



# Sunspot Index and Long-term Solar Observations

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## ***SUNSPOT BULLETIN***

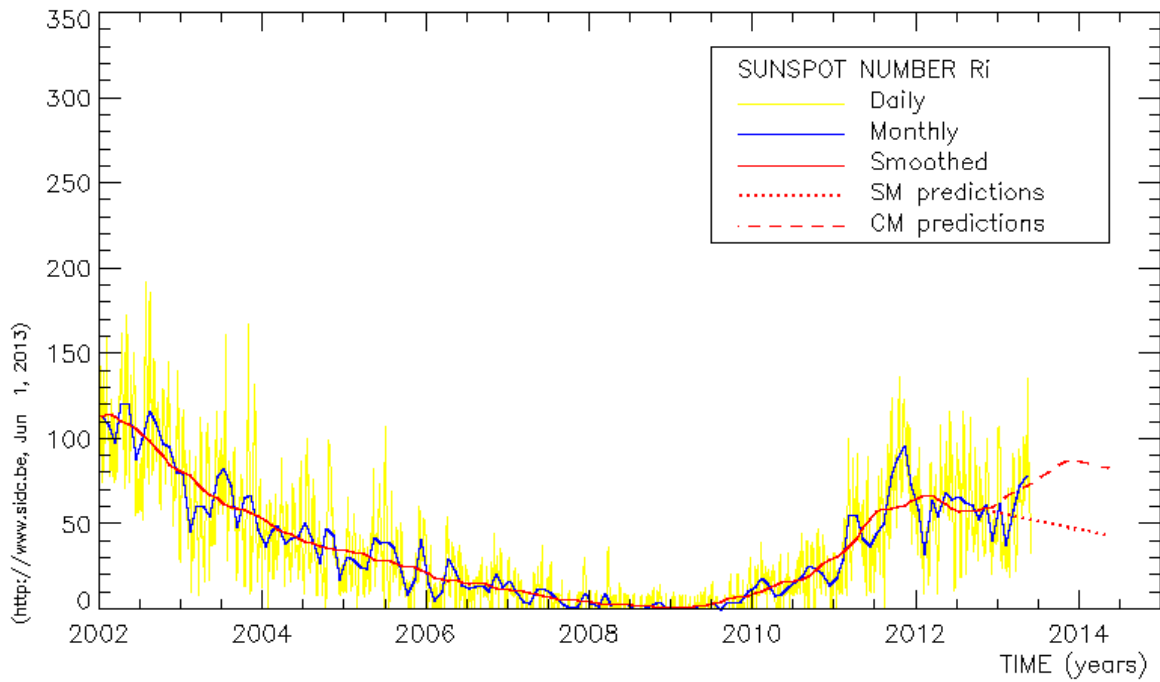
2014

n° 3

### Provisional international and normalized hemispheric daily sunspot numbers for March 2014

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

Date	R' <sub>I</sub>	R' <sub>N</sub>	R' <sub>S</sub>
1	111	23	88
2	113	36	77
3	115	39	76
4	101	36	65
5	110	36	74
6	91	29	62
7	96	28	68
8	83	28	55
9	79	28	51
10	81	35	46
11	79	32	47
12	94	42	52
13	80	36	44
14	78	41	37
15	79	41	38
16	87	41	46
17	90	29	61
18	97	27	70
19	101	18	83
20	99	17	82
21	90	16	74
22	104	24	80
23	108	29	79
24	98	36	62
25	97	35	62
26	80	27	53
27	82	28	54
28	87	37	50
29	84	37	47
30	79	31	48
31	84	25	59
<b>Monthly mean</b>	<b>92.2</b>	<b>31.2</b>	<b>61.0</b>
<b>Cooperating stations</b>	<b>66</b>	<b>56</b>	<b>56</b>



**Predictions of the monthly smoothed Sunspot Number**  
 using the last provisional value, calculated for September 2013: 73.1 ( $\pm 5\%$ )

		SM	CM		SM	CM		SM	CM		
2013	Oct	74	72	2014	Apr	78	75	2014	Oct	72	78
	Nov	77	72		May	77	76		Nov	71	78
	Dec	84	72		Jun	76	77		Dec	70	77
2014	Jan	82	72		Jul	75	78	2015	Jan	68	77
	Feb	80	73		Aug	74	78		Feb	67	76
	Mar	79	74		Sep	73	78		Mar	66	75

**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, due to 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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## S.I.D.C. SUMMARY OF THE URSIGRAMS

Date	R' <sub>i</sub>	PPSI	600	2800	COS	SFI	XI	Ak	SEA
28	137	153	-	171	////	109	1/0	11	
1	111	116	-	165	////	6	1/0	8	
2	113	129	-	161	////	12	0/0	5	
3	115	118	-	161	////	14	1/0	6	
4	101	95	-	158	////	11	0/0	8	
5	110	75	-	149	////	5	1/0	8	
6	91	50	-	149	////	2	0/0	8	
7	96	55	-	148	////	0	0/0	3	
8	83	34	-	146	////	14	1/0	4	
9	79	28	-	146	////	35	2/0	4	
10	81	49	-	152	////	122	4/0	4	
11	79	75	-	165	////	31	1/0	3	
12	94	102	-	148	////	11	2/0	6	
13	80	91	-	148	////	4	1/0	12	
14	78	91	-	144	////	4	0/0	5	
15	79	86	-	139	////	5	0/0	5	
16	87	78	-	136	////	2	0/0	1	
17	90	70	-	136	////	5	0/0	3	
18	97	58	-	138	////	4	0/0	6	
19	101	76	-	149	////	52	0/0	4	
20	99	98	-	151	////	73	1/0	7	
21	90	75	-	153	////	5	0/0	9	
22	104	85	-	155	////	26	1/0	5	
23	108	94	-	157	////	102	0/0	8	
24	98	94	-	159	////	14	0/0	4	
25	97	85	-	153	////	2	0/0	9	
26	80	68	-	153	////	15	0/0	12	
27	82	58	-	145	////	4	0/0	5	
28	87	44	-	146	////	6	2/0	9	
29	84	46	-	143	////	125	0/1	8	
30	79	32	-	148	////	12	1/0	6	
31	84	45	-	152	////	17	1/0	6	

- R'<sub>i</sub>** : provisional international sunspot numbers from the S.I.D.C.
- PPSI** : prompt photometric sunspot index from the S.I.D.C. in  $10^{-5} \text{ w/m}^2$  : 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** : From October 1992, Solar Flare Index from the S.I.D.C. (origin : Ursigrams – UGEOR, evaluation :  $1 \times \text{Sn} + 10 \times "1" + 100 \times ">1"$ ).
- XI** : X-flares index from the Ursigrams (M-flares/X-flares) (origin : Ursigrams – UGEOR, UGEOI).
- Ak** : geomagnetic index from Wingst, Germany (origin : Ursigrams).
- SEA** : sudden enhancements of atmospherics from Uccle & Humain (Royal Observatory, Belgium).

**Note that due to problems of interferences saturating our receivers, no SEA could be detected this month.**

SOLAR PHYSICS DEPARTMENT

UCCLE DAILY PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR MARCH 2014

DATE	UT	NUMBER		RELATIVE SUNSPOT NUMBERS			PPSI 10-5 WM-2	QUAL	OBS	
		OF GROUPS	OF SPOTS	TOTAL	NORTH	SOUTH				CENTRAL
1	900	9	43	133	18	115	76	85.7	1	LL
2	945	9	56	146	34	112	94	109.7	3	LL
3	1140	8	84	164	62	102	92	93.3	3	OL
4	910	8	77	157	58	99	94	93.6	3	OL
5	835	11	68	178	57	121	45	94.0	3	OL
6	845	7	44	114	33	81	35	64.6	3	OL
7	1020	8	50	130	40	90	48	27.8	3	OL
8	845	7	36	106	35	71	43	14.7	3	OL
9	845	6	49	109	43	66	35	17.6	3	OL
10	900	5	39	89	44	45	29	21.5	2	OB
11	1200	5	45	95	41	54	31	87.0	2	OB
12	830	6	45	105	50	55	44	90.5	2	OB
13	1125	6	43	103	44	59	34	97.2	3	FC
14	815	6	51	111	61	50	37	99.3	3	FC
15	1325	7	38	108	55	53	31	93.0	2	FC
16	1000	9	33	123	60	63	25	91.0	3	AE
19	830	9	34	124	11	113	51	79.8	2	AE
20	745	7	26	96	22	74	14	89.9	2	AE
21	1330	9	29	119	22	97	47	66.4	2	AE
22	1145	9	45	135	33	102	85	73.9	1	LL
23	1025	9	71	161	39	122	103	74.3	3	FC
24	1115	7	35	105	36	69	57	63.2	2	OB
25	845	6	53	113	45	68	39	44.4	2	OB
26	845	5	38	88	34	54	58	17.1	2	OB
27	945	6	26	86	32	54	58	15.2	2	OB
28	845	7	28	98	45	53	45	10.2	2	OB
29	900	7	28	98	42	56	22	32.5	2	OB
30	1000	5	24	74	29	45	30	11.1	2	OB
31	805	8	38	118	37	81	52	33.0	3	OL

The relative mean sunspot number is 116.8.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR MARCH 2014

$$K' = 0.811 (*)$$

1	108	7	105	13	84	19	101	25	92
2	118	8	86	14	90	20	78	26	71
3	133	9	88	15	88	21	97	27	70
4	127	10	72	16	100	22	109	28	79
5	144	11	77	17	***	23	131	29	79
6	92	12	85	18	***	24	85	30	60
								31	96

The normalised relative monthly mean sunspot number is 95.

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

The Sun has been observed 29 days on 31 possible.