



Sunspot Index and Long-term Solar Observations

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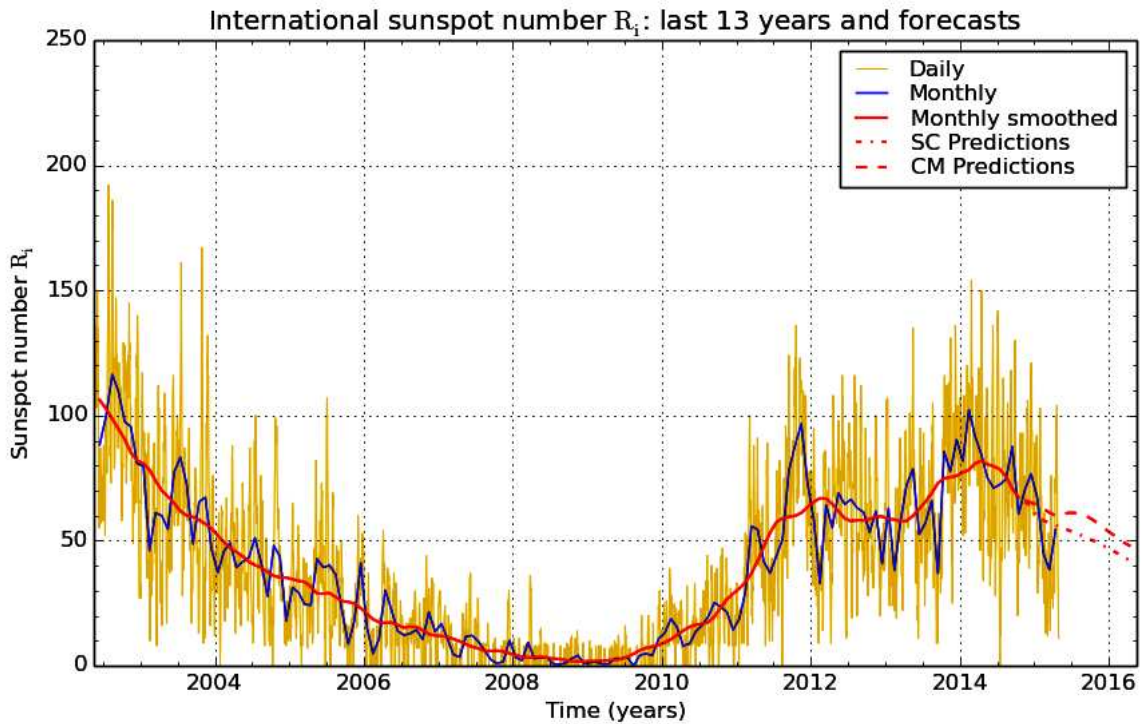
SUNSPOT BULLETIN

2015 n° 4

Provisional international and normalized hemispheric daily sunspot numbers for April 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 | 32 | 11 | 21 |
| 2 | 25 | 13 | 12 |
| 3 | 23 | 23 | 0 |
| 4 | 40 | 21 | 19 |
| 5 | 40 | 22 | 18 |
| 6 | 39 | 20 | 19 |
| 7 | 37 | 16 | 21 |
| 8 | 31 | 12 | 19 |
| 9 | 34 | 10 | 24 |
| 10 | 29 | 11 | 18 |
| 11 | 42 | 21 | 21 |
| 12 | 62 | 34 | 28 |
| 13 | 75 | 44 | 31 |
| 14 | 75 | 57 | 18 |
| 15 | 70 | 63 | 7 |
| 16 | 69 | 69 | 0 |
| 17 | 85 | 75 | 10 |
| 18 | 100 | 68 | 32 |
| 19 | 100 | 70 | 30 |
| 20 | 93 | 67 | 26 |
| 21 | 93 | 55 | 38 |
| 22 | 104 | 60 | 44 |
| 23 | 84 | 57 | 27 |
| 24 | 61 | 36 | 25 |
| 25 | 48 | 25 | 23 |
| 26 | 47 | 15 | 32 |
| 27 | 34 | 10 | 24 |
| 28 | 31 | 10 | 21 |
| 29 | 19 | 7 | 12 |
| 30 | 11 | 0 | 11 |
| Monthly mean | 54.4 | 33.4 | 21.0 |
| Cooperating stations | 77 | 67 | 67 |



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2015 May 4

Predictions of the monthly smoothed Sunspot Number

using the last provisional value, calculated for October 2014: 67.3 ($\pm 5\%$)

| | SM | CM | | SM | CM | | SM | CM |
|----------|----|----|----------|----|----|----------|----|----|
| 2014 Nov | 66 | 66 | 2015 May | 55 | 60 | 2015 Nov | 49 | 57 |
| Dec | 64 | 65 | Jun | 54 | 61 | Dec | 48 | 55 |
| 2015 Jan | 59 | 64 | Jul | 53 | 61 | 2016 Jan | 46 | 53 |
| Feb | 58 | 63 | Aug | 52 | 60 | Feb | 45 | 51 |
| Mar | 57 | 61 | Sep | 51 | 60 | Mar | 43 | 49 |
| Apr | 56 | 60 | Oct | 50 | 58 | Apr | 42 | 48 |

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.

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

| Date | R _i | PPSI | 600 | 2800 | COS | SFI | XI | Ak |
|------|----------------|------|-----|------|------|-----|-----|----|
| 31 | 27 | 25 | - | 128 | //// | 0 | 0/0 | 11 |
| 1 | 32 | 20 | - | 124 | //// | 0 | 0/0 | 9 |
| 2 | 25 | 8 | - | 121 | //// | 0 | 0/0 | 15 |
| 3 | 23 | 6 | - | 120 | //// | 0 | 0/0 | 13 |
| 4 | 40 | 11 | - | 122 | //// | 0 | 0/0 | 14 |
| 5 | 40 | 20 | - | 122 | //// | 1 | 0/0 | 8 |
| 6 | 39 | 27 | - | 126 | //// | 12 | 0/0 | 5 |
| 7 | 37 | 39 | - | 111 | //// | 6 | 0/0 | 4 |
| 8 | 31 | 32 | - | 106 | //// | 11 | 1/0 | 5 |
| 9 | 34 | 29 | - | 113 | //// | /// | /// | 12 |
| 10 | 29 | 25 | - | 115 | //// | 15 | 0/0 | 31 |
| 11 | 42 | 15 | - | 123 | //// | 8 | 0/0 | 17 |
| 12 | 62 | 32 | - | 134 | //// | 6 | 1/0 | 5 |
| 13 | 75 | 52 | - | 141 | //// | 26 | 0/0 | 6 |
| 14 | 75 | 68 | - | 147 | //// | 1 | 0/0 | 22 |
| 15 | 70 | 91 | - | 155 | //// | /// | /// | 33 |
| 16 | 69 | 103 | - | 150 | //// | 32 | 0/0 | 37 |
| 17 | 85 | 118 | - | 150 | //// | 7 | 0/0 | 21 |
| 18 | 100 | 120 | - | 148 | //// | 24 | 0/0 | 14 |
| 19 | 100 | 114 | - | 152 | //// | 0 | 0/0 | 10 |
| 20 | 93 | 90 | - | 150 | //// | 19 | 0/0 | 11 |
| 21 | 93 | 89 | - | 154 | //// | 116 | 6/0 | 22 |
| 22 | 104 | 83 | - | 150 | //// | 21 | 0/0 | 11 |
| 23 | 84 | 71 | - | 141 | //// | 16 | 0/0 | 6 |
| 24 | 61 | 48 | - | 135 | //// | 13 | 0/0 | 3 |
| 25 | 48 | 53 | - | 126 | //// | 5 | 0/0 | 2 |
| 26 | 47 | 43 | - | 119 | //// | 1 | 0/0 | 2 |
| 27 | 34 | 12 | - | 108 | //// | 0 | 0/0 | 7 |
| 28 | 31 | 7 | - | 108 | //// | /// | /// | 7 |
| 29 | 19 | 2 | - | 104 | //// | 0 | 0/0 | 4 |
| 30 | 11 | 3 | - | 102 | //// | 0 | 0/0 | 5 |

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 : $1 \times \text{Sn} + 10 \times \text{"1"} + 100 \times \text{">1"}$).

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 APRIL 2015

| DATE | UT | NUMBER | | RELATIVE SUNSPOT NUMBERS | | | PPSI | QUAL | OBS | |
|------|------|--------------|-------------|--------------------------|-------|-------|------|-------|-----|---------|
| | | OF GROUPS | OF SPOTS | TOTAL | NORTH | SOUTH | | | | CENTRAL |
| 1 | 1100 | 2 | 4 | 24 | 13 | 11 | 13 | 7.3 | 2 | OB |
| 2 | 1000 | 2 | 9 | 29 | 18 | 11 | 0 | 1.3 | 2 | OB |
| 5 | 730 | 3 | 22 | 52 | 27 | 25 | 0 | 19.2 | 4 | LL |
| 7 | 800 | 3 | 29 | 59 | 17 | 42 | 48 | 28.2 | 3 | AE |
| 8 | 715 | 2 | 21 | 41 | 17 | 24 | 41 | 45.2 | 2 | AE |
| 9 | 715 | 2 | 21 | 41 | 17 | 24 | 41 | 23.8 | 1 | AE |
| 10 | 745 | 2 | 12 | 32 | 12 | 20 | 0 | 19.5 | 2 | AE |
| 12 | 815 | 7 | 22 | 92 | 52 | 40 | 12 | 16.1 | 2 | AE |
| 13 | 950 | 8 | 46 | 126 | 79 | 47 | 30 | 40.3 | 2 | OL |
| 14 | 735 | 7 | 40 | 110 | 93 | 17 | 15 | 49.5 | 3 | OL |
| 15 | 735 | 7 | 51 | 121 | 110 | 11 | 47 | 60.5 | 4 | OL |
| 16 | 745 | 7 | 61 | 131 | 119 | 12 | 79 | 75.4 | 3 | OL |
| 17 | 920 | 9 | 55 | 145 | 99 | 46 | 72 | 102.2 | 2 | OL |
| 18 | 735 | 11 | 60 | 170 | 106 | 64 | 119 | 85.8 | 3 | OL |
| 19 | 735 | 11 | 73 | 183 | 141 | 42 | 99 | 65.3 | 3 | OL |
| 20 | 1000 | 10 | 43 | 143 | 101 | 42 | 50 | 42.2 | 2 | OB |
| 21 | 1030 | 9 | 41 | 131 | 79 | 52 | 52 | 53.8 | 2 | OB |
| 22 | 645 | 10 | 40 | 140 | 69 | 71 | 49 | 68.5 | 2 | OB |
| 23 | 845 | 8 | 28 | 108 | 65 | 43 | 44 | 48.4 | 2 | OB |
| 24 | 800 | 6 | 21 | 81 | 49 | 32 | 32 | 22.5 | 2 | OB |
| 27 | 730 | 3 | 10 | 40 | 14 | 26 | 14 | 3.4 | 3 | AM |
| 28 | 725 | 5 | 12 | 62 | 25 | 37 | 25 | 1.9 | 3 | OL |
| 29 | 700 | 2 | 4 | 24 | 0 | 24 | 0 | 0.3 | 2 | AM |
| 30 | 1245 | 2 | 8 | 28 | 0 | 28 | 17 | 5.6 | 2 | AM |

The relative mean sunspot number is 88.0.

NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS $U'=K'U$ FOR APRIL 2015

$$K' = 0.784 (*)$$

| | | | | | | | | | |
|---|-----|----|-----|----|-----|----|-----|----|-----|
| 1 | 19 | 7 | 46 | 13 | 99 | 19 | 143 | 25 | *** |
| 2 | 23 | 8 | 32 | 14 | 86 | 20 | 112 | 26 | *** |
| 3 | *** | 9 | 32 | 15 | 95 | 21 | 103 | 27 | 31 |
| 4 | *** | 10 | 25 | 16 | 103 | 22 | 110 | 28 | 49 |
| 5 | 41 | 11 | *** | 17 | 114 | 23 | 85 | 29 | 19 |
| 6 | *** | 12 | 72 | 18 | 133 | 24 | 64 | 30 | 22 |

The normalised relative monthly mean sunspot number is 69.

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

The Sun has been observed 24 days on 30 possible.