# Sunspot Index and Long-term Solar Observations

*World Data Center supported by the ICSU - WDS*

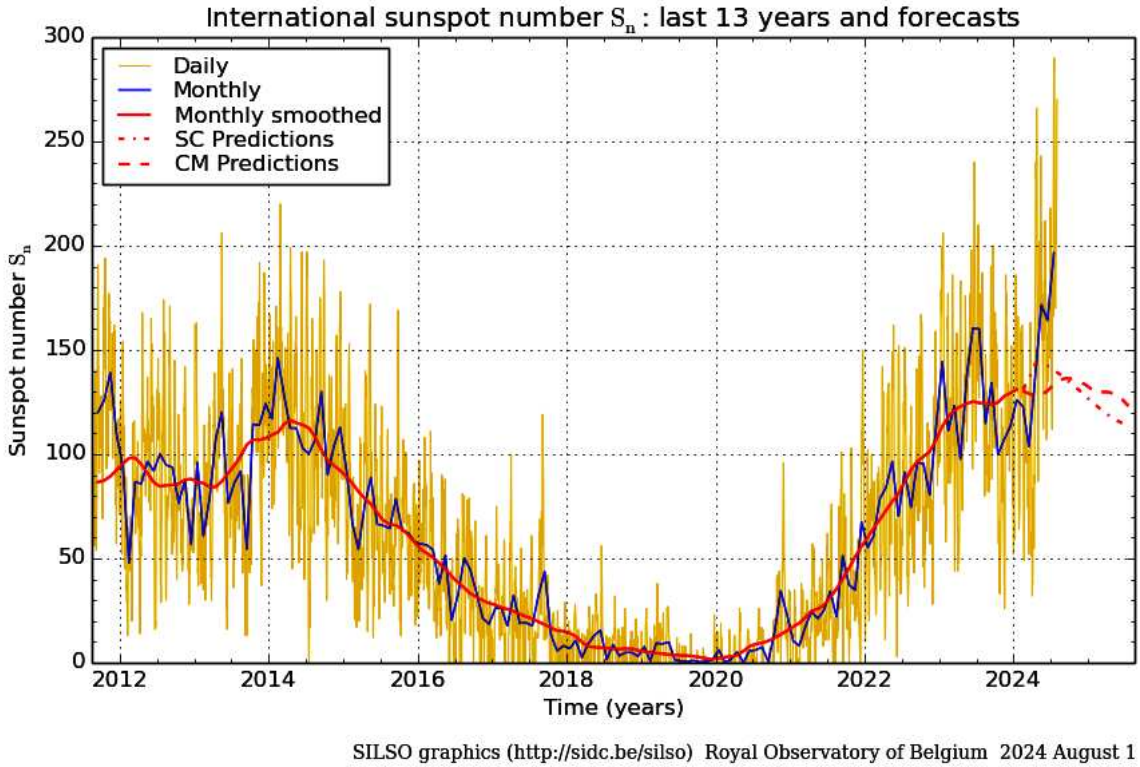
# *SUNSPOT BULLETIN*

**2024 n° 07**

**Provisional international and normalized hemispheric daily sunspot numbers for July 2024**

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 | 197 | 66 | 131 |
| 2 | 197 | 65 | 132 |
| 3 | 178 | 57 | 121 |
| 4 | 138 | 55 | 83 |
| 5 | 137 | 54 | 83 |
| 6 | 127 | 53 | 74 |
| 7 | 122 | 52 | 70 |
| 8 | 112 | 35 | 77 |
| 9 | 141 | 26 | 115 |
| 10 | 184 | 38 | 146 |
| 11 | 173 | 37 | 136 |
| 12 | 166 | 31 | 135 |
| 13 | 173 | 27 | 146 |
| 14 | 212 | 41 | 171 |
| 15 | 243 | 85 | 158 |
| 16 | 285 | 114 | 171 |
| 17 | 283 | 113 | 170 |
| 18 | 290 | 112 | 178 |
| 19 | 273 | 107 | 166 |
| 20 | 227 | 83 | 144 |
| 21 | 221 | 68 | 153 |
| 22 | 171 | 49 | 122 |
| 23 | 174 | 40 | 134 |
| 24 | 170 | 38 | 132 |
| 25 | 179 | 41 | 138 |
| 26 | 195 | 39 | 156 |
| 27 | 210 | 44 | 166 |
| 28 | 201 | 49 | 152 |
| 29 | 214 | 61 | 153 |
| 30 | 230 | 64 | 166 |
| 31 | 270 | 71 | 199 |
| Monthly mean | 196.5 | 58.5 | 138.0 |
| Cooperating stations | 60 | 54 | 54 |




**Predictions of the monthly smoothed Sunspot Number**

using the last provisional value, calculated for January 2024: 131.1 (± 5%)

| | SM | CM | | SM | CM | | SM | CM |
|---|---|---|---|---|---|---|---|---|
| 2024 Feb | 131 | 130 | 2024 Aug | 138 | 136 | 2025 Feb | 123 | 129 |
| Mar | 136 | 129 | Sep | 136 | 137 | Mar | 120 | 130 |
| Apr | 143 | 128 | Oct | 133 | 136 | Apr | 118 | 130 |
| May | 144 | 129 | Nov | 131 | 135 | May | 116 | 128 |
| Jun | 142 | 131 | Dec | 128 | 134 | Jun | 115 | 126 |
| Jul | 140 | 134 | 2025 Jan | 125 | 131 | Jul | 114 | 123 |

**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 | $S_n$ | PPSI | 600 | 2800 | COS | SFI | XI | Ak |
|---|---|---|---|---|---|---|---|---|
| 30 | 208 | 71 | - | 174 | //// | 6 | 0/0 | 15 |
| 1 | 197 | 87 | - | 171 | //// | 22 | 1/0 | 6 |
| 2 | 197 | 60 | - | 164 | //// | 1 | 0/0 | 6 |
| 3 | 178 | 49 | - | 167 | //// | 27 | 1/0 | 6 |
| 4 | 138 | 53 | - | 173 | //// | 4 | 0/0 | 12 |
| 5 | 137 | 41 | - | 166 | //// | 4 | 0/0 | 12 |
| 6 | 127 | 37 | - | 166 | //// | 14 | 1/0 | 4 |
| 7 | 122 | 37 | - | 171 | //// | 18 | 0/0 | 10 |
| 8 | 112 | 43 | - | 169 | //// | 14 | 0/0 | 12 |
| 9 | 141 | 50 | - | 180 | //// | 13 | 0/0 | 8 |
| 10 | 184 | 75 | - | 214 | //// | 47 | 5/0 | 6 |
| 11 | 173 | 105 | - | 205 | //// | 41 | 2/0 | 6 |
| 12 | 166 | 121 | - | 210 | //// | 9 | 0/0 | 7 |
| 13 | 173 | 104 | - | 238 | //// | 136 | 6/0 | 6 |
| 14 | 212 | 97 | - | 234 | //// | 54 | 4/1 | 8 |
| 15 | 243 | 92 | - | 233 | //// | 30 | 3/0 | 8 |
| 16 | 285 | 98 | - | 242 | //// | 67 | 4/1 | 16 |
| 17 | 283 | 75 | - | 224 | //// | 119 | 4/0 | 7 |
| 18 | 290 | 82 | - | 209 | //// | 30 | 2/0 | 5 |
| 19 | 273 | 83 | - | 202 | //// | 135 | 3/0 | 6 |
| 20 | 227 | 91 | - | 207 | //// | 38 | 2/0 | 9 |
| 21 | 221 | 103 | - | 198 | //// | 25 | 4/0 | 6 |
| 22 | 171 | 79 | - | 185 | //// | 27 | 3/0 | 10 |
| 23 | 174 | 63 | - | 176 | //// | 21 | 0/0 | 6 |
| 24 | 170 | 60 | - | 175 | //// | 118 | 2/0 | 7 |
| 25 | 179 | 55 | - | 167 | //// | 30 | 1/0 | 13 |
| 26 | 195 | 81 | - | 176 | //// | 16 | 1/0 | 28 |
| 27 | 210 | 94 | - | 204 | //// | 164 | 5/0 | 19 |
| 28 | 201 | 143 | - | 214 | //// | 172 | 7/0 | 12 |
| 29 | 214 | 168 | - | 223 | //// | 151 | 6/1 | 8 |
| 30 | 230 | 164 | - | 220 | //// | 143 | 7/0 | 25 |
| 31 | 270 | 137 | - | 235 | //// | 69 | 7/0 | 20 |

**$S_n$** : 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 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 JULY 2024

| DATE | UT | NUMBER OF GROUPS | NUMBER OF SPOTS | RELATIVE SUNSPOT NUMBERS TOTAL | NORTH | SOUTH | CENTRAL | PPSI 10-5 WM-2 | QUAL | OBS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 700 | 10 | 61 | 161 | 69 | 92 | 69 | 169.1 | 2 | OB |
| 2 | 1400 | 11 | 82 | 192 | 69 | 123 | 78 | 100.6 | 2 | OB |
| 4 | 800 | 7 | 58 | 128 | 57 | 71 | 26 | 92.8 | 2 | OB |
| 5 | 1540 | 7 | 44 | 114 | 55 | 59 | 25 | 21.2 | 2 | OB |
| 6 | 1225 | 8 | 42 | 122 | 54 | 68 | 52 | 38.6 | 3 | LL |
| 7 | 715 | 9 | 40 | 130 | 60 | 70 | 64 | 50.5 | 3 | LL |
| 8 | 935 | 7 | 47 | 117 | 33 | 84 | 24 | 52.1 | 2 | SB |
| 9 | 720 | 9 | 76 | 166 | 22 | 144 | 84 | 68.2 | 2 | OL |
| 10 | 640 | 13 | 103 | 233 | 46 | 187 | 110 | 79.9 | 3 | SB |
| 11 | 830 | 10 | 72 | 172 | 38 | 134 | 68 | 127.1 | 3 | JV |
| 13 | 930 | 11 | 126 | 236 | 53 | 183 | 55 | 115.7 | 3 | OB |
| 14 | 810 | 12 | 128 | 248 | 30 | 218 | 104 | 135.1 | 4 | OB |
| 15 | 655 | 14 | 158 | 298 | 98 | 200 | 169 | 106.3 | 3 | OL |
| 17 | 900 | 18 | 116 | 296 | 129 | 167 | 43 | 107.7 | 3 | OL |
| 18 | 835 | 18 | 119 | 299 | 122 | 177 | 128 | 107.9 | 3 | OL |
| 19 | 840 | 17 | 109 | 279 | 109 | 170 | 146 | 84.1 | 2 | OL |
| 20 | 915 | 13 | 90 | 220 | 84 | 136 | 146 | 130.6 | 3 | JV |
| 21 | 1300 | 11 | 93 | 203 | 67 | 136 | 124 | 135.8 | 1 | JV |
| 22 | 800 | 9 | 62 | 152 | 50 | 102 | 63 | 163.9 | 2 | AE |
| 24 | 1100 | 9 | 49 | 139 | 34 | 105 | 44 | 106.5 | 2 | AE |
| 25 | 645 | 10 | 50 | 150 | 45 | 105 | 48 | 103.6 | 2 | AE |
| 26 | 940 | 9 | 58 | 148 | 35 | 113 | 60 | 119.8 | 2 | AE |
| 28 | 830 | 7 | 80 | 150 | 47 | 103 | 109 | 243.7 | 2 | AE |
| 29 | 840 | 8 | 130 | 210 | 59 | 151 | 129 | 218.4 | 4 | SB |
| 30 | 750 | 9 | 147 | 237 | 69 | 168 | 145 | 214.6 | 3 | SB |
| 31 | 1345 | 11 | 123 | 233 | 71 | 162 | 84 | 187.5 | 2 | SB |

The relative mean sunspot number is 193.6.

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NORMALISED UCCLE OBSERVATIONAL SUNSPOT NUMBERS U'=K'U FOR JULY 2024

K'= 0.924 (*)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 149 | 7 | 120 | 13 | 218 | 19 | 258 | 25 | 139 |
| 2 | 177 | 8 | 108 | 14 | 229 | 20 | 203 | 26 | 137 |
| 3 | *** | 9 | 153 | 15 | 275 | 21 | 188 | 27 | *** |
| 4 | 118 | 10 | 215 | 16 | *** | 22 | 140 | 28 | 139 |
| 5 | 105 | 11 | 159 | 17 | 274 | 23 | *** | 29 | 194 |
| 6 | 113 | 12 | *** | 18 | 276 | 24 | 128 | 30 | 219 |
| | | | | | | | | 31 | 215 |

The normalised relative monthly mean sunspot number is 179.

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

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The Sun has been observed 26 days on 31 possible.