Comet Prospects for 2008

2008 is a fairly good year with six comets likely to come within binocular range. 8P/Tuttle may even be within naked eye range at the beginning of the year. There are a further nine comets that should be within visual range for larger telescopes and many more for the CCD observers.

Theories on the structure of comets suggest that any comet could fragment at any time, so it is worth keeping an eye on some of the fainter periodic comets, which are often ignored. This would make a useful project for CCD observers. Perhaps the most spectacular example of such fragmentation is 73P/Schwassmann-Wachmann, which exhibited a debris string of over 60 components as it passed close to the Earth in May 2006. Ephemerides for new and currently observable comets are published in the *Circulars*, Comet Section Newsletters and on the Section, CBAT and Seiichi Yoshida's web pages. Complete ephemerides and magnitude parameters for all comets predicted to be brighter than about 21^m are given in the International Comet Quarterly Handbook; details of subscription to the ICQ are available on the Internet. A section booklet on comet observing is available from the BAA Office.

6P/d'Arrest makes its 19th observed return, and it is a good one with the comet reaching perihelion when near opposition. It was first observed by La Hire in 1678 and only four other periodic comets (Halley, Tempel-Tuttle, Swift-Tuttle and Ikeya-Zhang) have a longer observational interval. At previous good returns it has reached naked eye brightness, but orbital perturbations have increased the perihelion distance over the past few returns and predictions suggest that it is unlikely to get brighter than 9^m at this return. It should come within visual range in June and reaches perihelion just after opposition in August. It heads south and will become invisible to UK observers, but Southern Hemisphere observers will be able to follow it as it fades out of visual range in October. It spends June and July in Aquila, but rapidly heads south in August and is in Microscopium by the end of the month.

8P/Tuttle is likely to be one of the brighter objects for visual observers in 2008, unless there is an exciting new discovery. It could be a binocular or even naked eye object at the beginning of the New Year as it makes a close pass of the Earth at 0.25 AU. It begins the year in Pisces, but is rapidly heading south and UK observers will lose it after the third week of January. Southern Hemisphere observers should be able to follow it for another three months. The comet was discovered by Pierre Mechain in January 1790 from Paris, but the available observations were insufficient to compute an elliptical orbit and it was lost until a comet was discovered by Horace Tuttle at Harvard, USA in February 1858. When an accurate orbit was computed it was found to be identical to Mechain's comet and it has been observed at every return since 1871 except for a very unfavourable one in 1953. The most favourable returns are those with a perihelion in December, January or February. The orbit is quite stable, due to the high inclination and the value of the argument of perihelion, and it intersects the earth's producing the Ursid meteor shower which peaks on December 23. Rates at maximum are usually only 10 - 15 per hour, but strong displays of around 100 per hour occurred in 1945 and 1986; in both cases the parent comet was near aphelion.

Alphonse Borrelly discovered comet **19P/Borrelly** in 1904 from Marseilles, France, during a routine comet search with a 160mm refractor. It was put into its discovery orbit by an encounter with Jupiter in 1889, which only made minor changes, and subsequent returns slowly became more favourable. Despite having had several further moderately close approaches to Jupiter the orbit has only changed a little and the comet will next approach Jupiter in 2019. This will be its 14th observed return, with two poor ones having been missed. At its best return in 1987 it reached 7.5^{m}. This is not a particularly good one, and it will remain close to the Sun until perihelion. It slowly emerges into the morning sky, and observations of the comet should be possible from July onwards as the comet fades from 11^{th} magnitude.

29P/Schwassmann-Wachmann is an annual comet that has outbursts, which in recent years seem to have become more frequent and were more or less continuous in 2004. At many recent outbursts it has reached 12^{m}. It spends the first third of the year in Auriga before sinking into solar conjunction. It emerges into the morning sky of Gemini in August, and spends the last third of the year in Cancer. Unusually there is no opposition in 2008. The comet is an ideal target for those equipped with CCDs and it should be observed at every opportunity. It is again well placed this year and UK based observers should be able to follow it for much of the year.

Carl A Wirtanen discovered **46P/Wirtanen** at Lick in 1948. It is in a chaotic orbit, and its perihelion distance was much reduced due to approaches to Jupiter in 1972 and 84. It has been reported to outburst, but BAA data suggests that it was just rejuvenated after the perihelion distance was reduced. A December perihelion would give a close approach to the Earth, and as the present period is now less than 5.5 years this will be achieved in 2018, when the comet could reach 3^{rd} magnitude. This is a relatively good return with the comet reaching 9^{th} magnitude in the evening sky around the time of its February perihelion. The comet travels eastwards, not that far from the ecliptic, crossing to northern declinations in late January and crossing north of the ecliptic in early February. It should be possible to continue observations until May as it fades.

Leo Boethin discovered **85P/Boethin** visually with a 0.20-m reflector at Bangued, Abra, Philippines on 1975 January 4. The last return was the worst of the century and the comet was not recovered. The orbit is evolving in response to encounters with Jupiter and Saturn. The comet passed 0.046 AU from Jupiter in May 2007, in an encounter which made significant changes to the angular elements. The return at the end of 2008 is favourable and the comet could become visible in binoculars. It comes into visual range in August when it is near opposition, but initially remains too far south for UK observers, who should be able to pick it up in October. By then it is 10^{th} magnitude and steadily brightens perhaps reaching 7^{th} magnitude in the December evening sky. It is another near ecliptic comet and ends the year in Pisces.

Two periodic comets for 2009 come into visual range by the end of the year, however the second is poorly placed. Of these, **144P/Kushida** was discovered by Yoshio Kushida (his second discovery within a month) on Technical Pan 6415 film exposed on 1994 January 8.8 with an 0.10-m, f4.0 patrol camera at Yatsugatake South Base Observatory, Japan. The comet was 13^{m}, diameter 1-2' with a strong central condensation. It proved to be a short period comet with a period of 7.4 years and was found at a favourable opposition. With an aphelion just outside the orbit of Jupiter, it belongs to the Jupiter family of comets, and its most recent close approach to the planet

before discovery was just over 1 AU in 1960. A similar approach followed in 1995 on the outbound leg of its post discovery revolution. The comet was moved into something close to its present orbit in a close encounter with Jupiter in 1782. Since then encounters have been more distant and there have only been slow changes in the elements. This is a favourable apparition and the comet could reach 11th magnitude by the end of the year.

2003 K2 (P/Christensen) An object discovered by the Catalina sky survey on 2003 May 26.18 was quickly confirmed as cometary. It passed perihelion at 0.55 AU in April, but was intrinsically faint. It was visible in SWAN imagery and at brightest probably reached 10th magnitude; it seems likely that it was the same object as reported in SWAN imagery between April 5 to 19, but which was not confirmed visually due to low elevation and poor elongation from the Sun. An orbit by Marsden gives the period as 5.75 years, however the observed arc is relatively short. It should be recovered by Southern Hemisphere astrometric observers by October, but it will remain poorly placed for northern observers until after perihelion.

With sky surveys getting ever deeper, long period comets are being discovered a considerable time from perihelion, and several are likely to be visible in 2008. Some two months after John Broughton discovered asteroid **2006 OF_2 (Broughton)** it was found to show a coma, not altogether surprisingly given the provisional highly eccentric orbit. It should emerge from solar conjunction in 2008 June as a 12th magnitude object and peak at 11th magnitude in November. It is circumpolar for Northern Hemisphere observers when brightest during the autumn of 2008 and will remain visible until 2009 May.

2006 Q1 (McNaught) may reach 11th magnitude in July 2008, when it is at perihelion, however it is then a Southern Hemisphere object. By December, when it becomes visible from the UK, it will have faded to 13th magnitude.

2007 G1 (LINEAR) reaches perihelion at 2.7 AU in mid November 2008. The comet might come within visual range in March 2008, reaching 12th magnitude for Southern Hemisphere observers near the time of perihelion and remain visible into 2009.

2007 N3 (Lulin) reaches perihelion early in 2009, but should be observable by Southern Hemisphere observers during their 2008 winter at around 12th magnitude. UK observers will have to wait until the new year and it may reach 6th magnitude in February.

2007 W1 (Boattini) will be best observed from the Southern Hemisphere and should reach 6th magnitude around the time of perihelion. From the UK it will be best seen in early May, when it may have reached 8th magnitude, as it sinks into the evening twilight prior to perihelion. It will be a little brighter when it emerges into the morning sky in July, but fades quite rapidly.

2008 A1 (McNaught) begins the year as a Southern Hemisphere object and brightens, reaching 8th magnitude near the time of perihelion in September. It emerges into northern skies in October as an evening object and fading. Unfortunately it remains quite low in the evening sky.

The other periodic and parabolic comets that are at perihelion during 2008 are unlikely to become brighter than 13th magnitude or are poorly placed. Ephemerides for these can be found on the CBAT WWW pages. 25D/Neujmin has not been seen since 1927. Searches at favourable returns in the intervening period have failed to reveal the comet and it is possible that it is no longer active.

In addition to these, Seiichi Yoshida points out that a number of SOHO comets may return to perihelion in 2008. 2003 T12 (SOHO) was pointed out as a possibly short period comet in M.P.E.C. 2004-K33. Hirohisa Sato calculated a periodic orbit with a period of 4.3 years. Yoshida calculated the next return of this comet based on Sato's orbit, including perturbations as around 2008 Feb. 23. This return is very good, and the comet may be observable from the ground after perihelion passage, possibly as a visual object. It will probably be too faint to catch in the SOHO/LASCO images. Rainer Kracht linked the Kracht group members seen in 2002 with C/1996 X3-X5, and predicted their return in 2008 as follows: C/2002 N2 around 2008 Feb 12/13, C/2002 Q8 around 2008 May 12/13, C/2002 Q10 around 2008 May 16, C/2002 S4 around 2008 Jun 28, C/2002 S5 around 2008 Jun 30, C/2002 S7 around 2008 Jul 03/04 and C/2002 S11 around 2008 Jul 22/23. Zdenek Sekanina and Paul W. Chodas calculated a linked orbit of the Marsden group comet 1996 V2 = 2002 V5. Yoshida calculated the next return of this comet based on Sekanina and Chodas's orbit, including perturbations as around 2008 Nov. 9.

Looking ahead to 2009, 85P/Boethin will still be visible as a binocular object at the start of year and 2007 N3 (Lulin) is well placed in February. Reaching 9th magnitude over the summer, 22P/Kopff is the brightest of the periodic comets returning to perihelion, whilst 81P/Wild and P/Christensen (2003 K2) should both reach 10th magnitude.

Comets reaching perihelion in 2008

Comet	T	q	P	N	H_1	K_1	Peak m
McNaught (2005 L3)	Jan 16.0	5.59			3.0	9.7	14
8P/Tuttle	Jan 27.0	1.03	13.6	11	7.3	15.0	5
46P/Wirtanen	Feb 2.5	1.06	5.44	9	8.1	13.7	9
110P/Hartley	Feb 3.5	2.49	6.89	3	8.0	15.0	14
196P/Tichy (2008 C2)	Feb 7.2	2.14	7.34	1	13.5	10.0	19
44P/Reinmuth	Feb 18.3	2.11	7.07	9	10.5	15.0	15
P/Kowalski (2006 F1)	Feb 19.9	4.12	10.1	0	8.0	10.0	17
193P/LINEAR-NEAT (2007 U2)	Feb 20.5	2.16	6.74	1	12.0	10.0	18
SOHO (2003 T12)	Feb 23.1	0.46	4.3	1	16.0	15.0	11 ?
194P/LINEAR (2007 W2)	Feb 26.2	1.71	8.04	1	15.5	10.0	18
LINEAR (2007 Y1)	Mar 19.5	3.34			10.5	10.0	18
186P/Garradd (2007 B3)	Mar 20.5	4.26	10.6	2	7.5	10.0	17
113P/Spitaler	Mar 23.4	2.13	7.09	3	12.5	5.0	16
26P/Grigg-Skjellerup	Mar 23.7	1.12	5.31	18	12.0	40.0	13
D/Denning (1894 F1)	Apr 2.9	1.67	9.87	1	10.5	10.0	15 ?
16P/Brooks	Apr 12.6	1.47	6.14	15	9.0	15.0	13
139P/Vaisala-Oterma	Apr 19.4	3.40	9.60	2	7.0	15.0	17
Siding Spring (2007 K3)	Apr 21.8	2.05			9.5	10.0	14
124P/Mrkos	Apr 27.2	1.47	5.75	3	13.1	15.0	14
11P/Tempel-Swift-LINEAR	May 4.6	1.55	6.31	5	15.0	10.0	19
183P/Korlevic-Juric (2006 Y1)	May 9.1	3.89	9.56	1	13.0	10.0	17
McNaught (2007 Y2)	May 18.2	4.13			9.0	10.0	18

LINEAR (1998 VS_{24})	May 18.3	1.06	4.85	1	16.5	5.0	18
173P/Mueller	May 18.5	4.21	13.6	1	7.5	10.0	16
86P/Wild	May 20.0	2.30	6.91	4	8.5	15.0	15
146P/Shoemaker-LINEAR	May 21.4	1.42	8.08	2	15.0	10.0	18
148P/Anderson-LINEAR	May 22.7	1.70	7.07	2	17.0	5.0	20
Gibbs (2007 T5)	May 24.4	4.05			8.0	10.0	17
P/LINEAR (2003 KV_2)	May 24.7	3.42	9.60	1	11.0	10.0	19
180P/NEAT (2006 U3)	May 26.7	2.47	7.53	2	11.0	10.0	16
79P/du Toit-Hartley	May 28.4	1.23	5.28	4	14.0	15.0	15
LINEAR (2007 W3)	Jun 2.8	1.78			12.0	10.0	15
Spacewatch (2006 U6)	Jun 5.5	2.50			8.0	10.0	14
P/LINEAR (2008 A2)	Jun 12.9	1.31	5.69	0	15.5	10.0	17
51P/Harrington	Jun 19.4	1.69	7.13	6	10.0	20.0	16
15P/Finlay	Jun 22.6	0.97	6.50	13	12.0	10.0	13
Boattini (2007 W1)	Jun 24.9	0.85			9.5	10.0	6
McNaught (2006 Q1)	Jul 3.8	2.76			5.0	10.0	11
33P/Daniel	Jul 20.4	2.17	8.10	9	10.5	20.0	20
19P/Borelly	Jul 22.3	1.35	6.85	13	7.0	12.7	13
P/LONEOS (2001 R1)	Aug 5.2	1.35	6.45	1	14.0	10.0	17
LINEAR (2007 U1)	Aug 7.3	3.33			9.0	10.0	16
McNaught (2007 M1)	Aug 12.2	7.47			6.0	10.0	19
6P/d'Arrest	Aug 15.0	1.35	6.54	18	10.0	20.0	9
Skiff (2007 B2)	Aug 20.9	2.97			6.0	10.0	13
P/Larson (2007 R1)	Aug 25.6	4.35	14.8	0	8.0	10.0	17
P/Larsen (1997 V1)	Aug 27.4	3.27	10.9	1	9.0	10.0	16
61P/Shajn-Schaldach	Sep 6.1	2.11	7.05	6	10.0	10.0	15
D/Giacobini (1896 R2)	Sep 9.9	1.53	6.66	1	10.0	10.0	11 ?
Broughton (2006 OF_2)	Sep 15.7	2.43			5.5	10.0	11
147P/Kushida-Muramatsu	Sep 23.0	2.76	7.43	2	14.0	10.0	20
7P/Pons-Winnecke	Sep 26.6	1.25	6.36	22	10.0	15.0	15
McNaught (2008 A1)	Sep 29.5	1.08			6.5	10.0	8
187P/LINEAR (2007 E3)	Oct 6.3	3.69	9.40	1	9.0	10.0	17
P/LINEAR (2001 CV_8)	Oct 11.3	2.16	7.66	1	13.0	10.0	18
172P/Yeung	Oct 12.8	2.24	6.58	2	13.0	10.0	18
25D/Neujmin	Oct 15.0	1.27	5.39	2	10.5	10.0	13 ?
P/NEAT (2001 J1)	Nov 6.8	0.94	7.67	1	16.0	10.0	16
SOHO (2002 V5)	Nov 9	0.05	5.99	2			8 ?
P/Catalina (1999 XN_{120})	Nov 12.5	3.30	8.57	1	13.5	5.0	18
LINEAR (2007 G1)	Nov 16.2	2.65			5.5	10.0	12
150P/LONEOS	Nov 26.0	1.77	7.68	3	13.5	10.0	17
Catalina (2007 M2)	Dec 8.4	3.54			8.0	10.0	16
P/LINEAR-NEAT (2001 TU_{80})	Dec 9.6	1.94	7.02	1	14.0	10.0	17
85P/Boethin	Dec 16.4	1.15	11.5	2	6.5	20.0	7
57P/du Toit-Neujmin-Delporte	Dec 26.0	1.72	6.41	6	12.5	15.0	18

The date of perihelion (T), perihelion distance (q), period (P), the number of previously observed returns (N), the magnitude parameters H_1 and K_1 and the brightest magnitude (which must be regarded as uncertain) are given for each comet. The date of return of D/Denning and D/Giacobini must be regarded as highly uncertain, whilst 25D/Neujmin has not been seen since 1927.

Note: $m_1 = H_1 + 5.0 * \log(d) + K_1 * \log(r)$

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