

Table 1. Observation dates at the time of the Orionid shower (M: Morning (dawn) observations; E: Evening (twilight) observations)

October	15	16	17	18	19	20	21	22	23	24	25	26	27
1984	-	-	-	-	-	-	-	E	E	E	E	E	M
1986	M	-	-	-	-	-	-	-	-	E	E	-	E
1987	-	E	-	-	-	E	E	M	-	-	-	-	-

where L is the thickness of the aerosol layer, k is the Boltzmann constant, T is the absolute temperature, g is acceleration due to gravity and $v = 2.2 \cdot 10^{-10} \alpha(\bar{H}) \text{ km}^{-1}$, an empirical relation, where $\alpha(\bar{H})$ is the volumetric scattering coefficient.

3. Finally, the size of the particles may also be obtained by comparison of experimental sedimentation velocities with theoretical ones, calculated for different particle size and density (Ivlev 1982).

For the Orionids in 1984, the mean particle sedimentation velocity on October 22–27 and at altitudes 70–80 km, was $5.747 \text{ cm sec}^{-1}$. The estimated particle radii were $\sim 0.08 \mu\text{m}$. In 1986, the mean particle radius was about the same, $\sim 0.065 \mu\text{m}$. A great amount of cosmic matter consisting of particles with a wide range of sizes was injected into the atmosphere during the 1987 Eta

Aquarid activity period. Very small particles with radii of the order of 0.0005 to $0.005 \mu\text{m}$ accumulated at an altitude of 100 to 120 km and those with $r = 0.5 \text{ mm}$ at $\bar{H} = 60$ to $\bar{H} = 80 \text{ km}$. Moreover, the background aerosol content increased at all altitudes.

Time variations of the intensities at different altitudes reflect the intrusion of the particles ($\bar{H} > 70 \text{ km}$) and their subsequent rearrangement in the atmosphere ($\bar{H} < 70 \text{ km}$). The time variation of I_N/I' coincide with those of meteor hourly rates from the radar (Poole 1988) and visual (Hajduk and Buhagiar 1982) observations (Fig. 5).

Conclusions

Thus, it is clear that twilight observations of the type described here may be used to reveal structures of meteor

showers. We plan to continue this work and hope eventually to accumulate enough material to be able to make more explicit statements about this.

The apparent increase in the aerosol content of the upper atmosphere when the Earth passed through the two meteor streams associated with P/Halley for the first time after the recent passage of this comet, is indeed very intriguing. We can offer no easy explanation to this at this moment.

References

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Visiting Astronomers

(April 1 – October 1, 1993)

Observing time has now been allocated for Period 51 (April 1 – October 1, 1993). The demand for telescope time was again much greater than the time actually available.

The following list gives the names of the visiting astronomers, by telescope and in chronological order. The complete list, with dates, equipment and programme titles, is available from ESO-Garching.

3.6-m Telescope

April 1993: De Graauw et al. (9-003-49K), Danziger/Bouchet/Gouiffes/Lucy/Fransson/Mazzali/Della Valle, Böhringer et al. (1-023-49K), Shaver/Wall/Kellermann, Jablonka/Bica/Alloin, Turatto et al. (4-004-45K), Danziger/Bouchet/Gouiffes/Lucy/Fransson/Mazzali/Della Valle, De Graauw et al. (9-003-49K),

May 1993: De Graauw et al. (9-003-49K), van der Hucht/Williams/Yudiawati Anggraeni/Bouchet, Habing et al. (7-008-51K), Danziger/Bouchet/Gouiffes/Lucy/Fransson/Mazzali/Della Valle, Kudritzki/Pakull/Méndez/Conti/Gabler/Motch, Danziger/Bouchet/Gouiffes/Lucy/Fransson/Mazzali/Della Valle, Magazzù/Martin/Rebolo, Macchetto/Sparks, Danziger/Bouchet/Gouiffes/Lucy/Fransson/Mazzali/Della Valle, Amram/Balkowski/

Boulesteix/Le Coarer/Marcelin/Cayatte/Sullivan, Lagage/Cabrit/André/Pantin/Olofsson/Nordh.

June 1993: Lagage/Cabrit/André/Pantin/Olofsson/Nord, Lagage/Pantin, Nissen/Lambert/Smith, Lemoine/Ferlet/Vidal-Madjar/Emerich, Baade/Kjeldsen, Leone/Pasquini, Mermilliod/Raboud/Levato, Barbuy/Renzini/Ortolani/Bica, Lagrange-Henri/Corporon/Bouvier.

July 1993: Rouan/Hofmann/Normand/Alloin/Cuby/Tacconi-Garman/Gallais, Beuzit/Lagrange-Henri/Tessier/Vidal-Madjar/Ferlet/Beust/Hubin, Dougados/Rouan/Lopez/Coudé du Foresto/Forveille, Ménard/Léna/Malbet/Dougados/Monin/Schuster, Rigaut/Léna/Gehring/Hofmann/Cuby, Della Valle/Bianchini/Duerbeck/Ögelman/Orio, Borkowski/Tsvetanov/Harrington, Danziger/Gilmozzi/Zimmermann/Hasinger/Macgillivray, Tadhunter/Morganti/Fosbury/Danziger/Shaw, Tinney/Mould/Reid, Molaro/Pasquini/Castelli/Bonifacio.

August 1993: Molaro/Pasquini/Castelli/Bonifacio, Zaggia/Capaccioli/Piotto/Stiavelli, Bedding/Beckers/von der Lühe/Weigelt/Urban/Beckman/Grieger/Kohl/van Elst, Danziger/Bouchet/Gouiffes/Lucy/Fransson/Mazzali/Della Valle, Barbon/Notni/Radovich/Rafanelli/Schulz, Véron, P./Hawkins, Seitter/Spiekermann/Schücker/Böhringer/Hartner/

Crudacce, Fosbury/Villar/Binette, Danziger/Bouchet/Gouiffes/Lucy/Fransson/Mazzali/Della Valle, Schulz/Mücke, Molaro/Primas/Castelli/Bonifacio.

September 1993: Saint-Pé/Combes, M./Rigaut/Tiphène/Demaiily/Tacconi-Garman, Combes, M./Saint-Pé/Tomasko/Demaiily/Fauchère, Vettolani et al. (1-019-47K), Mazure/Rhee et al. (1-014/005-43K), Hainaut/West R.M., Moller/Warren, Kneer/Bender/Krautter, Danziger/Bouchet/Gouiffes/Lucy/Fransson/Mazzali/Della Valle, Habing et al. (7-008-51K).

3.5-m NTT

April 1993: Moorwood/Oliva/Origlia/Kotilainen, Oliva/Marconi/Salvati/Moorwood, Miley/van Ojik/Röttgering/Moorwood, Oliva/Marconi/Salvati/Moorwood, Miley et al. (2-001-43K), Turatto et al. (4-004-45K), Tammann et al. (1-022-47K), Thomsen/Sodemann, Held/Renzini/Cappi.

May 1993: Gredel/Zinnecker, Gry/Balutau/Cox/Armand/Emery, Lutz/Genzel/Dratz/Cameron/Harris/Najarro/Hillier/Kudritzki, Bertola/Amico/Zeilinger, Motch/Pakull/Pietsch, Danziger/Méndez/Kudritzki/Mazzali/Lucy/Ciardullo/Jacoby/Roth, Tamman et al. (1-022-47K), West/Hainaut/Mars-