



# Sunspot Index and Long-term Solar Observations

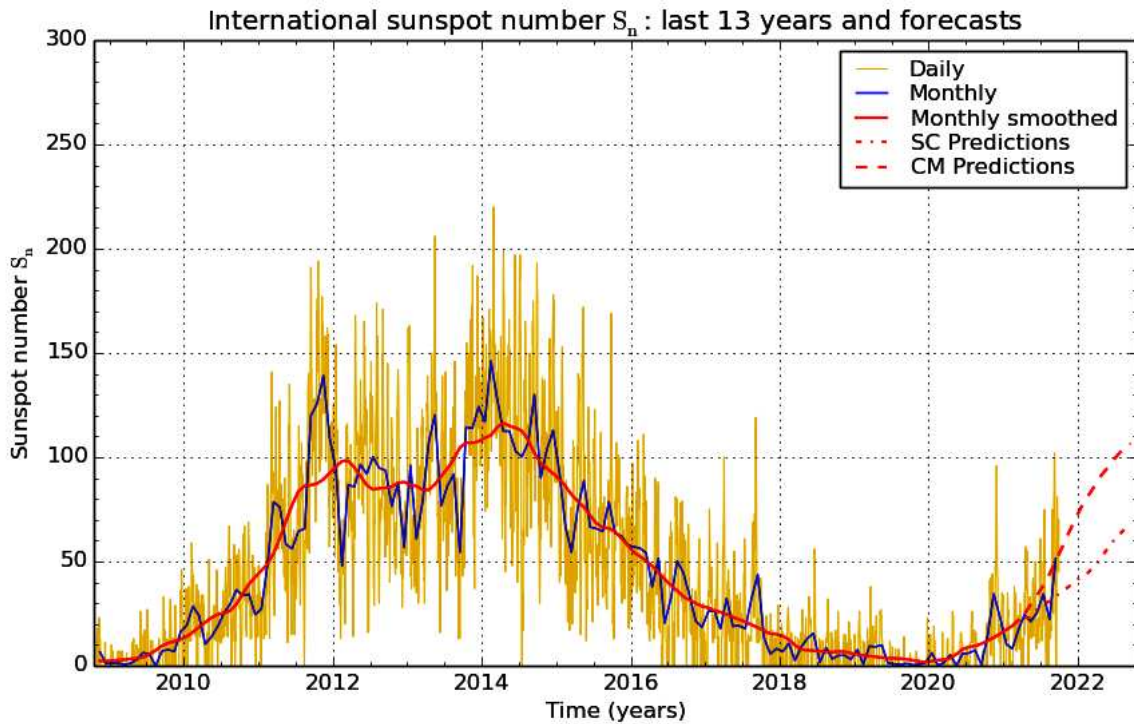
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## ***SUNSPOT BULLETIN*** 2021 n° 09

Provisional international and normalized hemispheric daily sunspot numbers for September 2021

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	38	9	29
2	33	0	33
3	25	2	23
4	70	29	41
5	75	20	55
6	83	22	61
7	84	19	65
8	98	15	83
9	102	12	90
10	97	12	85
11	74	11	63
12	50	0	50
13	34	0	34
14	23	0	23
15	10	0	10
16	0	0	0
17	0	0	0
18	0	0	0
19	13	0	13
20	44	29	15
21	65	31	34
22	81	34	47
23	69	40	29
24	61	33	28
25	46	20	26
26	50	15	35
27	49	9	40
28	56	25	31
29	70	33	37
30	45	22	23
Monthly mean	51.5	14.7	36.8
Cooperating stations	69	53	53



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2021 October 1

**Predictions of the monthly smoothed Sunspot Number**  
 using the last provisional value, calculated for March 2021: 21.8 ( $\pm 5\%$ )

	SM	CM		SM	CM		SM	CM
2021 Apr	23	25	2021 Oct	36	57	2022 Apr	51	90
May	23	30	Nov	38	63	May	55	94
Jun	27	34	Dec	40	70	Jun	59	98
Jul	29	39	2022 Jan	43	76	Jul	62	101
Aug	31	44	Feb	44	81	Aug	65	104
Sep	33	50	Mar	47	85	Sep	66	107

**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, October 1, 2021 08:40 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	40	23	-	84	////	3	0/0	8
1	38	12	-	84	////	2	0/0	4
2	33	17	-	86	////	0	0/0	5
3	25	14	-	84	////	1	0/0	8
4	70	13	-	87	////	1	0/0	6
5	75	32	-	94	////	7	0/0	6
6	83	61	-	100	////	3	0/0	8
7	84	80	-	101	////	4	0/0	13
8	98	74	-	100	////	20	0/0	14
9	102	66	-	100	////	3	0/0	6
10	97	85	-	96	////	2	0/0	10
11	74	26	-	92	////	1	0/0	9
12	50	19	-	88	////	1	0/0	6
13	34	7	-	83	////	0	0/0	10
14	23	2	-	78	////	0	0/0	8
15	10	0	-	75	////	0	0/0	6
16	0	0	-	73	////	0	0/0	4
17	0	0	-	73	////	0	0/0	26
18	0	1	-	74	////	0	0/0	7
19	13	1	-	75	////	0	0/0	2
20	44	12	-	80	////	0	0/0	4
21	65	26	-	85	////	4	0/0	10
22	81	33	-	89	////	2	0/0	14
23	69	34	-	90	////	22	1/0	10
24	61	25	-	88	////	1	0/0	8
25	46	23	-	88	////	4	0/0	8
26	50	16	-	86	////	1	0/0	2
27	49	7	-	89	////	0	0/0	8
28	56	12	-	89	////	4	0/0	13
29	70	30	-	102	////	10	0/0	5
30	45	108	-	95	////	9	0/0	11

**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 SEPTEMBER 2021

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	1225	1	13	23	0	23	0	19.5	1	SB
2	710	2	14	34	0	34	0	14.6	4	SB
3	1310	2	15	35	12	23	0	20.2	2	OL
4	1110	5	24	74	31	43	33	13.4	4	OB
5	935	4	44	84	26	58	42	48.8	3	OL
6	815	4	61	101	28	73	28	55.1	4	OB
7	830	4	58	98	22	76	22	62.6	3	OB
8	810	5	57	107	14	93	69	30.9	4	OB
9	815	5	58	108	11	97	43	28.3	4	OB
12	815	2	21	41	0	41	0	23.0	3	OB
13	640	2	14	34	0	34	0	8.2	2	SB
14	814	2	3	23	0	23	0	1.9	2	OL
15	1225	1	1	11	0	11	0	0.2	3	SB
16	740	0	0	0	0	0	0	0.0	2	SB
17	820	0	0	0	0	0	0	0.0	2	SB
18	740	0	0	0	0	0	0	0.0	3	SB
19	825	1	2	12	0	12	0	0.9	2	SB
20	650	3	11	41	27	14	14	8.1	3	GV
21	715	5	19	69	31	38	19	31.6	2	GV
22	810	6	36	96	39	57	21	40.4	3	GV
23	655	4	41	81	44	37	27	42.8	2	GV
24	1035	4	34	74	41	33	29	28.7	1	GV
25	715	3	34	64	23	41	23	23.6	3	GV
26	820	4	26	66	21	45	13	25.7	2	GV
27	1510	2	5	25	0	25	13	3.2	2	CB
28	730	4	10	50	24	26	11	24.2	2	CB
29	944	5	30	80	32	48	22	59.6	2	CB
30	730	2	18	38	17	21	0	26.9	1	CB

The relative mean sunspot number is 52.5.

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NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR SEPTEMBER 2021

$K'= 1.094$  (\*)

1	25	7	107	13	37	19	13	25	70
2	37	8	117	14	25	20	45	26	72
3	38	9	118	15	12	21	75	27	27
4	81	10	***	16	0	22	105	28	55
5	92	11	***	17	0	23	89	29	88
6	110	12	45	18	0	24	81	30	42

The normalised relative monthly mean sunspot number is 57.

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

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The Sun has been observed 28 days on 30 possible.