

Table 7 Working list of cometary meteor showers

**Recently active meteor showers and their parent comets.** Radiant and orbital elements in equinox J2000. Dates given are for AD 2000. Shower activity is expressed with peak solar longitude  $\lambda_{\odot}^{\max}$ , full-width-half-maximum ( $W$ , in degrees,  $\lambda_{\odot}$ ) and peak rate  $ZHR^{\max}$  (per hour), whereby:  $ZHR = ZHR^{\max} (W/2)^2 / ((\lambda_{\odot} - \lambda_{\odot}^{\max})^2 + (W/2)^2)$ . The magnitude distribution index is  $\chi = N(m + 1)/N(m)$ . Sequence of mean orbit for each stream has most reliable values on top. In some cases, the original orbit (given from a mean of individual orbital elements) was made to intersect Earth's orbit. Parent body orbits are for the best corresponding theoretical orbit of a meteoroid intersecting the orbit of Earth, not to be confused with the orbit of the parent itself. Sources are given at end of Table.

Table legend:

IAU#	Code	Name	$a$ (AU)	$q$ (AU)	$i$ (°)	Dates (2000)	Peak $\lambda_{\odot}^{\max}$ (°)	Peak R.A. (°)	$\chi$	$W$ (°)	$ZHR^{\max}$	src
#	Meteors	Notes	$\omega$ (°)	Node (°)	R.A. (°)	Decl. (°)	$\Delta R.A./\Delta\lambda_{\odot}$	$\Delta Decl./\Delta\lambda_{\odot}$	$W$ (°)	$V_g$ (km/s)	src	
	Outburst	Notes	Dates (2000)	Peak $\lambda_{\odot}^{\max}$	Peak R.A.	Peak Decl.	$\chi$	$W$ (°)	$ZHR^{\max}$	$V_g$ (km/s)	src	
	(Epoch)	$a$ (AU)	$q$ (AU)	$i$ (°)	$\omega$ (°)	Node (°)	R.A. (°)	Decl. (°)	$W$ (°)	$V_g$ (km/s)	src	
Parent	Name	(Epoch)	$\lambda_{\odot}^{\max}$	<i>Tisserand parameter <math>T_J</math>, absolute magnitude <math>H_0</math> (n) or <math>H_N</math> if asteroidal in appearance</i>								
(Epoch)	$a$ (AU)	$q$ (AU)	$i$	$\omega$ (°)	Node (°)	R.A. (°)	Decl. (°)	$\Delta R.A./\Delta\lambda_{\odot}$	$\Delta Decl./\Delta\lambda_{\odot}$	$V_g$ (km/s)	$\Delta C-E$	(AU)

Code	Name	$a$	$q$	$i$	Dates (2000)	Peak $\lambda_{\odot}^{\max}$	Peak R.A.	Decl.	$\chi$	$W$	$ZHR^{\max}$	Notes
#89	PVI	January	$\pi$ -Virginids		01/10-01/21	295	Jan. 16	295	$\sim 2$	(4)	--	Apex
	$N=7$	12.6	0.396	160.6	283.0	+09	179	+09	+0.9	+0.1	64.4	SASY
	$N=22$	--	--	--	--	+10	167	+10	--	--	--	RRR
#90	JCO	Jan. Comae	Berenicids		01/19-01/23	301	Jan. 22	301	--	(1.6)	2	This work
	$N=3$	Inf.	0.512	137.3	267.8	+16.8	188.9	+16.8	+1.3	-0.3	63.9	MP
	$N=6$	Inf.	0.548	136.8	263.1	+25	175	+25	--	--	65	
Parent?	C/Lowe	(1913 I)	-- assumed to be Halley type.			$\lambda_{\odot} = 304.4$	$T_J = -0.23$	$H_{10} = --$	--	--	59.4	V13
(1913)	(30)	0.405	120.5	280.7	304.4	+21.9	187.9	+21.9	--	--	0.0045	0.0045

Table 7 (cont.)

January

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta i$	$W$ $\Delta \text{Decl.}/\Delta i$	$ZHR^{\max}$ $V_g$	Notes $\Delta_{C-E}$
#91	JZA Jan. ( $\zeta$ -)Aurigids				01/04-01/21	Jan. 13	292	--	--	(6)	--	--	Antihelion
		$N=2$	2.653	0.643	11.6	209.3	70.3	+60.1	--	--	--	12.1	This work
		$N=-$	2.341	0.923	8.7	213.4	69.9	+49.1	--	--	--	12.0	T89
		$N=22$	1.851	0.836	11.1	221.0	83.9	+58.3	--	--	--	11.9	ZS
#92	UER v-Eridanids				01/14-01/30	Jan. 16	295.6	--	--	(6)	--	--	This work
		$N=6$	1.89	0.971	12.3	17.4	69.3	-29.0	+2.12	+0.13	10.1	10.1	This work
	Parent? (2006)	2004 TB <sub>18</sub> 1.775	0.976	(Epoch 2006-03-06) 13.203	12.919	70.4	$\lambda_{\odot} = 301.1$ -34.8	$T_J = +3.89$	$H_N = +17.7$	--	--	9.89	+0.0211
#93	VEL Puppids-Velids II				11/08-02/24	Jan. 17	296	--	3.0	--	--	2.4 ± 0.4	PJ
					$= \text{Columbids} = \tau\text{-Puppids} = \text{Jan. } \pi\text{-Puppids} = \gamma\text{-Velids} = \alpha\text{-Puppids} = \delta\text{-Velids?}$								
	Visual	$N=9$	2.4	0.93	62.0	123	-48.3	+0.64	-0.19	--	33.1 ± 1.3	Mean	
		$N=3$	7.1	0.86	49.9	152.4	-65.3	--	--	--	35.3	GE (2.13)	
	Visual				43	133.4	-50.2	--	--	--	33.2	GE (2.09)	
	Visual				01/10-01/15	115.0	-30.2	--	--	--	--	M (#62)	
#94	RGE $\rho$ -Geminids				12/01-12/06	101.7	-46.6	--	--	--	--	--	M (55)
		Outburst	7 slow meteors			1993, Jan. 17	296.3	297.01	1.4	>0.05	--	>14	--
	(1993)	(2.96)	0.596	3	263	115.8	+24.9	--	--	--	23	MV	
	$N=-$	1.822	0.658	3.3	262.0	123.7	+25.5	--	--	--	18.5	T89 (8a)	
	$N=13$	2.229	0.594	6.4	266.3	109.8	+31.3	--	--	--	21.8	ZS73	
	$N=2$	1.830	0.595	9.5	268.5	127.8	+33.8	--	--	--	20.1	L71B	
	$N=6$	2.66	0.771	3.5	243.4	110.8	+28.9	1.1	-0.2	--	--	L71A	
	$N=4$	2.78	0.780	5.2	242.7	110.2	+32.2	--	--	--	20.8	SH	
	Fireballs	AD 1049-1216:			01/19-01/26	116	+27	--	--	--	--	AT (2)	

RGE – after “MV;” from radiant meteor outburst, adopted speed.



Table 7 (*cont.*)

February

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta\lambda$	$W$ $\Delta\lambda \Delta\text{Decl.}/\Delta\lambda$	$ZHR^{\max}$ $V_g$	Notes
<i>Parent</i>	<i>2003 EH<sub>1</sub></i>				<i>(Epoch 2005-01-30)</i>							
(2005)	3.126	0.979	70.782	171.369		282.952	231.0	$\lambda_{\odot} = 282.9$ $+50.0$	$T_J = +2.06$ , $H_N = +16.67$ $+0.5$	$-0.3$	40.77	0.2145
#100	XSA Daytime $\xi$ -Sagittarids			01/17-02/01			Jan. 23	304.9	-	(6)	-	
$N = 15$	1.080	0.285	1.1	46.9		304.9	283.2	-21.9	-	-	24.4	ZS
$N = 14$	1.744	0.383	4.3	66.6		296.0	284.8	-18.6	-	-	26.3	ZS
<i>February:</i>												
#101	PIH $\pi$ -Hydrids			02/01-02/13			Feb. 06	317.1	-	(5)	-	Apex
$N = 8$	32.8	0.892	162.2	36.2		137.1	210.3	-23.0	+1.3	-0.4	70.7	This work
$N = 2$	2.3	0.96	178.8	159		145.7	236.7	-20.2	-	-	67	GE (2.54)
#102	ACE $\alpha$ -Centaurids			02/02-02/19			Feb. 08	319.4	2.0	$3.4 \pm 0.6$	$7.3 \pm 1.5$	PJ
Outburst	in 1980 and possibly 1974						1980, Feb. 08	319.2	2.2	$0.011 \pm 0.004$	$>230$	PJ
(1980)												
Visual	(14)	0.977	107.0	348.9		$\lambda_{\odot} = 319.2$	210.9	-58.2	-	-	-	JW
$N = -$	Inf.	0.986	108.3	357.3		138.9	212.1	-59.4	+1.9	-0.5	58.2	PJ
$N = -$		0.973	105.0	344		140.2	209.8	-58.4	+1.9	-0.5	59.3	K88
#103	TCE Centaurids II			01/23-03/12		(146.7)	223.6	-61.3	-	-	54.2	GE
							Feb. 09	321	2.6	(19)	$\sim 3$	PJ
visual	(7.2)	0.922	131.8	31.3		$\lambda_{\odot} = 321.0$	203.8	-39.6	+0.81	+0.01	$60.2 \pm 2.3$	Mean
$N = 2$	5.0	0.87	114.7	43		150.7	217.8	-43.7	+1.1	-0.4	64.6	PJ
$N = 2$	1.7	0.92	145.4	39		146.7	202.8	-48.3	-	-	59	GE (2.45)
visual				02/10-02/13		144.7	218.8	-35.2	-	-	63	GE (2.49)
							207.5	-43.5	-	-		M (#112)

PIH – “this:” Diffuse radiant.  $q$  versus  $\Pi$  dependence.



Table 7 (cont.)

February

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta \lambda$	$W$ $\Delta \text{Decl.}/\Delta \lambda$	ZHR <sup>max</sup> $V_g$	Notes $\Delta_{C-E}$
#110	AAN $\alpha$ -Antilids <i>= <math>\alpha</math>-Hydrids</i>				01/15-02/10			Feb. 02	313.1	3.4	1.6	<2	GB
	$N = 327$	1.788	0.142	64.3	141.9		$\lambda_{\odot} = 304.7$	140.0	-10.0	-	-	-	IMO
	$\sigma$	-	$\pm 0.032$	$\pm 7.8$	$\pm 5.3$		133.1	161.9	-13.5	+0.68	-0.16	42.6	GB
	$N = 6$	-					$\pm 2.4$	$\pm 2.3$	$\pm 3.1$	$\pm 0.03$	$\pm 0.01$	$\pm 2.6$	GK
	Visual						135.9	178.3	-10.0	+0.98	-0.57	42.6	M (#85)
#111	FCM Feb. Canis Majorids				02/17-02/20			Feb. 19	330.6	-	(1.6)	-	-
	Outburst (1985)						1985, Feb. 19	330.60	330.60	(1.8)	-	>70	Ch. 13
	Inf.	0.949		21.3	23.2		$\lambda_{\odot} = 330.60$	104.3	-25.6	-	-	19.5	This work
#29	(DLE) $\delta$ -Leonids <i>= ecliptic antihelion source</i>				01/21-03/12		150.6	101.9	-28.1	-	-	1.1 $\pm$ 0.3	PJ
#112	NDL N. $\delta$ -Leonids <i>= ecliptic antihelion source</i>				01/21-03/12			Feb. 23	334.7	3.0	14 $\pm$ 6	-	-
	$N = 8$	1.954	0.612	4.8	266.4		$\lambda_{\odot} = 336$	168.0	+16.0	+0.80	-0.30	0.6 $\pm$ 0.3	PJ
	$N = 24$	2.618	0.643	6.2	259.0		331.4	155.1	+17.9	-	-	20.6	IMO
	Fireballs	AD 1043-1073:			02/19-02/23		338.8	159.7	+18.8	-	-	20.1	ZS73
	Parent? (2005)	1999 RD <sub>32</sub>			(Epoch 2005-01-30)		115	115	+23	-	-	-	L72B
		2.640	0.605	5.927	264.128		345.995	168.2	+13.8	+0.53	-0.14	22.77	AT (4)
#113	SDL S. $\delta$ -Leonids <i>= ecliptic antihelion source</i>				01/21-03/12			Feb. 23	334.7	3.0	14 $\pm$ 6	0.5 $\pm$ 0.3	PJ
	$N = -$	1.950	0.804	9.8	237.2		334.7	148.6	+18.6	-	-	17.3	This work
	$N = -$	2.182	0.729	4.3	69.0		146.4	137.7	+17.8	-	-	17.4	T89 (6c)
	$N = 37$	2.473	0.702	6.4	91.3		134.5	136.1	+07.2	-	-	20.9	ZS
#114	DXC Daytime $\gamma$ -Capricornids				01/17-02/12			Feb. 01	311.3	-	(10)	-	Helion
	$N = 5$	3.103	0.760	10.5	118.2		311.3	321.4	+06.0	-	-	18.5	ZS73
	$N = 16$	2.473	0.702	1.5	108.0		314.2	324.7	-11.2	-	-	18.5	ZS

AAN – Stream detected in AMOR radar survey with limiting magnitude +14.

#115	DCS	Daytime Capricornids–Sagittariids		01/13–02/28		Feb. 02	312.5	–	(18)	–	~7	ZS73
	N = 15	1.684	0.355	6.8	242.5	145.1	–23.3	–	–	–	26.8	GE (2.01)
	N = 3	2.08	0.36	4.5	246	144.7	–20.8	–	–	–	28.9	HV18043
	N = 1	1.5	0.28	2	234	143.7	–20.8	–	–	–	25.1	ZS
	N = 29	1.712	0.415	6.2	69.8	309.1	–14.2	–	–	–	29.4	ZS73
	N = 26	1.991	0.314	6.8	60.0	314.0	–15.3	–	–	–	–	–
	Parent? (2005)	2001 ME <sub>1</sub>	0.356	3.558	247.831	138.795	–21.2	–	–	–	29.59	0.0782
#116	DEQ	Daytime ε-Aquariids		01/15–02/13		Feb. 04	315.8	–	(12)	–	–	–
	N = 17	2.004	0.529	8.8	84.8	315.1	–6.8	–	–	–	23.1	ZS
#117	DCQ	Daytime c-Aquariids		01/29–02/28		Feb. 13	325	–	–	–	–	–
		<i>(Twin of Sep. κ-Aquariids)</i>										
	N = 11	2.3	0.82	2.1	299	144.7	–23.7	–	–	–	14.1	GE (2.18)
	Parent? (2006)	2004 NL <sub>8</sub>	0.736	4.412	293.079	135.129	–20.4	–	–	–	17.75	+0.0379

*March:*

#118	GNO	γ-Normids		02/25–03/22		Mar. 13	353	2.4	3.3 ± 0.5	5.8 ± 1.0	Apex
	Visual	(Inf.)	0.976	130.9	15.5	173.1	–51.3	+1.3	–0.1	(65.7)	PJ
	N = 6	4.6	0.98	121.6	13	178.7	–56.0	–	–	58.9	GE (3.14)
	N = 3	1.18	0.66	137.4	95.9	(179.7)	–42.7	–	–	56.8	GE (3.15)
	N = 2	3.12	0.85	145.4	49	(179.7)	–41.2	–	–	64.0	GE
	radar					176	–50.1	–	–	–	WE55
	visual				03/06–03/11		–53.1	–	–	–	M (#149)
#119	LCE	λ-Centaurids		03/17–03/21		Mar. 19	359	–	(1.6)	–	–
	N = 3	7.74	0.774	59.3	58.0	178.7	–59.5	–	–	38.4	GE (3.09)
	?Visual				03/05–03/17		–56.6	–	–	–	M (84)

GNO – Also called Coronae Australis after a transcription error in the 1935 shower list by R. MacIntosh.

Table 7 (cont.)

March

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta \lambda$	$W$ $\Delta \text{Decl.}/\Delta \lambda$	ZHR <sup>max</sup> $V_g$	Notes $\Delta_{C-E}$
#43	ZSE	$\zeta$ -Serpentids		03/20-04/01			Mar. 25	365	-.-	(4.4)	-.-	
		Possibly related to $\delta$ -Aquilids										
	$N=1$	4.771	0.985	150.0	193.1	360.1	266.3	-06.3	-.-	-.-	67.42	HV5688
	$N=1$	6.358	0.946	150.3	207.9	11.5	273.7	-06.6	-.-	-.-	67.58	HV3024
#120	DPA	$\delta$ -Pavonids		03/11-04/16			Mar. 31	11.1	2.6	$8.4 \pm 1.6$	$5 \pm 1$	PJ
		= $\beta$ -Pavonids = $\phi$ -Pavonids										
	Visual (164)	0.959	108		337	191.1	309.1	-62.8	1.4	+0.2	58	PJ
	Visual				04/13-04/15		305.2	-66.3	-.-	-.-	-.-	M (#244)
	Parent (1907)	C/1907 G <sub>1</sub> (Grigg-Mellish)	(Epoch 1907-03-28)					$\lambda_{\odot} = 10.42$	$T_J = -0.23$	$H_{10} = +9.7$	$(n = 8.4)$	
		(29.96)	0.928	110.057	328.756	190.417	309.0	-60.4	-.-	-.-	58.72	0.0039
	Parent? (1742)	C/1742 C <sub>1</sub>	(Epoch 1742-02-09)					$\lambda_{\odot} = 7.71$	$T_J = -0.25$	$H_{10} = -.-$		
		(29.96)	0.907	112.596	324.587	187.710	305.8	-58.9	-.-	-.-	59.50	0.1636
#121	NHY	$\nu$ -Hydrids		03/01-03/06			Mar. 02	343.1	-.-	(2.0)	-.-	Antihelion
	$N=2$	1.622	0.626	12.5	88.4	163.1	159.1	-12.2	-.-	-.-	19.7	This work
	$N=-.-$	2.521	0.718	9.6	70.8	184.6	158.6	-11.3	-.-	-.-	19.3	T89 (18)
	$N=29$	2.138	0.618	0.5	84.7	163.0	162.0	+06.8	-.-	-.-	20.9	ZS
	$N=3$	12.5	0.75	7.3	62	178.7	159.6	-05.3	-.-	-.-	20.1	GE (3.02)
	Parent? (2005)	1999 RM <sub>45</sub>	(Epoch 2005-01-30)					$\lambda_{\odot} = 340.88$	$T_J = +3.95$	$H_N = +19.33$		
		1.681	0.598	10.881	90.716	160.888	158.4	-08.1	-.-	-.-	20.57	0.0071
#122	APX	$\alpha$ -Pyxidids		03/06-03/06			Mar. 05	345.9	-.-	-.-	-.-	
	Outburst (1979)	Tim Cooper						<345.91	2.2	<0.015	>50	PJ
	?Visual	(Inf.)	0.852	30.1	44.1	166.1	135.5	-35.2	-.-	-.-	25.9	Ch. 13
					03/07-03/14		175.2	-42.6	-.-	-.-	-.-	M (#82)
#50	(VIR)	March Virginids		02/18-04/25			Mar. 14	354	3.0	$\sim 22$	$4.5 \pm 0.7$	IMO/PJ

NHY – “this:” two video meteors from DMS database (+3.5 and +5.0<sup>m</sup>). Intrinsically faint comet. Association uncertain.  
 VIR – This includes the March  $\eta$ -Virginids.

#123	NVI	N. March Virginids	02/18-04/25	Mar. 14	354	3.0	~22	2.2 ± 0.7	IMO/PJ	
	<i>N</i> = --	= <i>antihelion</i> source								
			3.7	174.3	+08.7	+0.9	+0.4	(23.0)	GK	
	<i>N</i> = 18		0.728	353.5					ZS73	
			0.496	358.0	+02.3	--	--	23.0		
	Parent?	1998 SJ-70	(Epoch 2005-01-30)	$\lambda_{\odot} = 368.09$	$T_J = +3.25$ , $H_N = +18.33$					
	(2005)	2.234	0.657	7.157	260.045	8.232	188.0	+08.6	20.51	0.0341
#124	SVI	S. March Virginids	02/18-04/25	Mar. 14	354	3.0	~22	2.3 ± 0.7	IMO/PJ	
	<i>N</i> = --	= <i>antihelion</i> source = <i>southern Virginids</i>								
			3.8	158.3	+05.0	--	--	(22.9)	GK	
	<i>N</i> = 13		0.606	160.4					ZS73	
			0.565	182.0	-08.5	--	--	22.9		
	<i>N</i> = 5		0.64	175.7	+02.7	--	--	20	KL (1)	
#11	EVI	$\eta$ -Virginids	03/03-03/23	Mar. 14	354	3.0	(8)	<1.5	PJ	
		= Southern Virginids								
	Outburst?									
	(1953)	2.19	0.387	2.0	1953 Mar. 12-13	$\lambda_{\odot} = 352.4$			MP	
	<i>N</i> = 7	2.562	0.382	0.8	172.4	181.6	+1.00	-0.37	Ch. 28	
				3.5	280.5	182.1	+02.6	-0.37	This work	
	<i>N</i> = 3	4.336	0.424	4.0	352.4	180.7	+03.6	--	PG	
				5.6	335.9	168.7	+10.7	--	T89 (14N)	
	<i>N</i> = --	2.324	0.394	3.5	334.5	174.3	+04.7	+0.31	L71B	
				3.5	308.0	185.6	-02.3	--	L71B	
	<i>N</i> = 3	2.027	0.431	0.3	357.1	185.6	+00.9	--	KL (2)	
				5.7	296.9	188.8	+00.9	--	NL (61.3.3)	
	<i>N</i> = 9	1.94	0.36	2.9	304.3	188.8	-04.1	--	MP	
				2.9	355.2	181.6	-00.3	--	ZS	
	<i>N</i> = 3	2.38	0.26	1.0	291.0	352.8	181.6	-00.3	ZS73	
				6.4	310.6	356.0	196.6	-01.5	ZS73	
	<i>N</i> = --	2.52	0.42	6.4	299.7	345.5	183.3	+06.8	ZS73	
				9.8	315.7	360.2	202.6	-03.8	ZS73	
	<i>N</i> = 63	1.196	0.288	8	121.8	184.4	198.1	-07.7	ZS73	
				8	285.8	355.1	183.6	+03.7	W57	
	<i>N</i> = 9	1.869	0.325	5.2	284	354.7	182.6	+03.7	W54	
				6	109.4	160.8	170.6	+03.7	T89 (14Q)	
	<i>N</i> = 24	1.329	0.222	0.3	93.4	161.5	162.3	-02.3	T89 (14S)	
				9.1	178.0	188.3	-05.3	--	T89 (19Q)	
	<i>N</i> = 23	1.815	0.312	3.4	105.4	175.2	-11.3	--	T89 (19S)	
				12.3						
	<i>N</i> = 3	2.82	0.403	12.3						
	<i>N</i> = --	4.00	0.42							
	<i>N</i> = --	2.578	0.384							
	<i>N</i> = --	4.312	0.498							
	<i>N</i> = --	2.197	0.359							
	<i>N</i> = --	4.126	0.397							

Table 7 (cont.)

March

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak	$\lambda_{\odot}^{\max}$	$\chi$	$W$	ZHR <sup>max</sup>	Notes
								R.A.	Decl.	$\Delta R.A./\Delta\lambda$	$\Delta\text{Decl.}/\Delta\lambda$	$V_g$	$\Delta_{C-E}$
N=2	2.93	0.41	1	105	177.7	183.6	-03.3	27.8	GE (3,17)				
N=-	2.70	0.45	2	102	170.7	176.6	-00.3	29	JW				
Parent?	<i>(Epoch 2005-07-14)</i>												
(1766)	2.665	0.406	2.419	106.503	148.300	157.4	+7.1	28.61	0.1290				
(2004)	2.658	0.362	0.187	111.648	153.774	165.3	+6.1	30.01	0.0192				
(2047)	2.618	0.327	0.076	115.777	150.814	164.1	+6.1	31.07	0.0051				
#38	CUR	$\xi$ -Ursae Majorids											
N=3	2.899	0.803	12.6	03/18-04/03	358.0	Mar. 19	358.0	-	-	(6)			
N=1	3.780	0.810	12.6	238.5	358.0	175.4	+30.1	18.9	This work				
N=1	2.908	0.783	11.5	240.4	358.4	172.4	+30.3	18.88	HV6915				
N=1	2.553	0.804	19.3	238.4	360.2	175.4	+26.1	18.59	HV6971				
N=1	2.721	0.793	9.4	240.0	360.2	187.4	+36.9	19.42	HV7040				
#290	(ALL)	$\alpha$ -Leonids											
#39	NAL	N. $\alpha$ -Leonids											
N=3	2.016	0.907	6.9	02/25-03/25	349	Mar. 07	349	-	-	(11)			
N=23	1.978	0.878	5.8	43.3	173.9	158.7	+31.0	11.1	This work				
N=10	1.691	0.814	8.5	226.0	343.9	146.6	+31.3	12.3	ZS				
N=-	2.721	0.793	9.4	241.8	350.2	167.2	+28.0	13.9	ZS				
N=1	2.638	0.912	7.0	240.0	2.7	176.3	+22.7	-	GK				
N=1	2.835	0.971	5.7	218.2	2.5	160.2	+30.2	13.00	HV3076				
N=19	1.119	0.853	2.4	201.9	12.1	151.7	+33.6	10.68	HV10394				
Fireballs	AD 1071-1188:												
#125	SAL	S. $\alpha$ -Leonids											
N=5	2.016	0.907	6.9	03/22-03/30	359	Mar. 19	359	-	-	(11)			
N=-	2.313	0.904	10.5	221.8	358.8	141.8	-07.0	11.9	This work				
Visual	03/13-03/23												
#126	SGE	March $\delta$ -Geminids											
N=2	1.66	0.94	2.1	40.3	168.0	131.6	-12.2	13.2	T89 (16)				
N=1	2.054	0.996	0.7	03/22-04/15	361	Mar. 21	361	-	-	(10)			
Fireballs	AD 1062-1188:												
N=1	2.054	0.996	0.7	32.8	152.9	114.5	+12.2	8.0	This work				
Fireballs	AD 1062-1188:												
N=1	2.054	0.996	0.7	182.9	1.4	104.4	+28.1	4.9	IAU#332F1				
Fireballs	AD 1062-1188:												
N=1	2.054	0.996	0.7	112.7	-	112.7	+20.9	-	AT (1)				

#45	PDR	$\varphi$ -Draconids	03/11-04/17	Mar. 28	368	-	(15)	-	This work			
			$N=4$	3.020	0.995	36.3	1793	8.3	267.1	+69.4	22.9	
			$N=-$	2.770	0.996	37.5	171.1	14.4	281.0	+68.1	26.7	CL
			$N=-$	2.248	0.978	26.5	164.7	356.1	318.1	+72.2	17.3	T89 (15)
			$N=40$	2.156	0.988	33.0	169.0	06.5	285.4	+69.8	20.2	ZS
			$N=14$	1.173	0.972	30.9	166.3	12.2	291.5	+71.4	19.1	ZS73
#127	MCA	Mar. Cassiopeids	02/11-04/10	Mar. 08	350	-	(23)	-	This work			
			$N=5$	2.40	0.931	14.8	146.5	345.2	352.8	+52.3	14.5	
			$N=4$	2.322	0.930	15.2	146.3	350.5	360.2	+50.9	13.4	PG
			$N=-$	2.567	0.934	14.3	148.8	349.7	4.7	+48.3	13.6	T89 (17)
			$N=7$	1.7	0.18	1.8	42	359.7	338.7	-7.7	33.2	GE (3.01)
			$N=3$	2.13	0.30	2.5	59.7	354.4	340.2	-7.3	29.8	NL (61.3.2)
#129	QPE	Daytime $\eta$ -Pegasis	03/11-03/16	Mar. 14	354	-	(2)	-	This work			
			$N=5$	2.94	0.88	9.7	101.3	354.5	352.3	+12.9	21.7	NL (61.3.1)
			Parent	2005 EM <sub>169</sub>	(Epoch 2005-03-13)	$\lambda_{\odot} = 31.48$	$T_J = +347.54$	$T_J = +2.81$	$H_N = +24.67$	$\lambda_{\odot} = 31.48$	$T_J = +347.54$	$T_J = +2.81$
#130	DME	$\delta$ -Mensids	03/13-03/21	Mar. 17	356.7	-	(3.2)	-	IMO			
			Visual	(3.2)	0.982	56.1	345.6	177.1	58	-80	33	This work
			Parent	2.845	0.755	10.925	115.757	347.537	351.4	+19.0	18.37	-0.0022
<i>April:</i>												
#131	DAL	$\delta$ -Aquilids	04/10-04/16	Apr. 13	23	-	-	-	Apex			
			$N=2$	75	0.722	146.6	116.1	23.0	310.6	-00.2	66.2	This work
			visual	(Epoch 1984-10-14)	04/13-04/22	269.7	-10.0	B1900	$T_J = < -0.77$	$H_{10} = -$	$P$ unknown	
			Parent?	C/1984 S <sub>1</sub> (Meier)	$\lambda_{\odot} = 14.20$	$T_J = < -0.77$	$H_{10} = -$	$P$ unknown	$\lambda_{\odot} = 14.20$	$T_J = < -0.77$	$H_{10} = -$	$P$ unknown
			(1984)	Inf.	0.828	146.308	130.984	14.198	298.0	-2.2	67.40	0.0459
			#6	LYR	April Lyrids	04/16-04/25	Apr. 22	32.4	2.9	2.74±0.13	12.8±0.7	PJ
(1982)	0.006	32.085				2.9	0.018±	250	0.006			
(1945)	32.053	1.4				-	>97					
(1922)	≤32.006	>2.7	~0.017	≥800								

Table 7 (cont.)

April

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta \lambda$	$W$ $\Delta \lambda \Delta \text{Decl.}/\Delta \lambda V_g$	ZHR <sup>max</sup> $V_g$	Notes
(1803)												$\sim 860$	
$N = -$	45.7	0.921	79.6	214.3	31.8	272.0	31.950	-	-	-	-	46.6	DMS
$N = -$	31.61	0.918	79.61	214.53	32.439	271.6	+33.3	-	-	-	-	46.5	AW
dispersion ( $\sigma$ )	-	$\pm 0.013$	$\pm 1.1$	$\pm 2.6$	$\pm 1.0$	-	-	-	-	-	-	-	-
$N = 4$	Inf.	0.928	80.3	212.0	32.6	272.7	+33.7	-	-	-	-	47.6	PG
$N = 7$	56.0	0.918	79.5	214.5	32.2	271.9	+33.3	-	-	+1.23	+0.17	47.07	KP
$N = 5$	28	0.919	79.0	214.3	32.5	271.9	+33.6	-	-	+1.1	+0.0	47.6	AC
$N = 5$	25.812	0.879	78.6	217.2	32.3	271.5	+34.0	-	-	-	-	45.6	JW
Parent	$C/1861 G_1$ (Thatcher)									$T_J = +0.30, H_{10} = +5.5$ ( $n=4.0$ ), $P=415.5$ yr			
(1861)	55.682	0.9225	79.776	213.484	31.860	271.9	+33.5	-	-	-	-	47.08	0.002
#132	BPA	$\beta$ -Pavonids			03/11-04/16	Apr. 07	17.2	-	-	-	(14)	-	IMO
Visual	Inf.	0.992	108.8	349.2	$\lambda_{\odot} = 17.2$ 197.7	308.0	-63.0	-	-	+1.40	+0.20	59	This work
#46	BCR	$\beta$ -Craterids			04/01-04/06	Apr. 03	13.5	-	-	-	(2)	-	Antihelion
$N = 1$	2.716	0.678	17.6	75.6	191.7	176.8	-26.9	-	-	-	-	22.6	HV10365
$N = 1$	2.804	0.734	16.5	68.1	196.6	176.5	-28.3	-	-	-	-	21.0	HV10478
#27	KSE	$\kappa$ -Serpentids			04/01-04/07	Apr. 05	15.7	-	-	-	(3)	<4	AC
$N = -$	Inf.	0.45	65	275	15.7	230.6	+17.8	-	-	-	-	45	AC
$N = 1$	41.7	0.417	63.0	279.9	16.5	232.6	+15.4	-	-	-	-	45.01	HV10098
#49	LVI	$\lambda$ -Virginitids			03/03-04/24	Apr. 10	20	-	-	-	(21)	-	-
		= extension of $\eta$ -Virginitids?											
$N = -$	2.188	0.257	8.8	306.1	24.5	218.7	-16.2	-	-	-	-	32.2	T89 (23)
$N = -$	2.630	0.343	2.0	295.0	20.2	210.7	-10.2	-	-	-	-	26.8	L71B
$N = -$	2.374	0.426	4.6	106.0	201.7	205.7	-16.3	-	-	-	-	27.0	T89 (24)
$N = 12$	1.731	0.344	14.1	298.7	17.7	214.0	-01.3	-	-	-	-	28.6	Z73



Table 7 (cont.)

April

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta \lambda$	$W$ $\Delta \text{Decl.}/\Delta \lambda$	$ZHR^{\max}$ $V_g$	Notes $\Delta_{C-E}$
#21	<b>AVB</b> $\alpha$ -Virgins <i>= ecliptic antihelion source meteors</i>				<b>03/22-04/26</b>		<b>Apr. 18</b>	<b>28</b>	-	$\sim 8.6$	$\sim 5$	RRK
	$N =$	2.58	0.688	240.4	21.7	185.4	+09.6	-	-	-	16.8	SH
	$N =$	19	0.753	247.5	28.9	195.6	-05.3	-	-	-	16.6	L71B
	$N =$	21	0.812	239.7	31.8	195.6	+00.7	-	-	-	-	L71A
	Parent?	1998 SH <sub>2</sub>		(Epoch 1998-09-21)			$\lambda_{\odot} = 28.95$	$T_J = +2.93$	$H_N = +20.81$			PW'04
	(1998)	2.703	0.760	2.401	245.257	28.946	-01.9	-	-	-	18.05	0.0110
#137	<b>PPU</b> $\pi$ -Puppids				<b>04/15-04/28</b>		<b>Apr. 22</b>	<b>33.6</b>	2.0	(5)	<1	PJ
	Outbursts (see Tab. 6e)											
	Visual	2.97	1.00	359	33.640	110.4	-45.1	-	+0.40	-0.10	15	PJ
	Parent	26P/Grigg-Skjellerup		(Epoch 1977-04-07)			$\lambda_{\odot} = 33.354$	$T_J = +2.81$	$H_{10} = +11.7$			
	(1977)	2.999	1.006	359.311	213.354	109.8	-45.0	+0.46	+0.12		15.10	+0.0122
	(2002)	2.736	1.005	1.624	211.740	110.8	-48.5	-	-	-	15.46	+0.1127
	(2044)	2.779	1.005	2.243	211.470	111.5	-48.5	-	-	-	15.54	+0.0881
#138	<b>ABO</b> $\alpha$ -Bootids				<b>04/14-05/12</b>		<b>Apr. 28</b>	<b>36.7</b>	-	-	-	-
	Outburst	Telescopic					<b>1984 Apr. 28</b>	<b>38.168</b>	$\geq 4$	0.016	High rate	
	(1984)	(155)	0.775	237.4	38.168	214.4	+19.3	-	-	-	(24.65)	Ch. 13
	$N =$	5	0.839	232.5	22.1	193.1	+22.9	-	-	-	16.7	PG
	$N =$	8	0.753	246.9	36.9	218.6	+18.8	+0.7	+0.2		20	L72B
	$N =$	2	0.73	252.7	23.3	210.7	+21.0	-	-	-	22.9	SH
	?Fireballs	AD 1023-1099:		04/10-04/16		234	+30	-	-	-	-	AT (13)
#47	<b>DLI</b> $\mu$ -Virgins				<b>04/01-05/12</b>		<b>Apr. 28</b>	<b>39 <math>\pm</math> 2</b>	3.0	14 $\pm$ 3	1.1 $\pm$ 0.5	PJ
	$N =$	3	0.418	286.5	38.3	226.8	-08.7	-	-	-	28.3	PG
	$N =$	7	0.477	280.0	35.7	221.7	-05.2	+0.50	-0.19		26.8	L71B
#139	<b>GLI</b> $\gamma$ -Librids				<b>03/24-05/07</b>		<b>Apr. 28</b>	<b>39 <math>\pm</math> 2</b>	3.0	14 $\pm$ 3	1.1 $\pm$ 0.5	PJ
	$N =$	38	0.926	326.7	15.9	223.9	-12.8	-	-	-	26.0	ZS
	$N =$	17	1.570	113.7	225.5	234.1	-19.7	-	-	-	24.7	ZS73



Table 7 (cont.)

May

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$	Decl.	$\chi$	$W$	ZHR <sup>max</sup>	Notes
$N=11$	29.8	0.612	165.5	101.5	45.79	338.02	-01.75	+0.888	+0.456	-	-	-	L	
$N=9$	5.536	0.587	164.6	96.7	47.8	339.0	-00.9	-	-	65.0	-	-	ZS73	
$N=51$	3.34	0.54	161	90	47.7	338.6	+00.8	-	-	63	-	-	KL (17)	
$N=1$	13.0	0.560	163.5	95.2	43.1	336.8	-01.3	-	-	65.5	-	-	JW	
$N=-$	6.140	0.541	165.4	91.4	45.5	339.1	-01.5	-	-	64.8	-	-	G	
Parent	1P/Halley													
(1986)	17.940	0.587	162.687	98.605	46.211	338.2	-0.3	-	-	65.93	-	-	0.0658	
#145	<b>ELY</b>	<b><math>\eta</math>-Lyrids</b>												
$N=12$	6.03	0.995	79.4	190.0	45.7	292.5	+39.7	-	(2)	3 $\pm$ 1	-	-	3 $\pm$ 1	
$N=5$	Inf.	0.998	75.3	193.0	50.3	290.8	+42.7	-	-	45.3	-	-	KO	
$\sigma$	$\pm 0.042$	$\pm 0.002$	$\pm 1.4$	$\pm 1.0$	$\pm 1.0$	$\pm 1.0$	$\pm 0.8$	-	-	$\pm 0.8$	-	-	$\pm 0.8$	
?Fireballs	AD 1049-1070:					292.3	+56.1	-	-	-	-	-	AT (15)	
Parent	C/1983 H <sub>1</sub> (IRAS-Araki-Alcock)													
(1983)	98.098	0.997	73.252	192.852	49.102	288.0	+44.0	-	-	43.77	-	-	0.0058	
#146	<b>CAU</b>	<b><math>\beta</math>-Coronae Australids</b>												
Visual	(12.1)	0.221	121.7	125.3	234.7	285.1	-39.9	+1.10	+0.00	56.4	-	-	IMO	
Visual				04/28-05/05		285.7	-36.9	-	-	-	-	-	M (#208)	
#147	<b>PAQ</b>	<b><math>\phi</math>-Aquirids</b>												
$N=-$	2.78	0.56	174.1	270.4	239.7	350.9	-3.5	-	-	64	-	-	NL (5.12)	
#148	<b>MLV</b>	<b>May (<math>\lambda</math>-)Virgids</b>												
$N=-$	3.232	0.547	13.3	90.5	223.4	217.7	-31.2	-	(2)	25.6	-	-	T89 (28S)	
$N=-$	6.705	0.686	3.5	72.0	225.2	210.7	-18.2	-	-	25	-	-	L71B	
$N=-$	2.157	0.482	1.3	101.4	224.3	227.7	-19.2	-	-	24.6	-	-	T89 (28Q)	
#55	<b>ASC</b>	<b><math>\alpha</math>-Scorpiids</b>												
$N=3$	2.640	0.330	9.8	116.5	236.8	247.0	-28.8	2.5	4.9 $\pm$ 1.1	3.2 $\pm$ 0.4	+0.73	-0.07	PG	
$N=-$	2.469	0.324	8.9	117.7	233.1	243.8	-28.1	-	-	30.6	-	-	T89 (31)	

N = 2	2.235	0.212	3.5	132.0	230.2	247.8	-24.1	-	-	33	L71B
N = 22	1.502	0.264	3.5	130.0	237.8	255.1	-25.2	-	-	29.0	ZS
N = 29	1.458	0.243	0.6	132.9	232.5	251.1	-22.7	-	-	29.4	ZS73
N = 3	2.097	0.189	2.3	136.7	217.0	238.7	-21.1	-	-	32.1	L71B
N = 5	2.15	0.21	3	134	222.7	240.7	-22.1	+0.50	-0.19	35	AC
N = 30	1.464	0.283	13.5	308.3	58.4	257.1	-13.2	-	-	28.7	ZS
N = 27	1.707	0.282	7.4	306.2	56.9	253.2	-17.3	-	-	29.7	ZS73
N = 4	2.33	0.26	6.0	305.9	61.4	255.9	-19.2	-	-	32.5	NL (61.5.10)
N = 3	2.170	0.133	10.0	322.0	44.7	247.7	-18.1	-	-	36.3	L71B
Fireballs	AD 988-1068:			05/25-06/01		240.7	-20.1	-	-	-	AT (18)
Parent?	2004 BZ <sub>74</sub>	(Epoch 2006-03-06)					$\lambda_{\odot} = 59.36$	$T_J = +2.37$	$H_N = +18.39$		
(2006)	3.048	0.330	16.506	115.415	239.509	249.3	-34.0	-	-	32.19	0.0289
#292	(OPH)	May Ophiuchids									
#149	NOP	N. May Ophiuchids		04/25-05/31	May 13	49.7			(14)	-	-
		= ecliptic antihelion source									
#150	SOP	S. May Ophiuchids		04/25-05/31	May 20	56.7	-14.0	+0.90	-0.10	27.8	IMO
		= ecliptic antihelion source							(14)	-	-
#151	EAU	$\varepsilon$ -Aquilids		05/09-05/22	May 20	59	-24.0	+1.00	+0.00	27.8	IMO
N = 17	0.873	0.354	59.6	318.3	59.5	284.9	+15.6	-	(5)	-	-
N = 30	0.89	0.65	67	309	48.7	291.5	+29.1	-	-	30.8	ZS
N = 16	0.78	0.41	68	327	55.7	293.5	+22.1	-	-	32.1	KL (9)
										31	KL (15)
											<b>Helion</b>
#293	(DCE)	Daytime $\omega$ -Cetids									
#152	NOC	N. Daytime $\omega$ -Cetids		04/24-05/27	May 07	46.7			(12)	<2	
		= $\varepsilon$ -Arietids									
N = 86	1.27	0.10	27	28	32.7	356	+08.3	-	-	35.3	KL (3)
N = 16	0.967	0.108	42.0	25.6	47.8	2.3	+17.8	-	-	33.0	ZS
N = 18	1.412	0.147	29.1	35.9	48.0	12.8	+19.3	-	-	34.1	ZS
N = 17	1.64	0.11	30	32	52.7	17.7	+19.3	-	-	37.4	KL (13)
N = 3	1.01	0.08	15.5	22.8	62.1	24.4	+11.8	-	-	32.8	NL (61.5.13)
N = 10	2.44	0.17	10.2	42.6	64.4	37.7	+20.0	1.7	-	35.8	NL (61.5.3)

Table 7 (cont.)

May

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta \lambda$	$W$ $\Delta \text{Decl.}/\Delta \lambda$	$ZHR^{\max}$ $V_g$	Notes
Parent? (2003)	$C/2003 Q_1$ (SOHO) (1.64)	0.032	29.33	52.38	(Epoch 2003-08-21)	43.43	17.5	$\lambda_{\odot} = 43.4$ +20.5	$T_J = (+3.37)$	$H_{10} = -$	42.31	0.165
<b>#153</b>	<b>OCE</b>	<b>S. Daytime <math>\omega</math>-Cetids</b>										
$N = 970$	1.583	0.133	37.1	214.9	05/05-06/09	225.0	May 07	46.7	$-$	$12 \pm 2$	$\sim 8$	Ch. 23
$\sigma$	$-$	$\pm 0.035$	$\pm 7.5$	$\pm 6.0$		$\pm 7.9$	$\pm 3.3$	$\pm 2.1$	$\pm 0.80$	$\pm 0.01$	36.5	GB
$N = 11$	1.623	0.122	32.6	213.9		228.6	22.5	$-03.6$	$-$	$-$	36.6	ZS
$N = 11$	1.055	0.066	36.3	200.2		246.8	29.7	+01.5	$-$	$-$	34.6	ZS73
$N = 3$	1.41	0.13	33.8	212.5		245.6	36.1	+01.2	$-$	$-$	35.7	NL (61.5.8)
radar	1.3	0.11	34	211		238.7	29.6	$-03.5$	$-$	$-$	36.7	L54
<b>#154</b>	<b>DEA</b>	<b>Daytime <math>\varepsilon</math>-Arietids</b>										
	<i>= ecliptic helion source</i>											
$N = 25$	2.026	0.592	2.8	90.0		48.1	44.7	+21.2	$-$	$-$	20.6	ZS
$N = 6$	2.08	0.60	2.7	89.5		63.0	59.5	+23.8	+1.2	$-$	21.0	NL (61.5.5)
Parent? (2005)	$2002 SY_{50}$ (1.706)	0.530	8.291	80.484	(Epoch 2005-08-18)	53.030	42.1	$\lambda_{\odot} = 53.05$ +27.5	$T_J = +3.87$	$H_N = +17.57$	21.48	0.0481
<b>#294</b>	<b>(DMA)</b>	<b>Daytime May Arietids</b>										
<b>#155</b>	<b>NMA</b>	<b>N. Daytime May Arietids</b>										
	<i>= Daytime May Piscids, part of Taurid complex, twin of SOA</i>											
$N = 56$	1.532	0.33	3.4	60.8	05/04-06/06	55.0	May 16	55	$-$	(13)	<4	
$N = 11$	1.56	0.39	2.9	64.8		62.8	47.2	+19.3	+1.0	$-$	25.2	ZS
$N = 16$	1.94	0.44	6	74		54.7	41.7	+23.2	$-$	$-$	24.4	NL (61.5.2)
Parent?? (2003)	$2003 QC_{10}$ (1.376)	0.369	2.469	59.722	(Epoch 2003-08-27)	60.960	43.4	$\lambda_{\odot} = 60.96$ +19.1	$T_J = +4.48$	$H_N = +17.83$	23.98	0.0773
<b>#156</b>	<b>SMA</b>	<b>S. Daytime May Arietids</b>										
	<i>= part of Taurids complex, twin of NOA</i>											
$N = 43$	1.68	0.27	5	233	05/04-05/27	232.7	May 16	55	$-$	$-$	<2	
$N = 6$	3.23	0.35	12.5	243.7		242.6	48.5	+08.3	+1.9	-1.2	28.9	KL (11)
$N = 9$	1.39	0.22	16.7	224.1		244.7	41.3	+05.8	+1.4	$-$	31.8	NL (61.5.9)
											30.1	NL (61.5.6)



Table 7 (cont.)

June

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta\lambda$	$W$ $\Delta\text{Decl.}/\Delta\lambda$	ZHR <sup>max</sup> $V_g$	Notes $\Delta_{C-E}$
$N=11$	3.11	0.68	6	257	74.7	247.7	-13.1	+0.9	+0.5	21	AC	
$N=11$	3.112	0.679	6.0	256.7	74.6	246.7	-12.1	-	-	20.1	L71B	
$N=4$	2.63	0.755	3.3	249.1	70.5	238.7	-14.1	-	-	21	L71A	
Fireballs	AD 1037-1102:			06/07-06/19		260.7	-11.0	-	-		AT (21)	
Parent?	1996 JG	(Epoch 2005-01-30)										
(2005)	1.802	0.611	5.200	269.733	63.370	242.5	-13.2	-	-	20.0	0.0164	
<b>#161</b>	<b>SSC</b>	<b>S. <math>\omega</math>-Scorpiids</b>		<b>05/23-06/15</b>	<b>June 01</b>		<b>70</b>	-	(9)	$\sim 5$	<b>GK</b>	
		= $\theta$ -Librids		06/01-06/10	251.5		-22.2				<b>M (163)</b>	
$N=-$	2.852	0.693	1.7	74.7	250.0	243.7	-22.1	+0.90	-0.10	23.0	<b>GK</b>	
Fireballs	AD 995-1076:			06/14-06/19		246.8	-26.1	-	-	<2	<b>AT (18)</b>	
<b>#61</b>	<b>TAH</b>	<b><math>\tau</math>-Herculids</b>		<b>05/19-06/14</b>	<b>June 03</b>		<b>72</b>	-	(11)			
Outbursts	(see Tab. 6g)											
$N=14$	2.695	0.970	18.6	204.2	72.6	228.5	+39.8	+0.9	-0.1	15	L71B	
$N=8$	2.90	0.986	20.7	203.6	80.8	236.4	+40.8	-	-		L71A	
Parent	73P/Schwassmann-Wachmann 3	(Epoch 1930-07-03)										
1930 VI	3.081	1.006	17.384	192.021	78.024	219.7	+44.6	-	-	13.79	0.0056	
(2022)	3.092	0.983	11.296	202.176	67.023	210.0	+27.4	-	-	12.36	0.0139	
(2027)	3.060	0.921	6.276	218.183	48.681	200.4	+10.2	-	-	13.50	0.0068	
(2049)	3.039	0.899	6.329	222.453	44.645	200.0	+09.3	-	-	14.25	0.0134	
<b>#162</b>	<b>ACI</b>	<b><math>\alpha</math>-Circinids</b>		<b>06/04-06/04</b>	<b>June 04</b>		<b>73.9</b>	-	-	-		
Outburst	Belinda Bridge											
(1977)	(100)	0.855	33.4	46.8	253.92	1977 June 04	74.02	-	0.008	>100	<b>PJ</b>	
<b>#163</b>	<b>(SAG)</b>	<b><math>\mu</math>-Sagittariids</b>		<b>04/21-07/12</b>	<b>June 28</b>		<b>97</b>	-	-	(27.1)	<b>Ch. 13</b>	
		= Ophiuchids, ecliptic antihelion source						2.8	$\sim 16$	(2.3)	<b>PJ</b>	
<b>#67</b>	<b>NSA</b>	<b>N. <math>\mu</math>-Sagittariids</b>		<b>05/26-07/10</b>	<b>June 09</b>		<b>78.0</b>	2.8	12	1.5	<b>RK</b>	
		= $\theta$ -Ophiuchids, ecliptic antihelion source						+0.73	+0.07	22.9	<b>PG</b>	
$N=-$	2.390	0.566	4.5	271.2	91.7	271.9	-17.3	-	-			

$N=28$	2.224	0.503	0.3	279.3	86.2	270.3	-23.1	-	-	24.3	ZS
$N=-$	2.415	0.544	3.2	274.8	87.5	270.7	-20.0	-	-	23.4	T89 (33)
$N=30$	1.858	0.665	1.5	263.3	99.4	275.5	-20.9	-	-	18.3	ZS
Parent?? (1770)	<i>(Epoch 1770-08-14)</i>										
	3.15	0.674	1.325	256.400	103.095	275.6	$\lambda_{\odot}=101.1$ -21.3	$T_J=+2.61$	$H_0=-$	20.94	0.0143
<b>#69</b>	<b>SSG</b>	<b>S. <math>\mu</math>-Sagittariids</b>									
	= $\theta$ -Ophiuchids, ecliptic antihelion source										
$N=-$	2.142	0.650	2.6	84.3	279.4	276.4	-27.5	+0.73	+0.07	19.6	PG
$N=4$	2.33	0.52	1.0	97	260.7	262.8	-25.0	-	-	23.5	GE (6.01)
$N=4$	2.90	0.460	4.2	101.4	263.0	267.8	-28.0	-	-	26.7	CL
$N=31$	1.908	0.384	2.5	113.8	271.1	283.3	-25.1	-	-	26.8	ZS
$N=11$	1.981	0.430	3.9	108.4	280.2	290.8	-26.0	-	-	25.6	ZS
$N=6$	2.797	0.405	4.7	108.0	258.7	266.8	-28.0	-	-	28	L71B
$N=3$	2.08	0.52	5.0	97.0	266.0	268.0	-27.7	-	-	23.3	NL (61.6.9)
Fireballs	AD 1080-1098:										
Visual	06/22-07/17										
Visual	06/28-07/05										
Visual	06/08-06/15										
<b>#295</b>	<b>(JAQ) June Aquilids</b>										
<b>#164</b>	<b>NZC</b>	<b>N. June Aquilids</b>									
$N=19$	1.364	0.150	45.0	06/09-07/02	81.7	292.7	-04.9	-	(9)	3	JVF
$N=35$	1.348	0.114	39.3	325.0	86.5	298.3	-07.1	-	-	37.0	ZS
$N=11$	1.143	0.152	43.1	329.5	99.7	311.1	+0.7	-	-	36.3	ZS
$N=13$	1.5	0.15	39.5	326.7	80.7	290.4	-05.8	-	-	33.8	ZS
$N=2$	1.8	0.18	37.9	324.0	78.7	285.7	-05.9	-	-	36.3	GE (6.09)
$N=4$	1.61	0.11	40.1	318	85.0	294.6	-08.3	-	-	36.3	GE (6.33)
Visual	328.9										
Visual	06/10-06/19										
<b>#165</b>	<b>SZC</b>	<b>S. June Aquilids</b>									
	= alpha Microscopiids										
$N=4$	1.15	0.11	33.5	06/09-06/12	152	259.7	-33.9	-	(1.2)	1.43	GK
<b>#166</b>	<b>JLY</b>	<b>June Lyrids</b>									
	= $\xi$ -Draconids										
Outburst (1966)				196/11-06/21	85.167	297.8	-33.9	-	-	33.2	GE (6.08)
(1996)	(100)	0.994	52.2	06/11-06/21	85.167	280.3	+30.0	2.7	23	3.1	MK
				1996 June 15	85.167	278.5	+55.0	2.7	0.017	17	M96
				$\lambda_{\odot} \sim 85.12$	85.167	280.3	-	-	-	-	Ch. 13
				85.167	280.3	-	-	-	-	(33.4)	Ch. 13

Table 7 (cont.)

June

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak	$\lambda_{\odot}^{\max}$	$\chi$	$W$	$ZHR^{\max}$	Notes
								R.A.	Decl.	$\Delta R.A./\Delta\lambda$	$\Delta\text{Decl.}/\Delta\lambda$	$V_g$	$\Delta_{C-E}$
(1966)			0.84	50	231		84.5	278.4	+35.0	--	--	(31)	AC
$N=11$		2.054	0.912	45.3	224.1		86.2	281.9	+43.8	--	--	27.1	ZS
$N=-:-$		3.58	0.98	50	201		64	276.3	+52.0	--	--	32.4	T68
$N=-:-$		Inf.	0.98	56	202		76	275.3	+50.0	--	--	39.3	T68
<b>#296</b>	<i>(SIS)</i>												
<b>#167</b>	<b><math>\sigma</math>-Sagittariids</b>												
	<b>N. <math>\sigma</math>-Sagittariids</b>					<b>06/01-07/28</b>		<b>June 24</b>	<b>92.3</b>	--	(23)	--	
	= $\rho$ -Sagittariids												
$N=45$		1.133	0.332	8.2	309.4		92.3	293.1	-14.0	--	--	23.2	ZS
$N=4$		1.72	0.38	4.5	296.6		86.6	278.4	-20.0	1.3	--	26.5	NL (61.6.6)
$N=18$		1.970	0.386	3.9	293.3		73.1	263.5	-19.8	--	--	27.1	ZS73
$N=4$		2.811	0.430	13.0	284.2		86.5	275.4	-11.0	--	--	28	L71B
<i>Parent?</i>	<i>2001 ME<sub>1</sub></i>					<i>(Epoch 2005-01-30)</i>			$\lambda_{\odot}=93.13$	$T_J=+2.67$	$H_N=+16.81$		
(2005)	2.651		0.356	5.748	293.601		93.132	284.6	-18.1	--	--	29.70	+0.011
<b>#168</b>	<b>SSS</b>					<b>06/01-07/28</b>		<b>June 18</b>	<b>87</b>	--	(23)	--	
	= $\gamma$ -Sagittariids												
$N=29$		2.594	0.361	2.8	113.6		267.4	278.6	-25.3	--	--	29.3	ZS73
$N=2$		2.2	0.26	5.8	127		260.7	278.8	-27.0	--	--	31	GE (6.22)
$N=3$		3.33	0.33	4.1	113.7		265.7	276.0	-24.5	--	--	31.1	NL (61.6.10)
Fireballs	AD 1038-1078:				05/25-05/31			273.7	-28.0	--	--	--	AT (17)
<b>#169</b>	<b>SCU</b>					<b>06/07-07/22</b>		<b>June 27</b>	<b>94.9</b>	--	(18)	--	
	<b>Scutids</b>												
$N=32$		1.361	0.599	13.7	278.8		95.6	281.7	+00.9	--	--	18.9	ZS
$N=9$		1.367	0.615	10.3	276.8		93.4	277.4	-06.4	--	--	17.5	ZS73
$N=2$		2.126	0.606	15.5	268.5		97.7	279.3	-02.0	--	--	18.9	L71B
<b>#63</b>	<b>COR</b>					<b>06/04-06/30</b>		<b>June 26</b>	<b>94.9</b>	--	--	--	
Outburst	seen by C. Hoffmeister						1937, June		$\lambda_{\odot}=94.9$	1.9	(10)	13	H48
(1937)	(3.0)		1.013	3.1	7.7		274.9	192.6	-19.4	--	--	--	H48
$N=-:-$		3.00	1.014	2.9	7.1		275.0	191.4	-18.2	--	--	9.10	KP

visual	2.5-10	1.012	3.5	7.7	274.9	192.6	-19.4	-	-	10 ± 2	AC
(1953)	2.90	0.99	0.0	201	82.7	206	-09	-	-	10.0	HV7862
?Fireballs	AD 1079-1111:			06/20-06/21		214	-14	-	-		AT (22)
Parent?	2004 HW			(Epoch 2006-03-06)			$\lambda_{\odot} = 77.41$	$T_J = +3.04$	$H_N = +17.13$		
(2006)	2.689	0.977	0.666	25.406	257.290	205.0	-13.0	-	-	10.23	0.0088
<b>#170</b>	<b>JBO</b>	<b>June Bootids</b>		<b>06/26-06/30</b>		<b>June 28</b>	<b>96.3</b>	-	(1.6)	<1	
		Outbursts (see Tab. 6b)									
(1998)	3.3	1.016	18.4	183.65	96.046	222.88	+47.90	-	-	14.1	EN270698
Error	±0.3	±0.000	±0.4	±0.07	±0.000	±0.16	±0.06	-	-	±0.4	
(1998)	-	-	-	-	96.30	219.0	+49.0	+0.60	-0.40	13.9	TOM
(1995)	3.157	1.016	26.7	182.1	92.633	237.6	+59.5	-	-	17.8	JN950624
N = -	2.140	1.004	18.4	194.2	75.8	229.4	+49.8	-	-	12.8	T89 (34)
N = 54	2.479	1.000	21.7	168.0	91.2	208.9	+65.7	-	-	15.1	ZS
(1952)	2.89	1.01	21	189	83.7	227.4	+50.8	-	-	14.8	HV4106
Parent	7P/Pons-Winnecke			(Epoch 1915-09-20)			$\lambda_{\odot} = 100.52$	$T_J = +2.67$	$H_{10} = +7.2$	(var.)	
(1915)	3.261	1.013	18.305	172.414	100.518	208.9	+53.0	-	-	14.24	-0.0419
(1995)	3.435	1.013	22.301	172.648	93.098	214.0	+61.1	-	-	16.05	0.2422
(2039)	3.359	1.016	17.194	177.484	89.230	207.6	+51.8	-	-	13.62	0.0339
<b>#171</b>	<b>ARI</b>	<b>Daytime Arietids</b>		<b>05/22-07/02</b>		<b>June 07</b>	<b>76.7</b>	2.7	6.6 ± 2.0	54 ± 12	<b>Helton</b>
N = 1	2.581	0.064	36.963	25.376	(80.411)	44.9	+25.7	-	-	42.1	PJ
N = 48	1.376	0.085	25.0	25.9	77.6	40.2	+23.8	-	-	35.7	U
N = 55	1.750	0.094	27.9	29.5	78.7	43.7	+25.9	-	-	37.6	ZS
N = 32	2.0	0.08	17.4	28	81.7	49.7	+23.2	-	-	39.4	ZS73
N = 380	1.67	0.10	18.7	29.9	77.3	44.0	+23.1	-	-	36.9	GE (6.05)
N = 7	2.27	0.05	38.9	20.3	85.3	47.3	+25.2	+1.5	-	42.8	KL (14)
N = 8	1.49	0.06	33.4	23.0	85.5	46.8	+26.3	-	-	38.8	NL (61.6.1)
(1951)	1.61	0.090	21	29	77.5	44.1	+24.1	+0.70	+0.60	37	NL (61.6.2)
(1950)	1.49	0.10	18	29	77.7	44.5	+22.1	-	-	36	L54
Parent	Marsden-group of Sun skirrers	(Epoch 2004)					$\lambda_{\odot} = 81.5$	$T_J \sim +1.8$	$H_{10} > +1.8$		
(2004)	Inf.	0.0480	26.800	23.240	81.460	49.3	+23.2	-	-	45.68	0.006
(2004)	3.33	0.0483	26.800	23.240	81.460	47.8	+23.5	-	-	43.03	0.000

Table 7 (cont.)

June

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak	$\lambda_{\odot}^{\max}$	$\chi$	$W$	ZHR <sup>max</sup>	Notes
								R.A.	Decl.	$\Delta R.A./\Delta\lambda$	$\Delta\text{Decl.}/\Delta\lambda$	$V_g$	$\Delta_{C-E}$
<b>#172</b>	<b>ZPE</b>				<b>05/20–07/05</b>			<b>June 09</b>	<b>78.6</b>	<b>2.7</b>	<b>(18)</b>	<b>~20</b>	
		<i>= part of Taurid complex, twin of STA</i>											
$N=1$	1.283	0.2860	5.506	50.012	(80.414)	58.3	+24.7	–	–	–	–	26.2	U
$N=56$	1.492	0.365	6.5	60.5	81.5	64.5	+27.5	–	–	–	–	25.1	ZS
$N=73$	1.918	0.319	5.3	59.2	78.3	61.1	+24.9	–	–	–	–	29.3	ZS73
$N=6$	1.72	0.30	7.1	69	81.7	65.8	+27.1	–	–	–	–	27.8	GE (D.01)
$N=27$	1.72	0.31	4.8	56	71.7	51.7	+22.2	–	–	–	–	27.8	NL
$N=57$	1.74	0.33	3.2	59	73.7	55.7	+21.2	–	–	–	–	26.8	BF66
$N=60$	1.55	0.31	5.7	57.0	71.3	52.2	+23.1	–	–	–	–	27.6	KL (12)
$N=9$	1.67	0.30	5.7	55.4	84.5	65.0	+25.5	–	–	–	–	28.4	NL (61.6.3)
$N=--$	2.33	0.35	8.0	61	77.0	63.8	+27.1	+1.1	+0.4	+0.4	+0.4	28.8	L54
Parent?	2P/Encke			(Epoch 1974-04-23)									
(1974)	2.217	0.338	5.793	62.907	98.539	85.6	+28.0	–	–	–	–	29.18	0.1778
<b>#173</b>	<b>BTA</b>			<b>06/05–07/17</b>		<b>June 28</b>	<b>96.7</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>(17)</b>	<b>~10</b>	
		<i>= part of Taurid complex, twin of NTA</i>											
$N=41$	1.653	0.274	0.3	52.3	102.7	84.9	+23.5	–	–	–	–	29.0	ZS
$N=57$	1.853	0.325	2.2	239.2	275.2	80.2	+21.4	–	–	–	–	28.2	ZS73
$N=--$	2.2	0.34	6	246	276.4	86.7	+19.0	+0.8	+0.4	+0.4	+0.4	30	AC
$N=2$	1.7	0.31	4.8	237	261.7	65.7	+18.1	–	–	–	–	27.8	GE (6.21)
$N=7$	2.17	0.46	3.7	255.1	264.9	76.2	+20.4	+1.0	+0.8	+0.8	+0.8	25.5	NL (61.6.5)
$N=--$	2.2	0.34	6	224	278.1	87.3	+19.3	+0.8	+0.4	+0.4	+0.4	31.4	L54
Parent	2004 TG <sub>10</sub>			(Epoch 2006-03-06)									
(2006)	2.242	0.315	1.291	240.428	281.864	88.4	+22.5	–	–	–	–	29.90	0.0614
<b>#174</b>	<b>TAS</b>			<b>06/09–07/25</b>		<b>June 27</b>	<b>96.0</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>(18)</b>	<b>–</b>	
		<i>= ecliptic helion source</i>											
$N=--$	1.317	0.631	4.4	83.6	96.0	93.3	+31.3	–	–	–	–	15.8	ZS

July:

#175	JPE	July Pegasus	07/07-07/13	July 09	107.5	3.0	3.5	2.7	Apex
	Visual	0.536	267.2	340.0	+15.0	+0.6	+0.2	61.3	IMO
	N = 1	Inf.	243	339	+17	-	-	75.3	PJ
	Parent??	C/1979 Y <sub>1</sub> (Bradfield)	(Epoch 1980-01-24)		$\lambda_{\odot} = +108.61$	$T_J = \sim 0.66$	$H_0 = +11.8$	$(n = 4.9)$	P = 291 yr
	(1980)	45.017	0.565	146.367	263.932	108.611	346.5	+11.2	-
#176	PHE	July ( $\gamma$ -)Phoenicids	06/24-07/18	July 12	110.3	3.0	2.5 $\pm$ 0.5	4.0 $\pm$ 1.9	PJ
	N = --	2.5-Inf.	82-87	31.6	-47.7	+1.04	+0.53	47 $\pm$ 3	WE60
#177	BCA	$\beta$ -Cassiopeids	07/03-08/19	July 30	126.6	3.43	5.0	10	D00
	N = 6	18.194	0.995	89.1	192.1	125.5	353.5	+59.1	+1.04
	N = 12					125.2	335.5	+53.3	-
#178	JCE	July Centaurids	07/01-07/07	July 05	103.3	-	(2.4)	-	Antihelion
	Outburst	07:45-09:00 UT Sydney, 50 short swift, none next hr			$\lambda_{\odot} = 103.282$	-	<0.030	>40	
	(1896)	(Inf.)	0.967	6.3	25.4	283.6	$\sim$ 225	-35	PJ
	N = --	4.170	0.944	4.9	32.8	276.9	233.7	-10.2	T89 (35)
	Parent??	1997 OK <sub>1</sub> (Epoch 2005-01-30)							
	(2005)	2.797	1.006	2.830	13.255	296.436	221.9	-28.5	-
#179	SCA	$\sigma$ -Capricornids	06/18-07/30	July 12	110	-	(17)	-	-
	N = --	1.726	0.491	3.9	284.5	112.9	302.7	-15.9	T89
	N = 40	1.310	0.272	4.5	311.2	110.2	311.1	-14.5	ZS
	N = 35	1.782	0.431	2.1	290.3	107.6	298.7	-18.7	ZS73
	N = 5	2.86	0.37	3.9	289.8	117.8	307.6	-15.2	NL (61.7.8)
	N = 3	1.56	0.23	6.9	312.5	126.0	326.9	-12.1	NL (61.7.11)
#180	MSE	$\mu$ -Serpentids	07/03-07/31	July 16	114	-	(11)	-	-
	N = --	1.879	0.994	4.1	-	-	240.0	+11.0	J92
	N = --	2.447	0.992	3.3	197.3	115.0	232.7	-4.2	T89 (37)
#181	KPA	$\kappa$ -Pavonids	07/17-07/17	July 17	114.8	-	-	-	-
	Outburst			1986:	114.827	2.2	0.027	$\sim$ 60	PJ
	(1986)	(34.2)	0.865	25.6	45.7	294.83	282.1	-68.0	PJ
	(1986)	(3.2)	0.874	21.3	48.1	294.80	282.3	-66.9	PJ

Table 7 (cont.)

July

Code	Name	$q$	$i$	Dates (2000)	Peak	$\lambda_{\odot}^{\max}$	$\chi$	$W$	ZHR <sup>max</sup>	Notes
	$a$			$\omega$	R.A.	Decl.	$\Delta R.A./\Delta \lambda$	$\Delta \text{Decl.}/\Delta \lambda$	$V_g$	$\Delta_{C-E}$
#88	ODR	<i>o</i> -Draconids		07/06-07/24	July 17	115.5	-	(7)	-	
	$N=3$	3.52	1.01	190	279.7	+61.8	-	-	28.6	CL
	$N=14$	4.329	1.006	192.2	285.0	+61.3	-	-	28.5	ZS
#182	OCY	<i>o</i> -Cygnids		07/17-07/22	July 19	117.2 ± 0.5	2.7	4.9 ± 1.2	2.5 ± 0.8	PJ
	Visual	= $\psi$ -Cygnids $\neq$ $\alpha$ -Cygnids			304	+48	-	-	-	PJ
	Photo				304.5	+49.7	-	-	39.4	BK65
	$N=1$	4.57	0.97	206	306	+55	-	-	35.5	HV8018
#1	CAP	$\alpha$ -Capricornids		07/19-08/18	July 30	127 ± 1	2.2 ± 0.3	15.1 ± 2.6	2.0	PJ
	$N=36$	2.618	0.602	266.67	306.6	-08.2	+0.54	+0.25	22.2	IMO
	$\sigma$	±0.44	±0.037	±4.4	±2.6	±1.5	±0.02	±0.02	±1.5	This work
	$N=269$	2.155	0.550	273.3	306.7	-09.3	+0.91	+0.25	23.4	GB
	$\sigma$	±0.40	±0.036	±5.3	±2.7	±1.3	±0.02	±0.01	±1.7	
	$N=-$	2.540	0.594	267.6	303.4	-10.6	+0.75	+0.28	22.2	H02
	$N=15$	2.283	0.626	266.2	315.9	-08.7	-	-	20.6	PG
	$N=-$	2.038	0.544	275.9	306.4	-09.9	-	-	22.5	G
	$N=-$	2.636	0.580	268.0	314.7	-08.8	-	-	23.0	JVF
	$N=44$	1.920	0.620	267.9	315.9	-07.1	-	-	19.7	ZS
	$N=28$	1.850	0.630	267.2	327.1	-11.7	-	-	18.8	ZS73
	$N=18$	2.524	0.592	267.9	305.4	-09.6	-	-	25.0	L71B
	$N=21$	2.565	0.590	269.0	308.4	-09.6	+0.9	+0.3	22.8	AC
	Parent	169 P/NEAT	(= 2002 EX <sub>12</sub> )	(Epoch 2005-09-18)		$\lambda_{\odot} = 128.78$	$T_J = +2.89$	$H_N = +26.49$		
	(2005)	2.603	0.605	265.952	306.6	-08.4	-	-	22.21	0.1434
#183	PAU	Piscis Austrinids		07/09-08/17	July 27	123.7 ± 0.7	3.2	2.4 ± 0.5	2.9 ± 0.8	PJ
	$N=32$	4.31	0.17	114	340.7	-25.7	+0.90	+0.40	40.5	KL (32)
	radar				331.7	-17.8	+1.5	-0.3	-	WE60
	radar			304	328.7	-26.8	-	-	-	ER55
	Visual			07/26-08/08	338.4	-32.5	-	-	-	M (#290)
	Visual			07/14-07/22	331.9	-29.5	-	-	-	M (#274)



Table 7 (cont.)

August

Code	Name	$q$	$i$	Dates (2000)	Peak	$\lambda_{\odot}^{\max}$	$\chi$	$W$	ZHR <sup>max</sup>	Notes
$a$				$\omega$	R.A.	Decl.	$\Delta R.A./\Delta \lambda$	$\Delta \text{Decl.}/\Delta \lambda$	$V_g$	$\Delta_{C-E}$
#185	DBA	D. ( $\beta$ -)Andromedids		07/01–07/03	July 02	100.5	–	(2)	–	<b>Helion</b>
$N=13$	0.599	0.139	59.4	8.9	15.0	+37.5	–	–	26.0	ZS
Parent?		96P/Machholz (Epoch 2002-07-25)				$\lambda_{\odot} = 94.61$	$T_J = +1.94$	$H_{10} = +12.5$	(var.)	
(2002)	0.731	0.057	60.181	14.584	37.7	+30.3	–	–	33.25	0.3434
#186	EUM	$\epsilon$ -Ursae Majorids		07/1–07/15	July 08	106	–	(6)	–	
$N=--$	2.994	0.980	20.0	156.3	192.5	+61.7	–	–	15.2	T89 (36)
#187	PCA	$\psi$ -Cassiopeids		07/15–07/19	July 17	114.8	–	(2)	–	
$N=25$	2.418	0.821	72.1	121.2	389.4	+71.5	–	–	40.3	ZS
$N=23$	3.65	0.87	71	133	381.0	+75.3	–	–	40.5	KL (25)
$N=41$	1.72	0.87	77	126	373.8	+66.3	–	–	40.5	KL (23)
$N=23$	1.09	0.90	83	107	360.6	+56.3	–	–	39.4	KL (31)
Parent		1973 NA		(Epoch 2006-03-06)		$\lambda_{\odot} = 101.09$	$T_J = +2.53$	$H_N = +15.30$		
(2006)	2.434	0.825	67.674	121.797	12.2	+69.0	–	–	38.40	0.0854
#188	XRI	Daytime $\xi$ -Orionids		07/04–07/29	July 20	117.7	–	–	44.0	NL (61.7.5)
$N=3$	8.33	0.08	32.8	211.6	94.4	+15.0	–	–	38.4	KL (22)
$N=23$	5.18	0.18	16	228	98.7	+16.0	–	(10)	–	
#189	DMC	Daytime $\mu$ -Cancerids		07/03–08/11	July 30	126.0	–	(16)	–	
		= <i>helion source</i>								
$N=43$	1.720	0.443	2.1	71.0	122.7	+22.4	–	–	24.3	ZS
$N=5$	2.50	0.25	5.1	53.2	108.4	+24.8	+1.0	–	31.1	NL (61.7.6)
<i>August:</i>										
#190	BPE	$\beta$ -Perseids		08/07–08/08	Aug. 08	135.4	–	–	–	<b>Apex</b>
	Outburst	High rate of faint meteors			1935 Aug. 08	135.558	>4	0.011	High	PJ
(1935)	(35.6)	0.863	142.7	134.3	52.8	+40.2	–	–	(66.2)	Ch. 13
$N=1$	4.96	1.002	168.86	143.23	46.5	+44.8	–	–	63.8	DMS

<b>#191</b>	<b>ERI</b>	<b><math>\eta</math>-Eridanids</b>	<b>08/03-08/14</b>	<b>Aug. 10</b>	<b>137.5</b>	<b>(4)</b>	<b>&lt;6</b>
<i>N</i> = --	20.26	0.961	130.4	26.6	317.490	45.0	-12.9
<i>Parent?</i> (1852)	<i>C/1852 K<sub>1</sub> (Chacornac)</i> (Epoch 1852-04-20)	0.910	131.097	37.367	319.380	42.9	-12.6
<b>#192</b>	<b>TRI</b>	<b>Aug. Triangulids</b>	<b>08/05-08/14</b>	<b>Aug. 12</b>	<b>139.8</b>	<b>(4)</b>	<b>--</b>
<i>N</i> = 7	1.062	0.886	150.0	264.7	139.8	37.5	+30.7
<i>N</i> = 18	1.45	0.67	152	92	132.7	53.8	+33.2
<i>N</i> = 15	1.52	0.98	141	173	137.7	38.8	+37.2
Possibly related to #190 (BPE)							
<b>#7</b>	<b>PER</b>	<b>Perseids</b>	<b>07/17-08/24</b>	<b>Aug. 13</b>	<b>140.19</b>	<b>2.5</b>	<b>3.01 ± 0.16</b>
Outbursts (see Tab. 5c)							
<i>N</i> = 87	71.4	0.953	113.22	151.3	140.19	48.33	+57.96
$\sigma$ (intrinsic) > 50		±0.009	±1.5	±2.3	±3.3	--	--
<i>N</i> = --	24.0	0.949	113.0	150.4	139.7	46.8	+57.7
<i>N</i> = 193	62.50	0.948	113.1	151.3	138.0	45.3	+57.7
<i>N</i> = --	25.366	0.963	112.8	154.5	135.6	38.9	+56.2
<i>N</i> = 8	8.04	0.960	110.2	152.5	140.5	46.2	+59.4
<i>N</i> = 10	11.0	0.95	113.1	150.9	137.2	41.9	+56.8
<i>N</i> = 20	22.527	0.934	113.2	147.9	139.5	46.9	+57.2
<i>N</i> = --	22.53	0.934	113.2	147.9	139.4	47.0	+58.2
<i>Parent</i> (1995)	<i>109P/Swift-Tuttle</i> (Epoch 1995-10-10)	0.959	113.454	152.989	139.384	45.8	+57.7
<b>#193</b>	<b>ZAR</b>	<b><math>\zeta</math>-Arietids</b>	<b>08/13-08/25</b>	<b>Aug. 19</b>	<b>146</b>	<b>--</b>	<b>--</b>
<i>N</i> = 2	17.903	0.973	172.6	19.5	326.7	49.7	+14.2
Visual					$\lambda_{\odot}$ = 146.9	04.6	+09.3
Fireballs	AD 1063-1077:		08/07-08/15		45	+15	
<i>Parent?</i> (1862)	<i>C/1862 N<sub>1</sub> (Schmidt-Tempel)</i> (Epoch 1862-07-04)	0.956	172.109	27.166	328.437	49.5	+13.6
<b>#194</b>	<b>UCE</b>	<b><math>\nu</math>-Cetids</b>	<b>08/15-08/22</b>	<b>Aug. 19</b>	<b>146</b>	<b>--</b>	<b>--</b>
<i>N</i> = --	2.560	0.640	144.0	82.0	325.7	38.6	-2.8
							61.0

Table 7 (cont.)

August

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$	$\chi$	$W$	$\Delta R.A./\Delta \lambda$	$\Delta \text{Decl.}/\Delta \lambda$	$V_g$	ZHR <sup>max</sup>	Notes
#195	<b>BIN</b>	<b><math>\beta</math>-Indids</b>			<b>08/20-09/22?</b>			<b>Aug. 31</b>	<b>157.3</b>	-	-	-	-	-	-	
$N = --$	2.205	0.907	14.9	43.1	345.7			342.8	-51.7	-	-	-	-	14.1		T89 (44S)
Parent (1993)	C/1991 L <sub>3</sub> (Levy)					(Epoch 1993-02-22)			$\lambda_{\odot} = 157.69$	$T_J = +1.52$	$H_{10} = +8.0$	$(n=4)$	$P = 51.3$ yr			$+0.0789$
	13.853	0.932	18.161	32.743	337.692			320.2	-60.6	-	-	-	-	18.30		
#196	<b>NPH</b>	<b><math>\nu</math>-Phoenicids</b>			<b>07/16-08/14</b>			<b>Aug. 03</b>	<b>129.7</b>	-	(12)	-	-	-	-	<b>Antihelion</b>
$N = --$	(3.23)	0.674	74.0	76.1	311.8			20.0	-43.0	-	-	-	-	44.0		IMO
Parent? (1951)	1951 C <sub>1</sub> (Padijusakova)					(Epoch 1951-01-30)			$\lambda_{\odot} = 131.22$	$T_J < +0.25$	$H_{10} = --$	-	-			This work
	Inf.	0.693	87.897	68.602	311.220			21.9	-38.5	-	-	-	-	50.19		0.0321
#298	<b>(IAQ)</b>	<b><math>t</math>-Aquiriids</b>			<b>08/11-08/25</b>			<b>Aug. 20</b>	<b>147.70</b>	3.2	33	+0.90	-	~2.1		IMO
#33	<b>NIA</b>	<b>Northern <math>t</math>-Aquiriids</b>						328.0	-04.7	-	-	-	-	27.6		DMS
$N = --$	2.419	0.358	7.4	297.4	145.1			326.9	-09.3	-	-	-	-	34.4		PG
$N = 3$	3.580	0.238	5.7	306.7	129.5			343.1	-03.4	-	-	-	-	24.5		ZS
$N = 65$	1.045	0.249	4.4	319.1	138.0			350.2	+00.5	-	-	-	-	26.1		ZS
$N = 54$	1.356	0.302	5.2	307.4	153.1			344.1	+1.1	-	-	-	-	25.1		(NL61.8,2)
$N = 5$	1.20	0.30	7.9	310.4	146.7			328.4	-05.6	+1.03	+1.13	-	-	31.2		AC
$N = --$	1.625	0.260	5.0	308.0	147.7			355.2	+01.6	-	-	-	-	28.9		L71B
$N = 3$	1.918	0.326	4.0	299.7	162.1			352.7	-00.7	-	-	-	-	33.1		ZS73
$N = 29$	1.366	0.242	3.2	313.5	152.2			321.4	-08.0	-	-	-	-	32.9		KL (28)
$N = 13$	1.92	0.20	12.0	313.4	120.3			338	+06	-	-	-	-	1.5 ± 0.3		AT (39)
Fireball	AD 1062-1164:				08/28-09/02			<b>Aug. 04</b>	<b>131.7 ± 1.0</b>	3.3	9 ± 2	-	-	2.9		PJ
#3	<b>SIA</b>	<b>Southern <math>t</math>-Aquiriids</b>			<b>07/15-08/25</b>			<b>132 ± 2</b>	<b>1.7 ± 0.2</b>	26	-	-	-	34.8		IMO
$N = --$	2.676	0.190	8.6	137.5	306.9			339.0	-15.6	-	-	-	-	35.0		DMS
$N = 4$	3.547	0.266	0.0	121.5	304.7			321.4	-14.6	-	-	-	-	31.5		L71B
$N = 13$	2.12	0.26	7.6	125.9	307.3			328.5	-17.6	-	-	-	-	33.8		KL (27)
$N = --$	2.364	0.208	6.9	131.8	311.7			334.7	-14.2	+1.07	+0.18	-	-			AC

N = 4	1.98	0.232	1.2	133.5	301.8	324.5	-14.4	-	-	33.8	SH
N = -	2.24	0.214	4.6	131.5	305.7	327.6	-15.9	-	-	33.2	J
<b>#73</b>	<b>ZDR</b>	<b>ζ-Draconids</b>		<b>08/06-08/23</b>	<b>Aug. 14</b>	<b>141</b>			(7)	-	
		= θ-Herculids									
N = -	3.4	1.17	17	179	141.4	323.9	+52.2	-	-	18	BA
N = 2	3.113	1.005	16.7	194.3	135.7	260.5	+30.0	-	-	14	L71B
N = -	2.518	0.957	23.2	-	-	260.7	+40.3	-	-	16.9	J92
N = 17	1.414	0.880	27.1	238.8	140.4	303.6	+42.9	-	-	17.0	ZS
N = 3	2.38	0.986	18.2	200.7	140.3	269.5	+34.7	-	-	17.2	SH
<i>Parent</i>	<i>6P/d'Arrest</i>		<i>(Epoch 1851-07-17)</i>				$\lambda_{\odot} = 150.46$	$T_J = +2.70$	$H_{10} = +6.0$		
(1851)	2.960	1.009	13.907	174.546	150.463	239.1	+30.8	-	-	12.01	0.1625
(1970)	2.941	1.013	16.670	178.845	142.095	242.1	+37.6	-	-	13.03	0.1537
<b>#197</b>	<b>AUD</b>	<b>Aug. Draconids</b>		<b>08/11-08/17</b>	<b>Aug. 15</b>	<b>142</b>			(3)	-	
N = 54	1.515	1.007	30.4	185.6	141.9	272.5	+65.1	-	-	17.3	ZS
N = 60	2.776	1.010	38.5	183.1	141.5	271.3	+65.3	-	-	23.6	ZS
N = 2	2.820	1.015	33.0	183.5	150.2	269.2	+59.0	-	-	21.2	L71B
<b>#198</b>	<b>BHY</b>	<b>β-Hydrusids</b>		<b>08/17-08/17</b>	<b>Aug. 17</b>	<b>143.8</b>			-	-	
		Outburst			1985 Aug. 17	143.794		2.1	0.021	80 ± 20	PJ
									± 0.004		
(1985)	(32.7)	0.963	38.9	25.6	323.8	33.2	-75.1	-	-	(27.0)	PJ
(1985)	(3.25)	0.966	35.0	27.3	323.8	36.3	-74.5	-	-	(22.8)	PJ
<b>#199</b>	<b>ADC</b>	<b>Aug. (δ-)Capricornids</b>		<b>08/13-08/31</b>	<b>Aug. 19</b>	<b>146</b>			(7)	-	
		= λ-Capricornids									
N = 6	2.414	0.597	2.8	87.3	327.0	328.7	-16.0	-	-	21.6	PG
N = -	2.138	0.672	1.8	256.8	147.3	324.7	-13.8	-	-	22.0	T89 (43)
<i>Parent</i>	<i>45P/Honda-Mrkos-Pajutásáková</i>		<i>(Epoch 2001-06-20)</i>				$\lambda_{\odot} = 141.71^{\circ}$	$T_J = +2.58$	$H_{10} = +14.0$		
(2001)	3.021	0.528	0.355	93.406	321.710	325.5	-14.3	-	-	24.69	0.0599

BHY – The correct name is “Hydrids” from Latin possessive “Hydri” (constellation Hydrus = water snake), but that is confused with “Hydrids” from Latin possessive “Hydrae” of the constellation Hydra (= water serpent). I have adopted the common name.

Table 7 (cont.)

August

Code	Name	$q$	$i$	Dates (2000)	Peak	$\lambda_{\odot}^{\max}$	$\chi$	$W$	ZHR <sup>max</sup>	Notes				
	$a$			$\omega$	R.A.	Decl.	$\Delta R.A./\Delta \lambda$	$\Delta \text{Decl.}/\Delta \lambda$	$V_g$	$\Delta_{C-E}$				
#12	<b>KCG</b>	<b><math>\kappa</math>-Cygnids</b>												
				08/03-08/31	Aug. 20	$145.2 \pm 0.8$	2.2	$8.8 \pm 0.7$	$2.3 \pm 0.4$	PJ				
				$\lambda_{\odot} = 145.0$	286	+59	+0.30	+0.10	24.8	IMO				
	1993:	5.12	35.9	201.4	284.0	+52.7	-	-	24.0	DMS				
	$N=4$	$\pm 1.22$	$\pm 1.2$	$\pm 1.5$	$\pm 0.8$	$\pm 1.7$	-	-	$\pm 1.1$					
	1993:	4.10	34.7	206.2	287.1	+49.5	-	-	23.4	DMS				
	$N=5$	$\pm 0.57$	$\pm 1.3$	$\pm 0.9$	$\pm 0.5$	$\pm 0.8$	-	-	$\pm 0.9$					
	$N=32$	3.19	32.6	197.4	276.9	+53.6	-	-	21.4	DMS				
	$\sigma$	$\pm 0.91$	$\pm 3.7$	$\pm 7.6$	$\pm 5.9$	$\pm 6.8$	-	-	$\pm 2.0$					
	$N=13$	3.513	33.0	197.7	278.4	+52.3	-	-	21.7	PG				
	$N=8$	2.583	42.9	203.1	299.1	+63.2	-	-	25.9	ZS73				
	$N=3$	3.437	29.7	207.7	282.4	+42.1	-	-	20.1	L71B				
	$N=8$	3.09	38	194	286.2	+59.1	+0.0	+0.0	24.8	AC				
	Fireballs	AD 1059-1098:												
#200	<b>ESE</b>	<b><math>\eta</math>-Serpentids</b>												
				07/25-09/13	306.5	+40.2	-	-	-	AT (26+38)				
				07/06-10/19	Aug. 24	151	-	(39)	-					
					<i>= <math>\lambda</math>-Aquilids</i>									
	$N=22$	1.795	4.5	213.2	287.7	-03.7	-	-	8.6	PG				
	$N=-$	1.792	5.2	209.5	277.7	-04.0	-	-	9.8	T89 (38)				
	$N=-$	2.294	0.898	39.7	322.4	-12.6	-	-	11.8	T89 (44Q)				
	Parent?	$\lambda_{\odot} = 149.69 T_J = +3.01, H_N = +19.55$												
	(2005)	2.682	0.905	222.591	297.8	-11.7	-	-	12.60	0.00437				
#201	<b>GDO</b>	<b><math>\gamma</math>-Doradids</b>												
	Visual	(28.8)	0.970	65.6	61.2	-50.2	+0.5	+0.2	$4.8 \pm 1.6$	PJ				
				08/27-09/03	Aug. 29	$155.7 \pm 0.5$	2.8	$3.7 \pm 1.3$	(40.1)	PJ				
				23.0	335.7					<b>Helion</b>				
#202	<b>ZCA</b>	<b>Daytime <math>\zeta</math>-Cancerids</b>												
	$N=3$	5.00	0.05	206.5	119.7	+19.0	-	-	-	43.8 (NL61.8.5)				
#203	<b>GLE</b>	<b>Daytime <math>\gamma</math>-Leonids</b>												
				08/18-08/24	Aug. 22	148.7	-	(3)	-					
					<i>= ecliptic helion source</i>									
	$N=40$	1.527	0.569	2.1	139.9	+12.4	-	-	19.6	ZS				

$N=46$	0.968	0.860	6.4	59.0	149.2	156.6	+19.7	-.-	-.-	22.0	ZS
$N=4$	2.38	0.60	7.5	90.6	148.7	153.4	+20.8	2.1	-.-	22.9	(NL61.8.4)
Parent?? (2005)	1999 RD <sub>32</sub> 2.640	0.605	6.147	274.453	335.309	156.1	$\lambda_{\odot} = 155.3$ +01.1	$T_J = +2.87$ , -.-	$H_N = +16.32$ -.-	22.77	-0.0501
<b>#204 DXL</b>	Daytime $\gamma$ -Leonids										
$N=25$	1.598	0.330	2.5	238.4	334.9	142.1	+12.8	-.-	-.-	27.4	ZS
Parent? (2005)	2001 YB <sub>5</sub> 2.349	0.323	3.381	62.113	161.330	151.7	$\lambda_{\odot} = 161.33$ +14.3	$T_J = +2.89$ , -.-	$H_N = +20.62$ -.-	30.46	0.0759
September:											
<b>#205 XAU</b>	$\zeta$ -Aurigids										
$N=1$	28.24	0.971	106.4	128.0	157.5	93.5	+62.6	-.-	(3)	-.-	Apex
$N=1$	11.49	0.793	117.5	123.8	159.4	92.6	+56.4	-.-	-.-	56.9	PK#620125
$N=1$	2.50	0.785	111.5	117.1	160.4	92.3	+58.5	-.-	-.-	59.7	PK#621134
<b>#206 AUR</b>	$(\alpha)$ -Aurigids										
Outburst	= $\theta$ -Aurigids										
Outburst	1994			1994	158.700	1.7	158.700	1.7	0.019	$\sim 400$	PJ
Outburst	1986			1986	$\pm 0.020$		$\pm 0.020$		$\pm 0.002$		
Outburst	1935			1935	158.518	1.3	158.518	1.3	0.018	250 $\pm$ 30	PJ
$N=3$	Inf.	0.683	148.5	110.2	158.7	89.8	$\geq 158.664$	2.2	0.021	$\geq 100$	Ch. 13
$N=-.-$	Inf.	0.802	146.4	121.5	158.6	85.5	+41.0	+1.35	+0.25	65.7	This work
Parent (1911)	C/1911 N <sub>1</sub> (Kiess) 184.6	0.684	148.421	110.378	158.978	91.6	+42.0	-.-	-.-	66.3	AC
<b>#207 SCS</b>	Sep. ( $\beta$ -)Cassiopeids										
$N=8$	15.8	0.968	162.4	176.1	172.8	33.0	+68.9	-.-	(10)	-.-	This work
<b>#208 SPE</b>	Sep. ( $\epsilon$ -)Perseids										
$N=8$	31.1	0.742	138.9	241.9	171.3	50.2	+39.4	-.-	(6)	-.-	This work
Parent (1911)	C/1911 N <sub>1</sub> (Kiess) 184.6	0.684	148.421	110.378	158.978	91.6	$\lambda_{\odot} = 158.98$ +39.3	$T_J = -0.84$ , -.-	$H_{10} = +7.9$ -.-	66.17	0.0027

Table 7 (cont.)

September

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta \lambda$ $\Delta \text{Decl.}/\Delta \lambda$	$W$	ZHR <sup>max</sup> $V_g$	Notes
$a$												$\Delta_{C-E}$
$N=10$	15.0	0.750	142.8	241.3	168.0	51.5	+39.5	-	-	-	65.6	R92
$\sigma$	-	$\pm 0.033$	$\pm 3.9$	$\pm 3.6$							$\pm 1.7$	
$N=3$	Inf.	0.733	140.5	242.6	166.9	47.2	+38.9	-	-	-	65.4	PG
$N=-$	34.087	0.764	149.5	238.0	170.1	54.8	+36.2	-	-	-	67.1	T89 (46)
Fireballs		AD 1046-1069:		09/03-09/09		33.8	+38.2	-	-	-		AT (40)
<b>#209</b>	<b><math>\varepsilon</math>-Eridanids</b>			<b>08/20-09/16</b>		<b>Sep. 12</b>	<b>170</b>	<b>2.8</b>	<b><math>\sim 12</math></b>	<b><math>\sim 12</math></b>	<b>1.5</b>	<b>PJ</b>
<b>EER</b>	<b>= <math>\pi</math>-Eridanids</b>			$\lambda_{\odot} = 170.0$		56.6	-13.8	+0.70	+0.20		59.0	IMO
$N=1$	11.08	0.576	83.5	81.5	359.3	59.3	-17.4	-	-	-	52.6	HV83606
Outburst				1981 Sep. 10.6			>168.12	-	0.06		>170	PJ
Visual	(11.)	0.61	164	80	168.1	56.6	-13.8	-	-	-	$\sim 57$	PJ
<i>Parent?</i>	<i>C/1854 L<sub>1</sub> (Klinkerfues = 1854 III)</i>			<i>(Epoch 1854-06-23)</i>			$\lambda_{\odot} = 167.49$	$T_J = -0.11$	$H_{10} = +6.4$	$(n=4.0)$		
(1854)	(25.27)	0.6481	108.110	73.871	347.487	53.5	-16.2	-	-	-	56.52	0.0076
<b>#210</b>	<b><math>\beta</math>-Aurigids</b>			<b>09/19-09/25</b>		<b>Sep. 21</b>	<b>179.3</b>	-	-	-	-	
Outburst	19 meteors					1968 Sep. 21	179.258	2.3	-	-	-	
(1968)							+43	-	-	-	Medium	Ch. 3
$N=1$	4.57	0.98	148	159	179.256	86	+42	-	-	-	66.5	HV4453
$N=1$	23.08	1.00	145	170	176.7	93	+45	-	-	-	67.9	HV4454
$N=1$	Inf.	1.03	146	168	176.7	91	+44	-	-	-	68.8	HV4460
$N=1$	8.04	0.97	147	157	182.7	102	+42	-	-	-	67.3	HV4554
<i>Parent?</i>	<i>1790 A<sub>1</sub> (Herschel)</i>			<i>(Epoch 1790-01-16)</i>			$\lambda_{\odot} = 179.13$	$T_J < -0.70$	$H_{10} = -$			
(1790)	Inf.	0.722	148.068	115.931	179.125	114.5	+38.2	-	-	-	66.76	0.0333
<b>#81</b>	<b>SLY</b>	<b>Sep. Lynxids</b>		<b>09/26-09/29</b>		<b>Sep. 28</b>	<b>185.0</b>	-	-	(2)	-	
$N=1$	9.05	0.880	138.0	221.9	187.0	81.2	+46.6	-	-	-	65.2	PK#572513
$N=2$	76.970	0.770	136.5	152.5	185.9	110.9	+47.9	-	-	-	65.0	L71B
<b>#211</b>	<b>AOR</b>	<b>Sep. <math>\alpha</math>-Orionids</b>		<b>09/21-09/28</b>		<b>Sep. 26</b>	<b>183</b>	-	-	(3)	-	
$N=16$	1.52	0.91	152	47	2.7	86.7	+09.0	-	-	-	62	KL (37)
$N=1$	1.2	0.68	157	91	3.7	80.7	+12.0	-	-	-	60.8	HV4597
$N=1$	1.63	0.80	157	66	3.7	82.7	+11.0	-	-	-	63.4	HV4609

#212	KLE	<i>k</i> -Leonids		09/21-09/29	Sep. 24	181	-	(3)	-
		= twin shower of Dec. Monocerotids							
	<i>N</i> = 21	48.0	0.11	26	39	180.7	162.7	+15.7	-
	<i>N</i> = 9	17	0.17	24.8	31.9	184.2	162.2	+14.0	-0.2
	<i>N</i> = 3	1.6	0.13	7.0	35.6	184.1	187.0	+5.8	-
	Parent (1917)	<i>C</i> /1917 <i>F</i> <sub>1</sub> (Mellish)	(Epoch 1917-04-15)			$\lambda_{\odot} = 168.9$	$T_J = +0.64$ , $H_0 = +7.4$ ( $n = 3.9$ )	-	-
		27.65	0.190	36.339	51.122	169.558	155.9	+26.0	-
									42.10
									0.4955
#213	BRC	$\beta$ -Gruids		08/23-09/15	Sep. 03	160.3	-	(9)	-
	Visual	(3.16)	0.852	16.9	337	340.3	-	-	21.0
#214	BCP	$\beta$ -Capricornids		09/05-09/15	Sep. 10	167.7	-	(4)	-
	<i>N</i> = -	2.429	0.170	13.0	305.7	327.7	-12.8	-	37.0
	Fireballs	AD 1045-1068:		09/24-09/30	304.7	-13.8	AT (52)	-	-
#30	(PSC)	Piscids							
		= antihelion source meteors							
#215	NPI	Northern ( $\delta$ -)Piscids		09/12-09/31	Sep. 27	184	3.0	<23	0.5
		= extension of Taurid complex?							
	<i>N</i> = 7	4.83	0.256	5.2	306.6	174.4	9.2	+07.7	+1.07
	<i>N</i> = 3	1.977	0.272	5.2	305.2	173.3	7.0	+07.0	-
	<i>N</i> = 93	1.346	0.311	3.5	306.3	173.5	9.1	+07.2	-
	<i>N</i> = 42	1.868	0.344	3.8	298.5	168.3	0.8	+03.9	-
	<i>N</i> = 9	2.062	0.399	3.4	290.8	199.8	26.7	+14.3	-
#216	SPI	Southern ( $\delta$ -)Piscids		09/12-09/23	Sep. 17	174	3.0	<23	~1.5
		= extension of Taurid complex?							
	<i>N</i> = 5	1.546	0.247	6.3	130.6	364.0	23.6	+05.1	-
	<i>N</i> = 8	1.55	0.284	5.3	126.6	359.7	18.0	+03.1	-
	$\sigma$	-	$\pm 0.021$	$\pm 0.9$	$\pm 3.0$	$\pm 0.1$	$\pm 1.82$	$\pm 0.62$	-
	<i>N</i> = 19	1.64	0.28	5.4	125.7	363.0	18.7	+05.2	+0.7
	<i>N</i> = 4	2.5	0.28	8.4	123.9	362.9	20.3	+02.7	-
	<i>N</i> = 16	1.792	0.493	14.6	102.4	362.9	17.0	-11.0	-
	Parent?? (2003)	2003 QC <sub>10</sub>	(Epoch 2003-08-27)			$\lambda_{\odot} = 181.02$	$T_J = +4.48$ , $H_N = +17.83$	-	-
		1.376	0.369	5.035	119.760	361.015	16.3	+01.6	-
									24.06
									0.00010

Table 7 (cont.)

September

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta \lambda$	$W$ $\Delta \text{Decl.}/\Delta \lambda$	$ZHR^{\max}$ $V_g$	Notes
<b>#217</b>	<b>OPC</b>	<b><math>\omega</math>-Piscids</b>			<b>09/12-09/23</b>		<b>Sep. 17</b>	<b>174</b>	--	(4)	--	
		<i>= ecliptic antihelion source</i>										
$N=33$	2.864	0.525	1.5	273.6	190.8	10.6	+06.3	--	--	--	24.6	L71B
$N=6$	3.165	0.642	5.7	79.4	3.0	0.5	-08.8	--	--	--	21.4	This work
$N=7$	2.987	0.529	3.9	92.4	14.6	16.0	+01.7	--	--	--	24.5	PG
$N=3$	3.00	0.65	5.6	79.3	3.0	1.5	-08.6	--	--	--	24.6	B63 (I1)
Parent? (2005)	2001 HA <sub>4</sub> 2.687	0.552	17.079	90.915	359.002	10.7	$\lambda_{\odot} = 179.00$ -17.7	$T_J = +2.77$	$H_N = +17.48$	--	24.89	0.0033
<b>#218</b>	<b>GSA</b>	<b>Sep. (<math>\gamma</math>-)Sagittariids</b>			<b>09/11-09/15</b>		<b>Sep. 13</b>	<b>170.1</b>	--	(32)	--	
$N=-:-$	2.008	1.003	1.0	8.0	350.8	270.8	-31.0	--	--	--	6.2	T89 (48)
Fireballs	AD 1071-1163:			09/23-10/12		283.8	-25.9	--	--	--		AT (51)
Parent? (1936)	107 P Wilson-Harrington 2.643	0.996	0.856	13.940	347.153	279.1	$\lambda_{\odot} = 167.15$ -26.9	$T_J = +5.66$	$H_N = +15.99$	--	8.61	0.0467
(2001)	2.643	1.001	0.377	8.948	353.036	276.1	-25.0	--	--	--	8.31	0.0481
(2048)	2.645	0.999	0.043	10.475	352.143	277.9	-23.4	--	--	--	8.38	0.0487
<b>#76</b>	<b>KAQ</b>	<b><math>\kappa</math>-Aquariids</b>			<b>09/08-10/12</b>		<b>Sep. 22</b>	<b>179</b>	--	(14)	--	
$N=3$	2.564	0.884	1.0	45.2	359.8	334.0	-13.8	--	--	--	12.8	PG
$N=35$	2.606	0.741	7.6	247.8	179.5	343.0	+08.3	--	--	--	18.0	ZS
$N=6$	2.572	0.725	4.4	250.6	168.5	336.2	-01.2	--	--	--	18.1	ZS73
$N=9$	2.366	0.705	3.9	253.7	181.3	350.2	+03.2	--	--	--	18.2	ZS73
$N=5$	3.180	0.814	1.8	235.6	178.7	339.2	-04.4	--	--	--	16.5	L71B
$N=4$	2.940	0.867	2.1	229.2	186.6	342.3	-02.5	+0.80	+0.40	--	15.3	L71A
$N=3$	3.115	0.810	2.0	236.0	178.7	339.2	-04.4	--	--	--	16.0	AC
Visual				09/14-09/23		346.3	+00.5	--	--	--		M (#299)
Fireballs	AD 1053-1163:		09/19-09/27		$\lambda_{\odot} \sim 166$	333.6	+00.2	--	--	--		AT (45)
Parent? (2006)	2006 AR <sub>3</sub> 2.458	0.878	4.743	46.724	6.389	345.4	$\lambda_{\odot} = 186.4$ -20.6	$T_J = +3.17$	$H_N = +20.39$	--	12.90	0.0095



Table 7 (cont.)

October

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta i$	$W$ $\Delta \text{Decl.}/\Delta i$	ZHR <sup>max</sup> $V_g$	Notes $\Delta_{C-E}$
<i>October:</i>													
#224	DAU	Oct. $\delta$ -Aurigids				09/29–10/18		Oct. 08	191.0	2	(8)	3.0	Apex
	$N=14$	24.1	0.845	130.2	226.7	191.0	83.5	+50.4	+1.10	+0.10		64.9	R92
	$\sigma$	--	$\pm 0.085$	$\pm 4.5$	$\pm 12.2$				--	--		$\pm 1.9$	
#225	SOR	$\sigma$ -Orionids				09/26–10/26		Oct. 05	191.7	3.0	(12)	--	
	$N=1$	14.56	0.92	138	34	$\lambda_{\odot} = 191.7$	86.0	-03.0	+0.80	+0.00		65.00	IMO
	$N=1$	57.18	0.66	145	71	10	89	+00	--	--		65.9	HV8870
#281	OCT	October Camelopardalids				10/03–10/07		Oct. 06	193.0	--	--	65.8	HV4974
	(1902)	(radiant unknown)				$\lambda_{\odot} = 192.006$						--	This work
	(1942)					$\lambda_{\odot} = 192.8$	Cassiopeia						
	(1976)					$\lambda_{\odot} = 193.34$							
#226	ZTA	$\zeta$ -Taurids				10/07–10/24		Oct. 09	196	--	(7)	46.6	This work
	$N=3$	21.3	0.715	162.4	70.9	16.5	86.1	+14.7	--	--		67.2	This work
	$N=6$	1.632	0.231	163.1	311.8	193.5	71.5	+28.2	--	--		56.5	ZS
	$N=17$	1.48	0.38	152	119	23.7	88.7	+12.0	--	--		57	KL (43)
#23	EGE	$\varepsilon$ -Geminiids				10/14–10/27		Oct. 19	206.0	1.6	15	3.0	IMO
	$N=3$	10.0	0.731	172.9	241.7	209.0	101.6	+26.7	--	--		68.8	This work
	$N=-$	14.90	0.770	173.0	236.7	208.5	102.0	+27.0	--	--		69	JW
	$N=7$	26.77	0.77	173	237	209.7	104.8	+26.9	+0.7	+0.0		69.4	AC
	$N=13$	3.58	0.88	175	223	203.7	104.8	+24.9	--	--		68	KL (41)
	$N=4$	14.895	0.770	173.0	236.7	208.2	102.8	+26.9	--	--		69.1	L71B
#227	OMO	Oct. Monocerotids				10/18–10/22		Oct. 19	206	--	(2)	--	This work
	$N=3$	5.2	0.865	135.0	46.4	25.7	101.9	-01.4	--	--		63.5	GE (10.16)
	$N=2$	5.4	0.97	136	341	25.7	117.6	-05.1	--	--		65.0	GE (10.16)



Table 7 (cont.)

October

Code	Name	$a$	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta\lambda$	$W$ $\Delta\lambda/\Delta\lambda$	ZHR <sup>max</sup> $V_g$	Notes $\Delta_{C-E}$
<b>#232</b>	<b>BCN</b>	<b>Daytime <math>\beta</math>-Cancerids</b>											
$N=2$	2.8	0.93	152	325	24.7	<b>Oct. 26</b>	<b>213</b>	-	(5)	-	-	-	
$N=2$	2.6	1.00	153	359	25.7	121.7	+04.9	-	-	-	-	66.1	GE (10.17)
$N=3$	4.3	0.95	156	334	32.7	114.7	+05.9	-	-	-	-	66.1	GE (10.18)
$N=3$	6.1	0.98	148	10	35.7	127.7	+05.8	-	-	-	-	66.1	N62 (26.1)
						120.6	+00.9	-	-	-	-	66.1	N62 (26.3)
<b>#233</b>	<b>OCC</b>	<b>Oct. Capricornids</b>											
Outburst						<b>09/20–10/24</b>		<b>189.7</b>	-	-	-	$2.3 \pm 1.5$	PJ
$N=-$	4.264	0.987	0.8	190.8	189.7	Oct. 03	189.70	-	>0.15	-	-	-	
$N=-$	(3.65)	0.99	2.8	193.2	203.8	303.0	-10.0	+0.90	-	-	-	10.0	IMO
					189.3	315	-14	-	-	-	-	10.4	T89 (53)
						301.5	-08.7	-	-	-	-	$15 \pm 3$	W88
Parent (1979)	$D/1978 R_1$ (Haneda-Campos)					(Epoch 1979-01-07)		$\lambda_{\odot} = 183.49$	$T_J = +0.93$	$H_{10} = +12.5$ (var.)			
	2.070	0.997	3.407	190.543	183.491	287.6	-05.1	-	-	-	-	7.34	0.1381
<b>#234</b>	<b>EPC</b>	<b>Oct. (<math>\epsilon</math>)-Piscids</b>											
$N=5$	2.919	0.616	2.8	262.5	195.0	<b>Oct. 08</b>	<b>195</b>	-	(4)	-	-	-	
$N=-$	1.780	0.479	1.6	283.8	197.3	8.7	+8.1	-	-	-	-	21.8	J92
$N=45$	1.843	0.566	0.7	93.6	11.6	20.7	+11.3	-	-	-	-	23.2	T89 (52N)
$N=6$	2.19	0.550	0.7	274.0	195.5	12.8	+4.4	-	-	-	-	20.5	ZS
						15.6	+7.3	-	-	-	-	23.5	LB71A
<b>#235</b>	<b>LCY</b>	<b><math>\lambda</math>-Cygnids</b>											
$N=3$	2.768	0.972	13.9	199.4	213.2	<b>Oct. 12</b>	<b>199</b>	-	(7)	-	-	-	
$N=-$	2.585	0.828	17.8	234.4	189.6	319.1	+34.9	-	-	-	-	12.3	PG
$N=-$	2.352	0.950	22.0	204.6	233.5	338.6	+31.3	-	-	-	-	18.0	T89 (49a)
						334.5	+57.3	-	-	-	-	15.8	T89 (49c)
Parent? (2006)	2005 CA					(Epoch 2006-03-06)		$\lambda_{\odot} = 202.8$	$T_J = +3.03$	$H_N = +15.34$			
	2.359	0.967	17.006	203.186	202.759	313.3	+41.2	-	-	-	-	13.20	+0.131
<b>#236</b>	<b>GPS</b>	<b><math>\gamma</math>-Piscids</b>											
$N=-$	2.478	0.945	2.7	200.0	225.6	<b>Oct. 13</b>	<b>200</b>	-	(18)	-	-	-	
						347.6	+0.3	-	-	-	-	10.4	T89 (54)

$N = -$	2.866	0.871	1.4	224.9	229.8	377.7	+9.3	-	-	13.4	T89 (60)
Outburst?	Radiant "SE Peg/NE Psc"										
Parent?	(Epoch 1960-09-26)										
(1960)	6344 P-L	0.931	4.058	213.516	203.905	339.0	+06.0	-	-	11.06	0.0280
<b>#237</b>	<b>SSA</b>	$\sigma$ -Arietids		<b>10/10-10/22</b>		<b>Oct. 15</b>	<b>202</b>	-	-	(5)	-
		= part of Phaethon complex									
$N = 28$	4.46	0.11	7	145	22.7	44.7	+14.2	-	-	40.5	KL (46)
$N = 24$	1.74	0.05	17	158	21.7	52.7	+15.2	-	-	40.5	KL (47)
<b>#86</b>	<b>OGC</b>	<b>Oct. <math>\gamma</math>-Cetids</b>		<b>10/19-10/24</b>		<b>Oct. 20</b>	<b>206.4</b>	-	-	(2)	Ch. 13
Outburst	Coast of Maine, USA; 25/hr 01 UT, 100/hr 03 UT										
(1935)				1935 Oct. 20	$\lambda_{\odot} = 206.36$	40.6	-04.8	-	-	$\sim 0.09$	RM
$N = 2$	0.950	0.832	2.7	119.3	26.7	50.4	-06.9	-	-	3.3	This work
$N = -$	2.442	0.791	11.6	58.4	28.1	18.6	-18.7	-	-	17.1	T89 (50)
$N = 2$	1.760	0.783	8.5	67.0	27.7	22.6	-10.7	-	-	15.3	L71B
Visual				10/15-10/23	48.8	48.8	-02.6	-	-	-	M (#35)
Fireballs?	AD 1052-1093:										
<b>#83</b>	<b>OCG</b>	<b>Oct. Cygnids</b>		10/30-10/03	50	50	-10	-	-	-	AT (63)
$N = -$	3.428	0.904	25.0	218.1	190.7	322.5	+44	-	-	19.6	T89 (49b)
$N = 7$	2.764	0.976	25.0	198.6	195.9	317.8	+52.6	-	-	17.2	ZS73
$N = 2$	4.66	0.960	26.4	203.8	193.6	307.4	+48.2	-	-	22.2	W57
<b>#299</b>	<b>(OAR)</b>	<b>October Arietids</b>						-	-		
<b>#25</b>	<b>NOA</b>	<b>Northern Oct. (<math>\delta</math>-)Arietids</b>		<b>10/01-10/24</b>		<b>(Nov. 03)</b>		-	-	$> 9$	$< 3$
		= extension of NTA									
$N = -$	2.168	0.334	5.2	117.1	42.4	52.7	+18.2	-	-	29.1	T89 (59)
$N = 15$	4.05	0.22	12	307	201.7	34.7	+20.2	-	-	36.3	KL (45)
Parent?	2005 UR										
(2005)	2.259	0.266	6.675	124.247	36.156	51.3	+14.1	-	-	31.65	0.0335
<b>#28</b>	<b>SOA</b>	<b>Southern Oct. (<math>\delta</math>-)Arietids</b>		<b>10/01-10/24</b>		<b>(Nov. 03)</b>		-	-	$> 9$	$< 3$
		= extension of STA									
$N = -$	2.883	0.381	6.6	108.8	33.0	41.7	+10.2	-	-	29.8	T89 (57)
$N = -$	2.540	0.482	11.2	98.7	26.4	33.6	+01.2	-	-	26.2	T89 (52S)

Table 7 (*cont.*)

October

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta\lambda$	$W$ $\Delta\text{Decl.}/\Delta\lambda$	$ZHR^{\max}$ $V_g$	Notes
$N=83$	1.435	0.333	2.9	122.5	18.5	33.1	+10.6	-	-	-	25.6	ZS
$N=58$	1.723	0.273	1.4	126.9	08.5	24.6	+09.1	-	-	-	24.2	ZS73
$N=18$	1.74	0.24	1.2	130.7	23.2	40.3	+14.9	-	-	-	30.7	KL (44)
$N=13$	1.75	0.30	5.8	122.5	24.9	39.5	+10.7	-	-	-	27.8	MP
<i>Parent? 2P/Encke</i>												
(2003)	2.217	0.339	3.943	115.819	44.884	56.0	+16.5	-	-	-	29.06	0.1915
<b>#238</b>	<b>DOR</b>	$\alpha$ -Doradids		<b>10/08-10/31</b>		<b>Oct. 21</b>	<b>208</b>	-	-	(9)	<2	WE60
	Radar					$\lambda_{\odot} = 207.7$	69.3	-55.9	-	-	-	<b>Helion</b>
<b>#9</b>	<b>DRA</b>	<b>Oct. Draconids</b>		<b>10/02-10/16</b>		<b>Oct. 08</b>	<b>195.1</b>	2.6	-	-	<1	
	Outbursts (see Tab. 6d)											
(1998)	3.572	0.9966	31.8	173.6	195.0188	263.40	+55.76	-	-	-	21.0	T
(1998)	3.512	0.9964	31.8	173.4	195.081	263.16	+55.75	-	-	-	20.9	T
(1998)	3.33	0.996	31.09	173.36	195.08	263.20	+55.42	-	-	-	20.5	SAYS
$\sigma N=20$	$\pm 0.32$	$\pm 0.001$	$\pm 0.70$	$\pm 0.83$	-	$\pm 1.39$	$\pm 0.70$	-	-	-	0.6	
$N=5$	3.02	0.996	31.4	172.9	196.4	264.1	+57.6	+1.9	+0.3	-	20.4	This work
$N=7$	2.392	0.995	25.5	178.2	203.9	274.7	+52.4	-	-	-	16.7	PG
$N=-$	2.120	0.992	27.6	171.4	204.6	267.2	+55.0	-	-	-	17.4	T89 (51b)
$N=-$	2.855	0.994	29.8	183.8	202.6	283.2	+57.1	-	-	-	22.4	T89 (56a)
$N=2$	3.51	0.996	30.7	171.8	197.0	262.4	+54.1	-	-	-	20.43	AC
$N=2$	3.330	0.999	25.0	177.0	196.7	276.3	+49.0	-	-	-	17.8	L71B
<i>Parent 21P/Giacobini-Zinner</i>												
(1926)	3.513	0.994	30.73	171.748	196.946	261.9	+54.0	-	-	-	20.45	0.0005
(1998)	3.391	0.996	31.859	172.543	195.398	261.9	+55.9	-	-	-	20.92	+0.0381
(2045)	3.235	0.995	31.790	171.351	194.088	259.9	+55.9	-	-	-	20.80	+0.1040
<b>#239</b>	<b>GPU</b>	$\gamma$ -Puppids		<b>09/28-10/30</b>		<b>Oct. 16</b>	<b>202.7</b>	3.0	(1.3)	-	-	
	$N=4$	17.8	0.980	71.6	16.1	109.0	-44.0	+0.60	-0.20	-	43.0	IMO
						$\lambda_{\odot} = 202.7$	110.1	-44.0	+1.74	+0.03	39.2	This work

#240	DFV	Daytime $\psi$ -Virginids	09/28–10/24	Oct. 15	202	–	(10)	–
	$N=22$	1.513	258.1	193.7	–09.6	–	–	–
		$0.525$	22.3			–	–	–
		<i>= ecliptic helion source</i>				–	–	–
#241	OUI	Oct. Ursae Minorids	10/10–10/27	Oct. 21	208	–	(7)	–
	$N=4$	3.98	179.1	246.6	+74.3	–	–	–
		$0.995$	209.1	245.5	+73.8	–	–	–
		$0.994$	179.8	208.2	+69.2	–	–	–
	$N=43$	2.294	183.0	267.0	+76.0	–	–	–
		$0.992$	191.1	208.0		–	–	–
	$N=--$	2.851	10/05–11/05	Oct. 24	210.8	–	(12)	–
#242	XDR	$\zeta$ -Draconids	10/05–11/05	Oct. 24	210.8	–	–	–
	$N=--$	2.886	183.0	192.4	+74.7	–	–	–
		$0.984$	175.3	170.3	+73.3	–	–	–
	$N=38$	1.279	143.1	176.6	+70.9	–	–	–
		$0.988$	169.7	190.1	+78.9	–	–	–
	$N=8$	2.052				–	–	–
		$0.927$				–	–	–
	$N=22$	2.543				–	–	–
		$0.992$				–	–	–

November:

#243	ZCN	$\zeta$ -Cancerids	11/06–11/20	Nov. 07	225	–	(6)	–
	$N=7$	2.98	100.7	120.5	+14.3	–	–	–
		$0.443$	55.40	101.7	+19.9	–	–	–
	Fireballs	AD 1026–1098:	11/02–11/18			–	–	–
#244	PAR	$\psi$ -Aurigids	10/20–11/16	Nov. 09	226.98	–	(11)	–
	Outburst	15–20.5 UT, 43 meteors 19?		Nov. 09	226.98	–	–	–
						–	–	–
	Outburst	23:15–00:15 UT (Jan Janssens, Belgium)	$\lambda_{\odot} = 226.98$	90.9	+40.0	–	–	–
			1989 Nov. 04	222.687		–	–	–
	$N=--$	6.634	277.8	94.0	+50.0	–	–	–
	Fireballs	AD 1024–1096:	10/30–11/03	80.9	+38.0	–	–	–
#245	NHD	Nov. Hydrids	11/16–11/23	Nov. 17	235	–	–	–
	$N=2$	6.0	34.4	130.3	–06.3	–	–	–
		$0.91$	34.1	117.6	–05.1	–	–	–
	$N=2$	5.4	34.1	25.7		–	–	–
		$0.97$				–	–	–
	Parent?	$C/1943 W_1$ (van Gent–Peltier–Daimaca) (Epoch 1994-01-12)	$\lambda_{\odot} = 239.50$	$T_J \sim -0.03$ , $H_0 = +10.2$ ( $n=3.5$ ),	$66.69$	–	–	$P$ unknown
	(1994)	(200)	0.902	132.9	–08.3	–	–	$0.0336$
#13	LEO	Leonids	10/31–11/23	Nov. 17	235.1	2.5	$3.0 \pm 0.6$	$13 \pm 3$
	Outbursts (see Tab. 4a)					+0.659	–0.325	70.66
	(2001)	10.1	0.9853	162.36	173.50	236.15	154.24	–0.325
								70.66
								HB

Table 7 (*cont.*)

November

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta\lambda$	$W$ $\Delta\lambda/\Delta\lambda$	ZHR <sup>max</sup> $V_g$	Notes $\Delta_{C-E}$
(2000)	9.4	0.9853	162.42	173.47	236.10	154.16	+21.76	--	--	--	70.54	HB
(1999)	9.9	0.9839	162.44	172.51	235.31	153.66	+21.76	--	--	--	70.57	HB
(1998)	9.8	0.9839	162.05	171.89	234.68	153.29	+22.12	--	--	--	70.54	HB
(1997)	8.5	0.9844	162.23	172.37	235.20	153.58	+21.90	--	--	--	70.38	HB
(1995)	14.8	0.9827	161.55	171.85	235.24	154.08	+22.18	--	--	--	70.83	HB
$N=5$	13.972	0.985	162.4	173.1	235.6	153.2	+22.0	--	--	--	70.9	PG
$N=-$	11.5	0.985	162.6	172.5	235.2	153.0	+22.0	+0.70	-0.42	--	70.7	AC
$N=9$	10.3	0.984	162.1	172.4	235.0	153.6	+22.1	+0.60	-0.45	--	70.26	KP
$N=29$	15.2	0.984	162.53	172.36	235.7	153.9	+21.6	+0.944	-0.603	--	70.92	BPS
$\sigma$	--	$\pm 0.003$	$\pm 1.26$	$\pm 3.06$	$\pm 1.10$	$\pm 1.0$	$\pm 0.8$	--	--	--	$\pm 0.92$	
Parent (1998)	55P/Tempel-Tuttle 10.338	0.984	(Epoch 1998-08-15) 162.482	172.229	235.021	153.4	$\lambda_{\odot} = 235.02$ $+21.8$	$T_J = -0.29$	$H_0 = +8.5$	$(n = 10.7)$	70.63	0.0081
#246 (1995)	AMO $\alpha$ -Monocerotids Outburst			11/15-11/25		Nov. 21	239.3	2.7	3.8	--	3.5	IMO
$N=10$	(500)	0.488	134.13	90.66	59.322	117.10	239.322	1.80	0.008	--	500	PJ
$\sigma$	( $a > 28$ )	$\pm 0.005$	$\pm 0.34$	$\pm 0.78$	$\pm 0.4$	$\pm 0.13$	+00.83	--	--	--	63.0	DMS
(1985)				R.A. = 109.6°	Decl. = -7.1°		$\pm 0.16$	--	--	--	$\pm 0.2$	
(1935)				R.A. = 110.8°	Decl. = -5.1°		239.316	(2.7)	0.003	--	$\sim 600$	Ch. 13
(1925)							239.344	(~3)	$\sim 0.009$	--	$\sim 1200$	Ch. 13
							239.384	--	$\sim 0.005$	--	$\sim 2300$	Ch. 13
#247 #17	(TAU) Taurids NTA Northern Taurids			09/16-12/29		Nov. 05	224 $\pm$ 1	2.3	22 $\pm$ 3	--	7.3	PJ
$N=80$	2.12	0.350	3.1	294.9	226.2	58.6	224 $\pm$ 1	2.3	22 $\pm$ 3	--	4.0	PJ
$\sigma$	$\pm 0.25$	$\pm 0.053$	$\pm 1.1$	$\pm 6.5$	$\pm 10.2$	--	228 $\pm$ 3	2.3	46	--	3.5 $\pm$ 0.5	IMO
				$\lambda_{\odot} = 234.673$		62.0	+21.6	+0.80	+0.16	--	28.3	PK
							--	--	--	--	$\pm 1.9$	
							+23.2	--	--	--	27.1	U

N = 12	2.178	0.383	4.7	291.0	223.0	51.1	+22.8	--	--	28.2	PG
N = 25	2.20	0.284	2.9	302.3	212.7	44.0	+18.9	+0.82	+0.22	30.69	KP
N = --	2.443	0.418	2.9	286.0	242.5	67.7	+22.1	--	--	27.3	T89 (69)
N = --	2.454	0.557	3.8	91.3	60.6	58.7	+20.1	--	--	22.5	T89 (65)
N = 13	2.19	0.36	5.5	294.6	206.1	34.2	+18.4	--	--	28.4	KL (50)
N = 45	2.59	0.359	2.4	292.3	230.7	59.0	+22.4	+0.76	+0.10	29.2	AC
Fireballs	AD 1062-1095:			11/21-11/25		55	+25	--	--	--	AT (74)
Parent	2004 TG <sub>10</sub>			(Epoch 2006-03-06)			$\lambda_{\odot} = 223.83$	$T_J = +2.99$ , $H_N = +19.46$			
(2006)	2.242	0.315	3.622	298.443	223.865	54.7	+22.3	--	--	29.89	+0.0128
<b>#2 STA</b>	<b>Southern Taurids</b>			<b>09/25-12/19</b>		<b>Nov. 05</b>	<b>224 ± 1</b>	2.3	22 ± 3	3.3	PJ
N = 144	2.07	0.352	5.4	115.4	37.3	49.4	+13.0	+0.73	+0.18	28.0	PK
$\sigma$	±0.32	±0.058	±1.1	±7.2	±11.1	--	--	--	--	±2.1	
N = 19	2.096	0.357	5.6	114.4	38.7	49.8	+12.8	--	--	28.3	PG
N = 49	1.67	0.30	7.1	129	24.7	44.7	+11.2	--	--	29	GE (D.01)
N = 46	2.00	0.340	6.3	116.8	32.7	44.7	+11.5	+0.82	+0.22	28.35	KP
N = 46	1.93	0.375	5.2	113.2	40.7	51.2	+13.8	+0.79	+0.15	27.0	AC
N = 73	2.08	0.33	2.2	118.2	15.5	27.9	+08.8	--	--	28.8	KL (37)
N = 17	2.08	0.50	4.2	99.0	56.8	59.7	+16.7	1.0	--	23.8	NL (61.11.1)
N = 8	2.4	0.38	5.5	112	43.7	53.7	+14.2	--	--	27.8	<b>W54</b>
Fireballs	AD 1052-1170:			11/19-12/07		43.7	+04.2	--	--	--	AT (73)
Parent	2P/Eneke			(Epoch 2003-12-27)			$\lambda_{\odot} = 224.88$	$T_J = +3.03$ , $H_{10} = +11.5$ (var.)			
(2003)	2.217	0.339	3.943	115.819	44.884	56.0	+16.5	--	--	29.06	0.1915
<b>#24 PEG</b>	<b><math>\mu</math>-Pegasids</b>			<b>09/29-11/18</b>		<b>Nov. 12</b>	<b>230.4</b>	--	(5)	<2	
Outburst?				1952, Nov. 12			$\lambda_{\odot} = 230.41$	--	--	>50	Ch. 21
HV3570	3.856	0.9735	8.10	195.80	230.412	335.53	+21.78	--	--	11.21	This work
(error)	±0.16	±0.0003	±0.09	±0.10	--	±0.15	±0.12	--	--	±0.14	
HV3570	3.860	0.974	8.1	195.66	230.412	335.42	+21.68	--	--	11.20	JW
N = 2	3.099	0.948	7.18	206.34	(235.04)	355.4	+26.1	--	--	11.1	U
N = 6	3.86	0.97	8	196	230.7	335.6	+21.3	--	--	11.2	AC

PEG – “U:” From two video meteors during the 1998 and 1999 Leonid campaigns.

Table 7 (*cont.*)

November

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta\lambda$	$W$ $\Delta\lambda/\Delta\lambda$	ZHR <sup>max</sup> $V_g$	Notes $\Delta_{C-E}$
#18	<b>AND</b>				<b>10/08–11/22</b>		<b>Nov. 14</b>	<b>232</b>	--	(18)	--	
	Outbursts (see Tab. 6a)											
$N=18$	2.76	0.789	10.0	238.9	231.0	24.2	+32.5	+0.63			17.2	This work
$N=5$	1.749	0.691	12.0	--	221	27.2	+34.9	--			17.6	J92
$N=3$	2.375	0.760	14.3	245.2	207.2	3.3	+31.8	--			18.1	PG
$N=-$	2.441	0.738	12.4	248.6	201.9	2.6	+26.3	--			18.7	T89 (55)
$N=-$	1.824	0.854	13.8	232.4	234.8	17.7	+46.3	--			14.1	T89 (63)
$N=23$	2.90	0.777	7.5	242.7	225.5	23.7	+09.3	--			18.9	SH59
$N=-$	2.7	0.74	6.8	247	226	27.7	+25.2	--			18.0	J
<i>Parent</i>	<i>3D/Biela</i>				( <i>Epoch 1852-09-29</i> )							
(1852)	3.524	0.864	12.654	224.712	246.556	5.8	+43.4	--	$T_J = +0.78$	$H_{10} = +7.10$	16.15	-0.0066
(2004)	3.491	0.798	7.501	236.175	213.790	24.6	+27.2	--	--	--	17.21	0.0410
(2050)	3.510	0.806	5.950	234.913	231.498	24.2	+23.9	--	--	--	16.76	0.0891
#248	<b>IAR</b>				<b>11/01–11/23</b>		<b>Nov. 16</b>	<b>233.637</b>	1.88 ± 0.12	(9)	8.2 ± 2.8	HM
$N=25$	1.076	0.085	1998 Nov. 18		$\lambda_{\odot} = 235.0$	77.0	+35.0	--	--	--	--	KZ99
$N=32$	1.467	0.132	30.5	336.3	222.3	76.3	+33.3	--	--	--	34.0	ZS
Fireballs	AD 1032–1083:		19.6	326.1	222.1	68.1	+30.2	--	--	--	34.2	ZS
#249	<b>NAR</b>				<b>11/17–11/29</b>		<b>Nov. 23</b>	<b>241</b>	--	(5)	--	AT (64)
$N=3$	1.54	0.790	2.8	246.4	236.18	39.0	+23.2	--	--	--	12.3	NMS
$N=-$	2.608	0.794	5.3	238.2	241.3	38.7	+21.2	--	--	--	16.3	T89 (67a)
$N=4$	3.257	0.784	9.7	238.0	228.2	22.7	+30.3	--	--	--	17.8	L71B
#250	<b>NOO</b>				<b>11/16–11/29</b>		<b>Nov. 27</b>	<b>245</b>	--	(5)	--	(Outburst)
Outburst					1964	Nov. 25/26	244.12		1.8	0.020	140	Ch. 13
(1964)	Inf.	0.23	43	123	244.12	85.7	+04.0	--	--	--	~45	This work
$N=16$	12.7	0.088	26.9	145.8	(60.0)	85.2	+15.6	+0.71	-0.03		43.3	

N = 8	7.32	0.089	29.1	146.6	57.5	83.8	+15.3	--	--	43.5	MB <sub>7</sub>
N = 7	12.26	0.045	41.5	161.4	41.9	79.4	+14.6	--	--	38.8	ZS
Fireballs? AD 1053-1082:											
				11/08-11/13		83.6	+00.0				AT (69)
<b>#251</b>	<b>IVI</b>	<b>Daytime t-Virginids</b>		<b>11/05-11/07</b>	<b>Nov. 05</b>	<b>223</b>	<b>223</b>	<b>(2)</b>	<b>--</b>	<b>--</b>	<b>Helion</b>
N = 8	1.217	0.985	10.1	60.7	224.3	210.4	-03.8	--	--	29.0	ZS

December:

<b>#19</b>	<b>MON</b>	<b>(Dec.) Monocerotids</b>		<b>11/27-11/17</b>	<b>Dec. 13</b>	<b>260.9 ± 0.6</b>	<b>3.0</b>	<b>4 ± 3</b>	<b>2.0 ± 0.4</b>	<b>Apex</b>
N = 11	50.7	0.193	35.2	128.1	101.8	+08.1	+0.83	-0.05	42.0	PJ
N = 15	19.9	0.188	34.9	128.9	102.0	+08.3	+0.95	-0.03	41.6	This work
$\sigma$	--	±0.012	±3.1	±2.1	±1.1	±1.2			±1.8	O89
N = 12	27.6	0.187	34.9	128.9	102.2	+08.3	--	--	41.8	LO90
N = 30	6.199	0.153	22.3	135.8	95.1	+14.5	--	--	40.0	ZS
N = 52	7.114	0.119	24.7	141.2	92.1	+15.0	--	--	41.6	ZS73
N = --	52.24	0.175	31.5	131.0	100.7	+08.0	+0.80	+0.00	42	LB
N = 3	7.69	0.19	39.9	130	106.7	+05.9	--	--	40.5	GE (12.09)
N = 6	5.56	0.11	39.0	138.9	102.3	+09.5	--	-0.5	42.2	NL (61.12.7)
N = 4	11	0.11	22.6	135.3	95.5	+14.5	+1.0	--	41.3	NL (61.12.2)
N = --	3.464	0.121	22.3	141.9	89.0	+13.9	--	--	41.6	T89 (75S)
N = 4	20.00	0.20	18.7	131.5	96.8	+15.1	--	--	40.6	NL (60.12.9)
N = 3	42	0.14	24.8	135.8	100.5	+14.0	--	--	42.4	J
N = 2	Inf.	0.186	35.2	128.2	103.7	+07.9	--	--	42.4	W57

Parent C/1917 F<sub>1</sub> (Mellish) (Epoch 1917-04-15)  
 (1917) 27.65 0.190 35.981 128.263 80.267 102.0  
 $\lambda_{\odot} = 260.27$   $T_J = +0.04$ ,  $H_0 = +7.4$  ( $n = 3.9$ )  
 +07.8 -- -- 41.94 0.0615

<b>#32</b>	<b>DLM</b>	<b>Dec. Leonis Minorids</b>		<b>12/12-12/17</b>	<b>Dec. 14</b>	<b>262.4</b>	<b>(2)</b>	<b>--</b>	<b>--</b>	<b>This work</b>
N = 6	11.9	0.554	133.8	265.6	156.1	+32.7	--	--	62.3	This work
N = 3	4.70	0.549	133.97	265.98	156.5	+32.0	--	--	62.1	DMS
N = --	inf.	0.612	132.3	255.8	156.1	+34.6	--	--	63.7	CL
N = 9	3.76	0.81	138	249	163.7	+39.7	--	--	64	KL (193tr)
N = 3	57.4	0.712	135.7	264.5	151.7	+32.8	--	--	63.4	W57
?Outburst 44 meteors										
(1921)				$\lambda_{\odot} = 254.26$	160	+37	--	--	>80	Ch. 13

Table 7 (cont.)

December

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta i$ $\Delta \text{Decl.}/\Delta i$ $V_g$	$W$	ZHR <sup>max</sup>	Notes
Parent? (1799)	$C/1798 X_1$ (Bouvard)	0.775	(Epoch 1799-01-01) 139.354	234.967	266.648	169.0	$\lambda_{\odot} = 266.65$ +28.3	$> T_J = 0.01$ , $H_{10} = +11.0$ ( $n=4$ ), $P$ unknown	–	–	66.62	0.1165
#16	<b>HYD</b> <b><math>\sigma</math>-Hydrids</b>				<b>12/03–12/18</b>		<b>Dec. 17</b>	<b><math>265.5 \pm 0.8</math></b>	3.0	$6.6 \pm 2.0$	$2.5 \pm 0.5$	PJ
$N=18$	12.3	0.224	124.9	124.0	84.8	131.9	+00.2	+0.72	–	–	58.0	This work
$N=4$	37.046	0.294	132.5	114.4	73.2	124.2	+03.1	–	–	–	60.2	PG
$N=--$	113.8	0.253	127.9	119.3	72.5	121.7	+03.9	–	–	–	58.5	T89 (71)
$N=2$	11.525	0.230	125.0	124.0	82.7	129.6	+00.8	–	–	–	57.9	L71B
$N=--$	11.53	0.230	125.0	124.0	82.7	127.6	+01.8	+0.80	–	–0.20	58	JW
$N=8$	30.0	0.244	125.5	120.7	79.7	127.2	+01.4	+0.7	–	–0.2	58.4	J
#252	<b>ALY</b> <b><math>\alpha</math>-Lyncids</b>				<b>12/10–01/03</b>		<b>Dec. 21</b>	<b>268.9</b>	–	–	–	–
Outburst (1971)	(25.4)	0.281	84.4	295.9	268.8	138.8	<268.78	–	–	60	>350	Table III
? $N=5$	1.193	0.206	153.8	318.4	264.6	149.8	+43.8	–	–	–	50.4	PJ
#15	<b>URS</b> <b>Ursae Minorids (= Ursids)</b>				<b>12/17–12/26</b>		<b>Dec. 23</b>	<b><math>271.0 \pm 0.3</math></b>	3.4	(0.7)	$12 \pm 3$	PJ
Outbursts (see Tab. 5b)							$270.6 \pm 0.1$	–	–	1.6	$12 \pm 1$	IMO
$N=64$	4.62	0.944	51.5	204.9	270.74	219.35	+75.34	–	–	–	33.0	This work
$\sigma$	$\pm 1.3$	$\pm 0.007$	$\pm 1.0$	$\pm 1.9$	$\pm 0.07$	$\pm 4.0$	$\pm 0.7$	–	–	–	$\pm 0.9$	–
$N=--$	2.62	0.89	52	224	270.7	190.5	+74.7	–	–	–	32	KL (195)
Parent (2008)	8P/Tuttle	0.934	(Epoch 2008-01-15) 54.983	207.506	270.341	213.4	$T_J = +0.31$ , $H_0 = +8.0$ ( $n=6.0$ ) +74.4	–	–	–	34.27	0.0952
(2049)	5.106	0.934	54.611	207.438	270.018	213.9	+74.8	–	–	–	34.08	0.1030
#20	<b>COM</b> <b>Dec. Comae Berenicians</b>				<b>12/12–01/15</b>		<b>Dec. 26</b>	<b>274</b>	3.0	26	$3.2 \pm 0.7$	IMO
	= apex source											
$N=--$	14.6	0.560	136.0	262.2	283.1	175.7	+24.7	–	–	–	64	L87
$N=--$	11.1	0.86	149.4	137	260.7	190.6	+13.7	–	–	–	64	GE (12.22)
$N=4$	14.4	0.541	139.4	265.0	283.3	175.2	+22.2	–	–	–	63.7	This work

HYD – “this.” Strong variation of  $q$  versus  $i$ . Values are for a cluster of orbits near the center of the range.

URS – The proper name is “Ursae Minorids.” The activity curve consists of two components with  $B=0.9 \pm 0.4$  (ZHR = 10) and  $B+=0.08 \pm 0.03/B- = 0.5 \pm 0.4$  (ZHR = 2.0), where  $B$  is the  $\log_{10}$  exponent of ZHR versus solar longitude.

N = 11	Inf.	0.580	134.0	259.6	282.0	175.8	+25.4	+0.88	-0.45	64.0	AC
N = 1	18.92	0.556	136.4	263.2	284.3	176.4	+23.5	-	-	63.75	JW
<b>#253</b>	<b>CMI</b>	<b>Dec. Canis Minorids</b>	<b>12/02-12/05</b>	<b>Dec. 03</b>	<b>Dec. 03</b>	<b>Dec. 03</b>	<b>252.4</b>	-	-	-	<b>Antihelion</b>
	Outburst										
(1988)	93 meteors plotted										
N = 1	1.38	0.08	39	154	77	111	+11	-	-	~54	Ch. 13
N = 1	3.79	0.08	36	149	80	109	+13	-	-	Swift	Ch. 13
<b>#254</b>	<b>PHO</b>	<b>Phoenicids</b>	<b>12/04-12/06</b>	<b>Dec. 05</b>	<b>Dec. 05</b>	<b>253</b>	<b>2.8 ± 1.5</b>	<b>&lt;3</b>			
	Outbursts (see Tab. 6k)										
Visual	2.96	0.99	13	359	74	15.6	-44.7	-	-	11.7	AC
<i>Parent</i>	<i>D/1819 W<sub>1</sub> (Blanpain)</i>		<i>(Epoch 1819-11-22)</i>				$\lambda_{\odot} = 249.80$	$T_J = +0.51$	$H_{10} = +8.5$		
(1819)	2.957	0.986	8,970	360,164	69,795	357.4	-42.0	-	-	10.06	0.0971
<i>Parent</i>	<i>2003 WY<sub>25</sub></i>		<i>(Epoch 2005-01-30)</i>				$\lambda_{\odot} = 252.25$	$T_J = +0.54$	$H_N = +20.88$		
(2005)	2.847	0.983	5,911	6,250	72,244	3.8	-26.6	-	-	9.15	0.0163
(1819)	2.993	0.889	9,23	349,65	80,020	347.9	-44.0	-	-	10.85	0.089
<b>#255</b>	<b>PUV</b>	<b>Puppids-Velids I</b>	<b>11/02-01/22</b>	<b>Dec. 06</b>	<b>Dec. 06</b>	<b>254.0</b>	<b>2.9</b>	<b>18 ± 3</b>	<b>4.5 ± 0.7</b>		<b>PJ</b>
		= core of Puppid-Velid Complex									
Visual											
N = 6	1.3	0.98	70	360	82.7	141.5	-45.0	+0.50	-0.20	36.8 ± 2.2	Mean
N = 3	1.1	0.98	75	361	82.7	145.5	-45.2	-	-	35.3	GE (12.07)
Visual				12/03-12/12		113.4	-45.2	-	-	37.4	GE (12.08)
Visual				12/03-12/04		118.4	-40.8	-	-	-	M (61)
<b>#14</b>	<b>(XOR)</b>	<b><math>\chi</math>-Orionids</b>	<b>12/01-01/5</b>	<b>Dec. 11</b>	<b>Dec. 11</b>	<b>≤259</b>	<b>≤259</b>	<b>(22)</b>	<b>(22)</b>	<b>(0.6)</b>	<b>M (65)</b>
<b>#256</b>	<b>ORN</b>	<b>Northern <math>\chi</math>-Orionids</b>	<b>12/01-01/5</b>	<b>Dec. 11</b>	<b>Dec. 11</b>	<b>≤259</b>	<b>≤259</b>	<b>(22)</b>	<b>(22)</b>	<b>(0.6)</b>	
		= Extension of NTA into Dec.									
N = 12	2.22	0.449	2.5	283.9	257.3	83.9	+25.5	+0.54	+0.00	24.9	This work
N = 7	2.271	0.417	3.3	286.6	254.2	82.1	+26.4	-	-	26.4	PG
N = -	2.185	0.523	4.0	275.0	261.7	82.8	+23.0	-	-	23.6	T89 (72)
N = 15	1.729	0.376	0.1	294.4	251.6	83.4	+23.4	-	-	26.2	ZS
N = 49	1.475	0.265	0.0	309.2	256.9	97.0	+23.3	-	-	28.7	ZS73
N = 4	2.216	0.472	2.5	281.0	259.0	83.8	+26.0	-	-	25.7	L71B
N = 4	2.22	0.47	2	281	258	84.8	+26.0	-	-	25.2	AC

PUV – Puppids-Velids – Name consists of two constellation names, both “-id”.

Table 7 (*cont.*)

December

Code	Name	$q$	$i$	$\omega$	Dates (2000)	Node	Peak R.A.	$\lambda_{\odot}^{\max}$ Decl.	$\chi$ $\Delta R.A./\Delta\lambda$	$W$ $\Delta\text{Decl.}/\Delta\lambda$	$ZHR^{\max}$ $V_g$	Notes $\Delta_{C-E}$
Parent? (2002)	2002 XM <sub>35</sub>				(Epoch 2002-12-02)							
	2.331	0.376	2.854	290.836	251.773	81.3	$\lambda_{\odot} = 251.77$ $+25.7$	$T_J = +2.96$	$H_N = +22.96$	28.31	0.0196	
<b>#257 ORS</b>	<b>Southern <math>\chi</math>-Orionids</b>			<b>12/01-01/16</b>		<b>Dec. 12</b>	<b>260</b>		(2.2)	(0.6)		
	= Extension of STA into Dec.											
$N = 12$	2.23	0.594	5.2	86.4	80.1	78.7	+15.7	+0.88	-0.03	21.5	This work	
$N = 6$	2.193	0.528	4.4	94.3	78.5	81.1	+17.6	-	-	23.3	PG	
$N = 8$	2.224	0.471	6.9	100.6	79.8	85.7	+16.0	-	-	23.1	L71B	
$N = 4$	1.85	0.56	4.6	93.7	79.3	80.7	+16.8	+1.3	-	21.5	NL (60.12.2)	
$N = 32$	1.790	0.420	2.6	109.0	78.2	87.8	+20.6	-	-	25.2	ZS73	
$N = 8$	2.1	0.47	7	101	79	85.7	+16.0	-	-	25.5	AC	
$N = 4$	1.64	0.38	15.7	114.3	78.3	91.6	+08.9	-	-	26.9	NL (60.12.3)	
<b>#4 GEM</b>	<b>Geminids</b>			<b>11/27-12/18</b>		<b>Dec. 14</b>	<b>262.08</b>		(2.0)	$0.90 \pm 0.10$	$120 \pm 10$	Ch. 22
	<i>Main peak:</i>											
$N = 221$	1.372	0.1410	24.02	324.42	261.49	113.2	+32.5	+1.02	-0.15	34.58	DMS	
$\sigma$	$\pm 0.033$	-	$\pm 1.29$	$\pm 0.91$	$\pm 0.30$	$\pm 0.69$	$\pm 0.24$	-	-	$\pm 0.61$		
Mean	1.357	0.1400	24.27	324.63	261.433	At peak in year 2000						
$\Delta/\Delta_{\odot}$	-1.9e-3	+1.0e-3	-0.13	-0.41	+1.00							
$\Delta/\text{yr}$	-7.0e-4	+2.1e-6	+9.7e-3	+7.8e-3	+6.8e-4							
$N = 19$	1.386	0.137	24.4	324.7	260.2	112.0	+32.6	-	-	35.0	PG	
	<i>Background component (radar):</i>											
$N = 48$	1.376	0.141	23.9	324.9	259.2	110.5	+32.9	+0.92	+0.07	34.63	This work	
$\sigma$	$\pm 0.12$	$\pm 0.009$	$\pm 2.1$	$\pm 1.2$	$\pm 1.7$	$\pm 0.76$	$\pm 0.36$	-	-	$\pm 0.80$		
$N = 118$	1.306	0.139	23.2	325.2	262.1	114.2	+32.1	-	-	34.0	ZS	
$N = 20$	1.30	0.13	18.2	327	261.7	112.8	+29.9	-	-	34.2	GE	
$N = 11$	1.19	0.14	16.4	325.7	260.1	110.2	+29.9	+1.1	-	32.5	NL (60.12.1)	
$N = 401$	1.31	0.14	24	326	260.7	111.8	+32.9	-	-	34.2	KL (51)	

Parent (2005)	3200 Phaethon 1.271	(Epoch 2005-08-18) 24.186	0.140	325.246	262.495	115.0	$\lambda_{\odot} = 262.50$ +32.4	$T_J = +4.51$	$H_N = +14.6$	33.92	0.0208
<b>#258</b>	<b>DAR</b>	<b>Dec. <math>\alpha</math>-Aurigids</b>		<b>12/14-12/31</b>	<b>Dec. 14</b>	<b>Dec. 14</b>	<b>262.2</b>	1.8	(7)	~1/10	
	Outburst? (1996)			1996 Dec. 13			262.218				
	N = 5	2.279	0.668	257.7	79.7	262.218	+43.1				T89
	N = --	2.365	0.694	253.6	84.9	270.0	+35.5				PG
	N = --	2.096	0.760	245.4	85.9	274.7	+42.0				T89 (77)
	N = 22	1.851	0.901	221.0	91.2	276.5	+62.0				T89 (78)
	N = 6	2.053	0.816	235.9	85.0	293.9	+58.3				ZS
<b>#259</b>	<b>CAR</b>	<b>Carinids</b>		<b>12/04-02/04</b>	<b>Dec. 16</b>	<b>Dec. 16</b>	<b>264</b>	3.0	(25)	14.2	ZS73
	Visual				$\lambda_{\odot} = 263.7$	129.0	-58.0			38.9 $\pm$ 2.5	Mean
	N = 4	2.94	0.91	323.7	76.9	155.3	-60.9			38.9	NL (60.12.7)
	N = 16	1.940	0.970	347.0	79.7	142.4	-54.2			39.0	JVF
	N = 3	1.89	0.98	340.5	77.2	143.6	-54.3			38.5	NL (61.12.6)
	N = 5	2.08	0.98	353.4	79.0	138.8	-53.1			39.1	NL (60.12.8)
	N = 7	2.205	0.970	344	82.7	135.6	-63.4			33.2	GE (12.06)
<b>#260</b>	<b>GTI</b>	<b><math>\gamma</math>-Triangulids</b>		<b>12/15-01/13</b>	<b>Dec. 24</b>	<b>Dec. 24</b>	<b>272</b>		(12)		
		= Dec. $\beta$ -Perseids									
	N = 3	2.545	0.926	212.0	273.0	43.3	+41.6			11.3	PG
	N = --	2.292	0.932	209.3	272.3	40.8	+32.2			10.5	T89 (76)
	N = 14	2.420	0.857	228.0	262.6	54.7	+25.2			12.8	L71B
<b>#261</b>	<b>DDC</b>	<b>Daytime <math>\delta</math>-Scorpiids</b>		<b>12/05-12/07</b>	<b>Dec. 06</b>	<b>Dec. 06</b>	<b>254</b>			(2)	<b>Helton</b>
		= ecliptic helion source									--
	N = 4	2.38	0.50	262.6	74.4	246.6	-26.3			25.3	NL (61.12.3)
	N = 3	2.27	0.43	255.4	79.5	248.8	-24.3			26.9	NL (60.12.5)
Parent? (2006)	2004 YD <sub>5</sub> 2.274	(Epoch 2006-03-06) 3.610	0.494	262.331	88.195	263.1	$\lambda_{\odot} = 268.24$ -27.4	$T_J = +0.39$	$H_N = +29.26$	24.89	0.0002
<b>#262</b>	<b>KLI</b>	<b>Daytime (<math>\kappa</math>-)Librids</b>		<b>12/08-12/12</b>	<b>Dec. 11</b>	<b>Dec. 11</b>	<b>259</b>			(2)	--
	N = 3	1.35	0.19	221.1	78.8	231.3	-20.8			31.9	NL (60.12.6)
	radar			235.7	235.7	19.2					ER55

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