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the international circular for meteor observers

A Soviet group of meteor observers from the Astronomical Observatory of the Crimean Station of Young Technicians; G. Zateishchikov Meteor Station of All-Union Astronomical-Geodetical Society. The sitting person pointing to the spiral galaxy is V.V. Martynenko. Read about their work in this issue of *WGN*!

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The December issue - Het decembernummer *(WGN 15:6)*

This issue will appear in Belgium in the first week of December. Contributions are due by *November 1* at the latest and should be sent to *Marc Gyssens* (address on inside of back cover).

Bijdragen voor het decembernummer moeten uiterlijk op *1 november* toekomen bij *Marc Gyssens* (adres op binnenzijde achterkaft).

Subscriptions-Abonnementen 1988

Subscriptions 1988: more information on p. 153

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Editoriaal

Het barslechte weer tijdens de voorbije zomer heeft voor vele waarnemers als spelbreker gespeeld. Storende maan en slecht weer maakten dat slechts weinig nachten in de Benelux konden benut worden. We hopen echter dat niemand de moed heeft latenzakken en bij de pakken is gaan zitten. Na regen komt immers zonneschijn. We raden iedereen aan nog eens het artikel over de ε-Geminiden te herlezen in het vorig nummer. Houd tijdens de maand oktober de mogelijke activiteit van dezekleine (?) zwerm in het oog en bedenk dat een negatieve waarneming ook een resultaat is!

Ondertussen blijft onze oproep voor verslagen van waarnemingsacties nog steeds van kracht. Wie tijdens de zomer toch wat activiteit heeft kunnen ontplooiien, wordt verzocht dit te melden. En hetzelfde geldt uiteraard voor de herfstacties die hopelijk meer succesvol zullen blijken!

Oktober is traditioneel de maand waarin gevraagd wordt aan de lezers hun abonnement op *WGN* te hernieuwen. Meer informatie hierover vindt U op p. 141. Hier willen we alvast kwijt dat de prijs van 300 BEF ongewijzigd is gebleven (VVS-leden in België betalen slechts 200 BEF, dank zij de lagere verzendingskosten). Voor onze Nederlandse abonnees hebben we vanaf nu ook de mogelijkheid voorzien om te betalen met Eurocheques, wat één en ander ongetwijfeld zal vergemakkelijken. We herinneren er tevens aan dat het onze politiek is U dit blad zo goedkoop mogelijk aan te bieden; extra steun kan dus goed gebruikt worden. De inspanningen die tijdens dit jaar geleverd werden om de presentatie van *WGN* te verbeteren, zijn hiervoor trouwens het beste bewijs.

Zoals de vorige keer reeds aangekondigd werd, is er een feestelijk tintje aan dit nummer. Het is om te beginnen vier pagina's dikker dan gewoonlijk. We mogen ons de laatste tijd trouwens verheugen in veel copij, maar die komt meestal van buiten de Benelux; het is dus absoluut hoog tijd dat de Belgische en Nederlandse meteorenwaarnemers wat meer van zich laten horen.

Verder konden we voor de tweede achtereenvolgende keer rekenen op een professionele bijdrage, die deze keer van niemand minder dan Dr. B.A. Lindblad van het Lund Observatory in Zweden afkomstig is. Sommigen kennen Dr. Lindblad allicht nog van het Meteorenweekend te Hingene. Dergelijke contacten tussen professionelen en amateurs zijn het rechtstreeks gevolg van de inspanningen van de amateurs om zinvol werk te leveren. We hopen dan ook dat deze contacten, onderandere via *WGN* wederzijds vruchten zullen afwerpen.

Laat ons tenslotte nog een blik werpen op de inhoud van dit nummer. Naast de traditionele rubrieken, bevat de Nederlandse sectie een bijdrage van Klaas Jobse over de zomeractie te Oostkapelle. Belangrijk hierbij aan te stippen is het succes van BETSY: een systeem waarmee meteoren tot magnitude 7 (!) kunnen opgenomen worden op video! In dit nummer staat ook het uitgebreide verslag van de radiosectie van de VVS Werkgroep Meteoren. Als men de activiteiten van 1986 vergelijkt met die van 1985 mag men gewagen van een verdubbeling! Verder vestigen we uw aandacht op de pas verschenen "Bibliographic Catalague of Meteors", een uitgelezen instrument om wegwijs te geraken in de uitgebreide meteorenliteratuur!

Een belangrijk artikel in de Engelse sectie is uiteraard de bijdrage van Dr. Lindblad. Hij heeft het over de associatie tussen komeet 1944 I en de november-Monocerotiden, die ondubbelzinnig werd aangetoond door visuele waarnemingen in 1987. De twee andere hoofdtenoren in dit deel zijn de Perseïden en de Quadrantiden. Paul Roggemans bespreekt de helderheidsgegevens over de Perseïden 1986, en verder lezen we een waarnemingsverslag over waarnemingen van de Perseïden 1985 in de Sovjet-Unie. Tenslotte hebben we een heleboel verslagen over de bijzonder gunstige verschijning in 1987 van de Quadrantiden gebundeld: het betreft bijdragen uit Finland, Noorwegen, Spanje, Japan en België.

Veel leesgenot!

Marc Gyssens

Actie-oproep: oktober-november

Paul Roggemans

Tabel --- Maanlicht oktober-november 1987

Datum	k	Datum	k
vrijdag 2 oktober	0.68+	vrijdag 6 november	1.00-
vrijdag 9 oktober	0.96-	vrijdag 13 november	0.56-
vrijdag 16 oktober	0.38-	vrijdag 20 november	0.02-
vrijdag 23 oktober	0.00+	vrijdag 27 november	0.39+
vrijdag 30 oktober	0.53+	vrijdag 4 december	0.98+

Nieuwe Maan:	22 oktober, 21 november, 20 december
Eerste Kwartier:	30 september, 29 oktober, 28 november
Volle Maan:	7 oktober, 5 november, 5 december
Laatste Kwartier:	14 oktober, 13 november, 13 december

1. Epsilon Geminiden

In het vorig nummer van *WGN* kon u het artikel lezen van Duncan Olsson-Steel over de mogelijke verhoogde ε-Geminidenaktiviteit. De theoretische radiant zou zich op 7 oktober 1987 nabij volgende positie bevinden : $\alpha = 93°$, $\delta = +28°$. Of er die nacht veel van de snelle meteoren te zien zijn, is geenszins zeker. Het is net volle maan zodat de waarnemingen zeker fel gestoord zullen worden. De zwerm die we als ε-Geminiden kennen is echter pas tussen 14 en 27 oktober aktief, met een radiant in de buurt van $\alpha = 104°$, $\delta = +27°$. Het is best mogelijk dat deze zwerm niet geassocieerd is met komeet 1987c, en dan valt er na 7 oktober niets te verwachten. Als er wel een associatie bestaat tussen de zwakke ε-Geminidenaktiviteit die de voorbije jaren werd vastgesteld en de komeet 1987c, dan blijft een verhoogde zwermaktiviteit tot de mogelijkheden behoren. De meteoroïden afkomstig van de komeet 1987c die de aarde nu zouden ontmoeten kunnen slechts bij een vorige periheliumpassage van de komeet zijn losgekomen. Dit is 2500 jaar of een veelvoud van deze omloopsperiode geleden. Een compacte zwerm die lang geleden door de komeet werd uitgestoten zal zich in de tijd, van de komeet verwijderen. De zwerm en de komeet zullen elk een iets verschillende baanevolutie kennen. Zo is het mogelijk dat nu bij een nieuwe periheliumpassage, de zwerm achter de komeet zit en buiten de komeetbaan. Dit kan dan aanleiding geven tot een zwermaktiviteit met een iets andere radiantpositie en aktiviteitsperiode dan theoretisch verwacht werd uit de baanelementen van de komeet. De vragen die dan op een antwoord wachten zijn :

- Hoe sterk zijn de meteoroïden in de ruimte verspreid geraakt?
- Waar bevindt de zwerm zich precies t.o.v. de komeet?
- Hoe groot is de kans dat de aarde deze compacte zwerm, als die bestaat, ontmoet?

Om op alle vragen een antwoord te vinden wordt er een grote waarnemingsaktie georganiseerd van 3 tot en met 24 oktober. Het komt erop aan zoveel mogelijk nachten te observeren, teneinde zekerheid te krijgen of er zich enige aktiviteit van deze zwerm voordoet of niet. Vanaf 16 oktober kunnen de waarnemingen gecombineerd worden met deze van de Orioniden. Let echter op; beide radianten staan vrij dicht bij elkaar. (Orioniden op $\alpha = 95°$, $\delta = +16°$ (21 oktober) en de ε-Geminiden op $\alpha = 104°$, $\delta = +27°$). Verwar beide niet ! De snelheid voor beide zwermen verschilt ook weinig: Orioniden 66,4 km/s, ε-Geminiden 70,4 km/s. Dit is visueel nauwelijks te onderscheiden. In de periode voordat de Orionidenaktiviteit aanvangt, van 4 tot 16 oktober zal de maan elke nacht storen (zie in de Hemelkalender voor de tijdstippen van opkomst en ondergang van de maan).

2. De Orioniden

In de vorige paragraaf kon u reeds vaststellen dat de omstandigheden voor de Orioniden in 1987 vrijwel perfect zijn. De Halley-koorts is nu stilaan over, doch voor de met deze komeet geassocieerde zwermen blijft het toch nog enkele jaren wenselijk om de aktiviteit nauwgezet te volgen. Tijdens de hele periode van de Orionidenaktiviteit zal de maan niet storen. Bovendien dient men tijdens een deel van de Orionidenaktiviteit aandacht te spenderen aan de mogelijkheid voor een ε-Geminidenzwerm. Beide zwermen dienen in de nanacht te worden geobserveerd, zodat alleen de vroegste Orioniden last kunnen krijgen met de maan in laatste kwartier. De dagen nadien vermindert dit snel en na nieuwe maan op 22 oktober zal de maan 's avonds helemaal geen hinder veroorzaken voor de Orioniden in de nanacht tot op het einde van de zichtbaarheidsperiode voor de Orioniden omstreeks 30 oktober.

3. De Tauriden

Tauriden zijn tijdens de maand oktober reeds waarneembaar. De rijkste periode valt echter omstreeks 3 november voor de zuidelijke tak van de Tauriden en omstreeks 13 november voor de noordelijke tak. De eerste datum valt vrij ongunstig : enkele dagen voor volle maan. Positief is wel dat rond 1 november een verlofperiode de waarnemingen zal vergemakkelijken. Het weekend 6-7-8 november kan je vergeten voor meteoorwaarnemingen omwille van de storende maan. Het volgende weekend 13-14-15 november is echter wel goed geschikt. De maan zal in de nanacht storen doch men kan alleszins in het eerste deel van de nacht gebruik maken van de maanloze hemel om de Tauriden Noord te volgen. De Tauriden blijven verder aktief gedurende heel november. Lees meer over deze zwerm in het Handboek Visuele Meteoorwaarnemingen.

4. De Leoniden

Voor deze zwerm zijn de omstandigheden in 1987 vrij gunstig : het maximum zou zich vertonen op 17 november 's ochtends. Leoniden dient men in de laatste paar uren van de nacht te observeren. De maan zal nog wel een beetje storen, doch niet voldoende om als excuus te dienen om deze zwerm over te slaan. Omstreeks het maximum kan de aktiviteit wel verrassend interessant zijn met 10 à 15 Leoniden per uur. Observeer deze snel bewegende Leoniden (70,7 km/s) met hun radiant nabij $\alpha = 152°3$ en $\delta = +22°1$, zodat we elk jaar een idee hebben van de maximale Leonidenaktiviteit.

5. Tot slot bij de herfstaktie van 1987

1987 is al een pover jaar geweest met een ongetwijfeld record-slechte zomerperiode. De herfst is traditioneel een rijke periode voor meteoorwaarnemingen. Helaas is de zomervakantie voorbij en de school begonnen, voor de meeste jongeren een ideaal excuus om de waarnemingen op een laag pitje te zetten. Het is echter allemaal een kwestie van prioriteit. Diegene die hun vrije tijd als student niet reserveren voor astronomie, die doen dat evenmin als ze de studies beëindigen, want dan veranderen alleen de alibis om niets of weinig te doen. Voor de ouderen is het dan de koude (gezondheid boven alles), en als dit niet kan gezegd worden voor de zeldzame heldere nachten, dan vindt men heus wel iets om niet te observeren. Niets is gemakkelijker als men eigenlijk niet geïnteresseerd is dan excuses te bedenken om toch maar niet te moeten toegeven dat de echte ware amateur niet in de geëxcuseerde waarnemer schuilt. Waarom zo'n komedie om zich te willen voordoen als een echte waarnemer en een doorwinterde amateur?

Een echt aktieve amateur spendeert geen tijd aan excuses. Hij gaat observeren als hij zin heeft, en die zin is er altijd als de hemel helder is. Observeer dus, neem deel aan de akties en zend uw waarnemingen uiterlijk begin december aan Glenn Ticket. Veel succes en geniet van elk helder uurtje !

Actie-oproep: radiowaarnemingen

Jeroen Van Wassenhove

De maanden oktober en november worden gekenmerkt door een aantal kleine zwermen. Dit jaar komt er echter nog een toemaatje bij. Volgens Dr. D. Olsson-Steel is het mogelijk dat er een meteorenstorm verschijnt rond 7 oktober a.s. (1). De waarnemingsomstandigheden voor deze meteorenzwerm luiden als volgt (UT) :

Z:	$19^h-01^h-09^h$	N:	05^h-09^h en 19^h-23^h
ZW:	$22^h-04^h-09^h$	NO:	07^h-09^h en $19^h-22^h-00^h$
W:	$03^h-06^h-09^h$	O:	$18^h-22^h-01^h$
NW:	$04^h-06^h-09^h$ en 18^h-21^h	ZO:	$18^h-23^h-06^h$

De radiant bevindt zich op α = 93° en δ = +28°. De beste richtingen voor deze mogelijke storm zijn west en oost. Mag ik ook op uw medewerking rekenen om er een geslaagde aktie van te maken?

De eerste kleine zwerm, de Orioniden, kan man reeds beluisteren vanaf 16 oktober. Rond 26 oktober verschijnen de laatste exemplaren. Het vage maximum situeert zich rond 21 oktober. Waarnemingsomstandigheden (UT):

α = 96°0, δ = +15°0

Z:	$22^h-04^h-10^h$	N:	07^h-11^h en 22^h-02^h
ZW:	$22^h-06^h-11^h$	NO:	$22^h-01^h-04^h$
W:	$02^h-08^h-10^h$	O:	$22^h-02^h-06^h$
NW:	$05^h-08^h-11^h$	ZO:	$22^h-03^h-10^h$

Eind oktober, maar vooral begin november duiken de Tauriden op. Het maximum verschijnt rond 7 november. Deze zwerm is rijk aan trage heldere meteoren. De uurfrequentie blijft aan de lage kant. Waarnemingsomstandigheden (UT):

Z:	$18^h-00^h-07^h$	N:	03^h-05^h en 18^h-22^h
ZW:	$18^h-02^h-07^h$	NO:	$18^h-22^h-00^h$
W:	$22^h-03^h-07^h$	O:	$18^h-22^h-03^h$
NW:	$01^h-03^h-07^h$	ZO:	$18^h-00^h-07^h$

Alle waarnemingsomstandigheden gelden voor een verticaal opgestelde antenne. Begin oktober zal er een nieuwe frequentielijst beschikbaar zijn (de meest recente). Alle waarnemers zullen die automatisch opgestuurd krijgen.

Referenties

(1) Duncan Olsson-Steel, "Prospects for an Enhanced ε-Geminid Shower in 1987", *WGN 15:4*, 1987, pp. 109-111.

Bijdragen voor het december-nummer van WGN moeten de redacteur (adres: zie binnenzijde achterkaft) bereiken vóór 1 december.

Informatie over abonnementen voor 1988 vindt U op pagina 141.

Korte berichten

WGN: Abonnementen 1988

Marc Gyssens

Het abonnementsgeld voor *WGN* voor 1988 bedraagt ongewijzigd 300 BEF. VVS-leden kunnen echter van een reductie genieten en hoeven slechts 200 BEF te betalen. Stel niet nodeloos uit; U helpt ons geweldig door uw abonnement vroeg te hernieuwen. De Belgische abonnees kunnen hun bijdrage storten op postrekening nummer 000-0688050-29 ten name van Paul Roggemans. Voor de Nederlandse abonnees bestaan er verschillende mogelijkheden. Een eerste bestaat erin de som te voldoen door middel van een internationaal postmandaat. Een tweede mogelijkheid is de som over te maken van een Nederlandse *giro*rekening naar hoger vermelde postrekening. Vanaf dit jaar laten we ook nog een derde mogelijkheid toe, namelijk betaling met een *Eurocheque*. Indien U deze methode verkiest, dient U er wel op te letten *dat de cheque uitgeschreven wordt in Belgische frank en betaalbaar aan Paul Roggemans* (dus niet *WGN*, Werkgroep Meteoren, of iets dergelijks). Vermeld voor de plaats waar de cheque uitgeschreven werd, een Belgische stad (bijvoorbeeld Brussel). Gemeenschappelijk aan deze drie betalingswijzen is dat zij geen wissel- of andere onkosten voor de VVS-Werkgroep Meteoren met zich mee brengen. Dit is voor ons uiterst belangrijk, daar het onze politiek is de kostprijs van dit blad zo scherp mogelijk te stellen. In het bijzonder drukken we er daarom nog eens op dat, wanneer U met een Eurocheque betaalt, het essentieel is de hierboven opgesomde richtlijnen te volgen. Dank bij voorbaat alvast voor uw begrip hiervoor.

Tenslotte herinneren we eraan dat U *WGN* kan steunen door meer te betalen dan het abonnementsgeld, dat zelfs niet volstaat om de werkelijke kosten te dekken. We blijven inspanningen leveren om de presentatie en de inhoud van *WGN* verder te verbeteren; van U hangt het af of we hierin kunnen slagen!

Meteoren waarnemen in Zuid-Frankrijk

Paul Roggemans

De eerstvolgende actie gaat door van 17 tot 24 oktober in de Haute-Provence. Voor de periode in december (van 13 tot 26) zijn geïnteresseerden nog steeds welkom, zolang er plaats is. Inmiddels is een eerste verblijf achter de rug; van 18 tot en met 31 juli verbleven enkele meteorenwaarnemers te Saint-Michel-l'Observatoire; het werd een succes met meer dan 4000 visuele meteoren in 12 nachten (slechts één nacht bleef geheel bewolkt). Het was meteen ook de eerste ervaring met een dergelijk soort verblijf sinds de reeks waarnemingsprojecten in Zwitserland tussen 1978 en 1983.

De gehuurde woning bleek een goed gemeubeld en degelijk ingericht huis te zijn, comfortabel voor het opgegeven aantal personen. Zelf koken vergt natuurlijk wat vaardigheid en inspanning van de deelnemers; van elkaar wordt verwacht dat men spontaan meewerkt. De praktijk leert echter dat zoiets degelijk moet georganiseerd worden, want niet iedereen is spontaan geneigd tot huishoudelijk werk; ongetwijfeld een zwak punt in deze formule. Voordelen zijn natuurlijk dat men zelf bepaalt wat men wil eten en wanneer. De hoeveelheid tijd die aan "levensonderhoud" gespendeerd wordt valt best mee: 1 à 1.5 uur per dag per persoon als iedereen even hard meewerkt. Een groot voordeel van de formule is dat men beschikt over een vrij groot huis en dat men geen rekening moet houden met vreemden, wat in een hotel bijvoorbeeld niet het geval is. Het belangrijkste voordeel is zonder enige twijfel echter de prijs: de gemiddelde prijs per dag per persoon kwam neer op 58 FF (hierin zijn alle onkosten voor administratie, huur en maaltijden inbegrepen). Om de totale kostprijs van zulk verblijf te kennen, vermenigvuldigt U dus deze 58 FF met het aantal dagen dat U wil verblijven, U telt er uw reiskosten bij, en U kent de prijs: werkelijk miniem.

In 1988 is de Perseïdenperiode vrij van maanlicht; de meest perfecte waarnemingsomstandigheden (maximum 's nachts en geen storende maan) doen zich voor sedert augustus 1980, toen een werkelijk indrukwekkend Perseïdenmaximum werd waargenomen in Zwitserland. Daarom willen we terug naar de Haute-Provence in de periode van zaterdag 6 tot en met zaterdag 20 augustus 1988. Er werd gezocht naar een goed gelegen verblijfplaats en een mogelijk locatie is Lardiers, waar een tweewoonst, buiten het dorp gelegen, aan negen personen plaats biedt. Observeren kan vlak bij het huis; het terrein errond is vlak.

Teneinde het aantal deelnemers te kennen, worden geïnteresseerden uitgenodigd om contact op te nemen met Paul Roggemans. Wie wil deelnemen kan 2000 BEF storten op rekening nummer 000-0688050-29 ten name van Paul Roggemans en is dan verzekerd van een plaats, uiteraard zo lang er nog iets vrij is. Het aantal deelnemers is dus maximaal negen. Indien U zou inschrijven en om ernstige redenen niet zou kunnen deelnemen, dan wordt bij onderling akkoord van de overige deelnemers het voor reservatie betaalde bedrag teruggestort. Momenteel proberen we zo snel mogelijk te weten te komen hoeveel mensen er zouden willen meegaan.

Perseïdenactie Haute-Provence, 6-20 augustus 1988:

geïnteresseerden kunnen een plaats laten reserveren door 2000 BEF te betalen op rekening 000-0688050-29 ten name van Paul Roggemans.

Weekend der Amateurs Houthalen - 7–8 november 1987

Paul Roggemans

In vorige nummers van *WGN* zag U heel wat reclame voor deze bijeenkomst, die gepland was in de Borggraaf te Hasselt. Doordat de reservatie niet betaald was door de VVS en doordat de Borggraaf een boeking van een andere groep registreerde, kan het weekend niet op de geplande plaats doorgaan. Omdat met de optie van de VVS geen rekening was gehouden bij de boeking van de andere groep, was de Borggraaf bereid om dezelfde overnachtingscapaciteit in Hengelhoef te Houthalen te boeken, hetgeen door het VVS-bestuur aanvaard werd. Enkele negatieve aspecten aan Hengelhoef maakten dit alternatief voor sommige initiatiefnemers onaanvaardbaar; de organisatie van het Weekend der Amateurs werd overgenomen door Johan Gijsenbergs van de Limburgse Volkssterrenwacht. Zij zullen de praktische organisatie voor hun rekening nemen. Er werden garanties gegeven dat de problemen met het openbaar vervoer zullen opgelost worden door een non-stop pendelende autocar en dat de vergaderzalen gans het weekend in orde zullen zijn voor diaprojectie en voordrachten. De contactgelegenheid tussen de amateurs is gewaarborgd. Inschrijven kan nog tot 15 oktober. De organisatoren rekenen op de deelname van de werkgroepen.

Weekend der Amateurs, Houthalen, 7-8 november 1987:

inschrijven voor 15 oktober; meer informatie kan U terugvinden op de achterkaft van WGN.

Cyclops: zomeractie 1987

Klaas Jobse

From July 18 till the end of August, 650 visual meteors were seen from Oostkapelle, the Netherlands. Due to bad weather, only 5 meteors were photographed. Many meteors were also recorded on video. The system the author uses can detect meteors up to magnitude +7.

Tijdens de periode van 18 juli tot eind augustus 1987 werden vanuit *Cyclops* waarnemingen verricht. Drie waarnemers, te weten: Marc de Lignie, Sicco van Hoegee en de auteur, wisten ongeveer 650 visuele meteoren te noteren.

Het voor meteorenwaarnemers slechte weer liet niet toe om veel waar te nemen. Fotografisch werden vijf meteoren vastgelegd waaronder een Perseïde van -1,5 die op 15 augustus om $21^h41^m27^s$ UT verscheen in Pegasus. Deze meteoor bleek simultaan gefotografeerd te zijn met Bussloo. Vanuit Oostkapelle werd deze meteoor gefotografeerd op de nieuwe T-max film van Kodak. Tesamen met de ontwikkelaar Diq (4 min., 21 °C) gaf dit een goed resultaat.

Het grootste succes van onze actie was de vuurdoop van "BETSY". BETSY staat voor: Beeldversterker Televisie Systeem. Deze camera bestaat uit een 58 mm f 0.85 objectief met daarachter gemonteerd een beeldversterker (maximaal 46 000 maal). Achter de beeldversterker is op zijn beurt weer een zwart-wit CCD camera geplaatst, welke met een videorecorder is verbonden. Op deze wijze is het mogelijk om meteoren te filmen. BETSY werd afgelopen winter door Marc de Lignie en de auteur gebouwd en hoewel nog niet geheel voltooid, is de camera ingezet tijdens de zomeractie. Het resultaat was dat meer dan 450 meteoren op videoband konden worden vastgelegd.

BETSY heeft een grensmagnitude voor sterren van ca. 8.5 en voor meteoren van ca. 7. De beste nacht voor BETSY (en ook voor ons) was 5-6 augustus toen ze bij een kraakheldere hemel (visuele grensmagnitude 6.7) meer dan 30 meteoren per uur filmde. Na het bekijken van de videobanden met een ruwe classificatie vanaf het beeldscherm werden 16 α-Capricorniden, 27 Aquariden, 112 Perseïden, 25 κ-Cygniden en 260 sporadische meteoren genoteerd.

Tijdens het uittesten van BETSY in april jongstleden werden 50 meteoren gefilmd tijdens de nachten 22-23 en 23-24 april. Deze meteoren werden vanaf het beeldscherm overgetekend op de gnomonische sterrenkaarten. De Lyridenradiant sprong er toen direct uit (16 Lyriden).

Aan een nauwkeuriger manier van verwerken wordt momenteel gewerkt door ons. Het ligt in de bedoeling om alle data via een P.C. softwarematig te gaan verwerken. Naast al de nuttige informatie die wij op deze manier kunnen vergaren, is het ook wel eens leuk mooie meteoren eens in de "herhaling" te zien!

Al met al was het voor ons nog niet zo'n slechte campagne, vooral dank zij de vele video-meteoren!

Erratum

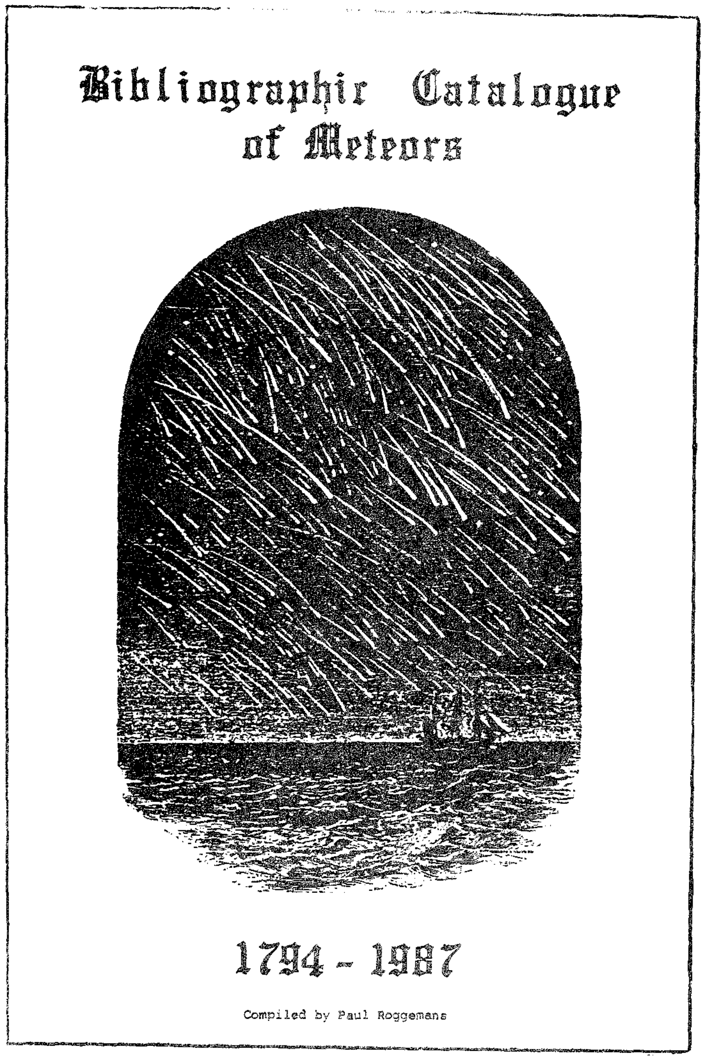
Jeroen Van Wassenhove pointed out to us that some explanation about Figure 1 on p. 115 in *WGN 15:4* (august) in "Reflection Duration Determination: An Experiment" by Christian Steyaert, is missing. Please note that the squares in this figure are data of Luc Gobin, the diamonds are data of Maurice De Meyere and the plus-signs are data of Jeroen Van Wassenhove.

We apologize if this omission should have caused any inconvenience to the reader in understanding the article.

New Publication

Bibliographic Catalogue of Meteors

compiled by Paul Roggemans



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Short Note

While already typing the last pages for this issue, we received an important message from Casper ter Kuile. The International Meteor Weekend of 1988 will take place in "Erve Het Hulsbeek" in Oldenzaal from Friday March 25 till Sunday March 27. The price will be 70 Dutch Guildens and includes the stay and all meals. Payments can be made on postal giro account 5227412 of Casper ter Kuile, De Bilt, the Netherlands, mentioning IMC-88 befor January 31, 1988. The language of the Meteor Weekend will be English. In the next issue of WGN, we hope to give you more detailed information on this meteor weekend that will undoubtfully continue the tradition of successful meteor weekends that goes on for quite some years now!

(communicated by Frank Witte, Mark van Rossum and Casper ter Kuile,
Enschedesestraat 105
NL-7551 EK Hengelo, the Netherlands
phone: (31)(0)74-422459 (weekends only)
)

VVS-Meteor Section

Radio Subsection: Annual Report 1986

Jeroen Van Wassenhove

1986 was a splendid year for the Radio Subsection. Seven observers gathered more than 15 000 meteor reflections, which is a doubling in comparison with 1985.

Table 1 --- Listing of meteor observers (radio work)

Observer	Init.	T (tot)	Number of meteor reflections
Maurice De Meyere	MDM	$132^h\ 30^m$	2995
Dirk Eeckhaut	DE	$28^h\ 56^m$	1135
Luc Gobin	LG	$34^h\ 48^m$	2484
Lieven Philips	LP	$03^h\ 02^m$	27
Johan Smet	JS	$42^h\ 11^m$	3645
Christiaan Steyaert	CS	$84^h\ 23^m$	1313
Jeroen Van Wassenhove	JVW	$78^h\ 55^m$	3616

Table 2 --- Geographic locations of meteor observing sites

Loc.	Observer	Observing site	λ(E)	φ(N)
1	Luc Gobin	Mechelen	0429	5102
2	Christiaan Steyaert	Bottelare	034607	505758
3	Christiaan Steyaert	Puimichel (F)	060123	435842
4	Maurice De Meyere	Puimichel (F)	0601234	4358415
5	Jeroen Van Wassenhove	Puimichel (F)	060123	435841
6	Jeroen Van Wassenhove	Nazareth	033546	505736
7	Johan Smet	De Pinte	033852	510003
8	Lieven Philips	Dendermonde	040737	510127
9	Dirk Eeckhaut	Eke	034012	505801
10	Maurice De Meyere	St.-Martens-Latem	0337005	505955

Explanation of table 3

Antenna

Nr: number of reflectors
Nd: number of directors
Pol: polarization. There are three possibilities :
- H : Horizontal
- V : Vertical
- C : Circular

Hag: height above the ground of the antenna, measured from the dipole. Unit = meter (m).
Note: if the antenna is circular polarised, Nr and Nd must be doubled.

Cable

Type: this can be coax (c) or twin-lead (t).
Imp: impedance of the used cable. Unit = Ohm (Ω).
L: length of the cable, expressed in meters.
Am: indicator if an amplifier is used or not.

Rec: Receiver. There are 9 possibilities:
- G : Grundig Satellit 300A
- M : Marantz ST 300 L
- N : Nordmende
- O : own design
- R : R 2000
- Sa : Sanyo DXT 5502 LV
- So : Sony ICF 7600 D
- T : Toshiba
- Y : Yeasu FRG 9600

Fd: Frequency-display. A : Analogue.
D : Digital.

Table 3 --- List of the used equipments

Number of Equipment	Antenna (Yagi) Nr	Nd	Pol	Hag	Cable Type	Imp	L	Am	Rec	Fd
1	1	2	H	8.0	C	60	10.0	No	Y	D
2	1	2	C	3.0	C	60	12.0	No	T	A
3	1	2	C	3.0	C	60	12.0	No	R	D
4	1	2	C	3.0	C	60	12.0	Yes	Y	D
5	1	2	C	3.0	C	60	12.0	Yes	O	A
6	1	3	V	1.0	C	75	20.0	No	T	A
7	1	3	C	1.5	C	75	12.0	Yes	T	A
8	1	3	H	10.0	C	60	4.0	No	O	A
9	1	2	H	10.0	C	60	1.0	Yes	O	A
10	1	3	H	4.0	C	60	6.5	No	Sa	A
11	1	2	H	8.0	C	60	10.0	No	Y	D
12	1	2	H	10.0	C	60	10.0	Yes	Y	D
13	1	4	C	3.5	C	60	9.0	No	So	D
14	1	3	C	3.7	C	60	7.0	No	M	A
15	1	3	C	4.5	C	75	7.0	No	M	A
16	1	4	C	0.7	C	75	1.0	No	So	D
17	1	4	C	0.7	T	240	1.5	No	So	D
18	1	4	C	6.7	T	240	5.3	No	N	A
19	1	4	C	6.7	T	240	5.3	No	G	D
20	1	4	C	0.75	T	240	4.75	No	G	D

Table 4 --- List of observations. (raw data ! radio)

Date (1986)	B.T. (UT)	E.T. (UT)	Obs.	Freq. (Mhz)	Eq.	Loc.	N
Jan 01	13^h30^m	15^h00^m	CS 1	88.30	13	2	4
01	01 00	03 00	JVW 1	88.50	18	6	26
02	01 00	03 00	JVW 2	88.50	18	6	35
03	01 00	03 00	JVW 3	88.50	18	6	40
04	01 00	03 00	JVW 4	88.50	18	6	53
05	00 11	01 11	CS 2	88.30	13	2	5
Feb 28	20 00	20 35	JVW 5	88.30	18	6	0
28	20 35	21 00	JVW 5	88.50	18	6	1
Mar 07	20 00	20 30	JVW 6	88.50	19	6	1
10	21 22	22 22	JS 1	72.11	11	7	78
12	20 54	21 54	JS 2	72.11	11	7	76
15	21 35	22 35	JS 3	72.11	11	7	87
15	19 02	20 00	JVW 7	91.10	19	6	3
16	20 00	21 00	MDM 1	72.11	2	10	17

Table 4 --- continued

Date (1986)	B.T. (UT)	E.T. (UT)	Obs.	Freq. (Mhz)	Eq.	Loc.	N
Mar 16	21 47	22 47	JS 4	72.11	11	7	82
18	20 00	21 30	MDM 1	72.11	2	10	23
18	21 02	22 02	JS 5	72.11	11	7	60
19	21 54	22 54	JS 6	72.11	11	7	69
21	20 00	21 00	MDM 2	72.11	2	10	15
22	19 00	20 00	JVW 8	88.30	19	6	2
22	20 30	21 00	CS 3	88.30	13	2	3
23	21 21	22 21	JS 7	72.11	11	7	39
24	20 23	21 23	JS 8	72.11	11	7	64
28	20 00	21 00	MDM 3	72.11	2	10	19
28	20 00	21 00	JS 9	72.11	11	7	39
29	20 00	21 00	CS 3	88.30	13	2	4
29	19 51	20 51	JS 9	72.11	11	7	27
29	20 00	21 00	JVW 9	88.30	19	6	8
30	19 16	20 16	JS 10	72.11	11	7	27
31	19 05	20 00	MDM 3	72.11	2	10	9
Apr 01	19 58	21 00	MDM 4	72.11	2	10	19
07	21 19	22 19	JS 18	72.11	11	7	32
19	04 00	05 00	JVW 13	88.30	19	6	12
19	20 15	21 15	JS 17	72.11	11	7	32
20	06 15	07 15	MDM 5	72.11	2	10	6
20	07 36	09 00	MDM 5	72.11	2	10	3
20	10 50	11 50	JS 16	72.11	11	7	40
20	20 55	21 55	JS 15	72.11	11	7	43
20	22 22	22 37	CS 4	88.30	13	2	0
20	22 37	23 07	CS 4	88.40	13	2	3
20	04 00	05 00	JVW 12	88.30	19	6	14
21	05 38	06 38	JS 14	72.11	11	7	33
21	20 30	21 30	JS 30	72.11	11	7	42
21	09 04	10 12	CS 4	88.30	13	2	0
21	04 00	05 00	JVW 11	88.30	19	6	11
22	04 00	05 45	MDM 5	72.11	2	10	9
22	05 55	07 55	MDM 5	72.11	2	10	11
22	06 40	07 40	JS 12	72.11	11	7	89
22	10 54	11 15	JS 11	72.11	11	7	33
22	04 00	05 00	JVW 10	88.30	19	6	18
23	04 00	05 00	JVW 14	88.30	19	6	13
May 01	06 45	08 00	MDM 8	72.11	2	10	42
01	08 20	09 20	JS 31	72.11	11	7	124
02	07 25	08 25	CS 33	95.30	13	2	5
02	20 20	21 20	DE 4	72.11	1	9	34
02	08 37	09 37	CS 33	95.30	13	2	8
02	05 41	06 41	JS 30	72.11	11	7	95
03	06 45	08 00	MDM 7	72.11	2	10	36
03	07 29	08 29	CS 33	95.30	13	2	15
03	08 08	09 19	JS 29	72.11	11	7	153
03	08 38	09 38	CS 33	95.30	13	2	9
03	14 05	14 45	JS 28	72.11	11	7	23
04	06 45	08 00	MDM 6	72.11	2	10	60
04	07 45	08 54	CS 34	95.30	13	2	7
04	18 09	18 36	DE 4	72.11	1	9	9
04	08 58	09 58	CS 34	95.30	13	2	10
04	06 45	07 45	JS 27	72.11	11	7	149

Table 4 --- continued

Date (1986)	B.T. (UT)	E.T. (UT)	Obs.	Freq. (MHz)	Eq.	Loc.	N
May 04	08^h00^m	09^h00^m	JS 26	72.11	11	7	146
05	05 00	06 00	JS 25	72.11	11	7	216
05	19 34	20 08	JS 22	72.11	11	7	20
05	19 30	20 07	DE 3	72.11	1	9	31
06	05 23	06 50	MDM 11	72.11	3	10	15
06	06 20	07 20	JS 24	72.11	11	7	168
06	19 34	20 04	JS 21	72.11	11	7	12
06	19 30	20 04	DE 2	72.11	1	9	22
07	21 25	21 40	JS 20	72.11	11	7	11
07	07 15	08 03	DE 1	72.11	1	9	56
07	19 47	20 25	JVW 38	88.30	19	6	1
08	06 27	08 00	MDM 10	72.11	11	7	35
08	13 16	14 16	JVW 38	88.30	19	6	6
08	08 02	09 02	JS 23	72.11	11	7	124
08	14 20	15 20	JVW 38	90.05	19	6	6
09	06 15	06 45	JS 19	72.11	11	7	76
10	06 45	07 15	MDM 10	72.11	3	10	7
11	06 58	07 35	MDM 9	72.11	3	10	7
15	08 30	09 05	MDM 12	72.11	4	10	21
15	10 40	11 40	MDM 12	72.11	4	10	15
16	08 15	09 15	MDM 12	72.11	4	10	7
Jul 06	09 27	10 30	MDM 13	72.11	2	10	9
07	09 35	10 35	MDM 13	72.11	2	10	9
09	09 27	10 27	MDM 13	72.11	2	10	12
10	09 30	10 30	MDM 14	72.11	2	10	16
10	09 30	10 30	MDM 14	72.11	2	10	16
11	09 30	10 30	MDM 14	72.11	2	10	10
11	18 00	19 00	JVW 15	88.30	19	6	3
12	09 30	10 30	MDM 14	72.11	2	10	16
12	18 00	19 00	JVW 15	88.30	19	6	3
13	09 28	10 20	MDM 14	72.11	2	10	10
14	09 24	10 24	MDM 15	72.11	2	10	5
15	09 27	10 27	MDM 15	72.11	2	10	16
16	09 05	10 35	MDM 15	72.11	4	10	27
17	09 30	10 30	MDM 16	72.11	4	10	21
18	09 30	10 00	MDM 16	72.11	3	10	8
23	20 30	21 30	MDM 16	72.11	2	10	0
24	20 00	20 15	MDM 16	72.11	3	10	0
24	20 20	21 05	MDM 16	72.11	3	10	11
25	11 00	12 00	MDM 17	72.11	2	10	14
25-26	23 00	01 00	JVW 16	88.30	19	6	25
25	20 30	22 00	MDM 17	72.11	2	10	19
26	20 45	21 45	MDM 21	72.11	2	10	35
26	20 45	21 45	JS 32	72.11	12	7	70
27	20 10	21 45	MDM 18	72.11	6	10	61
27	21 00	22 00	DE 5	72.11	1	9	15
28	20 15	21 45	MDM 19	72.11	2	10	59
28	21 00	22 00	DE 6	72.11	1	9	22
28	21 01	22 01	JS 33	72.11	12	7	72
29	20 45	22 00	MDM 20	72.11	2	10	27
29	21 00	22 00	DE 7	72.11	1	9	23
30	20 20	22 00	MDM 22	72.11	2	10	65
30	21 02	22 02	JS 34	72.11	12	7	65
30	21 00	22 00	DE 8	72.11	1	9	18

Table 4 --- continued

Date (1986)	B.T. (UT)	E.T. (UT)	Obs.	Freq. (MHz)	Eq.	Loc.	N
Jul 31	20^h12^m	22^h00^m	MDM 23	72.11	2	10	70
31	21 00	22 00	JS 35	72.11	12	7	83
31	21 00	22 00	DE 9	72.11	1	9	30
Aug 01	21 00	22 00	DE 10	72.11	1	9	67
01	20 20	22 00	MDM 24	72.11	2	10	67
01	19 00	19 59	LP 1	88.30	10	8	10
01	21 00	23 20	CS 5	88.30	15	2	26
01	19 00	20 00	JVW 17	88.30	19	6	6
02	21 00	22 00	DE 11	72.11	1	9	29
02	20 45	21 45	MDM 25	72.11	2	10	47
02	23 25	23 55	CS 6	88.30	15	2	7
03	21 00	22 00	DE 12	72.11	1	9	26
03	20 30	21 00	MDM 26	72.11	2	10	70
03	10 30	11 00	CS 7	88.35	14	2	0
03	22 00	24 00	CS 7	87.65	14	2	26
03	09 40	10 10	LG 1	66.74	8	1	13
04	20 30	22 00	MDM 27	72.11	2	10	81
04	17 20	17 30	LG 2	66.74	8	1	2
04	21 00	22 00	DE 13	72.11	1	9	41
04	21 00	22 00	JS 36	72.11	12	7	113
04	10 40	11 40	CS 8	87.65	14	2	4
04	22 00	24 00	CS 8	87.65	14	2	54
05	20 30	22 00	MDM 28	72.11	2	10	98
05	22 12	23 33	LP 2	91.20	10	8	11
05	21 00	22 00	DE 14	72.11	1	9	44
05	20 59	21 59	JS 37	72.11	12	7	104
05	10 30	11 30	CS 9	87.65	14	2	11
05	22 00	24 00	CS 9	87.65	14	2	39
06	21 00	22 00	DE 15	72.11	1	9	42
06	21 20	22 20	JS 38	72.11	12	7	98
06	20 30	22 00	MDM 29	72.11	2	10	87
06	10 35	11 35	CS 10	87.65	14	2	12
06	22 00	24 00	CS 10	87.65	14	2	67
06	20 30	23 00	JVW 28	87.70	20	5	55
07	20 30	22 00	MDM 30	72.11	2	10	61
07	17 30	18 00	LG 3	66.17	8	1	8
07	21 00	22 00	DE 16	72.11	1	9	45
07	20 45	21 45	JS 39	72.11	12	7	87
07	10 40	11 19	CS 11	87.60	14	2	14
07	09 27	10 27	JVW 18	94.50	20	5	13
07	10 45	13 00	JVW 18	94.50	20	5	51
07	22 00	24 00	CS 11	87.65	14	2	46
07	20 00	23 00	JVW 29	87.70	20	5	36
08	20 30	22 00	MDM 31	72.11	2	10	29
08	17 26	18 00	LG 4	66.74	8	1	5
08	21 00	22 00	DE 17	72.11	1	9	35
08	10 33	11 30	CS 12	87.65	14	2	10
08	22 00	24 00	CS 12	87.65	14	2	38
08	10 00	13 00	JVW 19	94.50	20	5	484
08	20 00	23 00	JVW 30	87.70	20	5	90
09	20 30	22 00	MDM 32	72.11	2	10	68
09	22 19	23 01	LP 3	91.40	10	8	6
09	21 00	22 00	DE 18	72.11	1	9	30
09	21 00	22 00	JS 45	72.11	12	7	85
09	10 33	11 33	CS 13	87.65	14	2	7

Table 4 --- continued

Date (1986)	B.T. (UT)	E.T. (UT)	Obs.	Freq. (Mhz)	Eq.	Loc.	N
Aug 09	22 00	24 00	CS 13	87.65	14	2	37
09	10 00	13 00	JVW 20	94.50	20	5	94
09	20 00	23 00	JVW 31	87.70	20	5	138
10	20 30	22 00	MDM 33	72.11	2	10	41
10	21 00	22 00	DE 19	72.11	1	9	56
10	20 48	21 48	JS 40	72.11	12	7	62
10	10 31	11 30	CS 14	88.40	14	2	18
10	22 00	24 00	CS 14	87.65	14	2	56
10	10 00	13 00	JVW 21	94.50	20	5	145
10	20 00	23 00	JVW 32	87.70	20	5	247
11	20 30	22 00	MDM 34	72.11	2	10	55
11	21 00	22 00	DE 20	72.11	1	9	53
11	21 00	22 00	JS 41	72.11	12	7	96
11	10 37	11 38	CS 15	87.65	14	2	17
11	22 00	24 00	CS 15	87.65	14	2	45
11	10 00	13 00	JVW 22	94.50	20	5	303
12	20 30	22 00	MDM 35	72.11	2	10	92
12	01 03	01 33	LG 5	72.30	8	1	21
12	11 27	11 58	LG 5	72.30	8	1	15
12	20 48	21 48	JS 42	72.11	12	7	140
12	21 00	22 00	DE 21	72.11	1	9	67
12	10 30	11 30	CS 16	87.65	14	2	9
12	22 00	24 00	CS 16	87.65	14	2	118
12	10 00	13 00	JVW 23	94.50	20	5	313
12	20 00	23 00	JVW 33	87.70	20	5	378
12	20 30	22 00	MDM 36	72.11	2	10	84
13	01 03	01 22	LG 6	72.11	8	1	5
13	21 00	22 00	DE 22	72.11	1	9	51
13	20 47	21 47	JS 4	72.11	12	7	114
13	10 41	11 41	CS 17	87.65	14	2	12
13-14	22 02	00 02	CS 17	87.65	14	2	75
13	10 00	13 00	JVW 24	94.50	20	5	297
14	20 30	22 00	MDM 37	72.11	2	10	43
14	20 49	21 49	JS 44	72.11	12	7	77
14	21 00	22 00	DE 23	72.11	1	9	37
14	10 37	11 37	CS 18	87.65	14	2	11
14	21 46	24 00	CS 18	87.65	14	2	33
14	10 00	13 00	JVW 25	94.50	20	5	196
14	20 30	23 00	JVW 34	87.70	20	5	163
15	21 00	22 00	DE 24	72.11	1	9	32
15	21 55	23 55	CS 19	87.65	14	2	40
15	10 00	13 00	JVW 26	94.50	20	5	90
15	20 00	23 00	JVW 35	87.70	20	5	109
16	21 00	22 00	DE 25	72.11	1	9	19
16	10 00	13 00	JVW 27	94.50	20	5	110
Oct 06	21 00	22 00	MDM 38	72.11	2	10	0
07	21 18	22 00	MDM 38	72.11	2	10	0
08	10 00	11 00	MDM 38	72.11	2	10	0
08	15 15	16 00	MDM 38	72.11	5	10	0
08	21 00	22 00	MDM 39	72.11	5	10	1
12	21 13	21 45	MDM 40	72.11	5	10	6
15	18 00	18 45	MDM 41	72.11	2	10	5
16	10 00	11 00	MDM 42	72.11	2	10	10
20	07 00	08 00	MDM 43	72.11	2	10	29

Table 4 --- continued

Date (1986)	B.T. (UT)	E.T. (UT)	Obs.	Freq. (Mhz)	Eq.	Loc.	N
Oct 21	07 00	08 00	MDM 44	72.11	2	10	29
22	07 00	08 00	MDM 45	72.11	2	10	31
23	07 00	08 00	MDM 46	72.11	2	10	27
24	07 00	08 00	MDM 47	72.11	2	10	29
25	07 00	08 00	MDM 48	72.11	2	10	10
26	07 00	08 00	MDM 49	72.11	2	10	11
27	07 00	08 00	MDM 50	72.11	2	10	2
31-01	21 18	24 18	MDM 51	72.11	6	4	20
31-01	23 30	24 05	CS 20	87.70	17	3	7
Nov 01	13 00	14 00	CS 20	87.70	17	3	1
01	20 26	23 05	CS 20	87.70	17	3	8
01-02	23 29	01 00	CS 21	87.70	17	3	8
02	13 00	14 00	MDM 52	72.30	6	4	2
02	21 15	23 30	MDM 53	72.30	6	4	15
02	13 00	14 00	CS 21	87.70	16	3	2
02	21 30	21 51	CS 22	87.70	16	3	3
02	21 51	22 50	CS 22	94.50	16	3	6
03	13 23	14 23	MDM 54	72.30	6	4	7
03	20 07	24 00	MDM 54	72.30	6	4	48
03	13 00	14 00	CS 22	94.50	16	3	13
03	20 20	23 30	CS 23	94.50	16	3	32
04	12 51	13 54	MDM 55	72.30	6	4	6
04	20 18	23 30	MDM 55	72.11	6	4	30
04	13 00	14 00	CS 23	94.50	16	3	10
04	20 31	22 39	CS 24	94.50	16	3	22
04	22 43	23 30	CS 24	94.50	16	3	9
05	12 30	14 00	MDM 56	72.11	6	4	7
05	20 35	23 35	MDM 56	72.11	6	4	19
05	12 40	14 02	CS 25	94.50	16	3	17
05	20 30	23 30	CS 25	94.50	16	3	26
06	12 45	14 00	MDM 57	72.11	6	4	11
06	12 45	14 00	CS 26	94.50	16	3	6
06	20 35	23 45	CS 26	94.50	16	3	51
12	18 00	18 45	MDM 57	72.11	2	10	12
18	17 39	18 39	MDM 57	72.11	2	10	23
19	17 44	18 44	MDM 58	72.11	2	10	27
20	17 40	18 40	MDM 58	72.11	2	10	25
21	17 40	18 40	MDM 59	72.11	2	10	22
23	17 35	18 35	MDM 59	72.11	2	10	17
24	17 35	18 35	MDM 60	72.11	2	10	31
26	17 35	18 35	MDM 60	72.11	2	10	23
30	17 35	18 35	MDM 61	72.11	2	10	17
Dec 02	20 02	20 32	LG 7	72.11	9	1	19
03	17 35	18 35	MDM 61	72.11	7	10	21
03	20 01	20 35	LG 8	72.11	9	1	18
04	17 35	18 35	MDM 62	72.11	7	10	24
04	20 15	20 46	LG 9	72.11	9	1	26
05	17 35	18 35	MDM 62	72.11	7	10	22
05	19 58	20 32	LG 10	72.11	9	1	23
06	20 06	20 36	LG 11	72.11	9	1	19
07	17 30	18 30	MDM 63	72.11	7	10	21
07	09 02	10 02	LG 12	66.17	9	1	101
07	20 00	21 00	LG 13	72.11	9	1	58
08	17 30	18 30	MDM 63	72.11	7	10	25

Table 4 --- continue

Date (1986)	B.T. (UT)	E.T. (UT)	Obs.	Freq. (Mhz)	Eq.	Loc.	N
Dec 08	19 58	21 00	LG 14	72.11	9	1	65
08	20 00	20 30	DE 26	72.11	1	9	22
09	17 30	18 30	MDM 64	72.11	7	10	12
09	19 59	21 00	LG 15	72.11	9	1	62
09	20 00	20 30	DE 27	72.11	1	9	23
10	21 00	22 00	MDM 65	72.11	7	10	41
10	19 59	21 00	LG 16	72.11	9	1	57
10	21 28	22 30	LG 17	72.11	9	1	149
10	20 00	20 30	DE 28	72.11	1	9	24
11	21 00	22 00	MDM 66	72.11	7	10	29
11	20 00	21 00	LG 18	72.11	9	1	63
11	21 30	22 30	LG 19	72.11	9	1	165
11	20 00	20 30	DE 29	72.11	1	9	34
12	21 00	22 00	MDM 67	72.11	7	10	73
12	20 00	21 00	LG 20	72.11	9	1	62
12	21 30	22 30	LG 21	72.11	9	1	175
12	20 00	20 30	DE 30	72.11	1	9	53
12	21 38	22 40	CS 27	91.10	13	2	22
13	21 12	22 12	MDM 68	72.11	7	10	98
13	20 00	21 00	LG 22	72.11	9	1	76
13	21 30	22 30	LG 23	72.11	9	1	190
13	21 07	22 38	CS 28	91.10	13	2	70
13	21 08	21 18	JVW 36	88.30	19	6	17
14	21 00	22 00	MDM 69	72.11	7	10	21
14	20 00	21 00	LG 24	72.11	9	1	49
14	21 30	22 30	LG 25	72.11	9	1	132
14	12 00	13 00	CS 29	91.10	13	2	11
14	21 03	22 30	CS 30	91.10	13	2	56
14	20 00	20 30	DE 31	72.11	1	9	55
14	19 26	19 50	JVW 37	88.30	19	6	13
15	21 03	22 03	MDM 70	72.11	7	10	55
15	20 00	21 00	LG 26	72.11	9	1	24
15	21 30	22 30	LG 27	72.11	9	1	82
15	20 00	20 30	DE 32	72.11	1	9	22
16	21 00	22 00	MDM 71	72.11	7	10	33
16	20 00	20 30	DE 33	72.11	1	9	14
17	21 00	22 00	MDM 72	72.11	7	10	43
17	20 00	20 30	DE 34	72.11	1	9	9
19	19 30	20 30	LG 28	66.17	9	1	60
20	19 30	20 31	CS 31	91.10	13	2	13
20	19 30	20 30	LG 29	66.17	9	1	68
21	19 30	20 32	LG 30	66.17	9	1	69
22	19 30	20 30	LG 31	66.17	9	1	176
23	19 28	20 30	LG 32	66.17	9	1	65
26	14 29	15 05	LG 33	66.17	9	1	29
26	21 00	22 00	MDM 73	72.11	7	10	37
26	14 01	14 23	LG 32	66.17	9	1	19
27	21 00	22 00	MDM 74	72.11	7	10	30
28	14 00	15 00	LG 34	66.17	9	1	38
28	21 00	22 00	MDM 75	72.11	7	10	25
28	19 30	20 30	LG 35	66.17	9	1	52
28	21 30	22 30	LG 36	66.17	9	1	74
29	21 00	22 00	MDM 76	72.11	7	10	14
30	14 00	15 00	LG 38	66.17	9	1	47
31	23 00	24 00	CS 32	91.10	13	2	14
31	14.00	15.00	LG 39	66.17	9	1	50

Conclusion

1986 was a splendid year for the Radio Subsection. Seven observers gathered more than 15 000 meteor reflections. This is a doubling in comparison with 1985. 1986 is featured by the following points:
- 90% of all meteor showers were covered. No radio observations were carried out in September and only two in February;
- An outburst of meteor activity was registered on August 8, between 10^h and 13^h UT.
- The Ursids showed a very high activity on December 21.

Many thanks to all observers!

WGN: Subscriptions 1988

Marc Gyssens

The subscription rate for volume 16 (1988) of *WGN* is unchanged 300 BEF for 6 issues (about 200 pages). You help us a lot by renewing early. Since the interest in *WGN* from abroad has increased considerably, we have relaxed our payment policy to some extent. Also we included the possibility for airmail delivery to non-European countries. Since it is our policy to keep the charges for *WGN* as low as possible, it is crucial to us that, after deduction of banking and/or exchange costs, we retain 300 BEF (+ airmail charges, if applicable). Therefore we ask you to read carefully the following instructions.

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Finally, in order to avoid misunderstands in our administration, we ask all non-Benelux members to fill out the form enclosed in this issue of *WGN*. Also, you can help us to further improve *WGN* by paying something extra. We included room for that on the form. Thank you in advance!

Comet 1944 I and the Nov Monocerotids

B.A. Lindblad, Lund Observatory

In this article the association between comet van Gent-Peltier-Daimaca (1944I) and the November Monocerotids is investigated. This association is finally confirmed by visual observations in 1985.

Comet van Gent-Peltier-Daimaca (1944 I) was discovered independently by van Gent at Johannesburg, Peltier at Delphos and Daimaca at Targul Siv. The comet passed through perihelion on Jan. 12, 1944. It approaches the Earth's orbit to within 0.037 A.U. Comet 1944 I has therefore been recognized as a possible parent comet for a meteor stream (Hoffmeister 1948, Hasegawa 1958, Drummond 1981). Hasegawa predicted a meteor shower on Nov. 20 with a theoretical radiant at $\alpha = 132°$, $\delta = -8°$ and a geocentric velocity of 67 km/s.

An intense, very short meteor shower was recorded by visual observers on Nov. 21-22, 1925 (Olivier 1926). The observed radiant position was in accord with the theoretical radiant published by Hoffmeister and Hasegawa. Ten years later, on Nov. 21, 1935, the same meteor shower was again reported (Olivier 1936). The meteor shower of Nov. 21, 1935 seems to have been one of the most conspicious meteor events observed in this century, with an hourly rate of 2000 or more (Kresak 1958). Discussing these observations Kresak (1958) identified the Nov. 20 showers as associated with comet 1944 I. Kresak emphasized that there are large discrepancies between the various radiant positions determined by the visual observers. With some hesitation he proposed the name Monocerotids for this shower.

A 1985 recurence of the November Monocerotid stream has recently been reported (*WGN 15:2*). Adams (1986) summarizes visual observations in the USA. The shower was of very short duration, with the principal activity confined to less than 1 hour. The time of maximumactivity is reported as Nov. 21.486 UT, which corresponds to solar longitude 238°62 (equinox 1950.0). The solar longitude at maximum activity agrees well with Kresak's value for the 1925 and 1935 showers (238°7). It is evident that visual observers now have finally confirmed the association between comet 1944 I and the meteor shower of Nov. 20.

Because of the unexpected appearance of the Nov. 20-21 meteor shower the radiant is still not well determined. Observations in 1935 gave a radiant at $\alpha = 110°$, $\delta = -5°$, which places the radiant in Monoceros (Olivier 1936). The 1985 observations (Capitola, California) gave a radiant at $\alpha = 109°$, $\delta = -7°$ ($\pm 5°$), which is near to α Monoceros. Several authors have therefore named the shower "Monocerotids". The designation Monocerotids is however, not suitable since it is already in general use for a meteor shower in December. The December Monocerotids stream is a well known reccurent stream appearing in the period 10-17 December. It is associated with comet 1917 I (Whipple 1954, Lindblad 1971). It has been observed both photographically and by radar. The present writer suggests that the November 20 meteor shower associated with comet 1944 I be called the November Monocerotids to distinguish between the two streams.

Comet 1944 I moves in a parabolic, retrograde orbit. This poses an interesting question : how is it possible for a long periodic comet to give rise to extremely concentrated meteor streams which have been observed 18 and 8 years before perihelion passage as well as 42 years after perihelion passage of the parent comet ?

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On the Perseid Meteor Stream (I)

Magnitude Data

Paul Roggemans

Visual observations yielded 36 876 magnitude estimates of which 11 320 were sporadics and 21 148 were Perseids. Sufficiant numbers of meteor estimates were available for the Perseids from July 29-30 until August 16, inclusive, to study mass distribution variations from day to day. The mass distribution within the Perseid cross section 1986 was quite different from 1985. A remarkable increment in faint Perseids was found for August 8-9, 1986. The 1986 Perseids were remarkably strong in faint meteors during the whole activity period.

1. Introduction

Since the publication last year of the Perseid observational results 1985, another succesful year with large numbers of Perseids reported passed by. The article (1) with the analysis of the 1985 data caused a lot of response and many more observers promised to send in their 1986 data. Unfortunately, the geographical distribution of the observers around the world did not improve. Europe produced more observational data than ever before, while few American and Japanese observing reports reach our headquarter. European data is very easely analysed in one common analysis as all groups in Europe use the same reporting format. The European reports came from :

France: a group of VVS members, together with two dutch observers of the Harderwijk team and the director of the BAA Meteor Section executed an extensive observing program in the Haute Provence. They contributed with the largest part of data.

Belgium: about 30 observers contributed to the study.

G.D.R.: Several experienced meteor observers sent their reports to Jürgen Rendtel who transferred the interesting reports to me. Finally it turned out to be the largest contribution after the report from the France meteor camp.

Finland: URSA Meteor Section; Teemu Hankamäki sent in a complete report of the Finish observations.

Denmark: Per Aldrich sent us a detailed report of the Danish summer observations.

Norway: The Norvegian Meteor Section prepared a very detailed report containing all the observational results of their members.

Italy: The IAU Meteor Section provided us with a preliminary report on their observing results.

For America we regret to have only two reporting meteor observers. Few observers outside Europe observe in order to calculate ZHR values. Therefore the observational data is presented in another format, so that it is difficult or in some cases impossible to compare or to use the data. The same problem occurs with the Japanese observations. They explained their observing method and ZHR definition, and these are quite different from the European standard. Beside no magnitude distributions are available from Japanese observers.

The observers, not listed in *WGN 15:3*, pp. 76-77, and whose data were used are mentioned here:
Koen Miskotte (F), Bauke Rispens (F), Andreas Krawietz (DDR), Rainer Arlt (DDR), Pierre Bader (DDR), Petra Baldauf (DDR), André Knöfel (DDR), Ralf Koschack (DDR), Ina Rendtel (DDR), Jürgen Rendtel (DDR), Ulrich Sperberg (DDR), Øyvind Grandum (N), Finn Gundersen (N), Kai Gaarder (N), Lars Trygve Heen (N), Trond Erik Hillestad (N), Kai stokkeland (N), Eltri Maurizio (It), Rossani Livio (It), Scarpa Napoleone (It), Stomeo Enrico (It), Stomeo Stefano (It), Trizio Emiliano (It), Per T. Aldrich (DK), Peter B. Pearson (DK), Norman Mc Leod (USA), Wanda Simmons (USA), Karl Simmons (USA), Robert Lunsford (USA), Pekka Parviainen (Finland), Teemu Hankamäki (Finland),...

We are grateful to these observers for their observing reports and we hope that even more observers will contribute to future observing reports.

2. Magnitude Distributions

One of the most interesting features of visual meteor observations is to estimate the apparent magnitude of meteors. The magnitude is related to the mass of the meteoroid; a shower rich in bright meteors will be produced by larger meteoroids than a fainter shower, assuming the geocentric velocity to be the same. Within a meteor streams, it is possible that filaments of different meteoroid mass are superimposed. Each year, we are able to study one cross-section of the stream as the Earth traverses the meteor stream. For some showers researchers could confirm mass variations throughout the stream. For instance the Geminid core consists of brighter meteors, observable after a strong ascending branch produced by fainter shower members. Also for the Perseids, mass-size variations were reported, but not confirmed in succesive years. For example in 1980, the maximum night 11-12 August turned out to be remarkable rich in brighter Perseids. In 1985, the nights prior to the maximum night were more abundant in bright Perseids while from 11 August on, the fainter Perseids proportionally became stronger, equalling the sporadic background mass distribution from 15 August onwards. One of the questions for the 1986 data was whether or not this feature would be repeated this year.

As like in 1985, the vast amount of magnitude estimates was obtained by the observing team in the South of France. The observations were reported in summary report-format, so we had magnitude distributions available per observer, per shower and per night. Next these magnitude distributions were accum lated per shower, per night for all observers. Finally sufficient numbers of meteors were available for all nights July 28-29 until August 15-16. The observing project succesfully covered a much longer period than the 1985 event (6-16 August). The observational circumstances under which these magnitude distributions were obtained are nearly perfect, ruling out influences of weather. The sporadic magnitude distribution has been given for each night as well, in order to calibrate the magnitude distribution of the stream. Some nights observing conditions were above the usual standard perfect sky, therefore some differences occur in the sporadic magnitude distributions night by night. These differences will be reflected in both the sporadic and in the shower magnitude distributions. The effect of varying observing conditions can be eliminated by comparison of the shower magnitude data with the sporadic background.

Table 1 lists the total magnitude distribution per night for all observers. For each night we obtained the mean magnitudes, $\overline{m}_p$ for the Perseids and $\overline{m}_s$ for the sporadics, the difference $\Delta\overline{m}$ and the population indices r_p for the Perseids and r_s for the sporadics. These results were listed in table 2. To be compared with the results of 1985, the values of 1986 were drawn in three graphs. Figure 1 shows the variations in $\overline{m}$ night after night. It is clear that the sporadic $\overline{m}$ follows the Perseid $\overline{m}$ very well, indicating that the variations are due to circumstances that have nothing to do with the variations within the shower activity. Figure 2 shows $\Delta\overline{m}$. There is no trend except that Perseids become as faint as the sporadics after the maximum at the end of the activity period. This has been noted in 1985 too. The characteristics of 1985 weren't completely confirmed in 1986. The nights around 8-9 August produced more brighter Perseids in 1985 than in 1986. In 1986 the stream was slightly richer in bright meteors on the maximum night, compared with 1985. This is however not as strong as it was in 1980 (BAA Perseid report, (3)). The Perseids are in general rich in medium faint meteors and are deficient in really bright appearances such as Perseid fireballs.

Figure 3 shows the variations in r. Large fluctuations occur on the population index r, night after night. For sporadic meteors, r_s is always higher than r_p. The fluctuations on r_s are larger because r-values are more sensitive to statistical fluctuations. The high r-value of the Perseids is larger than r_s, $\Delta\overline{m}$ is rather small, 0.54. All the observers report exceptionally many faint Perseids in the night 8-9 August. The sporadic $\overline{m}$ = 3.84 is very close to the average of $\overline{m}$ = 3.82 of the sporadics indicating that the limiting magnitude wasn't better

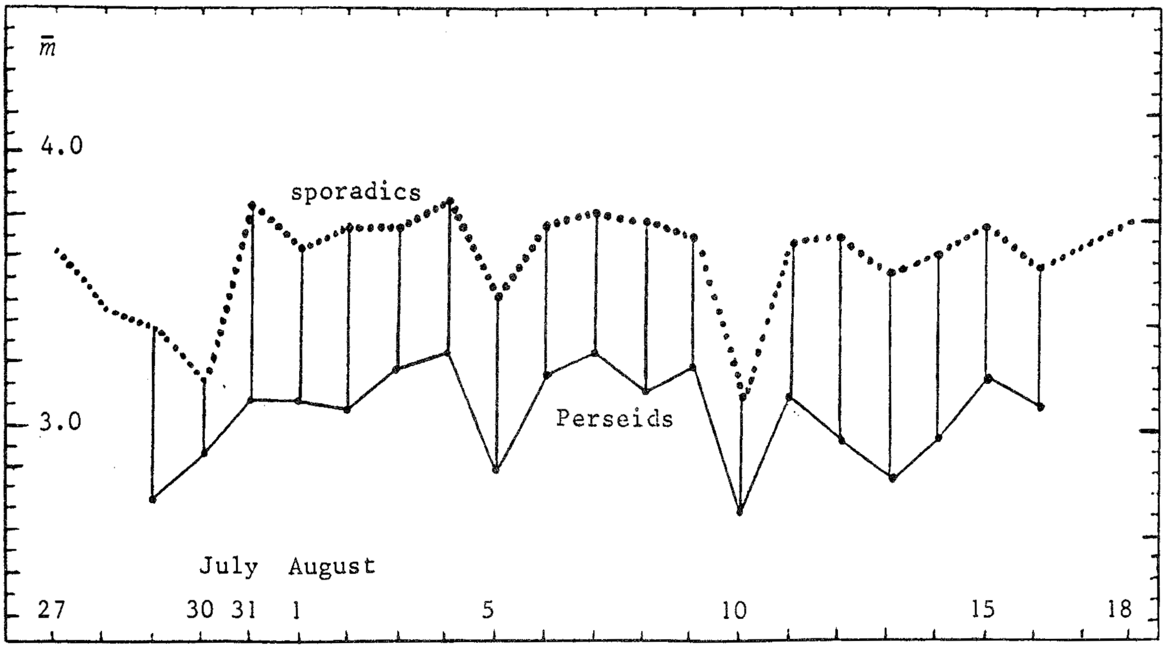

Figure 1 --- Variations in the mean magnitude night by night.

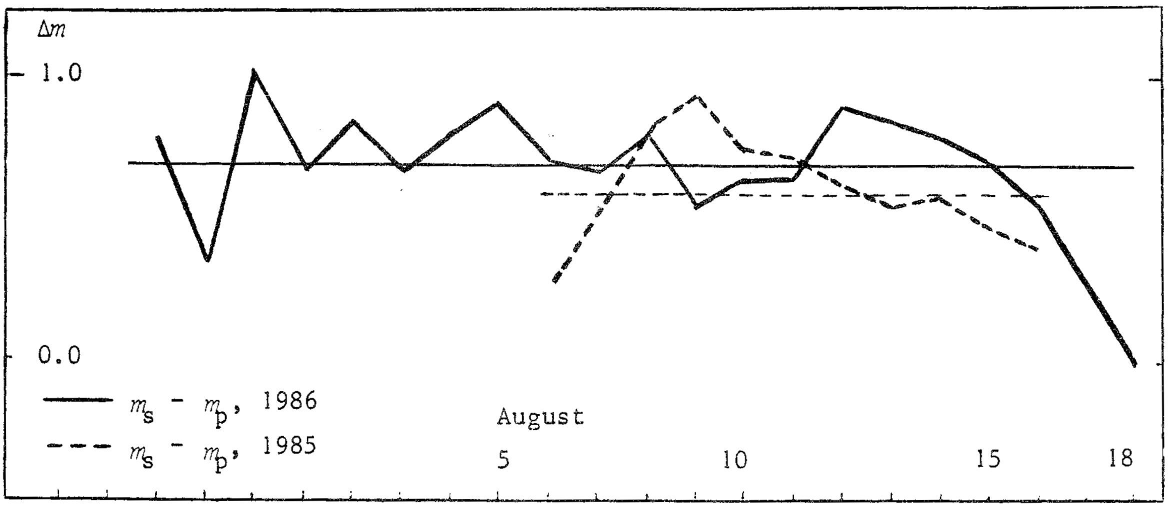

Figure 2 --- Variation in Δm night by night.

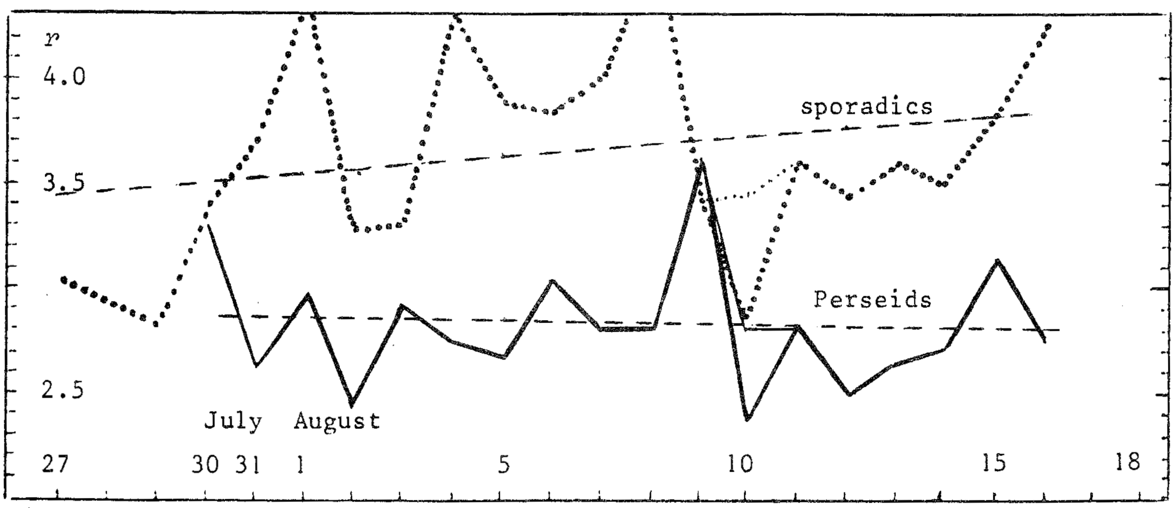

Figure 3 --- Variation in r night by night.

Table 1 --- Magnitude distributions 1986

Mag.	26–27 July p	s	27–28 July p	s	28–29 July p	s	29–30 July p	s	30–31 July p	s
−8	0	2	0	0	0	0	0	0	0	0
−7	0	0	0	0	0	0	0	0	0	0
−6	0	0	0	0	0	0	0	0	0	0
−5	0	0	0	0	0	0	0	0	0	0
−4	0	0	0	0	0	0	0	0	0	0
−3	0	0	0	0	0	0	0	0	0	0
−2	0	0	1	0	0	0	0	0	0	0
−1	1	1	0	0	0	2.5	0	0	2.5	1
0	0	1.5	0	0	0	2.5	0.5	2	3.5	4
+1	0	1.5	0	0	4.5	2.5	8.5	4.5	6.5	17
+2	1.5	4	0	0	8	10	10	17.5	13	26.5
+3	0.5	7.5	0	6.5	6	24	18.5	38	24	45
+4	0	13	0	3	3.5	21	15	34	14	56
+5	0	21.5	0	1.5	1	20.5	3.5	10.5	15.5	77
+6	0	11	0	0	1	3	0	0.5	4	69.5
Tot.	3	63	1	11	24	86	56	107	83	296
$\bar{m}$	–	3.82	–	–	2.65	3.45	2.88	3.22	3.13	4.16
$\overline{\Delta m}$	–		–		0.80		0.34		1.03	
r	–	3.04	–	–	1.99	3	3.29	3.41	2.63	3.72

Mag.	31 July – 1 Aug p	s	1–2 Aug p	s	2–3 Aug p	s	3–4 Aug p	s	4–5 Aug p	s
−8	0	0	0	1	0	0	0	0	0	0
−7	0	0	0	0	0	0	0	0	0	0
−6	0	0	0	0	0	0	0	0	0	0
−5	0	0	0	0	0	1	0	0	0	0
−4	0	0	0	0	0	0	0	0	0	0
−3	0	0	0	1	1	0	0	0	1	0
−2	0.5	0	5	1.5	0	2	0	1	1.5	1.5
−1	3	0.5	6.5	4	0.5	6	10	1.5	9.5	1.5
0	5.5	1.5	8	12.5	12.5	11	28.5	6.5	8.5	4.5
+1	8	6	24	32.5	48	43.5	44	20.5	23	10
+2	17	14.5	43.5	61.5	71.5	79	77.5	68.5	40.5	25
+3	32	53.5	63.5	83.5	92	126.5	108	130.5	70	70
+4	50	88	55	113	94	164	125	193	60	142
+5	15	52	33	133	67.5	170	103	225	25	79.5
+6	0	5	21.5	119.5	32	151	48	123.5	2	7
Tot.	131	221	260	564	419	754	544	770	241	341
$\bar{m}$	3.12	3.79	3.07	3.93	3.27	3.95	3.34	4.13	2.80	3.73
$\overline{\Delta m}$	0.67		0.86		0.68		0.79		0.93	
r	2.96	4.40	2.46	3.28	2.92	3.33	2.76	4.31	2.67	3.87

Mag.	5–6 Aug p	s	6–7 Aug p	s	7–8 Aug p	s	8–9 Aug p	s	9–10 Aug p	s
−8	0	0	0	0	0	0	0	0	0	0
−7	0	0	0	0	0	0	0	0	0	0
−6	0	0	0	0	0	0	0	0	0	0
−5	0	1	0	0	0	0	0	1	1	0
−4	0	0	1	0	0	0	1	0	0	0
−3	1	0	0	0	1.5	0	0	1	6	0
−2	5	1	7	0	3.5	0	1	0	13	3

Table 1 --- continued

Mag.	p	s	p	s	p	s	p	s	p	s
-1	8	4.5	15.5	3	8	0.5	2.5	4	24.5	10
0	17	6	28	10.5	6	3	24	8.5	38.5	24
+1	51	32	63	26	44	12	66.5	31	75.5	31
+2	127	76	123	87	95.5	46	140	54	129.5	85
+3	191	145	191	170	111	88.5	154.5	89	177.5	109
+4	176.5	255	213.5	286	113.5	118	161.5	152.5	154.5	147.5
+5	103.5	246.5	163	252	64.5	108.5	114	135	69.5	93
+6	44	84	67	122.5	32.5	54.5	65	70	11.5	18.5
Tot.	724	851	872	957	480	431	730	546	701	521
$\bar{m}$	3.24	3.95	3.35	4.02	3.17	3.97	3.30	3.84	2.61	3.22
$\Delta\bar{m}$	0.71		0.67		0.80		0.54		0.61	
r	3.04	3.84	2.80	4.01	2.81	4.65	3.61	3.43	2.38	2.88

Mag.	10-11 Aug		11-12 Aug		12-13 Aug		13-14 Aug		14-15 Aug	
	p	s	p	s	p	s	p	s	p	s
-8	0	0	0	0	0	0	0	0	0	0
-7	0	0	0	0	0	0	0	0	0	0
-6	1	0	0	0	0	0	0	0	0	0
-5	0	0	0	0	6	0	0	0	1	0
-4	1	0	6	0	9.5	0	4	0	0	0
-3	4	0	13.5	0	27.5	2	10	0	2	0
-2	5	1	24.5	4	81.5	8.5	32.5	2	4	0
-1	9.5	3.5	71.5	5.5	232	7.5	76.5	8	7	3.5
0	31.5	5	104	14.5	397.5	38	143.5	16	21	5.5
+1	85	18	190.5	27	731	83.5	265.5	32	68.5	11
+2	144	49	328	60	1331.5	188	458.5	83.5	179.5	37
+3	230.5	94	463	122.5	1864.5	321	752	201.5	302.5	90
+4	264.5	174.5	550.5	189	1751.5	498	818.5	351.5	335	224.5
+5	154	132.5	336	222.5	881.5	399.5	387	254	164.5	176.5
+6	29	28.5	66.5	52	99	76	63	41.5	16	17
Tot.	959	506	2154	697	7413	1622	3011	990	1101	565
$\bar{m}$	3.15	3.80	2.94	3.85	2.76	3.60	2.94	3.75	3.24	3.95
$\Delta\bar{m}$	0.65		0.91		0.84		0.81		0.71	
r	2.83	3.59	2.51	3.44	2.65	3.60	2.72	3.51	3.15	3.83

Mag.	15-16 Aug		Totals July - August 1986				
	p	s	sporadics	Perseids	Aquarids	κ-Cygnids	α-Capricornids
-8	0	0	3	1	0	0	0
-7	0	0	0	0	0	0	0
-6	0	0	1	1	1	0	0
-5	0	0	3	12	0	1	0
-4	0	0	0	27.5	0	0	0
-3	0	0	4	69.5	2	9	0
-2	2.5	0	25.5	205.5	1	5.5	3.5
-1	5	0.5	71.5	529	17.5	18.5	11.5
0	5.5	2.5	182.5	968	42.5	27	30
+1	11	9	462.5	1967.5	111	54.5	58.5
+2	35	17.5	1117.5	3623	255.5	124	124
+3	96.5	55	2135.5	5165	567.5	216.5	174
+4	83	98.5	3371.5	5170.5	861	233	214.5
+5	22	49.5	2874.5	2784	588	190	170.5
+6	2.5	0.5	1068	624.5	157	68	70.5

Table 1 --- continued

Mag.	p	s	sporadics	Perseids	Aquarids	κ-Cygnids	α-Capricornids
Tot.	263	233	11320	21148	2604	947	857
$\bar{m}$	3.11	3.66	3.82	2.92	3.69	3.36	3.44
$\Delta\bar{m}$	0.55		-	0.90	0.13	0.46	0.38
r	2.76	4.25	3.49	2.91	3.54	2.90	3.05

Table 2 --- Summary of $\bar{m}$-values and r-values

Date	Perseids n	$\bar{m}$	±	r	sporadics n	$\bar{m}$	±	r	$\Delta\bar{m}$
July 26-27	3	-	-	-	63	3.82	0.48	3.04	-
27-28	1	-	-	-	11	3.55	1.07	-	-
28-29	24	2.65	0.54	-	86	3.45	0.37	2.82	0.80
29-30	56	2.88	0.38	3.29	107	3.22	0.31	3.41	0.34
30-31	83	3.13	0.34	2.63	296	4.16	0.24	3.72	1.03
31-01	131	3.12	0.27	2.96	221	3.79	0.25	4.40	0.67
Aug 01-02	62	3.07	0.19	2.46	564	3.93	0.17	3.28	0.86
02-03	419	3.27	0.16	2.92	654	3.95	0.14	3.33	0.68
03-04	544	3.34	0.14	2.76	770	4.13	0.15	4.31	0.79
04-05	241	2.80	0.18	2.67	341	3.73	0.20	3.87	0.93
05-06	724	3.24	0.12	3.04	851	3.95	0.14	3.84	0.71
06-07	872	3.35	0.11	2.80	957	4.02	0.13	4.01	0.67
07-08	480	3.17	0.14	2.81	431	3.97	0.19	4.65	0.80
08-09	730	3.30	0.12	3.61	546	3.84	0.16	3.43	0.54
09-10	701	2.61	0.10	2.38	521	3.22	0.14	2.88	0.61
10-11	959	3.15	0.10	2.83	506	3.80	0.17	3.59	0.65
11-12	2154	2.94	0.06	2.51	697	3.85	0.15	3.44	0.91
12-13	7413	2.76	0.03	2.65	1622	3.60	0.09	3.60	0.84
13-14	3011	2.94	0.05	2.72	990	3.75	0.12	3.51	0.81
14-15	1101	3.24	0.10	3.15	565	3.95	0.17	3.83	0.71
15-16	263	3.11	0.19	2.76	233	3.66	0.24	4.25	0.55
17-18	23	4.00	0.83	-	28	3.98	0.75	-	-0.02
Tot.*	21148	2.92	0.02	2.91	11320	3.82	0.04	3.49	0.90
mean	$\bar{x}$	3.10	0.31		$\bar{x}$	3.79	0.25		0.69

* Including some observations not incorporated in the totals per date.

than any other night. On figure 1, nothing can be told about the abundant number of faint Perseids that night, figure 2 shows a dip in $\Delta\bar{m}$ on 8-9 August, while the graph of r shows the exceptional r_p value very well on 8-9 August. Immediately after 8-9 August we find the lowest r value on 9-10 August, $\Delta\bar{m}$ is close to the average value for the entire period while r_s is also the lowest r_s for the entire period. Indeed the limiting magnitude was less than the initially assumed value of +6.5, reflected in the $\bar{m}_s$=3.22, 0.6 magnitude lower than on average. Therefore r was recomputed using $^{s}p(m)$-values valid for lm=5.9, over the magnitude range $-2 \le m \le +5$. Then we find r_s=3.44 and r_p=2.81, and shown in figure 3 in thin. The depression on 9-10 August in r as found from the first calculation is explained by weather circumstances, once again indicating that the limiting magnitude has to be taken into consideration when computing r. Figure 2 give a slight impression of an increment in brighter Perseids around the Perseids maximum. Also figure 3 results in a depression in r_p around August 12. This is in contradiction with the trend found in 1985 and would rather agree with the 1980 results.

In 1985 we found the following variation of r_p expressed in days d for $7 \leq d \leq 16$.

$$r_p = 0.112\,d + 1.46$$

For the same period in 1986 we found the following relationship,

$$r_p = -0.02\,d + 3.09 \qquad (7 \leq d \leq 16)$$

Using the entire period of observation we find

$$r_p = -0.0053\,d + 2.87 \qquad (-2 \leq d \leq 16)$$

There is no gradual change in r_p throughout the Perseid activity. Sudden variations such as observed on 8-9 August are perhaps explainable by local variations within the mass distribution of the Perseids. In general Perseids varied around $r_p = 2.9$, considerably above the literature value of 2.4 or 2.5, often quoted for Perseids. Sporadics however are perfectly matching the reference values of $r_s = 3.4$ or 3.5. The final conclusion therefore is that the Perseids in 1986 were exceptionally rich in faint shower members. As a consequence, moonlight interference with such a faint display would produce low rates as limiting magnitude corrections would undercorrect if standard r-values are used.

3. Comparison European and Canadian Perseid results 1986.

The Canadian observations were disregarded for the general study of the Perseids because of the uncomparable reporting format. However it is interesting to compare the independantly obtained results of the European data and the Canadian observations.

One major difference between the two data sets is the size of the database. The European database includes more than 25 × the amount of the Canadian database. Some nights were lost in Canada, making a good comparison rather difficult.

Comparing ZHR-values, the extremely low observed rates of August 12-13 are remarkable; these are 2 to 3 times less than the rates observed elsewhere. The maximum ZHR of 48 is far below the European result for August 12-13. It could be explained as if the three Canadian observers have a perception that is much smaller than the European average. Another explanation is that peak rates occured on August 12, at 19h UT. and that the maximum was long over when the Canadians started to observe. Even in this case the ZHR-values noted in Canada are still remarkably low. The ZHR-curve is one curve drawn visually over the datapoints. There are too few datapoints to compare the Canadian and the European ZHR profile in detail.

Peter Brown arrives at conclusions for the magnitude variation night by night, that are comparable to the 1985 results of Europe, but in contradiction with the 1986 results for European Perseid data. I don't know how the curve in *WGN 15:4*, p. 124, figure 2 was found. Looking at the number of meteors for which the mean magnitude was derived, we see that the value for July 31, is based on only 7 Perseids, even for August 12-13 only 124 Perseids were available. The uncertainty on the $\bar{m}$-values therefore can explain the impression reported by the observers. The author concludes that the maximum brilliance of the stream is reached sometime between August 7 and 10, while there were no observations on 7-8 and 8-9. So there is no reason to arrive at conclusions that differ from the European observational results.

The bright Perseid maximum isn't shown in the European results of 1985, there is a tendency in the 1986 Perseid results, but only a rather weak brightening can be reported. The explanation given by Peter Brown may help to explain why the effect is stronger in some observations. The European data is compiled for the major part from visual observers using taperecorders. These observers never interrupt the observations for recording data and so they watch the sky continuously. Indeed the increase in bright Perseids becomes much less obvious on the peak night and this supports the hypothesis put forward by Peter Brown.

The criticism to the use of $p(m)$-values for magnitude range above +2 or +3 is not supported from the European magnitude distributions. These $p(m)$-values serve well over the magnitude range -2 to +5. Here there may be a discrepancy between the *p(m)*-values valid in Europe and the values that are valid for the AMG-observers. It should be investigated further. However considering $\bar{m}_s = 2.65$, this is about 1.0 magnitude below the European result $\bar{m}_s = 3.66$. Assuming that Δlm $= \Delta m_s$ (see 1980 Perseids results), this would mean that the limiting magnitude in Canada was 1.0 magnitude less than in Europe. It is not known that the *p(m)* values were corrected for this difference in lm. If not, this final correction would lead to slightly higher *r*-values. The author reports skies between lm = 6.2 and 6.5; however the $\bar{m}$-values suggest rather skies with lm = 5.2 to 5.5. Anyhow, if the values are indeed higher; then the Canadian observations may perhaps confirm the European ones.

In general we can conclude that the differences between the Canadian data and the European results are perhaps due to the lack of data in Canada for several nights and other observing and analyzing methods. The discrepancy between maximum ZHR-values is surprising, but may be explained assuming that the limiting magnitude was lower than assumed (reflected in $\bar{m}_s$). The Canadian observers produced a very well develloped paper and it is certainly worthwile to investigate the points raised in it. This comparison with European data can help this aim.

Figure 4 --- The Canadian observing team of the Alberta Meteor Group. Peter Brown stands at the left.

References

(1) Roggemans P., "On the Perseid Stream 1985", *WGN 14:4*, 1986, pp. 108-125.

(2) Sharp I., Mason J.W., "The Perseid meteor stream in 1980", *J. BAA 91*, 1980-81, pp. 368-390.

The Perseids 1985 in the Soviet Union

V. V. Martynenko and A.S. Levina

An account is given of Perseid observations in the Soviet Union in 1985. The investigation of the Perseids was conducted by the G. Zateischchikov Crimean Meteor Station according to the "relay-race" program.

As usual, amateurs of all countries throughout the world observed the 1985 Perseid meteor shower. Some researchers predicted the maximum to occur in the night of August 11-12. Indeed, high rates were observed in that night (60-90), but the real peak came one day later.

In 1985, the Perseids appeared rather uneven. The appearance of Perseids with trains was very interesting. A deficiancy of faint meteors was also revealed. High hourly rates were observed on August 13-14 and 14-15. In the Soviet Union the investigation of the Perseid shower was conducted according to the "relay race" program. At the head of the research program was the Crimean meteor station, named after G. Zateishchikov. Due to the scatter of observational points in geographical longitude, we managed to monitor the shower during 11 to 13 hours per night; this explains the name of the program.

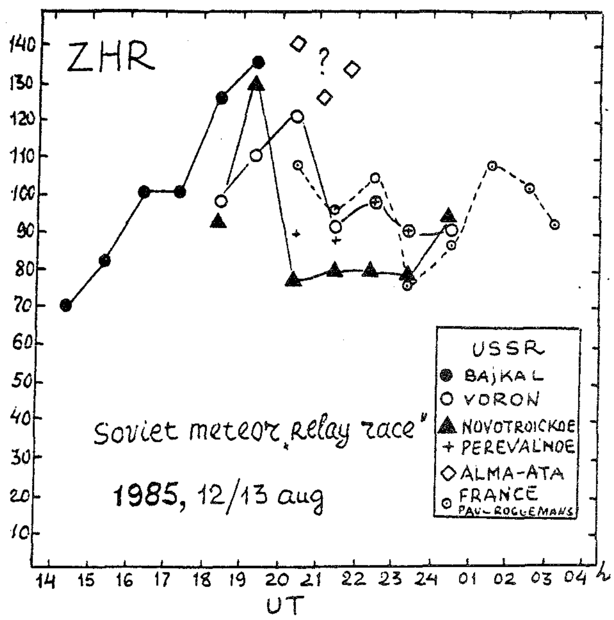

Figure --- Soviet observation of the 1985 Perseids according to the "relay race" program, compared with French and Belgian observations.

During July 12-24 and August 1-24, 1985, 19 groups of observers, 98 persons in total, worked in the USSR in Simferopol, Alushta, Sudak, Rostov-na-Donu, Alma-Ata, etc. During 16 nights in August, 22 247 meteors were recorded, 9756 of which were Perseids. The majority of them were seen by the Crimean observers (12 506 of which 6017 were Perseids). In Sliudyanka, a small settlement on the south coast of Lake Baikal, a group of Crimean observers worked.

Three thunderstorms occurred at the peak of maximum, ruining the August 12-13 observational program of this group. However, they were the first to witness Perseids in the USSR in the night of maximum activity.

On the night of August 11-12, during the observations, the sky cleared out suddenly and observers could see an amazingly clear sky, with limiting magnitudes up to 7.0! That night, the sky was clear in the village Dalnegorsky. A member of the observing team, Mr. N. Knyaziuk counted Perseids. From 14^h to 19^h UT, the average ZHR was 59. During the interval 19^h to 20^h UT, M. Bidnichenko in Sliudyanka determined the ZHR to be 55. The limiting magnitude that night was about 6.5, near to standard conditions. The ZHR-evolution is shown in the table on the following page. During that night, bright Perseids were seen everywhere. In Dalnegorsk and Sliudyanka, -5.5 Perseids were seen at 15^h20^m and 18^h38^m UT. One of them produced a nice train, which was blue at the center and green to orange at the edges. During 7 minutes starting at 16^h48^m UT, four bright Perseids were seen, the magnitudes of which were -3,-2,-5 and -5. A group in Novotroitsk observed two Perseids of magnitudes -4 and -3 and a fireball of magnitude -6. They also reported an uneven stream of meteors. Most interesting was a period, when after an activity gap of almost an hour in which only 7 Perseids were seen, 6 Perseids of magnitudes -5,-3,-8,-1,0,-2 were seen in only 12 (!)

Table 1 --- Evolution of the Perseid activity on August 11-12, 1987.
Legend: [1]data for Dalnegorsk
[2]data for Sliudyanka
[3]average data for Novotroitsk, Donetsk, Simferopol and Voron

Period (UT)	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-00	00-01
HR	36[1]	45[1]	42[1]	33[1]	26[1]	55[2]	57[3]	51[3]	51[3]	49[3]	40[3]
ZHR	50	67	63	56	56	55	63	66	70	87	86

minutes starting at 00^h16^m UT.

In the night of August 12-13, similar groups of meteors were observed in the Crimea as well. Among them were Perseids of -3 and -4. From the 557 meteors that were recorded, we noted 44 twins, 18 threefold, 11 fourfold and 11 groups with 5 up to 8 members. Sometimes, meteors appeared near the radiant in bunches; this was very impressive. We managed to determine the radiant rather accurately. Maximum activity in Sliudyanka was seen on August 12-13, from 16^h UT till daybreak. ZHR's varied between 90 and 125-135 ± 25. In spite of the decrease of the number of observed meteors due to daybreak, the relative number of Perseids kept on growing and approached 90-100%.

The average magnitude for 35 shower meteors (observed at 19^h30^m during 40 minutes) was 2.2 (the average magnitude for the night was 2.8). The increase of activity was confirmed by observers in Alma-Ata (ZHR=130), Novotroitsk (ZHR for the period 19^h-20^m UT was 130). Clouds spoiled the observations in the Crimea. From 20^h to 21^h UT, the ZHR was 120 on the Voron-mountain in the Crimea.

The Perseids were rich in meteors of magnitudes 2, 3 and 4. You can see this from Table 2, below.

Table 2 --- Magnitude distribution of the Perseids 1985 between August 1 and 15 from observations from Sliudyanka and Voron.

Magnitude	-7	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6
Number	1	2	0	1	2	7	23	62	101	369	624	546	171	25

A wonderfull fireball was observed at the south coast of Lake Baikal, on August 13-14. The fireball of -7 exploded and all observers witnessed a nice orange ionized train. The altitude of the fireball was approximately 25°, so it's real magnitude was probably about -8 to -9. In that night M. Bidnichenko and I. Kruzman in Sliudyanka determined the ZHR as 78 (from 14^h30^m to 15^h30^m UT). For two consecutive time intervals, ZHR's were 50 and 40. A. Maidik in Novotroitsk recorded 60 Perseids from 20^h to 21^h UT. D. Shortov, M. Kitin and A. Levina who were counting near the zenith obtained 52, 48, 67 and 48 as ZHR's for the intervals between 19 to 23 UT. On August 13, at 20^h17^m UT a Perseid of -6 occurred.

More than 80% of the Perseids belonged to the main radiant. There were however some other radiants located near $H, \chi, \alpha, \beta, \varepsilon$ and ϕ of Perseus. The location of the main radiant on August 12-13 was $\alpha = 46.^\circ0 \pm 1.^\circ0$ and $\delta = 57.^\circ6 \pm 1.^\circ0$. The minor radiants were active too. One of the most active minor streams were the κ-Cygnids.

As far as non-Perseid fireballs are concerned, it is necessary to mention one occurred on August 11 at 23^h33^m UT in the zenith over the Voron mountain. After the fireball's first flash (-2 to -4), it's magnitude dropped to 0-1. After that there was a new outburst; it's magnitude reached -10 to -12. The color varied from orange to white and blue to violet. The meteor left a greenish train of -2. Probably, the fireball's radiant was in Cetus or Eridanus.

Quadrantids 1987

Under this title, we collected some contributions on the Quadrantids 1987, which appeared under excellent conditions. In many countries, the weather allowed observations. We recall that the visual observations of the Quadrantids 1987 in Belgium were reported in WGN 15:4. Below we publish observations from Finland, Norway, Spain and Japan. In Japan, the Quadrantids were also observed by radio. We end this report with a contribution on radio observations of the Quadrantids 1987 in Belgium.

Quadrantids 1987 in Finland

Teemu Hankamäki

Excellent but very cold weather and moonless skies enabled 9 Finnish observers to see 1049 Quadrantids and 147 sporadic meteors in the period January 2-5.

This report contains the results of the visual observations in the period between January 2 and January 5, 1987 in Finland. Excellent but very cold weather (-28°C) and moonless skies enabled Finnish meteor observers to make extensive observations of the Quadrantid meteor stream. Quadrantids were seen during the nights from January 02-03 until January 04-05.

9 observers monitored 4 nights and a total of 1196 meteors were recorded, 1049 of which were Quadrantids and 147 were sporadics. In the night of January 03-04 from 1^h UT to 3^h UT, maximum rates reached about 35 to 60 meteors per hour.

The mean magnitude of the Quadrantids was 2.41; the sporadics were on average 0.32 magnitude fainter. 3.1% of the Quadrantids showed a train and 3.81% showed a color (blue or yellow). This latter percentage was 2.7% for the sporadic background.

Table 1 --- Data about observers and observing sites

Observer	Init	λ	φ
Teemu Hankamäki	TH	23°03' E	61°13' N
Markus Hotakainen	MH	24°24' E	60°13' N
Timo Kinnunen	TK		
Ismo Luukkonen	IL	25°25' E	64°49' N
Markku Nousiainen	MN	24°24' E	60°13' N
Aki Parviainen	AP	29°51' E	62°42' N
Pekka Parviainen	PP	22°25' E	64°49' N
Leo Rajala	LR	25°25' E	61°51' N
Marko Riikonen	MR	29°51' E	62°42' N

On the next page, we give the actual observational data, followed by a magnitude distribition, both for the Quadrantid meteor stream and the sporadic background, for each observer separately.

Please send your contributions for the december issue to the editor (address on inside of back cover); they should reach him before December 1. We also want to note that we can include black an white photographs, provided you send us a print of good quality.

Table 2 --- Finnish data about the Quadrantids in 1987

Date	Obs	Period (UT)	T_{eff}	Lm	F	Quad	Spor
Jan 02-03	MH	$23^h15^m-00^h24^m$	1.12	5.00	1.11	1	0
02-03	MN	23 21 -00 27	1.05	5.00	1.11	1	0
03-04	LR	14 30 -16 30	1.92	5.65	1.14	19	7
03-04	TK	18 45 -19 22	0.58	3.80	1.09	7	1
03-04	LR	20 45 -01 00	4.05	6.17	1.00	115	48
03-04	AP	21 22 -05 07	6.69	6.10	1.11	290	15
03-04	MR	21 25 -05 07	6.18	6.10	1.11	266	22
03-04	PP	23 35 -05 15	5.40	6.00	1.18	194	21
03-04	IL	01 47 -05 40	2.75	6.27	1.11	126	24
03-04	TH	01 50 -03 12	1.08	5.90	1.05	28	7
04-05	TH	15 45 -17 25	0.63	5.80	1.05	2	2

Table 3 --- Magnitude distribution of the Quadrantids 1987 in Finland

Date	Obs	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	$\bar{m}$
Jan 02-03	MH	0	0	0	0	0	0	0	0	1	0	0	4.00
	MN	0	0	0	0	0	0	0	1	0	0	0	3.00
Jan 03-04	LR	0	0	0	0	0	3	5	7	3	1	0	2.68
	TK	0	0	0	0	0	1	2	3	1	0	0	2.57
	LR	0	1	1	2	1	9	19	39	30	13	0	3.03
	AP	0	1	0	9	8	48	114	75	33	2	0	2.18
	MR	0	0	3	5	17	42	84	68	39	8	0	2.25
	PP	0	1	2	4	15	20	37	56	43	16	0	2.39
	IL	0	1	3	6	12	16	18	32	23	15	0	2.38
Jan 04-05	TH	0	0	0	0	0	3	11	8	5	1	0	2.64

Table 4 --- Magnitude distribution of the sporadics during the observation of the Quadrantids 1987 in Finland

Date	Obs	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	$\bar{m}$
Jan 02-03	MH	0	0	0	0	0	0	0	0	0	0	0	
	MN	0	0	0	0	0	0	0	0	0	0	0	
Jan 03-04	LR	1	0	0	0	0	1	0	4	1	0	0	2.16
	TK	0	0	0	0	0	0	0	1	0	0	0	3.00
	LR	0	0	0	1	0	3	7	12	15	9	1	3.41
	AP	0	0	0	1	1	4	4	4	1	0	0	1.80
	MR	0	0	0	1	0	3	11	6	1	0	0	2.09
	PP	0	0	0	0	1	2	3	6	6	3	0	3.09
	IL	0	0	2	0	1	3	1	4	10	3	0	2.83
	TH	0	0	0	0	0	1	3	3	0	0	0	2.29
Jan 04-05	TH	0	0	0	0	0	0	0	1	1	0	0	3.50

Subscriptions 1988: more information on p. 153
Abonnementen 1988: meer inlichtingen op p. 141

Quadrantids 1987 in Norway

Trond Erik Hillestad

During the period January 1-4, two observers saw 487 meteors, 386 of which were Quadrantids.

Our visual efforts during January 1987 were much higher than normal. In this month, a total of 386 Quadrantids, plus some Coma Berenicids, all in all 487 meteors.

Table 1 --- Observers and observing sites

Observer	Init	Location	λ	φ
Kai Gaarder	KG	Roa	10°36 E	60°10' N
Lars Trygve Heen	LTH	Kristiansand	07°56ʹ.2 E	58°08ʹ.0 N

Table 2 --- Norvegian data about the Quadrantids in 1987

Date	Obs	Period (UT)	T_{eff}	Lm	F	Quad	Com	Spor
Jan 01-02	KG	01^h00^m-02^h00^m	0.99	6.25	1.00	1	1	14
02-03	LTH	01 15 -02 15	0.98	6.25	1.11	2	-	7
02-03	KG	03 00 -04 00	0.99	6.30	1.00	8	2	15
02-03	KG	04 00 -05 00	0.99	6.30	1.00	5	3	9
03-04	KG	22 45 -23 45	0.93	6.10	1.00	49	-	9
03-04	KG	23 45 -00 45	0.85	6.20	1.00	59	-	10
03-04	KG	00 45 -01 45	0.92	6.20	1.00	88	-	15
03-04	KG	01 45 -02 45	0.95	6.20	1.00	78	-	10
03-04	KG	02 45 -04 00	1.17	6.00	1.07	96	-	6

Quadrantids 1987 in Spain

Jose-Maria Trigo-Campoy

185 Quadrantids were observed near Valencia, Spain between January 2 and January 6.

The Quadrantids shower was the most active one of the year. The radiant is located at α = 230°, δ = +48°, in the constellation of Boötes, more exactly in that part that previously belonged to the abolished constellation of the Quadrant. The stream was discribed in 1839 by the Belgian astronomer Adolphe Quëtelet. The activity is restricted to only a few hours.

We couldn't see this shower last year because it was cloudy. This year, the conditions were wonderful. The maximum was observed with New Moon in Chelva (Valencia, Spain) with limiting magnitude of 6.2. The other days we observed from the city of Valencia with a limiting magnitude between 4 and 5, except for an observation made from Rocafort (Valencia) with limiting magnitude 5.3.

In total we observed 185 Quadrantids. The dominant colors of the Quadrantids are white, yellow and blue. We could also verify that the geocentric velocity of the Quadrantids increased during the night.

Table 1 --- Listing of the observers

Observer	Initials
J. Maria Trigo-Campoy	JMT
Antonio Fco. Marin	AFM
J. Luis Martin Herrera	JLMH

Table 2 --- Spanish data about the Quadrantids in 1987

Date	Init.	Location	Period (UT)	Lm	HR	ZHR	Spor
Jan 01-02	JMT	Rocafort	05^h37^m-06^h31^m	5.3	2	3	5
01-02	JLMT	Valencia	04 30 -05 30	5.0	3	4	5
02-03	AFM	Valencia	03 30 -05 00	5.0	3	5	7
02-03	AFM	Valencia	05 30 -06 10	4.5	1		2
03-04	JMT	Chelva	20 35 -21 05	5.7	0	0	1
03-04	JMT	Chelva	00 00 -02 00	6.2	30	90 ± 5	15
03-04	AFM	Chelva	00 00 -02 00	6.2	18		8
03-04	JMT	Chelva	02 30 -05 15	6.2	60	60 ± 5	23
03-04	AFM	Chelva	02 35 -05 20	6.2	36		22
03-04	JLMH	Valencia	03 30 -04 30	5.0	21	39	5
04-05	JLMH	Valencia	04 00 -04 30	5.0	3	9.1	1
05-06	AFM	Valencia	02 45 -03 45	4.0	2	6.7	2

Quadrantids 1987 in Japan

Masahiro Koseki

A pretty rich meteor shower was observed in Japan in the morning of January 4, as well visually as photographically as by radio.

1. Introduction

A pretty rich meteor shower produced by Quadrantids was observed in Japan on the morning of the 4th January, 1987. Our observations of Quadrantids in the winter of 1986 resulted in failure under the influence of the approach of a depression though a fine meteor shower was observed in England (1). But, this year observation conditions were favorable for us. As in other years, it was clear at the Pacific side of Japan were the major part of our members live.

2. Observations

Visual observers confirmed that meteor activity is rising till dawn, and many of them recorded more than 60 meteors an hour then. This was the most active display in twelve years for Japanese observers. Some observers noticed that rates increased rapidly after 18^h UT, but the proportion of bright meteors decreased. Taking the downward tendency of the rates after 20^h UT, it might be concluded that the visual meteor rates reached maximum around 20^h UT (= 282.40), though our result is inconclusive because of the lack of data after 21^h UT. The peak ZHR, about 90 meteors per hour, would be much higher amounting to about 180 meteors per hour if we calculated ZHR according to the European method of FEMA (Table 1).

An analysis of magnitude data was carried out for the most excellent estimates, and the results are shown in table 2, the average of which is used in ZHR calculation. The mean magnitude we found is 2.59 ± 0.09.

FM radio observations caught the real maximum (Fig. 1). It is suggested that the

Table 1 --- ZHR calculated by two different methods.

Period (UT)	Quad	NMS	FEMA
3.583-3.625	1	20.8	30.1
3.625-3.667	4	32.1 ± 17.0	52.2 ± 11.9
3.667-3.708	13	37.3 ± 19.4	72.1 ± 40.8
3.708-3.750	10	58.3 ± 27.3	99.2 ± 39.3
3.750-3.792	14	89.9 ± 31.7	149.4 ± 48.3
3.792-3.833	16	90.0 ± 30.5	180.6 ± 68.8
3.833-3.875	13	86.0 ± 26.4	159.6 ± 42.7

Table 2 --- Magnitude distribution and magnitude ratio

Observer	Lm	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	r
U. Ehime	5.9-6.0	0	0	4	13	12	26	46	53	35	17	2.48
K. Watanabe	6.0	0	3	3	3	18	18	29	54	54	19	2.60
K. Sano	6.0	0	0	0	2	7	13	36	54	33	3	2.71
H. Tomioka	5.7-6.0	1	1	0	0	9	22	102	87	24	13	2.59

maximum of the radio meteor rates occurred between 22^h and 23^h UT (= 282.50), though the echo rates were affected by the culmination of the radiant very much.

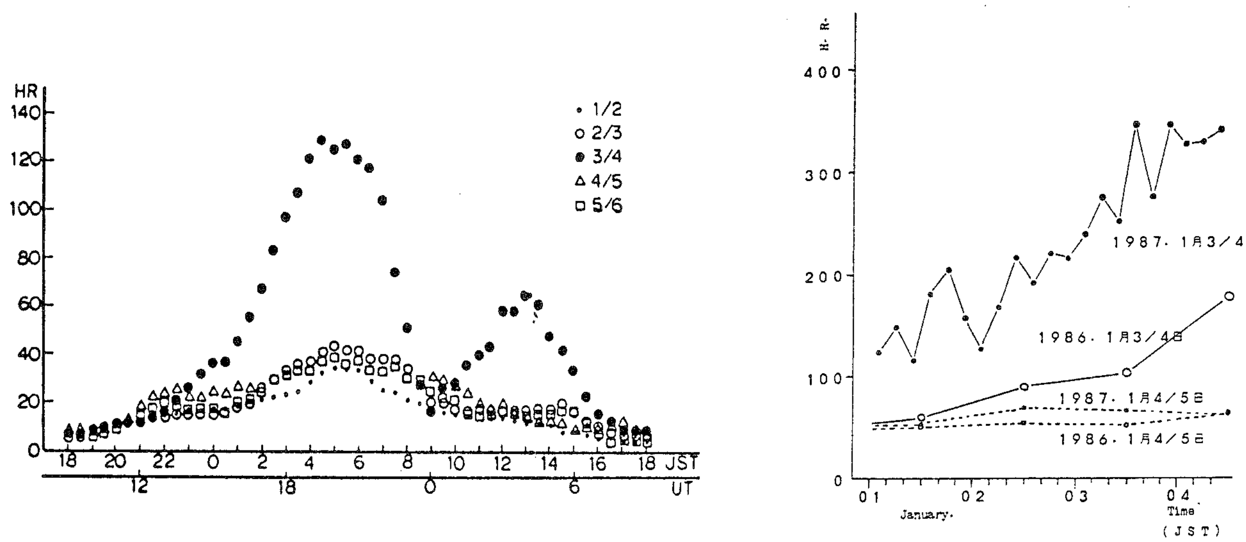

Figure 1 --- Japanese radio-observations of the Quadrantids in 1987.

It is therefore clear that this year the actual peak of the Quadrantids shower occurred about four hours prior to the prediction. It is said that the visual peak of the shower would be preceded by that of the fainter meteors; on the contrary however bright meteors were ahead of the mass of the meteor particles.

Photographic observations obtained excellent results, though they have been collected and measured only partly. Otsuka calculated meteor paths and orbits from his own observations and KPM (Kanto Photographic Meteor network) members (Fig. 2 and Table 3).

More than one hundred meteors were recorded on video-tape aided by I.I. (Image Intensifier) and their image will be exhibited at the time of our annual assembly.

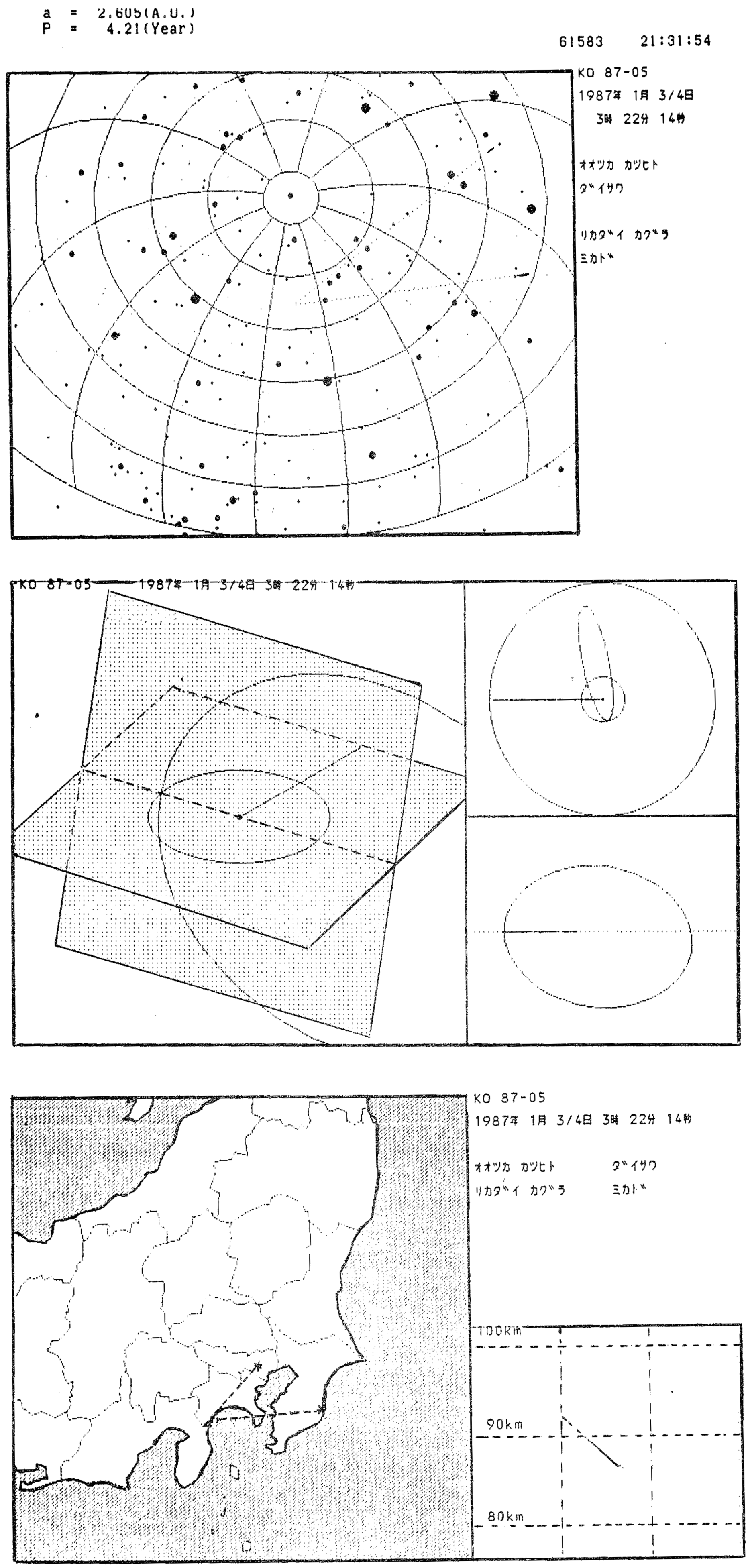

Figure 2 --- Calculations on simultaneous photographic Quadrantids in Japan

Table 3 --- Photographic Quadrantid meteors 1987 from Japan (1950.0)

Nr.	1	2	3	4	5	6
T	$18^h18^m41^s$	$18^h22^m14^s$	$19^h01^m36^s$	$19^h09^m46^s$	$19^h51^m35^s$	$20^h09^m06^s$
α	227°.3	227°.2	226°.6	228°.0	228°.5	226°.3
δ	+50°.1	+49°.5	+51°.3	+52°.3	+50°.1	+50°.4
V_g	41.3 km/s	41.2 km/s	41.4 km/s	38.5 km/s	41.8 km/s	43.2 km/s
q	0.982 au	0.981 au	0.983 au	0.983 au	0.981 au	0.983 au
Q	6.6 au	29.9 au	9.3 au	21.3 au	5.3 au	12.8 au
e	0.651	0.623	0.683	0.570	0.703	0.767
i	72°.5	72°7	72°.1	68°.1	72°.6	74°.6
Ω	282°.3	282°.3	282°.4	282°.4	282°.4	282°.4
ω	175°.1	173°.9	178°.3	178°.1	173°.9	177°.3

3. Concluding remarks

Japanese observers paid attention to the fact that the peak might move between $\lambda_\odot$ = 282°.4 and $\lambda_\odot$ = 282°.8 from year to year. Moreover it is worth noting that Zausaev and Pushkarev (2) suggest Quadrantids will be rather active in 1988. It is therefore necessary to pay further attention to the activity in 1988.

References

(1) Spalding G., *BAA Meteor Section Newsletter No. 19*, 1986.

(2) Zausaev A.F., Pushkarev A.N., *Astron. vestnik 18*, 1984, pp. 145-150.

Quadrantids 1987 in Belgium

Jeroen Van Wassenhove

Four Belgian observers made radio observations of the Quadrantids in 1987. With their observations, an *r*-value of 2.75 ± 0.12 was computed for the brighter meteors.

Four Belgian observers were able to cover the 1987 Quadrantids: Maurice De Meyere (St.-Martens-Latem), Luc Gobin (Mechelen), Christian Steyaert (Bottelare) and Jeroen Van Wassenhove (Nazareth). The observations of Luc Gobin and Maurice De Meyere are shown below.

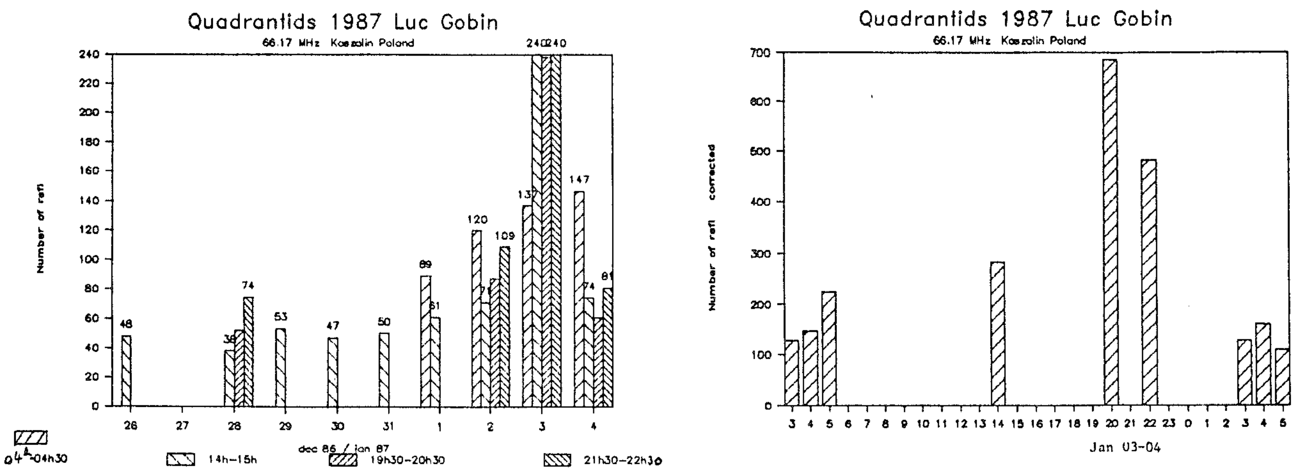

Figure 1 --- Radio observations of the Quadrantids 1987 by Luc Gobin.

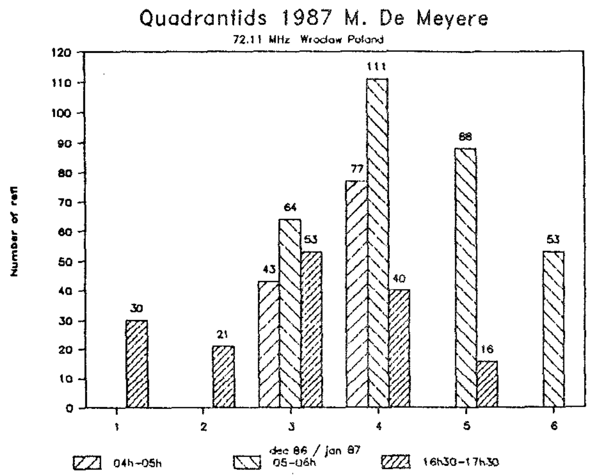

Figure 2 --- Radio observations of the Quadrantids 1987 by Maurice De Meyere.

Christian Steyaert listened on 91.10 MHz during the following days (counts are uncorrected):

Table 1 --- Radio observations of the Quadrantids 1987 by Christian Steyaert

Date	B.T.	E.T.	N
1987 Jan 01	$23^{h}00^{m}$	$24^{h}00^{m}$	12
02	23 00	24 00	18
03	23 00	24 00	80
04	00 00	01 00	73
04	01 00	02 00	114

Begin and end of observation are of course given in UT. Jeroen Van Wassenhove listened also during several days on 88.30 MHz (counts are uncorrected):

Table 2 --- Radio observations of the Quadrantids 1987 by Jeroen Van Wassenhove

Date	B.T.	E.T.	N
1987 Jan 01	$13^{h}00^{m}$	$14^{h}00^{m}$	12
02	13 00	14 00	22
03	13 00	14 00	37
04	13 00	14 00	17

The low hourly rates are due to bad observing circumstances (position radiant, antenna).

The maximum was calculated with the data of Luc Gobin, after substracting the sporadic level. We got:

Observations between:	
$14^{h}00^{m}-15^{h}00^{m}$	$14^{h}.8 \pm 1^{h}.5$
19 30 -20 30	16.9 1.4
21 30 -22 30	18.6 1.55

Combining these three values we find:

$$1987 \text{ Jan } 03,\ 16^{\text{h}}.7 \pm 1^{\text{h}}.5 \text{ UT}$$

The large number of reflections of Luc Gobin allowed us to make some calculations about the population index. All the echo durations were divided in classes. The echo durations less than 1 second were omitted, because of estimation errors (1).

From (2) we get the formula:

$$N = \text{Cst}.r^{\text{M}}$$

This can be easily transformed to the linear relationship:

$$\log N = \text{Cst.} + \log r \,.\, M$$

Combining this formula with the following (3) giving the correlation between magnitudes and echo durations:

$$M = \text{Cst.} - 2.5 \log T_{\text{D}}$$

gives us:

$$\log N = \text{Cst.} - 2.5 \log r \log T_{\text{D}}$$

With linear regression analysis we found Cst. = 2.47 and

$$r = 2.75 \pm 0.12$$

However it must be noted that this result is only valid for the bright meteors as the short echo durations were omitted.

References

(1) Steyaert C., "Reflection Duration Determination: An Experiment, *WGN 15:4*, August 1987, pp. 114-116.

(2) Steyaert C., "Populatie-indexbepaling: methode en nauwkeurigheid", *Technische Nota 5*, VVS-Werkgroep Meteoren.

(3) McKinley, "Meteor Science and Engineering".

The Meteor Library

compiled by Paul Roggemans

D.W. Hughes, "The Relationship between Comets and Meteoroid Streams" Asteroids, Comets, Metors II, C.I. Lagerkvist and H. Rickman (eds.), Uppsala, 1986, pp. 503-520.

The decay of short period comets is, in the main, a gentle process which slowly feeds dust into a meteoroid stream. It is concluded that the cometary decay rate and the meteoroid stream formation rate are such that all active meteor showers should have streams with obvious, visible parent comets. Many don't, the prime examples being the Quadrantids. It is concluded that differential orbital perturbation is to blame.

The orbital statistics of comets and meteoroid streams should be similar. Unfortunately both suffer from observational selection, this being especially severe in the case of meteoroid streams. There is every indication that the removal of selection effects would improve the similarity.

C. Froeschlé, H. Scholl, "Numerical Investigation on a Possible Gravitational Breaking of the Quadrantid Meteor Stream"
Asteroids, Comets, Meteors II, C.I. Lagerkvist and H. Rickman (eds.), Uppsala, 1986, pp. 555-564.

We investigated numerically the dynamical evolution of a Quadrantid-like meteor stream orbiting the Sun in a 2/1 mean motion resonance with Jupiter. Only the main forces, the gravitational forces exerted by the Sun and by Jupiter were taken into account. Highly inclined streams located at resonance center may give rise to the formation of arcs. These arcs evolve separately due to the different possible modes for the motions of the stream particles nodal lines: regression or progression. These modes are due to the resonant motion and are not caused by close approaches to Jupiter.

B.A. Lindblad, "Spurious Maxima and Minima in Meteor Stream Profiles"
Asteroids, Comets, Meteors II, C.I. Lagerkvist and H. Rickman (eds.), Uppsala, 1986, pp. 545-554.

Meteor stream cross-sections derived from long-term observational records may exhibit spurious secondary maxima. These maxima, spaced at regular intervals in solar longitude, are related to the sampling frequency. Two cases based on radar recordings of the Perseid stream are presented.

B.A. Lindblad, "The Activity Curve of the Perseid Meteor Stream from Onsala Radar Observations 1953-78"
Asteroids, Comets, Meteors II, C.I. Lagerkvist and H. Rickman (eds.), Uppsala, 1986, pp. 537-544.

The cross-section of the Perseid meteor stream is analyzed based on radar observations at the Onsala Space Observatory in 1953-78. The cross-section consists of two components: a flat long duration component and a sharp central core, which defines shower maximum. Maximum occurs at solar longitude 139°.20 (Equinox 1950.0)

B.A. Lindblad, "Structure and Activity of the Perseid Meteor Stream from Visual Observations 1953-81"
Asteroids, Comets, Meteors II, C.I. Lagerkvist and H. Rickman (eds.), Uppsala, 1986, pp. 531-536.

Visual observations of Perseid meteors 1953-81 indicate that the Perseid stream cross section consists of two components: a long duration rather flat component and a sharp spike-like feature which defines the Perseid maximum. Shower maximum for visual meteors occurs at solar longitude 139°.4 (Equinox 1950). The Perseid shower shows large variations in activity from year to year, with more than a factor two variation in hourly rates at maximum.

J. Rajchl, "Fireballs and Noctilucent Clouds"
Bull. Astron. Inst. Czechosl. 37, 1986, pp. 305-311.

The possible causal relation between the overflights of bright fireballs and the occurrence of noctilucent clouds in the Northern Hemisphere is investigated and discussed. The comparison of the observation data from the European Fireball Network with the Scotland centre's data on noctilucent clouds indicates a non-positive relation between the two phenomena.

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VERENIGING VOOR STERRENKUNDE

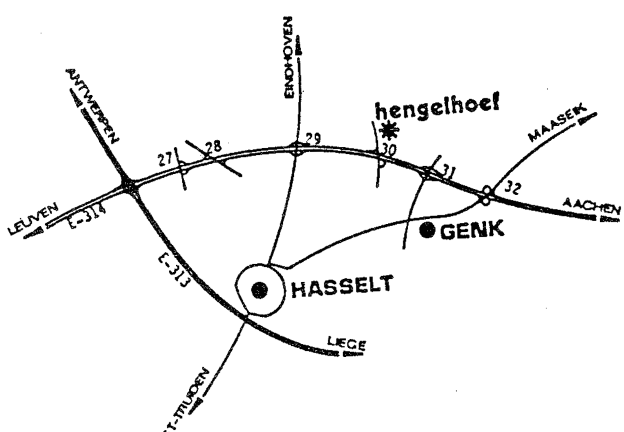
V.Z.W.

WEEKEND DER AMATEURS

DE AFWEZIGEN ZULLEN ONGELIJK KRIJGEN ....

want voor het eerst richt de VERENIGING VOOR STERRENKUNDE een *'WEEKEND DER AMATEURS'* in om je de mogelijkheid te geven kontakt op te nemen met collega amateurastronomen. Vele sprekers en specialisten stellen er hun werkterrein voor om uw sterrenkundige hobby een extra dimensie te geven !
Je kan trouwens zelf je werk komen voorstellen of meedoen aan de astro-ruilbeurs. Keuze te over.
Verscheidene firma's en boekhandels stellen tevens hun astronomisch gamma voor.
Het *'WEEKEND DER AMATEURS'* heeft plaats gedurende het weekeinde van 7-8 november aanstaande in het congrescentrum van Hengelhoef nabij Genk. Als deelname in de onkosten betaal je slechts 1250,-Bfr. (alles in, maaltijden, overnachting). En J.V.S.-ers betalen slechts 950,-Bfr. om dit spetterend weekend mee te beleven !
DUS : zorg dat je erbij bent op 7-8 november in Hengelhoef op het enige echte *'Weekend der Amateurs'* en vul snel het V.V.S.-inschrijvingsformulier in ! (reservatie voor maaltijden en overnachting noodzakelijk).

Het domein 'Hengelhoef' is zeer goed bereikbaar langs de autosnelweg E 314. Tussen Genk en Houthalen neem je gewoon afrit 30 'Park Midden Limburg'. Neem niet afrit 29 !
Vanaf het station van Genk zal een continu pendeldienst van dienst zijn gedurende het volledig weekend.



7-8 nov. Hengelhoef