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CORRIGENDA

- In the October 2004 issue, page 202, in the NOTE line just before the tabulated data, for page 334 of this issue read page 234 of this issue
- In the 2004 *Comet Handbook*, page H140, the date on the top line should read December 2003
- In the 2005 *Comet Handbook*, page H154, for P/2005 T5 (LINEAR) read P/2002 T5 (LINEAR)

The Long-Term Evolution of Cometary Outgassing from the Observations of Amateur and Professional Astronomers*

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Abstract. Cometary activity is driven by the sublimation of ices in the nucleus: mainly water when the comet is close to the sun (typically $r < 4$ AU), and (presumably) carbon monoxide farther from the sun. The monitoring of the long-term evolution of cometary activity is fundamental for cometary studies. This evolution differs from comet to comet. It provides clues to the sublimation mechanism of cometary ices and to seasonal effects. Such monitorings serve as a basis for predictions for organizing future observations. They are a requisite for the intercomparison of various phenomena when they are observed at different times. A review of the main methods used for monitoring cometary outgassing is presented. Direct observations of CO and H₂O production rates are rare and difficult because they involve costly and oversubscribed instruments (large telescopes, space observatories). Indirect observations (e.g., the OH radical from its radio lines at 18 cm and from narrow-band photometry in the near-ultraviolet) are more handy, but they have their own limitations. The huge database of visual magnitude observations by amateur astronomers gives another approach to this topic. For comets from historical times, it provides a precious heritage that is often the only source of information. The empirical relation between visual magnitudes and gas-production rates, even if it is physically ill-understood, is a very useful tool. For a systematic and timely exploitation of this database, standardization, fast communication and archiving are crucial points.

1. Introduction

Recent spectroscopic investigations on the composition of the outgassing products of comets (Bockelée-Morvan *et al.* 2005), mainly at radio and infrared wavelengths, have confirmed the paradigm of the “dirty snowball model” proposed by Fred Whipple (1950) more than fifty years ago: cometary ices are composed mainly of water. Close to the sun (*i.e.*, at heliocentric distances $r \leq 3$ AU), cometary activity is governed by the sublimation of water. The production rate of water is thus an adequate quantitative indicator of cometary activity. The production rates of other molecules outgassed from cometary ices are currently given relative to water-production rates, in order to provide an easy comparison between different comets and to yield relative abundances. Hence the importance of measuring cometary water production and its short- and long-term evolution.

The activity of comets at large heliocentric distances is governed by the sublimation of species more volatile than water, such as carbon monoxide (the most abundant species observed in distant comets). The correlation between total visual magnitudes and CO production rates was investigated by Biver (2001); it will not be discussed here.

2. How to Probe Cometary Outgassing?

Ironically, although being the most abundant cometary volatile, water is one of the species the most difficult to observe, due to the opacity of the earth’s atmosphere to water lines.

2.1. Direct Observation of Water

Cometary water was first directly observed through its fundamental bands of vibration in the infrared in comet 1P/Halley from the Kuiper Airborne Observatory, a stratospheric aircraft (Mumma *et al.* 1986), and with the IKS instrument aboard the Vega spacecraft (Combes *et al.* 1988). The same bands were observed in a very limited number of comets with the Infrared Space Observatory (Crovisier *et al.* 1997). It is impossible to observe these bands from the ground; however, weaker “hot bands” (*i.e.*, transitions between higher states of vibration, excited by fluorescence), are not absorbed by the terrestrial atmosphere. They could be observed at high spectral resolution with large ground-based infrared telescopes (NASA Infrared Telescope Facility; Keck telescope) in a dozen comets (*e.g.*, Dello Russo *et al.* 2000). All infrared bands of water are emitted by fluorescence, which is a well-understood process; thus their observation permits a robust estimation of the water-production rate.

* Written as a detailed version of a paper presented at the IWCA III, Meudon, France, 2004 June 4–6. Editor’s note: contributed papers from IWCA III will be published over several *ICQ* issues in 2005.

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More recently, the fundamental rotational line of water at 557 GHz could be observed by ‘heterodyne’ techniques in several comets with the small submillimetric satellites SWAS and Odin (Neufeld *et al.* 2000; Lecacheux *et al.* 2003). This strong line is saturated, and the derivation of water production from its observation is model-dependent. However, consistent results were obtained, in agreement with other determinations. Very sensitive observations of this line (and of other rotational lines) are expected in the future with the Herschel Space Observatory.²

Thus, the direct observation of cometary water relies on space facilities or sophisticated ground-based instruments. Such direct observation cannot, at the present time, be used for investigating a large sample of comets or for comprehensive monitorings, but it is invaluable for validating other less-direct means of observations.

2.2. Indirect Indicators

Water is readily photodissociated by solar ultraviolet (UV) radiation into fragments — OH, H, O — that can be observed and directly related to their parent molecule (Feldman *et al.* 2004). OH and O are, in part, created in excited states; their subsequent deexcitation is accompanied by *prompt emission* (in the infrared for vibrationally excited OH; in the visible for electronically excited O). The hydrogen atom can be observed by the strong fluorescence of its Lyman- α line in the far-UV. OH can be observed through the fluorescence of its electronic bands in the near-UV (from space spectroscopy or from the ground with careful narrow-band photometry). OH can also be observed through its 18-cm radio lines (which are emitted by a weak maser process, whose mechanism is governed by the UV fluorescence and is well understood).

Other minor constituents of the cometary gas coma can also be used as indirect indicators. Radicals such as CN and C₂ can be easily observed by narrow-band photometry (*e.g.*, A’Hearn *et al.* 1995). Molecules such as HCN (hydrogen cyanide) or CH₃OH (methanol) can be observed by ground-based millimetric radio telescopes. There is no strong variation of [CN]/[OH] or [HCN]/[H₂O] (A’Hearn *et al.* 1995; Biver *et al.* 2002) observed from comet to comet, so that the production rates (Q) of CN and HCN are closely correlated with $Q[\text{water}]$. Possible ways to relate cometary total visual magnitudes to $Q[\text{water}]$ are discussed in Section 4, below. The dust indicator $Af\rho$ is also a convenient and sensitive tool to trace cometary activity,³ as discussed by Jorda (2004).

All these methods for measuring the gas-production rates of comets have their own limitations. Most space facilities are subject to solar-elongation constraints and cannot observe close to the sun (which unfortunately corresponds to moments when the comets are at their brightest); they are also oversubscribed instruments for which there is high competition for observing time. All ground-based observations are affected by weather conditions (except OH 18-cm observations). Modelling issues may also be crucial: a good knowledge of the excitation and distribution of the molecules is needed.

Altogether, these various methods may be considered to be somewhat complementary; they are listed in Table 1 with the size of the corresponding databases.

3. Databases

As discussed in the preceding section, direct observations of water are only available for a handful of comets. Observations of the 18-cm lines of OH are not affected by weather conditions or visibility constraints. They are only usable, however, when the OH maser inversion — which depends on the comet heliocentric velocity — is significant. The Nançay database comprises 2416 observations of 65 comets during 1973–1999 (Crovisier *et al.* 2002a) and more than 1100 observations of 25 comets made with the new telescope system since 2000 (Crovisier *et al.* 2002b). The same lines were occasionally observed in a few comets by other radio telescopes, especially at Green Bank and at Arecibo.

The International Ultraviolet Explorer (IUE) observed the OH near-UV bands in 55 comets from 1978 to 1997 (Festou 1997). The analysis of the complete results in a consistent way is still pending. Only a limited number of comets have been investigated with the Hubble Space Telescope (Feldman *et al.* 2003). The SWAN instrument on SOHO routinely provides Lyman- α maps of the sky where the hydrogen coma of bright comets is easily visible (Mäkinen *et al.* 2001). This wealth of information is still to be exploited.

Observations of the oxygen forbidden line *prompt emission* at 630 nm are available for many comets (Fink and Hicks 1996). Their interpretation, however, is plagued by several issues (blended NH₂ line; ill-known branching ratios).

Considerable data on narrow-band photometry of comets with production rates of OH, CN, and C₂ radicals exist. However, the only consistent published set of data of some consequence is that of A’Hearn *et al.* (1995), which deals with 85 comets observed from 1976 to 1992.

Although other databases exist (*e.g.*, Kamél 1992 and Svoreň 2002), the most comprehensive data set of cometary total visual magnitudes is that gathered by D. W. E. Green for the *International Comet Quarterly* (ICQ). This data set does not yet include all historical observations. It is available as computer files upon request on a comet-by-comet basis.

² A joint-ESA/NASA spacecraft scheduled for launch in 2007; formerly known as “Far Infrared and Submillimetre Telescope” (FIRST).

³ Editor’s note: A’Hearn and colleagues (1995) introduced a parameter in the 1980s that is intended to be independent of the size of the aperture through which the dust is observed; their quantity $Af\rho$ is given by $A(\theta)f\rho = qr^2\Delta F_\lambda/d$, where A is the Bond albedo for the particular scattering angle (θ); f is the so-called “filling factor” (the number of grains per unit area, divided by the area of the field-of-view, times their mean cross-section) of the grains in the field-of-view, ρ is the radius of the assumed-circular field-of-view; Δ and r are given in AU; the mean cometary continuum flux averaged over the filter bandpass (F_λ) is given in $\text{erg cm}^{-2} \text{s}^{-1} \text{\AA}^{-1}$; d is the diameter of the field-of-view in arcsec; and q is a coefficient that is a function of solar flux (tabulated by A’Hearn *et al.* 1995).

Table 1: Methods for estimating gas production rates in comets.

Method	Instrument	Begin. year	N comets	Sensit. a)	Visib. b)	Model. c)	
<i>Direct observation of water</i>							
H ₂ O IR	space: ISO	1996	3	A	C	A	
	airborne: KAO	1985	2	C	C	A	
	ground	1996	≈ 12	C	B	B	d)
H ₂ O radio	space: SWAS, Odin	1999	12	A	C	C	
<i>Observation of water-derived products</i>							
OH 18 cm	Nançay	1973	≈ 90	B	B	C	
	others	1973	≈ 15	B	B	C	
OH IR	ground	1996	≈ 4	C	C	C	
OH UV	ground	1973	≈ 80	A	C	B	
	space: IUE	1978	55	B	C	B	e)
	space: HST + others		≈ 12	A	B	B	
OI vis.	ground		≈ 50	A	B	C	
Lyman α	space: SOHO/SWAN	1995	≈ 60	B	B	B	e)
	space: HST + others	1968	≈ 12	A	B	B	
<i>Observation of other gas indicators</i>							
HCN radio	ground: IRAM...	1985	≈ 25	B	A	C	f)
CN vis.	ground		> 100	A	B	C	f)
<i>Total visual magnitudes</i>							
visual mag.	amateur network	< 1900	> 1000	A	B	C	f)

a) sensitivity to weak comets.

b) visibility and weather constraints.

c) modelling issues for retrieving water production rates.

Grades for a), b), c): A = good; B = medium; C = bad (rather subjective).

d) water *hot bands*.

e) database still to be exploited.

f) not directly linked to water production.

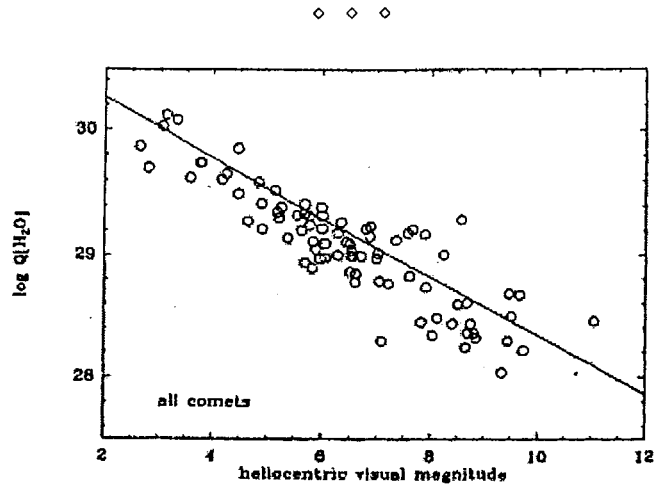


Figure 1. The correlation between heliocentric visual magnitudes and the water-production rates observed in 13 comets. From Jorda *et al.* (1992).

◇ ◇ ◇

4. Empirical Laws

Table 1 shows that the huge dataset of total visual magnitudes of comets gathered by amateur astronomers is, by far, the most important database on the evolution of comets. For many weak comets and for comets from historical times, it is the only source of information. To take advantage of this wealth of information, several attempts have been made to relate the total visual magnitude, m_h (reduced to $\Delta = 1$ AU), and the water-production rate $Q[\text{H}_2\text{O}]$ (Festou 1986; Sekanina 1989; Roettger *et al.* 1990; Jorda *et al.* 1992; Jorda 1995; de Almeida *et al.* 1997; see Figure 1 of this paper). From a statistical analysis of 15 comets, based upon m_h from the *ICQ* database and $Q[\text{H}_2\text{O}]$ from the Nançay database,

Jorda (1995) derived:

$$\log Q[H_2O] = 30.78 - 0.265m_h. \quad (1)$$

A new analysis based upon a larger dataset is to be published (Jorda *et al.*, in preparation). This relation (or similar ones) has been broadly used to predict gas productions of comets in the absence of direct measurements (*e.g.*, Jorda and Rickman 1995; de Almeida *et al.* 1997). Of course, equation (1) has only a statistical signification, and departures up to a factor of two may be found for individual comets. It should not be applied far from the sun where the insolation is not high enough to trigger water sublimation. In this case, Biver (2001) tried to relate m_h to $Q[CO]$, but the (radio) observations of CO in distant comets are still sparse.

Naïvely, one would expect the comet brightness to be proportional to its gas production, and therefore a slope -0.4 in equation (1), rather than -0.26 (see discussions in *e.g.*, Newburn 1984 and Jorda 1995).

5. Marcus' Interpretation of the Empirical Law

In this workshop, Marcus (2004) pointed out that a coefficient, k_2 , exceeding the -0.4 value in the relation $\log Q = k_1 + k_2 m_1$ could be explained by a psychophysical artefact of human vision. His model assumes that (a) the coma surface brightness, $j(\varepsilon) = j_c \varepsilon^{-1}$, is inversely proportional to the projected angular distance, ε , in the coma, where j_c is the surface brightness at a standard distance ε_c ; and (b) the visual coma perimeter, ε_{lim} , is delimited by a threshold, γ_{lim} , to the gradient contrast

$$\gamma = [dj(\varepsilon)/d\varepsilon]/[j(\varepsilon) + b], \quad (2)$$

where $b \gg j(\varepsilon_{lim})$ is the sky background; and (c) $\gamma_{lim} = \text{constant}$. If j_c is increased by a factor of x , this third condition constrains the coma to increase only to $x^{1/2} \varepsilon_{lim}$, not to $x \varepsilon_{lim}$, as would be otherwise expected. In further consequence, the model predicts that the total visual coma brightness, I , scales to J_c as $I \sim J_c^{3/2}$, not $\sim j_c$. Because $Q \sim j$ and not $\sim I$, it follows that $Q \sim I^{2/3}$, not $\sim I$. Hence,

$$\log Q \sim (2/3) \log I = (2/3)(-0.4)m_1 = -0.27m_1 \neq -0.4m_1. \quad (3)$$

(Marcus, in preparation), which is close to what we have found in our production-rate/magnitude-data sets. In plots against $\log r$, the theory also predicts more-shallow n slopes for $-2.5 \log Q$ than for m_1 , as we have also found.

6. Conclusions

- Water can now be observed directly, but sophisticated instrumentation is needed. Thus, such observations are rare and costly. They validate $Q[\text{water}]$ obtained by other means.
- Other indirect observations all have their own limitations. They are somewhat complementary. Inter-calibration is needed.
- Systematic exploitation of the large database of total visual magnitudes from the amateur nets is a very helpful approach. The empirical correlation between m_h and $Q[\text{water}]$ is physically ill understood, but it works!
- Standardization, fast communication and archiving of the database of cometary magnitudes are crucial points, already addressed in this workshop.

Acknowledgements. I am greatly indebted to Laurent Jorda for many discussions on this topic. I thank Joseph N. Marcus for providing the summary of his analysis which is reproduced in Section 5.

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Φ Φ Φ

Tabulation of Comet Observations

New addition to the comparison-star-magnitudes reference code: Reinder J. Bouma (Groningen, The Netherlands) has begun using comparison-star magnitudes from "The Amateur Sky Survey" (TASS), which has data available at the website URL <http://www.tass-survey.org/>. Bouma notes that TASS is similar to that of ASAS (*ICQ* reference code AS; cf. *ICQ* **25**, 160), finding the data down to mag ~ 13 very useful for comets north of $\delta = +28^\circ$, where ASAS stops. The webpage for downloading data has URL <http://sallman.tass-survey.org/servlet/markiv/template/DataDownload.vm>, which presents a query form that allows the observer to enter coordinates and size of the field for which reference stars are desired. Bouma adds that once can best save the data as a 'zipped' text file; apparently using Microsoft software, Bouma then opens this file in 'Excel' and then uses Guide8 software to select stars (close to a faint comet) that look suitable as comparison stars, and he then searches in 'Excel' for a star at the proper position, usually getting a list with separate measurements of that star in V and I , which he then averages and selects those star magnitudes with $V-I < +1.0$ (minding also the scatter in V and I , preferring stars with $> 15-20$ measurements). Bouma adds: "The whole procedure is rather time consuming, but I find the data quite good in the magnitude range 10-13. Maybe it is also useful to note that the AAVSO sometimes uses data from TASS-IV as an extension to Tycho-2 data for stars fainter than magnitude 11, down to 12.5-13, in some new sequences, when no accurate CCD-V data are available." The *ICQ* Editor had significant problems accessing the TASS website (which appears to be running on a very slow computer)

and getting any data at all, but for those who can access the data and have the patience to do so, we hereby assign the ICQ reference code 'TA' to the TASS data.

It is planned that numerous backlogged observations contributed on paper (most of which are several years old and were contributed long after the observations were made, thereby removing any urgency in publishing them) will be included in the April issue.

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

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

◊ Comet 9P/Tempel \Rightarrow 2005 Jan. 17.84: Guide 8.0 software used for comp.-star mag (comp. star has $B-V = +0.75$) [TSU02]. Jan. 21.83: $B-V$ values of comp. stars were +0.56, +0.61, +0.68, +0.69, +0.76, and +0.79 [NAK01].

◊ Comet 29P/Schwassmann-Wachmann \Rightarrow 2004 June 27.00: bright outburst [GUZ]. July 11.98 and 23.97: Guide 8.0 software used for comp.-star mags [TOT03]. July 17.99 and 21.04: Guide 7.0 software used for comp.-star mags [SAR02]. Aug. 14.93 and Sept. 20.85: Guide 8.0 software used for comp.-star mags [NAG09]. Aug. 24.01, Sept. 10.88, 17.84, 18.88, Oct. 3.77, and 17.84: Guide 8.0 software used for comp.-star mags [TOT03]. Sept. 14.11: CCD images w/ 35-cm L (+ R filter) show a fan-shaped coma of dia. 3'.7 and a pointlike central cond.; R-band photometry from co-added images in circular apertures of diameter 15", 30", 60", 90", 120", and 240" yield, respectively, 15.6, 14.7, 13.8, 13.2, 12.8, and 12.2 [HOR02]. Sept. 17.06: ten 40-sec co-added images (taken as on Sept. 14.11) show a very bright and strongly condensed object, w/ a faint fan-shaped outer coma of dia. 6'.5 and a faint broad tail > 8' long in p.a. $\approx 228^\circ$ (tail also visible on Sept. 14.11); R-band photometry from co-added images in circular apertures of diameter 15", 30", 60", 90", 120", 240", and 390" yield, respectively, 12.6, 12.4, 12.2, 12.0, 11.8, 11.3, and 11.0 [HOR02]. Sept. 17.84: outburst [TOT03]. Sept. 17.94: new outburst; faint outer halo, with bright stellar pseudonucleus of mag ≈ 13.0 , surrounded by 0'.4 central cond. [GUZ]. Sept. 18.06: w/ 35-cm L, R-band photometry from co-added CCD images in circular apertures of diameter 15", 30", 60", 90", 120", 240", and 390" yield, respectively, 12.8, 12.4, 12.2, 12.0, 11.8, 11.3, and 11.1 [HOR02]. Sept. 19.01: faint outer halo, with bright stellar pseudonucleus of mag ≈ 12.8 , surrounded by 0'.4 central cond. [GUZ]. Sept. 21.95: outer halo not visible despite excellent conditions; obvious stellar pseudonucleus of mag ≈ 13.2 [GUZ]. Oct. 6.89: w/ 25.6-cm L (169 \times), strong central cond. of mag 13.4 (beginning of outburst) [BIV]. Oct. 19.01: fan-shaped coma [HOR02].

Nov. 1.43: Guide 8.0 software used for comp.-star mags [YOS02]. Nov. 4.54 and Dec. 2.49: Guide 8.0 software used for comp.-star mag (comp. star has $B-V = +0.48$) [TSU02]. Nov. 6.57: $B-V$ values of comp. stars were +0.60, +0.70, and +0.75 [NAK01]. Nov. 12.44: comet close to star, but clearly visible [SEA]. Nov. 30.45: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 3.52 and 2005 Jan. 8.47: Guide 8.0 software used for comp.-star mags [OHS]. Dec. 3.52: $B-V$ values of comp. stars were +0.51, +0.54, and +0.75 [OHS]. Dec. 3.77: comet very diffuse; at 109 \times , 14th-mag central cond. glimpsed [BOU]. Dec. 8.43: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 16.48: Guide 8.0 software used for comp.-star mags [MIY01]. Dec. 21.80: fan-shaped coma; beginning phase of outburst; moonlight [HOR02]. Dec. 30.39: Guide 8.0 software used for comp.-star mags [MIY01]. 2005 Jan. 7.82: new outburst [GON05]. Jan. 8.40: w/ 40-cm f/4.5 L, "possibly just after small outburst?; strongly condensed" [YOS04]. Jan. 8.47: comp. star has $B-V = +0.79$ [OHS]. Jan. 14.81: "disturbing 24-percent-illuminated lunar crescent was only 17 $^\circ$ to the SW; stray light from streetlights (Virso, Sweden)" [KAR02]. Jan. 30.83: zodiacal light [GON05].

◊ Comet 32P/Comas Solá \Rightarrow 2004 Oct. 13.02: possible tail 1' long in p.a. 225 $^\circ$ [SRB]. Nov. 6.62: $B-V$ values of comp. stars were +0.60, +0.70, and +0.75 [NAK01]. Nov. 7.53, Dec. 6.56, and 2005 Jan. 9.51: Guide 8.0 software used for comp.-star mags [TSU02]. 2004 Nov. 7.53: comp. star has $B-V = +0.71$ [TSU02]. Nov. 11.85: motion confirmed [GUZ]. Nov. 16.58 and Dec. 9.54: StellaNavigator (ver.6.1) software used for comp.-star mags [NAG08]. Nov. 16.66, Dec. 5.55, and 16.50: Guide 8.0 software used for comp.-star mags [MIY01]. Dec. 6.49, 11.67, and 2005 Jan. 8.63: Guide 8.0 software used for comp.-star mags [OHS]. 2004 Dec. 6.49: comp. star has $B-V = +0.98$ [OHS]. Dec. 6.56: comp. star has $B-V = +0.44$ [TSU02]. Dec. 8.51: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 11.67: comp. star has $B-V = +0.42$ [OHS]. Dec. 30.41: Guide 8.0 software used for comp.-star mags [MIY01]. 2005 Jan. 8.42: w/ 40-cm f/4.5 L, near a star [YOS04]. Jan. 8.63: comp. star has $B-V = +0.79$ [OHS]. Jan. 9.51: comp. star has $B-V = +0.63$ [TSU02]. Jan. 14.81: stray light from streetlights [KAR02].

◊ Comet 40P/Väisälä \Rightarrow 2004 May 14.90: Guide 8.0 software used for comp.-star mags [TOT03]. May 15.99: star of mag 15.6 (GSC 1.1) close to the comet; possible short tail [RES].

◊ Comet 42P/Neujmin \Rightarrow 2004 Nov. 7.46: $B-V$ of comp. stars were +0.51, +0.55, +0.68, +0.70, and +0.87 [NAK01].

◊ Comet 48P/Johnson \Rightarrow 2004 Nov. 7.44: Guide 8.0 software used for comp.-star mags; $B-V$ values of comp. stars were +0.38 and +0.77 [NAK01]. Nov. 8.45: Guide 8.0 software used for comp.-star mag (comp. star has $B-V = +0.54$) [TSU02]. Dec. 3.43: Guide 8.0 software used for comp.-star mags; $B-V$ values of comp. stars were +0.51, +0.54, and +0.75 [OHS].

◊ Comet 49P/Arend-Rigaux \Rightarrow 2004 Nov. 9.55: Guide 8.0 software used for comp.-star mags (comp. star has $B-V = +0.89$) [OHS]. Nov. 30.46: $B-V$ of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 6.50: Guide 8.0 software used for comp.-star mag (comp. star has $B-V = +0.57$) [TSU02]. Dec. 8.46: $B-V$ of comp. stars were +0.68 and +0.87 [NAK01].

◊ Comet 53P/Van Biesbroeck \Rightarrow 2004 Dec. 2.47: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01].

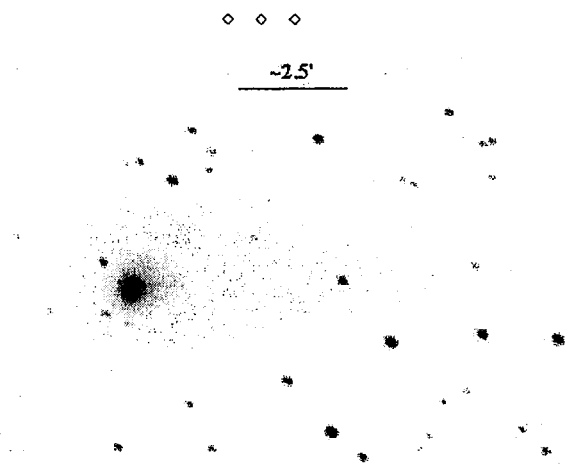
◊ Comet 56P/Slaughter-Burnham \Rightarrow 2004 Nov. 4.52, Dec. 2.48, and 2005 Jan. 9.48: Guide 8.0 software used for comp.-star mags [TSU02]. 2004 Nov. 4.52 and Dec. 2.48: comp. star has $B-V = +0.47$ [TSU02]. Nov. 7.55: $B-V$ values

of comp. stars were +0.51, +0.55, +0.68, +0.70, and +0.87 [NAK01]. Nov. 9.50 and 2005 Jan. 8.51: *Guide 8.0* software used for comp.-star mags [OHS]. 2004 Nov. 9.50: comp. star has $B-V = +0.67$ [OHS]. Dec. 1.47: $B-V$ values of comp. stars were +0.56, +0.68, +0.68, and +0.80 [NAK01]. 2005 Jan. 8.51: comp. star has $B-V = +0.79$ [OHS]. Jan. 9.48: comp. star has $B-V = +0.44$ [TSU02].

◊ *Comet 62P/Tsuchinshan* \Rightarrow 2004 Nov. 12.81: $B-V$ values of comp. stars were +0.49, +0.55, +0.60, +0.75, and +0.85 [NAK01]. Dec. 16.82: $B-V$ of comp. stars were +0.45, +0.48, +0.55, +0.59, +0.63, +0.80, +0.83, and +0.85 [NAK01]. Nov. 19.81: faint object but relatively easily seen at mid to high power; close to 13th-mag star [PEA]. Nov. 20.82: difficult and diffuse object [PEA]. 2005 Jan. 7.82, 11.81, 12.83, and 21.83: *Guide 8.0* software used for comp.-star mags [MIY01]. Jan. 8.78: w/ 40-cm $f/4.5$ L, "very large and very diffuse but easy to see" [YOS04]. Jan. 17.82: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.50$) [TSU02]. Jan. 20.81: *Guide 8.0* software used for comp.-star mags [YOS02]. Jan. 21.80: $B-V$ of comp. stars were +0.56, +0.61, +0.68, +0.69, +0.76, and +0.79 [NAK01].

◊ *Comet 65P/Gunn* \Rightarrow 2004 Sept. 13.94: *Guide 7.0* software used for comp.-star mags [SZA]. Dec. 2.53: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 6.45: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.98$) [OHS].

◊ *Comet 69P/Taylor* \Rightarrow 2004 Nov. 12.78: $B-V$ values of comp. stars were +0.49, +0.55, +0.60, +0.75, and +0.85 [NAK01]. Dec. 16.75: $B-V$ values of comp. stars were +0.45, +0.48, +0.55, +0.59, +0.63, +0.80, +0.83, and +0.85 [NAK01]. Dec. 20.90 and 21.94: moonlight [HOR02].



Unfiltered CCD image of comet 78P taken by A. Lepardo, M. Gonano, and G. Sostero with the 25-cm $f/5.7$ reflector (+ KAF402ME CCD) at Remanzacco Observatory in Italy on 2004 Nov. 21.83 UT (six 240-sec exposures; scale $2''.6/\text{pixel}$). North is up and east is to the left. The bar at top represents ≈ 2.5 .

◊ *Comet 78P/Gehrels* \Rightarrow 2004 Aug. 14.98, Sept. 10.99, and Dec. 31.72: *Guide 8.0* software used for comp.-star mags [NAG09]. Sept. 10.90, 18.89, Oct. 17.85, and Nov. 6.90: *Guide 8.0* software used for comp.-star mags [TOT03]. Oct. 6.85, Nov. 9.83, 19.99, and Dec. 31.73: *Guide 7.0* software used for comp.-star mags [SAN07]. Oct. 24.03: moonlight [ADA05]. Nov. 3.79, 6.65, and 8.76: *Guide 7.0* software used for comp.-star mags [MIY01]. Nov. 7.49, Dec. 6.60, and 2005 Jan. 9.53: *Guide 8.0* software used for comp.-star mags [TSU02]. Nov. 7.49: comp. star has $B-V = +0.62$ [TSU02]. Nov. 7.50, 16.57, Dec. 2.49, and 9.52: *StellaNavigator* (ver.6.1) software used for comp.-star mags [NAG08]. Nov. 7.57, 21.78, and Dec. 11.53: *Guide 8.0* software used for comp.-star mags [YOS02]. Nov. 7.73 and 13.71: *Guide 8.0* software used for comp.-star mags [NAG04]. Nov. 8.88: a 216XT-CCD image shows a curved $3'$ tail in p.a. 258° [SHU]. Nov. 12.68: $B-V$ values of comp. stars were +0.49, +0.55, +0.60, +0.75, and +0.85 [NAK01]. Nov. 15.89: significantly brighter than 4 weeks ago; condensed coma w/ a very conspicuous starlike false nucleus of mag 12.0; no tail discernible [KAM01]. Nov. 16.65, Dec. 5.54, and 16.49: *Guide 8.0* software used for comp.-star mags [MIY01]. Nov. 19.79 and 20.80: bright and prominent central cond. [PEA]. Nov. 21.15: rather bright and well condensed coma [GRA04]. Nov. 30.49: comet close to star; obs. made quickly through breaks in cloud [SEA].

Dec. 2.46: *The Sky* (ver.5) software used for comp.-star mags [MIT]. Dec. 3.56 and 11.69: *Guide 8.0* software used for comp.-star mags [OHS]. Dec. 3.56: comp. star has $B-V = +0.85$ [OHS]. Dec. 6.00: surface brightness similar to NGC 205; difficult to see due to a quite-bright sky background [GRA04]. Dec. 6.60: comp. star has $B-V = +0.55$ [TSU02]. Dec. 6.92: nearby star of mag 12 interfered; comet continues to display a pronounced inner coma; at $333\times$, starlike false nucleus of mag 13.5 [KAM01]. Dec. 11.69: comp. star has $B-V = +0.42$ [OHS]. Dec. 14.97: easy object; small coma w/ central cond.; at $242\times$, starlike false nucleus of mag 13.5 [KAM01]. Dec. 15.88: small coma w/ pronounced central cond.; at $242\times$, starlike false nucleus of mag 14.0; faint tail of length $0^\circ 07'$ suspected in p.a. 30° [KAM01]. Dec. 30.42, 2005 Jan. 1.44, 2.39, 5.53, 7.41, 8.40, 11.45, 12.47, 21.45, and 31.48: *Guide 8.0* software used for comp.-star mags [MIY01]. 2005 Jan. 2.58: *Guide 8.0* software used for comp.-star mags [NAG04]. Jan. 4.92: pronounced central cond. displaced towards SW; coma elongated and fan-shaped towards NE (very probably indicating broad tail of $3'$ length); at $242\times$, stellar false nucleus of mag 13.5 [KAM01]. Jan. 6.84: star embedded in coma (meas. data uncertain) [PIL01]. Jan. 6.86: bright star

of mag 11.7 in coma, 1' from central cond. [SRB]. Jan. 8.51: *The Sky* (ver.5) software used for comp.-star mags [MIT]. Jan. 9.53: comp. star has $B-V = +0.71$ [TSU02]. Jan. 9.95: small central cond.; at 242 \times , stellar false nucleus of mag 14.0 [KAM01]. Jan. 14.83: stray light from streetlights [KAR02]. Jan. 14.90: at 242 \times , still significant central cond., but no false nucleus brighter than mag ≈ 14.5 visible [KAM01]. Jan. 16.90: fan tail > 3' long in p.a. 30 $^\circ$ -90 $^\circ$ [SRB].

◊ *Comet 88P/Howell* \Rightarrow 2004 Sept. 14.09: *Guide 8.0* software used for comp.-star mags [TOT03]. Nov. 4.62: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.54$) [TSU02]. Dec. 8.49: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01].

◊ *Comet 99P/Kowal* \Rightarrow 2004 Dec. 16.76: $B-V$ values of comp. stars were +0.45, +0.48, +0.55, +0.59, +0.63, +0.80, +0.83, and +0.85 [NAK01].

◊ *Comet 117P/Helin-Roman-Alu* \Rightarrow 2005 Jan. 21.83 and 28.82: *Guide 8.0* software used for comp.-star mags [OHS]. Jan. 21.83: $B-V$ values of comp. stars were +0.53, +0.54, +0.66, and +0.66 [OHS]. Jan. 28.82: $B-V$ values of comp. stars were +0.70, +0.72, and +0.84 [OHS].

◊ *Comet 119P/Parker-Hartley* \Rightarrow 2004 Nov. 4.61 and Dec. 6.52: *Guide 8.0* software used for comp.-star mags [TSU02]. Nov. 4.61: comp. star has $B-V = +0.45$ [TSU02]. Nov. 9.58: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.88$) [OHS]. Dec. 2.48: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 6.52: comp. star has $B-V = +0.34$ [TSU02].

◊ *Comet 120P/Mueller* \Rightarrow 2004 Nov. 6.61: $B-V$ values of comp. stars were +0.60, +0.70, and +0.75 [NAK01]. Dec. 8.50: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01].

◊ *Comet 121P/Shoemaker-Holt* \Rightarrow 2004 Nov. 12.84: $B-V$ values of comp. stars were +0.49, +0.55, +0.60, +0.75, and +0.85 [NAK01]. Dec. 16.81: $B-V$ values of comp. stars were +0.45, +0.48, +0.55, +0.59, +0.63, +0.80, +0.83, and +0.85 [NAK01]. Dec. 22.03: stellar appearance [SRB]. 2005 Jan. 21.80: *Guide 8.0* software used for comp.-star mags; $B-V$ values of comp. stars were +0.53, +0.54, +0.66, and +0.66 [OHS].

◊ *Comet 129P/Shoemaker-Levy* \Rightarrow 2004 Dec. 11.55: $B-V$ values of comp. stars were +0.45, +0.59, +0.63, +0.79, +0.83, and +0.85 [NAK01].

◊ *Comet 130P/McNaught-Hughes* \Rightarrow 2004 Dec. 6.40: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.98$) [OHS].

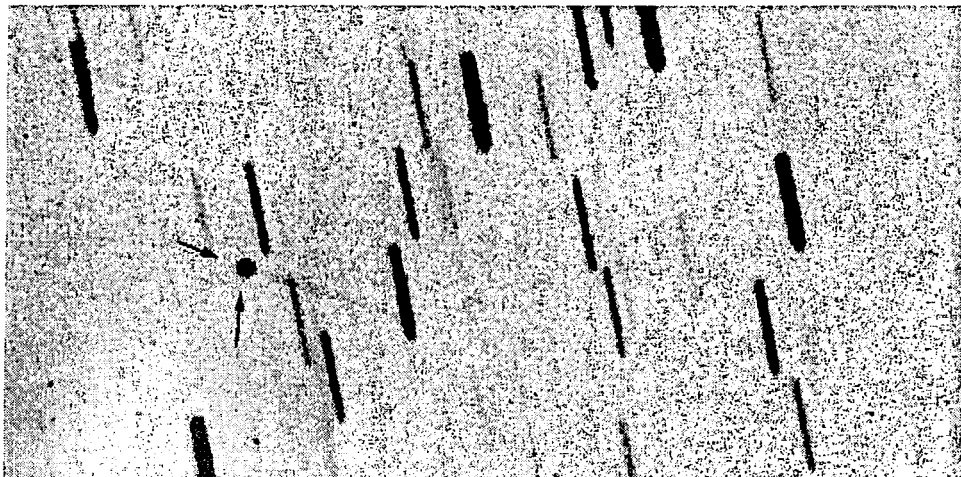
◊ *Comet 131P/Mueller* \Rightarrow 2004 Nov. 7.59: $B-V$ values of comp. stars were +0.51, +0.55, +0.68, +0.70, and +0.87 [NAK01]. Dec. 1.49: $B-V$ values of comp. stars were +0.56, +0.68, +0.68, and +0.80 [NAK01].

◊ *Comet 152P/Helin-Lawrence* \Rightarrow 2004 Dec. 1.45: $B-V$ values of comp. stars were +0.56, +0.68, +0.68, and +0.80 [NAK01].

◊ *Comet 159P/2003 UD₁₆ (LONEOS)* \Rightarrow 2004 Dec. 11.63: $B-V$ values of comp. stars were +0.45, +0.59, +0.63, +0.79, +0.83, and +0.85 [NAK01].

◊ *Comet 160P/2004 NL₂₁ (LINEAR)* \Rightarrow 2004 Nov. 4.46: $B-V$ of comp. stars were +0.51, +0.55, and +0.70 [NAK01]. Dec. 1.43: $B-V$ of comp. stars were +0.56, +0.68, +0.68, and +0.80 [NAK01]. Dec. 4.81: stellar appearance [HOR02].

◊ *Comet 162P/2004 TU₁₂ (Siding Spring)* \Rightarrow 2004 Nov. 12.0: tail 2' long — brighter close to the head [Gianluca Masi, Ceccano, Italy]. Nov. 13.28-13.42: fast CCD photometry using USNO-B1.0 red magnitudes (w/ 30-cm T, assumed from his records dealing with astrometry) indicates a steady, smooth brightening of 0.4 mag over this period [Juan Lacruz, La Canada, near Madrid, Spain]. Nov. 14.19: fourteen co-added 60-sec CCD images taken by G. Masi, F. Mallia, and R. Wilcox w/ 36-cm SoTIE telescope at Las Campanas show a tail longer than 5'8 in p.a. 70 $^\circ$ (fainter and three times longer than when imaged on Nov. 12.0), but no obvious coma (size of head the same as sizes of stars of similar brightness; FWHM = 3''); tail very faint close to the nucleus (barely visible), peaking at $\approx 100''$ from the nucleus [Gianluca Masi, Ceccano, Italy]. Nov. 15.03-15.09: possible disconnection of very faint tail seen in fifty-seven 1-min CCD exposures, divided into three sets each w/ 19 images (images of each set were median-combined — to remove star interference, for better analysis — and then the three resulting frames added); tail longer than 10' is apparent (longer than on the previous night), but it continues to fade from night to night, also showing a different brightness distribution — though always pointing in p.a. 70 $^\circ$; close to the nuclear condensation, the tail is very faint/absent (but the total exposure was not deep as before) [Gianluca Masi, Ceccano, Italy]. Nov. 17.53: CCD images w/ 1.0-m f/8 reflector show a 'nucleus' that appears asteroidal in 1'9 seeing; tail 9'8 long, initially in p.a. 72 $^\circ$, curving to p.a. 73 $^\circ$ (no evidence of an inflection), and widens gradually to 8'' at limit; tail is overall very faint — brightest for the first 1'0, faintest at 1'3 from the 'nucleus', then gradually brightening again until it is 'bright' at 2'2 and fairly uniform with a gradual 'tailing' off out to a distance of 9'8; red mag 14.7 measured for this comet [MCN]. Nov. 17.94: mountain location, very clear sky; limiting stellar mag 15.5; faint stellar object, confirmed by motion over a 1-hour period [GON05]. Nov. 24.55: twenty co-added 20-sec CCD exposures taken in moonlight with the ANU 1.0-m f/8 reflector shows no evidence of any tail, out to 12' [MCN]. Nov. 30.43: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Nov. 30.49: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.33$) [TSU02]. Dec. 3.76: very faint, stellar object; motion close to star of mag 13.5 obvious within 5 min [BOU]. Dec. 4.87: stellar appearance [SRB]. Dec. 10.86: sixty co-added 30-sec CCD images (taken centered on this clock time) clearly show a faint, long, narrow tail starting at the stellar nuclear cond. in p.a. 70 $^\circ$ and ending some 6' away in p.a. 76 $^\circ$ [Juan Lacruz, La Canada, near Madrid, Spain]. Dec. 21.74: strong moonlight [HOR02]. 2005 Jan. 9.45: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.23$) [TSU02].



Unfiltered CCD image of comet 162P/2004 TU₁₂ taken on 2004 Nov. 13.8 (forty-four 30-sec exposures) by R. Naves N. of Barcelona, Spain, at Observatorio Montcabre with a 30-cm f/5.5 Schmidt-Cassegrain reflector. Note the apparent lack of coma (starlike head) and the long, thin, faint tail. (See descriptive comments by other observers of this unusual comet on page 10.)

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[text continued from page 10]

◇ Comet 163P/2004 V4 (NEAT) ⇒ 2004 Nov. 7.62: $B-V$ values of comp. stars were +0.51, +0.55, +0.68, +0.70, and +0.87 [NAK01]. Nov. 12.70: $B-V$ values of comp. stars were +0.49, +0.55, +0.60, +0.75, and +0.85 [NAK01]. Dec. 2.54: $B-V$ of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 11.51: $B-V$ of comp. stars were +0.45, +0.59, +0.63, +0.79, +0.83, and +0.85 [NAK01]. Dec. 17.61: Guide 8.0 software used for comp.-star mag (comp. star has $B-V = +0.87$) [OHS]. 2005 Jan. 8.66: Guide 8.0 software used for comp.-star mag (comp. star has $B-V = +0.79$) [OHS].

◇ Comet 164P/2004 Y1 (Christensen) ⇒ 2005 Jan. 21.77: $B-V$ values of comp. stars were +0.56, +0.61, +0.68, +0.69, +0.76, and +0.79 [NAK01]. Jan. 21.78: Guide 8.0 software used for comp.-star mags; $B-V$ values of comp. stars were +0.53, +0.54, +0.66, and +0.66 [OHS].

◇ Comet P/1996 R2 (Lagerkvist) ⇒ 2004 Nov. 12.5: 23 co-added 120-sec images (stacked in groups of 11 and 12) taken with the Australian National University 1.0-m reflector (+ custom-made CCD camera w/ thinned Tek 2048x2048 engineering-grade chip and Astromed controller) at Siding Spring in good (2''0) seeing show no sign of this comet to red mag 21.5 (± 1) within ± 0.5 day of the Minor Planet Center Electronic Service ephemeris; "an earlier candidate is clearly not real" [MCN].

◇ Comet C/1999 F1 (Catalina) ⇒ 2004 Dec. 2.52: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 6.51: Guide 8.0 software used for comp.-star mag (comp. star has $B-V = +0.98$) [OHS].

◇ Comet C/2001 HT₅₀ (LINEAR-NEAT) ⇒ 2004 Oct. 12.96: possible tail 1' long in p.a. 127° [SRB]. Nov. 4.48 and Dec. 2.44: Guide 8.0 software used for comp.-star mags; $B-V$ values of comp. stars were +0.47 and +0.49 [TSU02]. Nov. 7.54: $B-V$ values of comp. stars were +0.51, +0.55, +0.68, +0.70, and +0.87 [NAK01]. Dec. 1.42: $B-V$ values of comp. stars were +0.56, +0.68, +0.68, and +0.80 [NAK01]. Dec. 3.46 and 2005 Jan. 8.43: Guide 8.0 software used for comp.-star mags [OHS]. 2004 Dec. 3.46: $B-V$ values of comp. stars were +0.51, +0.54, and +0.75 [OHS]. Dec. 21.77: moonlight [HOR02]. 2005 Jan. 8.43: comp. star has $B-V = +0.79$ [OHS].

◇ Comet C/2001 K5 (LINEAR) ⇒ 2004 Sept. 17.97: dense star field [HOR02].

◇ Comet C/2001 Q4 (NEAT) ⇒ 2004 Apr. 30.31: key comp. star was η Col; strong moonlight [PAL04]. May 3.27: key comp. star was κ Cma; strong moonlight; comet alt. $\approx 50^\circ$ [PAL04]. May 8.27: faint but definite tail visible, quite curved; key comp. star was α Mon [PAL04]. May 9.78: w/ 8-cm R (19 \times), $m_2 = 7.0$ [KOS]. May 9.83, 10.83, 12.84, 16.84, 20.86, 23.86, 30.88, July 7.87, 20.90, 23.89, Aug. 9.90, 15.88, 20.85, and Sept. 20.81: Guide 8.0 software used for comp.-star mags [NAG09]. May 9.83, July 17.89, and Aug. 5.82: Guide 7.0 software used for comp.-star mags [SAR02]. May 11.83: w/ 7 \times 50 B, $m_2 = 7.0$; 0 $^\circ$ 8 dust tail in p.a. 125° [KOS]. May 13.26: key comp. star was β CMi; comet alt. $\approx 45^\circ$ [PAL04]. May 14.82: w/ 8-cm R (19 \times), $m_2 = 8.0$; 0 $^\circ$ 5 dust tail in p.a. 135° [KOS]. May 14.87, June 25.89, July 8.86, and 13.88: GUIDE 8.0 software used for comp.-star mags [CSO]. May 15.18: w/ 10 \times 50 B, 1 $^\circ$ 25 tail in p.a. 140° [MOR]. May 16.26: key comp. star was δ Cnc; comet alt. $\approx 35^\circ$ [PAL04]. May 20.19: w/ 10 \times 50 B, 2 $^\circ$ tail in p.a. 146° and 3 $^\circ$ tail in p.a. 170° [MOR]. June 7.90, 25.89, July 8.89, 12.89, 23.89, Aug. 7.84, Sept. 2.81, 10.84, 17.81, and Oct. 3.78: Guide 8.0 software used for comp.-star mags [TOT03]. June 13.90: S edge of tail 0 $^\circ$ 2 long in p.a. 135° [CSU]. June 14.87: S edge of tail 0 $^\circ$ 1 long in p.a. 154° [CSU]. June 15.88: S edge of tail 0 $^\circ$ 08 long in p.a. 147° [CSU]. June 17.89: S edge of tail 0 $^\circ$ 08 long in p.a. 145° [CSU]. June 19.88: S edge of tail 0 $^\circ$ 08 long in p.a. 134° [CSU]. June 21.87: S edge of

tail 0°08 long in p.a. 140° [CSU]. June 22.89: S edge of tail 0°07 long in p.a. 123° [CSU]. June 23.90: S edge of tail 0°07 long in p.a. 128° [CSU]. June 30.92: moonlight [GUZ]. June 30.92, July 18.93, Sept. 10.95, 17.05, and 21.98: some light pollution [GUZ]. Aug. 15.86: light pollution [GUZ]. Sept. 13.95: *GUIDE 7.0* software used for comp.-star mags [SZA]. Sept. 17.79: second faint tail 6'6 long in p.a. 42° [HOR02]. Sept. 30.82: second faint tail > 6' long in p.a. 31° [HOR02]. Oct. 15.88: *Guide 7.0* software used for comp.-star mags [SAN07]. Nov. 1.41: *Guide 8.0* software used for comp.-star mags [YOS02]. Nov. 4.43: $B-V$ values of comp. stars were +0.51, +0.55, and +0.70 [NAK01]. Nov. 7.44 and 2005 Jan. 9.41: *Guide 8.0* software used for comp.-star mags; $B-V$ values of comp. stars were +0.47 and +0.48 [TSU02]. Nov. 8.96: comet becoming very diffuse and faint [BOU]. Nov. 30.40: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 3.45: *Guide 8.0* software used for comp.-star mags; $B-V$ values of comp. stars were +0.61 and +0.74 [OHS]. Dec. 21.70: dense star field; fan-shaped coma; moonlight [HOR02]. 2005 Jan. 8.39: w/ 0.40-m $f/4.5$ L; diffuse but still bright, large, and clearly visible [YOS04]. Jan. 10.93: dense star field [SRB]. Jan. 11.85: *Guide 8.0* software used for comp.-star mags [MIY01]. Jan. 16.70: at 81 \times , limiting mag \sim 15; second confirming detection made at Jan. 16.74 UT [LEH]. Jan. 16.83: stellar appearance; dense star field [SRB].

◊ *Comet C/2001 T4 (NEAT)* \implies 2004 Nov. 6.67: $B-V$ of comp. stars were +0.60, +0.70, and +0.75 [NAK01].

◊ *Comet C/2002 J4 (NEAT)* \implies 2004 Dec. 2.50: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.72$) [NAK01].

◊ *Comet C/2002 J5 (LINEAR)* \implies 2004 Sept. 17.81: outer edge of coma within 5'' of a star of mag $R = 17.7$ [HOR02].

◊ *Comet P/2002 T5 (LINEAR)* \implies 2005 Jan. 21.82: $B-V$ values of comp. stars were +0.56, +0.61, +0.68, +0.69, +0.76, and +0.79 [NAK01].

◊ *Comet C/2002 T7 (LINEAR)* \implies 2003 Oct. 18.95: w/ 40.7-cm L (233 \times), central cond. of mag 13.9 [BIV]. 2004 Apr. 30.59: key comp. star was λ Psc; tail was thin and bright; comet situated w/in some particularly bright zodiacal light [PAL04]. June 6.89: comet low in twilight [BIV]. Dec. 16.85: $B-V$ values of comp. stars were +0.45, +0.48, +0.55, +0.59, +0.63, +0.80, +0.83, and +0.85 [NAK01]. 2005 Jan. 17.80: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.65$) [TSU02].

◊ *Comet C/2002 V2 (LINEAR)* \implies 2004 Dec. 8.48: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01].

◊ *Comet C/2003 G1 (LINEAR)* \implies 2004 Sept. 17.89: dense star field [HOR02].

◊ *Comet C/2003 H3 (NEAT)* \implies 2004 Nov. 7.53: $B-V$ values of comp. stars were +0.51, +0.55, +0.68, +0.70, and +0.87 [NAK01]. Dec. 2.44: $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01].

◊ *Comet C/2003 K4 (LINEAR)* \implies 2004 May 9.95, 15.98, 20.96, July 7.88, 17.90, 20.90, and 23.90: *Guide 8.0* software used for comp.-star mags [NAG09]. May 14.87, 16.83, 30.86, June 7.92, 25.90, July 9.90, 12.91, 16.93, and 23.96: *Guide 8.0* software used for comp.-star mags [TOT03]. June 14.82: w/ 8-cm R, dust tail in p.a. 135° [KOS]. June 14.82: w/ 7 \times 50 B, $m_2 = 7.5$ [KOS]. June 25.91, July 8.91, and 13.93: *GUIDE 8.0* software used for comp.-star mags [CSO]. June 26.99: coma elongated in p.a. \approx 130° [GUZ]. June 30.93: moonlight interference [GUZ]. July 16.87, 17.89, and 20.86: very faint, thin tail [KOS]. July 17.92: *Guide 7.0* software used for comp.-star mags [CZE03]. July 18.90: *Guide 7.0* software used for comp.-star mags [SAR02]. Aug. 4.71: tail diffuse (averted vision required to estimate length) [BEG01]. Aug. 5.73: very clear conditions; definite stellar central cond., slightly displaced in sunward direction [BEG01]. Aug. 5.85, 9.85, 15.83, and 16.81: *Guide 8.0* software used for comp.-star mags [NAG09]. Aug. 6.86: *Guide 7.0* software used for comp.-star mags [SAR02]. Aug. 7.73: *Guide 6* software used for comp.-star mags [VAN15]. Aug. 7.85: *Guide 8.0* software used for comp.-star mags [TOT03]. Aug. 13.76: hazy conditions; comet alt. 20° [VAN15]. Sept. 1.79: low alt. and twilight [GUZ]. Sept. 5.70: no tail visible; conditions clear but alt. only 12° [BEG01]. Oct. 22.84: "my first obs. in the morning sky; slightly disappointing due to the comet's faintness; no sign of a tail, although the sky background was affected by twilight" [PEA].

Nov. 6.80: coma small, very condensed, and of high surface brightness; easily seen also in 8 \times 40 B [PEA]. Nov. 7.84 and 22.84: *Guide 8.0* software used for comp.-star mags [NAG04]. Nov. 12.31: comp. stars have $V = 7.31$ ($B-V = +0.59$) and 7.48 ($B-V = +0.08$); nautical twilight [AMO01]. Nov. 12.85 and 16.84: *StellaNavigator* (ver.6.1) software used for comp.-star mags [NAG08]. Nov. 13.80: "well-defined tail observed, 51' long in p.a. 274°; I'm also positive that I saw some form of anti-tail; it appeared as a relatively bright appendage 11' long in p.a. 54° (this was also well seen in 20-cm L)" [PEA]. Nov. 16.09: anti-tail 9' long in p.a. 60°, visible w/ averted vision and occasionally directly [BEG01]. Nov. 16.86 and 20.85: *Guide 8.0* software used for comp.-star mags [TSU02]. Nov. 16.86: comp. star has $B-V = +0.86$ [TSU02]. Nov. 17.09: "anti-tail appears as a small diffuse extension to the coma, 3' long in p.a. 60°, less prominent than yesterday" [BEG01]. Nov. 18.08: anti-tail conspicuous, 10' long in p.a. 62° [BEG01]. Nov. 19.27: comp. stars have $V = 7.10$ ($B-V = +0.41$) and 7.76 ($B-V = +0.67$) [AMO01]. Nov. 19.81: "well-defined tail 46' long in p.a. 270°; anti-tail also obs. as a relatively bright appendage 13' long in p.a. 48°; this comet may also have been glimpsed w/ the naked eye from this dark-sky site, although it was only glimpsed intermittently and I can't claim certainty" [PEA]. Nov. 20.81: "straight tail 45' long in p.a. 275° (this tail's brightness has decreased markedly over the last few mornings)"; also, an anti-tail w/ a higher surface brightness than the main tail, 9' long in p.a. 55° [PEA]. Nov. 20.85: comp. star has $B-V = +0.44$ [TSU02]. Nov. 21.81: tail 34' long in p.a. 265°; also, anti-tail 4' long in p.a. 49° [PEA]. Nov. 21.85: *Guide 8.0* software used for comp.-star mags [YOS02]. Nov. 22.84: w/ 30.4-cm L (61 \times), 5' fan-shaped anti-tail in p.a. 25°-85° [NAG04]. Dec. 11.76: comet located in a rich Vela star field, which hampered observations of any tail [PEA]. Dec. 16.91: coma extended 6' in p.a. 260° [BEG01]. Dec. 17.11: ref. stars SAO 237222 and SAO 237085 [MAN04]. Dec. 18.75: comet

located in a rich Carina star field, being quite impressive against this backdrop [PEA]. Dec. 24.98: comp. stars have $V = 7.10$ ($B-V = +0.25$) and 7.60 ($B-V = +0.21$); moonlight interference [AMO01]. Dec. 28.15: comp. stars have $V = 7.17$ ($B-V = +0.37$) and 7.67 ($B-V = +0.46$); moonlight interference [AMO01]. Dec. 30.55: fan-shaped tail $\approx 20'$ long in p.a. 86° , although it appeared quite faint and ill-defined [PEA]. Dec. 30.78: quite diffuse w/ faint central point of mag ~ 11 [COO02].

2005 Jan. 2.55: fan-shaped tail $\approx 16'$ long in p.a. 87° [PEA]. Jan. 2.95: slightly hazy conditions [BEG01]. Jan. 3.83: excellent conditions and seeing superb; tail faint, but distinctly curved [BEG01]. Jan. 4.86: coma diffuse w/ definite hazy point in center, not sharp, conditions hazy after several days of cloud [COO02]. Jan. 4.90: coma had a faint fan-like extension $10'$ long in p.a. 28° [BEG01]. Jan. 10.81: poor conditions, comet obs. between thin clouds [COO02]. Jan. 12.98 and 14.97: comp. stars have $V = 7.58$ ($B-V = +0.89$) and $V = 8.27$ ($B-V = +0.43$) [AMO01]. Jan. 16.99 and 20.96: comp. stars have $V = 7.57$ ($B-V = -0.13$) and 7.92 ($B-V = +0.37$); moonlight interference [AMO01]. Jan. 17.20: stellar cond. within a bright disk inside the coma [ROB06]. Jan. 18.57: comet located close to 5th-mag star [PEA]. Jan. 26.99: comp. stars have $V = 7.71$ ($B-V = +0.41$) and 8.88 ($B-V = +0.76$) [AMO01]. Jan. 30.87: comp. stars at the same low alt. (10°) as the comet [GON05]. Jan. 31.44: *The Sky* (ver.5) software used for comp.-star mags [MIT].

◊ *Comet C/2003 T3 (Tabur)* \Rightarrow 2004 May 21.03: *Guide 8.0* software used for comp.-star mags [NAG09]. May 28.06: close to 13th-mag star; twilight; for all CCD comet photometry in this issue, *Astrometrica* software was used for the main photometry, which is then used with *Focas* (created by the Spanish observers for $10'' \times 10''$ box photometry), which in turn reviews *Astrometrica*'s log files; information on *Focas* can be found on the WWW at http://astrosurf.com/cometas-obs/Articulos/Focas_i/Focas_i.htm [RES]. July 11.99: *Guide 8.0* software used for comp.-star mags [TOT03]. Sept. 17.11: some light pollution [GUZ]. Nov. 12.85: $B-V$ values of comp. stars were $+0.49$, $+0.55$, $+0.60$, $+0.75$, and $+0.85$ [NAK01]. Nov. 16.85: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.60$) [TSU02]. Dec. 11.80: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.79$) [OHS]. Dec. 16.84: $B-V$ values of comp. stars were $+0.45$, $+0.48$, $+0.55$, $+0.59$, $+0.63$, $+0.80$, $+0.83$, and $+0.85$ [NAK01]. 2005 Jan. 21.76: $B-V$ values of comp. stars were $+0.56$, $+0.61$, $+0.68$, $+0.69$, $+0.76$, and $+0.79$ [NAK01].

◊ *Comet C/2003 T4 (LINEAR)* \Rightarrow 2004 Nov. 7.80: *Guide 8.0* software used for comp.-star mags [TOT03]. Nov. 21.18: fairly easy object [GRA04]. Nov. 24.22: comet close to stars of mag 12.1 and 13.1 (ref: T4) [BOU]. Nov. 30.38: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.72$) [NAK01]. Dec. 3.42: *Guide 8.0* software used for comp.-star mags; $B-V$ values of comp. stars were $+0.61$ and $+0.74$ [OHS]. 2005 Jan. 11.84, 12.84, 21.84, and 31.86: *Guide 8.0* software used for comp.-star mags [MIY01]. Jan. 15.20: comet close to several stars of mag 10-11 [MEY]. Jan. 20.87: *Guide 8.0* software used for comp.-star mags [YOS02]. Jan. 21.85: *Guide 8.0* software used for comp.-star mags; $B-V$ values of comp. stars were $+0.53$, $+0.54$, $+0.66$, and $+0.66$ [OHS].

◊ *Comet C/2003 WT₄₂ (LINEAR)* \Rightarrow 2004 Nov. 12.73: $B-V$ values of comp. stars were $+0.49$, $+0.55$, $+0.60$, $+0.75$, and $+0.85$ [NAK01]. Dec. 11.53: $B-V$ values of comp. stars were $+0.45$, $+0.59$, $+0.63$, $+0.79$, $+0.83$, and $+0.85$ [NAK01].

◊ *Comet C/2004 B1 (LINEAR)* \Rightarrow 2004 Nov. 9.60, Dec. 11.75, and 17.66: *Guide 8.0* software used for comp.-star mags [OHS]. Nov. 9.60: $B-V$ values of comp. stars were $+0.55$ and $+0.60$ [OHS]. Nov. 12.74: $B-V$ values of comp. stars were $+0.49$, $+0.55$, $+0.60$, $+0.75$, and $+0.85$ [NAK01]. Dec. 11.59: $B-V$ values of comp. stars were $+0.45$, $+0.59$, $+0.63$, $+0.79$, $+0.83$, and $+0.85$ [NAK01]. Dec. 11.75: comp. star has $B-V = +0.60$ [OHS]. Dec. 17.66: comp. star has $B-V = +0.87$ [OHS].

◊ *Comet C/2004 D1 (NEAT)* \Rightarrow 2004 Dec. 11.57: $B-V$ values of comp. stars were $+0.45$, $+0.59$, $+0.63$, $+0.79$, $+0.83$, and $+0.85$ [NAK01].

◊ *Comet C/2004 F4 (Bradfield)* \Rightarrow 2004 Apr. 30.08 and May 3.08: twilight [CSU]. Apr. 30.08: tail certainly visible to 1° ; coma appearance very starlike [CSU]. May 8.06 and 10.06: moonlight [CSU]. May 11.03, 15.02, and 20.99: *GUIDE 8.0* software used for comp.-star mags [NAG09]. May 18.04, June 7.91, and July 11.97: *GUIDE 8.0* software used for comp.-star mags [TOT03]. May 30.03: "nuclear" mag 15.1 [RES].

◊ *Comet C/2004 H6 (SWAN)* \Rightarrow 2004 July 18.00 and 21.03: *GUIDE 7.0* software used for comp.-star mags [SAR02]. July 23.94: *Guide 8.0* software used for comp.-star mags [TOT03]. July 24.02: *Guide 8.0* software used for comp.-star mags [NAG09].

◊ *Comet C/2004 HC₁₈ (LINEAR)* \Rightarrow 2004 May 28.96: faint and small object; moonlight [RES].

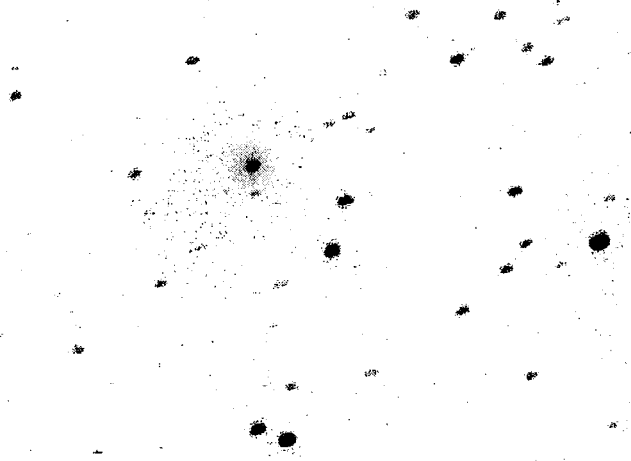
◊ *Comet P/2004 K2 (McNaught)* \Rightarrow 2004 Nov. 6.63: $B-V$ values of comp. stars were $+0.60$, $+0.70$, and $+0.75$ [NAK01]. Dec. 8.53: $B-V$ values of comp. stars were $+0.68$ and $+0.87$ [NAK01]. Dec. 11.50: $B-V$ values of comp. stars were $+0.45$, $+0.59$, $+0.63$, $+0.79$, $+0.83$, and $+0.85$ [NAK01].

◊ *Comet C/2004 P1 (NEAT)* \Rightarrow 2004 Nov. 4.44: $B-V$ of comp. stars were $+0.51$, $+0.55$, and $+0.70$ [NAK01].

◊ *Comet C/2004 Q1 (Tucker)* \Rightarrow 2004 Sept. 10.91, 14.11, and Oct. 17.85: *Guide 8.0* software used for comp.-star mags [TOT03]. Sept. 10.94, Dec. 5.83, and 31.70: *Guide 8.0* software used for comp.-star mags [NAG09]. Sept. 24.85: bright and large object [PEA]. Oct. 5.79, 6.81, 15.90, Nov. 5.73, 9.80, 19.97, Dec. 31.72-31.75: *Guide 7.0* software used for comp.-star mags [SAN07]. Nov. 1.44, 7.47, and Dec. 11.49: *Guide 8.0* software used for comp.-star mags [YOS02]. Nov. 4.58, 30.53, and 2005 Jan. 9.44: *Guide 8.0* software used for comp.-star mags [TSU02]. 2004 Nov. 4.58: comp. star has $B-V = +0.90$ [TSU02]. Nov. 6.01: a rather faint object w/ diffuse coma — its glow fainter than that of NGC 205 [GRA04]. Nov. 6.64: *Guide 7.0* software used for comp.-star mags [MIY01]. Nov. 7.49, 16.56, and Dec. 2.48, and 9.51:

StellaNavigator (ver.6.1) software used for comp.-star mags [NAG08]. Nov. 7.61: *Guide 8.0* software used for comp.-star mags [NAG04]. Nov. 7.80: strong enhancement w/ a Lumicon Swan Band Filter [MEY]. Nov. 8.96: comet close to double star of mag ≈ 10 [SCH04]. Nov. 13.89: comet very close to star of mag 8.2 [COM]. Nov. 16.65 and Dec. 5.53: *Guide 8.0* software used for comp.-star mags [MIY01]. Nov. 21.16: diffuse coma w/ ill-defined boundary; despite similar m_1 and alt. (about 15°) as 78P, 78P was considerably easier to see [GRA04]. Nov. 30.53: comp. star has $B-V = +0.50$ [TSU02]. Dec. 1.52: $B-V$ values of comp. stars were $+0.56$, $+0.68$, $+0.68$, and $+0.80$ [NAK01]. Dec. 2.47: *The Sky* (ver.5) software used for comp.-star mags [MIT]. Dec. 4.75: dense star field [HOR02]. Dec. 6.56: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.98$) [OHS]. Dec. 6.93: rather diffuse object; at $333\times$, starlike false nucleus of mag 14.5 discernible [KAM01]. Dec. 8.86: gray sky; some thin clouds in field; comet close to star of mag 11.2 (ref: TK) [COM]. Dec. 10.94: some light pollution [GUZ]. Dec. 14.96, 15.91, 2005 Jan. 4.91, and 10.90: very diffuse coma w/ small central cond. [KAM01]. 2004 Dec. 15.91: no false nucleus brighter than mag 14.5 [KAM01]. Dec. 20.85: strong moonlight [HOR02]. Dec. 30.38, 2005 Jan. 1.40, 2.41, 7.41, 8.39, 11.44, 12.46, and 21.43: *Guide 8.0* software used for comp.-star mags [MIY01]. Dec. 31.72: w/ 11.4-cm L ($20\times$), $1^\circ 5'$ tail in p.a. 85° and 2° tail in p.a. 350° [SAN07]. 2005 Jan. 4.91 and 10.90: no false nucleus discernible [KAM01]. Jan. 8.41: w/ 40-cm f/4.5 L, well condensed at center [YOS04]. Jan. 8.50: *The Sky* (ver.5) software used for comp.-star mags [MIT]. Jan. 9.44: comp. star has $B-V = +0.53$ [TSU02]. Jan. 10.91 and 16.85: dense star field [SRB]. Jan. 14.87: stray light from streetlights [KAR02]. Jan. 14.88: "slightly more condensed than in the preceding days" [KAM01].

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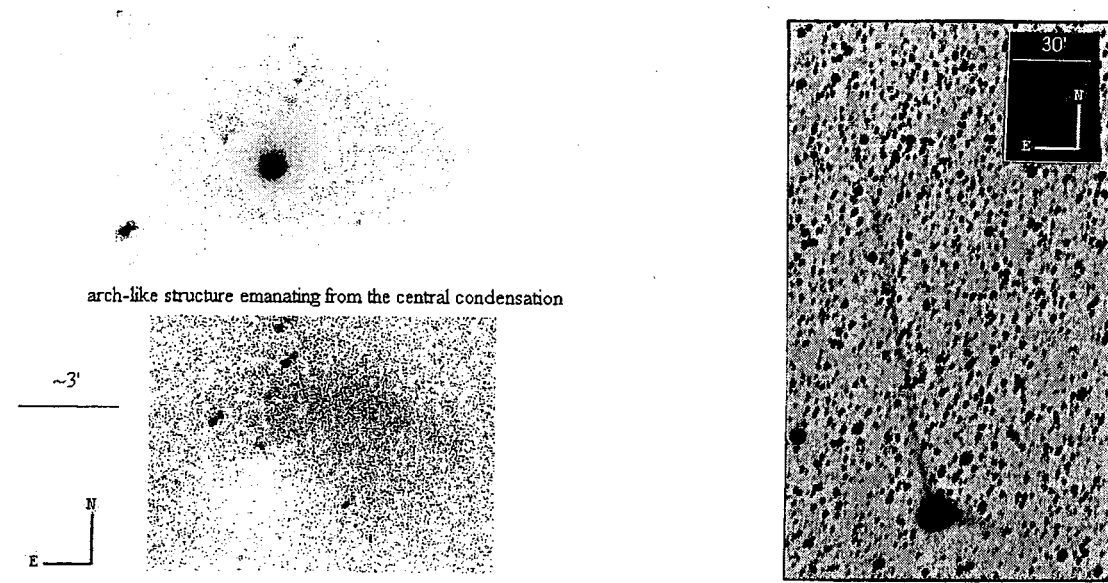


CCD image of comet C/2004 Q1 taken by Giovanni Sostero with the 25-cm T (+ Hi-Sis23 ME CCD + Cousins I filter) on 2004 Nov. 16.97 (three 100-sec exposures). The field-of-view is $\approx 11' \times 8'$ in size (scale $2''/\text{pixel}$). North is up and east to the left.

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◇ Comet C/2004 Q2 (Machholz) \Rightarrow 2004 Aug. 28.09: low alt. and some haze [GUZ]. Sept. 9.08: low alt. and some moonlight interference [GUZ]. Sept. 10.91, 14.11, and Oct. 17.85: *Guide 8.0* software used for comp.-star mags [TOT03]. Sept. 10.94, Dec. 5.83, and 31.70: *Guide 8.0* software used for comp.-star mags [NAG09]. Sept. 11.06, Dec. 30.76, and 31.73: *Guide 8.0* software used for comp.-star mags [NAG09]. Sept. 11.09: quite condensed, bright center (definite point in center, not sharp, like out-of-focus star); tail is a short, narrow fan; *Guide 6* software used for comp.-star mags [COO02]. Sept. 14.08 and Dec. 20.86: *Guide 8.0* software used for comp.-star mags [TOT03]. Sept. 15.11: coma spherical and well condensed near the center with a fainter outer halo [BEG01]. Oct. 4.10, 8.96, and 22.02: *Guide 6* software used for comp.-star mags [VAN15]. Oct. 5.79, 6.81, 15.90, Nov. 5.73, 9.80, 19.97, Dec. 31.72-31.75: *Guide 7.0* software used for comp.-star mags [SAN07]. Oct. 13.03: tail slightly curved in clockwise direction [SRB]. Oct. 13.81: short, broad tail $5'$ long in p.a. 288° ; starlike central cond. clearly visible at come center, even at low power [PEA].

Nov. 3.78 and 8.74: *Guide 7.0* software used for comp.-star mags [MIY01]. Nov. 4.65: comp. star has $B-V = +0.42$ [TSU02]. Nov. 4.65, 13.59, 30.56, and Dec. 6.63: *Guide 8.0* software used for comp.-star mags [TSU02]. Nov. 4.66, 12.82, 16.60, 22.65, 29.61, 30.6, Dec. 2.52, 5.60, 6.58, 9.55, 10.59, 11.59, 14.49, 16.64, and 17.58: *StellaNavigator* (ver.6.1) software used for comp.-star mags [NAG08]. Nov. 4.88: tail broad and slightly curved [BEG01]. Nov. 7.67: w/ 30.4-cm L ($61\times$), $5'$ tail in p.a. 295° [NAG04]. Nov. 7.72: *Guide 8.0* software used for comp.-star mags [YOS02]. Nov. 7.67, 13.58, 21.73, and 22.75: *Guide 8.0* software used for comp.-star mags [NAG04]. Nov. 7.86: coma more compact w/ a stellar central cond. that was seen w/ averted vision; tail broad and superimposed on the star HIP 24178, which may have interfered somewhat w/ the tail-length measurement [BEG01]. Nov. 8.07, 19.99, Dec. 8.87, and 18.87: *Guide 8.0* software used for comp.-star mags [CSO]. Nov. 9.52: "comet very close to 7th-mag star, so brightness estimate probably too conservative; something could be detected with naked eye at the position, but I could not be sure whether it was the comet or a combination of comet and star (obs. on subsequent evenings indicated that it was the comet itself)" [SEA]. Nov. 12.04: comp. stars have $V = 7.05$ ($B-V = +0.43$) and $V = 7.61$ ($B-V = +0.84$) [AMO01]. Nov. 12.47: in 25×100 B, broad tail visible for at least $20'$ in p.a. 260° [SEA]. Nov. 12.86: comet slightly brighter and more condensed, distinct stellar central cond.; tail now becoming quite prominent [BEG01]. Nov. 13.58: w/ 30.4-cm L ($61\times$), $9'$ tail in p.a. 260°



CCD images of comet C/2004 Q2 taken by Giovanni Sostero, along with A. Lepardo for the left image (2004 Nov. 27.02; 25-cm T + Cousins I filter; fifteen 60-sec exposures) and with S. Garzia for the right image (Dec. 11.9; Canon Digital Rebel SLR camera + Zeiss Sonnar 180-mm f/2.8 lens; twenty 120-sec exposures) North is up and east to the left in both views.

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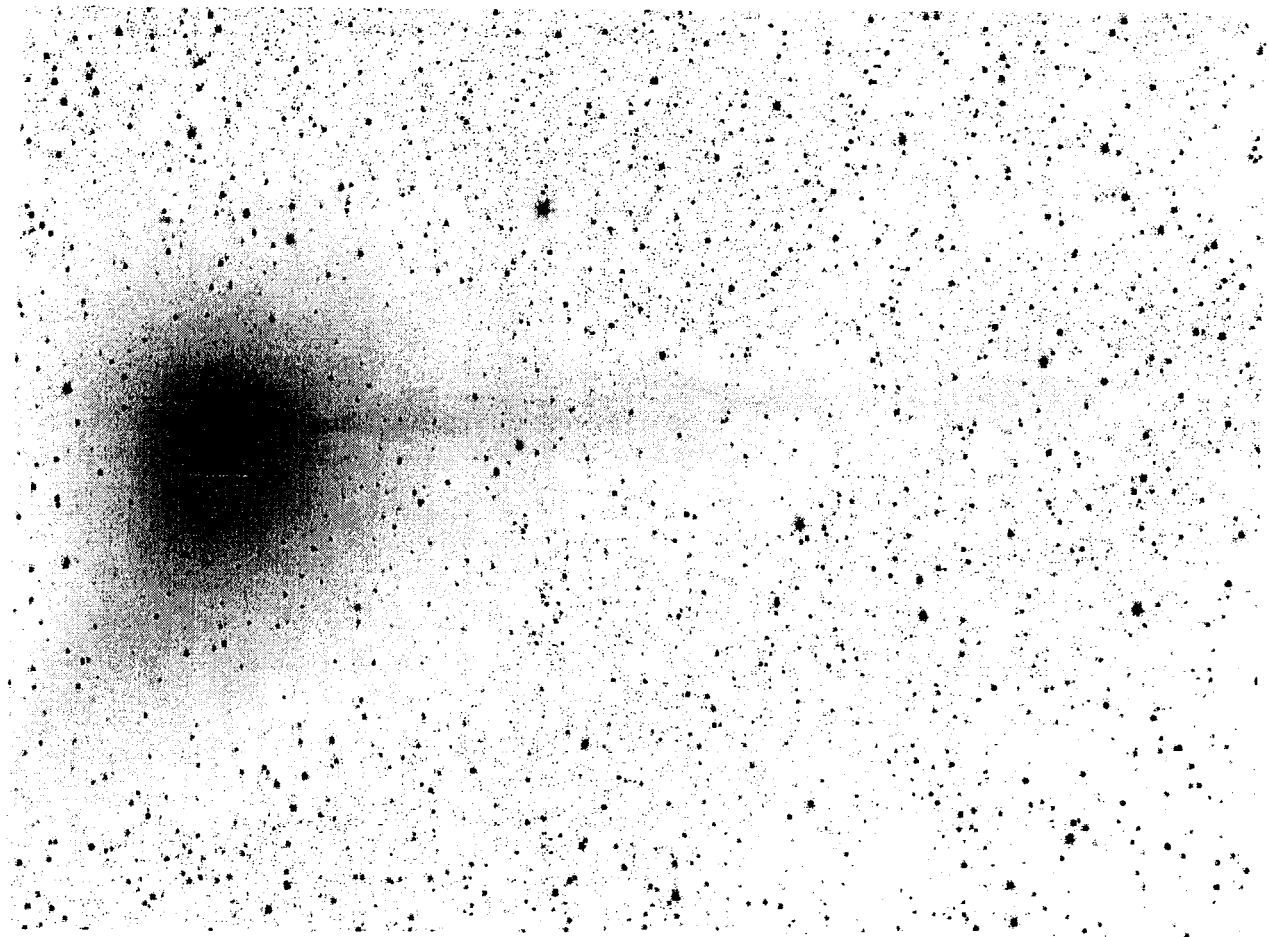
[text continued from page 14]

[NAG04]. Nov. 13.80: comet visible w/ the naked eye (obs. from a dark-sky site) — relatively easily seen w/ averted vision, and in moments of good seeing also held in direct vision; clear distinction between the comet and nearby 7th-mag star [PEA]. Nov. 14.86: distinctly brighter tonight, markedly brighter than SAO 195631; tail broad (p.a. estimated on central brightest component) [BEG01]. Nov. 16.64-16.67, Dec. 5.56, 6.55, 16.51, and 17.59: *Guide 8.0* software used for comp.-star mags [MIY01]. Nov. 17.08: coma appears as a bright, perfectly spherical ball with a distinctive stellar central cond.; tail diffuse — narrower and brighter than previously [BEG01]. Nov. 18.03, Dec. 5.99, 12.04, and 13.02: mountain location, very clear sky; tab. tail info is for ion tail; also broader dust tail 0°6 long in p.a. 285° [GON05]. Nov. 18.97, 19.97, Dec. 20.80, 26.84, and 31.72: *Guide 7.0* software used for comp.-star mags [SAN07]. Nov. 19.27 and 20.09: comp. stars have $V = 5.99$ ($B-V = -0.04$) and $V = 6.49$ ($B-V = +0.50$) [AMO01]. Nov. 19.70, 21.74, Dec. 5.68, 7.71, 8.70, 9.71, and 11.56: *Guide 8.0* software used for comp.-star mags [YOS02]. Nov. 19.80: “long, straight (ion?) tail 1°1 long in p.a. 326°; this is the first time I have seen this tail, so it must have increased in prominence over the past week; a shorter broad tail (dust?) 34' long in p.a. 267°, although it appeared quite vague and ill-defined” [PEA]. Nov. 20.08 and 22.02: ref. stars SAO 195509 and SAO 195631 [MAN04]. Nov. 20.08, 22.02, 23.07, 28.13, Dec. 24.13, and 25.08: moonlight interference [MAN04]. Nov. 20.09, 21.04, 22.95, 23.95, 27.16, Dec. 24.97, 26.15, 27.15, 28.15, and 2005 Jan. 16.99: moonlight interference [AMO01]. Nov. 20.81: “long, straight tail 1°2 long in p.a. 330°; a shorter, broad tail 27' long in p.a. 271°, although it appeared quite vague and ill-defined; this comet appears to be brightening quite rapidly” [PEA]. Nov. 21.01: comet well visible despite alt. of only 7° and some light pollution [BOU]. Nov. 21.04: w/ 20×80 B, tail 0°2 long in p.a. 260° [AMO01]. Nov. 21.04, 22.95, 23.95, 27.16, and Dec. 2.02: comp. stars have $V = 5.99$ ($B-V = -0.04$) and $V = 6.49$ ($B-V = +0.50$) [AMO01]. Nov. 21.13 and 25.04: moonlight interference [SOU01]. Nov. 21.79: straight ion tail 49' long in p.a. 335° w/ broad dust tail 18' long in p.a. 259° [PEA]. Nov. 22.75: w/ 30.4-cm L (61×), 17' fan-shaped tail in p.a. 280°-340° [NAG04]. Nov. 23.07: ref. stars SAO 170029 and SAO 170311 [MAN04]. Nov. 25.05, Dec. 18.88, and 18.89: moonlight [HOR02]. Nov. 28.13, Dec. 1.09, and 2.08: ref. stars SAO 170029 and SAO 169752 [MAN04]. Nov. 29.06 and Dec. 1.07: ref. stars SAO 170050 and SAO 169889 [ADD]. Nov. 30.48 and Dec. 3.47: obs. made quickly through breaks in cloud [SEA]. Nov. 30.56: comp. star has $B-V = +0.50$ [TSU02]. Nov. 30.80: stubby dust tail, appears golden-white in color [PRI04]. Nov. 30.81: narrow gas tail 45' long in p.a. 346°; broad and slightly brighter dust tail; w/ 20-cm L (72×), central cond. stellar in appearance, w/ surrounding coma gradually and evenly falling off in brightness [BEG01].

Dec. 2.51 and 5.60: *The Sky* (ver.5) software used for comp.-star mags [MIT]. Dec. 2.85: gas tail 55' long in p.a. 355°; via naked, eye, $m_1 = 5.9$, dia. 20', and $DC = 6$ [BEG01]. Dec. 3.01, 4.02, 4.99, and 7.99: comp. stars have $V = 5.61$ ($B-V = +0.10$) and $V = 5.99$ ($B-V = -0.04$) [AMO01]. Dec. 3.94: gas tail 0°5 long in p.a. 355°, dust tail 0°5 long in p.a. 280° [GUZ]. Dec. 4.02: w/ 20×80 B, tail 0°15 long in p.a. 280° [AMO01]. Dec. 5.00: gas tail 1°5 long in p.a. 355°, dust tail 1°5 long in p.a. 280° [GUZ]. Dec. 5.12: ref. stars SAO 169997 and SAO 169650 [ADD]. Dec. 5.85: gas tail 0°7 long in p.a. 355°, dust tail 1°2 long in p.a. 275° [GUZ]. Dec. 5.98: w/ 7×50 B, clearly seen despite 5°5 max. alt.; w/ 7.0-cm R (24×), apparent stellar central cond. of mag ≈ 7.5 (ref. TK) [GRA04]. Dec. 5.99: no tail seen; alt. 5° [SKI]. Dec. 6.15: ref. stars SAO 149856 and SAO 159650; clouds [MAN04]. Dec. 6.54, 10.58, 14.57, 15.58, 16.58, 17.58, and 18.60: *StellaNavigator* (ver.7) software used for comp.-star mags [MOM]. Dec. 7.97: alt. 6°5 [GRA04]. Dec. 7.99: no tail visible; alt. 6° [SKI]. Dec. 7.99: clouds interference [AMO01]. Dec. 8.94: w/ 25.6-cm L (42×), broad dust tail in

p.a. 280° ; at $169\times$, central cond. of mag 12.5 [BIV]. Dec. 8.95, 18.96, and 20.88: *Guide 6.0* software used for comp.-star mags [KOV02]. Dec. 9.03: ref. stars SAO 149789 and SAO 149856 [MAN04]. Dec. 9.08: also ion tail $0^\circ 1'$ long in p.a. 330° [SOU01]. Dec. 9.25: very easy to see with naked eye; w/ 7×35 B and 4-inch R ($23\times$), inner coma quite condensed and outer coma very extensive [OME]. Dec. 10.93: first found with Canon 18×50 'IS' B as a large, fuzzy ball; a stubby tail pointing N suspected; alt. 9° [KAR02]. Dec. 10.96: gas tail $1^\circ 4'$ long in p.a. 10° , dust tail $0^\circ 7'$ long in p.a. 270° [GUZ]. Dec. 11.75: "comet is a very impressive sight in a dark sky; ion tail $2^\circ 6'$ long in p.a. 5° and a shorter, broad dust tail $55'$ long in p.a. 259° ; both tails appeared quite prominent and were easily seen even in small binoculars" [PEA]. Dec. 11.83: gas tail $1^\circ 2'$ long in p.a. 10° , dust tail $0^\circ 5'$ long in p.a. 270° [GUZ]. Dec. 11.95: round coma, brighter center; alt. 9° ; hazy sky, drifting low clouds [WAR01]. Dec. 11.96 and 12.95: obs. from Haute Provence Obs. [BIV]. Dec. 11.96: w/ 20.3-cm L ($40\times$), broad dust tail in p.a. $\approx 260^\circ$; at $95\times$, central cond. of mag 12.6 [BIV]. Dec. 12.07 and 13.09: ref. stars SAO 149789 and SAO 169354 [MAN04]. Dec. 12.57: dust tail $> 52'$ long in p.a. 256° ; *Guide 8.0* software used for comp.-star mags; $B-V$ values of comp. stars were $+0.33$, $+0.68$, and $+0.70$ [NAK01]. Dec. 12.73: ion tail $1^\circ 8'$ long in p.a. 1° ; a shorter broad dust tail $45'$ long in p.a. 275° [PEA]. Dec. 12.74: gas tail $1^\circ 5'$ long in p.a. 358° [BEG01]. Dec. 12.89: large, fuzzy ball with a faint, stellar pseudo-nucleus and a faint broad tail pointing N; p.a. only approx. [KAR02]. Dec. 12.95: w/ 20.3-cm L ($40\times$), $30'$ dust tail in p.a. $\approx 260^\circ$; at $95\times$, central cond. of mag 12.3 [BIV]. Dec. 12.97: alt. 10° [GRA04]. Dec. 13.55, 16.59, 18.61, 26.51, 30.40, 2005 Jan. 1.46, 2.51, 4.52, 5.51, 6.53, 7.60, 8.45-8.47, 10.51, 12.53, 17.48, 21.51, 28.46, and 31.42: *The Sky* (ver.5) software used for comp.-star mags [MIT]. Dec. 13.92: dust tail $1^\circ 0'$ long in p.a. 260° [HOR02]. Dec. 14.25: also ion tail $0^\circ 2'$ long in p.a. 355° [SOU01]. Dec. 14.75: ion tail $1^\circ 5'$ long in p.a. 0° ; a shorter broad dust tail $45'$ long in p.a. 274° [PEA].

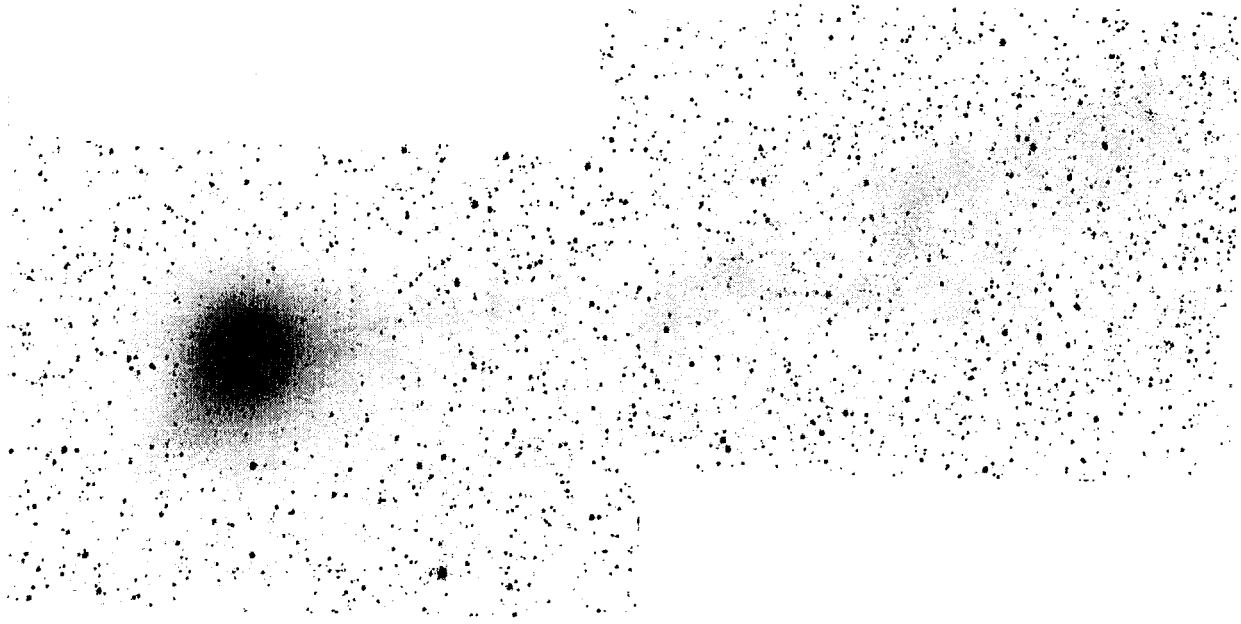
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CCD image of C/2004 Q2 taken by Michael Jäger on 2004 Dec. 13.97 with an 8-inch Schmidt camera.

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Dec. 15.01: also dust tail $1^\circ 1'$ long in p.a. 275° [GON05]. Dec. 15.81: low alt. [TIT]. Dec. 15.90: "long, straight gas tail pointed upwards (mistaken as the dust tail earlier); glimpsed for the first time via naked eye despite being right above the city lights" [KAR02]. Dec. 15.90-15.91: w/ 7×50 B, a possible tail $\approx 1^\circ$ long between p.a. 0° and 30° [SKI]. Dec. 15.93: the comet appeared slightly fainter than M31; a tail was suspected toward N; glimpsed w/ naked eye; 13° alt. [GRA04]. Dec. 15.94 and 19.98: round coma, well-condensed brighter center; alt. 12° [WAR01]. Dec. 15.97: comp. stars have $V = 4.66$ ($B-V = -0.13$) and $V = 4.91$ ($B-V = -0.05$) [AMO01]. Dec. 16.08 and 17.07: ref. stars SAO 131063 and SAO 149789 [MAN04]. Dec. 16.55: another tail $0^\circ 6'$ long in p.a. 305° [KAN]. Dec. 16.75: via naked eye, $m_1 = 4.2$ (slightly fainter than nearby 53 Eri) [PRI04]. Dec. 16.90: via naked eye, $m_1 = 4.1$; in 15×60 B, gas tail $40'$ long in central



CCD image of comet C/2004 Q2 taken by Jäger with the 8-inch Schmidt camera ($f.l. = 300$ mm) on 2004 Dec. 18.93. Mosaic of two images (field-of-view $190' \times 90'$).

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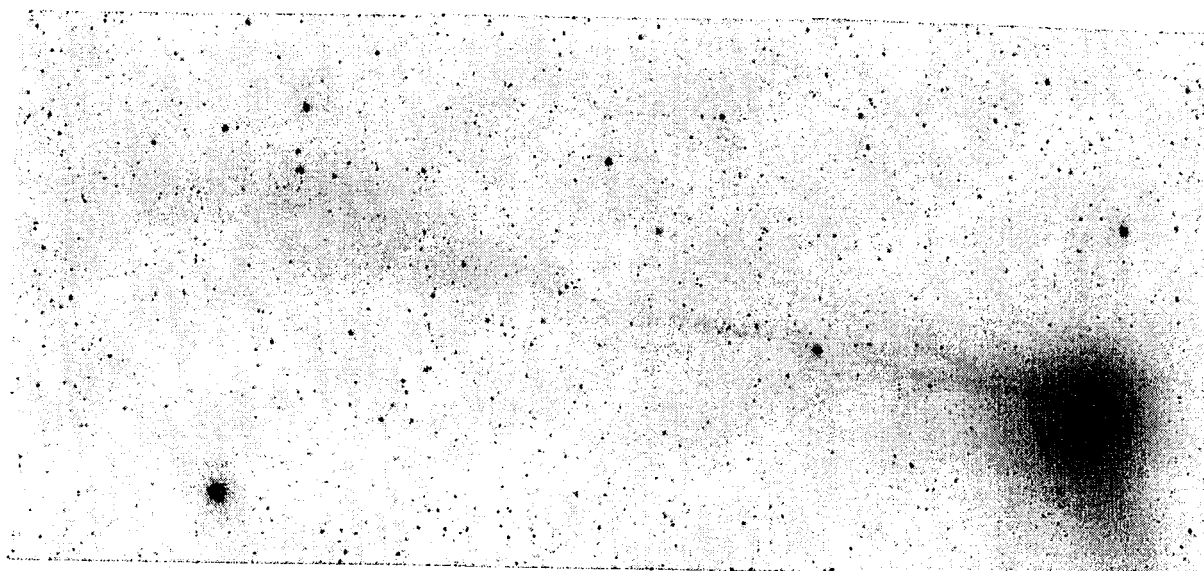
p.a. 20° , dust tail $50'$ long in central p.a. 242° ; gas tail appears as a diffuse, possibly slightly 'striated' fan of material, while the dust tail is a broad prominent fan extending from p.a. 225° to 265° (N edge of the dust tail is hazy and diffuse, while the S edge is quite sharply demarcated); in 20-cm $f/9$ ($72\times$), coma fills over a third of the field-of-view, and central cond. is a compact ball of light w/ stellar pseudo-nucleus of mag 8.4 (coma elliptical w/ the central cond. displaced in the sunward direction); coma extended in p.a. 336° (dust tail) w/ a faint streamer (gas tail) $15'$ long in p.a. 16° [BEG01]. Dec. 16.93: in 8×40 B, ion tail $1^\circ 5'$ long in p.a. 10° and dust tail $0^\circ 5'$ long in p.a. 280° [RIE]. Dec. 16.94: ion tail $> 1^\circ$ long in p.a. $\approx 25^\circ$ and dust tail $> 1^\circ$ long in p.a. $\approx 270^\circ$ - 25° [BUS01]. Dec. 16.97: w/ 25.6-cm L ($42\times$), $0^\circ 6'$ dust tail in p.a. 260° ; at $169\times$, central cond. of mag 12.7 [BIV]. Dec. 17.62, 2005 Jan. 4.56, and 7.56: Guide 8.0 software used for comp.-star mags [TSU02]. 2004 Dec. 17.72: ion tail $1^\circ 3'$ long in p.a. 18° ; a shorter broad dust tail $57'$ long in p.a. 264° [PEA]. Dec. 17.89: w/ 15.2-cm L ($38\times$), false nucleus of mag ≈ 8.5 (ref. TK); no tail seen; faintly visible to naked eye; alt. 15° [GRA04]. Dec. 17.93: gas tail $30'$ long in p.a. 12° , dust tail $55'$ long in p.a. 248° ; inner coma very condensed, w/ a large, faint outer section [BEG01]. Dec. 17.98: w/ 25.6-cm L ($42\times$), $0^\circ 6'$ tail in p.a. 260° , $0^\circ 7'$ tail in p.a. 20° ; at $169\times$, central cond. of mag 11.7 [BIV]. Dec. 18.73: "comet is a very impressive sight in a dark sky; ion tail $3^\circ 0'$ long in p.a. 35° ; however, there appeared to be a distinct bend or kink in the tail $\approx 1^\circ 25'$ from the coma; p.a. measured is for the first section of this tail; a shorter broad dust tail or fan $28'$ long in p.a. 256° , although this dust tail appears to be losing its prominence and becoming less-well-defined" [PEA]. Dec. 18.77: via naked eye, $m_1 = 4.1$, DC = 6 [PRI04]. Dec. 18.91: comet also imaged using 20.3-cm T (working at $f/3.3$) and CCD w/ V filter; moonlight [GRA04]. Dec. 18.94: gas tail $50'$ long in p.a. 16° ; via naked eye, $m_1 = 3.9$, dia. = $25'$, DC = 7 [BEG01]. Dec. 18.99: ion tail $> 1^\circ$ long in p.a. $\approx 30^\circ$ and dust tail $\approx 0^\circ 7'$ long in p.a. $\approx 245^\circ$ [BUS01]. Dec. 19.88, 19.89, 20.87, 20.88, 21.86, and 21.87: moonlight [HOR02]. Dec. 19.89: moonlight, but comet well visible in very transparent winter sky; faintly visible to naked eye [BOU]. Dec. 19.95: in 8×40 B, ion tail $2^\circ 5'$ long in p.a. 25° and dust tail $1^\circ 0'$ long in p.a. 250° [RIE]. Dec. 19.98: coma extended in p.a. $\approx 50^\circ$ [WAR01]. Dec. 20.04: in 15×80 B, ion tail $> 1.5^\circ$ long in p.a. $\approx 30^\circ$ and dust tail $\approx 0^\circ 4'$ long in p.a. $\approx 245^\circ$ [SCH04]. Dec. 20.07: w/ 25.6-cm L ($42\times$), $0^\circ 5'$ tails in p.a. 240° and p.a. 30° ; at $169\times$, central cond. of mag 11.8 [BIV]. Dec. 20.10: ref. stars SAO 130686 and SAO 131063 [MAN04]. Dec. 20.49, 29.42, 31.56, 2005 Jan. 1.46, 6.61, 7.66, and 8.52-8.53: Guide 8.0 software used for comp.-star mags [YOS02]. 2004 Dec. 21.02: ref. stars SAO 150340 and SAO 149789 [ADD]. Dec. 21.85 and 24.87: moonlight [JAN03]. Dec. 21.91: gas tail 1° long in p.a. 24° , dust tail $1^\circ 1'$ long in central p.a. 265° ; despite moonlight interference, the coma is very condensed, bright, and large, and the dust tail is visible w/ direct vision [BEG01]. Dec. 21.93: moonlight [URB01]. Dec. 21.97: second tail in p.a. 30° , length $> 20'$ [SRB]. Dec. 22.85, 26.98, and 26.99: strong moonlight interference [GUZ]. Dec. 22.89: moonlight [GIA01]. Dec. 22.96: glow of coma slightly brighter than that of M31; moonlight [GRA04]. Dec. 23.54, 27.59, 30.43, 31.49, 2005 Jan. 1.50, 2.48, 5.50, 8.48, 9.52, 12.43, and 13.53: StellaNavigator (ver.7) software used for comp.-star mags [MOM]. 2004 Dec. 23.60 and 24.60: bright moonlight [PEA]. Dec. 23.9: strong moonlight interference [GON05]. Dec. 24.13 and 25.08: ref. stars SAO 130686, SAO 131019, and SAO 131063 [MAN04]. Dec. 24.9-28.9: strong moonlight [BOU, COM, DIJ]. Dec. 24.97, 26.15, 27.15, and 28.15: comp. stars have $V = 4.04$ ($B-V = +0.33$) and $V = 4.36$ ($B-V = +0.01$) [AMO01].

Dec. 25.79: strong moonlight [GRA04]. Dec. 25.84: moonlight [TIT]. Dec. 25.91 and 26.96: obs. from Versailles, France; clear skies but strong moonlight [BIV]. Dec. 25.91: w/ 25.6-cm L ($169\times$), jets in p.a. 130° , 250° , and 330° ; central cond. of mag 11.4 [BIV]. Dec. 25.92 and 26.90: strong moonlight interference [SCH04]. Dec. 26.48, 30.40-30.43, 2005

Jan. 1.63, 5.40, and 8.50: *StellaNavigator* (ver.6.1) software used for comp.-star mags [NAG08]. 2004 Dec. 26.81: easily visible despite full moon [GRA04]. Dec. 26.90: comet also weakly visible w/ naked eye [SCH04]. Dec. 26.96: w/ 25.6-cm L (169 \times), jets in p.a. 260 $^\circ$ and 320 $^\circ$; central cond. of mag 11.2 [BIV]. Dec. 27.97: obvious naked-eye object in spite of strong moonlight [PER01]. Dec. 28.54: obs. made before moonrise [PEA]. Dec. 28.84: w/ 40.7-cm L (233 \times), jets in p.a. 280 $^\circ$ and 330 $^\circ$; central cond. of mag 11.2 [BIV]. Dec. 29.82: w/ 10 \times 50 B, there is a bright disk-like center measuring about 2/3 of the total dia., surrounded by a wider and fainter halo [MEY]. Dec. 29.83: in 9 \times 34 B, tails seen but not measured [PER01]. Dec. 29.84: round coma w/ very diffuse, faint tail; in 14-cm L (36 \times), small, diffuse central cond. of mag 9.0; bright sky, waning gibbous Moon 15 $^\circ$ above ENE horizon [WAR01]. Dec. 30.12: comet visible to naked eye, but with some difficulty [SOU01]. Dec. 30.43-30.44, 2005 Jan. 1.38-1.44, 2.40, 4.52, 5.54, 7.42, 8.53, 9.51-9.52, 11.45-11.46, 12.48-12.49, 16.55-16.58, 17.55-17.59, 20.58, 21.44, and 31.46: *Guide 8.0* software used for comp.-star mags [MIY01]. 2004 Dec. 30.45: in 25 \times 100 B, very sharp central cond. and broad, faint tail [SEA]. Dec. 30.55: "this comet has quite an unusual appearance in a dark sky with two tails widely separated in p.a.; long anti-solar tail 2 $^\circ$ 25 long in p.a. 66 $^\circ$ and a brighter (dust?) tail 1 $^\circ$ 8 long in p.a. 205 $^\circ$ (both tails are quite faint even against a dark sky background, which is unfortunate based on the relative brightness of the comet); the anti-solar tail was quite faint; the tail in p.a. 205 $^\circ$ was clearly visible to the naked eye; through a 20-cm L, the coma is quite incredible (fairly uniform surface brightness with a very small and bright central cond.; w/o this central cond., the coma would be rated as quite diffuse" [PEA]. Dec. 30.71: w/ 10.0-cm f/5 R (14 \times), tail 1 $^\circ$ 1 long in p.a. 75 $^\circ$ [HAS02]. Dec. 30.71: w/ 7 \times 50 B, the comet appeared smaller but somewhat brighter than M31; no tail visible; obs. before moonrise under less-than-ideal conditions [GRA04]. Dec. 30.76: 1 $^\circ$ 5 dust tail in p.a. 220 $^\circ$ [NAG09]. Dec. 30.78: no tail seen near comet [SKI]. Dec. 30.84: w/ 7 \times 50 B, also dust tail 1 $^\circ$ 2 long in p.a. 205 $^\circ$ [GON05]. Dec. 30.86: "easily found w/ naked eye; 18 \times 50 B showed a 7.5-mag non-stellar nuclear cond. W of the center and a short, wide fan of material protruding towards E (the foreshortened dust tail?); gibbous moonlight [KAR02]. Dec. 30.94: gas tail 2 $^\circ$ long in p.a. 61 $^\circ$, dust tail 1 $^\circ$ 2 long in p.a. 210 $^\circ$; first gap in the clouds in ten days, but unfortunately not before the moon was well up; slightly hazy in the area of the comet [BEG01]. Dec. 31.54-31.55 and 2005 Jan. 1.50-1.51: *Skychart III* (ver.3.6.4) software used for comp.-star mags [END]. 2004 Dec. 31.55, 2005 Jan. 1.54, 6.55, 10.56, 16.56, and 21.53: *Guide 8.0* software used for comp.-star mags [OHM]. Dec. 31.58: "two tails again observed — anti-solar tail 1 $^\circ$ 2 long in p.a. 56 $^\circ$ and the dust(?) tail 1 $^\circ$ 1 in p.a. 196 $^\circ$; both appeared quite faint in this slightly brighter sky" [PEA]. Dec. 31.70: "very diffuse, extended coma with much brighter, well-condensed center; rather faint, straight, diffuse, wide tail; in 14-cm L (19 \times), with Lumicon Deep Sky filter, the brightest part of main tail was directed in p.a. \approx 70 $^\circ$, w/ another fainter, straight tail in p.a. \approx 215 $^\circ$ (both tails at least 1 $^\circ$ 5 long); alt. 25 $^\circ$; easily visible w/ naked eye; naked-eye mag estimate made w/o glasses (observer is near-sighted)" [WAR01]. Dec. 31.72: w/ 11.4-cm L (20 \times), 1 $^\circ$ 5 tail in p.a. 85 $^\circ$ and 2 $^\circ$ tail in p.a. 350 $^\circ$ [SAN07]. Dec. 31.78, 2005 Jan. 3.69, 9.66, and 17.74: visible w/ the naked eye [TIT]. 2004 Dec. 31.79: w/ 7 \times 50 B, also dust tail 1 $^\circ$ 3 long in p.a. 205 $^\circ$ [GON05]. Dec. 31.80: "w/ 20-cm T (64 \times), diffuse coma covers a large part of the field (the brightness grew gradually to a stellar 'nucleus' W of the center; short, wide fan of material faded to the E" [KAR02]. Dec. 31.91: w/ 10 \times 56 B, ion tail > 1 $^\circ$ long in p.a. \approx 65 $^\circ$ and dust tail > 1 $^\circ$ long in p.a. \approx 200 $^\circ$ [BUS01]. Dec. 31.91: easy naked-eye object; in 7 \times 50 B, besides a 2 $^\circ$ 7 gas tail in p.a. 60 $^\circ$, faint broad dust tail visible, 1 $^\circ$ 1 long in p.a. 200 $^\circ$ [BOU]. Dec. 31.95: briefly obs. a few min before the end of the year (UT + 1h in Norway) — thus affected by New Year fireworks [GRA04].

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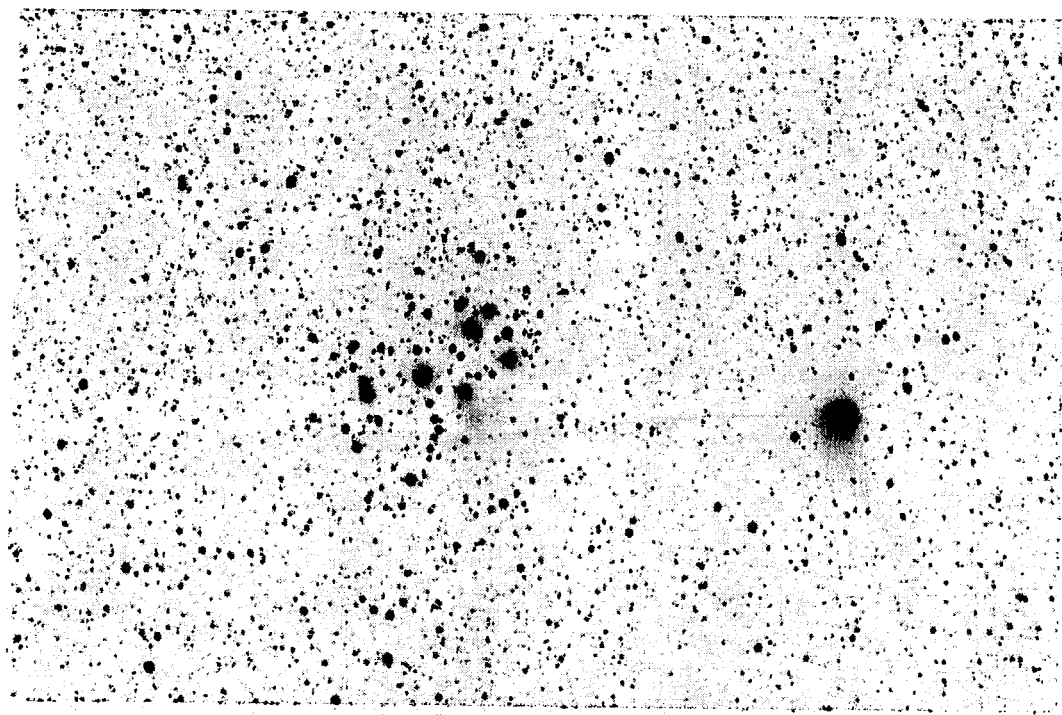
CCD mosaic of comet C/2004 Q2 taken by Michael Jäger and G. Rhemann near Vienna, Austria, on 2005 Jan. 2.89 with a 20-cm Schmidt camera (+ SXV-119 CCD). Six fields, each from two 100-sec exposures; field size 5 $^\circ$ \times 2 $^\circ$. Note the ion tail to the left and the short, stubby dust tail to the lower right.

2005 Jan. 1.03: also faint 0^o5 ion tail in p.a. 70° [SOU01]. Jan. 1.06: ref. stars SAO 111579 and SAO 111696 [MAN04]. Jan. 1.38 and 2.39: *StellaNavigator* (ver.6) software used for comp.-star mags [KON03]. Jan. 1.58: “two tails again observed, anti-solar tail 1°0 long in p.a. 46° and the dust(?) tail 1°1 long in p.a. 180°; both appeared quite faint in this slightly brighter sky” [PEA]. Jan. 1.72: poor sky conditions [PRI04]. Jan. 1.77: “gas tail 1°3 long in p.a. 50° (the first 30' prominent); dust tail 1°2 long w/ central p.a. 195° — a broad sheet of material that spans p.a. 180°-210°; coma very large, w/ the inner two-thirds very condensed and the outer third diffuse; coma also appears extended into a fan 30' long in p.a. 98°, though this is probably just part of the dust tail”; via naked eye, $m_1 = 3.4$, dia. = 35', DC = 7 [BEG01]. Jan. 1.84: broad tail centered on p.a. 140° [TUR]. Jan. 2.02: comet close to 30 Tau [BOU]. Jan. 2.52: 1°2 dust tail in p.a. 205° [NAG04]. Jan. 2.52, 5.70, 8.68, 10.64, 17.71, and 28.42: *Guide 8.0* software used for comp.-star mags [NAG04]. Jan. 2.54: “ion tail 4°4 long in p.a. 71° and a (dust?) tail 2°1 long in p.a. 200°; the ion tail seems to have gained in prominence somewhat; impressive object, although it would be more impressive if the tails were brighter (as was the case with C/2002 T7)” [PEA]. Jan. 2.72: second tail 0°8 long in p.a. 180° [HOR02]. Jan. 2.79: w/ 10×50 B, coma dia. 25', DC = 5 [PIL01]. Jan. 2.81: w/ 8×40 B, ion tail 2°0 long in p.a. 65° and broad dust fan of length 1°0 in p.a. between 180° and 220° [RIE]. Jan. 2.81: gas tail is very faint; broad dust tail some 0°9 long in p.a. 190° is more easily visible [BOU]. Jan. 2.81: also dust tail 0°8 long in p.a. 184° [DIJ]. Jan. 2.82: comp. stars λ Tau, ξ Tau, λ Cet, ξ_2 Cet, ρ Tau; comet slightly fainter than during previous obs. [PER01]. Jan. 2.87: w/ 25.6-cm L (169× and 333×), 1' jets in p.a. 300° and 340°; central cond. of mag 11.6 [BIV]. Jan. 2.90: w/ 10×56 B, ion tail > 0.5° long in p.a. 65° and dust tail of length > 0.5° in p.a. \approx 200° [BUS01]. Jan. 2.90: cirrus clouds [URB01]. Jan. 2.94: gas tail 2°0 long in p.a. 68°, dust tail 1°5 long in p.a. 200°; conditions slightly hazy; via naked eye, $m_1 = 3.8$, dia. = 30', DC = 7 [BEG01]. Jan. 2.94: no tail seen w/ naked eye [SKI]. Jan. 2.99: w/ 7×50 B, coma dia. 20', but no tail seen [SKI]. Jan. 3.58: long ion tail 1°3 long in p.a. 45° and a brighter (dust) tail 1°55 long in p.a. 188° [PEA]. Jan. 3.73: via naked eye, $m_1 = 3.8$, dia. = 25', DC = 7 [PRI04]. Jan. 3.78: gas tail 1°4 long in p.a. 40°, dust tail 2°1 long in p.a. 190°; “central cond. offset nearly to N edge of the coma; gas tail is unusual, rather diffuse, and not in the p.a. that one would expect, seems to be ‘lagging’ quite substantially” [BEG01]. Jan. 3.80 and 6.81: mountain location, very clear sky; zodiacal light [GON05]. Jan. 3.80: w/ 7×50 B, forked ion tail 3°2 long in p.a. 70°, dust tail 1°6 long in p.a. 190° [GON05]. Jan. 3.85: comp. stars ν Tau, τ Tau, λ Tau, ξ Tau, λ Cet, ξ_2 Cet, ρ Tau [PER01]. Jan. 3.88: second tail \approx 13' long lies 30° apart in p.a. from main tail [FED03]. Jan. 3.90: in 6×30 B, 2° gas tail in p.a. 80° and 1° dust tail in p.a. 180° [MAR02]. Jan. 3.98: w/ 11×80 B, coma dia. 30', DC = 6, diffuse central cond. of mag 7.5; diffuse, broad, straight tail 0°75 long in p.a. 200°, and a fainter, narrower, straight tail 1°5 long in p.a. 80°; CCD image obtained w/ SXV-H9 CCD and Baader IR-Block filter (limiting mag 14.0; 19-min exposure, 10"/pixel) at \approx Jan. 3.906 gives coma dia. 50', dust tail 1°3 long in p.a. 197°, gas tail > 2°2 long in p.a. 72°, and central cond. of mag 6.4 (ref: VT) [WAR01]. Jan. 4.46: in 6×35 B, tail 2°3 long in p.a. 78°; in 25×100 B, a second tail 0°6 long in p.a. 100° [SEA]. Jan. 4.58: ion tail 1°6 long in p.a. 75° and dust tail 1°0 long in p.a. 184° [PEA]. Jan. 4.75: via naked eye, $m_1 = 3.7$, dia. = 30', DC = 7; slight haze [PRI04]. Jan. 4.76 and 6.78: also tail 0°4-0°5 long in p.a. 180° [PIL01]. Jan. 4.81: second tail 0°5 long in p.a. 105° [HOR03]. Jan. 4.84: slight haze; tail appears as a broad, indistinct fan — brightest in p.a. 160°; comet easily visible to naked eye, even from suburban Johannesburg [COO02]. Jan. 4.89: comet brighter than M31; no tail seen w/ certainty; w/ 7.0-cm R, the coma showed an asymmetric brightness distribution [SKI]. Jan. 4.96: broad tail [GRA04]. Jan. 4.97: dust tail 1°2 long in p.a. 195° [HOR02].

Jan. 5.04: in 30.5-cm T (56×), broad dust tail \approx 0°5 long [COM]. Jan. 5.57: ion tail 1°55 long in p.a. 80° and dust tail 1°3 long in p.a. 179° [PEA]. Jan. 5.71: some disturbance from high clouds [GRA04]. Jan. 5.72: stellar center as seen w/ naked eye [KAR02]. Jan. 5.78: well-condensed coma; no tail seen w/ naked eye or B; in 8×21 B, coma extended in p.a. 130°; in 14-cm $f/3.6$ L (23×), w/ Lumicon Deep Sky filter, coma dia. 20', DC = 6, faint, diffuse, wide tail 0°75 long in p.a. 185° (coma extended also in p.a. 85°); clear sky but light-polluted sky (Uppsala, Sweden) [WAR01]. Jan. 5.95: w/ 25.6-cm L (169×), jets in p.a. 260°, 310°, and 340°; central cond. of mag 11.5 [BIV]. Jan. 5.98-5.99, 7.01-7.07, 7.88, 8.95, and 9.96: comp. stars λ Tau, τ Tau, o Per, ξ Per [PER01]. Jan. 5.98-5.99: add. comp. star ξ Tau; in spite of better conditions, tails less prominent in 9×34 B than during previous observations [PER01]. Jan. 5.98-5.99, 7.01, 7.07, 7.88, and 8.95: stellar naked-eye limit mag 6.2-6.5 near comet [PER01]. Jan. 6.04: ref. stars SAO 111195 and SAO 93469 [MAN04]. Jan. 6.46: in 6×35 B, tails 2° long in p.a. 85° and 1°7 long in p.a. 185° [SEA]. Jan. 6.76: “well-condensed coma but no tail seen w/ naked eye; in 14-cm $f/3.6$ L (23×), and w/ Lumicon Deep Sky filter, coma dia. 25', DC = 6/, w/ a diffuse, wide dust tail 0°9 long in p.a. 190°, a faint, narrow gas tail 0°5 long in p.a. 85°, and central cond. of mag \approx 7.0; a faint fan-shaped haze extended from the coma in the sector between the tails” [WAR01]. Jan. 6.77: in 7×50 B, gas tail 5°4 long in p.a. 84°, dust tail 3°3 long in p.a. 193° [BEG01]. Jan. 6.78: w/ 8×40 B, ion tail of length 1°0 in p.a. 70° and broad dust fan of length 0°5 in p.a. between 180° and 220° [RIE]. Jan. 6.78: dust tail 1°4 long in p.a. 195° [HOR02]. Jan. 6.79: dust tail > 20' long in p.a. 170° [SRB]. Jan. 6.81: w/ 7×50 B, ion tail 3°3 long in p.a. 80°, dust tail 1°6 long in p.a. 185° [GON05]. Jan. 6.82: second tail 0°4 long in p.a. 98° [HOR03]. Jan. 6.83: second tail 0°2 long in p.a. 98° [HOR03]. Jan. 6.89: w/ 15×80 B, weak ion tail \approx 3° long in p.a. 80° and dust tail of length \approx 0°5 in p.a. \approx 145° [SCH04]. Jan. 6.90: in 6×30 B, 1°5 gas tail in p.a. 100° and 0°75 dust tail in p.a. 160° [MAR02]. Jan. 7.75: gas tail 5°2 long in p.a. 79°, dust tail 3°2 long in p.a. 185°; “I suspected a ‘kink’ in the gas tail, and the tail was brighter near the Pleiades than it was near the coma, so I then used 15×60 B, which revealed a disconnection in the gas tail (the leading point of the discarded tail had a small bright ‘knot’ in it, which at 17^h55^m UT was 40' from the central cond., and by 22^h15^m UT it had moved back along p.a. 79° towards the Pleiades — a total of 80' from the first noted position)” [BEG01]. Jan. 7.83: dust tail 1°1 long in p.a. 190° [HOR02]. Jan. 7.84: w/ 7×50 B, ion tail 2°6 long in p.a. 80°, dust tail 1°0 long in p.a. 185° [GON05]. Jan. 7.86: second tail 0°4 long in p.a. 85° [HOR03]. Jan. 7.87: w/ 10×50 B, coma dia. 21', DC = 4 [HAS02]. Jan. 7.88: add. comp. stars λ Cet, μ Cet; comet fainter and more diffuse [PER01]. Jan. 8.11: comp. stars have $V = 3.70$ ($B-V = -0.11$) and $V = 4.30$ ($B-V = -0.11$) [AMO01]. Jan. 8.45: rendezvous with Pleiades

[YOS04]. Jan. 8.55: long, straight ion tail and wide dust tail clearly visible with 10-cm B [YOS04]. Jan. 8.47: 0°5 dust tail in p.a. 175°, then slightly curved counter-clockwise [MIT]. Jan. 8.68: 0°9 dust tail in p.a. 170° [NAG04]. Jan. 8.75: w/ 8×40 B, weak ion tail of length 1°6 in p.a. 80° and dust tail of length 1°0 in p.a. between 175° and 190° [RIE]. Jan. 8.75: via naked eye, $m_1 = 3.5$, dia. = 30', DC = 7, dust tail 1°2 long in p.a. 185°; in 10×50 B, dust tail 2°0 long in p.a. 185°, gas tail 2°0 long in p.a. 80° [PRI04]. Jan. 8.80: dust tail 1°3 long in p.a. 190° [HOR02]. Jan. 8.83: dust tail > 22' long in p.a. 162° [SRB]. Jan. 8.83: second tail 1°4 long in p.a. 85° [HOR03]. Jan. 8.88: w/ 15×80 B, weak ion tail $\approx 2^\circ$ long in p.a. 85° and dust tail $\approx 1^\circ$ long in p.a. $\approx 180^\circ$ [SCH04]. Jan. 8.89: w/ 10×56 B, ion tail $\approx 1^\circ$ long in p.a. 90° and broad dust fan of length > 1°0 in p.a. between 90° and 180° [BUS01]. Jan. 8.89: via naked eye, $m_1 = 3.5$, dia. = 25', DC = 7; some haze in area of the comet; in 7×50 B, gas tail 2°5 long in p.a. 71°, dust tail 2°3 long in p.a. 182° [BEG01]. Jan. 8.92: ion tail very faint; dust tail is broad fan pointing roughly S [BOU]. Jan. 8.95: comet brighter again [PER01]. Jan. 9.03: w/ 25×150 B, bluish color; starlike cond. of mag 8.9 and coma dia. 16' [SHU]. Jan. 9.72: somewhat brighter than M31; greenish coma w/ an asymmetric brightness distribution; w/ 15.2-cm f/5 L (38×), coma dia. 18', DC = 7, nuclear cond. of mag 9.5 (ref = TK) [GRA04]. Jan. 9.76: "6×30 finder showed a 1°0 tail towards p.a. 160°; 20-cm T (64×) showed two bright double stars on the E side of the coma; the dust tail stretched across the whole field-of-view, and the E border seemed to be sharper" [KAR02]. Jan. 9.77: dust tail 2°0 long in p.a. 185° [HOR02]. Jan. 9.79: well-condensed coma and no tail seen w/ naked eye; in 11×80 B, coma dia. 10', DC = 6/, coma extended in p.a. $\approx 140^\circ$; clear, light-polluted sky (Uppsala, Sweden) [WAR01]. Jan. 9.80: visible w/ the naked eye [SVE01]. Jan. 9.82: w/ 7×50 B, ion tail 2°5 long in p.a. 85°, dust tail 1°5 long in p.a. 180° [GON05]. Jan. 9.89: second tail 0°9 long in p.a. 85° [HOR03]. Jan. 9.96: HIP 16386 and HIP 16378 seen as one star involved in the coma, and brightness was therefore subtracted (+0.1 mag) from m_1 ; HIP 16410 and HIP 16411 seen as one star near coma edge, but thought to have not affected m_1 (otherwise their contribution would be < 0.2 mag); stellar naked-eye limit mag 6.9 near comet [PER01].

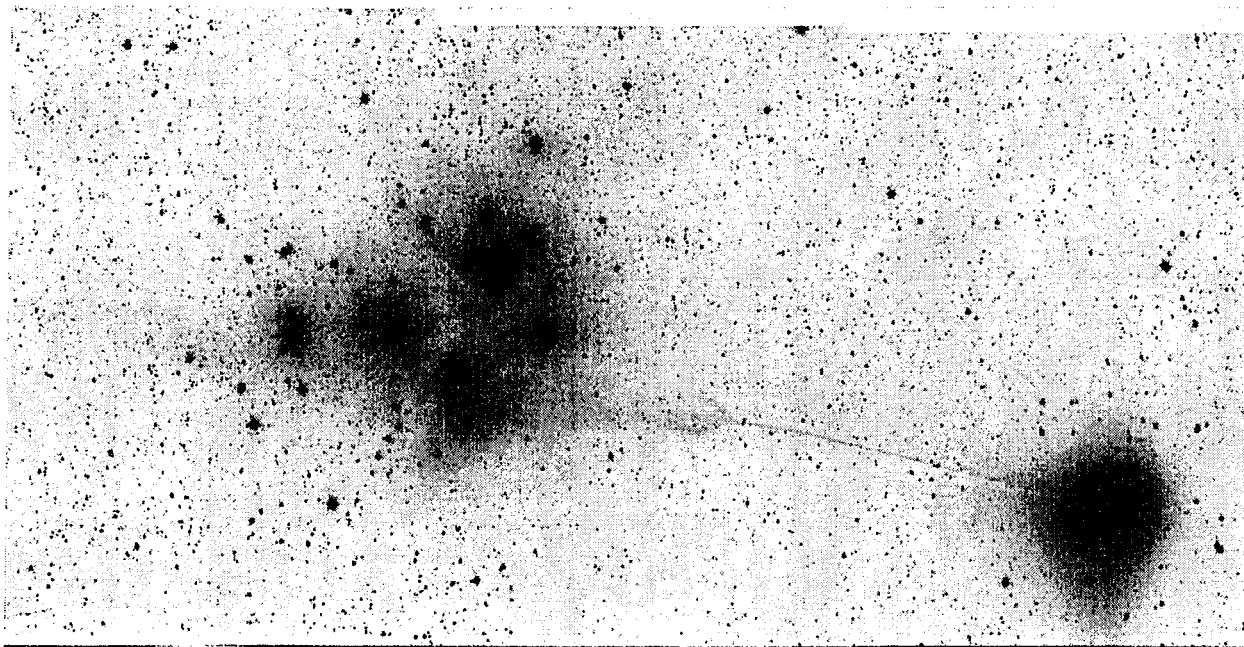
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1 degree
 N
 E
 C/2004 Q3 (Machholz)
 Casoli Solaris, January, 7.83, 2005
 Average of 3 exposures, 120 sec each
 Canon Digital Rebel + Zeiss Sonnar 130mm f/2.8 telephoto lens
 Antonio Lepardo, Sara Garcia and Giovanni Sostero (Rennuzacco Observatory)

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Jan. 10.54: ion tail 2°9 long in p.a. 85° and a brighter dust tail 2°3 long in p.a. 175°; ion tail is particularly faint, even against this dark sky background [PEA]. Jan. 10.64: 1°8 dust tail in p.a. 185° [NAG04]. Jan. 10.78: dust tail > 15' long in p.a. 162° [SRB]. Jan. 10.80: conditions poor w/ haze; tail visible, but no length or p.a. measured due to haze [COO02]. Jan. 10.89: dust tail 1°4 long in p.a. 190° [HOR02]. Jan. 10.93: dust tail 0°7 long in p.a. 185° [ADA05]. Jan. 11.00: no tail seen via naked eye; w/ 7×50 B, coma dia. 20'-25', narrow tail 2° long in p.a. 85° [SKI]. Jan. 11.74: dust tail 1°8 long in p.a. 190° [HOR02]. Jan. 11.76: gas tail 3°5 long in p.a. 84°, dust tail 2°7 long in p.a. 183°; "there appears to be a broad, faint fan of material 50' long centered on p.a. 124°, extending all the way from the gas tail and merging w/ the dust tail" [BEG01]. Jan. 11.98: w/ 19.0-cm L (38×), 1°7 tail in p.a. 84° [SHU]. Jan. 12.74: comet close to star of mag 5.8 [DIJ]. Jan. 12.75: via naked eye, $m_1 = 3.8$, dia. = 20', DC = 7, dust tail 50' long in p.a. 180° [PRI04]. Jan. 12.79: w/ 8×40 B, weak ion tail of length 2°0 in p.a. 80° and dust tail of length 1°0 in p.a. 170° [RIE]. Jan. 12.80: comet very obvious to naked eye; in 7×50 B, ion tail 2°3 long in p.a. 83° and broad dust tail $\approx 1^\circ$ long in p.a. 170°;



Another CCD mosaic of comet C/2004 Q2 by Michael Jäger and Gerald Rhemann, taken around 2004 Jan. 7.90 UT with the 20-cm $f/1.5$ Schmidt telescope, as the comet passed by the Pleiades (M45). Note the ion tail extending right through and past the nebulous star cluster. Mosaic of six fields, each of which was composed of two 90-sec exposures.

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[text continued from page 20]

star of mag 5.8 at edge of coma [BOU]. Jan. 12.85: via naked eye, $m_1 = 3.8$, dia. = 20', DC = 6, dust tail 30' long in p.a. 150°; in 7×50 B, gas tail 2°5 long in p.a. 86°, dust tail 1°3 long in p.a. 150°; dust tail is a broad sheet extending from the gas tail to p.a. 180°, but w/ the brightest and longest component in p.a. 150° [BEG01]. Jan. 12.88: in 30.5-cm T (56×), broad fan-shaped dust tail $\approx 1^\circ$ long [COM]. Jan. 12.88: w/ 10×56 B, ion tail of length $> 1^\circ$ in p.a. 90° and broad dust fan of length $> 1^\circ$ in p.a. between 85° and 170° [BUS01]. Jan. 12.93: w/ 15×80 B, very weak ion tail $< 1^\circ$ long in p.a. 85° and dust tail $\approx 0^\circ 3$ long in p.a. between 85° and 180°; w/ 20-cm L (42×), clear 'false nucleus' of mag ≈ 9 ; star SAO-56414 (mag 8.2) in coma [SCH04]. Jan. 12.95: w/ 7×50 B, narrow ion tail 2° long in p.a. 90°, coma dia. 25', and short dust tail towards S [SKI]. Jan. 12.97, 14.97, and 16.99: comp. stars have $V = 3.83$ ($B-V = +0.05$) and $V = 4.23$ ($B-V = +0.34$) [AMO01]. Jan. 13.80: w/ 7×50 B and 7.0-cm R (20×), tab. data refer to an apparent dust tail that was quite broad and curved counterclockwise by $\approx 10^\circ$; the same instruments also showed a 1°4 gas tail in p.a. 90° that was straight and more narrow; both tails were faint; w/ 7.0-cm $f/7$ R (20×), apparently stellar nuclear cond. of mag 9.3 (ref = TK), coma dia. 20', DC = 6/, 2° tail in p.a. 165°; the coma was distinctly greenish and showed an asymmetric brightness distribution w/ the central cond. towards W; comet easily seen w/ naked eye, somewhat more prominent than M31 [GRA04]. Jan. 13.80: dust tail $\approx 1^\circ 0$ long in p.a. 160° [DIJ]. Jan. 13.88: gas tail 40' long in p.a. 88°, dust tail 1°2 long in p.a. 160°; coma appears slightly brighter, smaller, and definitely more condensed than previously [BEG01]. Jan. 13.89: w/ 15×80 B, weak ion tail $\approx 1^\circ 5$ long in p.a. 90° and dust tail $\approx 1^\circ 2$ long in p.a. 165°; between both tails was a short, broad dust fan [SCH04]. Jan. 14.8-15.0 and 19.8-20.0: unfiltered CCD images taken of the inner coma with a 25-cm reflector (+ KAF-400 CCD) at Venegono Observatory over 4.45 hr by L. Comolli and A. Brunati show four fixed 'porcupine' jets and two expanding halos (distance between the first two halos was 13400 km w/ expansion velocity of 730 km/h, yielding a rotation period of 0.765 ± 0.020 day); confirmation obtained from images taken at Tradate Observatory (20-cm reflector) taken on Jan. 3 and 4; a compatible period (0.752 ± 0.010 day) was found by F. Manzini and R. Behrend with the SAS Observatory 40-cm reflector (+ kaf-1600 CCD) in a photometric study of the light curve of the inner coma performed on Jan. 4, 6, 11 and 13 [comm. by L. Comolli, Merate Observatory, Italy; also involved were R. Crippa, St. Bartelemy Observatory, Italy; and C. Guaita, Merate Observatory]. Jan. 14.85: gas tail 3°4 long in p.a. 89°, dust tail 2°9 long in p.a. 168°; suspected faint sunward-pointing fan noted coming out of the coma, 20' long in p.a. 281°; in 20-cm $f/9$ L (150×), faint sunward fan emanating from the central cond. [BEG01]. Jan. 14.87: w/ 10×56 B, ion tail of length $> 1^\circ$ in p.a. 90° and broad dust fan of length $> 1^\circ$ in p.a. between 90° and 170° [BUS01]. Jan. 14.88: comet obvious naked-eye object; in 7×50 B, besides ion tail of length 2°5 in p.a. 92°, dust tail 1°0 long in p.a. 165° [BOU]. Jan. 14.88: also dust tail $\approx 1^\circ 0$ long in p.a. 171° [DIJ].

Jan. 15.02: rural location; w/ 7×50 B, ion tail 1°5 long in p.a. 95°, dust tail 0°6 long in p.a. 150° [GON05]. Jan. 15.71: w/ 10×50 B, coma dia. 20', DC = 6 [PIL01]. Jan. 15.75: dust tail 0°7 long in p.a. 180° [HOR02]. Jan. 15.90: w/ 10×56 B, ion tail of length $> 1^\circ$ in p.a. 90° and broad dust fan of length $> 1^\circ$ in p.a. between 90° and 175° [BUS01]. Jan. 15.92: also broad dust tail 1°0 long in p.a. $\approx 155^\circ$ [BOU]. Jan. 15.92: also dust tail 0°5 long in p.a. 158° [DIJ]. Jan. 15.95: w/ 7×50 B, wide dust tail [BIV]. Jan. 15.96: w/ 25.6-cm L (169×), jets in p.a. 260° and 290°-360°; central

cond. of mag 11.2 [BIV]. Jan. 16.78: dust tail $> 20'$ long in p.a. 156° ; fan tail $> 25'$ long in p.a. 95° - 160° [SRB]. Jan. 16.80, 16.81, 19.81, 19.82, 23.78 and 23.79: moonlight [HOR02]. Jan. 16.82: dust tail $0.6'$ long in p.a. 180° ; moonlight [HOR02]. Jan. 17.08: w/ 7×50 B, ion tail $2.5'$ long in p.a. 98° , dust tail $0.6'$ long in p.a. 150° [GON05]. Jan. 17.57: hurried obs. between clouds [PEA]. Jan. 17.71: w/ 10.0 -cm R ($21\times$), tails $1.4'$ long in p.a. 90° and $1.15'$ long in p.a. 185° [NAG04]. Jan. 17.75: moonlight [ADA05]. Jan. 17.87: light-polluted sky; hazy; low, drifting clouds [WAR01]. Jan. 18.73: moonlight [SVE01]. Jan. 18.74: very clear with moon; short broad dust tail visible [COM]. Jan. 19.03: somewhat brighter than, and similar in size to, the visible part of M31; moonlight [GRA04]. Jan. 19.11: w/ 25.6 -cm L ($169\times$), jets in p.a. 250° , 280° , and 335° ; central cond. of mag 11.5 [BIV]. Jan. 19.76: in 30.5 -cm T ($56\times$), false stellar nucleus obvious; also short, broad dust tail visible [COM]. Jan. 19.78 and 24.83: strong moonlight interference [SCH04]. Jan. 21.80: moonlight; comet only $20'$ from ι Per; fine display of bright aurora in the north [BOU]. Jan. 22.81 and 24.82: strong moonlight interference [GON05]. Jan. 23.81: w/ 25.6 -cm L ($169\times$), central cond. of mag 11.3 [BIV]. Jan. 24.82: w/ 7×50 B, ion tail $0.4'$ long in p.a. 90° [GON05]. Jan. 28.42: w/ 10.0 -cm R ($21\times$), tail $1.0'$ long in p.a. 165° and another tail $0.8'$ long in p.a. 95° [NAG04]. Jan. 29.65: dia. $14' \times 17'$ [KOZ02]. Jan. 30.73: first obs. after a protracted period of rain; comet alt. 9° ; comp. stars at same alt. as comet, so no atmospheric extinction correction applied [BEG01]. Jan. 30.96: comet close to star of mag 5.6 [DIJ]. Jan. 31.73: very clear horizon; slight twilight; comet alt. 8° [BEG01]. Jan. 31.82: besides gas tail of length $1.5'$ in p.a. 75° , broad diffuse dust tail $1.0'$ long in p.a. 135° [BOU]. Jan. 31.96: mountain location, very clear sky; w/ 7×50 B, ion tail $0.6'$ long in p.a. 95° , dust tail $0.4'$ long in p.a. 140° [GON05].

◊ *Comet C/2004 R2 (ASAS)* \implies 2004 Sept. 12.12: *Guide 6* software used for comp.-star mags [COO02]. Sept. 15.10: coma moderately condensed and slightly elongated in the anti-solar direction [BEG01]. Sept. 27.87: difficult obs. at low alt. and in bright, moonlit sky [PEA].

◊ *Comet P/2004 R3 (LINEAR-NEAT)* \implies 2004 Nov. 6.59: $B-V$ values of comp. stars were $+0.60$, $+0.70$, and $+0.75$ [NAK01]. Nov. 7.57: $B-V$ values of comp. stars were $+0.51$, $+0.55$, $+0.68$, $+0.70$, and $+0.87$ [NAK01].

◊ *Comet C/2004 RG₁₁₃ (LINEAR)* \implies 2004 Dec. 11.61: $B-V$ values of comp. stars were $+0.45$, $+0.59$, $+0.63$, $+0.79$, $+0.83$, and $+0.85$ [NAK01]. Dec. 16.74: $B-V$ values of comp. stars were $+0.45$, $+0.48$, $+0.55$, $+0.59$, $+0.63$, $+0.80$, $+0.83$, and $+0.85$ [NAK01]. Dec. 17.71: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.72$) [OHS]. 2005 Jan. 14.97: very faint, but definitely seen during moments of good seeing as a small, somewhat-condensed object; followed for 35-40 min; motion relative to nearby 13th-mag star suspected, but not certain because of slow motion of the comet [BOU].

◊ *Comet C/2004 S1 (Van Ness)* \implies 2004 Oct. 17.83: *Guide 8.0* software used for comp.-star mags [TOT03].

◊ *Comet P/2004 T1 (LINEAR-NEAT)* \implies 2004 Nov. 4.56, Dec. 2.51, and 2005 Jan. 9.49: *Guide 8.0* software used for comp.-star mags [TSU02]. 2004 Nov. 4.56: comp. star has $B-V = +0.54$ [TSU02]. Nov. 6.58: $B-V$ values of comp. stars were $+0.60$, $+0.70$, and $+0.75$ [NAK01]. Nov. 9.52 and Dec. 6.47: *Guide 8.0* software used for comp.-star mags [OHS]. Nov. 9.52: comp. star has $B-V = +0.88$ [OHS]. Dec. 1.48: $B-V$ values of comp. stars were $+0.56$, $+0.68$, $+0.68$, and $+0.80$ [NAK01]. Dec. 2.51: comp. star has $B-V = +0.56$ [TSU02]. Dec. 6.47: comp. star has $B-V = +0.98$ [OHS]. 2005 Jan. 9.49: comp. star has $B-V = +0.45$ [TSU02].

◊ *Comet C/2004 U1 (LINEAR)* \implies 2004 Nov. 12.77: $B-V$ values of comp. stars were $+0.49$, $+0.55$, $+0.60$, $+0.75$, and $+0.85$ [NAK01]. Nov. 22.74: comp. star has $B-V = +0.64$ [KAD02]. Dec. 2.64: comp. star has $B-V = +0.46$ [KAD02]. Dec. 3.54: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.85$) [OHS]. Dec. 3.59: comp. star has $B-V = +0.56$ [KAD02]. Dec. 5.98: outburst; motion confirmed over 1-hr period [GUZ]. Dec. 6.53: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.47$) [OHS]. Dec. 6.70: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.58$) [TSU02]. Dec. 10.99: outburst activity continuing; motion confirmed over 1-hr period [GUZ]. Dec. 11.60: $B-V$ values of comp. stars were $+0.45$, $+0.59$, $+0.63$, $+0.79$, $+0.83$, and $+0.85$ [NAK01]. Dec. 13.04: mountain location, clear sky; limiting stellar mag 14.5; comet in outburst; motion checked during a 1-hr period [GON05]. Dec. 16.73: $B-V$ values of comp. stars were $+0.45$, $+0.48$, $+0.55$, $+0.59$, $+0.63$, $+0.80$, $+0.83$, and $+0.85$ [NAK01]. Dec. 16.97: small, diffuse object; comp. stars from TASS-IV survey [BOU]. Dec. 20.83: moonlight [HOR02]. Dec. 21.89: elongated coma in p.a. $\approx 220^\circ$; moonlight [HOR02]. 2005 Jan. 6.91: stellar appearance [SRB].

◊ *Comet P/2004 V1 (Skiff)* \implies 2004 Nov. 7.49: $B-V$ values of comp. stars were $+0.51$, $+0.55$, $+0.68$, $+0.70$, and $+0.87$ [NAK01]. Nov. 30.41 and Dec. 2.45: $B-V$ of comp. stars were $+0.68$ and $+0.87$ [NAK01]. Dec. 2.40: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.41$) [TSU02]. Dec. 6.42: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.98$) [OHS]. Dec. 8.44: $B-V$ of comp. stars were $+0.68$ and $+0.87$ [NAK01].

◊ *Comet C/2004 V13 (SWAN)* \implies 2005 Jan. 5.45: "quite strongly enhanced using Swan Band filter, but still a very difficult object" [SEA]. Jan. 6.46: "a little clearer than previous evening, being somewhat higher in a darkening sky; enhanced using Swan Band filter, but maybe not as much as previous night" [SEA]. Jan. 6.78 and 7.80: mountain location, very clear sky; zodiacal light; difficult obs. at low alt. [GON05]. Jan. 7.48: "very difficult object; I formed the impression that the enhancement with Swan Band filter (though still evident) became progressively less each night, though difficult to be sure with such a faint object" [SEA]. Jan. 8.38: w/ 40 -cm $f/4.5$ L, "extremely low in the evening glow, very hard to see; hard to determine how large it was; my estimation seems too bright because I felt it was around mag 11.5 or so" [YOS04].

◊ *Comet P/2004 V5 (LINEAR-Hill) = P/2003 YM₁₅₉* \implies 2004 Nov. 12.80: $B-V$ values of comp. stars were $+0.49$, $+0.55$, $+0.60$, $+0.75$, and $+0.85$ [NAK01]. Dec. 16.83: $B-V$ values of comp. stars were $+0.45$, $+0.48$, $+0.55$, $+0.59$, $+0.63$, $+0.80$, $+0.83$, and $+0.85$ [NAK01].

◊ *Comet P/2004 VR₈ (LONEOS)* ⇒ 2004 Dec. 8.55 and 9.55: possible faint tail to SE; $B-V$ values of comp. stars were +0.68 and +0.87 [NAK01]. Dec. 17.68: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.87$) [OHS].

◊ *Comet P/2004 WR₉ (LINEAR)* ⇒ 2004 Dec. 9.56: $B-V$ values of comp. stars were +0.68, +0.87 [NAK01]. Dec. 16.69: $B-V$ values of comp. stars were +0.45, +0.48, +0.55, +0.59, +0.63, +0.80, +0.83, and +0.85 [NAK01]. Dec. 17.64: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.72$) [OHS].

◊ *Comet C/2004 X2 (LINEAR)* ⇒ 2004 Dec. 16.79: $B-V$ values of comp. stars were +0.45, +0.48, +0.55, +0.59, +0.63, +0.80, +0.83, and +0.85 [NAK01]. 2005 Jan. 28.76: *Guide 8.0* software used for comp.-star mags; $B-V$ values of comp. stars were +0.70, +0.72, and +0.84 [OHS].

◊ *Comet C/2004 X3 (LINEAR)* ⇒ 2005 Jan. 21.79: $B-V$ values of comp. stars were +0.56, +0.61, +0.68, +0.69, +0.76, and +0.79 [NAK01].

◊ *Comet C/2005 A1 (LINEAR)* ⇒ 2005 Jan. 17.25: mountain location, very clear sky; elongated coma [GON05]. Jan. 17.86: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +0.30$) [TSU02]. Jan. 19.78 and 21.82: *Guide 8.0* software used for comp.-star mags [OHS]. Jan. 19.78: comp. star has $B-V = +1.0$ [OHS]. Jan. 20.84: *Guide 8.0* software used for comp.-star mags [YOS02]. Jan. 21.82: *Guide 8.0* software used for comp.-star mags [MIY01]. Jan. 21.82: $B-V$ values of comp. stars were +0.53, +0.54, +0.66, and +0.66 [OHS]. Jan. 21.87: $B-V$ values of comp. stars were +0.56, +0.61, +0.68, +0.69, +0.76, and +0.79 [NAK01].

◊ *Comet C/2005 B1 (Christensen)* ⇒ 2005 Jan. 19.77: *Guide 8.0* software used for comp.-star mag (comp. star has $B-V = +1.0$) [OHS]. Jan. 21.85: $B-V$ of comp. stars were +0.56, +0.61, +0.68, +0.69, +0.76, and +0.79 [NAK01].

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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 Association; 11 = Dutch Comet Section (Werkgroep Kometen); 16 = Japanese observers (via Akimasa Nakamura, Kuma, Japan); 35 = South American observers (c/o Jose G. de Souza Aguiar, Brazil); 42 = Belarus observers (c/o V. S. Nevski and S. E. Shurpakov, Vitebsk); 48 = Ukrainian observers (c/o Denis A. Svehkarev); etc.]:

ADA05 23	Martin Adamovsky, Czech Republic	GRI01 42	Igor B. Grinevich, Russia
ADD	G. Addiego, Montevideo, Uruguay	GUL01 32	K. Gulyás, Veresegyház, Hungary
AM001 35	Alexandre Amorim, Brazil	GUZ 18	Piotr Guzik, Krosno, Poland
ARA 35	Wesley Araujo, Salvador, Brazil	HAD01 32	Csaba Hadrházi, Hungary
BAL04 32	János Balogh, Hungary	HAS02	Werner Hasubick, Germany
BAL08 32	Zoltán Balogh, Hungary	HOR02 23	Kamil Hornoch, Czech Republic
BEG01 15	Mike Begbie, Harare, Zimbabwe	HOR03 23	Petr Horalek, Czech Republic
BIV	Nicolas Biver, France	HUR	Guy M. Hurst, England
*BOG 48	Viktoriya Bogatyreva, Ukraine	ILL 32	Elek Illés, Hungary
*BOG01 48	Juliya Bogatyreva, Ukraine	JAN03 23	Otto Janoušek, Czech Republic
BOU	Reinder J. Bouma, Netherlands	JOH01	C. Johannink, The Netherlands
BUS01 11	E. P. Bus, The Netherlands	JON	Albert F. Jones, New Zealand
COM 11	Georg Comello, The Netherlands	KAD02 16	Ken-ichi Kadota, Saitama, Japan
C0002	Tim P. Cooper, South Africa	KAM01	Andreas Kammerer, Germany
COR01	A. P. da Silva Correia, Portugal	KAN 16	Kiyotaka Kanai, Gunma, Japan
CSO 32	Tibor Csörgei, Slovak Republic	KAR02 21	Timo Karhula, Virsbo, Sweden
CSU 32	Mátyás Csukás, Salonta, Romania	KER 32	Ákos Kereszturi, Hungary
*CZE03 32	Balázs Czeplédi, Hungary	KES01	Sándor Keszthelyi, Pecs, Hungary
DES01	Jose G. de Souza Aguiar, Brazil	KON03 16	Eitoshi Konno, Iwate, Japan
DIE02	Alfons Diepvens, Belgium	KOS	Attila Kósa-Kiss, Romania
DIJ	Edwin van Dijk, The Netherlands	KOV01 37	Mychailo Kovzickov, Ukraine
END 16	Tsunenobu Endo, Nagano, Japan	*KOV02 32	Adrián Kovács, Slovak Republic
ERD 32	József Erdei, Hungary	KOZ02 42	Alexandr Kozlovski, Russia
FED03 48	D. V. Fedotov, Kharkov, Ukraine	LAB02	Carlos Labordena, Spain
GIA01	Antonio Giambersio, Italy	LEH	Martin Lehky, Czech Republic
GON05	Juan Jose Gonzalez, Spain	*LOB 35	Bruno Lima Lobo, Brumado, Brazil
*GON06	Virgilio Gonano, Udine, Italy	MAN02 23	Roman Maňák, Lipov, Czech Rep.
GRA04 24	Bjoern Haakon Granslo, Norway	MAN04	Luis A. Mansilla, Argentina
GRE	Daniel W. E. Green, U.S.A.	MAR02 13	Jose Carvajal Martinez, Spain

MCN	Robert H. McNaught, Australia	SAN07 32	Gábor Sánta, Hungary
MEY	Maik Meyer, Germany	SAR02 32	Krisztián Sárneczky, Hungary
MIC 36	Marco Micheli, Pompiano, Italy	SCA02	Toni Scarmato, Calabria, Italy
MIT 16	Shigeo Mitsuma, Saitama, Japan	SCH04 11	Alex H. Scholten, Netherlands
MIY01 16	Osamu Miyazaki, Ibaraki, Japan	SEA 14	David A. J. Seargent, Australia
MOM 16	Masahiko Momose, Nagano, Japan	SHU 42	Sergey E. Shurpakov, Belarus
MOR	Charles S. Morris, U.S.A.	SKI 24	Oddleiv Skilbrei, Norway
MORO9	Philippe Morel, France	*SKR01 48	Yourij Skripchuk, Ukraine
NAG04 16	Kazuro Nagashima, Nara, Japan	*SKR02 48	Eugene Skripchuk, Ukraine
NAG08 16	Yoshimi Nagai, Nagano, Japan	SOU01 35	Willian C. de Souza, Brazil
NAG09 32	Miklós Nagy, Csenger, Hungary	SOW 16	Toshihide Sowa, Wakayama, Japan
NAK01 16	Akimasa Nakamura, Ehime, Japan	SRA 32	Márta Sragner, Pécs, Hungary
NEV 42	Vitali S. Nevski, Belarus	SRB 23	Jiri Srba, Vsetin, Czech Rep.
OHM 16	Fumihiko Ohmori, Miyazaki, Japan	STR03 15	Magda Streicher, South Africa
OHS 16	Yuuji Ohshima, Nagano, Japan	SVE01 48	Denis A. Svechkarov, Ukraine
OME 05	Stephen O'Meara, MA, U.S.A.	SZA	Sándor Szabó, Sopron, Hungary
*PALO4	Graham P. Palmer, New Zealand	TIT 48	R. E. Titarenko, Ukraine
PEA 14	Andrew R. Pearce, Australia	TOT03 32	Zoltán Tóth, Hungary
PERO1	Alfredo J. S. Pereira, Portugal	TSU02 16	Mitsunori Tsumura, Japan
*PILO1	Uwe Pilz, Leipzig, Germany	TUR 15	Cliff Turk, S. Africa
PRIO4 15	David Pringle-Wood, Zimbabwe	*URB01 23	Ľubomír Urbančok, Slovak Rep.
RES 18	Maciej Reszelski, Poland	VAN15 15	Koos van Zyl, South Africa
RIB 40	José R. Ribeiro, Portugal	WAR01	Johan Warell, Sweden
RIE 11	Hermanus Rietveld, Netherlands	YOS02 16	Katsumi Yoshimoto, Japan
ROBO6	Walter R. Robledo, Argentina	YOS04 16	Seiichi Yoshida, Ibaraki, Japan
SANO4 38	Juan Manuel San Juan, Spain	ZAN01 11	W. T. Zanstra, The Netherlands

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

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

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

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

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

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

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NOTE: The new-style CCD tabulated data begin on page 67 of this issue.

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Visual Data

Comet 2P/Encke

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2003 10 15.83		S	13.5:	HS	40.7	L	4	116	1.0	3			BIV
2003 10 15.84		S	13.6:	HS	40.7	L	4	233	0.8	3			BIV
2003 10 18.88		S	13.0	HS	40.7	L	4	116	1.2	2			BIV
2003 10 21.94		S	12.8	HS	40.7	L	4	116	1.0	2			BIV
2003 10 26.93		S	12.5	HS	40.7	L	4	116	1.3	2			BIV
2003 11 01.86		S	12.0	HS	40.7	L	4	58	2.0	2			BIV
2003 11 01.87		S	11.9	HS	40.7	L	4	116	1.6	2			BIV
2003 11 12.23		S	9.4	TK	5.0	R		16	7	3			BIV
2003 11 12.23		S	9.5	TK	20.3	L	6	48	7	3			BIV
2003 11 13.25		S	9.3	TK	20.3	L	6	48	6	2			BIV
2003 11 13.26		S	8.8	TK	5.0	R		16	6	3			BIV
2003 11 14.24		S	8.9	TK	20.3	L	6	48	7	2			BIV
2003 11 14.25		S	8.8	TK	5.0	R		16	8	2			BIV
2003 11 15.25		S	9.0	TK	20.3	L	6	48	8	2			BIV
2003 11 15.26		S	8.7	TK	5.0	R		16	11	2			BIV
2003 11 16.27		S	9.1	TK	20.3	L	6	48	8	2			BIV
2003 11 16.28		S	8.6	TK	5.0	R		16	10	2			BIV
2003 11 18.23		S	8.3	TK	20.3	L	6	48	9	2			BIV
2003 11 18.24		S	7.9	TK	5.0	R		16	10	2			BIV
2003 11 25.81		S	8.1	TK	25.6	L	5	42	10	3			BIV
2003 11 25.82		S	7.6:	TK	5.0	B		7	10	3			BIV

Comet 29P/Schwassmann-Wachmann

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2003 09 24.02		S	13.7	HS	40.7	L	4	58	1.5	2			BIV
2003 09 26.02		S	13.7	HS	40.7	L	4	58	1.5	2			BIV
2004 06 27.00		M	11.3	TK	20.3	L	6	63	0.8	5			GUZ
2004 07 11.98		S	12.1	HS	27.0	L	6	83	1.5	2			TOT03
2004 07 17.99		S	11.9	HS	40.5	L	4	147	1.8	3			SAR02
2004 07 21.04		S	11.7	HS	40.5	L	4	125	1.4	3			SAR02
2004 07 23.97		S	13.0	HS	27.0	L	6	120	0.8	3			TOT03
2004 08 12.05		S	13.1	HS	40.7	L	4	116	1.5	5			BIV
2004 08 14.04		S	13.0	HS	40.7	L	4	58	1.7	4			BIV

Comet 29P/Schwassmann-Wachmann [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 08 14.93		S	13.0	HS	20.0	L	5	111	1.0	3			NAG09
2004 08 14.98		S	12.9	HS	40.7	L	4	58	2.0	4			BIV
2004 08 15.03		B	13.2	HS	23.5	T	10	94	1	3			LAB02
2004 08 15.94		M	12.3	TK	20.3	L	6	63	1.2	4			GUZ
2004 08 15.99		S	13.1	HS	40.7	L	4	58	2.0	3			BIV
2004 08 24.01		S	13.1	HS	27.0	L	6	120	1.1	2/			TOT03
2004 09 08.90		S	12.7	AU	20.3	L	6	63	1.5	2			GUZ
2004 09 10.88		S	13.5	HS	27.0	L	6	167	1.0	2			TOT03
2004 09 10.97		S	12.7	AU	20.3	L	6	63	1.5	2			GUZ
2004 09 14.92		S	12.9	AU	20.3	L	6	63	1.8	2			GUZ
2004 09 17.02		S	12.8	AU	20.3	L	6	63	1.6	2			GUZ
2004 09 17.84		S	12.6	HS	27.0	L	6	120	0.5	8			TOT03
2004 09 17.94		M	12.1	AU	20.3	L	6	63	2	7			GUZ
2004 09 18.87		B	12.1	HS	23.5	T	10	188	2	2			LAB02
2004 09 18.88		S	12.6	HS	27.0	L	6	120	0.4	7			TOT03
2004 09 19.01		M	11.8	AU	20.3	L	6	63	2	7			GUZ
2004 09 20.85		S	12.4	HS	20.0	L	5	111	0.5	6			NAG09
2004 09 21.95		M	11.7	AU	20.3	L	6	63	0.7	7			GUZ
2004 09 24.10		S	11.7	HS	25.6	L	5	42	1.5	5			BIV
2004 09 24.11		S	12.1	HS	25.6	L	5	169	1.5	6			BIV
2004 10 03.77		S	12.7	HS	27.0	L	6	120	1.0	3			TOT03
2004 10 06.89		S	11.9	HS	25.6	L	5	84	1.2	8			BIV
2004 10 08.81	x	S	12.4	TT	20	L	4	100	1.2	3/			PEA
2004 10 12.95		S	11.9	HS	25.6	L	5	42	1.5	6			BIV
2004 10 15.99		S	12.0	HS	25.6	L	5	42	1.7	3			BIV
2004 10 16.80	x	S	12.3	TT	20	L	4	100	1.3	2			PEA
2004 10 16.97		S	12.2	HS	23.5	T	10	94	0.7	1			LAB02
2004 10 17.84		S	12.0	HS	27.0	L	6	83	1.5	4			TOT03
2004 10 18.87		S	12.0	HS	40.7	L	4	58	2.0	3			BIV
2004 10 19.02		M	11.8	TK	35	L	5	68	2.2	2			HOR02
2004 10 21.11		S	12.2	HS	25.6	L	5	42	2.0	3			BIV
2004 11 01.43	x	S	12.6:	HS	25.4	L	4	113	1.8	2			YOS02
2004 11 08.83		S	12.2	TK	30	L	5	60	1.4	4			NEV
2004 11 08.95		S	12.5	AU	25.4	J	6	88	1.0	4			BOU
2004 11 09.43		S	12.9	HS	40.0	L	4	144	1.1	s4			YOS04
2004 11 11.83		S	12.5	AU	20.3	L	6	63	1.5	3			GUZ
2004 11 12.44		S	12.1	GA	25.4	L	4	71					SEA
2004 11 13.01		S	11.8	TK	20.3	T	10	100	1.5	4			GON05
2004 11 13.83		S	12.8	TI	23.5	T	10	67	1.3	2			LAB02
2004 11 15.98		S	11.9	TK	20.3	T	10	100	1.5	3			GON05
2004 11 16.73		S	12.6	HS	30	L	5	100	1.1	3			NEV
2004 11 18.01		S	11.9	TK	20.3	T	10	100	2	3			GON05
2004 12 03.77		S	12.6	AU	31.0	J	6	89	1.6	1/			BOU
2004 12 05.73		S	12.8	AU	20.3	L	6	63	1.5	2			GUZ
2004 12 05.87		S	12.2	TK	20.3	T	10	100	1.5	2			GON05
2004 12 11.43		S	13.0	AU	40.0	L	4	144	1.6	1			YOS04
2004 12 11.72		S	12.9	AU	20.3	L	6	63	1.5	1			GUZ
2004 12 11.78		S	12.4	TI	23.5	T	10	94	1.5	2			LAB02
2004 12 11.87		S	13.4	HS	20.3	L	6	95	1.2	2			BIV
2004 12 12.84		S	12.3	TK	20.3	T	10	100	1.5	3			GON05
2004 12 12.85		S	13.4	HS	20.3	L	6	95	1.3	2			BIV
2004 12 16.48	x	S	11.6	TJ	31.7	L	6	152	0.5	4			MIY01
2004 12 17.99		S	12.9	HS	25.6	L	5	169	0.5	5			BIV
2004 12 30.39	x	S	13.2	HS	31.7	L	6	152	0.5	4			MIY01
2005 01 02.76		S	12.3	AU	31.0	J	6	109	1.2	3/			BOU
2005 01 02.76		S	12.5	AU	31.0	J	6	109	0.9	1/			DIJ
2005 01 06.88		S	12.1	TK	20.3	T	10	100	1.5	4			GON05
2005 01 07.80		S	12.5	NP	25.5	L	5	60	1.5	6			SAN04
2005 01 07.81		S	12.4	NP	25.5	L	5	60	1.5	6/			MAR02
2005 01 07.82		S	11.9	TK	20.3	T	10	100	1.5	4			GON05
2005 01 07.84		S	12.4	TI	23.5	T	10	94	0.7	4			LAB02
2005 01 08.40		S	11.9	TJ	40.0	L	4	144	1.2	7			YOS04
2005 01 11.72		S	13.0	HS	44.0	L	5	156	0.4	4			HAS02
2005 01 12.77		S	12.2	AU	31.0	J	6	109	1.4	3/			BOU
2005 01 14.81		S	13.2	HS	44.5	L	4	100	1.2	5			KAR02

Comet 29P/Schwassmann-Wachmann [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 30.83		S	12.5	TK	20.3	T	10	133	1	2			GON05

Comet 32P/Comas Solá

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 09.53		S	13.4	HS	40.0	L	4	144	0.9	5			YOS04
2004 11 11.85		S	13.0	HS	20.3	L	6	63	1	3			GUZ
2004 11 13.92		S	13.8	TI	23.5	T	10	94	1	2			LAB02
2004 11 14.83		S	13.4	AU	31.0	J	6	109	1.2	4			BOU
2004 11 16.02		S	12.3	TK	20.3	T	10	100	1.5	3			GON05
2004 11 16.58	x	S	13.3	HS	32.0	L	5	87	1.4	5			NAG08
2004 11 16.78		S	13.5	HS	30	L	5	100	0.9	2			NEV
2004 11 21.05		S	13.3	AU	31.0	J	6	109	1.0	4			BOU
2004 11 21.06		S	13.0	AU	31.0	J	6	109	0.9	2/			DIJ
2004 12 05.55	x	S	12.9	HS	31.7	L	6	152	0.8	3			MIY01
2004 12 05.81		S	12.5	HS	20.3	L	6	63	1	4			GUZ
2004 12 05.93		S	12.6	TK	20.3	T	10	100	1.0	4			GON05
2004 12 08.97		S	12.5	HS	25.6	L	5	84	1.0	4			BIV
2004 12 09.54	x	S	12.7	HS	32.0	L	5	87	0.9	4			NAG08
2004 12 10.97		S	12.3	HS	20.3	L	6	63	1	3			GUZ
2004 12 11.42		S	12.8	AU	40.0	L	4	144	1.3	5			YOS04
2004 12 11.75		S	12.4	HS	20.3	L	6	63	1	3			GUZ
2004 12 11.83		S	12.4	TI	23.5	T	10	94	1.5	2			LAB02
2004 12 12.83		S	12.7	HS	20.3	L	6	95	1.2	4			BIV
2004 12 14.48		S	12.7	GA	25.4	L	4	71					SEA
2004 12 16.50	x	S	12.3	HS	31.7	L	6	152	1.4	5			MIY01
2004 12 18.01		S	12.6	HS	25.6	L	5	84	1.3	3			BIV
2004 12 30.41	x	S	12.9	HS	31.7	L	6	152	0.8	3			MIY01
2004 12 30.57	x	S	12.7	TT	20	L	4	100	1.2	2			PEA
2005 01 02.57	x	S	12.7	HS	20	L	4	100	1.1	2			PEA
2005 01 02.77		S	12.8	TA	31.0	J	6	109	1.0	4			BOU
2005 01 02.78		S	13.2	TA	31.0	J	6	109	0.8	1			DIJ
2005 01 02.95		S	12.5	HS	25.6	L	5	84	1.7	2			BIV
2005 01 07.50		S	12.6	GA	25.4	L	4	114					SEA
2005 01 07.85		S	12.7	TI	23.5	T	10	94	0.7	2			LAB02
2005 01 07.88		S	12.8	TK	20.3	T	10	100	1.0	3			GON05
2005 01 08.42		S	12.5	HS	40.0	L	4	144	1.3	4			YOS04
2005 01 10.57	x	S	12.8	HS	20	L	4	100	1.0	2			PEA
2005 01 11.74		S	13.2	HS	44.0	L	5	156	0.4	4			HAS02
2005 01 12.77		S	12.7	GA	31.0	J	6	109	1.0	4			BOU
2005 01 12.90		S	13.5	HS	25.6	L	5	169	0.8	3			BIV
2005 01 14.81		S	13.0	HS	44.5	L	4	100	1.0	2			KAR02
2005 01 14.89		S	12.7	GA	31.0	J	6	109	1.1	3/			BOU
2005 01 14.90		S	12.8	GA	31.0	J	6	109	1.3	1			DIJ
2005 01 31.94		S	12.5	TK	20.3	T	10	100	1.0	3			GON05

Comet 40P/Väisälä

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 05 14.90		S	[13.5	HS	27.0	L	6	167	! 0.5				TOT03

Comet 43P/Wolf-Harrington

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 01 24.86		S	12.7	HS	40.7	L	4	116	1.2	5			BIV
2004 02 13.85		S	12.8	HS	40.7	L	4	116	1.2	3			BIV

Comet 62P/Tsuchinshan

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 09.77		S	13.8	HS	40.0	L	4	144	2.0	1/			YOS04
2004 11 16.16		S	12.8	TK	20.3	T	10	77	1.7	2			GON05
2004 11 19.81	x	S	12.4	TT	20	L	4	100	1	2			PEA
2004 11 20.82	x	S	12.6	TT	20	L	4	100	1.5	1			PEA
2004 11 21.07		S	12.3	AU	31.0	J	6	89	2.2	2/			BOU

Comet 62P/Tsuchinshan [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 21.08		S	12.7	AU	31.0	J	6	89	2.0	0/			DIJ
2004 12 06.00		S	12.0	HS	20.3	L	6	63	1.5	2			GUZ
2004 12 11.02		S	11.7	TK	20.3	L	6	63	2	3			GUZ
2004 12 11.77		S	11.8	HS	40.0	L	4	144	2.4	2			YOS04
2004 12 12.14		S	11.9	HS	20.3	L	6	95	2.0	4			BIV
2004 12 13.12		S	11.6	TK	20.3	L	6	40	2.0	3			BIV
2004 12 14.67		S	11.8	GA	25.4	L	4	71					SEA
2004 12 20.11		S	11.8	HS	25.6	L	5	84	2.0	2			BIV
2005 01 07.82	x	S	11.5	TJ	31.7	L	6	63	1.7	3			MIY01
2005 01 08.78		S	11.0	TJ	40.0	L	4	75	5.0	2			YOS04
2005 01 11.81	x	S	11.2	TJ	31.7	L	6	63	2.7	3/			MIY01
2005 01 12.83	x	S	12.4	HS	31.7	L	6	63	1.4	4			MIY01
2005 01 18.04		S	12.7	HS	30	L	5	60	1	2			NEV
2005 01 19.16		S	11.6	TK	25.6	L	5	42	2.0	3			BIV
2005 01 20.81	x	S	11.8	TK	25.4	L	4	46	3.5	2			YOS02
2005 01 21.83	x	S	12.4	HS	31.7	L	6	63	1.7	3/			MIY01

Comet 65P/Gunn

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 13.94		S	13.4	HS	34.0	L	5	115	0.8	3			SZA

Comet 69P/Taylor

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 05.99		S	[13.2	HS	20.3	L	6	63	! 1				GUZ
2004 12 11.00		S	[13.2	HS	20.3	L	6	63	! 1				GUZ
2004 12 11.76		S	[13.5	HS	40.0	L	4	144	! 1.0				YOS04

Comet 78P/Gehrels

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 08 14.98		S	12.7	HS	20.0	L	5	111	0.7	4			NAG09
2004 08 15.09		B	12.7	HS	23.5	T	10	94	3	2			LAB02
2004 08 15.96		S	12.6	SK	20.3	L	6	63	0.8	4			GUZ
2004 09 08.93		M	12.3	TK	20.3	L	6	63	1.2	5			GUZ
2004 09 08.96		S	12.8	HS	40.7	L	4	116	1.0	6	0.03	260	BIV
2004 09 10.90		S	12.2	HS	27.0	L	6	167	1.3	5			TOT03
2004 09 10.98		M	12.1	TK	20.3	L	6	63	1.2	6			GUZ
2004 09 10.99		S	12.5:	HS	20.0	L	5	83	1	5			NAG09
2004 09 13.98		S	11.9	HS	34.0	L	5	70	2	3			SZA
2004 09 14.92		M	12.2	SK	20.3	L	6	63	1.5	5			GUZ
2004 09 15.14		S	12.3	HS	25.6	L	5	42	1.3	7	0.05	270	BIV
2004 09 17.03		M	11.8	SK	20.3	L	6	63	2	5			GUZ
2004 09 17.10		S	12.2	HS	40.7	L	4	58	1.3	7	0.06	270	BIV
2004 09 17.98		M	11.9	SK	20.3	L	6	63	2	5			GUZ
2004 09 18.89		S	12.3	HS	27.0	L	6	83	1.4	3			TOT03
2004 09 19.04		M	11.9	SK	20.3	L	6	63	2	5			GUZ
2004 09 21.97		M	11.9	SK	20.3	L	6	63	2	5			GUZ
2004 09 24.13		S	12.0	TK	25.6	L	5	42	1.2	6	0.06	270	BIV
2004 10 06.85		S	11.4	HS	20.0	L	6	96	1.5	2			SAN07
2004 10 06.92		S	11.6	HS	25.6	L	5	84	1.3	6	0.04	260	BIV
2004 10 08.82	x	S	11.6	TT	20	L	4	45	1.8	4			PEA
2004 10 12.99		S	11.5	TK	25.6	L	5	42	1.4	5	0.06	270	BIV
2004 10 16.02		S	11.5	TK	25.6	L	5	42	1.5	6	0.07	260	BIV
2004 10 16.81	x	S	11.6	TT	20	L	4	45	2.6	4			PEA
2004 10 17.85		S	11.5	HS	27.0	L	6	83	1.7	5			TOT03
2004 10 18.88		M	11.4	TK	35	L	5	68	1.8	6/	3.5m	260	HORO2
2004 10 18.92		S	11.5	HS	40.7	L	4	116	1.5	6			BIV
2004 10 21.19		S	11.2	TK	25.6	L	5	42	1.6	6	0.05	270	BIV
2004 10 22.81	x	S	11.3	TT	20	L	4	45	2.5	4/			PEA
2004 10 23.05		M	11.6	TJ	30	T	10	79	1.0	5			ADA05
2004 10 24.03		M	11.4	TJ	30	T	10	79	0.8	4			ADA05
2004 11 03.79	x	S	11.2	HS	31.7	L	6	63	1.9	5/			MIY01
2004 11 04.85		M	10.9	AU	25.4	J	6	72	1.7	5/			BOU

Comet 78P/Gehrels [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 05.88		S	11.0:	TK	30.0	L	5	60	& 2	6	&0.1	278	SCH04
2004 11 06.65	x	S	10.4	TJ	31.7	L	6	63	2.3	5/			MIY01
2004 11 06.81	x	S	11.0	TT	20	L	4	45	2.7	5			PEA
2004 11 06.90		S	10.0	HS	27.0	L	6	83	1.7	s5			TOT03
2004 11 07.50	x	S	10.2	TJ	32.0	L	5	58	1.8	6			NAG08
2004 11 07.57	x	S	10.5	TK	25.4	L	4	46	1.5	6			YOS02
2004 11 07.73	x	B	10.9	TJ	30.4	L	5	79	0.6	5			NAGO4
2004 11 07.82		S	10.1	TK	15.0	R	5	38	3.0	4			MEY
2004 11 08.76	x	S	10.3	TJ	31.7	L	6	63	2.0	5/			MIY01
2004 11 08.88		S	10.3	TK	30	L	5	60	1.5	6	4 m	270	NEV
2004 11 08.97		M	10.7	AU	25.4	J	6	58	2.3	5			BOU
2004 11 08.97		S	10.0	TK	20.0	L	4	42	3	7			SCH04
2004 11 09.00		M	11.2	TJ	15	L	5	30	3	4/			SHU
2004 11 09.50		S	10.1	AA	10.0	B		25					SEA
2004 11 09.52		S	10.3	TJ	40.0	L	4	36	2.1	6	4.2m	255	YOS04
2004 11 09.83		M	10.5	HS	20.0	L	6	75	3	S5/			SAN07
2004 11 11.82		M	10.1	TK	20.3	L	6	63	2	7			GUZ
2004 11 11.98		S	10.0	TK	20.0	L	4	42	& 2	6			SCH04
2004 11 12.44		S	10.0	AA	10.0	B		25					SEA
2004 11 13.06		S	10.4	TK	20.3	T	10	77	2.5	6			GON05
2004 11 13.48		S	10.0	AA	10.0	B		25					SEA
2004 11 13.71	x	B	11.0	TJ	30.4	L	5	79	0.7	5			NAGO4
2004 11 13.79	x	S	10.4	TT	20	L	4	45	2	5			PEA
2004 11 13.89		S	9.7	TJ	15.0	R	15	75	2	6			DIE02
2004 11 13.90		B	11.1	TI	23.5	T	10	67	1.3	7	1.3m		LAB02
2004 11 13.95		M	10.5	TK	25.4	L	6	76	3	5			GRA04
2004 11 14.06		B	10.0	TK	13.0	L		45	1.4	2/			RES
2004 11 14.44		S	9.9	AA	10.0	B		25	4.0				SEA
2004 11 14.74		M	10.8	TJ	19	L	5	38	1.5	4/			SHU
2004 11 14.74		S	10.2	TJ	32.0	L	5	58	1.0	6			PIL01
2004 11 14.81		M	10.6	AU	31.0	J	6	58	2.6	5			BOU
2004 11 14.95		S	10.8	HS	25.6	L	5	42	1.5	6	0.06	270	BIV
2004 11 14.96		S	9.8	TK	8.0	B		15	& 5	5			SCH04
2004 11 15.46		S	9.9	AA	10.0	B		25					SEA
2004 11 15.76		M	10.6	TJ	41	L	4	89	1.6	5			SHU
2004 11 15.89		S	10.4	TK	30.5	T	10	75	2.1	s5			KAM01
2004 11 16.06		S	10.2	TK	20.3	T	10	77	2.5	6			GON05
2004 11 16.07		S	9.8	TK	10.0	B		25	3	5			GON05
2004 11 16.57	x	M	10.2	TJ	32.0	L	5	58	1.8	6/			NAG08
2004 11 16.65	x	S	11.0	TJ	31.7	L	6	63	2.5	5/			MIY01
2004 11 16.66	x	S	13.4	HS	31.7	L	6	152	0.9	3			MIY01
2004 11 16.72		M	10.6	TJ	19	L	5	38	2	4/			SHU
2004 11 16.77		S	10.4	TK	30	L	5	60	1.7	7	6 m	270	NEV
2004 11 16.85		B	9.9	TK	13.0	L		45	1.5	2/			RES
2004 11 19.79	x	S	10.4	TT	20	L	4	45	3	6			PEA
2004 11 19.99		M	9.6	HS	11.4	L	5	50	3	s4/			SAN07
2004 11 19.99		M	10.7	TI	10	B		25	3.9	7/			HOR03
2004 11 20.80	x	S	10.3	TT	20	L	4	45	2.5	5			PEA
2004 11 21.01		S	9.9	TJ	15.0	R	15	75	2	5			DIE02
2004 11 21.02		M	10.3	AU	31.0	J	6	58	2.5	5			BOU
2004 11 21.02		S	10.2	AU	31.0	J	6	58	3.4	4/			DIJ
2004 11 21.15		M	10.2	TK	25.4	L	6	59	2.5	5/			GRA04
2004 11 21.78	x	S	10.7	TK	25.4	L	4	46	1.7	6			YOS02
2004 11 21.92		B	9.7	TK	13.0	L		45	1.5	3/			RES
2004 11 22.00		M	11.1	TJ	19	L	5	38	1.5	5			SHU
2004 11 22.79	x	B	11.2	TJ	30.4	L	5	79	0.7	6			NAGO4
2004 11 30.49		S	10	: AA	10.0	B		25					SEA
2004 12 02.46	x	M	10.6	TJ	15.0	B		25	4	4			MIT
2004 12 02.49	x	M	10.7	TJ	32.0	L	5	58	2.0	6			NAG08
2004 12 03.90		S	10.7	TK	15.0	R	15	75	2	4			DIE02
2004 12 04.81		M	10.7	TI	10	B		25	2.9	6/			HOR03
2004 12 04.81		M	10.7	TT	10	B	4	25	2.5	3			LEH
2004 12 05.54	x	S	11.4	TJ	31.7	L	6	63	1.5	4/			MIY01
2004 12 05.80		M	10.3	TK	20.3	L	6	63	2	6			GUZ
2004 12 05.94		S	10.3	TK	20.3	T	10	77	3	5			GON05

Comet 78P/Gehrels [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 06.00		M	10.4	TK	20.3	T	10	77	2.0	4			GRA04
2004 12 06.92		S	10.7	TK	30.5	T	10	75	1.4	6/			KAM01
2004 12 08.77		M	10.7	AU	31.0	J	6	72	2.5	4/			BOU
2004 12 08.77		S	10.9	AU	31.0	J	6	72	1.4	5			DIJ
2004 12 08.91		S	10.7	TK	25.6	L	5	42	2.0	5			BIV
2004 12 09.52	x	M	11.1	TJ	32.0	L	5	58	2.1	6			NAG08
2004 12 09.76		S	10.7	HS	32.0	L	5	36	2.0	4			PILO1
2004 12 10.84		M	10.9	TI	25	L	5	50	2.1	7			HOR03
2004 12 10.98		M	10.6	TK	20.3	L	6	63	2.5	5			GUZ
2004 12 11.41		S	11.2	TJ	40.0	L	4	75	1.9	7			YOS04
2004 12 11.53	x	S	10.5	TK	25.4	L	4	46	1.9	5/			YOS02
2004 12 11.74		M	10.8	TK	20.3	L	6	63	2.5	5			GUZ
2004 12 11.74	x	S	10.8	TT	20	L	4	45	3.3	3/			PEA
2004 12 11.82		B	10.9	TI	23.5	T	10	67	2	5			LAB02
2004 12 11.93		S	10.4	TK	20.3	L	6	40	3.0	5			BIV
2004 12 12.92		S	10.4	TK	20.3	L	6	40	2.0	6			BIV
2004 12 12.92		S	10.8	TK	20.3	T	10	77	3	5			GON05
2004 12 13.94		S	10.7	TK	15.0	R	15	75	1	4			DIE02
2004 12 14.01		S	10.6	TJ	19	L	5	38	1.5	4/			SHU
2004 12 14.88		S	10.7	TK	15.0	R	15	75	2	4			DIE02
2004 12 14.94		S	11.0	TK	20.0	L	4	80	& 3	2			SCH04
2004 12 14.95		S	10.4	TK	10.0	B		25	3	5			GON05
2004 12 14.97		S	11.0	TK	30.5	T	10	75	1.4	5			KAM01
2004 12 15.88		S	11.1	TK	30.5	T	10	75	1.6	5			KAM01
2004 12 16.49	x	S	11.1	TJ	31.7	L	6	63	2.0	4/			MIY01
2004 12 16.94		S	11.0	TK	15.0	R	15	75	1	3			DIE02
2004 12 16.95		M	11.0	AU	31.0	J	6	72	2.4	4			BOU
2004 12 16.95		S	11.0	AU	31.0	J	6	72	2.0	3/			DIJ
2004 12 16.98		S	10.7	TK	25.6	L	5	42	2.5	5			BIV
2004 12 18.02		S	11.0	TK	25.6	L	5	42	2.0	5			BIV
2004 12 18.73	x	S	11.0	TT	20	L	4	45	2.5	3			PEA
2004 12 19.79		S	11.4	TK	15.0	R	15	75	1	3			DIE02
2004 12 19.88		S	11.0	AU	25.4	J	6	72	2.2	3/			BOU
2004 12 20.09		S	11.2	TK	25.6	L	5	42	2.0	5			BIV
2004 12 20.83		M	10.9	TT	11	R	15	47	2	4			LEH
2004 12 30.42	x	S	11.5	TJ	31.7	L	6	63	1.7	4/			MIY01
2004 12 30.57	x	S	11.3	TT	20	L	4	45	2.8	3			PEA
2004 12 31.72		S	11.4	HS	20.0	L	5	111	1.5	2			NAG09
2004 12 31.73		S	10.0:	HS	11.4	L	5	50	2.5	2			SAN07
2005 01 01.44	x	S	11.5	TJ	31.7	L	6	63	1.5	4/			MIY01
2005 01 02.39	x	S	11.4	TJ	31.7	L	6	63	1.4	4/			MIY01
2005 01 02.56	x	S	11.3	TT	20	L	4	45	2.5	3			PEA
2005 01 02.58	x	B	11.8	HS	30.4	L	5	61	1.1	2/			NAG04
2005 01 02.80		S	11.2	TK	25.6	L	5	42	1.8	6			BIV
2005 01 02.81		S	11.0	AU	31.0	J	6	72	2.5	3/			DIJ
2005 01 02.81		S	11.3	AU	31.0	J	6	72	2.3	3/			BOU
2005 01 02.83		S	11.4	TK	15.0	R	15	75	1	4			DIE02
2005 01 03.85		S	10.9	TK	20.3	T	10	77	2.5	4			GON05
2005 01 04.92		S	11.2	TK	30.5	T	10	75	1.7	5			KAM01
2005 01 05.53	x	S	11.5	TJ	31.7	L	6	63	1.6	4/			MIY01
2005 01 06.82		S	11.4:	HS	32.0	L		57	2.5	3			PILO1
2005 01 07.41	x	S	11.3	TJ	31.7	L	6	63	2.1	4			MIY01
2005 01 07.83		S	11.4	NP	25.5	L	5	60	2	4			SAN04
2005 01 07.87		S	11.3	TI	23.5	T	10	94	1.5	5			LAB02
2005 01 07.90		S	10.9	TK	20.3	T	10	77	2.5	4			GON05
2005 01 07.92		S	11.1	NP	25.5	L	5	60	2.5	4			MAR02
2005 01 08.40	x	S	11.3	HS	31.7	L	6	63	1.7	3/			MIY01
2005 01 08.43		S	11.2	TJ	40.0	L	4	144	2.0	6/			YOS04
2005 01 08.51	x	S	11.1	TJ	15.0	B		25	3	3			MIT
2005 01 09.95		S	11.6	TK	30.5	T	10	115	1.3	4			KAM01
2005 01 10.56	x	S	11.4	TT	20	L	4	45	3	3			PEA
2005 01 10.94		S	11.6	TK	30.5	T	10	115	1.3	4			KAM01
2005 01 11.45	x	S	11.2	HS	31.7	L	6	63	2.0	4			MIY01
2005 01 11.73		S	11.4	TK	44.0	L	5	156	1.6	4			HAS02
2005 01 12.47	x	S	11.5	TJ	31.7	L	6	63	2.0	4			MIY01

Comet 78P/Gehrels [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 12.78		S	11.5	AU	31.0	J	6	72	2.0	3/			BOU
2005 01 12.91		S	11.5	TK	25.6	L	5	42	1.5	5			BIV
2005 01 14.83		S	11.9	HS	44.5	L	4	62	1.9	4			KAR02
2005 01 14.90		S	11.7	TK	30.5	T	10	115	1.5	3/			KAM01
2005 01 14.91		M	11.5	AU	31.0	J	6	89	2.5	2/			DIJ
2005 01 14.91		S	11.5	AU	31.0	J	6	89	2.2	3			BOU
2005 01 15.90		S	11.8	TK	30.0	L	5	60	& 2	1			SCH04
2005 01 16.76		M	11.9	HS	42	L	5	81	1.7	3			LEH
2005 01 17.80		M	11.5	TJ	41	L	4	89	1	3			SHU
2005 01 21.45	x	S	11.4	TJ	31.7	L	6	86	1.6	3			MIY01
2005 01 31.48	x	S	11.5	HS	31.7	L	6	86	1.4	3/			MIY01
2005 01 31.91		S	11.9	TK	20.3	T	10	77	1.5	3			GON05

Comet 88P/Howell

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 08 14.08		S	13.0	HS	40.7	L	4	116	1.6	3			BIV
2004 08 15.02		S	12.7	HS	40.7	L	4	58	2.0	3			BIV
2004 08 15.95		S	12.1	TK	20.3	L	6	63	2	2			GUZ
2004 08 16.03		S	13.0	HS	40.7	L	4	58	2.0	3			BIV
2004 09 08.92		S	13.0:	HS	20.3	L	6	63	2	1			GUZ
2004 09 10.99		S	12.8:	HS	20.3	L	6	63	& 2	1			GUZ
2004 09 14.09		S	12.9	HS	27.0	L	6	120	1.5	1/			TOT03
2004 09 17.04		S	[13.0	HS	20.3	L	6	63	! 2				GUZ
2004 09 17.12		S	12.9	HS	40.7	L	4	116	1.8	3			BIV
2004 09 17.97		S	[13.0	HS	20.3	L	6	63	! 2				GUZ
2004 11 09.50		S	[13.1	HS	40.0	L	4	144	! 0.6				YOS04

Comet 121P/Shoemaker-Holt

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 11.78		S	[13.6	HS	40.0	L	4	144	! 1.2				YOS04
2005 01 08.79		S	[13.6	HS	40.0	L	4	144	! 0.6				YOS04

Comet 153P/Ikeya-Zhang

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2002 04 12.78		B	4.2	AA	5.0	B		7	5	6	1.8	340	KAN

Comet 162P/Siding Spring

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 17.94		I	14.9	HS	20.3	T	10	222		9			GON05
2004 12 03.76		I	14.7	SK	31.0	J	6	143		9			BOU
2004 12 11.45		I	[14.5	HS	40.0	L	4	144					YOS04

Comet C/2001 HT_50 (LINEAR-NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2003 09 24.05		S	11.7	HS	40.7	L	4	58	1.3	5			BIV
2003 09 26.06		S	12.1	HS	40.7	L	4	58	1.0	5			BIV
2003 10 18.96		S	11.9	HS	40.7	L	4	116	2.0	4			BIV
2003 10 26.96		S	12.6:	HS	40.7	L	4	116	1.3	4			BIV
2003 11 01.91		S	11.8	HS	40.7	L	4	116	1.5	4			BIV
2003 11 15.33		S	11.1	HS	20.3	L	6	48	1.5	5			BIV
2003 11 15.33		S	11.4	HS	20.3	L	6	96	1.5	4			BIV
2003 11 17.58		S	11.8	TK	20.3	L	6	48	1.5	5			BIV
2003 11 18.41		S	11.9	HS	20.3	L	6	48	1.5	4			BIV
2003 11 19.47		S	11.8	HS	20.3	L	6	48	1.5	4			BIV
2003 12 17.85		S	11.8	TK	40.7	L	4	58	1.8	4			BIV
2004 01 24.88		S	13.0	HS	40.7	L	4	116	1.0	5			BIV
2004 02 13.83		S	12.8	HS	40.7	L	4	116	1.0	3			BIV
2004 09 07.85		S	13.2	HS	27.0	L	6	167	0.6	3			TOT03
2004 09 08.89		S	13.4	HS	27.0	L	6	167	0.7	2			TOT03
2004 09 10.86		S	[13.5	HS	27.0	L	6	167	! 0.5				TOT03

Comet C/2001 HT_50 (LINEAR-NEAT) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 17.83		S	[13.5	HS	27.0	L	6	167	! 0.7				TOT03

Comet C/2001 Q4 (NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 04 30.31		B	4.1	HR	3.5	B		6	16.5				PAL04
2004 05 01.89		S	3.6	YG	0.0	E		1					SOU01
2004 05 03.27		S	3.7	HR	3.5	B		6	17.5				PAL04
2004 05 03.89		S	3.6	YG	0.0	E		1					SOU01
2004 05 06.86		S	3.4	HV	0.0	E		1	20	6			BIV
2004 05 06.86		S	3.5	HV	5.0	B		7	20	6	2.0	125	BIV
2004 05 07.87		S	3.6	HV	0.0	E		1	20	7	2.0	120	BIV
2004 05 07.89		S	3.0	YG	0.0	E		1	20	7			SOU01
2004 05 07.89		S	3.6	HV	5.0	B		7	20	6	2.0	120	BIV
2004 05 08.27		S	3.6	HR	3.5	B		6	28.5		&7		PAL04
2004 05 08.77		E	3.6	CA	11.5	L	8	48	9	4		45	SKR01
2004 05 08.85		S	3.3	HV	0.0	E		1	20	6	3.0	120	BIV
2004 05 08.89		S	3.0	YG	0.0	E		1	25	7			SOU01
2004 05 08.89		S	3.4	HV	5.0	B		7	20	6	2.8	120	BIV
2004 05 09.77		E	3.9	CA	11.5	L	8	48	10	4		50	SKR01
2004 05 09.77		S	4.2	AA	5.0	B		7	3	S4	2.2	75	KOS
2004 05 09.78		S	4.2	AA	0.0	E		1	10	4			KOS
2004 05 09.83		S	3.0	TI	0.0	E		1	15	5			NAG09
2004 05 09.83		S	3.7:	TI	0.0	E		1	20	s3			SAR02
2004 05 09.90		S	3.0	YG	0.0	E		1	25	7			SOU01
2004 05 10.76		E	4.0	CA	4.0	R	10	14	6	3		61	SKR01
2004 05 10.80		S	3.0	AA	5.0	B		10	10	6	0.50	130	KES01
2004 05 10.82		S	3.0	AA	6.0	B		20	20	s3			KER
2004 05 10.83		S	3.0	TI	0.0	E		1	20	5			NAG09
2004 05 10.91		S	3.4	TK	0.0	E		1	25	6			BIV
2004 05 10.92		S	3.6	TK	5.0	B		7	20	6	3.0	120	BIV
2004 05 11.80		S	4.1	AA	3.5	B		7	10	5	0.7	140	KES01
2004 05 11.83		S	3.0	AA	6.0	B		20	12	5	0.5	135	BAL04
2004 05 11.83		S	3.3	AA	5.0	B		7	15	S5	4.0	103	KOS
2004 05 11.84		S	3.0	AA	0.0	E		1	17	4			KOS
2004 05 11.91		S	3.3	TK	0.0	E		1	20	6			BIV
2004 05 12.84		S	3.8	TI	5.0	B		10	15	7	0.75	110	NAG09
2004 05 12.90		S	3.5	TK	0.0	E		1	20	6			BIV
2004 05 12.91		S	3.6	TK	5.0	B		7	20	6	2.5	130	BIV
2004 05 13.26		S	3.3	HD	3.5	B		6	24.5		&8		PAL04
2004 05 14.21		M	3.3	TJ	5.0	B		10		7	5		MOR
2004 05 14.82		S	3.7	AA	5.0	B		7	8	S4	4.5	118	KOS
2004 05 14.82		S	3.9	AA	8.0	R	6	19	10	S4	5.3	118	KOS
2004 05 14.82		S	4.0	AA	0.0	E		1	7	5			KOS
2004 05 14.82		G M	3.3	TI	0.8	E		1	10	6	1.1	94	HOR03
2004 05 14.83		S	4.0	AA	3.5	B		7	8	5	1.0	120	SRA
2004 05 14.87		S	3.6	TI	5.0	B		15	10	s3	2	80	CSO
2004 05 14.89		S	3.7	TK	0.0	E		1	20	6			BIV
2004 05 14.89		S	3.7	TK	5.0	B		7	15	6	1.0	110	BIV
2004 05 15.18		M	3.4	TJ	5.0	B		10		7	5.5	109	MOR
2004 05 15.92		S	4.0	HV	0.0	E		1	15	5			BIV
2004 05 15.93		S	4.1	HV	5.0	B		7	15	6	2.0	110	BIV
2004 05 16.21		M	3.5:	TJ	5.0	B		10	13	7			MOR
2004 05 16.26		S	3.9	HD	3.5	B		6	22		&5		PAL04
2004 05 16.80		S	3.7	AA	5.0	B		20	30	2	3	100	GUL01
2004 05 16.84		M	3.6	TI	5.0	B		10	20	7	7.5	110	NAG09
2004 05 16.84		S	4.6	AA	5.0	B		10	8	5/	4	120	ILL
2004 05 16.91		S	4.0	HV	0.0	E		1	12	5			BIV
2004 05 16.91		G M	3.6	TI	0.8	E		1	9	6	1.3	96	HOR03
2004 05 16.92		S	4.0	HV	5.0	B		7	18	6	2.5	110	BIV
2004 05 17.18		M	3.9	TJ	5.0	B		10	12	6	4		MOR
2004 05 17.80		S	4.8	AA	5.0	B		7	8	D5	2.4	119	KOS
2004 05 17.81		S	3.9	AA	15.4	L	10	37	30	2/	3	100	GUL01
2004 05 17.81		S	4.6	AA	8.0	R	6	19	9	D5	2.8	119	KOS
2004 05 17.81		S	5.0	AA	0.0	E		1	8	6			KOS

Comet C/2001 Q4 (NEAT) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 05 17.83		S	3.5	AA	8.0	B		20	8	4	1.5	110	KESO1
2004 05 17.83		S	4.5	AA	5.0	B		10	7	6/	4	120	ILL
2004 05 17.84		S	4.0	AA	0.0	E		1	30	7			SZA
2004 05 17.96		S	4.0	HV	0.0	E		1	15	6			BIV
2004 05 17.97		S	4.2	HV	5.0	B		7	15	6	2.5	110	BIV
2004 05 18.91		M	4.4	TK	5.0	B		10	12	7	&2		COM
2004 05 18.91	G	M	4.6	TI	0.8	E		1	11	6	0.9	96	HOR03
2004 05 18.94		S	4.0	HV	0.0	E		1	15	5			BIV
2004 05 18.98		S	4.1	HV	5.0	B		7	12	6	2.0	110	BIV
2004 05 19.20		M	3.9	TJ	5.0	B		10	13	6	5	107	MOR
2004 05 19.83		S	4.4	AA	5.0	B		7	8	D6	2.1	120	KOS
2004 05 19.84		S	4.5	AA	0.0	E		1	7	7	0.5	120	KOS
2004 05 19.85		S	4.5	AA	8.0	B		20	6	5			SRA
2004 05 19.94		S	4.1	HV	0.0	E		1	10	6			BIV
2004 05 19.96		S	4.2	HV	5.0	B		7	12	6	2.5	110	BIV
2004 05 20.19		M	4.2	TJ	5.0	B		10	12	6	5	104	MOR
2004 05 20.86		B	4.2	TI	5.0	B		10	10	7	4	115	NAG09
2004 05 20.93		S	4.3	HV	0.0	E		1	15	5			BIV
2004 05 20.94		S	4.4	HV	5.0	B		7	12	5	2.5	110	BIV
2004 05 21.18		M	4.3	TJ	5.0	B		10	12	6	5		MOR
2004 05 21.84		S	4.5	AA	5.0	B		10	6	7/	3	120	ILL
2004 05 21.84		S	4.5	AA	8.0	B		20	7	5	1.2	110	KESO1
2004 05 21.89		S	4.4	HV	5.0	B		7	15	5			BIV
2004 05 22.20		M	4.5	TJ	5.0	B		10		6	5		MOR
2004 05 22.86	G	M	4.8	TT	0.8	E		1	9	7	1.0	97	HOR03
2004 05 22.91		S	4.5	HV	0.0	E		1	15	5			BIV
2004 05 22.95		S	4.5	HV	5.0	B		7	10	6	1.8	100	BIV
2004 05 23.19		M	4.5	TJ	5.0	B		10	11	6	5	118	MOR
2004 05 23.84		S	5.1	AA	5.0	B		7	11	D7	2.2	108	KOS
2004 05 23.84		S	5.2	AA	0.0	E		1	8	7			KOS
2004 05 23.86		M	5.1	TI	5.0	B		10	15	7	3.0	110	NAG09
2004 05 23.91		S	4.7	HV	5.0	B		7	16	6	1.0	110	BIV
2004 05 23.93		S	4.6	HV	0.0	E		1	10	5			BIV
2004 05 25.01		S	4.6	HV	0.0	E		1	10	5			BIV
2004 05 25.02		S	4.7	HV	5.0	B		7	8	6	1.6	100	BIV
2004 05 25.18		M	5.0	TJ	5.0	B		10	11	6	3.5		MOR
2004 05 27.18		M	5.4	TJ	5.0	B		10		5			MOR
2004 05 30.88		M	5.5	TI	5.0	B		10	6	7	0.25	120	NAG09
2004 05 30.91		S	5.4	HV	5.0	B		7	10	5			BIV
2004 06 06.95		S	5.5	HV	0.0	E		1	10	5			BIV
2004 06 06.95		S	5.9	HV	5.0	B		7	7	6	1.0	100	BIV
2004 06 07.90		S	5.5	TI	27.0	L	6	60	5	5	0.50	100	TOT03
2004 06 10.93		S	6.4	HV	5.0	B		7	7	5	0.5	100	BIV
2004 06 12.95		S	6.6	TK	5.0	B		7	7	5			BIV
2004 06 13.91		S	6.2	AA	6.0	B		20	6	5	0.8	94	CSU
2004 06 13.95		S	6.4	TK	0.0	E		1	5	5			BIV
2004 06 13.95		S	6.6	TK	5.0	B		7	7	6	0.8	95	BIV
2004 06 14.87		S	6.3	AA	0.0	E		1	3	3			KOS
2004 06 14.87		S	6.3	AA	5.0	B		7	5	4	1.4	90	KOS
2004 06 14.87		S	6.3	AA	6.0	B		20	6	5/	0.25	105	CSU
2004 06 15.88		S	6.4	AA	6.0	B		20	6	5	0.13	100	CSU
2004 06 16.95		S	6.9	TK	5.0	B		7	7	5			BIV
2004 06 17.89		S	6.5	AA	6.0	B		20	5	5/	0.13	106	CSU
2004 06 17.92		S	6.6	AA	0.0	E		1	3	3			KOS
2004 06 17.92		S	6.6	AA	5.0	B		7	5	4	1.8	90	KOS
2004 06 17.92		S	6.6	AA	8.0	R	6	19	6	D4	2.2	90	KOS
2004 06 17.96		S	7.0	TK	5.0	B		7	8	6	0.5	90	BIV
2004 06 17.96		S	7.1	TK	25.6	L	5	42	5	6	0.5	110	BIV
2004 06 19.88		S	6.5	AA	6.0	B		20	4.5	6	0.13	118	CSU
2004 06 19.95		S	7.1	TK	5.0	B		7	8	5	0.7	100	BIV
2004 06 21.87		S	6.6	AA	6.0	B		20	4.5	5	0.13	89	CSU
2004 06 22.89		S	6.6	AA	6.0	B		20	4.5	5	0.13	86	CSU
2004 06 23.90		S	6.6	AA	6.0	B		20	4.5	5	0.12	86	CSU
2004 06 24.91		S	6.7	HV	5.0	B		7	8	5			BIV
2004 06 25.89		S	7.1	TI	27.0	L	6	60	5	5	0.25	130	TOT03

Comet C/2001 Q4 (NEAT) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 06 25.89	S	7.3	TI	36.0	L	4	100	5	s3	0.66	100	CSO	
2004 06 28.03	S	6.9	HV	5.0	B		7	7	4			BIV	
2004 06 29.92	S	7.1	HV	5.0	B		7	7	4			BIV	
2004 06 30.92	S	6.9	TK	5.0	B		10	5	5			GUZ	
2004 07 04.85	S	7.6	AC	5.0	B		7	4	3	0.6	90	KOS	
2004 07 04.85	S	7.6	AC	8.0	R	6	19	5	s4	0.7	90	KOS	
2004 07 05.86	S	7.7	AC	8.0	R	6	19	5	s4			KOS	
2004 07 05.86	S	7.8	AC	5.0	B		7	4	3			KOS	
2004 07 05.88	M	7.3	TK	5.0	B		10	6	5			GUZ	
2004 07 06.89	M	7.4	TK	5.0	B		10	6	5			GUZ	
2004 07 07.87	S	7.7	TI	5.0	B		10	4	6			NAG09	
2004 07 08.86	S	8.0	TI	36.0	L	4	100	5	s3	0.25	100	CSO	
2004 07 08.89	S	7.5	TI	27.0	L	6	60	5	4/	0.33	140	TOT03	
2004 07 08.90	M	7.5	TK	5.0	B		10	5	4			GUZ	
2004 07 09.82	E	6.0	SE	11.5	L	9	108	5	3	10 m		KOV01	
2004 07 09.83	E	6.0	SE	11.5	L	8	48	5	3			SKR02	
2004 07 09.83	E	6.1	SE	11.5	L	8	135	6	3			SKR01	
2004 07 10.84	S	8.2	AC	5.0	B		7	3	4			KOS	
2004 07 10.84	S	8.2	AC	8.0	R	6	19	3	3			KOS	
2004 07 10.92	S	7.9	AA	6.0	B		20	4	3/			CSU	
2004 07 12.89	M	7.6	TK	5.0	B		10	4	5			GUZ	
2004 07 12.89	S	8.0	TI	27.0	L	6	60	5	4	0.33	120	TOT03	
2004 07 12.93	S	7.8	TK	5.0	B		7	7	5			BIV	
2004 07 13.86	S	8.5	AC	5.0	B		7	3	3			KOS	
2004 07 13.88	S	8.9	TI	36.0	L	4	100	5	s3	0.25	100	CSO	
2004 07 15.93	S	8.1	TK	5.0	B		7	6	5			BIV	
2004 07 15.93	S	8.1	TK	25.6	L	5	42	4.5	5			BIV	
2004 07 16.85	S	8.5	AC	5.0	B		7	3	3			KOS	
2004 07 16.85	S	8.5	AC	8.0	R	6	19	4	s3			KOS	
2004 07 16.90	S	7.8	AA	6.0	B		20	6	5			BAL04	
2004 07 16.94	S	8.1	TK	5.0	B		7	6	6			BIV	
2004 07 17.86	S	8.4	AC	5.0	B		7	3	3			KOS	
2004 07 17.87	S	8.4	AC	8.0	R	6	19	4	3			KOS	
2004 07 17.89	S	8.2	TI	6.0	B		20	6	3/			SAR02	
2004 07 18.81	E	7.5	SE	11.5	L	8	155	4	3	9 m	63	KOV01	
2004 07 18.81	E	7.6	SE	11.5	L	8	155	4	4	9 m	65	BOG	
2004 07 18.81	E	7.6	SE	11.5	L	8	155	5	4	10 m	65	BOG01	
2004 07 18.93	M	8.0:	TK	5.0	B		10	4	5			GUZ	
2004 07 20.84	S	8.6	AC	5.0	B		7	3	3			KOS	
2004 07 20.85	S	8.6	AC	8.0	R	6	19	3	4			KOS	
2004 07 20.90	S	7.9	TI	5.0	B		10	4	4			NAG09	
2004 07 22.85	S	8.7	AC	5.0	B		7	3	3			KOS	
2004 07 23.89	S	7.8	TI	5.0	B		10	4	4			NAG09	
2004 07 23.89	S	8.1	TI	27.0	L	6	60	2.5	4			TOT03	
2004 07 24.91	S	8.1	AA	6.0	B		20	4	2			CSU	
2004 08 05.82	S	8.7	TI	6.0	B		20	7	2			SAR02	
2004 08 06.86	S	9.0	AA	6.0	B		20	3	1			CSU	
2004 08 07.84	S	9.0	TI	27.0	L	6	43	2.5	4			TOT03	
2004 08 08.86	S	9.4	AA	6.0	B		20	2.5	1			CSU	
2004 08 09.85	S	9.0	AA	6.0	B		20	2.5	0/			CSU	
2004 08 09.90	S	8.9	TI	20.0	L	5	40	5	5			NAG09	
2004 08 10.85	S	9.0	AA	6.0	B		20	2.5	0			CSU	
2004 08 11.95	S	8.5:	TK	5.0	B		7	5	5			BIV	
2004 08 12.90	S	8.7	TK	5.0	B		7	5	5			BIV	
2004 08 13.94	S	8.7	TK	5.0	B		7	6	5			BIV	
2004 08 14.89	S	8.8	AC	5.0	B		7	3	3			KOS	
2004 08 14.90	S	8.9	AC	8.0	R	6	19	3	3			KOS	
2004 08 14.92	S	8.9	TK	5.0	B		7	6	5			BIV	
2004 08 15.83	S	9.0	AA	6.0	B		20	2.5	0			CSU	
2004 08 15.85	S	9.1	AC	8.0	R	6	19	3	3			KOS	
2004 08 15.86	S	8.6	TK	5.0	B		10	5	4			GUZ	
2004 08 15.88	S	9.3	TI	20.0	L	5	40	4	4			NAG09	
2004 08 15.90	S	9.0	TK	5.0	B		7	5	5			BIV	
2004 08 15.90	S	9.2	TK	40.7	L	4	58	3.5	5	0.5	150	BIV	
2004 08 16.83	S	9.0	AA	6.0	B		20	2.5	0			CSU	

Comet C/2001 Q4 (NEAT) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 08 16.90		S	9.2	TK	40.7	L	4	58	4.0	5	0.4	150	BIV
2004 08 18.82		S	9.1	AA	6.0	B		20	2.5	0			CSU
2004 08 20.85		S	9.6	TI	20.0	L	5	40	4	4			NAG09
2004 08 23.86		S	9.1	AA	6.0	B		20	2.5	0			CSU
2004 09 01.86		S	9.3	TK	25.6	L	5	42	4.0	5			BIV
2004 09 02.81		S	9.4	HS	27.0	L	6	43	4	2			TOT03
2004 09 02.83		M	9.3	TT	10	B	4	25	5	3			LEH
2004 09 03.84		M	9.4	TT	10	B	4	25	5	3			LEH
2004 09 04.83		M	9.4	TT	10	B	4	25	5	3			LEH
2004 09 05.81		S	10.3	AC	8.0	R	6	19	3	2			KOS
2004 09 06.84		M	9.4	TT	10	B	4	25	5	3			LEH
2004 09 08.83		M	9.4	TT	10	B	4	25	5	3			LEH
2004 09 08.88		M	9.9	TK	20.3	L	6	63	3	5	0.2	160	GUZ
2004 09 08.90		S	9.6	TK	40.7	L	4	58	4.0	5			BIV
2004 09 10.84		S	10.6	HS	27.0	L	6	83	2.3	3			TOT03
2004 09 10.95		M	10.1	TK	20.3	L	6	63	3	5			GUZ
2004 09 11.85		B	9.9	TJ	30	T	10	76	2.5	4			ADA05
2004 09 13.99		S	9.8	HS	34.0	L	5	115	2.5	5			SZA
2004 09 15.10		S	10.3	TK	25.6	L	5	42	4.0	4			BIV
2004 09 17.05		S	10.2	TK	20.3	L	6	63	2.5	4			GUZ
2004 09 17.13		S	10.1	TK	40.7	L	4	58	4.0	4			BIV
2004 09 17.81		S	10.4	HS	27.0	L	6	83	2.8	3			TOT03
2004 09 20.81		S	10.0	TI	20.0	L	5	40	3	3/			NAG09
2004 09 21.98		M	10.1	TK	20.3	L	6	63	3	4			GUZ
2004 09 24.09		S	10.3	TK	25.6	L	5	42	3.5	3			BIV
2004 10 03.78		S	10.8	HS	27.0	L	6	83	3.5	2			TOT03
2004 10 06.85		S	10.2	TK	25.6	L	5	42	4.0	4			BIV
2004 10 12.92		S	11.0	TK	25.6	L	5	42	4.0	3			BIV
2004 10 14.89		B	11.0	TI	23.5	T	10	57	4	4			LAB02
2004 10 16.80		S	11.1	TK	25.6	L	5	42	3.0	4			BIV
2004 10 17.74		M	10.3	TK	35	L	5	68	4.5	2			HOR02
2004 10 18.77		M	10.5	TK	35	L	5	68	4.3	2/			HOR02
2004 10 18.85		S	11.3	TK	40.7	L	4	58	3.5	3			BIV
2004 10 21.16		S	11.3	TK	25.6	L	5	42	3.0	3			BIV
2004 11 01.41	x	S	11.3	TK	25.4	L	4	46	2.6	2			YOS02
2004 11 04.82		S	11.9	TK	25.4	J	6	72	2.2	2			BOU
2004 11 08.85		S	13.0	HS	30	L	5	60	1.2	2			NEV
2004 11 08.96		S	12.0	TA	25.4	J	6	72	2	1			BOU
2004 11 09.42		S	12.8	HS	40.0	L	4	144	1.2	2			YOS04
2004 11 11.80		S	12.3	HS	20.3	L	6	63	1.5	2			GUZ
2004 11 13.82		S	11.3	TI	23.5	T	10	67	3	3			LAB02
2004 11 14.71		S	12.0	HS	32.0	L	5	72					PIL01
2004 11 14.77		S	12.4	TA	31.0	J	6	89	1.5	1/			BOU
2004 11 14.91		S	11.6	TK	25.6	L	5	84	3.0	3			BIV
2004 11 15.91		S	12.5	TK	20.3	T	10	100	1.5	2			GON05
2004 11 16.72		S	12.3	HS	30	L	5	60	1.6	2			NEV
2004 11 21.04		S	12.1	TA	31.0	J	6	89	2.0	1/			DIJ
2004 11 21.04		S	12.4	TA	31.0	J	6	89	2	1			BOU
2004 11 24.20		S	12.3	TA	31.0	J	6	89	2	1/			BOU
2004 11 24.21		S	12.4	TA	31.0	J	6	89	2.5	0/			DIJ
2004 12 03.78		S	12.5	TA	31.0	J	6	89	1.8	1/			BOU
2004 12 05.71		S	12.7	HS	20.3	L	6	63	1.2	2			GUZ
2004 12 08.89		S	12.4	HS	25.6	L	5	84	1.3	3			BIV
2004 12 11.46		S	12.3:	HS	40.0	L	4	144	1.8	2			YOS04
2004 12 11.71		S	12.7	HS	20.3	L	6	63	1.2	2			GUZ
2004 12 11.77		S	11.4	TI	23.5	T	10	67	2	3			LAB02
2004 12 11.85		S	12.8	TK	20.3	T	10	100	1.5	1			GON05
2004 12 11.88		S	12.9	HS	20.3	L	6	95	1.2	3			BIV
2004 12 12.86		S	12.7	HS	20.3	L	6	95	1.5	2			BIV
2004 12 16.91		S	12.4	HS	25.6	L	5	84	1.5	2			BIV
2005 01 02.80		S	13.0	TA	31.0	J	6	109	1.1	0/			DIJ
2005 01 02.80		S	13.0	TA	31.0	J	6	109	1.5	2			BOU
2005 01 08.39		S	12.7	HS	40.0	L	4	144	1.6	2			YOS04
2005 01 11.85	x	S	11.3	HS	31.7	L	6	63	1.3	3			MIY01
2005 01 16.70		M	12.9	HS	42	L	5	81	1	3/			LEH

Comet C/2002 T7 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2003 08 23.12		S	11.7	TK	40.7	L	4	233	1.0	6			BIV
2003 08 25.08		S	11.8	TK	40.7	L	4	116	0.8	5			BIV
2003 09 24.04		S	12.3	TK	40.7	L	4	58	0.6	7			BIV
2003 09 26.03		S	11.9	TK	40.7	L	4	58	0.6	7			BIV
2003 10 18.94		S	11.5	TK	40.7	L	4	116	1.2	7			BIV
2003 10 21.95		S	11.3	TK	40.7	L	4	116	1.3	6			BIV
2003 10 26.97		S	11.0	TK	40.7	L	4	58	1.3	7			BIV
2003 11 01.89		S	10.7	TK	40.7	L	4	58	1.5	7			BIV
2003 11 12.25		S	10.4	TK	20.3	L	6	48	1.5	7			BIV
2003 11 13.29		S	10.4	TK	20.3	L	6	48	1.5	7			BIV
2003 11 14.57		S	10.2	TK	20.3	L	6	48	1.5	7			BIV
2003 11 15.28		S	10.3	TK	20.3	L	6	48	1.3	7			BIV
2003 11 17.52		S	10.2	TK	20.3	L	6	48	1.5	7			BIV
2003 11 18.38		S	10.1	TK	20.3	L	6	48	1.8	7	0.07	135	BIV
2003 11 19.38		S	9.8	TK	20.3	L	6	48	2.0	7	0.05	130	BIV
2003 12 15.81		S	10.2	TK	25.6	L	5	42	2.0	7	0.05	100	BIV
2003 12 17.89		S	9.4	TK	40.7	L	4	58	1.7	6	0.17	85	BIV
2003 12 17.90		B	9.4	TK	5.0	B		7	2	7			BIV
2003 12 21.79		S	9.5	TK	25.6	L	5	42	2.0	6	0.1	80	BIV
2003 12 28.74		S	9.2	TK	40.7	L	4	58	2.0	6	0.15	80	BIV
2004 01 17.80		S	8.5	TK	25.6	L	5	42	4.0	5	0.15	65	BIV
2004 01 17.87		S	8.6	TK	40.7	L	4	58	3.5	5			BIV
2004 01 18.85		S	8.5	TK	40.7	L	4	58	4.0	5	0.35	60	BIV
2004 01 18.86		B	8.0	TK	5.0	B		7	5	5			BIV
2004 01 24.80		B	8.0	TK	5.0	B		7	6	5			BIV
2004 01 24.82		S	8.1	TK	40.7	L	4	58	4.0	5	0.33	65	BIV
2004 01 29.81		S	8.6	TK	25.6	L	5	42	4.0	5			BIV
2004 02 09.81		S	8.2	TK	25.6	L	5	42	4.0	5			BIV
2004 02 13.79		S	7.6	TK	5.0	B		7	7	5			BIV
2004 02 13.80		S	7.7	TK	40.7	L	4	58	6.0	5	0.5	60	BIV
2004 02 16.76		S	7.9	TK	25.6	L	5	42	5.0	5	0.25	60	BIV
2004 02 23.77		S	7.5	TK	5.0	B		7	6	5			BIV
2004 02 23.78		S	7.9:	TK	25.6	L	5	42	4.0	4	0.2	60	BIV
2004 02 26.78		S	7.5	TK	25.6	L	5	42	5.0	5			BIV
2004 02 26.79		S	7.1:	TK	5.0	B		7	6	5			BIV
2004 03 01.81		S	7.3	TK	40.7	L	4	58	5.0	5			BIV
2004 03 09.79		S	7.3:	TK	25.6	L	5	42	4.0	5			BIV
2004 04 30.59		B	4.4	HR	3.5	B		6	9.5		&3		PAL04
2004 06 06.89		S	6.2:	TK	40.7	L	4	58	3.0	3			BIV
2004 12 11.79		S	14.0	HS	40.0	L	4	144	0.7	3			YOS04
2005 01 08.80		S	13.8	HS	40.0	L	4	144	0.8	4			YOS04

Comet C/2003 H1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 05 06.89		S	13.4	HS	20.3	T	10	77	1.0	4			BIV
2004 05 07.90		S	13.8:	HS	20.3	T	10	267	1.0	3			BIV

Comet C/2003 K4 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 04 15.15		S	11.9	TK	40.7	L	4	116	0.9	6			BIV
2004 04 23.12		S	11.8	TK	25.6	L	5	84	1.0	6			BIV
2004 04 26.11		S	11.5	TK	40.7	L	4	58	1.0	6			BIV
2004 04 28.13		S	11.4	TK	25.6	L	5	42	1.0	5			BIV
2004 05 09.95		S	11.5	TI	20.0	L	5	83	1.3	5			NAG09
2004 05 13.12		S	10.5:	TK	20.3	T	10	67	1.5	5			BIV
2004 05 14.87		S	10.3	TI	27.0	L	6	120	1.2	4			TOT03
2004 05 15.98		S	11.2	TI	20.0	L	5	83	1.5	5/			NAG09
2004 05 16.83		S	10.4	TI	27.0	L	6	120	1.3	4			TOT03
2004 05 17.01		S	10.8	TK	40.7	L	4	58	1.5	7			BIV
2004 05 18.06		S	10.6	TK	40.7	L	4	58	1.8	6			BIV
2004 05 19.02		S	10.7	TK	40.7	L	4	58	1.6	6			BIV
2004 05 20.01		S	10.6	TK	40.7	L	4	58	1.8	6			BIV
2004 05 20.96		S	10.6	TI	20.0	L	5	83	2.5	6			NAG09

Comet C/2003 K4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 05 20.99	S	10.7	TK	40.7	L	4	58	1.8	6				BIV
2004 05 23.03	S	10.7	TK	40.7	L	4	58	1.8	5				BIV
2004 05 25.06	S	10.5	TK	40.7	L	4	58	2.0	6				BIV
2004 05 30.86	S	9.8	TI	27.0	L	6	83	1.0	4				TOTO3
2004 06 06.92	S	9.3	TK	40.7	L	4	58	3.5	5				BIV
2004 06 07.92	S	9.1	TI	27.0	L	6	83	4	5	0.03	190		TOTO3
2004 06 13.99	S	8.7	TK	40.7	L	4	58	4.5	6	0.17	175		BIV
2004 06 14.01	S	8.6	TK	5.0	B		7	7	5				BIV
2004 06 14.89	S	8.3	AA	6.0	B		20	6	3/				CSU
2004 06 15.88	S	8.2	AA	6.0	B		20	6	3				CSU
2004 06 17.89	S	8.3	AA	6.0	B		20	5	3				CSU
2004 06 17.99	S	8.7	TK	25.6	L	5	42	4.5	5				BIV
2004 06 18.01	S	8.5	TK	5.0	B		7	7	5				BIV
2004 06 19.88	S	8.1	AA	6.0	B		20	5.5	3				CSU
2004 06 19.99	S	8.2	TK	5.0	B		7	6	5				BIV
2004 06 19.99	S	8.6	TK	40.7	L	4	58	4.5	6	0.20	190		BIV
2004 06 21.88	S	8.1	AA	6.0	B		20	6	3				CSU
2004 06 22.90	S	7.9	AA	6.0	B		20	8	3				CSU
2004 06 23.94	S	7.9	AA	6.0	B		20	6	3				CSU
2004 06 25.90	S	7.8	TI	27.0	L	6	83	6	5	0.25	120		TOTO3
2004 06 25.91	S	8.2	TI	36.0	L	4	100	3.5	s6	0.25	120		CSU
2004 06 26.88	M	8.1	AA	15.4	R	10	100	5	S6				GUL01
2004 06 26.99	M	7.8	TK	5.0	B		10	10	5	0.3	160		GUZ
2004 06 28.06	S	8.4	TK	25.6	L	5	42	4.5	6	0.17	150		BIV
2004 06 28.07	S	8.2	TK	5.0	B		7	7	5				BIV
2004 06 30.93	M	7.5	TK	5.0	B		10	8	5				GUZ
2004 07 03.86	M	7.3	TK	5.0	B		10	12	5				GUZ
2004 07 04.86	S	7.2	AA	5.0	B		7	6	3				KOS
2004 07 04.86	S	7.2	AA	8.0	R	6	19	6	3				KOS
2004 07 05.87	S	7.2	AA	5.0	B		7	5	4				KOS
2004 07 05.87	S	7.2	AA	8.0	R	6	19	6	4				KOS
2004 07 05.89	M	7.3	TK	5.0	B		10	14	6	0.5	135		GUZ
2004 07 06.90	M	7.1	TK	5.0	B		10	15	6	0.5	135		GUZ
2004 07 07.88	S	7.0	TI	5.0	B		10	15	6				NAG09
2004 07 07.89	M	7.0	TK	5.0	B		10	15	6	0.5	130		GUZ
2004 07 08.89	S	7.0	AA	5.0	B		7	8	3				KOS
2004 07 08.89	S	7.0	AA	8.0	R	6	19	8	3				KOS
2004 07 08.91	M	6.9	TK	5.0	B		10	15	6	0.3	130		GUZ
2004 07 08.91	S	7.9	TI	36.0	L	4	100	7	s6	0.33	120		CSU
2004 07 09.84	E	7.0	SE	11.5	L	9	108	5	3	8	m		KOV01
2004 07 09.85	E	7.2	SE	11.5	L	8	48	5	3				SKR02
2004 07 09.85	E	7.2	SE	11.5	L	8	135	6	3				SKR01
2004 07 09.89	M	6.9	TK	5.0	B		10	15	6	0.3	130		GUZ
2004 07 09.90	S	7.4	TI	27.0	L	6	60	7	3	0.1	70		TOTO3
2004 07 10.85	S	6.9	AA	5.0	B		7	8	3				KOS
2004 07 10.85	S	6.9	AA	8.0	R	6	19	9	3				KOS
2004 07 10.89	S	6.9	AA	6.0	B		20	7	3				CSU
2004 07 10.91	M	7.8	AA	15.4	R	10	100	5.5	S6/				GUL01
2004 07 12.90	M	6.8	TK	5.0	B		10	15	5	0.5	120		GUZ
2004 07 12.90	S	6.8:	TK	0.0	E		1	&15	7				GUZ
2004 07 12.91	S	7.0	TI	27.0	L	6	60	8	4	0.16	90		TOTO3
2004 07 12.92	S	6.9	TK	5.0	B		7	15	5				BIV
2004 07 13.87	S	6.6	AA	0.0	E		1	4	2				KOS
2004 07 13.93	S	8.1	TI	36.0	L	4	100	5	s6	0.33	110		CSU
2004 07 15.88	E	9.0	SE	11.5	L	8	135	5	3	10	m	44	SKR02
2004 07 15.88	E	9.0	SE	11.5	L	8	135	5	3	10	m	44	SKR01
2004 07 15.96	S	6.9	TK	5.0	B		7	13	5				BIV
2004 07 15.96	S	7.2	TK	25.6	L	5	42	7.5	6	0.33	90		BIV
2004 07 16.84	E	8.8	SE	11.5	L	8	48	5	3	10	m	45	SKR01
2004 07 16.84	E	8.8	SE	11.5	L	8	135	5	3	15	m	45	SKR02
2004 07 16.86	S	6.5	AA	0.0	E		1	2	3				KOS
2004 07 16.86	S	6.6	AA	5.0	B		7	6	3				KOS
2004 07 16.87	S	6.5	AA	8.0	R	6	19	8	d4	0.9	96		KOS
2004 07 16.88	S	6.8	AC	6.0	B		20	10	6				BAL08
2004 07 16.93	S	7.1	TI	27.0	L	6	60	8	4	0.08	85		TOTO3

Comet C/2003 K4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 07 16.96		S	6.9	TK	5.0	B		7	12	6	0.5	95	BIV
2004 07 17.88		S	6.4	AA	0.0	E		1	3	3			KOS
2004 07 17.88		S	6.5	AA	5.0	B		7	6	3			KOS
2004 07 17.89		S	6.4	AA	8.0	R	6	19	8	3	1.1	95	KOS
2004 07 17.90		M	7.0	TI	5.0	B		10	15	6	0.33	90	NAG09
2004 07 17.92		S	7.4	TI	6.0	B		20	10	D5			CZE03
2004 07 17.93		M	6.6	TK	5.0	B		10	12	5	0.4	110	GUZ
2004 07 17.94		S	6.3	AC	5.0	B		10	10	1			ERD
2004 07 17.94		S	6.5	AC	25	L	5	82	10	4	0.08	110	ERD
2004 07 18.83		E	8.0	SE	11.5	L	8	155	6	3	13 m	48	KOV01
2004 07 18.83		E	8.2	SE	11.5	L	8	60	5	4	10 m	48	BOG01
2004 07 18.83		E	8.3	SE	11.5	L	8	60	5	4	10 m	48	BOG
2004 07 18.90		S	6.9	TI	3.0	B		8	13	4/			SAR02
2004 07 18.92		M	6.7	TK	5.0	B		10	12	5	0.4	110	GUZ
2004 07 19.90		M	6.7	TK	5.0	B		10	12	5	0.4	110	GUZ
2004 07 20.85		S	6.5	AA	0.0	E		1	3	3			KOS
2004 07 20.86		S	6.5	AA	5.0	B		7	6	3			KOS
2004 07 20.86		S	6.6	AA	8.0	R	6	19	6	4	1.3	92	KOS
2004 07 20.88		S	7.5	AA	6.0	B		20	7	3/			CSU
2004 07 20.90		M	6.8	TI	5.0	B		10	18	5	0.5	110	NAG09
2004 07 20.91		M	6.8	TK	5.0	B		10	12	4	0.5	105	GUZ
2004 07 21.87		M	6.7	TK	5.0	B		10	12	5	0.5	110	GUZ
2004 07 22.86		S	6.4	AA	0.0	E		1	3	3			KOS
2004 07 22.86		S	6.5	AA	5.0	B		7	8	4			KOS
2004 07 23.90		M	7.0	TI	5.0	B		10	11	6	0.16	80	NAG09
2004 07 23.96		S	7.0	TI	27.0	L	6	43	8	3			TOT03
2004 07 24.86		S	7.1	AA	6.0	B		20	8	4			CSU
2004 08 03.71		M	6.8	AA	6.0	B		15	11	5	40 m	105	BEG01
2004 08 04.71		M	6.7	AA	6.0	B		15	11	6	35 m	101	BEG01
2004 08 05.18		M	6.7	TJ	5.0	B		10	8	6	1		MOR
2004 08 05.73		M	6.7	AA	6.0	B		15	12	6	45 m	100	BEG01
2004 08 05.83		S	6.5	AA	0.0	E		1	3	4			KOS
2004 08 05.83		S	6.6	AA	5.0	B		7	5	5			KOS
2004 08 05.84		S	6.6	AA	8.0	R	6	19	5	5	1.1	52	KOS
2004 08 05.85		M	6.7	TI	5.0	B		10	10	5	0.3	90	NAG09
2004 08 06.71		M	6.9	AA	6.0	B		15	9	5	30 m	98	BEG01
2004 08 06.84		S	6.7	AA	6.0	B		20	8	4/			CSU
2004 08 06.86		S	7.0	TI	6.0	B		20	8	5	0.50	85	SAR02
2004 08 07.73	x	S	5.9	TK	20.3	L	5	40	8	6/	0.5	90	VAN15
2004 08 07.85		S	6.3	TI	27.0	L	6	43	5	5	0.05	85	TOT03
2004 08 08.18		M	6.5	TJ	5.0	B		10	7	7/	1		MOR
2004 08 08.71		M	6.8	AA	5.0	B		10	9	6	15 m	100	PRI04
2004 08 08.73		M	6.5	AA	6.0	B		15	7	5			BEG01
2004 08 08.84		S	6.7	AA	6.0	B		20	7	4/			CSU
2004 08 09.18		M	6.4	TJ	5.0	B		10	9	6/	1		MOR
2004 08 09.72		S	7.1	AA	20.0	L	8	89	3	4			COO02
2004 08 09.84		S	6.6	AA	6.0	B		20	7	4/			CSU
2004 08 09.85		M	6.7	TI	5.0	B		10	7	5	0.33	90	NAG09
2004 08 10.18		M	6.4	TJ	5.0	B		10	9	6	1.25		MOR
2004 08 10.73		M	6.5	AA	6.0	B		15	10	5	35 m	96	BEG01
2004 08 10.83		S	6.8	AA	6.0	B		20	6	4/			CSU
2004 08 10.85		S	6.4	AA	0.0	E		1	2	4			KOS
2004 08 10.85		S	6.5	AA	5.0	B		7	5	5			KOS
2004 08 10.86		S	6.6	AA	8.0	R	6	19	5	5	1.2	50	KOS
2004 08 11.18		M	6.3	TJ	5.0	B		10	9	6	2		MOR
2004 08 11.82		S	6.7	AA	6.0	B		20	6	4/			CSU
2004 08 12.90		S	6.9	TK	5.0	B		7	6	6	0.7	90	BIV
2004 08 13.76	x	S	5.8:	TK	4.0	B		8	8				VAN15
2004 08 13.88		S	7.0	TK	5.0	B		7	7	5	1.0	85	BIV
2004 08 14.81		S	6.8	AA	5.0	B		7	3	6			KOS
2004 08 14.82		S	6.7	AA	0.0	E		1	2	4			KOS
2004 08 14.82		S	6.8	AA	8.0	R	6	19	4	6	1.5	48	KOS
2004 08 14.87		S	7.1	TK	5.0	B		7	7	6	0.7	80	BIV
2004 08 15.18		M	6.4	TJ	5.0	B		10	8	6	2.33		MOR
2004 08 15.82		S	6.5	AA	6.0	B		20	7	5			CSU

Comet C/2003 K4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 08 15.83		M	6.5	TI	5.0	B		10	6	6	0.33	110	NAG09
2004 08 15.84		S	7.0	AA	5.0	B		7	3	6			KOS
2004 08 15.85		M	6.4	TK	5.0	B		10	8	6			GUZ
2004 08 15.85		S	7.0	AA	8.0	R	6	19	4	5	1.0	48	KOS
2004 08 15.87		S	7.0	TK	5.0	B		7	7	6	0.6	80	BIV
2004 08 16.74	x	S	6.3	TK	20.3	L	5	40	5	4/			VAN15
2004 08 16.81		M	6.6	TI	5.0	B		10	8	6	0.66	80	NAG09
2004 08 16.82		S	6.8	AA	6.0	B		20	6	5			CSU
2004 08 16.88		S	7.0	TK	5.0	B		7	7	5	0.7	85	BIV
2004 08 18.72		M	6.8	AA	6.0	B		15	10	5	40 m	83	BEG01
2004 08 18.82		S	7.0	AA	6.0	B		20	6	5			CSU
2004 08 20.82		S	7.0	AA	6.0	B		20	5	5			CSU
2004 08 23.80		S	6.1	AA	5.0	B		7	5	6			KOS
2004 08 31.83		S	7.1:	HV	25.6	L	5	42	5	6			BIV
2004 09 01.79		S	6.5:	AA	8.0	R	5	30	5	2			SZA
2004 09 01.79	\$	S	6.5	TK	5.0	B		10	6	6			GUZ
2004 09 01.82		S	7.0	HV	25.6	L	5	42	5	6	0.2	75	BIV
2004 09 02.78		S	6.0	AA	5.0	B		7	6	4			KOS
2004 09 02.78		S	6.1	AA	8.0	R	6	19	8	6			KOS
2004 09 05.70	&	S	6.5:	AA	6.0	B		15	7	4			BEG01
2004 10 22.84	x	S	7.4	TT	8.0	B		20	4	4			PEA
2004 11 06.80	x	B	7.3	TT	8.0	B		20	4	6/			PEA
2004 11 07.80	x	B	7.4	TT	8.0	B		20	4	5/			PEA
2004 11 07.84	x	B	7.4	HV	10.0	B	5	26	2.1	4			NAG04
2004 11 09.83	w	S	7.0	TJ	40.0	L	4	36	4.4	6/			YOS04
2004 11 12.31		S	7.3	TK	8.0	B		20	3	6/			AM001
2004 11 12.71		S	7.0	AA	3.5	B		6					SEA
2004 11 12.81	x	B	7.3	TT	8.0	B		20	5.5	5			PEA
2004 11 12.85	xw	M	6.9	TJ	10.0	B		20	5	6/			NAG08
2004 11 13.80	x	B	7.2	TT	8.0	B		20	5.5	5	0.85	274	PEA
2004 11 14.80	x	B	7.2	TT	8.0	B		20	5	5	0.47	271	PEA
2004 11 16.09		M	7.0	AA	6.0	B		15	8	6	40 m	270	BEG01
2004 11 16.84	xa	M	7.2	TJ	8.0	B		11	6	6			NAG08
2004 11 16.85	x	B	7.3	HV	10.0	B	5	26	4.0	5			NAG04
2004 11 17.09		M	7.0	AA	6.0	B		15	8	5	40 m	265	BEG01
2004 11 17.80	x	B	7.2	TT	8.0	B		20	5.5	6	0.52	273	PEA
2004 11 18.08		M	7.1	AA	6.0	B		15	7	5	45 m	260	BEG01
2004 11 19.27		S	7.4	TK	5.0	B		7	5	7			AM001
2004 11 19.81	x	B	7.2	TT	8.0	B		20	6.5	5	0.77	270	PEA
2004 11 20.30		B	6.6	TK	5	R	7	13	8	3			ROB06
2004 11 20.63		S	7.0	TK	4.5	R	6	13	6	2			JON
2004 11 20.81	x	B	7.3	TT	8.0	B		20	6	5	0.75	275	PEA
2004 11 20.81	x	B	7.5	TT	20	L	4	45	5	6	0.75	275	PEA
2004 11 21.81	x	B	7.2	TT	8.0	B		20	5	5	0.57	265	PEA
2004 11 21.85	xw	M	6.8	TK	10.0	B		20	6	5			YOS02
2004 11 22.84	x	S	7.3	HV	7.0	B		16	3.8	5/			NAG04
2004 12 04.25		S	7.2	TK	5.0	B		10	8	3			ARA
2004 12 06.24		S	7.1	TK	5.0	B		10	9	3			ARA
2004 12 06.45		S	6.4	TK	4.5	R	6	13	9	2			JON
2004 12 10.50		S	7.0	TK	4.5	R	6	13	7	3			JON
2004 12 11.76	x	S	7.2	TT	8.0	B		20	6.8	5			PEA
2004 12 11.78	x	S	7.2	TT	4.0	B		8	7	6			PEA
2004 12 12.27		S	6.6	TK	5	R	7	13	11	5	0.6	305	ROB06
2004 12 12.58		S	7.4	TK	4.5	R	6	13	4	1			JON
2004 12 12.73	x	B	7.1	TT	8.0	B		20	6.3	5			PEA
2004 12 13.52		S	7.0	AA	3.5	B		6					SEA
2004 12 14.06		S	7.1	TK	8.0	B		11	5	2			SOU01
2004 12 14.50		S	7.3	AA	3.5	B		6					SEA
2004 12 14.76	x	B	7.4	TT	8.0	B		20	6	5			PEA
2004 12 15.50		S	7.3	AA	3.5	B		6					SEA
2004 12 16.91		M	6.8	AA	6.0	B		15	6	4			BEG01
2004 12 17.09		S	7.4	TK	8.0	B		11	3	3			SOU01
2004 12 17.11		M	7.2	TI	5.2	B		7	4	4			MAN04
2004 12 17.47		S	7.3	TK	7.8	R	4	15	7	2			JON
2004 12 17.73	x	B	7.3	TT	8.0	B		20	6	4			PEA

Comet C/2003 K4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 17.94		M	7.2	AA	6.0	B		15	8	4			BEG01
2004 12 18.59		S	7.3	TK	7.8	R	4	15	6	3			JON
2004 12 18.75	x	B	7.5	TT	8.0	B		20	5.5	4			PEA
2004 12 18.95		M	7.0	AA	6.0	B		15	8	4	36 m	343	BEG01
2004 12 24.98		S	7.4	TK	8.0	B		20	3	2			AM001
2004 12 27.18		S	7.5	TK	8.0	B		11	4				ARA
2004 12 28.15		S	7.4	TK	8.0	B		20	4	3			AM001
2004 12 30.10		S	7.5	TK	8.0	B		11	3	3			SOU01
2004 12 30.27		S	8.0	TK	18	L	8	50	4	3			ARA
2004 12 30.55	x	B	7.4	TT	8.0	B		20	6.8	4	0.33	86	PEA
2004 12 30.81		S	8.0	S	20.0	L	8	89	2.4	3/			CO002
2004 12 30.97		S	7.3	TJ	8.0	B		11	10	5			DES01
2004 12 31.04		S	7.5	TK	8.0	B		11	3	3			SOU01
2004 12 31.26		S	8.1	TK	18	L	8	50	4	3			ARA
2004 12 31.60	x	B	7.5	TT	8.0	B		20	5.5	4			PEA
2005 01 01.02		S	7.5	TK	8.0	B		11	5	3			SOU01
2005 01 01.05		S	7.1	TK	18	L	8	32	8	3			LOB
2005 01 01.11		S	7.4	TJ	8.0	B		11	8	6			DES01
2005 01 01.59	x	B	7.6	TT	8.0	B		20	5	4			PEA
2005 01 01.76		M	7.2	AA	6.0	B		15	6	3	13 m	315	BEG01
2005 01 02.12		S	7.6	TK	20.3	T	10	57	5.0	4			ROB06
2005 01 02.55	x	B	7.5	TT	8.0	B		20	6.5	4	0.27	87	PEA
2005 01 02.95		M	7.5:	AA	6.0	B		15	5	4			BEG01
2005 01 02.98		S	7.6	TK	8.0	B		11	3	2			SOU01
2005 01 03.58	x	B	7.6	TT	8.0	B		20	5.5	3/			PEA
2005 01 03.83		M	7.6	AA	6.0	B		15	8	4	40 m	322	BEG01
2005 01 04.45		S	7.2	AA	3.5	B		6					SEA
2005 01 04.59	x	B	7.8	TT	8.0	B		20	5.5	3/			PEA
2005 01 04.86		S	8.5:	S	20.0	L	8	89	2.6	3			CO002
2005 01 04.90		M	7.5	AA	6.0	B		15	7	4			BEG01
2005 01 05.58	x	B	7.8	TT	8.0	B		20	5	4			PEA
2005 01 05.87		M	7.6	AA	6.0	B		15	7	4			BEG01
2005 01 06.18		S	7.6	TJ	8.0	B		11	8	5/			DES01
2005 01 06.47		S	7.4	AA	3.5	B		6					SEA
2005 01 06.91		M	7.7	AA	6.0	B		15	5	3			BEG01
2005 01 07.09		S	7.6	TK	8.0	B		11	3	2			SOU01
2005 01 07.86		M	7.8	AA	6.0	B		15	8	4	24 m	25	BEG01
2005 01 08.88		M	7.3	AA	6.0	B		15	9	3	28 m	33	BEG01
2005 01 09.58	x	S	8.0	TT	8.0	B		20	6	3			PEA
2005 01 10.06		S	7.6	TK	8.0	B		11	3	3			SOU01
2005 01 10.55	x	S	7.9	TT	8.0	B		20	7	4/			PEA
2005 01 10.81		S	8.1:	S	20.0	L	8	89	2.9	3			CO002
2005 01 11.49		S	7.2	AA	5.0	B		10					SEA
2005 01 11.57	x	S	7.9	TT	8.0	B		20	6	4			PEA
2005 01 11.90		M	7.8	AA	6.0	B		15	6	3			BEG01
2005 01 12.84		M	7.9	AA	6.0	B		15	6	5	15 m	40	BEG01
2005 01 12.98		S	7.6	TK	8.0	B		20	6	5			AM001
2005 01 13.19		S	7.7	TK	8.0	B		11	5	5/			DES01
2005 01 13.58	x	S	8.0	TT	8.0	B		20	6.5	3/			PEA
2005 01 14.20		S	7.7	TK	8.0	B		11	5	6			DES01
2005 01 14.89		M	7.9	AA	6.0	B		15	6	3	15 m	42	BEG01
2005 01 14.97		S	7.7	TK	8.0	B		20	5	5			AM001
2005 01 15.20		S	7.7	TK	8.0	B		11	5	6			DES01
2005 01 15.57	x	S	8.1	TT	8.0	B		20	6	3/			PEA
2005 01 16.56	x	S	8.1	TT	8.0	B		20	5.8	3/			PEA
2005 01 16.99		S	7.7	TK	8.0	B		20	5	4			AM001
2005 01 17.20		S	8.3	TK	20.3	T	10	57	4.0	6			ROB06
2005 01 17.56	x	S	8.3	TT	8.0	B		20	6.5	4			PEA
2005 01 18.57	x	S	8.5	TT	8.0	B		20	5.5	3/			PEA
2005 01 19.55	x	S	8.2	TT	8.0	B		20	5.5	4			PEA
2005 01 20.56	x	S	8.3	TT	8.0	B		20	6	3/			PEA
2005 01 20.96		S	8.0	TK	8.0	B		20	3	3			AM001
2005 01 21.55	x	S	8.3	TT	8.0	B		20	6.2	3			PEA
2005 01 26.99		S	8.2	TK	8.0	B		20	3	3			AM001
2005 01 30.87		S	8.4	TK	10.0	B		25	7	3			GON05

Comet C/2003 K4 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 31.44	xw	S	9.3:	HV	15.0	B		25	4	2			MIT

Comet C/2003 T3 (Tabur)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 04 23.14		S	9.2:	TK	25.6	L	5	84	1.5	5			BIV
2004 04 26.14		S	9.8	TK	40.7	L	4	58	2.0	5/			BIV
2004 05 08.16		S	10.4	TK	20.3	T	10	67	2.5	5			BIV
2004 05 09.16		S	10.6	TK	20.3	T	10	67	2.5	5			BIV
2004 05 13.16		S	10.0	TK	20.3	T	10	77	3.0	4			BIV
2004 05 17.10		S	10.2	TK	40.7	L	4	58	2.5	6			BIV
2004 05 18.11		S	10.6	TK	40.7	L	4	58	1.5	6			BIV
2004 05 19.11		S	10.0	TK	40.7	L	4	58	2.0	6	0.05	295	BIV
2004 05 21.03		S	10.1	TI	20.0	L	5	83	2	3			NAG09
2004 05 23.08		S	10.9	TK	40.7	L	4	58	2.5	5			BIV
2004 05 25.10		S	10.6	TK	40.7	L	4	58	1.7	5			BIV
2004 06 14.05		S	10.6	TK	40.7	L	4	116	1.3	6	0.05	300	BIV
2004 06 20.02		S	10.5	TK	40.7	L	4	58	1.7	6	0.05	290	BIV
2004 06 27.02		S	10.3	TK	20.3	L	6	63	2	3			GUZ
2004 07 11.99		S	10.6	TI	27.0	L	6	83	2.2	3			TOTO3
2004 07 16.99		S	11.7	TK	40.7	L	4	116	1.5	4			BIV
2004 08 12.11		S	12.1	HS	40.7	L	4	116	1.8	4			BIV
2004 08 13.90		S	12.2	HS	40.7	L	4	116	1.5	4			BIV
2004 08 15.09		S	12.4	HS	40.7	L	4	58	1.5	4			BIV
2004 08 16.01		S	11.5:	TK	20.3	L	6	63	2	3			GUZ
2004 08 16.05		S	12.3	HS	40.7	L	4	116	1.3	3			BIV
2004 09 15.17		S	12.9	HS	25.6	L	5	169	1.0	3			BIV
2004 09 17.11		S	12.3	TK	20.3	L	6	63	1.2	3			GUZ
2004 09 17.17		S	12.7	HS	40.7	L	4	233	1.0	4			BIV
2004 09 17.18		S	12.5	HS	40.7	L	4	116	1.2	3			BIV
2004 11 09.79		S	[13.6	HS	40.0	L	4	144	! 0.7				YOSO4

Comet C/2003 T4 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 08 12.01		S	14.4	HS	40.7	L	4	233	0.8	4			BIV
2004 08 14.02		S	14.4	HS	40.7	L	4	116	0.8	5			BIV
2004 08 14.93		S	14.1	HS	40.7	L	4	116	0.8	4			BIV
2004 08 16.01		S	14.3	HS	40.7	L	4	116	0.8	4			BIV
2004 08 16.02		S	[13.0	HS	20.3	L	6	63	! 0.5				GUZ
2004 09 08.87		S	13.6	HS	40.7	L	4	116	1.0	4			BIV
2004 09 15.17		S	13.8	HS	25.6	L	5	169	0.9	5			BIV
2004 09 17.10		S	[13.0	HS	20.3	L	6	63	! 0.5				GUZ
2004 09 17.15		S	13.4	HS	40.7	L	5	116	1.0	4			BIV
2004 09 24.18		S	13.5	HS	25.6	L	5	169	1.0	5			BIV
2004 10 06.83		S	13.1	HS	25.6	L	5	84	1.3	4			BIV
2004 10 06.84		S	13.4	HS	25.6	L	5	169	1.0	4			BIV
2004 10 12.91		S	13.1:	HS	25.6	L	5	169	1	4			BIV
2004 10 18.84		S	13.2	HS	40.7	L	4	116	1.0	4			BIV
2004 10 19.08		M	13.6	HS	35	L	5	158	1.6	3			HORO2
2004 10 21.20		S	13.1	HS	25.6	L	5	169	1.0	4			BIV
2004 11 04.83		S	12.4	HN	25.4	J	6	88	1.5	3			BOU
2004 11 07.80		S	13.0	HS	27.0	L	6	120	1.0	3			TOTO3
2004 11 08.87		S	13.1	HS	30	L	5	100	1	3			NEV
2004 11 08.97		S	12.4	SK	25.4	J	6	88	1.4	3/			BOU
2004 11 09.82		S	12.7	HS	40.0	L	4	144	1.0	3			YOSO4
2004 11 14.76		S	12.0	HN	31.0	J	6	89	1.6	3			BOU
2004 11 14.89		S	12.6	HS	25.6	L	5	84	1.3	4			BIV
2004 11 15.89		S	12.3	TK	20.3	T	10	100	1.5	3			GONO5
2004 11 16.71		S	12.5	HS	30	L	5	100	1	3			NEV
2004 11 21.18		M	11.8	TA	25.4	L	6	59	2.0	4			GRAO4
2004 11 24.22		S	11.8	TA	31.0	J	6	109	1.5	4			BOU
2004 11 24.22		S	11.9	TA	31.0	J	6	109	1.0	3			DIJ
2004 12 03.75		S	11.8	TA	31.0	J	6	89	1.7	3			BOU
2004 12 05.70		M	11.3	TK	20.3	L	6	63	1.5	5			GUZ

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 05.85		S	11.9	TK	20.3	T	10	77	1.5	3			GON05
2004 12 08.78		S	11.5	TK	31.0	J	6	109	1.5	3/			BOU
2004 12 08.79		S	11.7	TK	31.0	J	6	109	1.7	2			DIJ
2004 12 08.88		S	11.4	TK	25.6	L	5	84	1.5	4			BIV
2004 12 09.75		S	11.4	HS	32.0	L	5	144	1.0	1			PIL01
2004 12 11.40		S	11.5	TJ	40.0	L	4	144	1.5	4			YOS04
2004 12 11.70		M	11.4	TK	20.3	L	6	63	1.5	5			GUZ
2004 12 12.15		S	11.6	TK	20.3	L	6	40	1.8	4			BIV
2004 12 12.81		S	11.6	TK	20.3	L	6	40	1.5	4			BIV
2004 12 12.81		S	11.9	TK	20.3	T	10	160	1.5	3			GON05
2005 01 02.75		S	11.0	TK	31.0	J	6	89	1.8	2/			DIJ
2005 01 02.75		S	11.2	TK	31.0	J	6	89	1.8	2/			BOU
2005 01 02.77		S	10.9	TK	25.6	L	5	42	2.5	3			BIV
2005 01 07.78		S	11.1	TK	20.3	T	10	77	2	2			GON05
2005 01 08.77		S	11.0	TI	23.5	T	10	94	2	2			LAB02
2005 01 08.82		S	10.8	TJ	40.0	L	4	144	1.2	5			YOS04
2005 01 11.72		S	11.2	TK	44.0	L	5	156	1.3	4			HAS02
2005 01 11.84	xa	S	10.8	TJ	31.7	L	6	63	1.9	4			MIY01
2005 01 12.76		S	10.8	TK	31.0	J	6	72	1.5	4			BOU
2005 01 12.84	a	S	10.8	TJ	31.7	L	6	63	2.4	4			MIY01
2005 01 15.20		S	10.5	TK	15.0	R	5	38	& 2.8	3			MEY
2005 01 16.18		M	10.6	TJ	19	L	5	38	1.9	3			SHU
2005 01 16.19		S	10.9	TK	15.0	R	5	38	2.6	3/			MEY
2005 01 17.19		M	9.9	TT	42	L	5	66	2.5	4/			LEH
2005 01 17.23		S	10.9	TK	20.3	T	10	100	2.0	3			GON05
2005 01 17.67		M	11.3	TJ	41	L	4	89	1	3/			SHU
2005 01 18.07		S	11.0	TK	30	L	5	60	1.5	3			NEV
2005 01 20.87	x	S	10.2	TK	25.4	L	4	46	2.0	4/			YOS02
2005 01 21.84	x	S	11.0	TJ	31.7	L	6	63	1.4	4			MIY01
2005 01 31.86	x	S	10.4:	TJ	31.7	L	6	63	0.7	4			MIY01

Comet C/2004 F4 (Bradfield)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 04 23.15	\$	B	3.3	HV	5.0	B		7	1	8			BIV
2004 04 23.15	\$	B	3.5	HV	25.6	L	5	42	0.8	8	0.3	330	BIV
2004 04 23.17		B	3.8:	HV	25.6	L	5	42	0.6	8			BIV
2004 04 26.14	\$	B	4.6	HV	5.0	B		7	1.5	8	2.5	310	BIV
2004 04 26.16	\$	B	4.8	HV	40.7	L	4	58	1.0	8	1.0	310	BIV
2004 04 30.08		S	6.0	AA	6.0	B		20	1	9	1.5	305	CSU
2004 05 01.12		B	6.5:	TK	5.0	B		7			6	320	BIV
2004 05 03.08		S	7.0	AA	6.0	B		20	3	8	2	304	CSU
2004 05 07.15		S	7.0	TK	5.0	B		7	3	6			BIV
2004 05 07.15		S	7.4	TK	20.3	T	10	67	3.0	6	0.5	315	BIV
2004 05 08.06		S	7.1	AA	6.0	B		20	4	7	1.2	300	CSU
2004 05 08.14		B	7.7	TK	5.0	B		7	4	6	2.5	300	BIV
2004 05 08.15		S	7.8	TK	20.3	T	10	67	3.0	5	0.83	305	BIV
2004 05 09.15		B	7.6	TK	5.0	B		7	4	5	1.3	300	BIV
2004 05 09.15		S	7.8	TK	20.3	T	10	67	3.0	5	0.8	300	BIV
2004 05 10.06		S	7.2	AA	6.0	B		20	3.5	4/	0.6	307	CSU
2004 05 11.03		S	8.2	TI	5.0	B		10	0.5	6	1.5	290	NAG09
2004 05 12.15		S	8.5:	TK	20.3	T	10	67	4.0	5	0.6	310	BIV
2004 05 12.16		S	7.8	TK	5.0	B		7	4	5	1.5	305	BIV
2004 05 13.14		B	8.2	TK	5.0	B		7	5	4	1.5	305	BIV
2004 05 15.02		M	8.6	TI	5.0	B		10	3.0	5	0.7	310	NAG09
2004 05 17.12		S	9.4	TK	40.7	L	4	58	4.0	2/	0.5	300	BIV
2004 05 18.04		S	9.5	TI	27.0	L	6	83	3	3	0.5	300	TOT03
2004 05 18.09		S	9.5	TK	40.7	L	4	58	3.5	4	0.6	300	BIV
2004 05 19.09		S	9.5	TK	40.7	L	4	58	3.5	3	0.7	310	BIV
2004 05 20.99		S	9.3	TI	20.0	L	5	40	3	4	0.25	300	NAG09
2004 05 23.06		S	11.0:	TK	40.7	L	4	58	3.0	3	0.33	315	BIV
2004 05 25.08		S	10.7	TK	40.7	L	4	58	3.0	3	0.33	310	BIV
2004 06 07.91		S	12.4	HS	27.0	L	6	167	0.8	3			TOT03
2004 06 14.02		S	13.6:	HS	40.7	L	4	233	1.0	3			BIV
2004 06 14.03		S	13.3:	HS	40.7	L	4	116	1.3	2			BIV

Comet C/2004 F4 (Bradfield) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 06 20.04		S	13.0:	HS	40.7	L	4	58	1.4	2			BIV
2004 06 20.05		S	12.8:	HS	40.7	L	4	233	1.0	2			BIV
2004 06 27.01		S	12.8:	SK	20.3	L	6	63	1.5	1			GUZ
2004 07 11.97		S	13.2	HS	27.0	L	6	214	0.5	3			TOTO3

Comet C/2004 H6 (SWAN)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 07 18.00		S	9.0:	TI	40.5	L	4	55	5	2			SAR02
2004 07 20.95		S	9.0:	TK	5.0	B		10	6	2			GUZ
2004 07 21.03		S	9.2	TI	40.5	L	4	55	6	1			SAR02
2004 07 21.98		S	8.8	TK	5.0	B		10	6	2			GUZ
2004 07 23.94		S	11.0	HS	27.0	L	6	83	3	0			TOTO3
2004 07 24.02		S	9.4	TI	20.0	L	5	83	6	0			NAG09
2004 08 13.92		S	11.4	TK	20.3	L	6	63	4	1			GUZ
2004 08 13.97		S	12.4	HS	40.7	L	4	58	4	2			BIV
2004 08 14.09		S	12.7	HS	40.7	L	4	58	4	2			BIV
2004 08 14.95		S	12.5	HS	40.7	L	4	58	5	1			BIV
2004 08 15.92		S	11.8	TK	20.3	L	6	63	3	1			GUZ
2004 08 15.93		S	12.8	HS	40.7	L	4	58	4	1			BIV
2004 09 08.89		S	[12.8	HS	20.3	L	6	63	!	2			GUZ

Comet C/2004 Q1 (Tucker)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 08.91		S	12.4	TK	20.3	L	6	63	1.2	4			GUZ
2004 09 08.95		S	12.8	HS	40.7	L	4	58	1.3	6			BIV
2004 09 10.91		S	12.6	HS	27.0	L	6	120	1.3	3			TOTO3
2004 09 10.94		S	12.3	HS	20.0	L	5	83	1	4			NAG09
2004 09 10.96		S	12.3	SK	20.3	L	6	63	1.0	5			GUZ
2004 09 13.95		S	12.0	HS	34.0	L	5	115	3.5	4			SZA
2004 09 14.11		S	12.3	HS	27.0	L	6	120	1.3	4			TOTO3
2004 09 14.91		M	12.0	SK	20.3	L	6	63	1.6	5			GUZ
2004 09 15.15		S	12.5	TK	25.6	L	5	42	1.2	5			BIV
2004 09 17.01		M	12.3	SK	20.3	L	6	63	1.5	5			GUZ
2004 09 17.09		S	12.0	TK	40.7	L	4	58	1.6	5			BIV
2004 09 17.95		M	12.2	SK	20.3	L	6	63	1.5	4			GUZ
2004 09 19.03		M	12.1	TK	20.3	L	6	63	1.8	4			GUZ
2004 09 21.96		M	11.8	TK	20.3	L	6	63	2	4			GUZ
2004 09 24.12		S	11.3	TK	25.6	L	5	42	1.8	5			BIV
2004 10 05.79		M	11.0	HS	20.0	L	6	96	1.7	D5			SAN07
2004 10 06.81		M	10.8:	HS	20.0	L	6	96	2	D5			SAN07
2004 10 06.90		S	11.3	TK	25.6	L	5	42	1.8	5			BIV
2004 10 08.82	x	S	11.2	TT	20	L	4	45	2.0	4			PEA
2004 10 12.97		S	11.0	TK	25.6	L	5	42	2.0	6			BIV
2004 10 15.88		S	10.5:	HS	11.4	L	5	50	3.5	0/			SAN07
2004 10 15.90		M	9.8	HS	11.4	L	5	50	4	D4			SAN07
2004 10 16.00		S	10.8	TK	25.6	L	5	42	2.0	6			BIV
2004 10 16.80	x	S	10.6	TT	20	L	4	45	3.5	4			PEA
2004 10 17.84		M	10.6	TK	35	L	5	68	2.5	6			HORO2
2004 10 17.85		M	10.8	HS	27.0	L	6	83	3.2	s5			TOTO3
2004 10 18.79		M	10.5	TK	35	L	5	68	2.7	6/			HORO2
2004 10 18.89		S	10.9	TK	40.7	L	4	58	3.0	6			BIV
2004 10 21.13		S	10.7	TK	25.6	L	5	42	3.0	6			BIV
2004 10 22.81	x	S	10.5	TT	20	L	4	45	3.5	4			PEA
2004 10 22.99		M	10.7	TJ	30	T	10	79	1.5	4			ADA05
2004 11 01.44	x	M	10.8	TK	25.4	L	4	46	2.7	6			YOS02
2004 11 04.81		S	9.8	TT	8.0	B		15	4	4			RIE
2004 11 04.84		M	10.5	TK	25.4	J	6	58	2.6	4/			BOU
2004 11 04.86		S	10.5	TJ	15.0	R	15	75	1	7			DIE02
2004 11 05.73		M	10.4	HS	20.0	L	6	45	4	D4			SAN07
2004 11 05.83		S	10.2	TK	30.0	L	5	39	& 3	6			SCH04
2004 11 06.01		M	10.1	TK	15.2	L	5	38	2.5	3/			GRA04
2004 11 06.64	x	S	10.3	TJ	31.7	L	6	63	1.7	4/			MIY01
2004 11 06.87		M	10.3	TT	8.0	B		10	5	5			HORO2

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 07.47	x	M	10.2	TK	25.4	L	4	46	3.0	5			YOSO2
2004 11 07.49	x	M	10.5	TJ	32.0	L	5	58	3.2	5/			NAG08
2004 11 07.61	x	B	10.8	TJ	30.4	L	5	79	1.0	5			NAG04
2004 11 07.80		S	10.0	TK	15.0	R	5	38	3.8	3/			MEY
2004 11 08.84		S	9.8	TK	30	L	5	60	3	5			NEV
2004 11 08.94		M	10.3	TK	25.4	J	6	58	2.8	5			BOU
2004 11 08.96		S	10.1	TK	20.0	L	4	42	& 3	5/			SCH04
2004 11 09.47		S	9.8	TJ	40.0	L	4	36	4.2	6			YOSO4
2004 11 09.50		S	10.3	AA	10.0	B		25					SEA
2004 11 09.73		S	10.7	TJ	15.0	R	15	75	1	5			DIE02
2004 11 09.80		S	9.8:	HS	20.0	L	6	75	4	5/4			SAN07
2004 11 11.74		S	10.6	TJ	15.0	R	15	75	1	5			DIE02
2004 11 11.79		M	10.3	TK	20.3	L	6	63	2.5	5			GUZ
2004 11 12.46		S	10.3	AA	10.0	B		25					SEA
2004 11 12.91		S	10.0	TK	30.5	T	10	56	& 3	3/			COM
2004 11 12.91		S	10.0	TK	30.5	T	10	56	& 3	3			COM
2004 11 13.04		S	10.4	TK	20.3	T	10	77	2.5	5			GON05
2004 11 13.82		S	10.8	TJ	15.0	R	15	75	1	5			DIE02
2004 11 13.84		B	10.3	TI	23.5	T	10	67	2	6	2	m	LAB02
2004 11 13.89		S	10.3	TK	30.5	T	10	56	> 2	3/			COM
2004 11 13.89		S	10.3	TK	30.5	T	10	56	> 2	3/			COM
2004 11 14.02		B	10.5	TK	13.0	L		45	1.5	3			RES
2004 11 14.46		S	10.0	AA	10.0	B		25	3.0				SEA
2004 11 14.71		M	10.3	TJ	15	L	5	30	3	4/			SHU
2004 11 14.72		S	10.5	TJ	32.0	L	5	58	1.8	5			PIL01
2004 11 14.75		M	10.3	TK	31.0	J	6	58	2.8	5			BOU
2004 11 14.93		S	10.7	TK	25.6	L	5	42	3.0	6			BIV
2004 11 14.95		S	10.4	TK	20.0	L	4	42	3	6			SCH04
2004 11 16.09		S	10.4	TK	20.3	T	10	77	2.5	5			GON05
2004 11 16.10		S	10.1	TK	10.0	B		25	3	4			GON05
2004 11 16.56	x	M	10.7	TJ	32.0	L	5	58	2.9	5/			NAG08
2004 11 16.65	x	S	11.4	TJ	31.7	L	6	63	1.3	4/			MIY01
2004 11 16.67		M	10.3	TJ	15	L	5	30	3	3/			SHU
2004 11 16.74		S	10.3	TK	30	L	5	60	3.5	6			NEV
2004 11 16.97		B	10.3	TK	13.0	L		45	1.6	3			RES
2004 11 18.02		S	10.2	TK	20.3	T	10	77	2.5	5			GON05
2004 11 19.97		M	9.5	HS	11.4	L	5	50	3.5	3	0.05	120	SAN07
2004 11 20.99		S	11.0	TK	15.0	R	15	75	1	5			DIE02
2004 11 21.06		M	10.3	TK	31.0	J	6	58	2.7	5			BOU
2004 11 21.09		S	10.4	TK	31.0	J	6	58	3.0	5			DIJ
2004 11 21.16		S	10.4	TK	25.4	L	6	59	4	2/			GRA04
2004 11 21.98		M	10.8	TJ	19	L	5	38	1.6	3/			SHU
2004 11 24.97		B	10.1	TK	13.0	L		45	1.5	3/			RES
2004 12 02.47	x	S	10.9	TJ	15.0	B		25	3.5	5			MIT
2004 12 02.48	x	M	11.2	TJ	32.0	L	5	58	3.0	5/			NAG08
2004 12 02.73		M	10.7	TI	25	L	5	50	1.9	5/			HOR03
2004 12 03.73		S	10.6	TK	15.0	R	15	75	1	3			DIE02
2004 12 03.79		S	10.7	TK	31.0	J	6	58	3.0	3			BOU
2004 12 04.79		M	10.6	TT	10	B	4	25	3	3			LEH
2004 12 04.80		M	11.3	TI	10	B		25	2.7	5			HOR03
2004 12 05.53	x	S	10.4	TJ	31.7	L	6	63	1.4	5			MIY01
2004 12 05.72		M	10.2	TK	20.3	L	6	63	3	5			GUZ
2004 12 05.83		S	11.4	HS	20.0	L	5	83	2.5	3			NAG09
2004 12 06.00		S	10.7	TK	20.3	T	10	77	2.5	4			GON05
2004 12 06.88		B	10.1	TK	13.0	L		45	1.4	3/			RES
2004 12 06.93		S	10.5	TK	30.5	T	10	75	1.8	3/			KAM01
2004 12 08.86		S	11.0	TK	30.5	T	10	56	& 2	2			COM
2004 12 08.86		S	11.0	TK	30.5	T	10	56	& 2	2			COM
2004 12 08.90		S	11.0	TK	25.6	L	5	42	2.5	5			BIV
2004 12 09.51	x	M	11.2	TJ	32.0	L	5	58	1.8	5			NAG08
2004 12 09.77		S	11.2	HS	32.0	L	5	58	1.7				PIL01
2004 12 10.83		M	11.2	TI	25	L	5	50	1.4	6			HOR03
2004 12 10.94		M	10.9	TK	20.3	L	6	63	2.5	4			GUZ
2004 12 11.49		M	10.9	TJ	40.0	L	4	75	2.0	7			YOSO4
2004 12 11.49	x	S	11.0	TK	25.4	L	4	46	2.1	5			YOSO2

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 11.73		M	10.5	TK	20.3	L	6	63	3	5			GUZ
2004 12 11.80		B	10.8	TI	23.5	T	10	67	2	6			LABO2
2004 12 11.92		S	11.0	TK	20.3	L	6	40	2.6	5			BIV
2004 12 12.90		S	11.1	TK	20.3	T	10	77	2.5	4			GON05
2004 12 12.91		S	10.9	TK	20.3	L	6	40	2.5	5			BIV
2004 12 14.88		S	11.3	TK	15.0	R	15	75	1	3			DIE02
2004 12 14.96		S	11.0	TK	30.5	T	10	75	1.6	2			KAM01
2004 12 15.91		S	11.1	TK	30.5	T	10	75	2.2	2/			KAM01
2004 12 16.89		S	11.3	TK	25.6	L	5	42	2.0	5			BIV
2004 12 17.99		S	11.1	TK	25.6	L	5	42	2.0	4			BIV
2004 12 19.78		S	11.3	TK	15.0	R	15	75	1	2			DIE02
2004 12 19.88		S	11.1	TK	25.4	J	6	72	2.4	3/			BOU
2004 12 20.09		S	11.0	TK	25.6	L	5	84	2.0	4			BIV
2004 12 20.81		M	11.0	TI	11	R	15	47	1.7	4			LEH
2004 12 28.72		S	11.3	TK	15.0	R	15	75	1	3			DIE02
2004 12 30.38	x	S	11.1	TJ	31.7	L	6	63	0.5	5			MIY01
2004 12 31.70		S	11.5	HS	20.0	L	5	83	1	3			NAG09
2004 12 31.75		M	10.3	HS	11.4	L	5	50	3.5	2			SAN07
2005 01 01.40	x	S	11.6	TJ	31.7	L	6	63	1.8	4			MIY01
2005 01 02.41	x	S	11.6	HS	31.7	L	6	152	0.8	5			MIY01
2005 01 02.79		S	11.0	TK	25.6	L	5	42	2.0	5			BIV
2005 01 02.82		S	11.4	TK	15.0	R	15	75	1	3			DIE02
2005 01 02.84		M	11.4	SK	31.0	J	6	72	2.2	4/			BOU
2005 01 02.84		S	11.0	TK	31.0	J	6	72	1.4	3/			DIJ
2005 01 04.91		S	11.1	TK	30.5	T	10	115	1.8	2			KAM01
2005 01 06.79		S	10.8	TK	25.4	L	5	65	1.9	3			MEY
2005 01 06.82		S	11.7	HS	32.0	L		72	0.5	6			PIL01
2005 01 06.93		S	11.3	TK	20.3	T	10	77	2.0	3			GON05
2005 01 07.41	x	S	11.8	HS	31.7	L	6	63	1.1	4			MIY01
2005 01 07.83		S	10.8	NP	25.5	L	5	60	2.5	4/			MAR02
2005 01 07.84		B	11.1	TI	23.5	T	10	67	1	4			LABO2
2005 01 07.84		S	10.6	NP	25.5	L	5	60	4	4/			SAN04
2005 01 07.91		S	11.1	TK	20.3	T	10	77	2.0	3			GON05
2005 01 08.39	x	S	11.3	TJ	31.7	L	6	63	2.2	4			MIY01
2005 01 08.41		S	10.5	TJ	40.0	L	4	75	2.9	6			YOS04
2005 01 08.50	x	S	11.2	TJ	15.0	B		25	2	3			MIT
2005 01 09.94		S	11.6	TK	30.5	T	10	115	1.1	2			KAM01
2005 01 10.84		S	11.4	TK	25.4	L	5	65	& 1.3	2/			MEY
2005 01 10.90		S	11.5	TK	30.5	T	10	115	1.5	2			KAM01
2005 01 11.44	x	S	11.0	TJ	31.7	L	6	63	1.4	3/			MIY01
2005 01 11.73		S	11.8	HS	44.0	L	5	156	0.7	4			HAS02
2005 01 12.46	x	S	11.4	TJ	31.7	L	6	63	1.9	3/			MIY01
2005 01 12.79		M	11.5	TK	31.0	J	6	89	1.8	4			BOU
2005 01 12.88		S	11.3	TK	25.6	L	5	42	2.0	4			BIV
2005 01 14.87		S	11.9	TK	44.5	L	4	62	1.1	3			KAR02
2005 01 14.88		S	11.5	TK	30.5	T	10	115	1.6	2/			KAM01
2005 01 14.92		M	11.5	TK	31.0	J	6	72	2.0	4			BOU
2005 01 14.93		S	11.1	TK	31.0	J	6	72	1.5	3/			DIJ
2005 01 16.72		M	11.1	TI	42	L	5	66	2.0	3			LEH
2005 01 17.69		S	11.8	TK	30	L	5	60	1.3	2			NEV
2005 01 17.73		M	11.6	TJ	41	L	4	89	1.5	3			SHU
2005 01 21.43	x	S	11.0	TJ	31.7	L	6	86	1.4	3/			MIY01
2005 01 30.88		S	11.5	TK	20.3	T	10	77	2.0	3			GON05

Comet C/2004 Q2 (Machholz)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 08 28.09		S	10.4	TK	20.3	L	6	63	2	3			GUZ
2004 09 07.71		S	11.3	AU	31.7	L	5	97	0.5				JON
2004 09 08.72		S	11.3	AU	31.7	L	5	64	1	1			JON
2004 09 09.08		M	10.2	TK	20.3	L	6	63	2.5	5			GUZ
2004 09 11.06		S	10.8	HS	20.0	L	5	83	2	5			NAG09
2004 09 11.09	x	S	10.1	TK	30.0	T	10	214	1.2	6/	7	m 235	COO02
2004 09 11.09	x	S	10.2	TK	30.0	T	10	214	2	5	8	m 237	STRO3
2004 09 11.10		M	10.1	TK	20.3	L	6	63	2.5	6			GUZ

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 11.16		S	10.5:	TK	25.6	L	5	84	2	4			BIV
2004 09 11.72		S	11.2	AU	31.7	L	5	64	1	1			JON
2004 09 13.62		S	11.1	AU	31.7	L	5	64	1	2			JON
2004 09 14.08		S	10.2	HS	27.0	L	6	83	2.0	5			TOTO3
2004 09 15.11		M	10.3	AC	20.0	L	8	72	1.8	5			BEG01
2004 09 15.12		S	10.3	TK	25.6	L	5	42	2.6	6	0.05	280	BIV
2004 09 17.09		M	9.8	TK	20.3	L	6	63	3	5			GUZ
2004 09 17.11		S	9.5:	TK	5.0	B		10	3	7			GUZ
2004 09 17.17		S	10.1	TK	40.7	L	5	58	3.0	5			BIV
2004 09 18.10		M	9.9	TK	20.3	L	6	63	3	5			GUZ
2004 09 18.63		S	10.7	TK	31.7	L	5	64	1	3			JON
2004 09 19.08		M	9.9	TK	20.3	L	6	63	3	5			GUZ
2004 09 19.67		S	10.7	TK	31.7	L	5	64	1	3			JON
2004 09 21.65		S	10.9	TK	31.7	L	5	64	1	3			JON
2004 09 24.16		S	9.6	TK	25.6	L	5	42	3.0	5			BIV
2004 09 24.64		S	10.0	TK	31.7	L	5	64	1	4			JON
2004 10 03.17		S	9.6:	TK	25.6	L	5	84	3.0	5			BIV
2004 10 03.18		S	9.7:	TK	25.6	L	5	42	3.0	5			BIV
2004 10 04.10	x	M	8.3	HI	20.3	L	5	40		1/			VAN15
2004 10 07.85	x	S	9.0	TT	8.0	B		20	4.5	5			PEA
2004 10 07.85	x	S	9.2	TT	20	L	4	45	3.3	5	0.08	297	PEA
2004 10 08.83	x	S	8.7	TT	8.0	B		20	5	5			PEA
2004 10 08.83	x	S	8.8	TT	20	L	4	45	4	6	0.17	265	PEA
2004 10 08.96	x	M	8.1	HI	20.3	L	5	50		5			VAN15
2004 10 11.49		S	9.5	TK	31.7	L	5	64	1	5			JON
2004 10 13.64		S	9.6	TK	31.7	L	5	64	2	5			JON
2004 10 13.81	x	B	8.6	TT	8.0	B		20	7	5			PEA
2004 10 13.81	x	B	8.9	TT	20	L	4	45	4	5	0.08	288	PEA
2004 10 14.82	x	B	8.6	TT	8.0	B		20	7	5			PEA
2004 10 14.82	x	B	8.9	TT	20	L	4	45	4	5	0.07	266	PEA
2004 10 16.05		S	9.2	TK	25.6	L	5	42	3.0	6			BIV
2004 10 16.06		S	9.1	TK	25.6	L	5	42	3.0	6	0.05	280	BIV
2004 10 16.58		S	8.8	TK	7.8	R	4	15	3				JON
2004 10 16.58		S	9.0	TK	31.7	L	5	64	3	5			JON
2004 10 16.81	x	B	8.1	TT	8.0	B		20	7	5			PEA
2004 10 16.81	x	B	8.3	TT	20	L	4	45	5.5	5	0.13	275	PEA
2004 10 17.80	x	B	8.1	TT	8.0	B		20	6	5			PEA
2004 10 17.80	x	B	8.5	TT	20	L	4	45	4	5/	0.12	287	PEA
2004 10 19.06		M	8.5	TT	13	L	8	69	3.4	2			HOR02
2004 10 20.60		S	8.4	TK	7.8	R	4	15	4				JON
2004 10 21.17		S	8.5	TK	25.6	L	5	42	5.0	5	0.2	270	BIV
2004 10 21.18		S	8.2	TK	5.0	B		7	6	5			BIV
2004 10 21.80	x	B	7.9	TT	8.0	B		20	5.5	5			PEA
2004 10 21.80	x	B	8.4	TT	20	L	4	45	4	6	0.15	285	PEA
2004 10 22.02	x	M	6.8	HI	20.3	L	5	40	5	6			VAN15
2004 10 22.82	x	B	7.7	TT	4.0	B		8	7	5			PEA
2004 10 22.82	x	B	7.8	TT	8.0	B		20	6	6			PEA
2004 10 22.82	x	B	8.0	TT	20	L	4	45	4.5	6	0.2	262	PEA
2004 10 24.06		S	7.8:	TK	5.0	B		10	& 5	5			GUZ
2004 10 24.11		M	7.8	TI	25	L	5	50	4.6	6	0.2	276	HOR03
2004 10 25.83	x	B	7.7	TT	8.0	B		20	5	5/			PEA
2004 10 28.10		S	7.5	TI	5.0	B		7	6	s5			SCA02
2004 10 31.43		S	8.0	TK	7.8	R	4	15	5	5			JON
2004 11 01.82		M	7.2	AA	6.0	B		15	6	5	20	m 300	BEG01
2004 11 02.50		S	7.1	AA	5.0	B		10					SEA
2004 11 02.84		M	7.3	AA	6.0	B		15	6	5	15	m 310	BEG01
2004 11 03.11		S	7.5	TJ	18	L		32	5	4			LOB
2004 11 03.48		S	7.0	AA	2.5	B		2					SEA
2004 11 03.78	x	S	7.2	HV	8.0	B		11	2.7	5/			MIY01
2004 11 04.66	xa	S	7.4	TJ	8.0	B		11	6	6			NAG08
2004 11 04.88		M	7.2	AA	6.0	B		15	6	5	14	m 300	BEG01
2004 11 05.90		M	7.2	AA	6.0	B		15	6	5	14	m 300	BEG01
2004 11 06.09		S	7.5	TJ	18	L		32	6	2/			LOB
2004 11 06.44		S	7.5	TK	7.8	R	4	15	5	4			JON
2004 11 06.48		M	7.2	AA	10.0	B		25					SEA

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 06.79	x	B	7.2	TT	4.0	B		8	8	5			PEA
2004 11 06.79	x	B	7.2	TT	8.0	B		20	7.5	6	0.32	269	PEA
2004 11 06.92		M	7.2	AA	6.0	B		15	6	5	15 m	290	BEG01
2004 11 07.44		S	7.5	TK	7.8	R	4	15	5	4			JON
2004 11 07.67	x	B	7.7	HV	10.0	B	5	26	5.8	5/			NAG04
2004 11 07.72	xa	M	7.3	TK	10.0	B		20	7	5			YOS02
2004 11 07.80	x	B	7.2	TT	8.0	B		20	7	5	0.23	305	PEA
2004 11 07.86		M	7.1	AA	6.0	B		15	5	6	9 m	295	BEG01
2004 11 08.02		B	8.0	TI	8.0	B		11	4	5			LAB02
2004 11 08.03		S	7.2	TJ	18	L		32	6.5	4			LOB
2004 11 08.07		S	8.2	TI	36.0	L	4	100	5	d3			CSO
2004 11 08.74	x	S	7.2	HV	8.0	B		11	5.1	5/			MIY01
2004 11 09.52		S	7.0	AA	3.5	B		6					SEA
2004 11 09.75		S	7.0	TJ	7.0	R		10	10	4			YOS04
2004 11 10.54		S	6.3	AA	0.0	E		1					SEA
2004 11 10.92		S	7.0	TI	5.0	B		7	10	s6			SCAO2
2004 11 11.07		S	7.1	TJ	18	L	6	32	5	3/			LOB
2004 11 11.83		M	7.1	AA	6.0	B		15	5	5	25 m	280	BEG01
2004 11 11.93		S	6.9	TI	5.0	B		7	12	s5			SCAO2
2004 11 12.04		S	7.2	TK	8.0	B		20	5	5			AM001
2004 11 12.47		S	6.3	AA	0.0	E		1					SEA
2004 11 12.47		S	6.6	AA	3.5	B		6					SEA
2004 11 12.80	x	B	7.1	TT	8.0	B		20	7.5	5/	0.25	276	PEA
2004 11 12.82	xw	M	7.3	TJ	8.0	B		11	7	6			NAG08
2004 11 12.86		M	7.0	AA	6.0	B		15	6	6	25 m	280	BEG01
2004 11 13.04		S	7.2	TK	8.0	B		11	5	5/			SOU01
2004 11 13.07		S	7.4	TK	20.3	T	10	77	5	6			GON05
2004 11 13.08		S	7.1	TK	10.0	B		25	6	5	0.2	285	GON05
2004 11 13.10		S	6.9	TK	5.0	B		7	8	5			GON05
2004 11 13.48		S	6.3	AA	0.0	E		1					SEA
2004 11 13.58	x	B	7.0	HV	5.0	B		10	9.5	5			NAG04
2004 11 13.59	x	M	6.5	TT	3.5	B		7					TSU02
2004 11 13.80	x	B	6.8	TT	4.0	B		8	8	5			PEA
2004 11 13.80	x	B	6.9	TT	8.0	B		20	8	5	0.32	269	PEA
2004 11 13.85		M	7.0	AA	6.0	B		15	6	6	30 m	280	BEG01
2004 11 13.99		B	7.1	TI	8.0	B		11	6	6	18 m	298	LAB02
2004 11 14.21		M	7.0	TJ	5.0	B		10	7	6	0.33		MOR
2004 11 14.45		S	6.2	AA	0.0	E		1					SEA
2004 11 14.80	x	B	6.8	TT	8.0	B		20	8	5	0.28	279	PEA
2004 11 14.86		M	6.8	AA	6.0	B		15	7	6	28 m	282	BEG01
2004 11 14.98		S	7.3:	TK	25.6	L	5	42	5	5			BIV
2004 11 15.01	w	S	6.1	HV	6.3	B		9	15	5	0.2	280	KAM01
2004 11 15.42		S	6.9	TK	7.8	R	4	15	6	3			JON
2004 11 15.46		S	6.4	AA	2.5	B		2					SEA
2004 11 15.85		M	6.8	AA	6.0	B		15	9	5	20 m	280	BEG01
2004 11 16.11		S	6.6	TK	5.0	B		7	12	5			GON05
2004 11 16.12		S	6.6	TK	10.0	B		25	8	5	0.6	285	GON05
2004 11 16.42		S	6.4	TK	4.5	R	6	13	8				JON
2004 11 16.60	xw	M	6.5	TJ	3.5	B		7	11	5/			NAG08
2004 11 16.64	x	S	7.1	HV	8.0	B		11	7.7	5			MIY01
2004 11 16.67	x	S	6.2	HV	5.0	B		7	6.0	5			MIY01
2004 11 17.07		M	6.0	AA	0.0	E		1	15	5			BEG01
2004 11 17.08		M	6.6	AA	6.0	B		15	8	6	45 m	282	BEG01
2004 11 17.42		S	6.4	TK	4.5	R	6	13	8	5			JON
2004 11 17.79	x	B	6.4	TT	4.0	B		8	6	6			PEA
2004 11 17.79	x	B	6.5	TT	8.0	B		20	5.5	6	0.43	273	PEA
2004 11 17.89		S	6.3	TI	5.0	B		7	14	s6			SCAO2
2004 11 18.03		S	6.2	TK	5.0	B		7	15	5	0.9	325	GON05
2004 11 18.06		I	6.2	TK	0.0	E		1	20	6			GON05
2004 11 18.06		M	6.0	AA	0.0	E		1	15	6			BEG01
2004 11 18.07		M	6.5	AA	6.0	B		15	15	7	45 m	280	BEG01
2004 11 18.97		M	6.5:	TI	11.4	L	5	50	7	3/			SAN07
2004 11 19.27		B	6.2	YG	5.0	B		7	10	5			AM001
2004 11 19.70	xw	M	6.0	TK	3.5	B		7	17	5			YOS02
2004 11 19.80	x	B	6.1	TT	4.0	B		8	19	6			PEA

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 19.80	x	B	6.1	TT	8.0	B		20	11	6	1.1	326	PEA
2004 11 19.80	x	I	6.1	TT	0.0	E		1		8			PEA
2004 11 19.95		B	6.8	TI	8.0	B		11	8	7			LAB02
2004 11 19.95		S	7.0	AA	8.0	B		20	7	3			KES01
2004 11 19.97		M	5.5	TI	5.0	B		10	10	D5			SAN07
2004 11 19.99		S	8.0	TI	36.0	L	4	100	5	d3			CSO
2004 11 20.00		M	6.0	TI	10	B		25	23	5	1.1	337	HOR03
2004 11 20.03	w	M	6.0	TT	8.0	B		10	11	4			HOR02
2004 11 20.04		S	5.9	HV	6.3	B		9	16	5			KAM01
2004 11 20.08		M	6.4	TI	5.2	B		7	8	6			MAN04
2004 11 20.09		B	6.3	YG	5.0	B		7	7	6			AM001
2004 11 20.10		B	6.6	TI	5.0	B		10	7	4			ADD
2004 11 20.10		S	6.1	YG	8.0	B		11	10	6			SOU01
2004 11 20.28		B	6.1	TK	5	R	7	13	14	6			ROB06
2004 11 20.64		S	6.2	TK	4.5	R	6	13	8	3			JON
2004 11 20.81	x	B	5.9	TT	4.0	B		8	19	6			PEA
2004 11 20.81	x	B	6.0	TT	8.0	B		20	12	6	1.2	330	PEA
2004 11 20.81	x	I	6.0	TT	0.0	E		1		8			PEA
2004 11 21.01		S	6.3	TK	8.0	B		15	9	4/			BOU
2004 11 21.02		S	6.4	TK	8.0	B		15	8	5			DIJ
2004 11 21.04		M	6.1	YG	5.0	B		7	10	5/			AM001
2004 11 21.13		S	6.2	YG	8.0	B		11	10	5			SOU01
2004 11 21.61		B	7.5	SC	17.5	L	5	36	10	5			SOW
2004 11 21.73	x	B	6.2	HV	5.0	B		10	14	6			NAG04
2004 11 21.74	xw	M	5.8	TK	3.5	B		7	18	5/			YOS02
2004 11 21.79	x	B	6.0	TT	4.0	B		8	11	6			PEA
2004 11 21.80	x	B	6.1	TT	8.0	B		20	10	6	0.82	335	PEA
2004 11 21.88		S	6.4	TI	5.0	B		7	12	s5			SCA02
2004 11 22.02		M	6.3	TI	5.2	B		7	8	6			MAN04
2004 11 22.03		M	6.7	TJ	19	L	5	38	2.5	6			SHU
2004 11 22.05		S	6.5	AA	5.0	B		7	6	5			KOS
2004 11 22.25		M	6.1	YG	8.0	B		11	10	5	0.25		SOU01
2004 11 22.58		B	7.5	SC	17.5	L	5	36	10	5			SOW
2004 11 22.65	xa	M	6.3	TJ	8.0	B		11	10	5/			NAG08
2004 11 22.75	x	B	6.2	HV	5.0	B		10	14	6			NAG04
2004 11 22.95		S	6.0	YG	5.0	B		7	8	2			AM001
2004 11 22.95		S	6.2	YG	8.0	B		20	5	4			AM001
2004 11 23.12		M	6.0	TI	5.2	B		7	10	6			MAN04
2004 11 23.59		B	7.5	SC	17.5	L	5	36	10	5			SOW
2004 11 23.95		M	6.1	YG	8.0	B		20	8	5/			AM001
2004 11 24.25		S	6.2	YG	8.0	B		11	10	5	0.2		SOU01
2004 11 25.04		M	6.1	YG	20	T	10	62	10	5			SOU01
2004 11 25.05	w	M	5.9	TT	8.0	B		10	12	4			HOR02
2004 11 25.97		S	5.9	TI	5.0	B		7	16	s6			SCA02
2004 11 25.97		S	6.1	TK	18	L	6	32	5	5			LOB
2004 11 27.10		S	6.2	TK	18	L	6	32	& 8	4/			LOB
2004 11 27.16		S	6.0	YG	5.0	B		7	10	4			AM001
2004 11 28.02		S	6.1	TK	8.0	B		11	10	3			ARA
2004 11 28.13		M	6.1	TI	5.2	B		7	8	6	0.2		MAN04
2004 11 29.06		S	5.9	TI	5.0	B		10	13	3			ADD
2004 11 29.41		S	7.0	TK	4.5	R	6	13	10	4			JON
2004 11 29.61		B	5.7	AA	17.5	L	5	36	15	6			SOW
2004 11 29.61	xa	M	6.2	TJ	8.0	B		11	10	5/			NAG08
2004 11 30.03		S	6.1	TK	8.0	B		11	8	4			ARA
2004 11 30.48		S	5.3	AA	0.0	E		1					SEA
2004 11 30.56	x	B	5.6	TT	4.0	B		8	17	6			PEA
2004 11 30.58		B	6.2	AA	5.0	B		7	15	6			SOW
2004 11 30.61	xa	M	6.0	TJ	8.0	B		11	10	5/			NAG08
2004 11 30.62	xa	M	5.8	TJ	3.5	B		7	12	5			NAG08
2004 11 30.80		M	6.2	AA	5.0	B		10	12	6	50	m 290	PRI04
2004 11 30.81		M	6.1	AA	6.0	B		15	13	7	55	m 273	BEG01
2004 12 01.07		M	5.9	TI	5.0	B		10	13	4			ADD
2004 12 01.09		M	5.8	TI	5.2	B		7	15	4/	0.5		MAN04
2004 12 01.58		B	6.2	AA	5.0	B		7	15	6			SOW
2004 12 01.58	x	B	5.6	TT	4.0	B		8	16	6			PEA

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 01.68		S	5.0	YG	7.0	R		10	11	4			YOS04
2004 12 01.85		M	5.6	AA	5.0	B		7	13	5	1.0	287	BEG01
2004 12 01.92		B	5.5	TK	5.0	B		10	10.7	4			HAS02
2004 12 01.94		B	6.2	TI	8.0	B		11	10	7	10	m	LAB02
2004 12 02.02		M	6.0	YG	5.0	B		7	15	7			AM001
2004 12 02.08		M	5.8	TI	5.2	B		7	15	4/	0.6		MAN04
2004 12 02.51	xw	M	5.9	HV	3.5	B		7	18	5			MIT
2004 12 02.52	xw	M	5.6	TJ	3.5	B		7	13	5/			NAG08
2004 12 02.54		B	6.0	AA	5.0	B		7	15	6			SOW
2004 12 02.57		S	5.2	YG	7.0	R		10	13	5			YOS04
2004 12 02.80		M	6.0	AA	5.0	B		10	14	6	55	m	PRI04
2004 12 02.85		M	5.9	AA	6.0	B		15	10	7	1.5		BEG01
2004 12 02.90		S	5.2	TI	5.0	B		7	16	s5	1.0		SCA02
2004 12 02.92		B	5.5	TK	5.0	B		10	10.7	4			HAS02
2004 12 02.96		S	5.9	TK	5.0	B		10	14	5			ARA
2004 12 03.01		M	5.8	YG	5.0	B		7	20	5			AM001
2004 12 03.47		M	5.2	AA	5.0	B		10					SEA
2004 12 03.56	x	B	5.6	TT	4.0	B		8	16	6			PEA
2004 12 03.90		S	5.3	TI	5.0	B		7	16	s5/	1.0		SCA02
2004 12 03.94		M	5.5	TK	5.0	B		10	&15	6	0.5		GUZ
2004 12 03.97		S	5.8	TK	8.0	B		11	13	5			ARA
2004 12 04.02		M	5.8	YG	5.0	B		7	15	5			AM001
2004 12 04.09		S	5.4	TK	5.0	B		10	18	6			ARA
2004 12 04.80	x	B	5.5	TT	4.0	B		8	15	6			PEA
2004 12 04.81		S	5.2	S	5.0	B		10	12	6	0.6		CO002
2004 12 04.91	w	M	5.2	TT	8.0	B		10	18	4			HOR02
2004 12 04.92	w	M	5.0	TT	0.8	E		1	20	3/			HOR02
2004 12 04.99		M	5.6	YG	5.0	B		7	18	5			AM001
2004 12 05.00		M	5.3	TK	5.0	B		10	18	7	1.5		GUZ
2004 12 05.01		S	5.2	TK	0.0	E		1	&15	7			GUZ
2004 12 05.03		B	5.5	HK	5.0	B		10	8	D4			RIB
2004 12 05.03		B	5.6	HK	6.0	B		12	10	D5			COR01
2004 12 05.10		S	5.5	TK	5.0	B		10	19	6			ARA
2004 12 05.12		M	5.5	TI	5.0	B		10	15	5			ADD
2004 12 05.12		S	5.8	YG	8.0	B		11	20	6	0.2		SOU01
2004 12 05.55		S	4.8	YG	7.0	R		10	15	6			YOS04
2004 12 05.56	x	B	5.4	TT	4.0	B		8	16	6			PEA
2004 12 05.56	x	S	5.3	HV	5.0	B		7	20	5			MIY01
2004 12 05.58		S	5.6	AA	5.0	B		7	19	4	0.7		KAN
2004 12 05.60	xw	M	5.3	HV	3.5	B		7	22	5			MIT
2004 12 05.60	x	M	5.3	TJ	3.5	B		7	16	6			NAG08
2004 12 05.68	x	M	5.2	TK	3.5	B		7	18	5			YOS02
2004 12 05.85		M	5.3	TK	5.0	B		10	18	7	1.2		GUZ
2004 12 05.86		S	5.3	TK	0.0	E		1	&15	7			GUZ
2004 12 05.93		S	4.6	TI	0.0	E		1	16	s6			SCA02
2004 12 05.93		S	4.8	TI	5.0	B		7	22	s6	2.0		SCA02
2004 12 05.97		S	5.3	TK	5.0	B		7	19	6			GON05
2004 12 05.98		I	5.2	TK	0.0	E		1	20	7			GON05
2004 12 05.98		M	5.4	TK	5.0	B		7	12	5			GRA04
2004 12 05.99		M	5.2	TK	5.0	B		7	&15	5/			SKI
2004 12 05.99		M	5.4	TK	8.0	B		11	19	6			ARA
2004 12 05.99		S	5.4	TK	8.0	B		11	14	6	0.9		GON05
2004 12 06.02		B	5.6	HK	6.0	B		12	10	D5			COR01
2004 12 06.03		B	5.5	HK	5.0	B		10	9	D5			RIB
2004 12 06.03		S	5.3	TK	6.0	B		15	8	5/			DIJ
2004 12 06.07		S	5.5	TK	18	L	6	32	21	5	0.33		LOB
2004 12 06.08		S	5.1	TK	5.0	B		16	14	3			LOB
2004 12 06.15		M	5.5	TI	5.2	B		7	18	4/	0.6		MAN04
2004 12 06.45		S	5.5	TK	4.5	R	6	13	13				JON
2004 12 06.51		B	5.7	AA	5.0	B		7	15	6			SOW
2004 12 06.54	x	S	5.3	TK	4.0	B		8	12	5			MOM
2004 12 06.55	x	S	5.6	HV	5.0	B		7	20	5			MIY01
2004 12 06.58		B	5.2	AA	5.0	B		7	16	4	0.5		KAN
2004 12 06.58		B	5.6	AA	5.0	B		7	16	4	0.5		KAN
2004 12 06.58	x	M	5.3	TJ	3.5	B		7	16	5/			NAG08

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 06.59		S	4.9	YG	7.0	R		10	12	5			YOS04
2004 12 06.63	x	M	5.1	TT	3.5	B		7					TSU02
2004 12 06.87		S	6.0	AC	5.0	B		10	15	D5			ERD
2004 12 06.89	w	M	5.1	TT	8.0	B		10	19	4			HOR02
2004 12 06.90		B	5.2	TK	6.0	B		20	7	5/			RES
2004 12 06.92		S	4.8	TI	5.0	B		7	20	s6	2.0	360	SCA02
2004 12 06.95	!	S	5.9	TK	15	L	5	30	6	3/			MIC
2004 12 06.99		S	5.2	HV	6.3	B		9	16	5	0.6	345	KAM01
2004 12 07.00		S	5.5	TK	8.0	B		15	9	5			HUR
2004 12 07.01		S	5.3	TK	5.0	B		10	13	5			HUR
2004 12 07.26		S	5.5	YG	8.0	B		11	20	6			SOU01
2004 12 07.29		S	5.3	YG	3.0	B		8	20	5			SQU01
2004 12 07.58		S	4.7	YG	7.0	R		10	12	5/			YOS04
2004 12 07.71	x	M	5.2	TK	3.5	B		7	15	6			YOS02
2004 12 07.90	w	M	5.1	TT	8.0	B		10	17	3/			HOR02
2004 12 07.96		B	5.3	TI	8.0	B		11	10	7			LAB02
2004 12 07.97		M	5.2	TK	5.0	B		7	14	5/			GRA04
2004 12 07.99		M	5.1	TK	5.0	B		7	15	5/			SKI
2004 12 07.99		S	5.5	YG	5.0	B		7	15	5			AMO01
2004 12 08.05		B	5.4	HK	5.0	B		10	10	D5			RIB
2004 12 08.05		B	5.5	HK	6.0	B		12	12	D5			COR01
2004 12 08.26		S	5.3	YG	3.0	B		8	15	5			SOU01
2004 12 08.70	x	M	5.0	TK	3.5	B		7	20	6			YOS02
2004 12 08.87		S	5.6	TI	36.0	L	4	100	8	S4			CSD
2004 12 08.89	w	M	5.0	TT	8.0	B		10	20	4			HOR02
2004 12 08.90		S	5.6	TK	15.0	R	8	30	6	6			DIE02
2004 12 08.94		S	5.3	HV	5.0	B		7	17	5	1.0	340	BIV
2004 12 08.95		B	5.7	TI	5.0	B		15	3	0			KOV02
2004 12 09.03		M	5.3	TI	5.2	B		7	16	5			MAN04
2004 12 09.08		S	5.3	YG	8.0	B		11	15	6	0.2	280	SOU01
2004 12 09.25		M	4.7	HV	0.0	E		1					OME
2004 12 09.55	x	M	5.2	TJ	3.5	B		7	16	6/			NAG08
2004 12 09.71	x	M	4.8	TK	3.5	B		7	22	6/			YOS02
2004 12 09.88		S	5.7	TJ	5.0	B		10					PIL01
2004 12 09.99		B	5.3	HK	6.0	B		12	12	D5			COR01
2004 12 10.00		B	5.3	HK	5.0	B		10	10	D5			RIB
2004 12 10.40		S	5.7	TK	4.5	R	6	13	9	6			JON
2004 12 10.58	x	S	4.9	TK	3.2	B		6	15	6			MOM
2004 12 10.59	x	M	5.0	TJ	3.5	B		7	19	6/			NAG08
2004 12 10.61		S	4.5	YG	7.0	R		10	18	5/			YOS04
2004 12 10.87		S	4.5	TI	0.0	E		1		s6			SCA02
2004 12 10.91		B	4.9	TK	6.0	B		20	8	5			RES
2004 12 10.91		B	5.2	TI	8.0	B		11	10	7	20	m	LAB02
2004 12 10.93		B	4.8	TK	5.0	B		7	14	6			KAR02
2004 12 10.96		M	5.0	TK	5.0	B		10	20	7	1.4	10	GUZ
2004 12 10.96		S	4.9	TK	0.0	E		1	20	6			GUZ
2004 12 10.99		S	5.5	TK	8.0	B		15	14	3			HUR
2004 12 11.00		B	5.0	HK	6.0	B		12	13	D6			COR01
2004 12 11.01		B	4.9	HK	5.0	B		10	12	D6			RIB
2004 12 11.03		B	4.7	GA	8.0	M		20	12	5	16.1m	6	MOR09
2004 12 11.43		S	5.9	TK	4.5	R	6	13	12	5			JON
2004 12 11.50		I	4.3	YG	0.0	E		1	20	7			YOS04
2004 12 11.51		M	4.8	YG	7.0	R		10	17	6			YOS04
2004 12 11.56	x	M	4.6	TK	3.5	B		7	20	6/			YOS02
2004 12 11.59	x	M	5.0	TJ	3.5	B		7	19	6/			NAG08
2004 12 11.75	x	B	4.8	TT	0.0	E		1	27	7			PEA
2004 12 11.75	x	B	4.9	TT	4.0	B		8	22	6	2.6	5	PEA
2004 12 11.83		M	4.8	TK	5.0	B		10	20	7	1.2	10	GUZ
2004 12 11.84		S	4.8	TK	0.0	E		1	20	6			GUZ
2004 12 11.90		B	4.7	TI	8.0	B		11	15	7	1.0		LAB02
2004 12 11.91		S	4.4	TI	0.0	E		1		s6/			SCA02
2004 12 11.95		B	4.8	HV	0.7	E		1	15	5			BIV
2004 12 11.95		B	5.5	TK	8.0	B		11	8	5			WAR01
2004 12 11.97		S	5.0	HV	5.0	B		10	16	5	1.0	0	BIV
2004 12 12.02		S	4.7	TK	5.0	B		7	22	6	2.0	10	GON05

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 12.04		I	4.6	TK	0.0	E		1	25	7			GON05
2004 12 12.07		M	5.0	TI	5.2	B		7	18	5/			MAN04
2004 12 12.41		S	6.0	TK	4.5	R	6	13	12				JON
2004 12 12.73	x	B	4.8	TT	0.0	E		1		7			PEA
2004 12 12.73	x	B	4.9	TT	4.0	B		8	17	6	1.8	1	PEA
2004 12 12.74		B	4.9	AA	6.0	B		15	18	7	2.2	266	BEG01
2004 12 12.75		B	4.5	AA	0.0	E		1	20	7	1.0	265	BEG01
2004 12 12.89		B	4.7	TK	5.0	B		18	14	7	0.9	355	KAR02
2004 12 12.90		B	4.8	TK	5.0	B		10	25	4	0.69	15	HAS02
2004 12 12.90		I	4.9	TK	0.8	E		1					HAS02
2004 12 12.92		S	5.0	HV	5.0	B		10	18	6	1.0	355	BIV
2004 12 12.93		B	4.2	AA	20.0	T	10	77	18	6	24	m 115	TUR
2004 12 12.94		B	4.9	HV	0.7	E		1	15	5			BIV
2004 12 12.97		M	5.0	TK	5.0	B		7	18	5/			GRA04
2004 12 13.00		B	5.3	GA	8.0	M		20	9.5	5	9.6m	346	MOR09
2004 12 13.01		I	4.6	TK	0.0	E		1	25	7			GON05
2004 12 13.02		S	4.7	TK	5.0	B		7	25	6	1.5	10	GON05
2004 12 13.04		S	4.9	YG	5.0	B		7	20	5			SOU01
2004 12 13.09		M	5.0	TI	5.2	B		7	18	6			MAN04
2004 12 13.26		S	4.8	YG	3.0	B		8	20	5			SOU01
2004 12 13.29		M	4.9	YG	8.0	B		11	20	6	0.2	280	SOU01
2004 12 13.50		S	4.4	AA	0.0	E		1					SEA
2004 12 13.53		S	5.0	AA	5.0	B		7	22	5	0.5	355	KAN
2004 12 13.54		B	5.3	AA	5.0	B		7	22	5	0.5	355	KAN
2004 12 13.55	x	M	5.0	HV	3.5	B		7	21	5			MIT
2004 12 13.81		S	4.8	S	5.0	B		10	21	6			CO002
2004 12 13.88		B	4.8	TK	3.2	B		8	25	4			HAS02
2004 12 13.88		I	4.9	TK	0.8	E		1					HAS02
2004 12 13.88		M	4.4	TJ	3.0	B		8	24	6			SHU
2004 12 13.88		S	4.3	TI	0.0	E		1		s7			SCA02
2004 12 13.89		S	5.0	TJ	5.0	B		7	20	5			GIA01
2004 12 13.91	w	M	4.6	TT	0.8	E		1	25	5/	1	0	HOR02
2004 12 13.92		B	4.7	TI	8.0	B		11	15	7	20	m	LAB02
2004 12 13.92		S	4.9	TK	15	L	5	30	11	5			MIC
2004 12 13.92	w	M	4.8	TT	5.0	B		10	23	4/	4.5	0	HOR02
2004 12 13.93		S	4.9	TK	5.0	B		8	10	7			DIE02
2004 12 13.99		S	4.7	YG	5.0	B		7	20	5			SOU01
2004 12 14.03		B	5.2	GA	8.0	M		20	11	5	20.0m	3	MOR09
2004 12 14.25		S	4.7	YG	8.0	B		11	20	6	0.2	285	SOU01
2004 12 14.39		S	5.8	TK	4.5	R	6	13	11				JON
2004 12 14.49	xa	M	4.7	TJ	3.5	B		7	22	6			NAG08
2004 12 14.50		S	4.4	AA	0.0	E		1					SEA
2004 12 14.57	x	S	4.6	TK	4.0	B		8	15	7			MOM
2004 12 14.75	x	B	4.7	TT	0.0	E		1	24	8			PEA
2004 12 14.75	x	B	4.8	TT	4.0	B		8	19	6/	1.5	0	PEA
2004 12 14.85		S	4.7	TJ	5.0	B		10	20	6			PILO1
2004 12 14.87		S	4.7	TK	5.0	B		8	11	7			DIE02
2004 12 14.93		B	4.8	TK	3.2	B		8	25	4			HAS02
2004 12 14.93		I	4.9	TK	0.8	E		1					HAS02
2004 12 14.93		S	4.9	TK	4.0	B		8	&22	6			SCH04
2004 12 14.96		S	4.3	HV	6.3	B		9	18	6	1.0	15	KAM01
2004 12 15.00		B	4.7	HK	6.0	B		12	15	D6			COR01
2004 12 15.00		I	4.5	TK	0.0	E		1	25	7			GON05
2004 12 15.01		B	4.5	HK	5.0	B		10	13	D5			RIB
2004 12 15.01		S	4.6	TK	5.0	B		7	25	6	2.0	20	GON05
2004 12 15.03		B	5.3	GA	8.0	M		20	22	6	26.0m	2	MOR09
2004 12 15.17		B	5.1	HV	5.0	B		12	&12	5/			GRE
2004 12 15.18		S	4.6	HV	3.5	B		7	&12	7			GRE
2004 12 15.19		S	4.7	HV	1.8	B		7	&12	5			GRE
2004 12 15.21		S	4.6	YG	8.0	B		11	20	7	0.2	285	SOU01
2004 12 15.22		S	4.6	YG	3.0	B		8	20	5/			SOU01
2004 12 15.50		S	4.2	AA	0.0	E		1					SEA
2004 12 15.58	x	S	4.5	TK	3.2	B		6	15	7			MOM
2004 12 15.81	w	S	4.5:	S	7	R		12	10	3/	0.3		TIT
2004 12 15.89		B	4.6	TK	6.0	B		20	13	5			RES

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 15.89		M	4.8	TI	25	L	5	50	20	6/	0.3	26	HOR03
2004 12 15.90		B	4.5	TK	5.0	B		10	16	6	1.4	5	KAR02
2004 12 15.90		M	4.6	TK	5.0	B		7	20	5/			SKI
2004 12 15.90	G	M	4.7	TI	0.8	E		1	2	8			HOR03
2004 12 15.91		I	4.5	TK	0.7	E		1					SKI
2004 12 15.93		M	4.6	TI	5.0	B		7	16	7			HOR03
2004 12 15.93		M	4.6	TK	5.0	B		7	18	5/			GRA04
2004 12 15.94		B	5.1	TK	8.0	B		11	10	6			WAR01
2004 12 15.96		S	4.3	HV	6.3	B		9	21	6	0.6	15	KAM01
2004 12 15.97		I	4.6	YG	0.0	E		1					AM001
2004 12 15.97		M	4.7	YG	5.0	B		7	20	6			AM001
2004 12 15.97		S	5.0	TK	8.0	B		11	19	5			ARA
2004 12 16.08		M	4.7	TI	5.2	B		7	20	6	0.2		MAN04
2004 12 16.46		S	4.2	AA	0.0	E		1					SEA
2004 12 16.51	x	S	4.9	HV	5.0	B		7	20	5	&1	5	MIY01
2004 12 16.55		S	4.3	AA	5.0	B		7	21	5	0.6	350	KAN
2004 12 16.56		B	4.6	AA	5.0	B		7	21	5	0.6	350	KAN
2004 12 16.58	x	S	4.4	TK	4.0	B		8	18	6			MOM
2004 12 16.59	x	M	4.5	HV	3.5	B		7	20	5/			MIT
2004 12 16.64	xa	M	4.6	TJ	3.5	B		7	21	6/			NAG08
2004 12 16.75		M	4.3	AA	5.0	B		10	18	6	1.5	240	PRI04
2004 12 16.81		B	4.6	TK	3.2	B		8	27	4			HAS02
2004 12 16.89		B	4.4	TK	6.0	B		20	15	5			RES
2004 12 16.90		M	4.8	AA	6.0	B		15	16	7	50 m	242	BEG01
2004 12 16.93		M	4.4	TK	5.0	B		7	20	5/	1.8	22	BOU
2004 12 16.93		S	4.4	TK	0.0	E		1	>25	6			RIE
2004 12 16.93		S	4.5	TK	5.0	B		8	12	7			DIE02
2004 12 16.94		M	4.5	TK	5.0	B		7	17	6			DIJ
2004 12 16.94		S	4.5:	TK	5.6	B		10	>20	6/	>1.0	25	BUS01
2004 12 16.95		B	4.3	HV	0.7	E		1	15	6			BIV
2004 12 16.95		S	4.8	TK	5.0	B		10	&18	6			COM
2004 12 16.95		S	4.8	TK	5.0	B		10	&18	6			COM
2004 12 16.95		S	5.0	TK	8.0	B		15	18	5	0.6	9	HUR
2004 12 16.96		S	4.4	HV	5.0	B		7	16	5	1.5	20	BIV
2004 12 16.96		S	4.8	TK	8.0	B		11	19	5			ARA
2004 12 16.96		S	4.9	TK	5.0	B		10	18	4	0.3	9	HUR
2004 12 16.97		I	4.7	TK	0.0	E		1					HUR
2004 12 16.97		S	4.6	YG	5.0	B		7	20	5/			SQU01
2004 12 16.99		B	4.6	HV	0.7	E		1	15	6			BIV
2004 12 17.03		B	4.6	HK	5.0	B		10	10	D6			RIB
2004 12 17.03		B	4.6	HK	6.0	B		12	11	D7			COR01
2004 12 17.07		M	4.6	TI	5.2	B		7	20	6			MAN04
2004 12 17.20		S	4.5	YG	3.0	B		8	20	6			SOU01
2004 12 17.21		S	4.6	YG	8.0	B		11	20	6/			SOU01
2004 12 17.41		S	6.0	TK	4.5	R	6	13	10	5			JON
2004 12 17.49		S	4.1	AA	0.0	E		1					SEA
2004 12 17.58	x	M	4.4	TJ	3.5	B		7	21	7			NAG08
2004 12 17.58	x	S	4.3	TK	4.0	B		8	18	6			MOM
2004 12 17.59	x	S	4.5	HV	5.0	B		7	17	5	1.6	5	MIY01
2004 12 17.59	x	S	4.6	HV	0.0	E		1	25	5			MIY01
2004 12 17.62	x	M	4.5	TT	3.5	B		7					TSU02
2004 12 17.72	x	B	4.5	TT	0.0	E		1	30	8			PEA
2004 12 17.72	x	B	4.6	TT	4.0	B		8	18	7	1.3	18	PEA
2004 12 17.84		S	3.9	TI	0.0	E		1	25	s7			SCA02
2004 12 17.89		B	4.5	TI	8.0	B		11	15	7			LAB02
2004 12 17.89		I	4.4	TK	0.7	E		1					GRA04
2004 12 17.89		M	4.3	TK	5.0	B		7	18	6			GRA04
2004 12 17.91		S	4.9	TK	8.0	B		15	18	4	0.5	15	HUR
2004 12 17.93		M	4.7	AA	6.0	B		15	22	7	55 m	248	BEG01
2004 12 17.95		I	4.4	TK	0.0	E		1					HUR
2004 12 17.95		S	4.7	TK	5.0	B		10	18	4			HUR
2004 12 17.96		B	4.4	HV	0.7	E		1	15	5			BIV
2004 12 17.97		S	4.4	HV	5.0	B		7	18	5	1.5	25	BIV
2004 12 17.99		S	4.5	TK	8.0	B		11	17	5/			ARA
2004 12 18.00		S	4.5	TK	5.0	B		10	&20	6			COM

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 18.00		S	4.5	TK	5.0	B		10	&20	6			COM
2004 12 18.42		S	5.2	TK	5.0	B		10	19	3			ZAN01
2004 12 18.49		S	4.1	AA	0.0	E		1					SEA
2004 12 18.60	x	S	4.2	TK	3.2	B		6	20	6			MOM
2004 12 18.61	x	M	4.5	HV	3.5	B		7	21	5/			MIT
2004 12 18.73	x	B	4.4	TT	0.0	E		1	30	7			PEA
2004 12 18.73	x	B	4.5	TT	4.0	B		8	27	7	3.0	35	PEA
2004 12 18.77		M	4.3	AA	5.0	B		10	22	7	1.0	240	PRI04
2004 12 18.80		S	4.5	TK	6.0	B		20	23	5			GON06
2004 12 18.84		B	4.6	TK	3.2	B		8	22	4			HAS02
2004 12 18.85		M	4.4	TT	3.0	B		8	24	5			MAN02
2004 12 18.85		M	5.0	TT	5.0	B		10	20	3			LEH
2004 12 18.85		S	4.5	SC	6.0	B		20	23	5			GON06
2004 12 18.86		S	4.5	TK	7.0	B		11	15	5/			MIC
2004 12 18.87		S	3.9	TI	0.0	E		1	22	s7/			SCA02
2004 12 18.87		S	5.6	TI	36.0	L	4	100	12	S5	0.7	305	CSO
2004 12 18.88	w	M	4.5	TT	0.8	E		1	27	4			HOR02
2004 12 18.89		M	4.3	TK	5.0	B		7	18	6			BOU
2004 12 18.89		M	5.0	TJ	5.0	B		7	18	6			URB01
2004 12 18.89	w	M	4.6	TT	8.0	B		10	22	4/	1.5	15	HOR02
2004 12 18.90		B	4.3	TK	6.0	B		20	11	4/			RES
2004 12 18.91		M	4.4	TK	5.0	B		7	18	6			GRA04
2004 12 18.91		M	4.4	TK	5.0	B		7	20	6	1.3	25	DIJ
2004 12 18.91		M	5.5	TJ	5.0	B		7	15	7			URB01
2004 12 18.93		S	4.4	TK	5.0	B		10	&20	6			COM
2004 12 18.93		S	4.4	TK	5.0	B		10	&20	6			COM
2004 12 18.94		M	4.4	AA	6.0	B		15	26	7	1.1	246	BEG01
2004 12 18.95		S	4.6	TK	4.0	B		8	&25	6/			SCH04
2004 12 18.96		B	5.3	TI	5.0	B		15	3	2			KOV02
2004 12 18.97		S	4.6	TK	8.0	B		11	18	5			ARA
2004 12 18.99		S	4.1	TK	0.0	E		1	&30	6			BUS01
2004 12 18.99		S	4.1	TK	3.0	R	6	6	&25	6/	>1.0	30	BUS01
2004 12 19.01		B	4.3	TI	8.0	B		11	15	7	20 m		LAB02
2004 12 19.73		M	4.5	AA	5.0	B		10	20	7	1.0	260	PRI04
2004 12 19.80		S	4.4	TK	5.0	B		8	16	7			DIE02
2004 12 19.82		M	5.0	TT	5.0	B		10	20	3/			LEH
2004 12 19.82		S	4.0	TI	0.0	E		1	16	s7/			SCA02
2004 12 19.84		M	4.4	TK	5.0	B		7	17	6			DIJ
2004 12 19.85		M	4.7	TT	0.8	E		1	25	7			LEH
2004 12 19.87		M	4.5	TI	5.0	B		7	22	5/			HOR03
2004 12 19.88		G M	4.4	TI	0.8	E		1	7	7/			HOR03
2004 12 19.88	G	S	4.4	TT	0.8	E		1	25	4			HOR02
2004 12 19.89		M	4.3	TK	5.0	B		7	18	6	1.5	27	BOU
2004 12 19.89		M	4.4	TJ	5.0	B		7	15	6			ADA05
2004 12 19.89		M	4.5	TT	8.0	B		10	25	4/	1.5	15	HOR02
2004 12 19.91		M	4.9	TT	6	R		15	25	4			JAN03
2004 12 19.93		S	4.6	TK	5.0	B		10	18	5			HUR
2004 12 19.94		S	5.2	TK	5.0	B		10	19	3			ZAN01
2004 12 19.95		B	5.0	GA	20.3	T		57	11	6	24.4m	13	MOR09
2004 12 19.95		S	4.1	TK	0.0	E		1	25	6			RIE
2004 12 19.96		S	4.7	TK	8.0	B		15	22	4			HUR
2004 12 19.98		B	5.0	TK	8.0	B		11	9	6			WAR01
2004 12 20.00		S	4.5	TK	8.0	B		11	16	6			ARA
2004 12 20.04		S	4.6	TK	4.0	B		8	&25	6			SCH04
2004 12 20.05		B	4.5	HV	0.7	E		1	15	5			BIV
2004 12 20.07		S	4.5	HV	5.0	B		7	15	5	1.6	30	BIV
2004 12 20.10		M	4.2	TI	5.2	B		7	22	5			MAN04
2004 12 20.49	x	M	4.5	TK	3.5	B		7	17	6/			YOS02
2004 12 20.69	x	B	4.4	TT	0.0	E		1		7			PEA
2004 12 20.69	x	B	4.4	TT	4.0	B		8	20	6/	1.5	29	PEA
2004 12 20.79		M	4.8	TT	5.0	B		10	20	3/			LEH
2004 12 20.80		M	4.1	TI	5.0	B		10	17	s3	2	350	SAN07
2004 12 20.80		M	4.6	TT	0.8	E		1	25	7			LEH
2004 12 20.82		M	4.5	AA	3.0	B		8	21	d4	1.5	25	HAD01
2004 12 20.85		S	4.6	TJ	5.0	B		10	15	3			PIL01

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 20.86		S	3.8	TI	3.0	B		8	15	5	0.6	45	TOT03
2004 12 20.87		M	4.4	TI	5.0	B		7	26	5/			HOR03
2004 12 20.87		S	4.4	TK	5.0	B		8	16	7			DIE02
2004 12 20.87	G	S	4.3	TT	0.8	E		1	28	4			HOR02
2004 12 20.88		B	5.2	TI	5.0	B		15	3	2			KOV02
2004 12 20.88		M	4.5	TT	8.0	B		10	26	5			HOR02
2004 12 20.89		M	4.9	TT	6	R		15	25	4			JAN03
2004 12 20.89	G	M	4.3	TI	0.8	E		1	7	7/			HOR03
2004 12 20.90		M	4.2:	TT	3.0	B		8	23	5			MAN02
2004 12 20.91		M	4.5	TJ	3.0	B		8	16	5			ADA05
2004 12 20.94		B	4.4	TI	8.0	B		11	15	7	15	m	LAB02
2004 12 20.97		S	4.7	TK	8.0	B		15	10	4			HUR
2004 12 20.98		S	4.4	TK	5.0	B		10	10	4			HUR
2004 12 20.99		S	4.0	HV	6.3	B		9	13	6	0.7	25	KAM01
2004 12 21.02		M	4.4	TI	5.0	B		10	16	5			ADD
2004 12 21.79		M	4.8	TT	5.0	B		10	20	3/			LEH
2004 12 21.82		S	3.9	TI	0.0	E		1	18	s7/			SCA02
2004 12 21.84		M	4.4	TI	5.0	B		7	21	5			HOR03
2004 12 21.84	G	M	4.3	TI	0.8	E		1	6	7/			HOR03
2004 12 21.85		M	4.8	TT	6	R		15	25	5			JAN03
2004 12 21.86	G	S	4.2	TT	0.8	E		1	25	4/			HOR02
2004 12 21.87		M	4.3	TT	8.0	B		10	25	4/	1.4	15	HOR02
2004 12 21.91		M	4.2	AA	6.0	B		15	30	7	1.1	265	BEG01
2004 12 21.93		M	5.0	TJ	5.0	B		7	20	6			URB01
2004 12 21.94		S	4.6	TJ	5.0	B		10	20	5			PILO1
2004 12 22.00		S	4.3	TK	8.0	B		11	19	6			ARA
2004 12 22.85		M	4.4	TK	5.0	B		10	&15	6			GUZ
2004 12 22.89		S	4.4	TJ	5.0	B		7	20	5			GIA01
2004 12 22.93		S	4.6	TK	8.0	B		15	15	4			HUR
2004 12 22.96		M	4.2	YG	5.0	B		7	16	5/			GRA04
2004 12 23.54		B	4.8	AA	5.0	B		7	18	5	0.5	5	KAN
2004 12 23.54		S	4.2	AA	5.0	B		7	18	5	0.5	5	KAN
2004 12 23.54	x	S	4.4	TK	4.0	B		8	15	6			MOM
2004 12 23.60	x	B	4.4	TT	4.0	B		8	14	6/			PEA
2004 12 23.87		S	4.2	TK	5.0	B		7	15	6			GON05
2004 12 23.88		I	4.0	TK	0.0	E		1	15	7			GON05
2004 12 24.13		M	4.0	TI	5.2	B		7	18	5/			MAN04
2004 12 24.60	x	B	4.3	TT	4.0	B		8	17	7			PEA
2004 12 24.83		B	4.1	TK	6.0	B		20	11	4/			RES
2004 12 24.86		M	4.1	TI	5.0	B		7	19	6			HOR03
2004 12 24.87		M	4.7:	TT	6	R		15	25	5			JAN03
2004 12 24.93		S	3.6	TI	0.0	E		1	22	s7/			SCA02
2004 12 24.93		S	4.0	TK	5.0	B		10	&20	6			COM
2004 12 24.97		M	4.1	YG	5.0	B		7	16	5			AMO01
2004 12 25.08		M	4.0	TI	5.2	B		7	22	6			MAN04
2004 12 25.77		S	5.4	AA	8.0	R	6	19	15				KOS
2004 12 25.77		S	5.5	AA	5.0	B		7	14				KOS
2004 12 25.79		M	4.0	TK	5.0	B		7	18	6			GRA04
2004 12 25.79		M	4.1	TK	5.0	B		7	20	5/			BOU
2004 12 25.84		S	4.2	TK	5.0	B		10	15	4			HUR
2004 12 25.84		S	4.3	TK	8.0	B		15	10	4	0.7	23	HUR
2004 12 25.84	w	S	4.2	S	7	R		12	15	4	0.65		TIT
2004 12 25.88		S	4.6	HV	5.0	B		7	18	6			BIV
2004 12 25.92		S	4.0	TK	4.0	B		8	&20	7			SCH04
2004 12 25.92		S	4.5	HV	5.0	B		7	18	6			BIV
2004 12 25.93		M	4.3	TK	5.0	B		7	18	5/			DIJ
2004 12 26.01		S	4.7	TK	5.0	B		10	25	5			ZAN01
2004 12 26.15		S	4.2	YG	5.0	B		7	15	5			AMO01
2004 12 26.48	x	M	3.8	TJ	3.5	B		7	22	7			NAG08
2004 12 26.51	x	M	4.0	HV	3.5	B		7	22	6			MIT
2004 12 26.76		S	5.0	AA	8.0	R	6	19	12				KOS
2004 12 26.77		S	5.0	AA	0.0	E		1					KOS
2004 12 26.77		S	5.0	AA	5.0	B		7	10				KOS
2004 12 26.78		M	4.1	TK	5.0	B		7	20	6			BCU
2004 12 26.80		S	4.3	TK	5.0	B		20	20	7			DIE02

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 26.81		M	4.0	TK	5.0	B		7	20	6			GRAO4
2004 12 26.84		M	4.0	TI	5.0	B		10	15	s4	0.3	60	SANO7
2004 12 26.86		S	4.5	HV	5.0	B		7	19	6			BIV
2004 12 26.87		S	4.2	TK	8.0	B		15	14	4	1	12	HUR
2004 12 26.88		S	3.8	TI	0.0	E		1	16	s7/			SCAO2
2004 12 26.88		S	3.8	TK	5.0	B		10	&23	6			BUS01
2004 12 26.88		S	4.1	TK	5.0	B		10	14	4			HUR
2004 12 26.91		S	4.7	TK	5.0	B		10	25	5			ZANO1
2004 12 26.97		M	4.2	TK	5.0	B		7	18	5/			DIJ
2004 12 26.97		S	4.4	HV	5.0	B		7	20	6			BIV
2004 12 26.98		M	4.2	TK	5.0	B		10	&20	6			GUZ
2004 12 26.99		M	4.0	TK	0.0	E		1	&20	5			GUZ
2004 12 27.15		S	4.1	YG	5.0	B		7	10	6			AM001
2004 12 27.59	x	S	4.2	TK	4.0	B		8	20	7			MOM
2004 12 27.60		M	3.8	YG	7.0	R		10	18	7			YOS04
2004 12 27.88		S	3.6	TI	0.0	E		1	20	s7/			SCAO2
2004 12 27.94		M	4.0	TK	8.0	B		11	12	6/			ARA
2004 12 27.97		I	4.5	TK	0.0	E		1	&16	4			PERO1
2004 12 27.97		S	4.4	TK	3.4	B		9	16	4/			PERO1
2004 12 28.15		S	4.2	YG	5.0	B		7	15	5			AM001
2004 12 28.54	x	B	4.0	TT	0.0	E		1	26	7			PEA
2004 12 28.54	x	B	4.0	TT	4.0	B		8	16	7			PEA
2004 12 28.74		S	4.2	TK	5.0	B		20	23	8			DIE02
2004 12 28.79		M	4.0	TK	5.0	B		7	20	6			BOU
2004 12 28.80		S	3.5	TI	0.0	E		1	22	s7/			SCAO2
2004 12 28.81		S	4.3	TK	8.0	B		15	16	4			HUR
2004 12 28.82		M	4.0	TJ	3.0	B		8	25	6			ADA05
2004 12 28.82		S	4.1	TK	5.0	B		10	12	4			HUR
2004 12 28.83		S	4.1	TK	5.0	B		10	25	6			ZANO1
2004 12 28.87		S	4.5	HV	5.0	B		7	20	6			BIV
2004 12 28.88		M	4.0	TK	5.0	B		7	20	6			DIJ
2004 12 28.89		S	4.5	HV	5.0	B		7	20	6			BIV
2004 12 28.90		S	3.9	TK	4.0	B		8	&25	6			SCH04
2004 12 28.91		B	4.2:	HV	0.7	E		1	20	5			BIV
2004 12 28.92		M	4.0	TK	8.0	B		11	17	6/			ARA
2004 12 29.00		M	3.9	TJ	3.0	B		8	21	6			ADA05
2004 12 29.42	x	M	4.0	TK	3.5	B		7	25	6			YOS02
2004 12 29.70		M	3.9	YG	7.0	R		10	26	7			YOS04
2004 12 29.72		S	3.5	TK	5.0	B		10	30	4			GON06
2004 12 29.82		I	4.1	TK	0.8	E		1		8			MEY
2004 12 29.82		M	4.1	TK	5.0	B		10	21	D5			MEY
2004 12 29.83		I	4.3	TK	0.0	E		1		7			PERO1
2004 12 29.83		S	4.1	TK	3.4	B		9	15	5			PERO1
2004 12 29.84		B	4.4	TK	8.0	B		11	15	6	0.25	35	WAR01
2004 12 29.84		S	3.5	TI	0.0	E		1	25	s7/			SCAO2
2004 12 29.89		S	3.8:	HV	6.3	B		9	18	7			KAM01
2004 12 29.97		S	4.1	TK	8.0	B		11	17	6			ARA
2004 12 30.00		M	4.3	TJ	5.0	B		7	20	6			URB01
2004 12 30.04		B	4.5	HK	5.0	B		10	8	D6			RIB
2004 12 30.04		B	4.5	HK	6.0	B		12	9	D6			COR01
2004 12 30.12		S	4.1	TK	3.0	B		8	20	6			SOU01
2004 12 30.40		M	3.7	YG	7.0	R		10	24	7			YOS04
2004 12 30.40	x	M	3.9	HV	3.5	B		7	25	6			MIT
2004 12 30.40	x	M	3.9	TJ	3.5	B		7	25	7			NAG08
2004 12 30.43	x	S	3.7	TJ	0.0	E		1		8			NAG08
2004 12 30.43	x	S	3.8	TK	3.0	B		6	25	7			MOM
2004 12 30.43	x	S	4.0	HV	5.0	B		7	17	5	0.5	65	MIY01
2004 12 30.44	x	S	4.1	HV	0.0	E		1	25	5			MIY01
2004 12 30.45		S	3.8	AA	0.0	E		1					SEA
2004 12 30.55	x	B	3.8	TT	0.0	E		1	31	8			PEA
2004 12 30.55	x	B	4.0	TT	4.0	B		8	27	7	2.25	66	PEA
2004 12 30.65		I	3.8	TJ	0.0	E		1	12	6/			KOZ02
2004 12 30.67		S	4.3	AA	0.0	E		1					KOS
2004 12 30.68		S	4.3	AA	5.0	B		7	11				KOS
2004 12 30.69		S	4.2	AA	8.0	R	6	19	11		3	92	KOS

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 30.71		B	4.1	TK	0.7	E		1					GRA04
2004 12 30.71		B	4.3	TK	3.2	B		8	25	4			HAS02
2004 12 30.71		M	4.0	TK	5.0	B		7	24	6			GRA04
2004 12 30.72	G	S	3.8	TT	0.8	E		1	35	5			HOR02
2004 12 30.73		M	3.5	AA	3.0	B		8	28	D4			HAD01
2004 12 30.73		M	4.0	TT	5.0	B		10	28	5	1.4	195	HOR02
2004 12 30.75		M	4.0	TT	0.8	E		1	25	7			LEH
2004 12 30.76		M	4.1	TT	5.0	B		10	20	4			LEH
2004 12 30.76		M	4.2	TI	5.0	B		10	25	6	2.5	70	NAG09
2004 12 30.76		M	4.4	TJ	5.0	B		7	25	4/			URB01
2004 12 30.77		B	3.8	TI	5.0	B		10	20	8	3.0	3	LAB02
2004 12 30.78		B	4.0	TK	0.7	E		1					SKI
2004 12 30.78		M	3.9	TK	5.0	B		7	20	6			SKI
2004 12 30.78		S	4.1	S	5.0	B		10	20	7	50	m 200	CDD02
2004 12 30.81		I	4.1	TK	0.0	E		1					HUR
2004 12 30.81		I	4.2	TK	0.8	E		1					HAS02
2004 12 30.81		S	4.0	TK	5.0	B		10	16	5			HUR
2004 12 30.81		S	4.3	TK	8.0	B		15	24	5	1.4	7	HUR
2004 12 30.82		I	3.7	TK	0.0	E		1	30	7			GON05
2004 12 30.83	G	M	3.8	TI	0.8	E		1	20	6			HOR03
2004 12 30.84		I	4.2	TK	0.0	E		1		5			PER01
2004 12 30.84		S	3.9	TK	5.0	B		7	25	6	2.0	65	GON05
2004 12 30.86		B	3.7	TK	0.0	E		1	&30	7			KAR02
2004 12 30.94		M	3.9	AA	6.0	B		15	34	7	2	61	BEG01
2004 12 30.98		S	3.9	TK	5.0	B		7	15	7			SOU01
2004 12 30.98		S	4.2	TK	8.0	B		11	14	5			ARA
2004 12 31.07		S	3.9	AT	0.0	E		1					DES01
2004 12 31.07		S	4.0	AT	8.0	B		11	25	6/			DES01
2004 12 31.46		S	3.7	AA	0.0	E		1					SEA
2004 12 31.49	x	S	3.8	TK	3.0	B		6	28	7			MOM
2004 12 31.54	x	S	3.9	TJ	3.0	B		6	25	7			END
2004 12 31.55	x	S	3.7	TJ	0.0	E		1		8			END
2004 12 31.55	x	S	3.9	HJ	3.0	B		8	20	7			OHM
2004 12 31.56	x	M	3.8	TK	3.5	B		7	23	6			YOS02
2004 12 31.58	x	B	3.9	TT	0.0	E		1	27	7/			PEA
2004 12 31.58	x	B	4.1	TT	4.0	B		8	17	7	1.2	56	PEA
2004 12 31.65		M	3.7	YG	7.0	R		10	24	7			YOS04
2004 12 31.69		B	4.0	TK	0.0	E		1					WAR01
2004 12 31.70		B	3.9	TK	8.0	B		11	30	6	0.5	60	WAR01
2004 12 31.73		M	4.1	TI	5.0	B		10	25	6			NAG09
2004 12 31.77		M	3.6	TJ	6	R	10	30	20	7			KOZ02
2004 12 31.78		I	3.7	TK	0.0	E		1	30	7			GON05
2004 12 31.78	w	S	3.6	S	7	R		12	25	4	0.75		TIT
2004 12 31.79		S	3.9	TK	5.0	B		7	25	6	2.5	65	GON05
2004 12 31.80		B	3.6	TK	0.0	E		1	&30	7			KAR02
2004 12 31.84		S	3.3	TI	0.0	E		1	30	s7/			SCA02
2004 12 31.90		M	3.8	TK	5.0	B		7	23	7	1.1	58	DIJ
2004 12 31.91		M	3.7	TK	5.0	B		7	25	7	2.7	60	BOU
2004 12 31.91		S	3.6	TK	3.4	R	4	5	&32	7			BUS01
2004 12 31.91		S	3.7	TK	5.6	B		10	&32	7	>1	65	BUS01
2004 12 31.95		B	4.1	HV	0.7	E		1	20	6			BIV
2004 12 31.95		M	3.9	TK	5.0	B		7	23	6			GRA04
2004 12 31.95		S	4.3	HV	5.0	B		7	20	6	1.5	60	BIV
2004 12 31.99		S	4.2	HV	5.0	B		7	20	6	1.5	65	BIV
2005 01 01.02		S	3.7	TK	5.0	B		16	20	4			LOB
2005 01 01.03		S	3.9	TK	5.0	B		7	15	7/	0.5	195	SOU01
2005 01 01.06		M	4.1	TI	5.2	B		7	18	5/			MAN04
2005 01 01.10		S	4.0	AT	0.0	E		1					DES01
2005 01 01.38	x	M	3.9	TK	3.5	B		7	27	6			KON03
2005 01 01.38	x	S	4.1	HV	5.0	B		7	25	5	0.5	105	MIY01
2005 01 01.44	x	B	3.9	HV	0.0	E		1	50	4			MIY01
2005 01 01.46	x	M	3.7	TK	3.5	B		7	25	6			YOS02
2005 01 01.46	x	M	3.9	HV	3.5	B		7	27	6			MIT
2005 01 01.50		I	4.1	YG	0.0	E		1	27	6/			YOS04
2005 01 01.50		M	3.6	YG	7.0	R		10	28	7			YOS04

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 01.50	x	S	3.6	TJ	0.0	E		1	&30	7/			END
2005 01 01.50	x	S	3.8	TJ	3.0	B		6	24	7			END
2005 01 01.50	x	S	3.8	TJ	3.0	B		6	25	7	0.3	70	END
2005 01 01.50	x	S	3.8	TK	3.0	B		6	25	7			MOM
2005 01 01.51		B	4.0	AA	5.0	B		7	26	6			KAN
2005 01 01.51		S	3.8	AA	5.0	B		7	26	6			KAN
2005 01 01.51	x	S	3.6	TJ	0.0	E		1		8			END
2005 01 01.54	x	S	3.7	HJ	3.0	B		8		5			OHM
2005 01 01.58	x	B	3.9	TT	0.0	E		1	27	8			PEA
2005 01 01.58	x	B	4.0	TT	4.0	B		8	15	7	1.0	46	PEA
2005 01 01.63	x	M	3.6	TJ	3.5	B		7	25	7			NAG08
2005 01 01.71		S	3.5	TK	5.0	B		10	30	5			GON06
2005 01 01.72		M	4.0:	AA	5.0	B		10	34	7			PRI04
2005 01 01.76		B	3.9	TI	5.0	B		10	17	7			LAB02
2005 01 01.77		M	3.6	AA	6.0	B		15	30	7	1.2	195	BEG01
2005 01 01.78		I	3.5	HV	0.7	E		1					KAM01
2005 01 01.78		S	4.1	TK	8.0	B		15	16	6	1.4	4	HUR
2005 01 01.79		S	4.1	TK	5.0	B		10	16	5			HUR
2005 01 01.80		I	4.1	TK	0.0	E		1					HUR
2005 01 01.81		S	3.2	TI	0.0	E		1	32	s7/			SCA02
2005 01 01.83		B	3.8	S	0.0	E		1	15	5			MAR02
2005 01 01.84		S	4.1	S	5.0	B		7		5	1	140	TUR
2005 01 01.95		B	4.2	HV	0.7	E		1	20	6			BIV
2005 01 01.96		M	3.8	TK	5.0	B		7	24	7			DIJ
2005 01 02.00		S	3.9	TK	5.0	B		20	23	7			DIE02
2005 01 02.02		M	3.8	TK	5.0	B		7	26	6/			BOU
2005 01 02.39	x	M	3.7	TK	3.5	B		7	27	7			KON03
2005 01 02.40		S	3.7	AA	5.0	B		7	31	6			KAN
2005 01 02.40	x	B	4.0	HV	0.0	E		1	40	5			MIY01
2005 01 02.40	x	S	4.1	HV	5.0	B		7	20	5	0.3	110	MIY01
2005 01 02.41		B	3.9	AA	5.0	B		7	31	6			KAN
2005 01 02.41		M	3.7	YG	7.0	R		10	22	6/			YOS04
2005 01 02.48	x	S	3.7	TK	3.0	B		6	25	6			MOM
2005 01 02.51	x	M	3.8	HV	3.5	B		7	27	6/			MIT
2005 01 02.52	x	B	3.9	HV	5.0	B		10	22	6	2.0	75	NAG04
2005 01 02.54	x	B	3.7	TT	0.0	E		1	32	8			PEA
2005 01 02.54	x	B	4.0	TT	4.0	B		8	29	7	4.4	71	PEA
2005 01 02.69		M	3.7	TK	5.0	B		7	25	5/			GRA04
2005 01 02.71	G	S	3.7	TT	0.8	E		1	35	5/			HOR02
2005 01 02.72		M	3.8	TT	5.0	B		10	30	5	2.2	80	HOR02
2005 01 02.77		M	3.5	AA	0.0	E		1	30	7	1	190	BEG01
2005 01 02.78		S	3.2	TI	0.0	E		1	30	s7/			SCA02
2005 01 02.79		M	3.8	TJ	3.0	B		8	22	7			ADA05
2005 01 02.79		S	3.8	TJ	0.7	E		1					PIL01
2005 01 02.80		M	3.7	TI	5.0	B		7	45	5			HOR03
2005 01 02.80	G	M	3.6	TI	0.8	E		1	25	6			HOR03
2005 01 02.81		I	3.4	TK	0.0	E		1	>30	7			RIE
2005 01 02.81		M	3.6	TK	5.0	B		7	25	7	2.0	65	BOU
2005 01 02.81		M	3.7	TK	5.0	B		7	25	7	2.0	56	DIJ
2005 01 02.81		S	3.9	TK	5.0	B		20	23	7			DIE02
2005 01 02.82		B	4.0	HV	0.7	E		1	25	6			BIV
2005 01 02.82		I	4.3	TK	0.0	E		1		5			PER01
2005 01 02.82		S	4.1	TK	8.0	B		15	22	5			HUR
2005 01 02.83		I	4.1	TK	0.0	E		1	16	5			HUR
2005 01 02.83		S	4.1	TK	5.0	B		10	16	5			HUR
2005 01 02.84		B	3.7	S	0.0	E		1	25	6			MAR02
2005 01 02.85		M	4.2	TT	6	R		15	25	4/			JAN03
2005 01 02.88		S	4.1	HV	5.0	B		7	23	6	2.0	70	BIV
2005 01 02.89					6.3	B		9	23	7	1.0	74	KAM01
2005 01 02.89		M	3.9	TK	5.0	B		10	>20	7			COM
2005 01 02.89		S	3.6	HV	0.7	E		1					KAM01
2005 01 02.90		M	3.9	TJ	5.0	B		7	20	5			URB01
2005 01 02.90		S	3.6	TK	5.6	B		10	&30	7	>0.5	65	BUS01
2005 01 02.91		S	3.5	TK	0.0	E		1	>30	7			BUS01
2005 01 02.91		S	3.5	TK	3.4	R	4	5	&30	7			BUS01

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.	
2005 01 02.94		B	3.7	TI	5.0	B		10	18	7	0.5		LAB02	
2005 01 02.94		B	3.8	YG	0.7	E		1		6			SKI	
2005 01 02.94		M	4.2	AA	6.0	B		15	28	7	2.0	68	BEG01	
2005 01 02.96		I	3.9	TK	0.0	E		1					WAR01	
2005 01 02.97		B	4.3	TK	5.0	B		10	19	4			HAS02	
2005 01 02.97		I	4.3	TK	0.8	E		1					HAS02	
2005 01 03.00		B	4.3	HK	6.0	B		12	12	D6			COR01	
2005 01 03.00		B	4.5	HK	5.0	B		10	10	D6			RIB	
2005 01 03.01		S	4.1	TK	5.0	B		10	30	6	1.3	75	ZAN01	
2005 01 03.58		M	3.7	YG	7.0	R		10	25	7			YOS04	
2005 01 03.58	x	B	3.9	TT	0.0	E		1	27	7/			PEA	
2005 01 03.58	x	B	4.1	TT	4.0	B		8	15	7	1.3	45	PEA	
2005 01 03.69	w	S	3.7	S	7	R		12	25	4	2.5		TIT	
2005 01 03.75		M	3.8	AA	5.0	B		10	28	7	1.2	185	PRI04	
2005 01 03.76		I	3.8	TJ	0.0	E		1	&10	7			KOZ02	
2005 01 03.78		M	4.0	AA	6.0	B		15	32	7	2.1	190	BEG01	
2005 01 03.79		S	3.9	TK	5.0	B		7	27	6	3.2	70	GON05	
2005 01 03.80		I	3.7	TK	0.0	E		1	30	7			GON05	
2005 01 03.80		S	3.1	TI	0.0	E		1	35	s7/			SCA02	
2005 01 03.82		M	4.0	TK	7.0	B		11	20	7			MIC	
2005 01 03.85		I	4.3	TK	0.0	E		1		4/			PER01	
2005 01 03.86		M	3.9	TJ	5.0	B		7	19	4/			URB01	
2005 01 03.86	G	M	3.7	TJ	0.8	E		1					URB01	
2005 01 03.88	w	S	3.5	S	10	B		25	13		0.7		FED03	
2005 01 03.90		B	3.7	S	0.0	E		1	35	6			MAR02	
2005 01 03.95		B	3.5	TI	5.0	B		10	20	8	20	m	LAB02	
2005 01 03.98		B	3.8	TK	0.0	E		1		6			WAR01	
2005 01 04.12		B	4.3	TK	5	R	7	13	25	6	1.5	165	ROB06	
2005 01 04.46		S	3.5	AA	0.0	E		1	20				SEA	
2005 01 04.52	x	B	4.1:	HV	0.0	E		1	25	4			MIY01	
2005 01 04.52	x	M	3.7	HV	3.5	B		7	26	7			MIT	
2005 01 04.52	x	S	4.0:	HV	5.0	B		7	20	5			MIY01	
2005 01 04.56	x	M	4.0	TT	3.5	B		7					TSU02	
2005 01 04.58	x	B	3.8	TT	0.0	E		1	20	8			PEA	
2005 01 04.58	x	B	3.9	TT	4.0	B		8	18	7	1.6	75	PEA	
2005 01 04.73					6.3	B		9	24	6/	1.8	75	KAM01	
2005 01 04.73		S	3.4	HV	0.7	E		1					KAM01	
2005 01 04.75		M	3.6	AA	5.0	B		7	18	7	6.0	82	BEG01	
2005 01 04.75		M	3.8	AA	5.0	B		10	28	7	1	190	PRI04	
2005 01 04.75		S	3.6	TJ	0.7	E		1					PILO1	
2005 01 04.76					8.0	B		20	30	5	1.5	70	PILO1	
2005 01 04.80		M	3.4	TJ	3.0	B		8	20	7			SHU	
2005 01 04.80		S	3.1	TI	0.0	E		1	35	s8			SCA02	
2005 01 04.81		M	3.8	TI	25	L	5	50	30	5	1.2	245	HOR03	
2005 01 04.82		B	3.5	TI	5.0	B		10	20	8	3.0	2	LAB02	
2005 01 04.82		M	3.5	TI	5.0	B		7	25	6	0.2	105	HOR03	
2005 01 04.84		B	4.0	TK	0.8	E		1		7			MEY	
2005 01 04.84		M	4.0	TK	5.0	B		10	20	5			MEY	
2005 01 04.84		S	4.0:	S	5.0	B		10	18	6/	36	m	160	COO02
2005 01 04.84	G	M	3.4	TI	0.8	E		1	14	7			HOR03	
2005 01 04.88		I	3.7	TJ	0.8	E		1	30	7/			ADA05	
2005 01 04.88		S	3.5	TK	5.0	B		10	30	5			GON06	
2005 01 04.89		B	3.5	YG	0.7	E		1		6			SKI	
2005 01 04.89		M	3.5	YG	5.0	B		7	25	6			SKI	
2005 01 04.91		I	4.1	TK	0.8	E		1					HAS02	
2005 01 04.91		M	4.1	TT	6	R		15	25	4	1	70	JAN03	
2005 01 04.95	G	S	3.6	TT	0.8	E		1	35	5/			HOR02	
2005 01 04.96		B	3.6	S	0.0	E		1	40	6/			MAR02	
2005 01 04.96		M	3.5	TT	5	N		1	35	5			HOR02	
2005 01 04.96		M	3.6	TK	0.7	E		1	30	6			GRA04	
2005 01 04.96		M	3.7	TK	5.0	B		7	25	6	0.5	180	GRA04	
2005 01 04.97		M	3.8	TT	5.0	B		10	30	5/	2.7	70	HOR02	
2005 01 04.97		S	4.1	TK	5.0	B		10	16	4			HUR	
2005 01 04.97		S	4.1	TK	8.0	B		15	16	5			HUR	
2005 01 04.98		I	4.0	TK	0.0	E		1					HUR	

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 04.99		M	3.6	TK	5.0	B		7	25	7			BOU
2005 01 05.04		M	3.8	TK	5.0	B		10	&25	7			COM
2005 01 05.04		S	4.1	TK	5.0	B		10	18	6			ZAN01
2005 01 05.40	x	M	3.6	TJ	3.5	B		7	27	7			NAG08
2005 01 05.47		M	3.6	YG	7.0	R		10	28	7			YOS04
2005 01 05.50		S	3.5	AA	0.0	E		1					SEA
2005 01 05.50	x	S	3.6	TK	3.0	B		6	22	7			MOM
2005 01 05.51	x	M	3.7	HV	3.5	B		7	27	7			MIT
2005 01 05.54	x	B	4.1	HV	0.0	E		1	35	5			MIY01
2005 01 05.54	x	S	3.9	HV	5.0	B		7	20	5	1.0	85	MIY01
2005 01 05.57	x	B	3.8	TT	0.0	E		1	21	8			PEA
2005 01 05.57	x	B	4.0	TT	4.0	B		8	17	7	1.55	80	PEA
2005 01 05.70	x	B	3.7	HV	5.0	B		10	22	6			NAG04
2005 01 05.71		M	3.6	TK	0.7	E		1	30	6			GRA04
2005 01 05.71		M	3.7	TK	5.0	B		7	25	6			GRA04
2005 01 05.72		B	3.5	TK	0.0	E		1	40	7			KAR02
2005 01 05.72		M	3.4	TJ	3.0	B		8	22	7			SHU
2005 01 05.78		I	3.9	TK	0.0	E		1					WAR01
2005 01 05.79		B	3.9	TK	2.1	B		8	15	6			WAR01
2005 01 05.88		B	3.6	S	0.0	E		1	35	6/			MAR02
2005 01 05.94		B	3.9	HV	0.7	E		1	25	5			BIV
2005 01 05.97		S	4.0	HV	5.0	B		7	18	6	1.0	80	BIV
2005 01 05.98		I	4.0	TK	0.0	E		1		6			PER01
2005 01 05.99		I	3.8	TK	0.8	E		1					HAS02
2005 01 05.99		M	4.0	TK	3.4	B		9	&20	4			PER01
2005 01 05.99	G	B	4.0	TK	0.0	E		1		6			PER01
2005 01 06.04		M	3.9	TI	5.2	B		7	20	4/			MAN04
2005 01 06.18		S	3.9	AT	0.0	E		1					DES01
2005 01 06.46		S	3.5	AA	0.0	E		1					SEA
2005 01 06.53	x	M	3.6	HV	3.5	B		7	27	7	1.2	80	MIT
2005 01 06.54		M	3.6	YG	7.0	R		10	22	7			YOS04
2005 01 06.55	x	S	3.7	HJ	3.0	B		8	25	5			OHM
2005 01 06.61	x	B	3.5	TK	0.0	E		1		7			YOS02
2005 01 06.61	x	M	3.7	TK	3.5	B		7	23	6/			YOS02
2005 01 06.72		S	3.7	TK	5.0	B		20	24	7			DIE02
2005 01 06.72		S	4.1	TK	5.0	B		10	18	6			ZAN01
2005 01 06.73		M	3.7	TK	5.0	B		7	23	7	2.4	76	DIJ
2005 01 06.76		I	4.0	TK	0.0	E		1					WAR01
2005 01 06.76		M	3.8	TT	5	N		1	30	5/			HOR02
2005 01 06.77					6.3	B		9	23	6/	2.5	80	KAM01
2005 01 06.77		M	3.7	AA	5.0	B		7	21	7	5.4	84	BEG01
2005 01 06.77		S	3.5	HV	0.7	E		1					KAM01
2005 01 06.77		S	3.6	TJ	0.7	E		1					PIL01
2005 01 06.77	G	S	3.9	TT	0.8	E		1	30	6			HOR02
2005 01 06.78					32.0	L		57	30	6	1.4	70	PIL01
2005 01 06.78		I	3.5	TK	0.0	E		1	&25	7			RIE
2005 01 06.78		M	4.0	TT	5.0	B		10	26	6	2.8	80	HOR02
2005 01 06.80		I	3.5	TK	0.0	E		1	32	7			GON05
2005 01 06.81		B	3.5	TI	5.0	B		10	20	8	1.0	2	LAB02
2005 01 06.81		B	3.5	TK	0.8	E		1		7			MEY
2005 01 06.81		M	4.0	TK	5.0	B		10	22	5			MEY
2005 01 06.81		S	3.7	TK	5.0	B		7	27	6	3.3	80	GON05
2005 01 06.82		M	3.7	TI	25	L	5	50	30	5	1.2	240	HOR03
2005 01 06.83		I	3.7	TJ	0.8	E		1	30	6			ADA05
2005 01 06.83		M	3.5	TI	5.0	B		7	23	6	0.3	240	HOR03
2005 01 06.83		M	3.6	TJ	3.0	B		8	25	6/			ADA05
2005 01 06.84		M	3.8	TK	5.0	B		10	&25	7			COM
2005 01 06.84	G	M	3.3	TI	0.8	E		1	16	5/			HOR03
2005 01 06.85		I	3.7	TK	0.8	E		1					HAS02
2005 01 06.89		I	3.6	TK	0.0	E		1	&20	7			SCH04
2005 01 06.89		S	3.7	TK	4.0	B		8	&20	6/			SCH04
2005 01 06.90		B	3.5	S	0.0	E		1	40	6/			MAR02
2005 01 06.94	G	S	3.9	TT	0.8	E		1	30	6			HOR02
2005 01 07.01		I	4.0	TK	0.0	E		1		5			PER01
2005 01 07.07	G	B	4.0	TK	0.0	E		1		5/			PER01

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 07.11		B	3.7	TK	5.0	B		16	23	4	0.33	126	LOB
2005 01 07.42	x	B	3.7	HV	0.0	E		1	35	5			MIY01
2005 01 07.42	x	S	4.3	HV	5.0	B		7	20	5	0.7	85	MIY01
2005 01 07.48		S	3.4	AA	0.0	E		1					SEA
2005 01 07.55	x	M	3.9	TT	0.0	E		1					TSU02
2005 01 07.60	x	M	3.5	HV	3.5	B		7	28	7	0.8	80	MIT
2005 01 07.61		M	3.7	YG	7.0	R		10	27	6			YOS04
2005 01 07.61		S	3.2	YG	0.0	E		1	28	6			YOS04
2005 01 07.66	x	M	3.6	TK	3.5	B		7	23	6/			YOS02
2005 01 07.74		M	3.3	AA	0.0	E		1	28	7	1.5	185	BEG01
2005 01 07.75		M	3.6	AA	5.0	B		7	21	7	5.2	79	BEG01
2005 01 07.76		M	3.8	TK	5.0	B		10	&25	7			COM
2005 01 07.79	G	S	4.0	TT	0.8	E		1	30	6			HOR02
2005 01 07.80		B	3.5	TI	5.0	B		10	20	8	3.0	89	LAB02
2005 01 07.80		M	3.9	TT	5	N		1	30	5/			HOR02
2005 01 07.81		M	3.6	TK	5.0	B		7	23	7	2	77	DIJ
2005 01 07.83		I	3.5	TK	0.0	E		1	32	7			GON05
2005 01 07.83		M	4.0	TT	6	R		15	25	5	0.6	85	JAN03
2005 01 07.83		M	4.1	TT	5.0	B		10	26	6	2.3	80	HOR02
2005 01 07.84		S	3.7	TK	5.0	B		7	27	6	2.6	80	GON05
2005 01 07.86		M	3.5	TI	5.0	B		7	30	5	0.6	190	HOR03
2005 01 07.87		I	3.7	TK	0.8	E		1					HAS02
2005 01 07.87	G	M	3.3	TI	0.8	E		1	17	7			HOR03
2005 01 07.88		I	4.2	TK	0.0	E		1		3/			PER01
2005 01 07.88		M	3.6	TT	0.8	E		1	30	7			LEH
2005 01 07.92		B	3.5	S	0.0	E		1	40	7			MAR02
2005 01 07.94		B	3.9	S	0.0	E		1	12	5			SAN04
2005 01 07.95		M	3.6	TK	5.0	B		7	25	6/	2.5	82	BOU
2005 01 07.96					6.3	B		9	25	6	&1.5	80	KAM01
2005 01 07.96		S	3.6	HV	0.7	E		1					KAM01
2005 01 08.11		S	4.0	YG	5.0	B		7	20	5			AM001
2005 01 08.45		M	3.5	YG	0.0	E		1	36	7/			YOS04
2005 01 08.45	x	S	3.5	HV	0.0	E		1		7			MIT
2005 01 08.47	x	M	3.6	HV	3.5	B		7	28	7	1.5	85	MIT
2005 01 08.48		S	3.5	AA	0.0	E		1					SEA
2005 01 08.48	x	S	3.6	TK	3.0	B		6	25	6			MOM
2005 01 08.50	x	M	3.6	TJ	3.5	B		7	21	7			NAG08
2005 01 08.52	x	M	3.6	TK	3.5	B		7	23	6/			YOS02
2005 01 08.53	x	B	3.4	TK	0.0	E		1	&35	7			YOS02
2005 01 08.53	x	S	3.8	HV	0.0	E		1	35	5			MIY01
2005 01 08.55		M	3.6	YG	2.4	B		10	22	6/			YOS04
2005 01 08.68	x	B	3.9	HV	5.0	B		10	23	6	1.8	90	NAG04
2005 01 08.71		M	3.8	TT	0.8	E		1	25	7			LEH
2005 01 08.72		M	4.0	TT	15	L	8	46	30	6	1.0	92	JAN03
2005 01 08.75		I	3.3	TK	0.0	E		1	&35	7			RIE
2005 01 08.75		M	3.6	AA	5.0	B		10	25	7	2.0	185	PRI04
2005 01 08.75		S	3.7	TK	5.0	B		20	25	7			DIE02
2005 01 08.77		M	3.9	TK	5.0	B		10	28	7			COM
2005 01 08.77		S	4.2	TK	5.0	B		10	40	5			ZAN01
2005 01 08.78		M	3.9	TT	5	N		1	33	5/			HOR02
2005 01 08.79		S	4.0	TK	8.0	B		15	12	4			HUR
2005 01 08.79	G	S	4.0	TT	0.8	E		1	30	6			HOR02
2005 01 08.80		I	3.7	TK	0.0	E		1	17	5			HUR
2005 01 08.80		M	4.0	TT	5.0	B		10	28	5/	1.5	75	HOR02
2005 01 08.80		S	3.9	TK	5.0	B		10	12	4			HUR
2005 01 08.81		M	3.6	TK	5.0	B		7	24	7	1.9	78	DIJ
2005 01 08.83		M	3.4	TI	5.0	B		7	35	5	0.7	190	HOR03
2005 01 08.84		I	3.9	TK	0.0	E		1					JOH01
2005 01 08.84	G	M	3.3	TI	0.8	E		1	25	6/	0.3	190	HOR03
2005 01 08.85		B	3.6	TI	5.0	B		10	20	8	2.5		LAB02
2005 01 08.88		I	3.7	TK	0.0	E		1	&25	7			SCH04
2005 01 08.88		S	3.5	TK	0.0	E		1	&30				BUS01
2005 01 08.89		M	3.9	AA	5.0	B		7	20	7	2.5	71	BEG01
2005 01 08.89		S	3.4	TK	3.4	R	4	5	&30	7			BUS01
2005 01 08.89		S	3.5	TK	5.6	B		10	&27	7	&1	90	BUS01

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 08.92		M	3.5	TK	5.0	B		7	25	6/	2.0	86	BOU
2005 01 08.95		I	4.0	TK	0.0	E		1		3/			PER01
2005 01 09.01		B	4.3	HK	6.0	B		12	15	D6			COR01
2005 01 09.02		B	4.3	HK	5.0	B		10	12	D6			RIB
2005 01 09.02		M	3.6	TJ	3.0	B		8	13	7			SHU
2005 01 09.51	x	B	3.7	HV	0.0	E		1	20	5			MIY01
2005 01 09.52	x	S	3.8	HV	5.0	B		7	20	5	1	85	MIY01
2005 01 09.52	x	S	3.8	TK	3.0	B		6	25	6			MOM
2005 01 09.59		M	3.3	YG	7.0	R		10	24	7			YOS04
2005 01 09.66	w	S	3.5	S	7	R		12	30	3	2		TIT
2005 01 09.71		M	3.8	TT	0.8	E		1	25	7			LEH
2005 01 09.71		M	3.9	TT	5.0	B		7	28	6			JAN03
2005 01 09.72		M	3.5	TK	0.7	E		1	25	6			GRA04
2005 01 09.72		M	3.6	TK	5.0	B		7	20	6/			GRA04
2005 01 09.72		M	3.9	TT	5.0	B		10	20	4			LEH
2005 01 09.73		S	3.7	TK	5.0	B		20	25	6			DIE02
2005 01 09.75		M	3.9	TT	5	N		1	35	5/			HOR02
2005 01 09.76		B	3.6	TK	0.0	E		1	25	7			KAR02
2005 01 09.76	G	S	3.9	TT	0.8	E		1	33	5/			HOR02
2005 01 09.77		M	4.0	TT	5.0	B		10	27	6	4.2	80	HOR02
2005 01 09.79		B	3.7	TK	0.0	E		1					WAR01
2005 01 09.79		M	3.7	TK	5.0	B		10	22	5			MEY
2005 01 09.80	w	S	3.5	S	11	L	7	32	25	3/	1.2	80	SVE01
2005 01 09.81		B	3.3	S	0.0	E		1	40	6/			MAR02
2005 01 09.81		B	3.6	TK	0.8	E		1		7			MEY
2005 01 09.81		I	3.4	TK	0.0	E		1	32	7			GON05
2005 01 09.81		S	3.7	TJ	0.7	E		1					PIL01
2005 01 09.82		S	3.6	TK	5.0	B		7	27	6	2.5	85	GON05
2005 01 09.83		I	3.7	TJ	0.8	E		1	25	6			ADA05
2005 01 09.83		M	3.8	TJ	3.0	B		8	18	5			ADA05
2005 01 09.84	G	M	3.2	TI	0.8	E		1	22	6/	0.3	185	HOR03
2005 01 09.87					5.0	B		10	35	4			HAS02
2005 01 09.87		I	3.7	TK	0.8	E		1					HAS02
2005 01 09.89		M	3.4	TI	5.0	B		7	35	5	0.7	185	HOR03
2005 01 09.96					6.3	B		9	21	6/	1.3	90	KAM01
2005 01 09.96		I	4.0	TK	0.0	E		1		4			PER01
2005 01 09.96		S	3.6	HV	0.7	E		1					KAM01
2005 01 10.02		B	3.8	HV	0.7	E		1	20	5			BIV
2005 01 10.03		S	3.8	HV	5.0	B		7	15	6			BIV
2005 01 10.08		S	4.1	TK	8.0	B		11	20	5	0.2	180	SOU01
2005 01 10.09		S	4.0	TK	5.0	B		7	15	5			SOU01
2005 01 10.40		M	3.5	YG	7.0	R		10	26	7			YOS04
2005 01 10.51	x	M	3.6	HV	3.5	B		7	26	7	1.5	85	MIT
2005 01 10.54	x	B	3.6	TT	0.0	E		1	28	7			PEA
2005 01 10.54	x	B	3.9	TT	4.0	B		8	20	7	2.9	85	PEA
2005 01 10.56	x	B	3.4	HJ	0.0	E		1		5			OHM
2005 01 10.64	x	B	3.9	HV	5.0	B		10	25	6	1.6	100	NAG04
2005 01 10.72		I	3.9	TK	0.0	E		1					JOH01
2005 01 10.72		M	3.8	TT	0.8	E		1	25	7			LEH
2005 01 10.73		M	3.9	TT	5.0	B		10	20	4			LEH
2005 01 10.73		S	3.7	TJ	0.7	E		1					PIL01
2005 01 10.75		I	3.8	TK	0.8	E		1					HAS02
2005 01 10.80		B	3.6	TK	0.8	E		1		7			MEY
2005 01 10.80		M	3.7	TK	5.0	B		10	25	5			MEY
2005 01 10.80		S	3.8:	S	5.0	B		10	13	7			COO02
2005 01 10.83		I	3.8	TJ	0.0	E		1		5			GIA01
2005 01 10.83		M	3.6	TJ	3.0	B		8	12	7			SHU
2005 01 10.83		M	4.0	TJ	0.8	E		1	20	7			ADA05
2005 01 10.83		M	4.1	TJ	3.0	B		8	15	6			ADA05
2005 01 10.84		M	3.4	TI	5.0	B		7	30	5	0.6	175	HOR03
2005 01 10.84	G	M	3.3	TI	0.8	E		1	18	6/			HOR03
2005 01 10.87		M	3.8	TT	5	N		1	35	5/			HOR02
2005 01 10.88	G	S	3.9	TT	0.8	E		1	35	5/			HOR02
2005 01 10.89		B	3.3	S	0.0	E		1	40	6/			MAR02
2005 01 10.89		I	3.9	TK	0.0	E		1					HUR

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 10.89		M	4.0	TT	5.0	B		10	28	6	2.3	80	HOR02
2005 01 10.89		S	3.9	TK	5.0	B		10	18	5			HUR
2005 01 10.89		S	4.1	TK	8.0	B		15	23	4			HUR
2005 01 10.93		B	3.9	TJ	10	B		25	23	7	0.7	79	ADA05
2005 01 10.94		M	4.1	TT	5.0	B		7	25	6			JAN03
2005 01 10.95					6.3	B		9	21	7	2.2	87	KAM01
2005 01 10.95		S	3.6	HV	0.7	E		1					KAM01
2005 01 11.00		B	3.7	YG	0.7	E		1		6			SKI
2005 01 11.45	x	B	3.9	HV	0.0	E		1	30	5			MIY01
2005 01 11.46	x	S	4.0	HV	5.0	B		7	25	5	1	80	MIY01
2005 01 11.50		S	3.7	AA	0.0	E		1					SEA
2005 01 11.56		M	3.5	YG	7.0	R		10	24	7			YOS04
2005 01 11.57	x	B	3.8	TT	0.0	E		1		8			PEA
2005 01 11.57	x	B	4.0	TT	4.0	B		8	15	7			PEA
2005 01 11.72		M	3.7	TJ	3	R		6	12	6/			SHU
2005 01 11.73		M	3.8	TT	5	N		1	35	5/			HOR02
2005 01 11.73	G	S	3.9	TT	0.8	E		1	33	5/			HOR02
2005 01 11.74		I	3.9	TK	0.8	E		1					HAS02
2005 01 11.74		M	4.0	TT	5.0	B		10	27	5/	2.2	80	HOR02
2005 01 11.75		M	3.7	AA	0.0	E		1	20	6	1.0	190	PRI04
2005 01 11.76		M	3.8	AA	5.0	B		7	22	7	3.5	84	BEG01
2005 01 11.78	G	M	3.4	TI	0.8	E		1	18	6			HOR03
2005 01 11.79		I	4.4	TK	0.0	E		1					HUR
2005 01 11.79		S	4.3	TK	5.0	B		10	23	4			HUR
2005 01 11.79		S	4.4	TK	8.0	B		15	23	4			HUR
2005 01 11.82					44	L	4	80	5	4	0.2	94	HUR
2005 01 11.85		B	3.5	TI	5.0	B		10	20	8			LAB02
2005 01 11.85		I	4.0	TJ	0.8	E		1	25	6			ADA05
2005 01 11.85		M	4.1	TJ	3.0	B		8	20	6			ADA05
2005 01 11.90		B	3.3	S	0.0	E		1	40	6			MAR02
2005 01 11.94					6.3	B		9	24	6/	3.0	90	KAM01
2005 01 11.94		S	3.5	TK	5.0	B		10	32	5			GON06
2005 01 11.94		S	3.6	HV	0.7	E		1					KAM01
2005 01 11.98					10.0	R	5	20	25.0	4	>3.0	85	HAS02
2005 01 12.43	x	S	3.9	TK	3.0	B		6	20	7			MOM
2005 01 12.48	x	B	3.5	HV	0.0	E		1	30	5			MIY01
2005 01 12.49	x	S	3.9	HV	5.0	B		7	22	5	0.8	115	MIY01
2005 01 12.53		M	3.6	YG	7.0	R		10	19	6/			YOS04
2005 01 12.53	x	M	3.6	HV	3.5	B		7	23	7	1.7	85	MIT
2005 01 12.74		M	3.7	TK	5.0	B		7	23	7			DIJ
2005 01 12.75		S	3.6	TK	5.0	B		20	25	6			DIE02
2005 01 12.76		M	3.6	TJ	3.0	B		8	12	7			SHU
2005 01 12.76		M	3.8	AA	5.0	B		10	22	7	1.4	182	PRI04
2005 01 12.76		S	3.8	HI	15	L	8	48	14	7			GRI01
2005 01 12.79		B	3.5	TK	0.0	E		1		6			BOU
2005 01 12.79		B	3.6	TK	0.8	E		1		7/			MEY
2005 01 12.79		I	3.4	TK	0.0	E		1	&30	7			RIE
2005 01 12.79		I	4.2	TK	0.0	E		1					HUR
2005 01 12.79		M	3.9	TK	5.0	B		10	18	5			MEY
2005 01 12.79		S	4.1	TK	8.0	B		15	18	4			HUR
2005 01 12.79		S	4.2	TK	5.0	B		10	23	3			HUR
2005 01 12.80		M	3.7	TK	5.0	B		7	22	6/	2.3	83	BOU
2005 01 12.81		B	3.8	HV	0.7	E		1	20	6			BIV
2005 01 12.81		S	4.2	TK	5.0	B		10	20	5			ZAN01
2005 01 12.85		S	3.8	HV	5.0	B		7	20	6	1.0	85	BIV
2005 01 12.86		M	4.2	AA	5.0	B		7	15	7	2.5	86	BEG01
2005 01 12.86		S	3.4	TK	3.4	R	4	5	>30	7			BUS01
2005 01 12.86		S	3.5	TK	0.0	E		1	&30				BUS01
2005 01 12.88		M	4.2	TK	5.0	B		10	&20	6			COM
2005 01 12.88		S	3.6	TK	5.6	B		10	&30	7	>1	85	BUS01
2005 01 12.93		S	3.8	TK	4.0	B		8	&20	7			SCH04
2005 01 12.94		I	3.8	TK	0.0	E		1	&20	7			SCH04
2005 01 12.95		B	3.6	YG	0.7	E		1		6			SKI
2005 01 12.97		I	3.8	YG	0.0	E		1					AMO01
2005 01 12.97		S	3.9	YG	5.0	B		7	20	6			AMO01

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 13.02		M	3.6	TK	0.7	E		1	25	6			GRA04
2005 01 13.02		M	3.8	TK	5.0	B		7	25	6/	0.6	160	GRA04
2005 01 13.53	x	S	3.9	TK	3.0	B		6	18	6			MOM
2005 01 13.57		M	3.6	YG	7.0	R		10	20	6/			YOS04
2005 01 13.57	x	B	3.7	TT	0.0	E		1		8			PEA
2005 01 13.57	x	B	4.0	TT	4.0	B		8	14	7			PEA
2005 01 13.72		M	4.0	TT	0.8	E		1	25	6			LEH
2005 01 13.74		S	3.6	TK	5.0	B		20	25	6			DIE02
2005 01 13.75		M	3.8	AA	5.0	B		10	18	6	1.0	175	PRI04
2005 01 13.75		M	4.0	TJ	3.0	B		8	20	7			SHU
2005 01 13.75	G	S	4.1	TT	0.8	E		1	32	5/			HOR02
2005 01 13.76		M	4.0	TT	5	N		1	35	5/			HOR02
2005 01 13.77		M	4.3	TT	5.0	B		10	24	5	1.2	180	HOR02
2005 01 13.78		I	3.9	TJ	0.8	E		1	22	7			ADA05
2005 01 13.78		M	4.0	TJ	3.0	B		8	20	6			ADA05
2005 01 13.79					44	L	4	80	2	3	0.1	68	HUR
2005 01 13.79		S	4.4	TK	8.0	B		15	8	5			HUR
2005 01 13.80		I	4.2	TK	0.0	E		1					HUR
2005 01 13.80		M	3.6	TK	0.7	E		1	25	6			GRA04
2005 01 13.80		M	3.7	TK	5.0	B		7	27	6/	2.0	165	GRA04
2005 01 13.80		M	3.8	TK	5.0	B		7	24	6/	2.4	84	DIJ
2005 01 13.80		S	4.2	TK	5.0	B		10		5			HUR
2005 01 13.82		M	4.1	TK	5.0	B		10	&20	6/	>1.0		COM
2005 01 13.82		S	3.4	TK	5.0	B		10	31	5			GON06
2005 01 13.83		S	3.9	HV	0.7	E		1					KAM01
2005 01 13.84		M	3.7	TK	5.0	B		7	20	6/			BOU
2005 01 13.86	G	M	3.5	TI	0.8	E		1	16	6/			HOR03
2005 01 13.88		I	3.6	TK	0.0	E		1	&25	7			SCH04
2005 01 13.88		M	4.0	AA	5.0	B		7	15	8	1.2	160	BEG01
2005 01 13.89		S	3.7	TK	4.0	B		8	&25	7			SCH04
2005 01 13.91					6.3	B		9	22	6/	1.0	95	KAM01
2005 01 13.93					10.0	R	5	20	16.0	4	1.6	90	HAS02
2005 01 13.93		M	4.1	TJ	5.0	B		7	27	5			URB01
2005 01 13.94		I	4.0	TK	0.8	E		1					HAS02
2005 01 13.96		B	3.6	TI	5.0	B		10	20	8	40 m		LAB02
2005 01 14.73					10.0	R	5	20	18.6	4	2.3	89	HAS02
2005 01 14.73					10.0	R	5	20	18.6	4	0.35	190	HAS02
2005 01 14.73		B	3.7	TK	3.2	B		8					HAS02
2005 01 14.73		I	3.7	TK	0.8	E		1					HAS02
2005 01 14.80		M	3.9	TK	5.0	B		10	24	6			MEY
2005 01 14.81		B	3.9	TK	0.8	E		1		7/			MEY
2005 01 14.83		M	4.0	AA	0.0	E		1	15	7			PRI04
2005 01 14.85		M	3.7	AA	5.0	B		7	22	7	3.4	89	BEG01
2005 01 14.86		S	3.4	TK	3.4	R	4	5	&30	6/			BUS01
2005 01 14.86		S	3.6	TK	0.0	E		1	&30				BUS01
2005 01 14.86		S	4.3	TK	5.0	B		10	17	6			ZAN01
2005 01 14.86	G	B	3.6	TK	0.0	E		1	35	7			KAR02
2005 01 14.87		S	3.7	TK	5.6	B		10	&30	7	>1	90	BUS01
2005 01 14.88		M	3.7	TK	5.0	B		7	22	7	2.5	92	BOU
2005 01 14.88		M	3.8	TK	5.0	B		7	26	6/	3.0	81	DIJ
2005 01 14.90		M	4.4	TJ	5.0	B		7	25	5/	0.5	75	URB01
2005 01 14.91					6.3	B		9	21	6/	2.2	90	KAM01
2005 01 14.91		S	3.9	HV	0.7	E		1					KAM01
2005 01 14.94		I	3.7	TK	0.0	E		1	&22	7			SCH04
2005 01 14.94		S	3.8	TK	4.0	B		8	&22	7			SCH04
2005 01 14.96		S	3.9	YG	5.0	B		7	15	6			AM001
2005 01 14.97		I	4.0	YG	0.0	E		1					AM001
2005 01 15.01		I	3.8	TK	0.0	E		1	25	7			GON05
2005 01 15.02		S	3.9	TK	5.0	B		7	22	6	1.5	95	GON05
2005 01 15.56	x	B	3.7	TT	4.0	B		8	15	7			PEA
2005 01 15.71		S	3.8	TJ	0.7	E		1					PIL01
2005 01 15.73		M	3.9	TT	5	N		1	30	5/			HOR02
2005 01 15.73		M	4.3	TT	0.8	E		1	25	7			LEH
2005 01 15.74		M	4.5	TT	5.0	B		10	20	4	0.5		LEH
2005 01 15.74	G	S	4.0	TT	0.8	E		1	27	6			HOR02

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 15.75		M	4.2	TT	5.0	B		10	24	5	3.5	90	HOR02
2005 01 15.78		S	3.7	TK	5.0	B		20	25	6			DIE02
2005 01 15.79		B	3.9	TK	0.8	E		1		7			MEY
2005 01 15.79		M	3.9	TK	5.0	B		10	21	D5/			MEY
2005 01 15.80		M	3.6	TI	5.0	B		7	25	5	0.6	90	HOR03
2005 01 15.80	G	M	3.5	TI	0.8	E		1	15	6/			HOR03
2005 01 15.89		S	3.7	TK	0.0	E		1					BUS01
2005 01 15.90		S	3.5	TK	3.4	R	4	5	&27	6/			BUS01
2005 01 15.90		S	3.7	TK	5.6	B		10	&25	7	>1	90	BUS01
2005 01 15.92		M	3.7	TK	5.0	B		7	19	6/	2.0	85	BOU
2005 01 15.92		M	3.9	TK	5.0	B		7	25	6	2.6	89	DIJ
2005 01 15.92		M	4.2	TT	5.0	B		7	25	6			JAN03
2005 01 15.93		I	3.7	TK	0.0	E		1	&25	7			SCH04
2005 01 15.94		B	4.1	HV	0.7	E		1	20	5			BIV
2005 01 15.94		S	3.8	TK	2.7	R	2	3	&25	7			SCH04
2005 01 15.94		S	4.3	TK	5.0	B		10	17	6			ZAN01
2005 01 15.95					6.3	B		9	22	6	2.3	87	KAM01
2005 01 15.95		S	3.9	HV	0.7	E		1					KAM01
2005 01 15.95		S	4.1	HV	5.0	B		7	16	5	0.5	150	BIV
2005 01 15.95	G	M	4.6	TJ	0.8	E		1	25	5			URB01
2005 01 15.96		M	4.3	TJ	5.0	B		7	27	6			URB01
2005 01 15.97		S	4.2	TK	5.0	B		7	15	5			SOU01
2005 01 16.16		M	3.8	TJ	3.0	B		8	16	7			SHU
2005 01 16.55	x	B	3.7	TT	4.0	B		8	15	6/			PEA
2005 01 16.55	x	B	3.8	HV	0.0	E		1	25	5			MIY01
2005 01 16.56	x	S	3.8	HJ	3.0	B		8	20	5			OHM
2005 01 16.58	x	S	3.9	HV	5.0	B		7	20	5	1.2	90	MIY01
2005 01 16.74		M	3.6	TI	5.0	B		7	30	5	0.8	90	HOR03
2005 01 16.74		S	3.8	TJ	0.7	E		1					PIL01
2005 01 16.74		S	4.3	TK	5.0	B		10	17	6			ZAN01
2005 01 16.74		S	4.3	TK	8.0	B		15	15	4			HUR
2005 01 16.74	G	M	3.5	TI	0.8	E		1	15	7			HOR03
2005 01 16.75		I	4.0	TK	0.0	E		1					HUR
2005 01 16.75		S	4.2	TK	5.0	B		10	15	4			HUR
2005 01 16.77		M	3.8	TK	5.0	B		7	18	6/			BOU
2005 01 16.78		M	4.3	TT	0.8	E		1	25	7			LEH
2005 01 16.79		M	4.5	TT	8.0	B		10	20	4	2	100	LEH
2005 01 16.80		M	3.9	TK	0.0	E		1	23	6			DIJ
2005 01 16.80		M	4.0	TT	5	N		1	33	5			HOR02
2005 01 16.81	G	S	4.0	TT	0.8	E		1	30	5/			HOR02
2005 01 16.82		M	4.2	TT	5.0	B		10	25	5/	1.7	90	HOR02
2005 01 16.83		M	4.2	TT	5.0	B		7	25	6			JAN03
2005 01 16.83		S	3.4	TK	5.0	B		10	31	5			GON06
2005 01 16.87		M	4.5	TJ	5.0	B		7	20	6			URB01
2005 01 16.96					6.3	B		9	21	6	1.8	90	KAM01
2005 01 16.96		S	4.0	HV	0.7	E		1					KAM01
2005 01 16.99		M	4.0	YG	5.0	B		7	15	4/			AM001
2005 01 17.03		M	3.8	TJ	3.0	B		8	16	7			SHU
2005 01 17.07		I	3.7	TK	0.0	E		1	25	7			GON05
2005 01 17.08		S	3.9	TK	5.0	B		7	22	6	2.5	98	GON05
2005 01 17.48	x	M	3.8	HV	3.5	B		7	23	7	1.5	100	MIT
2005 01 17.55		S	3.9	YG	7.0	R		10	15	6			YOS04
2005 01 17.57	x	B	4.0	TT	4.0	B		8	12	6			PEA
2005 01 17.59	x	B	3.8	HV	0.0	E		1	25	5			MIY01
2005 01 17.59	x	S	3.9	HV	5.0	B		7	15	5	0.8	90	MIY01
2005 01 17.67		M	3.8	HD	11	B		20	15	6	1	90	NEV
2005 01 17.68		I	4.2	TJ	0.0	E		1	&10	5			SHU
2005 01 17.68		M	3.8	TJ	3.0	B		8	16	7			SHU
2005 01 17.71	x	B	3.9	HV	5.0	B		10	24	5/			NAG04
2005 01 17.73		M	4.4	TT	0.8	E		1	25	7			LEH
2005 01 17.74		M	4.5	TT	5.0	B		10	20	4	0.5		LEH
2005 01 17.74	w	S	3.6	S	7	R		12	30	4	1		TIT
2005 01 17.75		B	3.7	TI	5.0	B		7	25	5/	0.5	90	HOR03
2005 01 17.75		B	4.2	TJ	3.0	B		8	17	5/			ADA05
2005 01 17.75		I	4.1	TJ	0.8	E		1	18	7			ADA05

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 17.75		M	4.4	AA	5.0	B		10	16	6	50	m 170	PRI04
2005 01 17.75	G	M	3.6	TI	0.8	E		1	15	7			HOR03
2005 01 17.87		I	3.9	TK	0.0	E		1					WAR01
2005 01 17.90		M	4.8	TJ	5.0	B		7	18	6/			URB01
2005 01 18.01		M	4.0	TT	5.0	B		10	30	5			HOR02
2005 01 18.02	G	S	4.1	TT	0.8	E		1	27	5			HOR02
2005 01 18.56	x	B	4.2	TT	4.0	B		8	13	6			PEA
2005 01 18.59		S	3.9	YG	7.0	R		10	16	6			YOS04
2005 01 18.73	w	S	3.7	S	20	M	10	40	25	3/	0.8		SVE01
2005 01 18.74		M	4.1	TK	5.0	B		10		6	>0.5		COM
2005 01 18.75		M	3.9	TK	5.0	B		7	18	6/			BOU
2005 01 18.76		B	3.8	TI	5.0	B		10	18	8	30	m	LAB02
2005 01 18.76		M	3.8	TK	5.0	B		7	24	6			DIJ
2005 01 18.78		S	4.2	TK	8.0	B		15	19	3			HUR
2005 01 18.79		I	4.3	TK	0.0	E		1					HUR
2005 01 18.79		S	4.2	TK	5.0	B		10	15	3			HUR
2005 01 18.79		S	4.4	TK	5.0	B		10	15	6			ZAN01
2005 01 18.89		B	4.2	HV	0.7	E		1	16	5			BIV
2005 01 19.03		M	4.0	TK	5.0	B		7	20	6			GRA04
2005 01 19.12		B	4.2	HV	0.7	E		1	15	5			BIV
2005 01 19.12		S	4.2	HV	5.0	B		7	15	5	1.0	80	BIV
2005 01 19.54	x	B	4.4	TT	4.0	B		8	13	6			PEA
2005 01 19.59		S	4.0	YG	7.0	R		10	14	5			YOS04
2005 01 19.75		M	4.0	TK	5.0	B		7	17	6/			BOU
2005 01 19.76		M	4.3	TK	5.0	B		10	&15	6			COM
2005 01 19.78		S	4.0	TK	4.0	B		8	&25	6/			SCH04
2005 01 19.81	G	S	4.1	TT	0.8	E		1	27	4/			HOR02
2005 01 19.82		M	4.4	TT	5.0	B		10	21	5			HOR02
2005 01 19.83	G	M	3.8	TI	0.8	E		1	8	7			HOR03
2005 01 20.55	x	B	4.5	TT	4.0	B		8	12	6			PEA
2005 01 20.57		S	4.0	YG	7.0	R		10	19	6/			YOS04
2005 01 20.58	x	S	5.1	HV	5.0	B		7	22	5	0.8	95	MIY01
2005 01 20.82		B	4.0	TI	5.0	B		10	18	8			LAB02
2005 01 20.97		M	4.0	TK	5.0	B		7	17	5/			DIJ
2005 01 21.44	x	S	5.1	HV	5.0	B		7	15	5	0.5	100	MIY01
2005 01 21.51	x	M	4.0	HV	3.5	B		7	19	7			MIT
2005 01 21.53	x	S	4.2	HJ	3.0	B		8	10	5			OHM
2005 01 21.55	x	B	4.7	TT	8.0	B		20	8	5			PEA
2005 01 21.67		S	4.2	YG	7.0	R		10	13	6			YOS04
2005 01 21.73		M	4.0	TK	5.0	B		7	18	5			DIJ
2005 01 21.75		S	4.8	TJ	5.0	B		10					PIL01
2005 01 21.80		M	4.0	TK	5.0	B		7	16	7			BOU
2005 01 21.92		B	4.1	TI	5.0	B		7	25	5/			HOR03
2005 01 21.92	G	M	4.0	TI	0.8	E		1	10	7/			HOR03
2005 01 22.47		S	4.1	YG	7.0	R		10	16	6/			YOS04
2005 01 22.80		I	4.1	TK	0.0	E		1	20	7			GON05
2005 01 22.81		S	4.2	TK	5.0	B		7	17	6			GON05
2005 01 22.82		M	4.1	TK	5.0	B		7	18	6			BOU
2005 01 22.83		M	4.1	TK	5.0	B		7	17	5			DIJ
2005 01 22.88		M	4.6	TT	0.8	E		1	20	7			LEH
2005 01 22.92		M	4.5	TK	5.0	B		10	&15	5/			COM
2005 01 22.92		S	4.0	TK	5.0	B		10	15	6			GON06
2005 01 22.95		B	4.2	TI	5.0	B		7	25	5/			HOR03
2005 01 22.95	G	M	4.1	TI	0.8	E		1	10	7/			HOR03
2005 01 23.78		S	4.4	HV	5.0	B		7	12	5			BIV
2005 01 23.78	G	S	4.2	TT	0.8	E		1	25	4			HOR02
2005 01 23.79		M	4.5	TT	5.0	B		10	18	4/			HOR02
2005 01 23.80		S	4.5	TK	8.0	B		15	12	4			HUR
2005 01 23.81		S	4.3	TK	5.0	B		10	10	4			HUR
2005 01 23.82		B	4.4	HV	0.7	E		1	15	5			BIV
2005 01 24.64		S	4.1	YG	7.0	R		10	12	7			YOS04
2005 01 24.74		M	4.2	TK	5.0	B		7	15	6			BOU
2005 01 24.77		M	4.2	TK	5.0	B		7	18	5/			DIJ
2005 01 24.81		B	4.4	TI	5.0	B		7	20	5			HOR03
2005 01 24.81		S	4.2	TK	5.0	B		7	17	6	0.4	90	GON05

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 24.82		I	4.2	TK	0.0	E		1	20	7			GON05
2005 01 24.83		S	3.8	TK	4.0	B		8	&20	6/			SCH04
2005 01 25.71		M	4.1	TJ	3.0	B		8	10	5			SHU
2005 01 25.88		B	4.2	TI	8.0	B		11	15	8			LAB02
2005 01 25.88		M	4.2	TK	5.0	B		7	16	6/			BOU
2005 01 25.89		M	4.5	TK	5.0	B		10	&15	5			COM
2005 01 25.90		M	4.4	TK	5.0	B		7	16	5			DIJ
2005 01 26.57		S	4.1	YG	7.0	R		10	13	7			YOS04
2005 01 27.61		M	4.5	TJ	6	R	10	10	14	6/			KOZ02
2005 01 27.76		M	4.4	TT	5.0	B		10	17	4/			HOR02
2005 01 27.77		M	4.6	TK	5.0	B		7	19	6			URB01
2005 01 27.77		S	4.2	TK	5.0	B		10	20	6			GON06
2005 01 27.77	G	S	4.2	TT	0.8	E		1	22	4			HOR02
2005 01 27.79		B	4.2	TI	8.0	B		11	15	7			LAB02
2005 01 28.42	x	B	4.5	HV	5.0	B		10	19	5/			NAG04
2005 01 28.46	x	M	4.2	HV	3.5	B		7	17	7	1.0	130	MIT
2005 01 28.77		M	4.1	TJ	3.0	B		8	19	5/			SHU
2005 01 28.83	G	M	4.7	TK	0.8	E		1	18	5			URB01
2005 01 28.86		M	5.1	TK	5.0	B		7	15	7			URB01
2005 01 29.65		M	4.4	TJ	6	R	10	30	14	7			KOZ02
2005 01 29.69		M	4.2	TJ	3.0	B		8	14	5/			SHU
2005 01 29.73		S	4.3	TK	5.0	B		10	20	6			GON06
2005 01 29.79		B	4.1	TI	5.0	B		10	15	7			LAB02
2005 01 29.86		B	4.6	TI	5.0	B		7	17	5			HOR03
2005 01 30.70		M	4.5	TJ	3.0	B		8	12	4/			SHU
2005 01 30.73	&	M	4.5	AA	6.0	B		15	10	6			BEG01
2005 01 30.79		M	4.5	TT	5.0	B		10	16	5			HOR02
2005 01 30.80	G	S	4.2	TT	0.8	E		1	24	4			HOR02
2005 01 30.84		I	4.2	TK	0.0	E		1	15	8			GON05
2005 01 30.86		B	4.3	TK	5.0	B		7	15	7			GON05
2005 01 30.87	G	M	4.7	TK	0.8	E		1	16	6			URB01
2005 01 30.88		M	4.9	TK	5.0	B		7	14	4			URB01
2005 01 30.96		M	4.3:	TK	5.0	B		7		5			DIJ
2005 01 30.96		S	4.9	TK	7.0	B		11	9	5			MIC
2005 01 31.42	x	M	4.5	HV	3.5	B		7	17	7	0.5	130	MIT
2005 01 31.46	x	S	4.8	HV	5.0	B		7	15	5	0.5	140	MIY01
2005 01 31.53		S	4.4	YG	7.0	R		10	18	7			YOS04
2005 01 31.73	&	M	4.4	AA	6.0	B		15	12	6			BEG01
2005 01 31.73	&	M	4.5	AA	5.0	B		10	8	6			PRI04
2005 01 31.79		M	4.6	TJ	3.0	B		8	&15	6			SHU
2005 01 31.82		M	4.4	TK	5.0	B		7	16	7	1.5	75	BOU
2005 01 31.84		M	4.3	TK	5.0	B		7	15	5			DIJ
2005 01 31.95		I	4.3	TK	0.0	E		1	15	8			GON05
2005 01 31.96		B	4.4	TK	5.0	B		7	15	7	0.6	95	GON05
2005 01 31.96		M	4.7	TK	5.0	B		10	15	6/			COM

Comet C/2004 R2 (ASAS)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 09 12.12	x	S	8.4	TK	30.0	T	10	94	2	3			STR03
2004 09 12.12	x	S	8.9	TK	30.0	T	10	94	2.2	3/			COO02
2004 09 13.71		S	11.1	AU	31.7	L	5	97	3	1			JON
2004 09 15.10		M	8.9	AC	20.0	L	8	72	1.5	4			BEG01
2004 09 18.71		S	9.6	TK	31.7	L	5	64	3	5			JON
2004 09 19.70		S	9.5	TK	31.7	L	5	64	2	5			JON
2004 09 20.72		S	9.2	TK	31.7	L	5	64	2	4			JON
2004 09 27.87	x	S	8.1	TT	20	L	4	45	3	4			PEA
2004 10 16.78		S[10.0	TK	25.6	L	5	42	2				BIV
2004 10 16.78		S[10.5	TK	25.6	L	5	84	1.5				BIV

Comet C/2004 RG_113 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 14.97		S	14.4	HN	31.0	J	6	155	0.6	3			DIJ
2005 01 14.97		S	14.4	HN	31.0	J	6	155	0.5	4			BOU

Comet C/2004 S1 (Van Ness)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 10 17.83		S	13.5	HS	27.0	L	6	167	! 1.0				TOT03

Comet P/2004 T1 (LINEAR-NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 11 09.45		S	13.8	HS	40.0	L	4	144	! 0.6				YOS04
2004 11 15.95		S	13.4	TK	20.3	T	10	100	1.1	3			GON05

Comet C/2004 U1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2004 12 05.98		S	13.2	HS	20.3	L	6	63	0.8	3			GUZ
2004 12 10.99		S	12.8	HS	20.3	L	6	63	1.5	3			GUZ
2004 12 11.59		S	13.4	HS	40.0	L	4	144	0.9	3			YOS04
2004 12 12.13		S	13.2	HS	20.3	L	6	95	0.9	6			BIV
2004 12 12.94		S	13.3	HS	20.3	L	6	95	0.8	4			BIV
2004 12 13.04		S	13.1	HS	20.3	T	10	133	0.6	3			GON05
2004 12 16.97		S	13.2	TA	31.0	J	6	155	1.1	2/			DIJ
2004 12 16.97		S	13.4	TA	31.0	J	6	155	0.7	3			BOU
2005 01 02.86		S	13.1	TA	31.0	J	6	143	1.0	2/			BOU
2005 01 02.86		S	13.2	TA	31.0	J	6	143	0.8	1/			DIJ
2005 01 08.53		S	13.4	UD	40.0	L	4	144	0.9	4			YOS04
2005 01 12.83		S	13.4	GA	31.0	J	6	143	0.7	3			BOU
2005 01 14.94		S	13.5	TA	31.0	J	6	155	0.7	3			BOU
2005 01 14.95		S	13.4	TA	31.0	J	6	155	0.6	3/			DIJ

Comet C/2004 V13 (SWAN)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 03.78		S	10.8	TK	20.3	T	10	77	1.5	3			GON05
2005 01 05.45		S	11.7	GA	25.4	L	4	71					SEA
2005 01 06.46		S	11.6	GA	25.4	L	4	71	1				SEA
2005 01 06.78		S	11.5	TK	20.3	T	10	160	1.5	3			GON05
2005 01 07.48		S	11.9	GA	25.4	L	4	71					SEA
2005 01 07.80		S	11.5	TK	20.3	T	10	100	2	3			GON05
2005 01 08.38		S	10.5	TJ	40.0	L	4	144	1.7	1			YOS04
2005 01 11.72		S	12.2	HS	44.0	L	5	156	2.7	3			HAS02

Comet C/2005 A1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
2005 01 17.25		S	11.6	TK	20.3	T	10	100	2.5	3			GON05
2005 01 20.84		x S	11.8	TK	25.4	L	4	113	1.4	4			YOS02
2005 01 21.82		x S	11.9	TJ	31.7	L	6	63	2.0	3			MIY01
2005 01 22.32		S	11.3	TK	20.3	T	10	77	2.5	3			ROB06

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Non-Visual Data (new format)

TABULATED NON-VISUAL DATA

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

Most of the columns below are as for the visual data (described on pages 24-25 of this issue). While electronic magnitudes *can* be submitted to 0.01 magnitude, for many reasons it is highly advised to continue giving total comet

magnitudes only to 0.1 mag. Similarly, it is advised to continue giving all times to 0.01 day, as 0.001 day is usually unnecessary for cometary photometry.

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

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Comet 9P/Tempel

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.		
2005 01 11.05	d	C	[16.0	LB	6.3M	8	a900						C 1.00m	K40	GAI	5*	ST7	SRB			
2005 01 16.98	d	C	[15.7	LB	6.3M	8	a900						C 1.00m	K40	GAI	5*	ST7	SRB			
2005 01 17.84	ax	C	16.6	HV	35.0C	10	a120	0.2	5	0.5m	270	S	0.70m	KAIa	SI4	5	ST2	TSU02			
2005 01 21.83		C	16.4	GA	60.0Y	6	a240	0.5				260	S	0.5	m	SIA	IPL	5	U	Ap7	NAK01

Comet 29P/Schwassmann-Wachmann

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.		
2004 07 04.01		C	13.6	TK	13.0L	7	a100	0.9	2				S 1.50m	KAIa	A32	3	ST7	RES			
2004 07 23.99		C	14.2	HS	13.0L	7	a216	1.1	1				S 1.50m	KAIa	A32	3	ST7	RES			
2004 07 25.06		C	14.4	HS	13.0L	7	a300	1.2	1				S 1.50m	KAIa	A32	3	ST7	RES			
2004 08 06.99		C	15.5	UD	13.0L	7	a160	1.3	5/				S 1.50m	KAIa	A32	3	ST7	RES			
2004 08 08.00		C	14.3	UD	13.0L	7	a180	1.5	8				S 1.50m	KAIa	A32	3	ST7	RES			
2004 08 22.96		C	15.2	UD	13.0L	7	a180	1.8	2				S 1.50m	KAIa	A32	3	ST7	RES			
2004 08 25.91		C	15.1	UD	13.0L	7	a140	2.2	1/				S 1.50m	KAIa	A32	3	ST7	RES			
2004 09 04.06		C	14.9	UD	13.0L	7	a140	1.5	1				S 1.50m	KAIa	A32	3	ST7	RES			
2004 09 04.97		C	15.3	UD	13.0L	7	a140	1.8	1/				S 1.50m	KAIa	A32	3	ST7	RES			
2004 09 17.88		C	12.5	UD	13.0L	7	a100	0.2	8/				S 1.50m	KAIa	A32	3	ST7	RES			
2004 09 18.87		C	12.9	UD	13.0L	7	a100	0.3	8/				S 1.50m	KAIa	A32	3	ST7	RES			
2004 09 24.88		C	13.5	UD	13.0L	7	a100	0.5	6				S 1.50m	KAIa	A32	2	ST7	RES			
2004 10 12.90	d	C	11.1	LB	6.3M	8	a900	3.2		> 5	m234	C	6.40m	K40	GAI	5*	ST7	SRB			
2004 10 12.90	d	C	11.4	LB	6.3M	8	a900	3.2		> 5	m234	C	3.90m	K40	GAI	5*	ST7	SRB			
2004 10 12.90	d	C	11.5	LB	6.3M	8	a900	3.2		> 5	m234	C	3.20m	K40	GAI	5*	ST7	SRB			
2004 10 12.90	d	C	11.8	LB	6.3M	8	a900	3.2		> 5	m234	C	2.00m	K40	GAI	5*	ST7	SRB			
2004 10 12.90	d	C	12.3	LB	6.3M	8	a900	3.2		> 5	m234	C	1.00m	K40	GAI	5*	ST7	SRB			
2004 10 12.90	d	C	13.1	LB	6.3M	8	a900	3.2		> 5	m234	C	0.50m	K40	GAI	5*	ST7	SRB			
2004 10 19.01	d	k	11.6	LA	35	L	5	a400	2.7		4.3m	224	C	2.70m	T24	GAI	5*P	ST6	HOR02		
2004 10 19.01	d	k	11.8	LA	35	L	5	a400	2.7		4.3m	224	C	2.00m	T24	GAI	5*P	ST6	HOR02		
2004 10 19.01	d	k	12.5	LA	35	L	5	a400	2.7		4.3m	224	C	1.00m	T24	GAI	5*P	ST6	HOR02		
2004 10 19.01	d	k	13.4	LA	35	L	5	a400	2.7		4.3m	224	C	0.50m	T24	GAI	5*P	ST6	HOR02		
2004 11 04.54	ax	C	11.8	HV	35.0C	10	a	90	2.3	7			S	3.14m	KAIa	SI4	5	ST2	TSU02		
2004 11 06.57		C	12.0	GA	60.0Y	6	a120	3.7	s1				S	3.7	m	SIA	IPL	5	U	Ap7	NAK01
2004 11 06.57		c	15.9	GA	60.0Y	6	a120						S10.0	s	SIA	IPL	5	U	Ap7	NAK01	
2004 11 10.82		C	13.1	UD	7.5A	7	a110	1.0	5				S	1.50m	KAIa	A32	3	ST7	RES		
2004 11 16.82		C	13.4	UD	7.5A	7	a	90	1.6	2/			S	1.50m	KAIa	A32	3	ST7	RES		
2004 11 30.45		C	12.4	GA	60.0Y	6	a120	3.5	s1/				S	3.5	m	SIA	IPL	5	U	Ap7	NAK01
2004 11 30.45		c	16.3	GA	60.0Y	6	a120						S10.0	s	SIA	IPL	5	U	Ap7	NAK01	
2004 12 02.49	ax	C	12.0	HV	35.0C	10	a	90	1.6	5			S	2.62m	KAIa	SI4	5	ST2	TSU02		
2004 12 03.52	x	C	15.8	TJ	25.0L	5	a120	0.3					S	0.3	m	K42	SI4	5	U	SE7	OHS
2004 12 04.85	d	k	12.7	LA	35	L	5	a400	2.8				C	2.80m	T24	GAI	5*	ST6	HOR02		
2004 12 04.85	d	k	12.9	LA	35	L	5	a400	2.8				C	2.00m	T24	GAI	5*	ST6	HOR02		
2004 12 04.85	d	k	13.6	LA	35	L	5	a400	2.8				C	1.00m	T24	GAI	5*	ST6	HOR02		
2004 12 04.85	d	k	14.5	LA	35	L	5	a400	2.8				C	0.50m	T24	GAI	5*	ST6	HOR02		

Comet 40P/Väisälä

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 15.99			C 15.3	HS	13.0L	7	a114	& 0.7	4				S 1.50m	KAIaA32	3			ST7	RES
2004 05 21.99			C 14.8	HS	13.0L	7	a 85	0.82	3				S 1.50m	KAIaA32	3			ST7	RES
2004 05 28.98			C 15.2	HS	13.0L	7	a 35	0.7	3				S 1.50m	KAIaA32	3			ST7	RES
2004 06 13.97			C 16.5	UD	13.0L	7	a120	0.35	2				S 1.50m	KAIaA32	3			ST7	RES

Comet 42P/Neujmin

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 07.46	a		C 18.1	GA	60.OY	6	a240	0.35					S 0.35m	SIA	IPL	5	U	Ap7	NAK01

Comet 48P/Johnson

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 07.44	x		C 15.9	TJ	60.OY	6	a120	0.5					S 0.5 m	SIA	IPL	5	U	Ap7	NAK01
2004 11 08.45	axC		C 15.3	HV	35.OY	10	A200	0.3	4				S 0.79m	KAIaSI4	5			ST2	TSU02
2004 12 03.43	wxC		C 15.8	TJ	25.OY	5	a240	0.2					S 0.2 m	K42	SI4	5	U	SE7	OHS

Comet 49P/Arend-Rigaux

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 09.55	x		C 16.1	TJ	25.OY	5	a120	0.3					S 0.3 m	K42	SI4	5	U	SE7	OHS
2004 11 30.46	a		C 15.5	GA	60.OY	6	a120	0.5			1.0m	35	S 0.5 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 06.50	axC		C 15.7	HV	35.OY	10	a120	0.4	5		1.5m	32	S 0.74m	KAIaSI4	5			ST2	TSU02
2004 12 08.46	a		C 15.3	GA	60.OY	6	a120	0.5			1.0m	33	S 0.5 m	SIA	IPL	5	U	Ap7	NAK01

Comet 53P/Van Biesbroeck

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 09 17.96			C 16.2	UD	13.0L	7	a450	0.3	3/				S 1.50m	KAIaA32	3			ST7	RES
2004 12 02.47			C 17.3	GA	60.OY	6	a240	0.45				250	S 0.45m	SIA	IPL	5	U	Ap7	NAK01

Comet 56P/Slaughter-Burnham

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 08 08.05			C 16.7	UD	13.0L	7	a510	0.2	5/				S 1.50m	KAIaA32	3			ST7	RES
2004 09 03.92			C 16.0	UD	13.0L	7	a130	0.4	3				S 1.50m	KAIaA32	3			ST7	RES
2004 09 05.06			C 16.1	UD	13.0L	7	a130	0.3	3				S 1.50m	KAIaA32	3			ST7	RES
2004 09 17.98			C 15.9	UD	13.0L	7	a230	0.5	5				S 1.50m	KAIaA32	2			ST7	RES
2004 09 18.09	d	k	C 15.3	LA	35 L	5	a720	0.62			1.2m	235	C 1.00m	T24	GAI	5*	P	ST6	HOR02
2004 09 18.09	d	k	C 15.5	LA	35 L	5	a720	0.62			1.2m	235	C 0.62m	T24	GAI	5*	P	ST6	HOR02
2004 10 12.97	d		C 15.3	LB	6.3M	8	a900	0.5					C 1.00m	K40	GAI	5*		ST7	SRB
2004 10 12.97	d		C 15.8	LB	6.3M	8	a900	0.5					C 0.50m	K40	GAI	5*		ST7	SRB
2004 11 04.52	axC		C 16.2	HV	35.OY	10	A200	0.3	4				S 0.78m	KAIaSI4	5			ST2	TSU02
2004 11 07.55			C 16.5	GA	60.OY	6	a120	0.4			1.0m	79	S 0.4 m	SIA	IPL	5	U	Ap7	NAK01
2004 11 09.50	x		C 17.2	TJ	25.OY	5	a120	0.2			0.4m	75	S 0.2 m	K42	SI4	5	U	SE7	OHS
2004 12 01.47			C 16.5	GA	60.OY	6	a120	0.5			0.8m	77	S 0.5 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 02.48	axC		C 16.3	HV	35.OY	10	A200	0.3	4		0.8m	76	S 0.99m	KAIaSI4	5			ST2	TSU02
2004 12 06.77			C 15.6	UD	7.5A	7	a350	0.7	3/				S 1.50m	KAIaA32	3			ST7	RES
2004 12 15.74			C 15.8	UD	7.5A	7	a450	0.6	2/				S 1.50m	KAIaA32	3			ST7	RES
2004 12 16.74			C 15.8	UD	7.5A	7	a350	0.6	3				S 1.50m	KAIaA32	3			ST7	RES
2005 01 08.51	x		C 16.2	TJ	25.OY	5	a240	0.3					S 0.3 m	K42	SI4	5	U	SE7	OHS
2005 01 09.48	axC		C 16.3	HV	35.OY	10	a270	0.2	4		0.6m	60	S 0.83m	KAIaSI4	5			ST2	TSU02

Comet 62P/Tsuchinshan

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 12.81			C 13.4	GA	60.OY	6	a120	1.9					S 1.9 m	SIA	IPL	5	U	Ap7	NAK01
2004 11 14.12			C 15.1	UD	13.0L	7	a100	0.9	2				S 1.50m	KAIaA32	3			ST7	RES
2004 12 16.82			C 11.9	GA	60.OY	6	a120	3.7					S 3.7 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 22.05	d		C 12.3	LB	6.3M	8	a900	1.5			> 2	m140	C 3.95m	K40	GAI	5*		ST7	SRB
2004 12 22.05	d		C 12.4	LB	6.3M	8	a900	1.5			> 2	m140	C 2.95m	K40	GAI	5*		ST7	SRB
2004 12 22.05	d		C 12.7	LB	6.3M	8	a900	1.5			> 2	m140	C 2.00m	K40	GAI	5*		ST7	SRB
2004 12 22.05	d		C 13.0	LB	6.3M	8	a900	1.5			> 2	m140	C 1.50m	K40	GAI	5*		ST7	SRB
2004 12 22.05	d		C 13.4	LB	6.3M	8	a900	1.5			> 2	m140	C 1.00m	K40	GAI	5*		ST7	SRB

Comet 78P/Gehrels [cont.]

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 04.89	d	C	12.2	LB	6.3M	8	a900	4.0			> 2	m255	C 0.50m	K40	GAI	5*	ST7	SRB	
2004 12 06.60	axC		10.8	HV	35.0C	10	a120	3.5		5	5	m270	S 4.67m	KAIaSI4	5	ST2	TSU02		
2004 12 11.69	x	C	11.5	TJ	25.0L	5	a120	2.2					S 2.2 m	K42	SI4	5	SE7	OHS	
2004 12 15.84		C	10.9	UO	7.5A	7	a450	1.4		5			S 3.50m	KAIaA32	3	ST7	RES		
2004 12 16.84		C	10.6	UO	7.5A	7	a450	1.3		5/			S 3.50m	KAIaA32	3	ST7	RES		
2004 12 21.94	d	C	11.2	LB	6.3M	8	a900	1.5					C 2.95m	K40	GAI	5*	ST7	SRB	
2004 12 21.94	d	C	11.4	LB	6.3M	8	a900	1.5					C 2.00m	K40	GAI	5*	ST7	SRB	
2004 12 21.94	d	C	11.6	LB	6.3M	8	a900	1.5					C 1.50m	K40	GAI	5*	ST7	SRB	
2004 12 21.94	d	C	12.0	LB	6.3M	8	a900	1.5					C 1.00m	K40	GAI	5*	ST7	SRB	
2004 12 21.94	d	C	12.7	LB	6.3M	8	a900	1.5					C 0.50m	K40	GAI	5*	ST7	SRB	
2005 01 06.83		C	11.2	UO	7.5A	7	a450	1.1		6			S 1.50m	KAIaA32	3	ST7	RES		
2005 01 06.86	d	C	10.8	LB	6.3M	8	a900	> 3.0			> 1	m 67	C 4.45m	K40	GAI	5*	ST7	SRB	
2005 01 06.86	d	C	11.1	LB	6.3M	8	a900	> 3.0			> 1	m 67	C 2.95m	K40	GAI	5*	ST7	SRB	
2005 01 06.86	d	C	12.0	LB	6.3M	8	a900	> 3.0			> 1	m 67	C 1.00m	K40	GAI	5*	ST7	SRB	
2005 01 09.53	axC		11.5	HV	35.0C	10	a120	3.0		5			S 4.45m	KAIaSI4	5	ST2	TSU02		
2005 01 10.89	d	C	10.5	LB	6.3M	8	a900	> 3.5			> 3	m 59	C 3.95m	K40	GAI	5*	ST7	SRB	
2005 01 10.89	d	C	10.5	LB	6.3M	8	a900	> 3.5			> 3	m 59	C 7.90m	K40	GAI	5*	ST7	SRB	
2005 01 10.89	d	C	11.3	LB	6.3M	8	a900	> 3.5			> 3	m 59	C 2.00m	K40	GAI	5*	ST7	SRB	
2005 01 10.89	d	C	12.2	LB	6.3M	8	a900	> 3.5			> 3	m 59	C 1.00m	K40	GAI	5*	ST7	SRB	
2005 01 10.89	d	C	13.1	LB	6.3M	8	a900	> 3.5			> 3	m 59	C 0.50m	K40	GAI	5*	ST7	SRB	
2005 01 16.90	d	C	11.3	LB	6.3M	8	a900	> 3.0			> 3	m 60	C 5.90m	K40	GAI	5*	ST7	SRB	
2005 01 16.90	d	C	11.5	LB	6.3M	8	a900	> 3.0			> 3	m 60	C 3.95m	K40	GAI	5*	ST7	SRB	
2005 01 16.90	d	C	11.6	LB	6.3M	8	a900	> 3.0			> 3	m 60	C 2.95m	K40	GAI	5*	ST7	SRB	
2005 01 16.90	d	C	11.9	LB	6.3M	8	a900	> 3.0			> 3	m 60	C 2.00m	K40	GAI	5*	ST7	SRB	
2005 01 16.90	d	C	12.5	LB	6.3M	8	a900	> 3.0			> 3	m 60	C 1.00m	K40	GAI	5*	ST7	SRB	
2005 01 16.90	d	C	13.3	LB	6.3M	8	a900	> 3.0			> 3	m 60	C 0.50m	K40	GAI	5*	ST7	SRB	

Comet 88P/Howell

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 07 24.07		C	13.3	HS	13.0L	7	a150	0.8		3			S 1.50m	KAIaA32	3	ST7	RES		
2004 08 26.02		C	14.5	UO	13.0L	7	a130	0.8		3/			S 1.50m	KAIaA32	3	ST7	RES		
2004 09 05.04		C	15.0	UO	13.0L	7	a130	0.6		2/			S 1.50m	KAIaA32	3	ST7	RES		
2004 09 18.01		C	14.9	UO	13.0L	7	a120	0.8		4			S 1.50m	KAIaA32	3	ST7	RES		
2004 09 18.96		C	15.3	UO	13.0L	7	a140	0.6		4/			S 1.50m	KAIaA32	3	ST7	RES		
2004 11 04.62	axC		13.6	HV	35.0C	10	a 90	1.0		5	1.5m	246	S 2.38m	KAIaSI4	5	ST2	TSU02		
2004 12 08.49		C	16.1	GA	60.0Y	6	a120	0.65				115	S 0.65m	SIA	IPL	5 U	Ap7	NAK01	

Comet 99P/Kowal

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 16.76		C	19.8	GA	60.0Y	6	a120	0.25					S 0.25m	SIA	IPL	5 U	Ap7	NAK01	

Comet 117P/Helin-Roman-Alu

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 01 21.83	wxC		16.5	TJ	25.0L	5	a240	0.5					S 0.5 m	K42	SI4	5 U	SE7	OHS	
2005 01 28.82	wxC		16.4	TJ	25.0L	5	a240	0.4			?	296	S 0.4 m	K42	SI4	5 U	SE7	OHS	

Comet 118P/Shoemaker-Levy

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 07.95		C	15.6	HS	13.0L	7	a200	0.75		3			S 1.50m	KAIaA32	3	ST7	RES		
2004 05 14.93		C	15.4	HS	13.0L	7	a 30	0.82		1/			S 1.50m	KAIaA32	3	ST7	RES		

Comet 119P/Parker-Hartley

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 09 18.94		C	16.3	UO	13.0L	7	a500	0.2		5			S 1.50m	KAIaA32	2	ST7	RES		
2004 11 04.61	axC		16.8	HV	35.0C	10	A200	0.3		4			S 0.70m	KAIaSI4	5	ST2	TSU02		
2004 11 09.58	x	C	17.2	TJ	25.0L	5	a240	0.2				1.0m	247	S 0.2 m	K42	SI4	5 U	SE7	OHS
2004 12 02.48		C	17.3	GA	60.0Y	6	a240	0.45				1.0m	250	S 0.45m	SIA	IPL	5 U	Ap7	NAK01
2004 12 06.52	axC		17.2	HV	35.0C	10	A200	0.3		4			S 0.70m	KAIaSI4	5	ST2	TSU02		

Comet 120P/Mueller

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 06.61		C	18.9	GA	60.0Y	6	a240	0.3					S 0.3 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 08.50		C	19.4	GA	60.0Y	6	a240	0.25					S 0.25m	SIA	IPL	5	U	Ap7	NAK01

Comet 121P/Shoemaker-Holt

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 09 19.14		C	15.7	UO	13.0L	7	a300	0.2	7				S 1.50m	KA1aA32	2			ST7	RES
2004 11 12.84		C	16.5	GA	60.0Y	6	a120	0.4					S 0.4 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 16.81		C	15.9	GA	60.0Y	6	a120	0.55			1.0m277		S 0.55m	SIA	IPL	5	U	Ap7	NAK01
2004 12 22.03	d	C	15.3	LB	6.3M	8	a900						C 1.00m	K40	GAI	5*		ST7	SRB
2004 12 22.03	d	C	16.0	LB	6.3M	8	a900						C 0.50m	K40	GAI	5*		ST7	SRB
2005 01 06.97		C	15.2	UO	7.5A	7	a550	0.7	4				S 1.50m	KA1aA32	3			ST7	RES
2005 01 11.07	d	C	14.5	LB	6.3M	8	a900	0.8					C 2.00m	K40	GAI	5*		ST7	SRB
2005 01 11.07	d	C	14.8	LB	6.3M	8	a900	0.8					C 1.00m	K40	GAI	5*		ST7	SRB
2005 01 11.07	d	C	15.0	LB	6.3M	8	a900	0.8					C 0.80m	K40	GAI	5*		ST7	SRB
2005 01 11.07	d	C	15.5	LB	6.3M	8	a900	0.8					C 0.50m	K40	GAI	5*		ST7	SRB
2005 01 16.95	d	C	14.3	LB	6.3M	8	a900	0.7					C 2.00m	K40	GAI	5*		ST7	SRB
2005 01 16.95	d	C	14.5	LB	6.3M	8	a900	0.7					C 1.00m	K40	GAI	5*		ST7	SRB
2005 01 16.95	d	C	14.8	LB	6.3M	8	a900	0.7					C 0.75m	K40	GAI	5*		ST7	SRB
2005 01 16.95	d	C	15.2	LB	6.3M	8	a900	0.7					C 0.50m	K40	GAI	5*		ST7	SRB
2005 01 21.80	wxC		15.6	TJ	25.0L	5	a120	0.4					S 0.4 m	K42	SI4	5	U	SE7	OHS

Comet 123P/West-Hartley

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 04 29.93		C	15.7	HS	13.0L	7	a 35	0.53	3				S 1.50m	KA1aA32	3			ST7	RES
2004 05 07.96		C	15.0	HS	13.0L	7	a120	0.90	3/				S 1.50m	KA1aA32	3			ST7	RES
2004 05 14.99		C	14.7	HS	13.0L	7	a 90	1.15	2				S 1.50m	KA1aA32	3			ST7	RES

Comet 129P/Shoemaker-Levy

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 11.55		C	17.3	GA	60.0Y	6	a240	0.35				26	S 0.35m	SIA	IPL	5	U	Ap7	NAK01

Comet 130P/McNaught-Hughes

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 06.40	wxC		18.5	TJ	25.0L	5	a240	0.2					S 0.2 m	K42	SI4	5	U	SE7	OHS

Comet 131P/Mueller

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 09 18.90		C	17.2	UO	13.0L	7	a520	0.1	7/				S 1.50m	KA1aA32	2			ST7	RES
2004 11 07.59		C	18.3	GA	60.0Y	6	a240	0.3					S 0.3 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 01.49		C	18.7	GA	60.0Y	6	a240	0.3					S 0.3 m	SIA	IPL	5	U	Ap7	NAK01

Comet 152P/Helin-Lawrence

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 01.45	a	C	18.4	GA	60.0Y	6	a240	0.35					S 0.35m	SIA	IPL	5	U	Ap7	NAK01

Comet 159P/LONEOS

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 11.63		C	17.6	GA	60.0Y	6	a240	0.35			0.8m256		S 0.35m	SIA	IPL	5	U	Ap7	NAK01

Comet 160P/LINEAR

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 09 30.98	d	k	17.2	LA	35	L	5	a680	0.33				C 0.33m	T24	GAI	5*P		ST6	HORO2
2004 09 30.98	d	k	17.2	LA	35	L	5	a680	0.33				C 0.50m	T24	GAI	5*P		ST6	HORO2
2004 11 04.46		C	18.1	GA	60.0Y	6	a240	0.35			110		S 0.35m	SIA	IPL	5	U	Ap7	NAK01
2004 12 01.43		C	18.4	GA	60.0Y	6	a240	0.35			75		S 0.35m	SIA	IPL	5	U	Ap7	NAK01
2004 12 04.81	d	k	18.0	LA	35	L	5	a680					C 0.25m	T24	GAI	5*		ST6	HORO2

Comet 162P/Siding Spring

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 30.43		C	15.1	GA	60.0Y	6	a120			9			S 0.5 m	SIA	IPL	5	U	Ap7	NAK01
2004 11 30.49	ax	C	15.4	HV	35.0C	10	a 60	< 0.2		9			S 0.70m	KAIa	SI4	5		ST2	TSU02
2004 12 01.75		C	14.3	UD	7.5A	7	a250	0.3		7/			S 1.50m	KAIa	A32	3		ST7	RES
2004 12 04.83	d k		14.5	LA	35 L	5	a520	0.22					C 0.22m	T24	GAI	5*	P	ST6	HOR02
2004 12 04.83	d k		14.5	LA	35 L	5	a520	0.22					C 0.50m	T24	GAI	5*	P	ST6	HOR02
2004 12 04.87	d	C	14.4	LB	6.3M	8	a900						C 0.75m	K40	GAI	5*		ST7	SRB
2004 12 04.87	d	C	14.6	LB	6.3M	8	a900						C 0.50m	K40	GAI	5*		ST7	SRB
2004 12 06.74		C	14.3	UD	7.5A	7	a250	0.2		7/			S 1.50m	KAIa	A32	3		ST7	RES
2004 12 15.92		C	15.2	UD	7.5A	7	a450	0.1		8/			S 1.50m	KAIa	A32	3		ST7	RES
2004 12 16.92		C	15.1	UD	7.5A	7	a250	0.1		8/			S 1.50m	KAIa	A32	3		ST7	RES
2004 12 21.74	d k		14.9	LA	35 L	5	a400	0.27					C 0.27m	T24	GAI	5*	P	ST6	HOR02
2004 12 21.74	d k		14.9	LA	35 L	5	a400	0.27					C 0.50m	T24	GAI	5*	P	ST6	HOR02
2005 01 06.82		C	16.3	UD	13.0L	7	a550	0.1		8			S 1.50m	KAIa	A32	3		ST7	RES
2005 01 09.45	ax	C	16.2	HV	35.0C	10	a 60	< 0.1		9			S 0.38m	KAIa	SI4	5		ST2	TSU02
2005 01 10.96	d	C	15.6	LB	6.3M	8	a900						C 1.00m	K40	GAI	5*		ST7	SRB
2005 01 16.87	d	C	15.8	LB	6.3M	8	a900						C 1.00m	K40	GAI	5*		ST7	SRB

Comet 163P/NEAT

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 07.62		C	18.1	GA	60.0Y	6	a240	0.35					S 0.35m	SIA	IPL	5	U	Ap7	NAK01
2004 11 12.70		C	17.9	GA	60.0Y	6	a240	0.35					S 0.35m	SIA	IPL	5	U	Ap7	NAK01
2004 12 02.54		C	16.9	GA	60.0Y	6	a240	0.4					S 0.4 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 11.51		C	17.0	GA	60.0Y	6	a240	0.4			20		S 0.4 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 17.61	x	C	16.8	TJ	25.0L	5	a240	0.3					S 0.3 m	K42	SI4	5	U	SE7	OHS
2005 01 08.66	x	C	17.3	TJ	25.0L	5	a240	0.2					S 0.2 m	K42	SI4	5	U	SE7	OHS

Comet 164P/Christensen

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 01 06.99		C	16.2	UD	13.0L	7	a550	0.5		3			S 1.50m	KAIa	A32	3		ST7	RES

Comet P/1996 R2 (Lagerkvist)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 12.5		C	21.5		100	L	8	A440										*1	MCN

Comet C/1999 F1 (Catalina)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 02.52	a	C	17.2	GA	60.0Y	6	a240	0.45			1.2m	144	S 0.45m	SIA	IPL	5	U	Ap7	NAK01
2004 12 06.51	wx	C	17.8	TJ	25.0L	5	a300	0.2			1.8m	152	S 0.2 m	K42	SI4	5	U	SE7	OHS

Comet C/2001 G1 (LONEOS)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 28.02		C	16.5	HS	13.0L	7	a 80	0.3		5/			S 1.50m	KAIa	A32	3		ST7	RES

Comet C/2001 HT_50 (LINEAR-NEAT)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 07 23.97		C	15.2	HS	13.0L	7	a220	0.5		3			S 1.50m	KAIa	A32	3		ST7	RES
2004 07 25.02		C	14.9	HS	13.0L	7	a250	0.8		2			S 1.50m	KAIa	A32	3		ST7	RES
2004 08 06.94		C	15.5	UD	13.0L	7	a190	0.6		5			S 1.50m	KAIa	A32	3		ST7	RES
2004 08 07.97		C	14.9	UD	13.0L	7	a185	0.8		4	0.05	12	S 1.50m	KAIa	A32	3		ST7	RES
2004 08 25.89		C	15.4	UD	13.0L	7	a110	0.9		4			S 1.50m	KAIa	A32	3		ST7	RES
2004 09 03.88		C	15.3	UD	13.0L	7	a110	0.8		5			S 1.50m	KAIa	A32	3		ST7	RES
2004 09 05.00		C	15.6	UD	13.0L	7	a110	0.7		5			S 1.50m	KAIa	A32	3		ST7	RES
2004 09 17.91		C	15.0	UD	13.0L	7	a120	0.7		3	0.01	138	S 1.50m	KAIa	A32	3		ST7	RES
2004 09 18.02	d k		13.9	LA	35 L	5	A080	1.6			4.8m	80	C 1.60m	T24	GAI	5*	P	ST6	HOR02
2004 09 18.02	d k		14.1	LA	35 L	5	A080	1.6			4.8m	80	C 1.00m	T24	GAI	5*	P	ST6	HOR02
2004 09 18.02	d k		14.6	LA	35 L	5	A080	1.6			4.8m	80	C 0.50m	T24	GAI	5*	P	ST6	HOR02
2004 09 18.85		C	15.1	UD	13.0L	7	a120	0.7		4			S 1.50m	KAIa	A32	3		ST7	RES
2004 10 12.96	d	C	14.7	LB	6.3M	8	a900	0.9					C 1.00m	K40	GAI	5*		ST7	SRB

Comet C/2001 Q4 (NEAT) [cont.]

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 04.43	a	C	12.0	GA	60.0Y	6	a120	3.2			> 8.3m	226	S 3.2 m	SIA	IPL	5	U	Ap7	NAK01
2004 11 07.44	axC	C	12.8	HV	35.0C	10	a120	1.2		4	1.8m	24	S 1.66m	KAIa	SI4	5		ST2	TSU02
2004 11 21.78		C	11.6	UD	7.5A	7	a110	1.1		5			S 2.50m	KAIa	A32	3		ST7	RES
2004 11 24.81		C	12.3	UD	7.5A	7	a120	1.0		5/			S 2.50m	KAIa	A32	3		ST7	RES
2004 11 30.40	a	C	13.1	GA	60.0Y	6	a120	2.0					S 2.0 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 03.45	x	C	14.2	TJ	25.0L	5	a120	0.5					S 0.5 m	K42	SI4	5	U	SE7	OHS
2004 12 04.79	d	C	12.3	LB	6.3M	8	a900	1.6					C 2.20m	K40	GAI	5*		ST7	SRB
2004 12 04.79	d	C	12.8	LB	6.3M	8	a900	1.6					C 1.70m	K40	GAI	5*		ST7	SRB
2004 12 04.79	d	C	13.4	LB	6.3M	8	a900	1.6					C 1.00m	K40	GAI	5*		ST7	SRB
2004 12 04.79	d	C	14.2	LB	6.3M	8	a900	1.6					C 0.50m	K40	GAI	5*		ST7	SRB
2004 12 06.79		C	12.8	UD	7.5A	7	a150	1.0		4/			S 2.50m	KAIa	A32	3		ST7	RES
2004 12 10.79		C	13.0	UD	7.5A	7	a450	0.9		3/			S 2.50m	KAIa	A32	2		ST7	RES
2004 12 15.78		C	13.5	UD	7.5A	7	a620	0.7		2/			S 2.50m	KAIa	A32	2		ST7	RES
2004 12 16.78		C	13.5	UD	7.5A	7	a620	0.7		2/			S 2.50m	KAIa	A32	2		ST7	RES
2004 12 21.70	d	k	13.1	LA	35	L	5 A560	2.5					C 2.50m	T24	GAI	5*P		ST6	HOR02
2004 12 21.70	d	k	13.2	LA	35	L	5 A560	2.5					C 2.00m	T24	GAI	5*P		ST6	HOR02
2004 12 21.70	d	k	13.6	LA	35	L	5 A560	2.5					C 1.00m	T24	GAI	5*P		ST6	HOR02
2004 12 21.70	d	k	14.3	LA	35	L	5 A560	2.5					C 0.50m	T24	GAI	5*P		ST6	HOR02
2004 12 21.83	d	C	13.1	LB	6.3M	8	a900	1.0					C 2.00m	K40	GAI	5*		ST7	SRB
2004 12 21.83	d	C	13.3	LB	6.3M	8	a900	1.0					C 1.00m	K40	GAI	5*		ST7	SRB
2004 12 21.83	d	C	14.4	LB	6.3M	8	a900	1.0					C 0.50m	K40	GAI	5*		ST7	SRB
2005 01 09.41	axC	C	15.2	HV	35.0C	10	a240	0.3		4			S 0.41m	KAIa	SI4	5		ST2	TSU02
2005 01 10.93	d	C	14.0	LB	6.3M	8	a900	0.8					C 1.50m	K40	GAI	5*		ST7	SRB
2005 01 10.93	d	C	14.5	LB	6.3M	8	a900	0.8					C 1.00m	K40	GAI	5*		ST7	SRB
2005 01 10.93	d	C	15.0	LB	6.3M	8	a900	0.8					C 0.50m	K40	GAI	5*		ST7	SRB
2005 01 16.83	d	C	14.6	LB	6.3M	8	a900	1.0					C 1.50m	K40	GAI	5*		ST7	SRB
2005 01 16.83	d	C	14.7	LB	6.3M	8	a900	1.0					C 1.00m	K40	GAI	5*		ST7	SRB
2005 01 16.83	d	C	15.0	LB	6.3M	8	a900	1.0					C 0.50m	K40	GAI	5*		ST7	SRB

Comet C/2001 T4 (NEAT)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 06.67		C	19.1	GA	60.0Y	6	a240	0.3					S 0.3 m	SIA	IPL	5	U	Ap7	NAK01

Comet C/2002 J4 (NEAT)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 02.50	x	C	17.0	HV	60.0Y	6	a240	0.45					S 0.45m	SIA	IPL	5	U	Ap7	NAK01

Comet C/2002 J5 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 21.03		C	16.7	HS	13.0L	7	a150	0.4		2/			S 1.50m	KAIa	A32	3	1	ST7	RES
2004 09 17.81	d	k	18.7	LA	35	L	5 a600	0.28					C 0.28m	T24	GAI	5*		ST6	HOR02

Comet P/2002 T5 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 01 21.82		C	18.6	GA	60.0Y	6	a240	0.3				260	S 0.3 m	SIA	IPL	5	U	Ap7	NAK01

Comet C/2002 T7 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 16.85	a	C	13.8	GA	60.0Y	6	a120	1.35			> 6.4m	114	S 1.35m	SIA	IPL	5	U	Ap7	NAK01
2005 01 17.80	axC	C	13.0	HV	35.0C	10	a120	2.0		5	> 7.5m	120	S 3.36m	KAIa	SI4	5		ST2	TSU02

Comet C/2002 V2 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 08.48		C	19.4	GA	60.0Y	6	a240	0.3					S 0.3 m	SIA	IPL	5	U	Ap7	NAK01

Comet C/2003 E1 (NEAT)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 07 24.91		C	17.0	UD	13.0L	7	a330	0.1		3			S 1.50m	KAIa	A32	3		ST7	RES

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

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 10 12.86	d	C	13.1	LB	6.3M	8	a900	1.2					C 2.00m	K40	GAI	5*	ST7	SRB	
2004 10 12.86	d	C	13.4	LB	6.3M	8	a900	1.2					C 1.20m	K40	GAI	5*	ST7	SRB	
2004 10 12.86	d	C	13.5	LB	6.3M	8	a900	1.2					C 1.00m	K40	GAI	5*	ST7	SRB	
2004 10 12.86	d	C	14.3	LB	6.3M	8	a900	1.2					C 0.50m	K40	GAI	5*	ST7	SRB	
2004 10 19.06	d	k	12.8	LA	35 L	5	a600	2.3					C 2.30m	T24	GAI	5*P	ST6	HOR02	
2004 10 19.06	d	k	13.2	LA	35 L	5	a600	2.3					C 1.00m	T24	GAI	5*P	ST6	HOR02	
2004 10 19.06	d	k	13.8	LA	35 L	5	a600	2.3					C 0.50m	T24	GAI	5*P	ST6	HOR02	
2004 11 21.69	C		12.0	UO	7.5A	7	a120	1.4		3/			S 2.50m	KAIaA32	3		ST7	RES	
2004 11 24.73	C		11.9	UO	7.5A	7	a110	1.4		3/			S 2.50m	KAIaA32	3		ST7	RES	
2004 11 30.38	x	C	12.5	TJ	60.0Y	6	a120	1.8			> 6.2m357		S 1.8 m	SIA	IPL	5 U	Ap7	NAK01	
2004 12 03.42	wxC		13.1	TJ	25.0L	5	a120	0.8					S 0.8 m	K42	SI4	5 U	SE7	OHS	
2004 12 04.77	d	C	11.8	LB	6.3M	8	a900	2.0					C 2.95m	K40	GAI	5*	ST7	SRB	
2004 12 04.77	d	C	12.0	LB	6.3M	8	a900	2.0					C 2.00m	K40	GAI	5*	ST7	SRB	
2004 12 04.77	d	C	12.5	LB	6.3M	8	a900	2.0					C 1.00m	K40	GAI	5*	ST7	SRB	
2004 12 04.77	d	C	13.2	LB	6.3M	8	a900	2.0					C 0.50m	K40	GAI	5*	ST7	SRB	
2004 12 06.72	C		11.4	UO	7.5A	7	a150	1.7		4			S 2.50m	KAIaA32	3		ST7	RES	
2004 12 06.72	C		11.4	UO	7.5A	7	a150	1.7		4			S 2.50m	KAIaA32	3		ST7	RES	
2004 12 15.73	C		11.4	UO	7.5A	7	a150	1.4		5			S 2.50m	KAIaA32	3		ST7	RES	
2004 12 16.71	C		11.2	UO	7.5A	7	a150	1.5		5			S 2.50m	KAIaA32	3		ST7	RES	
2005 01 21.85	wxC		10.6	TJ	25.0L	5	a120	3.0			3.5m348		S 3.0 m	K42	SI4	5 U	SE7	OHS	

Comet C/2003 WT_42 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 09 05.09	C		16.4	UO	13.0L	7	a110	0.5		3			S 1.50m	KAIaA32	3		ST7	RES	
2004 09 19.05	C		16.9	UO	13.0L	7	a420	0.4		3/			S 1.50m	KAIaA32	3		ST7	RES	
2004 11 12.73	C		15.5	GA	60.0Y	6	a120	0.45					S 0.45m	SIA	IPL	5 U	Ap7	NAK01	
2004 12 11.53	C		15.4	GA	60.0Y	6	a120	0.45					S 0.45m	SIA	IPL	5 U	Ap7	NAK01	
2005 01 05.73	C		14.5	UO	7.5A	7	a330	0.8		5			S 1.50m	KAIaA32	3		ST7	RES	
2005 01 06.75	C		14.1	UO	7.5A	7	a550	0.8		5/			S 1.50m	KAIaA32	3		ST7	RES	

Comet C/2004 B1 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 09.60	x	C	16.3	TJ	25.0L	5	a120	0.2			0.4m327		S 0.2 m	K42	SI4	5 U	SE7	OHS	
2004 11 12.74	C		16.3	GA	60.0Y	6	a120	0.4			0.6m341		S 0.4 m	SIA	IPL	5 U	Ap7	NAK01	
2004 12 11.59	a	C	15.9	GA	60.0Y	6	a120	0.45			0.7m 9		S 0.45m	SIA	IPL	5 U	Ap7	NAK01	
2004 12 11.75	x	C	16.3	TJ	25.0L	5	a240	0.3					S 0.3 m	K42	SI4	5 U	SE7	OHS	
2004 12 16.91	C		15.3	UO	7.5A	7	a610	0.8		4			S 2.50m	KAIaA32	3		ST7	RES	
2004 12 17.66	x	C	15.8	TJ	25.0L	5	a240	0.3					S 0.3 m	K42	SI4	5 U	SE7	OHS	

Comet C/2004 D1 (NEAT)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 11.57	C		17.5	GA	60.0Y	6	a240	0.35			0.4m217		S 0.35m	SIA	IPL	5 U	Ap7	NAK01	

Comet C/2004 DZ_61 (Catalina-LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 27.94	C		17.4	UO	13.0L	7	a204	0.1		8/			S 1.50m	KAIaA32	3		ST7	RES	

Comet P/2004 F3 (NEAT)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 07.97	C		15.2	HS	13.0L	7	a200	0.54		5			S 1.50m	KAIaA32	3		ST7	RES	
2004 05 14.97	C		15.0	HS	13.0L	7	a 60	0.53		6/			S 1.50m	KAIaA32	3		ST7	RES	
2004 05 21.97	C		15.0	HS	13.0L	7	a100	0.45		3			S 1.50m	KAIaA32	3		ST7	RES	

Comet C/2004 F4 (Bradfield)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 01.09	C		6.4	TI	13.0L	7	a 7	1.8		6	0.5	315	S 1.50m	KAIaA32	3		ST7	RES	
2004 05 02.09	C		6.4	TI	5.8R		a 7	2		6	1.0	302	S 5.00m	KAIaA32	3		ST7	RES	
2004 05 08.09	C		9.3	TI	13.0L	7	a 15	1.4		5	0.1	302	S 1.50m	KAIaA32	3		ST7	RES	
2004 05 16.04	C		11.3	TI	13.0L	7	a 50	1.2		6	0.28	300	S 1.50m	KAIaA32	3		ST7	RES	

Comet C/2004 F4 (Bradfield) [cont.]

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 27.02		C	13.2	HS	13.0L	7	a	80	1.4	3			S 1.50m	KA1aA32	3			ST7	RES
2004 05 29.01		C	14.2	HS	13.0L	7	a	77	1.1	3	0.17	316	S 1.50m	KA1aA32	3			ST7	RES
2004 05 30.03		C	14.2	HS	13.0L	7	a	170	0.80	7	0.2	316	S 1.50m	KA1aA32	3			ST7	RES
2004 06 13.99		C	15.8	HS	13.0L	7	a	120	0.7	4			S 1.50m	KA1aA32	3			ST7	RES

Comet C/2004 G1 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 08.00		C	15.8	HS	13.0L	7	a	200	0.49	2			S 1.50m	KA1aA32	3			ST7	RES
2004 05 15.03		C	15.4	HS	13.0L	7	a	60	0.55	3			S 1.50m	KA1aA32	3			ST7	RES

Comet C/2004 H6 (SWAN)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 07 24.99		C	12.5	TK	13.0L	7	a	205	2.3	0/			S 1.50m	KA1aA32	3			ST7	RES
2004 08 07.04		C	13.4	UO	13.0L	7	a	260	2.3	0/			S 1.50m	KA1aA32	3			ST7	RES
2004 08 22.92		C	14.6	UO	13.0L	7	a	220	0.4	0/			S 1.50m	KA1aA32	3			ST7	RES

Comet P/2004 HC_18 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 05 28.96		C	16.5	UO	13.0L	7	a	84	0.47	2			S 1.50m	KA1aA32	3	1		ST7	RES
2004 08 22.89		C	16.1	UO	13.0L	7	a	60	0.3	3			S 5.00m	KA1aA32	3			ST7	RES

Comet C/2004 K1 (Catalina)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 07 24.01		C	16.3	UO	13.0L	7	a	330	0.1	7			S 1.50m	KA1aA32	3			ST7	RES

Comet P/2004 K2 (McNaught)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 06.63		C	18.8	GA	60.0Y	6	a	240	0.3				S 0.3 m	SIA	IPL	5	U	Ap7	NAK01
2004 12 08.53		C	19.8	GA	60.0Y	6	a	240	0.25				S 0.25m	SIA	IPL	5	U	Ap7	NAK01
2004 12 11.50		C	20.0	GA	60.0Y	6	a	240	0.25				S 0.25m	SIA	IPL	5	U	Ap7	NAK01

Comet C/2004 P1 (NEAT)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 11 04.44		C	19.8	GA	60.0Y	6	a	240	0.3				S 0.3 m	SIA	IPL	5	U	Ap7	NAK01

Comet C/2004 Q1 (Tucker)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 09 04.00		C	14.1	UO	13.0L	7	a	20	1.1	6			S 1.50m	KA1aA32	3			ST7	RES
2004 09 04.01		C	14.3	UO	13.0L	7	a	130	1.0	6			S 1.50m	KA1aA32	3			ST7	RES
2004 09 17.99		C	13.6	UO	13.0L	7	a	55	1.2	6			S 1.50m	KA1aA32	2			ST7	RES
2004 09 18.98		C	13.9	UO	13.0L	7	a	60	1.3	6			S 1.50m	KA1aA32	2			ST7	RES
2004 09 24.93		C	13.7	UO	13.0L	7	a	40	1.3	6			S 1.50m	KA1aA32	3			ST7	RES
2004 10 09.83	d	k	10.7	LA	35	L	5	a440	3.8		> 6	m201	C 3.80m	T24	GAI	5*P		ST6	HOR02
2004 10 09.83	d	k	11.0	LA	35	L	5	a440	3.8		> 6	m201	C 2.00m	T24	GAI	5*P		ST6	HOR02
2004 10 09.83	d	k	11.5	LA	35	L	5	a440	3.8		> 6	m201	C 1.00m	T24	GAI	5*P		ST6	HOR02
2004 10 09.83	d	k	12.1	LA	35	L	5	a440	3.8		> 6	m201	C 0.50m	T24	GAI	5*P		ST6	HOR02
2004 10 11.92	d	k	10.5	LA	35	L	5	a360	5.5		> 6	m201	C 5.50m	T24	GAI	5*P		ST6	HOR02
2004 10 11.92	d	k	10.6	LA	35	L	5	a360	5.5		> 6	m201	C 4.00m	T24	GAI	5*P		ST6	HOR02
2004 10 11.92	d	k	11.0	LA	35	L	5	a360	5.5		> 6	m201	C 2.00m	T24	GAI	5*P		ST6	HOR02
2004 10 11.92	d	k	11.5	LA	35	L	5	a360	5.5		> 6	m201	C 1.00m	T24	GAI	5*P		ST6	HOR02
2004 10 11.92	d	k	12.1	LA	35	L	5	a360	5.5		> 6	m201	C 0.50m	T24	GAI	5*P		ST6	HOR02
2004 10 12.92	d	C	10.6	LB	6.3M	8	a	900	3.8		> 6	m190	C 6.90m	K40	GAI	5*		ST7	SRB
2004 10 12.92	d	C	10.8	LB	6.3M	8	a	900	3.8		> 6	m190	C 3.95m	K40	GAI	5*		ST7	SRB
2004 10 12.92	d	C	11.1	LB	6.3M	8	a	900	3.8		> 6	m190	C 2.00m	K40	GAI	5*		ST7	SRB
2004 10 12.92	d	C	11.7	LB	6.3M	8	a	900	3.8		> 6	m190	C 1.00m	K40	GAI	5*		ST7	SRB
2004 10 12.92	d	C	12.4	LB	6.3M	8	a	900	3.8		> 6	m190	C 0.50m	K40	GAI	5*		ST7	SRB
2004 10 17.81	d	k	10.3	LA	35	L	5	a400	5.4		> 9.0m	189	C 5.40m	T24	GAI	5*P		ST6	HOR02
2004 10 17.81	d	k	10.4	LA	35	L	5	a400	5.4		> 9.0m	189	C 4.00m	T24	GAI	5*P		ST6	HOR02

Comet C/2004 U1 (LINEAR)

Table with columns: DATE (UT), n, M, MAG., RF, AP., T, f/, EXP., COMA, DC, TAIL, PA, APERTUR, Chp, Sfw, C, P, Cam, OBS. Contains multiple rows of comet observation data for C/2004 U1.

Comet P/2004 V1 (Skiff)

Table with columns: DATE (UT), n, M, MAG., RF, AP., T, f/, EXP., COMA, DC, TAIL, PA, APERTUR, Chp, Sfw, C, P, Cam, OBS. Contains multiple rows of comet observation data for P/2004 V1.

Comet P/2004 V5 (LINEAR-Hill) [component A]

Table with columns: DATE (UT), n, M, MAG., RF, AP., T, f/, EXP., COMA, DC, TAIL, PA, APERTUR, Chp, Sfw, C, P, Cam, OBS. Contains multiple rows of comet observation data for P/2004 V5 component A.

Comet P/2004 V5 (LINEAR-Hill) [component B]

Table with columns: DATE (UT), n, M, MAG., RF, AP., T, f/, EXP., COMA, DC, TAIL, PA, APERTUR, Chp, Sfw, C, P, Cam, OBS. Contains multiple rows of comet observation data for P/2004 V5 component B.

Comet P/2004 VR_8 (LONEOS)

Table with columns: DATE (UT), n, M, MAG., RF, AP., T, f/, EXP., COMA, DC, TAIL, PA, APERTUR, Chp, Sfw, C, P, Cam, OBS. Contains multiple rows of comet observation data for P/2004 VR_8.

Comet P/2004 WR_9 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2004 12 09.56		C	17.3	GA	60.0Y	6	a240	0.35			0.5m244	S	0.35m	SIA	IPL	5	U	Ap7	NAKO1
2004 12 16.69		C	17.4	GA	60.0Y	6	a240	0.35				S	0.35m	SIA	IPL	5	U	Ap7	NAKO1
2004 12 17.64	x	C	17.5	TJ	25.0L	5	a240	0.2				S	0.2 m	K42	SI4	5	U	SE7	OHS

Comet C/2004 X2 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.	
2004 12 16.79		C	18.0	GA	60.0Y	6	a240	0.35				330	S	0.35m	SIA	IPL	5	U	Ap7	NAKO1
2005 01 28.76	wxC	C	17.2	TJ	25.0L	5	a240	0.4		?		331	S	0.4 m	K42	SI4	5	U	SE7	OHS

Comet C/2004 X3 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.	
2005 01 21.79		C	18.4	GA	60.0Y	6	a240	0.3					S	0.3 m	SIA	IPL	5	U	Ap7	NAKO1

Comet P/2004 Y1 (Christensen)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.	
2005 01 21.77		C	16.7	GA	60.0Y	6	a240	0.55				240	S	0.55m	SIA	IPL	5	U	Ap7	NAKO1
2005 01 21.78	wxC	C	16.2	TJ	25.0L	5	a240	0.6					S	0.6 m	K42	SI4	5	U	SE7	OHS

Comet C/2005 A1 (LINEAR)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.
2005 01 17.86	axC	C	13.1	HV	35.0C	10	a 90	0.7		5	2.5m299	S	1.87m	KAIa	SI4	5		ST2	TSU02
2005 01 19.78	wxC	C	12.7	TJ	25.0L	5	a120	1.4			2.3m309	S	1.4 m	K42	SI4	5	U	SE7	OHS
2005 01 21.82	wxC	C	12.6	TJ	25.0L	5	a120	1.3			2.5m310	S	1.3 m	K42	SI4	5	U	SE7	OHS
2005 01 21.87	a	C	12.8	GA	60.0Y	6	a120	1.6			5.0m307	S	1.6 m	SIA	IPL	5	U	Ap7	NAKO1

Comet C/2005 B1 (Christensen)

DATE (UT)	n	M	MAG.	RF	AP.	T	f/	EXP.	COMA	DC	TAIL	PA	APERTUR	Chp	Sfw	C	P	Cam	OBS.	
2005 01 19.77	x	C	17.7	TJ	25.0L	5	a240	0.4					S	0.4 m	K42	SI4	5	U	SE7	OHS
2005 01 21.85		C	17.8	GA	60.0Y	6	a240	0.4			0.5m233	S	0.4 m	SIA	IPL	5	U	Ap7	NAKO1	

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DESIGNATIONS OF RECENT COMETS

Listed on page 84, for handy reference, are the last 35 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. (The 'P/' prefix for designations is used for new comets with orbital periods < 30 yr; otherwise, 'C/' is used.) Also tabulated below 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 — most of which are presumed to be no longer in existence. Earlier lists and references to such comets appeared in the July 2002 issue (p. 219) and references therein.

Note that the designation and name P/2004 NL₁₅₉ (LINEAR-Catalina) was changed to P/2004 V5 (LINEAR-Hill); cf. *IAUC* 8438 (the original designation was not deleted, but P/2004 V5 is considered the primary designation until permanent numbering occurs).

[This list updates that in the October 2004 issue, p. 241.]

	<i>New-Style Designation</i>	<i>P</i>	<i>T</i>	<i>q</i>	<i>IAUC</i>
*	C/2004 HV ₆₀ (Spacewatch)		12/21/03	3.10	8337
*	C/2004 K1 (Catalina)		7/5/05	3.40	8343
*	C/2004 H6 (SWAN)		5/12/04	0.78	8346
*	P/2004 K2 (McNaught)	5.51	6/16/04	1.55	8348
*	C/2004 K3 (LINEAR)		6/30/04	1.10	8350
*	C/2004 L1 (LINEAR)		3/30/05	2.05	8352
*	C/2004 L2 (LINEAR)		11/14/05	3.78	8356
*	C/2004 P1 (NEAT)		8/8/03	6.01	8383
*	C/2004 Q1 (Tucker)		12/6/04	2.05	8393
*	C/2004 Q2 (Machholz)		1/24/05	1.21	8394
*	P/2004 R1 (McNaught)	5.49	8/30/04	0.99	8398
*	C/2004 R2 (ASAS)		10/7/04	0.11	8402
*	P/2004 R3 (LINEAR-NEAT)	7.51	5/24/04	2.14	8407
*	160P/2004 NL ₂₁ (LINEAR)	7.95	10/13/04	2.08	8408
*	C/2004 S1 (Van Ness)		12/8/04	0.68	8412
*	P/2004 T1 (LINEAR-NEAT)	6.47	11/7/04	1.71	8416
*	C/2004 T3 (Siding Spring)		4/14/03	8.86	8421
*	C/2004 U1 (LINEAR)		12/8/04	2.66	8421
*	P/2004 V1 (Skiff)	9.99	12/8/04	1.42	8426
*	161P/2004 V2 (Hartley-IRAS)	21.5	6/20/05	1.28	8428
*	P/2004 V3 (Siding Spring)	18.9	11/11/04	3.94	8429
*	163P/2004 V4 (NEAT)	7.01	1/31/05	1.92	8429
*	P/2004 V5 (LINEAR-Hill)	22.4	2/28/05	4.41	8433
*	162P/2004 TU ₁₂ (Siding Spring)	5.32	11/10/04	1.23	8436
*	C/2004 RG ₁₁₃ (LINEAR)		3/3/05	1.94	8444
*	P/2004 WR ₉ (LINEAR)	14.9	1/11/05	1.92	8448
*	P/2004 X1 (LINEAR)	4.86	11/01/04	0.78	8449
*	C/2004 X2 (LINEAR)		8/24/04	3.79	8450
*	P/2004 VR ₈ (LONEOS)	10.7	9/2/05	2.38	8451
*	C/2004 V13 (SWAN)		12/21/04	0.18	8455
*	C/2004 X3 (LINEAR)		1/17/05	4.40	8457
*	164P/2004 Y1 (Christensen)	6.91	6/21/04	1.65	8458
*	C/2005 A1 (LINEAR)		4/10/05	0.91	8463
*	C/2005 B1 (Christensen)		2/23/06	3.21	8466
*	C/2005 E1 (Tubbiolo)		11/15/06	1.67	8491

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2005 COMET HANDBOOK

The *ICQ's* annual *Comet Handbook* for 2005 was mailed in February. Consisting of 154 pages, it contains orbital elements, updated magnitude parameters, and ephemerides for 160 comets that are potentially observable in 2005 and/or early 2006. *ICQ* subscribers can receive one copy of the annual *Handbook* for US\$8.00; additional copies, and copies to nonsubscribers, cost \$15.00 each (though reduced rates are available for multiple-copy orders).

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