Sunspot Index and Long-term Solar Observations

World Data Center supported by the ICSU - WDS

SUNSPOT BULLETIN

2015 n° 9

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Regarding data files, various files have been replaced by new ones, with new more homogeneous names and new internal column formats.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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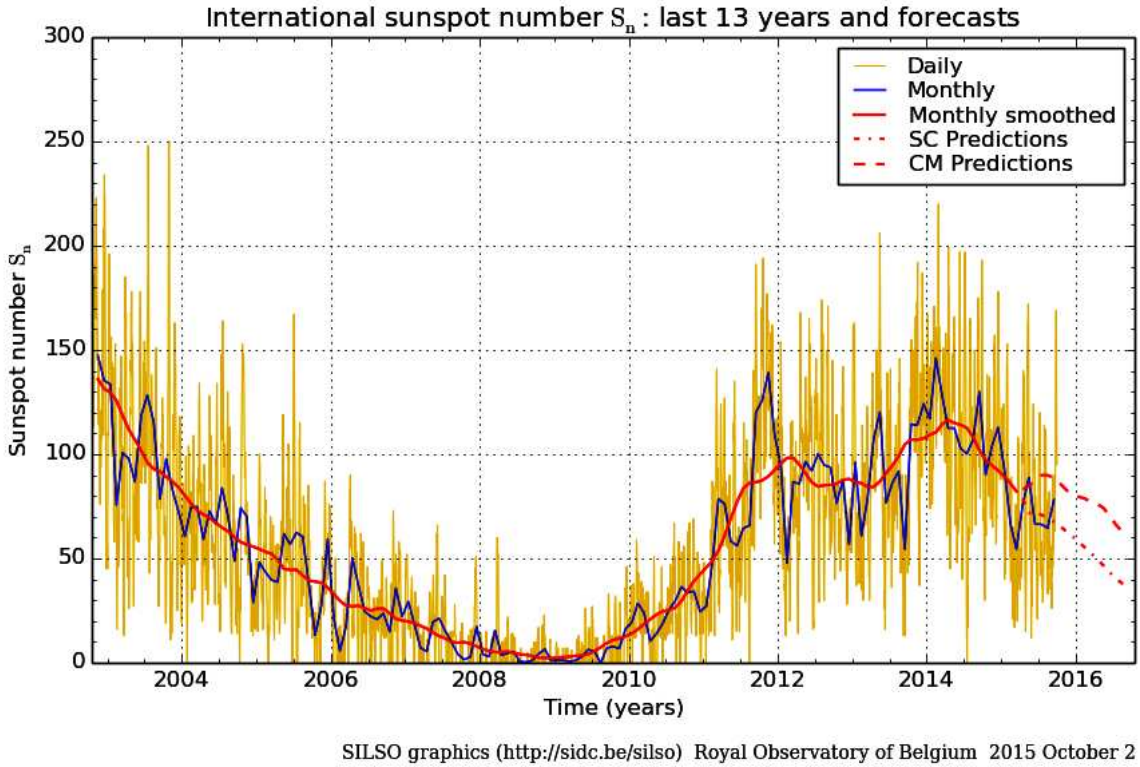
Provisional international and normalized hemispheric daily sunspot numbers for September 2015

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	43	43	0
2	34	34	0
3	29	16	13
4	38	24	14
5	26	26	0
6	42	29	13
7	44	29	15
8	42	25	17
9	59	33	26
10	46	14	32
11	81	14	67
12	90	24	66
13	83	20	63
14	54	0	54
15	68	15	53
16	83	20	63
17	74	22	52
18	70	20	50
19	63	20	43
20	66	31	35
21	79	40	39
22	84	47	37
23	95	53	42
24	100	52	48
25	153	88	65
26	161	92	69
27	169	95	74
28	154	79	75
29	117	59	58
30	95	51	44
Monthly mean	78.1	37.2	40.9
Cooperating stations	78	66	66



Predictions of the monthly smoothed Sunspot Number

using the last provisional value, calculated for March 2015: 82.7 (± 5%)

	SM	CM		SM	CM		SM	CM
2015 Apr	79	83	2015 Oct	65	86	2016 Apr	50	76
May	72	85	Nov	63	83	May	47	74
Jun	72	88	Dec	61	81	Jun	43	70
Jul	71	90	2016 Jan	58	80	Jul	40	66
Aug	69	90	Feb	55	79	Aug	38	63
Sep	68	89	Mar	52	77	Sep	36	61

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, 2015 08:38 UT

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

Date	S_n	PPSI	600	2800	COS	SFI	XI	Ak
31	35	6	-	91	////	1	0/0	6
1	43	8	-	89	////	4	0/0	5
2	34	6	-	88	////	1	0/0	10
3	29	5	-	87	////	0	0/0	14
4	38	7	-	90	////	1	0/0	20
5	26	5	-	85	////	0	0/0	19
6	42	8	-	86	////	0	0/0	17
7	44	9	-	84	////	0	0/0	36
8	42	9	-	84	////	1	0/0	26
9	59	17	-	82	////	0	0/0	51
10	46	13	-	84	////	0	0/0	19
11	81	22	-	93	////	10	0/0	46
12	90	38	-	99	////	5	0/0	15
13	83	37	-	97	////	2	0/0	14
14	54	34	-	97	////	5	0/0	20
15	68	35	-	101	////	12	0/0	18
16	83	69	-	109	////	8	0/0	16
17	74	70	-	107	////	38	1/0	14
18	70	66	-	103	////	11	0/0	12
19	63	66	-	106	////	1	0/0	16
20	66	56	-	110	////	102	2/0	30
21	79	39	-	103	////	3	0/0	9
22	84	50	-	107	////	6	0/0	11
23	95	50	-	107	////	7	0/0	14
24	100	56	-	107	////	4	0/0	10
25	153	90	-	120	////	7	0/0	7
26	161	115	-	120	////	14	0/0	6
27	169	110	-	128	////	85	2/0	4
28	154	111	-	124	////	65	4/0	4
29	117	114	-	129	////	171	9/0	7
30	95	95	-	131	////	50	2/0	3

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 SEPTEMBER 2015

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
2	800	2	10	30	30	0	0	3.5	3	OL
3	950	2	10	30	17	13	0	1.4	3	OL
4	715	3	10	40	26	14	28	6.5	3	OL
5	1005	2	11	31	31	0	18	2.5	2	OL
6	755	3	11	41	28	13	14	10.2	3	OL
9	830	3	10	40	13	27	40	25.4	2	OB
10	800	3	14	44	11	33	44	26.3	3	OL
11	830	4	20	60	11	49	45	23.9	2	OB
12	840	2	18	38	0	38	0	24.9	1	OB
13	840	5	22	72	11	61	12	20.8	2	OB
14	1300	3	16	46	0	46	0	28.2	2	AE
15	845	4	21	61	12	49	26	30.0	2	AE
17	1505	3	36	66	18	48	52	29.9	2	OB
18	645	3	23	53	17	36	28	51.3	2	AE
19	1300	4	19	59	18	41	40	44.0	2	AE
20	1125	4	15	55	26	29	26	47.4	3	OL
21	730	5	28	78	33	45	25	38.1	3	OL
22	1240	5	33	83	44	39	0	57.8	3	OL
24	800	5	44	94	46	48	57	53.7	3	OL
25	755	7	86	156	87	69	87	81.7	3	OL
26	850	7	80	150	83	67	114	125.6	3	OL
27	830	9	43	133	79	54	72	69.6	2	AE
28	810	8	67	147	77	70	40	61.9	2	OB
29	815	5	59	109	57	52	13	52.6	3	OB
30	815	4	46	86	46	40	23	71.6	3	OB

The relative mean sunspot number is 72.1.

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

K'= 1.250 (*)

1	***	7	***	13	90	19	74	25	195
2	38	8	***	14	58	20	69	26	188
3	38	9	50	15	76	21	98	27	166
4	50	10	55	16	***	22	104	28	184
5	39	11	75	17	83	23	***	29	136
6	51	12	48	18	66	24	118	30	108

The normalised relative monthly mean sunspot number is 90.

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

The Sun has been observed 25 days on 30 possible.