# OBSERVATIONS OF THE ORIONIDS 1974

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*Abstract.* Radar meteor echo data from the period of Oct. 14—30, 1974, as observed at the Ondřejov Observatory are given. Hourly rates of different categories of echo duration and other data are tabulated. The mass distribution factor is determined.

## 1. Observations

The observations of three meteor showers — Orionids, Geminids and Quadrantids were taken into the program of ground base observations made in cooperation of Intercosmos. Results of the observations, carred out with the equipment of the Observatory of the Czechoslovak Academy of Sciences at Ondřejov during the period of Oct. 14—30, 1974 are presented here.

The Ondřejov meteor radar operates at the frequency of 37.5 MHz, with a peak power of 20 kW, repetition frequency of 500 Hz and pulse length of 10 s. The beam-width of the antenna is ±26 and ±18 degrees between the half-power points in the vertical and horizontal planes respectively. The observations were carried out with the antenna steered so that it was always pointed to the azimuth, opposite to that of the Orionid radiant. The antenna was fixed in elevation at 45 deg. Other data can be found in article of Plavcová and Šimek (1960).

Meteor echo durations, amplitudes and distances have been measured from the range-time record. The accuracy of measurements correspond to $\Delta\tau = \pm 0.05$ s for the duration of echoes, to $\Delta A = \pm 0.05$ mm in the vertical size of the echo image on the 35 mm film, and to $\Delta R = \pm 5$ km in the slant range. The film moved in front of the display with a velocity of 5.6 cm/min.

A total number of about 20,000 meteor echoes have been obtained during these observations. The summary of echo numbers *N*, the net observational time and the mean echo rate *f* for the corresponding night are given in Table 1. Each observation started at about 21:30 CET and ended at about 11:00.

Table 1

| Oct. | $N$ | $t$ | $\bar{f}/h$ |
|---|---|---|---|
| 14/15 | 1721 | $13^h02^m$ | 132.0 |
| 15/16 | 2143 | 11 10 | 191.9 |
| 16/17 | 2035 | 12 54 | 157.8 |
| 17/18 | 1560 | 12 51 | 121.4 |
| 18/19 | 2048 | 12 19 | 166.3 |
| 19/20 | 1821 | 12 34 | 144.9 |
| 20/21 | 1350 | 13 16 | 101.8 |
| 21/22 | 1922 | 12 46 | 150.5 |
| 22/23 | 1395 | 13 03 | 106.9 |
| 23/24 | 2062 | 13 14 | 155.8 |
| 25/26 | 2000 | 13 13 | 151.3 |
| 26/27 | 1696 | 13 27 | 126.1 |
| 2728 | 837 | 11 12 | 74.7 |
| 28/29 | 1513 | 13 06 | 115.5 |
| 29/30 | 2087 | 13 06 | 159.3 |

## 2. Hourly Rates

The hourly rates of observed echoes are given in Tables 2—5 for different categories of echo duration, where all echoes, echoes with duration $\tau \geqslant 0.5$ s, echoes with $\tau \geqslant 1$ s and echoes with $\tau \geqslant 5$ s are used. The net observational time, corresponding to the values of Tables 2—5 is seen in Table 6, where the numbers indicate the missing minutes due to the interferences or other affects.

The radiant of the Orionids culminates at 04:20 local time, almost exactly identical with Central European time (CET) for the Ondřejov Observatory.

Figure 1 is constructed for the time interval of approximately ±5 hours around the meridian transit of the shower radiant. Mean hourly rates of echoes of different duration categories contain data from 23:00—10:00 CET for the nights of Oct. 14/15 to Oct. 25/26 subtrahing the mean sporadic background as determined from the corresponding period of nights of Oct. 26/27 to Oct. 29/30.

Table 2

Orionids 1974

| Oct. \ CET | 0 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | — | — | — | — | — | — | — | — | — | — | — | 134 | 107 | 101 |
| 15 | 114 | 156 | 209 | 183 | 207 | 114 | 107 | 140 | 105 | 88 | 66 | 128 | 124 | 162 |
| 16 | 212 | 149 | 209 | 221 | 310 | 295 | 270 | 146 | 151 | 156 | 84 | 141 | 103 | 141 |
| 17 | 185 | 187 | 190 | 197 | 252 | 213 | 182 | 128 | 96 | 97 | 79 | 147 | 65 | 82 |
| 18 | 106 | 105 | 136 | 176 | 211 | 133 | 106 | 137 | 94 | 108 | 95 | 102 | 157 | 123 |
| 19 | 129 | 258 | 227 | 229 | 251 | 178 | 188 | 156 | 164 | 111 | 66 | — | 102 | 142 |
| 20 | 148 | 165 | 189 | 193 | 181 | 196 | 168 | 134 | 124 | 67 | 55 | 92 | 70 | 40 |
| 21 | 86 | 94 | 150 | 136 | 119 | 133 | 104 | 125 | 115 | 89 | 67 | 80 | 100 | 114 |
| 22 | 127 | 152 | 206 | 234 | 238 | 193 | 181 | 167 | 86 | 65 | 67 | 106 | 61 | 46 |
| 23 | 59 | 108 | 101 | 125 | 179 | 186 | 120 | 131 | 111 | 85 | 60 | 102 | 82 | 123 |
| 24 | 184 | 242 | 194 | 239 | 240 | 212 | 163 | 117 | 96 | 74 | 65 | — | — | — |
| 25 | — | — | — | — | — | — | — | — | — | — | — | 108 | 87 | 143 |
| 26 | 175 | 210 | 201 | 150 | 172 | 156 | 169 | 155 | 135 | 127 | 95 | 100 | 121 | 126 |
| 27 | 112 | 100 | 151 | 183 | 191 | 134 | 96 | 139 | 138 | 78 | 80 | — | 150 | 86 |
| 28 | 128 | 113 | 89 | 76 | 65 | 44 | 51 | 58 | 91 | 73 | 31 | 69 | 103 | 105 |
| 29 | 91 | 114 | 106 | 109 | 168 | 191 | 162 | 143 | 109 | 68 | 34 | 197 | 158 | 165 |
| 30 | 155 | 209 | 215 | 237 | 204 | 128 | 34 | 36 | 174 | 171 | 152 | — | — | — |

Table 3

Orionids 1974

$\tau \geq 0.5^s$

| Oct. \ CET | 0 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | — | — | — | — | — | — | — | — | — | — | — | 22.8 | 27.0 | 26.0 |
| 15 | 22.0 | 31.0 | 34.0 | 40.0 | 31.0 | 20.7 | 20.7 | 24.2 | 13.4 | 14.1 | 9.4 | 29.0 | 37.9 | 39.1 |
| 16 | 69.2 | 34.9 | 60.0 | 48.4 | 50.8 | 54.0 | 50.0 | 30.6 | 26.7 | 45.0 | 31.7 | 32.3 | 33.6 | 45.9 |
| 17 | 45.0 | 45.8 | 47.8 | 34.1 | 35.6 | 34.3 | 32.5 | 21.0 | 9.6 | 8.3 | 17.9 | 31.1 | 15.5 | 26.9 |
| 18 | 24.4 | 31.0 | 29.0 | 36.2 | 29.0 | 13.0 | 20.0 | 9.2 | 6.2 | 15.3 | 20.0 | 40.0 | 38.0 | 24.0 |
| 19 | 30.0 | 45.0 | 50.0 | 36.0 | 35.0 | 20.7 | 26.0 | 15.3 | 21.4 | 15.3 | 19.3 | — | 36.7 | 48.0 |
| 20 | 59.0 | 57.0 | 61.0 | 39.0 | 58.0 | 38.0 | 31.0 | 28.0 | 33.0 | 18.0 | 18.6 | 25.4 | 14.0 | 15.0 |
| 21 | 30.5 | 26.0 | 27.0 | 24.4 | 34.0 | 26.0 | 25.0 | 21.0 | 12.7 | 14.0 | 14.0 | 12.0 | 19.0 | 23.0 |
| 22 | 32.0 | 26.0 | 42.0 | 31.0 | 31.0 | 21.0 | 28.0 | 24.0 | 5.0 | 25.7 | 1.5 | 23.1 | 8.0 | 7.0 |
| 23 | 17.3 | 19.0 | 22.0 | 19.0 | 30.0 | 18.0 | 26.0 | 20.0 | 16.0 | 16.0 | 6.3 | 22.0 | 18.0 | 22.0 |
| 24 | 42.0 | 53.0 | 39.0 | 34.0 | 33.0 | 32.5 | 30.0 | 17.0 | 21.0 | 16.0 | 9.3 | — | — | — |
| 25 | — | — | — | — | — | — | — | — | — | — | — | 21.0 | 13.0 | 27.0 |
| 26 | 42.0 | 30.0 | 20.0 | 22.0 | 15.0 | 17.0 | 10.0 | 20.0 | 13.0 | 7.0 | 12.5 | 10.9 | 19.0 | 19.0 |
| 27 | 24.0 | 10.0 | 27.0 | 23.0 | 19.0 | 10.0 | 7.0 | 14.0 | 11.0 | 6.0 | 7.8 | — | 20.0 | 14.0 |
| 28 | 23.0 | 24.4 | 16.5 | 12.0 | 6.7 | 4.0 | 3.0 | 6.0 | 6.0 | 6.0 | 2.1 | 21.0 | 23.0 | 28.0 |
| 29 | 18.0 | 21.4 | 15.0 | 18.0 | 17.0 | 14.0 | 20.3 | 13.2 | 3.0 | 6.0 | 6.1 | 31.0 | 29.0 | 35.0 |
| 30 | 34.0 | 37.6 | 34.0 | 27.0 | 23.0 | 16.3 | 6.1 | 3.3 | 12.0 | 12.4 | 14.7 | — | — | — |

As it is seen from the all duration levels, the activity of the shower varies significantly along the solar longitude, showing minima at about $\lambda_\odot \cong 204$, 207 and 209. However, the observed density variation across the stream is not unusual event for the Orionids. The filamentary structure of this stream has been shown by Hajduk (1970) on the basis of a long series of observations. Also the high echo rate at $\lambda_\odot = 202.5$ has some verification in the past returns of the shower. Taking into account the observed changes in the variation of the sporadic echo rate (see Tabs 2—5), we may assume that the density variation across the stream could be a little less. The accuracy of the observed shower/sporadic ratio may be increased by the study of the range distribution of echoes during the whole period of observations. For the whole shower period the activity in 1974 appears to be flat and medium sized in comparison with results of the other years.

Table 4

Orionids 1974
$\tau \geqslant 1^s$

| Oct. \ CET | 0 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | — | — | — | — | — | — | — | — | — | — | — | 4.1 | 4.0 | 7.0 |
| 15 | 9.0 | 10.0 | 14.0 | 13.0 | 11.0 | 9.3 | 7.2 | 10.5 | 4.1 | 2.4 | 3.5 | 6.2 | 16.8 | 10.4 |
| 16 | 30.0 | 16.7 | 24.0 | 21.0 | 18.3 | 24.0 | 15.6 | 4.9 | 4.4 | 16.1 | 11.3 | 4.6 | 18.3 | 15.3 |
| 17 | 25.0 | 14.2 | 13.2 | 12.4 | 12.2 | 9.6 | 11.2 | 9.5 | 3.2 | 3.1 | 6.3 | 11.1 | 7.2 | 9.3 |
| 18 | 10.2 | 13.0 | 10.0 | 10.3 | 9.0 | 4.0 | 6.3 | 1.0 | 1.5 | 6.1 | 7.4 | 4.0 | 12.0 | 4.4 |
| 19 | 19.5 | 15.0 | 27.0 | 18.0 | 17.0 | 5.2 | 12.0 | 4.1 | 4.1 | 5.1 | 5.1 | — | 11.7 | 14.0 |
| 20 | 15.0 | 23.0 | 22.0 | 10.0 | 11.0 | 11.0 | 7.0 | 6.0 | 9.0 | 4.0 | 6.2 | 4.6 | 7.0 | 5.0 |
| 21 | 11.2 | 6.0 | 12.0 | 8.1 | 15.0 | 7.0 | 9.0 | 7.0 | 6.9 | 4.0 | 3.0 | 4.0 | 8.0 | 12.0 |
| 22 | 17.0 | 11.0 | 19.0 | 21.0 | 8.0 | 6.0 | 14.0 | 9.0 | 2.0 | 8.6 | 0 | 6.9 | 5.0 | 3.0 |
| 23 | 8.1 | 9.0 | 11.0 | 8.0 | 10.0 | 6.0 | 10.0 | 11.0 | 7.0 | 8.0 | 1.6 | 10.0 | 10.0 | 7.0 |
| 24 | 23.0 | 22.0 | 22.0 | 10.0 | 10.0 | 11.2 | 8.0 | 4.0 | 10.0 | 9.0 | 2.7 | — | — | — |
| 25 | — | — | — | — | — | — | — | — | — | — | — | 9.0 | 8.0 | 11.0 |
| 26 | 22.0 | 22.0 | 12.0 | 7.0 | 9.0 | 11.0 | 2.0 | 10.0 | 7.0 | 3.0 | 9.1 | 7.3 | 8.0 | 10.0 |
| 27 | 17.0 | 6.0 | 13.0 | 11.0 | 7.0 | 5.0 | 2.0 | 5.0 | 1.0 | 1.0 | 3.3 | — | 10.0 | 5.0 |
| 28 | 14.0 | 18.8 | 11.8 | 7.0 | 1.3 | 1.0 | 1.0 | 3.0 | 1.0 | 4.0 | 2.1 | 6.0 | 13.0 | 18.0 |
| 29 | 7.0 | 15.3 | 9.0 | 9.0 | 12.0 | 4.0 | 6.1 | 4.1 | 3.0 | 3.0 | 3.7 | 9.7 | 10.0 | 21.0 |
| 30 | 11.0 | 21.4 | 21.0 | 15.0 | 11.0 | 8.1 | 4.1 | 0 | 5.0 | 8.3 | 8.0 | — | — | — |

Table 5

Orionids 1974
$\tau \geqslant 5^s$

| Oct. \ CET | 0 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | — | — | — | — | — | — | — | — | — | — | — | 2.1 | 1.0 | 0 |
| 15 | 1.0 | 2.0 | 2.0 | 2.0 | 1.0 | 2.1 | 2.1 | 5.3 | 2.1 | 0 | 1.2 | 2.1 | 1.1 | 2.6 |
| 16 | 2.3 | 2.8 | 4.8 | 0 | 4.1 | 3.0 | 4.4 | 2.4 | 2.2 | 4.3 | 1.1 | 0 | 2.0 | 1.2 |
| 17 | 1.0 | 3.1 | 2.0 | 3.1 | 0 | 2.1 | 2.0 | 3.2 | 0 | 1.0 | 1.1 | 0 | 1.0 | 1.0 |
| 18 | 1.0 | 1.0 | 1.0 | 2.1 | 4.0 | 0 | 1.1 | 0 | 0 | 2.0 | 2.1 | 2.0 | 3.0 | 1.1 |
| 19 | 4.5 | 0 | 5.0 | 3.0 | 7.0 | 1.0 | 5.0 | 0 | 1.0 | 1.0 | 0 | — | 1.7 | 1.0 |
| 20 | 3.0 | 5.0 | 5.0 | 0 | 1.0 | 0 | 2.0 | 0 | 6.0 | 3.0 | 2.1 | 0 | 3.0 | 0 |
| 21 | 2.0 | 1.0 | 3.0 | 0 | 1.0 | 0 | 3.0 | 2.0 | 2.3 | 0 | 1.0 | 0 | 3.0 | 2.0 |
| 22 | 3.0 | 1.0 | 3.0 | 4.0 | 1.0 | 1.0 | 5.0 | 2.0 | 1.0 | 1.7 | 0 | 0 | 0 | 2.0 |
| 23 | 1.0 | 1.0 | 2.0 | 2.0 | 1.0 | 1.0 | 3.0 | 6.0 | 3.0 | 2.0 | 0 | 2.0 | 1.0 | 1.0 |
| 24 | 3.0 | 2.0 | 5.0 | 2.0 | 2.0 | 0 | 2.0 | 1.0 | 3.0 | 2.0 | 0 | — | — | — |
| 25 | — | — | — | — | — | — | — | — | — | — | — | 0 | 1.0 | 1.0 |
| 26 | 3.0 | 4.0 | 1.0 | 1.0 | 2.0 | 3.0 | 1.0 | 3.0 | 2.0 | 1.0 | 5.7 | 0 | 0 | 3.0 |
| 27 | 2.0 | 0 | 2.0 | 0 | 1.0 | 1.0 | 1.0 | 1.0 | 0 | 0 | 1.1 | — | 0 | 0 |
| 28 | 2.0 | 1.9 | 3.5 | 4.0 | 0 | 1.0 | 1.0 | 1.0 | 1.0 | 0 | 1.0 | 4.0 | | |
| 29 | 1.0 | 0 | 3.0 | 4.0 | 0 | 2.0 | 5.1 | 2.0 | 1.0 | 1.0 | 1.2 | 0 | 2.0 | 2.0 |
| 30 | 1.0 | 1.0 | 2.0 | 3.0 | 2.0 | 1.0 | 0 | 0 | 2.0 | 3.1 | 1.3 | — | — | — |

Table 6

Orionids 1974

| Oct. \ Cet | 0 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | — | — | — | — | — | — | — | — | — | — | — | 31 | | |
| 15 | | | | | | 2 | 2 | 3 | 2 | 9 | 9 | 31 | 3 | 37 |
| 16 | 34 | 17 | 10 | 3 | 1 | | 6 | 11 | 6 | 4 | 7 | 34 | 1 | 9 |
| 17 | | 1 | 1 | 2 | 1 | 4 | 1 | 3 | 4 | 2 | 3 | 33 | 2 | 2 |
| 18 | 1 | | | 2 | | | 3 | 1 | 21 | 1 | 3 | 30 | | 5 |
| 19 | 20 | 40 | | | | 2 | | 1 | 1 | 1 | 1 | — | 24 | |
| 20 | | | | | | | | | | | 2 | 34 | | |
| 21 | 1 | | | 1 | | | | | 8 | | | 30 | | |
| 22 | | | | | | | | | | 25 | 19 | 34 | | |
| 23 | 1 | | | | | | | | | | 22 | 30 | | |
| 24 | | | | | | 1 | | | | | 15 | — | — | — |
| 25 | — | — | — | — | — | — | — | — | — | — | — | 40 | | |
| 26 | | | | | | | | | | | 7 | 27 | | |
| 27 | | | | | | | | | | | 6 | — | 54 | |
| 28 | | 28 | 9 | | 15 | | | | | | 2 | 40 | | |
| 29 | | 1 | | | | | 1 | 1 | | | 11 | 29 | | |
| 30 | | 1 | | | | 1 | 1 | 5 | | 2 | 15 | — | — | — |

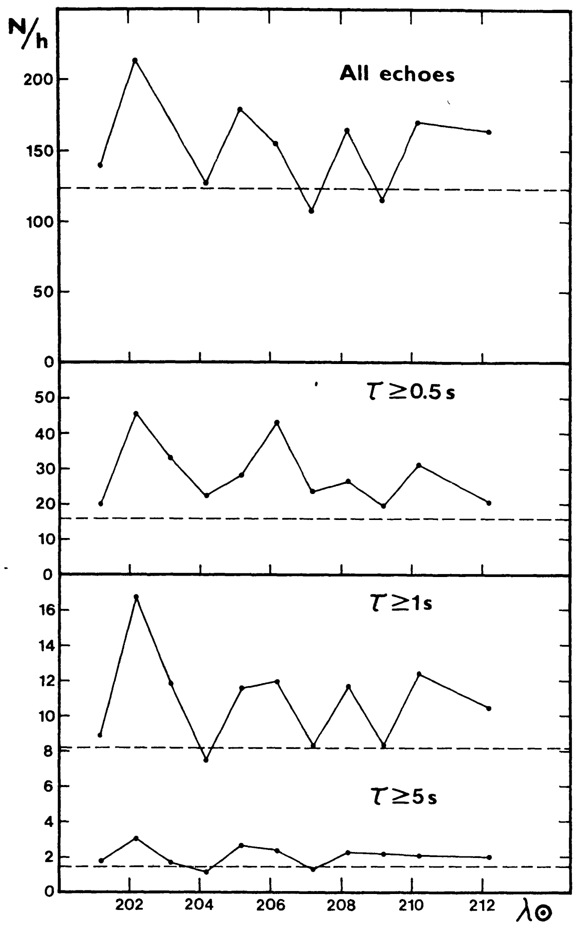


Fig. 1. The mean hourly rates of meteor echoes of different duration classes. Horizontal lines — the corresponding sporadic means.

## 3. Mass Distribution of Overdense Echoes

A method for the determination of the mass distribution exponent was described by Šimek (1973) and McIntosh and Šimek (1974). In the case of the Orionid meteor shower we have to take into account the height of the maximum ionization which depends on the geocentric velocity ($v_g = 66$ km/s). According to McKinley (1961) we can suppose $H_{max} = 103$ km. Hence using Bibarsov's formula

$$B_0 = \exp(-0.1611\, H + 11.489) \qquad (1)$$

we have $B_0 = 0.006$. Using relation

$$H_{max} = 82 + 491 \log v_g - 4.4 \log \alpha_{max}, \qquad (2)$$

$\alpha_{max} = 3.1 \times 10^{15}$ el/m. The overdense echo duration is given by

$$T_{0v} = 7 \times 10^{-17} \lambda^2 \alpha / D. \quad \text{(Then } T_0 = 0.692 \text{ s).} \qquad (3)$$

The value of $D$ at the hight of 103 km was found from

$$\log D = 0.067\, H_{max} - 5.6, \quad (D = 20 \text{ m}^2/\text{s}). \qquad (4)$$

The recorded echo duration $T_A$ is related to the duration $T_D$ (where $T_D$ is the duration of an overdense echo controlled by diffusion only) according to Plavcová (1965) as

$$T_D = T_A \exp B_0(T_D T_0)^{1/4}\, T_A\,. \qquad (5)$$

In Table 7 the values of $T_D$, corresponding with the measured values of $T_A$ are given. Because of higher geocentric velocity and very fast diffusion, the echo duration is controlled by diffusion as a dominant factor and then differences between $T_A$ and $T_D$ are relatively small.

Supposing a nonlinear dependence between $\log N$ and $\log T_D$ we used here the formula derived by McIntosh and Šimek (1974):

$$\frac{\mathrm{d}\log N}{\mathrm{d}\log T_D} = -\frac{3}{4}(s-1) - \frac{3}{4}\log T_D \frac{\mathrm{d}s}{\mathrm{d}\log T_D}. \qquad (6)$$

When the course of $s$ vs. $\log T_D$ is approximated by a second order polynomial, we can found the constants in equation

$$s = A_0 + A_1 \log T_D + A_2 (\log T_D)^2. \qquad (7)$$

(For details see McIntosh and Šimek, 1974.)

## 4. Results of the Mass Distribution

The activity of the shower shows particular breaks between October 14th and 29th respectively (Figs 1 and 2) and therefore the determination of a typical background is rather ambiguous. In this part of the analysis for "the sporadic background" were used the observations from October 18, 27, 28 and 29, respectively. Even on October 21 the meteor activity corresponds rather to the sporadic level; therefore this day was excluded from the calculation of mass distribution factor $s$, as it corresponds, on the other hand, to the middle of the shower period (Lovell, 1954 and others).

Our results according to (7) are summarized in Table 7. In Figure 2 we can see the variation of the mass distribution index $s$ with the solar longitude for $T_D = 1$ s (in this case it corresponds with $A_0$ in Table 7). The dependence of $s$ on $T_D$ can be seen on Figure 3.

Two facts should be pointed out: a) the value of

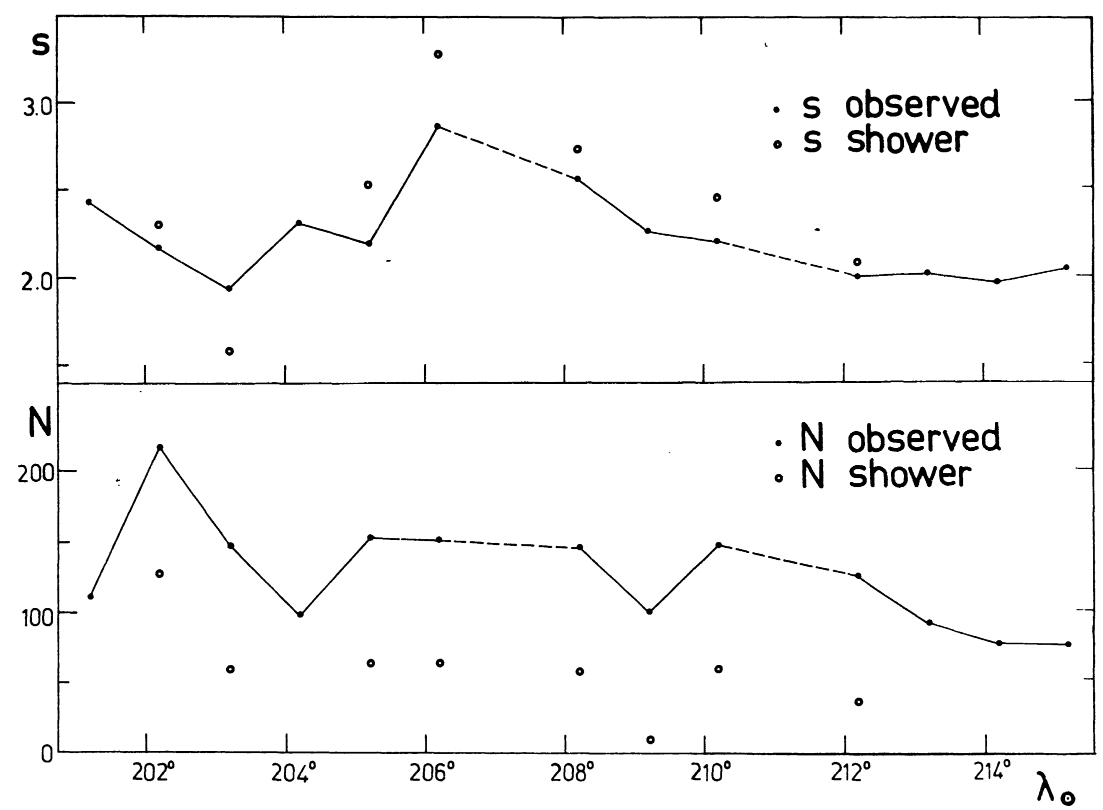


Fig. 2. Meteor echoes with $T_A \geq 0.9$ sec. Mass distribution index for all echoes with $T_A \geq 0.9$ and that one for the Orionid shower. In the lower part is the activity for echoes with $T_A \geq 0.9$, including sporadic background and shower meteors only.

Table 7

| $T_A$ (s) | 0.85 | 1.05 | 1.55 | 2.05 | 2.95 | 4.05 | 5.56 | 8.05 |
|---|---|---|---|---|---|---|---|---|
| $T_D$ (s) | 0.85 | 1.06 | 1.57 | 2.08 | 3.02 | 4.21 | 5.99 | 8.82 |

Table 8

| October | All | | | Shower | | |
|---|---|---|---|---|---|---|
| | $A_0'$ | $A_1'$ | $A_2'$ | $A_0'$ | $A_1'$ | $A_2'$ |
| 15 | 2.459 | −0.156 | 0.044 | | | |
| 16 | 2.172 | −0.074 | 0.544 | 2.295 | 0.028 | 0.514 |
| 17 | 1.937 | 1.204 | −0.614 | 1.577 | 5.081 | −3.996 |
| 18 | 2.308 | 0.756 | −0.723 | | | |
| 19 | 2.195 | 0.014 | −0.033 | 2.516 | 0.015 | −0.659 |
| 20 | 2.871 | −2.170 | 1.872 | 3.383 | 1.342 | −2.163 |
| 21 | — | — | — | — | — | — |
| 21 | 2.561 | −2.059 | 2.336 | 2.720 | −0.340 | −0.170 |
| 23 | 2.270 | −0.297 | 0.115 | | | |
| 24 | 2.204 | 0.268 | 0.046 | 2.442 | 2.045 | −1.883 |
| 25 | — | — | — | — | — | — |
| 26 | 1.997 | −0.039 | 0.404 | 2.077 | −0.190 | 0.293 |
| 27 | 2.023 | 0.877 | −0.323 | | | |
| 28 | 1.960 | −0.179 | 0.548 | | | |
| 29 | 2.042 | −1.147 | 1.578 | | | |
| background | 2.010 | −0.180 | 0.627 | | | |
| shower totals | | | | 2.772 | 0.216 | −0.572 |

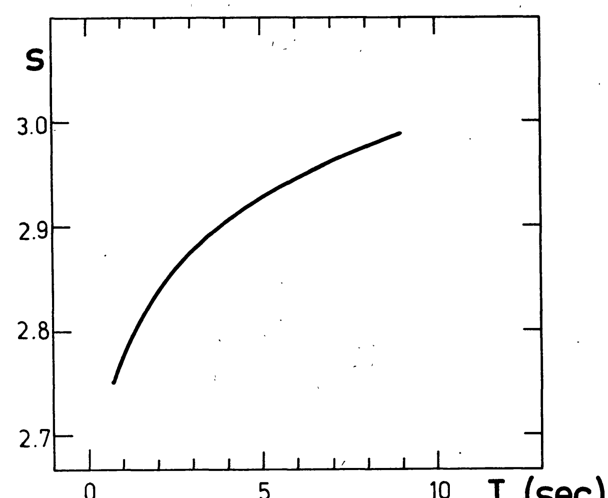


Fig. 3. Calculated $s$ as a function of log $T_D$ for the shower.

$s$ (sporadic) is in agreement with that one for the December period (Šimek, 1973), b) $s$ for shower meteors is higher than that one for sporadic background. This conspicuous results should be studied more precisely when more extensive observational material is available.

## Conclusions

The comparison of the observations of Orionids 1974 with the results from other years allow to assigne this return of the shower to the years of mean activity, with a flat maximum showing significant changes in the density distribution across the stream.

The duration distribution of echoes lead to the higher values of the mass distribution factor of the shower period in comparison with the background.

We wish express our thanks to the staff of the Ondřejov Observatory for carrying out the observations and to the members of the Slovak Astronomical Society, who reduced the records.

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# RADAROVÉ POZOROVANIE ORIONÍD 1974

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## Súhrn

Práca obsahuje analýzu asi 20 000 radarových ozvien meteorov získaných meteorickým radarom Astronomického ústavu ČSAV v Ondřejove v období od 14.—30. 10. 1974. Priebeh aktivity meteorického roja Orioníd ukazuje na relatívne ploché maximum, v okolí $\lambda_{\odot} \cong 209$, no s nerovnomerným rozložením hustoty častíc v prieréze prúdu. Zmeny hustoty v prieréze prúdu potvrdzuje aj relatívne zastúpenie ozvien nasýtených stôp. Faktor rozdelenia hmotností meteorov vychádza vyšší pre roj než pre sporadické pozadie.

# РАДИОЛОКАЦИОННЫЕ НАБЛЮДЕНИЯ ОРИОНИД С 1974 Г.

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## Резюме

Сделан анализ более 20 000 радиоотражений от метеорных следов полученных в период с 14.—30. октябръя 1974 г. радиолокационной установкой Астрономического института Чехословацкой академии наук в Ондржееве. Активность метеорного потока Орионид показывает релативно плоский максимум деятельности соответствующий долготе Солнца $\lambda_{\odot} \cong 209$. Одновременно показывается, что плотность распределения метеорного вещества в рое не равномерна. Изменения плотности в поперечнике роя следуют даже из вариации относительного числа эхо от насыщенных следов. Фактор распределениа масс метеоров показывает повышение во время активности потока в обсуждаемом его возврате в сравнении со спорадическим фоном.