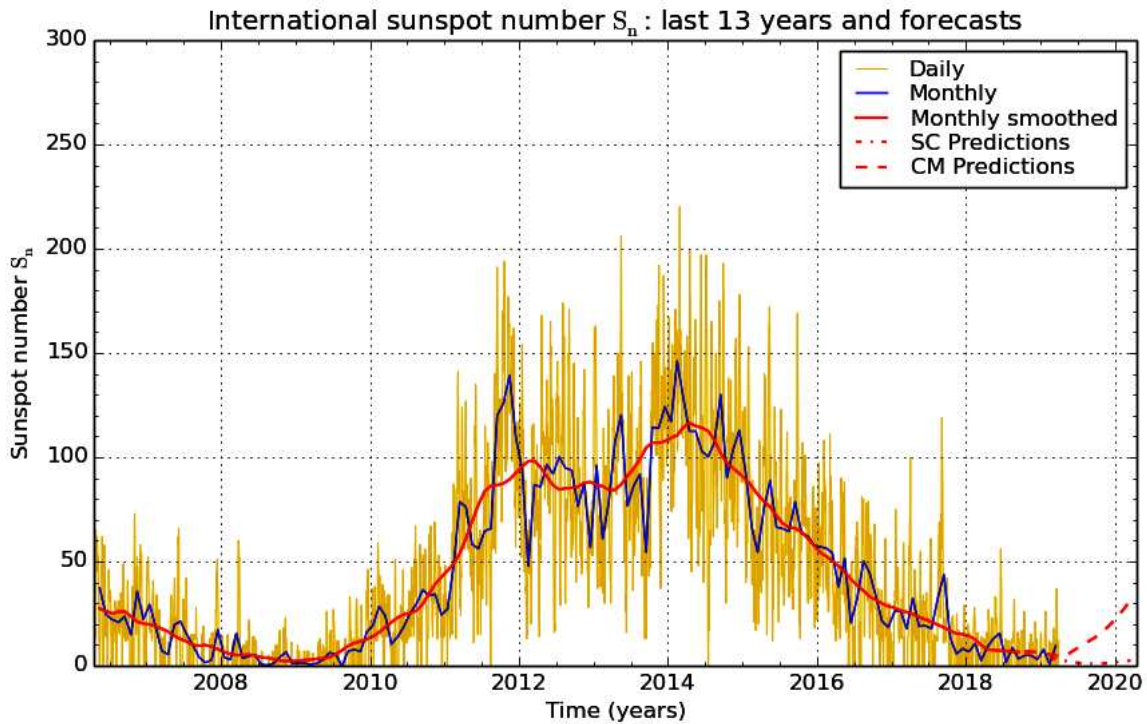
## *SUNSPOT BULLETIN*

2019 n° 3

Provisional international and normalized hemispheric daily sunspot numbers for March 2019

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	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	14	14	0
6	18	18	0
7	16	16	0
8	11	11	0
9	11	11	0
10	11	11	0
11	11	11	0
12	11	11	0
13	0	0	0
14	13	13	0
15	0	0	0
16	0	0	0
17	0	0	0
18	13	13	0
19	16	16	0
20	33	33	0
21	37	37	0
22	30	30	0
23	22	22	0
24	15	15	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	12	12	0
Monthly mean	9.5	9.5	0.0
Cooperating stations	70	55	55



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2019 April 2

**Predictions of the monthly smoothed Sunspot Number**  
 using the last provisional value, calculated for September 2018: 6.6 ( $\pm 5\%$ )

	SM	CM		SM	CM		SM	CM
2018 Oct	6	7	2019 Apr	3	4	2019 Oct	1	15
Nov	5	7	May	2	6	Nov	1	18
Dec	5	6	Jun	2	8	Dec	1	21
2019 Jan	4	6	Jul	1	10	2020 Jan	2	24
Feb	4	5	Aug	1	11	Feb	2	27
Mar	3	5	Sep	1	13	Mar	3	32

**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, April 1, 2019 08:22 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
28	0	0	-	70	////	0	0/0	28
1	0	0	-	70	////	0	0/0	32
2	0	0	-	69	////	0	0/0	14
3	0	0	-	70	////	0	0/0	7
4	0	0	-	71	////	0	0/0	6
5	14	1	-	72	////	0	0/0	6
6	18	4	-	73	////	0	0/0	9
7	16	3	-	71	////	0	0/0	9
8	11	1	-	72	////	1	0/0	5
9	11	1	-	71	////	1	0/0	7
10	11	1	-	71	////	0	0/0	4
11	11	0	-	70	////	0	0/0	2
12	11	0	-	71	////	0	0/0	8
13	0	0	-	71	////	0	0/0	4
14	13	0	-	70	////	0	0/0	11
15	0	0	-	70	////	0	0/0	9
16	0	0	-	70	////	0	0/0	15
17	0	0	-	69	////	0	0/0	15
18	13	2	-	70	////	2	0/0	2
19	16	3	-	70	////	0	0/0	10
20	33	8	-	77	////	16	0/0	5
21	37	12	-	80	////	13	0/0	2
22	30	13	-	82	////	27	0/0	0
23	22	7	-	79	////	10	0/0	1
24	15	2	-	75	////	4	0/0	2
25	0	0	-	71	////	0	0/0	6
26	0	0	-	69	////	0	0/0	4
27	0	0	-	69	////	0	0/0	8
28	0	0	-	68	////	0	0/0	11
29	0	0	-	69	////	0	0/0	8
30	0	0	-	69	////	0	0/0	4
31	12	0	-	70	////	0	0/0	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 MARCH 2019

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
5	1410	1	2	12	12	0	0	0.3	2	BB
7	820	1	7	17	17	0	17	5.8	2	SB
8	900	1	2	12	12	0	12	2.2	3	SB
9	1245	1	1	11	11	0	11	0.3	2	SB
10	1210	1	1	11	11	0	0	0.3	1	SB
11	1120	1	1	11	11	0	0	0.2	2	SB
13	1320	0	0	0	0	0	0	0.0	1	BB
14	1325	0	0	0	0	0	0	0.0	2	SB
16	1600	0	0	0	0	0	0	0.0	1	SB
17	915	0	0	0	0	0	0	0.0	2	SB
18	1515	1	8	18	18	0	18	5.5	3	FC
19	850	1	8	18	18	0	18	6.0	2	SB
20	805	2	16	36	36	0	14	21.3	3	FC
21	930	2	31	51	51	0	11	16.6	3	FC
22	820	1	30	40	40	0	0	10.7	3	FC
24	910	1	8	18	18	0	0	3.3	3	FC
25	1207	0	0	0	0	0	0	0.0	3	OL
26	930	0	0	0	0	0	0	0.0	1	BB
28	1230	0	0	0	0	0	0	0.0	2	OL
29	830	0	0	0	0	0	0	0.0	4	OL
30	845	0	0	0	0	0	0	0.0	3	OL
31	1024	1	2	12	12	0	0	0.2	3	OL

The relative mean sunspot number is 12.1.

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NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR MARCH 2019

$$K' = 1.197 (*)$$

1	***	7	20	13	0	19	22	25	0
2	***	8	14	14	0	20	43	26	0
3	***	9	13	15	***	21	61	27	***
4	***	10	13	16	0	22	48	28	0
5	14	11	13	17	0	23	***	29	0
6	***	12	***	18	22	24	22	30	0
								31	14

The normalised relative monthly mean sunspot number is 15.

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

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The Sun has been observed 22 days on 31 possible.