Sunspot Index and Long-term Solar Observations

World Data Center supported by the ICSU - WDS

SUNSPOT BULLETIN

2015 n° 7

WARNING OF MAJOR DATA CHANGE

Over the past 4 years a community effort has been carried out to **revise entirely the historical sunspot number series**. A good overview of the analyses and identified corrections is provided in the recent review paper: *Clette, F., Svalgaard, L., Vaquero, J.M., Cliver, E. W. (2014), "Revisiting the Sunspot Number. A 400-Year Perspective on the Solar Cycle", 2014, Space Science Reviews, Volume 186, Issue 1-4, pp. 35-103.*

Now that the new data series has been finalized, **we replaced the original version of our sunspot data by an entirely new data set on July 1st**. On this occasion, we decided to simultaneously introduce changes in several conventions in the data themselves and also in the distributed data files.

The most prominent change in the sunspot number is the choice of a new reference observer, A. Wolfer (pilot observer from 1876 to 1928) instead of R. Wolf himself. This means **we dropped the conventional 0.6 Zürich scale factor**, thus raising the scale of the entire sunspot number time series to the level of modern sunspot counts. This major scale change may thus strongly affect some user applications: keep an eye out for eventual problems.

Regarding data files, various files have been replaced by new ones, with new more homogeneous names and new internal column formats. The included information sometimes changes: combining data (e.g. hemispheric numbers together with total numbers), separating data (monthly smoothed numbers in a separate file) or adding new values that were not provided previously (standard errors on values).

All those changes are explained in the information accompanying our data. While the core files have been replaced in early July, some other changes will still occur over the next months. During this transitory phase, we thus invite you to visit the main SILSO Web site to follow the possible changes: http://www.sidc.be/silso.

For specific technical questions, in particular, if you need to adapt automated data import software used for operational purposes, please contact us by e-mail at silso.info@oma.be

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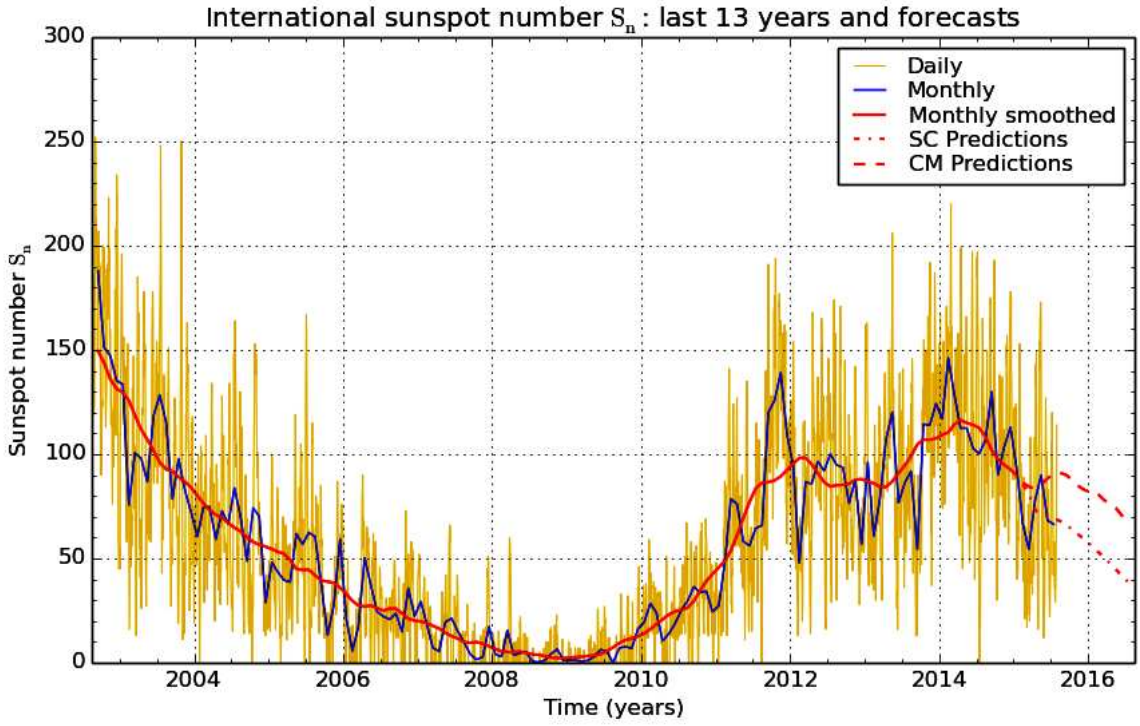
Provisional international and normalized hemispheric daily sunspot numbers for July 2015

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	55	44	11
2	75	38	37
3	87	38	49
4	100	58	42
5	106	56	50
6	96	57	39
7	111	59	52
8	120	51	69
9	108	40	68
10	101	43	58
11	88	35	53
12	71	44	27
13	48	30	18
14	42	28	14
15	43	30	13
16	50	38	12
17	49	38	11
18	58	39	19
19	43	32	11
20	36	36	0
21	36	36	0
22	36	36	0
23	29	29	0
24	30	19	11
25	34	0	34
26	39	0	39
27	51	11	40
28	61	11	50
29	66	12	54
30	74	41	33
31	114	59	55
Monthly mean	66.4	35.1	31.3
Cooperating stations	79	64	64



Predictions of the monthly smoothed Sunspot Number

using the last provisional value, calculated for January 2015: 89.8 (± 5%)

	SM	CM		SM	CM		SM	CM
2015 Feb	86	86	2015 Aug	68	91	2016 Feb	54	81
Mar	81	84	Sep	66	90	Mar	51	78
Apr	73	83	Oct	64	88	Apr	48	76
May	72	85	Nov	61	85	May	45	74
Jun	71	89	Dec	59	83	Jun	42	70
Jul	69	91	2016 Jan	56	82	Jul	39	66

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, August 1, 2015 10:31 UT

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

Date	S_n	PPSI	600	2800	COS	SFI	XI	Ak
30	42	17	-	101	////	2	0/0	8
1	55	32	-	109	////	1	0/0	8
2	75	44	-	114	////	22	0/0	2
3	87	53	-	112	////	27	1/0	4
4	100	94	-	117	////	2	0/0	20
5	106	56	-	125	////	9	0/0	22
6	96	78	-	133	////	124	2/0	10
7	111	114	-	133	////	23	0/0	8
8	120	130	-	129	////	2	0/0	5
9	108	122	-	122	////	3	0/0	6
10	101	92	-	129	////	8	0/0	11
11	88	102	-	120	////	8	0/0	24
12	71	70	-	116	////	0	0/0	16
13	48	43	-	110	////	0	0/0	35
14	42	33	-	105	////	2	0/0	8
15	43	21	-	101	////	0	0/0	10
16	50	18	-	100	////	0	0/0	10
17	49	4	-	97	////	2	0/0	5
18	58	25	-	96	////	1	0/0	3
19	43	24	-	99	////	0	0/0	2
20	36	22	-	93	////	0	0/0	4
21	36	20	-	91	////	0	0/0	12
22	36	15	-	89	////	1	0/0	10
23	29	9	-	89	////	0	0/0	23
24	30	3	-	92	////	19	0/0	10
25	34	14	-	94	////	1	0/0	11
26	39	27	-	97	////	6	0/0	10
27	51	35	-	100	////	2	0/0	10
28	61	33	-	101	////	0	0/0	10
29	66	26	-	101	////	0	0/0	7
30	74	17	-	102	////	0	0/0	20
31	114	27	-	101	////	0	0/0	23

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 x Sn+10 x "1"+100 x ">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 JULY 2015

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
1	615	4	17	57	46	11	11	8.6	2	AE
2	745	5	15	65	31	34	14	24.7	2	AE
3	730	6	23	83	32	51	44	29.1	3	AE
4	900	7	24	94	54	40	51	31.0	3	AE
5	815	8	22	102	53	49	50	25.1	2	AE
6	735	6	39	99	60	39	62	35.9	3	OL
7	1310	8	54	134	64	70	83	81.0	3	OL
9	730	7	34	104	38	66	56	90.2	3	OL
10	735	6	41	101	50	51	44	67.3	3	OL
11	845	5	26	76	41	35	0	81.7	2	OB
16	1000	4	8	48	37	11	11	6.2	2	OB
17	815	3	9	39	28	11	13	4.2	2	OB
18	950	4	11	51	40	11	13	7.3	2	AM
19	1450	4	17	57	45	12	45	26.6	3	AM
20	1700	2	11	31	31	0	31	27.6	4	AM
21	1720	2	24	44	44	0	32	24.4	2	AM
22	710	2	18	38	38	0	27	23.4	3	AM
23	730	2	11	31	31	0	20	20.7	3	AM
24	850	3	5	35	12	23	0	3.1	4	AM
26	800	2	19	39	0	39	23	22.1	3	OB
27	1545	3	20	50	11	39	23	26.4	2	AE
28	1515	4	18	58	11	47	36	21.6	2	AE
29	630	5	17	67	11	56	12	20.1	2	AE
30	1200	5	15	65	37	28	0	17.5	2	AE
31	615	6	18	78	38	40	12	17.9	2	AE

The relative mean sunspot number is 65.8.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR JULY 2015

K'= 1.182 (*)

1	67	7	158	13	***	19	67	25	***
2	77	8	***	14	***	20	37	26	46
3	98	9	123	15	***	21	52	27	59
4	111	10	119	16	57	22	45	28	69
5	121	11	90	17	46	23	37	29	79
6	117	12	***	18	60	24	41	30	77
								31	92

The normalised relative monthly mean sunspot number is 78.

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

The Sun has been observed 25 days on 31 possible.