



# Sunspot Index and Long-term Solar Observations

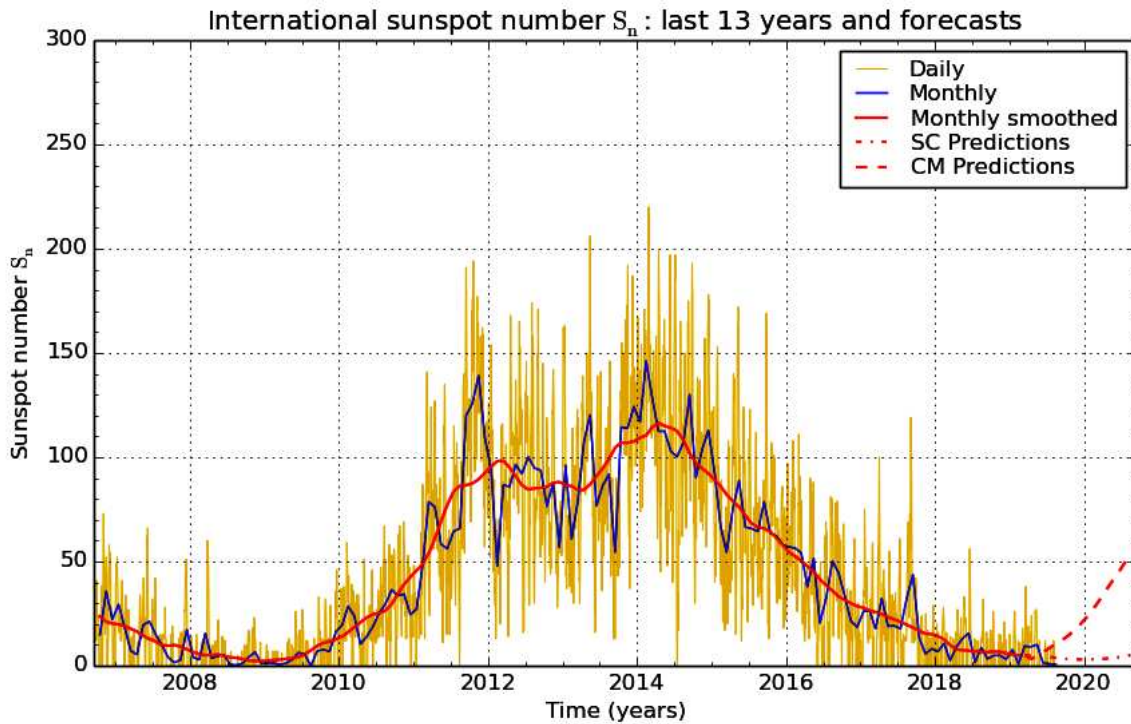
World Data Center supported by the ICSU - WDS

## *SUNSPOT BULLETIN* 2019 n° 8

Provisional international and normalized hemispheric daily sunspot numbers for August 2019

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                    | 0     | 0        | 0        |
| 2                    | 0     | 0        | 0        |
| 3                    | 0     | 0        | 0        |
| 4                    | 0     | 0        | 0        |
| 5                    | 12    | 0        | 12       |
| 6                    | 0     | 0        | 0        |
| 7                    | 11    | 11       | 0        |
| 8                    | 0     | 0        | 0        |
| 9                    | 0     | 0        | 0        |
| 10                   | 0     | 0        | 0        |
| 11                   | 0     | 0        | 0        |
| 12                   | 0     | 0        | 0        |
| 13                   | 0     | 0        | 0        |
| 14                   | 0     | 0        | 0        |
| 15                   | 0     | 0        | 0        |
| 16                   | 0     | 0        | 0        |
| 17                   | 0     | 0        | 0        |
| 18                   | 0     | 0        | 0        |
| 19                   | 0     | 0        | 0        |
| 20                   | 0     | 0        | 0        |
| 21                   | 0     | 0        | 0        |
| 22                   | 0     | 0        | 0        |
| 23                   | 0     | 0        | 0        |
| 24                   | 0     | 0        | 0        |
| 25                   | 0     | 0        | 0        |
| 26                   | 0     | 0        | 0        |
| 27                   | 0     | 0        | 0        |
| 28                   | 0     | 0        | 0        |
| 29                   | 0     | 0        | 0        |
| 30                   | 0     | 0        | 0        |
| 31                   | 0     | 0        | 0        |
| Monthly mean         | 0.7   | 0.4      | 0.3      |
| Cooperating stations | 68    | 57       | 57       |



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2019 September 1

**Predictions of the monthly smoothed Sunspot Number**  
 using the last provisional value, calculated for February 2019: 5.0 ( $\pm 5\%$ )

|          | SM | CM |          | SM | CM |          | SM | CM |
|----------|----|----|----------|----|----|----------|----|----|
| 2019 Mar | 5  | 5  | 2019 Sep | 3  | 12 | 2020 Mar | 3  | 31 |
| Apr      | 5  | 3  | Oct      | 3  | 15 | Apr      | 3  | 36 |
| May      | 5  | 5  | Nov      | 3  | 17 | May      | 4  | 40 |
| Jun      | 5  | 7  | Dec      | 3  | 20 | Jun      | 4  | 44 |
| Jul      | 4  | 9  | 2020 Jan | 3  | 24 | Jul      | 4  | 49 |
| Aug      | 4  | 11 | Feb      | 3  | 27 | Aug      | 5  | 54 |

**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 | S <sub>n</sub> | PPSI | 600 | 2800 | COS  | SFI | XI  | Ak |
|------|----------------|------|-----|------|------|-----|-----|----|
| 31   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 10 |
| 1    | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 13 |
| 2    | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 4  |
| 3    | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 3  |
| 4    | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 5  |
| 5    | 12             | 0    | -   | 68   | //// | 0   | 0/0 | 35 |
| 6    | 0              | 0    | -   | 68   | //// | 0   | 0/0 | 13 |
| 7    | 11             | 0    | -   | 68   | //// | 0   | 0/0 | 8  |
| 8    | 0              | 0    | -   | 69   | //// | 0   | 0/0 | 8  |
| 9    | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 8  |
| 10   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 12 |
| 11   | 0              | 0    | -   | 68   | //// | 0   | 0/0 | 8  |
| 12   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 6  |
| 13   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 10 |
| 14   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 4  |
| 15   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 4  |
| 16   | 0              | 0    | -   | 68   | //// | 0   | 0/0 | 6  |
| 17   | 0              | 0    | -   | 68   | //// | 0   | 0/0 | 4  |
| 18   | 0              | 0    | -   | 68   | //// | 0   | 0/0 | 7  |
| 19   | 0              | 0    | -   | 68   | //// | 0   | 0/0 | 4  |
| 20   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 6  |
| 21   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 6  |
| 22   | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 6  |
| 23   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 5  |
| 24   | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 4  |
| 25   | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 4  |
| 26   | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 7  |
| 27   | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 13 |
| 28   | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 5  |
| 29   | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 4  |
| 30   | 0              | 0    | -   | 67   | //// | 0   | 0/0 | 14 |
| 31   | 0              | 0    | -   | 66   | //// | 0   | 0/0 | 40 |

**S<sub>n</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** : 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 AUGUST 2019

| DATE | UT   | NUMBER       |             | RELATIVE SUNSPOT NUMBERS |       |       | PPSI | QUAL | OBS |         |
|------|------|--------------|-------------|--------------------------|-------|-------|------|------|-----|---------|
|      |      | OF<br>GROUPS | OF<br>SPOTS | TOTAL                    | NORTH | SOUTH |      |      |     | CENTRAL |
| 1    | 850  | 0            | 0           | 0                        | 0     | 0     | 0.0  | 3    | OB  |         |
| 2    | 800  | 0            | 0           | 0                        | 0     | 0     | 0.0  | 3    | OB  |         |
| 5    | 725  | 1            | 2           | 12                       | 0     | 12    | 12   | 0.4  | 2   | SB      |
| 6    | 705  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 7    | 645  | 1            | 1           | 11                       | 11    | 0     | 11   | 0.4  | 3   | SB      |
| 8    | 630  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 9    | 1220 | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 1   | SB      |
| 10   | 800  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | OB      |
| 11   | 700  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 1   | SB      |
| 12   | 735  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 4   | FC      |
| 13   | 700  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | OB      |
| 14   | 715  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 4   | OB      |
| 15   | 910  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | OB      |
| 16   | 910  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | OB      |
| 18   | 1400 | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 2   | OB      |
| 19   | 650  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 20   | 720  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 21   | 650  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 22   | 635  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 23   | 705  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 24   | 720  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 25   | 620  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | SB      |
| 26   | 730  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | OB      |
| 27   | 755  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 4   | OL      |
| 28   | 900  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 4   | OL      |
| 29   | 810  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | OL      |
| 30   | 730  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 2   | OL      |
| 31   | 730  | 0            | 0           | 0                        | 0     | 0     | 0    | 0.0  | 3   | OL      |

The relative mean sunspot number is 0.8.

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NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS  $U'=K'U$  FOR AUGUST 2019

$K' = 1.131 (*)$

|   |     |    |    |    |     |    |   |    |   |
|---|-----|----|----|----|-----|----|---|----|---|
| 1 | 0   | 7  | 12 | 13 | 0   | 19 | 0 | 25 | 0 |
| 2 | 0   | 8  | 0  | 14 | 0   | 20 | 0 | 26 | 0 |
| 3 | *** | 9  | 0  | 15 | 0   | 21 | 0 | 27 | 0 |
| 4 | *** | 10 | 0  | 16 | 0   | 22 | 0 | 28 | 0 |
| 5 | 14  | 11 | 0  | 17 | *** | 23 | 0 | 29 | 0 |
| 6 | 0   | 12 | 0  | 18 | 0   | 24 | 0 | 30 | 0 |
|   |     |    |    |    |     |    |   | 31 | 0 |

The normalised relative monthly mean sunspot number is 1.

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

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The Sun has been observed 28 days on 31 possible.