Comet Prospects for 2013

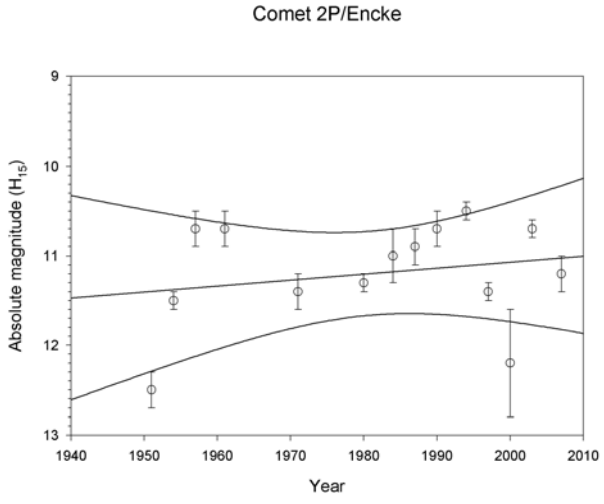
2013 has the prospect of two naked eye comets, but shows little promise for the return of periodic comets. Only two periodic comets are likely to be readily visible, but one is 2P/Encke, which returns for the 62nd time of observation and should be a binocular object. To make up for the lack of periodic comets there are several parabolic comets, and two of these may become the brightest comets for several years.

This draft version was last updated with elements and magnitude parameters from 2012 September 25. This version is likely to be printed in the December Journal, and an updated one will appear in the Section Newsletter in 2013 January. [Omit this paragraph in the Journal.]

These predictions focus on comets that are likely to be within range of visual observers. Members are encouraged to make visual magnitude estimates, particularly of periodic comets, as long term monitoring over many returns helps understand their evolution. Guidance on visual observation and how to submit estimates is given in the BAA Observing Guide to Comets. Drawings are also useful, as the human eye can sometimes discern features that initially elude electronic devices.

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 comets, which are often ignored. They would make useful targets for CCD observers, especially those with time on instruments such as the Faulkes telescope. CCD observers are encouraged to report total magnitude estimates, using the format given in the BAA Guide. When possible use a waveband approximating to Visual or V magnitudes. Such estimates can be used to extend the visual light curves, and hence derive more accurate absolute magnitudes.

In addition to those in the BAA Handbook, ephemerides for new and currently observable comets are published in the *Circulars*, 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. The BAA Observing Guide to Comets is available from the BAA Office; a new edition is planned for 2013.



This year sees comet **2P/Encke's** 62nd observed return to perihelion since its discovery by Mechain in 1786. The orbit is quite stable, and with a period of 3.3 years apparitions repeat on a 10-year cycle. This year the comet is well seen from the Northern Hemisphere prior to perihelion, which is in late November. The comet brightens rapidly during September and could be visible in large binoculars by the

end of the month. It crosses from the evening to the morning sky through October and will sink into the morning twilight by mid November, when it could be 6th magnitude. This magnitude may however be optimistic as observations from the SOHO spacecraft in 2000 showed that it suddenly brightened after perihelion, by which time it will be at a poor elongation. A possible explanation for this behaviour is that Encke has two active regions, an old one with declining activity, which operates prior to perihelion and a recently activated one present after perihelion. There is, however, little evidence for a secular fading in the archive of BAA observations of the comet. The comet is the progenitor of the Taurid meteor complex and may be associated with several Apollo asteroids.

29P/Schwassmann-Wachmann is an annual comet that has outbursts, which over the last decade seem to have become more frequent. The comet had one of its strongest outbursts yet recorded in early 2010. The comet is an ideal target for those equipped with CCDs and it should be observed at every opportunity. The comet begins the year in Virgo, and completes its retrograde loop on the border with Hydra by mid summer. It ends the year in nearby Libra. The comet is at opposition towards the end of April and passes through solar conjunction early in November.

154P/Brewington makes its third return since its discovery by Howard J Brewington of Cloudcroft, New Mexico, as a small diffuse 10^m object on 1992 August 28.41 using a 0.40-m reflector x55. This was his fourth discovery and his second periodic one. The comet is in a Jupiter crossing orbit, but has not approached the planet for several revolutions. At a really favourable return it could reach 7^m, but at this return it will only reach 10th magnitude, although it is conveniently placed. Observers located in the UK should pick it up as a 12^m object in the August morning sky, although Southern Hemisphere observers may find it a couple of months earlier. By October it could be 10^m and has moved to the evening sky. It is at its brightest around the time of the new moon in early November, when it is on the border of Aquarius and Pegasus. By the end of the year it has faded to 11th magnitude, but remains well placed in the evening sky.

2011 F1 (LINEAR) reaches 10th magnitude at perihelion, but it is then poorly placed for observation. It is observable from the UK in the evening from July to early October as it slowly brightens from 12th magnitude. After perihelion it slowly emerges from conjunction for Southern Hemisphere observers.

2011 L4 (PanSTARRS) is raising some excitement in the blogosphere, however comet brightness is notoriously difficult to predict. At the time of writing there is a 20 magnitude uncertainty range in the peak brightness, but at worst it is likely to be at least 4th magnitude and could be as bright as Venus. It will not be visible from the UK prior to perihelion, but some Southern Hemisphere locations may find it as a binocular object early in the year. After perihelion in March it rapidly emerges into our evening sky in Pisces when it could be a naked eye comet with a 10° tail. By April it is visible all night, and is still a binocular object. It fades relatively quickly and by the end of June a telescope will be needed.

2012 F6 (Lemmon) will be best seen from the Southern Hemisphere. It could come into visual range at the end of 2012, and will reach around 9th magnitude near the time of perihelion in March. It is poorly placed after perihelion, but UK observers may get it in June, when it is 13th magnitude and fading rapidly.

2012 K5 (LINEAR) is at perihelion in 2012 November, and then passes 0.3 AU from the Earth at the end of 2012 December. It is well placed for Northern Hemisphere observation and is circumpolar around the time of closest approach when it may reach 7th magnitude, though the magnitude is very uncertain. It passes some 4° from M37 around 2013 January 3/4, but it then fades rapidly, though should still be in visual range all month.

2012 S1 (ISON) is a Sun-skirting comet and has perihelion at 0.013 AU at the end of November. It should emerge from solar conjunction in September as an 11th magnitude object in the morning sky. It remains in the morning sky, reaching a maximum elongation of 54° towards the end of October, and continues to brighten. It should be a naked eye object by the time it approaches conjunction in late November. It rapidly rounds the Sun and emerges back into the morning sky in early December., becoming visible in the evening sky from mid month. There is a possibility that the tail may be seen in the morning sky from November 30. The comet rapidly moves north, passing only 4° from the pole in early January 2014, when it may still be a naked eye object. Because the comet passes close to the Sun, there is a possibility that it may become very bright. The current magnitude formula gives a peak of -13 around midnight UT on November 28/29, when it is less than a degree from the Sun. It might be visible in daylight from the UK on November 28 or 29 when it could be -6, but at only 3° elongation. The comet passes close to Spica on November 18, and five degrees from M13 on December 22.

The other periodic and parabolic comets that are at perihelion during 2013 are unlikely to become brighter than 12th magnitude or are poorly placed. Ephemerides for these can be found on the CBAT WWW pages. One D/ comet has predictions for a return, though searches at favourable returns in the intervening period have failed to reveal the comet and its orbit has been perturbed by Jupiter to give a larger perihelion distance. There is however always a chance that it will be rediscovered accidentally by one of the Sky Survey patrols. Several SOHO comets are predicted to return, however these will only be visible from the SOHO or STEREO satellites.

Looking ahead to 2014, the prospects for periodic comets are even worse, with the most interesting object being 2004 CB, which could reach 11th magnitude when it passes 0.05 AU from the earth in May. 2012 K1 (PanSTARRS) may reach 6th magnitude after its August perihelion, but is unfortunately a morning object.

Comets reaching perihelion in 2013

Comet	T	q	P	N	H_1	K_1	Peak mag
LINEAR (2011 F1)	Jan 8.0	1.82			6.6	5.2	10
259P/Garradd (2008 R1)	Jan 25.5	1.80	4.51	1	15.5	10.0	20
246P/NEAT (2010 V2)	Jan 28.7	2.88	8.08	1	2.5	15.0	12
111P/Helin-Roman-Crockett	Jan 30.7	3.70	8.49	3	5.0	20.0	19
P/LINEAR (2000 R2)	Feb 2.4	1.46	6.13	1	18.0	10.0	21
McNaught (2012 C1)	Feb 4.9	4.83			7.5	10.0	18
133P/Elst-Pizarro	Feb 9.0	2.65	5.62	5	12.0	10.0	18
125P/Spacewatch	Feb 17.0	1.53	5.53	4	15.5	10.0	19
120P/Mueller	Feb 22.4	2.73	8.39	3	12.0	10.0	19

P/Kowalski (2007 T2)	Feb 25.6	0.69	5.43	1	18.5	10.0	18
P/NEAT (2004 F1)	Feb 28.2	2.42	9.36	1	16.0	5.0	19
91P/Russell	Mar 1.2	2.62	7.70	4	7.5	15.0	15
PanSTARRS (2011 L4)	Mar 10.2	0.30			-1.0	15.5	-5?
P/Christensen (2006 S1)	Mar 17.0	1.36	6.53	1	17.5	10.0	21
256P/LINEAR (2012 B2)	Mar 17.4	2.69	9.96	1	14.0	5.0	17
Lemmon (2012 F6)	Mar 24.4	0.73			10.0	10.0	9
197P/LINEAR	Mar 24.9	1.06	4.85	2	16.5	5.0	17
PanSTARRS (2012 F2)	Apr 10.6	2.90	15.8		12.0	10.0	18
63P/Wild	Apr 10.8	1.95	13.2	3	12.0	10.0	15
P/SOHO (2002 R4 = 2007 Y4)	Apr 13.5	0.05	5.31	2			
76P/West-Kohoutek-Ikemura	May 7.7	1.60	6.47	5	8.0	30.0	16
LINEAR (2012 L2)	May 9.0	1.50			10.0	10.0	13
114P/Wiseman-Skiff	May 13.9	1.57	6.67	4	11.5	15.0	16
LINEAR (2010 S1)	May 20.3	5.90			3.5	10.0	15
McNaught (2012 K6)	May 21.2	3.37			8.5	10.0	16
P/LINEAR (2010 A2)	May 23.1	2.00	3.47	1	15.5	10.0	20
175P/Hergenrother	May 23.6	1.95	6.34	2	14.0	10.0	17
P/SOHO (2002 R1 = 2008 A3)	Jun 1.1	0.05	5.37	2			
257P/Catalina (2012 F4)	Jun 4.4	2.13	7.27	1	11.5	10.0	16
P/LINEAR (2005 YQ_{127})	Jun 5.8	1.91	7.59	1	14.0	10.0	19
112P/Urata-Niijima	Jun 24.3	1.46	6.64	4	14.0	15.0	18
P/LINEAR (2003 U2)	Jun 29.0	1.69	9.52	1	15.0	10.0	19
26P/Grigg-Skjellerup	Jul 6.0	1.09	5.24	19	12.0	40.0	14
P/Gehrels (1997 C1)	Jul 8.2	3.60	18.0	1	8.0	10.0	16
46P/Wirtanen	Jul 9.4	1.05	5.43	10	8.5	20.5	11
178P/Hug-Bell	Jul 23.1	1.93	7.03	2	13.5	10.0	18
84P/Giclas	Jul 23.2	1.84	6.94	6	9.5	20.0	16
PanSTARRS (2012 B1)	Jul 23.3	3.83	16.5		9.0	10.0	17
184P/Lovas	Jul 28.5	1.39	6.61	2	14.0	10.0	15
P/McNaught (2006 K2)	Aug 2.7	2.10	7.12	1	14.0	10.0	18
98P/Takamizawa	Aug 5.4	1.67	7.43	4	11.5	15.0	15
79P/du Toit-Hartley	Aug 23.3	1.12	5.06	5	14.0	15.0	16
266P/Christensen (2012 P1)	Aug 31.6	2.33	6.64	2	12.0	10.0	17
102P/Shoemaker	Sep 1.0	1.97	7.22	4	8.0	15.0	13
121P/Shoemaker-Holt	Sep 8.3	3.75	9.94	3	4.5	15.0	15
P/SOHO (2002 Q8 = 2008 E4)	Sep 10.5	0.05	5.52	2			
P/SOHO (2002 S11 = 2008 G6)	Oct 26.9	0.05	5.53	2			
83D/Russell	Nov 7.4	2.14	7.53	2	12.0	10.0	18
P/Christensen (2007 C1)	Nov 16.2	2.19	6.80	1	15.0	10.0	20
2P/Encke	Nov 21.7	0.34	3.30	61	10.0	8.8	6
P/McNaught (2005 L1)	Nov 24.6	3.16	7.96	1	9.5	10.0	16
ISON (2012 S1)	Nov 28.9	0.01			6.0	10.0	-13 ?
PanSTARRS (2012 A1)	Dec 2.8	7.60			6.0	10.0	19
P/Larsen (2004 H2)	Dec 11.6	2.64	9.63	1	13.5	10.0	20
154P/Brewington	Dec 12.2	1.61	10.8	2	7.0	15.0	10
P/NEAT (2003 S1)	Dec 16.1	2.59	9.71	1	11.5	10.0	17
87P/Bus	Dec 19.6	2.10	6.38	5	10.0	15.0	17
LINEAR (2011 J2)	Dec 25.9	3.45			6.0	10.0	14

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 magnitudes, orbits, and in particular the time of perihelion of the D/ comets, are uncertain.

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

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Jonathan Shanklin