## SOLAR, GEOMAGNETIC, IONOSPHERIC AND OZONE DATA

### KODAIKANAL SOLAR, GEOMAGNETIC AND IONOSPHERIC DATA

(APRIL — JUNE 1961)

Tables 1 to 5 summarise the data on solar and geomagnetic phenomena. The hourly median values of critical frequency and virtual height for the ionospheric layers are given in Table 6.

**TABLE 1**

**Prominent sunspot groups**

| Kodaikanal serial No. of spotgroup | Mean latitude | Date of central meridian passage | Total area (millionths of the Sun's visible hemisphere at central meridian passage) |
|---|---|---|---|
| 12152 | 4° N | Jun 15 | 630 |

**TABLE 2**

**Solar Flares**

| Date | Time in GMT | | | | | | Co-ordinates | | Importance | H-alpha line width | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Beg. | | Max. | | End. | | Mean latitude | Mean longitude | | | |
| | *h* | *m* | *h* | *m* | *h* | *m* | | | | Å | |
| Apr 6 | 02 | 00 | 02 | 10 | 02 | 30 | 15°N | 03°W | 1 | 2·6 | Observed in filtergram and spectrohelioscope |
| Apr 27 | 02 | 44 | 02 | 50 | 03 | 15 | 08°S | 45°E | 1 | 1·5 | Do. |
| May 24 | 04 | 26 | 04 | 30 | 05 | 01 | 17°N | 18°E | 2 | 2·0 | Do. |
| Jun 2 | 04 | 40 | 04 | 46 | 04 | 48 | 07°S | 67°E | 1+ | 1·8 | Do. |
| Jun 3 | 02 | 20 | 02 | 23 | 02 | 37 | 07°S | 55°E | 1 | 1·52 | Do. |
| Jun 24 | 02 | 42 | 02 | 44 | 02 | 47 | 15°N | 60°W | 1 | .. | Observed in filtergram |

**TABLE 3**

**Sudden disappearance of prominences and H-alpha dark markings**

| Phenomenon | Date and time (GMT) of phenomenon when last seen | | Co-ordinates of phenomenon | | Remarks |
|---|---|---|---|---|---|
| | | | Mean latitude | Mean longitude | |
| Dark marking | 22 Apr | 1030 | 24°N | 5°W | The dark marking which was seen on 22nd was not seen on 23rd |
| Eruptive prominences | 7 May | 0725 | 11°N | 90°W | Prominence has almost disappeared at 0725 U.T. |

**TABLE 4**

**Daily Solar Data**

| Date | APRIL 1961 | | | MAY 1961 | | | JUNE 1961 | | |
|---|---|---|---|---|---|---|---|---|---|
| | (a) | (b) | (c) | (a) | (b) | (c) | (a) | (b) | (c) |
| 1 | 91 | — | — | 64 | 2000 | 6 | 22 | 2188 | — |
| 2 | 40 | — | — | 54 | 1656 | 2 | 38 | 3656 | 5 |
| 3 | 62 | 1031 | 8 | 49 | 2781 | 1 | 40 | 2500 | 3 |
| 4 | 66 | — | — | 46 | 3656 | 7 | 58 | 1812 | 8 |
| 5 | 76 | 1750 | 5 | 42 | 2375 | 12 | 38 | — | — |
| 6 | 92 | 1563 | 3 | 24 | 2375 | 12 | 29 | — | — |
| 7 | 81 | 594 | 4 | 15 | 1750 | 8 | — | — | — |
| 8 | 74 | 1125 | 10 | 16 | 1531 | 13 | 43 | — | — |
| 9 | 45 | 1188 | 4 | 21 | 1094 | 8 | — | — | — |
| 10 | 39 | 1000 | 3 | 26 | 1656 | 8 | 48 | 2344 | 2 |
| 11 | 63 | 1438 | 1 | 22 | 2906 | 5 | 51 | 1625 | 7 |
| 12 | 34 | 1531 | — | 24 | 2688 | 6 | — | — | — |
| 13 | 33 | 1563 | 4 | 19 | 3063 | 7 | — | — | — |
| 14 | 38 | 1219 | 3 | 14 | — | 1 | 52 | 2938 | — |
| 15 | 53 | 2032 | 4 | — | — | — | 89 | 1531 | 2 |
| 16 | 82 | 1219 | 3 | 22 | 2156 | 1 | 97 | 2125 | 1 |
| 17 | 63 | — | — | 22 | 4875 | 5 | 115 | 2750 | 3 |
| 18 | 76 | 2750 | — | 22 | 5219 | 6 | 86 | 813 | 2 |
| 19 | 86 | 2594 | 4 | 46 | 3031 | 9 | 90 | 875 | 1 |
| 20 | 78 | — | — | 41 | 3000 | 12 | 106 | 1594 | 2 |
| 21 | 61 | 3281 | 3 | — | — | — | 126 | 1782 | 2 |
| 22 | 33 | 4500 | 3 | — | — | — | — | — | — |
| 23 | 33 | 3406 | 3 | 51 | — | — | 55 | 3219 | — |
| 24 | 22 | 3813 | 6 | 44 | 2688 | 2 | 63 | 2000 | 4 |
| 25 | 38 | 2219 | 4 | 49 | — | — | 48 | 3344 | — |
| 26 | 33 | 1781 | — | 36 | — | — | — | — | — |
| 27 | 53 | 2563 | 3 | — | — | 2 | — | — | — |
| 28 | 77 | — | 6 | — | — | — | — | — | — |
| 29 | 75 | 1500 | 8 | — | — | — | — | — | — |
| 30 | 118 | — | — | 25 | 2313 | — | 37 | — | — |
| 31 | | | | 26 | 3844 | 1 | | | |

— No observations

(a) Relative sunspot number

(b) H-alpha dark markings (Areas in millionths of the sun's visible hemisphere)

(c) Calcium prominence (Areas in square minutes of arc)

**TABLE 5**

**Principal magnetic storms**

| Greenwich date 1961 | Storm-time GMT of beginning | | Storm-time GMT of ending[1] | | Sudden commencement Type[2] | Sudden commencement Amplitude[3] | | | C-figure degree of activity[4] | Maximal activity Greenwich day | Ranges | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *D* | *H* | *Z* | | | *D* | *H* | *Z* |
| | *h* | *m* | *d* | *h* | | ′ | γ | γ | | | ′ | γ | γ |
| Apr 13 | 14 | 50 | 15 | 18 | s.c. | <1 | 29 | 17 | ms | 15 | 9 | 259 | 58 |
| May 25 | 02 | 14 | 25 | 19 | ... | — | — | — | m | 25 | 4 | 188 | 51 |
| Jun 20 | 16 | 06 | 22 | 23 | ... | — | — | — | m | 22 | 6 | 231 | 69 |

The following symbols and conventions have been used according to recognised practice—

1. Approximate time of ending of storm construed as the time of cessation of reasonably marked disturbance movements in the traces

2. s.c. = sudden commencement ... = gradual commencement

3. Signs of amplitudes of *D* and *Z* taken algebraically :
   (*D*—reckond negative being westerly)
   (*Z*—reckoned positive being vertically downwards)

4. Storm described by three degrees of activity ;
   m —for moderate (when range is less than 250γ)
   ms—for moderately severe (when range is between 251γ and 400 γ)
   s —for severe (when range is above 400 γ)

## TABLE 6

Beginning from January 1952, systematic ionospheric observations are being made at Kodaikanal with the Automatic Multi-frequency Ionosphere Recorder (Type C-3) made by the National Bureau of Standards, U.S.A. The general electrical characteristics of the instruments are given below —

(*a*) Supply voltage—90 to 260 volts AC single phase

(*b*) Supply frequency—50 to 60 cps

(*c*) Power load—approximately 30 amperes at 115 volts

(*d*) Pulse recurrence frequency—from 10 to 90 pps

(*e*) Frequency sweep time—7½, 15 or 30 seconds and 30, 60 or 120 seconds

(*f*) Frequency sweep range—1 to 25 megacycles

(*g*) Frequency sweep interval—5, 15, 30 or 60 minutes

(*h*) Height ranges—0-1500, 0-1000, 0-4000 kilometres

(*i*) Peak-pulse power—approximately 10 kilowatts

**Ionospheric data** (Median values)

Kodaikanal (10·2°N, 77·5° E) April 1961

| Time (hrs) | h'F2 | foF2 | h'F | foF1 | h'E | foE | foEs | (M3000) F2 |
|---|---|---|---|---|---|---|---|---|
| 00 | | 10·0 | 265 | | | | | 3·10 |
| 01 | | 8·4 | 255 | | | | | 3·20 |
| 02 | | 7·0 | 245 | | | | | 3·20 |
| 03 | | 5·9 | 240 | | | | | 3·25 |
| 04 | | 4·8 | 240 | | | | | 3·30 |
| 05 | | 3·4 | 245 | | | | | 3·40 |
| 06 | | 5·8 | 260 | | | | | 3·25 |
| 07 | | 8·6 | 240 | | 120 | 2·6 | G | 3·20 |
| 08 | | 10·0 | 225 | | 120 | | 7·0 | 2·90 |
| 09 | | 10·4 | 220 | | 120 | | 8·0 | 2·50 |
| 10 | 335 | 9·4 | 220 | 5·0 | 120 | | 8·4 | 2·45 |
| 11 | | 9·0 | 210 | | | | 8·4 | 2·50 |
| 12 | | 9·2 | 215 | | | | 8·6 | 2·45 |
| 13 | | 9·3 | 210 | | 120 | | 8·5 | 2·50 |
| 14 | | 9·8 | 210 | | 120 | | 8·2 | 2·50 |
| 15 | | 10·5 | 220 | | 120 | | 8·2 | 2·50 |
| 16 | | 10·8 | 230 | | 120 | 3·0 | 7·3 | 2·60 |
| 17 | | 11·1 | 250 | | | | 6·0 | 2·60 |
| 18 | | 11·4 | 280 | | | | 6·3 | 2·60 |
| 19 | | 10·3 | 350 | | | | | 2·50 |
| 20 | | 9·4 | 355 | | | | | 2·50 |
| 21 | | 9·4 | 320 | | | | | 2·60 |
| 22 | | 9·4 | 300 | | | | 4·6 | 2·75 |
| 23 | | 10·0 | 280 | | | | | 2·90 |

**Ionospheric data** (Median values)

Kodaikanal (10·2°N, 77·5°E) May 1961

| Time (hrs) | h'F2 | foF2 | h'F | foF1 | h'E | foE | foEs | (M3000) F2 |
|---|---|---|---|---|---|---|---|---|
| 00 | | 6·2 | 300 | | | | 3·8 | 2·85 |
| 01 | | 5·3 | 305 | | | | 3·3 | 2·90 |
| 02 | | 4·7 | 300 | | | | 3·8 | 2·95 |
| 03 | | 4·6 | 300 | | | | 4·6 | 3·05 |
| 04 | | 4·1 | 265 | | | | 4·8 | 3·25 |
| 05 | | 3·2 | 260 | | | | | 3·40 |
| 06 | | 6·0 | 260 | | | | 3·2 | 3·20 |
| 07 | | 8·3 | 235 | | 115 | | 6·6 | 3·05 |
| 08 | | 9·2 | 220 | | 120 | | 7·6 | 2·80 |
| 09 | | 9·6 | 220 | | | | 8·0 | 2·55 |
| 10 | 345 | 8·8 | 210 | 4·8 | | | 8·6 | 2·45 |
| 11 | 360 | 8·5 | 205 | 4·9 | | | 8·7 | 2·50 |
| 12 | 355 | 8·8 | 205 | 4·8 | | | 8·8 | 2·50 |
| 13 | 350 | 9·0 | 210 | 4·8 | 120 | | 8·8 | 2·50 |
| 14 | 335 | 9·6 | 210 | | 110 | | 8·4 | 2·50 |
| 15 | | 10·0 | 215 | | 120 | 3·4 | 7·8 | 2·60 |
| 16 | | 10·8 | 230 | | 120 | 3·0 | 6·8 | 2·70 |
| 17 | | 11·0 | 250 | | | | 6·2 | 2·85 |
| 18 | | 11·3 | 265 | | | | 5·0 | 2·80 |
| 19 | | 10·6 | 295 | | | | | 2·80 |
| 20 | | 9·2 | 300 | | | | | 2·75 |
| 21 | | 8·1 | 300 | | | | | 2·80 |
| 22 | | 7·4 | 300 | | | | 3·6 | 2·80 |
| 23 | | 7·0 | 305 | | | | | 2·75 |

Kodaikanal (10·2°N, 77·5°E) June 1961

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 00 | | 4·6 | 290 | | | | 4·2 | 2·90 |
| 01 | | 3·6 | 300 | | | | 5·6 | 2·90 |
| 02 | | 2·8 | 320 | | | | 5·4 | 2·85 |
| 03 | | 2·6 | 320 | | | | 3·0 | 2·90 |
| 04 | | 2·3 | 260 | | | | 5·6 | 3·10 |
| 05 | | 2·5 | 280 | | | | 4·6 | 2·95 |
| 06 | | 5·8 | 240 | | 120 | 2·0 | 2·9 | 3·10 |
| 07 | | 8·0 | 220 | | 105 | 2·7 | 7·1 | 3·05 |
| 08 | | 8·8 | 205 | | 105 | | 9·0 | 2·80 |
| 09 | 320 | 9·1 | 200 | | 105 | | 10·0 | 2·55 |
| 10 | 350 | 8·6 | 190 | 4·8 | | | 11·4 | 2·45 |
| 11 | 360 | 8·4 | 190 | 4·8 | | | 12·0 | 2·40 |
| 12 | 380 | 8·4 | 185 | 4·8 | | | 12·0 | 2·45 |
| 13 | 370 | 8·5 | 190 | 4·8 | | | 11·8 | 2·45 |
| 14 | 380 | 8·7 | 200 | 4·8 | 110 | | 11·0 | 2·45 |
| 15 | 330 | 9·4 | 200 | | 110 | 3·2 | 9·1 | 2·55 |
| 16 | | 10·0 | 215 | | 110 | 3·0 | 8·6 | 2·70 |
| 17 | | 10·6 | 235 | | 120 | 2·4 | 8·0 | 2·85 |
| 18 | | 10·8 | 255 | | | | 6·4 | 2·95 |
| 19 | | 9·6 | 255 | | | | 4·2 | 2·95 |
| 20 | | 8·8 | 250 | | | | 4·6 | 2·95 |
| 21 | | 7·3 | 255 | | | | 4·8 | 2·90 |
| 22 | | 6·6 | 265 | | | | 4·4 | 2·90 |
| 23 | | 5·8 | 280 | | | | 4·1 | 2·90 |

Time: 75·0°E

Sweep: 1·0 Mc. to 25·0 Mc. in 27 seconds

*Astrophysical Observatory, Kodaikanal*
*31 July 1961*

M. K. VAINU BAPPU
*Director, Astrophysical Observatory*

The symbols and terminology used are in accordance with the recommendations of the Special Committee on World-wide Ionospheric Soundings to the U.R.S.I./A.G.I. in its first report (Brussels, 2 September, 1956).

## MAGNETIC OBSERVATORY, ALIBAG (BOMBAY)

### Three-hourly indices of Geomagnetic Activity

(K9 = 300 γ)

(Scale values of variometers in γ/mm: D = 11·3 ; H = 4·4 ; Z = 3·0)

| Greenwich Day | APRIL 1961 | | | | MAY 1961 | | | | JUNE 1961 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | K-indices | | Sum | Character of the day* | K-indices | | Sum | Character of the day* | K-indices | | Sum | Character of the day* |
| 1 | 4332 | 2233 | 22 | S | 3222 | 3312 | 18 | S | 3224 | 5322 | 23 | Sa |
| 2 | 2332 | 2243 | 21 | S | 3322 | 2221 | 17 | S | 2344 | 3321 | 22 | S |
| 3 | 2332 | 2332 | 20 | Ca | 0121 | 1121 | 9 | Ca | 2423 | 1111 | 15 | S |
| 4 | 2222 | 1111 | 12 | Ca | 1111 | 1243 | 14 | Ca | 2312 | 3222 | 17 | Ca |
| 5 | 2112 | 1111 | 10 | Ca | 3232 | 2432 | 21 | S | 2322 | 2222 | 17 | Ca |
| 6 | 1111 | 2333 | 15 | Ca | 3544 | 4222 | 26 | M | 2222 | 2433 | 20 | S |
| 7 | 3222 | 1222 | 16 | Ca | 2243 | 2323 | 21 | S | 2333 | 4332 | 23 | S |
| 8 | 2222 | 1122 | 14 | Ca | 2333 | 2232 | 20 | Ca | 2223 | 2232 | 18 | S |
| 9 | 2346 | 5233 | 28 | Ma | 1325 | 3221 | 19 | M | 1222 | 1221 | 13 | Ca |
| 10 | 3333 | 3332 | 23 | S | 2122 | 2222 | 15 | Ca | 1222 | 2100 | 10 | Ca |
| 11 | 2423 | 3422 | 22 | S | 2322 | 2242 | 19 | S | 1222 | 2010 | 10 | Ca |
| 12 | 0232 | 3332 | 18 | S | 2322 | 2242 | 19 | S | 1433 | 2211 | 17 | S |
| 13 | 1122 | 4332 | 18 | S | 2323 | 3232 | 20 | S | 1222 | 1211 | 12 | Ca |
| 14 | 2444 | 3454 | 30 | M | 2223 | 1111 | 13 | Ca | 2212 | 1123 | 14 | Ca |
| 15 | 4543 | 3433 | 29 | M | 1222 | 2121 | 13 | Ca | 2323 | 3222 | 19 | S |
| 16 | 1222 | 2333 | 18 | S | 3533 | 4322 | 25 | M | 3211 | 1222 | 14 | Ca |
| 17 | 1121 | 2120 | 10 | Ca | 2222 | 2211 | 14 | Ca | 1233 | 2122 | 16 | Ca |
| 18 | 1232 | 1111 | 12 | Ca | 1121 | 1111 | 9 | Ca | 2212 | 2222 | 15 | Ca |
| 19 | 2331 | 2232 | 18 | Ca | 2222 | 2223 | 17 | Ca | 2321 | 1122 | 14 | Ca |
| 20 | 2221 | 1111 | 11 | Ca | 3322 | 2330 | 18 | Ca | 1232 | 2233 | 18 | Ca |
| 21 | 1121 | 2121 | 11 | Ca | 1022 | 1132 | 12 | Ca | 3556 | 4344 | 34 | Ma |
| 22 | 1122 | 4132 | 16 | S | 3443 | 2432 | 25 | Sa | 5433 | 4444 | 31 | M |
| 23 | 1212 | 2122 | 13 | Ca | 3522 | 3221 | 20 | M | 3121 | 1122 | 13 | Ca |
| 24 | 3111 | 2222 | 14 | Ca | 2211 | 3222 | 15 | Ca | 2221 | 2212 | 14 | Ca |
| 25 | 2222 | 1222 | 15 | Ca | 3552 | 3341 | 26 | M | 1223 | 2223 | 17 | Ca |
| 26 | 2222 | 4331 | 19 | S | 3221 | 2212 | 15 | Ca | 1221 | 2221 | 13 | Ca |
| 27 | 2433 | 4222 | 22 | S | 1222 | 2111 | 12 | Ca | 1333 | 3111 | 16 | S |
| 28 | 2321 | 1121 | 13 | Ca | 1242 | 3443 | 23 | S | 1121 | 1112 | 10 | Ca |
| 29 | 3102 | 1233 | 15 | S | 1221 | 1122 | 12 | Ca | 3632 | 3222 | 23 | Ma |
| 30 | 2222 | 2223 | 17 | Ca | 1332 | 3223 | 19 | S | 2222 | 1111 | 12 | Ca |
| 31 | | | | | 4234 | 3322 | 23 | S | | | | |

*At Bombay, since 1883, a day is classified as (1) a quiet day or day of (2) Small, (3) Moderate, (4) Great or (5) Very Great disturbance, the letters distinguishing the respective classes being, C, S, M, G and VG. For representing intermediate conditions of activity of the smaller period movements, sub-classifications Ca, Sa and Ma are used. Roughly speaking, a storm having a range of over 225 γ in the variations of the horizontal force during the first twenty-four hours after its commencement is classed as "Very Great". It is "Great" if the range is between 150γ and 225γ "Moderate" if the range is between 65γ, and 150γ, "Small" if the range is less than 65γ.The range, is however, not the only criterion used in assigning the character of a storm. The oscillations in the magnetograms are duly taken into account in determining the class to which a particular storm should belong.

The corresponding International Character figures can be determined from the following—

| Bombay Character | International Character | Bombay Character | International Character |
|---|---|---|---|
| C, Ca | 0 | M, Ma | 2 |
| S, Sa | 1 | G, VG | 2 |

*Colaba, Bombay*
*15 September 1961*

P. R. PISHAROTY
*Director, Colaba and Alibag Observatories*

## DAILY OZONE DATA—INDIA

(From direct sun observations on 3112/3323 Å and 4536/3323 Å)

Assumed $\alpha$ (3112) = 1·233 and $\alpha'$ (3323) = 0·071

NEW DELHI

(Lat. 28°35′N, Long. 77°12′E)

| Date | APRIL 1961 | | | MAY 1961 | | | JUNE 1961 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Hours (IST) | Ozone amount (cm-atmos) | State of sky | Hours (IST) | Ozone amount (cm-atmos) | State of sky | Hours (IST) | Ozone amount cm-atmos) | State of sky |
| 1 | 1700 | 0·254 | *Cu* 2 | 1650 | 0·271 | Hazy | 1708 | 0·237 | Dust and haze |
| 2 | 0814 | 0·251 | *Cs* 5, sun covered | 0741 | 0·267 | (*Ci*, *Cs*) 2 | 1708 | 0·238 | Very hazy |
| 3 | 0800 | 0·255 | *As* 1, sun clear | 1645 | 0·265 | *Cu* T | 1718 | 0·254 | ,, |
| 4 | 0800 | 0·247 | (*Ci*, *Cs*) 1, hazy | 1700 | 0·241 | Hazy | 1711 | 0·238 | *As* 1, hazy |
| 5 | 0808 | 0·257 | (*Ci*, *Cs*) 5, sun covered | 0738 | 0·262 | Very hazy | 1711 | 0·230 | Hazy |
| 6 | 1645 | 0·265 | *Cu* T, sl. hazy | 1700 | 0·270 | *Cu* 4 | 1710 | 0·233 | ,, |
| 7 | 0749 | 0·270 | (*Ci*, *Cs*) 6, sun covered | No observation | | | 1720 | 0·226 | *Ci* T, hazy |
| 8 | 0753 | 0·265 | *Ci* 1, sun behind *Ci* | 1700 | 0·266 | Clear | 1720 | 0·227 | Sl. hazy |
| 9 | No observation | | | 1705 | 0·246 | *Cu* T | No observation | | |
| 10 | 1636 | 0·237 | (*Sc*, *Cu*) 2 | 1702 | 0·254 | Partly cloudy | 1714 | 0·231 | *As* 6 |
| 11 | 1641 | 0·227 | (*Ci*, *Cs*) 6, gusty winds | Observation doubtful | | | 1717 | 0·251 | *Cu* 2, (*Ci*, *Cs*) 6 |
| 12 | No observation | | | No observation | | | Observation doubtful | | |
| 13 | 1645 | 0·227 | (*Cu*, *Fc*) 1 | 1656 | 0·265 | Hazy | 1717 | 0·257 | Hazy |
| 14 | 1645 | 0·243 | (*Cu*, *Sc*) 2, (*Ci*, *Cs*) 1 | 0746 | 0·265 | Clear | 0736 | 0·245 | Dust and haze |
| 15 | 1645 | 0·243 | Clear | Observation doubtful | | | 1710 | 0·231 | Thick dust haze |
| 16 | 1645 | 0·255 | *Ci* 3, sun behind *Ci* | 1700 | 0·250 | *Cu* 1 | 1714 | 0·230 | (*Sc*, *Cu*) 1, hazy |
| 17 | 1644 | 0·253 | (*Ci*, *Cs*) 3, sl. hazy | 1649 | 0·239 | Clear | 0738 | 0·243 | Very hazy |
| 18 | Observation doubtful | | | 1657 | 0·249 | Cloudy | 0739 | 0·226 | Hazy |
| 19 | 1648 | 0·226 | Sl. hazy | 1656 | 0·235 | Clear | 1706 | 0·247 | (*Ci*, *Cs*) 6 |
| 20 | 0744 | 0·229 | Hazy | 1714 | 0·230 | Cloudy | 1709 | 0·247 | Cloudy |
| 21 | 1647 | 0·243 | *Cs* patches | 1700 | 0·247 | *Fc* 1, *Cc* 1, (*Ci*,*Cs*) 3 | No observation | | |
| 22 | 1651 | 0·250 | Sl. hazy | 1704 | 0·257 | Hazy | ,, | | |
| 23 | 1700 | 0·247 | Clear | 1655 | 0·243 | *Ac* 3, *As* 3 | 1656 | 0·249 | *Cu* 6 |
| 24 | 1710 | 0·247 | ,, | 1700 | 0·257 | *Ac* T, sl. hazy | 0741 | 0·247 | Partly cloudy |
| 25 | 0741 | 0·241 | ,, | 1700 | 0·250 | *Ac* 3, *As* 1 | 0718 | 0·241 | Sl. hazy |
| 26 | Observation doubtful | | | 0721 | 0·253 | *Ac* 1, (*Ci*, *Cs*) 3 | 1707 | 0·243 | Clear |
| 27 | 1656 | 0·234 | *Ci* T | 1703 | 0·242 | *Ac* 1, (*Ci*, *Cs*) 2 | 1700 | 0·242 | (*Sc*, *Cu*) 4 |
| 28 | 1700 | 0·258 | (*Ci*, *Cs*) 2 | 1700 | 0·249 | *Cs* T | 1709 | 0·245 | *Cu* 2, *Cs* 2 |
| 29 | 1709 | 0·265 | (*Cu*, *Cs*) 2 | 1704 | 0·235 | Dust haze | 1706 | 0·241 | (*Ci*, *Cs*) 5 |
| 30 | 0743 | 0·278 | *Ci* T | 1709 | 0·238 | Hazy | 1707 | 0·245 | *Cu* 4, (*Ci*, *Cs*) 2 |
| 31 | | | | 0720 | 0·241 | *Cs* in patches, hazy | | | |

NOTE—The cloud amounts are in oktas

## DAILY OZONE DATA—INDIA

(Direct sun or zenith sky observation—AD)

$\alpha$ (3055) = 1·882 $\alpha'$ (3254) = 0·120

$\alpha$ (3176) = 0·391 $\alpha'$ (3398) = 0·017

### AHMEDABAD

(Lat. 23°04′ N, Long. 72°38′E)

| Date | APRIL 1961 | | | MAY 1961 | | | JUNE 1961 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Hours (IST) | Ozone amount (cm-atmos) | State of sky | Hours (IST) | Ozone amount (cm-atmos) | State of sky | Hours (IST) | Ozone amount (cm-atmos) | State of sky |
| 1 | 10 | 0·250 | Clear | 09 | 0·278 | *Ac* 2, *Cs* 2 | 09 | 0·259 | (*Ac*, *Cs*) 3 |
| 2 | 10 | 0·251 | ,, | 09 | 0·277 | *Cu* 1, *Cs* 2 | 09 | 0·262 | *Cu* 2, hazy |
| 3 | 10 | 0·256 | ,, | 09 | 0·270 | Clear | 09 | 0·258 | ,, |
| 4 | 09 | 0·262 | Thick *Ci* | 17 | 0·275 | *Cu* 2 | No observation | | |
| 5 | 09 | 0·253 | Clear | 09 | 0·251 | Nearly overcast | 09 | 0·261 | (*Ac*, *Cs*) 3 |
| 6 | 09 | 0·258 | Thick *Ci* | 09 | 0·267 | Clear | 09 | 0·260 | *Cu* 2 |
| 7 | 09 | 0·260* | Overcast | No observation | | | 17 | 0·258* | Overcast |
| 8 | 09 | 0·261 | Clear | | ,, | | 09 | 0·254 | (*Ac*, *Cs*) 3 |
| 9 | 09 | 0·256 | Nearly overcast | 09 | 0·260* | Overcast | 17 | 0·259 | Observation through cloud |
| 10 | 09 | 0·257 | *Ac* 2 | 10 | 0·266 | Clear | 09 | 0·262* | Overcast |
| 11 | 17 | 0·250 | *Cu* 1, *Cs* 2 | 09 | 0·267 | ,, | No observation | | |
| 12 | 17 | 0·250* | Overcast | 09 | 0·262 | Nearly overcast | 16 | 0·267 | Observation through cloud |
| 13 | 09 | 0·244 | Clear | 09 | 0·266 | ,, | 17 | 0·283 | ,, |
| 14 | 17 | 0·240 | ,, | No observation | | | 09 | 0·269 | *Ac* 3, hazy |
| 15 | 09 | 0·250 | ,, | 10 | 0·258 | Clear | 09 | 0·273 | (*Ac*, *Cs*) 3 |
| 16 | No observation | | | 17 | 0·262 | *Cs* 2, hazy | 09 | 0·275 | ,, |
| 17 | 09 | 0·243 | Clear | 09 | 0·266 | *Ci* 1, *Cs* 2 | 09 | 0·277 | ,, |
| 18 | 09 | 0·246 | ,, | 17 | 0·262 | Clear | No observation | | |
| 19 | 17 | 0·257 | ,, | 17 | 0·254 | *Ac* 2 | 09 | 0·264 | *Ac* 2, *Cs* 1 |
| 20 | 09 | 0·238 | ,, | 09 | 0·258 | *Cs* 2 | 09 | 0·263 | Nearly overcast |
| 21 | 09 | 0·244 | ,, | 10 | 0·253 | *Ac* 2, *Cs* 1 | 09 | 0·265 | Thick *Ci* |
| 22 | 17 | 0·249 | ,, | 10 | 0·252 | Clear | 09 | 0·274* | Overcast |
| 23 | 10 | 0·257 | ,, | 09 | 0·262 | ,, | No observation | | |
| 24 | 09 | 0·253 | ,, | 09 | 0·264 | ,, | 09 | 0·246 | Nearly overcast |
| 25 | 09 | 0·262 | ,, | 10 | 0·262 | *Cu* 2, hazy | No observation | | |
| 26 | 09 | 0·249 | ,, | 09 | 0·273 | *Cs* 2, Hazy | 09 | 0·258* | Overcast |
| 27 | 16 | 0·232 | ,, | 09 | 0·263 | Clear | 17 | 0·262 | Nearly overcast |
| 28 | 17 | 0·252 | ,, | 10 | 0·261 | Nearly overcast | 17 | 0·265 | *Cu* 2 |
| 29 | 16 | 0·265 | ,, | 09 | 0·269 | ,, | 17 | 0·266 | ,, |
| 30 | No observation | | | 09 | 0·256 | Clear | 16 | 0·258* | Overcast |
| 31 | | | | 09 | 0·256 | ,, | | | |

NOTE—The cloud amounts are in oktas

*Zenith sky observation

## DAILY OZONE DATA—INDIA

(From direct sun observations on 3112/3323 Å and 4536/3323 Å)

Assumed $\alpha$ (3112) = 1·23 and $\alpha'$ (3323) = 0·08

KODAIKANAL

(Lat. 10° 14′N, Long. 77° 28′E)

| Date | APRIL 1961 | | | MAY 1961 | | | JUNE 1961 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Hours (IST) | Ozone amount (cm-atmos) | State of sky | Hours (IST) | Ozone amount (cm-atmos) | State of sky | Hours (IST) | Ozone amount (cm-atmos) | State of sky |
| 1 | No observation | | *Sc* 7 | 10 | 0·273 | *Ac* 1, *Cs* 5 (very thick) | No observation | | Overcast |
| 2 | 10 | 0·265 | *Sc* 1, *Cs* 7 (thick) | 09 | 0·266 | *Ac* 2, *Cs* 4 | 09 | 0·273 | *Cu* 2 |
| 3 | 08 | 0·254 | *Cs* 3 (thick) | 08 | 0·265 | *Sc* 2, *Cs* 3 (thick) | 08 | 0·267 | *Ac* 1 |
| 4 | No observation | | Overcast | 08 | 0·263 | *Sc* 3, *Cs* 4 (thick) | 08 | 0·267 | *Ci* 2 (thin) |
| 5 | 08 | 0·251 | *Cs* 2 (very thick) | 08 | 0·259 | *Sc* 4 | No observation | | Overcast |
| 6 | 08 | 0·254 | *Ci* 4 (thick) | 08 | 0·266 | *Ac* 3 | 08 | 0·265 | *Cs* 6 (very thick) |
| 7 | 08 | 0·254 | *Ac* 1, *Ci* 4 (thin) | 08 | 0·267 | *Cs* 3 (thick) | No observation | | Overcast, drizzle |
| 8 | 08 | 0·259 | *Cs* 2 (thin) | 09 | 0·258 | *Ac* 5 | ,, | | ,, |
| 9 | 08 | 0·261 | *Ci* 2 (thin) | 08 | 0·269 | *Cu* 1, *Cs* 5 (very thick) | ,, | | ,, |
| 10 | 08 | 0·259 | *Cs* 1 (thin) | 08 | 0·263 | *Ci* 2, *Cs* 3 (thin) | ,, | | Overcast |
| 11 | 08 | 0·257 | *Ci* 6 (thin) | 08 | 0·259 | *Ci* 3 (thick) | 08 | 0·265 | *Cs* 4 (thin) |
| 12 | 08 | 0·265 | *Cs* 7 (thick) | 08 | 0·262 | *Cs* 1 (thin) | No observation | | Overcast |
| 13 | 08 | 0·265 | *Cs* 4 (thick) | 08 | 0·262 | *Cs* 5 (thin) | ,, | | ,, |
| 14 | 08 | 0·259 | *Ci* T | No observation | | Overcast | 07 | 0·259 | *Sc* 4 |
| 15 | 08 | 0·262 | *Cs* 2 | ,, | | ,, | 09 | 0·278 | *Sc* 2, *Ci* 3 (thick) |
| 16 | 08 | 0·255 | *Ac* 1, *Cs* 3 | 10 | 0·270 | *Ac* 5 | 09 | 0·271 | *Cs* 4, (thin) |
| 17 | 08 | 0·254 | *Cs* 5 (thick) | 08 | 0·267 | *Cs* 3 (thin) | 08 | 0·273 | *Ac* 3, *Ci* 2 (very thick) |
| 18 | 08 | 0·253 | *Cs* 4 (thin) | 08 | 0·265 | *Ci* 3 (thick) | 10 | 0·282 | *Sc* 2, *Cs* 5 (very thick) |
| 19 | 08 | 0·254 | *Ci* 3 (thin) | 08 | 0·263 | *Ci* 1 (thin) | 11 | 0·287 | *Cs* 7 (very thick) |
| 20 | 08 | 0·257 | *Cs* 5 (very thick) | 08 | 0·267 | *Cs* 2, *Ci* 1 (thin) | No observation | | *Sc* 7 |
| 21 | 08 | 0·254 | *Cs* 6 (very thick) | 09 | 0·271 | *Cs* 8 (very thick) | 08 | 0·266 | *Cs* 1 (thin) |
| 22 | 08 | 0·259 | *Ci* 1, hazy | No observation | | Overcast, drizzle | No observation | | Overcast, drizzle |
| 23 | 08 | 0·263 | *Ci* 2 (thin) | ,, | | ,, | ,, | | Overcast |
| 24 | 08 | 0·262 | Hazy | 09 | 0·269 | *Ac* 2, *Cs* 1 (thin) | 08 | 0·270 | *Sc* 2, *Ci* 4 (thick) |
| 25 | 08 | 0·266 | *Cs* 5 (very thick) | 08 | 0·266 | *Sc* 4, *Ac* 2 | No observation | | Overcast |
| 26 | 08 | 0·263 | *Sc* 1, *Ac* 1, *Cs* 5 (thick) | No observation | | Overcast | ,, | | Overcast, drizzle |
| 27 | 08 | 0·255 | *Cs* 6 (thick) | ,, | | ,, | ,, | | Overcast, rain |
| 28 | 08 | 0·253 | *Sc* 2, *Cs* 5 (thick) | ,, | | ,, | ,, | | ,, |
| 29 | 10 | 0·271 | *Sc* 6 | ,, | | Overcast, rain | ,, | | Overcast, drizzle |
| 30 | 08 | 0·259 | *Cs* 3 (thick) | ,, | | Overcast | ,, | | Overcast, rain |
| 31 | | | | 08 | 0·271 | *Cs* 4 (thick) | | | |

NOTE—The cloud amounts are in oktas