



Sunspot Index Data Center  
SUNSPOT BULLETIN

Data Analysis Service supported by the FAGS

1991 n° 11  
Provisional Sunspot numbers for November 1991

From observations at the Locarno Specola Solare  
completed with data from an international network,  
computed at the Observatoire Royal de Belgique  
36 cooperating stations on December 1st, 11 UT

| Day | Ri  | Day | Ri  |
|-----|-----|-----|-----|
| 1   | 183 | 16  | 73  |
| 2   | 163 | 17  | 75  |
| 3   | 127 | 18  | 75  |
| 4   | 109 | 19  | 93  |
| 5   | 113 | 20  | 90  |
| 6   | 125 | 21  | 82  |
| 7   | 134 | 22  | 78  |
| 8   | 141 | 23  | 76  |
| 9   | 132 | 24  | 99  |
| 10  | 121 | 25  | 95  |
| 11  | 129 | 26  | 83  |
| 12  | 114 | 27  | 104 |
| 13  | 98  | 28  | 106 |
| 14  | 94  | 29  | 104 |
| 15  | 88  | 30  | 80  |

Mean = 106.1

Predictions of the smoothed monthly Sunspot Numbers

| Classical Method    |                     | SIDC Adjusted values |
|---------------------|---------------------|----------------------|
| 1991 Dec. 129(± 31) | 1992 Jun. 114(± 36) | 1991 Dec. 135(± 33)  |
| 1992 Jan. 127       | Jul. 112            | 1992 Jan. 134        |
| Feb. 124            | Aug. 111            | Feb. 132             |
| Mar. 122            | Sep. 108            | Mar. 131             |
| Apr. 119            | Oct. 106            | Apr. 128             |
| May 117             | Nov. 104            | May 127              |

forecasted on the basis of the most recent provisional monthly smoothed  
Sunspot Number calculated for 1991 May : 145.4 (± 5%)

Provisional smoothed values :

|                     |               |               |
|---------------------|---------------|---------------|
| 1991 Jun. 143(± 21) | 1991 Aug. 139 | 1991 Oct. 134 |
| Jul. 141            | Sep. 137      | Nov. 132      |

Brussels, 1991 December 01

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S.I.D.C. SUMMARY OF THE URSIGRAMS

1991 NOVEMBER R'IM = 106.1

| Date | R'I | PPSI | 600 | 2800 | COS | XFI | XI  | Ak  | SEA  | MAG                     |
|------|-----|------|-----|------|-----|-----|-----|-----|------|-------------------------|
| 31   | 188 | 246  | 45  | 232  | 820 | 20  | 1/0 | 48  |      | 0908                    |
| 1    | 183 | 293  | 46  | 230  | 810 | 33  | 1/0 | 102 |      | 1137 (gradual)          |
| 2    | 163 | 160  | 44  | 218  | 836 | 41  | 3/0 | 33  | 1147 | 1b(0623)+T;1b(1610)+T   |
| 3    | 127 | 72   | 43  | 186  | 843 | --  | -/- | 16  |      |                         |
| 4    | 109 | 49   | 43  | 177  | 862 | 8   | 2/0 | 34  |      |                         |
| 5    | 113 | 96   | 46  | 176  | 866 | 24  | 1/0 | 24  |      | sb(2204)+T              |
| 6    | 125 | 121  | 49  | 187  | 873 | 36  | 3/0 | 16  | 1227 | sb(0445)+T;T(2355)      |
| 7    | 134 | 123  | 48  | 194  | 881 | 12  | 0/0 | 14  |      |                         |
| 8    | 141 | 119  | 46  | 200  | 844 | 43  | 1/0 | 118 |      | 0647 1b(1652)+T+Aurorae |
| 9    | 132 | 124  | 48  | 197  | 826 | 147 | 2/1 | 116 | 1534 | 1b(1531)+T ↓            |
| 10   | 121 | 164  | 50  | 195  | 845 | 39  | 3/0 | 27  |      | 1n(0115)+T;1n(2004)+T   |
| 11   | 129 | 162  | 56  | 198  | 850 | 18  | 1/0 | 28  |      | 1751                    |
| 12   | 114 | 212  | 52  | 192  | 851 | 6   | 0/0 | 11  |      |                         |
| 13   | 98  | 193  | 47  | 181  | 854 | 5   | 0/0 | 15  |      |                         |
| 14   | 94  | 169  | 47  | 184  | 858 | 9   | 0/0 | 18  |      |                         |
| 15   | 88  | 132  | 46  | 173  | 860 | 105 | 0/1 | --  |      | 3b(2233)+II+T           |
| 16   | 73  | 87   | 47  | 166  | 858 | 5   | 0/0 | 24  |      |                         |
| 17   | 75  | 58   | 47  | 165  | 861 | 43  | 3/0 | 18  |      | 2b(0153)+II+T;2b(1830)  |
| 18   | 75  | 51   | 45  | 163  | 870 | 17  | 1/0 | 24  |      |                         |
| 19   | 93  | 47   | 44  | 158  | 872 | 16  | 0/0 | 53  |      | 0421                    |
| 20   | 90  | 49   | 44  | 153  | 855 | 19  | 1/0 | 26  |      | 3b(0051)+II, IV+T       |
| 21   | 82  | 58   | 42  | 145  | 860 | 1   | 1/0 | 68  |      | bps (1706+2130)         |
| 22   | 78  | 46   | 42  | 139  | --- | --  | -/- | 44  |      |                         |
| 23   | 76  | 50   | 42  | 135  | 862 | 7   | 0/0 | 33  |      |                         |
| 24   | 99  | 47   | 41  | 130  | 868 | 7   | 0/0 | 16  |      |                         |
| 25   | 95  | 46   | 41  | 131  | 883 | 4   | 0/0 | 15  |      |                         |
| 26   | 83  | 55   | 43  | 144  | 884 | 8   | 0/0 | 7   |      |                         |
| 27   | 104 | 89   | 43  | 153  | 892 | 9   | 0/0 | 8   |      |                         |
| 28   | 106 | 92   | 42  | 155  | 901 | 5   | 0/0 | 12  |      |                         |
| 29   | 104 | 114  | 42  | 161  | 901 | 13  | 0/0 | 17  |      | 1b(0342)                |
| 30   | 80  | 99   | 44  | 168  | 882 | 19  | 3/0 | 16  |      |                         |

\* From Humain station only.

R'I,R'IM: 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 subtract from the mean solar constant.  
 600 :600 Mhz solar flux from Humain station (Belgium).  
 2800:2800 Mhz solar flux from Ottawa (origin:Ursigrams).  
 COS :thousands of the cosmic ray counts (origin:Ursigrams).  
 XFI :X-flares index from the S.I.D.C. (origin:Ursigrams).  
 XI :X-flares index from the Ursigrams (M-flares/X-flares).  
 Ak :planetary geomagnetic index from Wingst (Germany from Ursigrams).  
 SEA :sudden enhancements of atmospherics from Uccle & Humain (Belgium).  
 MAG :magnetic events from Dourbes station(Royal Météo. Institute Belgium).  
 Remarks:sid(sudden ionospheric disturbance);ssc(sudden storm commencement)  
 mgst(magnetic storm);sfe(solar flare effect);s-1-2-3-4(class of flares);  
 II-IV radio-burst;T(ten cm radio-burst);P(proton flare);p(proton event);gle(ground level event:neutron event);si(sudden impulse);  
 F(Forbush)

## OBSERVATOIRE ROYAL DE BELGIQUE

DEPARTEMENT 4 RADIOASTRONOMIE ET PHYSIQUE SOLAIRE

## DAILY PROVISIONAL

## RELATIVE SUNSPOT NUMBERS

STATION UCCLE BELGIUM

NOVEMBER 1991

| DATE | UT   | NUMBER<br>OF<br>GROUPS | NUMBER<br>OF<br>SPOTS | RELATIVE<br>SUNSPOT<br>NUMBER | REL NUMB<br>CENTRAL<br>ZONE | PPSI<br>10-5<br>WM-2 | QUAL | OBS |
|------|------|------------------------|-----------------------|-------------------------------|-----------------------------|----------------------|------|-----|
| 1    | 840  | 9                      | 148                   | 238                           | 63                          | 272.1                | 1    | AK  |
| 2    | 1555 | 11                     | 87                    | 197                           | 61                          | 138.4                | 2    | AK  |
| 6    | 916  | 11                     | 61                    | 171                           | 86                          | 107.7                | 2    | VI  |
| 9    | 910  | 11                     | 110                   | 220                           | 131                         | 123.8                | 4    | AK  |
| 10   | 1035 | 11                     | 110                   | 220                           | 117                         | 162.3                | 2    | CG  |
| 12   | 1151 | 6                      | 70                    | 130                           | 58                          | 144.0                | 4    | ST  |
| 13   | 915  | 6                      | 57                    | 117                           | 46                          | 174.4                | 3    | ST  |
| 15   | 1315 | 4                      | 87                    | 127                           | 69                          | 123.3                | 2    | AK  |
| 21   | 1106 | 9                      | 19                    | 109                           | 48                          | 77.8                 | 3    | ST  |
| 22   | 1044 | 5                      | 9                     | 59                            | 14                          | 43.3                 | 1    | VI  |
| 24   | 1040 | 10                     | 94                    | 194                           | 134                         | 85.3                 | 5    | AK  |
| 26   | 1250 | 6                      | 20                    | 80                            | 41                          | 58.1                 | 1    | ST  |
| 27   | 954  | 7                      | 46                    | 116                           | 59                          | 83.0                 | 3    | ST  |
| 28   | 947  | 8                      | 72                    | 152                           | 98                          | 88.6                 | 2    | VI  |
| 29   | 1340 | 8                      | 58                    | 138                           | 74                          | 108.4                | 2    | FC  |

The Sun has been observed 15 days on 30 possible.  
The relative mean sunspot number is 151.2.

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

1991 NOVEMBER

$K' = 0.990$  (\*)

|   |     |    |     |    |     |    |     |    |     |
|---|-----|----|-----|----|-----|----|-----|----|-----|
| 1 | 235 | 7  | *** | 13 | 115 | 19 | *** | 25 | *** |
| 2 | 194 | 8  | *** | 14 | *** | 20 | *** | 26 | 79  |
| 3 | *** | 9  | 217 | 15 | 125 | 21 | 107 | 27 | 114 |
| 4 | *** | 10 | 217 | 16 | *** | 22 | 58  | 28 | 150 |
| 5 | *** | 11 | *** | 17 | *** | 23 | *** | 29 | 136 |
| 6 | 169 | 12 | 128 | 18 | *** | 24 | 191 | 30 | *** |

The Sun has been observed 15 days on 30 possible.

The normalized relative monthly mean Wolf number is 149.

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

UCCLE OBSERVATIONAL MAJOR SUNSPOT GROUPS FOR 1991 NOVEMBER  
E AND F BRUNNER'S TYPE GROUPS

| Uccle<br>N° | East Limb<br>Date | Date and type |         |          | West Limb<br>Date |
|-------------|-------------------|---------------|---------|----------|-------------------|
|             |                   | 1st obs       | CMP     | Last Obs |                   |
| 10-1848     | 10 21.5           | 22 F          | 10 28.2 | 2 E      | 11 4.0            |
| 14-1848     | 10 21.8           | 26 E          | 10 28.6 | 2 G      | 11 4.3            |
| 16-1848     | 10 23.6           | 26 D          | 10 30.3 | 2 G      | 11 6.1            |
| 28-1848     | 10 29.2           | 2 C           | 11 5.0  | 10 G     | 11 11.7           |
| 39-1848     | 11 4.4            | 9 D           | 11 11.2 | 15 G     | 11 17.9           |
| 6-1849      | 11 6.2            | 10 C          | 11 13.0 | 15 G     | 11 19.7           |
| 8-1849      | 11 7.9            | 13 E          | 11 14.7 | 15 E     | 11 21.4           |

PROBABLE RETURN OF MAJOR GROUPS FOR 1991 JANUARY

| N° | New East Limb | New CMP | New West Limb |
|----|---------------|---------|---------------|
| 10 | 11 18.0       | 11 24.7 | 12 1.5        |
| 14 | 11 18.2       | 11 24.9 | 12 1.7        |
| 16 | 11 19.6       | 11 26.3 | 12 3.1        |
| 28 | 11 25.4       | 12 2.2  | 12 8.9        |
| 39 | 12 1.3        | 12 8.0  | 12 14.8       |
| 8  | 12 4.9        | 12 11.7 | 12 18.4       |