



Sunspot Index and Long-term Solar Observations

World Data Center supported by the ICSU - WDS

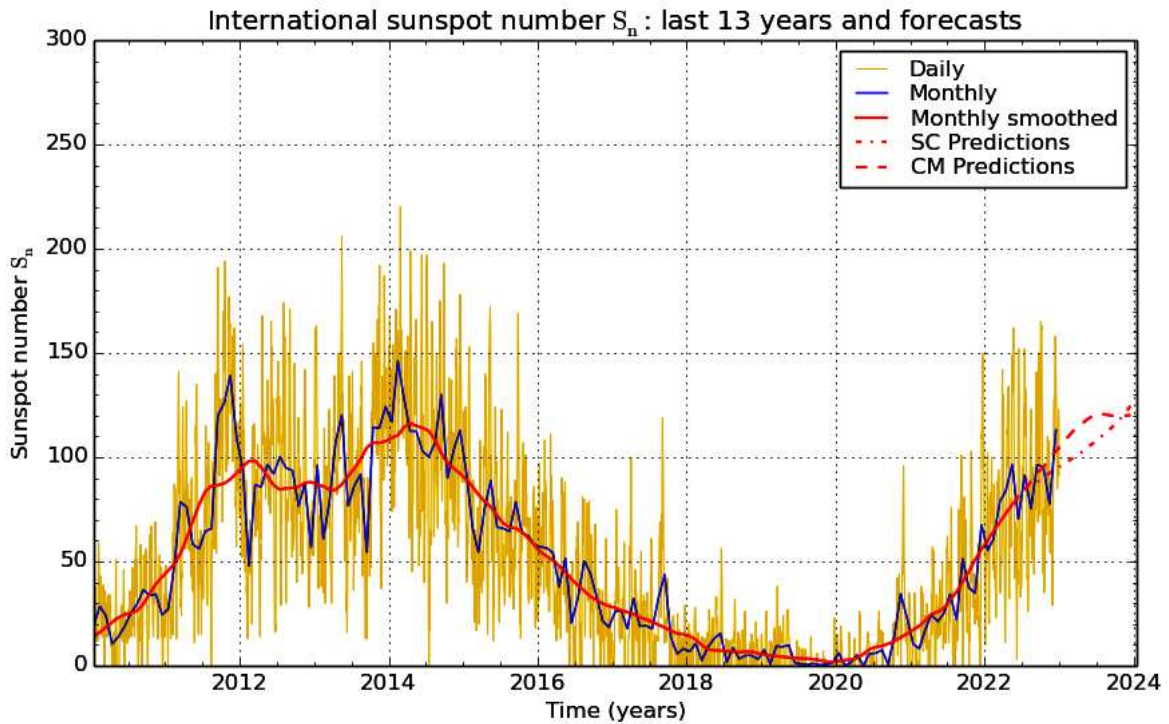
SUNSPOT BULLETIN

2022 n° 12

Provisional international and normalized hemispheric daily sunspot numbers for December 2022

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	52	25	27
2	73	39	34
3	79	46	33
4	97	68	29
5	106	78	28
6	120	83	37
7	128	97	31
8	128	90	38
9	111	75	36
10	123	74	49
11	140	56	84
12	156	63	93
13	158	67	91
14	154	46	108
15	143	32	111
16	132	30	102
17	131	40	91
18	127	41	86
19	114	45	69
20	109	44	65
21	102	42	60
22	99	58	41
23	85	54	31
24	94	67	27
25	103	66	37
26	114	81	33
27	93	78	15
28	103	70	33
29	123	80	43
30	117	87	30
31	91	75	16
Monthly mean	113.1	61.2	51.9
Cooperating stations	61	52	52



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2023 January 1

Predictions of the monthly smoothed Sunspot Number
 using the last provisional value, calculated for June 2022: 81.0 ($\pm 5\%$)

		SM	CM			SM	CM			SM	CM
2022	Jul	85	84	2023	Jan	96	106	2023	Jul	109	121
	Aug	88	89		Feb	98	110		Aug	112	121
	Sep	88	92		Mar	100	113		Sep	114	120
	Oct	90	95		Apr	102	116		Oct	117	120
	Nov	93	99		May	104	118		Nov	121	120
	Dec	94	103		Jun	107	120		Dec	125	120

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, January 1, 2023 09:24 UT
 Reproduction permitted if source mentioned.

Editors: Frédéric Clette and Laure Lefèvre
 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

With our best wishes for a fruitful and sunny new year in 2023 !

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

Date	S _n	PPSI	600	2800	COS	SFI	XI	Ak
30	30	3	-	111	////	1	0/0	25
1	52	5	-	119	////	10	1/0	28
2	73	18	-	124	////	0	0/0	16
3	79	34	-	134	////	0	1/0	10
4	97	68	-	144	////	3	0/0	27
5	106	84	-	150	////	8	0/0	6
6	120	89	-	144	////	0	0/0	3
7	128	81	-	148	////	3	0/0	17
8	128	91	-	143	////	2	0/0	9
9	111	115	-	149	////	0	0/0	12
10	123	75	-	142	////	20	0/0	10
11	140	63	-	148	////	7	0/0	10
12	156	202	-	151	////	0	0/0	7
13	158	62	-	153	////	13	0/0	4
14	154	69	-	165	////	127	8/0	7
15	143	68	-	166	////	29	5/0	6
16	132	67	-	155	////	///	///	5
17	131	71	-	155	////	27	1/0	2
18	127	59	-	156	////	5	0/0	5
19	114	51	-	152	////	10	0/0	10
20	109	45	-	146	////	27	1/0	6
21	102	44	-	139	////	34	0/0	10
22	99	39	-	131	////	7	0/0	15
23	85	41	-	128	////	9	0/0	27
24	94	37	-	133	////	11	0/0	24
25	103	41	-	///	////	///	///	9
26	114	39	-	///	////	14	0/0	26
27	93	49	-	160	////	11	3/0	29
28	103	37	-	160	////	13	0/0	4
29	123	45	-	163	////	2	0/0	14
30	117	51	-	162	////	121	2/0	36
31	91	79	-	165	////	12	0/0	18

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 : $1 \times S_n + 10 \times "1" + 100 \times ">1"$).

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 DECEMBER 2022

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
6	1138	7	114	184	111	73	103	131.2	4	GV
7	1215	9	68	158	115	43	91	123.1	4	OB
8	1015	9	64	154	104	50	94	162.7	3	OB
11	1045	9	60	150	60	90	25	85.9	4	OB
12	1035	10	79	179	73	106	62	125.0	3	GV
13	932	11	88	198	86	112	83	102.5	3	GV
14	955	9	108	198	51	147	119	104.3	2	GV
15	1005	7	127	197	38	159	136	108.8	3	GV
16	1050	7	120	190	32	158	110	126.7	2	GV
17	1002	8	84	164	44	120	48	96.1	3	GV
24	1150	7	38	108	86	22	74	12.6	1	JV
27	950	6	40	100	86	14	0	45.0	2	OL

The relative mean sunspot number is 165.0.

 NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS $U'=K'U$ FOR DECEMBER 2022

$K'= 1.045 (*)$

1	***	7	165	13	207	19	***	25	***
2	***	8	161	14	207	20	***	26	***
3	***	9	***	15	206	21	***	27	104
4	***	10	***	16	199	22	***	28	***
5	***	11	157	17	171	23	***	29	***
6	192	12	187	18	***	24	113	30	***
								31	***

The normalised relative monthly mean sunspot number is 172.

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

 The Sun has been observed 12 days on 31 possible.