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The International Comet Quarterly (*ICQ*) is a journal devoted to news and observation of comets, published by the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts. Regular issues are published 4 times per year (January, April, July, and October), with an annual *Comet Handbook* of ephemerides published normally in the first half of the year as a special fifth issue. An index to each volume normally is published in every other October issue (now in odd-numbered years); the *ICQ* is also indexed in *Astronomy and Astrophysics Abstracts* and in *Science Abstracts Section A*.

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Group subscription rates available upon request. Back issues are $10.00 each — *except* for "current" *Comet Handbooks*, which are available for $15.00 ($10.00 to subscribers if ordered with their *ICQ* subscription; see above). Up-to-date information concerning comet discoveries, orbital elements, and ephemerides can be obtained by subscribing to the *IAU Circulars* and/or the *Minor Planet Circulars* (via postal mail and also available via computer access); for further information, contact the above e-mail address (or the *ICQ* at the above postal address).

Manuscripts will be reviewed/refereed for possible publication; authors should first obtain a copy of "Information and Guidelines for Authors" from the *ICQ* website or from the Editor. Cometary observations should be sent to the Editor in Cambridge; again, see the *ICQ* website or contact the Editor for the proper format. Those who can send observational data (or manuscripts) in machine-readable form are encouraged to do so [especially through e-mail via the Internet (ICQ@CFA.HARVARD.EDU)]. The *ICQ* has extensive information for comet observers on the World Wide Web, including the Keys to Abbreviations used in data tabulation (see URL http://cfa-www.harvard.edu/icq/icq.html). In early 1997, the *ICQ* published a 225-page *Guide to Observing Comets*; this edition is now out of print, but a revised edition is under preparation.

Most of the Observation Coordinators (OCs) listed below have e-mail contacts with the *ICQ* Editor; observers in the general area of such OCs who lack access to e-mail networks may send data to the OC for relay to the *ICQ* in electronic form.

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CORRIGENDA

- In the October 2005 issue, page 256, "Call for Observations: 2006 Apparition of Comet 41P", line 1 of text, *for* it's *read* its

- In the October 2005 issue, page 259, second paragraph under comet 41P, first line, *for* (see the following article *read* (see the preceding article

From the Editor

Due to the sudden closing of the Smithsonian Astrophysical Observatory (SAO) print shop (scheduled for 2005 Nov. 15 on only about 2 months notice — since extended by a week or two, allowing this January issue to be printed early), there may be some delay in the printing of the April 2006 quarterly issue of the *ICQ* while a new procedure of printing is sought. The SAO print shop has been printing the *Minor Planet Circulars* for nearly 30 years and the *ICQ* for the past 1.5 decades, but the new Directorship at the Harvard-Smithsonian Center for Astrophysics has determined that (a) anything that needs to be printed can be printed commercially outside of SAO and (b) we should be moving rapidly toward a paperless society, at least at the Harvard/Smithsonian Observatory. Some key recent articles of the *ICQ* will become posted at this website in the coming year as time permits, and both *ICQ* subscribers and non-subscribers are encouraged to inform the Editor of their thoughts on continuation of the printed *ICQ* with partial WWW posting of key articles.

The stable level of subscriptions to the printed *ICQ* over the past 20-25 years suggests that there is still good interest in maintaining the printed journal, and our commitment to outstanding paid subscriptions extends 2-3 years into the future, so that any determination to cease printing the *ICQ* will require several years advance notice to subscribers. It should be noted that there appears to be no suggestion of ceasing the major printed professional and amateur astronomical journals and magazines despite their increased electronic presence on the WWW. There is considerable flux in computer hardware and software over relatively short timescales (decades or less): witness the fact that the WWW is only a decade old for the general public, that URLs change constantly, that it may be difficult to move (and maintain) some material on different computer web servers from one geographical site to another over time, and that computer operating systems and their associated software not only are somewhat incompatible but have "industry standards" that change (the life of the ICQ archive has utilized data on punched cards, magnetic tapes, floppy disks, compact disks, e-mail ASCII and pdf, etc., and who-knows-what in the future). It thus seems highly prudent to maintain important publications in printed form for the foreseeable future so that such copies can be easily accessed now and in the distant future when access to various computer formats may not be easy or the same.

Of course, this does not mean that data should *not* be made available electronically because it must. The world has forever changed since the mid-1990s due to the Internet and especially its WWW. The tabulated photometric data on comets in the ICQ archive that have been published in every issue since the late 1970s (and much earlier data published elsewhere in the literature) have been given out for years (since essential retirement of the magnetic-tape drives at the SAO) to any researcher who asks, at no cost, on a comet-by-comet basis. Obviously people who want to analyze cometary photometric data do not want to re-type in the data from the printed pages of the *ICQ*. Observers do like to see their data and names in print, and it gives an opportunity (much utilized) for observers and others to look over the data and point out occasional errors that are then corrected in the archive (and often also in print). One possibility being given serious consideration, however, is to stop publishing all the photometric tabulated data in the printed *ICQ* and instead give lists of observers with the number of observations contributed and added to the archive in between *ICQ* issues and also give lists of comets with synopses of the contributed data, perhaps in the form of plotted light curves, in the printed *ICQ* – possibly even posting the tabulated data on these webpages for at least a limited amount of time (several months?).

But the existence of printed journals such as the *ICQ* are still relished by many, including librarians (the *ICQ* is subscribed to by most major astronomy libraries worldwide and is one of the cheaper serial publications that a library can obtain!). We would also welcome any generous financial donations to the *ICQ* (the Smithsonian is non-profit, so any donations are likely to be tax deductible) in order to be able to continue printing this journal and making it even better in terms of reproducing illustrations, etc.; for years we have been just about "breaking even" with the cost of production and postage. I note with great thanks that a couple of *ICQ* readers have given small but very welcome donations in recent years. So stay tuned, send us your suggestions or comments, and thank you for your support of the *ICQ*.

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Letter to the Editor: Comet 41P

I would like to point out a small error in your piece concerning 41P (October 2005 issue, page 256). During its first huge brightening in June of 1973, I was the first person to call attention to the fact that the comet had undergone a major outburst but the event was already in decline when I discovered it. My magnitude determination of 10.2 was made several days AFTER the comet peaked at 4th-6th magnitude. As I recall from that time, 41P had been 13th or 14th magnitude prior to the outburst and was just about there again when the second outburst happened. My magnitude 6.5 determination came just after the peak of the SECOND brightening, I having received a phone call from Brian Marsden advising me that a second event was in progress.

Something I also remember, not specifically mentioned in your article but probably of interest, is that I'm pretty sure that at one of the subsequent apparitions (1990?) there seemed to be another pair of outbursts. Unfortunately, these were very poorly observed because the comet was low in the morning sky but appeared to have occurred at almost the precise number of days from perihelion that the two 1973 outbursts were noted! After reading the related *IAUCs* concerning the second possible brightening, I remember cursing myself for not having been smart enough to go out to check the comet myself around the 30-day mark following the initial brightening.

John E. Bortle (Stormville, New York)

News Concerning Recent Comets

Despite my good intentions five years ago to again make this column regular, the flurry of activity since the October 2000 issue of the *ICQ* has precluded the writing of another column (until now). Part of my rationale in not giving the matter more urgency is that a combination of efforts going into the published *ICQ* has lessened the urgency for text specifically devoted to "news concerning recent comets" — these diverse efforts ranging from (first and foremost) the tabulation and accompanying descriptive photometric information on comets that appears in every quarterly issue of the *ICQ*, the annual *Comet Handbook* (which gives the latest light-curve parameters and predictions for comets based on past — and notably, recent — observations), the regular listings of designations/names given to recent comet discoveries/recoveries, and the individual articles appearing in most quarterly issues (including the semi-regular reviews of comet literature by *ICQ* Associate Editor Carl Hergenrother). That said, there still is much interesting material on comets that has not appeared in these pages — only a small portion of which I could hope to cover in a column such as this that needs to span five years! The material that follows is intended, therefore, to *not* be duplication of what has appeared in the aforementioned places in past issues of the *ICQ*.

In the last installment of this column (*ICQ* **22**, 117), I noted the tremendous increase in the number of comet discoveries that had occurred in the span of about 4.5 years since the previous installment had been written (April 1996) — due especially to the LINEAR survey program — whereby the discovery rate had essentially tripled to around 32 comet discoveries per year (not including the SOHO-spacecraft discoveries that were invisible to ground-based observers). Well, LINEAR has continued to factor in the discoveries of comets since the October 2000 column was written, to the tune of 109 additional named comets. But other surveys have joined in, as well, with the Jet Propulsion Laboratory's NEAT survey at Palomar/Haleakala raking in 49 named discoveries (or co-discoveries), followed by the LONEOS survey with 24 (including eight comets named for Brian Skiff), the Catalina survey (joined recently by its cousin, the Mt. Lemmon survey) with 22, the older Spacewatch survey with 16, and the Siding Spring survey (most of whose comets are named for Rob McNaught) with 12. But the dynamics of the surveys seem to be changing: as of the first week in November, fully 16 comets discovered in the year 2005 were found by the combined Catalina/Mt. Lemmon program, the next closest programs being LINEAR and Siding Spring with seven comets each, LONEOS with six, and the Spacewatch program with five. The LINEAR and NEAT programs have clearly dropped in significantly in their discovery numbers recently, whereas LONEOS and Spacewatch have remained relatively stable (actually slightly increasing their comet finds over the last couple of years). LINEAR found 28 comets named for its program in each of 2002 and 2003, dropping off only to 23 comets in 2004; NEAT peaked with 16 named comets found in 2001, and its production level has dropped off steadily since then.

Comets and the Big CCD Surveys

The more-sensitive CCD surveys of the past 7 years or so have also been picking up many more faint comets than was possible a decade ago, including not only intrinsically faint comets with perihelion distances inside the main asteroid belt but also comets with much larger perihelion distances — including C/2000 Y1 (Tubbiolo) with q = 7.97 AU, C/2001 G1 (LONEOS) with q = 8.24 AU, C/2002 L9 (NEAT) with q = 7.03 AU, C/2003 S3 (LINEAR) with q = 8.13 AU, C/2004 T3 (Siding Spring) with q = 8.86 AU, and C/2003 A2 (Gleason) with q = 11.43 AU (passing the previous record-holder, C/2000 A1, which had q = 9.74 AU). Prior to the LINEAR era that began in the late 1990s, the previous record holder for perihelion distance was C/1991 R1 (McNaught-Russell) at q = 6.99 AU. About a third of all comets with orbital periods between 70 and 500 years listed in the latest *Catalogue of Cometary Orbits* were discovered in the last five years, the recent group including C/2003 U1 (P = 109 yr), C/2003 W1 (P = 126 yr), C/2001 M10 (P = 138 yr), and C/2005 N5 (P = 154 yr). Three "centaur"-type comets, 165P/2000 B4 (LINEAR), 166P/2001 T4 (NEAT), and 167P/2004 PY_{42} (CINEOS) were recently numbered (the rationale for their numbering given on *IAUC* 8552, where the argument for minor-planet-numbering status was put forward to counter the usual cometary "requirement" of multiple observed returns to perihelion before numbering can occur); the term "centaur" is applied to minor planets with comet-like orbits — 95P/Chiron = (2060) is a notable example — residing beyond Jupiter but are not considered to be transneptunian. Of some interest to the comet community is the discovery of the first known object in 1:1 libration with Neptune, 2001 QR_{322} (cf. *IAUC* 8044); it is quite possible that many of the known "Trojan" objects connected to the Jovian planets (Jupiter has many known Trojans) are cometary nuclei. Some of the outer satellites of the Jovian planets that continue to be discovered (*e.g.*, *IAUC* 8193) are also candidates for cometary nuclei, including those that are in retrograde orbits about the planet.

More and more asteroidal objects are being found in comet-like orbits, and we are finding increasing numbers of objects that show just borderline cometary activity, so that larger instruments are clearly needed on a regular basis to determine if a new minor planet exhibits a coma/and or tail. A good example of this was C/2001 OG_{108} (LONEOS), which was observed without success for cometary activity for months before such activity became visible at $r \sim 1.4$ AU in January 2002 (*IAUC* 7814). A second example occurred with C/2005 EL_{173} (LONEOS), which has a hyperbolic orbit but which was only seen as asteroidal until a large (3.6-m) telescope could be pointed at it by Alan Fitzsimmons to show a small, extended 3''.5 coma (*IAUC* 8526) some two months after discovery. The problems are highlighted by the case of 2005 SD, a LINEAR discovery that was reported as diffuse by Mark Kidger from numerous small-telescope CCD images obtained by Spanish amateurs in October 2005; after it was announced as a comet on *IAUC* 8618, observers with larger instruments quickly argued that their deeper images show the object as only asteroidal (*IAUC* 8620). Another interesting feature coming out of the new surveys is the existence of asteroidal objects in retrograde orbits, for which no cometary activity has been detected: I noted a couple in my last installment of this column that had been found in 1999 — one of which has been numbered as a minor planet, (20461) 1999 LD_{31}, and another one found three years later also numbered, (65407) 2002 RP_{120} (i = 119°.1, P = 413 yr); there are nearly a dozen known as of this writing. Of course, prior to 1999 the only objects known to be orbiting the sun in retrograde orbits had been seen as having cometary activity.

Lost Comets Re-found

One of the LINEAR comets, which typically are reported by LINEAR as asteroidal in appearance, had been discovered in late September 2000 and was found two months later by Carl Hergenrother and Arianna Gleason to be cometary (with a highly condensed 5″ coma and a 15″ tail in p.a. 45°) on 300-sec R-band CCD exposures taken with the Steward Observatory 1.54-m reflector near Tucson (cf. *IAUC* 7524). Already given the minor-planet designation 2000 SO_{253}, this comet with a 7-year orbital period was given the new apellation P/2000 SO_{253} (LINEAR), but a month later was identified (by *ICQ Handbook* Editor Syuichi Nakano) with comet C/1963 W1 (O.S. 1963 IX). *IAU Circular* 2013 explains the initial discovery thus: "Mrs. Jean H. Anderson, Department of Astronomy, University of Minnesota, writes that she has discovered a comet on four Palomar Schmidt plates taken by Dr. W. J. Luyten on [four] consecutive nights in November 1963. The comet was of about magnitude 16 and had a wide tail about 3′ long in a north preceding direction." Brian G. Marsden reduced Anderson's plate measurements into celestial coordinates and then produced a couple of representative sets of orbital elements — one parabolic and one with a 5.5-yr orbital period. With Nakano's identification, the comet received a permanent number and the name 148P/Anderson-LINEAR. Observations of comet 148P were then also identified in 1993 from U.K. Schmidt telescope plates taken at Siding Spring, Australia (*MPC* 41826), and it was determined that the comet passed 0.10 AU and 0.40 AU from Jupiter in 1961 and 1985, respectively.

A similar case occurred a few years later, when a LINEAR discovery, P/2001 RG_{200} (initially reported as asteroidal and thus receiving a minor-planet designation), was found by Syuichi Nakano as being identical with C/1979 O1 (O.S. 1979h), a comet observed via only a 3-day arc by Charles Kowal at Palomar and lost immediately — though it was suspected at the time of being a short-period comet (cf. *IAUC* 8247); this comet was numbered and re-named as 158P/Kowal-LINEAR.

In August 2001, Yanga R. Fernandez, Karen J. Meech, and Jana Pittichová obtained images of comet 39P/Oterma as a point-source object near mag 22 — confirming images of the comet obtained on two dates in May 1998 by David Jewitt, Jane Luu, and Chadwick Trujillo (and measured by Gareth Williams). Comet 39P had last been observed in August 1962; half a year later, it passed only 0.095 AU from Jupiter, throwing its perihelion distance from 3.4 to 5.5 AU and making it much fainter even at perihelion (T = 2002 Dec. 22). Another long-lost comet, 11D/Tempel-Swift, was rediscovered by LINEAR on December 2001; after receiving the designation P/2001 X3 (*IAUC* 7778), Carl Hergenrother and Kenji Muraoka independently noted the similarity of its orbital elements with those of 11D (*IAUC* 7779) — a link confirmed at the Minor Planet Center and by Syuichi Nakano (Nakano had published a prediction that was off by ΔT = +3.4 days in perihelion time). Now renamed comet 11P/Tempel-Swift-LINEAR, it had been lost since 1908, its orbital period having increased from 5.7 to 6.4 years in the interim.

And yet another lost short-period comet, 54P/de Vico-Swift, was rediscovered, this time in 2002 October by the NEAT program and designated P/2002 T4. Again, Muraoka made the identification of P/2002 T4 with 54P, which had not been seen since 1965 (the comet having passed 0.16 AU from Jupiter in 1968, with the perihelion distance increased from 1.62 to 2.14 AU and the orbital period from 6.3 to 7.3 years). The comet was renamed 54P/de Vico-Swift-NEAT. Comet 66P/du Toit was recovered in Mar. 10 by Jim Scotti with the 1.8-m Spacewatch II telescope at Kitt Peak; this is only the third observed apparition of this comet (first discovered in 1944), which has an orbital period 15 years and was missed at its last return to perihelion. A 12th-magnitude comet reported by Paulo Holvorcem and Charles Juels on 2003 Oct. 6 was quickly determined (through the work of Sebastian Hönig, *ICQ* Assistant Editor Maik Meyer, and Brian Marsden) to be the lost comet D/1978 C2 (Tritton; O.S. 1978d = 1977 XIII), which had been observed for only a month; it was numbered as 157P/Tritton.

A comet found by Kenneth Russell on a single U.K. Schmidt telescope plate taken on 1986 Sept. 3 was never confirmed despite attempts to do so three weeks later, though the astrometry was reported to the Central Bureau for Astronomical Telegrams (CBAT) and the Minor Planet Center (MPC); in 2003, Tim Spahr identified the 1986 Sept. 3 positions with an apparently asteroidal object discovered by LINEAR, 2000 QD_{131}, and with 1993 WU (discovered by Carolyn Shoemaker's team at Palomar; cf. *IAUC* 8118); the three observed apparitions for the 6.8-yr-period comet allowed the comet to be numbered as 156P/Russell-LINEAR. Some detective work by Gary Kronk and Brian Marsden yielded the identification of an unconfirmed comet, which had been reported to the CBAT by the late Leo Boethin on three nights in January 1973, with comet 104P/Kowal (cf. *IAUC* 8255).

Other comets recovered for the first time during the last five years include 149P/Mueller (former designations P/2000 Y10 = P/1992 G3; O.S. 1992g = 1992 IV) by T. Oribe in Japan from CCD images taken in Dec. 2000 and Jan. 2001; 151P/Helin (P/2001 M1 = P/1987 Q3; O.S. 1987w = 1987 XVII) by a team of German observers; 152P/Helin-Lawrence (P/2001 Y1 = P/1993 K2; O.S. 1993l = 1993 XI) by Hergenrother and D. Means; Oribe; and Krisztian Sárneczky and Z. Heiner; 154P/Brewington (P/2002 Q4 = P/1992 Q1; O.S. 1992p = 1992 XIV) by F. Artigue, H. Cucurullo, and G. Trancredi in Uruguay; 155P/Shoemaker (P/2002 R2 = P/1986 A1; O.S. 1986a = 1985 XVIII) by Oribe and by Akimasa Nakamura; 161P/Hartley-IRAS (P/2004 V2 = P/1983 V1; O.S. 1983v = 1984 III) by Rob McNaught; 168P/Hergenrother (P/2005 N2 = P/1998 W2); 171P/Spahr (P/2005 R3 = P/1998 W1); and 173P/Mueller (P/2005 T1 = P/1993 W1; O.S. 1993s = 1994 XXV).

Amateur Discoveries

There has not been a visual discovery of a comet in well over a year, the last one being the discovery of C/2004 Q2 by

Donald E. Machholz, Jr., of Colfax, California. Indeed, five of the last seven comets discovered by amateur astronomers have been found via CCD cameras. While one might expect that visual discoveries of comets will become much more rare — due to a combination of the big professional CCD sky surveys and to the ever-increasing light pollution worldwide (the latter of which is forcing fewer and fewer amateurs to even consider visual hunting due to such poor skies near their homes) — there was in 2001-2002 what will probably turn out to be the last big spurt of visual comet discoveries (at least for many years to come): in the span of less than 16 months, beginning with P/2001 Q2 (Petriew), six new comets were discovered by nine different visual observers. One might venture that it will become exceedingly rare for new short-period comets to be discovered visually, and yet Canadian-amateur Vance Petriew's comet was just that. And comet P/2002 C1, discovered visually independently by Kaoru Ikeya (Mori, Shuchi, Shizuoka, Japan) and by Daqing Zhang (Kaifeng, Henan province, China) turned out to be an even more intriguing object.

Comet 153P/2002 C1 (Ikeya-Zhang) was a very interesting object because it was a rediscovery of a comet last seen in 1661 (and well observed and documented in print by Johannes Hevelius then). The large, nearly parabolic orbit (with aphelion distance at $\approx$ 101 AU) made the initial period determination uncertain, and a possible link to the 1532 comet was initially suspected until a longer observational arc in 2002 pointed squarely at comet C/1661 C1. I spent some time collecting and reducing Hevelius' measurements of the distances between the comet and many reference stars made over a 5-week period in the winter of 1661; his 82 measurements were published in Hevelius' monumental 1668 masterpiece on comets entitled *Cometographia*, and nearly four dozen of my reduced positions were published on *MPC* 46096. The osculating orbital elements of 153P for 2002 give an orbital period of 364 years — more than double the previous record period for a comet known definitively to have been observed at more than one return to perihelion (the next closest comets being 35P/Hershcel-Rigollet and 109P/Swift-Tuttle with orbital periods of 155 and 135 years, respectively). Comet 153P put on a nice display in March and April 2002, reaching total visual mag 3 in the second half of March.

Five Edgar Wilson comet-award announcements have been made since the last writing of this column, with 18 different awards going out to amateur astronomers (14 for visual discoveries of comets, and four for CCD discoveries). No amateur discoveries of comets have been made via photographic emulsions since that of P/1998 U3 by Michael Jäger, and it seems unlikely that additional comets will be found via photography (given that film is being phased out and few serious amateurs use photography any more; even Jäger has switched over to CCD imaging). One interesting morsel about the Wilson awards for the past five years is that five of them went to visual observers who were making comet discoveries several decades ago: Albert Jones (C/1946 P1), Kaoru Ikeya (*e.g.*, C/1965 S1), Shigehisa Fujikawa (*e.g.*, C/1969 P1), William Bradfield (*e.g.*, C/1974 C1), and Don Machholz (*e.g.*, C/1978 R3).

Douglas Snyder of Palominas, Arizona, who co-discovered comet C/2002 E2, described himself then as an early retiree (age 60) who "is living his dream of having his own observatory out under the dark skies of the Arizona desert", having moved with his wife "to southeastern Arizona two years ago from San Jose, California, for the express purpose of pursuing amateur astronomy". His visual discovery was made with their own backyard 20-inch-apertur telescope. Charles W. Juels (Fountain Hills, AZ) and Paulo R. Holvorcem (Campinas, Brazil) are amateur astronomers who have teamed up to observe minor planets and comets remotely via a CCD camera attached to a telescope in southern Arizona, and they have been name-credited with two discoveries of comets in less than three years (C/2002 Y1 and C/2005 N1). Their discovery of C/2002 Y1 was made during their "first attempt at testing the feasibility of using a small wide-field refractor to search for relatively bright comets, which we had been discussing for some time", according to Holvorcem; Juels started running a computer-software script to take the planned images on the automated telescope on the night of 2002 Dec. 28 and sent Holvorcem the images via the Internet as they were taken. They both blinked the resulting images, and Juels "was the first to notice what seemed to be a faint moving object in one field." Holvocem adds: "He told me about the object, which I visually checked, and we decided to take more images before the end of the night, in an attempt to confirm or disprove the object's reality. . . . I co-added the discovery images and noticed signs of coma, but only reported this to the MPC when we learned through the NEOCP that the object had already been confirmed by others. We had at this time still some doubts if the object was real."

Regarding the discovery of C/2005 N1, Holvorcem writes: "By the time this comet was found, our comet survey had become much more automatized, using several items of software which I have developed over the last years . . . (we have found that my moving object detection software finds almost everything which has a minimal *S/N* ratio). I have recently written software which identifies in real time the automatically detected moving objects with known asteroids and comets. Sub-frames around known asteroids and comets are no longer blinked, saving some more human effort. Charles turns the automated telescopes on in the evenings, starts the above mentioned programs, and goes to sleep. In the morning, he wakes up, turns off the telescopes, and quickly blinks the small sub-frames containing the night's automated moving object detections. Sometimes he will wake up in the middle of the night to blink the sub-frames produced up to that point. Usually nothing is found, only known objects and obviously spurious detections. On very rare nights, such as the discovery night of C/2005 N1 (July 2 UT), an automated detection is produced by the software, which clearly does not correspond to a known object and is not an obvious spurious detection. . . . In the case of C/2005 N1, Charles was skeptical (after a few reported spurious detections which had fooled us in the previous months), but I was pretty confident it was real, and probably a comet (given its motion rate, small elongation, and hint of diffuse appearance). Unlike the case of C/2002 Y1, in which I co-added the discovery images, saw signs of a coma, and reported the results to the MPC, in the case of C/2005 N1 the object was so faint in our images that I didn't want to make any statement to the MPC/CBAT about coma which might soon prove incorrect. Since the object was posted on the NEOCP, others would soon confirm or disprove the object's reality and possible cometary nature."

The Brighter Recent Comets

The past five years have seen numerous naked-eye comets — but none of them spectacular. C/2002 V1 (NEAT) became as bright as mag −0.5 as viewed by ground-based observers in mid-February 2002 in bright twilight (though it was mainly observed by binoculars due to its proximity to the sun when at its brightest) — making it the brightest comet observed in the last five years. Bill Bradfield's latest comet, C/2004 F4, was found close to the horizon in bright twilight, making it difficult to confirm (cf. *IAUC* 8319) and difficult to measure both positions and brightness. C/2004 F4 displayed a beautiful tail as it rounded the sun in full view of the SOHO coronagraphs (several images of which were reproduced at lower resolution in the April 2004 issue of the *ICQ*) — a tail that remained as a long, thin structure when viewed by ground-based observers for some days after it pulled away from the solar glare (when the comet was briefly near total visual mag 3-4).

The NEAT program discovered a distant comet ($\Delta \approx r \approx$ 10 AU), designated C/2001 Q4, in August 2001 that caused some excitement over a possibly nice view from earth at its forthcoming perihelion passage in May 2004. Indeed, C/2001 Q4 was well observed and ireached total visual mag $\approx$ 3 in May 2004. Around that time, it produced periodic dust shell (commonly seen in bright comets) that J. Lecacheux and E. Frappa used to determine a nucleus rotation period of around 20-23 hr (*IAUC* 8349).

Other well-observed long-period comets discovered by LINEAR in the last half decade include C/2001 A1 (which peaked in brightness near total visual mag 3 in June 2001); C/2002 T7 (which peaked near total visual mag 2 in May 2004); and C/2000 WM_1 (which peaked about a half-magnitude fainter in late January and early February 2002).

Split, Outbursting, and Disintegrating Comets

Interestingly, the split comet 73P/Schwassmann-Wachmann was recovered shortly after my last column was written in late 2000, and as this column is being written five years later, 73P has again just been recovered. As Zdenek Sekanina (2005, *ICQ* **27**, 225) has shown, comet 73P was notably brighter before perihelion at the 2000-2001 apparition than it had been during the previous apparitions dating back to 1930, but it was intrinsically fainter than it had been after perihelion in 1995 (when its notable split occurred). Three components were visible in 2000-2001, but (according to Sekanina) apparently not the same three as were seen in late 1996; it remains to be seen how many secondary components will be visible at the 2006 return to perihelion. The recovery brightness reported by Carl Hergenrother on 2005 Oct. 22 and 24 (mag 19.2-19.3) was intrinsically 1-2 mag fainter than at the same pre-perihelion point in 2001 but still 2-3 mag brighter than its brightness at that pre-perihelion distance during 1930-1995. Assuming a light curve that is midway between the pre-1995-split brightness of 73P and the 2000-2001 brightness, one might expect a peak total brightness near visual mag 3 for as long as 10 days during its close approach to the earth in mid-May 2006 (for the comet's main component, C).

Another comet known for outbursts, comet 41P/Tuttle-Giacobini-Kresák, underwent a 2–3-magnitude outburst in late November and December 2000 (see my call in the October 2005 issue of the *ICQ* for observations of this comet at its 2006 return to perihelion).

Several comets were seen to split and/or evidently disintegrate in the past five years, beginning with C/2000 W1 (Utsunomiya-Jones), which faded rapidly and losing its nuclear condensation in February 2001 (cf. *IAUC* 7586, 7594). Comet C/2001 A2 (LINEAR) underwent an outburst of $\sim$ 2.5 mag in late March 2001, and within a month it had been found to have split into two components of nearly equal brightness by Carl Hergenrother and colleagues — though within a couple of weeks the eastern component had faded to $\sim$ 2 mag fainter than the western component; later observations found additional fragments, with another outburst having occurred due to the additional splitting in June. Comet C/2005 K2 (LINEAR) was found to have split into two components evidently in April 2005 (*IAUC* 8545), and C/2005 A1 (LINEAR) curiously to have split likewise within days of the splitting of C/2005 K2 (*IAUC* 8562). Comet 51P/Harrington was found to have split again in December 2001 (cf. *IAUC* 7769, 7773), after three nuclear components were observed at its 1994 apparition. After a single diffuse companion (of mag $\sim$ 19) to comet 57P/du Toit-Neujmin-Delporte was reported on NEAT images and confirmed elsewhere, Yanga R. Fernandez, David Jewitt, and Scott Sheppard obtained images on 2002 July 17 and 18 with a 2.2-m reflector at Mauna Kea that showed as many as 18 additional components to the comet ranging in magnitude from 20.0 to 23.5 (*IAUC* 7934, 7935); the primary component of 57P was then near mag 15.

In 2002, two sets of LINEAR dual-comet discoveries turned out to be comet pairs that had evidently split prior to discovery; C/2002 A1 and C/2002 A2 have orbital periods around 77-78 years (*IAUC* 7788), both components having been observed for well over a year, while C/2002 Q2 and C/2002 Q3 were only observed for about three weeks (resulting in only parabolic orbits having been computed). Zdenek Sekanina computed that the latter pair split some three decades earlier at perhaps 57 AU from the sun (*IAUC* 7966)! P/2004 V5 (a comet with an orbital period of around 22 years) was found to be split into two components upon discovery, but it received only a single designation (though see the comments about its redesignation and renaming below) with the two components labelled 'A' and 'B' — as is more typical for instances where only a single component is initially seen and the comet is found to have split *after* its initial discovery; in this case the components were within 2′ of each other, having presumably split apart about 3 years earlier according to Sekanina (*IAUC* 8440). Comet C/2003 S4 was also found to have split into two components in late 2004 (*IAUC* 8434).

Comet C/2002 O7 evidently disintegrated in September 2004 (cf. *IAUC* 8250). Comets C/2002 O6 (SWAN) and C/2002 O4 (Hönig) each faded rapidly and lost condensation in September and October 2002, respectively. The disintegration of C/2004 S1 was discussed at length by Sekanina in the July 2005 issue of this journal (*ICQ* **27**, 141).

SOHO and SWAN

During the past five years, the SOHO spacecraft continued to detect what are presumed to be near-sun comets in large numbers, found mostly by amateur astronomers scanning the visible-light C2 and C3 coronagraph images posted at the SOHO website — "presumed" comets because (a) the majority of them are faintish (getting no brighter than mag 7-8) and essentially stellar with no coma or tail visible, and (b) the majority of them have been found to belong to one of four dynamical groups. The first group, of course, has been known for over a century as the Kreutz sungrazing comets. A fair number of non-Kreutz-sungrazers have been identified in the near-sun-coronagraph images over the years, and in the last few years three other groups have been identified among the non-Kreutz SOHO comets (*IAUC* 7832; Meyer 2003, *ICQ* **25**, 115) that have perihelion distances some ten times further from the sun than the Kreutz sungrazers; the three new groups have become known (and are named) for their respective discoverers, Brian Marsden, Maik Meyer, and Rainer Kracht. Marsden has recently suggested that two pairs of Marsden-group comets observed via SOHO (C/2005 E4 and C/1999 N5; C/2004 V9 and C/1996 J6) may in fact be only two objects with 5- to 6-yr orbital periods (*IAUC* 8494, 8519), postulating a mutual splitting in 1993 and further predicting that C/1999 U2 might then return in early October 2005 (an event that apparently did not occur).

Marsden's recent review article (2005, *Annual Rev. Astron. Astrophys.* **43**, 75) indicates that about 85 percent of the SOHO comets discovered into mid-2004 were Kreutz sungrazers and around 11 percent were members of the three new groups, with the remaining 4 percent belonging to no known group. And, in an interesting twist, Zdenek Sekanina and Paul Chodas (2005, *Ap.J.*, in press) have determined that the Marsden and Kracht groups of small-perihelion comets are likely connected with a much larger known population that has been dispersed over time — the largest member of which they argue is comet 96P/Machholz, with the southern δ Aquarid meteor stream, and Quadrantid meteor stream, and the minor planet 2003 EH_1 all components of this "complex"; they argue that the first "precursors" broke off from 96P at least a millennium ago, and the individual members in turn pass through the phases that we now see as distinct groupings (depending evidently on when they separated from the parent comet or secondary nuclei). Another suggested complex of objects with similar orbital elements that was recently put forward (*IAUC* 8485) involves the lost comet D/1819 W1 (Blanpain), the minor planet 2003 WY_{25}, and the Phoenicid meteor stream (which displayed only one known shower, in 1956).

The Central Bureau for Astronomical Telegrams has spent a considerable amount of time in recent years unsuccessfully getting ground-based confirmation (cf. *IAUC* 8138, 8346) of possible comets located by amateur astronomers on ultraviolet SWAN images posted at the SOHO-satellite website. SWAN is a very-wide-field imager with extremely low resolution, so that positions are generally no better than a degree and the spurious noise level is quite high. In 2002, T. Mäkinen reported another possible comet belatedly from 2000 images; because it was never confirmed as a comet, C/2000 S5 was never given a name. Mäkinen estimated that the object peaked near mag 7 in Oct. 2000 based on correlations between Lyman$_\alpha$ fluxes and total visual magnitudes of comets published by Jorda *et al.* [1992, *Asteroids, Comets, Meteors 1991*, ed. by A. W. Harris and E. Bowell (Houston: Lunar and Planetary Institute), pp. 285-288]. Nevertheless, several objects first noted by amateur astronomers on SWAN website images have in fact been confirmed as comets in the past year and a half via ground-based observations, including C/2004 H6, C/2004 V13, C/2005 P3, and P/2005 T4. C/2004 V13 was interesting in that, after its presence on SWAN images was suspected and reported, the comet was confirmed in optical images as it entered the SOHO C3 coronagraph on Dec. 16 (cf. *IAUC* 8455).

The World Wide Web is increasingly allowing amateur astronomers to participate in finding and performing valuable follow-up measurements for comets. In addition to the optical SOHO and ultraviolet SWAN websites for images, other surveys have been posting their images via the Internet. For example, Maik Meyer aided in the quick refining of the orbit of newly discovered comet P/2003 L1 by identifying and measuring images of the "clearly diffuse" object on NEAT frames taken in three nights a year earlier (cf. *IAUC* 8153, *MPEC* 2003-M21), and Meyer's finding and measuring images of P/2003 UD_{16} (LINEAR) from Palomar Sky Survey photographs taken in 1989 and 1991 permitted the comet to be numbered as 159P (*IAUC* 8263). Other work by Meyer includes identification and measurement of images of P/2004 NL_{21} (NEAT) from 1996 NEAT exposures, allowing the comet to be numbered as 160P (*IAUC* 8414) — and the same for P/2004 V4 (NEAT) from 1990-1991 Digitized Sky Survey images and from 1997 NEAT exposures, allowing the comet to be numbered 163P (*IAUC* 8468). Kracht has reviewed old SOLWIND-satellite images for near-sun comets and reported several recently dating back to 1981-1984 (*IAUC* 8566, 8573, 8583).

Physical Observations of Comets

A team led by Nicolas Biver reported (*IAUC* 7559) that radio observations of comet C/1999 T1 (McNaught-Hartley) in early January 2001 suggested the highest percentage of carbon monoxide every seen in a comet relatively close to the sun, the CO production rate being 0.4 that of water — though infrared observations by Michael Mumma *et al.* a few nights later suggested the H_2O:CO ratio to be 0.17 (*IAUC* 7578). The high level of non-optical observations of this comet was unusual considering that its peak total visual magnitude was around 7.5. Comet 2P/Encke is not heavily observed by professional astronomers who are not performing astrometry or photometry, due to its faintness except when close to the sun (and at small solar elongations); yet at its return to perihelion in late 2003, HCN and water vapor were detected from 2P at radio wavelengths from Mauna Kea (cf. *IAUC* 8239) and with the Submillimeter Wave Astronomy Satellite (SWAS; *IAUC* 8249). The attention drawn to 9P/Tempel as a result of the planned crash of the *Deep Impact* probe into the comet on 2005 July 5 drew a lot of physical observations that are normally atypical for a 10th- or 11th-magnitude comet. For example, radio observations by Biver *et al.* (*IAUC* 8538) showed a periodic variation in HCN production with a period of 1.7 days (thought to be the rotation rate of the comet's nucleus); water was also detected with the SWAS instruments in 9P (*IAUC* 8550). When *Deep Impact* actually hit the comet, a significant temporary brightening of the nuclear condensation (as much as 2 magnitudes) was observed from the earth (*e.g.*, *IAUC* 8558), but the total brightness increase for the entire coma was only a few tenths of a magnitude.

IAU Issues: Comet Magnitudes and CBETs

At the 2003 General Assembly of the International Astronomical Union (IAU) in Sydney, Australia, I presented the conclusions of a committee that had been assembled to assess cometary magnitudes from the standpoint of publishing astrometry and ephemerides within the scope of IAU Commission 20 (which studies the "Positions and Motions of Minor Planets, Comets, and Satellites"). My own analyses of the light curves of comets observed in the last half-century with orbital periods $P > 30$ yr have shown a clear average behavior that tends toward an inverse-third-power law (2.5n log

$r = 7.5 \log r$, where r is the heliocentric distance and $n = 3$), whereas periodic comets with $P < 15$ yr clearly have a trend where $n > 4$. The default value of n has been 4 for many decades, but this has caused major problems when trying to predict the brightness near perihelion of potentially bright, newly discovered long-period comets; for example, knowing what we know now, if comet C/1973 E1 (Kohoutek; O.S. 1973f = 1973 XII) had been predicted to brighten as $7.5 \log r$ (which it in fact did do) instead of the customary $10 \log r$, a lot of embarassment might have been avoided. So the recommendations adopted at the Sydney meeting of Commission 20 include using $n = 3$ for ephemerides of newly discovered longer-period comets.

These new recommendations also call for elimination of the distinguishing between total (customarily denoted m_1) and so-called 'nuclear' (m_2) magnitudes in published astrometry and ephemerides of comets. Readers of the *ICQ* have long been aware of the problems surrounding trying to define m_2, and in fact most astrometrists derive comet magnitudes that are in between true nuclear magnitudes and total magnitudes (their CCD exposures tend to be very short), so observers, archivists, and publishers of cometary astrometry are recommended to use a new system for magnitudes in which 1-character codes are used for photometric-aperture size and for bandpass (to give a much better assessment of what sort of magnitude is being presented). The recommendations call for four letters to be used to indicate the size of the photometric aperture in a single dedicated column: `a` = > 1′; `b` = 15″ to 60″; `c` = < 15″; `s` = (essentially) stellar appearance — with the column left blank if the size is not known or stated. A second set of upper-case letters denote the bandpass for a second dedicated column, thus: `P` = photographic; `R` = CCD R-band (or I-band or thereabouts); `U` = unfiltered CCD; `V` = CCD V-band (or thereabouts); `X` = bandpass not stated (or left blank by observers; also used for observers reporting the old codes "N" or "T" for "nuclear" and "total"). The option is left for other letters to be added later (though the fewer letters the better, perhaps). In practice, the Minor Planet Center, which currently is responsible for archiving cometary astrometry, is using an older format that does not allow for these two new recommended codes, but a new format is being planned for use in the near future; the Central Bureau for Astronomical Telegrams (CBAT), on the other hand, began immediately in 2003 to remove m_1 and m_2 from cometary astrometry and ephemerides in its publications, replacing them with simply "Mag." (for "magnitude").

In a related CBAT matter, we introduced in December 2002 a new electronic-only publication (available via e-mail to subscribers and also to the general public now at the CBAT website) called *Central Bureau Electronic Telegrams*, in order both to speed up issuing urgent material without having to compile and "typeset" a printed *IAU Circular* and also to allow for much longer items to be published. These *CBETs* have been a great success, and some comet discoveries have been announced initially on *CBETs*, particularly in my absence from Cambridge, but such reports will continue to appear soon thereafter on the formal, printed *IAUCs*.

IAU Issues: Comet Naming

Meanwhile, in March 2003, new comet-naming guidelines were adopted by the IAU Committee on Small-Body Nomenclature (CSBN). These new guidelines were written mostly by myself with Brian Marsden and Gareth Williams (with helpful input from a couple of other members of the CSBN, including Michael A'Hearn and Donald Yeomans) to update an earlier preliminary version by incorporating the considerable experience of the CBAT in dealing with problematic naming situations stemming especially from group observing and from objects that are not immediately identified as cometary. The new guidelines, presented in their entirety immediately following this article, are intended to be a guide to the naming of newly discovered comets — but there have been a few cases since their adoption when the CSBN was still required to assess and vote on some problematic comet names where a clear discoverer within a group was not manifest. The mantra of the CSBN in developing the comet-naming guidelines was for simplicity and fairness to be the theme.

Among the problematic comet names discussed by the CSBN in the last five years, causing delays in the issuing of names via *IAU Circulars*, was P/2004 S4 (LINEAR-Spacewatch) — a comet reported as asteroidal by LINEAR but cometary by the Spacewatch team. What held up the naming was an investigation into the wishes by the first Spacewatch observer to have it named for another individual who helped to confirm the cometary nature, and the CSBN ruled that since more than one individual of a team was involved, the comet would receive the group name (cf. *IAUC* 7553). In 2001, the CSBN wrestled with a series of comets discovered by the LONEOS program and again decided that — when it was unclear as to whether or not a single individual within a group was responsible for making the discovery observation, identifying (discovering) the comet, and measuring and reporting the details to the CBAT — comets should generally be named for the program (if there is a 'usuable' program name). One of these comets, 150P/2000 WT_{168} (LONEOS), was independently discovered by the LONEOS and LINEAR programs (on 2000 Nov. 25 and 27, respectively) and reported as apparently asteroidal but found to be cometary elsewhere nearly three months later; a month after the object was announced as a comet, Reiner Stoss and Rob McNaught identified it with two asteroidal trails taken with the U.K. Schmidt telescope in 1978 and 1986, allowing the comet to be numbered as 150P. Another comet discussed by the CSBN at that time was C/2001 HT_{50} (LINEAR-NEAT), which was reported independently by the LINEAR and LONEOS programs as apparently asteroidal (on Apr. 23 and 26, respectively) and went without an orbit until the NEAT team rediscovered the object on May 14 as apparently cometary; minor-planet discoveries have for many years been accepted only for a single observation (and corresponding observer or group), and under this rule, the minor planet discovery for 2001 HT_{50} had gone to the first observer (LINEAR).

In late 2004, the CSBN announced names for three comets that had remained nameless for quite some time: C/1996 R3 (Lagerkvist), P/2003 A1 (LINEAR), P/2004 A1 (LONEOS). C/1996 R3 was a very faint comet that was reported a month after the known observations were made (all on only three successive nights), and attempts to recover the comet failed (though the arc was extended by a month by Lagerkvist eight years later when he identified and measured images of the comet taken in Oct. 1996); past practice has been to not give names to comets discovered after they were no longer visible. Comet P/2003 A1, found in the course of the LINEAR survey, was suspected from the time of its discovery (*IAUC* 8044) as being quite possibly identical with (or at least connected to) comet D/1783 W1, which was discovered by Edward Pigott at York, England, and observed by John Goodricke, P. F. A. Méchain, and Charles Messier. I extracted the positional measurements from the 18th-century literature and, as with the 1661 comet mentioned above, I produced 45 equinox-2000.0 positions based on modern star catalogues, though the 1783 observations were not of very high precision. The number of orbital revolutions remains unknown; complete orbital convergence was not possible, despite considerable effort by Gareth Williams, Syuichi Nakano, and myself. Because a definitive link cannot be made at this time, the CSBN decided to name the comet for the LINEAR survey and allow for the future possibility of changing the name to "Pigott-LINEAR" if the link is ever confirmed. P/2004 A1 presented another complicated naming issue because more than one person at Lowell Observatory was involved in the process of finding, confirming, and reporting the comet in the course of the LONEOS survey; after a lengthy and divided discussion, the CSBN voted by majority to name the comet for the survey.

In November 2004, the CSBN made the unprecedented suggestion for redesignating and renaming comet P/2003 YM_{159} (LINEAR-Catalina) to P/2004 V5 (LINEAR-Hill) after more details from the Catalina program (than were available initially) suggested that the discovery was entirely due to Rik Hill rather than being a group effort.

Transneptunian Objects

I feel that I'd be remiss in a column reviewing news on recent comets if I failed to mention the recently discovered large transneptunian objects (TNOs), including especially 2003 UB_{313}, which appears to be notably larger than Pluto in size and has its own orbiting satellite. In fact, numerous TNOs have been found in the last five years to have satellites (*e.g.*, *IAUC* 7610, 7787, 7807, 7959, 7962, 8034, 8143, 8251, 8289, 8526). The known TNOs, of course, are thought to move in regions where comets formed and still exist, and there are persistent questions about where cometary nuclei end and other planetary objects begin (recall the retrograde minor planets noted above). A spacecraft mission to Pluto and several other TNOs could therefore show how these objects are real Rosetta stones to understanding key questions about the solar system. Of course, the silly debates currently going on inside and outside the IAU are focussed on defining what a planet is (thus, whether Pluto is the "ninth planet" or not). I believe that the term "planet" needs no additional defining: it's well understood. The problem lies rather with people who use the term "planet" alone to mean something that is confusing without use of qualifiers, such as "minor" or "major" or "transneptunian" or "extra-solar", etc. Astronomers seem to be getting worse at using words and terms without thinking about them; recall the poor term (and concept) "Kuiper Belt" (the problems of which I've written about numerous times in these pages), or take the horrendous term "near-earth object" ("NEO"), which might be aptly given to an earth-orbiting satellite but not to a minor planet or comet (except during the very brief period that they actually *are* very close to the earth!; NEO *should* apply to something that is *always* near the earth — to use it otherwise is just confusing to the general public).

One should instead be considering what constitutes a "major planet" vs. a "minor planet": then the problems would be minimized because one doesn't have to worry about re-defining a whole concept. But since the Minor Planet Center will be involved with cataloguing the observations and improving the orbits for all TNOs (including Pluto), let the MPC issue its designations for practicality, and if others want to consider certain TNOs to *also* be "major planets", let them do so! It's probably easiest to just say that there the solar system has four terrestrial planets, four giant gaseous planets, and a host of satellites and minor planets (including comets) and smaller debris (meteoroids and dust) — rather than getting hung up on how many major planets there are. We already have dual status with comet 95P/Chiron and minor-planet (2060) Chiron, among others, so why not show that astronomers can be flexible instead of rigid, and move into the 21st century on a creative note instead of being stuck in old ways of thinking? — *Daniel W. E. Green*

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IAU Comet-Naming Guidelines

The following guidelines for naming comets were adopted in March 2003 by the Committee on Small Body Nomenclature of Division III of the International Astronomical Union. Abbreviations: *Committee on Small Bodies Nomenclature (IAU Division III) = CSBN* [in the following, the CSBN means also any other appropriate IAU committee that may replace the CSBN in the future for the purposes of deciding comet-nomenclature issues, noting that the CSBN had a recent name change]; *Central Bureau for Astronomical Telegrams (IAU Commission 6) = CBAT*.

Introduction. Comets did not become routinely named for their discoverers until the 20th century. In the 19th century, names were generally used for short-period comets only after their second apparition; single-apparition short-period comets and long-period comets were generally referred to by designations (with names sometimes, though not with much consistency, given parenthetically).

In recent years, the comet-naming process has been impacted by several wide-field CCD surveys conducted by professional teams. It is therefore appropriate to write down guidelines for the naming of comets to make the process as simple and fair as possible. Though guidelines have been drafted previously by IAU Commission 20 members in recent years, this aims to replace those guidelines by starting anew, by creating guidelines that are even simpler and more fair. These guidelines may need to be revised by the CBAT and CSBN, as special circumstances warrant.

The CBAT works closely with the Minor Planet Center (MPC) in many cases regarding the astrometry, identifications, orbit computing, and collection of observations. In recent practice, comet names are announced on IAU Circulars after a reasonable orbit has been determined, in an effort to prevent re-naming of lost comets. The CBAT consults with the CSBN on non-routine naming matters, in which some interpretation of the following guidelines is deemed appropriate.

Guideline 1: Regarding proper reporting of discoveries.

1.1 Comets normally receive their names on the basis of information available to the CBAT at the time of first official announcement of the discovery. The discovery observation (and thus the discoverer) is taken to be that which permits the CBAT to issue reasonable requests for confirming observations (directly to individual observers or sometimes via "The NEO Confirmation Page" at the CBAT/MPC website) or to issue an announcement Circular.
1.2 Comets are generally considered no longer available for additional recognized discovery claims once the call for confirmation has been widely issued (e.g., e-mail or World Wide Web posting) by the CBAT or MPC.
1.3 Independent discoveries of a comet that are reported to the CBAT after the issuance of the announcement IAUC are usually not considered in the naming process, unless:
  (a) it can be shown unambiguously that the discovery claim in question was made before any outside knowledge could have been available to the claimant; and
  (b) that the comet has not yet been named; and
  (c) there are not already more than two names to be given to the comet in question.
1.4 The time of comet discovery is taken to be the time of the first detection visually or the time that the image was taken upon which the discovery was made.

Guideline 2: Regarding discoverers.

2.1 Comets are to be named for their individual discoverer(s) if at all possible. This means using the last (family) name of the discoverer(s).
2.2 Sometimes, however, team names are more appropriate.
  (a) A discoverer is defined here as the person(s) who first detect(s) the comet (visually, or on a photograph or electronic image). He or she is responsible for obtaining and communicating to the CBAT (possibly via a responsible third party) accurate information on the comet's positions and physical appearance.
  (b) Although past comets have borne the names of three (and, on rare occasions, more) discoverers, it is preferable to keep the limit to two names if at all possible; more than three names are to be avoided except in rare cases where named lost comets are identified with a rediscovery that has already received a new name.
  (c) When there are two (or more) independent discoveries of a comet,
    (1) the discoverers' (or their teams') names are to be listed in the chronological order in which each discoverer (or team) found the comet,
    (2) each individual name is to be separated by a hyphen (but family surnames with two or more words separated by either spaces or hyphens are to be distinguished in comet names by single spaces only between each surname word -- although, for simplicity, the discoverer shall in such cases also be given the option to choose one main word from his or her name to represent the surname on the comet, with such choosing strongly encouraged), and
    (3) there is to be no more than one name on that comet from a single observing location or program (excepting the possibility of lost comets being rediscovered, as noted in Guideline 5, below).
  (d) Observers and observing programs (or their representatives) cannot require the IAU to use any specific name. The final naming process is the sole discretion of the CBAT and the CSBN in accordance with these guidelines. For observing programs consisting of more than two people, the established team/program name will generally be used for the comet name unless Guideline 3.4(a)(2), below, is satisfied.

2.3 Occasionally a very bright comet (usually near the sun) suddenly becomes visible to many observers worldwide nearly simultaneously as a naked-eye object. In some of these situations, comets do not receive the name(s) of any discoverer(s) but rather a "generic" name such as "Great Comet" or "Eclipse Comet".

[Examples: C/1997 J2 (Meunier-Dupouy), 57P/du Toit-Neujmin-Delporte, 76P/West-Kohoutek-Ikemura, 105P/Singer Brewster, C/1882 R1 (Great September Comet), C/1910 A1 (Great January Comet), C/1947 V1 (Southern Comet), C/1948 V1 (Eclipse Comet)]

Guideline 3: Regarding teams of discoverers.

3.1 Nowadays, there are very frequently teams of professional, and even amateur, astronomers (as opposed to individuals) who find comets in the course of their observing. It is required and presumed that full and truthful details concerning discovery circumstances from teams of discoverers will be given in the initial discovery report.

3.2 Since most discoveries involve teamwork (in the broad sense that confirmation and necessary orbit work is generally done by people not even at the same location as the discoverer), a team is here more narrowly defined as a group of astronomers who are formally organized with certain instrumentation to seek and find celestial objects including comets.

3.3 If an acceptable one-word team name (including an acronym for a longer team name that is acceptable to the CSBN) is submitted for the observing program, this name can be used for the comet.

3.4 If there is no team name, either the comet shall be named for the person who actually found the comet or the comet may receive no name at all.

- (a) Individual names of team members.
  - (1) In no case shall a comet contain the name of more than two people from the same observing program. If there is no other independent discovery, it is acceptable to have the names of two people from the same program on a comet, if and only if:
    - (A) there are only two team members,
    - (B) both were directly involved in the discovery (that is, involved in making the discovery observation and/or first identifying the comet's image), and
    - (C) their last (family) names are not identical.
  - (2) If a team (with more than two members) supplies satisfactory written testimony that a single team observer did the work to find the comet and note its cometary activity, measure its position and magnitude (or monitor an automatic computer program that does so), and report this information, then it is acceptable for a comet so discovered by a team program to have that single individual's name on the comet instead of the program name.
  - (3) The same name is not to be used twice on the same comet, even if two discoverers share the same last name.
- (b) Comets that are discovered from data or images made public through printed publication or electronic posting (e.g., World Wide Web) are not eligible for individual names of people and generally will not be named unless there is an established program name for the origin of the images. Such discoverers are considered members of the "team".

[Examples: C/1977 V1 (Tsuchinshan), C/1997 B3 (SOHO), C/1999 S4 (LINEAR), C/1999 T1 (McNaught-Hartley), P/2000 C1 (Hergenrother), P/2000 Y3 (Scotti), C/1992 U1 (Shoemaker)]

Guideline 4: Regarding cometary nature that is not immediately noticed.

4.1 It frequently happens that a comet is found by (a) discoverer(s) --- whether a single individual, two individuals working together, or a team --- who cannot detect cometary activity with the equipment that he/she/they possess. Such an object may therefore be assumed to be a minor planet and so designated when two or more nights' worth of observations are available to the Minor Planet Center (or posted, for example -- prior to being designated -- on the MPC's NEO Confirmation webpage, if unusual motion is detected).

4.2 If an observer (whether an individual or a team) who is not the original discoverer of the "minor planet" finds that an "asteroidal" object has a cometary appearance, and if such cometary appearance is confirmed, both the original discoverer of the "minor planet" and the identifier of the cometary nature may be credited in the name of the comet, subject to the following prerequisites:

(a) This dual recognition in the name will occur only when there has been no prior suspicion of the unusual nature of the object; if the object was listed on the "NEO Confirmation Page" or had an unusual orbit published prior to identification of cometary appearance, the identifier of the cometary nature will not be eligible for inclusion in the name.

(b) If no prior suspicion of unusual nature is suspected, the name of the newly recognized comet can consist of two parts: one part derived from the name of the original discoverer of the "minor planet", and the other part derived from the name of the discoverer of the cometary nature. EACH PART of the name would, however, be subject to the following conditions:

(1) Only one name (either individual or team) is permitted. If the "minor planet" was credited jointly to two individuals, only one of these names can be used.

(2) If the original discoverer of the "minor planet" is a team, the team cannot suggest that an individual team-member's name be used.

4.3 If follow-up observations performed by (an) observer(s) other than the original discoverer of a reportedly "asteroidal" object show the object to be a comet (that is, showing a coma and/or tail), -- and the provisos of 4.2 do not apply -- the comet may receive a single name of the original discoverer (individual or team).

4.4 If the minor-planet designation was published before the realization is made that the object is a comet, the comet will retain the minor-planet designation. Otherwise, a new comet designation will be assigned.

4.5 If the object receives a permanent minor-planet number prior to its recognition as a comet, it shall be accorded "dual status". As such, it both retains the permanent minor-planet number and receives a new periodic-comet number.

(a) If the numbered "minor planet" has already received a name, the comet should inherit this name.

(b) If the "minor planet" has not yet received a name, a new name for the comet will be assigned according to these guidelines. The same new name will also be used for the "minor-planet" numbering, noting that minor-planet names must be unique.

[Examples: P/1997 B1 (Kobayashi), P/1999 DN3 (Korlevic-Juric), C/2000 WM1 (LINEAR); 95P = (2060) Chiron, 107P = (4015) Wilson-Harrington, 133P = (7968) Elst-Pizarro; P/2001 BB50 (LINEAR-NEAT)]

Guideline 5: Regarding changes in comet names.

5.1 The CBAT/CSBN has the option occasionally, in the interest of fairness and/or simplicity, to change the name of a rediscovered lost comet or in other complicated cases involving comet names (such as names found later to be spelled incorrectly or be missing diacritical marks, etc.). However, such changes will be made only rarely.

5.2 Numerous one- or multi-apparition short-period comets remain lost due to highly uncertain orbital elements (from poor sets of observations). Sometimes such "lost" comets are rediscovered, and occasionally the identification of the past apparition(s) is not made until after a new name is assigned; though efforts are made to search for identifications before naming of a new comet is made, this is not always immediately possible, in practice.

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        (a) Comet names are generally announced on IAU Circulars by the
            CBAT at the time of publication of a first set of orbital elements.
            The hope is to maintain stability by preventing previously observed
            comets (particularly lost comets) from getting new names.
        (b) Occasionally this is not possible, and when a lost comet has been
            given a new name(s) before it is shown to be the same comet, the
            new name(s) is (are) to be added to the original name(s).
   5.3  New comets later identified with observations of "asteroidal"
        objects (or previously unidentified cometary images) in previous
        months or years do not get names added due to such findings after
        the initial comet name is published.
   5.4  Prior to the publication of a name for a new comet, if the comet
        can be identified with an object reported as asteroidal at the same
        apparition on two or more nights by a single or team discoverer,
        so that a minor-planet designation has already been given, it can
        also have a name for that individual or team discoverer added,
        provided that there is only one other name for the comet (for a
        total of two names).
   5.5  Also in the stated interest of simplicity, comet names will not
        be changed by adding numerals after names (where multiple comets
        carry the same discoverers' names), as was done during much
        of the twentieth century, as this merely complicates matters.
        Officially, there is no need to retain numerals on short-period
        comets that have routinely carried them in the past, because the
        robust designation system obviates their necessity and because
        the historical facts belie any logic associated with using numerals
        (different numerals were used in different places, and there are
        gaps in the numerals used even recently).

 [Examples:  C/1955 N1 (Bakharev-Macfarlane-Krienke),
             C/1980 O1 (Cernis-Petrauskas), C/1997 L1 (Zhu-Balam),
             2P/Encke, 27P/Crommelin, 97P/Metcalf-Brewington,
             146P/Shoemaker-LINEAR]


Guideline 6:  Regarding unnamed comets.

   6.1  The CSBN and CBAT reserve the right to delay naming, possibly
        indefinitely.  Reasons for such delay may include:
        (a) A comet is found months or years after observation and
            is no longer observable.  Exceptions have been made in
            connection with team names for sungrazing comets observed by
            space-based coronagraphs.
        (b) A comet's orbit is not determinable due to poor observations
            or short arc of observation; in such cases, an object will
            usually be given an "X/" designation.
        (c) There is no agreement among team members for (an) observing
            program(s) claiming the discovery.

 [Examples:  C/1931 AN, C/1996 R3, C/1997 K2,
             P/1997 T3 (Lagerkvist-Carsenty), C/2001 HT_50 (LINEAR-NEAT)]
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Φ Φ Φ

Photometry of Deep-Sky Objects

The previous batch of deep-sky photometry of *ICQ*-recommended objects appeared in the October 2005 issue, pages 260-262. The descriptive information by observer SRB below were accidentally left out of the October issue (where his tabulated data appear).

Descriptive Information, to complement the Tabulated Data (all times UT):

◇ *NGC 221 = M32* ⟹ 2004 Sept. 1.98 and 2.95: moonlight; tab. data published in Oct. 2005 *ICQ* [SRB].

◇ *NGC 1952 = M1* ⟹ 2004 Sept. 1.99: moonlight; tab. data published in Oct. 2005 *ICQ* [SRB]. 2005 Sept. 30.16: size 7′ × 4′; all deep-sky estimates for this and other objects were made from the Cantabrian Mountains, Asturias, near Leon, Spain [GON05].

◇ *NGC 3031 = M81* ⟹ 2005 July 30.02 and Aug. 30.03: size 15′ × 8′ in both 7×50 and 11×80 B [GON05].

◇ *NGC 3623 = M65* ⟹ 2005 Nov. 11.20: size 7′ × 2′ [GON05].

◇ *NGC 3627 = M66* ⟹ 2005 Nov. 11.20: size 7′ × 3′ [GON05].

◇ *NGC 6781* ⟹ 2005 July 29.97: planetary nebula with nearly circular ring; no DC estimate was made [GON05].

◇ ◇ ◇

Visual Data

NGC 221 = M32

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 03.00		M	9.0	TK	20.3	T	10	77	5	6			GON05
2005 07 03.01		M	9.0	TK	10.0	B		25	4	6			GON05

NGC 936

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 09 14.16		M	10.7	TK	20.3	T	10	77	4	6			GON05

NGC 1068 = M77

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 09 14.15		M	9.6	TK	20.3	T	10	77	4	6			GON05

NGC 1952 = M1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 09 30.16		S	8.3	TK	10.0	B		25	7	2/			GON05

NGC 2068

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 09 30.17		S	8.2	TK	10.0	B		25	5	1			GON05

NGC 3031

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 30.02		M	7.5	TK	8.0	B		11	15	6			GON05
2005 08 30.03		M	7.3	TK	5.0	B		7	15	6			GON05

NGC 3344

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 06.18		S	10.3	TK	20.3	T	10	77	5	3			GON05

NGC 3485

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 11.21		S	12.2	TK	20.3	T	10	77	2	3			GON05

NGC 3623 = M65

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 11.20		M	9.5	TK	20.3	T	10	77	7	6			GON05

NGC 3627

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 11.20		M	9.3	TK	20.3	T	10	77	7	6			GON05

NGC 3640

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 06.22		S	10.5	TK	20.3	T	10	77	4	3			GON05

NGC 4147

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 06.24		M	9.8	TK	20.3	T	10	77	4	5			GON05

NGC 4374

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 11.22		M	10.1	TK	20.3	T	10	77	4	6			GON05

NGC 4406

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 11.23		M	9.9	TK	20.3	T	10	77	5	6			GON05

NGC 4486 = M87

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 11.22		M	9.4	TK	20.3	T	10	77	5	6			GON05

NGC 4649 = M60

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 05.98		M	9.3	TK	10.0	B		25	7	6			GON05

NGC 5024

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 05.99		B	7.7	TK	5.0	B		7	8	8			GON05

NGC 5272 = M3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 02.00		B	6.5	TK	5.0	B		7	8	7			GON05

NGC 6356

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 30.01		M	8.7	TK	20.3	T	10	77	4	6			GON05
2005 09 02.88		M	8.8	TK	10.0	B		25	4	6			GON05

NGC 6384

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 30.00		S	10.3	TK	20.3	T	10	77	5	4			GON05

NGC 6426

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 29.99		S	10.8	TK	20.3	T	10	77	3	4			GON05

NGC 6712

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 30.05		M	8.2	TK	20.3	T	10	77	4	6			GON05
2005 08 29.97		M	8.2	TK	10.0	B		25	4	6			GON05

NGC 6760

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 30.03		S	8.8	TK	20.3	T	10	77	4	5			GON05
2005 08 29.98		S	8.9	TK	10.0	B		25	4	5			GON05

NGC 6781

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 29.97		S	10.4	TK	20.3	T	10	77	2.5				GON05

NGC 6934

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 30.04		M	9.2	TK	20.3	T	10	77	4	7			GON05

NGC 7078 = M15

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 09 14.13		B	6.3	TK	5.0	B		7	5	7			GON05
2005 09 14.14		B	6.7	TK	10.0	B		25	6	6			GON05

UGC 5373

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 11 06.20		S	11.0	TK	20.3	T	10	77	4	2			GON05

Φ Φ Φ

Tabulation of Comet Observations

Descriptive Information, to complement the Tabulated Data (all times UT):

See the July 2001 issue (page 98) for explanations of the abbreviations used in the descriptive information.

◇ *Comet 21P/Giacobini-Zinner* ⟹ 2005 Nov. 8.77: *Guide 8.0* software used for photometry; $B-V$ values of comp. stars were +0.54, +0.71, and +0.85 [OHS].

◇ *Comet 29P/Schwassmann-Wachmann* ⟹ 2005 July 7.96: comet obs. low in sky but w/ very good sky conditions [BAR06]. Oct. 31.54: *Guide 8.0* software used for photometry; comp. star has $B-V = +0.66$ [TSU02]. Nov. 1.76: *Guide 8.0* software used for photometry; comp. star has $B-V = +0.66$ [OHS].

◇ *Comet 65P/Gunn* ⟹ 2005 Nov. 8.63: *Guide 8.0* software used for photometry; $B-V$ values of comp. stars were +0.54, +0.71, and +0.85 [OHS].

◇ *Comet 101P/Chernykh* ⟹ 2005 Oct. 31.43: *Guide 8.0* software used for photometry; comp. star has $B-V = +0.76$ [TSU02].

◇ *Comet 161P/Hartley-IRAS* ⟹ 2005 July 7.92: larger diffuse coma; very good sky conditions [BAR06].

◇ *Comet 169P/2002 EX_{12} (NEAT)* ⟹ 2005 Oct. 13.15: ephemeris from MPC Ephemeris website; checked Digitized Sky Survey; limiting stellar mag 15.5 [HAS02].

◇ *Comet C/2003 K4 (LINEAR)* ⟹ 2005 Oct. 31.58: *Guide 8.0* software used for photometry; comp. star has $B-V = +0.43$ [TSU02].

◇ *Comet C/2004 Q2 (Machholz)* ⟹ 2005 Jan. 2.86: 3° gas tail in p.a. 90°; 1° dust tail in p.a. 185° (7×50 B) [DOR02]. Jan. 8.71: 1°.7 gas tail in p.a. 85°; 0°.8 dust tail in p.a. 163° [BOH02]. Jan. 9.79: 1°.0 gas tail in p.a. 86°; 0°.4 dust tail in p.a. 174° (20×60 B) [SCI]. Jan. 9.88: 3°.5 gas tail in p.a. 88°; 1°.5 dust tail in p.a. 180° (7×50 B) [DOR02]. Jan. 10.80: 0°.5 gas tail in p.a. 90°; 0°.5 dust tail in p.a. 160° (7×50 B) [DOR02]. Jan. 11.74: 0°.5 gas tail in p.a. 95°; 0°.5 dust tail in p.a. 175° (20×60 B) [SCI]. Jan. 12.78: 0°.5 gas tail in p.a. 95°; 0°.5 dust tail in p.a. 165° (7×50 B) [DOR02].

Jan. 13.80: 0°.5 gas tail in p.a. 95°; 0°.5 dust tail in p.a. 165° (7×50 B) [DOR02]. Jan. 15.92: 0°.41 gas tail in p.a. 80°; 0°.66 dust tail in p.a. 145° (18.5-cm L) [KWI]. Jan. 15.93: 1°.0 gas tail in p.a. 85°; 0°.7 dust tail in p.a. 140° (7×50 B) [FIL04]. Jan. 16.77: 1°.4 gas tail in p.a. 87°; 0°.8 dust tail in p.a. 140° (20×60 B) [SCI]. Jan. 16.89: 1°.0 gas tail in p.a. 90°; 0°.5 dust tail in p.a. 170° (7×50 B) [FIL04]. Jan. 16.92: 1° gas tail in p.a. 90°; 0°.3 dust tail in p.a. 165° (7×50 B) [KIS03]. Jan. 18.96: 0°.5 gas tail in p.a. 85°; 0°.66 dust tail in p.a. 135° (18.5-cm L) [KWI]. Feb. 6.74: 0°.5 gas tail in p.a. 85°; 1°.0 dust tail in p.a. 170° (7×50 B) [FIL04].

◇ *Comet P/2004 V3 (Siding Spring)* ⟹ 2005 Oct. 24.52 and 24.55: twelve co-added 120-sec CCD exposures (two such images produced) w/ 1.0-m *f*/8 reflector show a diffuse trail 5″ wide and 35″ long in p.a. 192°, with no obvious concentrations or condensations [R. H. McNaught, Siding Spring Observatory].

◇ *Comet C/2005 A1 (LINEAR) — component A* ⟹ 2005 Nov. 7.47: *Guide 8.0* software used for photometry; $B-V$ values of comp. stars were +0.55 and +0.61 [YOS02].

◇ *Comet C/2005 E2 (McNaught)* ⟹ 2005 Oct. 31.40: *Guide 8.0* software used for photometry; comp. star has $B-V$ = +0.73 [TSU02]. Nov. 4.86: alt. 6° [GON05].

◇ *Comet P/2005 K3 (McNaught)* ⟹ 2005 Nov. 8.60: *Guide 8.0* software used for photometry; $B-V$ values of comp. stars were +0.54 and +0.71 [OHS]. Nov. 8.84: *Guide 8.0* software used for photometry; $B-V$ values of comp. stars were +0.48 and +0.83 [YOS02].

◇ *Comet P/2005 Q4 (LINEAR)* ⟹ 2005 Nov. 8.65: *Guide 8.0* software used for photometry; $B-V$ values of comp. stars were +0.54, +0.58, and +0.71 [OHS].

◇ *Comet P/2005 R1 (NEAT)* ⟹ 2005 Oct. 31.45: *Guide 8.0* software used for photometry; comp. star has $B-V$ = +0.88 [TSU02].

◇ *Comet P/2005 R2 (Van Ness)* ⟹ 2005 Oct. 11.90: poor weather conditions; measurements to be taken w/ caution [SHU]. Oct. 27.75: ephemeris from MPC Ephemeris website; checked Digitized Sky Survey; limiting stellar mag 15.5 [HAS02]. Oct. 31.53 and Nov. 7.52: *Guide 8.0* software used for photometry [TSU02]. Oct. 31.53: comp. star has $B-V$ = +0.42 [TSU02]. Nov. 7.52: *Guide 8.0* software used for photometry; $B-V$ values of comp. stars were +0.60 and +0.72 [YOS02].

◇ *Comet P/2005 S3 (Read)* ⟹ 2005 Oct. 31.57: *Guide 8.0* software used for photometry; comp. star has $B-V$ = +0.58 [TSU02].

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Key to observers with observations published in this issue, *with 2-digit numbers between Observer Code and Observer's Name indicating source [16 = Japanese observers (via Akimasa Nakamura, Kuma, Ehime); 32 = Hungarian observers (via Krisztián Sárneczky, Budapest); etc.]:*

ABB	07	James Abbott, Essex, England
ADA02	18	Jacek Adamik, Poland
BAR06	37	Alexandr R. Baransky, Ukraine
BOH02	18	Jerzy Bohusz, Gdynia, Poland
BUR04	18	Wojciech Burzynski, Poland
CHE03	33	Kazimieras T. Cernis, Lithuania
CHR	18	Antoni Chrapek, Pikulice, Poland
DOR02	18	Dariusz Dorosz, Poland
FIL04	18	Marcin Filipek, Poland
GON05		J. J. Gonzalez, Asturias, Spain
GRO03	18	Radoslaw Grochowski, Poland
GRO04	18	Jaroslaw Grolik, Poland
HAS02		Werner Hasubick, Germany
*HUR01	18	Adam Hurcewicz, Rudnica, Poland
KID01	18	Krzysztof Kida, Elblag, Poland
KIS03	18	Adam Kisielewicz, Poland
KOR01		Valeriy L. Korneev, Russia
KOS		Attila Kósa-Kiss, Romania
KWI	18	Maciej Kwinta, Krakow, Poland
LAB02		Carlos Labordena, Spain
LEG	18	Marian Legutko, Gliwice, Poland
MAR12	18	Leszek Marcinek, Poland
MER05	07	Cliff Meredith, England
MOZ	18	Dawid Mozdzierski, Poland
NAG08	16	Yoshimi Nagai, Gunma, Japan
OHS	16	Yuuji Ohshima, Nagano, Japan
OSS	18	Piotr Ossowski, Poland
PAC03	18	Pawel Paczkowski, Serock, Poland
PAN	07	Roy W. Panther, England
PAR03	18	Mieczyslaw L. Paradowski, Poland
POW01	18	Jacek Powichrowski, Poland
RZE	18	Zbigniew Rzepka, Poland
SAN07	32	Gábor Sánta, Hungary
SCI	18	Tomasz Sciezor, Poland
SER	42	Ivan M. Sergey, Belarus
SHA02	07	Jonathan D. Shanklin, England
SHU	42	Sergey E. Shurpakov, Belarus
SIK01	18	M. Sikora, Lublin, Poland
SIW	18	Ryszard Siwiec, Poland
SMY	18	Jaroslaw Smyslo, Poland
SOU01	35	Willian Carlos de Souza, Brazil
SPE01	18	Jerzy Speil, Poland
SWI	18	Mariusz Swietnicki, Poland
SZW	18	Grzegorz Szwed, Torun, Poland
*SZY	18	Jakub Szymkowiak, Mosina, Poland
TSU02	16	Mitsunori Tsumura, Japan
TUR01	18	Pawel Turek, Krakow, Poland
YOS02	16	Katsumi Yoshimoto, Hirao, Japan
ZAN01	11	W. T. Zanstra, The Netherlands

Visual Data

TABULATED VISUAL DATA (also format for old-style CCD data)

NOTE: As begun in the October 2001 issue, the CCD and visual tabulated data are separated. The tabulated CCD data are also now generally further separated into two "CCD" sections: the first in the old format for those observations submitted only in the old format, and the second in the new format (whose columns are described on page 208 of the July 2002 *ICQ*).

The headings for the tabulated data are as follows: "DATE (UT)" = Date and time to hundredths of a day in Universal Time; "N" = notes [`*` = correction to observation published in earlier issue of the *ICQ*; an exclamation mark (`!`) in this same location indicates that the observer has corrected his estimate in some manner for atmospheric extinction (prior to September 1992, this was the standard symbol for noting extinction correction, but following publication of the extinction paper — July 1992 *ICQ* — this symbol is only to be used to denote corrections made using procedures different from that outlined by Green 1992, *ICQ* **14**, 55-59, and in Appendix E of the *ICQ Guide to Observing Comets* — and then only for situations where the observed comet is at altitude > 10°); '`&`' = comet observed at altitude 20° or less with no atmospheric extinction correction applied; '`$`' = comet observed at altitude 10° or lower, observations corrected by the observer using procedure of Green (*ibid.*); for a correction applied by the observer using Tables Ia, Ib, or Ic of Green (*ibid.*), the letters '`a`', '`w`', or '`s`', respectively, should be used; `x` indicates that a secondary source (often amateur computer software) was used to get supposedly correct comparison-star magnitudes from an accepted catalogue].

"MM" = the method employed for estimating the total (visual) magnitude; see article on page 186 of the Oct. 1996 issue [B = VBM method, M = Morris method, S = VSS or In-Out method, I = in-focus, C = unfiltered CCD, c = same as 'C', but for 'nuclear' magnitudes, V = electronic observations — usually CCD — with Johnson *V* filter, *etc.*]. "MAG." = total (visual) magnitude estimate; a colon indicates that the observation is only approximate, due to bad weather conditions, *etc.*; a left bracket ([) indicates that the comet was not seen, with an estimated limiting magnitude given (if the comet IS seen, and it is simply estimated to be fainter than a certain magnitude, a "greater-than" sign (>) must be used, not a bracket). "RF" = reference for total magnitude estimates (see pages 98-100 of the October 1992 issue, and Appendix C of the *ICQ Guide to Observing Comets*, for all of the 1- and 2-letter codes; an updated list is also maintained at the *ICQ* World Wide Website). "AP." = aperture in centimeters of the instrument used for the observations, usually given to tenths. "T" = type of instrument used for the observation (R = refractor, L = Newtonian reflector, B = binoculars, C = Cassegrain reflector, A = camera, T = Schmidt-Cassegrain reflector, S = Schmidt-Newtonian reflector, E = naked eye, *etc.*). "F/" and "PWR" are the focal ratio and power or magnification, respectively, of the instrument used for the observation — given to nearest whole integer (round even); note that for CCD observations, in place of magnification is given the exposure time in seconds [see page 11 of the January 1997 issue; a lower-case "a" indicates an exposure time under 1000 seconds, an upper-case "`A`" indicates an exposure time of 1000-1999 seconds (with the thousands digit replaced by the "`A`"), an upper-case "`B`" indicates an exposure time of 2000-2999 seconds (with the thousands digit replaced by the "`B`"), etc.].

"COMA" = estimated coma diameter in minutes of arc; an ampersand (&) indicates an approximate estimate; an exclamation mark (!) precedes a coma diameter when the comet was not seen (*i.e.*, was too faint) and where a limiting magnitude estimate is provided based on an "assumed" coma diameter (a default size of 1′ or 30″ is recommended; cf. *ICQ* **9**, 100); a plus mark (+) precedes a coma diameter when a diaphragm was used electronically, thereby specifying the diaphragm size (i.e., the coma is almost always larger than such a specified diaphragm size). "DC" = degree of condensation on a scale where 9 = stellar and 0 = diffuse (preceded by lower- and upper-case letters S and D to indicate the presence of stellar and disklike central condensations; cf. July 1995 issue, p. 90); a slash (/) indicates a value midway between the given number and the next-higher integer. "TAIL" = estimated tail length in degrees, to 0.01 degree if appropriate; again, an ampersand indicates a rough estimate. Lower-case letters between the tail length and the p.a. indicate that the tail was measured in arcmin ("m") or arcsec ("s"), *in which cases the decimal point is shifted one column to the right.* "PA" = estimated measured position angle of the tail to nearest whole integer in degrees (north = 0°, east = 90°). "OBS" = the observer who made the observation (given as a 3-letter, 2-digit code).

A complete list of the Keys to abbrevations used in the *ICQ* is available from the Editor for $4.00 postpaid (available free of charge via e-mail); these Keys (with the exception of the Observer Codes) are also available in the *Guide to Observing Comets* and via the *ICQ*'s World Wide Web site. *Please note that data in archival form, and thus the data to be sent in machine-readable form, use a format that is different from that of the Tabulated data in the printed pages of the ICQ;* see pages 59-61 of the July 1992 issue, p. 10 of the January 1995 issue, and p. 100 of the April 1996 issue for further information [note correction on page 140 of the October 1993 issue]. Further guidelines concerning reporting of data may be found on pages 59-60 of the April 1993 issue, and in the *ICQ Guide to Observing Comets.*

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NOTE: *The new-style CCD tabulated data begin on page 39 of this issue.*

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Comet 2P/Encke

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 11 02.14		B	7.5	S	7.5	B		40	8	3			CHE03

Comet 9P/Tempel

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 03 06.94		S	13.0	HS	30	L	4	200		8			ABB
2005 03 29.83	x	S	11.6	TJ	25	L	6	108	2	1			SWI
2005 03 29.96	x	S	12.1	TT	30.0	L	6	105	& 1.5	3			FIL04
2005 03 30.92	x	B	12.6	TJ	31.7	L	5	200	& 1	8			ADA02
2005 03 30.97	x	S	12.0	TT	30.0	L	6	105	& 1	3			FIL04
2005 03 31.79	x	M	12.5	TK	11.4	L	8	95	& 2	3			DOR02
2005 03 31.90	x	S	12.1	HS	20	L	5	110	2.5	4			POW01
2005 04 01.06	x	S	12.3	TT	30.0	L	6	105	& 1.5	D4			FIL04
2005 04 01.79	x	B	12.6	TK	11.4	L	8	95	& 2	3			DOR02
2005 04 01.89	x	B	12.2:	TJ	31.7	L	5	78	& 2	6			ADA02
2005 04 02.03	x	S	12.1	TT	30.0	L	6	105	& 1	4			FIL04
2005 04 03.88	x	S	11.6	TT	30.0	L	6	105	& 1.5	3			FIL04
2005 04 03.90		S	11.6	HS	30	L	4	96	0.7	7	0.7m	218	ABB
2005 04 04.84	x	S	11.8	TJ	25	L	6	108	1.5	3			SWI
2005 04 04.88	x	S	11.6	TT	30.0	L	6	105	& 1.5	4			FIL04
2005 04 04.93		S	11.7	TK	30	R	20	185	0.7	4			SHA02
2005 04 08.89		S	12.4	HS	30	R	20	185	0.7	4			SHA02
2005 04 08.90	x	B	12.5	HS	38	L	4	155	1.5	2			TUR01
2005 04 10.85		S	11.6	TK	30	R	20	185	0.7	3			SHA02
2005 04 11.87		S	11.4	TK	30	R	20	185	0.9	3			SHA02
2005 04 11.90	x	M	11.5	TK	10	M	10	35	2	3			DOR02
2005 04 16.88		S	11.7	TK	30	R	20	185	1.0	4			SHA02
2005 04 29.88	x	B	11.1	TK	11.4	L	8	45	2	3			DOR02
2005 04 29.92	x	S	10.8	TT	30.0	L	6	105	& 1.5	3			FIL04
2005 04 30.87	x	S	11.0	TT	30.0	L	6	105	& 1	3/			FIL04
2005 05 02.89		S	10.9	TK	30	R	20	185	0.8	4			SHA02
2005 05 02.91	x	M	11.0	TK	10	M	10	35	2	2			DOR02
2005 05 04.89		S	10.9	TK	30	R	20	185	0.8	3			SHA02
2005 05 07.78	x	S	11.6	TJ	35	L	6	110	& 1	d1/			CHR
2005 05 07.85	x	S	10.4	TT	10.0	B		25	& 2	2			SCI
2005 05 07.89	x	S	11.0	TT	10.0	B		25	& 2	2			PAR03
2005 05 07.89		S	11.1	TK	30	R	20	185	1.1	3			SHA02
2005 05 08.90	x	S	10.6	TT	10.0	B		25	& 1	3			SCI
2005 05 08.95	x	S	11.4	TT	30.0	L	6	105	& 2	2/			FIL04
2005 05 09.91	x	B	11.2	TK	10	M	10	35	3	3			DOR02
2005 05 09.97	x	S	10.4	TT	10.0	B		25	& 1	3			SCI
2005 05 10.86	x	B	10.5	TT	20	L	5	50	1.2	5			POW01
2005 05 10.91	x	M	11.2	TK	10	M	10	35	2	3			DOR02
2005 05 10.92		S	11.1	TK	30	R	20	185	1.1	3			SHA02
2005 05 11.87	x	S	11.2	TT	30.0	L	6	105	& 1.5	3/			FIL04
2005 05 11.90	x	S	11.0	TK	10	M	10	35	3	3			DOR02
2005 05 12.90	x	S	11.2	TT	30.0	L	6	105	& 1.5	3			FIL04
2005 05 12.91	x	S	11.2:	TT	10.0	B		25	& 1	3/			SCI
2005 05 13.80	x	S	11.2	TJ	35	L	6	110	& 1	d1/			CHR
2005 05 13.88	x	B	10.9	TT	20	L	5	50	1.7	4			POW01
2005 05 13.88	x	S	11.0:	TT	10.0	B		25	& 1	3			SCI
2005 05 13.89	x	B	11.4	HS	38	L	4	51	1	2/			TUR01
2005 05 13.91	x	S	11.2	TT	30.0	L	6	105	& 1.5	3/			FIL04
2005 05 13.92		S	11.1	TK	30	R	20	185	1.5	3			SHA02
2005 05 13.99	x	M	10.8	TK	11.4	L	8	45	2	3			DOR02
2005 05 25.88	x	S	10.5	TJ	20	L	5	64	2.5	2			SWI
2005 05 25.90	x	S	10.0:	TT	10.0	B		25	& 3	3			SCI
2005 05 26.87	x	S	10.7	TT	20	L	6	80	1.2	3			POW01
2005 05 26.91	x	S	10.3	TT	10.0	B		25	& 3	3			PAR03
2005 05 26.92	x	S	10.2:	TT	10.0	B		25	& 2	2			SCI
2005 05 26.92	x	S	10.6:	TT	30.0	L	6	60	& 4	3			FIL04
2005 05 26.93	x	S	10.8	TK	10	M	10	35	3	2			DOR02
2005 05 27.88	x	S	10.5	TT	10.0	B		25	& 2	2			SCI
2005 05 27.91	x	S	10.3	TT	10.0	B		25	& 3	3			PAR03

Comet 9P/Tempel [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 05 27.93	x	S	10.8	TK	10	M	10	35	3	2			DOR02
2005 05 27.95		S	10.6	TK	33	L	5	100	2.2	2			SHA02
2005 05 27.95	x	S	10.7	TT	30.0	L	6	60	& 2	2/			FIL04
2005 05 28.86	x	S	10.4:	TT	10.0	B		25	& 3	2/			SCI
2005 05 28.94		S	10.8	TK	30	R	20	185	1.6	2			SHA02
2005 05 28.95	x	S	10.3	TT	10.0	B		25	& 3	3			PAR03
2005 05 28.95	x	S	10.7	TT	30.0	L	6	60	& 2	1/			FIL04
2005 05 29.88	x	S	10.6:	TT	10.0	B		25	& 2	2			SCI
2005 05 29.91	x	S	10.7	TT	30.0	L	6	60	& 2	2			FIL04
2005 05 29.94	x	S	11.0	TK	10	M	10	35	2	2			DOR02
2005 05 30.92	x	S	11.1:	TT	30.0	L	6	60	& 1.5	2			FIL04
2005 05 30.94		S	11.0	TK	30	R	20	185	1.1	2			SHA02
2005 06 01.88	x	S	10.4	TT	10.0	B		25	& 3	2/			SCI
2005 06 01.92	x	S	11.2	TT	30.0	L	6	105	& 1	2/			FIL04
2005 06 01.94	x	S	11.2	TK	10	M	10	35	1	2			DOR02
2005 06 03.94	x	S	11.1	TT	30.0	L	6	105	& 2	2/			FIL04
2005 06 03.95		S	11.6	TK	30	R	20	185	1.3	2			SHA02
2005 06 05.89	x	S	10.7	TT	10.0	B		25	& 1.5	2			SCI
2005 06 05.94	x	S	11.5:	TK	10	M	10	35	& 2	2			DOR02
2005 06 06.95		S	11.1	TK	30	R	20	185	1.8	2			SHA02
2005 06 10.95		S	11.3	TK	30	R	20	185	1.5	2			SHA02
2005 06 10.96		S	11.1	TK	30	L	4	120	1.1	3			ABB
2005 06 27.94	x	S	11.0:	TK	10	M	10	35	& 3	2			DOR02
2005 06 29.87	x	S	10.3	TJ	18.5	L	5	53	1	2/			KWI
2005 07 03.86	x	S	10.2	TJ	18.5	L	5	53	1.5	3			KWI
2005 07 03.88	x	S	9.5	TT	10.0	B		25	3	4			PAR03
2005 07 04.86	x	S	9.5:	TT	10.0	B		25	& 2.5	4			SCI
2005 07 04.86	x	S	9.6	TJ	18.5	L	5	53	2	4/			KWI
2005 07 04.86	x	S	[10.0	TK	10.2	R	5	40	! 3				DOR02
2005 07 04.86	x&	S	9.5:	TT	20	K	10	140	& 1.5				GRO03
2005 07 04.88	x&	S	9.5:	TJ	20.3	L	6	38	& 3	4			PAR03
2005 07 07.86	x	S	9.9	TJ	18.5	L	5	53	2	4/			KWI

Comet 21P/Giacobini-Zinner

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 05 10.05	x	S	11.5	TT	30.0	L	6	105	& 1	3			FIL04
2005 05 14.00	x	S	11.6	TT	20	L	6	80	2	3			POW01
2005 05 14.01	x	S	12.0	TK	11.4	L	8	90	& 1	3			DOR02

Comet 29P/Schwassmann-Wachmann

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 06 24.92		S	11.5	GA	20	L	6	100	1.2				KOR01
2004 06 27.92		S	11.5	GA	20	L	6	100	1.2				KOR01
2004 06 29.92		S	11.4	GA	20	L	6	100	1.3				KOR01
2004 06 30.93		S	11.4	GA	20	L	6	100	1.5				KOR01
2004 07 20.93	x	S	12.8	HS	20	L	5	110	1	4			POW01
2004 09 18.92		S	12.4	HS	30	L	4	96	0.4	5			ABB
2004 09 18.95		S	12.0	HS	30	L	6	120	0.7	4			SHA02
2004 09 18.96		S	12.1	HS	30	R	20	185	0.6	6			SHA02
2004 09 19.91	x	B	12.2	HS	20	L	5	110	1.2	S7			POW01
2004 09 19.92	x	B	12.1	HS	20	L	5	110	1.0	S6			BUR04
2004 09 21.86	x	S	12.0	TT	30.0	L	6	105	& 1.5	4/			FIL04
2004 10 06.77	x	M	12.2	TJ	25	L	6	202	1	4			SWI
2004 10 07.04	x	S	12.3	TT	30.0	L	6	105	& 0.5	7			FIL04
2004 10 07.90		S	12.1	HS	30	L	4	96	0.5	7		130	ABB
2004 10 10.89	x	S	12.1	TT	30.0	L	6	105	& 1.5	4			FIL04
2004 10 12.05	x	S	12.6	HS	20	L	5	110	0.9	4			POW01
2004 10 12.82	x	M	11.7	TJ	25	L	6	108	1.2	2			SWI
2004 10 12.93	x	S	11.8	TT	30.0	L	6	105	& 1	3/			FIL04
2004 10 13.90	x	S	11.9	TT	30.0	L	6	105	& 2	3/			FIL04
2004 10 14.05	x	S	12.1	TT	20	L	5	110	1.7	3			POW01
2004 10 16.87		S	12.1	HS	30	R	20	185	0.8	2			SHA02
2004 10 18.90		S	12.3	HS	30	R	20	185	1.1	3			SHA02

Comet 29P/Schwassmann-Wachmann [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 10 19.90	x	S	12.1	TT	30.0	L	6	105	& 1.5	3			FIL04
2004 11 04.77		S	12.9	HS	30	R	20	230	0.6	2			SHA02
2004 11 09.84	x	S	12.6	TT	30.0	L	6	105	& 1.5	2/			FIL04
2004 11 12.92		S	13.2:	HS	30	R	20	230	0.3	5			SHA02
2004 11 13.80		S	12.6	HS	33	L	5	150	0.7	2			SHA02
2004 11 14.80	x	S	12.7	HS	20	L	5	110	0.8	4			POW01
2004 12 16.77		S	12.6	HS	30	L	4	96	0.3	6	0.3m	140	ABB
2004 12 17.93		S	12.7	HS	30	R	20	185	0.5	5			SHA02
2005 01 01.85		S	13.2	HS	30	R	20	185	0.8	2			SHA02
2005 01 12.79		S	[12.5	HS	30	R	20	230					SHA02
2005 07 06.96		S	[12.0	HS	36	L	6	80	! 1.0				BAR06
2005 07 07.96		S	12.6:	HS	36	L	6	80	1.5	3			BAR06
2005 08 03.97		S	[13.0	HS	36	L	6	80	! 0.7				BAR06
2005 08 04.97		S	[13.2	HS	36	L	6	80	! 0.7				BAR06
2005 08 30.90		S	[13.2	HS	36	L	6	80	! 0.5				BAR06
2005 09 03.95		S	13.7	HS	36	L	6	90	0.4	4			BAR06
2005 09 05.02		S	13.8	HS	36	L	6	90	0.6	5			BAR06
2005 09 25.86		S	13.9	HS	36	L	6	80	0.6	5			BAR06
2005 10 07.99	x	S	13.5	HS	20.3	L	6	80	& 0.5	6			PAR03
2005 10 08.00	x	S	13.8	HS	20.3	L	6	120	0.5	6			PAR03
2005 10 27.76		S	13.0	HS	44.0	L	5	156	0.6	3			HAS02
2005 11 04.94		S	13.3	AU	20.3	T	10	160	0.7	3			GON05
2005 11 08.84		S	13.1	TA	23.5	T	10	188	1	2			LAB02

Comet 32P/Comas Solá

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 16.78		S	12.7:	HS	30	R	20	230	0.7	3			SHA02
2004 12 17.00	x	S	12.4	HS	20	L	5	110	& 1.5	3			POW01
2004 12 17.96		S	12.8:	HS	30	R	20	185	0.8	2			SHA02
2005 01 01.88		S	12.9	HS	30	R	20	230	0.9	2			SHA02
2005 02 05.80	x	S	11.6	HS	20	L	5	110	1.4	3			POW01
2005 02 12.84		S	12.8:	HS	30	R	20	185	1.1	1			SHA02
2005 03 31.85	x	S	12.8	HS	20	L	5	110	0.8	3			POW01
2005 04 08.89		S	[12.7	HS	30	R	20	300					SHA02

Comet 37P/Forbes

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 09 03.98		S	12.5:	HS	36	L	6	80	1.5	2			BAR06
2005 09 25.98		S	13.5	HS	36	L	6	80	0.9	2			BAR06

Comet 43P/Wolf-Harrington

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 04 04.79		S	12.2	GA	30	L	4	120	1.5	3	0.08	240	KOR01
2004 04 06.78		S	12.2	GA	30	L	4	120	1.6	3	0.1	245	KOR01
2004 04 11.79		S	12.1	GA	30	L	4	120	1.6	3	0.1	245	KOR01
2004 04 13.81		S	12.1	GA	30	L	4	120	1.6	3	0.1	250	KOR01
2004 04 18.78		S	12.0	GA	21	L	5	100	1.8	3			KOR01

Comet 62P/Tsuchinshan

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 21.24		S	12.7	HS	30	R	20	230	0.7	2			SHA02

Comet 65P/Gunn

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 15.97	x	S	11.1	TT	20	L	5	50	4	3			POW01

Comet 67P/Churyumov-Gerasimenko

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 07 31.91		S	14.5:	NP	101.0	C	13	430	0.3	1			CHE03

Comet 67P/Churyumov-Gerasimenko [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 10 09.80			[11.5	AC	20.0	R	15	120					CHE03
1982 10 11.81		B	11.9:	AC	101.0	C	13	430	1	7			CHE03
1982 10 12.86		S	11.8	AC	11.0	B		20	1	7			CHE03
1982 10 17.79		S	11.6	AC	11.0	B		20	1.5	7			CHE03
1982 10 19.80		S	12.0:	AC	11.0	B		20	1	7			CHE03
1982 10 20.81		S	11.3	AC	11.0	B		20	1	7			CHE03
1982 10 27.10		S	11.7	AC	11.0	B		20	1.5	7			CHE03
1982 10 28.11		S	11.5:	AC	11.0	B		20	1	6			CHE03
1982 11 11.78		S	10.7	AC	11.0	B		20	1.5	6			CHE03
1982 11 12.70		S	10.5	AC	11.0	B		20	1.5	6			CHE03
1982 11 16.90		S	10.5:	AC	11.0	B		20	2	6			CHE03
1982 11 16.92		B	10.6	AC	20.0	R	15	120	1.5	7			CHE03

Comet 72P/Denning-Fujikawa

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 10 11.90		B	10.0:	AC	11.0	B		20	2	3			CHE03

Comet 78P/Gehrels

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 09.99	x	S	11.9	TT	20	L	5	110	1	4			POW01
2004 09 10.87	x&	S	12.0	TT	30	L	6	105	& 1	3			FIL04
2004 09 10.90	x	S	12.5	HS	20	L	5	110	1	3			POW01
2004 09 17.01	x	S	12.5	HS	20	L	5	110	1.1	4			POW01
2004 09 18.98		S	13.3	HS	30	R	20	185	0.7	4			SHA02
2004 09 19.04	x	S	12.1	TT	30.0	L	6	105	& 1.5	4/			FIL04
2004 09 19.94	x	S	11.6	TT	20	L	5	110	1.4	4			POW01
2004 09 19.95	x	S	12.2	HS	20	L	5	110	1.5	2/			BUR04
2004 09 20.10	x	S	11.6	TT	30.0	L	6	105	& 1	4/			FIL04
2004 09 21.88	x	S	11.8	TT	30.0	L	6	105	& 1	4			FIL04
2004 10 05.88	x	S	11.8	TT	30.0	L	6	105	& 1	4			FIL04
2004 10 07.92		S	12.0	HS	30	L	4	96	0.5	4			ABB
2004 10 09.88	x	S	11.7	TT	30.0	L	6	105	& 1	4			FIL04
2004 10 10.92	x	S	11.4	TT	30.0	L	6	105	& 1	5			FIL04
2004 10 12.08	x	S	11.2	TT	20	L	5	110	2.5	3			POW01
2004 10 12.92	x	S	10.6	TT	30.0	L	6	105	& 1.5	5/			FIL04
2004 10 13.91	x	S	10.6	TT	30.0	L	6	105	& 1.5	5/			FIL04
2004 10 14.08	x	S	11.5	TK	10	M	10	35	1	3			DOR02
2004 10 14.09	x	S	11.3	TT	20	L	5	50	1.5	4			POW01
2004 10 14.96	x	S	11.3:	TT	10	M	10	100	& 1.2	4			SCI
2004 10 15.07	x	S	11.5:	TK	10	M	10	35	& 1	3			DOR02
2004 10 18.94		S	12.1	HS	30	R	20	185	0.5	5			SHA02
2004 10 18.96		S	12.7	HS	30	L	4	96	0.4	7			ABB
2004 10 19.89	x	B	12.0	TT	30.0	L	6	105	& 1	5/			FIL04
2004 10 20.85	x	S	11.5	TK	10	M	10	35	1	3			DOR02
2004 10 23.02	x	B	11.7:	HS	27	L	4	111	1	3/			TUR01
2004 10 25.12	x	S	11.5	TK	10	M	10	35	1	3			DOR02
2004 11 03.74	x	B	11.0	TK	10	M	10	35	2	4			DOR02
2004 11 04.89		S	10.9	TK	30	L	4	96	0.6	7	0.7m	250	ABB
2004 11 08.05	x	B	10.3:	TT	30.0	L	6	105	& 1.5	5/			FIL04
2004 11 09.86	x	B	10.4	TT	30.0	L	6	60	& 2	6			FIL04
2004 11 09.96	x	S	10.3:	TT	10.0	B		25	& 1.5	4/			SCI
2004 11 11.93	x	B	10.9	HS	27	L	4	112	1.5	4/			TUR01
2004 11 12.92		S	10.6	TK	30	L	4	96	1.4	6	1.3m	300	ABB
2004 11 12.93		S	11.3	TK	30	R	20	105	1.6	6			SHA02
2004 11 13.81		S	10.8	TK	33	L	5	75	1.4	5			SHA02
2004 11 13.88		S	10.9	TK	30	L	4	96	0.7	7	0.7m	265	ABB
2004 11 13.96		S	10.4	TK	10	B		25	2.3	4			SHA02
2004 11 14.83	x	S	10.3	TT	20	L	5	45	1.5	5			POW01
2004 11 14.84	x	M	10.0	TK	10	M	10	35	3	3			DOR02
2004 11 16.81	x	M	10.0:	TK	10	M	10	35	3	5			DOR02
2004 11 16.95	x	S	11.0	TT	20	L	5	50	3	3			POW01
2004 12 02.78	x	M	11.0	TK	11.4	L	7	45	1.5	4			DOR02
2004 12 04.90	x	S	9.6	TT	30.0	L	6	60	& 2	4			FIL04

Comet 78P/Gehrels [cont.]

DATE (UT)	N	MM MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 05.80	x	M 11.5	TK	11.4	L	8	7	1	4			DOR02
2004 12 06.80		S 10.5:	TK	33	L	5	100	1.0	3			SHA02
2004 12 06.83		S 12.5	HS	30	L	4	96	0.7	7			ABB
2004 12 10.95		S 11.4	TK	30	R	20	185	1.0	3			SHA02
2004 12 11.89	x	S 11.6	TT	30.0	L	6	60	& 3	5			FIL04
2004 12 11.95	x	S 10.0:	TJ	10.0	B		25	& 2	4			PAR03
2004 12 15.80	x	M 11.0	TK	11.4	L	8	45	2	4			DOR02
2004 12 15.97	x	S 10.2	TT	30.0	L	6	60	& 3	3/			FIL04
2004 12 16.76		S 11.3	TK	33	L	5	100	1.4	3			SHA02
2004 12 16.92		S 12.1	TK	30	L	4	96	1.2	4	1.2m	45	ABB
2004 12 17.97		S 11.6	TK	30	R	20	185	1.0	4			SHA02
2005 01 01.89		S 11.9	TK	30	R	20	185	1.1	2			SHA02
2005 01 02.83		S 11.9	TK	30	L	4	96	0.7	4	0.7m		ABB
2005 01 04.85		S 11.5	TK	30	R	20	185	1.1	2			SHA02
2005 01 10.90		S[11.5	TK	30	R	20	230					SHA02
2005 01 11.75	x	S 11.2	TT	30.0	L	6	60	& 4	3			FIL04
2005 01 12.81		S[12.5	HS	30	R	20	230					SHA02
2005 02 05.85	x	S 12.0	HS	20	L	5	110	1.3	3			POW01
2005 02 12.83		S 12.8	TK	30	R	20	185	1.0	2			SHA02

Comet 161P/Hartley-IRAS

DATE (UT)	N	MM MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 06 04.01	x	S[12.0	TT	30.0	L	6	105	! 2				FIL04
2005 06 05.95	x&	S 11.0:	TT	10.0	B		25	& 1	2			PAR03
2005 06 26.95	x	S 11.0	TK	10	M	10	35	2	3			DOR02
2005 06 28.02		S 11.3:	TK	30	L	6	185	1.0	2			SHA02
2005 06 29.96	x	S 11.0	TT	10.0	B		25	2	3			PAR03
2005 07 03.95	x	S 11.0:	TT	10.0	B		25	2	3			PAR03
2005 07 04.93	x	S 10.8	TT	20.3	L	6	48	& 2	3			PAR03
2005 07 05.94	x	S 11.0:	TK	10	M	10	35	3	2			DOR02
2005 07 08.96	x	S 10.8	TT	20.3	L	6	46	& 2	3			PAR03
2005 07 11.96	x	S 11.0:	TT	20.3	L	6	46	& 2	3			PAR03
2005 07 12.94	x	S 10.5:	TK	10	M	10	35	3	3			DOR02
2005 07 14.94	x	S 11.0:	TK	10	M	10	35	3	3			DOR02
2005 07 24.88	x	S 10.5	TK	10	M	10	35	3	5			DOR02
2005 07 27.87	x	S 10.8	TT	20.3	L	6	80	& 3	3			PAR03
2005 07 27.89	x	S 11.0	TK	11.4	L	8	45	3	2			DOR02
2005 08 01.93	x	S 11.0	TK	10	M	10	35	2	2			DOR02
2005 08 02.89	x	S 11.6:	TJ	10.0	B		25	& 2	3			SCI
2005 08 02.98	x	S 11.1	TT	20.3	L	6	48	3	3			PAR03
2005 08 03.98		S 11.4	HS	36	L	6	80	1.4	3			BAR06
2005 08 10.90	x	S 11.4	TT	20.3	L	6	48	2	2			PAR03
2005 08 14.88	x	S 12.0	TT	20	L	5	110	1.5	2			POW01
2005 08 27.85	x	S 12.4	HS	20	L	5	110	1.0	2/			POW01
2005 08 28.87	x	S 11.5	TT	20.3	L	6	38	1.5	2			PAR03
2005 08 28.87		S 11.9:	TK	20	T	10	160	1.4	2			SHA02
2005 08 28.88	x	S 11.8	TT	20.3	L	6	80	1	3			PAR03
2005 08 29.89	x	S 11.7	TT	20.3	L	6	80	1	3			PAR03
2005 08 30.88	x	S 12.5	TT	20.3	L	6	80	1	3			PAR03
2005 08 30.89	x	S 12.0	TT	20.3	L	6	48	1.5	2			PAR03
2005 08 30.98		S 12.2	HS	36	L	6	80	0.9	2/			BAR06
2005 08 31.84	x	S 11.8	TT	20.3	L	6	48	1	2			PAR03
2005 09 01.85	x	S 13.0	HS	25	L	5	120	1.0	2			POW01
2005 09 02.85	x	S 11.8:	TT	30.0	L	6	105	& 1	3/			FIL04
2005 09 03.84		S 12.3	HS	36	L	6	80	0.8	3			BAR06
2005 09 07.84	x	S 12.0	TT	20.3	L	6	48	1.5	2			PAR03
2005 09 07.85	x	S 12.2	TT	20.3	L	6	80	1	3			PAR03

Comet 169P/NEAT

DATE (UT)	N	MM MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 10 13.15		S 13.5:	HS	44.0	L	5	156	0.5	3			HAS02

Comet C/1979 M1 (Bradfield)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1979 07 25.11			[8.5	S	11.0	B		20					CHE03
1979 07 27.12			[8.5	S	11.0	B		20					CHE03

Comet C/1979 Y1 (Bradfield)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 02 10.83		B	8.5:	S	11.0	B		20					CHE03
1980 02 12.83		B	9.0:	S	11.0	B		20					CHE03
1980 02 15.81		B	9.0:	S	11.0	B		20	5	3			CHE03
1980 03 13.82		S	10.5:	AC	11.0	B		20	4	3			CHE03
1980 03 14.81		S	10.6:	AC	11.0	B		20					CHE03
1980 03 15.83		S	10.5:	AC	11.0	B		20	2	1			CHE03
1980 03 16.81		S	10.5:	AC	11.0	B		20	2	1			CHE03
1980 03 17.81		B	11.3:	AC	35.0	M	4	45	5.5	3			CHE03

Comet C/1980 Y2 (Panther)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 02 15.70		B	8.8:	S	8.0	B		10	2	3			CHE03
1981 03 01.82		B	8.9:	S	8.0	B		10	3	3			CHE03
1981 03 02.80		B	8.9:	S	8.0	B		10					CHE03
1981 03 03.80		S	9.2	S	7.5	B		40					CHE03
1981 03 13.81		S	9.0:	S	8.0	B		7	5	3			CHE03

Comet C/1982 M1 (Austin)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 08 17.67		B	5.0	S	11.0	B		20	7	5	1	35	CHE03
1982 08 18.65		B	5.0	S	11.0	B		20	8	5	1		CHE03
1982 08 19.69		B	4.8	S	5.0	B		7	8	5	1		CHE03
1982 08 20.70		B	4.9	S	5.0	B		7	11	5	1		CHE03
1982 08 21.71		B	4.8	S	5.0	B		7	10	5	0.5		CHE03
1982 08 22.71		B	5.1	S	5.0	B		7	11	5			CHE03
1982 08 25.80		B	5.2	S	8.0	B		10		3	0.5		CHE03
1982 08 26.82		B	5.4	S	8.0	B		10					CHE03
1982 08 27.82		B	5.5	S	8.0	B		10	6	3	0.3		CHE03
1982 08 30.80		B	5.8	S	8.0	B		10					CHE03
1982 08 31.80		B	5.8	S	8.0	B		10					CHE03
1982 09 05.81		B	6.3	S	8.0	B		10	5	3			CHE03
1982 09 09.83		B	6.6	S	8.0	B		10					CHE03
1982 09 10.90		B	6.5	S	11.0	B		20	6	3	0.2	31	CHE03
1982 09 11.85		B	6.6	S	8.0	B		10	6	3			CHE03
1982 09 15.85		B	7.0	S	8.0	B		10					CHE03
1982 09 17.83		B	7.3	S	8.0	B		10					CHE03
1982 09 21.85		B	7.7	S	11.0	B		20					CHE03
1982 10 13.10		B	9.5	S	11.0	B		20					CHE03
1982 10 14.00		B	9.3	S	11.0	B		20	4	1			CHE03
1982 10 19.00		B	9.6	AC	11.0	B		20	4	1			CHE03
1982 10 20.05		B	9.8	AC	11.0	B		20	3	1			CHE03
1982 10 21.05		B	10.2	AC	11.0	B		20	2	1			CHE03
1982 10 27.10		B	10.4	AC	11.0	B		20	2	1			CHE03
1982 10 28.10		B	10.5	AC	11.0	B		20	2	1			CHE03
1982 10 29.00			[11.5	AC	11.0	B		20					CHE03
1982 10 29.00		S	10.8:	AC	11.0	B		20	2	1			CHE03
1982 11 12.04		S	11.0:	AC	11.0	B		20					CHE03

Comet C/1983 H1 (IRAS-Araki-Alcock)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 08.93		B	3.7	S	0.0	E		1	35	3			CHE03
1983 05 09.85		B	3.1	S	0.0	E		1					CHE03
1983 05 09.86		B	3.2	S	5.0	B		7	65	2			CHE03
1983 05 11.85		B	3.0:	S	8.0	B		10		1			CHE03

Comet C/1983 J1 (Sugano-Saigusa-Fujikawa)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 18.93		B	8.5:	S	11.0	B		20	4	3			CHE03
1983 05 20.95		B	8.3	S	11.0	B		20	4	3			CHE03
1983 06 02.95			[8.5	S	5.0	B		7					CHE03

Comet C/2001 Q4 (NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 05 02.89		I	3.6	YG	0.0	E		1					SOU01
2004 05 09.84	xa	B	2.7	TJ	8	R	7	35	32	S7	0.4	115	KWI
2004 05 09.85	xa	B	2.8	TJ	0.0	E		1	30	6/			KWI
2004 05 12.84	x	B	3.2	TJ	8	R	7	35	12	S7	0.3	108	KWI
2004 05 16.86	x	B	5.1	TJ	6	R	6	20	8	5	&0.25	113	SIK01
2004 05 27.90	x	B	5.8	TJ	18.5	L	5	53	4	S6	20 m	88	KWI
2004 06 07.89	x	M	6.4	TJ	18.5	L	5	53	2	5/	0.25	115	KWI
2004 06 17.89	x	M	7.1	TJ	18.5	L	5	53	3	6	0.43	90	KWI
2004 07 09.91	x	S	9.1	TJ	18.5	L	5	53	2	4/			KWI
2004 07 21.90	x	S	9.6	TJ	18.5	L	5	53	2	4			KWI
2004 08 15.91	x	S	9.1	TJ	18.5	L	5	53	2	1/			KWI
2004 08 31.85		S	9.0	VB	10	B		25	3	4			SHA02
2004 09 01.85		S	9.1	TK	10	B		25	3	3			SHA02
2004 09 04.84		S	9.0:	VB	8.0	B		20	4	4			SHA02
2004 09 04.89		S	9.0	TK	30	L	4	48	3.7	5			ABB
2004 09 07.84		S	9.2	VB	8.0	B		20	5	3			SHA02
2004 09 07.85		S	9.5	TK	30	L	6	55	3.7	3			SHA02
2004 09 13.85		S	10.7	TK	30	L	4	48	3.5	4			ABB
2004 09 13.88		S	9.8	TK	30	L	6	70	3.4	3			SHA02
2004 09 18.88		S	10.4	TK	30	L	4	48	2.3	4			ABB
2004 09 18.92		S	10.2	TK	30	L	6	70	2.5	2			SHA02
2004 10 07.81		S	11.8	TK	30	L	4	96	0.8	4			ABB
2004 10 13.80	x	S	11.0	TJ	35	L	6	105	& 1	d1			CHR
2004 10 16.82		S	10.4	TK	30	L	6	90	2.3	2			SHA02
2004 10 18.89		S	11.8	TK	30	L	4	96	1.2	3		320	ABB
2004 10 18.91		S	11.5	TK	30	L	6	120	1.8	2			SHA02
2004 10 19.92	x	S	12.0	TT	30.0	L	6	105	& 2	2/			FIL04
2004 11 09.87	x	S	12.9:	TT	30.0	L	6	105	& 1.5	2/			FIL04
2004 11 14.85	x	S	13.0	HS	20	L	5	110	& 1	2			POW01
2005 01 12.76		S	12.9:	HS	33	L	5	150	1.0	2			SHA02

Comet C/2003 K4 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 03 23.14	x	S	11.5	TJ	18.5	L	5	53	1	4			KWI
2004 04 13.05	x	S	10.5	TJ	18.5	L	5	53	1	2/			KWI
2004 04 16.06	x	S	10.3	TJ	18.5	L	5	53	1	2			KWI
2004 04 21.05	x	S	10.2	TJ	18.5	L	5	53	2	3			KWI
2004 06 17.91	x	M	8.7	TJ	18.5	L	5	53	2	4	0.17	155	KWI
2004 06 17.91	x	M	8.7	TJ	18.5	L	5	53	2	4	0.17	155	KWI
2004 07 09.93	x	S	8.6	TJ	18.5	L	5	53	2.5	3	0.2	115	KWI
2004 07 13.87		S	6.6	AA	5.0	B		7	6	3			KOS
2004 07 21.91	x	S	8.4	TJ	18.5	L	5	53	2.5	3			KWI
2004 08 15.89	x	S	7.9	TJ	18.5	L	5	53	2	3	0.3	65	KWI
2004 08 31.84		S	[6.0	TK	10	B		25					SHA02
2004 09 01.84		S	6.7	TK	10	B		25	5	4			SHA02
2004 11 19.98	x	B	7.3	TI	6.3	B		9	5	4			SZW
2005 10 30.01		S	13.2	HS	36	L	6	90	0.9	3			BAR06

Comet C/2003 T4 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 18.93		S	13.4:	HS	30	L	6	120	0.6	4			SHA02
2004 10 18.92		S	[12.0:	HS	30	L	6	120					SHA02
2004 11 04.79		S	[11.0	TK	30	L	6	120					SHA02
2004 11 12.90		S	12.3:	TK	30	L	6	185	0.5	3			SHA02
2004 11 13.76		S	12.1	TK	33	L	5	100	1.5	2			SHA02
2004 11 14.84	x	S	13.1	HS	20	L	5	110	1	4			POW01

Comet C/2003 T4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 22.10	x	S	11.7	TK	25	L	5	130	1.0	2			BOH02
2004 12 06.76		S	11.2	TK	33	L	5	100	1.5	2			SHA02
2004 12 11.74		S	10.5	TK	33	L	5	100	1.8	2			SHA02
2004 12 16.75		S	11.1:	TK	33	L	5	100	2.2	2			SHA02
2004 12 16.78		S	11.7	HS	30	L	4	200	1.2	3			ABB
2004 12 31.74		S	10.1	TK	33	L	5	100	2.7	3			SHA02
2005 01 08.71	x	S	10.6	TT	20	L	5	50	1.5	3			POW01
2005 01 08.76		S	10.6	TK	10	B		25	1.5	3			SHA02
2005 01 11.19	x	S	10.1	TT	30.0	L	6	105	& 2	4			FIL04
2005 01 12.75		S	10.8	TK	33	L	5	100	1.1	3			SHA02
2005 01 12.77		S	11.6	HS	30	L	4	200	0.8	3			ABB
2005 01 16.14	x	S	10.5	TK	10	M	10	35	1	4			DOR02
2005 01 17.12	x&	S	11.0	TT	30.0	L	6	105	& 1.5	3			FIL04
2005 01 17.14	x	B	10.5:	TK	10	M	10	35	2	3			DOR02
2005 01 17.18	x	S	10.7	TJ	35	L	6	105	& 1	d1			CHR
2005 01 21.25		S	11.0	TK	30	R	20	185	1.1	3			SHA02
2005 02 06.12	x	S	10.0	TK	10	M	10	35	3	2			DOR02
2005 02 07.17	x	S	10.7	TT	20	L	5	110	1.2	3			POW01
2005 02 08.14	x	B	10.5	TK	10	M	10	35	3	2			DOR02
2005 02 09.18	x	S	10.5	TT	20	L	5	50	1.8	3			POW01
2005 02 10.14	x	S	10.0	TK	10	M	10	35	2	2			DOR02
2005 02 20.21		S	9.7	TK	30	R	20	105	1.2	4			SHA02
2005 02 20.22		S	9.4	TK	8.0	B		20	1.4	4			SHA02
2005 03 03.11	x	B	8.5	TK	10	M	10	35	4	4			DOR02
2005 03 04.12	x	B	8.5:	S	10	M	10	35	& 5	3			DOR02
2005 03 10.09	x	B	8.5	TK	5.0	B		20	3	4			DOR02
2005 03 12.21		S	8.5:	TK	10	B		25	4	3			SHA02
2005 03 15.08	x	B	8.5	TK	10	M	10	35	4	4			DOR02
2005 03 20.14	x	S	8.5	TT	10.0	B		25	3	4			SCI

Comet C/2003 WT_42 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 10 30.01		S	13.6:	HS	36	L	6	90	0.6	3			BAR06

Comet C/2004 Q1 (Tucker)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 09.97	x	S	13.2	HS	20	L	5	110	& 2	3			POW01
2004 09 10.93	x	S	12.6	HS	20	L	5	110	1.5	2/			POW01
2004 09 17.04	x	S	12.0	HS	20	L	5	110	1.7	3			POW01
2004 09 18.99		S	12.5	HS	30	R	20	185	0.7	3			SHA02
2004 09 19.96	x	S	12.2	HS	20	L	5	110	2.5	s4			BUR04
2004 09 19.97	x	S	12.2	TT	20	L	5	110	1.4	4			POW01
2004 09 21.90	x	S	12.8	TT	30.0	L	6	105	& 1	3/			FIL04
2004 10 05.89	x	S	11.4	TT	30.0	L	6	105	& 1.5	5			FIL04
2004 10 07.91		S	11.7	HS	30	L	4	96	0.5	6			ABB
2004 10 09.87	x	S	11.3	TT	30.0	L	6	105	& 1	5			FIL04
2004 10 10.91	x	S	11.0	TT	30.0	L	6	105	& 2	4			FIL04
2004 10 12.07	x	S	11.6	TT	20	L	5	50	2.2	4			POW01
2004 10 12.93	x	S	10.9	TT	30.0	L	6	105	& 2	4/			FIL04
2004 10 13.10	x	B	11.0	TK	10	M	10	35	2	3			DOR02
2004 10 13.91	x	S	10.9	TT	30.0	L	6	105	& 1.5	5			FIL04
2004 10 13.95	x	S	10.9:	TT	10.0	M	10	100	& 1	3/			SCI
2004 10 14.07	x	S	11.2	TK	10	M	10	35	2	5			DOR02
2004 10 14.08	x	S	11.5	TT	20	L	5	110	& 1.5	4			POW01
2004 10 14.99	x	S	11.2:	TT	10.0	M	10	100	& 1	4			SCI
2004 10 15.07	x	S	11.2	TK	10.0	M	10	100	2	4			DOR02
2004 10 16.86		S	11.0	TK	30	R	20	105	1.1	4			SHA02
2004 10 18.89		S	10.8	TK	30	R	20	105	2.0	4			SHA02
2004 10 18.89	x	S	11.3	TK	10	M	10	35	2	4			DOR02
2004 10 18.92		S	10.8	TK	30	L	4	96	0.9	7		194	ABB
2004 10 18.92	x	S	11.3:	TT	10.0	M	10	100	& 1.2	4			SCI
2004 10 18.93		S	10.7	TK	30	L	6	90	2.0	5			SHA02
2004 10 19.88	x	B	10.3	TT	30.0	L	6	60	& 3	5/			FIL04

Comet C/2004 Q1 (Tucker) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 10 20.85	x	S	11.0	TK	10	M	10	35	2	4			DOR02
2004 10 22.85	x	S	10.5:	TK	10	M	10	35	& 2	3			DOR02
2004 10 22.92	x	B	11.4	HS	27	L	4	111	2	4			TUR01
2004 11 03.70	x	M	10.8	TI	15	L	6	45	2	5			HUR01
2004 11 03.73	x	S	10.8	TT	20	L	5	50	3	4			POW01
2004 11 03.74	x	B	10.5	TK	10	M	10	35	3	3			DOR02
2004 11 04.76		S	10.9	TK	30	R	20	105	1.9	4			SHA02
2004 11 04.88		S	10.7	TK	30	L	4	96	1.4	4	1.7m	155	ABB
2004 11 08.01	x	B	10.9	TT	30.0	L	6	60	& 4	4			FIL04
2004 11 09.85	x	B	10.8	TT	30.0	L	6	105	& 1.5	5			FIL04
2004 11 11.78	x	B	11.2	HS	20	L	5	95	1.5	3/			TUR01
2004 11 12.93		S	11.0	TK	30	R	20	105	1.4	4			SHA02
2004 11 12.98		S	11.0	TK	30	L	4	96	0.7	5			ABB
2004 11 13.77		S	10.8	TK	33	L	5	45	2.0	4			SHA02
2004 11 13.91		S	12.1	TK	30	L	4	96	0.5	4	0.7m	72	ABB
2004 11 14.05		S	10.8	TK	10	B		25	1.5	3			SHA02
2004 11 14.78	x	M	10.4	TK	10	M	10	35	3	4			DOR02
2004 11 14.81	x	S	10.8	TT	20	L	5	45	2	4			POW01
2004 11 29.78		S	11.9	TK	30	R	20	185	1.2	3			SHA02
2004 12 02.78	x	M	11.5	TK	11.4	L	7	45	3	3			DOR02
2004 12 05.75	x	S	10.6	TT	30.0	L	6	60	& 5	3/			FIL04
2004 12 05.78	x	M	11.2	TK	11.4	L	8	45	3	3			DOR02
2004 12 06.78		S	10.7	TK	33	L	5	100	2.0	3			SHA02
2004 12 06.81		S	11.1	TK	30	L	4	96	1.2	5	1 m	70	ABB
2004 12 10.94		S	12.0	TK	30	R	20	185	1.2	4			SHA02
2004 12 11.76		S	11.2	TK	33	L	5	100	1.6	2			SHA02
2004 12 11.91	x	S	11.4	TT	30.0	L	6	105	& 1.5	3/			FIL04
2004 12 15.80	x	M	11.0	TK	11.4	L	8	45	1	2			DOR02
2004 12 15.98	x	S	10.9	TT	30.0	L	6	105	& 1.5	3			FIL04
2004 12 16.74		S	10.6	TK	33	L	5	100	1.4	3			SHA02
2004 12 17.94		S	11.0	TK	30	R	20	185	1.3	4			SHA02
2004 12 30.81		S	11.8	TK	30	L	4	96	0.3	4	0.5m	9	ABB
2004 12 31.75		S	11.9	TK	33	L	5	150	1.8	3			SHA02
2004 12 31.83		S	11.7	TK	30	L	4	96	0.6	4			ABB
2005 01 01.86		S	12.1	TK	30	R	20	185	1.5	4			SHA02
2005 01 02.85		S	11.5	TK	30	L	4	96	1.0	6			ABB
2005 01 04.84		S	11.9	TK	30	R	20	185	1.2	4			SHA02
2005 01 10.92		S	11.1	TK	30	R	20	185	1.6	3			SHA02
2005 01 11.92	x	S	12.2	TT	30.0	L	6	105	& 1.5	2/			FIL04
2005 01 12.77		S	11.5	TK	33	L	5	100	1.4	3			SHA02
2005 01 12.83		S	13.2	HS	30	L	4	200	1.3	5		300	ABB
2005 02 12.85		S	12.4	TK	30	R	20	185	0.5	s5			SHA02
2005 02 27.81		S	12.5	HS	30	L	4	200	0.5	4			ABB
2005 03 06.89		S	12.9	HS	30	L	4	200	0.3	6			ABB
2005 04 01.05	x	S	12.9	TT	30.0	L	6	105	& 1	2			FIL04
2005 04 02.04	x	S	12.9	TT	30.0	L	6	105	& 1	2/			FIL04

Comet C/2004 Q2 (Machholz)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 14.11	x&	S	9.9	TT	30.0	L	6	60	& 2	4			FIL04
2004 09 15.08	x	B	10.3	TK	10	M	10	35	2	3			DOR02
2004 09 15.08	x	S	10.9	TT	20	L	5	110	& 1	5			POW01
2004 09 17.08	x	B	10.4	TK	10	M	10	35	2	3			DOR02
2004 09 17.08	x	B	10.8	TT	20	L	5	50	1.6	5			POW01
2004 09 18.07	x	B	10.5	TK	10	M	10	35	3	3			DOR02
2004 09 19.08	x	B	10.5	TK	10	M	10	35	2	4			DOR02
2004 09 20.09	x&	S	10.1	TT	30.0	L	6	105	& 2	3			FIL04
2004 09 20.11	x	S	10.0	TT	10.0	B		25	2	2			PAR03
2004 10 06.14	x&	S	9.3	TT	30.0	L	6	105	& 2	2/			FIL04
2004 10 07.09	x&	S	9.4	TT	30.0	L	6	60	& 2.5	4			FIL04
2004 10 12.06	x	B	9.2	TT	20	L	5	50	4.0	4			POW01
2004 10 12.10	x	B	9.1	TK	10	M	10	35	4	4			DOR02
2004 10 12.12	x	S	9.2	TT	10.0	B		25	4	4			PAR03
2004 10 13.06	x	B	9.1	TT	20	L	5	43	3	4/			TUR01

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 10 13.10	x	B	9.1	TK	10	M	10	35	4	5			DOR02
2004 10 13.12	x	S	9.0	TT	30.0	L	6	60	& 3	5			FIL04
2004 10 14.06	x	B	9.2	TT	20	L	5	50	3	5			POW01
2004 10 14.08	x	B	9.4	TK	10	M	10	35	5	5			DOR02
2004 10 20.12	x$	S	8.5	TT	30.0	L	6	60	& 3	4/			FIL04
2004 11 10.04	x$	B	8.6	TT	30.0	L	6	60	& 5	4/			FIL04
2004 11 12.01	x	B	8.4	HS	7.0	B		26	6	5/			TUR01
2004 11 14.04		S	7.3	TK	8.0	B		20	4	4			SHA02
2004 11 19.79	x	B	6.4	TI	6.3	B		9	10	4			SZW
2004 11 21.83	x	B	7.5	TI	6.3	B		9	12	3			SZW
2004 11 23.81	x	B	7.5	TI	6.3	B		9	10	3			SZW
2004 11 30.99		S	6.5:	TK	10	B		25	3	4			SHA02
2004 12 02.78	x	B	6.3	TI	6.3	B		9	10	5			SZW
2004 12 04.75	x	B	5.7	TI	6.3	B		9	14	4			SZW
2004 12 04.91	x&	B	5.6	TJ	4.0	B		8	15	4			GRO03
2004 12 05.00	x&	B	6.0	TT	5.0	B		7	&18	5/			FIL04
2004 12 05.80	x	B	5.6	TJ	35	L	6	105	& 7.5	D4			CHR
2004 12 05.88	x	B	5.7	TJ	25	L	6	54	13	4			SWI
2004 12 05.88	x	B	5.7	TK	5.0	B		7	&15	6			DOR02
2004 12 05.92	x&	S	5.6	TJ	10.0	B		25	13	D5	1.0	350	PAR03
2004 12 06.97		S	5.7	TK	10	B		25	4	4			SHA02
2004 12 07.80	x	B	5.6	TJ	6.0	B		20	& 7	D4			CHR
2004 12 08.87	x	B	5.2	TK	5.0	B		7	15	5			DOR02
2004 12 08.88	x	B	5.5	HS	6.0	B		20	12	5/			TUR01
2004 12 10.88	x	B	5.4	TJ	7.0	B		15	10	4			SWI
2004 12 10.90	x	B	5.3	TJ	8.0	B		16	18	5			GRO03
2004 12 10.92		S	5.5	TK	8.0	B		20	8	4	0.5	330	SHA02
2004 12 10.95	x&	B	5.2	TT	5.0	B		7	&16	5/	&0.38	350	FIL04
2004 12 11.74	x	B	5.5	TJ	6.0	B		20	& 7	D4			CHR
2004 12 11.84	x	B	5.0:	TK	5.0	B		7	&15	5			DOR02
2004 12 11.86	x&	B	5.0	TT	5.0	B		7	&18	5/	&0.25	15	FIL04
2004 12 11.92	x	B	5.3	TJ	20	L	5	32	14	5	&0.80		SWI
2004 12 11.92	x&	B	5.3	TJ	5.0	B		7	&15	5			PAR03
2004 12 11.96	x	B	5.0	TT	6.0	B		20	&16	4			ADA02
2004 12 14.25		I	4.6	YG	0.0	E		1					SOU01
2004 12 14.92	x&	B	5.5:	TJ	5.0	B		20	&12	D3			MOZ
2004 12 15.81	x	B	5.0	TJ	6.0	B		20	&10	D5			CHR
2004 12 15.86	x&	B	5.4	TJ	5.0	B		10	12	s4/			MAR12
2004 12 15.87	x	M	4.8	TK	5.0	B		7	20	6	0.5		DOR02
2004 12 15.91	x	B	5.1	TT	4.6	B		10	19	d5			BUR04
2004 12 15.93	x	M	5.3	TJ	18.5	L	5	53	8	s6			KWI
2004 12 15.95	x	B	4.5	TT	5.0	B		7	&20	6	1.5	35	FIL04
2004 12 16.78	x	B	4.8	TJ	6.0	B		20	&10	D5			CHR
2004 12 16.81	x	B	4.5	TK	5.0	B		7	20	5	&0.5		DOR02
2004 12 16.87	x	B	4.8	TT	5.0	B		10	&14	D4/	0.5	17	KIS03
2004 12 16.88		S	4.2	SC	5.0	B		10	20	4			PAN
2004 12 16.89	x	B	4.5	TT	6.0	B		30	18	5			POW01
2004 12 16.89	x	B	5.0	TJ	8.0	B		18	&14	s6			RZE
2004 12 16.89	x	B	5.1	TJ	5.0	B		10	15	S4/			MAR12
2004 12 16.89	x	B	5.2	TJ	5.0	B		7	&19	s6			SPE01
2004 12 16.91	x&	B	4.8	TJ	5.0	B		10	15	D6			PAR03
2004 12 16.92	x	B	5.3	TJ	6.0	B		20	&18	4/			SIW
2004 12 16.97		I	4.6	YG	0.0	E		1					SOU01
2004 12 16.97	x&	B	5.2	TJ	5.0	B		20	13	s4			MOZ
2004 12 16.98		S	5.3	TK	8.0	B		20	11	5	0.6	20	SHA02
2004 12 16.99		S	5.0	TK	5.0	B		7	9	5			SHA02
2004 12 16.99		S	5.5	TK	30	L	4	48	6	8		320	ABB
2004 12 17.84	x	B	4.6	TK	5.0	B		7	20	5	1		DOR02
2004 12 17.90	x	B	5.5	TT	10.0	B		25	& 8	6	&0.4	10	SCI
2004 12 17.91		S	4.9	TK	8.0	B		20	12	6	1.4	20	SHA02
2004 12 17.92		S	4.5	TK	0.7	E		1	12	3			SHA02
2004 12 17.96		S	4.5	SC	5.0	B		10	20	4	1	355	PAN
2004 12 19.82	x	B	4.5	TK	5.0	B		20	&20	5			DOR02
2004 12 19.84		S	4.5	SC	7.0	B		15	18	5	1.5	342	PAN
2004 12 19.86		S	4.8	TK	5.0	B		10	12	5			SHA02

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 20.88	x	B	5.0	TJ	5.0	B		7	&12	s5			SPE01
2004 12 20.90		S	4.7	TK	5.0	B		10	12	4			SHA02
2004 12 20.92	x	B	4.5	TJ	5.0	B		20	15	S5			MOZ
2004 12 20.94	x	B	4.5	TT	5.0	B		7	&12	D6			PAR03
2004 12 20.95	x	B	5.1	TJ	8.0	B		18	&13	3			RZE
2004 12 21.80		S	4.8	TK	8.0	B		20	8	5			SHA02
2004 12 21.89	x	B	4.5	TT	5.0	B		20	12	S4/			MOZ
2004 12 22.74	x	B	4.4	TJ	6.0	B		20	&10	D5			CHR
2004 12 22.94	x	B	4.8	TJ	8.0	B		18					RZE
2004 12 24.81	x	B	4.1	TK	5.0	B		10	20	d5			BOH02
2004 12 24.83	x	B	5.2	TT	10.0	B		25	& 8	5/			SCI
2004 12 24.87		S	4.2	TK	5.0	B		7	15	4			SHA02
2004 12 24.93	x	B	4.5	TT	5.0	B		7	12	D6			PAR03
2004 12 24.94		S	3.9	SC	5.0	B		16	18	5	1	340	PAN
2004 12 25.89		S	4.2	SC	5.0	B		16	18	4	1	340	PAN
2004 12 25.90		S	4.1	TK	5.0	B		7	15	5			SHA02
2004 12 26.88		S	4.0	TK	2.5	B		10	15	5			SHA02
2004 12 26.88		S	4.1	SC	5.0	B		16	18	4	1	335	PAN
2004 12 26.88		S	4.1	TK	5.0	B		7	15	5			SHA02
2004 12 28.88		S	4.4	TK	5.0	B		10	13	5			ABB
2004 12 28.89		S	4.0	SC	5.0	B		16	18	5	1	340	PAN
2004 12 28.96		S	4.1	TK	5.0	B		7	15	5	15 m	45	SHA02
2004 12 28.97		S	4.0	TK	2.5	B		10	15	5			SHA02
2004 12 29.72	x	B	4.2	TJ	6.0	B		20	&12	D5			CHR
2004 12 29.94		S	4.2	TK	5.0	B		10	20	3			MER05
2004 12 30.12		I	4.0	TK	0.0	E		1					SOU01
2004 12 30.73		S	4.1	TK	2.5	B		10	12	5	0.2	15	SHA02
2004 12 30.74		S	3.7	TK	0.7	E		1	20	3			SHA02
2004 12 30.76	x	B	4.1	TJ	6.0	B		20	&12	D5			CHR
2004 12 30.77	x	B	4.6	TT	10.0	B		25	&12	S6			SCI
2004 12 30.79		S	4.2	TK	0.7	E		1	17	6	20 m		ABB
2004 12 30.79		S	5.9	TK	30	L	4	96					ABB
2004 12 30.86	x	B	4.6	S	5.0	B		10	12	5/			TUR01
2004 12 30.88	x	B	4.5	TJ	5.0	B		10	10	S5			MAR12
2004 12 30.92	x&	B	4.6	TJ	8.0	B		18	&12	d5			RZE
2004 12 30.98		I	3.9	TK	0.0	E		1					SOU01
2004 12 31.72		M	3.5	TI	0.0	E		1	25	2/			SAN07
2004 12 31.78		S	4.3	TK	2.5	B		10	12	5			SHA02
2004 12 31.82		S	3.9	SC	4.0	B		8	24	7	1	345	PAN
2004 12 31.87		S	4.0	TK	0.7	E		1	15	3			SHA02
2004 12 31.89		S	4.1	TK	0.7	E		1	17	6	30 m		ABB
2005 01 01.84		S	3.7	TK	0.7	E		1	20	4			SHA02
2005 01 01.84		S	3.7	TK	2.5	B		10	20	5			SHA02
2005 01 01.94		S	4.2	TK	5.0	B		10	15	3			MER05
2005 01 01.98	x	B	4.4	TJ	5.0	B		10	12	S5			MAR12
2005 01 02.71	x	B	3.9	TT	6.0	B		30	13	6			POW01
2005 01 02.73	x	S	4.2	TJ	5.0	B		10	30				GRO04
2005 01 02.75	x	B	4.5	TT	10.0	B		25	&12	S6			SCI
2005 01 02.77	x	B	3.8:	TT	0.0	E		1	&10	8			SCI
2005 01 02.80	x	B	4.2	TJ	5.0	B		10	25	S5			MAR12
2005 01 02.80	x	B	4.3	TT	5.0	B		7	&12	D6			PAR03
2005 01 02.84	x	B	4.1	TJ	5.0	B		7	&23	S6			SPE01
2005 01 02.86	x	B	3.7	TK	5.0	B		7	20	6	3	90	DOR02
2005 01 02.88	x	B	4.1	TT	5.0	B		7	&30	6	0.83	75	FIL04
2005 01 02.90	x	B	4.5	TJ	8.0	B		18	&24	D5/			RZE
2005 01 02.93		S	3.7	TK	0.7	E		1	20	4			SHA02
2005 01 02.93		S	3.7	TK	2.5	B		10	20	5			SHA02
2005 01 02.94					5.0	B		10	22	7	1	80	ABB
2005 01 02.94		I	4.1	TK	0.7	E		1	22	7			ABB
2005 01 03.84	x	B	3.9	TJ	6.0	B		20	&15	D6	0.5		CHR
2005 01 03.91	x	B	4.1	TJ	5.0	B		10	20	S5			MAR12
2005 01 04.82		S	4.0	TK	2.5	B		10	17	5			SHA02
2005 01 04.83		S	3.9	TK	0.7	E		1	20	4			SHA02
2005 01 04.94		I	4.2	TK	0.7	E		1	30	7	1	91	ABB
2005 01 05.71	x	B	4.0	TJ	5.0	B		10	15	S5/			MAR12

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 05.76	x	B	4.0	TJ	8.0	B		18	&14	D6/			RZE
2005 01 05.80	x	B	4.3	TK	5.0	B		7	20	6	&3	80	DOR02
2005 01 05.82	x	B	3.9	TJ	35	L	6	52	&16	D7	0.5		CHR
2005 01 05.84	x	B	3.8	TJ	6.0	B		10	&14	D6/			RZE
2005 01 05.95		S	3.8	TK	5.0	B		7	15	5			SHA02
2005 01 06.74	x	B	3.8	TJ	0.0	E		1	31	s4			MOZ
2005 01 06.75	x	B	3.8	TJ	0.0	E		1	&20	d5			KID01
2005 01 06.77	x	B	3.8	TT	6.0	B		20	&18	S6	&0.4	84	SCI
2005 01 06.82	x	B	4.0	TJ	5.0	B		7	&24	S6			SPE01
2005 01 06.84	x	B	3.6	TJ	6.0	B		20	&20	5/			SIW
2005 01 06.89	x	B	4.3	TJ	5.0	B		10	&13	5			OSS
2005 01 07.05	x	B	4.2	TK	5.0	B		7	20	6	&4.5	95	DOR02
2005 01 07.68	x	B	3.8	TJ	6.0	B		20	&16	D7	0.5		CHR
2005 01 07.90	x	B	3.7	TT	6.0	B		20	&20	S6	&0.8	80	SCI
2005 01 08.69	x	B	3.8	TJ	6.0	B		10	&15	D6/			RZE
2005 01 08.70	x	B	3.8	TJ	6.0	B		20	&18	D7	0.5		CHR
2005 01 08.71	x	B	3.8	TK	6	R	5	8	22	d7	1.7	85	BOH02
2005 01 08.73	x	B	3.7	TT	0.0	E		1	20	6			POW01
2005 01 08.76		S	3.7	TK	0.7	E		1	10	5			SHA02
2005 01 08.77		S	3.7	TK	2.5	B		10	20	5			SHA02
2005 01 08.80	x	B	3.8	TJ	0.0	E		1	15	6			PAR03
2005 01 08.81	x	B	3.6:	TT	4.0	B		12	24	6/	1.1	93	LEG
2005 01 08.81	x	B	3.9	TT	6.0	B		20	&20	S6	&1.3	94	SCI
2005 01 08.81	x	B	4.0	TJ	5.0	B		7	25	S5/			MAR12
2005 01 08.81	x	B	4.0	TJ	5.0	B		12	20	s6	&1.0	92	SMY
2005 01 08.81	x	S	3.8	TJ	5.0	B		10	33	7			GRO04
2005 01 08.82	x	B	4.0	TJ	5.0	B		7	25	D6			PAR03
2005 01 08.83	x	S	4.0	TT	5.0	B		10	&20	S5			KIS03
2005 01 08.88	x	B	3.4	TJ	7.0	B		15	18	5			SWI
2005 01 08.89	x	B	3.8	TJ	0.0	E		1	&17	4			ADA02
2005 01 08.89	x	B	4.1	TT	5.0	B		7	&25	6/	&1.2	80	FIL04
2005 01 08.91	x	B	3.7	TT	0.0	E		1	23	S6			MOZ
2005 01 08.94	x	M	4.3	TJ	18.5	L	5	53	12	7			KWI
2005 01 08.96					5.0	B		10	22	6	1.2	98	ABB
2005 01 08.96		I	3.3	TK	0.7	E		1	22	6			ABB
2005 01 09.68	x	B	3.9	TJ	6.0	B		20	&18	D6	0.5		CHR
2005 01 09.73	x	B	4.0	TT	5.0	B		7	&15	6/	&1.0	185	FIL04
2005 01 09.76	x	M	3.7	TJ	0.0	E		1	20	6			KWI
2005 01 09.77	x	M	4.4	TJ	18.5	L	5	53	15	6/			KWI
2005 01 09.78	x	B	3.8:	TT	0.0	E		1	&20	6			SCI
2005 01 09.79	x	B	3.9	TT	6.0	B		20	&17	S5/	&1.0	86	SCI
2005 01 09.79	x	B	4.4:	TJ	5.0	B		7	&21	S5			SPE01
2005 01 09.81	x	B	4.2:	TJ	8.0	B		18	&16	d5			RZE
2005 01 09.85		S	3.8	TK	2.5	B		10	15	4			SHA02
2005 01 09.88	x	B	3.7	TK	5.0	B		7	15	6	&3.5	88	DOR02
2005 01 09.91	x	B	3.6	TK	0.0	E		1	25	6			BOH02
2005 01 10.74	x	B	3.7	TT	5.0	B		7	22	6			POW01
2005 01 10.80	x	B	3.7	TK	5.0	B		7	15	6	&0.5	90	DOR02
2005 01 10.82	x	B	4.1	TT	6.0	B		20	&15	S5/	&1.2	83	SCI
2005 01 10.84		S	3.8	TK	2.5	B		10	15	5			SHA02
2005 01 10.86	x	B	4.3:	TT	4.0	B		12	17	6/	0.9	93	LEG
2005 01 10.88	x	B	4.0	TJ	5.0	B		7	&26	S6			SPE01
2005 01 10.89	x	B	4.1	TT	5.0	B		7	&20	6	&0.5	180	FIL04
2005 01 10.90		I	3.4	TK	0.7	E		1	22	7			ABB
2005 01 10.90		I	3.4	TK	5.0	B		10	22	6	2	111	ABB
2005 01 10.92		S	3.7	TK	0.7	E		1	15	4			SHA02
2005 01 11.67	x	B	4.1	TJ	6.0	B		20	&18	D6	0.5		CHR
2005 01 11.73	x	B	3.4	TJ	20	L	5	32	20	6			SWI
2005 01 11.74	x	B	4.3	TT	6.0	B		20	&12	S5	&0.5	95	SCI
2005 01 11.77		M	3.6	HD	3	O		8	30	5			SER
2005 01 11.78		S	3.8	TK	5.0	B		7	15	5			SHA02
2005 01 11.79		S	3.8	TK	0.7	E		1	15	5			SHA02
2005 01 11.89	x	B	4.0	TJ	5.0	B		7	&21	S6			SPE01
2005 01 11.93	x	B	4.2	TT	5.0	B		7	&12	6	&1.4	95	FIL04
2005 01 12.70	x	B	4.2:	TJ	5.0	B		10	15	S5			MAR12

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 12.73	x	B	4.1:	TJ	8.0	B		18	&15	5			RZE
2005 01 12.78	x	B	4.0	TK	5.0	B		7	15	6	0.5	95	DOR02
2005 01 12.80	x	B	4.2	TJ	6.0	B		20	&16	D6	0.5		CHR
2005 01 12.81		S	3.7	TK	0.7	E		1	20	5			SHA02
2005 01 12.82	x	B	4.3	TJ	6.0	B		20	&15	d5			RZE
2005 01 12.82		S	4.0	TK	2.5	B		10	15	5			SHA02
2005 01 12.88		I	3.4	TK	0.7	E		1	20	6			ABB
2005 01 12.88		I	3.4	TK	5.0	B		10	20	6	1	56	ABB
2005 01 13.73	x	B	4.0	TT	0.0	E		1	&15	6			POW01
2005 01 13.79		S	3.8	TK	2.5	B		10	17	5			SHA02
2005 01 13.80	x	B	4.2	TK	5.0	B		7	14	6	0.5	95	DOR02
2005 01 13.80	x	B	4.4	TT	6.0	B		20	&16	S5	&1.4	84	SCI
2005 01 13.81	x	B	4.0:	TT	0.0	E		1	&15	5			SCI
2005 01 13.87	x	B	4.1	TJ	6.0	B		20	&23	S6			KID01
2005 01 13.92		I	3.7	TK	0.7	E		1	20	6			ABB
2005 01 14.77		S	3.7	TK	2.5	B		10	15	5			SHA02
2005 01 14.77		S	3.8	TK	0.7	E		1	15	4			SHA02
2005 01 14.80	x	B	4.1:	TJ	6.0	B		20	&15	6			KID01
2005 01 14.88	x	B	4.0	TT	0.0	E		1	&15	6			POW01
2005 01 14.95	x	B	4.0	TJ	5.0	B		10	13	S5			MAR12
2005 01 15.73	x	B	4.4	TT	6.0	B		20	&14	S5	&0.5	85	SCI
2005 01 15.78	x	B	3.9	TK	5.0	B		7	12	6	0.5	90	DOR02
2005 01 15.78	x	B	4.4	TT	5.0	B		7	17	6			POW01
2005 01 15.79		S	3.8	TK	5.0	B		7	13	5			SHA02
2005 01 15.82	x	B	4.5	TJ	8.0	B		18	&12	d5			RZE
2005 01 15.90	x	B	3.9	TK	0.0	E		1	21	6/			BOH02
2005 01 15.90	x	B	4.2	TJ	5.0	B		10	13	S5			MAR12
2005 01 15.91	x	M	3.8	TJ	0.0	E		1	15	5			KWI
2005 01 15.92	x	M	4.3	TJ	18.5	L	5	53	13	5/	0.41	80	KWI
2005 01 15.93	x	B	4.5	TT	5.0	B		7	&15	6	&1.0	85	FIL04
2005 01 15.96	x	B	4.5	TT	5.0	B		7	15	6	0.5	130	POW01
2005 01 16.71	x	B	4.1:	TT	0.0	E		1	&10	5			SCI
2005 01 16.72	x	B	4.3	TJ	6.0	B		20	&16	D6			CHR
2005 01 16.77	x	B	4.3	TJ	6.0	B		20	&15	5/			SIW
2005 01 16.77	x	B	4.4	TT	6.0	B		20	&12	S5	&1.4	87	SCI
2005 01 16.80	x	B	4.0	TK	5.0	B		7	12	6	0.5	90	DOR02
2005 01 16.80		S	3.9	TK	0.7	E		1	15	5			SHA02
2005 01 16.80		S	3.9	TK	5.0	B		7	15	5			SHA02
2005 01 16.82	x	B	4.2	TJ	5.0	B		7	&15	6			PAR03
2005 01 16.83	x	B	4.1	TJ	5.0	B		7	&16	S6			SPE01
2005 01 16.83	x	B	4.4	TT	4.0	B		12	14	6/			LEG
2005 01 16.88	x	B	4.5	TJ	5.0	B		10	&11	5			OSS
2005 01 16.89	x	B	4.5	TT	5.0	B		7	&15	6	&1.0	90	FIL04
2005 01 16.92	x	B	4.0	TT	5.0	B		10	&20	S6	&1	90	KIS03
2005 01 17.66	x	B	4.4	TJ	6.0	B		20	&16	D6			CHR
2005 01 17.76	x	B	4.4	TJ	5.0	B		7	&13	S6			SPE01
2005 01 17.78	x	B	4.4	TK	5.0	B		7	10	6	&0.3	80	DOR02
2005 01 17.79	x	B	4.7	TT	4.0	B		12	14	6			LEG
2005 01 17.83	x	B	4.7	TT	6.0	B		20	&10	S5	&1.0	85	SCI
2005 01 17.90	x	B	4.5	TT	5.0	B		7	&18	5/	&1.0	100	FIL04
2005 01 18.72	x	B	4.6	TT	6.0	B		20	&15	S5	&0.7	92	SCI
2005 01 18.85	x	B	5.0	TK	5.0	B		7	10	6			DOR02
2005 01 18.85		S	4.1	TK	5.0	B		7	12	4			SHA02
2005 01 18.95	x	M	4.2	TJ	0.0	E		1	15	6			KWI
2005 01 18.96	x	M	4.5	TJ	18.5	L	5	53	10	5/	0.5	85	KWI
2005 01 19.70	x	B	4.6	TJ	6.0	B		20	&12	D5			CHR
2005 01 19.97		S	4.1	TK	5.0	B		7	10	4			SHA02
2005 01 20.91		S	4.0	TK	5.0	B		7	12	5			SHA02
2005 01 21.92		S	5.0	TK	5.0	B		10	10	3			MER05
2005 01 21.93		S	4.3	TK	5.0	B		7	14	5			SHA02
2005 01 22.70	x	B	5.2	TJ	5.0	B		10	9	s4/			MAR12
2005 01 22.76	x	B	4.8	TK	5.0	B		7	10	6			DOR02
2005 01 23.79	x	B	5.2	TT	6.0	B		20	& 9	4/			SCI
2005 01 23.81	x	B	5.2	TK	5.0	B		7	8	6			DOR02
2005 01 23.86	x	B	5.3	TJ	5.0	B		10	9	4			MAR12

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 25.90		S	4.6	TK	5.0	B		7	11	4	40 m	90	SHA02
2005 01 27.68	x	B	4.7	TK	5.0	B		7	10	6	&1	105	DOR02
2005 01 27.86	x	B	5.0	TJ	6.0	B		20	&10	4			KID01
2005 01 28.73	x	B	4.9	TJ	5.0	B		10	8	s4			MAR12
2005 01 28.73	x	B	5.0	TT	6.0	B		20	& 9	4/			SCI
2005 01 29.62		B	4.1:	HD	0.0	E		1	22	4			SER
2005 01 29.87	x	B	5.2	TT	5.0	B		7	&10	4			POW01
2005 01 30.81	x	B	5.1	TJ	6.0	B		20	&13	4/			KID01
2005 01 30.94		S	4.7	TK	5.0	B		7	11	5			SHA02
2005 01 31.70	x	B	4.9	TK	5.0	B		7	10	6	&1.5	110	DOR02
2005 01 31.85	x	B	4.9	TJ	5.0	B		10	8	s4/			MAR12
2005 01 31.86	x	B	5.3	TT	5.0	B		7	&13	5			POW01
2005 02 05.71	x	B	5.0	TK	5.0	B		7	10	6	1	110	DOR02
2005 02 05.74	x	B	5.0	TJ	5.0	B		10	8	4			MAR12
2005 02 05.78	x	B	4.6	TT	5.0	B		7	15	5			POW01
2005 02 06.68	x	B	5.1	TJ	6.0	B		20	&10	D5			CHR
2005 02 06.71	x	B	5.3	TK	5.0	B		7	10	6	1.5	110	DOR02
2005 02 06.74	x	B	5.4	TT	5.0	B		7	&15	6/	&1.0	170	FIL04
2005 02 06.75	x	B	4.9	TJ	20	L	5	32	10	5			SWI
2005 02 06.76	x	B	5.2	TJ	6.0	B		20	&11	4			KID01
2005 02 06.79	x	B	5.2	TJ	6.0	B		20	12	4/			SIW
2005 02 06.80	x	B	5.6	TJ	5.0	B		7	& 9	S5			SPE01
2005 02 06.81	x	B	5.3	TT	5.0	B		7	12	5			POW01
2005 02 06.85	x	B	5.2	TJ	5.0	B		7	&10	5			PAR03
2005 02 06.94		S	4.7	NP	5.0	B		7	10	4			SHA02
2005 02 06.94		S	4.9	NP	8.0	B		20	9	5			SHA02
2005 02 07.72	x	B	5.0	TJ	5.0	B		10	8	3/			MAR12
2005 02 07.72	x	B	5.2	TJ	6.0	B		20	&10	D5			CHR
2005 02 07.75	x	B	4.9	TK	5.0	B		7	10	D6	1.0	80	DOR02
2005 02 07.75	x	B	5.4	TT	5.0	B		7	10	5			POW01
2005 02 07.76	x	B	5.3	TJ	6.0	B		20	&10	4			SIW
2005 02 07.77	x	B	5.1	TJ	6.0	B		20	12	4/			KID01
2005 02 07.77		S	4.8	NP	2.5	B		10	9	5			SHA02
2005 02 07.77		S	5.0	NP	8.0	B		20	9	4			SHA02
2005 02 07.81		S	5.8	TK	6	R	12	17	6	6	1.0		ABB
2005 02 07.89	x	B	5.2	YG	11	L	8	45	12	4			SZY
2005 02 08.72	x	B	5.5	TT	6.0	B		20	& 9	4			SCI
2005 02 08.74	x	B	5.3	TJ	5.0	B		7	&10	S5			SPE01
2005 02 08.75	x	B	5.0	TK	5.0	B		7	12	D6	1.5	90	DOR02
2005 02 08.79		S	4.9	NP	2.5	B		10	10	5			SHA02
2005 02 08.79		S	5.0	NP	8.0	B		20	11	5	0.8	110	SHA02
2005 02 08.82	x	B	5.5	TT	5.0	B		7	10	5			POW01
2005 02 08.83	x	B	5.4	TJ	6.0	B		20	&10	4			SIW
2005 02 08.97	x	B	5.4	TT	5.0	B		7	&15	6/	&1.0	90	FIL04
2005 02 09.73	x	B	5.4	TK	5.0	B		7	12	D6	1	90	DOR02
2005 02 09.74	x	B	5.5	TT	6.0	B		20	& 8	4			SCI
2005 02 09.75	x	B	5.0	TJ	5.0	B		10	7	4			MAR12
2005 02 09.78	x	B	5.2	TJ	5.0	B		7	&10	S5			SPE01
2005 02 09.81	x	B	5.3	TJ	6.0	B		20	11	4			KID01
2005 02 09.87	x	B	5.3	TJ	5.0	B		7	&10	5			PAR03
2005 02 09.88	x	B	5.1	TT	5.0	B		7	12	5			POW01
2005 02 10.73	x	B	5.0	TJ	5.0	B		10	7	3/			MAR12
2005 02 10.76	x	B	5.3	TT	0.0	E		1	&10	4			POW01
2005 02 10.78	x	B	5.5	TK	5.0	B		7	10	5	0.5	85	DOR02
2005 02 10.84	x	B	5.3	TJ	6.0	B		20	&10	D5			CHR
2005 02 10.88	x	B	5.3	TJ	5.0	B		7	&10	5			PAR03
2005 02 11.83	x	B	5.4	TJ	6.0	B		20	&10	4/			SIW
2005 02 12.81		S	4.9	NP	2.5	B		10	9	5			SHA02
2005 02 12.81		S	5.4	NP	8.0	B		20	10	5	0.5	120	SHA02
2005 02 12.87		S	4.7	NP	0.7	E		1	12	4			SHA02
2005 02 13.83	x	B	5.7	TT	6.0	B		20	& 7	4/	0.5	80	SCI
2005 02 13.86		S	4.9	NP	2.5	B		10	10	4			SHA02
2005 02 13.86		S	4.9	NP	8.0	B		20	10	4	20 m	80	SHA02
2005 02 14.15	x	B	5.1	TK	5.0	B		20	10	5	0.3	75	DOR02
2005 02 14.72	x	B	5.5	TJ	6.0	B		20	&10	D5			CHR

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 02 14.78		S	4.9	NP	2.5	B		10	9	4			SHA02
2005 02 14.80	x	B	5.5	TK	5.0	B		20	8	5	0.1	75	DOR02
2005 02 15.81		S	4.9	NP	2.5	B		10	9	5			SHA02
2005 02 18.79		S	4.9	NP	2.5	B		10	10	5			SHA02
2005 02 18.89		S	5.4	NP	8.0	B		20	10	4			SHA02
2005 02 19.86		S	5.4	NP	5.0	B		7	9	4			SHA02
2005 02 20.82		S	5.5	NP	5.0	B		7	9	3			SHA02
2005 02 23.00		S	5.5	NP	8.0	B		20	9	4			SHA02
2005 02 25.76	x	S	5.9:	TT	6.0	B		20	& 4	4			SCI
2005 02 26.75	x	B	6.1	TJ	6.0	B		20	& 6	4			SIW
2005 02 26.80		S	5.5	NP	5.0	B		7	11	4			SHA02
2005 02 26.81		S	5.5	NP	8.0	B		20	8	5			SHA02
2005 02 27.72	x	B	6.3	S	5.0	B		7	8	5			DOR02
2005 02 27.77	x	B	5.6	TT	5.0	B		7	&10	4			POW01
2005 02 27.79	x	S	6.2	TT	6.0	B		20	& 8	3/			SCI
2005 02 27.79	x	S	6.3	TJ	5.0	B		10	& 4	6			OSS
2005 02 27.81	x	B	6.7	TT	6.6	B		20	& 7	5/	&0.25	130	FIL04
2005 02 27.83		S	5.4	TK	6	R	12	17	8.7	7	10 m	140	ABB
2005 02 27.83		S	5.5	NP	8.0	B		20	9	5			SHA02
2005 02 28.72	x	B	5.8	TJ	6.0	B		20	& 7.5	D5			CHR
2005 02 28.78	x	B	6.3	S	5.0	B		7	10	5	0.1	95	DOR02
2005 02 28.79	x	B	5.9	TT	5.0	B		7	7	5			POW01
2005 03 01.79	x	B	6.2	S	5.0	B		7	8	5			DOR02
2005 03 01.93	x	B	6.0	TT	6.0	B		20	& 9	4/	&0.4	80	SCI
2005 03 02.72	x	B	5.1	TJ	6.0	B		20	& 7.5	D4			CHR
2005 03 02.74	x	B	6.0:	TJ	6.0	B		20	6	3/			MAR12
2005 03 02.81	x	B	6.6	TT	6.0	B		20	& 6	5			SCI
2005 03 02.90	x	B	6.5:	S	5.0	B		7	7	5	0.25	110	DOR02
2005 03 02.93	x	S	6.6	TT	5.0	B		7	& 6	5			FIL04
2005 03 02.95		S	5.7	NP	8.0	B		20	9	4	0.5	140	SHA02
2005 03 03.75	x	B	6.5	TT	6.0	B		20	& 5	4			SCI
2005 03 03.76	x	B	6.2	TT	5.0	B		7	9	4			POW01
2005 03 03.79		S	5.7	NP	8.0	B		20	9	4			SHA02
2005 03 03.80	x	B	6.4	S	5.0	B		20	8	5	0.1	110	DOR02
2005 03 03.80		S	5.7	NP	5.0	B		7	9	4			SHA02
2005 03 03.96	x	B	6.1	TT	5.0	B		7	&12	4			FIL04
2005 03 04.90		S	5.9	NP	8.0	B		20	8	4			SHA02
2005 03 06.91		S	5.1	HS	6	R	12	17	9	7	10 m	186	ABB
2005 03 07.01		S	6.2	NP	8.0	B		20	9	4	0.6	190	SHA02
2005 03 08.78	x	B	7.0	TJ	6.0	B		20	6	3			MAR12
2005 03 08.81	x	B	6.4	S	5.0	B		20	7	5	0.1	135	DOR02
2005 03 09.86	x	B	6.8	TJ	6.0	B		20	6	4			SIW
2005 03 09.97	x	B	6.2	TT	5.0	B		7	&12	5			FIL04
2005 03 10.06	x	B	6.2	TK	5.0	B		20	6	5	0.1	135	DOR02
2005 03 12.00		S	6.4	NP	8.0	B		20	9	4			SHA02
2005 03 12.72	x	B	6.6	TJ	6.0	B		20	& 5	D4			CHR
2005 03 12.76	x	B	7.1	TT	6.0	B		20	& 9	4/	&0.3	170	SCI
2005 03 12.90	x	B	6.4	TT	5.0	B		7	&11	4/	&0.5	205	FIL04
2005 03 12.94		S	6.5	NP	8.0	B		20	6	4			SHA02
2005 03 13.80	x	B	6.5	TK	5.0	B		7	5	5	0.1	175	DOR02
2005 03 13.85	x	B	6.4	TT	5.0	B		7	9	4			POW01
2005 03 13.97	x	B	7.5	TT	6.0	B		20	& 6	4			SCI
2005 03 14.80	x	B	6.6	TJ	6.0	B		20	& 5	D4			CHR
2005 03 14.83	x	B	7.4	TJ	6.0	B		20	& 6	4			SIW
2005 03 14.85	x	B	6.8	TT	6.0	B		20	12	4			POW01
2005 03 15.05	x	B	6.7	TK	5.0	B		20	6	5	0.1	170	DOR02
2005 03 15.82	x	B	6.9	TK	5.0	B		7	5	5			DOR02
2005 03 17.07	x	B	6.9	TK	5.0	B		20	5	4			DOR02
2005 03 17.80		S	6.5	TK	8.0	B		20	8	3			SHA02
2005 03 18.90		S	6.6	TK	8.0	B		20	6	3			SHA02
2005 03 19.05	x	B	7.3	TK	5.0	B		20	5	5			DOR02
2005 03 19.79	x	B	7.3	TJ	6.0	B		20	& 6	4/			SIW
2005 03 19.80	x	B	7.1	TT	6.0	B		20	& 9	4	&0.5	217	SCI
2005 03 19.84	x	B	7.5	TK	5.0	B		20	5	5			DOR02
2005 03 19.96	x	B	7.2	TT	6.6	B		20	& 7	4	&0.12	180	FIL04

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 03 20.00	x	M	7.4	TJ	18.5	L	5	53	4	4			KWI
2005 03 20.77	x	B	7.2	TT	6.0	B		20	& 9	4			SCI
2005 03 20.81	x	B	7.4	TJ	6.0	B		20	& 7	4			SIW
2005 03 20.83	x	B	7.1	TT	5.0	B		7	9	4			POW01
2005 03 20.93	x	B	7.2	TT	6.6	B		20	& 6	4/			FIL04
2005 03 21.77	x	B	7.2	TT	6.0	B		20	10	4			POW01
2005 03 21.82	x	B	7.4	TJ	6.0	B		20	& 7	3/			SIW
2005 03 21.83	x	S	7.5	TT	6.0	B		20	& 6	4			SCI
2005 03 22.13	x	B	7.2	TT	10.0	B		25	& 6	4/			FIL04
2005 03 22.80	x	S	7.7	TT	6.0	B		20	& 5	4			SCI
2005 03 22.90	x	B	7.5	TK	5.0	B		20	& 4	4			DOR02
2005 03 22.97		S	7.0	TK	8.0	B		20	5	3			SHA02
2005 03 23.82		S	7.1	TK	8.0	B		20	4	3			SHA02
2005 03 24.94		S	7.1	TK	8.0	B		20	5	3			SHA02
2005 03 25.85		S	7.1	TK	8.0	B		20	5	3			SHA02
2005 03 26.90	x	B	7.7	TK	5.0	B		20	6	3			DOR02
2005 03 28.82	x	B	7.8	TJ	6.0	B		20	5	3/			SIW
2005 03 28.85	x	B	6.9	TT	5.0	B		7	10	4			POW01
2005 03 28.85	x	B	6.9	TT	5.0	B		7	10	4			POW01
2005 03 28.86		S	7.4	TK	8.0	B		20	5	3			SHA02
2005 03 28.88	x	S	7.9	TT	6.0	B		20	& 5	4			SCI
2005 03 28.90	x	B	7.7	TK	5.0	B		20	6	3			DOR02
2005 03 28.91	x	B	7.8	TT	10.0	B		25	& 7	4			FIL04
2005 03 29.78	x	B	7.7	TK	5.0	B		7	8	5			DOR02
2005 03 29.80	x	B	7.4	TJ	25	L	6	54	6	5			SWI
2005 03 29.81	x	B	7.1	TT	5.0	B		7	10	4			POW01
2005 03 29.82	x	B	7.5	TJ	6.0	B		20	& 6	3/			SIW
2005 03 29.84	x	M	7.9	TJ	18.5	L	5	53	2	3/			KWI
2005 03 29.89	x	B	7.5	TT	6.0	B		20	& 5	4			SCI
2005 03 29.91	x	B	7.4	TT	10.0	B		25	& 8	4/	&0.08	190	FIL04
2005 03 30.80	x	B	7.3	TJ	6.0	B		20	& 4	d3/			CHR
2005 03 30.85	x	B	7.8	TK	5.0	B		20	6	3			DOR02
2005 03 30.85	x	S	7.9	TT	6.0	B		20	& 5	4			SCI
2005 03 30.98	x	B	8.1	TT	10.0	B		25	& 6	4/	&0.1	170	FIL04
2005 03 31.78	x	B	7.3	TK	11.4	L	8	22	6	5	0.1	180	DOR02
2005 03 31.84	x	S	7.9	TJ	6.0	B		20	& 5	3/			SIW
2005 03 31.87	x	S	8.0	TT	6.0	B		20	& 5	4			SCI
2005 03 31.88	x	B	7.2	TT	5.0	B		7	11	4			POW01
2005 03 31.90	x	M	7.4	TK	5.0	B		20	6	5	0.1	180	DOR02
2005 04 01.07	x	B	7.9	TT	10.0	B		25	& 7	4/			FIL04
2005 04 01.78	x	B	7.4	TK	5.0	B		20	7	5	0.08	180	DOR02
2005 04 01.80	x	B	7.5	TJ	6.0	B		20	& 4	d3/			CHR
2005 04 01.85	x	S	7.7	TT	6.0	B		20	& 7	4/			SCI
2005 04 01.99	A	S	6.1	TK	5.0	B		10	8	2			ZAN01
2005 04 02.02	x	B	8.2	TT	10.0	B		25	& 7	4/			FIL04
2005 04 02.80	x	B	7.5	TK	5.0	B		20	6	4			DOR02
2005 04 02.86	x	S	8.3	TT	6.0	B		20	& 5	4			SCI
2005 04 03.03	A	S	6.1	TK	5.0	B		10	8	2			ZAN01
2005 04 03.75	x	B	7.7	TJ	35	L	6	110	& 3	d3/			CHR
2005 04 03.80	x	B	7.6	TK	5.0	B		20	5	4			DOR02
2005 04 03.82	x	B	7.7	TT	6.0	B		30	10	4			POW01
2005 04 03.83	x	S	8.0	TT	6.0	B		20	& 7	3/			SCI
2005 04 03.87	x	B	7.9	TT	10.0	B		25	& 7	4			FIL04
2005 04 03.88		S	7.1	TK	6	R	12	17	8	5	8 m	245	ABB
2005 04 03.88		S	7.1	TK	8.0	B		20	6	3			SHA02
2005 04 03.88		S	7.1	TK	30	L	4	30	8	6	8 m	245	ABB
2005 04 04.80	x	B	7.7	TJ	6.0	B		20	& 3	d3/			CHR
2005 04 04.80	x	B	7.7	TJ	25	L	6	54	6	5			SWI
2005 04 04.83	x	B	7.9	TT	5.0	B		7	9	4			POW01
2005 04 04.86	x	B	7.9	TK	10.0	M	10	35	6	4	0.1	170	DOR02
2005 04 04.87	x	B	8.3	TT	10.0	B		25	& 6	3			SCI
2005 04 04.90	x	B	8.1	TT	10.0	B		25	& 5	4/	&0.2	185	FIL04
2005 04 04.95		S	6.9	TK	8.0	B		20	6	4			SHA02
2005 04 05.91	x	B	8.3	TT	10.0	B		25	& 5	3			SCI
2005 04 05.93	x	B	8.2	TT	10.0	B		25	& 8	4			FIL04

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 04 05.94	A	S	6.2	TK	5.0	B		10	8	2			ZAN01
2005 04 06.82	x	B	7.7	TT	5.0	B		7	7	4			POW01
2005 04 06.83	x	B	8.0	TK	5.0	B		20	6	4			DOR02
2005 04 06.84	x	S	8.4:	TT	10.0	B		25	& 7	3			SCI
2005 04 06.96		S	7.2	TK	8.0	B		20	5	3			SHA02
2005 04 08.91		S	7.3	TK	8.0	B		20	6	5			SHA02
2005 04 08.93	x	S	8.1:	TT	10.0	B		25	& 5	3			SCI
2005 04 10.86		S	7.3	TK	8.0	B		20	6	3			SHA02
2005 04 11.76	x	B	7.7	TK	5.0	B		20	5	4			DOR02
2005 04 11.81	x	B	8.2	TT	6.0	B		30	8	4			POW01
2005 04 11.88		S	7.3	TK	8.0	B		20	6	4			SHA02
2005 04 14.96		S	7.6	TK	8.0	B		20	5	3			SHA02
2005 04 15.88	x	B	8.0	TK	5.0	B		20	4	3			DOR02
2005 04 16.86		S	7.8	TK	8.0	B		20	5	3			SHA02
2005 04 16.92	x	S	8.3	TT	10.0	B		25	& 4	3			SCI
2005 04 17.85	x	S	8.4	TT	10.0	B		25	& 4	2/			SCI
2005 04 17.91	x	S	8.1	TT	10.0	B		25	& 6	3			FIL04
2005 04 18.08	x	B	8.4	TK	5.0	B		20	4	3			DOR02
2005 04 18.86		S	7.8	TK	8.0	B		20	5	2			SHA02
2005 04 19.87	x	S	8.5	TT	10.0	B		25	& 5	2/			SCI
2005 04 21.85	x	S	8.8	TT	10.0	B		25	& 4	2			SCI
2005 04 21.87		S	8.0	TK	8.0	B		20	5	2			SHA02
2005 04 21.92	x	S	8.0	TT	10.0	B		25	& 5	2/			FIL04
2005 04 27.80	x	B	8.5	TJ	35	L	6	110	& 2	d3			CHR
2005 04 27.87	x	M	9.0	TK	5.0	B		30	4	3			DOR02
2005 04 29.87	x	B	9.0	TK	11.4	L	8	45	4	4			DOR02
2005 04 29.88	x	S	9.1:	TT	10.0	B		25	& 4	2			SCI
2005 04 29.90	x	S	9.0	TT	10.0	B		25	& 6	4			FIL04
2005 04 30.78	x	B	8.5	TJ	35	L	6	110	& 2	d3			CHR
2005 04 30.86	x	S	9.0	TT	10.0	B		25	& 8	3/			FIL04
2005 04 30.87	x	S	9.2	TT	10.0	B		25	& 4	2			SCI
2005 04 30.88	x	M	9.2	TK	5.0	B		20	4	3			DOR02
2005 05 02.90	x	M	9.3	TK	5.0	B		20	4	3			DOR02
2005 05 02.90		S	8.4	TK	8.0	B		20	5	3			SHA02
2005 05 02.90	x	S	9.5	TJ	18.5	L	5	53	2	2/			KWI
2005 05 02.95	x	S	9.0	TT	10.0	B		25	& 5	2			SCI
2005 05 04.90		S	8.6	TK	8.0	B		20	6	3			SHA02
2005 05 07.06	x	S	8.8	TT	10.0	B		25	& 6	3			FIL04
2005 05 07.80	x	S	10.0	TJ	35	L	6	110	& 1.5	d2/			CHR
2005 05 07.88	x	B	9.2:	TK	5.0	B		20	4	3			DOR02
2005 05 07.88	x	S	9.3	TT	10.0	B		25	& 4	2			SCI
2005 05 07.90		S	8.7	VB	8.0	B		20	6	3			SHA02
2005 05 07.91	x	S	9.0	TT	10.0	B		25	& 5	2			PAR03
2005 05 08.90	x	S	9.3	TT	10.0	B		25	& 4	3			SCI
2005 05 08.90	x	S	9.4	TJ	18.5	L	5	53	3	2			KWI
2005 05 08.93	x	B	9.1	TT	10.0	B		25	& 7	3/			FIL04
2005 05 09.90	x	B	9.3	TK	10	M	10	35	5	3			DOR02
2005 05 09.95	x	S	9.4	TT	10.0	B		25	& 5	3/			SCI
2005 05 10.06	x	S	9.3	TT	30.0	L	6	60	& 4	2/			FIL04
2005 05 10.88	x	B	10.0	TT	20	L	5	30	5	3			POW01
2005 05 10.90		S	8.7	VB	8.0	B		20	6	2			SHA02
2005 05 10.90	x	S	9.4	TK	5.0	B		20	3	3			DOR02
2005 05 11.88	x	B	9.0	TT	10.0	B		25	& 7	3/			FIL04
2005 05 11.89	x	S	9.6	TT	10.0	B		25	& 5	2/			SCI
2005 05 11.90	x	S	9.5	TK	5.0	B		20	3	3			DOR02
2005 05 12.89	x	B	9.5	TT	10.0	B		25	& 5	2/			FIL04
2005 05 12.89	x	S	9.6	TT	10.0	B		25	& 5	2/			SCI
2005 05 12.89	x	S	9.7	TJ	18.5	L	5	53	2	2			KWI
2005 05 13.82	x	S	10.2	TJ	35	L	6	110	& 1.5	d2/			CHR
2005 05 13.85	x	B	9.8	TT	20	L	5	30	3.3	3			POW01
2005 05 13.87	x	B	10.5	HS	38	L	4	51	3	3			TUR01
2005 05 13.90	x	S	9.4	TT	10.0	B		25	& 6	3			FIL04
2005 05 13.92		S	8.8	VB	8.0	B		20	5	2			SHA02
2005 05 13.97	x	S	9.7	TT	10.0	B		25	& 5	2/			SCI
2005 05 13.99	x	M	9.7	TK	11.4	L	8	45	3	3			DOR02

Comet C/2004 Q2 (Machholz) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 05 21.98	x	S	10.0:	TK	10	M	10	35	& 3	2			DOR02
2005 05 25.86	x	S	9.6	TJ	20	L	5	64	5	2			SWI
2005 05 26.89	x	S	10.4	TT	20	L	6	48	4.7	3			POW01
2005 05 26.91	x	B	10.0	TT	30.0	L	6	60	& 5	3/			FIL04
2005 05 26.92	x	S	9.6	TJ	10.0	B		25	& 4	3			PAR03
2005 05 26.93	x	S	9.5	TK	5.0	B		20	2	3			DOR02
2005 05 27.84	x	S	10.3	TJ	35	L	6	110	& 1.5	d2			CHR
2005 05 27.93	x	S	9.8	TK	10	M	10	35	2	3			DOR02
2005 05 27.95	x	S	9.5	TJ	10.0	B		25	& 4	3			PAR03
2005 05 27.96		S	10.0	TK	33	L	5	45	3.5	2			SHA02
2005 05 27.96	x	S	10.1	TT	30.0	L	6	60	& 3	3/			FIL04
2005 05 28.92	x	S	9.8	TT	10.0	B		25	& 4	3			SCI
2005 05 28.93	x	S	10.0	TK	5.0	B		20	2	2			DOR02
2005 05 28.95	x	S	9.5	TT	30.0	L	6	60	& 5	2/			FIL04
2005 05 28.95		S	10.1	TK	33	L	5	45	3.5	3			SHA02
2005 05 28.96	x	S	9.4	TJ	10.0	B		25	& 5	3			PAR03
2005 05 29.90	x	S	9.8	TT	30.0	L	6	60	& 4	2/			FIL04
2005 05 29.95	x	S	10.0	TT	10.0	B		25	& 3	2/			SCI
2005 05 29.97	x	S	10.0	TK	10	M	10	35	3	3			DOR02
2005 05 30.84	x	S	10.5	TJ	35	L	6	110	& 1	d1/			CHR
2005 05 30.90	x	S	9.9	TT	30.0	L	6	60	& 3	2/			FIL04
2005 05 30.92	x	S	10.2	TT	10.0	B		25	& 3	2/			SCI
2005 05 30.95		S	9.9	TK	33	L	5	45	3.5	3			SHA02
2005 05 30.96		S	10.4	TK	30	L	4	96	1.9	5			ABB
2005 06 01.90	x	S	10.6	TT	30.0	L	6	60	& 2	2/			FIL04
2005 06 01.91	x	S	10.0	TT	10.0	B		25	& 3	3			SCI
2005 06 01.94	x	S	10.3	TK	10	M	10	35	2	2			DOR02
2005 06 03.92	x	S	10.2	TT	10.0	B		25	& 3	3			SCI
2005 06 03.93	x	S	10.4	TT	30.0	L	6	60	& 3	3/			FIL04
2005 06 03.97		S	10.5	TK	33	L	5	45	3.1	3			SHA02
2005 06 05.94	x	S	10.8:	TT	10.0	B		25	& 2	2			SCI
2005 06 06.98		S	10.0	TK	33	L	5	45	3.1	2			SHA02
2005 06 07.94	x	S	10.5	TK	10	M	10	35	2	2			DOR02
2005 06 09.97		S	11.1	TK	33	L	5	100	2.0	3			SHA02
2005 06 10.98		S	10.7	TK	33	L	5	45	2.4	2			SHA02
2005 06 10.98		S	10.9	TK	30	L	4	98	0.9	5		320	ABB
2005 06 12.92	x	S	11.1	TT	20	L	5	50	1.3	2			POW01
2005 06 13.94	x	S	11.5	TT	30.0	L	6	105	& 2	2/			FIL04
2005 06 13.98		S	11.0	TK	30	R	20	105	2.2	3			SHA02
2005 06 27.97		S	10.9	TK	30	R	20	185	1.9	2			SHA02
2005 06 29.88	x	S	11.1	TJ	18.5	L	5	106	1	1			KWI
2005 06 29.95	x	S	10.9	TT	10.0	B		25	& 1	2			PAR03
2005 07 03.92	x	S	11.0	TT	10.0	B		25	2	2			PAR03
2005 07 03.94	x	S	11.8	TT	30.0	L	6	105	& 0.5	3/			FIL04
2005 07 04.89	x	S	11.1	TT	20.3	L	6	48	& 2	2			PAR03
2005 07 08.94	x	S	11.2	TT	20.3	L	6	46	& 2	2			PAR03
2005 07 11.92	x	S	11.7	TT	20.3	L	6	46	& 1.5	2			PAR03
2005 07 12.93	x	S	12.5:	TT	30.0	L	6	105	& 1	2			FIL04
2005 07 12.95		S	11.9:	TK	30	R	20	185	1.1	2			SHA02
2005 07 27.86	x	S	11.9	TT	20.3	L	6	80	& 1	2			PAR03
2005 08 02.91	x	S	12.0:	TT	20.3	L	6	38	& 1	2			PAR03
2005 08 04.98		S	11.4	HS	36	L	6	80	2.0	2			BAR06
2005 08 10.87	x	S	12.0	TT	20.3	L	6	48	& 1	1			PAR03
2005 08 29.85	x&	S	12.5	TT	20.3	L	6	80	& 0.5	1			PAR03
2005 08 30.82		S	12.4	HS	36	L	6	80	1.6	3			BAR06
2005 08 31.82	x	S	12.8	TT	20.3	L	6	48	& 1	1			PAR03
2005 09 05.83	x	S	12.3	HS	25	L	5	120	1	2			POW01
2005 09 23.76	x	S	12.9	TT	20.3	L	6	48	1	1			PAR03

Comet C/2004 U1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 17.99		S	[13.5	HS	30	R	20	185					SHA02

Comet C/2005 A1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 16.00	x&	S	12.0:	TT	20.3	L	6	60	& 2	2			PAR03
2005 07 16.02	x&	S	12.5:	TT	20.3	L	6	120	& 1	3			PAR03
2005 08 03.00	x	S	11.8:	TT	20.3	L	6	48	2	2			PAR03
2005 08 14.93	x	S	12.3	HS	20	L	5	110	2.3	2/			POW01
2005 08 27.88	x	S	12.2	HS	20	L	5	110	1.0	2/			POW01
2005 08 29.85	x	S	12.7	HS	20	L	5	110	1.7	2			POW01
2005 08 30.89		S	12.8	HS	36	L	6	80	0.9	2/			BAR06
2005 08 30.98	x	S	13.0	TT	20.3	L	6	80	0.3	2			PAR03
2005 09 03.90		S	12.7	HS	36	L	6	90	1.3	3			BAR06
2005 09 05.00		S	12.7	HS	36	L	6	90	1.3	3/			BAR06
2005 09 05.88	x	S	13.6	HS	25	L	5	120	1	2			POW01
2005 09 25.83		S	12.8	HS	36	L	6	90	0.8	3			BAR06
2005 10 01.96		S	12.8	HS	36	L	6	90	1.0	4			BAR06
2005 10 10.85		S	13.1	HS	36	L	6	90	0.8	3			BAR06
2005 10 27.75		S	13.3	HS	44.0	L	5	156	0.4	4			HAS02

Comet C/2005 E2 (McNaught)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 10 31.39		S	11.3	AU	32.0	L	5	87	1.7	5			NAG08
2005 11 04.40		S	11.2	AU	32.0	L	5	87	1.8	5			NAG08
2005 11 04.86		S	11.3	TK	20.3	T	10	100	1.5	4			GON05
2005 11 06.78		S	11.4	TI	23.5	T	10	94	2	3			LAB02

Comet C/2005 K1 (Skiff)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 08 04.97		S	13.3	HS	36	L	6	80	0.6	3			BAR06
2005 09 03.86		S	13.8	HS	36	L	6	90	0.5	2			BAR06

Comet C/2005 K2 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 05 28.96		S	[12.5	HS	33	L	5	150					SHA02
2005 06 01.96	x	S	12.2	TT	30.0	L	6	105	& 1.5	2			FIL04
2005 06 09.96		S	9.3	TK	33	L	5	45	2.2	5			SHA02
2005 06 10.96		S	8.9	TK	8.0	B		20	5	4			SHA02
2005 06 10.97		S	9.0	TK	33	L	5	45	4.7	4			SHA02
2005 06 11.93	x	S	9.5:	S	11.4	L	8	45	3	3			DOR02
2005 06 12.90	x	S	10.6	S	20	L	5	50	1.4	3			POW01
2005 06 12.96	x	S	10.0:	S	10	M	10	35	& 3	3			DOR02
2005 06 13.97		S	8.0	TK	8.0	B		20	5	4			SHA02
2005 06 17.97		S	6.6:	TK	30	L	6	55	4	3			SHA02
2005 06 18.95		S	[6.1	TK	30	L	6	70					SHA02

Comet C/2005 N1 (Juels-Holvorcem)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 07 27.88	x&	S	12.0	TT	20.3	L	6	80	& 2	3			PAR03
2005 08 03.02	x	S	11.6	TT	20.3	L	6	48	3	3			PAR03
2005 08 04.03		S	11.6	HS	36	L	6	80	1.6	3			BAR06
2005 08 14.97	x	S	11.5	TT	20	L	5	110	1.5	3			POW01
2005 08 21.80	x&	S	11.5	TT	20.3	L	6	80	& 0.5	4			PAR03
2005 08 29.82	x	S	11.8	TT	20.3	L	6	80	& 0.7	3			PAR03
2005 08 29.82	x&	S	11.8	TT	20.3	L	6	80	& 0.7	3			PAR03
2005 08 29.84	x&	S	12.5	TT	20.3	L	6	120	& 0.3	4			PAR03
2005 09 04.03		S	12.0	HS	36	L	6	80	1.8	2			BAR06
2005 09 05.03		S	11.7	HS	36	L	6	80	2	2			BAR06
2005 09 07.80	x&	S	12.3	TT	20.3	L	6	80	& 0.7	3			PAR03
2005 09 07.81	x&	S	12.1	TT	20.3	L	6	48	& 1	2			PAR03

Comet C/2005 P3 (SWAN)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 08 27.82	x	B	10.5	TT	20	L	5	50	2.0	4			POW01

Comet C/2005 P3 (SWAN) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 08 28.88		S	9.9	TK	20	T	10	75	2.3	3			SHA02
2005 08 28.89		S	10.1	TK	10	B		25	3	3			SHA02
2005 08 29.82	x&	S	10.6	TT	30.0	L	6	60	& 3	2/			FIL04
2005 08 29.83	x	S	11.3	TT	20	L	5	50	3.0	3			POW01
2005 08 30.81	x&	S	10.8	TT	21	L	8	52	1.5	3			PAC03
2005 08 30.82	x	S	11.1	TT	20	L	5	50	2.3	3/			POW01
2005 08 31.79	x	S	10.5	TK	11.4	L	8	45	4	3			DOR02
2005 08 31.81	x	S	11.5	TT	20	L	5	50	2.5	3			POW01
2005 09 01.03		S	10.6	HS	36	L	6	80	2	2			BAR06
2005 09 01.80	x	S	10.8	TK	11.4	L	8	45	3	3			DOR02
2005 09 01.81	x	S	11.3	TT	20	L	5	48	2.6	3			POW01
2005 09 02.80	x	S	11.0	TK	11.4	L	8	45	3	3			DOR02
2005 09 02.83	x	S	10.5	TT	20.3	L	6	38	3	3			PAR03
2005 09 02.84	x&	S	10.9	TT	20.3	L	6	80	1.5	4			PAR03
2005 09 03.80	x	S	11.5:	TK	11.4	L	8	45	& 3	3			DOR02
2005 09 03.82		S	10.8	HS	36	L	6	80	2.3	2			BAR06
2005 09 03.83	x	S	10.9:	TT	20.3	L	6	38	2	3			PAR03
2005 09 03.84	x	S	10.9:	TT	20.3	L	6	48	2	3			PAR03
2005 09 04.81	x	S	10.7	TT	20.3	L	6	38	3	3			PAR03
2005 09 05.03		S	11.0	HS	36	L	6	80	2	2			BAR06
2005 09 05.80	x	S	12.2	HS	25	L	5	48	3.2	1/			POW01
2005 09 07.82	x	S	10.9	TT	20.3	L	6	48	2.5	3			PAR03
2005 09 09.80	x	S	12.6	TT	20.3	L	6	80	1	3			PAR03
2005 09 09.81	x	S	10.8	TT	20.3	L	6	48	2	2/			PAR03
2005 09 23.78	x	S	11.7	TT	20.3	L	6	48	1	2			PAR03
2005 09 25.98		S	12.5	HS	36	L	6	80	1	2			BAR06
2005 09 28.98		S	12.8:	HS	36	L	6	80	0.7	2			BAR06
2005 10 08.77	x	S	13.0	HS	20.3	L	6	80	1	2			PAR03
2005 10 08.90	x	S	12.1:	TT	30.0	L	6	105	& 1	2			FIL04
2005 10 11.12	x	S	13.8	HS	20.3	L	6	80	1	2			PAR03
2005 10 13.14		S	13.2	HS	44.0	L	5	156	0.5	3			HAS02

Comet P/2005 R2 (Van Ness)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 10 27.75		S	13.8	HS	44.0	L	5	156	0.4	4			HAS02
2005 11 04.91		S	12.6	TK	20.3	T	10	133	0.8	5			GON05
2005 11 08.87		S	13.0	TA	23.5	T	10	188	1	2			LAB02

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Non-Visual Data (new format)

TABULATED NON-VISUAL DATA

The new format for non-visual data was introduced in the October 2001 issue of the *ICQ*, chiefly to help researchers make more sense of comet photometry obtained with CCD cameras, to determine what effects various instrumental factors play (spectral responses, exposure times, photometric aperture sizes, etc.). As described in that issue, almost all of the new information is added to the original observation records in columns 81-129, thereby leaving the first 80 columns essentially unchanged (except that in the "coma-diameter" column, true coma diameters are now given without exception in the new format; the old format allowed CCD users to put instead an aperture size in the "coma-diameter" column, but this is now allowed for in columns 87-93 of the new-format records). See also page 208 of the July 2002 issue.

Most of the columns below are as for the visual data (described on page 19 of this issue). While electronic magnitudes *can* be submitted to 0.01 magnitude, for many reasons it is highly advised to continue giving total comet magnitudes only to 0.1 mag. Similarly, it is advised to continue giving all times to 0.01 day, as 0.001 day is usually unnecessary for cometary photometry.

The headings for the tabulated data are as follows: The date (UT), notes, magnitude method (including filters for CCDs, and "P" for photographs), magnitude, reference, instrument aperture, instrument type, instrument *f*-ratio, exposure time, coma diameter, degree of condensation, tail length and position angle, and observer are all as described for the visual tabulation. The column headed "APERTUR" gives the photometric aperture, preceded by "S" for square aperture and "C" for circular aperture, and followed by "d" for degrees, "m" for arcmin, and "s" for arcsec. The column "Chp" contains the 3-character code for the computer chip, given to indicate spectral response of the CCD camera. This column will also be used to indicate photographic emulsion when such information is provided for photographic photometry. The column "Sfw" contains the 3-character code for the software used to actually perform the photometric measures (not solely to extract comparison-star magnitudes). A lower-case "a" between these two columns indicates an anti-blooming CCD. The column headed "C" gives a number as follows: 0 = no correction; 1 = correction for bias (bias subtracted); 2 = flat-field corrected (flat-fielded); 3 = 1 + 2; 4 = dark-subtracted (and bias-subtracted) 5 = 2 + 4. The column headed "P" includes a P if the images used to measure the photometry were also measured for astrometry *and* those astrometric measures were published in the *Minor Planet Circulars* (meaning they were refereed); a U in this column indicates that the respective astrometric was sent to the MPC for publication but that either (a) they are unpublished at the time of reporting the photometry or (b) the observer is unaware of the publication status; a blank in this column indicates that no astrometry was measured. The 3-character CCD-camera code is listed under "Cam".

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Comet 21P/Giacobini-Zinner

DATE (UT)	n M	MAG.	RF	AP. T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 11 08.77	wxC	15.3	TJ	25.0L	5	a120	0.6		0.9m	284	S 0.6 m	K42	SI5	5	U	SE7	OHS

Comet 29P/Schwassmann-Wachmann

DATE (UT)	n M	MAG.	RF	AP. T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 10 10.92	C	16.8	UO	11.0L	7	a480	0.42	8			C 0.42m	T25	A32	4		PIX	SHU
2005 10 28.81	C	16.3	UO	11.0L	7	a360	0.30	2/			C 0.30m	T25	A32	4		PIX	SHU
2005 10 30.76	C	16.2	UO	11.0L	7	a480	0.33	2/			C 0.33m	T25	A32	4		PIX	SHU
2005 10 31.54	axC	14.1	HV	35.0C	10	a 90	1.5	8			S 1.71m	KAIa	SI4	5		ST2	TSU02
2005 11 01.76	x C	14.8	TJ	25.0L	5	a120	0.8				S 0.8 m	K42	SI4	5	U	SE7	OHS
2005 11 03.80	C	16.5	UO	11.0L	7	a600	0.42	3			C 0.42m	T25	A32	4		PIX	SHU

Comet 65P/Gunn

DATE (UT)	n M	MAG.	RF	AP. T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 11 08.63	wxC	17.9	TJ	25.0L	5	a240	0.4				S 0.4 m	K42	SI5	5	U	SE7	OHS

Comet 101P/Chernykh

DATE (UT)	n M	MAG.	RF	AP. T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 10 30.85	C	15.3	UO	11.0L	7	a480	0.25	3			C 0.25m	T25	A32	4		PIX	SHU
2005 10 31.43	axC	15.6	HV	35.0C	10	a360	0.4	4			S 0.83m	KAIa	SI4	5		ST2	TSU02

Comet C/2003 K4 (LINEAR)

DATE (UT)	n M	MAG.	RF	AP. T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 10 31.58	axC	13.9	HV	35.0C	10	a120	0.8	5			S 1.49m	KAIa	SI4	5		ST2	TSU02

Comet C/2005 A1 (LINEAR) -- component A

DATE (UT)	n M	MAG.	RF	AP. T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 11 07.47	x C	15.8	GA	15.0L	6	a240	0.6				S 0.6 m	K26	SI5	5		ST9	YOS02

Comet C/2005 E2 (McNaught)

DATE (UT)	n M	MAG.	RF	AP. T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 10 31.40	axC	12.3	HV	35.0C	10	a 90	0.8	6			S 1.13m	KAIa	SI4	5		ST2	TSU02

Comet P/2005 K3 (McNaught)

DATE (UT)	n M	MAG.	RF	AP. T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 11 08.60	x C	14.9	TJ	25.0L	5	a120	0.7		1.2m	251	S 0.7 m	K42	SI5	5	U	SE7	OHS
2005 11 08.84	x C	15.4	GA	15.0L	6	a240	0.4		0.8m	245	S 0.4 m	K26	SI5	5		ST9	YOS02

Comet P/2005 Q4 (LINEAR)

DATE (UT)	n M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 11 08.65	wxC	17.5	TJ	25.0	L	5	a240	0.5				S 0.5 m	K42	SI5	5	U	SE7	OHS

Comet P/2005 R1 (NEAT)

DATE (UT)	n M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 10 31.45	axC	16.9	HV	35.0	C	10	a900	0.3	5			S 0.57m	KAIa	SI4	5		ST2	TSU02

Comet P/2005 R2 (Van Ness)

DATE (UT)	n M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 10 11.90	C	15.2	UO	11.0	L	7	a300	0.17	3			C 0.17m	T25	A32	4		PIX	SHU
2005 10 12.82	C	14.5	UO	11.0	L	7	a480	0.17	4			C 0.17m	T25	A32	4		PIX	SHU
2005 10 30.69	C	15.8	UO	11.0	L	7	a480	0.41	5			C 0.41m	T25	A32	4		PIX	SHU
2005 10 31.53	axC	13.8	HV	35.0	C	10	a 90	0.7	5	2.8m	238	S 1.40m	KAIa	SI4	5		ST2	TSU02
2005 11 03.77	C	16.1	UO	11.0	L	7	a600	0.66	3/			C 0.66m	T25	A32	4		PIX	SHU
2005 11 07.52	x C	14.2	GA	15.0	L	6	a240	1.1		6 m	240	S 1.1 m	K26	SI5	5		ST9	YOS02

Comet P/2005 S3 (Read)

DATE (UT)	n M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 10 31.57	axC	17.8	HV	35.0	C	10	A260	0.2	4			S 0.62m	KAIa	SI4	5		ST2	TSU02

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Updated ICQ Archive Statistics

In the April 1998 issue (page 103), which gave the last published list of archival statistics, we noted that the *ICQ* archive had just passed the 100,000 mark; that figure now stands at over 155,000 observations — where an "observation" is counted as a 1-line, 80-character record for visual data and as a 1-line, 129-character record for the new CCD data format. Below are the current tallies of observations for the 25 most-observed long-period comets and 25 most-observed short-period comets in the *ICQ* archive. Quite a number of comets observed in the last 7 years have supplanted older comets in terms of the archival numbers.

Long-period comets

12676	C/1995 O1 (Hale-Bopp)
4827	C/1990 K1 = 1990c = 1990 XX
3993	C/1996 B2 (Hyakutake)
2878	C/2004 Q2 (Machholz)
2579	C/2001 Q4 (NEAT)
2492	C/2001 A2 (LINEAR)
2410	C/1987 P1 = 1987s = 1987 XXIX
2375	C/1989 X1 = 1989c1 = 1990 V
1880	C/2002 T7 (LINEAR)
1867	C/2000 WM_1 (LINEAR)
1513	C/1989 Q1 = 1989r = 1989 XIX
1477	C/2003 K4 (LINEAR)
1463	C/1999 H1 (Lee)
1462	C/1988 A1 = 1988a = 1988 V
1205	C/1977 R1 = 1977m = 1977 XIV
1187	C/1999 S4 (LINEAR)
1166	C/1975 N1 = 1975h = 1975 IX
1146	C/1982 M1 = 1982g = 1982 VI
1143	C/1998 M5 (LINEAR)
1086	C/1993 Y1 = 1993v = 1994 XI
1035	C/1996 Q1 (Tabur)
986	C/2002 V1 (NEAT)
979	C/1997 J2 (Meunier-Dupouy)
974	C/1999 T1 (McNaught-Hartley)
954	C/1973 E1 = 1973f = 1973 XII

Short-period comets

7098	1P/Halley
3522	153P/Ikeya-Zhang
2694	29P/Schwassmann-Wachmann
2674	109P/Swift-Tuttle
2378	19P/Borrelly
1935	21P/Giacobini-Zinner
1745	9P/Tempel
1548	2P/Encke
1536	103P/Hartley
1464	22P/Kopff
1194	24P/Schaumasse
1146	23P/Brorsen-Metcalf
1125	6P/d'Arrest
1082	10P/Tempel
1056	122P/de Vico
1031	81P/Wild
925	67P/Churyumov-Gerasimenko
893	4P/Faye
730	78P/Gehrels
679	141P/Machholz
664	38P/Stephan-Oterma
567	55P/Tempel-Tuttle
523	52P/Harrington-Abell
510	73P/Schwassmann-Wachmann
507	43P/Wolf-Harrington

The archival figures for specific comets on page 41 include *all* observations (including those observations with no magnitude information) as entered into the *ICQ* archive through those published in this January 2006 issue: a total of 101589 observations of comets with orbital periods $P > 30$ yr, 52190 observations of numbered short-period comets, and 2311 observations of comets with $P < 30$ yr. Around 98.5 percent of the observations contain some sort of magnitude information: 140378 contain measured or estimated magnitudes, and another 3395 contain limiting magnitudes when the comet was not definitely detected.

Where magnitudes were provided on the observation records, the top comparison-star references, by code, are: `AA`, 25999; `S`, 18049; `AC`, 14568; `HS`, 9284; (no reference given), 8972; `TJ`, 8666; `GA`, 6577; `TT`, 6442; `TK`, 5981; `A`, 5596; `SC`, 5282; `TI`, 4398; `LA`, 3392; `NP`, 2680.

The top instrument types given on the observation records are: reflector (code `L`), 56083; binoculars (`B`), 53882; refractor (`R`), 16988; naked eye (`E`), 8896; Cassegrain reflector (`T`), 6918.

There are < 1000 records with magnitude information but no method cited; the leading methods cited for magnitudes are: VSS method (code `S`), 71843; VBM method (`B`), 25128; "Modified Out-Out" method (`M`), 19054; unfiltered CCD (`C`), 10883; CCD magnitude with Cousins *R* filter (`k`), 3415; Extrafocal-Extinction (or Beyer) method (`E`), 3093; in-focus (`I`), 2480.

Below are the numbers of magnitude estimates for the top 50 observers in the *ICQ* archive, listed by *ICQ* observer code, the number of positive magnitude estimates for each observer (comet seen), and the number of "negative" magnitude estimates (comet not definitely seen). Note that the numbers for some observers (notably HOR02, NAK01, TSU02, and SCO01) include many CCD magnitudes. — *D.W.E.G.*

Code	Mag.	Neg.	Code	Mag.	Neg.
HOR02	5937	92	SCO01	1184	0
NAK01	5178	133	COM	1167	2
BOU	3804	34	MOD	1145	402
BOR	3272	90	ISH02	1135	0
SHA02	3088	217	CHE03	1110	29
MOR	2760	107	PER01	1104	0
JON	2692	1	DES01	1103	0
LEH	2558	33	KOR01	1064	8
PEA	2546	170	SEA01	1039	5
BIV	2498	4	YOS04	983	101
BEY	2392	75	KAD02	877	0
HAL	2209	832	MEY	846	2
MOR03	1800	0	KOS	811	0
BAR06	1709	32	NAG08	808	15
SEA	1698	7	MIK	807	38
RES	1684	10	KEE	769	4
MOE	1593	0	SCH04	760	0
KRO02	1361	0	DIJ	750	1
TSU02	1344	16	PLE01	726	12
GRA04	1341	17	SHU	726	0
KEI	1288	5	CLA	718	0
SRB	1274	19	GON05	705	3
GRE	1244	3	REN	661	24
SPR	1239	0	CAM03	655	7
HAS02	1208	70	MAT08	651	95

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