Mitteilungen des

Arbeitskreises Meteore 119

Potsdam, den 28. Dezember 1990

Arbeitskreis Meteore
PSF 37, Potsdam, 1561

Beobachtungsergebnisse November 1990

						gesamt		Leoniden				
Dt	T_A	T_E	T_M	T_{eff}	m_{gr}	n	HR	n	ZHR	Beob.	Meth.	Bem.
										Gruppe A		
17	2134	+0140	2343	2,92	6,29	41	18	7	8,5	RENJU	R	2 Int.
18	-2325	0109	0017	1,17	6,37	17	17	2	4,7	BODRA	P	# c_a=1,01
18	-2358	0109	0018	1,18	6,37	12	12	1	2,2	WINRO	P	# c_a=1,01
24	2108	2325	2216	2,17	6,34	23	13			BODRA	P	
24	2124	2345	2234	2,23	6,24	17	10			WINRO	P	
27	0044	0452	0244	3,50	6,24	56	21			RENJU	P	2 Int.
										Gruppe B		
08	1857	1951	1924	0,83	5,91	8	18			RENJU	P	
16	-2351	0059	0025	1,08	6,02	10	16	1	3,4	BODRA	P	

Beobachter im November 1990:

RENJU	Jürgen Rendtel, Potsdam	7,95h Einsatzzeit	3 Beobachtgn.
BODRA	Ragnar Bödefeld, Chemnitz	4,68	3
WINRO	Roland Winkler, Markkleeberg	3,56	2

Von den beteiligten 3 Beobachtern wurden in 5 Nächten (8 Einsätze) innerhalb von 15,08h effektiver Beobachtungszeit (16,19h Gesamt-Einsatzzeit) zusammen 194 Meteore beobachtet.

Gruppenbeobachtung:

Markkleeberg 51.3°N; 12.4°E

Korrektur zu MM118, Tabelle S.1: Dt 17 muß richtig 18 heißen (Beob. mit Mitte um etwa 01h UTC in Lardiers)

Perseiden 1990 - Ergebnisse des AKM

Jürgen Rendtel

Im Jahre 1990 waren die astronomischen Voraussetzungen für die Beobachtung des maximumsnahen Teils der Perseidenaktivität nicht gerade günstig; schließlich befand sich der abnehmende Mond in recht störender Größe zum entscheidenden Zeitpunkt ziemlich nahe am Radianten. Dennoch sind die Perseiden natürlich die Attraktion des Jahres - hauptsächlich wegen der bequemen Zugänglichkeit und der Urlaubszeit. So wurden dann auch für sehr viele Nächte des Aktivitätszeitraumes Beobachtungsdaten gewonnen. Die Zusammenfassung dieser ZHR ist nachstender Tabelle zu entnehmen. Die grafische Darstellung enthält die (recht einfach gewichteten) Mittelwerte der ZHR für jede Nacht. Es wurden prinzipiell nur ZHR verwendet, wenn der Radiant zur Mitte des Beobachtungsintervalls mindestens 20° hoch stand und die Rahmenbedingungen wenigstens "mittelmäßig" waren ($m_{gr} \geq 5.8$). Es wurden nur zwei verschiedene Wichtungsfaktoren verwendet: $h_R \geq 40°$: 2, $20° \leq h_R < 40°$: 1. Eine weitaus detailliertere Auswertung wird noch mittels der VMDB der IMO durchgeführt. Durch Einbeziehung der Daten rund um die Erde sind dann auch Aussagen über feinere Aktivitätsstrukturen möglich.

Tabelle 1: ZHR der Perseiden 1990

Dat	T_M	n	h_R	ZHR	Beob.
Jul14	2204	3	31°	1,5	KOSRA
Jul15	2201	2	30	3,4	RENJU
15	2218	6	33	2,6	KOSRA
15	2335	2	43	2,9	RENJU
Jul19	2213	2	33	3,3	RENJU
19	2230	0	36	0	KNOAN
19	2306	1	39	1,8	SCHPA
19	2358	3	47	3,8	RENJU
19	2400	4	48	6,4	KNOAN
Jul20	2229	5	40	5,4	BADPI
21	0007	4	50	3,5	BADPI
Jul21	2202	2	32	2,4	RENJU
21	2210	2	34	2,9	KNOAN
21	2257	5	40	2,5	KOSRA
21	2326	1	42	0,9	WINRO
21	2354	1	45	1,0	SCHPA
21	2357	6	49	5,2	KNOAN
22	0004	3	49	2,5	RENJU
22	0028	5	54	2,4	KOSRA
Jul22	2152	5	31	7,9	RENIN
22	2202	2	32	2,1	BODRA
22	2203	5	32	6,5	RENJU
22	2212	5	34	2,5	KOSRA
22	2213	2	35	3,0	KNOAN
22	2216	0	34	0	WINRO
22	2233	6	40	5,8	BADPI
22	2335	3	44	3,1	SCHPA
22	2335	0	44	0	RENJU
22	2338	4	46	6,1	KNOAN
22	2357	0	49	0	BODRA
23	0008	5	51	4,0	BADPI
23	0015	8	51	3,2	KOSRA
Jul23	2103	0	21	0	KRAAN
23	2218	3	39	3,5	BADPI
23	2224	5	36	5,2	RENIN
23	2226	4	36	5,1	RENJU
23	2318	6	41	4,2	KRAAN
23	2343	3	50	2,9	BADPI
24	0016	1	51	1,0	RENJU
24	0025	8	53	3,5	KOSRA
Jul24	2118	6	23	5,8	KRAAN
24	2345	9	45	6,3	KRAAN
Jul25	2132	4	27	2,7	KRAAN
Jul26	2337	1	45	1,3	SCHPA
Jul27	2200	4	34	2,5	KOSRA
27	2341	6	46	7,4	JENAN
28	0001	8	50	6,7	RENJU
28	0017	6	52	2,1	KOSRA
Jul28	2134	2	31	7,4	WINRO
28	2218	6	35	4,5	KRAAN
Jul30	2200	3	35	2,1	KOSRA
30	2228	4	39	4,9	RENJU
30	2301	1	42	2,1	WINRO
31	0022	5	54	5,2	RENJU
31	0030	10	55	4,6	KOSRA
Jul31	2224	6	38	7,2	RENJU
31	2244	3	41	4,8	WINRO
32	0011	5	51	2,8	KOSRA
Aug01	2329	9	44	7,3	WINRO
02	0024	19	54	4,9	KOSRA
02	0025	16	53	10	RENJU
Aug02	2317	9	44	12	RENJU
02	2349	3	47	3,9	WINRO
03	0021	15	53	4,9	KOSRA
03	0053	9	57	10	RENJU
Aug04	0030	3	54	5,4	WINRO
04	0033	6	55	7,6	RATTH
04	0035	4	55	4,9	RICJA
04	0037	4	55	2,9	KUSRA
04	0037	12	55	9,9	RENJU
04	0037	4	55	3,3	KNOAN
04	0041	24	56	9,0	KOSRA
Aug05	0108	10	59	12	RENJU

Vollmondunterbrechung

Dat	T_M	n	h_R	ZHR	Beob.
Aug10	2217	9	40	23	RENIN
10	2314	11	45	15	RENJU
10	2323	8	46	7,8	KNOAN
Aug11	2030	18	28	50	BODRA
11	2054	13	32	15	KOSRA
11	2131	3	31	47	WINRO
11	2257	5	43	16	KOSRA
Aug12	2055	14	32	26	WINRO
12	2107	40	34	56	RENIN
12	2152	6	37	26	RENJU
12	2315	35	45	33	KOSRA
13	0033	38	55	35	KOSRA
13	0103	36	58	43	RENJU
13	0134	15	60	39	RENIN
13	0138	58	61	124	BODRA
13	0138	19	61	123	RATTH
13	0143	50	64	37	KOSRA
Aug13	2044	24	30	25	KOSRA
13	2054	21	30	53	BODRA
13	2118	8	34	25	RENJU
13	2119	5	34	23	RENIN
Aug16	2110	14	33	17	RENIN
16	2114	4	34	6,5	RENJU
16	2250	15	43	16	RENIN
16	2250	13	43	19	RENJU
Aug17	2149	8	36	12	SCHTH
17	2149	3	36	3,7	RATTH
18	0037	8	55	4,3	HENUD
18	0037	7	55	5,2	RATTH
Aug19	2010	1	29	2,9	RENJU
19	2046	6	31	6,7	KUSRA
19	2050	9	31	5,4	KOSRA
19	2052	3	32	3,0	BODRA
19	2053	2	32	2,9	SCHPA
19	2100	7	32	11	HEIBE
19	2150	15	36	6,5	RENIN
19	2304	0	44	0	BODRA
Aug20	2028	3	30	4,1	RENJU
20	2101	4	32	1,7	KOSRA
20	2104	1	32	1,2	WINRO
20	2107	10	33	5,5	RENIN
20	2112	3	33	2,8	SCHPA
20	2115	3	33	1,8	BODRA
20	2115	8	33	5,6	KUSRA
20	2214	5	39	4,8	RENJU
20	2253	3	43	2,5	KNOAN
20	2310	2	44	2,8	WACFR
20	2322	0	46	0	SCHPA
20	2322	1	46	0,8	BODRA
20	2322	1	46	1,0	KUSRA
20	2329	1	46	0,4	KOSRA
20	2330	5	46	3,1	RENIN
Aug21	0059	9	58	4,7	RENJU
21	0101	1	58	0,9	KUSRA
21	0107	5	58	3,2	BODRA
21	0108	2	58	2,0	SCHPA
21	0115	4	59	2,4	KNOAN
21	0125	16	61	7,6	RENIN
21	0127	11	61	4,0	KOSRA
Aug21	2044	4	31	3,9	RENIN
21	2050	1	31	1,3	BODRA
21	2053	0	32	0	SCHPA
21	2054	1	31	0,8	KOSRA
22	0023	1	53	4,8	RENIN
22	0023	1	53	2,9	KOSRA
22	0026	0	53	0	BODRA
Aug22	2116	1	33	2,0	WINRO
22	2136	1	36	0,9	RENJU
22	2250	3	42	3,2	BODRA
22	2325	2	46	1,6	KOSRA
22	2329	1	46	0,6	RENIN
23	0038	4	54	1,6	WACFR
23	0038	0	54	0	MORSA
23	0038	1	54	0,8	RICJA
23	0038	1	54	0,9	RATTH
Aug23	2042	1	31	1,5	WINRO
23	2045	3	31	4,1	RENJU
23	2105	7	33	3,8	RENIN
23	2110	0	33	0	KOSRA
23	2110	1	33	0,6	BODRA
23	2115	0	34	0	KUSRA
23	2129	0	34	0	MORSA
23	2129	4	34	2,9	HENUD
23	2129	1	34	2,1	ZIZJA
23	2129	3	34	4,9	RICJA
23	2155	0	36	0	KNOAN
23	2244	1	41	0,9	WINRO
23	2254	5	42	3,3	RENJU
23	2322	1	46	0,7	BODRA
23	2330	3	47	1,7	RENIN
23	2330	2	47	1,0	KOSRA
23	2340	4	48	3,5	KUSRA
24	0015	1	52	0,7	KNOAN
24	0045	0	54	0	HINWO
24	0045	2	54	1,8	MORSA
24	0045	0	54	0	WACFR
24	0045	8	54	3,4	HENUD
24	0045	2	54	1,8	ZIZJA
24	0045	0	54	0	RICJA
24	0045	5	54	3,3	RATTH
24	0117	3	59	1,5	BODRA
24	0121	6	59	4,1	RENJU
24	0130	4	61	1,9	RENIN
24	0130	2	61	0,7	KOSRA
Aug24	2032	0	30	0	WINRO
24	2044	1	31	0,9	RENIN
24	2053	7	32	3,2	KOSRA
24	2208	0	38	0	SCHPA
24	2209	0	38	0	HINWO
24	2209	5	38	2,3	HENUD
24	2209	0	38	0	RATTH
24	2209	3	38	1,5	KRAAN
24	2209	3	38	2,9	ZIZJA
24	2209	1	38	0,5	MORSA
24	2209	0	38	0	WACFR
25	0002	6	50	4,2	RENIN
25	0006	2	51	0,8	KOSRA

Aus unseren Daten ist man geneigt, das Maximum für den Morgen des 13. August 1990 anzunehmen; möglicherweise lag es auch später in der ersten Tageshälfte. Die hohen ZHR der Nacht 11/12 August stammen alle aus der ersten Nachthälfte (Radiant tief) und von relativ kurzen Beobachtungen bei meist schlechten Bedingungen (Gruppe B). Daher sollte man den verhältnismäßig hohen ZHR nicht zuviel Gewicht beimessen. Dasselbe gilt auch für die Werte des 13. August, die auch allesamt aus den Abendstunden stammen und unter ziemlich schlechten edingungen gewonnen wurden. Daher scheint das Maximum in unserer Auswertung im Vergleich zu früheren Jahren breiter zu sein. Nach Kenntnis der Bedingungen muß man jedoch von einem vorgetäuschten Effekt ausgehen.
In der Tabelle 2 sind nun noch die gewichteten Mittelwerte zusammengestellt. In der Nacht des Maximums ist der Versuch einer feineren Unterteilung gemacht worden, die aber aufgrund der wenigen Daten nicht sehr aussagekräftig ist. Daher sei nochmals auf die noch ausstehende Auswertung der Daten mittels der VMDB verwiesen.

Tabelle 2: Gemittelte Perseiden-ZHR 1990
(Das Datum bezieht sich auf 0h UTC; d.h. Jul16 betrifft die mittlere ZHR für die Nacht Jul15-16)

Datum	mittl.ZHR	σ	Intervalle
Jul16	3,0	0,3	3
20	3,6	2,1	5
21	4,5	0,9	2
22	2,5	1,3	8
23	3,3	2,4	13
24	3,1	1,6	8
25	6,1	0,2	2
26	2,7	–	1
27	1,3	–	1
28	5,0	2,4	4
29	6,0	1,4	2
31	3,9	1,4	5
Aug01	4,5	1,6	3
02	7,4	2,1	3
03	7,7	3,4	4
04	6,1	2,5	7
05	12	–	1
Vollmondpause			
Aug11	14	5,6	3
12	29	16	4
13	46	27	10
14	30	11	4
17	16	4,3	4
18	5,8	2,8	4
20	4,3	3,3	8
21	2,7	1,9	22
22	2,1	1,9	7
23	1,3	0,9	9
24	1,7	1,4	29
25	1,4	1,5	13

Für die Maximumsnacht lassen sich 4 Abschnitte finden, für die uns ZHR vorliegen. Eine Interpretation halte ich nicht für sinnvoll, da die jeweiligen Stichproben nicht sehr umfangreich sind.

3 Int. vor 22h:	ZHR 38	σ 15
1 Int. 22-24h:	33	–
1 Int. 00-01h:	35	–
5 Int. 01-0220h:	54	31

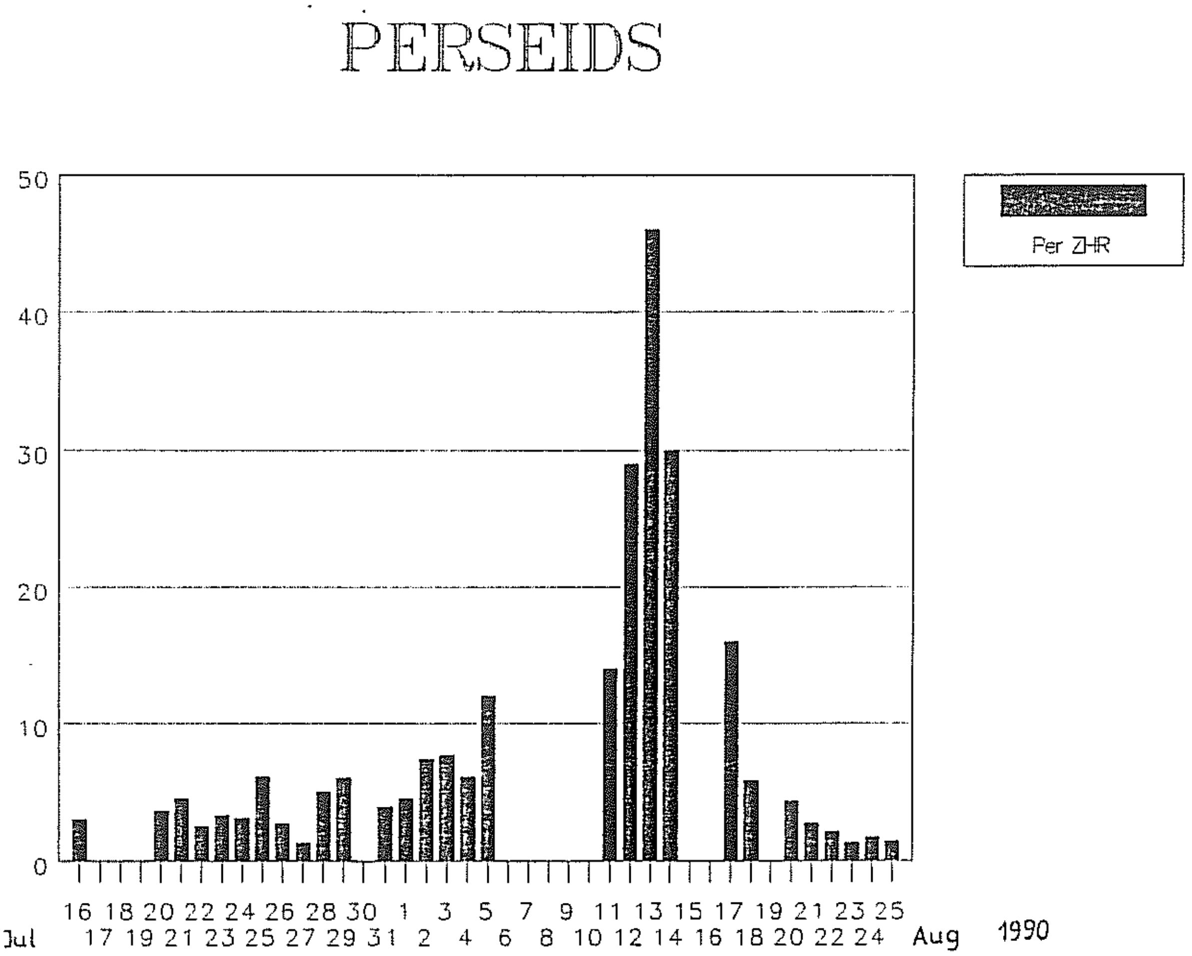

Abbildung: Darstellung der gemittelten Perseiden-ZHR 1990 nach Tab. 2 (ohne Streuung)

Geminiden 1990

...an der Nordseeküste...

Jürgen Rendtel

Es war wieder soweit: Dezember und trüber Himmel mit ebensolchen Wetteraussichten zum Geminidenmaximum. Doch Auskünfte der Meteorologen hatten schließlich vor ein paar Jahren schon einmal zu Maximumsbeobachtungen geführt. In Erwartung der Auskunft hatten Olli (Rainer Arlt) und ich bereits etliche Zugverbindungen im Kopf. Nach dem 13Uhr-Termin wagte ich den Anruf beim Meteorologen vom Dienst im Wetteramt Potsdam. Das träge über Europa trieselnde Tief hatte eine massive Wolkendecke weit um sich ausgebreitet. Um einige Lücken zu finden, empfahl uns der nette Herr eine Reise nach Sylt oder wenigstens ins nördlichste Schleswig-Holstein. Gerade diese Richtung war überhaupt nicht vorbereitet – also das Kursbuch her und kurzentschlossen kurz nach 17 Uhr ab Berlin. Unterwegs nur trüber

Himmel, Hamburg dicht, Schleswig dicht. Sollte das Tief seine Grüße nachsenden? Doch dann erste Sterne, noch zwischen Wolken. Die ausgewählte Station: Jübek. Klein genug um aus dem Licht zu entkommen, aber verkehrsmäßig günstig für den Abmarsch, falls es doch wieder... Aber es wurde nicht wieder schlecht, das Wetter. Am Ende des Birkenwegs richteten wir uns schnell ein, denn die Geminiden waren schon vor uns da. Bis zum Morgen konnten wir, von kleinen Unterbrechungen abgesehen, durchweg beobachten. Weit über 600 Meteore wurden visuell registriert. Was das fish eye-Objektiv einfing, muß sich erst noch herausstellen. Die Geminiden präsentierten ZHR's um 60-70, oftmals in dichter Folge bzw. in Form von synchron erscheinenden Meteoren. Feuerkugeln konnten wir nicht beobachten. Obwohl die Temperatur nicht weit unter Null lag, tat die Aufwärmung im Zug anschließend gut. Als wir in Husum zur Nordsee liefen, brachte uns der zuvor als schmale Sichel aufgehende Mond das Wasser freundlicherweise entgegen. Gut, daß der Zug zurück ein durchgehender war – so konnte etwas vom verlorenen Schlaf nachgeholt werden. Rundum ein gelungener Ausflug, fanden wir.
Die "digitalisierten" Resultate sind in der nächsten MM zu finden.

FK 119

Feuerkugel-überwachungsnetz des Arbeitskreises Meteore

NATIONAL FIREBALL NETWORK

Einsatzzeiten NOVEMBER 1990

Code	Name	Ort	PLZ	Feldgrößen	Zeit
BODRA	Bödefeld	Chemnitz	9002	128°*128°	20.46
FRIST	Fritsche	Schönebeck	3300	44°*62°	24.62
HAUAX	Haubeiß	Ringleben	5101	45°*64°	24.13
KOSRA	Koschack	Weißwasser	7580	128°*128°	32.14
RENJU	Rendtel	Potsdam	1570	ø180°	84.94
RINHE	Ringk	Dresden	8021	27°*40°; 35°*35°	58.11
SCHPA	Scharff	Kuhfelde	3561	62°*84°	15.95
WINRO	Winkler	Markkleeberg	7113	ø180° all sky	13.80

Nov	01	03	04	07	08	09	10	13	15	17	21	23	24	26	27	28	29	30
BODRA										2			12	6				
FRIST					8									9				8
HAUAX						9								4				12
KOSRA							5		3					13				11
RENJU	2		12	2	5		9		3		8	3	9	9	2	7	1	14
RINHE		2				12	5	4	10				13	13				
SCHPA													3					13
WINRO																		14

Feuerkugeln

KEINE SICHTUNGEN AUS DEUTSCHLAND ODER DEN NACHBARLÄNDERN GEMELDET.

Fotografierte Meteore

1990 Aug 22 nicht visuell, Aufn. 203000-204631UTC
in Lyr-Cyg
KOSRA (Lindenberg) 128°*128° ISO 400/27° m. Blaufilter

1990 Aug 24 205907UTC -1^m, Aufn. 203705-210440UTC
Az:45° h:40°, 6°/s, Teilung
BODRA (Lindenberg) 38°*54° ISO 3200/36°

1990 Aug 27 004023UTC $+1^m$, Aufn. 003832-004200UTC
Az:90° h:35°, 15°/s, 3s Nachleuchten
BODRA (Lindenberg) 38°*54° ISO 3200/36°

1990 Aug 28+ nicht visuell, ca. -1^m, Aufn. 220859-020520UTC
Az:360° h:60°
KOSRA (Lindenberg) 128°*128° ISO 400/27° m. Blaufilter

Korrekturen

FK 117:
- Aufnahme von KOSRA am 20./21. August 1990 zwischen 194318-221453UTC kein Meteor sondern Satellit.
- Aufnahme von KOSRA am 28./29. August 1990 zwischen 193014-220703UTC kein Meteor sondern Filmfehler.
- Aufnahme von KOSRA am 29./30. August 1990 zwischen 192452-021104UTC: Intervall des Aufleuchtens konnte durch eine Parallelaufnahme eingegrenzt werden auf 235446-024602UTC

Aus der Literatur:

Der am 6. April 1990 im holländischen Glanerbrug gefallene Meteorit bewegte sich offenbar auf einer Bahn, die der des Asteroiden 1981 Midas sehr ähnlich ist. Die Berechnung der Bahn beruht auf der Auswertung von mehr als 200 Reports von Augenzeugen.
(*Sky & Telescope* Oct. 1990, S. 351)

Mit dem Jahr 1991 wird das letzte Jahrzehnt des 20. Jahrhunderts eröffnet. Auch für den AKM werden sich einige Veränderungen ergeben. Diese sind allerdings organisatorischer Natur. Die Beobachtungen werden dadurch nicht erleichtert oder gar überflüssig. Mit einem verhältnismäßig kleinen Stamm von aktiven visuellen Beobachtern hat der AKM in der Liste der IMO führende Positionen "besetzt", wie man in der jüngsten Ausgabe von WGN lesen kann. Daten stellen immer die Grundlage für vorzeigbare Resultate dar! - Allen, die irgendwie am Gelingen von AKM-Aktivitäten mitgewirkt haben, ein extra Dankeschön. 1991 ist der AKM nicht nur Gastgeber für das eigene Seminar, sondern auch für die International Meteor Conference. Grund genug, mit den Aktivitäten fortzufahren. - Ein gesundes und erfolgreiches 1991!

Jürgen Rendtel André Knöfel

INTERNATIONAL METEOR CONFERENCE 1991

near Potsdam, Germany

First Circular

(December 1990)

The *International Meteor Conference 1991* will take place at the autumn equinox weekend 1991 near Potsdam, Germany. The programme includes lectures on meteors and related fields, workshops, and the *Third General Assembly of the International Meteor Organization*. Official language of the conference will be English, as usual. The preliminary time schedule: Begin on Friday, September 20, end on Monday, September 23, after lunch. (Possibly this will shift to Thursday, September 19, to Sunday, September 22.)

The registration fee is assumed to be 180 DM per person including the accomodation generally in two-bed-rooms and full board during the conference as well as the proceeedings. Special conditions of payment for participants from currency restricted countries can be arranged on request. Please, write to the organizing committee soon.

Amateur and professional meteor astronomers, who are interested in attending the IMC'91 are asked to complete and return the *preliminary registration form*. The second circular containing more detailed information about site, travel possibilities etc. will be sent in March 1991. Please, accept that we consider only registrations if you make a pre-payment of 100 DM until 30th April 1991 to Ina Rendtel, Gontardstr. 11, O-1570 Potsdam, Germany. Please, prefer International Postal Money Order! Furthermore, you may transfer the amount to the postal giro account of Ina Rendtel 5742 34-107 (code 100 100 10 of Postgiroamt in Berlin, Germany). You may also transfer the amount to the following account: 133213 at Volksbank Potsdam (bank code 1609 2134). Make sure, that we receive 100 DM (ask for transfer costs!). Otherwise we must ask you to pay these expenses. The IMC'91 will be organized by the Arbeitskreis Meteore (AKM).

Correspondence should be sent to the local organizing committee:

Arbeitskreis Meteore (AKM)
PSF 37
O-1561 Potsdam
Germany

[Rainer Arlt, André Knöfel, Ina and Jürgen Rendtel]

INTERNATIONAL
METEOR CONFERENCE 1991

near Potsdam, Germany

First Circular

PRELIMINARY REGISTRATION FORM

First Name: ____________________ Last Name: ______________________

Mailing address: ______________________________________ Age: ___ years

____

____

Phone: _________________________

How do you plan to travel? ____ by car ____ train ____ airplane

Do you intend
- * to introduce your local group
- * to give a lecture
  - topic ______________________________________
  - duration __________
- * to present a poster

Remarks, suggestions: ______________________________________

____

I sent the pre-payment on ______________ to ______________________

Date: _______________ Signature: ____________________________

Please,, return to: Arbeitskreis Meteore, PSF 37,
O-1561 Potsdam, Germany

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ASTRONOMY
AND
ASTROPHYSICS

Geminid meteoroids traced to cometary activity on Phaethon

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Summary. Opportunities for transfer of twenty Geminid meteoroids from Phaethon were found by integrating the equations of motion back in time along with Phaethon. Examination of the conditions for transfer show that the meteoroids could have been ejected under circumstances (location, speed and directions of ejection) that are possible or even expected during cometary activity. Phaethon's active period would be no more than 2000 years ago and may have been within the last 600 years. While other means of formation of the Geminid meteoroids cannot be ruled out, they are less likely based on this investigation.

Key words: comets – asteroids – meteoroids – meteor streams

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Predictions of the Meteor Radiant Point Associated with a Comet

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Abstract

Under the condition of equal heliocentric distances on the ecliptic plane, predictions of cometary meteor orbit and its radiant point are presented and discussed in terms of meteor observations. Some adjustment methods regarding the parent cometary orbit in order to fulfill the proposed conditions for the apparition of meteor streems are also presented.

Key words : Meteors; Orbital elements; Radiant points.

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METEORIC IONS IN THE CORONA AND SOLAR WIND

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ABSTRACT

The total mass of refractory material of interplanetary origin penetrating and evaporated in the "meltosphere" surrounding the Sun has been inferred from observations of meteoroids and fireballs falling in Earth's atmosphere. The amount of iron atoms deposited this way in the solar corona is of the order of 3000 t s^{-1} or larger. The measured flux of outflowing solar wind iron ions is equal to 2200 t s^{-1}. The close agreement of both fluxes is evidence that a significant fraction of iron ions observed in the solar wind and in the corona must be of meteoric origin. A similar accord is also obtained for silicon ions. The mean velocity of meteoroid ions formed in the solar corona is equal to the free-fall velocity: i.e., independent of their atomic mass as the thermal speed of heavy ion measured in low-density solar wind streams at 1 AU. Furthermore, the heavy ions of meteoric origin escape out of the corona with a larger bulk velocity than the protons which are mainly of solar origin. These differences of heavy ion and proton bulk velocities are also observed in the solar wind.

Subject headings: abundances — meteors and meteorites — Sun: corona — Sun: solar wind

Planetary Compositions – Clues from Meteorites and Asteroids

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Dedicated to Professor H. Wänke on the occasion of his 60th birthday

We review the chemical and mineralogical properties of primitive meteorites and chemical data for the Sun, Comet Halley and interplanetary dust particles. Regardless of where meteorites formed, concentrations of rock-forming elements in solar nebular solids could not have varied simply with distance from the Sun. Thus compositional differences between neighboring planets and the chemical and mineralogical diversity of chondritic asteroids may have been caused by local variations in the compositions of planetesimals, rather than transport of planetesimals over large heliocentric distances. Chemical variations were partly caused by differential transport and preferential agglomeration of various presolar and solar grains and aggregates, and the production from these aggregates of diverse types of chondrules, refractory inclusions and other chondritic components in brief, local high temperature events in the nebula. These processes were just as important in controlling solar system chemistry as effects due to changes in ambient nebular temperatures and pressures. Differences between the Fe/Si ratios of the Sun, CI chondrites, interplanetary dust particles and Comet Halley suggest that planetesimals in the outer solar system had diverse relative concentrations of rock-forming elements.

Key words: Meteorites, chondrites, asteroids, planets, comets.

THE ACTIVITY CURVE OF THE PERSEID METEOR STREAM AS DETERMINED FROM SHORT DURATION METEOR RADAR ECHOES

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ABSTRACT

The activity curve of the Perseid shower is studied based on short duration meteor radar echoes recorded 1953-78 at the Onsala Space Observatory. For short duration echoes the Perseid maximum occurs at solar longitude 139°.200 ± 0°.007 (equinox 1950). This value is identical to that previously reported for long duration echoes.

DYNAMICS AND SPATIAL SHAPE OF SHORT-PERIOD METEOROID STREAMS

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ABSTRACT. At the early stage of evolution the meteoroid streams may be considered as elliptical rings of relatively small thickness. The influence of planetary perturbations can essentially increase the stream width and its thickness. As a result one stream may produce several couples of meteor showers active in different seasons of the year. 22 short-period meteoroid streams under review may theoretically produce 104 meteor showers. The existence of 67 is confirmed by observations.

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Dissimilarities in Perseid meteoroids

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Abstract—A shutter-chopped, direct photograph of a 1980 Perseid meteor is discussed in which no shutter breaks are apparent. Evidence is considered that it is indeed a Perseid and that the phenomenon is the result of an extraordinary fragmentation of the meteoroid. Tentative evidence is presented for the existence in 1980 of a second radiant from which the apparently unchopped meteor and a second meteor, also showing marked fragmentation, emanated. The fragmentation of these two meteors and the concentration of their radiant are consonant with the concept of their origin from recently released material from the nearby parent comet.

ASTEROIDS, COMETS, METEORS III
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APOLLO ASTEROID-RELATED METEOROID STREAMS

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ABSTRACT

A recent re-analysis (*Icarus*, 75, 64-96, 1988) of the radar meteor orbits measured at Adelaide in the 1960's has shown compulsive evidence for the association of diffuse meteoroid streams with several Apollo-type asteroids, including the Taurid complex objects 2201 Oljato, 5025 P-L, 1982 TA and 1984 KB, and additionally 1937 UB (Hermes), 1566 Icarus, 2101 Adonis and 2212 Hephaistos; the association of 3200 Phaethon with the Geminid meteor shower was already well-recognized. This analysis is now being extended to the other orbits available from the IAU Meteor Data Center at the Lund Observatory, Sweden: the Adelaide orbits numbered less than 4,000 whereas there are over 60,000 additional orbits now available from surveys conducted in the U.S.S.R., U.S.A., Canada, and Ethiopia. In this paper the orbits determined in the Adelaide and Obninsk radar surveys and the Harvard radar and photographic surveys are used to investigate further the existence of streams associated with the four Taurid complex objects listed above, and additionally the link between 1566 Icarus and the Daytime Arietid shower. There is particularly strong evidence for 5025 P-L being a meteoroid parent, and the recovery of this Jupiter-crossing asteroid, with a numerical integration of its orbit then being possible, should render important clues to the origin and evolution of the Taurid complex and thus the rest of the interplanetary cloud of meteoroids and dust.

METEORE

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Beilage

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Comet P/Machholz and the Quadrantid Meteor Stream

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The calculated perturbation behaviors of comet P/Machholz 1986 VIII and of the Quadrantid meteor stream are strikingly similar except that their 4000 yr cycles are shifted by 2000 years. The orbits of the δ Aquarid and Arietid meteor streams are also consistent with this behavior at other stages in time. In addition, the ancient comet 1491-I is possibly included in this Jupiter-controlled complex.

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The accumulation rate of meteorite falls at the Earth's surface: The view from Roosevelt County, New Mexico

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Abstract—The discovery of 154 meteorite fragments within an 11 km² area of wind-excavated basins in Roosevelt County, New Mexico, permits a new calculation of the accumulation rate of meteorite falls at the Earth's surface.

Thermoluminescence dating of the coversand unit comprising the prime recovery surface suggests the maximum terrestrial age of the meteorites to be about 16.0 ka. The 68 meteorite fragments subjected to petrological analyses represent a minimum of 49 individual falls. Collection bias has largely excluded carbonaceous chondrites and achondrites, requiring the accumulation rate derived from the recovered samples to be increased by a factor of 1.25. Terrestrial weathering destroying ordinary chondrites can be modelled as a first-order decay process with an estimated half-life of 3.5 ± 1.9 ka on the semiarid American High Plains. Having accounted for the age of the recovery surface, area of field searches, pairing of finds, collection bias and weathering half-life, we calculate an accumulation rate of 9.4×10^2 falls/a per 10^6 km² for falls >10 g total mass. This figure exceeds the best-constrained previous estimate by more than an order of magnitude. One possible reason for this disparity may be the extraordinary length of the fall record preserved in the surficial geology of Roosevelt County. The high accumulation rate determined for the past 16 ka may point to the existence of periods when the meteorite fall rate was significantly greater than at present.

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With best regards,
P. Weissman

The Oort cloud

Paul R. Weissman

Although the outermost planet, Pluto, is 6×10^9 km from the Sun, the Sun's gravitational sphere of influence extends much further, out to $\sim2\times10^{13}$ km. This space is occupied by the Oort cloud, comprising 10^{12}–10^{13} cometary nuclei, formed in the primordial solar nebula. Observations and computer modelling have contributed to a detailed understanding of the structure and dynamics of the cloud, which is thought to be the source of the long-period comets and possibly comet showers.

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A Method to Determine Silicate Abundances from Reflectance Spectra with Applications to Asteroid 29 Amphitrite Associating It with Primitive Achondrite Meteorites

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Theoretical studies of spectral reflectances (0.25–2.55 μm) of olivine and pyroxene and their mixtures have been carried out to obtain better understanding of the mineral assemblages of asteroidal surfaces. A model consisting of layers of equal-sized grains is found to be sufficient for converting reflectance spectra of mineral powder into absorption coefficient spectra of the crystal. Reflectance and transmittance spectra of six samples of pyroxene and olivine were measured and converted into absorption coefficient spectra by this model. Additional parameters were experimentally determined to apply to asteroidal surfaces whose transmittance spectra cannot be measured. The absorption bands in absorption coefficient spectra obtained by this model were assigned to the transitions between *d*-electron splitting energy states of Fe^{2+} ions by crystal-field theory calculations, which employed the refined crystal structures and effective charges of pyroxenes and olivines. Because the absorption peak areas due to Fe^{2+} were found to be nearly proportional to the Fe concentration within each of orthopyroxene and olivine, Fe concentration can be estimated from absorption coefficient spectra which is obtained from reflectance spectra by this model. By combining this model and crystal-field theory calculations, a general method was formulated to deconvolve reflectance spectra of pyroxene-olivine mixtures and to estimate the Fe concentration in each mineral. This method was applied to the surface mineral assemblage of 29 Amphitrite which belongs to the S-type asteroid class. The mineral assemblage of Amphitrite can best be represented by those of primitive achondrites including lodranite, winonaite, and silicate inclusions in the IAB and IIICD irons.