

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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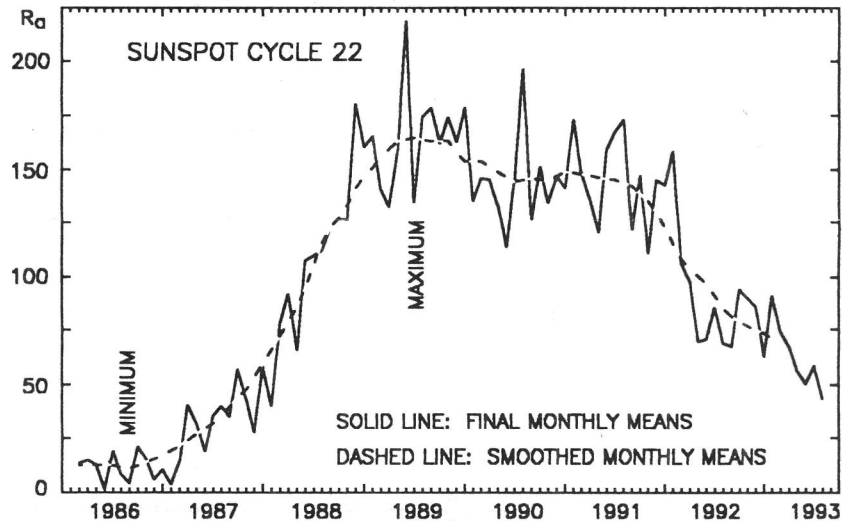


Volume 49 Number 8

August 1993

## American Relative Sunspot Numbers for August

|                       |    | R <sub>a</sub> Final |    |     |    |
|-----------------------|----|----------------------|----|-----|----|
| 1)                    | 42 | 11)                  | 66 | 21) | 35 |
| 2)                    | 38 | 12)                  | 60 | 22) | 45 |
| 3)                    | 34 | 13)                  | 62 | 23) | 44 |
| 4)                    | 33 | 14)                  | 45 | 24) | 55 |
| 5)                    | 26 | 15)                  | 30 | 25) | 54 |
|                       |    |                      |    |     |    |
| 6)                    | 34 | 16)                  | 23 | 26) | 49 |
| 7)                    | 43 | 17)                  | 28 | 27) | 52 |
| 8)                    | 40 | 18)                  | 31 | 28) | 53 |
| 9)                    | 60 | 19)                  | 27 | 29) | 50 |
| 10)                   | 65 | 20)                  | 23 | 30) | 41 |
|                       |    |                      |    | 31) | 36 |
|                       |    |                      |    |     |    |
| Mean: 42.7            |    |                      |    |     |    |
| Number of reports: 99 |    |                      |    |     |    |



**August Summary:** Solar activity continued to be low and very low during the first week of August. The geomagnetic field ranged between quiet and active conditions.

Activity was mainly low with one day at the moderate range between the 8th and 13th. On the 11th, NOAA/USAF Region 7562 (N09, L256, DAO) spawned the month's first, and as it turned out, only, class M flare (M1.5/SN). This is the smallest number of class M flares to be recorded since February 1988 (two such events occurred during January 1993). Mt. Wilson Observatory notes that Region 7562 appears to be a reverse-polarity sunspot group. (Such groups have generally been shown to be no more - or less - active flare producers than are sunspot groups with normal polarity.) The Sun's Southern Hemisphere was spotless on the 8th, and generally quiet during the remainder of the week. The geomagnetic field continued to vary between quiet and active levels.

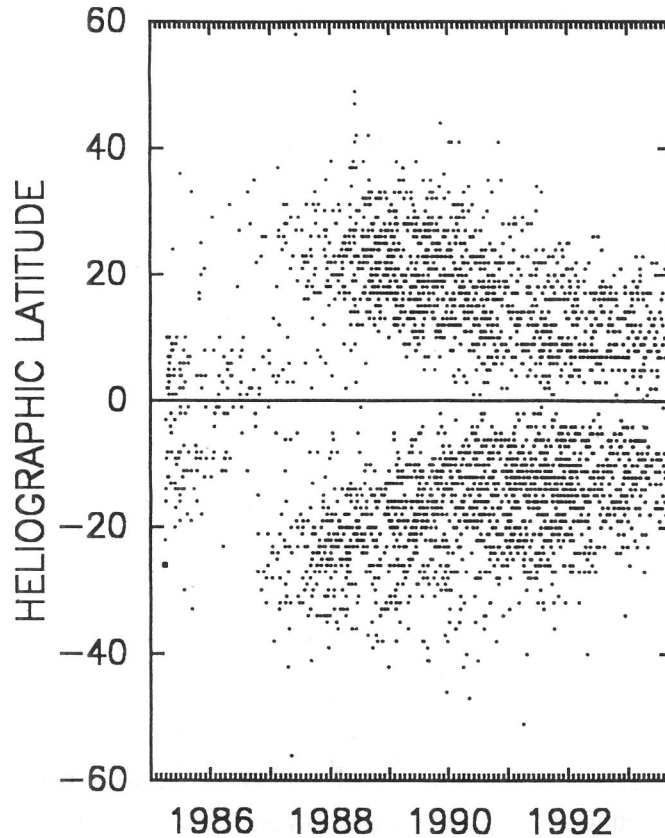
The following week saw activity in the low and very low range. The Sun's Northern Hemisphere was spotless between the 16th and 20th, and all groups in the Southern Hemisphere during the period were magnetically-simple. The geomagnetic field began the week in the quiet range, but experienced minor storm conditions at middle latitudes and major to severe disturbances at some high latitude stations on the 16th. Reports of aurorae from the northern United States and Canada also increased markedly around this time. Storm conditions gradually subsided over the next two days, returning to quiet levels on the 19th. A coronal hole is the suspected source of this activity.

Solar activity was very low between the 21st and 27th. A moderately sized filament near the central meridian disappeared from the Sun's Southern Hemisphere on the 22nd/23rd. The geomagnetic field was mostly quiet until the 27th, when minor to severe storm levels (depending on station latitude) occurred. The GOES-6 spacecraft recorded magnetopause crossings during a portion of the day. This disturbance may be related to a combination of effects from the filament disappearance cited above and coronal hole activity.

The remainder of August continued to be quiet; no other significant phenomena occurred during the month. The Sun's Southern Hemisphere was again spotless on the 31st. The smoothed-mean American Relative Sunspot Number for February 1993 declined to 70.0.

The estimated mean American Relative Sunspot Number for 1-13 September is 16. Solar activity during the first part of September has been low and very low. No solar flares have been recorded which exceeded the class C intensity level. The Sun's Southern Hemisphere was spotless through the 3rd, and again between the 7th and 9th; all other spot-groups were simple. The first totally spotless days since mid-July 1987 occurred between the 10th and 12th. The geomagnetic field was predominately quiet with occasional disturbances related to coronal hole activity.

**Butterfly-Diagram for Sunspot Cycle Twenty-Two, Through August 1993**



[A portion of the above information, and all region locations were obtained from SELDADS]

**Sudden Ionospheric Disturbances (SES) Recorded During July 1993**

Records were received from A9,40,50,59,61,62,63,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81

| Day | Max  | Imp | Def | Day | Max  | Imp | Def | Day | Max  | Imp | Def | Day | Max  | Imp | Def |
|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|
| 1   | 0048 | 1-  | 5   | 3   | 2021 | 1   | 5   | 7   | 1236 | 1-  | 5   | 18  | 1833 | 1   | 4   |
| 1   | 0255 | 2+  | 5   | 4   | 0729 | 1+  | 5   | 7   | 1334 | 1-  | 5   | 18  | 1850 | 1-  | 5   |
| 1   | 1450 | 2   | 5   | 4   | 0734 | 1-  | 4   | 7   | 1400 | 1-  | 5   | 19  | 1150 | 1-  | 5   |
| 1   | 1646 | 1   | 5   | 4   | 0751 | 2+  | 5   | 8   | 1216 | 1-  | 5   | 20  | 1522 | 1   | 5   |
| 1   | 2100 | 1-  | 5   | 4   | 1020 | 1-  | 5   | 9   | 1558 | 2   | 5   | 20  | 1555 | 1-  | 5   |
| 1   | 2155 | 2   | 5   | 4   | 1103 | 1-  | 4   | 9   | 1853 | 2   | 5   | 20  | 1832 | 1+  | 5   |
| 2   | 0649 | 1-  | 5   | 4   | 1115 | 1-  | 5   | 10  | 2257 | 1-  | 4   | 20  | 2029 | 1-  | 5   |
| 2   | 0836 | 1   | 5   | 4   | 1128 | 1+  | 5   | 11  | 0606 | 1-  | 5   | 22  | 0900 | 1+  | 5   |
| 2   | 1030 | 1-  | 5   | 4   | 1202 | 2+  | 5   | 13  | 1354 | 2   | 5   | 22  | 1611 | 1-  | 4   |
| 2   | 1319 | 2   | 5   | 4   | 1229 | 1+  | 4   | 14  | 0659 | 1   | 5   | 22  | 1626 | 1-  | 5   |
| 2   | 1745 | 1-  | 5   | 4   | 1639 | 1   | 5   | 14  | 1225 | 1   | 5   | 23  | 0717 | 1   | 5   |
| 3   | 1046 | 1-  | 5   | 5   | 0713 | 1-  | 5   | 14  | 2039 | 1-  | 5   | 23  | 1915 | 1-  | 5   |
| 3   | 1101 | 2+  | 5   | 5   | 0933 | 1-  | 5   | 15  | 1745 | 1-  | 5   | 23  | 2149 | 2   | 5   |
| 3   | 1322 | 1+  | 5   | 5   | 1132 | 1-  | 5   | 17  | 0834 | 2+  | 5   | 26  | 1136 | 1   | 3   |
| 3   | 1357 | 1-  | 5   | 5   | 2327 | 1   | 5   | 17  | 1624 | 1   | 5   | 27  | 1544 | 2+  | 5   |
| 3   | 1548 | 2+  | 5   | 6   | 0814 | 1   | 3   | 17  | 2201 | 1   | 5   | 28  | 1221 | 2   | 5   |
| 3   | 1716 | 1-  | 5   | 6   | 1007 | 2   | 5   | 18  | 1200 | 1-  | 5   | 31  | 1050 | 1-  | 3   |
| 3   | 1809 | 1-  | 5   | 6   | 1106 | 1   | 5   | 18  | 1415 | 1-  | 5   | 31  | 1201 | 2+  | 5   |
| 3   | 1814 | 3   | 5   | 7   | 1048 | 1-  | 5   | 18  | 1545 | 1-  | 5   | 31  | 1434 | 1+  | 5   |
| 3   | 1825 | 2   | 5   | 7   | 1137 | 1   | 5   | 18  | 1807 | 1-  | 5   |     |      |     |     |

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 Frequencies recorded (kHz): 16.8; 18.3; 19.6; 21.4; 23.4; 24.0; 24.8; 28.5; 30.6; 48.5; 51.6; 73.6; 77.15

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