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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 (even-numbered years); the *ICQ* is also indexed in *Astronomy and Astrophysics Abstracts* and in *Science Abstracts Section A*.

The regular (invoiced) subscription rate is US\$31.00 per year for surface-mail delivery (price includes the annual *Comet Handbook*; the price without the *Handbook* is US\$23.00 per year). Subscribers who do not wish to be billed may subscribe at the special rate of US\$23.00 per year for surface-mail delivery (rate is \$15.00 without *Handbook*). Add \$15.00/year to each of these rates for airmail delivery outside of the United States or for first-class delivery within the U.S. [The last set of digits (after the hyphen) on the top line of the mailing address label gives the Whole Number that signifies the last *ICQ* issue which will be sent under the current subscription status. An asterisk after these numbers indicates credit for the next annual *Comet Handbook*. The first five digits represent the subscriber's account number.] Make checks or money orders payable in U.S. funds (and drawn on a U.S. bank) to *International Comet Quarterly* and send to Mail Stop 18; Smithsonian Astrophysical Observatory; 60 Garden St.; Cambridge, MA 02138, U.S.A.

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Group subscription rates available upon request. Back issues are \$6.00 each — except for "current" *Comet Handbooks*, which are available for \$15.00 (\$8.00 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).

Cometary observations should be sent to the Editor in Cambridge; all data intended for publication in the *ICQ* that is not sent via computer electronic mail should be sent on standard *ICQ* observation report forms, which can be obtained upon request from the Editor. Those who can send observational data (or manuscripts) in machine-readable form are encouraged to do so [especially through e-mail via the computer networks SPAN (6700::DAN) or Internet (ICQ@CFA.HARVARD.EDU), or via floppy disks that can be read on an IBM PC], and should contact the Editor for further information. 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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#### EDITORIAL NOTICE.

The proceedings articles for the second International Workshop on Cometary Astronomy (held in Cambridge, England, last year) have been postponed for publication until the October 2000 issue for additional editing.

The 2001 *Comet Handbook* is in preparation and will be mailed separately from the October issue.

# Review of Recent Literature: Research Concerning Comets

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## Comet Nuclei

The study of comet nuclei is a difficult undertaking. The presence of coma makes direct observations nearly impossible when comets are at small heliocentric distances ( $r$ ). When inactive at large  $r$ , nuclei are faint. Though a small number can remain brighter than mag 20-22 at aphelion, the majority are much fainter. Recent research has centered on two tactics to compensate for these observational difficulties. Researchers can rely on large-aperture telescopes to study objects when faint, or observations can be made when the comets are close and active. These observations are carefully modeled to estimate and correct for the level of coma contamination, yielding a direct measurement of the nucleus' brightness.

A team from the Universities of Maryland and Hawaii led by Yanga Fernández (2000) has recently published an extensive visual and infrared study of the nucleus of comet 2P/Encke. Thermal-infrared continuum data in the range 8-12 microns ( $\mu\text{m}$ ) obtained with the European Southern Observatory (ESO) 3.6-m telescope and infrared data in the range 3.6-100  $\mu\text{m}$  obtained with the European Space Agency (ESA) Infrared Space Observatory (ISO) spacecraft, as well as scattered continuum data in the range 0.55-1.1  $\mu\text{m}$  obtained with NASA's Hubble Space Telescope (HST), were used. The observations were made during July 2000, when the comet was at  $r = 0.94$ -1.26 AU. Careful attention was made to subtract the coma contribution, and analysis of the mid-infrared ESO data yielded a best-determined rotational period of  $15.2 \pm 0.3$  hours, which is in reasonable agreement with previously published periods. The peak-to-valley amplitude of the light curve is  $0.7 \pm 0.1$  mag, which gives a long-to-short axial ratio of  $\sim 2.6$ . Using the HST visual-wavelength data, in conjunction with measurements from other observers, enabled the authors to determine a linear phase slope of 0.06 mag/deg between  $0^\circ$  and  $106^\circ$ . This is high for a solid minor body and is highly suggestive of a surface that is rougher than a typical asteroid's. The linear phase slope yields an absolute red magnitude of  $15.2 \pm 0.5$ . The ESA ISO data, in addition to an assumed thermal-infrared behavior model for the nucleus, gives an effective nucleus radius of  $2.4 \pm 0.3$  km.

Spectroscopic observations of comet 82P/Gehrels 3 taken with the 3.6-m Canada-France-Hawaii Telescope at Mauna Kea Observatory in June 1996 have been published by M. C. De Sanctis (Istituto di Astrofisica Spaziale, Rome) and colleagues in the journal *Astronomy and Astrophysics*. Comet 82P was observed at 4.5 AU and showed no sign of activity. The spectra, which ranged from 0.40 to 0.98  $\mu\text{m}$ , revealed that 82P is a red object and very similar to D-type asteroids, which suggests a surface composition similar to Trojan and dark asteroids.

## Extinct Comet Candidates

Two extinct, or dormant, comet candidates (ECC) were recently studied by Mike Hicks (Jet Propulsion Laboratory, California Institute of Technology) and colleagues with the Palomar Mountain Hale 5-m and Table Mountain 0.6-m telescopes. One is 1996 PW, an inactive asteroidal object that travels in a decidedly long-period comet orbit ( $a = 315$  AU,  $e = 0.99$ ,  $i = 30^\circ$ ,  $P = 5600$  years). *BVRI* broadband photometry agrees with previously published results that 1996 PW is spectrally similar to D-type asteroids. The second ECC, 1997 SE<sub>5</sub>, resides in an orbit similar to Jupiter-family comets (JFCs), with  $a = 3.73$  AU,  $e = 0.67$ ,  $i = 3^\circ$ ,  $P = 7.2$  years. Broadband photometry of this object also suggests a D-type spectral classification. The observations also allowed a rotational period of  $9.05 \pm 0.005$  hours to be determined.

On *IAUC 7376*, Richard P. Binzel (Massachusetts Institute of Technology) reports his 0.5-1.0- $\mu\text{m}$  spectra, obtained with the Kitt Peak 4-m reflector, of the 1P/Halley-type object 1999 LD<sub>31</sub> ( $a = 24.4$ ,  $e = 0.90$ ,  $i = 160^\circ$ ,  $P = 120$  yr) which also displays a spectral reflectance consistent with a D-type asteroid.

## The Comet-TNO Connection

In recent years it has been accepted that the belt of trans-Neptunian objects (TNOs) is the source of the Jupiter-family comet population. Dynamical and physical studies confirm this belief that TNOs migrate inward and become JFCs after a relatively short time spent as Centaur/scattered-disk objects. Two Centaurs are now recognized as active comets, (2060) = 95P/Chiron and C/2000 B4 (LINEAR). But other than Pluto's variable atmosphere (or coma), are there any

\* We welcome Carl Hergenrother to the *ICQ* editorial staff as an Associate Editor. He is an active comet observer, being involved with the Catalina Sky Survey and as an observer at the Smithsonian Astrophysical Observatory on Mount Hopkins. The name Hergenrother will be familiar to readers, as it is attached to a couple of comets that he found in the course of the Catalina Survey. This article is the first of a regular *ICQ* column that Hergenrother will write, reviewing cometary research in the literature. — D. W. E. Green

active TNOs? A recently published work calls attention to a TNO that shows cometary behavior. Photometric data of 1996 TO<sub>66</sub>, taken with the ESO 3.6-m New Technology Telescope at La Silla in Chile and with the University of Hawaii 2.2-m reflector at Mauna Kea in Hawaii by O. Hainaut (ESO) and colleagues, suggest that variable cometary activity may be taking place on that TNO, as well. Light curves obtained at two separate oppositions in 1997 and 1998 both show a period of  $6.25 \pm 0.03$  hours, not unusual for TNOs. The peak-to-peak amplitude was observed to change between oppositions from a value of 0.12 mag in 1997 to 0.33 mag in 1998. A search for an apparent coma or tail in their images was negative.

### Observational Techniques

As noted above, observing comet nuclei is a difficult endeavor while they are active. The excellent image quality of HST images has enabled some researchers to model out the coma and record fairly accurate photometric measurements of the nucleus. Unfortunately, ground-based observers have to deal with less optimal image quality due to poor and variable seeing. Nuclear light curves of active comets have been obtained with CCDs over the past two decades. The most common technique is the use of a very small aperture to isolate as much of the nuclear-brightness contribution as possible. A group led by Javier Licandro (Instituto de Astrofísica de Canarias, Tenerife, Spain) has studied the effect that seeing has on ground-based observations of this kind. Using simulated as well as actual observations of 21P/Giacobini-Zinner and 29P/Schwassmann-Wachmann 1, the authors find that photometric measurements with small apertures (radii  $\leq 5''$ ) are heavily dominated by seeing.

In order to compensate for the seeing effect, a new method has been developed. A relationship between seeing and brightness within a fixed aperture is determined by choosing the cometary image with the best seeing. The image is then degraded to simulate the cometary image at various levels of poorer seeing. The magnitude of the comet in each convolved image and the seeing is measured, and the seeing-magnitude relation is determined by fitting a second-order polynomial to the values. When the actual photometric light-curve data are reduced the seeing for each image is measured and the photometry is corrected to a mean seeing value using the seeing-magnitude relation.

### Journals On-line

There are dozen of astronomical journals that publish cometary research. The journals are usually rather expensive and even many astronomy-department and university libraries have trouble carrying them all. Luckily, a number of journals are now available on the internet. Some still require a paid subscription to view the articles, but some are free.

NASA maintains the Astrophysics Data System abstract and article service, which contains over 600,000 astronomy and astrophysics abstracts plus links to some articles. The service is an excellent resource and reference tool for researching previously published works. The NASA Astrophysics Data System can be accessed via <http://adswww.harvard.edu/>; this is a free abstract and article reference service.

### REFERENCES

- De Sanctis, M. C.; M. Lazzarin; M. A. Barucci; M. T. Capria; and A. Coradini (2000). "Comet P/Gehrels 3: spectroscopic observations and nucleus models", *Astron. and Astrophys.* **354**, 1086-1090.
- Fernández, Y. R.; C. M. Lisse; H. U. Käufli; S. B. Peschke; H. A. Weaver; M. F. A'Hearn; P. P. Lamy; T. A. Livengood; and T. Kostiuk (2000). "Physical Properties of the Nucleus of Comet 2P/Encke", *Icarus* **147**, 145.
- Hainaut, O. R.; C. E. Delahodde; H. Boehnhardt; E. Dotto; K. J. Barucci; K. Meech; J. M. Bauer; R. M. West; and A. Doressoundiram (2000). "Physical properties of TNO 1996 TO<sub>66</sub>. Lightcurves and possible cometary activity", *Astron. and Astrophys.* **356**, 1076-1088.
- Hicks, M. D.; B. J. Buratti; R. L. Newburn; and D. L. Rabinowitz (2000). "Physical Observations of 1996 PW and 1997 SE<sub>5</sub>: Extinct Comets or D-Type Asteroids", *Icarus* **143**, 354-359.
- Licandro, J.; M. Serra-Ricart; A. Oscoz; R. Casas; and D. Osip (2000). "The Effect of Seeing Variations in Time-Series CCD Inner Coma Photometry of Comets: A New Correction Method", *Astron. J.* **119**, 3133-3144.

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## 2000 Edgar Wilson Award

The 2000 Edgar Wilson Award for the amateur discovery of comets was announced on *IAUC* 7445 on June 29. The 2000 Award is being divided among the following three individuals or groups: Daniel W. Lynn, Kinglake West, Victoria, Australia, for comet C/1999 N<sub>2</sub>; Korado Korlević, Višnja, Croatia, for P/1999 WJ<sub>7</sub>; and Gary Hug and Graham E. Bell, Eskridge, KS, U.S.A., for C/1999 X<sub>1</sub>. The Edgar Wilson Award was explained in these pages in the July 1998 issue (*ICQ* **20**, 111).

## CORRIGENDA

• In the October 1988 issue (*ICQ* No. 67), page 103, ‘Comet Kohoutek 1973 XII’, the date of the observation on 1974 01 12.02 *should read* 1974 02 12.02

• In the October 1999 issue (*ICQ* No. 112), pages 121 and 131, the new observer János Balogh should have been given the code BAL04, as BAL03 was already in use. The single affected observation is that for C/1999 H1 for 1999 09 15.90 (page 131).

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## Tabulation of Comet Observations

As noted in the October 1998 issue (*ICQ* 20, 177), Brian Skiff of Lowell Observatory has in recent years obtained new *V* photometric sequences for comparison stars around numerous variable stars, and these may be of help to some comet observers. Some of these sequences have been published in sources such as the IAU’s *Information Bulletin on Variable Stars* (*IBVS*; specific sequences listed in *ICQ* 20, 177). Most astronomical libraries carry the *IBVS*, which can now also be accessed via the WWW at <http://www.konkoly.hu/IBVS/issues.html>. However, some of Skiff’s sequences have not been formally published, and appear only electronically on certain World Wide Web “pages”; one of these sites is <http://www.kusastro.kyoto-u.ac.jp/vsnet/catalogs/skiffchart.html>.

Because website material may be transient, with its long-term “permanence” in question due to the rapidly changing computer world and to the fact that many websites tend to be dependent upon a single maintainer (with no guarantee of future availability of data once that maintainer is gone), the *ICQ* policy for use of comparison-star magnitudes from such web-only sources is to be cautious. However, some observers find such data to be useful to their comet-magnitude estimation, and because of the high general respect for Skiff’s photometry, we are yielding to the stance adopted in the October 1998 issue to assign an *ICQ* reference code to Skiff photometry that have not yet appeared in *IBVS* issues. In the case of the unpublished Skiff comparison-star photometry, we are adding magnitude-reference code ‘BS’ to be reported by comet observers measuring  $m_1$  data with the Skiff stellar magnitudes, with the requisite addition of a statement (for publication in the *ICQ*’s description information) stating which sequence was used and where that sequence was found; this policy is extended to the *IBVS* and other published sources, as well, in which we will specify the relevant published source also in the descriptive information (as there are too many individual sequences to assign 2-letter codes to each, unless it is shown in the future that some specific sequences become heavily favored by comet photometrists).

Additional new reference code: TK = Tycho-2 Catalogue (Hog *et al.* 2000, *A.Ap.*, in press); see also World Wide Web site at <http://www.astro.ku.dk/~erik/Tycho-2/>. NOTE: *only* Tycho-2  $V_T$  magnitudes (labeled VT) from the *main* catalogue should be used. The supplements contain a mix of *V*-like magnitudes from the original Tycho catalogue and should not be taken from here. [NOTE: the *ICQ* website has been updated to include all reference codes, with recommendations, at <http://cfa-www.harvard.edu/icq/ICQRec.html>.]

Additional new instrument-type code: V = Volosov-Newtonian reflecting telescope (has two lenses — double-convex and planoconcave) with a Newtonian spherical mirror; designed by Pechatnikova and Volosov in Leningrad in 1943 (information provided by V. L. Korneev). [NOTE: the *ICQ* website has been updated to include all instrument and special-note codes, at <http://cfa-www.harvard.edu/icq/ICQKeys.html>. Observer codes in electronic form are available via special request to the editor; privacy issues suggest that name lists should not be posted on the Web as a courtesy to observers.]

In the observer table on page 42 of the April issue, the asterisks denoting new observers to the key were omitted; asterisks should be added to KAD02, LIN04, MIH, RAY, ROD03, and VAS05.

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

◊ Comet C/1997 BA<sub>6</sub> (*Spacewatch*) ⇒ 2000 June 5.88: comet appears moderately more condensed than previous obs. on June 2 [PEA]. June 11.87: “comet situated very close to 11th-mag star, which may have affected estimate” [PEA]. July 2.15: difficult object of low surface brightness; The Guide v.07 software used for reference-star mags [DES01].

◊ Comet C/1998 M5 (*LINEAR*) ⇒ 2000 May 8.47: *Guide 7.0* software used for comparison-star mags [NAK01].

◊ Comet C/1999 F1 (*Catalina*) ⇒ 2000 Apr. 28.58: *GUIDE 7.0* software used for comparison-star mags [NAK01].

◊ Comet C/1999 F2 (*Dalcanton*) ⇒ 2000 May 27.3: faint but quite long, narrow tail; on four LONEOS exposures, it extended to at least 4'8 length in p.a. 242° [Brian A. Skiff, Lowell Observatory, Flagstaff, AZ].

◊ Comet C/1999 G1 (*LINEAR*) ⇒ 1999 Apr. 11.13: several 120-s CCD exposures each yielded  $m_1$  ranging from 17.4 to 17.8; approx. spectral response of this CCD is not far from the Kron-Cousins *R* band [SAN11].

◊ Comet C/1999 H3 (*LINEAR*) ⇒ 2000 June 9.87: moonlight [RES].

◊ Comet C/1999 J2 (*Skiff*) ⇒ 2000 May 3.18: central cond. of dia. > 2" and mag 16.6; prominent diffuse tail w/o readily-apparent substructure [ROQ]. May 26.15: central cond. of dia. 2" and mag 15.9; coma was symmetrical,

merging into a faint and very diffuse, fan-shaped anti-tail showing no readily apparent internal structure [ROQ]. June 27.16: central cond. of dia. slightly  $< 2''$  and mag 16.6; coma appeared generally symmetrical, merging into a faint diffuse anti-tail w/ an imbedded axial core extending  $30''$  from the central cond. [ROQ].

◇ Comet C/1999 K6 (LINEAR)  $\Rightarrow$  2000 June 12.78: close to star [SEA].

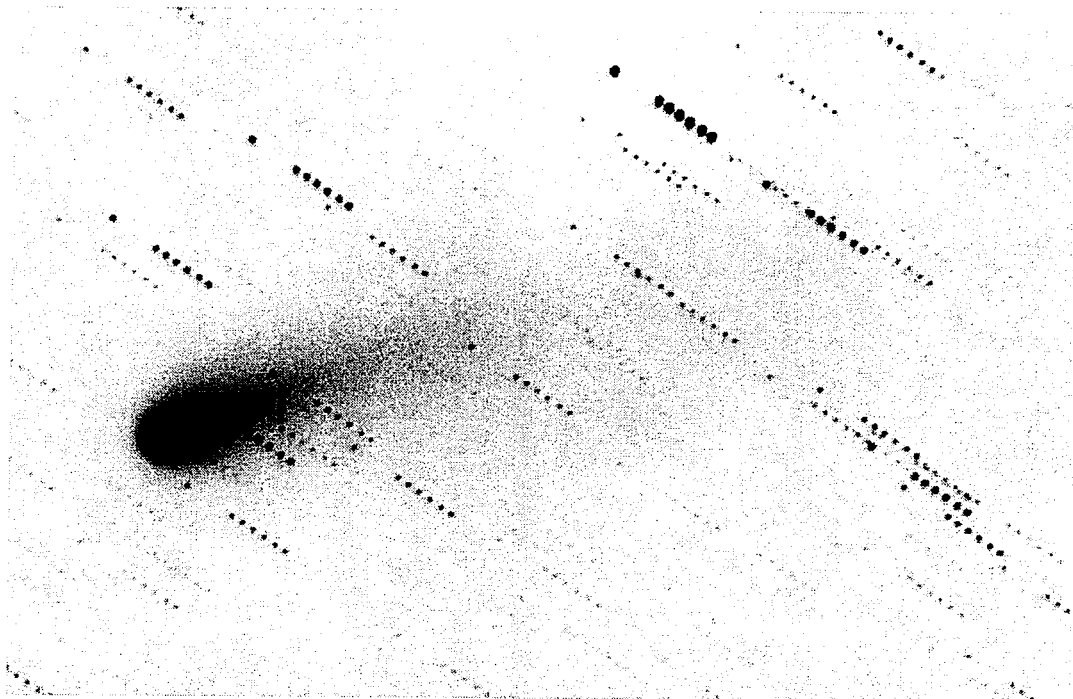
◇ Comet C/1999 L3 (LINEAR)  $\Rightarrow$  2000 Mar. 2.88: ref. star SAO 59011 (spectral type G5,  $V = 8.34$ , from Guide6 software) [MIL02].

◇ Comet C/1999 N2 (Lynn)  $\Rightarrow$  1999 Aug. 15.85 and Sept. 3.90: oval coma [LOO01]. Sept. 3.90: weak central cond. [LOO01].

◇ Comet C/1999 S4 (LINEAR)  $\Rightarrow$  2000 May 4.78: comet alt.  $3.9^\circ$ ; hint of tail toward NW [KAD02]. May 15-23: w/ 25.6-cm L, uncertain estimates because of either strong twilight or moonlight (faintest stars of mag 12.3) [BIV]. May 15.60: comet alt.  $6^\circ$ , but seen fairly easily in 20-cm L; obs. from the summit of Haleakala at 10000 feet w/ sea-surface horizon; two comparison stars at same alt. as comet [LIN04]. May 25.61: w/ 25.6-cm L ( $84\times$  and  $169\times$ ), comet clearly seen; faintest stars of mag 14.0, moderate moonlight interference [BIV]. May 29.78, June 4.78 and 30.76, July 4.70, 6.71, 8.75, 20.51, 21.5, and 22.51: Guide 7.0 software used for comparison-star mags [YOS02].

June 1.74, 4.74, 6.74, July 1.74, 6.72, 8.73, 9.75, 10.74, 16.6, and 21.47: Guide 6.0 software used for comparison-star mags [NAG08]. June 2.05 (and subsequent dates): ST7 CCD used in binning  $2\times 2$ ; all comparison-star magnitudes are extracted from Hipparcos catalogue on CD-ROM (Guide 6.0) [LIG]. June 2.33: low alt. ( $15^\circ$ ), superb transparency; central cond. not visible at  $67\times$ - $77\times$ ; fan tail open  $30^\circ$ ; unchanged using comet filter; Guide V.07 software used for reference-star mag [DES01]. June 2.96: comet faint, but clearly visible;  $10^\circ$  alt. [BAR06]. June 3.60 and 4.61: w/ 25.6-cm L ( $169\times$ ), central cond. of mag 13.2 [BIV]. June 4.75, 5.77, July 3.74, and 6.75: Guide 6.0 software used for comparison-star mags [HAS08]. June 6.61: w/ 25.6-cm L ( $169\times$ ), bright central cond. of mag 13.0 [BIV]. June 6.75: co-added frame (total integration time 800 sec) shows faint  $2'$  anti-tail in p.a.  $70^\circ$  [KAD02]. June 6.76:  $I$ -band frame (twelve 180-sec frames co-added) shows anti-tail  $2.6'$  long in p.a.  $68^\circ$  [FUK02]. June 7.78: faint anti-tail  $2.6'$  long in p.a.  $78^\circ$  [NAK01]. June 8.01: comet faintly (but definitely) visible, despite strong twilight and low alt. of only  $10^\circ$  [BOU]. June 8.97: excellent transparent sky after a rain; strong central cond.; coma has high surface luminosity [BAR06]. June 9.61: w/ 25.6-cm L ( $169\times$ ), central cond. of mag 13.5 [BIV]. June 10.61: w/ 25.6-cm L ( $169\times$ ), central cond. of mag 13.4 [BIV]. June 13.14: star of mag 11.6 in coma (affecting  $m_1$  by  $< 0.1$  mag); all comparison stars within  $1^\circ$  of the comet's alt. ( $20^\circ$ ); obs. after moonset, and just at the start of astronomical twilight [PER01]. June 14.15: mag 10.9 star in coma, affecting  $m_1$  by  $\approx 0.15$  mag (the tabulated  $m_1$  was corrected for this effect); all comparison stars  $< 1^\circ$  of the comet's alt. ( $23^\circ$ ); obs. w/ the Moon  $2^\circ$  above W horizon, and the sun at  $-16^\circ$  (some 16 min past the start of astronomical twilight) [PER01]. June 16.00: bright sky background (moonlight); faint non-stellar object found [RES]. June 18.00: "moonlight, but conditions great; I saw (via naked eye)  $\epsilon$  Sco,  $\approx 2^\circ$  above horizon" [RES]. June 19.06, 21.06, July 14.09, and 18.90: w/ 15-cm  $f/4$  Maksutov-Cassegrain reflector; moonlight [MIK]. June 20.00: moonlight [RES]. June 23.03, July 1.00, 6.03, 8.03, 18.86, and 20.88: red filter 23A used [LIG]. June 25.93: twilight [SHU]. June 26.61: w/ 25.6-cm L ( $169\times$ ), central cond. of mag 11.9 [BIV]. June 27.90: low alt. ( $20^\circ$ );  $1^\circ$  fan tail open  $40^\circ$ ; Guide V.07 software used for reference-star mag [DES01]. June 28.5: w/  $14\times 100$  B,  $m_1 = 9.1$  (MM = S, ref. = "megastar"); coma dia.  $3'$ , DC = 7 [LOO01]. June 28.58: w/ 25.6-cm L ( $169\times$ ), central cond. of mag 11.8 [BIV]. June 28.72: HOC2.exe software used for comparison-star mags [NAG08]. June 28.90: low alt. ( $22^\circ$ );  $1.8$  fan tail open  $30^\circ$ ;  $1.1$  dust tail curved in p.a.  $65^\circ$ ; Guide V.07 software used for reference-star mag [DES01]. June 29.34: slightly fainter w/ Swan-band filter [DEA]. June 29.90: no central cond. at the coma's center ( $76\times$ ); fan tail  $> 1.3$  long in p.a.  $95^\circ$  but spanning  $40^\circ$ ;  $1^\circ$  dust tail in p.a.  $125^\circ$ ; Guide V.07 software used for reference-star mag [DES01]. June 30.08: all comparison stars  $< 1.5^\circ$  of the comet's alt. ( $20^\circ$ ); superb transparency with mag 10.4 stars visible in smaller  $9\times 34$  B [PER01]. June 30.99: in 31.0-cm L ( $72\times$ ), broad fan tail, some  $20^\circ$ - $30^\circ$  wide, w/ rather bright N edge near the central cond., longest  $14'$  in p.a.  $265^\circ$ ; at  $186\times$ , tiny nearly stellar nucleus of mag  $\approx 13.5$ , near apex of parabolic (dust) fan [BOU].

July 1.55: comet alt.  $22^\circ$  [LIN04]. July 5.08:  $0.4$  fan tail spans p.a.  $242^\circ$ - $270^\circ$ ; all comparison stars  $< 1^\circ$  of the comet's alt. ( $23^\circ$ ) [PER01]. July 6.06: fan-like dust tail in p.a.  $235^\circ$ - $270^\circ$  [MIK]. July 6.76: photo taken w/ 16-cm  $f/4$  W + TP2415 film (15-min exp.) shows  $1.2$  type-I tail in p.a.  $273^\circ$  [TSU02]. July 6.95:  $0.7$  dust tail in p.a.  $280^\circ$  [HOR02]. July 7.07: narrow ion tail clearly visible, split into two tails at  $\approx 0.3$  from the comet nucleus (total length  $> 0.6$ ); fan-like dust tail in p.a.  $240^\circ$ - $270^\circ$  [MIK]. July 7.34: very faint tail [DEA]. July 8.06: no ion tail visible; fan-like dust tail in p.a.  $240^\circ$ - $275^\circ$  [MIK]. July 8.29: faint, thin tail [NOW]. July 8.73: stellar nucleus; while it seemed that the comet had become brighter than it was on July 1, "my  $m_1$  estimation was fainter" than that on July 1 [YOS04]. July 9.04: small, clear break; twilight [RES]. July 9.32: w/ 32-cm L ( $53\times$ ), broad  $15'$  tail w/ slight yellowish tinge [CRE01]. July 9.51: comet alt.  $14^\circ$  [LIN04]. July 9.96:  $1.2$  gas tail in p.a.  $273^\circ$ ;  $18'$  dust tail in p.a.  $273^\circ$  ( $7\times 50$  B) [SCI]. July 10.02: diffuse fan-like dust tail  $0.7$  long in p.a.  $230^\circ$ - $275^\circ$ ; no ion tail visible [MIK]. July 10.88: starlike nucleus is surrounded by round coma; cone-shaped, slightly curved tail whose W part is more diffuse, E more sharp [BAR06]. July 11.12:  $1.2$  dust tail curving noticeably clockwise;  $1^\circ$  gas tail near p.a.  $280^\circ$ ; all comparison stars  $< 1^\circ$  of the comet's alt. ( $32^\circ$ ); w/ modified-out method,  $m_1 = 7.8$ , with VBM method  $m_1 = 7.9$ , but tail rather bright near comet's head, and blending in the defocused comet image with these two methods; coma dia. (as usual) measured along the direction orthogonal to that bisecting the two tails [PER01]. July 12.979: w/ 35-cm L, 120-sec exp. w/ ST-6V CCD + R filter yields  $m_1 = 7.8$ , coma dia.  $3.2$ , ion tail  $> 13'$  long in p.a.  $281^\circ$ , dust tail  $> 13'$  long in p.a.  $269^\circ$ ; 1-sec, 10-sec, and 30-sec exposures show three curved jets (the following measures taken from the 10-sec exp.:  $0.9$  long in p.a.  $203^\circ$ , curved counterclockwise;  $4'$  long in p.a.  $282^\circ$ , curved clockwise;  $1.1$  long in p.a.  $334^\circ$ , curved clockwise) [HOR02]. July 13.99:  $m_2 = 10.7$ ; fan-like structure near nucleus; moonlight [RES]. July 14.06: ref. stars from AA used along with SC to get  $m_1$  estimate [BAR]. July 14.09: tab. narrow ion tail; dust tail  $\approx 0.6$  long in p.a.  $270^\circ$ - $285^\circ$  [MIK]. July 14.92: clear breaks, moonlight; hurried obs. before



Above is an unfiltered CCD image of comet C/1999 S4 from seven 1-min exposures taken by Gianluca Masi and M. A. Tosti (Ceccano, Italy) with a Celestron 28-cm f/3.3 Schmidt-Cassegrain telescope (+ SBIG ST-7 camera) on 2000 July 14.07 UT. The field is  $20'.3 \times 13'.2$ , with north up and east to the left.

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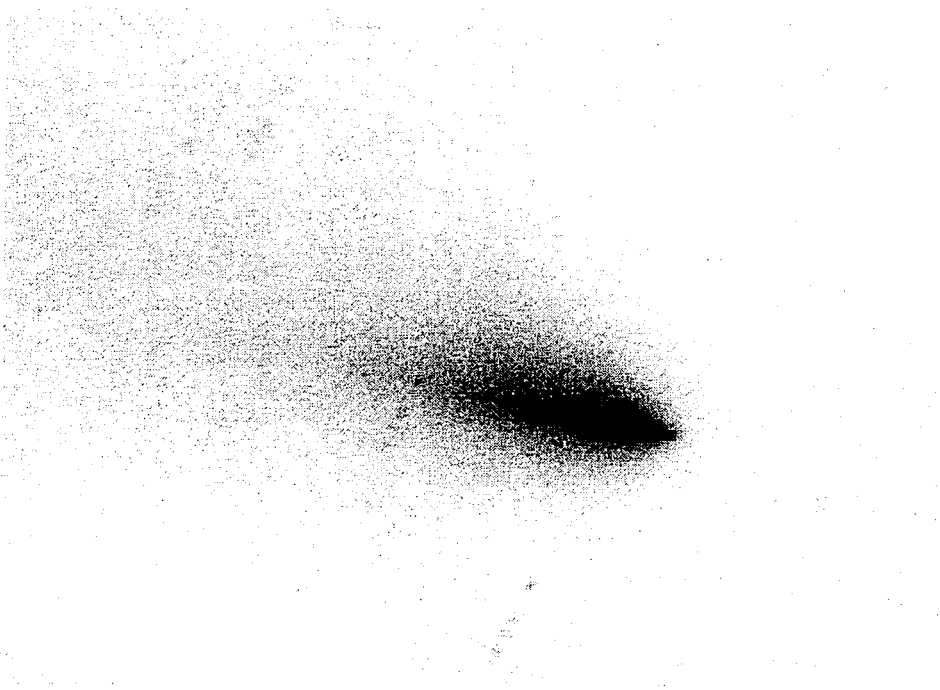
◇ Comet C/1999 S4 (LINEAR) [text continued from previous page]  $\Rightarrow$  clouds [RES].

July 15.06: strong moonlight [PER01]. July 15.34: very strong moonlight [SPR]. July 16.59-16.60: obs. made during total lunar eclipse [NAG08]. July 18.95: moonlight [SVE01]. July 19.26 and 20.23: coma slightly elongated N/S, w/ bright round globular-like center; narrow plasma tail [SPR]. July 20.92:  $1^\circ$  gas tail near p.a.  $19^\circ$ ;  $1^\circ$  clockwise-curved dust tail near p.a.  $352^\circ$  [PER01]. July 21.08:  $m_1$  estimate with  $20 \times 80$  B was made only using very red K0 stars; the estimate with  $12 \times 50$  B was made with bluer comparison stars some min later; late twilight, suburban Boston light pollution; comet alt.  $\approx 20^\circ$ ; tail p.a. is *very* approximate ( $\pm 20^\circ$ ); w/  $12 \times 50$  B,  $m_1 = 7.0$  using ref. S [GRE]. July 21.08: comet barely seen in  $7 \times 35$  B [NOW]. July 21.26: "coma has a bright round globular-like center; very bright inner 'spike-like' plasma tail up the middle of a broad fainter (dust?) tail (this 'spike-like feature' is a miniature of the one seen in C/1996 B2)" [SPR]. July 21.83: moonlight [TER02]. July 21.85: moonlight [KAY and FED03]. July 21.87: R filter [LIG]. July 21.89: narrow ion tail [MIK]. July 21.9: yellow color [LOO01]. July 21.90: "very condensed coma w/ conspicuous central cond.; tail very easy, despite some light-pollution in the direction of comet; in 20-cm T ( $51 \times /161 \times$ ), starlike false nucleus of mag 8, first 15' of tail easy" [KAM01]. July 21.91: "an impressive increase in brightness since my last obs. 24 hr ago!; in  $14 \times 100$  B,  $1^\circ 3'$  gas tail near p.a.  $34^\circ$ ;  $1^\circ$  clockwise-curved dust tail near p.a.  $7^\circ$ ; superb transparency" [PER01]. July 21.92: in  $9 \times 34$  B,  $1^\circ 6'$  gas tail near p.a.  $33^\circ$ ;  $1^\circ 8'$  clockwise-curved dust tail near p.a.  $10^\circ$  [PER01]. July 21.93: 22' dust tail; ion tail  $> 70'$  long [ROD01]. July 21.94: w/ 20-cm f/5 L ( $70 \times$ ), bright, stellar nucleus of mag  $\approx 9.0$  w/in strong condensed, drop-shaped inner coma that gradually becomes a sharp tailward (p.a.  $30^\circ$ ) spike  $\approx 8'$  long; another more feeble and diffuse spike/streamer  $9'$  long extends towards p.a.  $0^\circ$ - $5^\circ$ ; parabolic head;  $\approx 1^\circ$  long, slightly curved dust tail open in p.a.  $17^\circ$ - $39^\circ$ ; long gas tail (or thin streamer)  $\approx 15'$  long is suspected in p.a.  $56^\circ$  [BAR06]. July 21.97: comet clearly visible despite nautical twilight; w/ 20.3-cm T ( $100 \times$ ), bright central cond. and  $7'$  tail in p.a.  $28^\circ$  [GRA04]. July 22.19: thin tail [SCH12]. July 22.85:  $1^\circ$  ion tail; w/  $25 \times 100$  B,  $0^\circ 8'$  dust tail [ZNO]. July 22.90: no ion tail; some delicate ray-like features expanding from coma region in p.a.  $\approx 33^\circ$  [MIK]. July 22.90: "coma less condensed and considerably larger than yesterday; central cond. continues to be very conspicuous, tail easy" [KAM01]. July 22.93: second tail  $1^\circ 4'$  long in p.a.  $15^\circ$  [HOR02]. July 22.94: w/ 20-cm f/5 L ( $70 \times$ ), "in one day, the comet has changed strongly"; tail open in p.a.  $19^\circ$ - $38^\circ$ ; on the W border of the tail (opposite the brightest streamer),  $\approx 1^\circ$  from the nucleus, is a brighter cond. w/ stellar nucleus of mag  $\approx 9.6$ ; streamers  $7'$ ,  $15'$ ,  $13'$ , and  $6'$  long in p.a.  $358^\circ$ ,  $25^\circ$ ,  $38^\circ$ , and  $56^\circ$  [BAR06]. July 23.08: tail less easily seen than on July 21.08, but comet more condensed;  $m_1$  same with ref. S [GRE]. July 23.86: "small holes in gas tail (in brightest part)"; bright nuclear cond. at  $m_2 = 9.7$ ; also ion tail  $0^\circ 5'$  long near p.a.  $10^\circ$  [RES]. July 23.89:  $1^\circ 25'$  gas tail in p.a.  $42^\circ$ ;  $0^\circ 8'$  dust tail in p.a.  $24^\circ$  ( $20 \times 60$  B) [SAD]. July 23.90:  $0^\circ 5'$  gas tail in p.a.  $80^\circ$ ;  $0.19^\circ$  dust tail in p.a.  $45^\circ$  ( $20 \times 66$  B) [FIL04]. July 23.90: second tail  $1^\circ 1'$  long in p.a.  $20^\circ$  [HOR02]. July 24.08: alt.  $\approx 15^\circ$ , but comp. stars at about the same alt. as comet; wide, short tail spans  $20^\circ$  or more; w/ 25.4-cm L, starlike 'central' cond. of  $m_2 \approx 8.5 \pm 1.0$  [GRE]. July 24.20, 25.19, 26.22, and 27.21: fan-shaped tail [SCH12]. July 24.86: nuclear cond. at  $m_2 = 10.1$  [RES]. July 24.87: 27' dust tail; 110' ion tail [ROD01]. July 24.92: "w/ 20-cm f/5



Above is an image of comet C/1999 S4 combined from eight 30-sec CCD exposures taken by Herman Mikuž with a 15-cm  $f/4$  Maksutov-Cassegrain telescope (+ Cousins R filter) on 2000 July 22.863–22.867 UT. Copyright 2000 by H. Mikuž.

Below is an unfiltered CCD image of C/1999 S4 from four 30-sec exposures taken by Gianluca Masi (Ceccano, Italy) with a Celestron 28-cm  $f/3.3$  Schmidt-Cassegrain telescope (+ SBIG ST-7 camera) on 2000 July 28.82. The field is  $11'.6 \times 8'.5$ , with north up and east to the left.



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◇ Comet C/1999 S4 (LINEAR) [text continued from previous page]  $\Rightarrow$  L (70 $\times$ ), DC = s6; streamers 6', 8', and 7' long in p.a. 45°, 67°, and 85°; two of these are spread along the W and E borders of the parabolic tail, while the third (brightest) lies along the central axis of the tail" [BAR06].

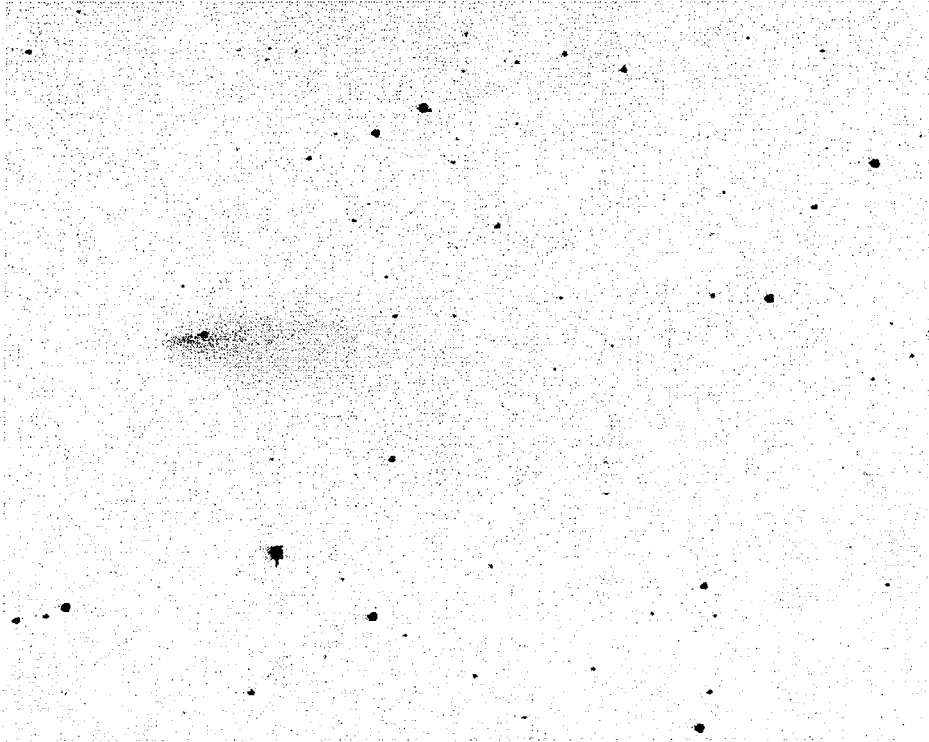




Above is an unfiltered image of comet C/1999 S4 taken by Olivier Bailly, Stephane Bourges, Mireille Jourdan, Frederick Ross, and Philippe Morel with a Flat-Field Lichtenknecker Camera (focal length 500 mm,  $f/3.5$ ) + Hisis 22 CCD. The image is a combination of twelve CCD frames of total exposure 9 min, 30 sec, taken during 2000 July 30.860-30.867 UT.

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◇ Comet C/1999 S4 (LINEAR) [text continued from page 72] ⇒ July 25.851: 10-sec exposures w/ 0.35-m L + ST-6V CCD + R filter reveal that the brightness measured in  $10'' \times 10''$  aperture (centered on brightest point of coma) was  $1.8\times$  brighter than on July 12.979 and  $3.4\times$  fainter than on July 23.873; but in a  $90'' \times 90''$  aperture, comet was  $3.3\times$  brighter than on July 12.979 and only  $1.7\times$  fainter than on July 23.873; central cond. also changed appearance during this time (on July 12.979, it had a circular shape, on July 23.873 a drop-like shape, and on July 25.851 it had a much more elongated shape in the comet-solar direction [HOR02]. July 25.88:  $55'$  gas tail in p.a.  $54^\circ$ ;  $1^\circ 6'$  dust tail in p.a.  $38^\circ$  (7×50 B) [SCI]. July 25.89: second tail  $1^\circ 7'$  long in p.a.  $40^\circ$  [HOR02]. July 26.10: hazy sky [SCH04]. July 26.36: "triangular nebulosity low in twilight, rather like a major comet in miniature; little changed when observed through Swan Band filter, although it may have been slightly enhanced" [SEA]. July 27.86: twilight [RES]. July 27.92, 29.92, and 30.94: "fainter w/ Swan-band filter" (not obvious if he's referring to tail alone or to the coma — Ed.) [DEA]. July 27.92, 28.93, and 29.92: bright tail ("very bright" on July 29.92) [DEA]. July 28.490: w/ 0.25-m  $f/5.0$  L + CCD (conditions not so good), comet extremely diffuse w/ no central cond. (unable to measure position);  $10'$  long in p.a.  $80^\circ$ ; coma spreads  $\approx 100''$  in E-W direction and  $40''$  in S-N direction; comet faded much since July 21 [A. Asami, Bisei Spaceguard Center, Japan]. July 28.82: w/ 28-cm  $f/3.3$  T in twilight, CCD images show the inner part of the coma very elongated, with no evidence of any fragment or false nucleus; this strong elongation of the inner coma makes it very different from the appearance it had on July 14 [Gianluca Masi, Ceccano, Italy]. July 28.86: "in  $25 \times 150$  B the comet looks odd, the coma has no photometric center but rather a sharp, uniform-brightness central bar of size  $2' \times 6'$ ; the bar is not lined up with the tail, which has a smaller p.a.; the  $1^\circ 0'$  tail in p.a.  $55^\circ$  has a sharper E border w/ traces of type-I features (spine); the W border is more diffuse and fan-shaped far from the coma" [ZAN]. July 29.35: nebulous streak brighter at end nearest sun; the brighter end took the form of an oval coma w/o cond.; appearance virtually unchanged through Swan Band filter, but may have been a little clearer w/ filter; unusual appearance, but very similar to C/1989 W1 (Aarseth-Brewington) on 1990 Jan. 23 and 24 [SEA]. July 29.86: in  $25 \times 150$  B,  $0^\circ 8'$  tail in p.a.  $55^\circ$ ; "the comet looks more diffuse than yesterday, but the features described for July 28 are still present" [ZAN]. July 29.90: "as reported on IAUC 7468, there clearly is no central cond. at the coma's center; however, the existing cond. (DC = 4) extends  $8'$  toward the tailward direction (p.a.  $100^\circ$ ) w/ a very flat profile; 32-cm L ( $125\times$ ) shows a comet 'with no head', indicating that perhaps disruption events are occurring" [MAR02]. July 30.85: "strongly elongated inner coma w/o central cond.; coma structure very much resembles that of comet C/1996 Q1 (Tabur) when it suffered its fading in late Oct. 1996" July 30.86: in  $25 \times 150$  B,  $0^\circ 6'$  tail in p.a.  $55^\circ$ ; "the comet looks like an edge-on spiral galaxy, and the tail is very faint; the comet is getting more and more diffuse" [ZAN]. July 31.86: in  $25 \times 150$  B, "the comet is diffuse and difficult and is impressively fainter than it was yesterday; the bar is less sharp than in recent days" [ZAN]. Aug. 2.35: diffuse and elongated object; seemed a little fainter when observed through Swan Band filter [SEA].



Above is an unfiltered 2-min CCD exposure of comet C/1999 S4 taken by J. Skvarc and Herman Mikuž with a 19-cm f/4 flat-field Schmidt-Cassegrain telescope on 2000 July 31.83. Copyright 2000 by Skvarc and Mikuž.

Below is an unfiltered image of comet C/1999 S4 taken by Olivier Bailly, Stephane Bourges, Mireille Jourdan, Frederick Ross, and Philippe Morel with a Flat-Field Lichtenknecker Camera (focal length 500 mm, f/3.5) + Hisis 22 CCD. The image is a combination of ten CCD frames of total exposure 6 min, 40 sec, taken during 2000 July 31.865-31.882 UT.



◊ *Comet C/1999 T1 (McNaught-Hartley)* ⇒ 2000 June 6.91: comet glimpsed briefly between clouds and the onset of morning twilight; a good GSPC sequence was located close to the comet's position; comet appeared as a diffuse object, glimpsed in moments of good seeing [PEA]. June 7.91: "this confirms obs. made on previous morning; comet distinctly visible and moderately condensed" [PEA]. June 9.74: at  $180\times$ ,  $m_1 = 13.1$ , coma dia.  $0'.8$ ,  $DC = 3$  [RAE]. June 30.72: "comet much easier to see, due to increase in DC" [RAE].

◊ *Comet C/1999 T2 (LINEAR)* ⇒ 2000 July 8.74: "I could see 14.5 mag stars, but it was hard to see the comet" [YOS04].

◊ *Comet C/1999 Y1 (LINEAR)* ⇒ 2000 July 24.01: bright star nearby; beginning of twilight [RES].

◊ *Comet C/2000 CT<sub>54</sub> (LINEAR)* ⇒ 2000 May 29.55: *Guide 7.0* software used for comparison-star mags [NAK01].

◊ *Comet C/2000 K1 (LINEAR)* ⇒ 2000 June 2.15: central cond. of dia. slightly  $> 2''$  and mag 17.1; coma appeared asymmetrical in p.a.  $150^\circ$  and merged into a faint, diffuse, broad tail that was w/o internal features [ROQ].

◊ *Comet C/2000 K2 (LINEAR)* ⇒ 2000 June 4.18: central cond. of dia.  $2''$  and mag 17.6; coma, although irregularly bounded, was generally symmetrical; short, very diffuse tail [ROQ].

◊ *Comet 2P/Encke* ⇒ 2000 July 8.77: *GUIDE 7.0* software used for comp.-star mags [YOS02].

◊ *Comet 29P/Schwassmann-Wachmann 1* ⇒ 2000 May 8.76: *Guide 7.0* software used for comparison-star mags [NAK01]. May 29.66: *Guide 7.0* software used for comp.-star mags [NAK01]. July 1.96: "possible outburst (?); object condensed; The *Guide v.07* software used for reference-star mags" [DES01].

◊ *Comet 44P/Reinmuth 2* ⇒ 2000 May 29.64: *Guide 7.0* software used for comparison-star mags [NAK01].

◊ *Comet 47P/Ashbrook-Jackson* ⇒ 2000 July 26.63: *Guide 7.0* software used for comparison-star mags [NAK01].

◊ *Comet 52P/Harrington-Abell* ⇒ 1998 Oct. 21.21, 22.16, 23.17, 27.18, 28.17, and 29.21:  $m_1$  estimates made using stars from the 1929 AAVSO (e) and (f) charts for GK Per, with revisions to three stars from  $V$  photometry by Brian Skiff at Lowell Observatory in 1995 (99 →  $V = 9.67$ ; 108 → 11.06; 123 → 12.16) [PER01]. Oct. 22.16: comet apparently larger, more diffuse, and of lower surface brightness than on previous night, despite similar conditions;  $m_1$  estimate could be uncertain by up to 0.3 mag [PER01]. Oct. 28.17: "additionally used ref. GA (GSPC-P306) for comparison-star mag; both sequences look consistent and in good agreement in the range used for the  $m_1$  estimate" [PER01].

◊ *Comet 63P/Wild 1* ⇒ 2000 Apr. 28.59: *GUIDE 7.0* software used for comparison-star mags [NAK01].

◊ *Comet 114P/Wiseman-Skiff* ⇒ 2000 Apr. 28.49: *GUIDE 7.0* software used for comp.-star mags [NAK01].

◊ *Comet P/1998 U3 (Jäger)* ⇒ 1998 Oct. 28.17: used Brian Skiff's sequence for the AAVSO GK Per charts (see note above for 52P on 1998 Oct. 21.21 for PER01); also used ref. GA (GSPC-P306) for comparison-star mags (see note above for 52P on Oct. 28.17); coma could be as large as  $2'.3$  [PER01].

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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 [07 = Comet Section, British Astronomical Assn. (via J. D. Shanklin); 11 = Dutch Comet Section (via A. Scholten); 13 = Agrupacion Astronomica de Madrid (via J. Carvajal); 16 = Japanese observers (via Akimasa Nakamura, Kuma, Japan); 18 = Coordinated amateur Polish group (via Tomasz Sciezor); 23 = Czech group (via P. Pravec and V. Znojil); 32 = Hungarian group (via K. Sarneczky); 42 = Belarus observers (via Sergey E. Shurpakov); 48 = Ukrainian observers via the Kharkov astronomical club "Asterion" (via Denis A. Svechkarev); etc.]. Those with asterisks (\*) preceding the 5-character code are new additions to the Observer Key:**

ADA02 18	Jacek Adamik, Poland	BOU	Reinder J. Bouma, Netherlands
*AMB 18	Adam Ambroziak, Poznan, Poland	BRU 42	Ivan S. Brukhanov, Belarus
*ANI 42	Genadiy A. Anikanov, Belarus	CER01 23	Jakub Černý, Praha, Czech Rep.
BAL03 42	Igor I. Baluk, Gomel, Belarus	CHE03 33	Kazimieras T. Cernis, Lithuania
BAL04 32	János Balogh, Hungary	CHO01 18	Franciszek Chodorowski, Poland
*BAL05 18	Andrzej Balcerek, Wronki, Poland	*CHO02 18	Piotr Chochlow, Poland
BAR	Sandro Baroni, Italy	CHR 18	Antoni Chrapek, Pikulice, Poland
BAR06 37	Alexandr R. Baransky, Ukraine	COM 11	Georg Comello, The Netherlands
*BAZ 42	Olga K. Bazhenova, Russia	CRE01	Phillip J. Creed, OH, U.S.A.
BEG01 15	Mike Begbie, Harare, Zimbabwe	*CZY 18	Jaroslav Czyz, Gliwice, Poland
BIV	Nicolas Biver, France	DEA	Vicente F. de Assis Neto, Brazil
BOD 18	Robert Bodzon, Poland	DES01	Jose G. de Souza Aguiar, Brazil
BOH02 18	Jerzy Bohusz, Gdynia, Poland	DIE02	Alfons Diepvens, Belgium

DRA02	18	Michal Drahus, Krakow, Poland	MIT	16	Shigeo Mitsuma, Saitama, Japan
DUS	18	Grzegorz Duzanowicz, Sweden	MOR03		Warren C. Morrison, Canada
ERO	42	Alexei V. Erohin, Kursk, Russia	MOR09		Philippe Morel, France
*FED03	48	D. V. Fedotov, Kharkov, Ukraine	NAG08	16	Yoshimi Nagai, Yamanashi, Japan
FIL04	18	Marcin Filipek, Poland	NAK01	16	A. Nakamura, Kuma, Ehime, Japan
FOG		Sergio Foglia, Italy	NES	37	Yurij V. Nesterov, Russia
FUK02	16	Hideo Fukushima, Tokyo, Japan	NEV	42	V. S. Nevski, Vitebsk, Belarus
GAN	18	Slawomir Ganddecki, Poland	NOW	05	Gary T. Nowak, VT, U.S.A.
GAS01	33	Darius Gasiunas, Lithuania	*OOT	16	Isao Ootsuki, Miyagi, Japan
*GIA01		Antonio Giambersio, Italy	*ORI	16	Takaaki Oribe, Tottori, Japan
GRA04	24	Bjoern Haakon Granslo, Norway	OSS	18	Piotr Ossowski, Poland
GRE		Daniel W. E. Green, U.S.A.	*PAL03	18	Grzegorz Palimaka, Poland
GRO03	18	Radoslaw Grochowski, Poland	PAR03	18	Mieczyslaw L. Paradowski, Poland
GRO04	18	Jaroslav Grolik, Poland	PEA		Andrew R. Pearce, Australia
*GRO05	18	Marta Grobosz, Knurów, Poland	PER01		Alfredo J. S. Pereira, Portugal
*GRO06	18	Michal Grobosz, Knurów, Poland	PLE01	18	Janusz Pleszka, Poland
*GUZ	18	Piotr Guzik, Krosno, Poland	POD	23	M. Podzorny, Czech Republic
HAL05	23	Michal Haltuf, Kolin, Czech Rep.	POW01	18	Jacek Powichrowski, Poland
HAS02		Werner Hasubick, Germany	RAE		Stuart T. Rae, New Zealand
HAS08	16	Yuji Hashimoto, Hiroshima, Japan	RAY		P. M. Raymundo, Salvador, Brazil
HER02		Carl Hergenrother, AZ, U.S.A.	RES	18	M. Reszelski, Szamotuly, Poland
HOE		S. F. Hoenig, Eislingen, Germany	ROD01	13	Diego Rodriguez, Spain
*HOL04	18	Mariusz Holuk, Poland	ROM	42	A. M. Romancev, Pinsk, Belarus
HOR02	23	Kamil Hornoch, Czech Republic	ROQ		Paul Roques, AZ, U.S.A.
*ISA	42	Zinaida S. Isaeva, Russia	SAD	18	Piotr Sadowski, Poland
KAD02	16	Ken'ichi Kadota, Saitama, Japan	SAL01	42	M. V. Saltanov, Orsha, Belarus
KAM01		A. Kammerer, Ettlingen, Germany	SAN04	38	Juan M. San Juan, Madrid, Spain
*KAY	48	V. G. Kaydash, Kharkov, Ukraine	SAN07	32	G. Sánta, Kisujszállás, Hungary
KES01		Sándor Keszthelyi, Pécs, Hungary	*SAN11		M. M. M. Santangelo, Italy
*KHA05	42	Andrey S. Khadkevich, Russia	SAR02	32	K. Sárneckzy, Budapest, Hungary
*KHA06	42	Riyan R. Khayrulin, Russia	SCH04	11	A. H. Scholten, The Netherlands
KON06	23	J. Konečný, Litovel, Czech Rep.	SCH12		R. W. Schmude, Jr., TX, U.S.A.
KOR01		V. L. Korneev, Zelenogr., Russia	SCI		Tomasz Sciezor, Poland
*KOR02	42	Sergey V. Korolkov, Russia	SEA		David A. J. Seargent, Australia
KOU	23	J. Koukal, Kroměříž, Czech Rep.	SEG	38	Carlos Segarra, Valencia, Spain
KRY01		Timur V. Kryachko, Russia	*SER02		Jérôme Serant, Chevillon, France
KUB	23	Pavel Kubicek, Czech Republic	SHA02	07	J. D. Shanklin, Cambridge, U.K.
*KULO1	42	Yuriy M. Kulikov, Russia	SHA04		Gregory T. Shanos, U.S.A.
KWI	18	Maciej Kwinta, Krakow, Poland	SHU	42	S. E. Shurpakov, Baran, Belarus
KYS	23	J. Kysely, Czech Republic	SIW01	18	Michal Siwak, Tuchow, Poland
*LAK	42	Andrei A. Laktionov, Russia	SMY	18	J. Smyslo, Busko Zdroj, Poland
*LEG	18	Marian Legutko, Gliwice, Poland	SOC	18	Krzysztof Socha, Poland
LEH		Martin Lehky, Czech Republic	SOU01	35	W. C. de Souza, S. Paulo, Brazil
LIB	23	Jan Libich, Jihlava, Czech Rep.	SPE01	18	Jerzy Speil, Poland
LIG		R. Ligustri, Latisana, Italy	SPR		C. E. Spratt, BC, Canada
LINO4		M. Linnolt, Makawao, HI, U.S.A.	SVE	23	Milan Švehla, Czech Republic
*LISO2	42	Dmitry A. Lisitsyn, Russia	*SVE01	48	Denis A. Svechkarev, Ukraine
LOO01		Frans R. van Loo, Belgium	SWI	18	Mariusz Swietnicki, Poland
LUE		Hartwig Luethen, Germany	*TER02	48	I. A. Tereshchenko, Ukraine
*MAK02	18	Pawel Maksym, Lodz, Poland	TIC		Milos Tichy, Czech Republic
MAR02	13	Jose Carvajal Martinez, Spain	*TIT	48	R. E. Titarenko, Ukraine
MAR13	18	Jerzy Marcinek, Poland	TOT03	32	Zoltán Tóth, Hungary
MAT08		Michael Mattiazzo, S. Australia	TSU02	16	M. Tsumura, Wakayama, Japan
MER04		S. Merzlakov, Zelenograd, Russia	VAS		Vitalis A. Vasilyus, Lithuania
MIH	42	Andrei Mihailuk, Pinsk, Belarus	*VER06	42	Irina Veremeichik, Belarus
MIK		Herman Mikuž, Slovenia	*VER07	42	Alexander V. Verin, Russia
MIL02		Giannantonio Milani, Italy	*VIN03	42	Igor V. Vinyaminov, Russia

WAL03 18	L. Walec, Stalowa Wola, Poland	YUS 16	Toru Yusa, Kogota, Miyagi, Japan
WLO 18	Robert Włodarczyk, Poland	ZAN	Mauro Vittorio Zanotta, Italy
*WLO01 18	Lukasz Włodarczyk, Poland	ZANO1	W. T. Zanstra, The Netherlands
YOS02 16	K. Yoshimoto, Yamaguchi, Japan	ZNO 23	Vladimír Znojil, Czech Republic
YOS04 16	Seiichi Yoshida, Ibaraki, Japan		

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## TABULATED DATA

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  $> 10^\circ$ ); '&' = comet observed at altitude  $20^\circ$  or less with no atmospheric extinction correction applied; '\$' = comet observed at altitude  $10^\circ$  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 =  $0^\circ$ , east =  $90^\circ$ ). "OBS" = the observer who made the observation (given as a 3-letter, 2-digit code).

A complete list of the Keys to abbreviations 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 now available in the new *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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## Comet C/1995 01 (Hale-Bopp)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 30.39		S	13.7	HS	25	L	5	180	0.8	1/			RAE
2000 05 19.45		S	[13.0	VN	41	L	4	200	! 0.5				PEA
2000 05 21.45		S	[13.5	VN	41	L	4	200	! 0.5				PEA
2000 06 01.47		S	[13.5	VN	41	L	4	200	! 0.5				PEA
2000 06 05.45		S	[13.7	GA	41	L	4	200	! 0.5				PEA
2000 06 06.45		S	[13.5	GA	41	L	4	200	! 0.5				PEA

## Comet C/1996 B2 (Hyakutake)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 03 26.78	x	S	1.3:	S	6.0	B		20	&25	5	&3		SAD
1996 03 26.79	x	I	1.5:	S	0.0	E		1	&15	5			SAD
1996 03 27.84	x	B	0.9:	S	6.0	B		20	&30	6/	17.5		SAD
1996 03 27.85	x	I	1.2:	S	0.0	E		1	&20	6	45		SAD
1996 03 28.88	x	B	1.1:	S	6.0	B		20	36	5/	12		SAD
1996 03 28.88	x	I	1.5:	S	0.0	E		1	&30	6	25		SAD
1996 03 29.79	x	S	1.4:	S	6.0	B		20	&25	4/	&2		SAD
1996 03 29.80	x	I	1.9:	S	0.0	E		1	&15	4			SAD
1996 04 01.84	x	B	2.4:	S	6.0	B		20	&25	7	2.5		SAD
1996 04 01.85	x	I	2.7:	S	0.0	E		1	&20	6/			SAD
1996 04 06.85	x	B	3.1:	S	6.0	B		20	&20	4	&3		SAD
1996 04 06.85	x	I	3.1:	S	0.0	E		1	&10	5/			SAD
1996 04 07.80	x	B	2.5:	S	6.0	B		20	18	6	5.5		SAD
1996 04 07.81	x	B	2.8:	S	5.0	B		7	&20	5/	6		SAD
1996 04 07.83	x	I	2.6:	S	0.0	E		1	&20	6			SAD

## Comet C/1997 BA6 (Spacewatch)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 04.70		S	13.2:	HS	20	L	7	160	0.8	4			MAT08
2000 05 13.89		S	13.4	VN	41	L	4	200	1.0	3			PEA
2000 06 02.89		S	13.4	GA	41	L	4	90	1.4	2			PEA
2000 06 04.63		S	12.8	HS	20	L	7	45	1.0	4			MAT08
2000 06 05.88		S	13.3	GA	41	L	4	90	1.4	3/			PEA
2000 06 06.92		S	13.4	GA	41	L	4	90	1.4	3			PEA
2000 06 07.86		S	13.3	GA	41	L	4	90	1.5	3			PEA
2000 06 08.85		S	13.2	GA	41	L	4	90	1.2	3			PEA
2000 06 10.87		S	13.3	GA	41	L	4	90	1.4	3			PEA
2000 06 11.87		S	13.4:	GA	41	L	4	90	1.0	2			PEA
2000 07 02.15		S	13.4	HS	23.0	L	5	77	1	7/			DES01
2000 07 02.15		S	13.4	HS	23.0	L	5	77	1	7/			SOU01
2000 07 03.64		S	12.9	HS	20	L	7	160	1.5	4			MAT08
2000 07 04.66		S	13.0	HS	20	L	7	160	1.5	4			MAT08
2000 07 09.68		S	13.0	HS	20	L	7	160	1.5	4			MAT08
2000 07 25.52		S	13.3	HS	20	L	7	160	1.0	4			MAT08

## Comet C/1997 J2 (Meunier-Dupouy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 03 25.38		S	12.8	AC	44.5	L	4	167	0.8	3			MOR03
1998 04 07.38		S	12.4	AC	44.5	L	4	167	1.0	3			MOR03
1998 04 22.36		S	12.4	AC	44.5	L	4	167	1.1	3			MOR03
1998 04 27.36		S	12.5	AC	44.5	L	4	167	1.1	4			MOR03
1998 05 23.33		S	12.4	AC	44.5	L	4	167	1.0	3			MOR03
1998 05 30.36		S	12.0	AC	44.5	L	4	80	1.6	3			MOR03
1998 06 04.33		S	12.1	AC	44.5	L	4	80	1.6	3			MOR03
1998 07 02.30		S	12.4	AC	44.5	L	4	167	0.6	3			MOR03
1998 07 19.15		S	12.3	AC	44.5	L	4	167	0.7	4			MOR03
1998 08 19.09		S	12.3	AC	44.5	L	4	167	0.9	5			MOR03
1998 09 13.12		S	12.4	AC	44.5	L	4	167	1.0	4			MOR03
1998 09 23.12		S	12.3	AC	44.5	L	4	80	1.6	2			MOR03
1998 09 24.05		S	12.9	AC	44.5	L	4	167	0.9	4			MOR03
1998 10 16.02		S	13.3	AC	44.5	L	4	167	0.7	3			MOR03

## Comet C/1998 M5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 19.10		S	12.3	AC	44.5	L	4	167	0.7	4			MOR03
1998 08 30.35		S	12.6	AC	44.5	L	4	167	0.6	4			MOR03
1998 09 23.29		S	12.4	AC	44.5	L	4	167	0.9	4			MOR03
1998 09 28.23		S	12.6	AC	44.5	L	4	167	0.8	4			MOR03
1998 10 16.03		S	12.6	AC	44.5	L	4	167	0.8	4			MOR03
1998 10 24.05		S	11.8	AC	44.5	L	4	80	1.4	4			MOR03
1998 11 18.08		S	11.4	AC	44.5	L	4	80	1.2	4			MOR03
1998 11 22.07		S	11.2	AC	44.5	L	4	80	1.8	3			MOR03
1998 12 12.99		S	10.9	AC	44.5	L	4	80	1.3	3			MOR03
1998 12 14.01		S	10.3	AC	15	R	5	62	2.5	2			MOR03
1999 01 10.01		S	10.5	AC	44.5	L	4	80	2.3	2			MOR03
1999 02 22.44		S	10.2	AC	15	R	5	42	3	2			MOR03
1999 03 08.17		S	10.1	AC	15	R	5	42	3	2			MOR03
1999 03 12.06		S	10.0	AC	15	R	5	42	4	2			MOR03
1999 03 13.94	x	B	9.7	HS	25.4	T	10	69	& 4	3			HOE
1999 03 15.42		S	9.9	AC	15	R	5	42	4.5	2			MOR03
1999 03 26.40		S	10.0	AC	15	R	5	42	5	2			MOR03
1999 04 06.09		S	10.2	AC	15	R	5	42	4	2			MOR03
1999 04 09.05		S	10.3	AC	15	R	5	42	4.5	2			MOR03
1999 04 11.07		S	10.5	AC	15	R	5	42	4	3			MOR03
1999 04 13.06		S	10.7	AC	15	R	5	42	4	2			MOR03
1999 05 08.10		S	11.8	AC	44.5	L	4	80	1.7	2			MOR03
1999 05 11.09		S	12.3	AC	44.5	L	4	80	1.7	3			MOR03
2000 05 08.47	x	C	16.8	HV	60.0	Y	6	a240	0.6				NAK01

## Comet C/1998 P1 (Williams)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 14.44		S	9.7	AC	15	R	5	42	3.5	2			MOR03
1998 12 15.41		S	9.5	AC	15	R	5	42	4	3			MOR03
1998 12 20.44		S	9.3	AC	15	R	5	42	5	3			MOR03
1998 12 24.42		S	9.0	AC	6	R	15	50	6	2			MOR03
1998 12 25.43		S	9.2	AC	15	R	5	42	3.5	2			MOR03
1999 01 18.06		S	8.6	AC	12.0	B		20	6	6			LO001
1999 02 22.37		S	12.0	AC	44.5	L	4	80	1.6	1			MOR03
1999 03 09.05		S	14.1	AC	44.5	L	4	167	0.8	1			MOR03

## Comet C/1998 T1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 29.53		a	H 16.6	LA	50.0	C	12	a360	0.21	4			FUK02
2000 05 08.51			C 17.0	GA	60.0	Y	6	a240	0.65				NAK01

## Comet C/1998 U5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 24.14		S	9.4	AC	15	R	5	42	5	1			MOR03
1998 11 25.13		S	8.2	AC	3.5	B		7	10				MOR03
1998 11 25.13		S	9.4	AC	15	R	5	42	5	2			MOR03
1998 12 14.00		S	10.1	AC	15	R	5	42	4.5	2			MOR03

## Comet C/1999 E1 (Li)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 24.60		!	k 16.6	LA	103.0	C	4	a488	0.55		1.1m	220	ORI
2000 04 28.57			C 17.1	GA	60.0	Y	6	a240	0.5				NAK01
2000 05 29.51			C 17.4	GA	60.0	Y	6	a240	0.5			205	NAK01

## Comet C/1999 F1 (Catalina)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 28.58		x	C 17.0	HV	60.0	Y	6	a240	0.35			40	NAK01

## Comet C/1999 F2 (Dalcanton)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 01.74		k	18.1	LA	103.0	C	4	a488	0.30		2.5m	218	ORI

## Comet C/1999 G1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 04 11.13		C	17.4	U0	51	L	4	a120			70	s 358	SAN11

## Comet C/1999 H1 (Lee)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 05 11.08	w	S	7.9	AC	15	R	5	42	4.5	2			MOR03
1999 05 17.09	s	S	7.6	AC	15	R	5	42	6	3			MOR03
1999 05 20.10	s	S	7.9	AC	15	R	5	42	5	3			MOR03
1999 06 05.11		S	7.0	AC	15	R	5	42	5	3			MOR03
1999 06 09.10	s	S	7.2	AC	15	R	5	42	4.5	3			MOR03
1999 08 02.36		S	7.2	AC	15	R	5	42	3	4			MOR03
1999 08 06.36		S	7.1	AC	15	R	5	42	3	4			MOR03
1999 08 09.08		S	7.3	AA	5.0	B		10	3	7			L0001
1999 08 12.34		S	7.6	AC	15	R	5	42	3.5	4			MOR03
1999 08 15.37		S	8.1	AC	15	R	5	42	3	3			MOR03
1999 08 18.36		S	7.8	AC	15	R	5	42	4	4	0.10	290	MOR03
1999 08 19.03		S	7.7	AA	10.0	B		14	6	7			L0001
1999 08 22.10		S	7.5	AA	10.0	B		14	3.5	7			L0001
1999 08 22.35		S	8.3	AC	15	R	5	42	4	4			MOR03
1999 08 23.10		S	7.3	AA	10.0	B		14	6	6			L0001
1999 09 03.09		S	7.9	AA	25.2	L		53	6	4			L0001
1999 09 04.02		S	7.6	AA	25.2	L		53	7	6			L0001
1999 09 05.97	M	8.5	S		6.0	B	5	20	4	2			KUB
1999 09 06.09		S	7.6	AA	25.2	L		53	9	6			L0001
1999 09 10.38		S	7.6	AC	3.5	B		7	9	3			MOR03
1999 09 11.23		S	7.6	AC	3.5	B		7	11	2			MOR03
1999 09 11.95	M	8.3	S		11	L	5	25	6	3			KUB
1999 09 12.95	M	8.1	S		11	L	5	25	6	2			KUB
1999 09 15.37		S	7.3	AC	3.5	B		7	10	2			MOR03
1999 09 18.40		S	7.5	AC	3.5	B		7	13	2			MOR03
1999 09 19.29		S	7.7	AC	3.5	B		7	14	1			MOR03
1999 09 21.39		S	7.9	AC	3.5	B		7	13	1			MOR03
1999 09 22.39		S	8.0	AC	3.5	B		7	11	1			MOR03
1999 10 01.90	B	9.2	TI		10	L	10	43	6		0.25		LIB
1999 10 02.06		S	9.4	AC	15	R	5	42	4	1			MOR03
1999 10 07.10		S	9.5	AC	15	R	5	42	5	3			MOR03
1999 10 11.32		S	9.8	AC	15	R	5	42	6.5	2			MOR03
1999 10 12.04		S	9.6	AC	15	R	5	42	5.5	1			MOR03
1999 10 15.09		S	9.8	AC	15	R	5	42	5.5	1			MOR03
1999 10 19.22		S	10.4	AC	15	R	5	42	4.5	1			MOR03
1999 11 01.14		S	10.6	AC	15	R	5	42	3	1			MOR03
1999 11 05.02		S	11.5	AC	15	R	5	42	3	1			MOR03
1999 11 08.05		S	12.7	AC	44.5	L	4	167	1.1	1			MOR03

## Comet C/1999 H3 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 02 09.23		S	13.7:	VB	30	R	20	185	0.7	2			SHA02
2000 02 11.07		S	13.9:	VB	30	R	20	185	0.7	2			SHA02
2000 03 07.14		S	13.4	HS	35	L	5	166	1.5	2/			HOR02
2000 04 02.83	B	13.9	HS	42	L	5	162	1.0	1.0	3			LEH
2000 04 03.80	B	13.9	HS	42	L	5	162	0.9	0.9	3			LEH
2000 04 06.85	B	14.1	HS	42	L	5	162	1	1	3/			LEH
2000 04 06.87	S	13.8	HS	35	L	5	158	1.3	1.3	3			HOR02
2000 04 08.80	S	13.7	HS	35	L	5	158	1.3	1.3	2/			HOR02
2000 04 08.87	B	14.1	HS	42	L	5	162	1	1	3			LEH
2000 04 21.84	B	14.3	HS	42	L	5	162	0.9	0.9	4			LEH
2000 04 22.81	B	14.2	HS	42	L	5	162	0.8	0.8	4			LEH
2000 04 23.52	C	15.2	TJ		18.0	L	6	a 60	0.5				KAD02
2000 04 24.66	!	k	14.7	LA	103.0	C	4	a488	1.10		5.0m	55	ORI



## Comet C/1999 H3 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 26.82		B	14.3	HS	42	L	5	162	1.0	4			LEH
2000 04 28.61		C	15.1	GA	60.0	Y	6	a120	1.2				NAK01
2000 04 28.83		B	14.2	HS	42	L	5	162	0.9	4			LEH
2000 05 01.03		B	14.4	HS	42	L	5	162	0.8	4			LEH
2000 05 02.83		B	14.4	HS	42	L	5	162	0.8	4			LEH
2000 05 04.58		C	15.5	TJ	18.0	L	6	a 60	0.45				KAD02
2000 05 05.88		S	14.0	HS	44.0	L	5	156	0.8	4			HAS02
2000 05 25.48	s	H	14.9	LA	50.0	C	12	a360	0.36	7	0.4m	132	FUK02
2000 05 25.50	s	V	15.8	LA	50.0	C	12	a360	0.36	7	0.4m	132	FUK02
2000 05 29.48		C	15.7	GA	60.0	Y	6	a120	0.85				NAK01
2000 05 29.48	s	H	15.3	LA	50.0	C	12	a360	0.40	5	0.7m	74	FUK02
2000 05 29.50	s	V	16.3	LA	50.0	C	12	a360	0.40	5	0.7m	74	FUK02
2000 06 01.91		S	13.7	HS	44.0	L	5	156	0.8	4			HAS02
2000 06 09.87		S	13.7	AC	40.6	L	5	72	0.8	2/			RES

## Comet C/1999 J2 (Skiff)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 03 07.15		S	14.3	HS	35	L	5	208	1.1	3			HOR02
2000 04 02.89		B	13.9	HS	42	L	5	162	1.1	4			LEH
2000 04 06.91		B	14.1	HS	42	L	5	162	1.1	4			LEH
2000 04 06.91		S	14.1	HS	35	L	5	237	0.9	2/			HOR02
2000 04 08.89		B	14.0	HS	42	L	5	162	1	3/			LEH
2000 04 21.88		B	14.2	HS	42	L	5	162	0.9	4			LEH
2000 04 22.86		B	14.2	HS	42	L	5	162	0.9	4			LEH
2000 04 23.69		C	15.7	TJ	18.0	L	6	a 60	0.4		0.5m	14	KAD02
2000 04 26.83		B	14.2	HS	42	L	5	162	1	4			LEH
2000 04 28.73		C	15.8	TJ	18.0	L	6	a 60	0.4		0.6m	18	KAD02
2000 04 28.85		B	14.0:	HS	42	L	5	162	0.9	4			LEH
2000 04 29.69	a	H	14.9	LA	50.0	C	12	a180	0.45	5	2.6m	12	FUK02
2000 04 29.71	a	V	15.6	LA	50.0	C	12	a180	0.45	5	2.6m	12	FUK02
2000 04 29.72		C	15.8	TJ	18.0	L	6	a 60	0.4		0.5m	14	KAD02
2000 05 01.04		B	14.3	HS	42	L	5	162	0.9	4			LEH
2000 05 01.69	k	15.2	LA	103.0	C	4	a488	0.65			3.0m	12	ORI
2000 05 02.57	a	H	14.6	LA	50.0	C	12	a300	0.43	5	3.3m	18	FUK02
2000 05 02.85		B	14.2	HS	42	L	5	162	0.9	4			LEH
2000 05 03.18		J	13.8	SC	25.4	T	5	a100	0.65	s5/	2.0m	12	ROQ
2000 05 04.58	a	H	15.0	LA	50.0	C	12	a180	0.37	5	3.2m	12	FUK02
2000 05 04.60	a	V	15.7	LA	50.0	C	12	a180	0.37	5	3.2m	12	FUK02
2000 05 04.63		C	15.6	HS	18.0	L	6	a 60	0.35				KAD02
2000 05 05.90		S	14.4	HS	44.0	L	5	156	0.4	4			HAS02
2000 05 08.59	s	H	14.9	LA	50.0	C	12	a360	0.37	5	2.4m	20	FUK02
2000 05 08.64	s	V	15.5	LA	50.0	C	12	a360	0.37	5	2.4m	20	FUK02
2000 05 08.67		C	15.5	GA	60.0	Y	6	a120	0.55		1.0m	21	NAK01
2000 05 14.69		C	15.7	TJ	18.0	L	6	a 60	0.4				KAD02
2000 05 18.55	s	H	14.9	LA	50.0	C	12	a360	0.36	6	1.5m	22	FUK02
2000 05 18.65	s	V	15.9	LA	50.0	C	12	a360	0.36	6	1.5m	22	FUK02
2000 05 20.86		S	14.4	HS	35	L	5	237	0.9	2/			HOR02
2000 05 24.68		C	15.8	TJ	18.0	L	6	a 60	0.4				KAD02
2000 05 25.55	s	H	14.8	LA	50.0	C	12	a360	0.34	5	1.8m	19	FUK02
2000 05 25.57	s	V	15.4	LA	50.0	C	12	a360	0.34	5	1.8m	19	FUK02
2000 05 26.15		J	14.2	SC	25.4	T	5	a100	3.57	s5/	1.4m	8	ROQ
2000 05 26.90		B	14.1	HS	42	L	5	162	0.9	4			LEH
2000 05 28.69		C	16.1	TJ	18.0	L	6	a 60	0.3				KAD02
2000 05 29.55	s	H	15.4	LA	50.0	C	12	a360	0.35	5	1.3m	21	FUK02
2000 05 29.67		C	15.6	GA	60.0	Y	6	a120	0.55		1.1m	19	NAK01
2000 05 29.69		C	15.8	TJ	18.0	L	6	a 60	0.35				KAD02
2000 06 01.59	s	H	14.8	LA	50.0	C	12	a360	0.44	5	2.7m	17	FUK02
2000 06 01.65	s	V	16.0	LA	50.0	C	12	a360	0.44	5	2.7m	17	FUK02
2000 06 01.68		C	15.8	TJ	18.0	L	6	a 60	0.35				KAD02
2000 06 01.92		B	14.2	HS	42	L	5	162	1	4			LEH
2000 06 01.93		S	14.8	HS	44.0	L	5	156	0.3	4			HAS02
2000 06 01.99		S	14.0	AC	40.6	L	5	72	1.5	2/			RES
2000 06 02.89		B	14.3	HS	42	L	5	162	0.9	4			LEH
2000 06 02.94		S	14.5	HS	44.5	L	4	146	0.7	5			SAR02

## Comet C/1999 J2 (Skiff) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 06 02.96		S	14.0	AC	40.6	L	5	72	1.5	2			RES
2000 06 03.88		B	14.3	HS	42	L	5	162	0.8	4			LEH
2000 06 03.90		S	14.6	HS	44.5	L	4	146	1	4/			SAR02
2000 06 04.55	s	H	14.9	LA	50.0	C	12	a360	0.33	5	2.0m	16	FUK02
2000 06 06.49	s	H	14.6	LA	50.0	C	12	a360	0.49	5	2.5m	19	FUK02
2000 06 06.52	s	V	15.7	LA	50.0	C	12	a360	0.49	5	2.5m	19	FUK02
2000 06 06.54		C	15.6	GA	60.0	Y	6	a120	0.55		1.3m	22	NAK01
2000 06 06.71		C	15.7	TJ	18.0	L	6	a 60	0.35				KAD02
2000 06 08.95		S	14.2	AC	40.6	L	5	72	1.0	2/			RES
2000 06 09.89		S	14.2	AC	40.6	L	5	72	0.9	3			RES
2000 06 14.54	s	H	14.4	LA	50.0	C	12	B520	0.50	5	2.5m	17	FUK02
2000 06 14.60	s	V	15.5	LA	50.0	C	12	A080	0.50	5	2.5m	17	FUK02
2000 06 15.54	s	H	14.9	LA	50.0	C	12	B520	0.43	5	2.3m	20	FUK02
2000 06 15.57	s	V	15.4	LA	50.0	C	12	A440	0.43	5	2.3m	20	FUK02
2000 06 15.65		C	16.1	TJ	18.0	L	6	a 60	0.25				KAD02
2000 06 16.49	s	H	14.7	LA	50.0	C	12	B520	0.42	4	1.7m	22	FUK02
2000 06 16.55	s	V	15.7	LA	50.0	C	12	A080	0.42	4	1.7m	22	FUK02
2000 06 19.52	s	H	14.9	LA	50.0	C	12	C600	0.36	5	2.0m	23	FUK02
2000 06 19.56	s	V	15.3	LA	50.0	C	12	a720	0.36	5	2.0m	23	FUK02
2000 06 23.97		S	14.2	AC	40.6	L	5	72	0.7	3			RES
2000 06 25.90		S	14.4	AC	40.6	L	5	72	0.6	3/			RES
2000 06 27.16		J	15.0	SC	25.4	T	5	a100	0.30	s5	0.5m	16	ROQ
2000 06 30.55		C	15.7	GA	60.0	Y	6	a120	0.5		1.0m	25	NAK01
2000 07 01.50	s	H	14.8	LA	50.0	C	12	A440	0.34	5	2.1m	19	FUK02
2000 07 01.52	s	V	15.5	LA	50.0	C	12	A800	0.34	5	2.1m	19	FUK02
2000 07 01.55		C	16.0	TJ	18.0	L	6	a 60	0.3				KAD02
2000 07 02.91		S	14.5	AC	40.6	L	5	72	0.5	3			RES
2000 07 21.53		C	16.0	GA	60.0	Y	6	a120	0.5		0.9m	36	NAK01
2000 07 24.96		S	14.6	AC	40.6	L	5	130	0.5	3			RES
2000 07 25.93		S	14.5	AC	40.6	L	5	130	0.5	2/			RES

## Comet C/1999 J3 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 09 20.39		S	8.1	AC	15	R	5	42	5	3			MOR03
1999 09 21.39		S	8.5	AC	15	R	5	42	4	3			MOR03
1999 09 22.38		S	8.7	AC	15	R	5	42	4.5	3			MOR03
1999 10 11.32		S	8.2	AC	15	R	5	42	5	4			MOR03
1999 10 14.37	w	S	8.4	AC	15	R	5	42	4.5	3			MOR03
1999 10 16.36		S	8.6	AC	15	R	5	42	4.5	3			MOR03
1999 10 19.40	s	S	8.8	AC	15	R	5	42	4	3			MOR03
1999 10 21.43	w	S	9.0	AC	15	R	5	42	5.5	3			MOR03

## Comet C/1999 K5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 04.69		S	13.6:	HS	20	L	7	160	0.5	4			MAT08
2000 05 09.68		S	13.4:	HS	20	L	7	160	0.5	4			MAT08
2000 05 13.88		S	13.2	GA	41	L	4	200	0.8	5			PEA
2000 06 02.88		S	13.3	GA	41	L	4	90	1.1	3			PEA
2000 06 04.64		S	13.5	HS	20	L	7	160	0.5	4			MAT08
2000 06 05.89		S	13.5	GA	41	L	4	90	1.0	4			PEA
2000 06 07.86		S	13.5	GA	41	L	4	90	1.0	5			PEA
2000 06 08.87		S	13.5	GA	41	L	4	90	0.9	4			PEA
2000 06 10.88		S	13.5	GA	41	L	4	90	0.7	5			PEA
2000 06 11.88		S	13.7	GA	41	L	4	90	0.8	3/			PEA
2000 06 12.78		S	13.4:	GA	25.4	L	4	114	0.5				SEA
2000 07 03.65		S	12.8	HS	20	L	7	160	1.0	4			MAT08
2000 07 04.67		S	13.2	HS	20	L	7	160	1.0	4			MAT08

## Comet C/1999 K8 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 06 04.74		C	14.7	TJ	18.0	L	6	a 40	0.3				KAD02
2000 06 06.73		C	15.0	TJ	18.0	L	6	a 60	0.25				KAD02

Comet C/1999 K8 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 06 07.73		C	14.3	TJ	18.0	L	6	a 60	0.35				KAD02
2000 07 31.99		S	13.3	AC	40.6	L	5	130	1.2	3			RES
2000 08 01.96		S	13.8	HS	44.0	L	5	156	0.5	3			HAS02

Comet C/1999 L3 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 01 25.86		S	11.2	HS	27	L	6	120	1.5	3			TOT03
2000 01 31.95		S	10.5	HS	27	L	6	83	1.5	5	0.2	110	TOT03
2000 02 01.94	x	S	11.8	TT	11.0	L	7	32	1.4	5/			SAD
2000 02 07.99		S	11.3	VB	30	R	20	105	1.3	4			SHA02
2000 02 08.85		S	11.7	VB	30	R	20	105	1.0	3			SHA02
2000 02 10.81		S	11.5	HS	27	L	6	83	1.3	2/	0.1	100	TOT03
2000 02 10.88	x	B	11.5	TT	35	M	10	200	& 2	S2			PLE01
2000 02 11.05		S	11.8	VB	30	R	20	105	1.3	3			SHA02
2000 02 11.07	x	S	11.2	TT	11.0	L	7	32	& 1.3	3			SAD
2000 02 11.94		S	12.0	VB	33	L	5	150	0.8	2			SHA02
2000 03 02.88	x	C	14.8	TT	20.0	L	4	a300	0.5		0.05	99	MIL02
2000 03 30.79		S	12.9	HS	20	L	6	100	0.8	1			SAN07
2000 04 02.80		B	13.9	HS	42	L	5	162	1	3			LEH
2000 04 06.81		B	13.8	HS	42	L	5	162	1.2	3			LEH
2000 04 06.85		S	13.3	HS	35	L	5	158	1.5	2/			HOR02
2000 04 08.80		S	13.3	HS	35	L	5	158	1.5	2/			HOR02

Comet C/1999 N2 (Lynn)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 08 02.09	s	S	7.6	AC	15	R	5	42	3	4			MOR03
1999 08 03.09	s	S	8.0	AC	15	R	5	42	3.5	4			MOR03
1999 08 07.09		S	8.2	AC	15	R	5	42	3.5	4			MOR03
1999 08 09.09		S	8.1	AC	15	R	5	42	4	4			MOR03
1999 08 12.08	s	S	8.4	AC	15	R	5	42	4	4			MOR03
1999 08 15.09	s	S	8.7	AC	15	R	5	42	4	3			MOR03
1999 08 15.85		S	7.7	AA	8.0	B		20	3	7			LO001
1999 08 30.06		S	9.5	AC	15	R	5	42	4	3			MOR03
1999 09 01.05		S	9.5	AC	15	R	5	42	4	3			MOR03
1999 09 03.90		S	9.0	AA	25.2	L	4	53	2	5			LO001
1999 09 12.05	s	S	10.4	AC	15	R	5	42	4	1			MOR03

Comet C/1999 N4 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 03 29.76		C	17.2:	TJ	18.0	L	6	a 60	0.25				KAD02
2000 05 08.74		C	16.4	GA	60.0	Y	6	a240	0.55				NAK01
2000 05 29.72		C	16.4	GA	60.0	Y	6	a240	0.5				NAK01
2000 06 07.61		C	16.4	GA	60.0	Y	6	a240	0.55		0.6m	102	NAK01
2000 06 30.57		C	16.5	GA	60.0	Y	6	a240	0.5				NAK01
2000 07 01.58		C	16.5	TJ	18.0	L	6	a 60	0.3				KAD02
2000 07 21.54		C	16.8	GA	60.0	Y	6	a240	0.45		0.6m	100	NAK01

Comet C/1999 S3 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 10 07.07		S	13.2	AC	44.5	L	4	167	0.4	6			MOR03
1999 10 12.08		S	13.3	AC	44.5	L	4	167	0.4	6			MOR03
1999 10 12.71	x	S	12.2	TT	35	M	10	270	0.8	s3			PLE01
1999 10 15.10		S	13.1	AC	44.5	L	4	167	0.6	6			MOR03
1999 10 19.23		S	13.3	AC	44.5	L	4	167	0.5	6			MOR03
1999 11 05.00		S	12.4	AC	44.5	L	4	167	0.5	6			MOR03
1999 11 27.84	x	B	12.4	TT	25	L	7	70	0.8	s4/			PLE01
1999 11 28.83	x	S	12.3	TT	35	M	10	270	0.7	s2/			PLE01
1999 12 12.07		S	13.7	AC	44.5	L	4	167	0.3	1			MOR03
2000 03 07.16		0	[13.8	HS	35	L	5	208	! 0.9				HOR02

## Comet C/1999 S4 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 12 21.75			[13.5	HS	35	M	10	340	! 1	2			PLE01
1999 12 31.74		S	13.7	HS	35	M	10	340	0.8	3			PLE01
2000 01 27.75		S	13.4	HS	27	L	6	120	0.5				TOT03
2000 02 08.83		S	[14.2	VB	30	R	20	185					SHAO2
2000 05 04.78		C	13.0:	TJ	18.0	L	6	a 30	0.4				KADO2
2000 05 15.60		S	11.6	TK	20	L	4	70	1.6	3			LINO4
2000 05 15.62		S	12.1:	TK	25.6	L	5	84	1	3			BIV
2000 05 17.63		S	11.3:	TK	25.6	L	5	84	1.5	4			BIV
2000 05 18.62		S	11.6:	TK	25.6	L	5	84	1.5	5			BIV
2000 05 18.75		C	11.6:	TJ	18.0	L	6	a 30	0.7				KADO2
2000 05 23.62		S	11.2:	TK	25.6	L	5	84	2	3			BIV
2000 05 24.75		C	11.6	TJ	18.0	L	6	a 30	0.75				KADO2
2000 05 25.61		S	11.3	TK	25.6	L	5	84	1.9	5			BIV
2000 05 25.77	s	H	11.4	LA	50.0	C	12	a480	0.7	6	1.0m	285	FUKO2
2000 05 29.61		S	11.0	TK	25.6	L	5	42	2	5			BIV
2000 05 29.61		S	11.1	TK	25.6	L	5	84	2.0	6			BIV
2000 05 29.75		C	11.0	TJ	18.0	L	6	a 60	0.85		1.0m	278	KADO2
2000 05 29.76		M	10.9	HS	25.0	L	6	120	1.1	3	1.5m	280	TSU02
2000 05 29.78	x	S	10.5	HS	25.4	L	4	46	1.5	5			YOS02
2000 05 30.61		S	10.9	TK	25.6	L	5	84	2.5	6			BIV
2000 06 01.10		S	10.5	NP	25	L	5	96	3	4/			SEG
2000 06 01.61		S	10.8:	TK	25.6	L	5	42	2.5	5			BIV
2000 06 01.74	xa	S	10.3	TJ	32.0	L	5	58	2.5	6			NAG08
2000 06 01.76		C	10.5	TJ	18.0	L	6	a 40	1.3		1.3m	274	KADO2
2000 06 01.76	s	H	10.3	LA	50.0	C	12	a180	2.3	7	1.8m	52	FUKO2
2000 06 02.05		C	9.9	HS	20.3	T	6	a 60	1.5				LIG
2000 06 02.96		S	10.8	HS	20	L	5	70	2.0	3			BAR06
2000 06 03.01	x	S	11.0	TT	25	L	5	70	1.5	4/			SAD
2000 06 03.01	x&	S	9.7	TT	25	L	5	70	2.3	S6			DRA02
2000 06 03.02		M	10.9	TI	10	B	4	25	3	3			LEH
2000 06 03.59		S	10.5	TK	25.6	L	5	42	3.0	6	0.06	270	BIV
2000 06 03.97		S	10.7	HS	20	L	5	70	2.0	3			BAR06
2000 06 03.99	x	S	10.0	TJ	35	M	10	90	2	5			PLE01
2000 06 04.00	x&	S	9.7	TT	25	L	5	70	1.5	S5			DRA02
2000 06 04.02		M	10.9	TI	10	B	4	25	2.5	3/			LEH
2000 06 04.03		C	9.8	HS	20.3	T	6	a 60	2.5				LIG
2000 06 04.31		M	10.4	TI	25.4	T	10	63	2	5			RAY
2000 06 04.60		S	10.2	TK	25.6	L	5	42	2.8	6	0.06	270	BIV
2000 06 04.74	xa	S	9.9	TJ	32.0	L	5	58	2.6	5/			NAG08
2000 06 04.75		C	10.5	TJ	18.0	L	6	a 40	0.85		0.9m	281	KADO2
2000 06 04.75	x&	S	10.5	TJ	15.0	B		25	1.5	4			HAS08
2000 06 04.78	xa	S	10.3	TT	25.4	L	4	46	1.8	4/			YOS02
2000 06 05.77	x&	S	9.9	TJ	15.0	B		25	1.8	4/			HAS08
2000 06 06.59		S	10.2	TK	25.6	L	5	42	3.0	6	0.07	275	BIV
2000 06 06.74	xa	S	9.8	TJ	32.0	L	5	58	2.9	6			NAG08
2000 06 06.75		C	10.4	TJ	18.0	L	6	a 40	1.0		1.3m	279	KADO2
2000 06 06.75		S	9.4	TJ	25.4	T	6	62	3	5			YOS04
2000 06 06.75	s	V	10.3	LA	50.0	C	12	a360	3.3	6	5.5m	277	FUKO2
2000 06 06.76	s	H	9.4	LA	50.0	C	12	B160	3.3	6	5.5m	277	FUKO2
2000 06 06.77		M	10.4	TT	25.0	L	6	64	1.8	4			TSU02
2000 06 07.74		C	10.9	TJ	18.0	L	6	a 40	0.65		0.7m	280	KADO2
2000 06 07.75		H	10.0	LA	18.0	L	6	a160	1.1		1.7m	280	KADO2
2000 06 07.78	a	C	10.8	GA	60.0	Y	6	a120	2.9		3.3m	277	NAK01
2000 06 08.01		S	10.2:	TT	31.0	J	6	72	2.5	2/			BOU
2000 06 08.03		M	10.1	TT	10	B	4	25	3.5	4			LEH
2000 06 08.97		S	9.9	TT	20	L	5	70	2.5	5			BAR06
2000 06 09.01	x	S	10.6:	TJ	31.7	L	5	150	& 2	4			ADA02
2000 06 09.03		M	10.3	TT	20	L	5	42	2.5	4/			LEH
2000 06 09.07		S	9.4	TT	10.0	B		25	2.5	4			HAS02
2000 06 09.59		S	10.1	TK	25.6	L	5	42	3.0	6	0.07	270	BIV
2000 06 09.97		S	9.5	TT	20	L	5	70	3.1	4			BAR06
2000 06 10.00	x&	S	10.1	TT	35	M	10	90	1.0	s3/			DRA02
2000 06 10.01		M	9.7	TT	13	L	8	69	3.5	3			HOR02
2000 06 10.01		M	9.9	TT	10	B	4	25	3	4			LEH
2000 06 10.01	x&	S	9.8:	TJ	20	L	4	58	2	4			SWI

Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 06 10.02		S	10.3	TI	7.6	L	9	35	4				CER01
2000 06 10.02		S	11.5	AC	26	T	12	100	2	3	0.1	280	KES01
2000 06 10.03		S	10.1	HS	27	T	6	83	2	5			TOT03
2000 06 10.05		& C	9.2	UO	57.0	P	5	a 20					TIC
2000 06 10.60		S	9.9	TK	25.6	L	5	42	3.5	6	0.1	270	BIV
2000 06 10.97		M	9.4	TT	20	L	5	70	3.0	4			BAR06
2000 06 10.99	x	S	9.3	TJ	15	M	10	80	1.5	5/			PLE01
2000 06 10.99	x	S	10.2:	TJ	31.7	L	5	150	& 2	4			ADA02
2000 06 11.00	x&	S	9.5	TT	35	M	10	144	1.1	S5			DRA02
2000 06 11.01		M	9.3	TT	20	L	5	42	3.5	4			LEH
2000 06 11.01		M	9.5	TT	13	L	8	69	4	3			HOR02
2000 06 11.01	x	S	9.7:	S	15.0	L	6	48	1.5	5			GUZ
2000 06 11.98		M	9.3	TT	20	L	5	70	3.2	3/			BAR06
2000 06 12.85		S	9.9	TT	15	L	8	40	2.0	5			MAT08
2000 06 13.14		S	8.9	TJ	10.0	B		14	& 4	5			PER01
2000 06 13.59		S	9.8	TK	25.6	L	5	42	3.5	5	0.1	270	BIV
2000 06 13.89		S	9.4	AA	21.0	L	5	54	3	2/			KOR01
2000 06 13.92		S	9.2	AA	18.3	V	3	35	3	3			KOR01
2000 06 13.99		S	8.8	AC	6.0	B		20	2	4			RES
2000 06 14.15		S	8.9	TJ	10.0	B		14	& 4	4/			PER01
2000 06 14.73		C	10.0	TJ	18.0	L	6	a 40	0.9		1.7m	270	KAD02
2000 06 14.73		H	9.2	LA	18.0	L	6	a160	1.0		2.3m	270	KAD02
2000 06 14.73	s	V	10.1	LA	50.0	C	12	a540	3.2	6	> 6.4m	272	FUK02
2000 06 14.75	s	H	7.9	LA	50.0	C	12	A620	3.2	6	> 6.4m	272	FUK02
2000 06 15.72	s	V	9.8	LA	50.0	C	12	a540	4.2	6	> 7.0m	268	FUK02
2000 06 15.74		H	9.1	LA	18.0	L	6	a160	1.2		2.8m	272	KAD02
2000 06 15.75	s	H	8.6	LA	50.0	C	12	B700	4.2	6	> 7.0m	268	FUK02
2000 06 16.00		S	8.6	HI	6.0	B		20	& 4	4			RES
2000 06 17.98	x	S	8.8	TJ	8.0	B		16	2.5	5	5 m	260	PLE01
2000 06 18.00		S	8.4	HI	6.0	B		20	& 4	4			RES
2000 06 18.00	x&	S	8.9	TT	10.0	B		25	2.8	s4			DRA02
2000 06 18.01		S	8.5	TT	8.0	B		10	5	3			HOR02
2000 06 18.02		& C	8.8	UO	57.0	P	5	a 20					TIC
2000 06 19.06	!	V	9.0	YF	15.0	T	4	a 60	+ 4.0	7	& 7 m	270	MIK
2000 06 19.99		M	8.8	TT	20	L	5	42	4	5			LEH
2000 06 20.00		S	8.1	HI	6.0	B		20	& 5	3			RES
2000 06 20.01		S	8.3	TT	8.0	B		10	6	2/			HOR02
2000 06 20.01		S	9.7	AC	15.0	R	8	30	2	6			DIE02
2000 06 20.10	x	B	10.3:	TT	8.0	B		15	& 2.5	4			DUS
2000 06 20.98	x	E	9.2	TJ	31.7	L	5	78	1.3	5			ADA02
2000 06 20.99		M	8.4	TT	20	L	5	42	5	5			LEH
2000 06 21.00	x	S	8.8	S	15.0	L	6	48	2	5			GUZ
2000 06 21.01		S	8.3	TT	8.0	B		10	6	2/			HOR02
2000 06 21.06	!	V	9.0	YF	15.0	T	4	a 60	+ 4.0	7	& 7 m	270	MIK
2000 06 21.99		M	8.3	TT	13	L	8	69	5	3			HOR02
2000 06 22.00		S	8.6	TI	11.4	L	8	45	2.5	4			FOG
2000 06 22.98		M	8.7	TT	20	L	5	70	3.5	d4/	0.1	281	BAR06
2000 06 23.03		k	9.3	HV	20.3	T	6	a 90	5				LIG
2000 06 23.97	x	S	8.5	TJ	6.6	B		20	3	5/	8 m	264	PLE01
2000 06 23.98		M	8.6	TT	20	L	5	70	3.8	3	0.1	273	BAR06
2000 06 23.98		S	8.5	TT	8.0	B		12	4	2/			BAR06
2000 06 23.99		S	7.8	AC	6.0	B		20	7	3/			RES
2000 06 24.92		S	7.8	AA	21.0	L	5	33	6	4	0.15	280	KOR01
2000 06 24.92	s	S	8.4	SE	6	R	6	25	6	2			ERO
2000 06 24.96	x&	S	8.0	TT	10.0	B		25	5	s4	13 m	265	DRA02
2000 06 24.99		S	8.0	AC	6.0	B		20	6	3			RES
2000 06 25.91	s	S	8.5	SE	6	R	6	25	6	1			ERO
2000 06 25.92		S	7.7	AA	21.0	L	5	33	6	4	0.17	280	KOR01
2000 06 25.93		M	9.0	SE	25	L	4	64	2.5	5			SHU
2000 06 25.98		M	8.5	TT	20	L	5	70	3.8	4	0.1	275	BAR06
2000 06 25.98		S	7.7	AA	8.0	B		10	7	5	0.2	280	KOR01
2000 06 25.98		S	7.8	AC	6.0	B		20	5	3			RES
2000 06 26.00		M	8.2	TT	8.0	B		10	7	3			HOR02
2000 06 26.14		B	7.9	AA	5.0	B		7	8	4			BEG01
2000 06 26.59		B	8.7	TK	25.6	L	5	42	4.0	6	0.3	260	BIV

## Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 06 26.59		S	8.6	TK	5.0	R		10	4	7			BIV
2000 06 26.87		S	8.4	AA	18.3	V	3	35	3	3/			MERO4
2000 06 26.94		M	8.5	TT	20	L	5	70	3.5	4	0.1	275	BAR06
2000 06 26.94		S	8.5	TT	8.0	B		12	4	3			BAR06
2000 06 26.94	s	S	8.2	SE	6	R	6	25	5	3			ERO
2000 06 26.96	x	S	7.9	TJ	6.0	B		20	3	D4			PAR03
2000 06 27.00		S	7.6	AA	21.0	L	5	33	7	4	0.17	275	KOR01
2000 06 27.01		S	7.7	AA	5.0	B		8	5	5	0.1	275	KOR01
2000 06 27.01		S	9.0	AC	15.0	R	8	30	2	6	5 m	265	DIE02
2000 06 27.03		M	7.8	AA	5.0	B		10	6	6	0.1	290	SAN07
2000 06 27.52		M	8.7	TK	20	L	4	70	2.0	7	5 m	250	LIN04
2000 06 28.00		M	7.8	AA	5.0	B		10	6	5	0.3	280	SAN07
2000 06 28.00	x	S	7.5:	S	15.0	L	6	48	3	6			GUZ
2000 06 28.00		S	8.9	AC	15.0	R	8	30	2	4			DIE02
2000 06 28.57		S	8.9	TK	25.6	L	5	42	3.5	7	0.25	260	BIV
2000 06 28.59		S	8.8	TK	5.0	R		10	4	7			BIV
2000 06 28.72	xa	S	8.0	TJ	10.0	B		20	5	6	15 m	260	NAG08
2000 06 28.94		M	8.6	TT	20	L	5	70	3	4	0.1	270	BAR06
2000 06 28.94		S	8.5	TT	8.0	B		12	4	3			BAR06
2000 06 29.00		S	8.6	AC	15.0	R	8	30	2	4	5 m	270	DIE02
2000 06 29.09		M	8.3	NP	25	L	5	30	2	6	8 m	290	SEG
2000 06 29.13	!	C	8.8	HI	40	D	3 a	10	> 2.6	D7	> 8.2m	270	ROD01
2000 06 29.34		B	8.1	S	7.0	B		10	7.6	4			DEA
2000 06 29.51		M	8.8	TK	20	L	4	40	2.5	6	6 m	260	LIN04
2000 06 29.87		S	8.7	AA	18.3	V	3	63	3	3	0.1	270	MERO4
2000 06 29.88	xs	S	8.0	HD	15	C	15	90	2.5	4			SVE01
2000 06 29.92	s	S	8.0	SE	6	R	6	25	4	3			ERO
2000 06 29.93		S	7.5	AA	21.0	L	5	33	7	5	0.2	275	KOR01
2000 06 29.96	x&	S	8.1	TJ	20	L	4	58	3	5			SWI
2000 06 29.98		S	7.6	AA	8.0	B		10	5	4/	0.1	270	KOR01
2000 06 29.99	x	S	7.3:	S	15.0	L	6	48	3	4	0.16		GUZ
2000 06 29.99		S	7.8	TT	8.0	B		10	6.5	3			HOR02
2000 06 30.08		S	8.2	TJ	10.0	B		14	& 6	4	10 m	265	PER01
2000 06 30.35		S	8.2	AA	20.0	T	10	50	2.2	6	&0.25	270	SHA04
2000 06 30.76	xs	M	8.3	TT	10.0	B		20	4	5	11 m	270	YOS02
2000 06 30.77		M	8.9:	TT	12.5	L	6	23					TSU02
2000 06 30.90		S	7.5	AA	21.0	L	5	33	7	5	0.2	270	KOR01
2000 06 30.92		E	8.0	AA	6	R	10	16	2	4/	0.2		ROM
2000 06 30.92		S	7.6	AA	8.0	B		10	5	5	0.2	270	KOR01
2000 06 30.93	s	S	8.2:	SE	6	R	6	25	5	1			ERO
2000 06 30.97	x	S	9.2	TJ	14.7	L	6	70	& 2	3/	&15 m		SIW01
2000 06 30.99	x	S	8.1:	TJ	18	L	7	58	& 2	4	&0.08	270	WLO
2000 06 30.99		S	8.3	TT	8.0	B		15	4.5	5			BOU
2000 06 30.99		S	8.4	TT	30.5	T	10	56	& 4.5	4	0.2		COM
2000 07 01.00		S	7.5	AA	5.0	R	6	20	8	4/	0.25	270	KOR01
2000 07 01.00	k	8.6	HV	20.3	T	6 a	60	5					LIG
2000 07 01.02		S	7.5	AA	50.0	L	4	64	8	5	0.25	270	KOR01
2000 07 01.05		S	8.4	TT	10.0	B		25	1.8	4	0.13	270	HAS02
2000 07 01.08		M	8.3	NP	25	L	5	30	2	7	7 m	270	SEG
2000 07 01.09	!	C	8.7	HI	40	D	3 a	10	> 3.27	D7	> 8.9m	270	ROD01
2000 07 01.55		M	8.8	TK	31	L	5	50	3.0	6	7 m	260	LIN04
2000 07 01.69	s	V	9.6	LA	18.0	L	6 a	180	1.3	6	6.4m	270	KAD02
2000 07 01.71	s	H	8.3	LA	50.0	C	12 a	180	4.7	6	> 9.6m	270	FUK02
2000 07 01.72		S	7.5	TJ	25.4	T	6	32	5.5	5	10 m	280	YOS04
2000 07 01.73		C	9.2	TJ	18.0	L	6 a	40	1.6		6.3m	270	KAD02
2000 07 01.73	s	V	8.7	LA	50.0	C	12 a	180	4.7	6	> 9.6m	270	FUK02
2000 07 01.74	s	H	8.8	LA	18.0	L	6 a	160	2.6	6	12 m	270	KAD02
2000 07 01.74	x	S	7.8	TJ	10.0	B		20	5	5/	10 m	270	NAG08
2000 07 01.77		M	8.3	TT	12.5	L	6	23					TSU02
2000 07 01.90		M	8.5	SE	25	L	4	54	2	4			SHU
2000 07 01.93		M	8.4	SE	25	L	4	54	2.6	4			ANI
2000 07 01.95					20	L		70	6	4	0.1	270	BAR06
2000 07 01.95		S	7.8	TT	8.0	B		12	7	4/			BAR06
2000 07 02.03		C	8.6	HV	20.3	T	6 a	60	4		0.13	0	LIG
2000 07 02.25		S	8.7	TJ	8.0	B		11	5	4			SOU01

## Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 02.33		S	8.7	TJ	23.0	L		45	6	3/	15 m	190	DES01
2000 07 02.33		S	8.7	TJ	23.0	L		45	6	3/	15 m	190	SOU01
2000 07 02.90		M	8.2	SE	25	L	4	54	2	5	4 m	290	SHU
2000 07 02.91		S	7.7	AC	6.0	B		20	7	4			RES
2000 07 02.94	x&	S	7.7:	TT	10.0	B		20	6	s3/	15 m	270	DRA02
2000 07 02.97	x	E	8.5:	TJ	31.7	L	5	78	1.8	5	0.08	275	ADA02
2000 07 03.01	x	B	8.4	TJ	8.0	B		16	3.5	6	10 m	269	PLE01
2000 07 03.71		s	H	8.1	LA	50.0	C	12 a120	5.0	6	> 9.1m	271	FUK02
2000 07 03.74		C	9.1	TJ	18.0	L	6 a	30	2.0	6	10 m	268	KAD02
2000 07 03.74		s	H	8.7	LA	18.0	L	6 a180	2.7	6	13 m	269	KAD02
2000 07 03.74		s	V	8.5	LA	50.0	C	12 a120	5.0	6	> 9.1m	271	FUK02
2000 07 03.74		x	S	8.1	TJ	15.0	B	25	3.2	6	13 m	270	HAS08
2000 07 03.85		!	M	8.0	TJ	10	B	25	4.0	6			MAT08
2000 07 03.86		S	8.0:	AA	18.3	V	3	35	5	4	>0.1	270	KOR01
2000 07 03.87		S	8.0:	AA	6.0	B		15	5	4/			KOR01
2000 07 03.87		S	8.2:	AA	18.3	V	3	35	3	3	0.15	270	MER04
2000 07 03.90		s	S	7.9	SE	6	R	6	25	9	3		ERO
2000 07 03.91		E	7.9	AA	6	R	10	16	2	4/	0.4		ROM
2000 07 03.95		S	7.3	TT	8.0	B		12	8	5			BAR06
2000 07 03.96	x&	S	8.5:	S	6.4	R	12	32	3.5	d1			CH001
2000 07 03.99	x	B	8.3	TJ	5.0	B		10	4	5	12 m	270	PLE01
2000 07 04.02		S	8.2	AC	15.0	R	8	30	3	5			DIE02
2000 07 04.03	x	B	8.4	TJ	5.0	B		10	3.9	5/	15 m	276	PLE01
2000 07 04.70	xs	M	7.7	TT	10.0	B		20	4	5	13 m	265	YOS02
2000 07 04.89		M	8.1	SE	25	L	4	54	2	5	5 m	285	SHU
2000 07 04.90		E	8.0	AA	6	R	10	16	1.5	d4/	0.4		ROM
2000 07 04.90		s	M	7.6	SE	6	R	6	25	11	D5	4 m	ERO
2000 07 04.92	x&	S	8.5:	S	11.0	L	7	32	3.5	d1			CH001
2000 07 04.93		S	8.1	TJ	11.0	B		20	3	3			CHE03
2000 07 04.93	x&	S	7.9	TJ	6.5	R	6	28	3	5			SWI
2000 07 04.94	x	S	8.2	TT	10.0	B		25	4.5	s4	23 m	273	DRA02
2000 07 04.94	x	S	9.1	TJ	14.7	L	6	70	2	4	&15 m		SIW01
2000 07 04.95	x	B	7.9	TJ	31.7	L	5	78	1.2	8	0.12	275	ADA02
2000 07 05.05		S	8.1	TT	10.0	B		25	1.9	4	0.14	280	HAS02
2000 07 05.06		S	8.0	SC	8.0	B		40	4	7			BAR
2000 07 05.08		S	8.3	TJ	10.0	B		14	& 3	s3	0.4	255	PER01
2000 07 05.10	!	C	8.2	HI	40	D	2 a	15	> 2.9	D7	>12.7m	270	ROD01
2000 07 05.91		M	7.7	TT	8.0	B		10	6	4	0.4	255	HOR02
2000 07 05.94	x	M	8.3	TT	10.0	B		25	4.5	s4	27 m	273	DRA02
2000 07 05.95	x	B	7.6:	TJ	18	L	7	58	& 2.5	3/			WLO
2000 07 05.96	x	S	8.5	TJ	14.7	L	6	70	2	4	&15 m		SIW01
2000 07 05.98	x	S	8.1	TT	6.0	B		20	3	4	10 m	286	SCI
2000 07 05.99	x	B	8.8:	TJ	8.0	B		20	& 1.1	s6	&0.05	280	SPE01
2000 07 05.99	&	S	8.3	HS	40.6	L	5	86	2.5	8	12.3m	326	MOR09
2000 07 06.00		M	7.4	AA	5.0	B		10	6	d6	0.8	270	SAN07
2000 07 06.02	x	B	8.2	TJ	5.0	B		10	3.8	5/	20 m	282	PLE01
2000 07 06.03		k	8.4	HV	20.3	T	6 a	60	4		0.25	0	LIG
2000 07 06.06	!	V	8.0	YF	15.0	T	4 a120	+ 6.0	7		&0.5	270	MIK
2000 07 06.71	xs	M	7.5	TT	10.0	B		20	4	6	13 m	265	YOS02
2000 07 06.72	x	S	7.0	TJ	3.5	B		7	10	5			NAG08
2000 07 06.72	x	S	7.3	TJ	10.0	B		20	7	6/	25 m	265	NAG08
2000 07 06.75	x	S	7.8	TJ	15.0	B		25	4.0	6/	14 m	270	HAS08
2000 07 06.76		M	7.6	TT	8.0	B		11			30 m	270	TSU02
2000 07 06.89		S	7.7	AA	18.3	V	3	35	6	5	0.15	270	KOR01
2000 07 06.90		E	7.9	AA	6	R	10	16	1.5	D5/	0.4m	280	ROM
2000 07 06.90		S	7.9	AA	18.3	V	3	35	4	5	0.15	270	MER04
2000 07 06.91		S	7.8	AA	15.6	L	7	62	5	4/	0.1	270	KOR01
2000 07 06.92		M	7.6	SE	25	L	4	64	4	5/			SHU
2000 07 06.93		B	7.8	TJ	11.0	B		20	4	4			CHE03
2000 07 06.93		B	7.9	TT	10	B		25		2			KON06
2000 07 06.95		M	7.6	TT	8.0	B		10	6	5/	0.4	255	HOR02
2000 07 06.95	x	S	7.4:	TJ	18	L	7	58	& 3	4/			WLO
2000 07 06.98	x	B	8.1	TT	6.0	B		20	3	6	18 m	276	SCI
2000 07 06.99		S	7.8	TI	8.0	B		20	10	6	0.5	280	FOG
2000 07 07.01		M	7.1	AA	5.0	B		10	4.5	d6/	0.9	270	SAN07

## Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 07.03	x	B	8.1	TJ	5.0	B		7	4.0	5/	18 m	282	PLE01
2000 07 07.07	!	V	7.7	YF	15.0	T	4	a120	+ 6.0	7	&0.6	275	MIK
2000 07 07.34		B	8.0	S	7.0	B		10	9.3	5	0.26	250	DEA
2000 07 07.89		S	7.8	AA	18.3	V	3	35	5	4	0.15	270	KOR01
2000 07 07.90		S	8.0	AA	18.3	V	3	35	3	4/	0.1	270	MERO4
2000 07 07.91					20	L		70	5	5	0.16	262	BAR06
2000 07 07.91		S	7.5	TT	8.0	B		12	6	5			BAR06
2000 07 07.93		B	7.6	TJ	11.0	B		20	4	4			CHE03
2000 07 07.93		M	7.7	TT	20.3	T	10	50	2	7	8 m	285	LUE
2000 07 07.93	s	M	7.2	SE	6	R	6	25	7	5			ERO
2000 07 08.03		k	8.2	HV	20.3	T	6	a 90	5		0.28	0	LIG
2000 07 08.06	!	V	8.0	YF	15.0	T	4	a120	+ 6.0	7	&0.5	275	MIK
2000 07 08.10	!	C	8.0	HI	40	D	2	a 15	> 3.4	D7	>14.7m	270	ROD01
2000 07 08.29		B	7.6	AC	8.0	B	4	11	2	4	1	200	NOW
2000 07 08.71		M	7.7	AA	15.0	B		25	3	6	0.5	270	MIT
2000 07 08.73		S	7.9	TJ	25.4	T	6	32	4.2	S7	11 m	270	YOS04
2000 07 08.73	x	S	7.3	TJ	3.5	B		7	8	5			NAG08
2000 07 08.75	x	M	7.7	TT	10.0	B		20	4	6	26 m	265	YOS02
2000 07 08.78	x	M	7.2	TT	3.5	B		7		4			YOS02
2000 07 08.88		M	7.6	SE	25	L	4	64	3.5	5	4 m	284	SHU
2000 07 08.90		S	7.8	AA	18.3	V	3	35	5	4	0.15	265	KOR01
2000 07 08.91		S	7.5	AA	8	R	10	28	2.5	3			NES
2000 07 08.91		S	8.0	AA	6.0	B		15	5	3/			KOR01
2000 07 08.91		S	8.0	AA	18.3	V	3	35	4	4/	0.1	270	MERO4
2000 07 08.92		B	7.9	TJ	12.0	R	5	20	4	4			GAS01
2000 07 08.92	s	M	6.7	SE	6	R		22	9.5	5	46 m		ERO
2000 07 08.94		B	7.7	TJ	11.0	B		20		5			CHE03
2000 07 08.96	xs	S	6.5:	HD	11	L	7	32	3		0.25		TIT
2000 07 09.01	x	B	8.0	TJ	8.0	B		16	3.5	6/	0.8	284	PLE01
2000 07 09.04		S	7.1	AC	6.0	B		20	& 5	4			RES
2000 07 09.06		S	7.6	SC	8.0	B		20	6	6	0.2	280	BAR
2000 07 09.32		M	7.4	NP	5.0	B		10	6	4			CRE01
2000 07 09.51		M	8.4	TK	20	L	4	40	3.5	6	18 m	270	LIN04
2000 07 09.69	s	H	7.5	LA	18.0	L	6	a160	3.1	6/	24 m	279	KAD02
2000 07 09.72		C	8.2	TJ	18.0	L	6	a 40	2.2	6/	15 m	279	KAD02
2000 07 09.75	x	S	7.2	TJ	5.0	B		12	8	6	20 m	280	NAG08
2000 07 09.91		B	7.3	AA	8	R		28	2	4	12 m		NES
2000 07 09.93	x	M	8.5	TT	10.0	B		25	3.5	S5	54 m	275	DRA02
2000 07 09.96	x	B	7.5	TJ	7.0	B		25	& 3	s7	&0.10	300	SOC
2000 07 09.96	x	B	8.6	TT	6.0	B		20	4	5	1.2	273	SCI
2000 07 09.96		S	7.0	HI	6.0	B		20	7	4/	0.6	260	RES
2000 07 09.96	x	S	8.2:	TJ	18	L	7	58	& 4	2/			WLO
2000 07 09.99	x	S	8.7	TJ	14.7	L	6	70	2	3/	&25 m		SIW01
2000 07 10.00	x	B	8.6	TT	8.0	B		15	2	5	9 m	269	DUS
2000 07 10.00	x	B	8.7	TJ	6.6	B		20	& 5	5	&0.46	280	FIL04
2000 07 10.02	!	V	8.0	YF	15.0	T	4	a120	+ 6.0	7	&0.7	275	MIK
2000 07 10.03	x	S	8.6	TJ	8.0	R	7	35	4	3			KWI
2000 07 10.05		S	7.4	SC	8.0	B		20	5	5	0.5	280	BAR
2000 07 10.65		B	8.2	HS	7.0	B		10			0.4	280	OOT
2000 07 10.68	s	H	8.2	LA	35.5	T	11	a120	2.8	7	> 9.4m	278	FUK02
2000 07 10.72	s	V	8.9	LA	35.5	T	11	a120	2.8	7	> 9.4m	278	FUK02
2000 07 10.74	x	S	7.2	TJ	5.0	B		12	8	6	30 m	275	NAG08
2000 07 10.75		C	8.3	TJ	18.0	L	6	a 40	2.7	6/	17 m	278	KAD02
2000 07 10.75	s	H	7.3	LA	18.0	L	6	a160	3.6	6/	>22 m	278	KAD02
2000 07 10.88		M	7.4	TT	8.0	B		12	6	S6			BAR06
2000 07 10.88		M	7.8	TT	20	L		70	5	3/	0.2	263	BAR06
2000 07 10.89	x	B	8.1	TJ	6.6	B		20	& 4	4	&0.35	275	FIL04
2000 07 10.90	x	E	7.9	TJ	31.7	L	5	78	1.3	7	0.12	283	ADA02
2000 07 10.91		E	7.7	AA	6	R	10	16	1.5	d5	0.2	280	ROM
2000 07 10.91	x!	B	7.4	S	35	L	6	105	5	D5	& 7 m		CHR
2000 07 10.91	x&	B	7.5	TJ	20	L	4	58	3	6			SWI
2000 07 10.92	x	M	8.0	TT	10.0	B		25	3.7	S5	40 m	280	DRA02
2000 07 10.93	x&	S	8.0:	S	11.0	L	7	32	4.0	d1	7.5m		CH001
2000 07 10.95		S	7.0	HI	6.0	B		20	8	4	0.4	260	RES
2000 07 10.96		S	7.5	TT	20.3	T	10	50	4	6	10 m	261	LUE



Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 10.97	x	M	7.0	TJ	6.0	B		20	4	D5	&1.5	275	PAR03
2000 07 10.98	x	S	8.6:	TT	6.7	B		20	3	5	6	m 280	SCI
2000 07 10.99		S	7.7	TT	30.5	T	10	56	& 7	5/	0.9		COM
2000 07 11.00	x	B	8.9	TT	8.0	B		15	3	5	18	m 276	DUS
2000 07 11.03	x	S	7.2	TJ	5.0	B		7	& 2				BOD
2000 07 11.06		M	7.0	AA	5.0	B		10	3.5	d7/	0.7	270	SAN07
2000 07 11.09		M	7.6	S	11.5	L	5	23	2	6	10	m 275	SEG
2000 07 11.12		S	7.8	TJ	10.0	B		14	& 3	5	1.2	260	PER01
2000 07 11.36		S	7.9	AA	20.0	T	10	50	1.7	8/	&0.5	270	SHA04
2000 07 11.90		M	7.4	SE	25	L	4	38	2.5	6	15	m 270	SHU
2000 07 11.91		B	7.8	AA	30	L	5	60	3	S7	0.3	270	NEV
2000 07 11.91		M	7.8	AA	30	L	5	60	3	S7	0.3	270	NEV
2000 07 11.93		E	7.5	AA	6	R	10	16	2	s5	0.2		ROM
2000 07 11.94		M	7.6	HD	5.0	B		15	6	6	15	m 268	BRU
2000 07 11.98		M	7.2	AA	10	R	5	20	16	1			SAL01
2000 07 11.98		M	7.2	SE	10	R	5	20		1			SAL01
2000 07 11.98	xs	S	6.7	HD	15	C	15	90	3.5	4	0.25	270	SVE01
2000 07 12.00		M	7.0	TT	5.0	B		10	7	5	0.8	290	HOR02
2000 07 12.06	&	S	7.8	HS	20.3	L	4	61	2	8	51	m 282	MOR09
2000 07 12.86	x	B	7.8	TJ	6.0	B		20	& 2				ADA02
2000 07 12.86	s	M	6.7	SE	6	R	6	22	8.5	3	46	m	ERO
2000 07 12.92		E	7.5	AA	6	R	10	16	2	d5	0.2		ROM
2000 07 12.98	x	B	7.0	Y	7.0	B		25	& 3	s7	&0.10	300	SOC
2000 07 12.98		M	7.3	TT	8.0	B		12	7	S6			BAR06
2000 07 12.98	x	S	7.3:	TJ	18	L	7	58	& 6	4	&0.15		WLO
2000 07 12.99		M	7.0	TT	8.0	B		10	6	5	0.6	280	HOR02
2000 07 13.01	x	B	7.5:	TJ	6.0	B		20	& 5	3/			WLO
2000 07 13.02		S	6.9	TT	5.0	B		10	9	0			ZAN01
2000 07 13.89		M	6.9	TT	5.0	B		10	7	5	0.6	290	HOR02
2000 07 13.95		S	7.2	AA	6.0	B		15	8	5	1.0	240	KOR01
2000 07 13.95	s	M	6.5	SE	6	R	6	22	8	3	53	m	ERO
2000 07 13.99		S	7.0	HI	6.0	B		20	4	4			RES
2000 07 13.99		S	7.4	TJ	40.6	L	5	72	5	7	0.8	260	RES
2000 07 14.01	x	M	7.9	HD	6.5	L	8	30	3.5	5	16	m 286	GRO04
2000 07 14.02	x	B	7.9	TT	6.7	B		20	3	5	14	m 292	SCI
2000 07 14.02	x	S	7.1:	TJ	18	L	7	58	& 6	4			WLO
2000 07 14.05		B	7.1	TI	5.0	B		7	& 7.5	3	0.17	85	KOU
2000 07 14.06		S	6.8	SC	8.0	B		20	6	5	0.5	290	BAR
2000 07 14.09	!	V	7.5	YF	15.0	T	4	a120	+ 6.0	7	&1	300	MIK
2000 07 14.13	!	C	7.2	TI	30	T	3	a 30	> 5.7	D7	>37.4m	285	ROD01
2000 07 14.88		S	7.1	AA	6.0	B		15	8	5/	1.2	240	KOR01
2000 07 14.89	x	B	7.8:	TT	6.7	B		20	& 3	6	6	m 294	SCI
2000 07 14.90		M	6.9	TT	5.0	B		10	7	5	0.5	280	HOR02
2000 07 14.91		S	7.3	AA	5.0	R		20	4	7	0.2	260	MER04
2000 07 14.92		S	6.9:	HI	6.0	B		20	& 4	4			RES
2000 07 14.92		S	7.3	AA	18.3	V	3	35	4	6	0.25	260	MER04
2000 07 14.93	s	M	6.4	SE	6	R	6	22	9	5	60	m	ERO
2000 07 14.95		M	7.0	TJ	20.3	T	10	67	2	7	10	m 267	LUE
2000 07 14.97		S	6.8	TJ	5.0	B		10	3	7			LUE
2000 07 14.98	x	B	7.0:	Y	7.0	B		25	& 2	s7			SOC
2000 07 15.05		S	6.6	SC	8.0	B		20	9	7	0.8	300	BAR
2000 07 15.06		S	7.1	TJ	10.0	B		14	& 4	5	0.5	300	PER01
2000 07 15.34		S	7.0	AA	8.0	R	5	30	5.5	5/			SPR
2000 07 15.88		S	7.2	AA	18.3	V	3	35	4	6	0.2	230	MER04
2000 07 15.92	s	M	6.3	SE	6	R	6	22	9	5	60	m	ERO
2000 07 15.95		S	7.0	AA	6.0	B		15	7	6	0.8	235	KOR01
2000 07 15.98		M	7.2	TT	8.0	B		12	6	S6			BAR06
2000 07 16.59	xs	S	7.1	TJ	8.0	B		11	7	5	15	m 315	NAG08
2000 07 16.60	xs	S	7.6	TJ	32.0	L	5	58	4	6	20	m 315	NAG08
2000 07 16.65	s	H	7.5	LA	18.0	L	6	a160	3.4	7	15	m 313	KAD02
2000 07 16.72		S	7.6	TJ	25.4	T	6	62	3.4	6/	6	m	YOS04
2000 07 16.75		C	8.0	TJ	18.0	L	6	a 10	2.2	7	11	m 312	KAD02
2000 07 16.75	s	H	6.8	LA	35.5	T	11	a120	4.1	6	> 7.6m	315	FUK02
2000 07 16.76	s	V	8.0	LA	35.5	T	11	a120	4.1	6	> 7.6m	315	FUK02
2000 07 16.88		S	7.0	TI	20	T	6	50	3	6			GIA01

## Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 16.91		S	7.0	AA	6.0	B		15	7	5/	0.7	235	KOR01
2000 07 17.86		S	7.0:	AA	8.0	B		20	4	2	0.4	320	KES01
2000 07 17.93		S	6.8	AA	6.0	B		15	8	6	1.1	230	KOR01
2000 07 17.96		S	7.4	AC	15.0	R	8	30	7	5	20 m	330	DIE02
2000 07 18.00	xs	B	7.9:	TJ	20	L	5	30	& 6	S5	&0.5		POW01
2000 07 18.86		k	7.1	HV	20.3	T	6	a 30	5		0.33	70	LIG
2000 07 18.90	!	V	7.4	YF	15.0	T	4	a060	+ 6.0	7	&0.6	330	MIK
2000 07 18.93		S	7.5	S	15.0	M	10	27	3	7	0.17	350	SER02
2000 07 18.94	s	S	6.1	SE	5.0	B		7	6	3			ERO
2000 07 18.95	xs	S	6.5	HD	15	C	15	90	4	4	20 m		SVE01
2000 07 19.26		S	6.7	AA	8.0	B		11	5	5	0.25	355	SPR
2000 07 19.85		E	7 :	AA	6	R	10	16	3	d6/	0.5	290	VAS
2000 07 19.89		B	6.5	TI	5.0	B		7	> 8.5	4/	>0.25	350	KOU
2000 07 19.89	x	S	6.7:	TJ	18	L	7	40	&10	5	&0.25		WLO
2000 07 19.91	x	B	6.9:	TJ	6.0	B		20	&10	4	&0.30		WLO
2000 07 19.92		M	7.6	S	10	R	5	45	2	6	8 m	330	MAR02
2000 07 19.93	s	S	6.0	SE	5.0	B		7	6	3			ERO
2000 07 19.94		S	6.6	AA	6.0	B		15	8	5/	1.4	220	KOR01
2000 07 19.94	s	S	5.9	SE	6	R	6	22	9	3			ERO
2000 07 19.99		B	6.2	AA	8	R	10	28	2	3			NES
2000 07 20.01		S	6.2	TT	5.0	B		10	10	1			ZAN01
2000 07 20.23		S	6.6	AA	8.0	B		11	5	5	0.30	5	SPR
2000 07 20.47	s	H	7.1	LA	35.5	T	11	a120	4.3	6	> 8.3m	5	FUK02
2000 07 20.48	s	H	7.6	LA	18.0	L	6	a 60	2.8	7	>16 m	5	KAD02
2000 07 20.49		S	8.0	LA	35.5	T	11	a120	4.3	6	> 8.3m	5	FUK02
2000 07 20.51	xs	M	7.0	TT	10.0	B		20	6	S7	35 m	5	YOS02
2000 07 20.76		S	6.4	AA	6.0	B		15	7	5	1.6	235	KOR01
2000 07 20.80		S	6.5	AA	25.0	L	4	56	10	4/	0.9	255	KOR01
2000 07 20.82		S	6.5	AA	12.0	L	7	33	8	4	0.7	250	KOR01
2000 07 20.85		S	6.9	AA	8.0	B		20	5	4	0.3	355	KES01
2000 07 20.86		M	6.4	TT	8.0	B		10	6.5	5/	1.2	10	HOR02
2000 07 20.87		M	6.9	HD	5.0	B		15	8	6	20 m	338	BRU
2000 07 20.88	x	B	7.0:	TJ	6.0	B		20	& 8	3/			WLO
2000 07 20.88		E	6.8	AA	6	R	10	16	3	6/	1		VAS
2000 07 20.88		k	6.7	HV	20.3	T	4	a 60	5		0.42	95	LIG
2000 07 20.89		B	6.2	TI	5.0	B		7	> 9.0	5	>0.42	345	KOU
2000 07 20.89		M	7.5	S	5.0	B		10	2	7			SEG
2000 07 20.90		B	6.6	TT	10	B		25		4/	0.6		KON06
2000 07 20.90		S	6.4	AA	5.0	B		7	8	6			MER04
2000 07 20.90		S	7.3	AA	15.0	R	8	30	7	6	20 m	355	DIE02
2000 07 20.91		S	6.3	AA	5.0	R		20	8	5			MER04
2000 07 20.92		S	6.7	TJ	10.0	B		14	& 5	4	1.0	19	PER01
2000 07 20.97	&	S	7.3	HS	20.3	L	4	61	5	2	24 m	20	MOR09
2000 07 20.98	x	M	7.2	HD	6.5	L	8	30	6	6	20 m	25	GRO04
2000 07 21.01		S	6.2	TT	5.0	B		10	15	2			ZAN01
2000 07 21.08		B	6.7	AC	6.3	B	5	9	2	6	1	350	NOW
2000 07 21.08		B	7.3	TK	8.0	B		20	& 4	5	&26 m	10	GRE
2000 07 21.09		B	7.1	TK	5.0	B		12	& 7	2			GRE
2000 07 21.26		S	6.8	AA	8.0	R	4	19	6	6	0.25	20	SPR
2000 07 21.47	xs	S	6.7	TJ	5.0	B		12	8	6	45 m	10	NAG08
2000 07 21.48	x	C	6.8	HV	8.0	R	6	a 60	9.3		37 m	11	NAK01
2000 07 21.49		M	6.5	TT	3.5	B		7					TSU02
2000 07 21.49	xs	M	6.9	TT	10.0	B		20	6	S7	40 m	10	YOS02
2000 07 21.51	xs	M	6.5	TT	3.5	B		7		6	&40 m	10	YOS02
2000 07 21.82	s	S	5.9	SE	6	R	6	7	7	3			ERO
2000 07 21.83	s	S	6.5	HD	11	L	7	32	4	4	10 m	40	TER02
2000 07 21.84	x	B	6.8	TJ	25	L	6	54	3	7			SWI
2000 07 21.84		M	5.8	AC	5.0	B		10	3.5	S8	1	20	SAN07
2000 07 21.84		M	6.3	TI	6.0	B		20	5	s6/	1.8	25	SAR02
2000 07 21.85	x&	S	7.0:	S	11.0	L	7	32		d1			CH001
2000 07 21.85	xs	S	6.8	HD	5.0	B		10		3			KAY
2000 07 21.86	xs	S	6.7	HD	5.0	B		7	2		23 m		FED03
2000 07 21.87	x	B	6.7	TJ	6.0	B		20	& 6				ADA02
2000 07 21.87		S	6.0	AA	6.0	B		15	9	4/	1.3	280	KOR01
2000 07 21.87		k	6.5	HV	20.3	T	4	a 60	5		0.45	120	LIG

## Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 21.88		E	6.6	AA	20	L	5	33	5	D7/	1	310	VAS
2000 07 21.88	xs	B	7.4	TJ	20	L	5	45	7	S6	0.7	30	POW01
2000 07 21.89		M	6.7	S	5.0	B		10	2	7			SEG
2000 07 21.89	x	M	6.8:	TJ	6.0	B		20	4	D5	&1.0	0	PAR03
2000 07 21.89	!	V	6.3	YF	15.0	T	4	a060	+ 8.0	7	>0.6	27	MIK
2000 07 21.9		S	6.5	AA	10.0	B		14		8	0.5		L0001
2000 07 21.90		B	6.6	HV	6.3	B		9	3.5	S8	0.7	25	KAM01
2000 07 21.90		M	6.8	S	7.0	B		10	5	5	0.5	355	MAR02
2000 07 21.90		S	6.1	AA	25.0	L	4	55	10	5	0.9	285	KOR01
2000 07 21.91		B	6.3	TJ	10.0	B		14	& 6	4/	1.3	34	PER01
2000 07 21.91		B	6.6	S	8.0	B		12	5	7	1	10	SER02
2000 07 21.91		M	6.2	TJ	10.0	B		14	& 6	4/	1.3	34	PER01
2000 07 21.91		S	6.0	TJ	10.0	B		14	& 6	4/	1.3	34	PER01
2000 07 21.91		S	6.1	AA	12.0	L	7	33	9	4	1.1	280	KOR01
2000 07 21.92					15.0	R	8	30	7	6	25 m	20	DIE02
2000 07 21.92		B	6.2	TJ	3.4	B		9	& 7	4	1.8	10	PER01
2000 07 21.92		M	6.0	TJ	3.4	B		9	& 7	4	1.8	10	PER01
2000 07 21.92		S	6.0	TJ	3.4	B		9	& 7	4	1.8	10	PER01
2000 07 21.92		S	6.6	TT	8.0	B		15	& 5	6/	0.9	10	SCH04
2000 07 21.92		S	6.8	AA	5.0	B		8					DIE02
2000 07 21.93	!	C	6.8	HI	40	D	2	a 15		D7			ROD01
2000 07 21.94					40	D	2	a120	> 6.4	D7	>22.0m	27	ROD01
2000 07 21.94		S	6.5	TT	3.5	R		7		S7	0.7	32	BAR06
2000 07 21.96		M	6.4	AA	10	R	4	20	4.3	3/			SAL01
2000 07 21.97		B	6.9	HV	5.0	B		7					GRA04
2000 07 21.97		M	6.9	HV	7.0	R	7	24	2.5	7			GRA04
2000 07 22.19		B	6.5	AA	8.0	B		11					SCH12
2000 07 22.19		S	6.4	AA	8.0	B		11	6	6	2		SCH12
2000 07 22.48		M	6.7	AA	15.0	B		25	3	7			MIT
2000 07 22.49		C	6.9	TJ	18.0	L	6	a 10	3.2	7	21 m	33	KAD02
2000 07 22.49		M	6.6	AA	8.0	B		20	6	7			YUS
2000 07 22.49	s	H	6.4	LA	18.0	L	6	a 60	5.0	7	>22 m	35	KAD02
2000 07 22.50	s	H	5.9	LA	35.5	T	11	a 60	4	7	> 6.3m	36	FUK02
2000 07 22.51	xs	M	6.6	TT	3.5	B		7		5			YOS02
2000 07 22.52	s	V	5.5	LA	35.5	T	11	a 60	4	7	> 6.2m	36	FUK02
2000 07 22.78	s	S	5.6	SP	10	R	4	18	10	7	48 m		BAL03
2000 07 22.82		S	5.7	AA	6.0	B		15	12	5	1.4	305	KOR01
2000 07 22.83		E	6.2	AA	20	L	5	33	7	D6/	1		MIH
2000 07 22.85		M	5.8	AC	5.0	B		10	5	S8	2	45	SAN07
2000 07 22.85		M	6.0	TT	10	B		25	10	5/	1.0		ZNO
2000 07 22.87		S	6.3	AA	5.0	B		7	6	5			MER04
2000 07 22.87		S	6.4	TI	20	T	6	50	6	7			GIA01
2000 07 22.88	x	B	6.3	TT	5.0	B		7	9	6/	1.1	39	SCI
2000 07 22.88		S	6.1	TT	3.2	B		8	< 9	3	1.0	345	HAS02
2000 07 22.88		S	6.2	AA	18.3	V	3	33	4	6			MER04
2000 07 22.89	x	B	7.1	TJ	5.0	B		7	4.0	7/	1.7	36	PLE01
2000 07 22.89	&	B	6.6	HS	8.0	B		20	7	8	132 m	34	MOR09
2000 07 22.90		B	6.2	HV	6.3	B		9	7	S7	0.7	35	KAM01
2000 07 22.90		M	6.3	AA	11	B		20	5	S7	0.5	15	NEV
2000 07 22.90	!	V	6.4	YF	15.0	T	4	a060	+ 8.0	7			MIK
2000 07 22.91		B	6.5	TJ	11.0	B		20	3	6	0.3		CHE03
2000 07 22.91		M	6.4	HD	5.0	B		15	10	5	22 m	7	BRU
2000 07 22.91		S	6.0	TJ	5.0	B		10	5	6	30 m	45	LUE
2000 07 22.91		S	6.6	TT	8.0	B		15	& 6	6/	0.7	30	SCH04
2000 07 22.92		B	6.3	TJ	5.0	B		7		5	0.3		CHE03
2000 07 22.93		M	6.0	TT	5.0	B		10	7	5/	1.6	40	HOR02
2000 07 22.93		S	5.8	TT	5.0	B		7	11		1		SVE
2000 07 22.94		M	6.2	TT	8.0	B		12	7	S7/	1.5	37	BAR06
2000 07 22.94		S	6.4	TT	3.5	R		7		S8	1.2	37	BAR06
2000 07 22.96		E	6.2	AA	20	L	5	33	6	D7/	0.8		MIH
2000 07 23.00		S	5.4	SP	10	R	4	18	5	4			BAL03
2000 07 23.08		B	6.7	TK	8.0	B		20	& 3.7	6	&0.3		GRE
2000 07 23.09		B	6.6	TK	5.0	B		12	& 5.5	6/			GRE
2000 07 23.27		M	6.7	TK	20	L	4	40	4.0	7	25 m	45	LIN04
2000 07 23.47	s	H	6.1	LA	35.5	T	11	a 60	6.0	7	> 8.2m	50	FUK02

## Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 23.48		C	6.8	TJ	18.0	L	6	a 10	3.7	7	>21 m	47	KAD02
2000 07 23.49	s	H	6.5	LA	18.0	L	6	a 80	6.2	7	>27 m	48	KAD02
2000 07 23.49	s	V	6.8	LA	35.5	T	11	a 60	6.0	7	> 8.2m	50	FUK02
2000 07 23.49	s	V	7.5	LA	18.0	L	6	a 80	3.2	7	15 m	46	KAD02
2000 07 23.83		S	6.2	TI	20	T	6	50	7	7			GIA01
2000 07 23.84		M	6.0	TI	6.0	B		20	6	6	2.0	40	SAR02
2000 07 23.84	x	O	6.6:	TJ	4.0	B		8	& 5	D6	&0.13	54	MAR13
2000 07 23.85		B	5.9	TI	6	M	6	25	9.0	5	>0.33	310	KOU
2000 07 23.85	x	B	6.1	S	15.0	L	6	81	4	7	0.33		GUZ
2000 07 23.85	x	B	6.5	S	6.0	B		20	4.9	s6	72 m	47	WLO01
2000 07 23.85	x	B	7.0:	Y	7.0	B		25	& 7	D8	&0.10	0	SOC
2000 07 23.85		M	6.0	AC	5.0	B		10	5	s6	2.5	55	SAN07
2000 07 23.86	x	B	6.4	TT	5.0	B		7	7	6/	45 m	31	SCI
2000 07 23.86	x	S	5.7	TJ	5.0	B		10	10	5	&30 m		SIW01
2000 07 23.86		S	6.1	AC	6.0	B		20	7	6	0.5	30	RES
2000 07 23.86		S	6.3	AC	40.6	L	5	72	9	8	1.2	30	RES
2000 07 23.87	x	B	6.5	TJ	25	L	6	108	4	7			SWI
2000 07 23.87	x	B	6.7	S	4.0	B		12	15	S7	51 m	56	LEG
2000 07 23.87	x	B	6.7	TJ	5.0	B		15	& 5	7			ADA02
2000 07 23.87	x	M	5.9	TJ	5.0	B		10	4	D5	&0.5	50	PAR03
2000 07 23.87		M	6.2	TI	5.0	B		7	6.5		2		KYS
2000 07 23.87	x	S	6.6:	TJ	18	L	7	40	&10	4/	&0.50		WLO
2000 07 23.87	x!	B	5.8	S	6.0	B		20	6	D5	&10 m		CHR
2000 07 23.88		M	6.3	S	10	R	5	45	5	7	15 m	330	MAR02
2000 07 23.88	x	M	6.7	S	11	L	7	32	7	S5	0.27	55	WAL03
2000 07 23.88	x	S	6.8:	TJ	6.0	B		20	& 8	4			WLO
2000 07 23.88	x&	B	6.7	S	10.0	B		25	4.1	S5	1	35	DRA02
2000 07 23.88	x&	O	7.2	S	6.0	B		20		4			BAL05
2000 07 23.89	x	B	6.5	TJ	5.0	B		10	5	3			GAN
2000 07 23.89	x	B	6.7	TJ	6.0	B		20	7.2	S7	1.25	42	SAD
2000 07 23.89	x	B	6.9	S	4.0	B		12	17	S7	32 m	55	GRO05
2000 07 23.89	x	B	7.2:	S	10.0	B		25	1.8	s4	11.5m	50	CH002
2000 07 23.89	x	M	6.0	TJ	7.0	R	6	20	4	D5	&0.5	50	PAR03
2000 07 23.90	x	B	5.0	TJ	5.0	B		10	&10	3			OSS
2000 07 23.90	x	B	6.5	TT	6.6	B		20	& 6	6/	0.5	80	FILO4
2000 07 23.90	x	B	6.8	TJ	8.0	B		20	2.7	S6	&0.29	55	SPE01
2000 07 23.90	x	B	7.1	S	6.0	B		20	21	S4/	1.3	27	AMB
2000 07 23.90		M	5.9	TT	8.0	B		10	6.5	6	1.5	45	HOR02
2000 07 23.90	x	M	6.2	TJ	8.0	R	7	35	6	6			KWI
2000 07 23.91	x	B	5.7	S	6.0	B		20	3	S6	0.06	60	PAL03
2000 07 23.91	x	B	8.1	S	11	L	7	32	5.7	S6	11 m	55	CZY
2000 07 23.91	x	M	6.4	HD	6.5	L	8	30	6	6	25 m	48	GRO04
2000 07 23.91		S	6.6	TT	8.0	B		15	5	6/	0.7	35	SCH04
2000 07 23.93	x	B	8.8	S	11	L	7	32	5.5	S5	11 m	55	GRO06
2000 07 23.94	x	B	6.7	S	6.0	B		20	1.6	S4	2	24	MAK02
2000 07 23.96	x&	B	7.3	TJ	11	L	7	33	3	s6	&0.83	61	BOH02
2000 07 23.97	x	B	6.2	S	5.0	B		7		S6	5	52	SMY
2000 07 23.98	x&	O	6.6	TJ	5.0	B		15	6	D7	&0.22	56	MAR13
2000 07 24.08		B	6.5	TK	5.0	B		12	& 8	5			GRE
2000 07 24.10		B	6.7	TK	25.4	L	4	39	& 1.1	8	&10 m	30	GRE
2000 07 24.20		B	5.0	AA	8.0	B		11					SCH12
2000 07 24.20		S	5.1	AA	8.0	B		11	6	4	1		SCH12
2000 07 24.27		S	6.6	AA	8.0	B		11	5	7	0.50	60	SPR
2000 07 24.78		S	5.4	SP	10	R	4	18	5	4			BAL03
2000 07 24.84	x	B	6.8	TJ	10.0	B		25	& 5	s5	&0.6		SAD
2000 07 24.84	xs	S	6.4	HD	10	C	10	60	3.5	4	17 m		SVE01
2000 07 24.84	s	S	6.4	HD	11	L	7	32	5	4	15 m		TER02
2000 07 24.85	x	B	8.3	S	11	L	7	32	2.3	s3	4 m	67	GRO06
2000 07 24.85	x	E	6.4	TJ	14.0	L	6	44	1.9	7	0.42	50	ADA02
2000 07 24.85	x	S	6.3	TJ	5.0	B		10	& 5				SWI
2000 07 24.86	x	B	6.8	S	10.0	B		25	23	s5	35 m		GRO05
2000 07 24.86		E	6.5	AA	20	L	5	33	6	d6/	1	27	MIH
2000 07 24.86		S	6.2	AC	6.0	B		20	6	5/	1.5	30	RES
2000 07 24.86		S	6.3	AC	40.6	L	5	72	8	7	1.2	30	RES
2000 07 24.87					40	D	2	a240	> 9	D7	>27.0m	60	ROD01

Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 24.87	x	B	5.7	S	10.0	B		25	14	s4	1	80	CH002
2000 07 24.87	x	B	5.9	S	10.0	B		25	3.8	S4	25 m	52	CZY
2000 07 24.87	x	M	6.0	TJ	5.0	B		10	5	D5	&0.5	55	PAR03
2000 07 24.87	x!	B	6.0	S	6.0	B		20	6	D5	&10 m		CHR
2000 07 24.88	x	B	5.8	S	4.0	B		12	4	s4	8 m	63	GRO05
2000 07 24.88	x	B	6.4	S	10.0	B		25	1.6	s3	3.3m	35	GRO06
2000 07 24.88	x	M	6.1	TJ	7.0	R	6	20	6	D5	&0.5	55	PAR03
2000 07 24.88	x	0	6.6	TJ	4.0	B		8	& 4	D6	&0.15	56	MAR13
2000 07 24.89		B	5.8	TI	6	M	6	25	9.5	5	0.42	300	KOU
2000 07 24.89	x	M	6.5	S	5.0	B		7	6.3	S5	0.40	48	WAL03
2000 07 24.89	!	C	6.5	HI	40	D	2 a	10		D7			ROD01
2000 07 24.89	x&	0	6.6	TJ	5.0	B		15	& 5	D6	&0.15		MAR13
2000 07 24.90	x	B	6.0	S	4.0	B		12	7	s3	14 m	39	LEG
2000 07 24.90	x	B	6.9	TJ	8.0	B		16	4.0	7			PLE01
2000 07 24.90	x	B	7.7	S	10.0	B		20	4.3	d3	18 m	44	WL001
2000 07 24.90	x	M	6.9	HD	6.5	L	8	30	5	5	18 m	57	GRO04
2000 07 24.90	x	M	7.0	S	5.0	B		7	2	S4/	0.05	48	HOL04
2000 07 24.90	x&	B	6.8	TJ	11	L	7	33	3	d4	&0.67	53	BOH02
2000 07 24.91	x	B	6.7	S	11	L	7	32	5.5	S6/	0.4		SAD
2000 07 24.91	x	B	7.0	TJ	15	M	10	40	4.5	6/	1.2	42	PLE01
2000 07 24.91	x&	0	6.7:	TJ	5.0	B		15	& 4	D6	&0.13		MAR13
2000 07 24.92	x	B	6.8	TJ	5.0	B		7	4.8	7/	1.5	42	PLE01
2000 07 24.92		M	6.2	TT	8.0	B		12	7	D6	1.2	67	BAR06
2000 07 24.92		S	6.4	TT	3.5	R		7	5	s7	1		BAR06
2000 07 24.92	x&	S	7.8	S	11.0	L	7	32	4.0	d1	10 m		CH001
2000 07 24.95	x	B	6.4	S	10.0	B		20		S6/	1.5	53	SMY
2000 07 24.98	x	B	7.0:	TJ	6.0	B		20	& 7	4			WLO
2000 07 25.19		B	6.1	AA	8.0	B		11					SCH12
2000 07 25.19		S	6.2	AA	8.0	B		11	8		0.75		SCH12
2000 07 25.29		M	7.2	TK	20	L	4	40	3.0	5	15 m	40	LINO4
2000 07 25.78		S	6.0	AA	6.0	B		15	8	6	1.1	340	KOR01
2000 07 25.79		S	6.1	AA	21.0	L	5	33	7	6	0.8	345	KOR01
2000 07 25.80		S	6.1	AA	21.0	L	5	55	7	6	0.7	340	KOR01
2000 07 25.82	x	B	7.5	S	11	L	8	32	11	S5	52 m	38	AMB
2000 07 25.84		B	6.4	TI	6	M	6	25	8.5	4/	0.33	285	KOU
2000 07 25.84	x	B	7.4	S	10.0	B		20	3.9	d3/	10 m	48	WL001
2000 07 25.84	x	B	7.6:	S	10.0	B		25	& 4.5	4	0.4		SAD
2000 07 25.84	x	E	6.5	TJ	31.7	L	5	78	1.3	8	0.3	70	ADA02
2000 07 25.85	x	B	7.0	S	11	L	7	32	6.9	S5	45 m	40	CZY
2000 07 25.85		E	6.9	AA	5.0	B	5	10	4		0.9		MIH
2000 07 25.85	x	M	6.9	S	8.0	B		16	5.6	S4	0.35	50	WAL03
2000 07 25.85		S	6.1	TT	8.0	B		10	5		1.0		POD
2000 07 25.85	x	S	7.1	TJ	5.0	B		7	& 3				BOD
2000 07 25.86	x	B	6.2	S	5.0	B		10	3	6	0.25		GUZ
2000 07 25.86	x	B	7.5	S	4.0	B		12	6	6	18 m	48	LEG
2000 07 25.86	x	B	8.7	S	10.0	B		25	2.6	s3	0.5	73	MAK02
2000 07 25.86		S	6.4	AC	6.0	B		20	6	5/	0.5	45	RES
2000 07 25.86	!	C	7.0	HI	40	D	2 a	10		D6			ROD01
2000 07 25.87	x	B	7.0:	Y	7.0	B		25	& 7	d5	&0.10	5	SOC
2000 07 25.87	x	B	7.1	TJ	5.0	B		7	5	6			PLE01
2000 07 25.87	x	B	7.3	TJ	15	M	10	40	3.5	6/			PLE01
2000 07 25.87	x!	B	6.6	S	6.0	B		20	5	D4	& 8 m		CHR
2000 07 25.88	x	B	7.0	TT	5.0	B		7	8	4	1.6	38	SCI
2000 07 25.88	x	B	7.1:	S	11.4	L	4	25	& 2.5	4			GRO03
2000 07 25.88	x	B	7.2	TJ	8.0	B		16	4.5	5/			PLE01
2000 07 25.88	x	M	6.8	S	8.0	B		16	4.6	S5	0.15	51	HOL04
2000 07 25.88	!	C	7.0	HI	40	D	2 a	240	> 6.7	D6	>30.0m	60	ROD01
2000 07 25.88	x&	B	7.1	TJ	25	L	4	33	4	d5	&0.60	50	BOH02
2000 07 25.89		M	6.0	TT	8.0	B		10	8	6	2.0	60	HOR02
2000 07 25.89		M	6.3	S	10	R	5	25	5	5	25 m	320	MAR02
2000 07 25.90	x	B	7.1	TJ	8.0	B		20	& 2	s5	&0.25	65	SPE01
2000 07 25.90	x	B	7.1	TT	6.6	B		20	& 8	6	&0.47	65	FIL04
2000 07 25.90		M	5.8	TI	10	B	4	25	12	5	1.8	95	HAL05
2000 07 25.94	x	B	6.3	S	5.0	B		7		S6/	3	55	SMY
2000 07 25.95		B	6.5:	TJ	5.0	B		7	3	4			CHE03

## Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 26.00		S	5.6	SP	7	R	4	12	5	4			BAL03
2000 07 26.10		S	6.5:	AA	20.0	T	10	50	1.7	7/			SHA04
2000 07 26.22		B	6.8	AA	8.0	B		11					SCH12
2000 07 26.22		S	6.7	AA	8.0	B		11	6	1	0.75		SCH12
2000 07 26.28		M	7.6	TK	20	L	4	40	3.0	5	11 m	70	LIN04
2000 07 26.36	w	S	6.5:	AA	10.0	B		25					SEA
2000 07 26.72		S	6.2	AA	11	L	7	33		2			KHA06
2000 07 26.77		B	7.2	S	5.0	B		15	4	2/	30 m		KRY01
2000 07 26.77		S	6.3	AA	6.0	B		15	9	5/	1.1	290	KOR01
2000 07 26.77	s	M	6.2	AA	25	L	4	53	4	2/	60 m		BAZ
2000 07 26.77	s	M	6.2	AA	25	L	4	53	4	3/	60 m	75	SHU
2000 07 26.77	s	M	6.2	AA	25	L	4	54	2	3/	50 m		ISA
2000 07 26.78		E	6.4	AA	11	L	7	45		2			VIN03
2000 07 26.78		E	6.5:	S	5.0	B		10					LAK
2000 07 26.78		K	6.4	AA	4.0	B		12		3/			VER07
2000 07 26.78		M	6.4	AA	11	L	7	33		3			KUL01
2000 07 26.79		E	6.5	AA	11	L	7	45		2			KOR02
2000 07 26.79		S	6.3	AA	21.0	L	5	33	8	6	0.9	285	KOR01
2000 07 26.80		S	6.3	AA	21.0	L	5	55	7	6/	0.7	285	KOR01
2000 07 26.83		C	7.3	HS	20.3	T	4	a 30	5		0.33	157	LIG
2000 07 26.83		M	6.5	S	11	L	7	32		2			KHA05
2000 07 26.83		S	6.4	TI	20	T	6	50	7	6			GIA01
2000 07 26.85		S	7.2	AC	6.0	B		20	7	4	0.2	90	BAL04
2000 07 26.85	s	M	5.6	SP	7	R	4	12	12	4			ERO
2000 07 26.86		E	7	: AA	5.0	B		5	10	4			VER06
2000 07 26.87		M	6.5	TI	5.0	B		7	12	4	1.5		KYS
2000 07 26.88		M	6.2	TT	5.0	B		10	9	5/	1.2	60	HOR02
2000 07 26.88		M	6.5	S	10	R	5	25	4	6	20 m	290	MAR02
2000 07 26.90		M	6.6	TI	10	B	4	25	18	3/	1.0	90	HAL05
2000 07 26.91		S	6.8	TJ	11.0	B		20	4	3			CHE03
2000 07 27.21		B	7.0	AA	8.0	B		11					SCH12
2000 07 27.21		S	6.8	AA	8.0	B		11	6	1	0.75		SCH12
2000 07 27.40		S	7.6	TJ	10	B		25	3.0	2	0.50	90	MAT08
2000 07 27.70		S	6.4	AA	11	L	7	33		3			KUL01
2000 07 27.70		S	6.8	AA	11	L	7	32					VER07
2000 07 27.71		S	6.7	AA	11	L	7	33		2			KHA06
2000 07 27.76		S	6.7	AA	6.0	B		15	8	6	0.9	280	KOR01
2000 07 27.77		M	7.2	S	6.0	B		15	5	2			KRY01
2000 07 27.77		S	6.8	AA	21.0	L	5	33	10	5/	0.7	280	KOR01
2000 07 27.79		E	6.5	AA	11	L	7	45	3	2			VIN03
2000 07 27.79		E	6.5	AA	11	L	7	45	& 3	2			KOR02
2000 07 27.79		M	8.0	AA	25	L	4	54	1	2/	40 m		ISA
2000 07 27.79		M	8.0	AA	25	L	4	54	4	2	40 m		BAZ
2000 07 27.79		M	8.0	AA	25	L	4	54	4	3	30 m		SHU
2000 07 27.79		S	6.8	AA	21.0	L	5	55	8	5	0.6	285	KOR01
2000 07 27.80		M	6.8	S	11	L	7	32		1/			KHA05
2000 07 27.81		M	7.3	S	5.0	B		10					LAK
2000 07 27.82		S	6.9	AA	5.0	B		10	10	6	0.9	280	KOR01
2000 07 27.83	x	B	7.5:	TJ	31.7	L	5	78	& 2				ADA02
2000 07 27.86		S	6.6	AC	6.0	B		20	5	4			RES
2000 07 27.86	x&	S	6.7	TJ	6.5	R	6	14	& 5				SWI
2000 07 27.89		M	6.2	S	10	R	5	25	4	5	30 m	285	MAR02
2000 07 27.89	!	C	7.8:	HI	40	D	2	a 10		D5			ROD01
2000 07 27.90					40	D	2	a240	> 6.3	D5	>32.0m	84	ROD01
2000 07 27.90		S	6.6	TJ	8.0	B		11	4	7	1.0	95	DES01
2000 07 27.92		B	7.3	S	7.0	B		10	8.0	5	0.43	65	DEA
2000 07 28.76		M	7.7	S	25	L	4	54	3	2	40 m	50	SHU
2000 07 28.76		S	7.1	AA	6.0	B		15	7	5	0.8	280	KOR01
2000 07 28.77		M	7.5	S	6.0	B		15	5	2			KRY01
2000 07 28.77		M	7.6	S	35	L	5	83	4	2	52 m		SHU
2000 07 28.78		M	7.7	S	25	L	4	54	2	2	40 m		BAZ
2000 07 28.78		S	7.2	AA	21.0	L	5	33	8	6	0.6	280	KOR01
2000 07 28.79		E	7.4	AA	11	L	7	45	& 3	2			KOR02
2000 07 28.79		K	7.8:	S	6.0	B		15	5	2			KRY01
2000 07 28.79		M	7.3:	AA	11	L	7	45		2			LAK

Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 28.79		S	7.3	AA	21.0	L	5	55	8	6	0.5	280	KOR01
2000 07 28.80		E	6.5	AA	11	L	7	54	3	2			KHA05
2000 07 28.80		E	7.3	AA	11	L	7	45	3	2			VIN03
2000 07 28.80		S	7.6:	AA	11	L	7	33		2			VER07
2000 07 28.80		S	7.7	AA	11	L	7	33		3			KUL01
2000 07 28.86		S	7.0	AA	4.2	B		7	5	3			ZAN
2000 07 28.86	!	C	7.4	HI	40	D	2	a 60		D5			ROD01
2000 07 28.87					40	D	2	a240	> 4.5	D5	>24.2m	86	ROD01
2000 07 28.90		S	6.4	TJ	8.0	B		11	3	6	1.8	95	DES01
2000 07 28.93		S	7.4	S	7.0	B		10	8.0	5	0.47	72	DEA
2000 07 29.35		S	8.2	AA	10.0	B		25			0.3	85	SEA
2000 07 29.75		S	7.9:	AA	11	L	7	54					VER07
2000 07 29.76		S	7.9	AA	6.0	B		15	6	5	0.8	265	KOR01
2000 07 29.77		E	7.3	AA	11	L	7	45	3	1			VIN03
2000 07 29.77		M	7.3	AA	11	L	7	45	3	1			LAK
2000 07 29.77		M	8.4	S	35	L	5	83	4	2	52 m	102	SHU
2000 07 29.78		E	7.4	AA	11	L	7	45	3	1			KOR02
2000 07 29.78		M	7.8	AA	11	L	7	32		1			KHA05
2000 07 29.78		M	8.4	HS	25	L	4	53	3	2	60 m		BAZ
2000 07 29.78		S	8.0	AA	21.0	L	5	33	7	5	0.5	265	KOR01
2000 07 29.79		S	8.0	AA	21.0	L	5	55	7	5	0.4	265	KOR01
2000 07 29.83		S	7.2	TI	8.0	B		20	5	2	8 m		FOG
2000 07 29.85		S	8.0	TI	20	T	6	67		2			TOT03
2000 07 29.86					40	D	2	a180	> 2.8	D5	>16.0m	91	ROD01
2000 07 29.86		S	7.2	AA	4.2	B		7	5	2/			ZAN
2000 07 29.86	!	C	7.9	HI	40	D	2	a 17		D5		91	ROD01
2000 07 29.87		S	8.2:	AA	11	L	7	54		1			VER07
2000 07 29.88		M	8.3	S	25	L	5	30	3	4	14 m	114	SEG
2000 07 29.90		M	6.4	S	7.0	B		10	6	4	35 m	100	MAR02
2000 07 29.90		M	6.6	S	7.0	B		10	9	3			SAN04
2000 07 29.90		S	7.1	AA	23.0	L	5	45	5	1	>1.3	95	DES01
2000 07 29.91		S	7.0	AA	8.0	B		11	5	0			DES01
2000 07 29.91		S	7.1	AA	13.5	L	5	21			2.0	95	DES01
2000 07 29.91		S	7.1	TJ	13.5	L		21	10	0/			SOU01
2000 07 29.92		S	8.2	S	7.0	B		10	4.5	5	0.33	88	DEA
2000 07 29.94		S	7.0	TJ	8.0	B		11		0			SOU01
2000 07 30.74		S	8.2	AA	11	L	7	54		1			VER07
2000 07 30.76		S	8.3	AA	6.0	B		15	10	4	0.9	260	KOR01
2000 07 30.77		M	8.4	AA	11	L	7	32	4	1			KHA05
2000 07 30.77		M	8.5	HS	35	L	5	83	4	2/	52 m	105	SHU
2000 07 30.77		M	8.5	S	25	L	4	53	4	2	60 m		BAZ
2000 07 30.77		M	8.5	S	35	L	5	83	4	2/	52 m	105	SHU
2000 07 30.77		S	8.3	AA	21.0	L	5	33	8	4/	0.6	260	KOR01
2000 07 30.78		M	7.5:	AA	11	L	7	45		1			LAK
2000 07 30.79		E	7.5	AA	11	L	7	45	4	1/			VIN03
2000 07 30.79		E	8.7:	AA	6.0	B		15		1			LIS02
2000 07 30.82		S	8.0	AA	25	L	4	54		2			KUL01
2000 07 30.85	!	V	7.9	YF	15.0	T	4	a060	+ 8.0		&0.5	90	MIK
2000 07 30.86					40	D	2	a180	> 3	d4	>18.2m	92	ROD01
2000 07 30.86		S	7.5	AA	4.2	B		7	5	3			ZAN
2000 07 30.86	!	C	8.0:	HI	40	D	2	a 15		d4		92	ROD01
2000 07 30.92		C	8.9	HS	20.3	T	6	a 30	5		0.25	184	LIG
2000 07 30.94		S	8.0	S	7.0	B		10	7.5	4	0.3	90	DEA
2000 07 31.43		S	8.5	TJ	10	B		25	3.0	1	0.33	90	MAT08
2000 07 31.76		M	9.0:	AA	11	L	7	32		0/			KHA05
2000 07 31.77		M	9.3	S	35	L	5	83	5	2	40 m		SHU
2000 07 31.80		E	8.7	AA	11	L	7	45	& 3	1			KOR02
2000 07 31.80		E	8.8:	AA	11	L	7	45	3	1			VIN03
2000 07 31.85		S	8.6	TT	10.0	B		25	5.7	1			HAS02
2000 07 31.85	!	C	8.6:	HI	40	D	2	a 12		d4			ROD01
2000 07 31.86					40	D	2	a180	> 3	d4	>18.0m	96	ROD01
2000 07 31.86		S	8.5	AA	15.0	B		20	3	1/			ZAN
2000 08 01.82	x	[	9.0	TJ	31.7	L	5	78	!	2			ADA02
2000 08 01.83	x	S	7.8	S	11	L	7	32	2.7	2/			SAD
2000 08 01.83	x	S	7.8:	S	15.0	L	6	48	5				GUZ

## Comet C/1999 S4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 08 01.85		M	7.7:	TT	8.0	B		10	9	2			HOR02
2000 08 01.85		S	8.5	TT	10.0	B		25	4.8	2			HAS02
2000 08 02.35		S	9.0	AA	10.0	B		25	4	1	0.3	95	SEA
2000 08 02.85	x	[	8.5	TJ	8.0	B		16	! 2	1			PLE01
2000 08 03.85	x	[10		TJ	35	M	6	50	! 2	1			PLE01

## Comet C/1999 T1 (McNaught-Hartley)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 06 06.91		S	12.5:	GA	41	L	4	90					PEA
2000 06 07.91		S	12.7	GA	41	L	4	90	1.2	3			PEA
2000 06 08.73		S	13.3	HS	25	L	5	180	0.8	3/			RAE
2000 06 09.74		S	12.9	HS	25	L	5	75	1.4	3/			RAE
2000 06 10.91		S	12.7	GA	41	L	4	90	1.1	2/			PEA
2000 06 11.90		S	12.8	GA	41	L	4	90	1.2	2			PEA
2000 06 12.80		S	12.6	GA	25.4	L	4	71	1.5				SEA
2000 06 12.83		S	12.8	HS	20	L	7	160	1.0	3			MAT08
2000 06 13.72		S	12.5	HS	25	L	5	75	1.4	2			RAE
2000 06 30.72		M	12.7	HS	25	L	5	75	1.3	4			RAE
2000 07 03.84		S	12.7	HS	20	L	7	160	1.0	3			MAT08

## Comet C/1999 T2 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 23.74		C	15.3	TJ	18.0	L	6 a	60	0.45				KAD02
2000 04 28.77		C	15.4	TJ	18.0	L	6 a	60	0.4				KAD02
2000 04 29.76		C	15.2	TJ	18.0	L	6 a	60	0.4				KAD02
2000 05 04.73		C	15.0	TJ	18.0	L	6 a	60	0.45				KAD02
2000 05 08.75		C	15.6	TJ	18.0	L	6 a	60	0.35				KAD02
2000 05 08.79		C	15.0	GA	60.0	Y	6 a	120	0.7				NAK01
2000 05 18.71		C	15.6	TJ	18.0	L	6 a	60	0.35				KAD02
2000 05 21.72		C	15.5	TJ	18.0	L	6 a	60	0.3				KAD02
2000 05 24.71		C	15.2	TJ	18.0	L	6 a	60	0.4				KAD02
2000 05 25.97		S	13.8	AC	31.0	J	6	186	0.5	3			BOU
2000 05 29.72		C	15.2	TJ	18.0	L	6 a	60	0.35				KAD02
2000 05 31.00		S	[13.1	HS	30	R	20	230					SHA02
2000 06 01.70	s	H	15.4	LA	50.0	C	12 a	360	0.32	4			FUK02
2000 06 01.71		C	15.1	TJ	18.0	L	6 a	60	0.35				KAD02
2000 06 01.99		S	13.6	AC	40.6	L	5	72	1.7	2			RES
2000 06 02.96		S	13.5	AC	40.6	L	5	72	1.5	3			RES
2000 06 03.00		B	13.1	HS	42	L	5	81	1.5	3			LEH
2000 06 04.00		M	12.9	HS	42	L	5	81	1.7	3			LEH
2000 06 06.72		C	15.1	TJ	18.0	L	6 a	60	0.4				KAD02
2000 06 06.97		S	13.5	AC	40.6	L	5	72	1.2	2/			RES
2000 06 07.71		C	15.3	TJ	18.0	L	6 a	60	0.35				KAD02
2000 06 07.75		C	15.1	GA	60.0	Y	6 a	120	0.6				NAK01
2000 06 08.95		S	13.8	AC	40.6	L	5	72	0.9	2			RES
2000 06 09.02		M	12.8	HS	20	L	5	106	1.5	3			LEH
2000 06 09.89		S	13.5	AC	40.6	L	5	72	1.4	2			RES
2000 06 10.01		M	12.8	HS	42	L	5	81	1.6	3			LEH
2000 06 10.98		M	12.4	HS	20	L	5	106	1.8	3/			LEH
2000 06 14.64	s	H	14.8	LA	50.0	C	12 a	540	0.29	3			FUK02
2000 06 14.71		C	15.3	TJ	18.0	L	6 a	60	0.35				KAD02
2000 06 23.97		S	13.1	AC	40.6	L	5	72	1.3	2			RES
2000 06 24.94		S	13.3	AC	40.6	L	5	72	1.8	2			RES
2000 06 24.99		S	13.0	NP	32	L	5	125	0.5	3/			SAN04
2000 06 25.00		S	13.2	NP	32	L	5	125	< 1	2			MAR02
2000 06 25.98		S	13.4	AC	40.6	L	5	72	1.4	2/			RES
2000 06 27.89		S	13.2	HS	44.0	L	5	226	0.4	4			HAS02
2000 06 29.01		S	13.0	NP	25	L	5	96	1	3/			SEG
2000 06 30.98		S	13.0	AC	31.0	J	6	109	1.1	4			BOU
2000 07 01.63		C	14.7	TJ	18.0	L	6 a	60	0.4				KAD02
2000 07 02.91		S	13.1	AC	40.6	L	5	72	1.4	2/			RES
2000 07 08.74		S	13.9	HS	25.4	T	6	116	0.7	3			YOS04
2000 07 09.96		S	13.4:	AC	40.6	L	5	72	1.0	3			RES



## Comet C/1999 T2 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 10.95		S	13.3	AC	40.6	L	5	72	1.0	3			RES
2000 07 21.57		C	14.3	GA	60.0	Y	6	a120	1.0		1.2m	122	NAK01
2000 07 23.92		S	14.0	HS	44.5	L	4	146	0.8	3/			SAR02
2000 07 23.94		S	13.4	AC	40.6	L	5	72	0.9	3			RES
2000 07 24.96		S	13.3	AC	40.6	L	5	72	1.1	3			RES
2000 07 24.98	x	S	13.9	HS	25	L	5	117	1.5	3			PLE01
2000 07 25.93		S	13.3	AC	40.6	L	5	72	1.1	3/			RES
2000 07 25.97	x	S	13.8	HS	25	L	5	117	1.2	3/			PLE01
2000 07 27.96		S	13.3	AC	40.6	L	5	72	1.1	3/			RES
2000 07 29.92		M	13.4	HS	35	L	5	112	0.25	3			SHU
2000 07 29.94		S	13.8	NP	25	L	5	133	1	4/			SEG
2000 07 30.91		M	13.4	HS	35	L	5	112	0.3	3			SHU
2000 07 31.86		S	13.5	HS	44.0	L	5	156	0.2	4			HAS02
2000 07 31.91		M	13.9	HS	35	L	5	112	0.25	2			SHU
2000 07 31.99		S	13.2	AC	40.6	L	5	72	1.0	3			RES
2000 08 02.90	x	S	13.5:	TT	25	L	7	135	0.5	s3			SAD
2000 08 03.93	x	S	13.3	HS	35	M	6	200	0.8	4			PLE01

## Comet C/1999 Y1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 02.79		B	13.3	HS	42	L	5	162	1.3	3			LEH
2000 04 03.79		B	13.4	HS	42	L	5	162	1.2	3			LEH
2000 04 06.80		B	13.7	HS	42	L	5	162	1.1	3			LEH
2000 04 06.86		S	13.8	HS	35	L	5	237	0.8	2			HOR02
2000 06 14.75		C	15.7	TJ	18.0	L	6	a 60	0.3				KAD02
2000 07 01.71		C	15.4	TJ	18.0	L	6	a 60	0.3				KAD02
2000 07 24.01		S	13.7:	AC	40.6	L	5	130	& 0.7	3			RES
2000 07 31.99		S	13.4	AC	40.6	L	5	72	0.9	2			RES

## Comet C/2000 A1 (Montani)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 01.47		C	19.3:	GA	60.0	Y	6	a240	0.25				NAK01

## Comet C/2000 B4 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 30.20		k	20.1	L	226.0	L	2	a300		9			HER02

## Comet C/2000 CT54 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 23.63		! k	16.0	LA	103.0	C	4	a488	0.35		0.4m	16	ORI
2000 05 29.55	x	C	16.5	HV	60.0	Y	6	a240	0.4			40	NAK01

## Comet C/2000 G2 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 12.65		C	18.7	GA	60.0	Y	6	a120	0.25			105	NAK01
2000 04 28.64		C	19.1	GA	60.0	Y	6	a240	0.25				NAK01
2000 05 03.63		C	19.4	GA	60.0	Y	6	a240	0.25			110	NAK01

## Comet C/2000 H1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 03.74		C	18.0:	GA	60.0	Y	6	a240	0.45			115	NAK01
2000 05 08.73		C	18.4	GA	60.0	Y	6	a240	0.3			110	NAK01

## Comet C/2000 J1 (Ferris)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 09.58		C	19.5	GA	60.0	Y	6	a240	0.2				NAK01

## Comet C/2000 K1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 28.65		C	16.6	TJ	18.0	L	6	a 60	0.25				KAD02
2000 05 29.68		C	16.0	GA	60.0	Y	6	a120	0.5		1.0m	155	NAK01
2000 06 01.90		S	[14.5	HS	44.0	L	5	156					HAS02
2000 06 01.93		B	14.7	HS	42	L	5	162	0.5	4			LEH
2000 06 01.93		S	[14.5	HS	44.0	L	5	226					HAS02
2000 06 02.15		J	14.8	SC	25.4	T	5	a100	.71	s3	0.9m	150	ROQ
2000 06 02.90		B	14.4	HS	42	L	5	162	0.9	4			LEH
2000 06 03.89		B	14.4	HS	42	L	5	162	0.9	4			LEH
2000 06 03.93		S	[14.0	HS	44.5	L	4	146	! 0.5				SAR02
2000 06 06.64		C	16.1	GA	60.0	Y	6	a120	0.55		1.0m	152	NAK01
2000 06 09.92		S	14.5	AC	40.6	L	5	72	0.4	3			RES
2000 06 30.56		C	16.0	GA	60.0	Y	6	a120	0.6		0.9m	151	NAK01
2000 07 01.57		C	16.3	TJ	18.0	L	6	a 60	0.25				KAD02
2000 07 27.87		S	[13.6	HS	44.5	L	4	253	! 1				SAR02
2000 07 27.88		S	[13.5	HS	44.5	L	4	253	! 1				SAR02
2000 07 31.87		S	[15.3	HS	44.0	L	5	156					HAS02

## Comet C/2000 K2 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 29.71		C	16.6	GA	60.0	Y	6	a240	0.5		0.8m	232	NAK01
2000 06 01.95		B	14.8	HS	42	L	5	162	0.4	5			LEH
2000 06 02.91		B	14.8	HS	42	L	5	162	0.5	4/			LEH
2000 06 03.90		B	14.9	HS	42	L	5	162	0.4	4/			LEH
2000 06 04.18		J	16.9	SC	25.4	T	5	a100	0.29	s3	0.4m	196	ROQ
2000 06 06.65		C	16.5	GA	60.0	Y	6	a240	0.55		0.8m	232	NAK01
2000 06 09.93		S	14.2	AC	40.6	L	5	72	0.7	3			RES
2000 06 30.64		C	16.4	GA	60.0	Y	6	a240	0.5				NAK01
2000 07 01.60		C	16.4	TJ	18.0	L	6	a 60	0.25				KAD02
2000 07 21.55		C	16.2	GA	60.0	Y	6	a120	0.6				NAK01

## Comet 2P/Encke

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 08.77		x S	[13.0	HS	25.4	L	4	113	! 0.5				YOS02
2000 07 29.99		M	11.4	HS	35	L	5	83	3	1/			SHU
2000 07 30.99		M	10.4	HS	35	L	5	83	3	2			SHU
2000 08 01.05		M	10.8	HS	35	L	5	83	3	2			SHU

## Comet 4P/Faye

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 28.55		C	17.4	GA	60.0	Y	6	a240	0.8	1			NAK01

## Comet 9P/Tempel 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 03 03.66		S	[11.0	TJ	25.6	L	5	169	! 1.5				BIV
2000 07 28.10		! C	16.6	GA	40	D	2	a240	> 0.8	d5	> 3.6m	243	R0D01
2000 07 29.10		! C	16.6	GA	40	D	2	a240	> 0.8	d5	> 3.6m	243	R0D01

## Comet 10P/Tempel 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 08 02.11		S	11.9	AC	44.5	L	4	80	1.4	2			MOR03
1999 08 09.11		S	11.8	AC	44.5	L	4	167	1.4	2			MOR03
1999 08 15.09		s S	10.4	AC	44.5	L	4	80	3.0	1			MOR03
1999 10 07.03		S	12.1	AC	44.5	L	4	80	1.5				MOR03
1999 10 12.01		S	11.3	AC	44.5	L	4	80	2.2	1			MOR03
1999 10 15.01		s S	11.9	AC	44.5	L	4	167	0.9	1			MOR03
1999 11 04.99		S	12.7	AC	44.5	L	4	167	1.0	1			MOR03

## Comet 21P/Giacobini-Zinner

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 02.23		S	13.8	AC	44.5	L	4	167	0.8	1			MOR03
1998 08 17.08		S	11.9	AC	44.5	L	4	80	1.4	1			MOR03
1998 09 13.06		S	12.1	AC	44.5	L	4	80	1.3	3			MOR03
1998 09 23.08		S	10.7	AC	15	R	5	62	1.8	2			MOR03
1998 09 28.13		S	10.2	AC	15	R	5	42	2				MOR03
1998 10 09.03		S	9.7	AC	15	R	5	42	2.5	3			MOR03
1998 10 10.08		S	9.8	AC	15	R	5	42	3	3			MOR03
1998 10 11.07		S	9.8	AC	15	R	5	42	2	3			MOR03
1998 10 13.00		S	9.6	AC	15	R	5	42	3	4			MOR03
1998 10 17.02		S	9.6	AC	15	R	5	42	3.5	3			MOR03
1998 10 24.01		S	9.6	AC	15	R	5	42	2.5	3			MOR03
1998 10 29.99		S	9.1	AC	15	R	5	42	3.5	4			MOR03
1998 11 08.99		S	9.4	AC	15	R	5	42	3	4			MOR03
1998 11 18.02		S	9.8	AC	15	R	5	42	3	4			MOR03
1998 11 23.98		S	9.8	AC	15	R	5	42	3.5	1			MOR03
1998 12 12.97		S	9.6	AC	15	R	5	42	4.5	1			MOR03
1998 12 14.00		S	9.9	AC	15	R	5	42	3	1			MOR03
1999 01 10.00		S	11.1	AC	44.5	L	4	80	1.5	2			MOR03

## Comet 28P/Neujmin 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 01.28		k	21.1	L	226.0	L	2	a300		9			HER02

## Comet 29P/Schwassmann-Wachmann 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 03 28.58			[13.0	HS	20	L	7	160					MAT08
2000 04 05.63			[13.5	HS	20	L	7	160					MAT08
2000 05 04.71		C	17.0:	TJ	18.0	L	6	a 40	0.25				KAD02
2000 05 08.76	x	C	16.4:	HV	60.0	Y	6	a120	0.3				NAK01
2000 05 25.61	s	H	15.6	LA	50.0	C	12	a360	0.1	8			FUK02
2000 05 29.66	x	C	15.7:	HV	60.0	Y	6	a240	0.4	8/			NAK01
2000 05 29.66	x	c	16.7:	HV	60.0	Y	6	a240					NAK01
2000 05 31.64			[13.5	HS	20	L	7	160					MAT08
2000 06 02.98		S	[12.5	HS	44.5	L	4	146	! 0.5				SAR02
2000 06 04.60		S	[13.5	HS	20	L	7	160					MAT08
2000 06 06.63	s	H	15.6	LA	50.0	C	12	a360	0.22	8			FUK02
2000 06 06.67	a	C	16.0	GA	60.0	Y	6	a240	0.4	8/			NAK01
2000 06 06.67	a	c	16.8	GA	60.0	Y	6	a240					NAK01
2000 06 07.87		S	[14.0	GA	41	L	4	200	! 0.5				PEA
2000 06 08.80		S	[14.0	GA	41	L	4	200	! 0.5				PEA
2000 07 01.96		S	13.7:	HS	23.0	L		115		8			DES01
2000 07 01.96		S	13.7:	HS	23.0	L		115		8			SOU01
2000 07 04.65		S	[13.5	HS	20	L	7	160					MAT08
2000 07 21.51	a	C	15.1	GA	60.0	Y	6	a240	0.7	s1/			NAK01
2000 07 21.51	a	C	16.7	GA	60.0	Y	6	a240					NAK01
2000 07 25.53		S	[13.5	HS	20	L	7	160					MAT08

## Comet 44P/Reinmuth 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 29.64	x	C	17.1	HV	60.0	Y	6	a240	0.3				NAK01
2000 06 02.97		S	[12.0	HS	44.5	L	4	146	! 1				SAR02
2000 07 21.50	a	C	16.5	GA	60.0	Y	6	a240	0.5				NAK01

## Comet 47P/Ashbrook-Jackson

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 06 07.87		S	[14.0	GA	41	L	4	200	! 0.5				PEA
2000 07 04.68		S	14.0:	HS	20	L	7	160	0.8	4			MAT08
2000 07 24.46		S	13.6	GA	25.4	L	4	114					SEA
2000 07 25.51		S	13.8:	HS	20	L	7	160	0.8	5			MAT08
2000 07 26.63	x	C	13.8	HV	60.0	Y	6	a120	0.95		1.4m	317	NAK01
2000 07 27.52		S	13.6	GA	25.4	L	4	114					SEA

## Comet 50P/Arend

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 30.18		k	19.1	L	226.0	L	2	a300	0.24	5			HERO2

## Comet 52P/Harrington-Abell

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 17.37		S	13.2	AC	44.5	L	4	167	0.6	2			MOR03
1998 09 23.30		S	13.4	AC	44.5	L	4	167	0.5	4			MOR03
1998 09 28.27		S	13.2	AC	44.5	L	4	167	0.7	1			MOR03
1998 10 16.25		S	13.4	AC	44.5	L	4	167	0.6	2			MOR03
1998 10 21.21		S	12.6	BS	25.3	L	6	58	& 1.0	5			PERO1
1998 10 22.16		S	12.5	BS	25.3	L	6	58	& 1.4	3/			PERO1
1998 10 23.17		S	12.4	BS	25.3	L	6	58	& 1.4	2/			PERO1
1998 10 27.18		S	11.9	BS	25.3	L	6	58	& 2.0	5			PERO1
1998 10 28.17		S	12.1	BS	25.3	L	6	58	& 2.2	4			PERO1
1998 10 29.21		S	12.3	BS	25.3	L	6	58	& 1.6	3			PERO1
1998 11 18.26		S	13.0	AC	44.5	L	4	167	0.8	2			MOR03
1998 11 22.16		S	12.9	AC	44.5	L	4	167	0.7	2			MOR03
1998 12 12.17		S	12.5	AC	44.5	L	4	167	1.0	4			MOR03
1998 12 25.42		S	12.2	AC	44.5	L	4	167	0.8	3			MOR03
1999 01 10.08		S	11.9	AC	44.5	L	4	167	0.9	4			MOR03
1999 01 22.09		S	12.1	AC	44.5	L	4	167	1.0	2			MOR03
1999 03 09.05		S	14.1	AC	44.5	L	4	167	0.8	1			MOR03
1999 03 13.03		S	14.2	AC	44.5	L	4	167	0.7	2			MOR03
1999 03 13.94	x	B	11.4	HS	25.4	T	10	761	3.0	1			HOE

## Comet 61P/Shajn-Schaldach

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 07 26.62		C	17.9	GA	60.0	Y	6	a240	0.35				NAK01

## Comet 63P/Wild 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 02 09.21		S	[13.4	HS	30	R	20	185					SHA02
2000 04 05.61			[13.5	HS	20	L	7	160					MAT08
2000 04 28.59	x	C	15.2	HV	60.0	Y	6	a240	1.2			125	NAK01

## Comet 71P/Clark

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 24.58		!	k 17.6	LA	103.0	C	4	a488	0.35				ORI
2000 05 29.50			C 17.7	GA	60.0	Y	6	a240	0.35			65	NAK01
2000 06 02.90			S[13.0	HS	44.5	L	4	146	!	1			SAR02

## Comet 73P/Schwassmann-Wachmann 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 24.51		!	k 18.8	LA	103.0	C	4	a488	0.25				ORI
2000 04 28.50			C 18.7	GA	60.0	Y	6	a240	0.25				NAK01

## Comet 74P/Smirnova-Chernykh

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 02.82		B	14.2	HS	42	L	5	162	0.8	4			LEH
2000 04 06.82		B	14.3	HS	42	L	5	162	0.8	4			LEH
2000 04 28.47		C	16.5	GA	60.0	Y	6	a120	0.45				NAK01

## Comet 84P/Giclas

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 01.14		k	19.4	L	226.0	L	2	a300	0.15	6			HERO2

## Comet 86P/Wild 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 30.23		k	[22.5	L	226.0	L	2	a300					HERO2

## Comet 87P/Bus

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 01.17		k	19.7	L	226.0	L	2	a300	0.20	7			HERO2

## Comet 93P/Lovas 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 24.25		S	14.1	AC	44.5	L	4	167	0.5	2			MOR03
1998 11 22.18		S	13.6	AC	44.5	L	4	167	0.5	2			MOR03
1998 12 12.16		S	13.5	AC	44.5	L	4	167	0.7	2			MOR03
2000 05 01.25		k	21.5	L	226.0	L	2	a300	0.11	8			HERO2

## Comet 95P/Chiron

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 05 01.76		!	k 16.8	LA	103.0	C	4	a488					ORI

## Comet 114P/Wiseman-Skiff

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 28.49		x	C 16.5	HV	60.0	Y	6	a240	0.65				NAK01

## Comet 129P/Shoemaker-Levy 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 06 07.35		k	18.1	L	226.0	L	2	a300	0.14	7			HERO2

## Comet 143P/Kowal-Mrkos

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 23.58		!	k 17.7	LA	103.0	C	4	a488	0.25				ORI
2000 05 01.59		k	17.4	LA	103.0	C	4	a488	0.25				ORI
2000 05 08.53		C	18.4	GA	60.0	Y	6	a240		9			NAK01
2000 06 06.50		C	19.0	GA	60.0	Y	6	a240		9			NAK01

## Comet P/1998 S1 (LINEAR-Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 30.22		k	18.9	L	226.0	L	2	a300	0.18	4			HERO2

## Comet P/1998 U3 (Jäger)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 27.17		S	12.3	BS	25.3	L	6	58	& 1.0	4/			PER01
1998 10 28.17		S	12.4	BS	25.3	L	6	58	& 1.8	4			PER01
1998 10 29.21		S	12.3	BS	25.3	L	6	58	& 1.8	3			PER01
1998 11 18.25		S	12.7	AC	44.5	L	4	167	0.8	3			MOR03
1999 01 10.08		S	11.6	AC	44.5	L	4	167	1.1	4			MOR03
1999 01 22.10		S	11.5	AC	44.5	L	4	80	1.9	4			MOR03
1999 03 09.06		S	13.6	AC	44.5	L	4	167	1.1	3			MOR03
1999 03 12.99		x	B 11.2	HS	25.4	T	10	761	0.8	6			HOE
1999 03 13.03		S	13.7	AC	44.5	L	4	167	1.1	2			MOR03
1999 03 13.94		x	B 11.4	HS	25.4	T	10	761	0.8	6			HOE
1999 04 11.07		S	13.9	AC	44.5	L	4	167	0.9	2			MOR03
1999 04 13.06		S	13.9	AC	44.5	L	4	167	1.2	2			MOR03

## Comet P/2000 B3 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 23.47		C	17.0:	TJ	18.0	L	6	a 60	0.25				KAD02
2000 04 27.45		H	16.8	LA	50.0	C	12	a360	0.20	3	0.4m	103	FUK02
2000 04 29.46		a	H 16.2	LA	50.0	C	12	a360	0.25	3	0.4m	101	FUK02

## Comet P/2000 B3 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 29.48	a	V	16.8	LA	50.0	C	12	a360	0.25	3	0.4m	101	FUKO2
2000 05 02.48	a	H	16.3	LA	50.0	C	12	a360	0.19	3	0.7m	103	FUKO2
2000 05 08.49		C	17.1	GA	60.0	Y	6	a240	0.4		0.8m	108	NAKO1
2000 05 29.49		C	17.6	GA	60.0	Y	6	a240	0.45			105	NAKO1

## Comet P/2000 C1 (Hergenrother)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 23.53		C	16.9	TJ	18.0	L	6	a 60	0.25				KADO2
2000 05 08.54		C	16.8	GA	60.0	Y	6	a240	0.55				NAKO1
2000 06 06.51		C	17.4	GA	60.0	Y	6	a240	0.65				NAKO1

## Comet P/2000 G1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2000 04 23.77		C	16.8	TJ	18.0	L	6	a 60	0.3				KADO2
2000 04 28.76		C	16.9	TJ	18.0	L	6	a 60	0.3				KADO2
2000 05 03.71		C	15.5	GA	60.0	Y	6	a120	0.75				NAKO1
2000 05 14.72		C	17.3	TJ	18.0	L	6	a 60	0.2				KADO2
2000 05 29.74		C	16.8	GA	60.0	Y	6	a240	0.55				NAKO1
2000 06 07.62		C	16.6	GA	60.0	Y	6	a240	0.7				NAKO1

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## DESIGNATIONS OF RECENT COMETS

Listed below, for handy reference, are the last 15 comets to have been given designations in the new system. The name, preceded by a star (\*) if the comet was a new discovery (compared to a recovery from predictions of a previously-known short-period comet) or a # if a re-discovery of a 'lost' comet. Also given are such values as the orbital period (in years) for periodic comets, date of perihelion,  $T$  (month/date/year), and the perihelion distance ( $q$ , in AU). Four-digit numbers in the last column indicate the *IAU Circular* (4-digit number) containing the discovery/recovery or permanent-number announcement.

Not included below are numerous recently-discovered comets observed only with the SOHO spacecraft — and seen only close to the sun with the SOHO instruments — that are presumed to be Kreutz sungrazers that are no longer in existence (see lists and references in the January 2000 *ICQ*, p. 232, and earlier *ICQ* lists cited therein); recent such SOHO discoveries were reported on *IAUC* 7383, 7386, 7393, 7412, 7422, 7426, 7433, 7435, 7439, 7445, 7450, 7451, 7452, 7453, 7454, 7458, 7459, 7472, 7479, 7480, and 7485, and include comets C/1996 E2; C/1997 G3, G4, G5, G6, J3, J4, K3, K4, K5, K6, L5, M3, M4, and N3; C/1998 F2, G5, G6, G7, G8, H3, H4, J3, J4, K12, K13, K14, K15, K16, K17, L2, L3, L4, L5, L6, L7, L8, L9, M8, M9, M10, and V1; C/1999 C2, G3, G4, G5, H5, H6, H7, J7, J8, J9, J10, J11, J12, K11, K12, K13, K14, K15, L6, L7, L8, R4, S5, S6, S7, U5, W1, X2, and Y3; and C/2000 B5, B6, B7, D3, F1, H2, J3, J4, J5, K3, K4, K5, K6, L1, L2, L3, L4, L5, M1, M2, M3, M4, M5, M6, M7, M8, M9, N1, N2, P1, and P2. Other SOHO discoveries that were evidently *not* Kreutz sungrazers include C/1999 J6 (*IAUC* 7386), C/2000 J2 (*IAUC* 7418), C/2000 O3 (*IAUC* 7479), and C/2000 Q1 (*IAUC* 7484).

[This list updates that in the January 2000 issue, p. 32. For explanation regarding new usage of 'C/' instead of 'P/' for intermediate-period comets, see editorial note on page 2 of the January 2000 issue.]

	New-Style Designation	$P$	$T$	$q$	IAUC
*	C/2000 D2 (LINEAR)		3/2/00	2.3	7372
#	143P/2000 ET <sub>90</sub> (Kowal-Mrkos)	8.95	7/1/00	2.55	7403
*	P/2000 G1 (LINEAR)	5.35	3/9/00	1.00	7396
*	C/2000 G2 (LINEAR)	53.6	2/6/00	2.7	7411
*	C/2000 H1 (LINEAR)		1/28/00	3.6	7410
*	C/2000 J1 (Ferris)		5/11/00	2.5	7416
*	C/2000 K1 (LINEAR)		12/14/99	6.3	7430
*	C/2000 K2 (LINEAR)		10/11/00	2.4	7430
*	C/2000 O1 (Koehn)		1/27/00	5.9	7462
	144P/2000 O2 (Kushida)	7.6	6/27/01	1.43	7467
*	C/2000 OF <sub>8</sub> (Spacewatch)		8/5/01	2.17	7484
#	145P/2000 R1 (Shoemaker-Levy 5)	8.7	8/17/00	1.99	7488
*	P/2000 R2 (LINEAR)	6.2	9/12/00	1.39	7492
*	P/2000 S1 (Skiff)	16.9	7/14/00	2.5	7496
#	146P/2000 S2 (Shoemaker-LINEAR)	7.9	7/14/00	1.32	7498