Sunspot Index and Long-term Solar Observations

World Data Center supported by the ICSU - WDS

SUNSPOT BULLETIN

2015 n° 6

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Regarding data files, various files have been replaced by new ones, with new more homogeneous names and new internal column formats.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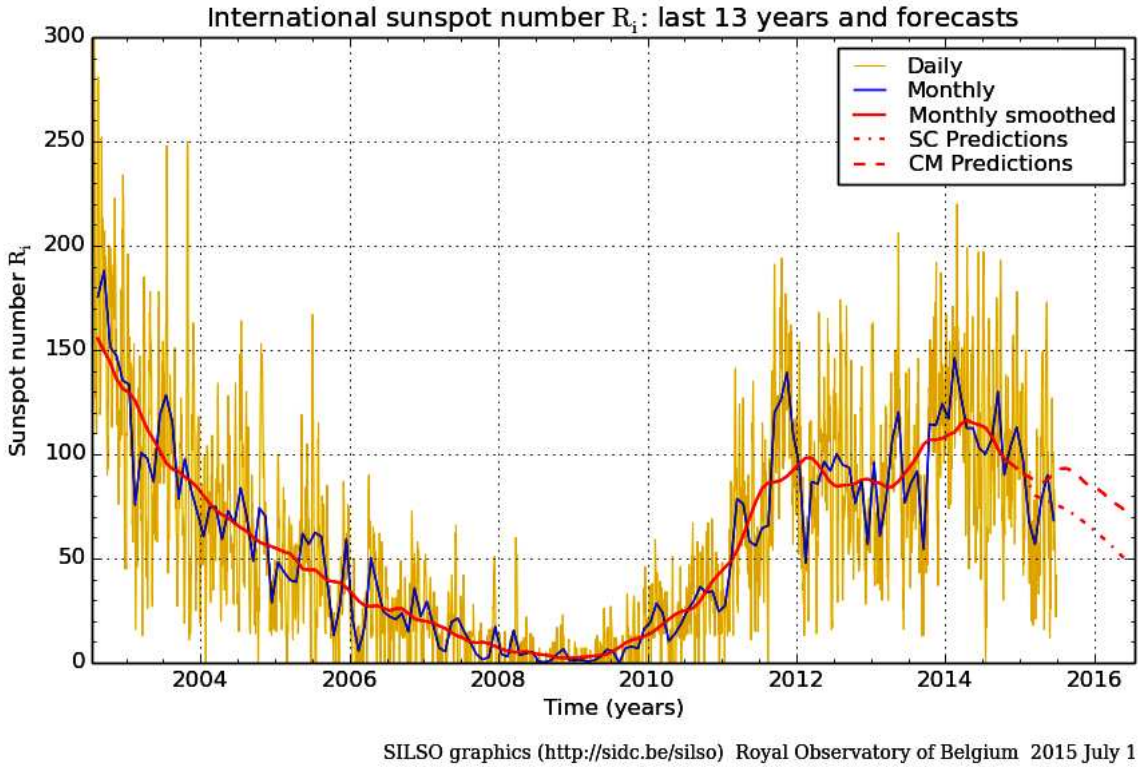
Provisional international and normalized hemispheric daily sunspot numbers for June 2015

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	26	0	26
2	46	9	37
3	50	20	30
4	85	46	39
5	94	71	23
6	111	76	35
7	127	85	42
8	114	77	37
9	97	75	22
10	96	79	17
11	99	76	23
12	101	65	36
13	99	53	46
14	92	45	47
15	54	14	40
16	71	33	38
17	83	43	40
18	80	50	30
19	70	36	34
20	63	36	27
21	61	38	23
22	58	40	18
23	47	35	12
24	36	36	0
25	28	28	0
26	23	23	0
27	22	22	0
28	34	34	0
29	41	30	11
30	42	30	12
Monthly mean	68.3	43.5	24.8
Cooperating stations	79	67	67



Predictions of the monthly smoothed Sunspot Number

using the last provisional value, calculated for December 2014: 93.3 (± 5%)

	SM	CM		SM	CM		SM	CM
2015 Jan	91	91	2015 Jul	75	93	2016 Jan	62	83
Feb	86	89	Aug	73	93	Feb	60	81
Mar	80	87	Sep	72	92	Mar	57	78
Apr	79	86	Oct	69	89	Apr	54	76
May	78	88	Nov	67	86	May	51	74
Jun	76	91	Dec	65	84	Jun	48	70

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, July 1, 2015 09:50 UT

Editor: Frédéric Clette
3, avenue Circulaire, B1180 Bruxelles, Belgium
Fax: ../32/(0)2/374.98.22 Tel: ../32/(0)2/373.02.33 Email: silso.info@oma.be

Web: http://sidc.oma.be/silso
FTP anonymous : omaftp.oma.be, directory: dist/astro/sidcdata

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

Date	R_i	PPSI	600	2800	COS	SFI	XI	Ak
31	24	39	-	94	////	0	0/0	8
1	26	11	-	100	////	0	0/0	11
2	46	20	-	101	////	2	0/0	3
3	50	15	-	109	////	3	0/0	4
4	85	30	-	118	////	8	0/0	3
5	94	33	-	126	////	5	0/0	3
6	111	47	-	133	////	3	0/0	5
7	127	65	-	137	////	2	0/0	8
8	114	69	-	134	////	1	0/0	33
9	97	49	-	137	////	12	0/0	16
10	96	49	-	140	////	4	0/0	14
11	99	45	-	140	////	28	1/0	14
12	101	58	-	137	////	49	0/0	8
13	99	51	-	136	////	19	1/0	10
14	92	50	-	132	////	1	1/0	16
15	54	68	-	135	////	2	0/0	14
16	71	68	-	136	////	13	0/0	14
17	83	96	-	136	////	31	0/0	18
18	80	120	-	151	////	45	1/0	10
19	70	191	-	137	////	18	0/0	5
20	63	163	-	135	////	21	1/0	2
21	61	196	-	136	////	139	4/0	10
22	58	215	-	135	////	219	1/0	62
23	47	150	-	116	////	5	0/0	48
24	36	98	-	110	////	14	0/0	16
25	28	63	-	102	////	103	1/0	36
26	23	38	-	101	////	10	0/0	10
27	22	17	-	97	////	0	0/0	11
28	34	4	-	97	////	3	0/0	16
29	41	10	-	97	////	13	0/0	6
30	42	17	-	101	////	2	0/0	8

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 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 JUNE 2015

DATE	UT	NUMBER OF GROUPS	NUMBER OF SPOTS	RELATIVE SUNSPOT NUMBERS TOTAL	NORTH	SOUTH	CENTRAL	PPSI 10-5 WM-2	QUAL	OBS
1	1230	2	5	25	0	25	13	2.8	1	AE
3	700	4	6	46	13	33	22	6.1	3	AE
4	700	5	15	65	42	23	11	49.8	2	AE
5	750	6	36	96	84	12	26	23.4	3	FC
6	800	7	31	101	66	35	43	24.2	2	AE
7	845	9	42	132	82	50	37	60.2	2	AE
8	730	9	50	140	102	38	68	67.8	3	OL
9	855	6	51	111	85	26	85	48.6	2	OL
10	745	7	48	118	103	15	77	42.3	3	OL
11	725	6	54	114	92	22	72	41.7	3	OL
12	800	7	68	138	93	45	47	41.3	4	OL
13	1015	7	27	97	66	31	44	37.5	2	AE
14	715	6	29	89	46	43	11	20.1	3	OL
15	1530	3	24	54	17	37	17	57.9	2	OB
16	830	3	19	49	11	38	26	66.8	2	OB
17	830	4	34	74	37	37	39	84.5	3	OB
18	1145	3	54	84	57	27	40	99.9	2	OB
20	1230	2	42	62	31	31	31	75.1	2	AM
21	1315	2	45	65	41	24	41	76.2	2	AM
23	710	2	30	50	37	13	37	67.9	3	AM
24	700	1	41	51	51	0	0	56.4	3	AM
25	710	1	25	35	35	0	0	45.1	3	AM
26	720	1	15	25	25	0	0	15.8	3	AM
27	1015	1	11	21	21	0	0	8.1	3	OL
28	735	2	7	27	27	0	0	4.1	3	LL
29	800	3	7	37	26	11	0	9.0	2	AE
30	630	3	8	38	27	11	0	10.6	3	AE

The relative mean sunspot number is 72.0.

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

K'= 1.211 (*)

1	30	7	160	13	117	19	***	25	42
2	***	8	170	14	108	20	75	26	30
3	56	9	134	15	65	21	79	27	25
4	79	10	143	16	59	22	***	28	33
5	116	11	138	17	90	23	61	29	45
6	122	12	167	18	102	24	62	30	46

The normalised relative monthly mean sunspot number is 87.

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

The Sun has been observed 27 days on 30 possible.