analysis, still it may be concluded that discrete sources emit atmospherics in discrete narrow frequency bands at any one moment.

Further, in this phenomenon a large number of natural causes are at work either simultaneously or in succession. We, therefore, expect that some of the characteristics of the physical processes occurring at the sources of atmospherics as well as some of the effects of the propagation mechanism on their paths should be reflected in the recorded magnitude and their variations in the integrated intensities of atmospherics on these vlf bands. If the correlation coefficient between the intensities of atmospherics on any two bands is looked at from its most simple and elementary interpretation that "it finally tends to represent the ratio of the number of common causes in the genesis of these two variables to the whole number of independent causes on which each depends,"[16] then the following points emerge.

(i) The low values of the correlation coefficients indicate that the common causes are much fewer than the total number of independent causes.

(ii) The majority of the correlation coefficient values are significant; and this fact indicates that the common causes are distinctly more effective.

(iii) The negative signs of all the three total period correlation coefficients indicate that some of the non-common causes must be responsible for this rather surprising result.

This leads us to state that we have not isolated or eliminated a large number of important parameters controlling the production and propagation of the vlf atmospherics by the method of correlation coefficients.

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Study of Meteors during Quadrantid Shower Period by Forward Scatter of vhf Radio Signals between Dehra Dun & Waltair

B RAMACHANDRA RAO, M SRIRAMA RAO, S RAJA RATNAM & D A V KRISHNA RAO

Space Research Laboratory, Department of Physics
Andhra University, Waltair 530 003

&

E BHAGIRATHA RAO

Himalayan Radio Propagation Unit, Dehra Dun 248 008

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Results of the study of meteors recorded by vhf forward scatter propagation between Dehra Dun and Waltair during the Quadrantid shower period are presented. High meteoric activity is recorded on 3 Jan. when the Quadrantid shower is known to exhibit peak activity. The diurnal variation in the activity of shower and non-shower meteors on 3 Jan. are studied. The variation of daily mean hourly rates of radio meteors during this period is found to agree well with that of visual meteors over Waltair.

It is well known that meteor ionization trails are capable of scattering vhf radio waves. We have given a review of the meteor forward scatter technique using C. W. transmission with radiated power of the order of 200 W in an earlier paper.[1] Vhf Forward scatter propagation studies at 48·2 MHz via meteor trails between Dehra Dun and Waltair (1760 km distance) during Dec. 1974 have been presented therein. Similar studies are extended with the same experimental set-up during the following months. In the present communication, the results of the study of meteors during the period 27 Dec. 1974 to 8 Jan. 1975, covering the activity of the Quadrantid meteor shower are reported.

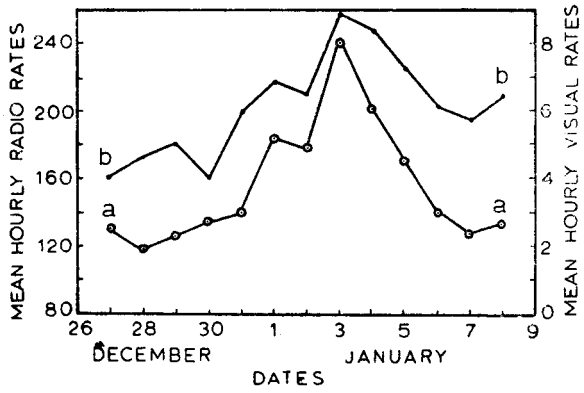

Fig. 1—Daily variation in the mean hourly rates of occurrence of radio meteors during 27 Dec. 1974 to 8 Jan. 1975 over the midpoint between Dehra Dun and Waltair (curve aa) and that of visual meteors over Waltair in the same period during 1961-72 (curve bb)

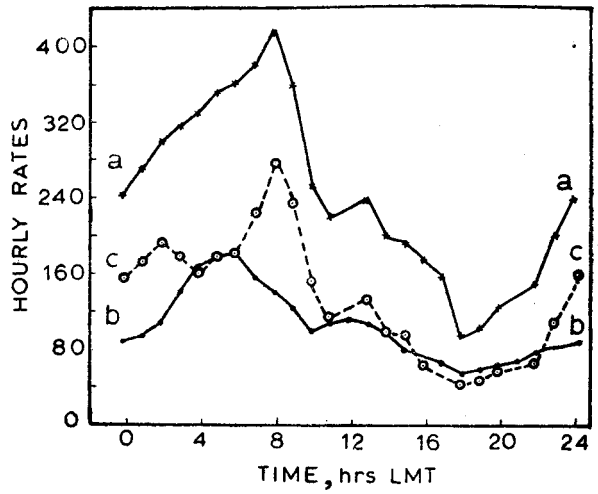

Fig. 2—Diurnal variation in the hourly rates of occurrence of meteors on 3 Jan. 1975 (curve aa) and 28 Dec. 1974 (curve bb) and that of Quadrantids (curve cc) on 3 Jan. 1975

The variation in the mean hourly rates of radio meteors thus obtained is shown in Fig. 1 as curve aa. The increased meteor activity during 1-5 Jan. with a peak on 3 Jan. is attributed to the Quadrantid meteor shower which is known to exhibit maximum intensity during this period. The variation in the mean hourly rates of visual meteors observed by Srirama Rao *et al.*[2] over Waltair during the same dates of 1961-1972 has also been reproduced in Fig. 1 as curve bb for comparison. The two curves in Fig. 1 show similar trends, the correlation coefficient between them being 0·88 which is highly significant (better than $P = 0{\cdot}01$ level, *vide* Fisher[3]).

To analyze the excess meteors due to Quadrantid shower, it is necessary to remove the background sporadic meteors from the total activity. As the minimum activity of meteors during the period 27 Dec.-8 Jan. is indicated on 28 Dec., it is reasonable to assume that the activity on 28 Dec. is that of sporadic meteors during the above period. The peak value of mean hourly rate during the period is 242 recorded on 3 Jan. and the minimum value is 118 recorded on 28 Dec. The difference of 124 in hourly rate may be considered to be contributed by the Quadrantid meteor shower on 3 Jan.

The diurnal variation of total hourly meteor rates recorded on 3 Jan. and 28 Dec. are shown in Fig. 2, as curves aa and bb, respectively. The difference between these two curves is then plotted as curve cc in the same figure, which may be taken to represent the Quadrantid meteor shower activity on 3 Jan., as curve bb may be considered as that for sporadic meteors. It may be seen from Fig. 2 that the Quadrantid shower shows maximum activity around 0800 hours and minimum around 1800 hours indicating that the maximum activity of the shower depends upon the time of upper transit of the shower radiant and the minimum activity depends upon the relative motion of the meteors and the earth. The upper transit of the shower radiant is given as 0835 hrs LMT by Mckinley.[4] The diurnal ratios between the maximum and minimum activities of non-shower and shower meteors recorded are 3·2 and 6·6, respectively. The larger diurnal ratios of the Quadrantid shower indicates the intensity of its activity.

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