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KONTAKTBLAD VAN METEOORWAARNEMERS IN DE BENELUX

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Cover : The meteor on the cover of this issue has been photographed on 1980 Aug.14 at 21h25m UT . The photographer was Pekka Parviainen , the most succesful meteor photographer of Europe. This meteor was a -3 to -5 Perseid . The film used was Tri-X developed in D-19. The camera was a Nikon FE with Nikkor 2.0/28 wide angle.

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AKTIE OPROEP

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AUGUSTUS — SEPTEMBER

Tabel : maanlicht augustus en september 1986

Datum	k	Datum	k
Vrijdag 1 augustus	0.20-	Vrijdag 5 september	0.01+
Vrijdag 8 augustus	0.05+	Vrijdag 12 september	0.58+
Vrijdag 15 augustus	0.71+	Vrijdag 19 september	0.99-
Vrijdag 22 augustus	0.94-	Vrijdag 26 september	0.51-
Vrijdag 29 augustus	0.35-	Vrijdag 3 oktober	0.01-

L.K. 28 juli,27 augustus,26 september
N.M. 5 augustus,4 september, 3 oktober
E.K. 13 augustus,11 september, 10 oktober
V.M. 21 juli,19 augustus,18 september,17 oktober

PERSEIDENMAXIMUM 12-13 AUGUSTUS

Inderdaad , we zijn weer zover , de meest favoriete zwerm van het jaar staat weer in het middelpunt van de belangstelling ! Globaal genomen kunnen we zeggen dat de omstandigheden in 1986 niet even perfect zijn als in 1985 , maar toch vrij goed om de zwerm te observeren. Elders in dit nummer vindt u een uitgebreid verslag van de Perseïden 1985. Aan dit verslag is zeer lang gewerkt , u hebt er ook lang moeten op wachten . Het resultaat beloont zeker al het wachten want nog nooit eerder hebben we zo een grondige verwerking van de Perseïdenzwerm kunnen ondernemen ! De resultaten zijn gewoon verbluffend . Voor de uiteindelijke resultaten werden waarnemingen van vele amateurs uit verschillende landen gecombineerd . Uiteindelijk krijgt u als één van de deelnemers aan de vorige Perseïdenaktie de indruk dat uw bijdrage verloren is gegaan in de grote massa gegevens. Wel , het is juist dankzij die grote hoeveelheid gegevens dat we een mooi beeld hebben verkregen van de Perseïden in 1985 . We hebben zeker niet te veel waarnemingen , integendeel , voor sommige periodes hebben we nog veel materiaal te kort ! Tijdens een aantal heldere nachten stelden we vast dat slechts enkele waarnemers in België aktief waren tijdens korte tijdsintervallen . Waar zaten de anderen toen ? Te veel waarnemers schieten pas in aktie met het Perseïdenmaximum en beperken zich tot dit maximum om slechts enkele uurtjes te observeren . Dit is fout ! De waarnemer in kwestie is en blijft zo onervaren terwijl een grote partij gelegenheidswaarnemers de globale resultaten slechts verstoren door vertekenende resultaten. Dit willen we dit jaar vermijden door :

- zoveel mogelijk waarnemers tijdens een lange periode te laten observeren.
- de waarnemers aan te moedigen om ook tijdens minder populaire periodes te observeren (eerste week van augustus.)

Het hoofddoel van de Perseïdenaktie bestaat erin om een zo gedetailleerd mogelijk beeld te bekomen van de Perseïdenaktiviteit om na te gaan of het aktiviteitsverloop , het maximum en het tijdstip van het maximum vergelijkbaar zijn met 1985. Verder willen we enkele prangende vragen die uit het 1985-materiaal zijn gerezen oplossen . Volgend jaar 1987 is ongunstig voor de Perseïden. Vandaar dat we er nu moeten van profiteren , na deze aktie is het wachten tot 1988 om de Perseïden weer eens onder ideale omstandigheden te kunnen observeren !

Het visuele programma bestaat hoofdzakelijk uit volgende punten :

- bepaling van de uurfrequenties
- opstellen van magnitudeverdelingen per nacht.

Daarom vraag ik de waarnemers uitdrukkelijk om zich toe te spitsen op juiste magnitudeschattingen en representatieve uurfrequenties. Om zulks te bekomen moet men zeker niet gaan intekenen op sterrenkaarten of op papieren. Om te vermijden dat de effektieve waarnemingstijd te fel wordt aangevreten door notitietijd is het sterk aanbevolen om met een cassetterecorder te werken. Wel moet men 's nachts zeer voorzichtig zijn met zulk toestel : menig waarnemer is reeds tot zijn groot spijt waarnemingen kwijtgespeeld door slordig werk met een cassetterecorder. Inderdaad is extra aandacht vereist . Vermijd om met batterijen te werken , werk bij voorkeur steeds op het net (220 V). Steek bij wijze van voorzorg wel batterijen in de recorder , indien de netstroom het laat afweten dan schakel je over op de batterijen , houd de cassetterecorder dan wel een beetje warm (steek hem in je slaapzak). Test tijdens het waarnemen om het kwartier of het apparaat nog goed werkt . Als je vaststeld dat je per ongeluk een stuk mist op je band , vermeld dit dan zodat je bij het invullen van het formulier de effektieve waarnemingsduur kunt invullen . Blijf steeds zoveel mogelijk naar de hemel kijken : als er een rat aan uw tenen peuzelt; niet laten afleiden , verder kijken !

Bepaal nauwkeurig de waarnemingsomstandigheden. Opgelet : we stelden vast dat de waarnemers in België onder minder goede omstandigheden de grensmagnitude vaak overschatten terwijl waarnemers onder perfecte omstandigheden de grensmagnitude blijven onderschatten ! Alleen waarnemingen met een gemiddelde grensmagnitude boven de 5.0 worden verwerkt , dit is een echt minimum om te grote afwijkingen op de resultaten te vermijden. Schat de helderheid tot op 0.5 magnitude nauwkeurig . Beginners , heb niet de pretentie van geen atlas te gebruiken om eerst de sterhelderheden te leren onderscheiden ! Vergeet niet dat de meeste (onervaren) waarnemers de neiging hebben om de helderheden fors te overschatten! Dit komt ook voor bij mensen die al veel jaren geleden begonnen met meteorenwaarnemingen maar die niet regelmatig of weinig waarnemen !

Zend uw waarnemingsformulieren in zo spoedig mogelijk na de waarnemingsperiode . Voeg bij uw 'pakje' waarnemingen nog twee extra tabellen :

- <u>Uurfrequenties</u> ,aantallen meteoren en waarnemingsomstandigheden per interval van 1 uur.
- <u>Magnitudeverdelingen</u> : maak zelf uw magnitudeverdelingen voor de Perseïden en de sporadischen afzonderlijk en per nacht.
- Zie voor voorbeelden WGN nr.1(1986) p.9 en in WGN nr.2 (1986) p.52 en p.56-58

Het fotografische programma is dit jaar vrij eenvoudig. Voor het projekt PMDB (zie elders in WGN) hebben we zoveel mogelijk meteoorfoto's nodig. De posities interesseren ons vooral. U hoeft dus niet op een vast richtpunt te mikken, heb je een camera ? Zet hem in en probeer zoveel mogelijk meteoren te fotograferen ! Vergeet echter niet alle tijdstippen (belichting,meteoor) in te vullen op een filmformulier ! Zend uw opname , liefst uitgemeten,door aan de werkgroepleider. Zend minstens één afdruk met de identificatie van de sterren door met het fotoformulier !

Dit jaar kunnen we begin augustus ongestoord waarnemen tot net bij het maximum , dan zal de maan tot middernacht storen op 12-13 augustus.Na het maximum stoort de maan nogal erg!

AKTIE OPROEP : RADIOWAARNEMINGEN

Jeroen Van Wassenhove

1. Augustus : de Perseïden .

Deze jaarlijkse zwerm vormt gewoonte getrouw het hoogtepunt van het jaar . De eerste Perseïden verschijnen al rond 15 juli , de laatste eind augustus. Het theoretisch maximum verwacht men in de nacht van 12 op 13 augustus omstreeks 20h U.T. De optimale richtingen hiervoor zijn O-W of OZO - WNW . Echter indien het maximum 6 tot 8 uren later verschijnt , is dit niet meer zo gunstig voor radiowaarnemingen. Eenmaal de radiant hoger dan 45° staat , daalt de aktiviteit (schijnbaar) aanzienlijk. Dit komt omdat aan de voorwaarde voor reflectie dan moeilijker voldaan wordt. De uurfrequenties kunnen hoog oplopen : van 50 tot 500 meteoren . Vooral personen met zeer gevoelige apparatuur kunnen deze laatste waarde bereiken .

Perseïden : 25 jul - 18 aug 12.3 aug α =46°.0 δ =+58°.0

	0h		2		4		6		8		10		12		14		16		18		20		22	
N - Z	7	8	8	6	5	2	1	3	5	7	8	8	7	6	4	3	2	1		1	2	4	5	6
NNO - ZZW	4	5	5	4	3	1	1	4	6	8	9	0	9	8	7	6	4	3	2	1	1	1	2	3
NO - ZW		1	2	2	1		2	4	6	8	9	0	0	9	8	7	6	5	4	4	3	3	2	1
ONO - WZW	4	3	2	1	1	1	2	3	5	7	8	9	9	9	8	8	7	6	6	6	5	5	5	4
O - W	7	6	5	4	3	2	2	2	3	4	5	6	7	7	7	7	7	7	6	6	7	7	7	7
OZO - WNW	9	9	7	6	4	3	2	1	1	1	2	3	4	5	5	5	6	6	6	7	7	8	9	9
ZO - NW	0	0	9	7	5	3	1	1	2	2	2	1		1	2	3	3	4	5	5	6	8	9	0
ZZO - NNW	9	9	9	7	5	3		2	4	5	5	5	4	2	1		1	2	3	4	5	6	7	9
	0h		2		4		6		8		10		12		14		16		18		20		22	

2. September : de sporadische aktiviteit.

Uit waarnemingen van vorig jaar bleek dat de sporadische aktiviteit in september soms hoog ligt . Ik doe een oproep aan al de waarnemers om na de Perseïden te luisteren naar de sporadische aktiviteit in september. Zodoende kunnen we vergelijken met vorig jaar.

Veel Succes !

Lees a.u.b. nog eventjes de opmerkingen in WGN3 vooraleer je begint te luisteren.

RADIOWAARNEMINGEN : SPORADISCHE AKTIVITEIT

Jeroen Van Wassenhoven

In de maanden februari en maart werden waarnemingen verricht van de sporadische aktiviteit. Op sommige dagen lag die zeer hoog . Het is mogelijk dat de Virginiden hun steentje hebben bijgedragen . Het aantal storingen bleef beperkt.

List of observers and equipment

Observer	Site	Antenna	Receiver
MDM Maurice De Meyere	St.Martens-Latem	crossed 4 el.Yagi	Toshiba
JS Johan Smet	De Pinte	crossed 3 el.Yagi	VHF-UHF receiver
CSt C.Steyaert	Bottelare	crossed 5 el.Yagi	Sony ICF 7600 D
JVW J.Van Wassenhove	Nazareth	crossed 5 el.Yagi	Grundig Sat.300a

List of observations

Date	Period(U.T.)	N	Frequency	Observer
Feb.28	2000-2035	0	88.30 MHz	JVW
28	2035-2100	1	88.50	JVW
Mar.07	2000-2030	1	88.50	JVW
10	2122-2222	78	72.110	JS
12	2054-2154	76	72.110	JS
15	2135-2235	87	72.110	JS
15	1902-2000	3	91.10	JVW
16	2000-2100	17	72.110	MDM
16	2147-2247	82	72.110	JS
18	2000-2130	23	72.110	MDM
18	2102-2202	60	72.110	JS
19	2154-2254	69	72.110	JS
21	2000-2100	15	72.110	MDM
22	1900-2000	2	88.30	JVW
22	2030-2100	3	88.30	CSt
23	2121-2221	39	72.110	JS
24	2023-2123	64	72.110	JS
28	2000-2100	19	72.110	MDM
28	2000-2100	39	72.110	JS
29	2000-2100	4	88.30	CSt
29	1951-2051	27	72.110	JS
29	2000-2100	8	88.30	JVW
30	1916-2016	27	72.110	JS
31	1905-2000	9	72.110	MDM

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MIDZOMERNACHTDROMEN IN DENEKAMP

C.Johannink

Summary : during the nights mentioned here we observed during 1-1.5 hours . The night 14-15 showed some activity of the June Lyrids. André Kluitenberg and Carl Johannink saw both three meteors coming from that area. The other nights showed only 1 or 2 candidates. This was the first year since 1979 that we could observe these meteors.

Juni : voor velen de mooiste maand , weerkundig vaak knullig , astronomisch gezien al te grijs. Wat kun je dan nog doen als meteoorwaarnemer ? Nou , gewoon wachten op uitzonderlijk helder weer en dan toch aan de slag. De gunstige uitwerking van een hogedrukgebied zorgde voor goed heldere nachten 13-14 , 14-15 en een matige 15-16 juni. Er was wel eens gemompeld dat er zoiets als Juni-Lyriden bestonden : attentie dus voor meteoren van die kant. In de eerste nacht werden 15 meteoren gezien door Ralf André en Carl . Ook werden lichtende nachtwolken waargenomen toen ze rond 00h15m MEZT richting sterrenwacht fietsten.

Er was één kandidaatje voor de Juni-Lyriden. De volgende dag was echt warm : hetzelfde drietal in begeleiding van Robert Morsink nam 30 meteoren waar , terwijl ze afkoelden onder de sterrenhemel. Zes kandidaten hieronder voor de Juni-Lyriden. In de laatste nacht (die van Rusland-België) namen Ralf en Carl nog waar en zagen onder aanvankelijk guppige omstandigheden nogmaals 7 meteoren waaronder 2 mogelijke Juni-Lyriden.

Conclusie : er is wel sprake van enige activiteit in de Lier rond die dagen , maar het woord "zwerm" is wel wat forsjes hiervoor.

Nacht	Obs.	Time (U.T.)	Numbers	Lm	Notes
13-14/6	AK	2230-0000	7	5.0-6.0	90m
	CJ	2230-0000	6	4.8-5.7	90m
	RM	2230-0000	2	5.0-6.0	90m
14-15/6	AK	2225-2350	15	4.9-6Q0	85m
	CJ	2225-2350	16	4.9-5.7	85m
	RM	2225-2350	2	4.8-5.9	85m
	ROM	2300-2350	2	5.7	50m
15-16/6	CJ	2230-2330	7	4.4-5.0	
	RM	2230-2330	2	4.4-5.0	

SPORADIC ACTIVITY : MAY - JUNE 1986

by Bauke Rispens

The weather in the spring months of 1986 gave us a reasonable number of clear nights with excellent conditions for visual meteor observing. A total of four nights (or parts of a night) we had the opportunity to go out and lay ourselves down face up , eyes open . Apart from the expectable low sporadic meteor rates , the nights in late spring have a charm in their own . Glowing dawn , dusk in the north , sky crossing satellites and bright planets above the southern horizon. Under the rising arc of the Milky Way you feel these nights are the nicest and most mysterious of the year. Now the results :

Date'86	Period(UT)	Obs.	Ns	$\bar{m}$	Teff	Lm	K	Remarks
15-16/5	2112-2245	BR	3	2.7	82	5.4	0.85	clouds
18-19/5	2055-2150	KM	4	3.1	55	5.4	1.0	moon
	2055-2150	BR	2	0.7	55	5.3	1.0	moon
	2150-2300	KM	5	2.7	70	5.4	1.0	moon
	2150-2300	BR	4	3.5	66	5.3	1.0	moon
	2300-0005	KM	3	3.2	65	5.4	1.0	moon
	2300-0005	BR	2	3.7	65	5.4	1.0	moon
30-31/5	2130-2300	BR	4	2.4	80	6.1	1.0	tired
	2300-2352	BR	2	4.0	52	6.4	1.0	tired
09-10/6	2150-2300	BR	5	2.2	70	5.8	1.0	
	2300-2330	BR	1	5.0	30	6.2	1.0	

Trains : Out of the 35 sporadics (which is the total of the 4th column) only two had a train. Percentage 6%. Nosignificant stream activity has been detected during these observations. No fireballs were seen . Two sporadics were of magnitude -2 . A -0.5 sporadic on 9 June showed fragmentation. Approx. time : 22h50m U.T. in Capricornus.

Send your Perseid reports in for publication in WGN before 1 Sept!

ON THE PERSEID METEOR STREAM 1985

Paul Roggemans

Abstract :

Over 24000 meteors were used to investigate the magnitude distributions and mass distribution within the Perseid meteor stream. The particle size distribution gradually changes throughout the cross-section of the stream.The Perseids display proportionally more faint meteors towards the post-maximum nights. Even more observational data was available for ZHR -profiles.Some 50000 meteors were available for this study.The influence of the use of different sliding means on the appearance of short duration peaks is discussed. Some depressions which separate submaxima can be explained as artifacts introduced by the undercorrection with a zenith exponent $\gamma=1.0$ instead of $\gamma=1.47$. Apart from the short duration features the median of the maximum occurred at $\lambda_\odot=139^\circ.5$ (epoch 1950.0) which is significant behind the expected time.The Perseid maximum covered a 24 hour period.

1. Introduction.

The Perseids are beyond any doubt the favourite annual shower of most of the northern hemisphere meteor observers. Indeed , the comfortable temperatures of summer nights are very attractive for meteor observing sessions . The meteor groups in northern Europe suffer from the long daylight and have few hours of darkness with the Sun just being under the horizon. Southern Europe benefits from much longer nights , at 45° north one can observe at perfect dark sky for about 6 hours. For this reason several European amateurs travelled south to Puimichel in France . This place has been blessed by nature with a micro-climate which provides over 200 nights with excellent conditions for astronomical work , each year. Dust and haze are blown towards the sea by the Mistral wind. The 1985 Perseid campaign became a magnificent success mainly because of the overwhelming observational success achieved in Puimichel!

The most hopeful point of this paper is the fact that the following results are obtained from meteor organisations and individuals from all over the world. The observers provided data for the entire visibility period of the Perseids with for several nights data for 24 hour on 24 hour ! The Perseid activity was recorded continuously from Europe between 20h and 3h U.T., from America between 5h and 11h U.T. and from Japan between 14h and 20h U.T. . For the future it would be very useful to obtain more data on the periods 18h-20h U.T.,3h-5h U.T. and 11h-14h U.T.

The available observational results were controlled to check the reliability and to evaluate the possibility to incorporate the observational data in the commonanalysis. Observations obtained under uncomparable conditions were removed from the data-file . Some groups sent their results too late and couldn't be included anymore. The final list of contributors to this Perseid study :

- Belgium : results of the V.V.S.Meteor Section , see for raw data in WGN,n°3 , June 1986, pages 79-89.
- Canada : Peter Brown , private correspondence.
- D.D.R. : results of the A.K.Meteore, Mitteilungen des Arbeitskreises Meteore im Kulturbund der D.D.R.
- Finland : U.R.S.A.Meteor Section, WGN n°6 December 1985, pages 196-197

- France :-Results Dutch meteor observation team "Delphinus" report Perseids 1985,published in Harderwijk.
  -Results of the V.V.S.Meteor Section,WGN n°3; June 1986 , pages 79-89.
- Holland :-Perseids 1985 : Harderwijk.
- Japan :-Astronomical Circular n°519,October 1985 Nippon Meteor Society.
  -Personal data from Japanese meteor observers : Observers : Sano,Takanashi,Takata,Takahashi,Ochiai, Oka,Niwa,Naruse,Matumoto.
- Norway :-N.A.S.Meteor Section; Norwegian visual observations. See WGN n°2 , April 1986, pages 42-43
- U.S.A. :-Personal results of Lunsford R.(California) and of McLeod N.(Florida).See WGN n°2,p.63-67.(1986).

We are grateful to all these meteor observers for the valuable work that they made available for this analysis.

2.The magnitude distributions.

The most valuable magnitude data were obtained in France under perfect observational circumstances.An additional set of magnitude distributions came from Norman McLeod who observed under perfect conditions most of the time. The other contributors were hampered somehow by unperfect skies. Their magnitude distributions were shifted towards the brighter magnitudes. All these magnitude data were used to obtain a general magnitude distribution for each night between 6 and 15 August. Magnitude data obtained under perfect sky conditions reduced the influence of the other data on the global result since it represents over 90% of the data.

Table 1 , Magnitude distributions 1985

	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	0	0	0	0	0	0	0	0	0	0
-5	0	0	0	0	0	0	2	0	0	0
-4	0	0	0	0	0	0	0	0	0	0
-3	0	0	0	0	0	0	5	0	3.5	0
-2	2	2.5	1	0	2	0	6	0	5	0
-1	3	2	3	0	6.5	0	18	2.5	12.5	2.5
0	6	15	1	2	20.5	3	16.5	2.5	28	8
+1	11.5	25	3.5	5.5	24.5	2.5	43.5	11.5	49	23
+2	27	54.5	17	11.5	53.5	27.5	99	60	92	53.5
+3	28	84.5	13	34	71.5	50	125.5	110.5	111.5	99
+4	21	58	14.5	23	60.5	68	108	131.5	109.5	121
+5	7	22.5	8	12.5	32.5	37.5	50	87.5	44	74.5
+6	0.5	3	1	5.5	2.5	6.5	4.5	15	3	5.5
Tot.	106	267	62	94	274	195	478	421	458	387
$\bar{m}$	2.50	2.78	2.83	3.38	2.76	3.62	2.66	3.60	2.64	3.40
$\Delta\bar{m}$	0.28		0.55		0.86		0.94		0.76	
r	2.88	3.36	2.46	3.26	2.68	4.16	2.31	3.82	2.41	3.45
	Before 6 Aug.		6-7 Aug.		7-8 Aug.		8-9 Aug.		9-10 Aug.	

	P	S	P	S	P	S	P	S
-8	0	0	0	0	0	5	0	0
-7	0	0	0	0	0	0	0	0
-6	0	0	0	0	0	0	0	0
-5	0	0	1.5	0	0	0	0	0
-4	0	0	3	1	1.5	1	0	0
-3	1.5	0	3.5	0	7	2	3	0
-2	2	0.5	15.5	2	21	1.5	14.5	0
-1	8	2.5	57.5	7.5	87	1.5	35.5	1
0	10	7.5	134.5	15.5	168.5	11.5	51.5	9
+1	29	16	296.5	37.5	417	48	107	23.5
+2	64	34	557	129	974.5	141	245.5	66
+3	66.5	65.5	722	214.5	1198.5	304.5	381.5	162
+4	32.5	63	559	244.5	951.5	351.5	433	201
+5	6.5	18.5	269.5	145.5	415.5	161.5	226.5	150.5
+6	1	1.5	53.5	25	61	14	25	18
Tot.	221	209	2673	822	4303	1043	1523	631
$\bar{m}$	2.30	3.02	2.75	3.38	2.80	3.34	3.08	3.65
$\Delta\bar{m}$	0.72		0.63		0.54		0.57	
r	2.57	3.60	2.66	3.23	2.76	3.45	2.66	4.28
	10-11 Aug.		11-12 Aug.		12-13 Aug.		13-14 Aug.	

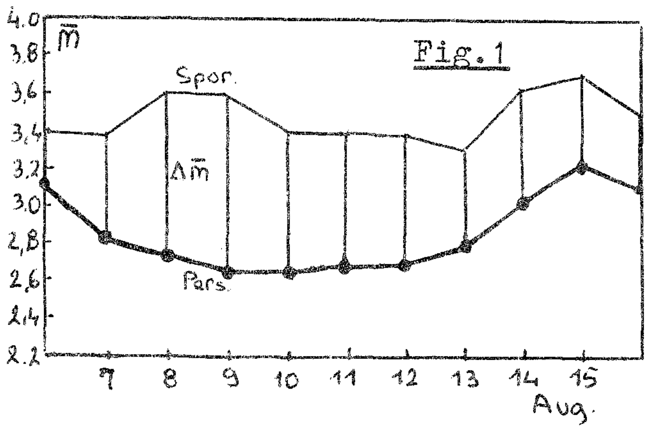
Mag.	P	S	P	S	P	S	P	S
-8	0	0	0	0	0	5	3	0
-7	0	0	0	0	0	0	1	0
-6	0	0	0	0	0	0	3	0
-5	0	0	0	0	3.5	0	4	1
-4	0	0	0	0	4.5	2	32	2.5
-3	0	0	0	0	23.5	2	55	2.5
-2	1	1	0.5	0	70.5	7.5	124.5	6.5
-1	3.5	1.5	3	5.5	237.5	26.5	291	16.5
0	20	2.5	11	14.5	467.5	91	533	48.5
+1	41.5	10	36.5	36	1058.5	238.5	993	68
+2	69.5	38.5	85	127	2284	742.5	1715.5	81
+3	156.5	98.5	130.5	236.5	3005	1459.5	1794.5	144
+4	156	148	118	313.5	2564.5	1723	1051	110
+5	93	95.5	57.5	168	1210	974	355.5	50.5
+6	11	12.5	5	22	168	128.5	89	2
Tot.	552	408	447	923	11097	5400	7045	533
$\bar{m}$	3.26	3.73	3.10	3.49	2.84	3.43	2.19	2.67
$\Delta\bar{m}$	0.47		0.39		0.59		0.48	
r	3.44	3.68	3.61	3.58	2.68	3.55	2.27	
Date	14-15 Aug.		After 15 Aug.		Tot. Perfect Sky		Tot. Unperfect Sky	

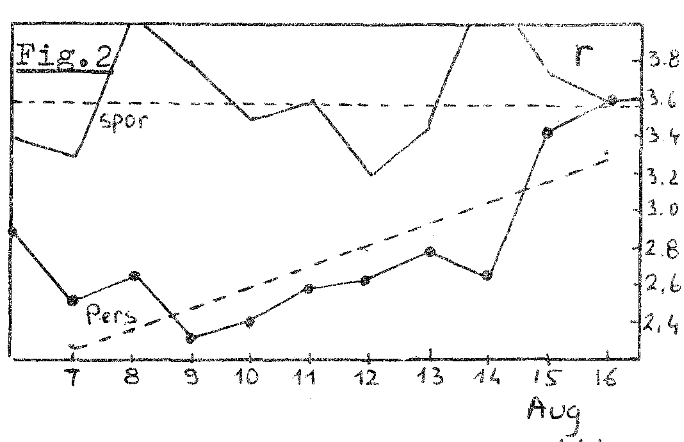
Mag.	P	S	δ Aquar.	α Cap.
-8	3	5	0	0
-7	1	0	0	0
-6	3	0	0	0
-5	7.5	1	0	0
-4	36.5	4.5	0	4
-3	78.5	4.5	0	2
-2	195	14	2	7
-1	528.5	43	3	9
0	1000.5	139.5	13.5	16
+1	2051.5	306.5	27.5	44
+2	3999.5	823.5	31.5	88.5
+3	4799.5	1603.5	121	106
+4	3615.5	1833	216	105
+5	1565.5	1024.5	104	45
+6	257	130.5	11.5	5.5
Tot.	18142	5933	530	432
$\bar{m}$	2.58	3.35	3.58	2.71
$\Delta\bar{m}$	0.77		-0.15	0.72
r	2.53	3.22	3.28	2.34
	Gen.TOTALS		Perfect sky	

Table 1 lists the magnitude distributions as derived in a limited period of time. The first magnitude distribution was found for the observations obtained before 6 August. The average lim. magn. then was 5.9 . The following nights,6-7 Aug. until the end of the month all had perfect skies.The only exception was 10-11 August when the observatory in Puimichel could work for two hours only.That night was better covered by observers in Belgium who observed under less favourable conditions.

The sporadic background has been treated in a similar way to serve as a reference for the variations of the Perseids throughout the stream. The high numbers of meteors taken into account and the perfect conditions under which these magnitude estimates were obtained deliver a very reliable picture of the mass distribution in the Perseid meteor stream.

Relative to the sporadic background , the Perseids show a decreasing activity in bright meteors over the entire activity period. The brightest mean magnitude $\bar{m}$ and lowest r value occurred on 8-9 August. From that night on , the Perseids were proportionally growing in faint meteor strength. At the maximum the mean magnitude of 2.80 agrees well with previous results obtained under perfect sky. It disagrees , however , with reports that indicate an increment of bright Perseids during the maximum night. On the contrary , this report on the 1985 display shows a meteor population during the maximum night rich in medium faint meteors with a complete absence of unusual bright appearances. An explanation may be found in the fact that normally many unexperienced observers get into observing activities just for the maximum. It has been shown before that unexperienced observers tend to overestimate the magnitudes . Using a lot of such reports could distort the general picture and hence lead to false conclusions.





In this report no data from unexperienced observers were used. The few observations obtained under unperfect sky couldn't change the final picture. The r-values were computed with the method explained in ref.1 . The r-value dropped to 2.31 on 8-9 Aug. and increased the following nights to equal the sporadic r after 16 Aug. Figure 1 the mean Perseid magnitude versus the mean sporadic magnitude; There is no dip at the maximum ! Figure 2 is even more significant. The sporadic r averages 3.55 , a high value! The variations on the sporadic r are due to the larger uncertainty on higher r-values. The r for the Perseids averages 2.68. Around these values the r is less sensitive to errors. The progressive increment in r therefore seems to be meaningful as a gradual change in particle size distribution through the stream. The 1985 observers provided a rather poor coverage of the period prior to 7 August. We have only one mean r-value for the first weeks of Perseid activity.The period of 7 to 16 August is very well covered and the following linear relation was found :

$$r_p = 0.112\ d + 1.46 \quad (\text{valid for } 7 \leqslant d \leqslant 16)$$

The hourly rates were too low to continue after 16 August with night by night magnitude distributions. The average r for the Perseids after 16 August until the end of the Perseid activity averages 3.6 being identical to the sporadic r !

The results for unperfect sky observations yield lower r-values. Taking them all together we find r_p=2.53 and r_s=3.22. The various Aquarid radiants turn out to be richer in faint meteors than the sporadics while the α Capricornids are richer in bright meteors than the Perseids. Shower activity of the Aquarids, α Capricornids and κ-Cygnids was filtered from the non-Perseid activity, leaving the sporadics as treated in this paper. Observations concerning Perseids only were added to the distribution for unperfect sky since the associated sporadic distributions weren't available as controll and reference.

3. The hourly rates and the Z.H.R.'s.

Fig.3

Z.H.R. Perseids 1985

Classic presentation.

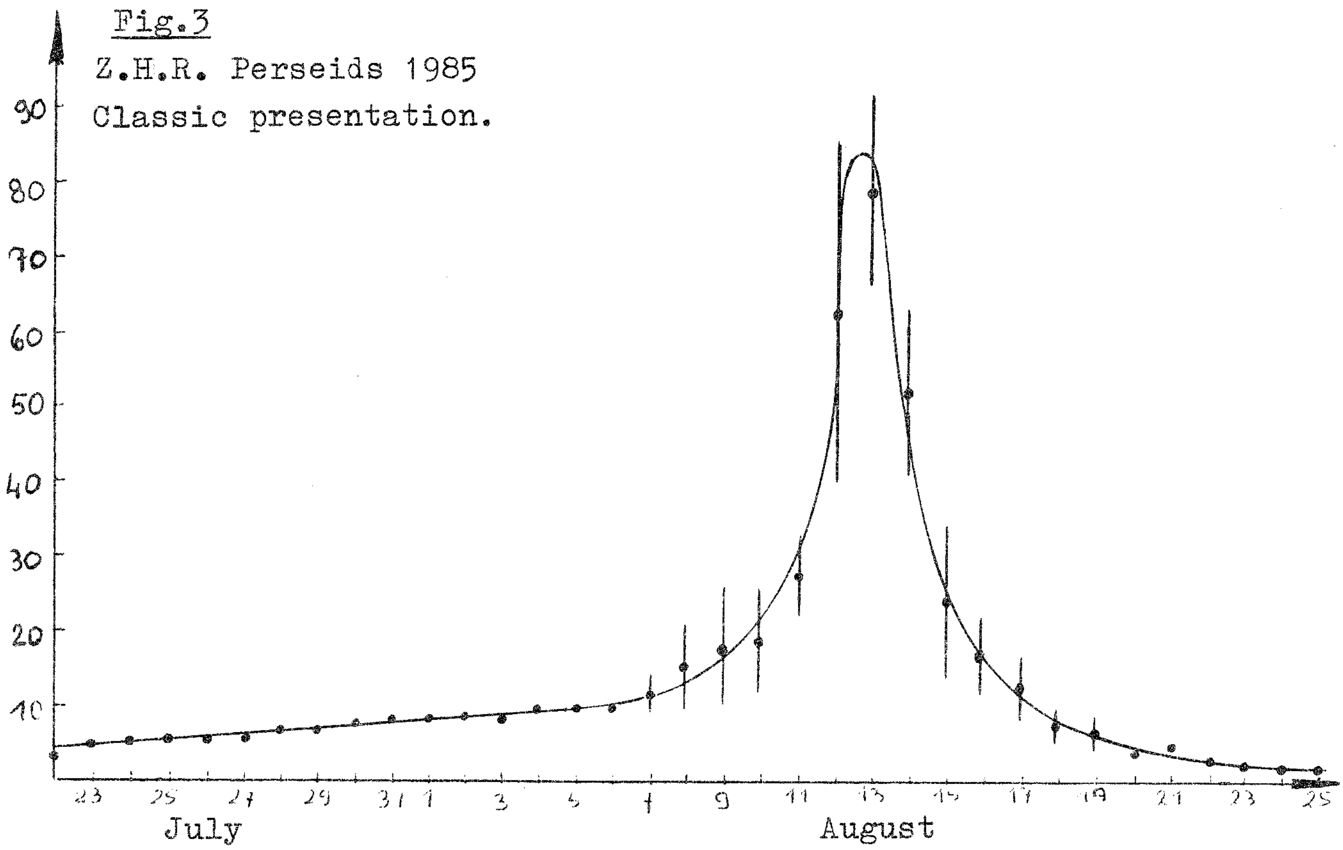
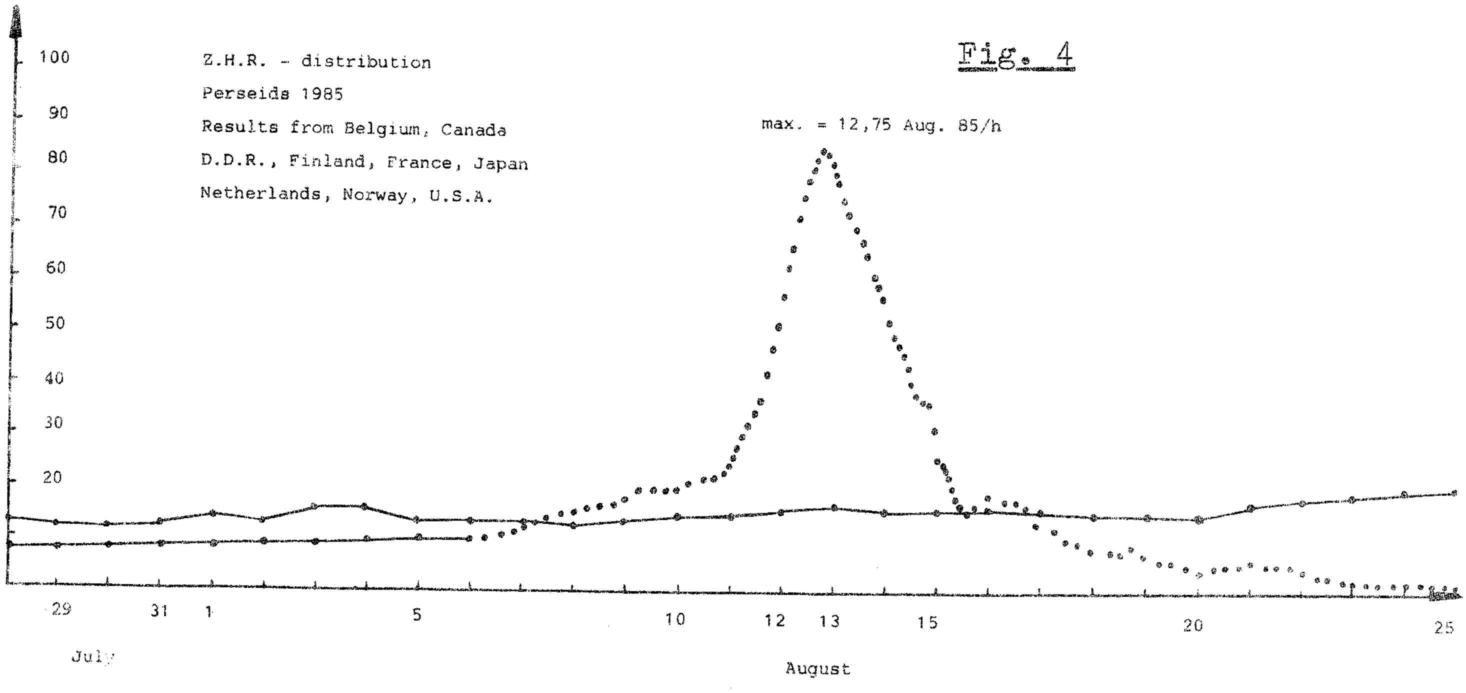


Figure 3 shows a classic hourly rate curve, it is the result of averaging the Z.H.R.'s over 24 hour periods. The first Perseids occurred around mid-July, the activity ceased at about August 25. Over 800 Z.H.R.'s were used to describe the Perseid activity 1985. The large amount of data enabled to avoid misleading features which are often produced by the large fluctuations on visual hourly counts ! The Perseid stream consists of a very widely dispersed meteoroid population responsible for the long period of visibility. The high inclination of the Perseid stream orbit avoids gravitational perturbations except from the regular passages at the Earth. The Perseid activity until the first week of August show Z.H.R.'s below the sporadic background activity . It is a feature of the aging process that the meteoroids of the Perseid stream were dispersed from the main Perseid stream far enough and numerous enough to cause a well defined shower activity a long time ahead on the main shower maximum. From 7 August onwards the hourly rates start sputtering. It exceeds the sporadic background rate but the Perseid rate follows a flat level just above the sporadic background between 7 and 11 August. In this period , the population index r drops to its lowest value on August 9. Rates are often experienced as being discouraging low on 10-11 August , just before the maximum. A very steep increase in rates follows on August 11. Note that no sharp peak has been drawn ! The decrease in hourly rates takes more time. The skewness of the activity curve of the cross-section of the core of the Perseid stream illustrates why post maximum nights 13-14 and 14-15 are in general appreciated as more interesting with better rates than the pre-maximum nights. The population index r increases during the cross-section of the core. The post maximum wing drops below the sporadic activity about August 15. The activity ceases about 25 August. The second wing thus being of a much shorter duration than the pre-maximum wing .

The amount of data with rates covering the activity on an almost 24 hour basis enable a more detailed picture of the cross-section of the core of the Perseid stream. Figure 4 (below) has been drawn with the results of a sliding mean over 24 hours. The sporadic background has been indicated as well. No spike-like peak appear but a rather broad maximum. The median of the maximum appears at August 12.75 corresponding with about $\lambda_{\odot} = 139.^{\circ}5$ (epoch 1950.0). This time is significant behind the previous results such as published by Lindblad (ref.3), he found $\lambda_{\odot} = 139.^{\circ}39$ (epoch 1950.0).

Fig. 4



The maximum was predicted for August 12.5 , corresponding with $\lambda_{\odot}$= 139°.25 . Radio observers reported shortly after the observations that the median of the maximum activity occurred later than predicted (ref.4). This is confirmed now by these visual observations.

The absence of a spike-like peak can be explained by the smoothing effect of a 24 hour covering running mean. Several authors mention such a spike-like peak (ref.3,ref.5) . For instance the 1980 display included a very short duration feature , around $\lambda_{\odot}$ = 139°.2 , which was considered to be the main maximum peak with exceptionally high rates. This remarkable peak was associated with the expected return of comet Swift-Tuttle around that time . The comet hasn't been rediscovered yet ! Long term studies of the Perseids have proven that the Perseid maxima display large annual variations (ref.6) . This means that the core of the Perseid stream is of a heterogenious nature along the stream orbit with considerable density variations. Maximum rate variations from one year to another such as these are anticipated from the nature of a meteor stream . The ejection mechanism of the cometary meteoroids has been going on during several perihelion passages of the parent comet. The current meteoroid population of the core has been built up steadily over many perihelion passages. This allows us to assume that fine inner structures excist within the core of the stream . This could explain the strong annual variations as well as the often controversal observations of different peak rates in one single year.

Another interesting consideration to be mentioned are the spurious features on the rate distribution. Small groups of observers often try to draw a rate profile from their own observations. It often turns out in conflicting rate curves of various groups . We therefor look at the rate plot at different stages of the analysis.

Raw data can be found in the references mentioned in the introduction. The Z.H.R.'s were computed according to the guidelines published in ref.2 . The following corrections were introduced ;

- cloudcover : if over 30% of the sky was obscured , the observation wasn't accepted.
- limiting magnitude : the correction for Perseid rates was 2.5 **(6.5-lm) the correction for the sporadic rates was 3.4 **(6.5-lm).
  Observations with lm<5.0 were ignored , observations with lm>5.0 and lm<5.5 were used if the effective observing time was long enough (>1.0) and no other corrections were necessary. We used r = 2.5 for the Perseids and r = 3.4 for sporadics. These values are smaller than the r = 2.68 and r = 3.55 found from the magnitude distributions. Another author , Zvolánková (ref.6) also used r = 2.6 and r = 3.5 for Perseids and Sporadics respectively.
- radiant zenith distance Z: was corrected by sec Z . The zenith exponent , mentioned by Zvolánková has been ignored. However , it seems that $\sec^{\gamma} Z$ with γ = 1.5 would solve some problems. Especially for the observations at more southern latitudes , this correction can be underestimated by sec Z . Results in this paper were found using γ = 1.0, comparable to previous results.
- Only individual rates were taken into consideration , the effective observing time was at least around 1 hour or more. No perception corrections were introduced.

Table 2 lists all the individual Z.H.R.'s , the observer or the data resource is mentioned between parenthesis.

Table 2 : Individual Z.H.R.'s Perseids 1985 and sporadic H.R.

July	Z.H.R.		H.R.		
13.29	0	±	12	±3	(PB-C)
14.56	3				(NMS)
16.29	2	2	14	7	(PB-C)
16.33	0		10	6	(PB-C)
16.38	6	4	14	7	(PB-C)
16.94	4	3	9	3	(GP-C)
16.95	0		10	5	(OS-C)
17.95	1	1	21	3	(DDR)
17.99	4	2	14	3	(DDR)
18.00	0		7	4	(OS-B)
18.00	0		12	3	(AS-B)
18.00	0		8	3	(GV-B)
18.30	16	7	7	4	(PB-C)
18.34	8	4	6	3	(PB-C)
18.76	0				(NMS)
18.97	2	1	8	2	(GP-B)
19.27	5	4	9	4	(PB-C)
19.31	9	5	11	5	(PB-C)
19.35	12	5	9	4	(PB-C)
19.97	2	1	20	2	(DDR)
20.39	0		14	4	(RL-U)
20.43	0		15	4	(RL-U)
20.94	7	5	19	7	(BW-B)
20.97	5	1	22	2	(DDR)
21.02	3	1	7	1	(GP-B)
21.08	0		16	7	(RS-B)
21.95	10	4	6	2	(BW-B)
21.96	1	1	31	3	(DDR)
22.02	3	1	23	3	(DDR)
22.02	4	1	12	1	(DDR)
22.74	6				(NMS)
23.73	0				(NMS)
23.89	5	3	16	5	(DDR)
23.94	13	7	8	5	(JVWB)
23.98	3	1	6	1	(GP-B)
23.99	4	2	11	2	(OS-B)
24.00	2	1	24	4	(DDR)
24.01	9	3	21	4	(BW-B)
24.01	4	2	14	4	(BD-B)
24.01	2	1	8	3	(BDuB)
24.01	4	2	11	4	(FT-B)
24.01	4	2	8	3	(AVHB)
24.01	1	1	6	3	(KVHB)
24.02	5	1	21	2	(DDR)
24.06	6	2	25	3	(DDR)
24.96	1	1	22	2	(DDR)
24.97	5	2	2	1	(GP-B)
24.98	7	4	16	5	(BW-B)
24.99	2	1	10	3	(OS-B)
25.00	1	1	24	2	(DDR)
25.00	2	2	12	4	(BD-B)
25.00	3	2	4	1	(MR-B)
25.00	3	2	10	3	(FT-B)
25.01	8	2	23	3	(DDR)
25.69	5	2			(NMS)
25.91	3	2	27	6	(DDR)
25.97	11	2	30	2	(DDR)
25.97	4	2	13	3	(DDR)
25.98	3	3	5	3	(FT-B)
26.53	7				(NMS)
26.72	2				(NMS)

July	Z.H.R.		H.R.		
26.96	2	± 2	17	± 5	(OS-B)
27.29	12	5	11	4	(PB-C)
27.33	15	6	9	4	(PB-C)
27.53	4	2			(MA-J)
27.68	6	2			(TA-J)
27.69	6	2			(MA-J)
27.73	6	2			(TA-J)
27.76	5	2			(TA-J)
27.99	7	5	11	6	(TEH-N)
28.26	10	5	5	3	(PB-C)
28.33	15	8	9	4	(PB-C)
28.37	8	4	11	4	(PB-C)
28.38	8	3	13	4	(RL-U)
28.43	7	3	14	4	(RL-U)
28.47	8	3	21	5	(RL-U)
28.68	3	1			(NMS)
28.72	4	2			(NMS)
29.31	7	4	11	4	(PB-C)
29.35	12	5	20	6	(PB-C)
29.43	5	3	13	4	(RL-U)
29.47	8	3	16	4	(RL-U)
29.73	2	-			(NMS)
31.97	5	3	7	4	(TEH-N)
August					
01.98	12	5	8	4	(TEH-N)
02.74	5	-			(NMS)
02.77	6	-			(NMS)
03.48	8	-			(NMS)
03.68	3	-			(NMS)
03.93	3	3	5	4	(IW-B)
03.95	9	7	13	8	(GV-B)
03.96	5	5	41	14	(PP-B)
03.97	10	7	30	13	(AS-B)
03.98	11	4	12	4	(TEH-N)
04.56	3	-			(NMS)
04.60	20	5			(MA-J)
04.67	3	-			(NMS)
04.72	4	4			(NMS)
04.77	5	5			(NMS)
04.98	6	3	13	5	(TEH-N)
05.66	5	-			(NMS)
05.69	8	-			(NMS)
05.88	12	5	23	6	(DDR)
06.53	4	-			(NMS)
06.60	12	-			(NMS)
06.69	5	-			(NMS)
06.70	5	2			(MA-J)
06.84	11	6	1	1	(AG-F)
06.84	8	5	12	3	(RH-F)
06.84	13	6	11	4	(KM-F)
06.84	17	8	6	3	(BR-F)
06.87	6	6	28	8	(GT-F)
06.90	12	6	17	5	(KN-F)
06.90	9	4	8	2	(AG-F)
06.90	14	5	9	3	(RH-F)
06.90	20	6	7	2	(KM-F)
06.90	13	5	6	2	(BR-F)
06.92	16	7	25	7	(GT-F)
07.52	10	-			(NMS)
07.56	8	-			(NMS)
07.60	4	-			(NMS)

Table 2 : continued

August	Z.H.R.		H.R.		
07.66	21	± -	-	-	(NMS)
07.70	13	-			(NMS)
07.86	21	7	9	± 3	(AG-F)
07.86	19	7	12	3	(RH-F)
07.86	14	6	10	3	(KM-F)
07.86	15	6	5	2	(BR-F)
07.90	12	5	2	1	(AG-F)
07.90	15	5	2	1	(RH-F)
07.90	10	4	8	2	(KM-F)
07.90	10	4	9	2	(BR-F)
07.94	9	3	8	2	(AG-F)
07.94	16	5	5	2	(RH-F)
07.94	11	4	8	2	(KM-F)
07.94	9	4	5	2	(BR-F)
07.94	28	10	16	6	(KN-F)
07.95	20	7	18	5	(GT-F)
07.98	11	6	21	8	(KN-F)
07.98	18	5	6	2	(AG-F)
07.98	12	4	7	3	(RH-F)
07.98	16	5	8	3	(KM-F)
07.98	16	5	13	4	(BR-F)
08.02	35	8	4	2	(AG-F)
08.02	21	6	3	2	(RH-F)
08.02	18	5	9	3	(KM-F)
08.02	25	6	10	4	(BR-F)
08.07	27	5	6	2	(AG-F)
08.07	12	4	9	3	(RH-F)
08.07	22	5	9	3	(KM-F)
08.07	23	5	3	2	(BR-F)
08.56	11	12			(NMS)
08.60	8	8			(NMS)
08.65	16	1			(NMS)
08.69	13	2			(NMS)
08.73	14	3			(NMS)
08.77	13	7			(NMS)
08.86	10	5	11	3	(AG-F)
08.86	25	7	14	3	(RH-F)
08.86	14	6	6	2	(BR-F)
08.86	6	4	14	3	(KM-F)
08.90	24	6	9	3	(DDR)
08.90	10	3	21	4	(DDR)
08.90	14	2	23	2	(DDR)
08.90	20	6	8	2	(AG-F)
08.90	12	5	9	3	(RH-F)
08.90	10	4	10	3	(KM-F)
08.93	19	6	9	3	(PR-F)
08.93	10	4	14	3	(KJ-F)
08.94	17	5	5	2	(AG-F)
08.94	20	5	6	2	(RH-F)
08.94	13	4	18	4	(KM-F)
08.94	17	5	6	2	(BR-F)
08.94	3	2	5	2	(IW-B)
08.94	7	3	9	3	(FD-B)
08.96	12	5	4	2	(GP-B)
08.97	16	6	12	4	(PR-F)
08.98	21	7	13	5	(KN-F)
08.98	14	7	19	8	(BD-B)
08.98	21	9	20	10	(FT-B)
08.98	13	8	20	10	(JVD-B)
08.98	22	6	14	4	(AG-F)
08.98	20	6	15	4	(RH-F)
08.98	16	5	12	4	(KM-F)
08.98	16	5	16	4	(BR-F)

August	Z.H.R.		H.R.		
08.98	16	± 5	12	± 3	(KJ-F)
08.99	5	2	19	4	(GV-B)
08.99	5	2	14	3	(FM-B)
08.99	8	4	20	5	(AS-B)
08.99	13	5	14	4	(GT-F)
09.01	18	6	9	4	(PR-F)
09.02	10	2	23	1	(DDR)
09.02	14	5	6	2	(AG-F)
09.02	36	7	11	3	(RH-F)
09.02	20	5	9	3	(KM-F)
09.02	20	5	7	3	(BR-F)
09.04	22	5	8	3	(KN-F)
09.04	25	5	19	5	(GT-F)
09.06	20	6	2	2	(AG-F)
09.06	25	6	8	3	(RH-F)
09.06	27	7	13	4	(KM-F)
09.06	27	7	11	4	(BR-F)
09.11	40	7	15	5	(AG-F)
09.11	42	8	27	6	(RH-F)
09.11	25	6	22	6	(KM-F)
09.11	30	6	18	5	(BR-F)
09.56	11	8			(NMS)
09.60	10	7			(NMS)
09.65	8	5			(NMS)
09.69	15	4			(NMS)
09.73	6	-			(NMS)
09.85	17	7	6	2	(AG-F)
09.85	23	8	13	4	(RH-F)
09.85	26	3	9	3	(KM-F)
09.85	21	7	4	2	(BR-F)
09.88	37	11	28	7	(KN-F)
09.88	68	17	19	7	(GT-F)
09.89	48	13	16	5	(KD-F)
09.89	33	9	13	4	(PR-F)
09.90	20	7	18	4	(KJ-F)
09.90	35	8	8	3	(AG-F)
09.90	41	9	13	3	(RH-F)
09.90	26	7	11	3	(KM-F)
09.90	16	6	9	3	(BR-F)
09.90	20	4	28	4	(DDR)
09.90	15	1	25	1	(DDR)
09.90	7	3	32	7	(DDR)
09.93	26	7	10	3	(PR-F)
09.93	54	13	6	4	(GT-F)
09.93	26	9	15	5	(KD-F)
09.94	17	6	4	2	(AG-F)
09.94	14	5	7	2	(RH-F)
09.94	30	8	12	3	(KM-F)
09.94	26	7	5	2	(BR-F)
09.94	16	5	14	4	(KJ-F)
09.94	44	14	33	10	(KN-F)
09.96	11	1	30	1	(DDR)
09.97	22	6	13	4	(KD-F)
09.97	28	9	21	7	(GT-F)
09.97	21	7	19	5	(PR-F)
09.98	22	6	14	4	(AG-F)
09.98	20	6	15	4	(RH-F)
09.98	16	5	11	4	(KM-F)
09.98	16	5	16	4	(BR-F)
09.98	19	6	6	3	(KJ-F)
09.98	18	8	26	9	(KN-F)
10.02	47	9	28	7	(GT-F)

Table 2 : continued

August	Z.H.R.		H.R.		
10.02	32	± 10	13	± 6	(PR-F)
10.02	17	6	8	3	(KJ-F)
10.02	21	2	42	4	(DDR)
10.02	23	6	17	6	(DDR)
10.04	34	7	13	4	(AG-F)
10.04	24	5	22	5	(RH-F)
10.04	28	7	28	6	(KM-F)
10.04	31	7	18	5	(BR-F)
10.10	34	9	17	6	(RH-F)
10.10	30	8	26	8	(BR-F)
10.16	18	8	8	3	(NM-U)
10.20	20	7	15	4	(NM-U)
10.24	16	6	4	2	(NM-U)
10.35	20	6	11	3	(RL-U)
10.39	18	7	7	3	(RL-U)
10.43	10	4	6	3	(RL-U)
10.47	4	2	0		(RL-U)
10.60	12	10			(NMS)
10.65	25	11			(NMS)
10.69	28	5			(NMS)
10.73	28	-			(NMS)
10.77	35	-			(NMS)
10.88	18	7	10	4	(AG-F)
10.88	23	7	11	2	(RH-F)
10.88	21	6	16	4	(KM-F)
10.90	56	17	12	6	(BR-F)
10.90	29	8	8	3	(KJ-F)
10.90	27	9	7	3	(PR-F)
10.90	14	5	6	2	(GT-F)
10.90	41	12	11	5	(KN-F)
10.90	19	11	14	8	(KV-B)
10.90	23	3	29	2	(DDR)
10.92	18	10	35	13	(BV-B)
10.93	37	9	5	3	(RB-H)
10.93	25	7	10	4	(KM-H)
10.93	31	6	10	3	(DDR)
10.93	17	5	7	2	(GP-B)
10.93	65	21	52	16	(TV-B)
10.94	21	7	11	5	(DL-B)
10.94	13	9	32	11	(BD-B)
10.94	31	12	21	9	(FT-B)
10.95	19	5	27	4	(DDR)
10.95	21	4	38	4	(DDR)
10.95	6	4	16	5	(FDG-B)
10.96	14	4	5	2	(LFK-B)
10.98	22	6	6	3	(RB-H)
10.98	18	6	8	3	(KH-H)
10.98	33	5	17	3	(BW-B)
10.98	30	9	10	4	(OS-B)
10.99	26	6	15	4	(PP-B)
11.00	27	3	30	3	(DDR)
11.00	22	4	13	3	(FM-B)
11.00	9	3	21	4	(GV-B)
11.01	27	3	29	3	(DDR)
11.04	38	8	9	4	(RB-H)
11.04	42	8	18	6	(KH-H)
11.22	24	9	9	4	(RB-C)
11.26	42	10	18	6	(RB-C)
11.32	32	10	11	4	(RL-U)
11.34	22	7	9	5	(PB-C)
11.35	27	7	9	3	(RL-U)
11.37	33	7	18	6	(NM-U)
11.39	38	7	15	4	(RL-U)

August	Z.H.R.		H.R.		
11.42	14	± 5	0	±	(NM-U)
11.43	55	8	16	4	(RL-U)
11.47	46	7	18	4	(RL-U)
11.60	25	18			(NMS)
11.65	35	14			(NMS)
11.69	32	14			(NMS)
11.73	34	2			(NMS)
11.85	40	4	29	3	(DDR)
11.85	33	9	7	3	(AG-F)
11.85	45	11	11	3	(RH-F)
11.85	33	10	8	3	(KM-F)
11.85	26	9	11	3	(BR-F)
11.85	33	17	32	11	(KN-F)
11.86	29	10	16	5	(GT-F)
11.86	29	12	16	6	(PR-F)
11.89	43	9	15	4	(KJ-F)
11.89	28	9	14	4	(KD-F)
11.90	34	4	33	3	(DDR)
11.90	43	4	27	3	(DDR)
11.90	46	9	1	1	(AG-F)
11.90	54	10	4	2	(RH-F)
11.90	52	11	11	3	(KM-F)
11.90	50	11	12	4	(BR-F)
11.90	43	11	17	5	(PR-F)
11.90	70	18	21	8	(KN-F)
11.90	54	12	20	5	(GT-F)
11.92	52	11	7	3	(KD-F)
11.93	74	8	27	4	(JB-F)
11.94	36	9	17	6	(RP-B)
11.94	38	4	33	3	(DDR)
11.94	34	6	26	4	(DDR)
11.94	49	9	25	6	(DDR)
11.94	67	10	4	2	(AG-F)
11.94	57	9	6	2	(RH-F)
11.94	71	12	10	3	(KM-F)
11.94	76	12	4	2	(BR-F)
11.94	57	11	14	4	(PR-F)
11.94	78	16	16	6	(KN-F)
11.94	63	12	13	4	(KJ-F)
11.94	62	11	7	3	(GT-F)
11.95	42	6	10	3	(DDR)
11.96	37	5	8	2	(GP-B)
11.96	33	5	11	2	(OS-B)
11.96	41	7	10	3	(DL-B)
11.96	84	13	11	4	(KD-F)
11.97	72	20	19	11	(GC-B)
11.97	39	10	27	9	(DDR)
11.97	40	6	22	4	(DDR)
11.97	48	6	15	3	(TEH-N)
11.97	70	11	24	6	(MS-N)
11.98	47	7	25	5	(BD-B)
11.98	35	6	23	5	(FT-B)
11.98	47	5	34	3	(DDR)
11.98	70	11	34	8	(DDR)
11.98	34	3	34	3	(DDR)
11.98	59	9	7	2	(AG-F)
11.98	66	9	12	3	(RH-F)
11.98	62	10	15	4	(KM-F)
11.98	66	10	5	2	(BR-F)
11.98	63	10	12	4	(KJ-F)
11.98	58	11	13	4	(KN-F)
11.98	55	10	19	5	(PR-F)

Table 2 : continued

August	Z.H.R.	±	H.R.	±	
11.99	67	12	17	5	(BA-N)
11.99	56	10	18	5	(GT-F)
12.01	52	4	8	3	(RB-H)
12.01	39	7	8	3	(KH-H)
12.01	56	10	13	4	(KD-F)
12.01	105	12	27	7	(ED-B)
12.02	40	4	35	4	(DDR)
12.02	68	9	7	2	(AG-F)
12.02	72	9	20	4	(RH-F)
12.02	88	11	16	4	(KM-F)
12.02	82	11	9	3	(BR-F)
12.02	72	10	25	5	(KJ-F)
12.02	51	10	9	4	(KN-F)
12.02	94	13	17	5	(PR-F)
12.03	92	13	13	4	(GT-F)
12.03	29	6	24	5	(AD-B)
12.04	65	16	19	10	(JVW-B)
12.04	55	11	23	6	(AS-B)
12.04	26	7	23	6	(BV-B)
12.04	58	8	19	4	(FM-B)
12.04	40	7	7	3	(PP-B)
12.04	26	5	22	4	(IW-B)
12.04	31	6	28	5	(GV-B)
12.05	37	3	31	3	(DDR)
12.06	66	10	0		(RB-H)
12.06	101	13	8	4	(KH-H)
12.06	61	9	6	3	(AG-F)
12.06	98	11	15	4	(RH-F)
12.06	93	11	11	4	(KM-F)
12.06	74	10	11	4	(BR-F)
12.06	86	11	8	3	(KJ-F)
12.06	100	14	17	6	(PR-F)
12.07	90	14	23	7	(GT-F)
12.10	126	23	10	6	(RB-H)
12.10	94	15	3	3	(KH-H)
12.11	94	12	16	5	(AG-F)
12.11	126	14	27	7	(RH-F)
12.11	87	11	25	6	(KM-F)
12.11	86	12	16	5	(BR-F)
12.11	74	11	23	6	(KJ-F)
12.11	77	11	18	6	(PR-F)
12.11	90	14	35	9	(GT-F)
12.16	60	15	8	3	(NM-U)
12.20	50	11	8	3	(NM-U)
12.24	70	12	8	3	(NM-U)
12.29	78	11	15	4	(NM-U)
12.30	90	14	17	4	(RL-U)
12.33	60	9	11	3	(NM-U)
12.35	113	14	20	4	(RL-U)
12.37	113	12	12	3	(NM-U)
12.39	91	11	19	4	(RL-U)
12.43	90	11	18	4	(RL-U)
12.47	95	11	14	4	(RL-U)
12.56	46	25			(NMS)
12.60	44	18			(NMS)
12.60	54	11			(NMS)
12.60	53	11			(NMS)
12.60	74	12			(Ni-J)
12.61	45	11			(MA-J)
12.65	74	10			(Ta-J)
12.65	82	12			(Ok-J)
12.65	101	13			(Ni-J)
12.65	63	20			(NMS)
12.69	68	36			(NMS)
12.69	94	13			(Ta-J)
12.69	115	15			(Ok-J)
12.69	132	15			(Ni-J)
12.73	64	17			(NMS)
12.73	96	12			(Ta-J)
12.73	72	11			(Tk-J)
12.73	139	13			(Ta-J)
12.73	73	10			(Ok-J)
12.73	113	12			(Ni-J)
12.76	85	15			(Ta-J)
12.76	70	14			(Tk-J)
12.76	121	16			(Ta-J)
12.76	104	16			(Ok-J)
12.76	132	18			(Ni-J)
12.77	72	20			(NMS)
12.80	94	-			(NMS)
12.85	92	18	13	4	(AG-F)
12.85	120	19	12	4	(RH-F)
12.85	98	18	19	5	(KM-F)
12.85	85	19	10	4	(BR-F)
12.85	71	21	33	10	(KN-F)
12.85	94	20	16	5	(PR-F)
12.85	51	16	16	6	(KJ-F)
12.85	82	18	5	3	(KD-F)
12.85	94	17	10	4	(GT-F)
12.86	51	5	24	3	(DDR)
12.86	60	17	23	9	(TP-SF)
12.90	94	15	7	3	(AG-F)
12.90	103	16	14	4	(RH-F)
12.90	89	15	9	3	(KM-F)
12.90	89	18	15	5	(BR-F)
12.90	59	11	4	2	(KD-F)
12.90	116	18	17	5	(KJ-F)
12.90	126	24	27	8	(KN-F)
12.90	81	15	15	4	(PR-F)
12.90	79	13	10	3	(GT-F)
12.91	81	22	23	12	(SF-MK)
12.91	73	10	22	4	(AS-B)
12.92	38	4	15	3	(DDR)
12.92	54	10	34	6	(DDR)
12.93	56	12	7	5	(PP-SF)
12.93	33	5	13	3	(FDP-B)
12.93	77	9	21	4	(TV-B)
12.94	92	14	4	2	(AG-F)
12.94	82	13	12	4	(RH-F)
12.94	88	15	11	4	(KM-F)
12.94	107	17	8	4	(BR-F)
12.94	139	22	14	6	(PR-F)
12.94	92	14	13	4	(KD-F)
12.94	58	11	5	2	(KJ-F)
12.94	91	15	14	4	(KN-F)
12.94	101	16	10	4	(GT-F)
12.94	70	10	15	4	(DDR)
12.95	96	22	13	6	(BD-B)
12.95	62	18	16	8	(FT-B)
12.96	116	14	25	6	(MS-N)
12.97	107	10	14	4	(BA-N)
12.97	147	15	2	2	(KG-N)
12.97	87	13	48	8	(TEH-N)
12.97	33	11	48	14	(DDR)
12.98	58	5	9	2	(GP-B)

Table 2 : continued

August	Z.H.R.		H.R.		
12.98	43	± 5	6	± 1	(FP-B)
12.98	62	6	7	2	(JPC-B)
12.98	94	12	4	2	(AG-F)
12.98	79	12	12	4	(RH-F)
12.98	76	11	3	2	(KM-F)
12.98	85	12	8	3	(BR-F)
12.98	72	12	10	4	(PR-F)
12.98	83	16	11	5	(KD-F)
12.98	104	16	17	5	(KJ-F)
12.98	86	13	9	4	(KN-F)
12.98	103	15	18	5	(GT-F)
12.99	41	5	15	2	(AD-B)
12.99	42	4	19	2	(IW-B)
12.99	65	5	24	3	(FM-B)
12.99	64	6	13	3	(PP-B)
12.99	43	4	12	2	(PDK-B)
12.99	36	4	22	2	(GV-B)
13.00	55	18	-		(DDR)
13.00	64	5	19	2	(BW-B)
13.00	47	8	12	4	(OS-B)
13.02	89	12	9	3	(AG-F)
13.02	66	9	8	2	(RH-F)
13.02	85	10	8	3	(KM-F)
13.02	89	12	5	2	(BR-F)
13.02	107	15	11	4	(KN-F)
13.02	92	12	16	4	(KJ-F)
13.02	85	11	8	3	(KD-F)
13.02	79	11	13	4	(PR-F)
13.02	112	14	19	5	(GT-F)
13.03	84	14	11	6	(LP-B)
13.03	125	20	16	8	(GC-B)
13.04	67	13	9	5	(KV-B)
13.06	106	12	9	3	(AG-F)
13.06	106	12	10	3	(KM-F)
13.06	103	13	16	5	(BR-F)
13.06	102	12	18	5	(KJ-F)
13.06	118	15	24	7	(KN-F)
13.06	101	12	19	5	(PR-F)
13.06	116	18	10	5	(GT-F)
13.07	59	12	8	5	(JC-B)
13.07	88	9	13	3	(TV-B)
13.08	56	11	38	10	(BV-B)
13.08	82	15	17	7	(ED-B)
13.09	114	11	17	4	(AG-F)
13.09	147	15	27	7	(KM-F)
13.09	139	15	22	6	(BR-F)
13.09	103	11	19	5	(KN-F)
13.09	89	10	15	4	(KJ-F)
13.09	97	10	16	4	(PR-B)
13.25	64	12	9	3	(NM-U)
13.29	82	11	13	4	(NM-U)
13.30	84	18	8	3	(LR-U)
13.33	83	11	16	4	(NM-U)
13.35	70	11	7	3	(LR-U)
13.37	76	14	16	4	(NM-U)
13.39	50	9	7	3	(LR-U)
13.43	82	10	14	4	(LR-U)
13.47	89	10	24	5	(LR-U)
13.56	46	11			(Oh-J)
13.57	42	21			(NMS)
13.60	47	12			(Ta-J)
13.60	20	± 6			(NMS)
13.60	66	11			(Ni-J)
13.60	29	11			(NMS)
13.65	22	12			(NMS)
13.65	63	10			(Oh-J)
13.65	89	12			(Ni-J)
13.69	38	20			(NMS)
13.69	38	8			(Sa-J)
13.69	68	10			(Oh-J)
13.69	96	14			(Ni-J)
13.69	30	9			(Na-J)
13.73	49	20			(NMS)
13.73	24	6			(Sa-J)
13.72	57	12			(Oh-J)
13.73	90	11			(Ni-J)
13.74	12	9			(Na-J)
13.76	96	17			(Ni-J)
13.77	46	24			(NMS)
13.77	27	7			(Sa-J)
13.77	35	9			(Ni-J)
13.85	102	23	13	± 5	(AG-F)
13.85	65	17	31	8	(RH-F)
13.85	71	18	31	8	(KM-F)
13.85	53	16	22	7	(BR-F)
13.85	121	33	49	15	(KN-F)
13.85	64	17	19	3	(PR-F)
13.86	36	9	11	3	(GT-F)
13.90	41	12	8	3	(AG-F)
13.90	69	15	17	5	(RH-F)
13.90	67	15	20	5	(KM-F)
13.90	42	12	14	5	(BR-F)
13.90	89	26	34	11	(KN-F)
13.90	50	12	14	5	(PR-F)
13.91	45	10	9	3	(GT-F)
13.92	48	7	24	4	(EB-F)
13.93	82	24	31	10	(KJ-F)
13.93	48	10	43	10	(NK-SF)
13.93	26	5	4	2	(PP-SF)
13.93	14	7	33	10	(MP-SF)
13.94	75	17	17	6	(AG-F)
13.94	63	12	17	4	(RH-F)
13.94	71	13	16	5	(KM-F)
13.94	63	12	12	4	(BR-F)
13.94	59	12	18	5	(KJ-F)
13.94	65	14	22	7	(KN-F)
13.94	91	15	12	4	(PR-F)
13.95	66	13	14	4	(GT-F)
13.96	30	5	42	6	(DDR)
13.98	30	7	9	3	(AG-F)
13.98	41	8	18	4	(RH-F)
13.98	38	7	7	3	(KM-F)
13.98	38	8	11	4	(BR-F)
13.98	57	12	15	5	(KJ-F)
13.98	45	12	27	8	(KN-F)
13.98	43	9	22	6	(PR-F)
13.99	55	10	9	4	(GT-F)
14.00	26	4	6	2	(GP-B)
14.01	29	8	6	4	(VB-B)
14.01	18	3	3	1	(FP-B)
14.02	62	14	13	5	(AG-F)
14.02	54	8	10	3	(RH-F)

Table 2 : continued

August	Z.H.R.		H.R.		
14.02	50	± 8	8	± 3	(KM-F)
14.02	73	19	18	8	(BR-F)
14.02	83	15	45	11	(KN-F)
14.02	60	10	16	5	(PR-F)
14.02	78	13	27	7	(KJ-F)
14.03	65	12	14	5	(GT-F)
14.04	28	5	29	5	(FM-B)
14.04	18	4	16	3	(GV-B)
14.04	17	4	22	4	(AS-B)
14.05	30	6	33	6	(DDR)
14.06	45	8	9	3	(AG-F)
14.06	35	6	11	3	(RH-F)
14.06	49	8	13	4	(KM-F)
14.06	58	10	17	5	(BR-F)
14.06	59	10	15	5	(PR-F)
14.06	62	10	17	5	(KJ-F)
14.06	70	12	12	5	(KN-F)
14.07	35	6	10	3	(GT-F)
14.07	19	5	34	7	(RS-B)
14.11	62	8	21	4	(AG-F)
14.11	68	8	15	4	(RH-F)
14.11	81	9	21	5	(KM-F)
14.11	80	9	24	5	(BR-F)
14.11	53	9	17	5	(PR-F)
14.11	46	14	27	6	(KN-F)
14.11	80	14	12	4	(GT-F)
14.22	62	9	19	7	(PB-C)
14.60	11	8			(NMS)
14.65	16	7			(NMS)
14.65	42	7			(Ni-J)
14.69	36	4			(NMS)
14.69	42	8			(Ni-J)
14.69	29	7			(Ma-J)
14.73	31	12			(NMS)
14.73	48	7			(Ni-J)
14.76	31	-			(NMS)
14.77	49	9			(Ni-J)
14.85	58	18	13	6	(AG-F)
14.85	41	15	26	8	(RH-F)
14.85	64	19	21	7	(KM-F)
14.85	52	17	28	9	(BR-F)
14.85	30	10	28	6	(PR-F)
14.89	13	5	15	3	(KJ-F)
14.89	33	8	20	6	(DDR)
14.90	20	7	12	4	(PR-F)
14.90	29	10	11	4	(AG-F)
14.90	26	9	16	5	(RH-F)
14.90	16	7	18	5	(KM-F)
14.90	16	7	11	4	(BR-F)
14.91	19	8	19	7	(LP-B)
14.91	30	6	10	3	(DDR)
14.93	38	13	18	3	(MP-SF)
14.93	13	4	52	8	(DDR)
14.94	13	3	7	2	(GP-B)
14.94	21	4	4	2	(PP-SF)
14.94	29	11	14	6	(AG-F)
14.94	37	9	12	4	(RH-F)
14.94	37	9	15	4	(KM-F)
14.94	32	9	10	4	(BR-F)
14.94	20	6	10	3	(KJ-F)
14.94	43	10	13	4	(PR-F)
14.95	17	3	32	3	(DDR)
14.97	13	± 4	31	± 5	(DDR)
14.97	18	2	33	3	(DDR)
14.98	12	4	3	2	(FP-B)
14.98	21	4	16	3	(BD-B)
14.98	20	5	16	4	(RH-F)
14.98	21	5	20	4	(KM-F)
14.98	13	4	15	4	(KJ-F)
14.98	29	8	7	3	(PR-F)
14.99	17	4	21	4	(FT-B)
15.01	11	2	16	3	(OS-B)
15.02	35	7	17	4	(RH-F)
15.02	46	8	9	3	(KM-F)
15.02	23	7	19	6	(KJ-F)
15.02	54	10	10	4	(PR-F)
15.04	19	2	26	3	(DDR)
15.06	44	7	24	5	(KM-F)
15.06	37	7	12	3	(KJ-F)
15.06	31	7	19	5	(PR-F)
15.10	65	8	20	4	(KM-F)
15.10	26	6	19	5	(KJ-F)
15.10	36	7	13	4	(PR-F)
15.21	11	6	9	4	(NM-U)
15.24	6	3	11	3	(NM-U)
15.29	11	4	8	3	(NM-U)
15.33	8	3	24	5	(NM-U)
15.56	16	5			(NMS)
15.57	21	11			(Oc-J)
15.60	6	6			(NMS)
15.65	17	1			(NMS)
15.69	16	5			(NMS)
15.73	13	-			(NMS)
15.75	2	-			(NMS)
15.88	23	9	19	5	(PR-F)
15.89	17	10	16	8	(BD-B)
15.89	25	12	14	8	(FT-B)
15.90	32	12	31	11	(JV-B)
15.92	32	9	12	4	(PR-F)
15.92	20	12	32	12	(OS-B)
15.95	12	6	13	5	(PR-F)
15.95	20	10	21	8	(KJ-F)
15.95	41	11	0		(KV-B)
15.95	0		14	4	(BV-B)
15.96	8	3	11	3	(FDG-B)
15.97	6	3	26	5	(IW-B)
15.98	12	3	25	3	(TEH-N)
15.99	19	3	28	4	(FM-B)
15.99	8	3	17	3	(GV-B)
16.02	31	6	17	4	(NN-B)
16.03	41	8	19	6	(GC-B)
16.05	23	4	28	4	(AS-B)
16.05	12	3	32	3	(DDR)
16.61	9	-			(NMS)
16.65	9	5			(NMS)
16.69	7	4			(NMS)
16.73	8	-			(NMS)
16.77	8	4			(NMS)
16.89	17	6	10	3	(KM-F)
16.89	13	6	16	4	(BR-F)
16.90	6	5	10	4	(PR-F)
16.91	6	4	7	3	(GP-B)
16.91	3	2	3	2	(FP-B)
16.93	15	5	11	3	(KJ-F)

Table 2 : continued

August	Z.H.R.	±	H.R.	±	
16.94	22	7	17	5	(PR-F)
16.94	17	6	12	3	(KM-F)
16.94	7	4	8	3	(BR-F)
16.98	14	5	5	2	(KM-F)
16.98	12	4	4	2	(BR-F)
16.98	15	9	20	10	(KV-B)
17.00	44	10	3	3	(KG-N)
17.06	21	5	9	3	(KM-F)
17.06	12	4	6	2	(BR-F)
17.07	10	4	20	6	(FM-B)
17.10	14	4	10	3	(KM-F)
17.10	7	3	3	2	(BR-F)
17.56	5	4			(NMS)
17.56	10	5			(Ta-J)
17.60	4	4			(NMS)
17.60	8	6			(Ta-J)
17.65	8	4			(NMS)
17.73	4	2			(NMS)
17.78	3	1			(Ma-J)
17.85	4	4	11	4	(KM-F)
17.90	3	3	32	9	(KM-F)
17.90	13	9	28	9	(BR-F)
17.92	4	1	24	2	(DDR)
17.93	8	8	39	16	(AS-B)
17.95	7	5	34	10	(FM-B)
17.95	3	3	12	6	(GV-B)
17.95	5	3	20	7	(DL-B)
17.96	2	1	6	2	(GP-B)
17.98	3	1	15	3	(OS-B)
17.98	14	5	12	3	(KM-F)
17.98	6	4	13	5	(BR-F)
18.02	9	5	9	4	(BR-F)
18.06	6	3	9	4	(BR-F)
18.10	20	7	18	7	(BR-F)
18.56	13	-			(NMS)
18.60	5	3			(NMS)
18.68	10	4			(NMS)
18.68	3	1			(Ma-J)
18.73	3	-			(NMS)
18.85	11	6	10	3	(KM-F)
18.85	6	4	28	5	(DDR)
18.90	6	3	7	2	(KM-F)
18.92	4	2	11	3	(LR-SF)
18.96	5	1	32	3	(DDR)
18.94	8	4	9	3	(KM-F)
18.98	8	3	7	3	(KM-F)
19.02	10	3	10	2	(KM-F)
19.06	6	2	8	2	(KM-F)
19.10	13	3	11	3	(KM-F)
19.59	3	-			(NMS)
19.91	3	2	17	4	(MR-SF)
19.92	5	2	11	2	(LR-SF)
20.53	4	-			(NMS)
20.63	6	-			(NMS)
20.85	6	4	16	4	(KM-F)
20.87	2	1	27	3	(DDR)
20.90	8	4	12	3	(KM-F)
20.90	3	2	4	2	(BR-F)
20.93	2	1	28	2	(DDR)
20.94	4	3	16	5	(TN-SF)
20.94	6	4	24	7	(MP-SF)
20.94	14	6	12	3	(KM-F)
20.94	3	3	9	4	(BR-F)
20.97	6	1	29	2	(DDR)
20.98	6	2	12	3	(KM-F)
21.02	6	2	21	4	(KM-F)
21.06	6	2	17	4	(KM-F)
21.10	7	3	21	4	(KM-F)
21.85	0		13	6	(KM-F)
21.85	2	2	5	3	(BR-F)
21.90	5	3	15	4	(KM-F)
21.90	8	5	15	4	(BR-F)
21.94	3	3	21	6	(KM-F)
21.94	1	1	15	4	(BR-F)
21.96	6	1	31	3	(DDR)
21.97	3	1	24	2	(DDR)
21.98	8	2	18	3	(TEH-N)
21.98	6	3	10	3	(KM-F)
21.98	2	2	10	3	(BR-F)
22.94	2	1	20	2	(DDR)
23.74	2	-			(NMS)
23.89	3	1	21	2	(DDR)
24.00	2	1	23	2	(DDR)
24.01	2	1	40	3	(DDR)
24.05	5	2	17	3	(DDR)
24.09	2	1	26	7	(DDR)
24.65	3	-			(NMS)
24.90	2	1	21	10	(MR-SF)
24.92	0	-	23	10	(TN-SF)
24.92	5	5	14	3	(MP-SF)
24.96	0	-	7	3	(OS-B)

The vast amount of 400 Z.H.R.'s has been derived from observations of Puimichel . European observations represent some 75% of the total number of Z.H.R.'s while Europe can cover only 25% of the 24 hour period. American longitudes had only 3 observers ; the weakest chain in the analysis. Japan has a lot of observers and the Japanese rates represent a large observational effort . The Z.H.R. for the Japanese data has been computed in a slightly different way , but it should be comparable with the European Z.H.R. The N.M.S.- Z.H.R.'s are averaged values with S.D.

Considering the core only , we obtain a very diffuse picture of the shower activity. The cloud of data points show a surprising large spread on the Z.H.R.'s. Rates varried from one hour to another . The fluctuations were even enlarged by the corrections used for unperfect sky. In cases of local groups for which

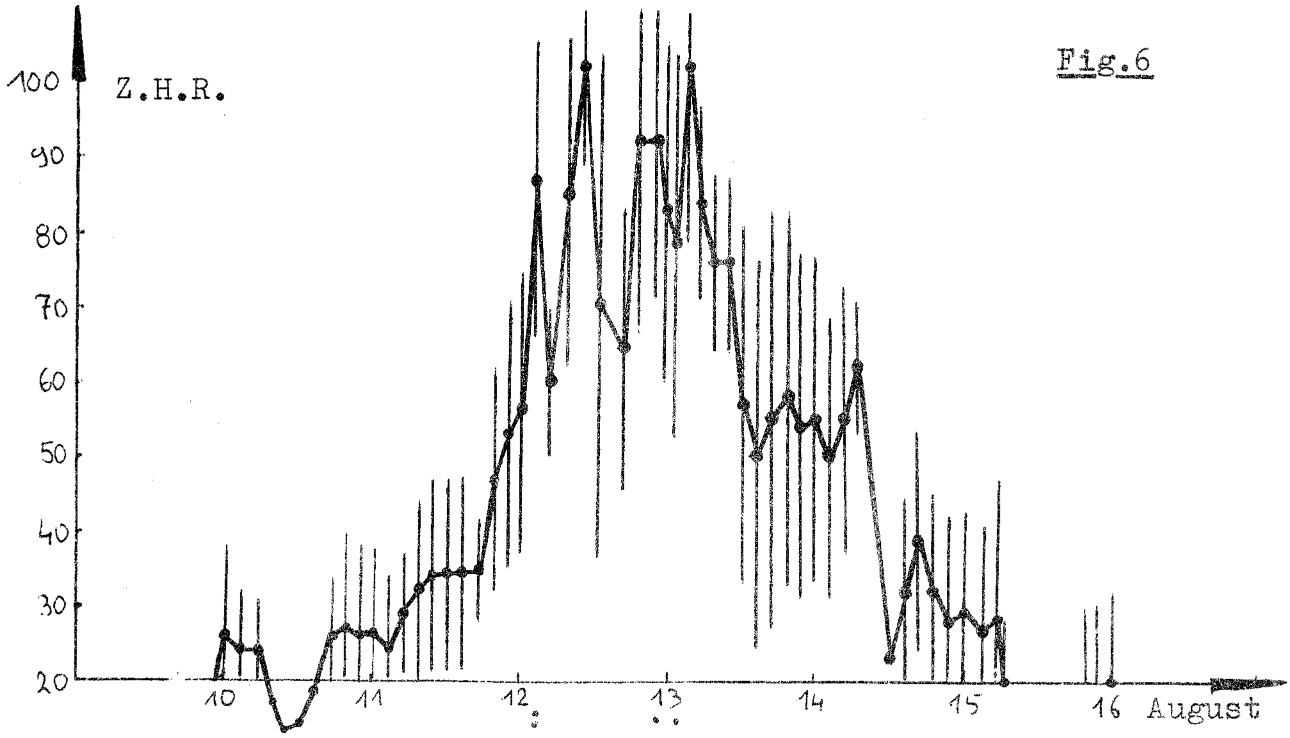


Fig.6

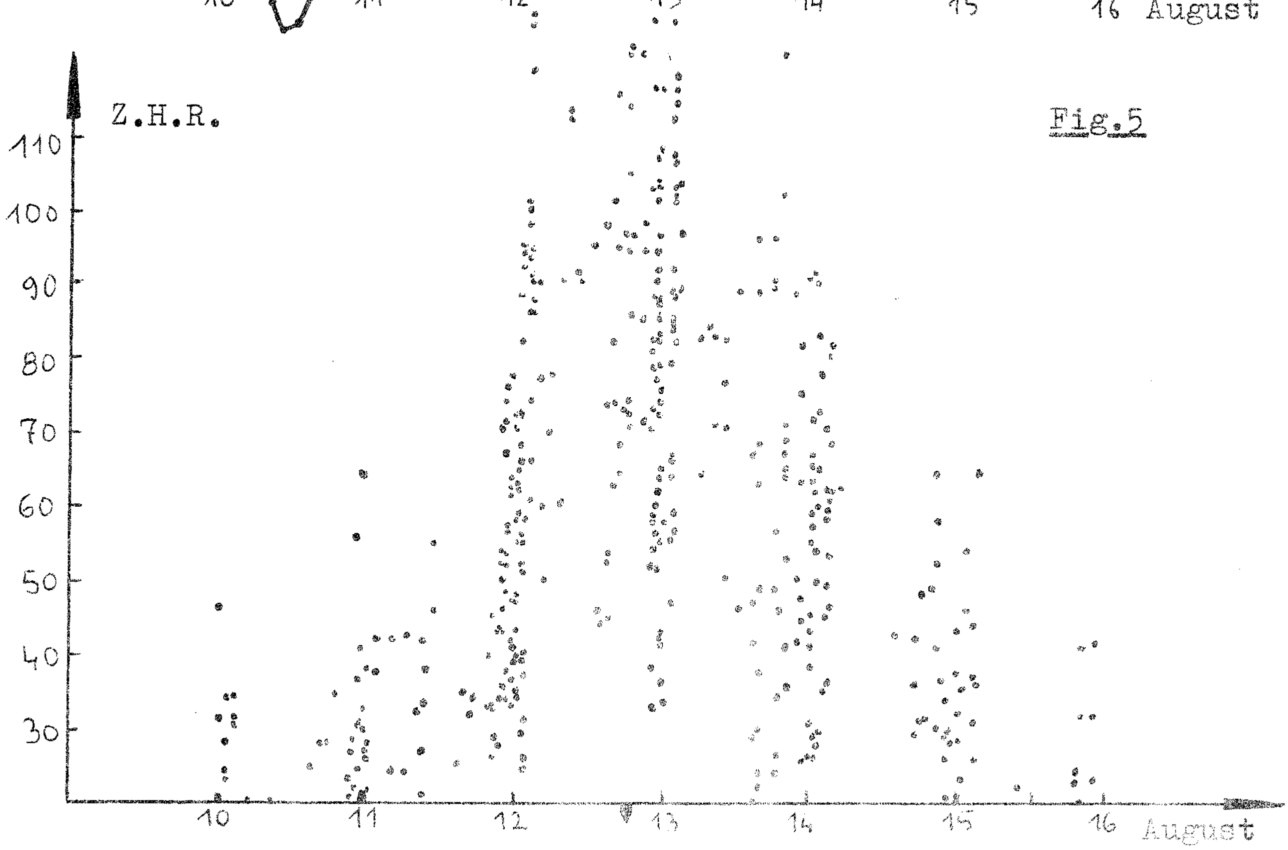
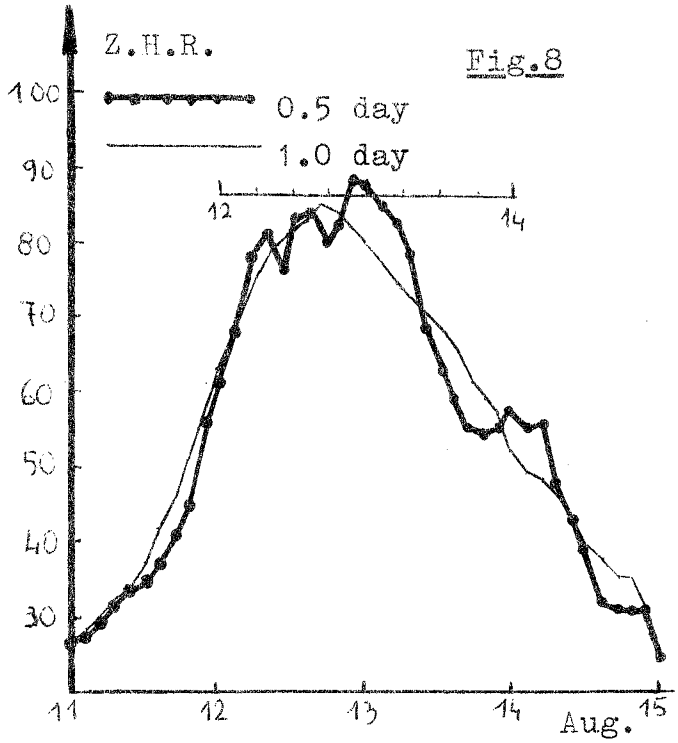
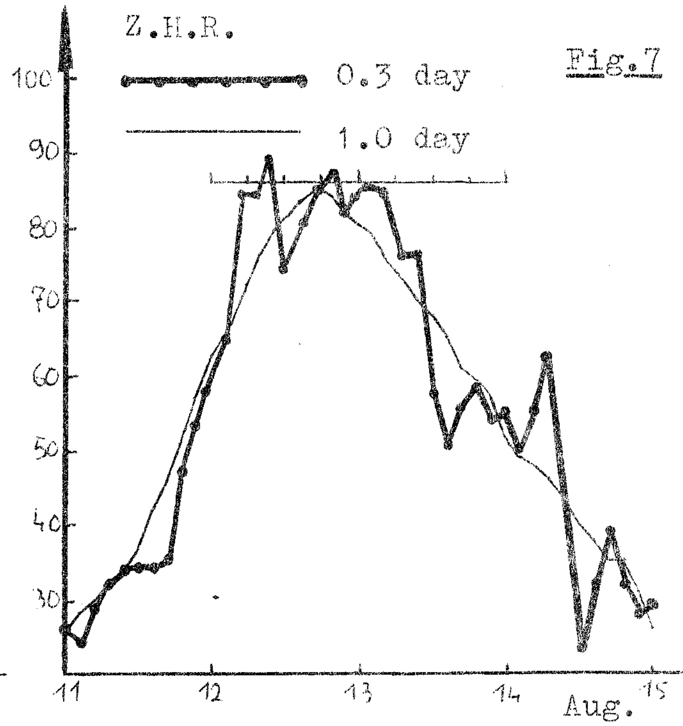


Fig.5

only some of these points are available, it is obvious that some conflicting rate profiles can be found. The reasons for strong fluctuations on observed rates were discussed in ref.2. The only solution to this problem is to use a general averaged rate profile including as much as possible data points . Therefore it is necessary to collect as many as possible observations : Your observations are indispensable for the study of the structure of meteor streams !

The individual Z.H.R.'s were averaged using a sliding mean Z.H.R. for a unit of time . The time interval used to average the Z.H.R. was chosen depending on the rate variation. For July this interval was 1.0 day then, rates were constantly low, increasing at a very small rate . From 7 August on the interval was limited to 0.3 day (~7 hours) . Because of some possible short duration peaks,





the period was reduced to 0.1 day (~2 hour) for 12.0 - 13.1 August . The interval was expanded again after 13.1 August. Results are listed in table 3 .

Table 3 , Mean Z.H.R.-values.

July			Aug.			Aug.			Aug.			Aug.		
13.5	0	±	1.0		±	10.1	24±	8	13.4	76±	12	17.25	18±	13
14.6	3		1.5	12		10.2	24	7	13.5	57	24	17.5	7	2
16.5	2	3	2.0	12		10.3	17	4	13.6	50	26	17.75	6	3
17.0	–	–	2.5	6		10.4	13	7	13.7	55	28	18.0	7	5
17.5	1		3.0	6		10.5	14	7	13.8	58	25	18.25	12	7
18.0	4		3.5	7		10.6	19	11	13.9	54	23	18.5	7	4
18.5	4		4.0	7		10.7	26	8	14.0	55	22	18.75	7	3
19.0	6		4.5	7		10.8	27	13	14.1	50	19	19.0	8	3
19.5	7		5.0	7		10.9	26	12	14.2	55	18	19.25	9	3
20.0	1		5.5	8		11.0	26	12	14.3	62	9	19.5	3	
20.5	6		6.0	8		11.1	24	10	14.4	–	–	19.75	4	
21.0	4		6.25	8		11.2	29	8	14.5	23		20.0	4	
21.5	4		6.5	11		11.3	32	12	14.6	32	13	20.25	4	
22.0	5		6.75	11		11.4	34	13	14.7	39	15	20.50	5	3
22.5	4		7.0	11		11.5	34	13	14.8	32	13	20.75	6	3
23.0	6		7.25	12		11.6	34	13	14.9	28	14	21.00	6	3
23.5	5		7.5	14	5	11.7	35	7	15.0	29	14	21.25	6	3
24.0	4	3	7.75	16	7	11.8	47	15	15.1	26	15	21.5	5	3
24.5	4	2	8.0	16	7	11.9	53	18	15.2	28	19	21.75	4	3
25.0	4	3	8.25	16	6	12.0	56	19	15.25	20	9	22.0	4	3
25.5	4		8.5	15	7	12.1	87	21	15.3	9	6	22.25	4	3
26.0	5		8.75	17	8	12.2	60	10	15.4	10	2	22.5	2	
26.5	4		9.0	18	8	12.3	85	22	15.5	15	6	22.75	2	
27.0	8		9.1	18	9	12.4	102	13	15.6	12	7	23.0	2	
27.5	8		9.2	30	8	12.5	70	34	15.7	12	7	23.5	2	
28.0	8	3	9.3	–	–	12.6	64	19	15.75	16		24.0	3	1
28.5	8		9.4	–	–	12.7	92	25	15.8	19	11	24.5	2	1
29.0	7		9.5	10	2	12.8	92	21	15.9	19	12	25.0	2	2
29.5	2		9.6	10	3	12.9	83	23	16.0	20	12			
30.0	–		9.7	17	8	13.0	78	26	16.25	27	12			
30.5	–		9.8	26	15	13.1	102	23	16.5	15	11			
31.0	–		9.9	26	12	13.2	84	13	16.75	13	8			
31.5	–		10.0	26	12	13.3	76	12	17.0	13	8			

The sporadic H.R. was averaged over 1 day , smoothing the diurnal variation. Perseid rates were plotted in figure 5. Figure 6 shows a better defined Z.H.R.-distribution than figure 5. The only part which wasn't smoothed is 12.0-13.1 August. This interval had no overlap on the averaged periods. Z.H.R.'s increased from 11.0 to 12.1 August when a first spike-like peak of short duration occurred with the radiant at a small zenith distance over Europe. Americans took over from Europe with much lower Z.H.R.'s at Aug.12.2 , the radiant being at a large zenith distance for them. Another short duration peak occurred at August 12.4 , again for a small zenith distance of the radiant for american observers. The following depression (Aug.12.5-12.6) is caused by Japanese observers when they got rates with the radiant at a small elevation above the Japanese horizon. This time corresponds with the predicted maximum . High rates were reported consistently by Japanese observers for 12.7-12.8 August.This corresponds with the median of the maximum activity. Another depression follows at 12.9-13.0 August when Europe took over at a small radiant elevation in Europe. The last peak appeared at 13.1 Aug. Then rates decreased at a slow rate taking two days to reached the level of 11.0 August.

Assuming that the zenith correction by sec Z is valid , the short duration peaks may represent a fine inner struture of filaments of enhanced density within the core of the Perseid stream. The excistence of such density variations within the Perseid stream is to be expected from the nature of a meteor stream. The appearance of such short duration spike-like peaks can be most misleading for the time of maximum activity. It also illustrates the need to consider the shower maximum as a whole continuously watched appearance . A single observed peak rate reported by agroup doesn't say much about the actual rate profile at the maximum.

Next , I used a sliding mean over 0.3 day for the entire period . The result is plotted in figure 7. Three sub-maxima remain , separated by depressions at August 12.5 and August 12.9. Using a sliding mean over 0.5 day (12 hours) the profile still shows two depressions , although shifted over 0.1 day. Using a sliding mean over 1.0 day smooths the Z.H.R.-profile; the thin curve on figures 7 and 8 is identical to figure 4.

The sub-maxima may be explained as artifacts. The observed rates were corrected for the zenith distance Z by sec Z. Assuming that rates were undercorrected by sec Z and introducing the zenith exponent $\gamma = 1.47$ as used by Zvolánková (ref.6) would affect the rates at the depressions most of all since these were observed with a large zenith distance Z. The influence of the zenith exponent γ on the Z.H.R. will be discussed in a following paper. The occurrence of the depressions at times when rates were observed with a large zenith distance of the radiant is most striking. If it is true that $\gamma = 1.0$ strongly undercorrects , then the actual Z.H.R.'s were higher than found from this analysis. As a consequence the zenith distance correction has to be reconsidered and updated!

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The author wishes to thank all the meteor observers for their contribution to this analysis !

BOLIVIA THE η-AQUARIDS 1986

Hans Salm

Despite poor weather during the first days of May in the Altiplano , Central and Eastern parts of Bolivia , 16 observers from Tarija , Potosi and La Paz were participating in the 1986 Eta-Aquarid Watch :

Santa Ana , Tarija (64°31'W,21°37'S,1900m) : Walter Yamaguchi, Edgar Espinoza,Rodolfo Zalles, Raul Zamora , Kheino Potter,Manuel Avila, Vladimir Avila.
Tarija , (64°35'W,21°30'S,1950m) : Marcelino Torres
Potosi , (65°45'W,19°35'S,4040m) : Luis Vera,Roberto Miranda, Gonzalo Miranda ; Rodolfo Miranda.
La Paz , (68°07'W,16°31'S,3500m) : Hans Salm,Eduardo Valdenassi, Grover Soria,Marcelo Ramirez.

Summary of observations :

Observer	Date	Time UT	Lim.Mag.	Eta Aq.	Spor.
Edgar Espinoza	May 02	7h46-9h55	5.4	14	-
Walter Yamaguchi	May 02	7h46-9h55	5.4	15	-
Walter Yamaguchi	May 03	8h05-9h57	5.5	16	3
Edgar Espinoza	May 03	8h10-9h54	5.5	11	4
Rodolfo Zalles	May 03	8h30-9h57	5.5	19	3
Raul Zamora	May 03	8h30-9h55	5.5	9	-
Edgar Espinoza	May 04	8h00-9h53	5.5	18	2
Rodolfo Zalles	May 04	8h00-9h00	5.5	13	-
		9h00-10h00	5.5	5	-
Walter Yamaguchi	May 04	8h03-9h52	5.5	10	1
Kheino Potter	May 05	7h40-9h45	5.5	50	7
Manuel Avila	May 05	7h45-9h45	5.5	37	-
Vladimir Avila	May 05	7h50-9h45	5.5	29	10
Edgar Espinoza	May 05	7h53-9h52	5.4	35	3
Walter Yamaguchi	May 05	7h53-9h52	5.4	20	-
Hans Salm	May 08	7h30-9h30	5.2	20	13
Luis Vera	May 09	6h45-9h30	5.0	16	7
Roberto Miranda	May 09	6h45-9h30	5.0	18	10
Gonzalo Miranda	May 09	6h45-9h30	5.0	14	13
Hans Salm	May 09	7h30-9h30	5.0	21	10
Grover Soria	May 11	7h50-8h50	5.0	6	2
Eduardo Valdenassi	May 12	7h35-9h40	5.0	10	5

Magnitude	-1	0	+1	+2	+3	+4	+5	$\bar{m}$
Eta Aquarids %	2.2	4.5	14.9	29.1	35.8	12.7	0.8	2.33
Non Eta Aquarids %	0	3.9	7.9	22.4	35.5	29.0	1.3	2.82

Colour	White	yellow	orange	red	blue	trail
Eta Aquarids %	41.2%	45.6%	7.4%	4.4%	1.4%	28.3%

RADIANT DETERMINATION OF PHOTOGRAPHIC METEORS by C.Steyaert

1. Introduction:

Determination of radiants remains a conflicting issue. Most of the time , plottings of visually observed meteors are not accurate enough . Based on the plottings , one has the risk of finding :

- abnormally large radiant sizes (ref.1)
- double radiants , e.g. for the Perseids (ref.2)
- fictive radiants (ν Pegasids , the Mackenzie catalogue, see ref.3 and ref.4)

Whilst the methods for discovering the radiants are correct (intersecting line , matrix method) , visual data are too unreliable. Only photographic work provides accurate enough data (ref.5) . Simultaneously photographed meteors uniquely determine the radiant . When also the duration is known by means of a rotating shutter , the heliocentric orbit can be determined , within certain limits . However , the vast majority of meteor photographs taken by amateurs , are single station meteors. The PMDB (ref.6) contains 930 photographs. With this large amount of data , the intersections of the backward prolonged trails can classify meteors with a good degree of certainty and find the location of the radiants.

2. The procedure.

Classifying single station meteors is an iterative process. More than half of the photographed meteors has also be seen by a visual observer. Depending on the experience of the observer , the classification is more or less correct. E.g. the Perseids are relatively easily classified , based upon their global flight direction and speed. Also the Geminids are easy objects. On the other hand , the difference between the several branches of the Aquarids and α Capricornids is much more difficult , as will be shown.

1. As a first step after obtaining the (α,δ) of the start and end of the meteor by means of astrometry , the meteors assigned to the most active stream , are plotted on one or more gnomonic maps. Fig. 1 shows a computer generated map with all the 1985 Perseids . The radiant position found in the literature ($\alpha = 47°$,$\delta = 57.°8$) is also shown with an x. The picture shows that most assignations are correct , but a few ones turn out to be completely wrong.

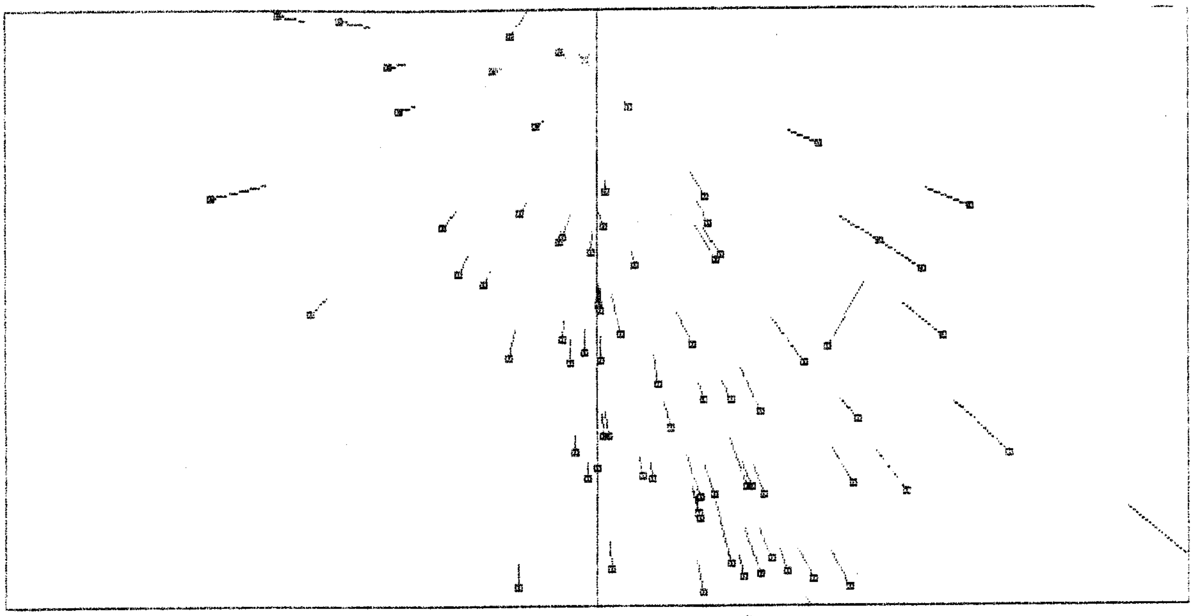
2. For these cases , either
- the data (α,δ) are wrong , but the classification is correct . The astrometric data are checked and corrected if necessary.
- the positional data are correct , but the classification is wrong. If the meteors don't line up with another known radiant , the classification is left blank . (The two incorrect ones on fig.1 turned out to be κ Cygnids). Also more than once , the sense of the meteor turns out to be inversed (start and end interchanged).

3. Another map is made now , showing all the not yet classified meteors.(Fig.2) . Some of the meteors on this map will be found to belong to the previously treated streams. Hence , the maps for these streams have to be updated.

Even in repeating this procedure over and over , several unclassified meteors will be left over. Satellite or air-

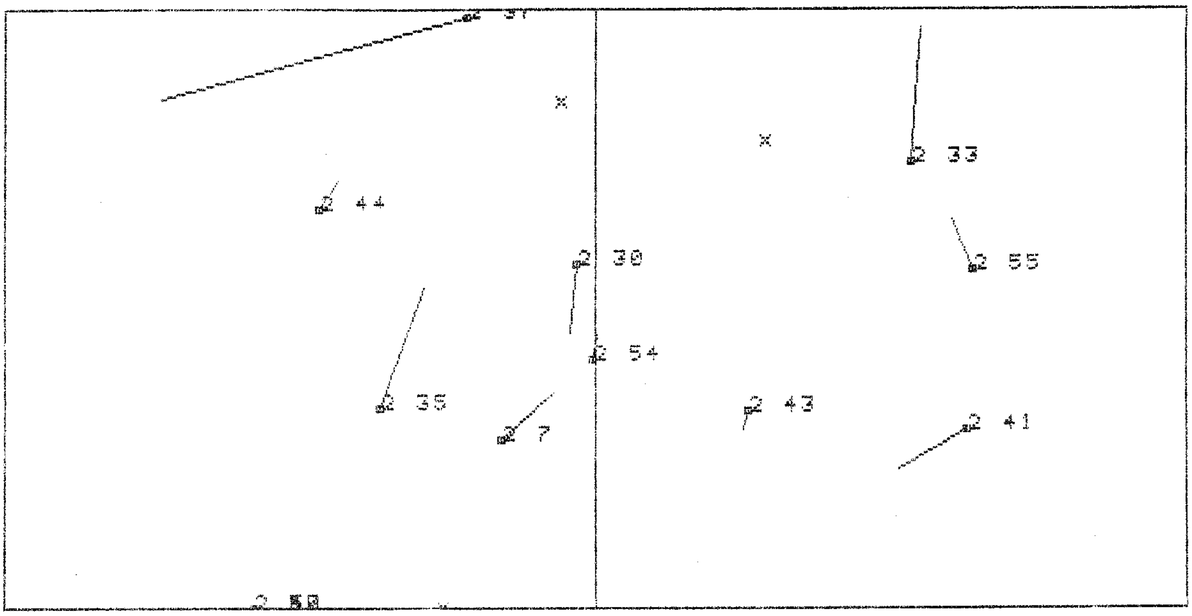
Fig.1 $\alpha = 3h$ $\delta = 0°$ Perseids 1985

$\alpha = 60°$



7h 3h and $\delta = 0°$ 23h

Fig.2 $\alpha = 21h$ $\delta = 0°$ Non-Perseids



21h, $\delta = 0°$

plane tracks , or scratches and emulsion defects can be taken by mistake as meteors. Always present is the sporadic background.

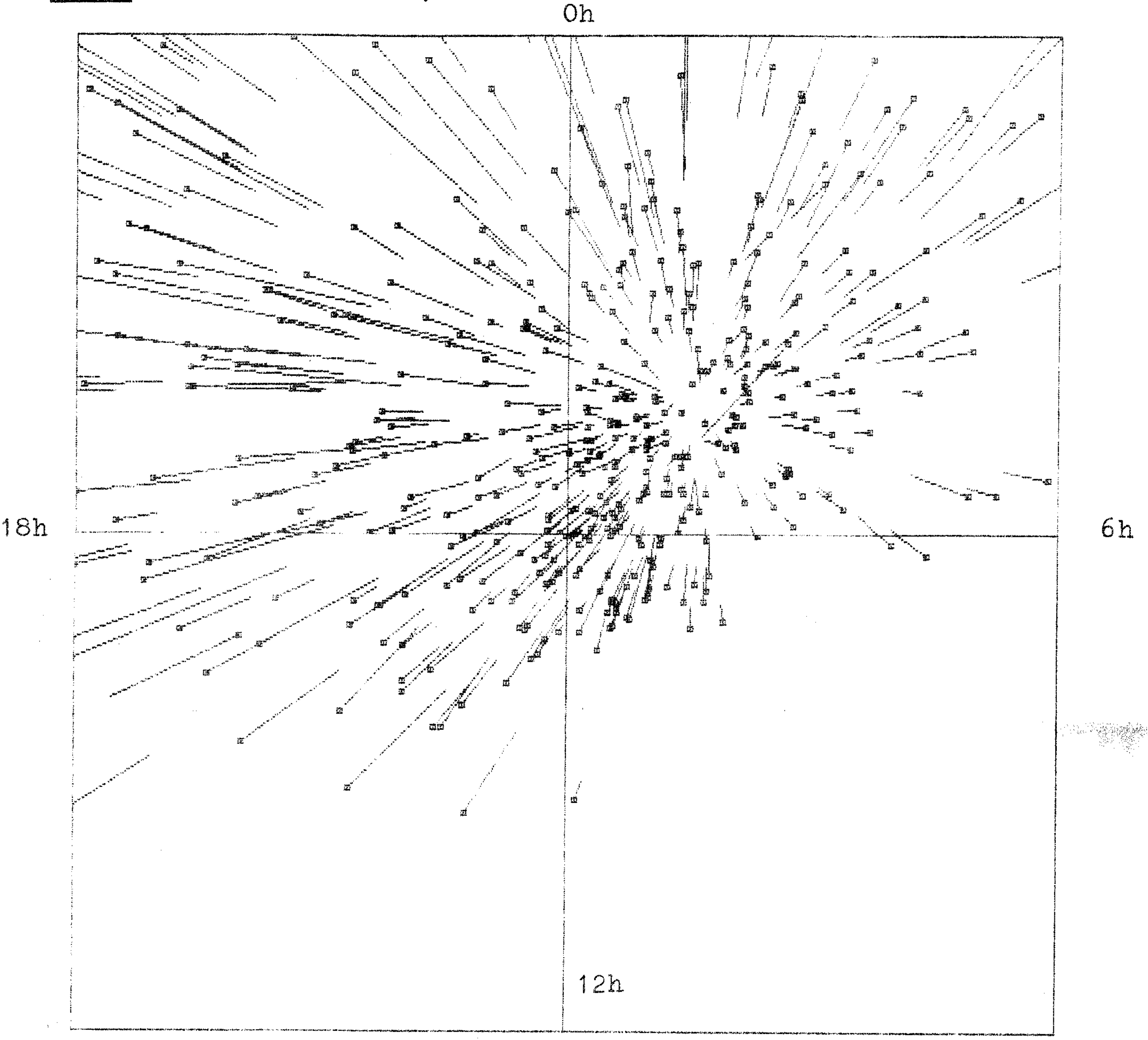
3. Discussion of the method.

The fact that first it is tried to assign meteors to the known major streams , has the small risk of underestimating the smaller or unknown radiants. Incidently , a meteor trail can line up with more than one radiant. In this case , another criterium has to be used. The closer to the radiant , the shorter the trail. Hence the ratio

$$R = \frac{\text{distance radiant - start point}}{\text{length of trail}}$$

looks a good indicator.

Fig.3 Center α = 12h , δ = +90°



This is not a constant , but depends upon :

- the geometry (elevation of the radiant)
- the brightness and speed of the meteor , and the effectivity of the camera.
- whether or not the complete trail is photographed.

Table 1 gives the empirical distribution of R for 188 Perseids chosen at random from the PMDB.

log R	R	n
-0.25 - 0.00	0.562 - 1.00	2
0.00 - 0.25	1.000 - 1.78	0
0.25 - 0.50	1.78 - 3.16	22
0.50 - 0.75	3.16 - 5.62	53
0.75 - 1.00	5.62 - 10	61
1.00 - 1.25	10 - 17.8	33
1.25 - 1.50	17.8 - 31.6	14
1.50 - 1.75	31.6 - 56.2	3
1.75 - 2.0	56.2 - 100	0

A good average value for R for the Perseids is 7.5. For shower meteors and streams with lower r-values , also R will be systematically lower.

This ratio was used by P.Roggemans (ref.3) to give more weight to the classification of the meteor of Aug.12 , 1978 , 01h08m U.T. as a Perseid than as a fictive ν Pegasid. Table 1 indicates that the R-value of 3.32 when classified as a Perseid is normal , while a low R = 0.21 is highly unlikely.

Once sufficient meteors are tentatively assigned , the radiant calculation method of ref. 8 is applied. The error distance of the trail to the corrected radiant is also calculated. The radiant radius can be largely influenced by a few incorrect meteors.

Example : Perseids 8-9 Aug. 1985 (Vol.4)

Record	Error Distance (°)
147	2.32
39	6.25
178	0.30
40	0.85
43	1.31
41	3.85
42	0.68
48	6.21
45	1.62
47	2.19

Yields $\alpha_R = 40.^\circ0$ $\delta_R = +56.^\circ0$ radius $3.^\circ3$

Eliminating records 39 and 48 gives :

Record	Error Distance (°)
147	2.14
178	1.47
40	2.07
43	0.20
41	1.78
42	1.23
45	0.37
47	0.69

yields $\alpha_R = 43.^\circ0$ $\delta_R = +58.^\circ1$ radius = $1.^\circ4$

a much better result.

The error distance of 6° is not easily visible on the low resolution maps , but is detected numerically.

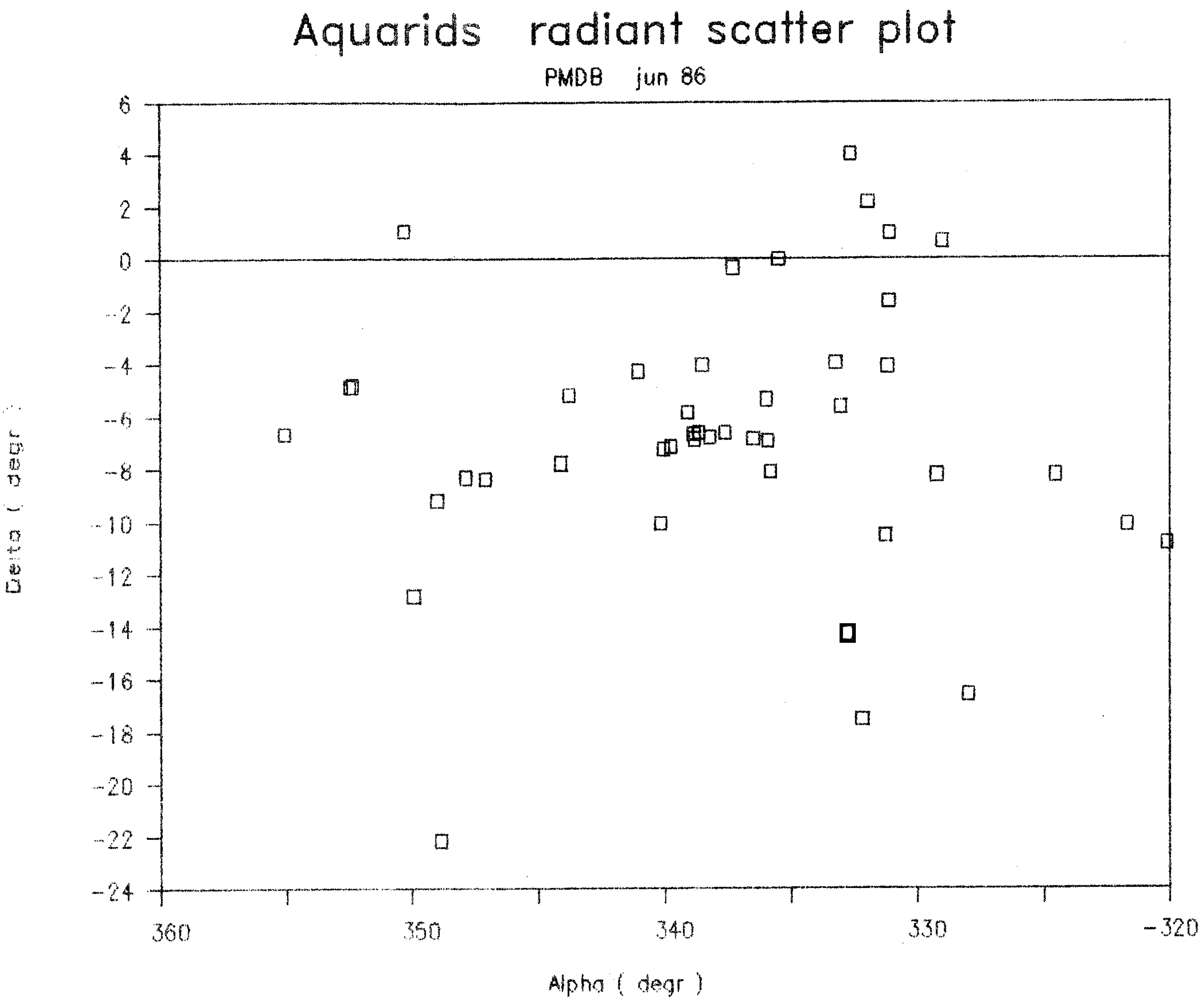
As often the timing of the meteor is not known , the α of both start and end point can be wrong by the equivalent of the exposure time (4 min = 1°). Hence , non guided exposures longer than say 15 min. are to be avoided for this purpose. From the astrometry , it also follows that the exposure times , as mentioned by the photographers , can be wrong by several minutes.

4. Example .

As an example of the procedure , we try to establish the Aquarid radiants of end July - early August. Due to the low elevation of these radiants at our latitude , most meteors are photographed rather far from the radiant and in a rather narrow sector north of these positions. Lovell (ref.9) mentions that the radiant is complex and has a large spread. Only later (ref.10) it was found that there is a northern and southern subradiant.

Fig.4 shows the plot of the corrected radiants for all tentative Aquarids of the PMDB . The radiant calculation gives :

$\alpha = 337.^\circ8$ $\delta = -6.^\circ7$ radius = $9.^\circ5$ (n = 44)



This position correspond best to the δ Aquarids N , although the more southern branch cannot be neglected. Of these 44 meteors , 11 belong with a great certainty to the northern branch :

$$\alpha = 337^{\circ}.5 \qquad \delta = +0^{\circ}.7 \qquad \text{radius} = 3^{\circ}.2$$

and another 11 to the southern :

$$\alpha = 339^{\circ}.0 \qquad \delta = -17^{\circ}.3 \qquad \text{radius} = 3^{\circ}.2$$

Hence, the position of the northern branch agrees better with the old value of Hawkins and Almond :

$$\alpha = 336^{\circ} \qquad \delta = 0^{\circ}$$

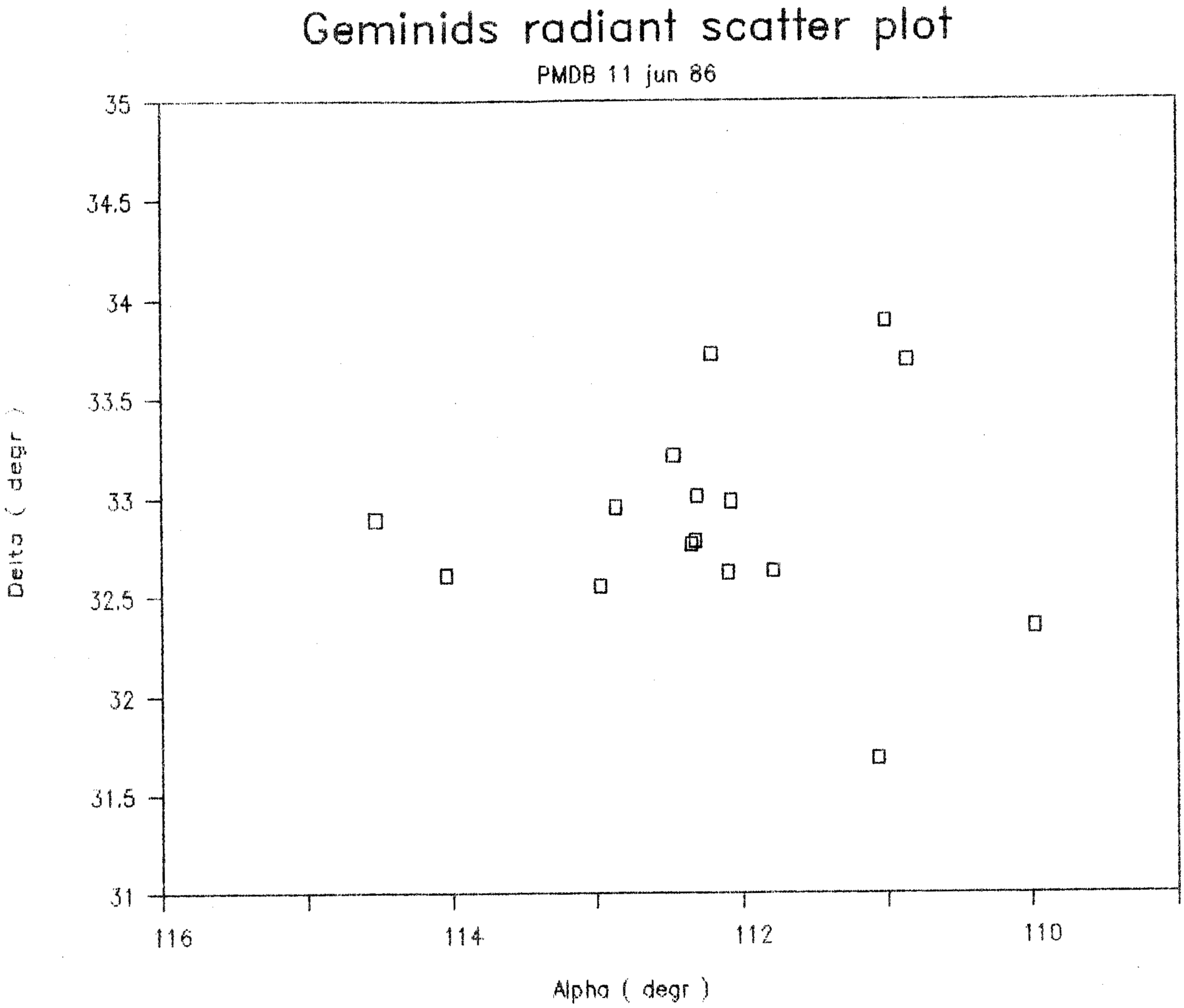
than with the more recent ones of Cook (ref.11):

δ Aquar.N $\quad \alpha = 339^{\circ} \quad \delta = -5^{\circ}$
ι Aquar.N $\quad \alpha = 327^{\circ} \quad \delta = -6^{\circ}$

Trying to split further our meteors in δ and ι Aquarids becomes meaningless , as the numbers are too small : only additional meteors can help. On the other hand , the Geminids are an example of an easy stream. Based on 16 meteors , the radiant is:

$$\alpha = 112^{\circ}.2 \qquad \delta = +32^{\circ}.9 \qquad \text{radius} = 1^{\circ}.1$$

Also the radiant scatter plot is much more confined (fig.5)



Conclusion.

Radiant determination from single station meteors is not a straightforward matter. More than once , visual stream determination turns out to be wrong. The actual classification is a blend of graphical identification , numerical calculation and use of a priori information. Always a certain number of unclassified and sporadic meteors will remain . In general , it is better not to classify rather than to classify incorrectly. The proposed method gives checks to avoid such mistakes.

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FORWARD SCATTER

AN INTERESTING EXPERIMENT

by C.Steyaert

Johan Smet (ON5EX) and Dirk Eeckhaut (ON4AED), two experienced radio amateurs , took the initiative for running some simultaneous meteor scatter sessions. The purpose of a first experiment was to evaluate the influence of the human factor on the observation of meteor reflections. This factor could include the general hearing perception, concentration , reflex ... . The set-up of the experiment consisted of a 4 element Yagi, pointed to the zenith. The azimuth of the antenna was 280° (hence, the elements of the antenna point in the direction 10°-190°, or almost South-North). The transmission line had 60 Ω impedance , and was 8 meters long. At the end of the line , an antenna splitter was mounted , which allows to keep the impedance and introduces minor losses. The two observers listened with a headphone to their identical receivers : Yaesu FRG 9600 , sensitivity 0.22 μV at 10 dB (S+N)/N . The detection was narrowband FM (15 kHz). The observers got no visual contact and could not influence each other. There were 3 sessions , each of 20 minutes , uninterrupted all on May 15 , 1986.

Session	Start time	Counts of ON4AED	counts of ON5EX	common counts
A	19h00	10	9	9
B	19h33	5	5	5
C	20h00	7	11	zero

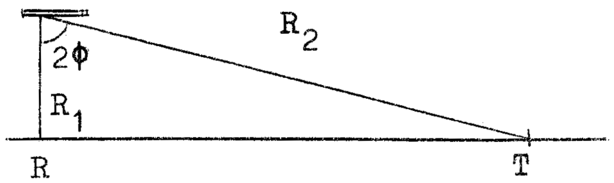
For session A , both observers tuned to 72.11 MHz (Wroclow). For session B , both selected 73.01 MHz (Danzig), a broadcast station with less power. Practically , identical reflections were heard. The auditive perception plays almost no role in counting the reflections. However , the description of the information within the reflection is more than once conflicting. This can be due to the very short duration of the reflection.

For session C , the frequencies were different (73.01 MHz , resp. 72.11 MHz) : there are no more common reflections ! This was a complete surprise. The explanation of these observations have to be sought in the geometry of the reflections and the type of reflections.

At observation time , there were no known radiants active. At that time of the day , also the sporadic activity is low . Yet , the effective rate is about 30/hour for the strongest broadcasting station (see ref.1,p.5.8). This confirms the good sensitivity of the set-up : most reflections are weak and of the underdense type . These trails have strict specular reflection and decay quickly : hence they are not distorted by winds.

Also not the complete trail contributes to the reflection. Only a few Fresnel zones centered at the tangent point play a role (ref.1 p.10.13, ref.2, Chap.9). The maximal length of half a Fresnel zone f for a vertical antenna is :

$$f^2 = \frac{R_1\ R_2}{(R_1+R_2)\cos^2\varphi} \qquad (\beta = 0)$$



For the practical example is :

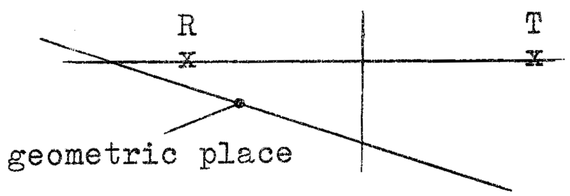
$\lambda = 4.1$ m , $R_1 = 100$ km

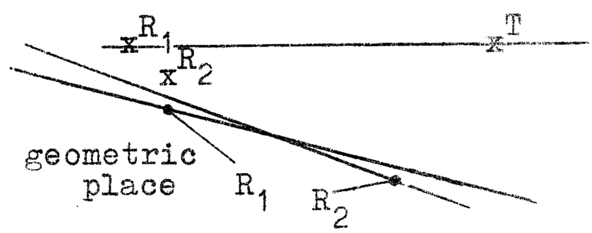
$RT \approx 700$ km , $\psi = 40°9$

$R_2 = 707$ km

or $f_{max} = 793$ m

Only a couple km's from the trail contribute to the meteor reflection. The easiest question to answer is whether a meteor reflecting for one observer will also reflect for another observer at a short distance. The answer greatly depends upon the radiant direction . As an example , we consider the receiver - transmitter to be in the west - east direction , at 700 km. Further , we take a meteor with radiant Az = 210° , h = 70° . On a horizontal map , the geometric place of all the meteors belonging to that stream is a narrow line :





The two lines intersect at a small angle . Only when the meteor lay in this intersecting zone , the reflections would be heard by both observers . It is seen that this length is rather small hence the small number of common reflections. When R_1, R_2 and T would be on the same west-east direction , there are practically no intersections anymore , except when the radiant is due south , as then the two lines coincide !

As far as we know , this is the first time that a forward scatter experiment is carried out from two places a few kilometers from each other , and that individual meteors were correlated. Forsyth et al.(ref.3) mentions that a certain amount of privacy is obtained in meteor communications on underdense trails . With vertical antennas , this turns out to be even more the case. We hope that this experiment will be done again and that also visual observers could participate . At the receiver side , the visual trail appears about 90° from the radiant. (As always , timings with an accuracy of 1 second are required). Last year during the Perseid campaign , the same meteor reflected to different receivers for distances as far as 10 km apart. These were stronger overdense and long lasting trails (ref.4) . We forecast that more common reflections will appear during shower activity.

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NOTE FOR CONTRIBUTIONS TO THE OCTOBER ISSUE :

We hope to have the next issue of WGN ready at the International Meteor Weekend in Hingene 3-5 October. Articles for this issue have to arrive before 7 September at last.

INTERNATIONAL METEOR WEEKEND

STATUS JUNE 1986

This circular will probable arrive at your address some two months before the conference date of 3-5 Oct. In this contribution we inform you about the current status of the weekend course organisation. The prospects look very good and we'll have an excellent program. As usual several people have been waiting with the confirmation (payment) of their reservation. Over 40 people informed us about their plans to attend the meeting. Most of you still have to pay the reservation. It is urgent now if you haven't paid yet! Pay without any delay 1000 Bf with a postal giro transfer to the belgian postal giro account 000-0688050-29 of P.Roggemans. Inform yourself at your national giro account office about the procedure of international payments . Do not send a check payable at a bank , banks charge high costs and don't even pay the sum mentioned on the checks ! If you ignore this and try to send us a check , please note that it is destroyed at its arrival as if you hadn't paid !

Several participants still have to give details about their lecture : title , duration , ... At the end of August we have to know all these details to complete the final information on the weekend. This final information will contain the program , list of all the participants , travelling information , rules of the house ... This newsletter has to be ready early in September in order to assure you the receipt at least around mid-September.

Around 15 September we have to report the final number of reservations to the housekeepers of the residence "Het Laathof". Entering new reservations then causes a lot of troubles.So help us to avoid difficulties and don't wait any longer ! Annulation is possible until September 30. The money is returned , reduced by administration costs if these are required for the repayment. If we aren't informed about annulation before 30 September , we cannot guarantee that the reservation can be entirely or partial be repaid.

The program :

The conference schedule hasn't been completed yet as several participants are still expected to inform us about their lecture. The program structure has space for 17 lectures , 9 informal breaks of variable duration and 2 conducted group discussions. The program will have the following structure :

Friday 3 October ;	15-18h	arrival of the participants and informal contacts.
	18-19h	supper.
	19-20h	welcoming - introduction of the participants. Slides on meteor work.
	20 -21h:	Lecture 1, After 21h informal talks.
Saturday 4 Oct. ;	8-8h45m	breakfast
	9-12h25m	Six lectures dealing with meteor photography + breaks.
	12h30-13h30	dinner
	13h30-17h50	Five lectures dealing with theoretical and visual work.(2 breaks)
	18-19h	supper
	19h-20h40m	Two lectures introducing the discussion on visual meteor work.
	20h40-....	group discussion(see further)
Sunday 5 Oct. ;	8-8h45	breakfast
	9-11h	Three lectures dealing with radiowork
	11-12h20m	Evaluation , future international co-operation.
	12h30	dinner ,departure after dinner.

Lectures announced (status June 1986):

We are grateful to Prof.Babadzhanov (Dushanbe,U.S.S.R.) President of the I.A.U. Commission 22 for his help to invite professional meteor workers. The I.M.W.1986 will be enriched by the participation of Dr. B.A.Lindblad and Dr.I.P.Williams.

- Dr.Lindblad (Lund Observatory , Sweden) is well known among meteor workers for his long standing radar observations and studies of combined visual and radar observations. He published many papers dealing with meteor work. Mr.Lindblad is one of the most active and experienced meteor workers of this time. His presence at the meteor weekend will be very important to improve the co-operation between amateur meteor workers and professional observing programs. He promised us a most interesting lecture on "The Magnitude Distribution of Visual Meteors and Errors in Visual Magnitude Estimates." This lecture is scheduled on Saturday 19h-20h as one of the starting lectures for the conducted group discussion. Dr.Lindblad proposes a general discussion of the goals of amateur observing programs. He also suggests to discuss the tendency for some amateur meteor observers to classify nearly every meteor that they see , as belonging to some minor shower . This problem has plagued visual meteor observations ever since Denning's days.

- Dr.I.P.Williams (Queen Mary College - University of London , England) is well known for his most interesting theoretical studies of meteor streams and their evolution. During the past years we have read several excellent papers from his hand , most of them were published in the Monthly Notices of the R.A.S. Dr.Williams is one of the leading theorists in this field. The presence of Dr. Williams at the meteor weekend will enrich the aims of the weekend and will improve the relationship between the theoretical branch and the observational counterpart . Dr.Williams announced us a very interesting lecture on " Meteor Stream Evolution" . This lecture has currently been programmed on Saturday 14-15h.

Amateur contributors announced the following lectures:

- Steve Evans (B.A.A.Meteor Section) , responsible for the photographic meteor program of the B.A.A., will deliver us a lecture "The photography of meteors with large format cameras".

- Casper ter Kuile (H.A.S.A.Meteor Team), promises a lecture on "Meteor Trajectories in the atmosphere" further details will be published later on since these weren't communicated yet.

- Paul Roggemans (V.V.S.Meteor Section) planned two lectures,one on the international results of the Perseids 1985 and another one on the remarkable results on the Geminids 1985. These lectures will describe the structure of both showers as derived from amateur visual observations. With this contribution on two meteor showers (magnitude results and Z.H.R.-profiles) it will become clear that there is a very urgent need for international co-operation. These lectures will be programmed separately on Saterday afternoon.

- Niels Nelson (Public Observatory Hoeven -the Netherlands) will speak about a theoretical topic on dust in the solar system . We hope to have more details available soon.

- Per Aldrich (Meteor Group Denmark) proposed us a lecture on the colour observations of meteors. This topic has to be confirmed , more details will appear in the final information.

- Christian Steyaert (V.V.S.Meteor Section ,Belgium), prepared two lectures . He delivered already two abstracts of these lectures . We reproduce these abstracts in this summary :

The photographic meteor database (PMDB) : A publication containing data about 950 photographed meteors in the period 1968-1986 will be presented. All meteor photographs , provided that some basic data are known , can be added to the PMDB. Obtaining the (α,δ) of start- and end point of the meteors is done by means of the astrometric technique : on prints , a number of reference stars and the meteor itself are measured. The data are organised following the relational database model . There are several files , e.g. :

- the meteor file , $(\alpha,\delta)_b$, $(\alpha,\delta)_e$, magnitude , shower.
- the photograph file : start/end of exposure , camera and emulsion characteristics.
- the astrometry file : center of plate , focal length , S.D. on reference stars , calculated exposure time.
- the observing site file.
- the observer file.

Data will also be available on diskette for some types of computers . The use of the PMDB is manifold . Illustrations are given about : - shower determination - double station meteor calculations. It is the intention to update this meteor catalogue regulary.

Quanta and meteor science : Observational results in meteor studies can often only rely on low counts or single events. As a result , the data have to be interpreted statistically . The human mind is not always able to grasp the implications of these quantum effects. The exponential and Poisson distribution play a major role in this field. The theory is illustrated by :

1. The time distribution and groupings of meteor sightings . Most if not all , of the reported groupings , can be explained by random effects.
2. Maximum activity determination of a stream and spread on Z.H.R. Also here , the observers can be easily misled . Global instead of detailed treatment of the data increases the reliability.
3. The quantum theory of vision . We derive the perception function based upon the minimum number of photons required to stimulate the rods . The time of stimulation is very important . The limiting magnitude for stars is not a good measure for hourly rate correction of meteors . The influence of the background light level is also discussed. A practical experiment for learning the observer's vision characteristics is proposed .

This topic serves as an introduction for the possibly controversial discussion of the standardization of visual observing techniques.

So far about the lectures that were already communicated. We expect several other lecturers to inform us about their contribution to the meteor weekend . More next time !

About the group discussions :

On request of Dr.B.A.Lindblad,Mr.Spalding,Detlef Koschny and C.Steyaert , we programmed a group discussion on the aims of amateur meteor observing programs. Some points to be discussed :

- International co-operation between amateurs and professional meteor workers , contacts , information,...
- Universal method of rate correction , which corrections to be used?(proposed by George Spalding).
- To improve the worldwide instruction of amateur meteor observers ; edition of a "Handbook for amateur meteor observers",an international circular for meteor workers,
- The edition of a bibliography on meteor literature.
- Future meetings , an international meteor observing camp ?, the foundation of a permanent meteor observatory in the South-East of France at Puimichel ...

The participants are requested to prepare these topics carefully before the weekend. Details of some topics are prepared by the participants who proposed the point of discussion.

V.V.S.WERKGROEP METEOREN - METEOR SECTION

Reken Sektie : Astrometrie , Baanberekeningen , enz ...

Christian Steyaert , Poelstraat 319 , B-9240 Bottelare
Tel.: 091/62 75 03

Visuele Sektie ; Waarnemingen , Publikaties , Werkgroepnieuws ...

Paul Roggemans , Dellingstraat 25 , B-2800 Mechelen

Tel.: 015/41 04 43

Radio Sektie : Waarnemingen

Jeroen Van Wassenhove , 's Gravenstraat 66, B-9730 Nazareth
Tel.: 091/85 61 09

Verzending WERKGROEPNIEUWS :

Pierre en Tilly Vingerhoets, Blokmakerstraat 20,B-2758 Haasdonk
Tel.: 03/775 13 29 (verwittigen wanneer WGN niet werd ontvangen)

Zend uw waarnemingen , foto's,artikels altijd onmiddellijk in naar de verantwoordelijke persoon.

ABONNEMENTSPRIJS : WERKGROEPNIEUWS verschijnt zes maal per jaar. In België bedraagt de abonnementsprijs voor 1986,250 Bf , personen die effektief lid zijn van de V.V.S. en die in België wonen hebben een gunstprijs van 200 Bf. Voor het buitenland bedraagt de abonnementsprijs 300 Bf , omwille van de hoge verzendingskosten kan er geen korting worden toegepast. Nederlandse abonnees worden verzocht hun bijdrage voor 1986 aan te vullen tot 300 Bf . Abonneren kan door middel van storting op postrekening 000-0688050-29 van Paul Roggemans , ook vanuit Nederland kan men kosteloos overschrijven van een Nederlandse postgiro naar een belgische postgiro.

USEFUL INFORMATION

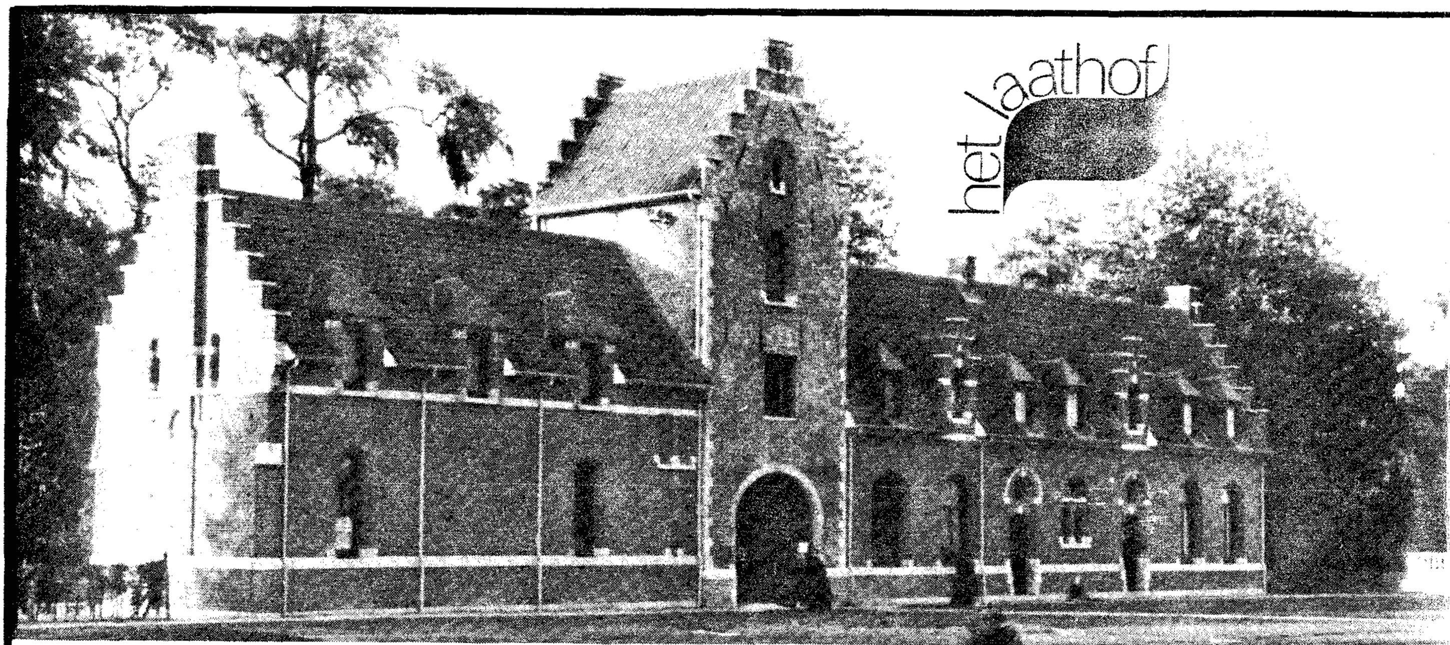
Visual Observations : send your visual reports to Paul Roggemans. Teams are requested to give individual rate data and magnitude distributions for each observer separately. Combined group observations are USELESS. Use only Universal Time to avoid confusion.

Radio observations : Radio meteor workers are invited to write to Jeroen Van Wassenhove (address above)

Photographic results : meteor photographs have to be measured on a paper print . This print has to be sent with the astrometric data to Christian Steyaert for Astrometric calculations. The listing with the astrometric results will be sent to you.

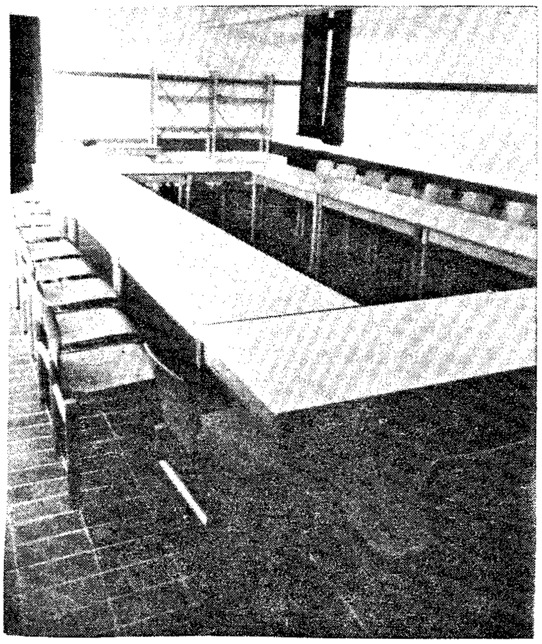
Articles for publication in WGN: Articles for WGN have to be readable written or typewritten. Figures , graphs and tables have to be copy-ready. Drawings of insufficient quality will not be printed.

Subscriptions to WGN in 1986 : The subscription for 1 year with 6 issues costs 300 Bf (bare price of costs),the equivalent of 7 US $ can be paid as well. Pay by International postal money order.



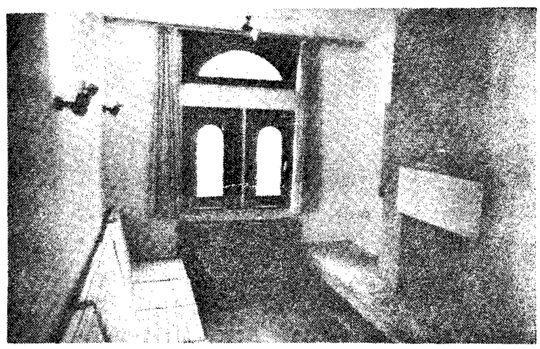
HINGENE BELGIUM METEOR WEEKEND

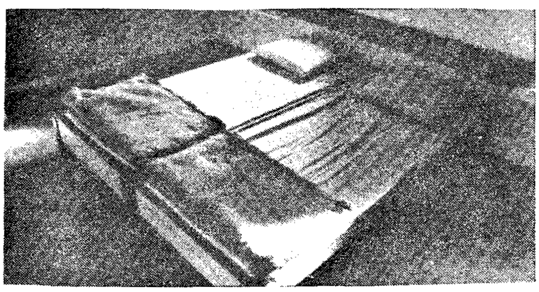
3-5 OCTOBER 1986



Meteor observers from several groups from different countries will meet each other for a weekend conference in Hingene. Hingene is a small village south east of Antwerp. The happening starts with the arrival of the participants between 15h and 18h on Friday 3 October. For the meeting itself we got several most interesting lectures. A famous professional meteor worker with a lot of experience on visual and radar observations will stay with us. Some groups made already most promising proposals for group discussions which will probably lead to a universal method of visual work. Amateurs from 10 countries wrote us that they will attend the meeting. This weekend may become a milestone in the history of amateur meteor work !

The final program will be arranged in September , participants who paid the registration then will receive full information in September. Amateurs interested to attend the meeting are invited to write to the organizer. Lecturers are requested to mention the title and the duration of the lecture. A written summary of the lecture is required as well.





Please send your registration letter to Paul Roggemans , Dellingstraat 25 , B - 2800 Mechelen ,Belgium. Prepayment is requested , transfer 1000 BF from your postal giro account to the belgian giro account of Paul Roggemans or pay by International Postal Money Order.