



Sunspot Index and Long-term Solar Observations

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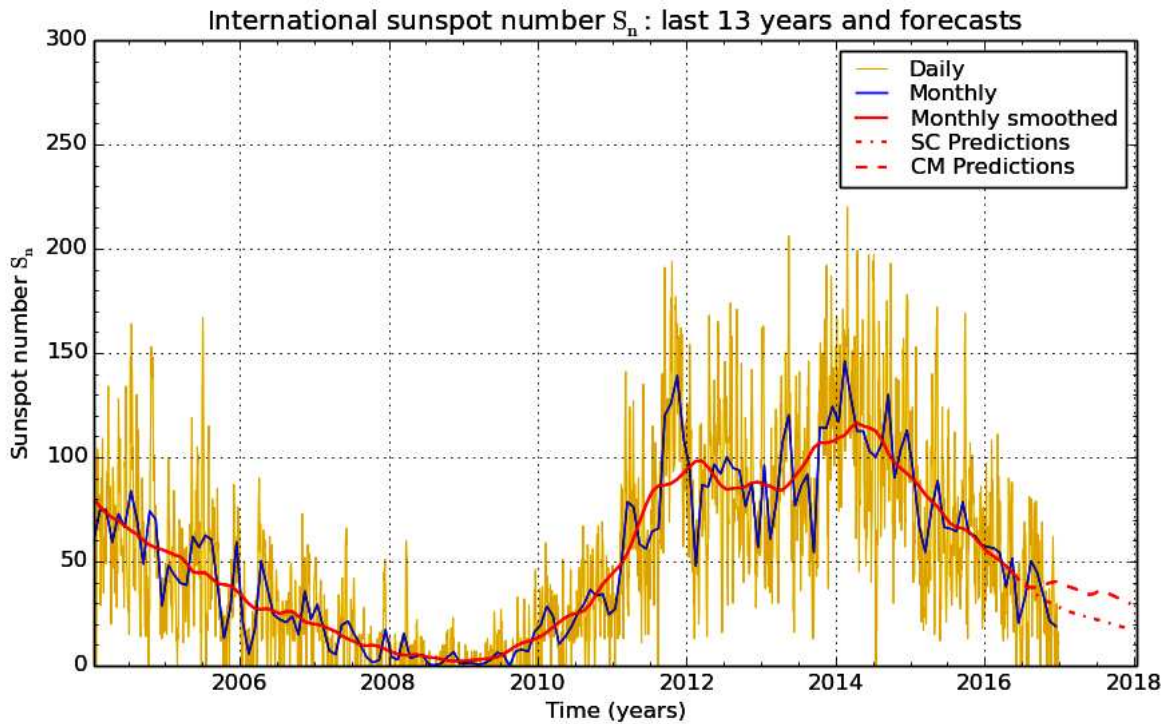
SUNSPOT BULLETIN

2016 n° 12

Provisional international and normalized hemispheric daily sunspot numbers for December 2016

Computed at the *Royal Observatory of Belgium* using observations from an international network with the *Specola Solare Ticinese Locarno* as reference station.

Date	R' _I	R' _N	R' _S
1	55	35	20
2	62	41	21
3	52	30	22
4	38	12	26
5	35	0	35
6	33	12	21
7	19	0	19
8	14	0	14
9	20	0	20
10	0	0	0
11	12	0	12
12	12	12	0
13	14	14	0
14	23	23	0
15	12	12	0
16	0	0	0
17	13	13	0
18	29	29	0
19	15	15	0
20	22	11	11
21	30	0	30
22	16	0	16
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	16	16	0
28	12	12	0
29	11	11	0
30	11	11	0
31	11	11	0
Monthly mean	18.9	10.3	8.6
Cooperating stations	72	60	60



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2017 January 5

Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for June 2016: 41.6 ($\pm 5\%$)

	SM	CM		SM	CM		SM	CM
2016 Jul	39	39	2017 Jan	27	40	2017 Jul	22	36
Aug	36	38	Feb	26	38	Aug	21	35
Sep	34	38	Mar	25	37	Sep	20	34
Oct	32	39	Apr	24	36	Oct	19	33
Nov	30	40	May	24	34	Nov	18	31
Dec	29	40	Jun	23	34	Dec	17	30

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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The SILSO team wishes you an excellent and sunny year in 2017

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

Date	R _i	PPSI	600	2800	COS	SFI	XI	Ak
30	52	42	-	84	////	9	0/0	2
1	55	33	-	85	////	0	0/0	1
2	62	33	-	84	////	0	0/0	5
3	52	29	-	85	////	0	0/0	3
4	38	27	-	82	////	5	0/0	1
5	35	28	-	83	////	2	0/0	5
6	33	28	-	80	////	0	0/0	8
7	19	15	-	77	////	0	0/0	11
8	14	3	-	75	////	0	0/0	30
9	20	2	-	73	////	0	0/0	32
10	0	0	-	72	////	0	0/0	18
11	12	2	-	71	////	1	0/0	20
12	12	3	-	71	////	0	0/0	5
13	14	3	-	71	////	0	0/0	5
14	23	2	-	72	////	0	0/0	4
15	12	1	-	73	////	0	0/0	2
16	0	0	-	73	////	0	0/0	2
17	13	2	-	72	////	0	0/0	7
18	29	3	-	72	////	0	0/0	9
19	15	4	-	73	////	0	0/0	6
20	22	1	-	75	////	0	0/0	6
21	30	10	-	75	////	0	0/0	26
22	16	3	-	75	////	0	0/0	26
23	0	0	-	74	////	0	0/0	21
24	0	0	-	73	////	0	0/0	15
25	0	0	-	73	////	0	0/0	23
26	0	0	-	74	////	0	0/0	26
27	16	5	-	74	////	2	0/0	13
28	12	1	-	73	////	0	0/0	6
29	11	1	-	73	////	0	0/0	4
30	11	1	-	74	////	0	0/0	3
31	11	0	-	74	////	0	0/0	14

R_i : 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 : $1 \times \text{Sn} + 10 \times \text{"1"} + 100 \times \text{">1"}$).

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 2016

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
3	1005	2	10	30	13	17	17	24.4	2	RA
4	1000	2	8	28	11	17	17	22.7	2	RA
5	950	3	10	40	0	40	29	20.9	2	AE
6	1110	2	10	30	12	18	0	16.5	2	AE
7	1100	1	4	14	0	14	0	11.8	2	AE
8	1300	1	3	13	0	13	0	1.6	2	AE
9	1315	0	0	0	0	0	0	0.0	1	AE
11	1206	0	0	0	0	0	0	0.0	3	OL
14	1013	1	2	12	12	0	0	0.3	3	OL
15	1000	1	1	11	11	0	0	0.3	2	OB
16	1315	0	0	0	0	0	0	0.0	3	OB
19	1005	2	5	25	25	0	25	2.9	3	OL
20	1030	2	3	23	12	11	12	1.8	2	FC
21	1224	2	5	25	0	25	12	19.1	1	OL
23	1025	0	0	0	0	0	0	0.0	2	OL
26	1110	0	0	0	0	0	0	0.0	3	OL
27	1300	2	5	25	25	0	11	10.7	3	FC
29	1000	0	0	0	0	0	0	0.0	3	OB
30	1000	1	1	11	11	0	0	0.2	3	OB

The relative mean sunspot number is 15.1.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR DECEMBER 2016

K'= 1.298 (*)

1	***	7	18	13	***	19	32	25	***
2	***	8	17	14	16	20	30	26	0
3	39	9	0	15	14	21	32	27	32
4	36	10	***	16	0	22	***	28	***
5	52	11	0	17	***	23	0	29	0
6	39	12	***	18	***	24	***	30	14
								31	***

The normalised relative monthly mean sunspot number is 20.

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

The Sun has been observed 19 days on 31 possible.