The brighter comets of 2007

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A report of the Comet Section (Director [1990–2015]: J. D. Shanklin)

This report describes and analyses the observations of the brighter or more interesting comets discovered or at perihelion during 2007, concentrating on those with visual observations. Magnitude parameters are given for all comets with observations. Information on other comets seen during the year may be found on the Section Web page.

Introduction

Two hundred and thirty two comets were assigned year designations and eighteen previously numbered periodic comets returned to perihelion. 176 comets were discovered from the SOHO satellite; of these 155 were members of the Kreutz group, ten were members of the Meyer group, one of the Marsden group, two of the Kracht group and eight were not associated with any known group. There were two amateur discoveries (2007 E2 and K5) for which Terry Lovejoy gained the Edgar Wilson Award. Twelve periodic comets were numbered. Three comets were reported as visible by the naked eye during the year.

Orbital elements for all the comets discovered and returning during the year can be found on the JPL Small-Body Database Browser,[1] which will also generate ephemerides. Discovery details and some information for the other comets found or returning during the year are available on the Section Web pages,[2] which also contain links to additional background information. The raw visual observations for the year are on the Section Web pages in ICQ format. Additional images of the comets are presented in the Section image archive.[3]

The comets given a discovery designation

2007 E2 (Lovejoy)

Terry Lovejoy discovered a 10th magnitude comet on March 15.73, using a Canon 350D DSLR with 200mm f2.8 lens. Sixteen 90s stacked images showed the comet with strong central condensation and a green 4' coma. Visual estimates put it slightly brighter. The comet was near perihelion at 1.1 au, but was approaching the Earth and brightened for another month, perhaps reaching mag 7 in late April.

Figure 1. Discovery image of 2007 E2. *(©Terry Lovejoy)*

This was the first comet discovery with a DSLR. Terry provided this information to the Comets Mailing List:

I use two Digital SLR cameras to image the sky, then process the images using IRIS and then examine them using the blink technique on a computer monitor. After a very intense search effort in 2006 without success (one near miss with 2006 M4), I had wound back my efforts in 2007 (partly because of 2006 P1 and partly because of fatigue!). March 15 was only the second time this year I had done any searches in the morning sky. While downloading images from the camera on March 15 I noticed a cometary object at the edge of 16 raw images centred at RA 20h57m Dec –51d 18m, made between 17h22m and 17h46m UT. Normally, the raw unprocessed images show only the brightest objects so I was very surprised that this could be an undiscovered comet. At first I thought it was simply a bright deep sky object, but after processing the intense telltale green hue and general morphology strongly suggested a comet. Additionally, when I blinked the processed images it showed small but clear motion. Astrometry quickly revealed no known object in that location. At this point I was very sure I had something :)

The following day there was an agonising wait for comet-rise (about midnight from my location) and I notified a number of people for follow-up observations. John Drummond being located further east had the first opportunity to see the comet. Sure enough John phoned me to confirm the existence of the comet around 11pm local time. It is the first time I have spoken to John and what a way to introduce yourself! Dan Green contacted me

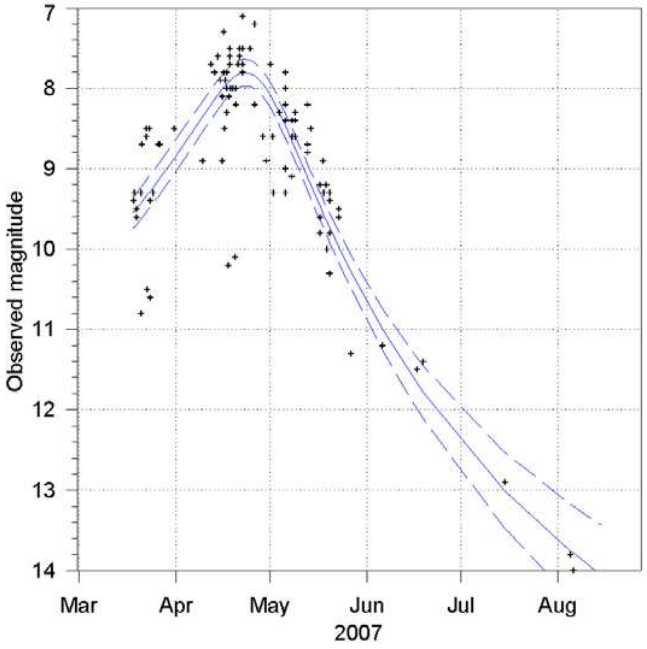

Figure 2. The lightcurve of 2007 E2 (Lovejoy). The dashed lines indicate the 99% confidence limits.

late on March 16 UT to advise me that the comet had been announced, but as per standard procedure the comet would not be named until an orbit was calculated and it was determined that the comet was not an existing named one.

All told I estimate I have examined about 1000 image fields since late 2004, which would equate to about 1000 hours (it takes me 10 minutes to actually examine an image, but there are other time consuming tasks like setup/development/identifying suspect objects, etc). Unfortunately I don't keep records on time taken and images examined.

Rob McNaught informs me that unusually cloudy weather has severely hampered coverage of the Siding Springs survey. Additionally, I also checked SWAN this morning and the last posted image is February 18. Moonlight probably explained why visual observers hadn't got to the comet first.

2007 F1 (LONEOS)

A 19th magnitude asteroidal object discovered by LONEOS on March 19.26 with the 0.59m Schmidt, and posted on the Near Earth Object Confirmation Page (NEOCP) was shown to have cometary characteristics by many observers including Peter Birtwhistle (UK) and Giovanni Sostero *et al*. Images by Michael Jaeger and Gerald Rhemann on Sep 14 suggested that it was around 11th magnitude, roughly a magnitude brighter than expected. Within a week a few visual observations were suggesting that it might have brightened to 9.5. Martin McKenna, observing from Northern Ireland on the evening of Oct 3 with a 22cm Dobsonian, estimated the comet at around 7.5, noting that it was strongly condensed with a 3' coma. Jonathan Shanklin observed it on October 15.77 with 20×80B, noting a strongly condensed coma and a total magnitude of 6.7. The comet was brightest towards the end of the month – Guy Hurst observing on Oct 23.76 made it mag 5.7 in 15×80B. Observers reported a short tail from the well condensed nucleus. There is some evidence for a period of more rapid fading in early November, which may explain why the observations are best fitted by a linear lightcurve, peaking just over a week before perihelion.

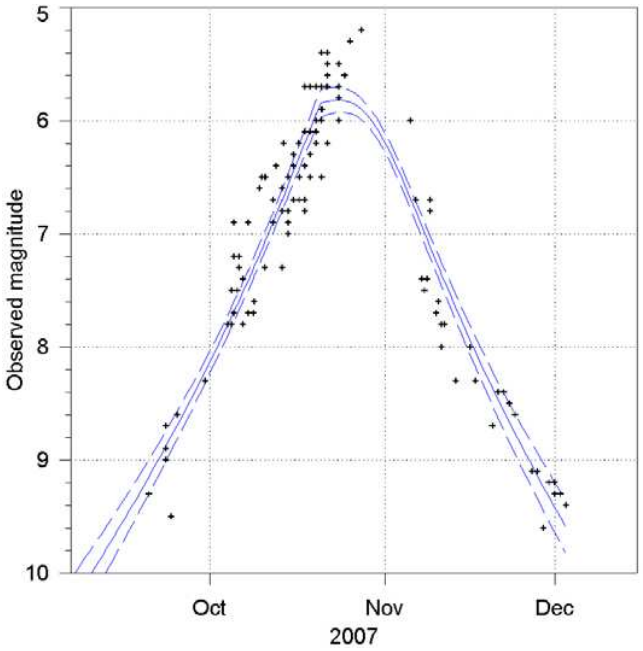

Figure 3. The lightcurve of 2007 F1 (LONEOS)

2007 K5 (Lovejoy)

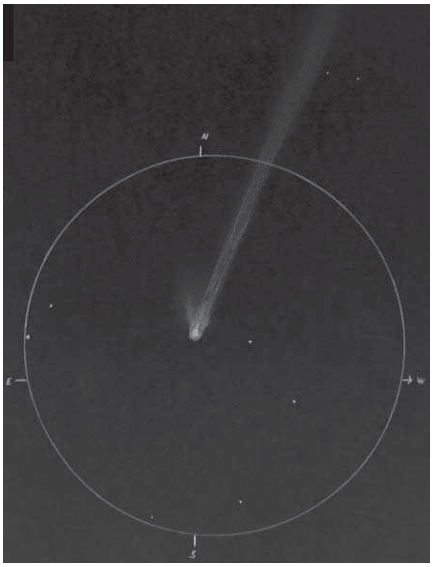

Figure 4. 2007 F1 (LONEOS) drawn by Martin McKenna on 2007 October 17.

Terry Lovejoy discovered a second comet using the Canon 350D DSLR with 200mm f2.8 lens on May 26.34, of 13th magnitude. Twelve 90s stacked images showed the comet as circular, 1' across, with a clear blue-green colour but no tail. The comet was just past perihelion at around 1.1 au, and was in an orbit with a period around 300 years. Terry provides the following information on the discovery:

'This particular comet (designated C/2007 K5) was found as a small, faint but still rather obvious blue-green haze in my images from the evening of May 26. My initial estimate is mag 13, but I admit I have not attempted more precise photometry and visually the comet could well be brighter. Interestingly the discovery was made during a bright waxing moon and in the evening sky where moderate light pollution prevails. On the evening I had both cameras (a Canon 300D + Canon 350D) mounted the usual way with the 300D pointed towards –18 declination and the 350D pointed towards declination –11. This allows me to image a 13 degree wide sweep of sky from west to east. Some 12 individual starfields were covered with both cameras, with 12 sub-exposures of 90 seconds for each starfield.

The following day, I downloaded the images from my 300D and ran them through the usual automated processing steps (IRIS is used for this). This processing step outputs 2 images per starfield effectively separated by 10 minutes so that moving objects like comets can be identified. By 'blinking' the 2 images one can see objects like asteroids and comets bobbing backwards and forwards. On examining the first image I almost immediately noticed

Figure 5. 2007 F1 (LONEOS) imaged by Richard Miles on 2007 Oct 23.

a moving small hazy object with a distinctive blue green colour typical of many comets. I knew I had something for sure, and notified a number of others for confirmation of a possible comet.

Confirmation came on May 28 when both John Drummond and I made follow-up observations, which were then sent to Dan Green at CBAT. Further follow-up was obtained on May 29 by Rob McNaught before an official circular (IAUC 8840) announced the new comet as C/2007 K5. Interestingly, C/2007 K5 required less than 20 hours of actual searching in contrast to the estimated 1400 hours for C/2007 E2.

The comet itself appears to be quite faint, and will probably remain that way, but a comet none-the-less. Further astrometry is required to calculate an orbit and once this is done the comet will be named.'

No visual or electronic magnitude observations were received.

2007 N3 (Lulin)

An apparently asteroidal object of 19th magnitude was discovered by Quanzhi Ye, a student at Sun Yat-sen University (Guangzhou, China), in images acquired on July 11.78 by Chi Sheng Lin (Institute of Astronomy, National Central University, Jung-Li, Taiwan) with the 0.41-m f/8.8 Ritchey–Chretien reflector in the course of the Lulin Sky Survey. It was found to show marginal cometary appearance in CCD images taken by J. Young with the Table Mountain 0.61-m reflector. Quanzhi Ye has also discovered a number of SOHO comets. This was the first discovery of a comet from Taiwan. The Lulin Sky Survey is a non- professional co-operative project between China and Taiwan.

The comet became sufficiently bright for visual observation through large telescopes by 2008 May and was being observed in large binoculars by the end of October. It entered solar conjunction and passed through the SOHO C3 field between Nov 17 and Dec 4. It should then have been around 7th magnitude to visual observers, but was clearly fainter than this. However Michael Mattiazzo did locate the mag 9 nuclear condensation in C3 images from Dec 1. It emerged from conjunction for near equatorial observers around Dec 15, rapidly moving into the morning sky.

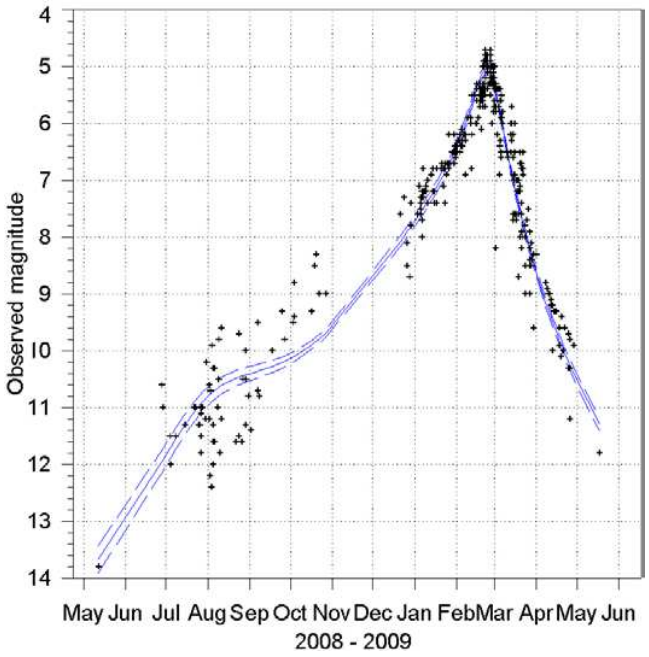

Figure 6. The lightcurve of 2007 N3 (Lulin).

An observation by Juan Jose Gonzalez Suarez on Dec 21.3 made it mag 7.6 in 25×100B, rather fainter than expected from the pre-conjunction lightcurve. By Christmas it was visible to observers between 50°N and 40°S and became visible to UK observers in early 2009. It was a naked eye object in 2009 February, but faded fairly quickly.

Michael Mattiazzo pointed out:

'We are observing comet 2007 N3 (Lulin) 'edge-on'. The orbital inclination of the comet is 178°, i.e. virtually in the same orbital plane as the Earth. This means from Earth's perspective, we will observe the comet edge-on throughout the apparition! The effect of this is to enhance the surface brightness of the comet and its dust tail. Take the deep sky example of an edge-on galaxy

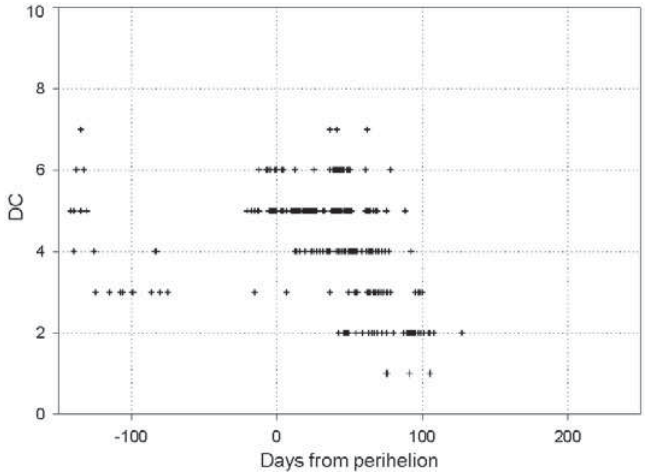

Figure 7. The DC of 2007 N3 (Lulin).

Table 1. Photometric observers, 2007

James Abbott, Witham, Essex
Alexandre Amorim, Brazil
Sandro Baroni, Italy
Alexandr R. Baransky, Ukraine
Nicolas Biver, Hawaii
Neil Bone, Chichester, W. Sussex
Reinder J. Bouma, The Netherlands
Denis Buczynski, Scotforth, Lancs.
Tim Cooper, Bredell, South Africa
Matyas Csukas, Romania
Haakon Dahle, Norway
Jose G. de Souza Aguiar, Brazil
James Fraser, Alness, Rossshire
David Frydman, London
Michael J. Gainsford, England
Antonio Giambersio, Italy
Franck Gobet, France
Marco Goiato, Brazil
J. J. Gonzalez, Asturias, Spain
Bjoern Haakon Granslo, Norway
Stephen Getliffe, Haverhill, Suffolk
Jane Gifford, Maidenhead, Berkshire
Massimo Giuntoli, Italy
Virgilio & Mario Gonano, Italy
Werner Hasubick, Germany
Colin Henshaw, Saudi Arabia
Guy M. Hurst, Basingstoke, Hants.
Michael Hezzlewood, Burnley
Geoff Honeyball, Hook, Hants.
Albert F. Jones, New Zealand
Andreas Kammerer, W. Germany
Mark Kidger, Canary Islands
A. Kamiya, Japan
Carlos Labordena, Spain
Martin Lehky, Czech Republic
Des Loughney, Edinburgh
Vsevolod Lozitsky, Ukraine
Luis Mansilla, Argentina
Jose Carvajal Martinez, Spain
Michael Mattiazzo, Australia
Yutaka Maeda, Japan
Artyom Novichonok, Russia
Martin Nicholson, Daventry
John O'Neill, Co Dublin, Ireland
Roy W. Panther, Northampton
Mieczyslaw Paradowski, Poland
Gary Poyner, Birmingham
Jan Qvam, Borrevannet, Norway
Stuart T. Rae, New Zealand
Walter Robledo, Argentina
Juan M. San Juan, Spain
Toni Scarmato, Italy
Jonathan Shanklin, Cambridge
Oddleiv Skilbrei, Norway
Willian C de Souza, Brazil
David Storey, Oxfordshire
Sergey Shurpakov, Belarus
David Tivey, Basingstoke, Hants.
Yasunori Watanabe, Japan
Seiichi Yoshida, Japan
Mauro Vittorio Zanotta, Italy

Note: This list (and Table 2) does not include all of the many people who submitted descriptions and images of 17P/Holmes when it outburst.

being more readily observable than one that is face-on.

Recently posted images are displaying the sharp sunward pointing dust tail (anti-tail) in PA 100, along with the ion tail at PA 280. The dust tail should remain at approximately PA 100 to 110 and appear as a sharply defined 'needle-like' appendage. Since most of the dust particles are released in the comet's wake, the dust tail will rapidly lengthen after Lulin's flyby of the Earth on February 24, length uncertain but perhaps a few degrees long. The ion tail however will appear considerably shortened, since it will be pointing directly away from the Sun when the comet is located at opposition on February 26.'

Peter Bus noted:

'In the period 2009 February 24–March 4, C/2007 N3 (Lulin) reaches a near backward scattering geometry (phase angle <10°, with a minimum of 0.1° (!) on February 26.3). Using a linear phase coefficient of beta= 0.02, a maximum brightening of about 0.6 magnitudes on February 26 is possible. In a moonless dark sky, there are good opportunities for photometric measurements. The so-called opposition effect, mainly observed between scatter angle 173 and 180° for the moon and asteroids, is unlikely.'

Prior to opposition the comet showed a spectacular anti-tail, extending up to 1.5°. The gas tail showed a rapid disconnection on Feb 4. The mean lightcurve suggests a peak magnitude of around 5.0, and whilst some observations are up to half a magnitude brighter at the end of February, others are equally fainter, so there is no clear evidence for strong back-scattering. After opposition the comet faded quite rapidly and the tail was not seen after late March.

The comet shows a slightly unusual pattern of degree of condensation (DC), being well condensed when first in visual range and becoming more diffuse. It was strongly condensed at perihelion and became steadily more diffuse afterwards, but during the potentially interesting transition period prior to perihelion it was in conjunction. The lightcurve also seems to show differences in behaviour before and after conjunction, so either the comet experienced some form of change in activity during this period, or exhibited strong seasonal effects. The coma diameter however, once corrected for the distance from the Earth, shows no clear variation during the course of the apparition.

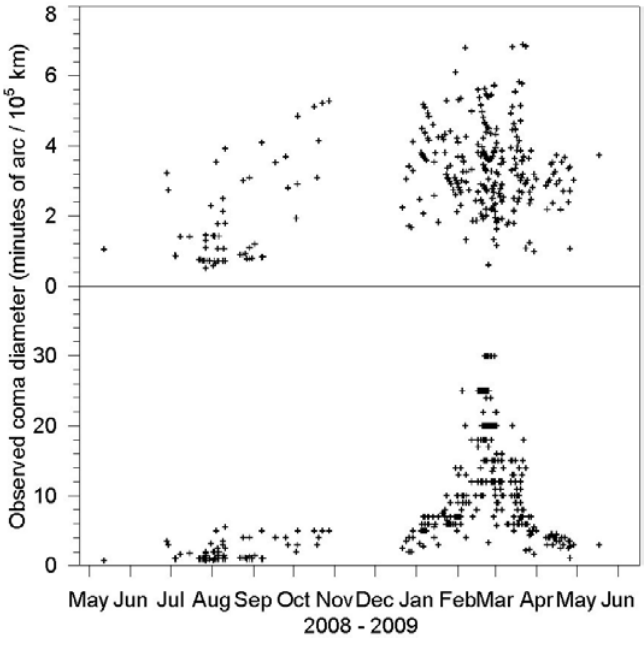

Figure 8. The coma diameter of 2007 N3 (Lulin).

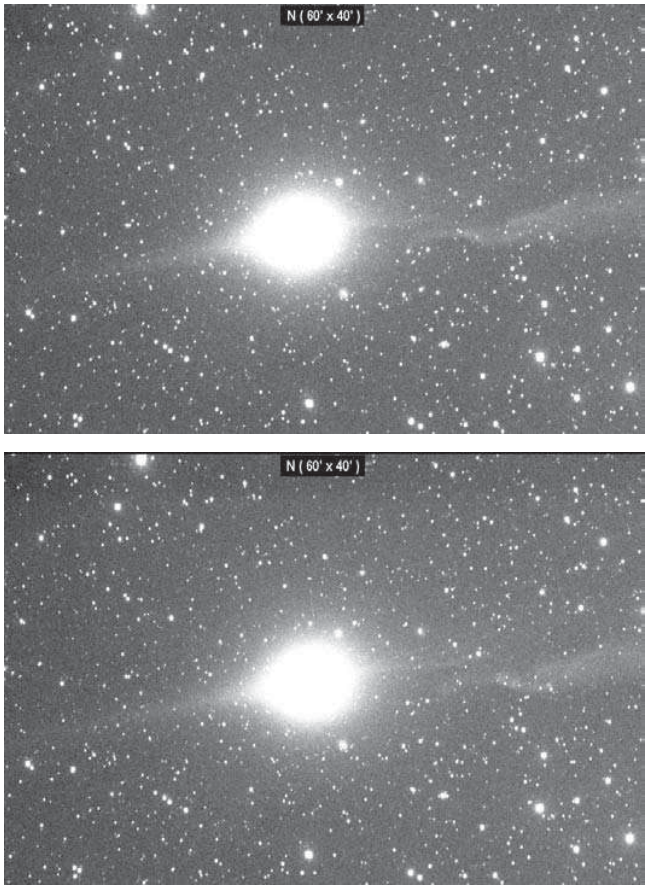

Figure 9. Rapidly moving tail disconnection in comet Lulin imaged by Martin Mobberley on 2009 February 4. *Top:* 10:48 UT; *bottom:* 11:15 UT.

2007 W1 (Boattini)

Andrea Boattini discovered an 18th magnitude comet on Nov 20.48 in images taken during the Mt Lemmon survey with the 1.5m reflector. The comet reached perihelion at 0.84 au in late 2008 June. Additional observations of the comet as asteroid 2007 WM_{63} were published in 2010. Cedric Bemer pointed out the possibility of a meteor shower from the comet with maximum likely on Aug 21.9 or 27.6, with a radiant of 168° –14°. The miss distance for the orbits is 0.0178 au and the Earth passed this point 27.5 days after the comet.

Figure 10. 2007 N3 (Lulin) imaged by Erik Bryssinck on 2009 Feb 20.

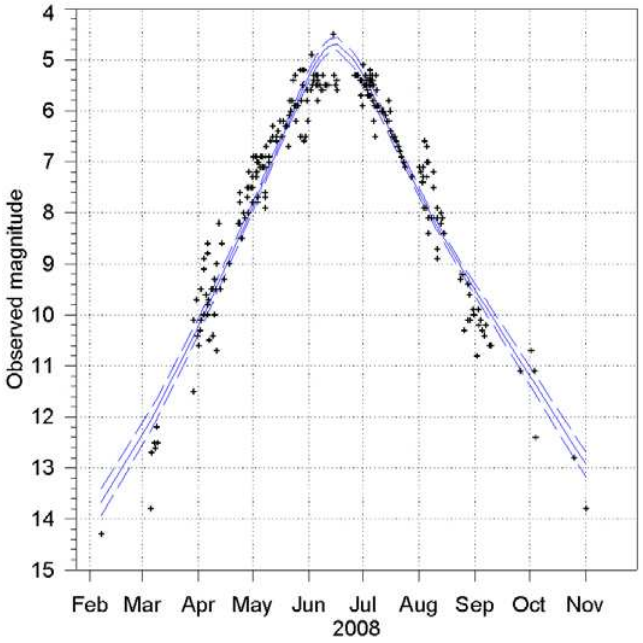

Figure 11. The lightcurve of 2007 W1 (Boattini)

Radar observations showed outbursts of the daytime Craterid meteor shower in 2003 and 2007 and these were linked to the comet[4] with the possibility of another outburst in 2015.

The authors further suggest that the comet must have recently suffered a close encounter with a giant planet to explain the 2003 outburst, however the comet did not pass Saturn until 2006 and the published original orbit is parabolic, suggesting an origin in the Oort Cloud. An alternative explanation might be an outburst or impact whilst the comet was at some considerable distance from the Sun.

The comet brightened rapidly and came within general visual range in early 2008 March. It reached binocular visibility in late April, but few UK observations were made as the comet was rather far south, and very diffuse. Southern hemisphere observers had a better view, and were able to view it through perihelion. The brightening seemed to slow during May, with many observers reporting it at around mag 6, for example Alexandre Amorim reporting it at 5.9 in 10×50B on May 24.92. It peaked at around 5th magnitude near the time of perihelion in late June.

It moved into view from the UK after perihelion and was imaged on July 25 by Peter Carson, from Leigh on Sea, Essex. It was visible as a weakly condensed binocular object in August. It had faded to around mag 10 by early September and had become quite diffuse, but then went into a steep decline, with CCD observations suggesting that it was 18th magnitude by late October.

Figure 12. 2007 W1 (Boattini) imaged by Rolando Ligustri on 2008 April 6. The image also shows the pair of interacting galaxies NGC4038 and 4039, known as the Antennae.

The numbered periodic comets at perihelion in 2007

2P/Encke

For a long time this was the comet with the shortest known period, however it has recently been put into second place by the main-belt comet 311P/PanSTARRS, which has a period of 3.24 years. At

Table 2. Astrometric, electronic, photographic and visual imagers during 2007

Observer	*Site*	*IAU Stn No*
David Arditti	Edgware, Middx.	
Alexandr Baransky	Ukraine	585
Colin Bembrick	Australia	
Peter Birtwhistle	Great Shefford, Berks.	J95
Walter Borghini	Italy	
Erik Bryssinck	Belgium	B96
Denis Buczynski	Scotforth, Lancs.	978
Montse Campas	Spain	213
Peter Carson	Leigh on Sea, Essex	
Mick Crook	Preston	
John Fletcher	Mount Tuffley, Glos.	J93
Mike Foylan	Co Meath, Ireland	
Maurice Gavin	Worcester Park, Surrey	
Virgilio & Mario Gonano	Italy	473
Ernesto Guido	Italy	H06
Mike Harlow	Ipswich, Suffolk	
Dale Holt	Hertfordshire	
Nick James	Chelmsford, Essex	970
Francois Kugel	France	A77
Peter Lawrence	Selsey, Sussex	
Martin Lehky	Czech Republic	048
Rolando Ligustri	Italy	235
Martin McKenna	Maghera, N. Ireland	
Cliff Meredith	Prestwich, Manchester	
Richard Miles	Dorset	J77
Martin Mobberley	Cockfield, Suffolk	480
Gustavo Muler	Lanzarote	J47
Danilo Pivato	Italy	
Alex Pratt	Leeds	
Toni Scarmato	Italy	
Giovanni Sostero	Italy	473
Willian C de Souza	Brazil	
David Strange	Worth Matravers, Devon	
David Storey	Isle of Man	987
Alan Tough	Elgin, Scotland	
Alex Vincent	Worthing, Sussex	
James West	Eastleigh, Hants.	
Sheridan Williams	Leighton Buzzard, Beds.	

Table 3. Magnitude parameters of the comets of 2007

a. Standard magnitude parameters

Comet	*No.obs.*	*r (au)*	H_1	K_1	H_{10}
B2 (Skiff)	9 c	3.2–5.6			5.3±0.3
D1 (LINEAR)	2 c	8.8			1.1±0.0
E1 (Garradd)	42 c	1.3–1.6	4.5±0.6	38.0±4.2	8.5±0.1
E2 (Lovejoy)	101	1.1–2.4	8.7±0.1	5.6±0.7	8.2±0.1
F1 (LONEOS)	115	0.4–1.0	7.7±0.1	4.6±0.5	9.0±0.1
G1 (LINEAR)	16 c	2.9–5.9	6.4±0.6	5.9±1.2	4.2±0.2
M1 (McNaught)	2 c	7.8			3.2±0.2
M3 (LINEAR)	3 c	3.5			6.5±0.3
N3 (Lulin)	364	1.2–3.5	5.6±0.1	7.9±0.2	5.2±0.0
O1 (LINEAR)	1 c	2.9			8.6
Q3 (Siding Spring)	84	2.3–4.0	4.5±0.6	8.0±1.4	3.6±0.1
R2 (P/Gibbs)	3 c	1.5–1.6			12.4±1.2
T1 (McNaught)	58 c	1.0–2.0	7.0±0.2	11.6±1.3	7.2±0.1
U1 (LINEAR)	6 c	3.3–3.5			5.2±0.2
VO_{53} (Spacewatch)	4 c	5.3–5.5			5.5±0.2
W1 (Boattini)	247	0.9–2.4	8.5±0.0	8.5±0.3	8.4±0.0
2P/Encke	18	0.3–1.3	9.9±0.3	7.2±1.2	10.6±0.2
17P/Holmes	934	1.6–3.9	–2.6±0.4	10.8±0.9	-2.2±0.0
50P/Arend	7 c	1.9–2.0			10.1±0.2
93P/Lovas	26 c	1.7–2.1	8.4±1.2	14.8±4.5	9.7±0.1
96P/Machholz	25 c	0.4–1.8	11.3±0.1	10.2±0.5	11.3±0.1
110P/Hartley	5 c	2.5–2.7			8.3±0.3
128P/Shoemaker–Holt	1 c	3.4			8.7
136P/Mueller	1 c	3.6			8.0
182P/LONEOS	1 c	1.2			17.1
185P/Petriew	2	1.0			9.1±0.1
188P/LINEAR-Mueller	2	2.6			7.9±0.0
189P/NEAT	2 c	1.2			16.4±0.1
191P/McNaught	6 c	2.1–2.2			9.8±0.3
192P/Shoemaker-Levy	3	1.5–1.6			9.4±0.0
284P/McNaught	22	2.3–2.4			8.0±0.1

b. Linear magnitude parameters

Comet	*No. obs.*	*Days*	H_1	K_1	ΔT
F1 (LONEOS)	115	–39–35	5.9±0.1	0.0525±0.0033	8.2±0.8

The magnitude of the comets can be calculated from the equation: $m = H_1 + 5.0 * \log(\Delta) + K_1 * \log(r)$. For many comets there are insufficient visual observations to calculate K_1 accurately and so a value of 10 is assumed, which gives the constant H_{10}. Some comets do not follow the standard equation and are better fitted with a linear equation: $m = H_1 + 5.0 * \log(\Delta) + K_1 * \text{abs}(t - T + \Delta t)$, where t is the Julian Date, T the Julian Date of perihelion and Δt an offset. If Δt is positive the comet is intrinsically brighter prior to perihelion.

CCD observations have been used to determine the magnitude parameters of comets with insufficient visual observations; these are indicated by c after the no. of observations. A correction for aperture of 0.0033/mm and the observer corrections derived in previous papers[14,15] have been applied and the H values are reduced to zero aperture.

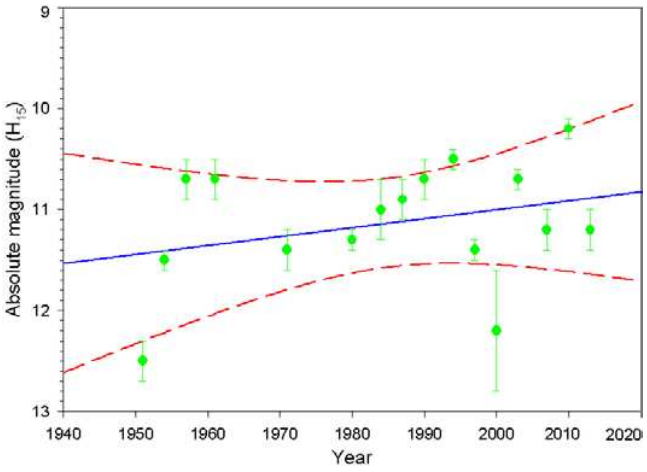

Figure 14. The secular absolute magnitude curve of 2P/Encke.

this return 2P celebrated its 61st observed return 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. The comet is the progenitor of the Taurid meteor complex and may be associated with several Apollo asteroids. The comet can make relatively close approaches to Jupiter, the Earth and Mercury.

This year the comet was visible from the northern hemisphere in the early evening sky prior to perihelion and in the morning sky from the southern hemisphere after perihelion. The comet was picked up visually in mid-February and followed until mid-April, brightening from 13th to 7th magnitude. It was recovered in mid-May at 8th magnitude and seems to have faded quite quickly.

There is a suggestion that 2P/Encke has two active regions,[5] an old one with declining activity, which operates prior to perihelion and a recently activated one present after perihelion. The observations made at this apparition are not sufficient to add further evidence to this hypothesis, though the apparent rapid fade after perihelion may suggest some seasonal effect on nuclear activity. The observations are consistent with the conclusion that there has been no significant change in the absolute brightness of the comet since the earliest standardised BAA observations in the 1950s.

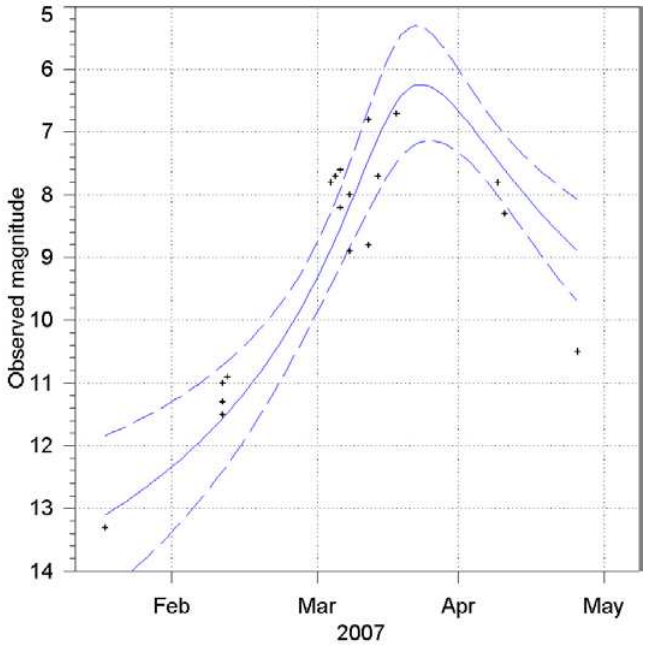

Figure 13. The 2007 lightcurve of 2P/Encke.

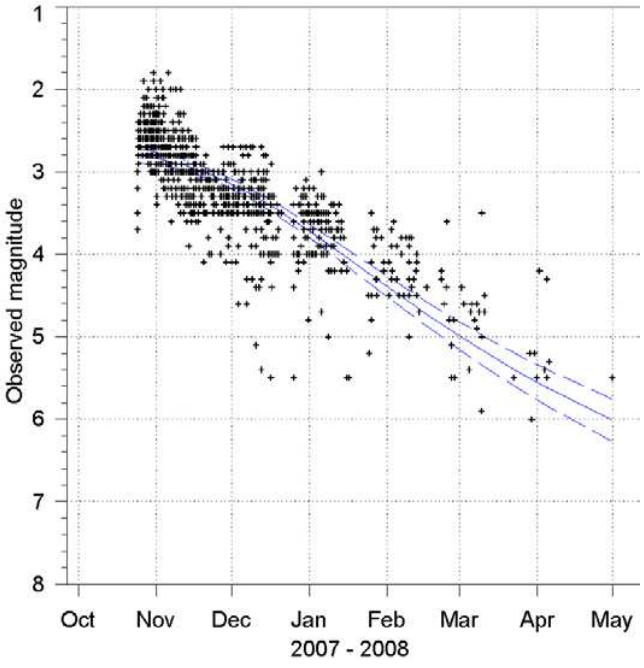

Figure 15. The lightcurve of 17P/Holmes.

17P/Holmes

The dramatic outburst of 17P/Holmes that began on 2007 October 23.8 has been documented in the *Journal*.[6,7,8] Richard Miles developed a theory[9] to explain the outburst and expanded it to explain the periodic outbursts of 29P/Schwassmann–Wachmann. After the outburst 17P/Holmes faded with a fairly standard magnitude curve, which is surprising for what is seen as a one-off explosive event. The visual coma observations clearly show the expansion of the inner and outer coma, with the fainter outer coma expanding more rapidly. The expansion rates are approximately 1500 ms^{-1} for the outer coma and 600 ms^{-1} for the inner coma.

After the new year the coma had become sufficiently faint and diffuse that its reported size was more a measure of the atmospheric conditions and extent of light pollution. Only one set of images of the comet is given here, however many others can be seen in the Section image archive.[3]

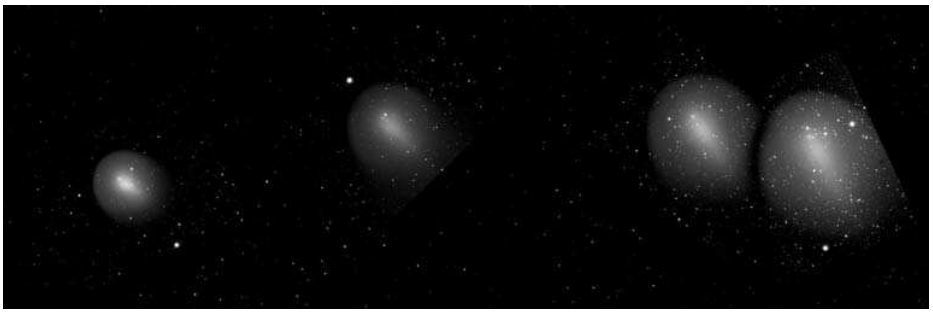

Figure 17. A montage of images of 17P/Holmes taken by David Arditti.

96P/Machholz

Don Machholz discovered this comet on 1986 May 12 with 29×130B. The orbit is evolving relatively rapidly, with the perihelion distance decreasing from 0.13au at discovery to 0.09au at the end of this century. It will pass 0.3au from Earth in 2028 June. The comet is the largest known object in the complex of objects that includes the Quadrantid, delta Aquarid and daytime Arietid meteors, and the Marsden and Kracht groups of SOHO comets. This complex is described in more detail by Sekanina & Chodas,[10] who show that the angular orbital elements of these objects undergo rapid evolution, and may originate from a single body.

At the previous return the comet made a spectacular pass through the SOHO C3 field, entering head first, rounding the Sun and leaving tail first. On this return the comet passed tangentially near the edge of the field from April 1 to 6, with the tail, which was at best around 2° long, approximately radial to the Sun, though showing some changing curvature. The comet is rarely well placed for ground-based observation from the Northern Hemisphere, but on this return it was potentially observable in the morning sky from mid-April to the end of May. The early hours put off many visual observers, however eight stalwarts made the effort and saw the comet fade from 7th to 13th magnitude.

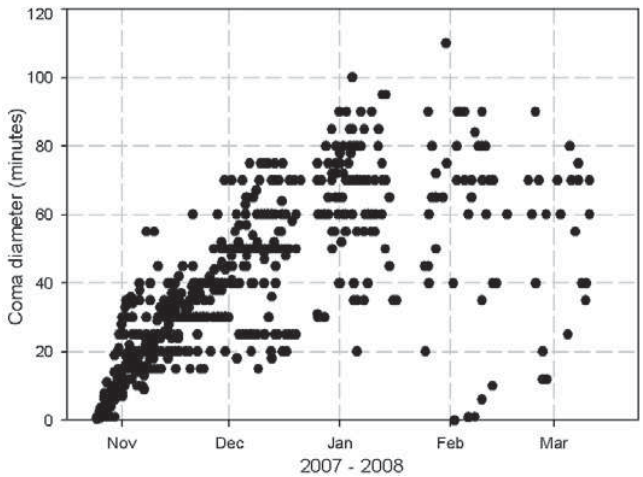

Figure 16. The coma expansion of 17P/Holmes.

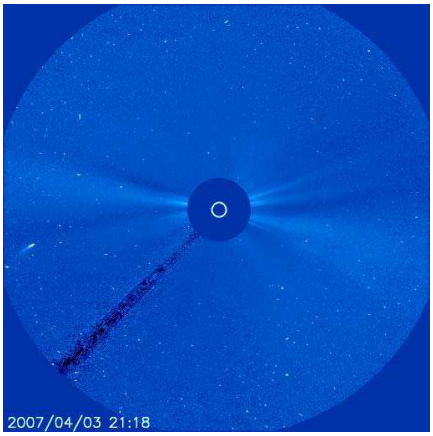

Figure 18. SOHO C3 image showing Comet 96P/Machholz on 2007 April 3 at 21:18. The comet was moving roughly northwards perpendicular to the tail direction.

Other comets and objects observed during the year

29P/Schwassmann–Wachmann

The comet was discovered in 1927 and is in a near-circular orbit, just outside that of Jupiter. Occasional encounters, the next in 2037, mostly affect the angular elements. In 1931 images of the comet were found on archival plates taken in 1902. It was at perihelion in 2004 when it was in almost continuous outburst.

This comet has frequent outbursts and for a number of years seems to have been more often active than not. Historically it rarely got brighter than mag 13 in outbursts, however even this is remarkable for an object that is more distant than Jupiter from the Sun. The outbursts may be due to a thermal heat wave propagating into the nucleus and triggering sublimation of carbon monoxide inside the comet. Richard Miles has recently developed an alternative model[11,12] for the activity of the comet, which most importantly makes predictions for future outbursts. The comet is an ideal target for those equipped with electronic imagers and it should be observed at every opportunity.

The comet was in solar conjunction in June and at opposition in December. Observation is difficult for around six weeks either side of conjunction. Positive visual observations were made in the first four and last three months of the year. Clearly defined outbursts occurred in early February and late December, with less well defined events in the other months. The outbursts followed the usual pattern with an initially high degree of condensation steadily becoming more diffuse. At brightest it reached around 11th to 12th magnitude.

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