TELEVISION OBSERVATIONS OF THE DELTA-AQUARID SHOWER

T. Sarma & J. Jones
Department of Physics
The University of Western Ontario, London, Canada N6A 3K7

The Southern Delta Aquarid meteor shower which is believed to be of relatively recent origin because of its compact photographic radiant, is also possibly associated with the Arietid meteor shower (Kresak and Porubcan 1970). Williams, Murray and Hughes (1979) have studied the orbit of the Quantrantid stream and it is interesting to note that the orbital parameters of that shower approximately 1500 years ago were similar to the orbit of the present day Delta Aquarids.

The Southern Delta Aquarids have an unusually small perihelion distance (0.06 a.u.) and an aphelion close to Jupiter's orbit. Meteors belonging to the Southern Delta Aquarids are visible from mid July to mid August with a maximum occuring near the 29th of July. It should be noted that because of the low declination of its radiant, the stream is more prominent in the southern hemisphere. This low elevation restricts the observation of the shower in the northern hemisphere to only a few hours.

Observations of the Southern Delta Aquarids, using a low light level television system, near the peak of activity were obtained in 1974, '78 and in '79. Forty-three meteors were obtained having a mean absolute visual magnitude between three mag. and four mag. The television camera consisted of a three stage image intensifier, fiber optically coupled to a vidicon tube and had a limiting sensitivity of 9 mag. The observations of the Perseids (Jones and Sarma 1979) have shown that the best observational results are obtained when the camera is maintained at a point 20 degrees from the radiant. The mean angular distance between the meteor trail and its radiant was 18.3 degrees for the Southern Delta Aquarids of this study.

Using a digitally controlled cursor which was displayed on the television monitor, the co-ordinates of the meteor image at several epochs were measured with respect to nearby reference stars. The best great circle was fitted to these points using the eigenvalue method described by Jones and Sarma (1979). Assuming all the meteors to have a velocity of 42.5 km/s (Wright, et al. 1954) and to occur at a height of 98 km (Hawkes and Jones 1979), the radiant was obtained by tracing back along

I. Halliday and B. A. McIntosh (eds.), Solid Particles in the Solar System, 167–170.

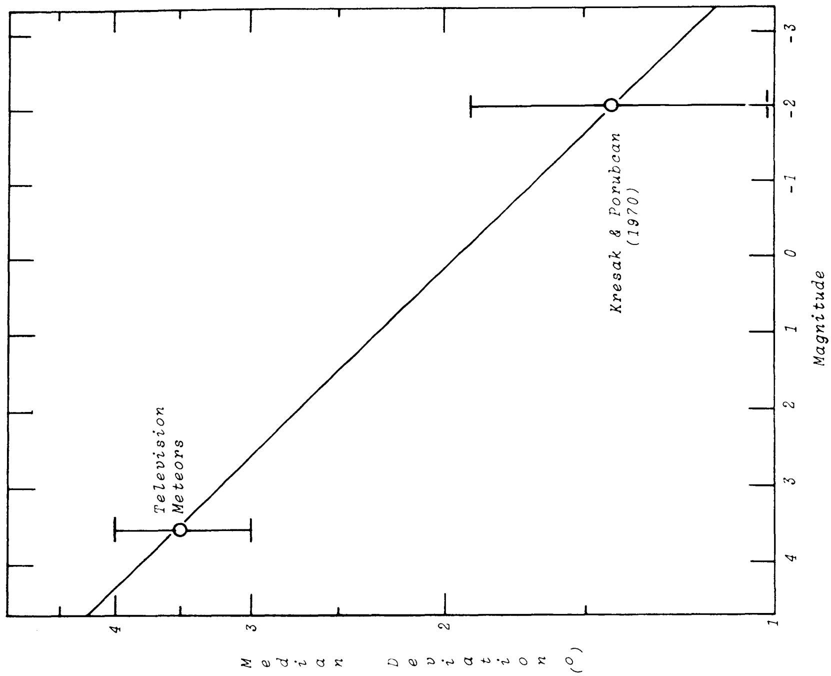

Fig. 2 Inherent scatter in radiant position of the δ-Aquarid shower.

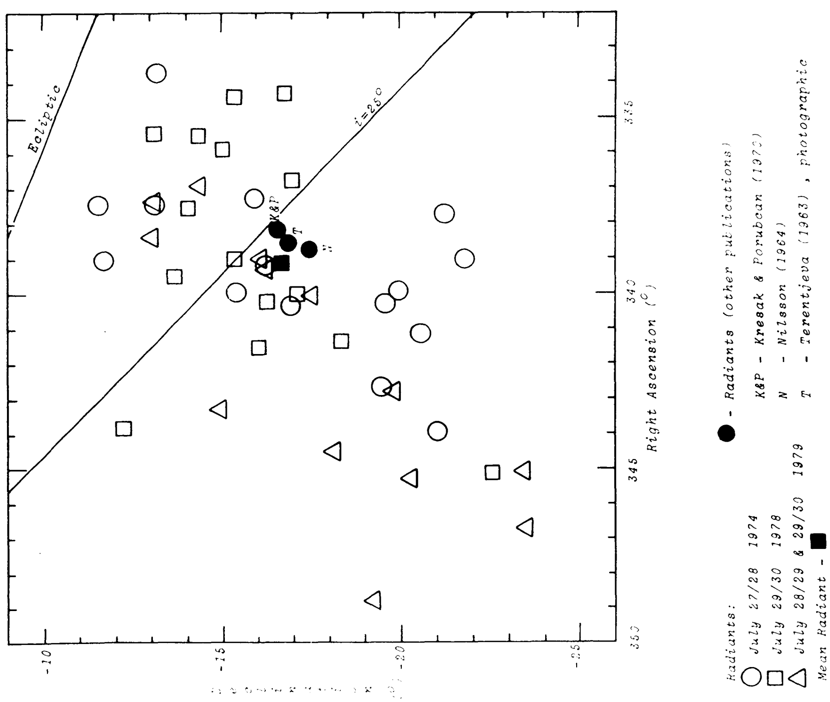

Fig. 1 Radiants of δ-Aquarid meteors; filled points: mean values, open points: individual meteors.

the great circle. Of course the radiants of the sporadic meteors with velocities other than 42.5 km/s are incorrectly located but this is of no consequence since they are already essentially randomly distributed.

The errors in the shower radiant positions arise from errors in time measurements (±1°), the height spread (±4.6 km which corresponds to 1°) and the dispersion in velocities of the shower meteors (±1 km/s = ±1°). If these are independent, they should together contribute about 2.0° to the root mean scatter of the observed radiant scatter.

The mean corrected radiant of the television data of $\alpha = 339.9° \pm 0.8°$ and $\delta = -16.7° \pm 0.5°$ for a solar longitude of 125.0° is in agreement with the other radiants cited in Figure 1 and as such, no systematic perturbations appear to be acting on the meteor stream. The scatter in the radiant which is predominantly perpendicular to the line of constant inclination ($i = 25°$) may be significant. After subtracting the measurement error from the points associated with the mean radiant, the residual inherent scatter was found to be 3.5° (median deviation). When compared to the value of 1.41° obtained by Kresak and Porubcan (1970) for the photographic meteors, there is good agreement with the formula;

$$|d\Psi| \sim m^{-1/6}$$

as can be seen from Figure 2.
This suggests that the observed scatter in the radiant is primarily the result of explosive disintegration of the parent comet (Whipple 1951; Jones and Sarma 1979).

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DISCUSSION

The following discussion relates to the companion paper by Hawkes and Jones.

Millman: What photometric method did you use to estimate the magnitude of the meteors recorded?
Hawkes: From screen photographs estimates were made by comparing visually the brightness of the meteor head with that of nearby reference stars.

McIntosh: I think this is very important work because it demonstrates positively how bad the selection effects are for radar meteors. I would like to ask if Jones has plans to do photometry electronically.
Hawkes: Yes. A microprocessor-controlled electronic spot is currently being used to measure meteor positions, and it is planned to adapt the system with a signal-and-hold circuit to estimate intensities automatically. Improvements in the optical system have resulted in vastly improved resolution and sensitivity (2-3 magnitudes) which should permit more accurate photometry as well.

Cook: These light curves resemble those reported by Cook et al. at the Albany symposium nearly a decade ago. (Reference in Hawkes and Jones.)