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N_2 is a similar quantity. If S is known, Δ can be determined from:

$$D \simeq \frac{\lambda^2}{16\pi^2(S-1)} \cdot \frac{\ln N_1 - \ln N_2}{\tau_2 - \tau_1} \qquad (3),$$

Now, S can be found from the duration distribution of the stable echoes (the author - Ref 3) and is expressed by Eq (4). Eq (3) is not very accurate but it appears to be adequate for most practical purposes. Figures 1 and 2 show the duration distribution of the meteoric reflections measured on January 9, 1957, in Tomsk, at the wavelength of 10 m. From the function $N(\tau)$, it was found that $S = 2.06$. From this, it was found that $D = 2.8\ m^2/sec$, which corresponds to the height $h = 90$ km

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SOV/109-4-7-21/25

A Method of Estimating the Diffusion Coefficient in the Meteor Zone

and velocity v = 28 km/sec.
There are 2 figures and 3 references, of which 2 are English and 1 Soviet.

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S.M. Kirova (Tomsk Polytechnical Institute imeni S.M. Kirov)

SUBMITTED: February 16, 1959

Card 3/3

APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3"

"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

S/049/59/000/12/025/027
E032/E391

AUTHOR: Fialko, Ye.I.

TITLE: New Method of Measuring the Height of the Homogeneous Atmosphere

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geofizicheskaya, 1959, Nr 12, pp 1891 - 1894 (USSR)

ABSTRACT: The method was based on the height (h_m) of meteors determined by radar, as described by T.R. Kaiser (Ref 1). The theoretical fundamentals of the method are given by Eqs (1) and (2). The height of the atmosphere H was determined from Eqs (3) and (5), where v_1 and v_2 are the velocities of two meteors. Figure 1 illustrates the relationship between h_m and v as given by Evans (Ref 2). As an example, the height of the atmosphere was calculated from the above equations as $\bar{H} \approx 6.9$ km (Eq 3) and $\bar{H} \approx 6$ km (Eq 5). There are 1 figure and 5 references, 2 of which are Soviet and 3 English.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

Card1/1

SUBMITTED: March 2, 1959

APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3"

"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

3(1)

AUTHOR: ~~Fialko, Ye. I.~~ SOV/33-36-1-17/31

TITLE: A New Method for Determining the Radiant of a Meteor Stream, Using an Antenna of Low Directivity

PERIODICAL: Astronomicheskiy zhurnal, 1959, Vol 36, Nr 1, pp 134-136 (USSR)

ABSTRACT: The author proposes a new method for the determination of the coordinates of a meteor stream with the aid of an antenna of low directivity. The present paper contains only a short general description of the method. After this the foundations of the calculations, the error estimations, the recommendations with respect to the antennas and wave lengths to be used shall be published. The method is not suitable for the determination of the radiant of the weak meteor streams. The author mentions K.V.Kostylev. 560874
There are 3 figures, and 2 non-Soviet references, of which 1 is American, and 1 English.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

SUBMITTED: September 6, 1957

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

3(1)

AUTHOR: Fialko, Ye.I. SOV/33-36-2-13/27

TITLE: Radio - Echo Observations of the Perseids in 1957

PERIODICAL: Astronomicheskiy zhurnal,1959,Vol 36,Nr 2,pp 311-314 (USSR)

ABSTRACT: During the radio-echo observations of meteors carried out at Tomsk on August 11 - 12, 1957 there were registered two maxima in the number of radio-echoes : a night maximum on $1^h - 2^h$ and a day maximum on $11^h - 12^h$. An instrument with $\lambda = 10$ m was used, impulse power $\approx$ 100 KW, duration of impulse $\approx 5 \mu$ sec, impulse number = 600 Imp/sec. It is stated that the two maxima can be reduced to the Perseid stream.
The author thanks Professor V.V. Fedynskiy for the revision of the script and F.I. Peregudov, E.K. Nemirova, L.A. Pokrovskiy for the performance of the observations. The calculations were carried out by A.S. Romanov, Laboratory Assistant. - There are 7 references, 5 of which are Soviet, 1 English, and 1 American.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnic Institute)

SUBMITTED: June 20, 1958

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11

3(1)

AUTHOR: Fialko, Ye.I. SOV/33-36-3-15/29

TITLE: An Approximate Estimation of the Probability of Meteoric Ionization

PERIODICAL: Astronomicheskiy zhurnal, 1959, Vol 36, Nr 3, pp 491-495 (USSR)

ABSTRACT: If β denotes the probability of the ionization and v denotes the velocity of the meteor, then usually it is put $\beta = av^n$. Under numerous simplifying assumptions (only normal reflection of the radio waves from the meteor trail; negligence of the curvature of the earth and the resonance effect of the plasma etc.) the author obtains $0.75 < n < 1.5$. That agrees with the other theoretical results.
There are 15 references, 4 of which are Soviet, 3 English, 1 Irish, 2 German, and 5 American.

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S.M.Kirova (Tomsk Polytechnical Institute imeni S.M.Kirov)

SUBMITTED: June 20, 1958

Card 1/1

APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3"

"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

FIALKO, Ye.I.

Variation of the number of meteors recorded by radar on a 10m. wavelength per hour. Astron.tsir. no.200:19-21 Mr '59. (MIRA 13:2)

1. Tomskiy politekhnicheskiy institut.
(Meteors)

APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3"

"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

FIALKO, Ye.I.

Method for measuring phase angles with continuous photorecording.
Izv. TPI 105:5-8 '60. (MIRA 16:8)

1. Predstavleno nauchnym seminarom radiotekhnicheskogo fakul'teta Tomskogo ordena Trudovogo Krasnogo Znameni politekhnicheskogo instituta imeni Kirova.
(Phasemeter)

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69443

9.3100

S/139/60/000/01/017/041
E192/E382

AUTHOR: Fialko, Ye.I.

TITLE: Approximate Experimental Evaluation of the Probability of Meteoric Ionisation

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, Nr 1, pp 90 - 92 (USSR)

ABSTRACT: The characteristic height of a meteor h_m (Ref 1) depends on the velocity v, mass m and other parameters of a meteor as well as the parameters of the atmosphere. If it is required to investigate the weakest meteors having a mass m_{min}, it is necessary to take into account the dependence of the mass on v which is due to the fact that the probability of meteoric ionisation β is dependent on the velocity of the meteor. It is therefore possible to determine the character of the functions $\beta(v)$ provided the functions $h_m(v, m_{min})$ and $m_{min}(\beta)$ are known and the increase in the height Δh_m corresponding to a transition from v_1 to v_2 is determined. The increase in the average characteristic

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E192/E382

Approximate Experimental Evaluation of the Probability of Meteoric Ionisation

height Δh_m during the transition from v_1 to v_2 can be expressed by (Refs 2, 3):

$$\Delta h_m \approx 2H \ln \frac{v_2}{v_1} + \frac{H}{3} \ln \frac{m_{min\ 1}}{m_{min\ 2}} \qquad (1)$$

where H is the average height of a uniform atmosphere within the layer $\Delta h_m = h_m(m_{min\ 1}) - h_m(m_{min\ 2})$, while $m_{min\ 1}$ and $m_{min\ 2}$ are the minimum masses of the meteors having velocities v_1 and v_2, respectively. The relationship between the minimum masses can be expressed by (Ref 3):

$$\frac{m_{min\ 1}}{m_{min\ 2}} \approx \frac{\beta_2}{\beta_1} \qquad (2)$$

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S/139/60/000/01/017/041
E192/E382

Approximate Experimental Evaluation of the Probability of Meteoric Ionisation

where β is the probability of ionisation which can normally be written as:

$$\beta = a \cdot v^n \qquad (3)$$

where a and n are constants.
On the basis of Equations (1), (2) and (3), the constant n can be expressed by Eq (4). By employing the experimental data obtained by Evans (Ref 6), which are shown in Figures 1 and 2, it is found from Eq (4) that n = 0.6. This value is slightly lower than that obtained theoretically, which is n = 0.8 (Ref 7).
It is also possible to determine the quantity n from Eq (5). It is necessary, however, to know the function $h_m(v)$ very accurately.

There are 2 figures and 12 references, 6 of which are English and 6 Soviet.

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E192/E382

Approximate Experimental Evaluation of the Probability of Meteoric Ionisation

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S.M. Kirova (Tomsk Polytechnical Institute imeni S.M. Kirov)

SUBMITTED: February 25, 1959

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

24388

S/142/60/003/005/015/015
E192/E382

3.1710

AUTHOR: Fialko, Ye.I.

TITLE: Resolution of Meteor Radar

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, 1960, Vol. 3, No. 5, pp. 529 - 531

TEXT: The resolution of meteor radar is defined as the capability of the system to record a meteor rapidly or to make the necessary measurements of its parameters. Quantitatively the resolution can be expressed by a time T_{min} necessary for reliable detection of the meteor or effecting the required measurements (Ref. 1 - the author - Tr. Sib. fiziko-tekhnich. in-ta, 1959, 37, 229). During this time, the signal should increase above the threshold level. The quantity T_{min} is one of the most important parameters of the radar equipment. In the following, an attempt is made to give a quantitative expression for the resolution of a radar system designed for the detection of meteors. Consequently, only the wavelengths λ = 4 - 10 m are of interest. An indirect method of

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E192/E382

Resolution of Meteor Radar

determining T_{min} is used. It is known that the number of detected meteors which produce the normal reflection from a surface element can be represented as (Ref. 1):

$$N \approx A' \lambda^{\ell} \cdot e^{-\gamma/\lambda^2} \qquad (1)$$

where $\ell \approx 0.35$,

$\gamma = 4\pi^2(S - 1)(a^2 + 4DT_{min})$,

a is the initial radius of the ionised trace,

D is the diffusion coefficient,

S is an exponent characterising mass distribution of meteors (Ref. 4 - T.R. Kaiser - J. Adv.Phys., 1953, Vol. 2, No. 8, p. 495) and

A is a constant which is independent of λ and T_{min} .

The ratio between the numbers of meteors detected by two radar systems, which differ only by the wavelengths employed, can

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thus be written as:

$$\frac{N\lambda_1}{N\lambda_2} \approx \left(\frac{\lambda_1}{\lambda_2}\right)^l \left[e^{-4\pi^2 (S-1)\left(\frac{1}{\lambda_1^2} - \frac{1}{\lambda_2^2}\right) a^2} \right] \times$$
$$\times \left[e^{-4\pi^2 (S-1)\left(\frac{1}{\lambda_1^2} - \frac{1}{\lambda_2^2}\right) DT_{min}} \right]. \quad (2)$$

In a particular case, when $V \approx \bar{V} \approx 45$ km/sec, $h \approx 97$ km, $D = 8\ m^2/sec$, $a \approx 0.22$ m, $S \approx 2$, $\lambda_1 = 10$ m and $\lambda_2 = 4$ m, this ratio is:

$$\frac{N_{\lambda=10\ м}}{N_{\lambda=4\ м}} \approx 1{,}51 \cdot e^{66\,T_{min}} \quad (3).$$

This is plotted in Fig. 1. In order to determine the resolution time T_{min}, two radar systems operating at $\lambda = 10$ m and

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E192/E382

Resolution of Meteor Radar

λ = 4 m were investigated experimentally and the ratio of their meteor numbers was 12. This corresponds to T_{min} = 0.03 sec (see Fig. 1). The author expresses acknowledgment to Aspirant L.A. Pokrovskiy for participating in the experiments. There are 1 figure, 1 table and 11 references: 5 Soviet and 6 non-Soviet. The four latest English-language references quoted are: Ref. 3 - J.S. Greenhow - Phil. Mag., 1954, ser. 7, 45, No. 364, 471; Ref. 5 - P.M. Millman - Science, 1954, 120, 325; Ref. 6 - J.S. Greenhow, E.L. Neufeld - J. Atm. Terr. Phys., 1955, 6, No. 2-3, 133 and Ref. 7 - L.A. Manning - J. Geoph. Res., 1958, 63, No. 1, 181.

ASSOCIATION: Kafedra konstruirovaniya i tekhnologii proizvodstva radioapparatury Tomskogo ordena Trudovogo Krasnogo Znameni politekhnicheskogo instituta im. S.M. Kirova (Chair of Design and Production Technology of the Radio-equipment of Tomsk "Order of the Labour Red Banner" Polytechnical Institute imeni S.M. Kirov)

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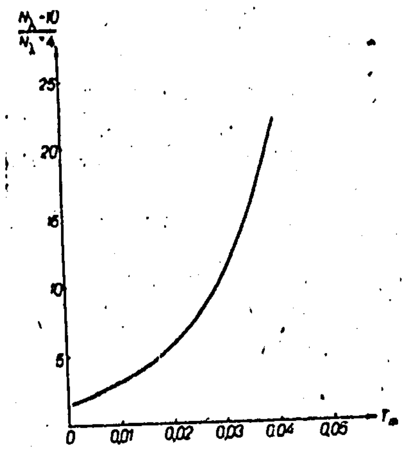
24388

S/142/60/003/005/015/015
E192/E382

Resolution of Meteor Radar

SUBMITTED: April 6, 1959

Fig. 1:



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25811
S/142/60/003/006/001/016
E140/E135

3,1710

AUTHOR: Fialko, Ye. I.

TITLE: Choice of radar pulse duration for detection of small meteors

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, 1960, Vol.3, No.6, pp. 549-557

TEXT: The minimum mass m_{min} of a meteor leaving an ionized trace detectable by radar depends substantially on the radar parameters. Previous work has studied the dependence of m_{min} on the radiated pulse power, the antenna directivity, wavelength and threshold signal power. Its dependence on pulse duration has not yet been studied. Examining this question, the author concludes that the dependence of m_{min} on pulse duration has an extremal character. An expression is found for m_{min} in terms of threshold signal power, characteristic height, corresponding to the most intense evaporation of the meteoric material, the height of the equivalent homogeneous atmosphere, the initial radius of the ionized trace and the diffusion coefficient corresponding to the characteristic height, wavelength, the reduction in return signal

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S/142/60/003/006/001/016
E140/E135

caused by diffusion during the time of flight of the meteor through the first Fresnel zone, and pulse duration. Since a number of these parameters are themselves functions of m_{min} the expression cannot be solved explicitly for m_{min} and an approximate solution is given. This approximate solution permits the following conclusions. 1) There exists an optimal pulse duration corresponding to the minimum mass of meteoric material giving rise to a detectable ionized trace. 2) The choice of pulse duration in the neighbourhood of the optimum is uncritical; decrease of pulse duration by an order of magnitude only doubles m_{min}. 3) Optimal pulse durations can be achieved only at very short waves of the order of 2 m. 4) In the wavelengths most frequently used for meteor radars (4 - 10 m) the pulse duration should be taken maximum. 5) The pulse durations actually used should be of the order of 100 µs, rather than several microseconds, as presently used. This permits reducing m_{min} by factors of 4 or 5 over present practice.
There are 4 figures and 11 references: 5 Soviet and 6 English. The four most recent English language references read as follows:

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

S/108/60/015/06/06/006
B007/B014

AUTHOR: Fialko, Ye. I., [redacted] Member of the Society

TITLE: On the Accuracy of Measuring the Parameters of Radar Used for Observations of Meteors

PERIODICAL: Radiotekhnika, 1960, Vol. 15, No. 6, pp. 67-69

TEXT: The article under review describes the change of the number of recorded meteors as dependent on the instability of the radar parameters in the application of highly- and poorly sensitive systems and with different laws of the distribution of meteoric bodies with respect to their mass. First, the author describes the use of the highly sensitive apparatus. Formula (1) is derived for N (number of unsteady meteoric radio echoes recorded per unit of time). Formula (2) is written down for $\frac{\Delta N}{N}$ with regard to the unsteadiness of the radar parameters. Provided the system is highly operative and uses relatively long waves, one obtains

Card 1/2

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On the Accuracy of Measuring the Parameters of Radar Used for Observations of Meteors

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B007/B014

formula (3). The analogous formulas (4) and/or (5) are obtained for the use of a poorly sensitive apparatus. A comparison between (3) and (5) indicates that, if a poorly sensitive apparatus is used, the change of the number of recorded meteors is four times as high as that found by means of a highly sensitive apparatus. This is due to the unsteadiness of the radar parameters. Conclusions: 1) When a poorly sensitive apparatus is used, the permissible change in the radar parameters must be higher by half an order of magnitude as compared to a highly sensitive apparatus. 2) The permissible change in the radar parameters depends to a large extent on the distribution of meteoric bodies with respect to their mass. 3) When a poorly sensitive apparatus is used and the number of meteors recorded within one hour must be measured with an accuracy of $\approx 10\%$, the permissible change in the parameter that has the strongest effect on $\frac{\Delta N}{N}$, must not exceed $\approx 5\%$. There are 6 references: 3 Soviet and 3 British.

SUBMITTED: February 7, 1959

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Card 2/2

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

86880

S/108/60/015/012/002/009
B010/B059

6.4320

AUTHOR: Fialko, Ye. I., Member of the Society

TITLE: The Number of Detected Meteors as a Function of the Radiolocation Wavelength

PERIODICAL: Radiotekhnika, 1960, Vol. 15, No. 12, pp. 10 - 12

TEXT: It is possible to represent the relation between the number, N, of detected meteors and the radiolocation wavelength λ in good accuracy in the form of $N \sim \lambda^n$. Cubic and linear approximations are demonstrated on devices of the types ТПИ (TPI) and М-3 (M-3) with the characteristic proper time $T_{min} = 0.035$ sec. Complex formulas for the relation between N and λ have been given by T. R. Kaiser, Ye. I. Fialko, and F. I. Peregudov. However, for many purposes it is sufficient to make the ansatz $N(\lambda) = B\lambda^n$ with B as a factor of proportionality. Proper choice of the exponent n permits an optimum approximation of this equation to the formulas of the above authors; for two wavelengths, λ_1 and λ_2, agreement is perfect. The

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The Number of Detected Meteors as a Function of the Radiolocation Wavelength

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following formula is given for n:

$$n = 1 + \frac{\lg[\xi(\Delta_1)/\xi(\Delta_2)]}{\lg(\lambda_1/\lambda_2)} - \frac{\lg e}{\lg(\lambda_1/\lambda_2)}\left(\frac{1}{\lambda_1^2} - \frac{1}{\lambda_2^2}\right)\gamma,$$ where

$\gamma = 4\pi^2(s-1)(a^2+4DT_{min})$; a is the initial radius of the ionizing trajectory of the meteor; D is the diffusion coefficient; s is a characteristic quantity for the mass distribution of the meteor; $\xi(\Delta) = [(1-\exp(-1.5\Delta^{0.5}))/1.5\Delta^{0.5}]^{s-1}$, $\Delta = 16\pi^2 DR^{1/2}/v\lambda^{3/2}$; R is the distance of the meteor from the observer; v is the velocity of the meteor; $l \approx 0.35$ for s = 2. After substitution of typical numerical values for the above quantities (e.g., v = 45 km/sec, s = 2), the following exponent is obtained for the range between λ_1 = 12 m and λ_2 = 4 m:

$n \approx 0.77 + 66\,T_{min}$. Thus, for $T_{min} \approx 0.001$ sec $N \sim \lambda$,

for $T_{min} \approx 0.01$ sec $N \sim \lambda^{3/2}$, for $T_{min} \approx 0.05$ sec $N \sim \lambda^4$, and

for $T_{min} \approx 0.1$ sec $N \sim \lambda^7$ to $N \sim \lambda^8$. Finally, these results are demonstrated

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The Number of Detected Meteors as a Function of the Radiolocation Wavelength

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on the devices TPI and M-3, for which $T_{min} \approx 0.035$ sec (Fig.2). The exact course of $N(\lambda)/N(\lambda_1)$ with $\lambda_1 = 12$ m is represented by curve (1) by means of the formula $N(\lambda)/N(\lambda_1) = (\lambda/\lambda_1)^1 \xi(\Delta)/\xi(\Delta_1)\cdot\exp(-\gamma(1/\lambda^2 - 1/\lambda_1^2))$, whereas the third approximation $N(\lambda)/N(\lambda_1) = (\lambda/\lambda_1)^3$ yields curve (2). However, the linear approximation $N(\lambda)/N(\lambda_1) = 0.16\lambda - 0.575$, shown as a dashed line (3), is better. F.I.Peregudov assisted in the present work. There are 2 figures and 13 references: 7 Soviet, 5 US, and 1 British.

SUBMITTED: February 13, 1959

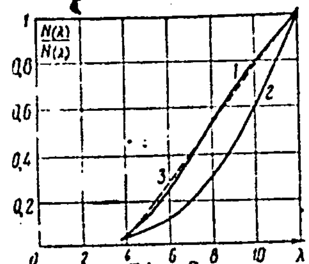

Fig.2

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S/033/60/037/03/015/027
E032/E314

AUTHOR: Fialko, Ye.I.

TITLE: The Duration Distribution of Meteor Radio Echoes. II. Reflection From Unstable Trails

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol 37, Nr 3, pp 526 - 529 (USSR)

ABSTRACT: An approximate expression is obtained for the duration distribution of meteor radio echoes received from the characteristic height region in the case of unstable trails. It is shown that this distribution is exponential and is very dependent on the distribution of meteor bodies with mass and velocity and on the wavelength of the locator. The final formula obtained for the duration distribution is given by Eq (7). Figure 1 shows the differential duration distribution. In this figure, N represents the number of reflections in the interval $\Delta\tau = 0.1$ sec and the points are experimental. The continuous curve represents Eq (7) with $s = 1.44$. The corresponding logarithmic plot is shown in Figure 2. The duration distribution for unstable reflections can be used to obtain the distribution of meteor bodies with mass (if

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E032/E314

The Duration Distribution of Meteor Radio Echoes. II. Reflection From Unstable Trails

the diffusion coefficient is known) or it may be used to determine the diffusion coefficient if the mass distribution is known. There are 2 figures and 4 references, 2 of which are Soviet and 2 English.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

SUBMITTED: August 4, 1959

VC

Card2/2

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9.9600

S/033/60/037/004/011/012
E032/E314

AUTHOR: Fialko, Ye.I.

TITLE: Dependence of the Mean Hourly Number of Recorded Meteors on the Parameters of the Meteor Bodies, the Atmosphere, and the Radio-echo Apparatus

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol. 37, No. 4, pp. 753 - 763

TEXT: Analytical relations are given between the number of recorded meteors and the parameters of the meteor bodies, of the atmosphere and the radio-echo apparatus. Both complete and accidental detection of unstable- and stable-type trails is considered. It follows from the general relationships obtained that the dependence of the hourly number of recorded meteors on the parameters of the apparatus employed and, in particular, on the wavelength, may be different with different sensitivities. Even for a given type of detection it may turn out that

$N \sim \lambda^{2(s-1)}$ or $N \sim \lambda^{6(s-1)}$. It is assumed that the volume density of the electrons in a trail varies with time only as a result of diffusion and, consequently, the linear density of

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E032/E314

Dependence of the Mean Hourly Number of Recorded Meteors on the Parameters of the Meteor Bodies, the Atmosphere, and the Radio-echo Apparatus

electrons remains constant. In fact, recombination processes may be important and hence the present results do not apply at relatively low altitudes. There are 1 figure and 15 references: 6 English, 1 German and 8 Soviet.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

SUBMITTED: August 4, 1959

Card 2/2

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

S/035/62/000/002/024/052
A001/A101

AUTHORS: Fialko, Ye. I., Lazarev, R. G.

TITLE: On the value of index s for meteoric streams Perseids and Geminids of 1957 - 1958 and for sporadic meteors

PERIODICAL: Referativnyy zhurnal, Astronomiya i Geodeziya, no. 2, 1962, 60, abstract 2A501 ("Astron. tsirkulyar", 1960, 15 sentyabrya, no. 214, 18-20)

TEXT: The authors analyze relationships N(t) and s(t) characterizing hourly numbers of detected meteors and frequencies p(s) of occurrence of the magnitude s for intervals $\Delta s = 0.1$. The Perseid streams of 1957 and 1958 and Geminid streams of 1957 and 1958 were considered and compared with relationships N(t) and s(t) for the sporadic background. The authors draw the conclusions: distributions of p(t) and N(t) for the 1957 Perseid stream are of a compact nature and have one broad maximum. The structure of the 1958 Perseid stream is considerably more complicated, 2 maxima are noted. The Geminid stream is of a somewhat less compact distribution. Functions p(s) and N(s) characterizing the sporadic background differ noticeably from distributions

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FIALKO, Ye.I.

Relationship between the mean hour number of detected meteors and some parameters of the radar (case of steady radio echos). Izv. TPI 105:21-23 '60. (MIRA 16:8)

1. Predstavleno nauchnym seminarom radiotekhnicheskogo fakul'teta Tomskogo ordena Trudovogo Krasnogo Znameni politekhnicheskogo instituta imeni Kirova.

(Meteors) (Radar in astronomy)

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

FIALKO, Ye.I.

Using the variation of threshold signals for investigating the distribution of meteor bodies by masses. Izv. TPI 105:24-27 '60. (MIRA 16:8)

1. Predstavleno nauchnym seminarom radiotekhnicheskogo fakul'teta Tomskogo ordena Trudovogo Krasnogo Znameni politekhnicheskogo instituta imeni Kirova.

(Meteors)

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

FIALKO, Ye.I.

Relation of the linear electron density in a meteor trail and the velocity and mass of the meteor body. Izv. TPI 105: 250-259 '60. (MIRA 16:8)

1. Predstavleno nauchnym seminarom radiotekhnicheskogo fakul'teta Tomskogo ordena Trudovogo Krasnogo Znameni politekhnicheskogo instituta imeni S.M. Kirova.
(Meteors)

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

FIALKO, Ye.I.

Effect of meteor velocity on the strength of the echo signal.
Izv. TPI 105:260-264 '60. (MIRA 16:8)

1. Predstavleno nauchnym seminarom radiotekhnicheskogo fakul'teta Tomskogo ordena Trudovogo Krasnogo Znameni politekhnicheskogo instituta imeni Kirova.
(Meteors) (Radar in astronomy)

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PHASE I BOOK EXPLOITATION SOV/5804

Fialko, Ye. I.

Radiolokatsionnyye metody nablyudeniya meteorov (Radar Methods of Meteor Observation) Moscow, Izd-vo "Sovetskoye radio," 1961. 111 p. Errata slip inserted. 3000 copies printed.

Ed.: I. M. Volkova; Tech. Ed.: B. V. Smurov.

PURPOSE: This book is intended for radio technicians, radiophysicists, astronomers, and geophysicists, as well as for students in these fields and for radio amateurs.

COVERAGE: The book contains a systematic presentation of basic information on radar methods of meteor observation and investigation. This information is drawn from both Soviet and non-Soviet publications. The following topics are discussed: the use of radio astronomy for the obser-

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1/2

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Pz-4/Pe-4/Pi-4/Pj-4/Pk-4/Pl-4/Pm-4 PT-2/JHB/WR
PHASE I BOOK EXPLOITATION SOV/6232 58
54

Fialko, Yevgeniy Iosifovich

Nekotoryye problemy radiolokatsii meteorov (Some Problems in Radiolocation of Meteors) Tomsk, Izd-vo Tomskogo univ., 1961. 208 p. 600 copies printed.

Sponsoring Agency: Mezhdunarodnyy geofizicheskiy god 1957-1958 and Tomskiy politekhnicheskiy institut imeni S. M. Kirova.

Ed.: I. A. Suslov; Tech. Ed.: A. T. Osovskiy.

PURPOSE: This book is intended for scientists, radio engineers, radio-physicists, aspirants, and students of departments of radio engineering and radio physics in schools of higher technical education. It may also be useful to astronomers and geophysicists (both specialists and students) who are interested in problems of the utilization of radar for investigating meteors and the atmosphere.

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Some Problems in Radiolocation (Cont.)

SOV/6232

COVERAGE: Soviet and non-Soviet information on radar methods and techniques of meteor observation are reviewed. The following topics are discussed: relationship between the number of recorded meteors and the parameters of the meteorites, the atmosphere, and the radar equipment; connection between certain statistical characteristics of meteor radio echoes and meteorites; and special features in the interpretation of results of meteor radar observations. Recommendations on the selection of parameters for meteor detection systems are given, and new methods of determining coordinates of meteor trail radiants and of measuring the diffusion coefficient are described. Certain statistical characteristics of the meteorites and radio echoes obtained by means of the TPI-2 radar designed for 10-m wavelength operation by the Tomsk Polytechnic Institute are listed. Experimental data gathered during the International Geophysical Year are discussed. No personalities are mentioned. There are 177 references: 101 Soviet, 74 English, and 2 German.

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BRAGIN, S.M.; BUTAKOV, I.N.; KRASIN, A.K.; SOKOLOV, A.A.; STEKOL'NIKOV, I.S.; TAREYEV, B.M.; FIALKO, Ye.I.; CHILIKIN, M.G.

Fiftieth anniversary of the birth of Professor A.A.Vorob'ev. Elektrichestvo no.1:93 Ja '61. (MIRA 14:4)

(Vorob'ev, Aleksandr Akimovich)

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S/194/62/000/012/071/101
D295/D308

AUTHOR: Fialko, Ye. I.

TITLE: On the analysis of the dependence of the hourly number of recorded meteors on parameters of meteoric bodies, atmosphere and equipment

PERIODICAL: Referativnyy zhurnal, Avtomatika i radioelektronika, no. 12, 1962, 54, abstract 12 Zh 339 (Byul. Komis. po kometam i meteoram Astron. soveta AN SSSR, no. 5, 1961, 7-19)

TEXT: A simplified method is given for analyzing the dependence of the hourly number of observed meteors N on parameters of the meteor, the equipment and the atmosphere. The method is based on the assumption that the majority of meteors is observed in the region of the characteristic height (the height of most intense ionization), i.e. that the dependence of N on the indicated parameters, typical of echo signals from the region of the characteristic height, describes sufficiently well the whole set of recorded

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meteors. A comparison of results obtained by this method with some experimental data and with some results of integration over the sector of the echo plane provides evidence for the objectivity of the simplified method. In the case of a linear dependence of the probability of ionization on the speed of meteoric bodies, the radiolocation method has pronounced selective properties, i.e. it is unequally sensitive to meteors at different speeds. The greatest sensitivity corresponds to speeds within approximately 40 - 55 km/sec. 25 references. /Abstracter's note: Complete translation./

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S/108/61/000/006/003/008
D201/D305

3,1550

AUTHOR: Fialko, Ye.I., Member of the Society (See Association)

TITLE: True and spurious detection of unstable meteorite traces

PERIODICAL: Radiotekhnika, no. 6, 1961, 24 - 33

TEXT: In the present article the author establishes numerical relationships between the truly and the accidentally detected meteorite tracks of unstable character. He assumes that the signals are received from an elementary echo plane lying within the characteristic height and obtained by very sensitive receivers from normally reflected ionization path radiowaves. The author starts with the basic equation

$$N_{re} = \Delta S \Delta t \int_{m_{min}}^{\infty} p(m)\, dm, \qquad (1)$$

which relates the number of truly detected meteorites N_{re} during

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the observation time Δt; ΔS - the area of the elementary echo-plane; m_{min} - the minimal mass of the meteorite body which produces a detectable track; p(m) dm - the number of meteorite bodies with masses within the limits m ÷ m + dm which cross the unit plane in unit time. The author proceeds to derive

$$N_{re} \sim \lambda^{1.1} e^{-\left(\frac{2\pi}{\lambda}\right)^2 (r_o^2 + 4DT_{min})}, \quad (19)$$

where λ - the wavelength; r_o^2 - the initial radius of the meteorite track; D - the diffusion coefficient and T - the duration of reflection. The graphs of N (λ) are given in Figs. 2 and 3; in these N_{re_1} is the numer of true detected meteorite traces for λ = 10 m and T_{min} = 0.001 sec, T_{min} being the threshold value of detection time. It is seen that highly sensitive receiving systems operating at long wavelengths, provide a basically true detection of meteorite tracks, the number of detected tracks being little dependent

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on λ and T_{min}. This property has been experimentally confirmed from radars type ТПИ (TPI) (Ref. 11: E.K. Nemirova, F.I. Peregudov Trudy Sibirskogo fiziko-tekhnicheskogo instituta, vyp. 37, 1959) and type M-3 (Ref. 12: F.I. Peregudov, Izvestiya Tomskogo politekhnicheskogo instituta, vol. 105, 1960). With the decrease of λ, the dependence of truly detected meteorites on wavelength becomes more pronounced, the changes in $N_{re}(\lambda)$ becoming more noticeable the larger the period T_{min}, the number of spurious detections N_{sp} increasing, as shown by

$$N_{sp} = N_{re} \psi, \qquad (22)$$

where

$$\psi = \frac{1}{s-1} \frac{T_e}{T_{min}} \left[(1 - s) \frac{T_{min}}{T_e} - 1 + e^{\frac{T_{min}}{T_e}(s-1)} \right]. \qquad (23)$$

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23607

True and spurious detection ... S/108/61/000/006/003/008 D201/D305

Here $T_e = \frac{\lambda^2}{16\pi^2 D}$ and S is an independent parameter (Ref. 1: T.R. Kaiser, J. Adv. phys. v. 2, no. 8, 1953). At the same time, the rate at which spurious detections occur decreases with decreasing wavelengths more slowly than that of N_{re}. Thence the total number of detected meteorites N varies at a much slower rate with varying λ and T_{min} as shown by

$$N_{\Sigma} = N_{re} + N_{sp} = N_{re}\Psi, \tag{25}$$

where

$$\Psi = 1 + \psi = \frac{T_{sp}}{T_{min}^{(s-1)}} [e^{(s-1)\frac{T_{min}}{T_{sp}}} - 1], \tag{26}$$

[Abstractor's note: T_{sp} is not defined]. Further graphs show that

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the increase of the pulse repetition frequency $F_i > 200 \div 300$ pulses/sec does not result in a marked increase of the registered meteorite reflections. For $F_i < 100$ pulses/sec, especially in the range of $\lambda < 4$m, the decrease in the pulse repetition frequency produces a marked fall in detection numbers. It may be also seen that in order to increase the hourly number of detected meteors the detecting systems with $F_i \approx 200 \div 300$ should be used if possible, with the wavelength λ between 4 and 12 m. The formula for the number of truly detected unstable radio echoes is derived as

$$\frac{P_i G^2}{\varepsilon_n} \left(\frac{\lambda}{R}\right)^3 \xi^2 e^{-2\left[\left(\frac{2\pi r_o}{\lambda}\right)^2 + \frac{T_{min}}{T_e}\right]} \gtrsim 1.5 \cdot 10^4, \qquad (33)$$

with its crude approximation as

$$\frac{P_i G^2}{\varepsilon_n} \left(\frac{\lambda}{R}\right)^3 \gtrsim 1.5 \cdot 10^4.$$

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True and Spurious detection ... S/108/61/000/006/003/008
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In these equations P_i is the pulse power of the transmitter, G - the directive gain of the antenna, ε_n - the signal threshold level, R - the distance to the meteor, ξ - a coefficient [Abstractor's note: It characterizes the decrease in amplitude of the reflected signal due to diffusion and the finite time of transit by the meteor of the first Fresnel zone] given by

$$\xi \approx \frac{1 - e^{-1.5\Delta^{0.5}}}{1.5\Delta^{0.5}} \qquad (9)$$

where Δ is given by

$$\Delta = \frac{16\pi^2 DR^{\frac{1}{2}}}{v\lambda^{\frac{3}{2}}}, \qquad (10)$$

(Ref. 1: Op.cit.) where v - is the velocity of the body of the meteor. As may be seen, with the decrease in λ the system loses its

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23607

sensitivity so that eventually only stable tracks can be detected. In the analysis, therefore, of N (λ, T_{min}) using the formulae derived in the article, the author recommends first ascertaining whether the condition of detecting unstable meteor tracks is satisfied. There are 6 figures and 16 references: 7 non-Soviet-bloc and 9 Soviet-bloc. The references to the English-language publications read as follows: T.R. Kaiser, J. adv. phys., v. 2, no. 8, 1953; J.S. Greenhow, Phil. mag., v. 45, ser. 7, no. 364, 1954; H.V. Cottony, J.R. Johler, PIRE, v. 40, no. 9, 1952; L.A. Manning, Journ. geoph. res., v. 63, no. 1, 1958.

ASSOCIATION: Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi im. A.S. Popova (Radio Engineering and Electrical Communications Society im. A.S. Popov). [Abstractor's note: Name of Association taken from first page of journal]

SUBMITTED: August 16, 1959

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A058/A101

3,1700

AUTHOR: Fialko, Ye. I.

TITLE: Radar determination of the coefficient of electron annexation to neutral molecules in meteor-belt regions

PERIODICAL: Referativnyy zhurnal, Fizika, no. 12, 1961, 473, abstract 12Zh623 (Geomagnetizm i aeronomiya, 1961, v. 1, no. 2, 209-212)

TEXT: There is described a method for determining the coefficient of electron annexation to neutral molecules in meteor-belt regions, which is based on using the distribution in duration of radio echoes from meteors. Experiment revealed that the coefficient of electron annexation to neutral molecules in meteor-belt regions is approximately equal to $4 \cdot 10^{-15}$ cm^3/sec^{-1}.

[Abstracter's note: Complete translation]

Tomsk Polytech Inst.

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

FIALKO, Ye.I., prof. doktor.

Some statistical characteristics of meteors observed by radar. Izv. TPI 100:4-15 '62.

Intensity of the signal reflected from meteor trail under conditions of severe diffusion. Ibid.:41-53

Distribution of radio reflections from meteors by duration. Ibid.:54-74

Positive and occasional radio detection of steady meteor trails. Ibid.:85-100

Radio detection of unsteady meteor trails under photorecording conditions. Ibid.:101-111

Radio detection of steady trails under integration conditions. Ibid.:112-117

Relationship between the average number per hour of detected meteors and the frequency of pulse emission by the radar. Ibid.:124-127

(MIRA 18:9)

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

FIALKO, Ye.I., prof. doktor. (Continued):

Recording conditions of various type ionized meteor trails. Izv. TPI 100:140-144

Selective properties of the radar observations of meteors; Pt.2. Steady trails. Ibid.:145-151

Methods for separating radio reflections caused by meteors of a shower. Ibid.:152-154 (MIRA 18:9)

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66

SOURCE: RZh. Fizika, Abs. 7Zh298

AUTHOR: Fialko, Ye. I.; Sayenko, A. V.

TITLE: Radar observations of meteoric activity in Tomsk as part of the 1957 IGY program

CITED SOURCE: Izv. Tomskogo politekhn. in-ta, v. 100, 1962, 20-27

TOPIC TAGS: meteor activity, radio observation , international geophysical year

TRANSLATION: Summary tables are presented of the results of an investigation of the meteor activity in accordance with the IGY program in the city of Tomsk. The parameters of the apparatus are: wavelength 10 meters, transmitter power 100 kw pulsed, pulse duration 5 microseconds, repetition frequency 600 pulses/sec, receiver

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sensitivity 5×10^{-14}W. A total of more than 602 hours of observations were carried out and more than 134,000 reflections recorded.

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E192/E382

AUTHORS: Fialko, Ye.I., Peregudov, F.I., Nemirova, E.K., Pokrovskiy, L.A.

TITLE: Radar observations on meteors at Tomsk

SOURCE: Ionosfernyye issledovaniya (meteory). Sbornik statey, no.8. V razdel programmy MGG (ionosfera). Mezhduved. geofiz. kom. AN SSSR. Moscow, Izd-vo AN SSSR, 1962, 41-44

TEXT: Systematic radar observations of meteors at Tomskiy politekhnicheskiy institut im. S.M.Kirova (Tomsk Polytechnical Institute imeni S.M.Kirov) have been conducted as part of the IGY program. Special equipment, type ТПИ-2 (TPI-2), with wavelength of 10 m, pulse power 100 kW, pulse-duration 5 μs and pulsing frequency 600 cps, was used. Between July and December 1957, the overall observation time was 602 hours, during which 135000 reflections were observed. Between January and June 1958, the total observation time was 541 hours and the number of recorded reflections was 46000. The average number of recorded meteors per hour was $\bar{N} \cong 160$ but the average for various days deviated

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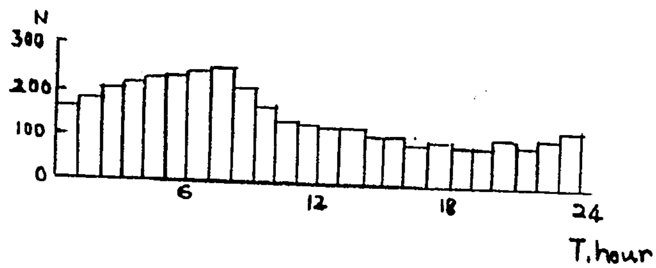
considerably from $\bar{N}$. An idea of the daily variation of the meteor activity can be obtained from Fig.1, which shows N as a function of the time of the day. The distribution of time intervals between neighbouring meteor reflections can be approximated by an exponential law which confirms the random character of the appearance of meteors in the atmosphere. The distribution of the echo durations obeys an inverse proportional law, as can be seen from Fig.4. The drift velocity of the meteors varies from 0 to 50 m/s, the average being 25 m/s. About one-third of the meteors produced a resonance effect. There are 5 figures.

Fig.1.



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E192/E382

6,4731

AUTHORS: Fialko, Ye.I., Peregudov, F.I., Nemirova, E.K., Zubarev, G.S., Zolotarev, I.D. and Pokrovskiy, L.A.

TITLE: Radar equipment for meteor observations at Tomsk

SOURCE: Ionosfernyye issledovaniya (meteory). Sbornik statey, no. 8. V razdel programmy MGG (ionosfera). Mezhduved. geofiz. kom. AN SSSR. Moscow, Izd-vo AN SSSR, 1962, 45 - 50

TEXT: Radar equipment, type ТПИ-2 (TPI-2), has been used for meteor observations at Tomsk since May, 1957. Apart from that, additional equipment, type M-3, was designed and built for operating at the wavelength of 4 m. The TPI-2 equipment operates at the wavelength of 10 m and permits determination of the range of a meteor track, its velocity and the radial component of the drift velocity of the track. The pulse-power of the radar transmitter is 100 kW, pulse duration 5 µs, pulsing frequency 600 c.p.s. (each alternate pulse being doubled) and its maximum range is 400 km. The sensitivity of the receiver is 10^{-13} W, the antenna being in the form of a half-wave dipole situated at a height of $\lambda/3$ above the

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Radar equipment S/831/62/000/008/006/016
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Earth. The transmitter equipment consists of: 1 - an excitation unit; 2 - high-frequency unit; 3 - output stage; 4 - modulator; 5 - rectifier circuit; 6 - sub-modulator unit; 7 - rectifier unit for 800 V; 8 - rectifier unit for 1 250 V; 9 - rectifier unit for 4 kV; 10 - high-voltage rectifier for 10 kW; 11 - control unit; 12 - rectifier circuits for 250 V and 2 kV; 13 - control panel and 14 - magnetic stabilizer. The transmitter employs a number of power-amplification stages, the output stage being capable of giving 100 kW pulse output. All the transmitter stages, except the quartz stabilized driver oscillator, operate under pulse conditions. The excitation unit consists of the driver, a buffer amplifier, power amplifier, tripler and a "coherent" voltage stage. The driver generates a frequency of 5 Mc/s and its anode circuit is tuned to 10 Mc/s. The buffer amplifier operates without grid currents and the following amplifier stage operates in class C; the tripler produces a frequency of 30 Mc/s and this is fed to the high-frequency unit consisting of two power stages. The modulating equipment consists of a sub-modulator and a modulator, the sub-modulator being driven by anode pulses with a

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duration of 5 μs, the grid pulses having a duration of 7 μs or gating pulses of 50 to 70 μs duration. The modulator produces powerful output pulses in the output stage and is based on discharging a storage capacitance. The output pulses from the modulator transformer secondary is applied to the anodes of the output tubes. The receiver equipment comprises a device for coherent pulse reception, range-measuring devices for amplitude and brightness, meteor-velocity indicator, drift indicator, noise suppressor, a synchronizing device, a photo-synchronization unit, coherent-pulse drift indicator and power supplies. The meteors are recorded on a photographic film moving with a velocity of 3 cm/min; under special conditions this can be increased to 70 cm/min. The range-indicator is used for visual observation of the reflected signals. The velocity of meteors is measured by the diffraction-pulse method (J.G.Davies, C.D.Ellyett. Philos. Mag., ser.7, v.40, no.305, 1949), the time-base being triggered by the signal reflected from the meteor. The equipment M-3 operates at a wavelength of 4 m and is used for recording the number, range and duration of meteor reflections. The equipment

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Radar equipment ....

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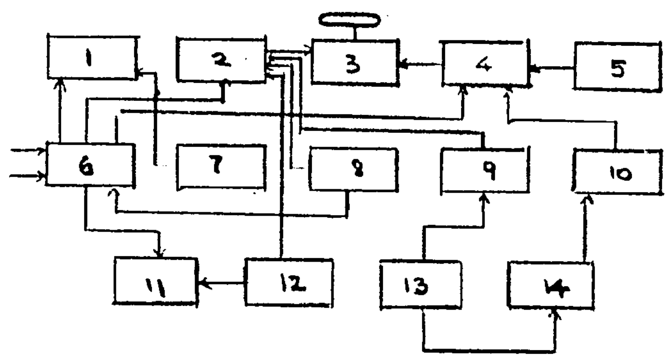
E192/E382

has a pulse power of 100 kW, repetition frequency of 600 cps and pulse-duration of 3 µs; it is furnished with a half-wave dipole antenna situated at a height of λ/3 above the Earth and a Yagi-type directional antenna.

Fig.1.



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37715

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E032/E514

9,9120

AUTHOR: Fialko, Ye.I.

TITLE: On the possibility of measurement of the coefficient of attachment of electrons to neutral molecules by means of radar observations of meteors

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, no.2, 1962, 51-55

TEXT: The author describes an indirect method of measuring the attachment coefficient in the upper layers of the Earth's atmosphere. The method is based on the determination of meteor radio-echo distributions. It is shown that analysis of the statistical properties of meteor radio-echoes can in fact be used to determine the attachment coefficient. It is estimated that in the region of the meteor zone the attachment coefficient is $\sim 4 \cdot 10^{-15}$ cm^3/sec, which is consistent with the results reported by J. Davies, J. S. Greenhow and J. E. Hall (Ref.1: Proc. Roy. Soc., 253A, No.1272, 121, 1959) and the present author (Ref.2: Geomagnetizm i aeronomiya 1, No.2, 15, 1961). There are 1 figure and 1 table.

Card 1/2

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

On the possibility of measurement ... S/139/62/000/002/010/028
E032/E514

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S.M.Kirova (Tomsk Polytechnic Institute imeni S.M.Kirov)

SUBMITTED: December 9, 1960

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FIALKO, Ye.I., prof. doktor; SAYENKO, A.V.

Radar observations of meteor activity in Tomsk according to the International Geophysical Year program in 1957. Izv. TPI 100:20-27 '62.

(MIRA 18:9)

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ACCESSION NR: AR3010552 S/0058/63/000/009/H045/H045

SOURCE: RZh. Fizika, Abs. 9Zh286

AUTHOR: Fialko, Ye. I.; Kalinichenko, G. L.

TITLE: Concerning the distribution of intervals between meteor radio echoes

CITED SOURCE: Izv. Tomskogo politekhn. in-ta, v. 100, 1962, 28-34

TOPIC TAGS: meteor observation by radar, hourly number, radio echo, distribution of intervals

TRANSLATION: From the results of normal sounding of meteor trails at a wavelength of 10 m, the distribution of the intervals between neighboring radio echoes is plotted over time intervals up to nine hours, for different character of behavior of the hourly numbers. The distribution is in satisfactory agreement with the theoretical

Card 1/2

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one plotted under the assumption that the meteor bodies penetrate randomly into the earth's atmosphere.

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L 16848-63 EWT(1)/FCC(w)/BDS/EEC-2/ES(v) AFFTC/ESD-3 Pe-4 PT-2/GW
ACCESSION NR: AR3006335 S/0058/63/000/007/H044/H044

65

SOURCE: RZh. Fizika, Abs. 7Zh300

AUTHOR: Fialko, Ye. I.

TITLE: Radio detection of stable meteor trails in the integration mode

CITED SOURCE: Izv. Tomskogo politekhn. in-ta, v. 100, 1962, 112-117

TOPIC TAGS: meteor trail, radio observation

TRANSLATION: The dependence of the number of registered meteors on the parameters has been obtained when working in the photoregistration mode. It is shown that if the averaging time is larger than the duration of the reflections, then for $S \sim 2$ the number of registered stable meteor trails is approximately proportional to the cube of the wavelength and to the square root of the pulse repetition fre-

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quency. The dependence of the number of registrations on the speed of motion of the photographic film have a non-monotonic character. It is advantageous to choose the film speed to be half that corresponding to the maximum number of registrations. V. N.

DATE ACQ: 15Aug63 SUB CODE: PH, AS ENCL: 00

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

ACCESSION NR: AR4028224 S/0274/64/000/002/B033/B033

SOURCE: RZh. Radiotekhnika i elektrosvyaz', Abs. 2B198

AUTHOR: Fialko, Ye. I.

TITLE: Concerning the selective properties of the radar method of meteor observation (II. Stable trails)

CITED SOURCE: Izv. Tomskogo politekhn. in-ta, v. 100, 1962, 145-151

TOPIC TAGS: meteor, meteor trail, meteor radar observation, stable meteor trail, meteor velocity distribution, apparatus sensitivity, meteor geocentric velocity

TRANSLATION: An analysis of the expressions that determine the number of reliably observed meteors of the stable type per unit time leads to the following conclusions: (1) to ascertain the true velocity distribution of the meteoric bodies it is necessary to know

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ACCESSION NR: AR4028224

the apparatus with which the meteor velocity measurements were made; (2) in the registration of both stable and unstable trails, radar observations have different sensitivity to meteor trails produced by bodies with different geocentric velocities. Criteria by which to distinguish between apparatus of "medium" and "low" sensitivity are indicated. (3 illustrations. Bibliography, 16 titles. For Part 1 see RZhRiE, 1964, 1A148. V.V.

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

L 16849-63 EWT(1)/FCC(w)/BDS/EEC-2/ES(v) AFFTC/ESD-3 Pe-4 PT-2/GW

ACCESSION NR: AR3006334 S/0058/63/000/007/H043/H044

72

SOURCE: RZh. Fizika, Abs. 7Zh299

AUTHOR: Fialko, Ye. I.; Pereguodv, F. I.; Nemirova, E. K.; Serafinovich, L. P.; Pokrovskiy, L. A.; Zolotarev, I. D.; Zubarev, G. S.

TITLE: Some results of radar observations of meteors in Tomsk during 1957-1959

CITED SOURCE: Izv. Tomskogo politekhn. in-ta, v. 100, 16-19 1962

TOPIC TAGS: meteor, radio observation, sporadic meteor, regular meteor, Quadrantide meteor

TRANSLATION: A summary is presented of radar observations made in the city of Tomsk in 1957--1958 using the TPI-2 meteor radar station. The parameters of the apparatus are: frequency 30 Mcs, power ~100 kW pulse, pulse duration 5 microseconds, transmission frequency

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600 pulses/sec, transmission and reception with half-wavelength dipoles located at a height $\lambda/3$ above the earth, receiver sensitivity $\sim 5 \times 10^{-14}$ W. The changes in the activity of the sporadic and regular-flow meteors were investigated. Altogether 130,000 reflections were registered in 1957 and 191,500 in 1958. Information is presented on the average course of the external noise, the distribution of the heights of the Quadrantide meteors (from the data of 4--5 January 1959) and of sporadic meteors. V. N.

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L 29450-66 EWT(1) GW

ACC NR: AR5022997 SOURCE CODE: UR/0269/65/000/008/0047/0047

AUTHOR: Sayenko, A. V.; Fialko, Ye. I. 27 B

TITLE: Basic results of the registry of the number of meteoric radio-echoes conducted in Tomsk during the IGY and the IGC

SOURCE: Ref. zh. Astronomiya, Abs. 8.51.421

REF SOURCE: Tr. Tomskogo in-ta radioelektron. i elektron. tekhn., v. 3, 1964, 36-38

TOPIC TAGS: astronomic data, meteor observation, meteor radiant

ABSTRACT: Radar calculations of the number of meteors were conducted in Tomsk from July 1957 to December 1959. The "TPI-2" radar station had the following parameters: wave length λ=10 m, impulse transmission power ~100 kwt, length of impulse 5 μ sec, transmission frequency 600 c with doubled alternate impulses. Transmitting and receiving antennas were semiwave vibrators, located at an altitude of λ/3 above the surface of the Earth. During the 4,000 hours of observation more than 669,000 meteoric reflections were registered, including 86,500 reflections of $\tau >$ 1 sec duration. For each month of the entire observation period the following data were given: time

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of the observations, total sum of the registered meteors and the number of meteors with $\tau \geqslant 1$ sec, monthly average hourly values of the total number of meteors and of the meteors with $\tau \geqslant 1$ sec. The maximal number of meteors registered in August 1957 was 249, and the minimal number of 49 - in June 1958. The yearly average hourly numbers of reflections from meteors with $\tau \geqslant 1$ sec. were 37, 17 and 19 for 1957, 1958 and 1959 respectively. V. Lebedinets

SUB CODE: 03/ SUBM DATE: none

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L 9216-66 EWT(1)/EWA(d) GW

ACC NR: AR6000138 SOURCE CODE: UR/0058/65/000/008/H057/H057

SOURCE: Ref. zh. Fizika, Abs. 8Zh390

AUTHORS: Lazarev, R. G.; Fialko, Ye. I.

ORG: none

TITLE: Concerning the distribution of meteoric bodies by masses in the meteor swarms of the Quadrantides, Perseids, and Geminides

CITED SOURCE: Tr. Tomskogo in-ta radioelektron. i elektron. tekhn., v. 3, 1964, 93-97

TOPIC TAGS: meteor observation, distribution function, meteor stream, radio echo

TRANSLATION: Results are presented for determining the average values of the parameter s of the mass distribution function of meteoric bodies in the Quadrantide, Perseid, and Geminide swarms and the sporadic background and dispersion of this parameter. The authors consider the distributions of the frequency of appearance of the quantity s after a definite observation time, the number of radio echoes with duration larger than 1 second, and the number of radio echoes of all durations. P. B.

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L 3295-66 FSS-2/EWT(1)/EWA(d) GS/GW/WR

ACCESSION NR: AT5024189

UR/0000/65/000/000/0057/0064

AUTHOR: Fialko, Ye. I.; Bayrachenko, I. V.; Chumak, Yu. V.; Moysya, R. I.; Mel'nik, V. I.

39

B+1

TITLE: Statistical characteristics of meteor radio echoes during the 1963 Geminid shower

SOURCE: AN UkrSSR. Fizika komet i meteorov (Physics of comets and meteors). Kiev, Izd-vo Naukova dumka, 1965, 57-64

TOPIC TAGS: radio echo, meteor trail, reflected signal, radar echo, radar meteor observation

ABSTRACT: Statistical characteristics of meteor radio echoes during the 1963 Geminid shower were studied experimentally. The radar equipment used had the following parameters: $\lambda = 9.59$ and 6.49 m; power, 20 kev; prf, 500 pps; and pulse duration, 10 μsec. In all, 198—207 meteor radio echoes were used to determine the distribution of radio echoes with respect to duration, amplitude, time interval between echoes, and distance. On the basis of the results obtained, the following conclusions were reached: 1) Distributions of meteor radio echoes with respect to duration at $\lambda = 9.59$ m and $\lambda = 6.49$ m are practically identical

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ACCESSION NR: AT5024189

in the region of long durations (>1 sec) and differ slightly in the region of short durations. 2) In the distribution of amplitudes, three groups of reflections are distinguished — stable, intermediate, and unstable. The distribution of intermediate radio echoes is similar to that of stable reflections. 3) Distribution of intervals between appearances of meteor reflections has an exponential character. Orig. art. has: 4 figures and 5 formulas.

ASSOCIATION: none [JR]

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L 3291-66 EWT(1)/FCC/EWA(d)/EWA(h) GS/GW

ACCESSION NR: AT5024190

UR/0000/65/000/000/0065/0067

AUTHOR: Fialko, Ye. I.; Bayrachenko, I. V.; Chumak, Yu. V.

TITLE: Some results of the utilization of intermediate-type trails for measuring the electron density of a meteor trail

SOURCE: AN UkrSSR. Fizika komet i meteorov (Physics of comets and meteors). Kiev, Izd-vo Naukova dumka, 1965, 65-67

TOPIC TAGS: meteor trail, radar meteor observation, radio echo, electron density, mathematic method

ABSTRACT: Linear electron density α of ionized meteor trails was determined from radar observations of intermediate-type trails at $\lambda = 9.59$ m. The observations were conducted by Kiev State University in 1963. The method is based on the dependence of intermediate-type radio echoes on α. The distribution of α was determined within the range of 10^{12} to 5×10^{12} eℓ/cm. Distribution of intermediate-type trails according to α is shown in Fig. 1 of Enclosure, where n is the number of trails in which electron density α exceeded a given value. Orig. art. has: 1 figure and 1 formula. [KM]

ASSOCIATION: none

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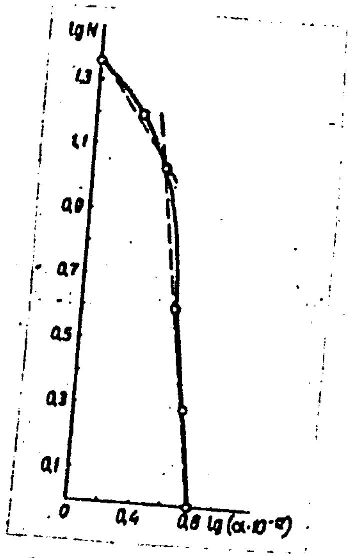

Fig. 1. Distribution of intermediate-type trails according to α

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L 06349-67 EWT(1)/FSS-2 GW/WR

ACC NR: AR6013395

SOURCE CODE: UR/0269/65/000/011/0044/0045

AUTHOR: Fialko, Ye. I.

TITLE: Distribution law of the hourly number of meteors recorded by radar

39
B

SOURCE: Ref. zh. Astronomiya, Abs. 11.51.398

REF SOURCE: Astron. tsirkulyar, no. 324, apr. 15, 1965, 1-4

TOPIC TAGS: radar meteor observation, pulsed radar, radar equipment

ABSTRACT: Some results of radar measurements of meteor frequency at Tomsk are presented. Apparatus parameters: wavelength - λ = 10 m; pulsed power - 100 kwt; pulse duration - 5 μsec; repetition rate - 600 pulses/sec; receiver sensitivity - 5 x 10^{-14} wt; transmitting and receiving antennas - half-wave dipoles at a height $\lambda/3$ above the surface of the earth. During IGY and IGQS observations were made in the course of 4060 hours. The differential and integral distributions of the hourly number of meteors are presented. The average value of the hourly number is 165. Bibliography of 5 citations. V. L. [Translation of abstract]

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Card 1/1

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L 13184-66 EWT(1)/EWA(d) GW

ACC NR: AP6002762 SOURCE CODE: UR/0203/65/005/006/1118/1119

AUTHOR: Fialko, Ye. I.

ORG: Kiev State University (Kiyevskiy gosudarstvennyy universitet)

38
36
B

TITLE: Total duration of meteoric reflections and duty factor at λ = 10 m

SOURCE: Geomagnetizm i aeronomiya, v. 5, no. 6, 1965, 1118-1119

TOPIC TAGS: meteor, radio echo, diurnal variation

ABSTRACT: The author compares data given in a previous paper on the persistence of meteoric echo signals (D. W. R. McKinley, *Canad. J. Phys.*, 1954, 32, 450) with the results of observations at the ten-meter wavelength in Tomsk in the IGY-IGC-59 period. The parameters of the instruments used in making the observations are given. A formula is given for the duty factor together with a graph showing the diurnal variation in the duty factor averaged over the IGY-IGC-59 period. These data show that the duty factor varies from about 0.58 to 0.17 during the course of the day. The total duration of the reflections is extremely short, making up about 4% of the observation time. The formula proposed by McKinley gives a duty factor of 0.176 for the ten-meter wave-

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ACC NR: AP6002762

length, while the experimental data for the entire 30 month period of the extended International Geophysical Year give an average duty factor of 0.042, which indicates that the formula requires revision. The author thanks G. V. Noskova, V. I. Moskalenko and other coworkers who took part in analyzing the meteoric echo signal data. Orig. art. has: 1 figure and 2 formulas. [14]

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[illegible] energy distribution of meteors [illegible]

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tribution. "In conclusion, the auth...

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FIALKO, Ye.I.

Determinability of the s index from the distribution of the durations of unstable meteor radio echoes. Astron. zhur. 42 no.3:656-659 My-Je '65. (MIRA 18:5)

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L 02969-67 EWT(d)/FSS-2/EWT(l)/EWT(m)/EEC(k)-2 GW/WS-2

ACC NR: AT6032437 SOURCE CODE: UR/3133/66/000/009/0157/0161

AUTHOR: Fialko, Ye. I.; Moysya, R. I.; Kolomiyets, G. I.; Mel'nik, V. I.; Chumak, Yu. V.

ORG: Kiev State University (Kiyevskiy gosudarstvennyy universitet) 38 B+1

TITLE: Statistical characteristics of radio echoes from sporadic meteors

SOURCE: AN UkrSSR. Mezhduvedomstvennyy geofizicheskiy komitet. Informatsionnyy byulleten', no. 9, 1966. Geofizika i astronomiya, 157-161

TOPIC TAGS: radio echo, meteor trail

ABSTRACT: The results of radar observations conducted on 29 October 1964 during a period in which intensive meteor streams were absent were used to construct statistical characteristics of the distribution of meteor radio echoes with respect to amplitude and duration. The radar system used had the following basic parameters: $\lambda = 8.7$ m; pulse power, 10 kw; pulse period, 10 μsec; pulse repetition rate, 500 pulse/sec; sensitivity, $\approx$ 5 μv. The four-element receiving and transmitting Yagi antennas were located at height $h = \lambda/2$ above the ground. The 492 radio echoes selected for constructing the statistical character-

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istics included 56 for unsaturated, 76 for intermediate, and 360 for saturated meteor trails. The integral distribution of meteor radio echoes with respect to amplitude and duration is illustrated in Figs. 1 and 2, respectively. The value of parameter s was determined by several approximate methods for a wide range of masses of meteoric bodies by using radio reflections from the trails. Parameter s had a sporadic

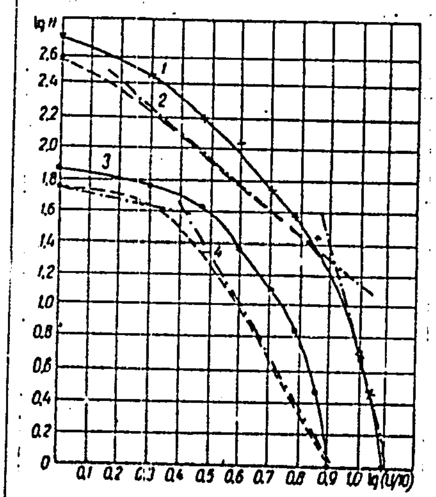

Fig. 1. Integral amplitude distribution of meteor radio echoes

1 - General integral amplitude distribution;
2 - reflection from saturated trails;
3 - reflection from intermediate trails;
4 - reflection from unsaturated trails

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ACC NR: AT6032437

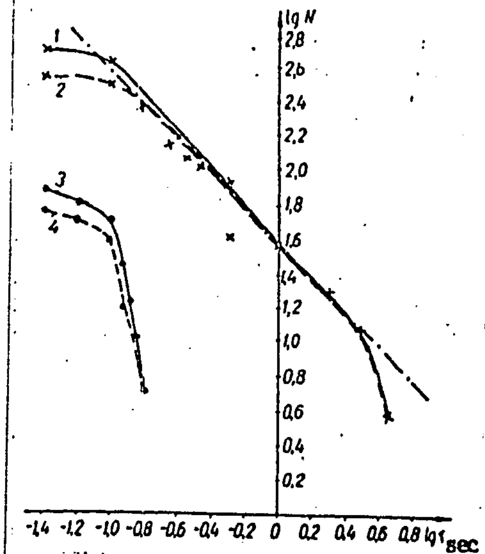

Fig. 2. Integral distribution of the duration of meteor radio echoes

1 - General integral distribution;
2 - reflection from saturated trails;
3 - reflection from intermediate trails;
4 - reflection from unsaturated trails.

noise value of 2.0—2.25, which was in agreement with previous determinations. Orig. art. has: 5 figures.

SUB CODE: 03 / SUBM DATE: none/ ORIG REF: 007/ OTH REF: 003
ATD PRESS: 5099

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L 02357-67 FSS-2/EWT(1) GW/WR
ACC NR: AT6032439 SOURCE CODE: UR/3133/66/000/009/0165/0169

AUTHOR: Fialko, Ye. I.; Bayrachenko, I. V.

40

ORG: Kiev State University (Kiyevskiy gosudarstvennyy universitet) B+1

TITLE: Distribution of meteoric bodies with respect to energies (experiment conducted at $\lambda = 9.59$ m)

SOURCE: AN UkrSSR. Mezhduvedomstvennyy geofizicheskiy komitet. Informatsionnyy byulleten', no. 9, 1966. Geofizika i astronomiya, 165-169

TOPIC TAGS: meteor observation, radar meteor observation, KINETIC ENERGY

ABSTRACT: The results of meteor observations by radar in the Geminide shower were used to determine the character of distribution of meteoritic bodies with respect to their kinetic energies. The observations were conducted in 1963 at the Tripol'ye Station of Kiev State University. The radar system had the following parameters: pulse power, 20 kw; pulse duration, 10 μsec; and pulse repetition rate, 500 pulse/sec. The four-element receiving and transmitting Yagi antennas were located at height h = 1/2 above the ground. Only those meteors whose velocity and linear electron density could be determined were considered. The distribution of meteoric bodies with respect to kinetic energies was found

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ACC NR: AT6032439

to have a distinct monotonically decreasing character (see Fig. 1).

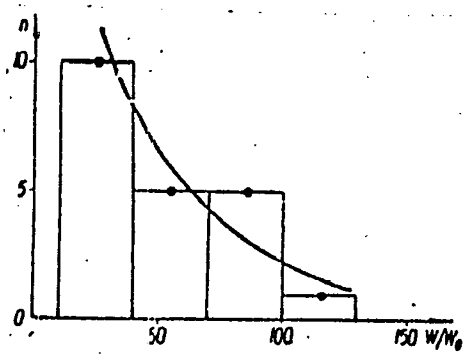

Fig. 1. Distribution of meteoric bodies with respect to kinetic energies

n - Number of measurements; W - kinetic energy of a meteoric body; W_0 - kinetic energy of a meteoric body possessing a velocity of 40 km/sec and creating at characteristic height linear electron density $\alpha = 10^{12}$ electron/cm; dots - experimental results; the curve illustrates the character of experimental distribution.

Distribution with respect to velocities had extremal character, while that with respect to masses was also monotonically decreasing. Orig. art. has: 1 table and 2 figures.

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ATD PRESS: 5099

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L 21504-66 EWT(1)/EWA(d) GW

ACC NR: AP6006786 SOURCE CODE: UR/0033/66/043/001/0204/0208

AUTHOR: Fialko, Ye. I.

ORG: Kiev State University im. T. G. Shevchenko (Kiyevskiy gos. universitet)

TITLE: Determining the absolute stellar magnitude of a meteor from the duration of unsteady type meteoric radio echoes

SOURCE: Astronomicheskiy zhurnal, v. 43, no. 1, 1966, 204-208

TOPIC TAGS: meteor, meteor observation, radar, stellar magnitude

ABSTRACT: A method is outlined for determining the absolute stellar magnitude of a meteor from radio echo produced by an unsaturated meteor trail. Starting from the steady duration case and using the formula that relates the stellar magnitude M to the meteor velocity, the following expression is derived for the unsteady case:

$$M = B_{I} - B_{II} \frac{D}{\lambda^2} \tau,$$

where

$$B_{II} = 40\pi^2 \lg e = 170$$

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ACC NR: AP6006786

and B_I is a coefficient independent of τ. For two durations τ_1, τ_2, this leads to the simple expression

$$\Delta M \approx M_2 - M_1 \approx -\frac{170D}{\lambda^3}(\tau_2 - \tau_1),$$

and for the case of $\tau_1 = \tau_{max}$ and $\tau_2 = 0$, to expression

$$\Delta M_{max} \approx 1.1\frac{\tau_{max}}{\tau_e}.$$

The above equations are then applied to the case of a meteor entry with $\lambda \approx 9.6$ m and with a time duration of a radar echo of $\tau \approx 0.05-0.11$, leading to an absolute magnitude $M \approx +5^m.2$ to $+4^m.2$. Orig. art. has: 14 formulas and 2 figures. [04]

SUB CODE: 03, 17 SUBM DATE: 22Mar65/ ORIG REF: 005/ OTH REF: 002 / ATD PRESS: 4222

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

ACC NR: AT6033993 SOURCE CODE: UR/3227/64/003/000/0036/0038

AUTHOR: Sayenko, A. V.; Fialko, Ye. I.

ORG: none

TITLE: Principal results of recording the number of meteor radio echoes in Tomsk during IGY - IQSY

SOURCE: Tomsk. Institut radioelektroniki i elektronnoy tekhniki. Trudy, v. 3, 1964, 36-38

TOPIC TAGS: meteor observation, meteor detection

ABSTRACT: The results of radar observations of meteor activity in Tomsk during Jul 57 - Dec 59 are briefly reported. A TPI-2 special radar operated at 10-m wavelength with a pulse power of 100 kw; train frequency, 600 per sec; pulse duration, 5 μsec; alternate pulses were doubled. Half-wave dipoles

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mounted at $\lambda/3$ height were used for transmission and reception. Over 669000 meteor radio echoes were recorded during 4000 hrs of observation; of these, 86500 echoes were over 1-sec long. Most echoes (80—85%) were from sporadic meteors and low-activity meteor streams. On the average, 168 echoes per hr were recorded; this number rose to 249 in Aug 57 and fell to 46 in Jun 58. Observation details are tabulated. Orig. art. has: 2 tables.

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"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000413010009-3

ACC NR: AT6033996 SOURCE CODE: UR/3227/64/003/000/0093/0097

AUTHOR: Lazarev, R. G.; Fialko, Ye. I.

ORG: none

TITLE: Problem of meteor mass distribution in the meteor streams of Quadrantids, Perseids, and Geminids

SOURCE: Tomsk. Institut radioelektroniki i elektronnoy tekhniki. Trudy, v. 3, 1964, 93-97

TOPIC TAGS: meteor stream, meteor observation

ABSTRACT: Three distributions of the parameter s are considered: p(s) - frequency of occurrence of s over a definite period of observation; $N_1(s)$ - number of radio echoes longer than 1 sec observed in all 1-hr intervals of the period of observation; N(s) - same, but radio echoes of all durations. Mean values of s and dispersion D (or mean effective deviation $\Delta s = \sqrt{D}$) are determined for 1958 streams of Quadrantids, 1957-58 Perseids, and 1957-58 Geminids, and also for the sporadic background. It is found that: (1) The total value of Δs depends on several

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