INTERNATIONAL COMET QUARTERLY

Whole Number 109 | JANUARY 1999 | Vol. 21, No. 1

SMITHSONIAN ASTROPHYSICAL OBSERVATORY
60 Garden Street · Cambridge, MA 02138 · U.S.A.

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

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Group subscription rates available upon request. Back issues are $6.00 each — *except* for "current" *Comet Handbooks*, which are available for $15.00 ($8.00 to subscribers if ordered with their *ICQ* subscription; see above). Up-to-date information concerning comet discoveries, orbital elements, and ephemerides can be obtained by subscribing to the *IAU Circulars* and/or the *Minor Planet Circulars* (via postal mail and also available via computer access); for further information, contact the above e-mail address (or the *ICQ* at the above postal address).

Cometary observations should be sent to the Editor in Cambridge; all data intended for publication in the *ICQ* that is not sent via computer electronic mail should be sent on standard *ICQ* observation report forms, which can be obtained upon request from the Editor. Those who can send observational data (or manuscripts) in machine-readable form are encouraged to do so [especially through e-mail via the computer networks *SPAN* (6700::DAN) or Internet (ICQ@CFA.HARVARD.EDU), or via floppy disks that can be read on an IBM PC], and should contact the Editor for further information. The *ICQ* has extensive information for comet observers on the World Wide Web, including the Keys to Abbreviations used in data tabulation (see URL http://cfa-www.harvard.edu/cfa/ps/icq.html). In early 1997, the *ICQ* published a 225-page *Guide to Observing Comets*; only a few copies are still available (contact the Editor before sending money).

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

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This issue is No. 109 of the publication originally called *The Comet* (founded March 1973) and is Vol. 21, No. 1, of the *ICQ*. *[ISSN 0736-6922]*

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CORRIGENDA

• The following observations by observer MEY published in the Oct. 1998 *ICQ* listed the reference incorrectly as HV (the proper reference is TJ): C/1997 J2, 1998 07 19.94, 1998 07 20.94 (p. 189), 1998 07 25.94 (p. 190), 1998 09 01.01 (p. 192); C/1998 M5, 1998 08 17.88, 1998 08 18.90, 1998 08 19.88, 1998 09 01.02, 1998 09 21.96, 1998 09 22.81 (pp. 201-203); 21P, 1998 09 22.78 (p. 210) and 1998 09 25.82 (p. 211).

• In the Oct. 1998 issue, pages 161 and 175, the title of Alan Hale's paper should of course read "Comets for the Visual Observer in 1999"

IWCA II

Further to the information given on the second International Workshop on Cometary Astronomy (to be held on August 14-16 in Cambridge, England) in the October *ICQ* with the early-registration form (page 228), we have learned some more details for those people who may be bringing spouses to New Hall. The additional cost will be about 17 pounds sterling (or US$28) more for a couple over the single rate for a room with shared bath, and about 25 pounds (or $40) more for a couple over the single rate for a room with a private bath; these costs include the British 17.5% value-added tax (VAT). These eases the concerns of some who worried that spouses might have to pay double the single rate; they do not.

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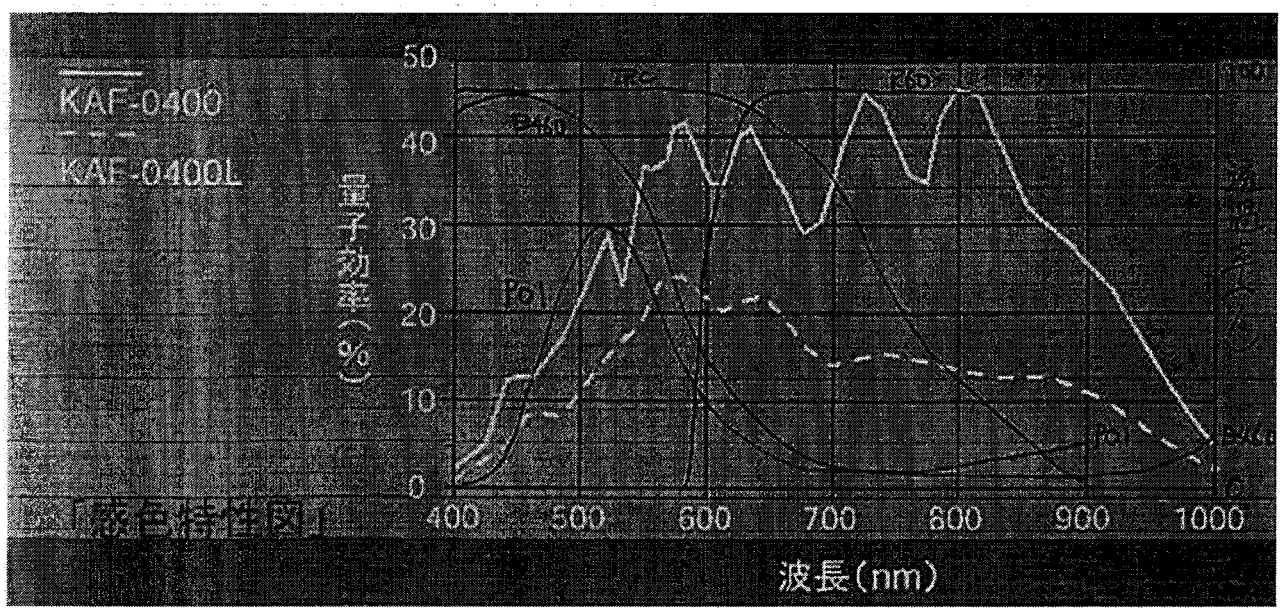
Tabulation of Comet Observations

Seiichi Yoshida has begun doing cometary CCD photometry with an R60 filter and an infrared-block filter, which have transmission curves as depicted in the figure below. We have assigned special-note codes as given below.



New codes for special notes (for columns 26 or 75 of tabulated data):
I = use of infrared-block filter with CCD; supposedly gives response similar to that of an unfiltered CCD
S = CCD photometry with an R60 filter (expected to be similar to, but not the same as, that of a standard *R* filter)

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

◇ *Comet C/1995 O1 (Hale-Bopp) [NOTE: the NES and LEH tabulated data appeared in the October 1998 ICQ]* ⟹ 1996 July 17.27: cond. at apex of large, very fan-shaped coma; there is the beginning of a tail in the eastward direction [HAL]. July 23.28: one-year anniversary of discovery; sky conditions are mediocre; nevertheless, the comet is easily visible to the naked eye [HAL]. Aug. 10.22: poor conditions; in 41-cm L the coma appears as a broad fan extending toward the west, w/ the tail extending out of the side of this fan; w/ 10×50 B, 50′ tail in p.a. 130° [HAL]. Aug. 12.19: w/ 10×50 B, 50′ tail in p.a. 120° [HAL]. Aug. 15.23: w/ 10×50 B, 40′ tail in p.a. 125° [HAL]. Aug. 21.24: w/ 10×50 B, 70′ tail in p.a. 130° [HAL]. Aug. 31.12: mediocre sky conditions [HAL]. Sept. 4.18: poor conditions; the given estimate is a lower limit to the brightness; in 41-cm L, the inner coma appears as a bright fan enveloped within a more 'normal'-looking coma that extends back into the tail; in addition, there is also a faint fan, or extension of the coma, extending to the S of the tail [HAL]. Sept. 19.19: crescent moon 25° away [HAL]. Sept. 27.11: obs. made during total lunar eclipse; impressive appearance in 41-cm L; a very bright cond. is seen, and the main tail seems to be contained within a broader fan [HAL].

◇ *Comet C/1995 O1 (Hale-Bopp) [cont. from previous page]* ⟹ Sept. 30.10: noticeably brighter than earlier in the month, and in both 41-cm L and 10×50 B, the appearance continues to become more and more 'cometary' [HAL]. Oct. 2.15: the first 30′ of the tail is fairly bright, the remaining length being quite a bit dimmer [HAL]. Oct. 7.15: significant jetting structure starting to become noticeable in 41-cm L; the cond. appears to be at the apex of two somewhat-curved jets extending back around tailward; there is also a central jet extending straight backward from the cond. [HAL]. Oct. 16.12: crescent moon nearby; mediocre sky conditions [HAL]. Oct. 29.09: on this and the following night, comet is in low-power telescopic field w/ M14; w/ 10×50 B, 1°.75 tail in p.a. 85° [HAL]. Nov. 4.09: w/ 10×50 B, 70′ tail in p.a. 103° [HAL]. Nov. 6.09: first 30′ of tail fairly bright; last 90′ of tail broad and very faint; second tail 30′ long in p.a. 55°; w/ 10×50 B, 2°.33 tail in p.a. 105° [HAL]. Nov. 8.08: w/ 10×50 B, 2° tail [HAL]. Nov. 12.06: central jetting structure has taken the shape of a 'T', w/ the central cond. located at the 'junction'; the two 'arm' jets remain straight, while the 'bottom' jet curves back to form part of the N 'boundary' of the main tail; w/ 10×50 B, 2°.33 tail in p.a. 98° [HAL]. Nov. 16.06: crescent moon in sky; also, a few clouds; no sign of a 'Saturn-like companion'; however, there is a 9th-mag star in the position of the reported 'object' [HAL]. Nov. 22.06: bright moonlight [HAL]. Nov. 27.06: in 10×50 B, tails 2° and 1° long in p.a. 100° and 55° [HAL]. Dec. 1.06: poor conditions [HAL]. Dec. 2.06: in 10×50 B, tails 1°.5 and 75′ long in p.a. 60° and 110° [HAL]. Dec. 4.06: in 10×50 B, tails 1°.75 and 1° long in p.a. 58° and 110° [HAL]. Dec. 7.06: in 10×50 B, tails 1°.75 and 80′ long in p.a. 65° and 80° [HAL]. Dec. 12.05: interference from twilight [HAL]. Dec. 19.06: interference from twilight, low alt., and moonlight [HAL]. Dec. 21.69: via naked eye, the comet looks like an inconspicuous misty speck on the sky with central cond. [LEH]. Dec. 26.05: interference from low alt. and bright twilight; an additional obs. was obtained w/ 20-cm L on Dec. 29.05 in bright twilight, but no formal brightness estimate was possible [HAL]. Dec. 30.69: with pointlike central cond. [LEH].

1997 Feb. 1.19, 2.18, 3.18, 15.19, 23.18, Mar. 2.17, 2.71: the comet looks like diffuse star w/ very strong central cond. via naked eye [LEH]. Feb. 2.18 and 3.18: w/ 8×30 B, very wide tail 80′ long in p.a. 315° [LEH]. Feb. 15.19: via naked eye, wide tail ~ 2°.5 long in p.a. 315° [LEH]. Feb. 23.18: w/ 8×30 B, tail ~ 2°.5 long spanning p.a. 280°-330° [LEH]. Mar. 10.70 and 11.08: w/ 7×50 B, central cond. of dia. 1′ and 5° dust tail [NES]. Mar. 11.10: w/ 5-cm R (20×), central cond. of dia. 1′ and 5° dust tail [NES]. Mar. 11.99: w/ E, central cond. of dia. 1′.5 and 8° dust tail; w/ 5-cm R (20×), central cond. of dia. 1′ and 3° dust tail; w/ 7×50 B, central cond. of dia. 1′ and 3° dust tail [NES]. Mar. 13.01: w/ E, central cond. of dia. 1′.5 and 10° dust tail; w/ 7×50 B, central cond. of dia. 1′ and 10° dust tail [NES]. Mar. 17.09: w/ 7×50 B, central cond. of dia. 1′ and 16° dust tail [NES]. Mar. 17: w/ 20×110 B, comet visible after sunrise; "in the second half of March, I often observed the comet w/ 20×110 B at sunrise and even after it" [NES]. Mar. 18.05: w/ 7×50 B, central cond. of dia. 1′.5 and 10° dust tail; w/ 20×110 B, central cond. of dia. 1′.0 and 8° dust tail; w/ E, central cond. of dia. 1′ and 8° dust tail [NES]. Mar. 19.06: w/ E, central cond. of dia. 1′ and 6° dust tail; w/ 7×50 B, central cond. of dia. 0′.7 and 7° dust tail [NES]. Mar. 19.09: w/ 20×110 B, central cond. of dia. 0′.5 and dust tail 10° long; w/ 8-cm R (160×), effusion from nucleus of length 5″-7″ is visible [NES]. Mar. 21.70-21.74: w/ 7×50 B, central cond. of dia. 1′ and 7° dust tail; w/ E, central cond. of dia. 1′ and 5° dust tail; w/ 20×110 B, central cond. of dia. 1′.0 and 10° dust tail [NES]. Mar. 22.09: w/ 20×110 B, central cond. of dia. 0′.7; 8° dust tail w/ four synchrones [NES]. Mar. 24.05-24.08: w/ 7×50 B, central cond. of dia. 1′ and 3° dust tail; w/ 8-cm R (160×), "blinking" of the nucleus was observed; w/ E, central cond. of dia. 1′ and 5° dust tail; w/ 20×110 B, central cond. of dia. 0′.7 and 7° dust tail [NES]. Mar. 26.05-26.08: w/ 7×50 B, central cond. of dia. 1′ and 3°.5 dust tail; w/ E, central cond. of dia. 1′.5 and 7° dust tail; w/ 20×110 B, central cond. of dia. 0′.7 and 5° dust tail [NES]. Mar. 27.76: w/ E, central cond. of dia. 1′ and 5° dust tail [NES]. Mar. 29.76: w/ 7×50 B, central cond. of dia. 1′ and 12° dust tail [NES]. Mar. 30.94: w/ E, central cond. of dia. 1′ and 10° dust tail [NES]. Mar. 31.08: w/ 20×110 B, central cond. of dia. 0′.7 and 8° dust tail [NES]. Mar. 31.76-31.78: w/ 20×110 B, central cond. of dia. 0′.7 and 12° dust tail; w/ 7×50 B, central cond. of dia. 1′ and 16° dust tail [NES]. May 1.75: w/ E, central cond. of dia. 1′.5 [NES]. May 2.75: w/ E, central cond. of dia. 2′ and 5° dust tail in p.a. 52° [NES]. May 4.75-4.76: w/ E, central cond. of dia. 1′.5 and 2° dust tail in p.a. 49°; w/ 5-cm R (20×), central cond. of dia. 1′.2 and 5° dust tail in p.a. 49° [NES]. May 6.77-6.78: w/ 5-cm R (20×), central cond. of dia. 2′ and 3° dust tail in 43°; w/ 8-cm R (28×), central cond. of dia. 1′ and dust tail in p.a. 43° [NES]. May 8.77: w/ 5-cm R (20×), central cond. of dia. 1′ and dust tail ~ 0°.5 long in p.a. ~ 55° [NES]. May 10.76 and 12.76: w/ 8-cm R (28×), central cond. of dia. 0′.5 [NES]. May 12.76: w/ 8-cm R (28×), central cond. of dia. 0′.5 [NES].

1998 Feb. 1.05: obs. from coral island Cayo Sombrero, Venezuela [LEH]. Feb. 5.01: obs. near observatory of Merida, Venezuela [LEH]. Feb. 9.06, 15.99, 16.99, 17.96: obs. from Santa Elena, Gran Sabana, Venezuela [LEH]. Feb. 20.99: wide tail ~ 11′ long; obs. from Puerto Escondido, Falcon, Venezuela [LEH]. Nov. 23.78: "coma very condensed w/ quite a prominent central cond.; this is a marked difference in appearance to last month, where it appeared much more diffuse" [PEA]. Dec. 18.78: "comet has undergone some kind of nuclear outburst, as there is a very bright and condensed central cond.; the cond. contributes 90%-95% of the total light of the coma; it has been necessary to estimate the magnitude w/ comet and stars in-focus; at low power, the coma is very faint but can be traced for 0′.5 away from the center, and at higher power it is almost non-existent (at 380×); the cond. still appears relatively stellar" [PEA]. Dec. 19.78: very prominent central cond. that makes the outer coma very faint and ill-defined; under higher power, the cond. still appears starlike [PEA]. Dec. 20.77: central cond. still very prominent; very difficult to detect outer coma due to the intensity of the cond., and at high power (100×), cond. still appears almost starlike [PEA]. Dec. 21.44: "did not expect to see [comet, but it] was very obvious and a much easier object than 21P tonight, even though slightly fainter and smaller; very small stellar central cond., surrounded by a surprisingly bright but small outer coma that made a significant contribution to overall brightness" [RAE]. Dec. 21.75: central cond. still very prominent w/ no signs of fading over the last few days [PEA]. Dec. 22.62: "outer coma less significant than in last obs.; stellar cond. strong" [RAE]. Dec. 23.44: stellar cond.; outer coma significant, contributes perhaps 30%-50% of light [RAE]. Dec. 23.75: starlike false nucleus of mag ≈ 13 visible within a brighter central cond.; only a slight drop in intensity of the cond. since the first obs. on Dec. 18 [PEA]. Dec. 25.75: at high power (200×, 380×), the central cond. has enlarged and dispersed through the coma; the starlike intensity

of the cond. has dropped off, becoming more diffuse as it has progressed through the coma, and no starlike false nucleus is now visible [PEA]. Dec. 26.81: at 380×, central cond. appears as a large plateau of relatively constant brightness extending across ≈ 80% of the total coma; no sign of any false nucleus [PEA].

1999 Jan. 1.79: observed w/ full moon present in NW sky [PEA]. Jan. 2.69: observed w/ full moon present in NE sky [PEA]. Jan. 5.47: "still an attractive sight in 25.4-cm L at 71×, with a conical tail up to 7′; unexpectedly bright, but did not appear to be in fresh outburst (no bright false nucleus); could the mid-December outburst have increased the comet's general level of brightness?" [SEA]. Jan. 9.60: comet very close to 10th-mag star [PEA]. Jan. 11.48: comet has faded since last week, coma has enlarged; outer coma extremely faint [RAE]. Jan. 16.52: m_1 "uncertain due to extrapolation from brighter comparison stars" [FAR01]. Jan. 21.97: `Guide ver. 6` used [DES01].

◇ *Comet C/1996 E1 (NEAT)* ⟹ 1996 July 23.45: low alt.; this obs. confirms a suspect observed on the previous morning (July 22.45 UT) [HAL]. Aug. 23.46: significant enhancement when viewed w/ Lumicon Swan Band filter [HAL].

◇ *Comet C/1996 N1 (Brewington)* ⟹ 1996 Aug. 10.20: poor conditions [HAL].

◇ *Comet C/1996 Q1 (Tabur) [all obs. by HAL]* ⟹ 1996 Aug. 21.46: enhancement when viewed w/ Lumicon Swan Band filter. Sept. 16.47: a rudimentary tail toward p.a. 240° was seen w/ both 10×50 B and 41-cm L. Sept. 20.47: obs. significantly hampered by nearby 6th-mag star; a short tail toward p.a. ∼ 250° was observed in 41-cm L. Oct. 1.47: moonlight; in 41-cm L, the coma appears oblong in a N-S direction. Oct. 6.44: easily visible to naked eye despite crescent moon in sky; in 41-cm L, the coma is oblong, and the overall appearance is reminiscent of old drawings of comet 3D/Biela; w/ 10×50 B, 20′ tail in p.a. 280°. Oct. 9.45: w/ 10×50 B, 13′ coma, 35′ tail in p.a. 307°. Oct. 17.47: second tail, broad and stubby, at angle of ≈ 90° to main tail (*i.e.*, p.a. ∼ 60°) observed in 41-cm L. Oct. 23.51: low alt., bright sky; distinct fading since previous obs. Oct. 30.08: coma appears distinctly elongated (into perhaps the beginning of a tail) as viewed in 20-cm L. Nov. 6.08: coma appears as little more than a diffuse, elongated patch. Nov. 11.07: coma is nothing more than a diffuse, elongated patch; the given coma 'diameter' is the length of the longest dimension. Dec. 8.53: low alt., twilight.

◇ *Comet C/1996 R1 (Hergenrother-Spahr)* ⟹ 1996 Sept. 9.24: there are hints of a very faint outer coma surrounding the 'measured' coma [HAL].

◇ *Comet C/1997 J2 (Meunier-Dupouy)* ⟹ 1998 Nov. 12.77: strong central cond. [LEH]. Nov. 16.09: central cond. of dia. > 3″ and mag 15.5; symmetrical coma [ROQ]. Nov. 23.43: "since an R60 filter was used, the magnitude might be uncertain" [YOS04].

◇ *Comet C/1998 J1 (SOHO)* ⟹ 1998 May 14.88: comet visible to naked eye; 0°.53 tail; comparison stars are at same alt. as comet [DEA]. May 22.90 and June 1.89: fainter w/ Swan-band filter [DEA]. June 4.89, 5.90, 6.90, and 9.90: brightness unchanged w/ Swan-band filter [DEA]. June 12.91, 21.92, and 25.91: comet brighter w/ Swan-band filter [DEA].

◇ *Comet C/1998 K1 (Mueller)* ⟹ 1999 Jan. 22.81: all images (of *all* comets in this issue) with observer code YOS04 were taken by K. Kadota at Ageo, Saitama, and measured by Yoshida [YOS04].

◇ *Comet C/1998 K5 (LINEAR)* ⟹ 1998 Sept. 23.90-Nov. 21.88: very strong central cond. [LEH].

◇ *Comet C/1998 M2 (LINEAR)* ⟹ 1998 Sept. 9.81-Nov. 21.74: strong central cond. [LEH].

◇ *Comet C/1998 M5 (LINEAR)* ⟹ 1998 Sept. 9.84, Oct. 20.76, Nov. 24.72: small, strong central cond. [LEH]. Oct. 26.95: comet close to star of mag 10.8 [BOU]. Oct. 27.81: coma slightly elongated [BAR06]. Nov. 8.49, 10.44, 22.48: `GUIDE 6.0` software was used for ref. stars [YOS02]. Nov. 11.74: comet close to star of mag 10.8 [BOU]. Nov. 25.05: central cond. of dia. 3″ and mag 13.6; tail was broad and diffuse; jet activity near p.a. 55° on *R* and *B* images [ROQ]. Dec. 13.02: comet smaller and fainter than M57 [NOW]. Dec. 15.70: no central cond. visible; diffuse, round, large coma [WAR01]. Dec. 15.83: disturbed by a streetlight [KAR02]. Dec. 15.97: averted vision necessary [NOW]. Dec. 17.72: slightly brighter and denser w/ a Lumicon Swan Band Filter [MEY]. Dec. 20.43: `GUIDE ver. 7.0` software was used for ref. stars [YOS02]. Dec. 22.10: no central cond. visible; diffuse, round coma; alt. 15°; hazy sky [WAR01]. Dec. 29.22: star of mag 12 near edge of coma [BOU]. 1999 Jan. 18.04: comet at low alt., only 14° over horizon [BOU].

◇ *Comet C/1998 P1 (Williams)* ⟹ 1998 Nov. 16.65: though not seen in 7×50 B on Nov. 12.64 ($m_1 > 8.0$, from Hale-Pohaku, Mauna Kea, Hawaii), comet was clearly seen this night with the 0.26-m L (42×) from Honolulu [BIV]. Nov. 18.85: CCD image available at `http://www.info.waseda.ac.jp/muraoka/members/seiichi/pictures/comet.html` ("image taken by KenIchi Kadota, with R60 filter; estimation by YOS04 using `GSC 1.1`; $m_1 = 11.1$ w/ R60 filter, a bit fainter than expected"); 'IR-block' filter "is expected to be similar to unfiltered CCD photometry" [YOS04]. Nov. 19.64: "confirms earlier 'possible' observation I made on Nov. 17.64-17.66, when I quickly estimated $m_1 \sim 9.4$:, dia. ∼ 3′.5, DC ∼ 3" w/ 11-cm L (low alt., incoming light)" [RAE]. Nov. 24.65: w/ 25.6-cm L (169×), central cond. of mag 12.3 [BIV]. Nov. 25.65: w/ 7×50 B from Hale-Pohaku, HI, comet relatively well condensed and easily visible [BIV]. Nov. 27.62: w/ 25.6-cm L (42×), 9′ and 5′ tails in p.a. 160° and 270°; at 169×, central cond. of mag 12.6 [BIV]. Dec. 14.59: w/ 25.6-cm L (42×), tails 14′ long in p.a. 160° and 6′ long in p.a. 250°; at 169×, central cond. of mag 13.6 [BIV]. Dec. 16.20: alt. 15° [KAR02]. Dec. 16.25: possible 0°.5 broad tail, longest near p.a. 310° [PER01]. Dec. 16.65: w/ 25.6-cm L (42×), tails 16′ long in p.a. 155° and 6′ long in p.a. 280°; at 169×, central cond. of mag 14.0 [BIV]. Dec. 17.26: comet close to 9th-mag star [PER01]. Dec. 18.19: central region appeared denser w/ a Lumicon Swan Band Filter [MEY]. Dec. 19.62: w/ 25.6-cm L (42×), tails 10′ long in p.a. 160° and 8′ long in p.a. 290° [BIV]. Dec. 21.20: comet close to NGC 4939

[BOU]. Dec. 29.80: HOC2.exe software was used for ref. stars [NAG08]. 1999 Jan. 12.48: w/ 25.6-cm L (42×), tails 15′ long in p.a. 160° and 8′ long in p.a. 260° [BIV].

◇ *Comet C/1998 Q1 (LINEAR)* ⟹ 1998 Sept. 9.82: strong central cond. [LEH]. Sept. 23.87 and 24.86: small, strong central cond. [LEH].

◇ *Comet C/1998 T1 (LINEAR)* ⟹ 1998 Oct. 13.77, 17.03, 20.90, 24.87: small, strong central cond. [LEH].

◇ *Comet C/1998 U5 (LINEAR)* ⟹ 1998 Nov. 8.72: position was 8′ SE from its predicted location given by the orbital elements on *IAUC* 7045; obs. before moonrise [KAR02]. Nov. 10.49, 15.74, 22.57: GUIDE 6.0 software was used for ref. stars [YOS02]. Nov. 11.24: central cond. of dia. 3″ and mag 12.6; the coma was strongly asymmetrical in p.a. 207° and encompassed a very narrow, short tail [ROQ]. Nov. 12.76: more condensed and brighter w/ a Lumicon Swan Band Filter [MEY]. Nov. 12.82: strong central cond. [LEH]. Nov. 14.53, 15.40, 17.57, 19.41, 25.39, Dec. 12.46: HOC2.exe software was used for ref. stars [NAG08]. Nov. 16.02-16.03: comet easily seen in 9×34 B; in 14×100 B, two fairly distinct levels of brightness within coma; outer coma edges very poorly defined [PER01]. Nov. 16.74 and 18.69: small strong central cond. [LEH]. Nov. 20.10-20.12: in 14×100 B, strongly suspected a 0°.9 delicate fan tail near p.a. 300°; however, comet was in a dense Milky Way area; in 25.3-cm *f*/5.6 L at 58×, strongly suspected > 0°.6 fan tail [PER01]. Nov. 21.11: suspected 0°.2 fan tail spanning p.a. ∼ 260°-295°; however, the comet is in a dense Milky Way area [PER01]. Nov. 22.93: drop-shaped coma [BAR06]. Nov. 23.93: elongated coma [BAR06]. Nov. 26.08: central cond. of dia. > 3″ and mag 13.3; tail was diffuse w/ a narrow central core embedded w/in the first 30% of the tail's length [ROQ]. Dec. 5.78: comet closing in on a bright star, possibly resulting in a significant underestimate of m_1; large outer coma with very poorly defined edges [PER01]. Dec. 7.87: attempted to ignore the presence of three stars in coma during the m_1 estimate procedure [PER01]. Dec. 19.78: some interference from star of mag 8.6 [BOU]. Dec. 20.47: GUIDE ver. 7.0 software was used for ref. stars [YOS02].

◇ *Comet C/1998 W3 (LINEAR)* ⟹ 1998 Dec. 18.85: small, strong central cond. [LEH].

◇ *Comet C/1998 Y1 (LINEAR)* ⟹ 1998 Dec. 29.19: central cond. of dia. < 2″ and mag 17.9; faint, symmetrical coma [ROQ].

◇ *Comet C/1999 A1 (Tilbrook)* ⟹ 1999 Jan. 16.47: conditions very poor and comet was quite marginal; appeared larger and considerably more obvious through Swan Band filter [SEA]. Jan. 17.50: comet very close to star; conditions quite poor [SEA]. Jan. 18.44: better conditions; comet faint but easily visible; enhanced by Swan Band filter [SEA]. Jan. 21.96: at 92×, comet very diffuse, but possibly elongated; no obvious change in appearance using comet filter [DES01].

◇ *Comet 4P/Faye* ⟹ 1998 Sept. 23.81-Nov. 21.72: strong central cond. [LEH]. Nov. 23.41: "since an R60 filter was used, the magnitude might be uncertain" [YOS04].

◇ *Comet 21P/Giacobini-Zinner* ⟹ 1998 Oct. 15.39: fan-shaped tail spans p.a. 90°-130° [SEA01]. Nov. 7.41, 10.41, 11.40, 14.40, 15.39, 19.40: HOC2.exe software was used for ref. stars [NAG08]. Nov. 8.46, 10.41, 22.45: *GUIDE 6.0* software was used for ref. stars [YOS02]. Nov. 9.45: somewhat brighter through Swan Band filter; "extreme" B method used, whereby stars and comet were placed well out-of-focus to ensure images of low surface brightness [SEA]. Nov. 16.06: central cond. of dia. > 3″ and mag 12.8; coma was asymmetrical toward tail; tail was generally broad and diffuse w/ some jet activity noted adjacent to the tail's emergence from the inner coma region [ROQ]. Nov. 16.37: w/ 11-cm L (16×), m_1 = 8.7, dia. 5′.5, DC = 5 [RAE]. Nov. 23.38: large, asymmetrical coma; some moonlight [RAE]. Nov. 23.55: coma elongated in an ENE-WSW direction, w/ the central cond. located at the W-SW end [PEA]. Nov. 24.38: moonlight interference [RAE]. Dec. 5.08: central cond. of dia. > 3″ and mag 13.4; tail appeared broad and diffuse w/o significant substructure [ROQ]. Dec. 11.43: obs. difficult due to background stars [RAE]. Dec. 15.96: hard to see [NOW]. Dec. 20.45 and 1999 Jan. 4.43: GUIDE 7.0 software was used for ref. stars [YOS02]. Dec. 23.43: "very large and diffuse; possibly some of observed coma was tail?" [RAE]. 1999 Jan. 4.07: central cond. of dia. 3″ and mag 12.8; tail appeared diffuse and featureless [ROQ]. Jan. 4.39: not entirely confident of obs. [and thus not tabulated]; conditions poor and comet hard to see; w/ 11-cm *f*/4 L (16×), $m_1 \simeq 9.3$: (MM = S, ref = TT), coma dia. 3′.5, DC = 4/ [RAE]. Jan. 6.43: "comet continues to change quickly; has faded significantly since last night" [RAE].

◇ *Comet 22P/Kopff* ⟹ 1996 Aug. 10.27: obs. hampered by poor conditions and nearby bright star [HAL].

◇ *Comet 29P/Schwassmann-Wachmann 1* ⟹ 1996 Nov. 10.53: a very weak candidate was suspected, but could not be confirmed on subsequent mornings; on both this and the subsequent two mornings, the obs. attempts were affected by low alt. and zodiacal light [HAL]. Nov. 12.50: obs. attempt made, despite lack of success the previous morning, in reponse to report on *IAUC* 6503 of an outburst at $R = 14.5$; no convincing suspects seen, although this is not inconsistent w/ the published report [HAL]. Dec. 8.52: estimate is of a candidate; however, the obs. attempt on Dec. 12.53 suggested this was not the comet [HAL]. Dec. 12.53: sky very 'grainy' [HAL].

◇ *Comet 46P/Wirtanen* ⟹ 1996 Dec. 27.09: obs. possibly obtained through thin cirrus [HAL].

◇ *Comet 52P/Harrington-Abell* ⟹ 1998 Oct. 20.98: comet seemed brighter and more condensed compared w/ last obs. [MEY]. Nov. 15.23: central cond. of dia. < 3″ and mag 14.1; well-defined, relatively broad tail showing an embedded, brighter core originating near the 'tail head' and extending almost 2′ along the tail axis [ROQ]. Nov. 30.23: the comet looks convincingly brighter than during previous obs., but GSC star of mag 13.3 near coma center; star brightness not 'discounted' from the tabulated m_1, as GSC magnitudes are notoriously unreliable; accepting the GSC value yields m_1 that is 0.15 mag fainter than that tabulated; taking $m_1 = 11.3 \pm 0.2$ would include a comfortably wide range of more

than one full magnitude for the uncertainty in the star's brightness [PER01]. Dec. 7.81: comet close to star of mag 12.5 [BOU]. Dec. 12.56, 17.67, 19.51, 24.52, 1999 Jan. 9.50, 10.42, 17.43: `HOC2.exe` software was used for ref. stars [NAG08]. Dec. 15.80: slightly brighter center; no central cond.; faint fuzzy tail [WAR01]. Dec. 16.16: six comparison stars within 0.5 mag of the comet's m_1; the RR Aur AAVSO sequence, used for several previous obs., yields $m_1 = 10.9$ [PER01]. Dec. 17.81: ill-defined coma [MEY]. Dec. 20.20: some interference from star of mag 10.4 [BOU]. Dec. 20.53 and 1999 Jan. 9.48: `GUIDE 7.0` software was used for ref. stars [YOS02]. Dec. 21.92: slightly brighter center; no central cond.; faint fuzzy tail; hazy sky [WAR01]. Dec. 23.19: central cond. of dia. $< 2''$ and mag 13.5; tail, although generally diffuse, showed some radial structure throughout the initial two-thirds of its length [ROQ].

1999 Jan. 8.15: central cond. of dia. $2''$ and mag 14.3; the tail appeared diffuse, but displayed several embedded radial features extending throughout its length [ROQ]. Jan. 9.54: faintly visible in 25×100 B [SEA]. Jan. 19.98: moderately condensed object in 30-cm T (75×); at 242×, false nucleus of mag 14 glimpsed [KAM01]. Jan. 20.96: central cond. more pronounced than the night before; at 242×, knot of material (dia. $\approx 8''$) of mag 13 [KAM01]. Jan. 23.98: at 242×, knot of material (dia. $\approx 5''$) of mag 13.5 [KAM01].

◇ *Comet 57P/du Toit-Neujmin-Delporte* $\Longrightarrow$ 1996 July 26.45: poor conditions (damp air, poor transparency); the comet's appearance is roughly similar to that of comet 29P shortly after an outburst [HAL].

◇ *Comet 59P/Kearns-Kwee* $\Longrightarrow$ 1999 Jan. 13: CCD obs. w/ 0.60-m reflector showed nothing at the predicted position; he adds, "it seems to me that the visual observation on the *ICQ* web page ($m_1 = 15.0$) is not of this comet" [NAK01].

◇ *Comet 60P/Tsuchinshan 2* $\Longrightarrow$ 1998 Dec. 22.96: bad seeing [SAR02].

◇ *Comet 68P/Klemomla* $\Longrightarrow$ 1998 Sept. 23.97: strong central cond. [LEH].

◇ *Comet 88P/Howell* $\Longrightarrow$ 1998 Oct. 25.73: strong central cond. [LEH]. Nov. 12.71: comet only 9° above horizon [MEY]. Nov. 22.42: `GUIDE 6.0` software was used for ref. stars [YOS02]. Nov. 23.37: "since an R60 filter was used, the magnitude might be uncertain" [YOS04]. Dec. 15.95: averted vision necessary [NOW].

◇ *Comet 93P/Lovas 1* $\Longrightarrow$ 1998 Nov. 18.57-Dec. 20.79: all frames taken (as usual) by KenIchi Kadota (Ageo, Saitama, Japan) and processed/measured by S. Yoshida [YOS04]. Dec. 7.78: comet close to couple of 13th-mag stars [BOU]. Dec. 17.78: comet near 14th-mag star [MEY].

◇ *Comet 121P/Shoemaker-Holt 2* $\Longrightarrow$ 1996 Dec. 22.53: an extremely faint candidate was suspected, which however could could not be confirmed as being the comet; a successful positive obs. on 1997 Jan. 3.41, at $m_1 = 13.5$, suggests the possibility that this suspect could have in fact been the comet [HAL].

◇ *Comet 126P/IRAS* $\Longrightarrow$ 1996 Sept. 30.12: low alt.; obs. hurried due to encroaching moonlight [HAL]. Oct. 31.16: poor conditions [HAL].

◇ *Comet 128P/Shoemaker-Holt 1 (nucleus B)* $\Longrightarrow$ 1999 Jan. 11.53-11.54: three additional exposures yielded $m_1 =$ 20.4, 20.5, and 20.6 [SCO01].

◇ *Comet 130P/McNaught-Hughes* $\Longrightarrow$ 1998 Dec. 19.09: very slightly diffuse; another exposure yields $m_1 = 20.5$ [SCO01].

◇ *Comet 139P/1998 WG$_{22}$ (Väisälä-Oterma)* $\Longrightarrow$ 1998 Dec. 8.29 and 8.33: additional exposures yield $m_1 = 18.6$, 18.7 [SCO01]. Dec. 14.271: narrow, straight tail [SCO01]. Jan. 14.19: faint tail [SCO01].

◇ *Comet P/1993 K2 (Helin-Lawrence)* $\Longrightarrow$ 1998 Dec. 19: w/ 91-cm Spacewatch telescope, "I scanned over $\Delta T = \pm 6$ days for P/1993 K2 and did not see anything, though the field is a bit crowded; it was probably too faint" [SCO01].

◇ *Comet P/1998 QP$_{54}$ (LONEOS-Tucker)* $\Longrightarrow$ 1998 Sept. 24.88, Oct. 17.02, 20.88, and 24.86: small, strong central cond. [LEH]. Oct. 25.81: strong central cond. [LEH]. Nov. 17.19: central cond. of dia. $< 2''$ and mag 17.5; coma generally symmetrical, but faint and irregularly defined [ROQ]. Dec. 14.136: fan-shaped tail spans p.a. 70°-120°; another m_1 measure yields 18.0 [SCO01].

◇ *Comet P/1998 S1 (LINEAR-Mueller)* $\Longrightarrow$ 1998 Oct. 20.86, 24.88, Nov. 21.81, Dec. 11.78, and 18.77: small, strong central cond. [LEH]. Dec. 14.16: faint tail-like structure; another m_1 measure yields 16.6 [SCO01].

◇ *Comet P/1998 U2 (Mueller)* $\Longrightarrow$ 1998 Nov. 12.83: small, strong central cond. [LEH].

◇ *Comet P/1998 U3 (Jäger)* $\Longrightarrow$ 1998 Nov. 11.28: central cond. $> 2''$; mag 14.2; diffuse, tapering tail w/ no apparent substructure [ROQ]. Nov. 12.85: small, strong central cond. [LEH]. Nov. 16.10: employed RR Aur PEP(V) seq. from AAVSO charts issued in Dec. 1993 [PER01]. Nov. 19.13: comet close to star of mag ~ 11.5 [PER01]. Nov. 22.54: `GUIDE 6.0` software was used for ref. stars [YOS02]. Nov. 23.94: sky condition very good [BAR06]. Dec. 2.19: central cond. of dia. $> 2''$ and mag 13.6; the tail appeared short and diffuse — encompassing a faint, embedded core $1'.4$ in length [ROQ]. Dec. 11.65, 12.55, 17.64, 19.49, 1999 Jan. 9.47, 10.41, 17.42, 24.51: `HOC2.exe` software was used for ref. stars [NAG08]. Dec. 16.17: six comparison stars within 0.5 mag of the comet's m_1; the RR Aur AAVSO sequence, used for several previous obs., yields $m_1 = 10.9$ [PER01]. Dec. 16.21: comet only $2'$ from 9th-mag star [BOU]. Dec. 17.80: comet near 11th-mag star [MEY]. Dec. 18.13: central cond. of dia. $2''$ and mag 13.3; tail appeared broad and diffuse, showing jet activity at the 'tail head' in the red image and to a lesser extent in the blue image [ROQ]. Dec. 20.50 and 1999 Jan. 9.44: `GUIDE 7.0` software was used for ref. stars [YOS02]. Dec. 21.95: round, diffuse coma w/ 12th-mag stellar central

cond.; hazy sky [WAR01]. Dec. 23.87: comet near 10th-mag star [MEY]. Dec. 31.22: comet only $\approx 2'$ from star of mag 9.5 [BOU].

1999 Jan. 6.51: comet close to star; faintly visible in 25×100 B [SEA]. Jan. 6.90: well-condensed object in 30-cm T (115×); at 242×, disklike central cond. [KAM01]. Jan. 8.11: central cond. of dia. $> 3''$ and mag 14.4; the faint, diffuse tail centered at p.a. 270° contained a brighter embedded core at p.a. 280° [ROQ]. Jan. 19.96: well-condensed object in 30-cm T (75×), possibly elongated E-W; at 242×, prominent stellar false nucleus of mag 13 [KAM01]. Jan. 20.96: well-condensed object in 30-cm T (75×), possibly elongated E-W; at 242×, prominent nucleus of mag 13, again disklike [KAM01]. Jan. 22.01: comet very diffuse [DES01]. Jan. 23.98: at 242×, prominent, disklike central cond. of mag 12.5 [KAM01]. Jan. 24.22: comet fainter w/ Swan-band filter [DEA].

◇ *Comet P/1998 U4 (Spahr)* $\Longrightarrow$ 1998 Nov. 18.30: central cond. of dia. $< 2''$ and mag 16.4; short, diffuse tail [ROQ]. Dec. 19.18: central cond. of dia. $> 1''$; coma appeared generally symmetrical and featureless [ROQ]. 1999 Jan. 10.07: central cond. of dia. $< 2''$; coma was irregularly shaped and asymmetrical toward p.a. 90° [ROQ]. Jan. 14.19: fan-shaped tail spans p.a. 318°-23°. [SCO01].

◇ *Comet P/1998 W1 (Spahr)* $\Longrightarrow$ 1998 Nov. 20.25: central cond. of dia. $2''$ and mag 16.1; coma appeared symmetrical [ROQ]. Dec. 9.81 and 18.83: small, strong central cond. [LEH]. Dec. 26.47 and 1999 Jan. 3.48: CCD frames taken by K. Kadota (Ageo, Saitama, Japan) and processed/measured by S. Yoshida, as usual [YOS04]. 1999 Jan. 2.14: central cond. of dia. $2''$ and mag 16.5; coma appeared generally symmetrical, but irregularly bounded [ROQ]. Jan. 14.21: coma slightly asymmetric; another m_1 measure yields 16.0 [SCO01].

◇ *Comet P/1998 Y2 (Li)* $\Longrightarrow$ 1999 Jan. 14.12: central cond. of dia. $< 1''$ and mag ≈ 17; irregularly-shaped coma was asymmetrical in p.a. 180° [ROQ].

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TABULATED DATA

The headings for the tabulated data are as follows: "DATE (UT)" = Date and time to hundredths of a day in Universal Time; "N" = notes [* = correction to observation published in earlier issue of the *ICQ*; an exclamation mark (!) in this same location indicates that the observer has corrected his estimate in some manner for atmospheric extinction (prior to September 1992, this was the standard symbol for noting extinction correction, but following publication of the extinction paper — July 1992 *ICQ* — this symbol is only to be used to denote corrections made using procedures different from that outlined by Green 1992, *ICQ* **14**, 55-59, and in Appendix E of the *ICQ Guide to Observing Comets* — and then only for situations where the observed comet is at altitude > 10°); '&' = 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].

"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). "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).

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

A complete list of the Keys to abbrevations used in the *ICQ* is available from the Editor for $4.00 postpaid (available free of charge via e-mail); these Keys are also now available in the new *Guide to Observing Comets* and via the *ICQ*'s World Wide Web site. *Please note that data in archival form, and thus the data to be sent in machine-readable form, use a format that is different from that of the Tabulated data in the printed pages of the ICQ;* see pages 59-61 of the July

1992 issue, p. 10 of the January 1995 issue, and p. 100 of the April 1996 issue for further information [note correction on page 140 of the October 1993 issue]. Further guidelines concerning reporting of data may be found on pages 59-60 of the April 1993 issue, and in the *ICQ Guide to Observing Comets.*

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Key to observers with observations published in this issue, *with 2-digit numbers between Observer Code and Observer's Name indicating source [07 = Comet Section, British Astronomical Assn.; 16 = Japanese observers (c/o Akimasa Nakamura, Kuma, Japan); 23 = Czech group (c/o P. Pravec and V. Znojil); 32 = Hungarian group (c/o K. Sarneczky); 37 = Ukrainian Comet Section (c/o A. R. Baransky and K. I. Churyumov); 42 = Belarus observers, c/o V. S. Nevski, Vitebsk; etc.]. Those with asterisks (*) preceding the 5-character code are new additions to the Observer Key:*

BAR Sandro Baroni, Italy
BAR06 37 Alexandr R. Baransky, Ukraine
BIV Nicolas Biver, France
BOU Reinder J. Bouma, The Netherlands
BUR04 18 Wojciech Burzynski, Poland
CHE03 33 Kazimieras T. Cernis, Lithuania
CHR 18 Antoni Chrapek, Pikulice, Poland
COM 11 Georg Comello, The Netherlands
CRE01 Phillip J. Creed, OH, U.S.A.
DEA Vicente F. de Assis Neto, Brazil
DES01 Jose G. de Souza Aguiar, Brazil
DIE02 Alfons Diepvens, Belgium
DRA02 18 Michal Drahus, Krakow, Poland
ERO 42 Alexei V. Erohin, Kursk, Russia
FAR01 Fraser Farrell, South Australia
FUK02 16 Hideo Fukushima, Tokyo, Japan
GIL01 11 G. Gilein, The Netherlands
GON05 Juan J. Gonzalez, Asturias, Spain
HAL Alan Hale, U.S.A.
HAS02 Werner Hasubick, Germany
HAS08 16 Yuji Hashimoto, Hiroshima, Japan
HOR02 23 Kamil Hornoch, Czech Republic
IVA03 37 Vladimir Ivanov, Russia
KAM01 Andreas Kammerer, Germany
KAR02 21 Timo Karhula, Sweden
KID01 18 Krzysztof Kida, Elblag, Poland
KUJ 23 Josef Kujal, Czech Republic
KWI 18 Maciej Kwinta, Krakow, Poland
KYS 23 J. Kysely, Czech Republic
LEH Martin Lehky, Czechoslovakia
LIB 23 Jan Libich, Czech Republic
MAR02 13 Jose Carvajal Martinez, Spain
MAT08 Michael Mattiazzo, S. Australia
MEY Maik Meyer, Germany
MIT 16 Shigeo Mitsuma, Japan
MOE Michael Moeller, Germany
NAG02 16 Takashi Nagata, Hyogo, Japan
NAG08 16 Yoshimi Nagai, Yamanashi, Japan
NAK01 16 Akimasa Nakamura, Ehime, Japan
NEV 42 Vitali S. Nevski, Belarus
NOW Gary T. Nowak, VT, U.S.A.
PEA 14 Andrew R. Pearce, Australia
PER01 Alfredo J. S. Pereira, Portugal
PLE01 18 Janusz Pleszka, Poland
RAE Stuart T. Rae, New Zealand
RES 18 Maciej Reszelski, Poland
ROQ Paul Roques, AZ, U.S.A.
SAD 18 Piotr Sadowski, Poland
SAN04 38 Juan M. San Juan, Madrid, Spain
SAR02 32 Krisztián Sárneczky, Hungary
SCO01 James V. Scotti, AZ, U.S.A.
SCO04 37 Borys Skorichenko, Ukraine
SEA David A. J. Seargent, Australia
SEA01 John Seach, Australia
SHA02 07 Jonathan D. Shanklin, England
SHU 42 Sergey E. Shurpakov, Belarus
SOU01 35 Willian C. de Souza, Brazil
SPR Christopher E. Spratt, BC, Canada
SUZ02 16 Masayuki Suzuki, Japan
SVE 23 Milan Švehla, Czech Republic
SWI 18 Mariusz Swietnicki, Poland
TAY 07 Melvyn D. Taylor, England
VEL03 37 Peter Velestschuk, Ukraine
VIT01 40 Catarina Vitorino, Portugal
WAR01 Johan Warell, Sweden
WLO 18 Robert Wlodarczyk, Poland
YOS02 16 Katsumi Yoshimoto, Japan
YOS04 16 Seiichi Yoshida, Ibaraki, Japan

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Comet C/1995 O1 (Hale-Bopp)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 17.27		M	5.8	SC	5.0	B		10	18	6/			HAL
1996 07 22.30		M	5.7	SC	5.0	B		10	18		20	m 120	HAL
1996 07 22.30		S	5.4	SC	1.0	E		1	25				HAL
1996 07 23.28		S	5.3	SC	1.0	E		1	20				HAL
1996 08 10.22		S	5.7:	SC	1.0	E		1	15				HAL
1996 08 12.19		S	5.4	SC	1.0	E		1	15				HAL
1996 08 15.23		S	5.2	SC	1.0	E		1					HAL
1996 08 21.24		S	5.2	SC	1.0	E		1	20				HAL
1996 08 31.12		S	5.3:	SC	1.0	E		1					HAL
1996 09 04.18		S	5.5:	SC	1.0	E		1					HAL

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 05.21		M	5.7	SC	5.0	B		10	12		1.0	107	HAL
1996 09 05.21		S	5.5	SC	1.0	E		1					HAL
1996 09 09.20		M	5.7	SC	5.0	B		10	12				HAL
1996 09 09.20		S	5.5	SC	1.0	E		1					HAL
1996 09 11.21		M	5.7	SC	5.0	B		10					HAL
1996 09 16.11		M	5.6	SC	5.0	B		10	12		50 m	88	HAL
1996 09 16.11		S	5.5	SC	1.0	E		1					HAL
1996 09 19.19		M	5.7	SC	5.0	B		10	12		0.5	85	HAL
1996 09 19.19		S	5.5	SC	1.0	E		1					HAL
1996 09 27.11		M	5.6	SC	5.0	B		10	12		1.0	104	HAL
1996 09 27.11		S	5.5	SC	1.0	E		1					HAL
1996 09 30.10		M	5.5	SC	5.0	B		10			70 m	90	HAL
1996 09 30.10		S	5.4	SC	1.0	E		1					HAL
1996 10 02.15		M	5.5	SC	5.0	B		10			80 m	92	HAL
1996 10 02.15		S	5.3	SC	1.0	E		1					HAL
1996 10 07.15		M	5.5	SC	5.0	B		10	12		75 m	105	HAL
1996 10 07.15		S	5.3	SC	1.0	E		1					HAL
1996 10 09.09		M	5.5	SC	5.0	B		10	12		1.5	98	HAL
1996 10 09.09		S	5.2	SC	1.0	E		1					HAL
1996 10 11.12		S	5.2	SC	1.0	E		1					HAL
1996 10 16.12		S	5.2	SC	1.0	E		1					HAL
1996 10 29.09		S	4.9	SC	1.0	E		1					HAL
1996 10 30.10		S	4.9	SC	1.0	E		1					HAL
1996 11 04.09		S	4.8	SC	1.0	E		1					HAL
1996 11 06.09		S	4.8	SC	1.0	E		1					HAL
1996 11 08.08		S	4.7	SC	1.0	E		1					HAL
1996 11 10.06		S	4.6	SC	1.0	E		1					HAL
1996 11 12.06		S	4.6	SC	1.0	E		1					HAL
1996 11 16.06		S	4.5	SC	1.0	E		1					HAL
1996 11 22.06		M	4.5:	SC	5.0	B		10					HAL
1996 11 27.06		S	4.4	SC	1.0	E		1					HAL
1996 12 01.06		S	4.2:	SC	1.0	E		1					HAL
1996 12 02.06		S	4.1	SC	1.0	E		1					HAL
1996 12 04.06		S	4.0	SC	1.0	E		1					HAL
1996 12 07.06		B	3.9	SC	1.0	E		1					HAL
1996 12 09.05		S	3.9	SC	1.0	E		1					HAL
1996 12 12.05		S	3.7	SC	1.0	E		1					HAL
1996 12 19.06		M	3.8:	SC	5.0	B		10					HAL
1996 12 26.05		M	3.5:	SC	5.0	B		10					HAL
1998 08 30.77		S	9.6	AA	8.0	B		15	2.0	2			SEA01
1998 10 13.59		S	10.2	CG	25.4	L	6	61	1.5	2			SEA01
1998 10 15.55		S	10.4	VN	25.4	L	6	61	2.0	2			SEA01
1998 10 17.52		S	10.5	VN	25.4	L	6	61	1.4	2			SEA01
1998 10 18.55		S	10.5	VN	25.4	L	6	61	1.3	2			SEA01
1998 10 19.54		S	10.6	VN	25.4	L	6	61	1.2	2			SEA01
1998 10 20.51		S	10.7	VN	25.4	L	6	61	1.0	1			SEA01
1998 10 21.67		S	10.5	CG	25.4	L	6	61	1.1	2			SEA01
1998 10 22.66		S	10.5	CG	25.4	L	6	61	1.0	1			SEA01
1998 11 08.51		S	10.8	TI	20	L	7	45	2	4			MAT08
1998 11 09.48		S	10.4	AA	10.0	B		25					SEA
1998 11 14.63		S	10.6	VN	25.4	L	6	61	1.6	2			SEA01
1998 11 15.07		S	10.8	AA	13.5	L		21	1.5	2/			SOU01
1998 11 15.07		S	10.8	TT	23.0	L	5	92	1.5	2			DES01
1998 11 15.65		S	10.7	VN	25.4	L	6	61	1.6	3			SEA01
1998 11 19.08		S	10.6	VT	8.0	B		20	2.5	3			SHA02
1998 11 19.47		S	10.8	VN	25.4	L	6	61	1.7	2			SEA01
1998 11 20.47		S	10.7	VN	25.4	L	6	61	1.7	2			SEA01
1998 11 23.78		S	11.1	VN	41	L	4	90	1.6	6			PEA
1998 11 24.78		S	11.1	VN	41	L	4	90	1.2	5			PEA
1998 11 26.79		S	11.0	VN	41	L	4	90	1.2	5			PEA
1998 11 27.78		S	11.1	VN	41	L	4	90	1.3	4/			PEA
1998 11 29.80		S	11.0	VN	41	L	4	90	1.3	4/			PEA
1998 12 07.50		S	11.0	TI	20	L	7	45	2	5			MAT08
1998 12 10.44		S	10.8	VN	25.4	L	6	61	1.5	4			SEA01
1998 12 12.16		S	11.0	TJ	23.0	L		67	1.0	2/			DES01

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 13.15		S	11.0	TJ	23.0	L		67	1.0	2			DES01
1998 12 14.15		S	11.1	TJ	23.0	L		67	1.0	2			DES01
1998 12 15.51		S	11.0	TI	20	L	7	45	1.5	5			MAT08
1998 12 18.78		I	11.3	VN	41	L	4	90	1.0	9			PEA
1998 12 19.08		S	11.1	TJ	23.0	L		67	& 1	2/			DES01
1998 12 19.78		I	11.3	VN	41	L	4	90	1.0	9			PEA
1998 12 20.09		S	11.1	TJ	23.0	L		67	& 1	3			DES01
1998 12 20.78		M	10.8	VN	20	L	4	45	1.6	8			PEA
1998 12 21.09		S	10.9	TJ	23.0	L		67	& 1	3			DES01
1998 12 21.44		M	10.6	TT	11	L	4	16	1.5	6/			RAE
1998 12 21.51		M	10.8	TI	20	L	7	45	1.5	7			MAT08
1998 12 21.75		M	10.9	VN	20	L	4	45	1.5	8			PEA
1998 12 22.57		M	10.7	TI	20	L	7	45	1.5	7			MAT08
1998 12 22.62		M	10.8	TT	11	L	4	16	1.2	7			RAE
1998 12 23.44		M	10.7	TT	11	L	4	16	1.5	6/			RAE
1998 12 23.58		M	10.8	TI	20	L	7	45	1.5	6			MAT08
1998 12 23.75		M	10.9	VN	20	L	4	45	1.2	7/			PEA
1998 12 25.60		M	10.6	TT	11	L	4	16	1.5	6			RAE
1998 12 25.75		M	11.0	VN	41	L	4	90	0.8	6			PEA
1998 12 26.14		S	11.2	TJ	23.0	L		67	& 1	3/			DES01
1998 12 26.81		M	11.0	VN	41	L	4	90	0.9	5/			PEA
1998 12 27.77		M	11.0	VN	41	L	4	90	0.9	5			PEA
1998 12 28.77		M	11.1	VN	41	L	4	90	1.0	4			PEA
1998 12 31.13		S	11.2	TJ	23.0	L		67	& 1	3/			DES01
1999 01 01.79		S	11.2	VN	41	L	4	90	1.0	3			PEA
1999 01 02.69		S	11.2	VN	41	L	4	90	0.9	3			PEA
1999 01 05.41		S	10.2	TT	11	L	4	16	2	2/			RAE
1999 01 05.47		S	9.7	GA	10.0	B		25					SEA
1999 01 05.56		M	10.6	TI	20	L	7	45	2.0	5			MAT08
1999 01 06.41		S	10.2	TT	11	L	4	16	2	3			RAE
1999 01 06.55		S	11.3	VN	41	L	4	90	1.0	3			PEA
1999 01 07.42		S	10.4	TT	11	L	4	16	2	4/			RAE
1999 01 07.60		S	11.2	VN	41	L	4	90	1.0	3			PEA
1999 01 08.62		S	11.1	VN	41	L	4	90	1.1	3			PEA
1999 01 09.46		S	9.6	GA	8.0	B		15					SEA
1999 01 09.60		S	11.3	VN	41	L	4	90	1.1	3			PEA
1999 01 10.50		M	9.6	GA	10.0	B		25					SEA
1999 01 10.65		S	11.0	VN	41	L	4	90	1.1	3			PEA
1999 01 11.16		S	11.2	TJ	23.0	L		67	& 1	3/			DES01
1999 01 11.48		M	10.8	TT	11	L	4	16	2.5	5			RAE
1999 01 11.51		M	11.0	TI	20	L	7	45	1.5	5			MAT08
1999 01 11.57		S	11.1	VN	41	L	4	90	1.1	2			PEA
1999 01 12.50		S	9.9	GA	10.0	B		25					SEA
1999 01 12.52		M	11.1	TI	20	L	7	45	1.5	5			MAT08
1999 01 12.57		S	11.2	VN	41	L	4	90	1.1	2/			PEA
1999 01 13.52		S	9.7	GA	10.0	B		25					SEA
1999 01 14.51		S	11.1	TI	20	L	7	45	1.5	4			MAT08
1999 01 14.78		S	11.2	VN	41	L	4	90	1.1	2			PEA
1999 01 15.55		S	11.3	VN	41	L	4	90	1.3	2			PEA
1999 01 16.52		B	11.2:	TJ	40	L	6	44	0.6	4			FARO1
1999 01 16.55		S	11.3	VN	41	L	4	90	1.2	3			PEA
1999 01 18.45		S	10.5	GA	10.0	B		25					SEA
1999 01 20.03	x	S	11.3	TJ	23.0	L		67	& 1	4			DES01
1999 01 21.02	x	S	11.3	TJ	23.0	L		67	& 1.0	4/			DES01
1999 01 21.97	x	S	11.4	TJ	23.0	L		67	& 1	5			DES01
1999 01 24.63		S	10.8	TT	11	L	4	16	2	3/			RAE
1999 01 25.56		S	11.0	TT	11	L	4	16	2	3/			RAE

Comet C/1996 E1 (NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 23.45		S	12.1	AC	20	L	6	122	2	2			HAL
1996 08 12.45	!	S	11.4	AC	41	L	4	72	3	2			HAL
1996 08 23.46		S	11.7	NP	41	L	4	72	3	1			HAL
1996 09 05.12		S	12.3	NP	41	L	4	72	3	0			HAL

Comet C/1996 J1 (Evans-Drinkwater) [component B]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 17.60		C	18.9	GA	60.0	Y	6	a240	0.25				NAK01

Comet C/1996 N1 (Brewington)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 17.16		S	9.2	NP	5.0	B		10		4/			HAL
1996 08 10.20	!	M	8.3	NP	5.0	B		10	6				HAL
1996 08 19.15		M	8.1	NP	5.0	B		10	5				HAL
1996 09 01.14		S	8.3	NP	5.0	B		10					HAL
1996 09 09.15		S	8.7	NP	5.0	B		10	4				HAL
1996 09 17.18		M	9.5	NP	41	L	4	72					HAL
1996 10 02.18		S	11.6	AC	41	L	4	72	2.5	0/			HAL

Comet C/1996 P2 (Russell-Watson)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 08 13.43	!	S	12.7	AC	41	L	4	72	1.3	2			HAL
1996 08 21.43	!	S	12.7	AC	41	L	4	72	1.5				HAL
1996 09 17.39	!	S	13.3	AC	41	L	4	72					HAL

Comet C/1996 Q1 (Tabur)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 08 21.46		S	10.0	PC	41	L	4	72	3.5	3			HAL
1996 09 09.45		S	8.0	PC	41	L	4	72	5	4			HAL
1996 09 16.47		M	6.8	SC	5.0	B		10	11	5/			HAL
1996 09 20.47		S<	7.5	SC	5.0	B		10	8				HAL
1996 09 25.49		M	6.1	SC	5.0	B		10					HAL
1996 09 25.49		S	6.0	SC	1.0	E		1					HAL
1996 10 01.47		M	5.6	SC	5.0	B		10	13	5/			HAL
1996 10 06.44		S	4.5	SC	1.0	E		1					HAL
1996 10 09.45		S	5.0	SC	1.0	E		1					HAL
1996 10 12.44		S	5.6	SC	1.0	E		1					HAL
1996 10 17.47		M	6.0:	SC	5.0	B		10			40	m 330	HAL
1996 10 23.51		S	7.0	SC	5.0	B		10					HAL
1996 10 30.08	!	S	7.9	NP	5.0	B		10					HAL
1996 11 06.08		S	8.7	AC	20	L	6	49					HAL
1996 11 11.07		S	9.5	AC	20	L	6	49	8				HAL
1996 12 08.53		I[10	:		20	L	6	49					HAL

Comet C/1996 R1 (Hergenrother-Spahr)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 09.24		M	12.4	AC	41	L	4	72	0.8	6/			HAL
1996 09 17.22		M	12.3	AC	41	L	4	72	0.9	6/			HAL
1996 10 07.28		S	12.8	AC	41	L	4	72	1	2/			HAL

Comet C/1997 BA6 (Spacewatch)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 15.83	a	C	15.3	GA	60.0	Y	6	a120	0.5			25	NAK01
1998 12 05.83		C	15.3	TJ	12.0	L	6	a 60	0.45				YOS04
1998 12 16.83		C	14.8	TJ	60.0	Y	6	a120	0.7				NAK01
1998 12 18.80		S	14.0	VN	41	L	4	200	0.5	3			PEA
1998 12 19.79		S	14.0	VN	41	L	4	200	0.5	3			PEA
1998 12 24.81		C	14.6	TJ	60.0	Y	6	a120	0.7		0.7m	350	NAK01
1998 12 26.78		S	14.0	VN	41	L	4	200	0.6	2			PEA
1998 12 27.81		S	14.0	VN	41	L	4	200	0.4	2			PEA
1999 01 11.77		S	13.8	VN	41	L	4	200	0.5	2			PEA
1999 01 14.79		S	13.8	VN	41	L	4	200	0.5	1			PEA
1999 01 16.81		S	13.9	VN	41	L	4	200	0.4	2			PEA
1999 01 17.82		S	13.9	VN	41	L	4	200	0.4	2			PEA

Comet C/1997 J1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 25.00		C	20.0	HS	60.0	D	2						SAR02

Comet C/1997 J2 (Meunier-Dupouy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 24.84	x	S	12.3	TJ	35	M	10	146	1.1	s3			DRA02
1998 03 07.78		C	12.2	HS	7.1	A	6	a180	1.3				YOS04
1998 07 30.98		E	11.9:	VF	13.3	R	5	40	2	2			SCO04
1998 07 31.96		E	11.8	VF	13.3	R	5	40	2.5	2			SCO04
1998 08 01.91		E	11.9	VF	13.3	R	5	40	& 2	2			SCO04
1998 08 16.87	x	S	11.4	TJ	15	L	6	80	1.0	s3/			DRA02
1998 08 20.96	x	S	11.6	TJ	20	T	10	112	1.8	s5			PLE01
1998 08 20.97	x	S	11.4	TJ	15	M	10	150	2.0	s5/			PLE01
1998 08 20.97	x	S	12.5	TJ	20	T	10	143	1.7	s6			DRA02
1998 08 23.96	x	S	11.2	TJ	15	M	10	150	2.0	s4/			PLE01
1998 08 28.96	x	S	11.0	TJ	20	T	10	112	1.9	s5			PLE01
1998 08 28.97	x	S	11.1	TJ	20	T	10	143	2.0	s5			DRA02
1998 09 02.00	x	S	12.3	TJ	35	M	10	146	0.6	s5			DRA02
1998 09 09.83		M	11.3	TI	42	L	5	66	2.3	3			LEH
1998 09 23.83		M	12.0	TI	42	L	5	81	2.0	3			LEH
1998 09 24.80		S	11.8	TI	20	L	4	57	1.7	3			KYS
1998 09 24.81		M	12.1	TI	42	L	5	81	1.9	3			LEH
1998 09 26.99	x	S	12.4	TJ	35	M	10	135	1.8	s3/			PLE01
1998 10 03.98	x	S	12.5	TJ	35	M	10	135	2.0	s3			PLE01
1998 10 16.78		S	12.1	AC	25.4	L	5	104	1.3	1			MEY
1998 10 16.98	x	S	13.0	TJ	35	M	10	90	1.5	1/			PLE01
1998 10 17.99	x	S	13.2	TJ	35	M	10	135	2.0	1/			PLE01
1998 10 20.86		S	12.2	AC	25.4	L	5	104	1.4	2			MEY
1998 10 23.94	x	S[	13.0	TJ	25	L	5	70	2.0	1/			PLE01
1998 10 24.85		M	12.8	HS	42	L	5	81	1.8	3/			LEH
1998 10 25.80		M	12.8	HS	42	L	5	81	1.7	3/			LEH
1998 10 27.96	x	S[	13.0	TJ	35	M	10	90	! 2.0	1/			PLE01
1998 11 01.48	S1	R[	13.5	HS	10.7	A	4	a 60					YOS04
1998 11 07.27		S	12.9	HS	25.6	L	5	84	1	3			BIV
1998 11 08.44		C	13.0	GA	60.0	Y	6	a120	1.7		> 4.5m	355	NAK01
1998 11 08.52		S[	12.5	HS	20	L	7	158					MAT08
1998 11 09.46		S	13.0	GA	25.4	L	4	71					SEA
1998 11 11.74		S	12.0	HS	35	L	5	92	1.5	2/			HOR02
1998 11 12.73		S	12.2	HS	35	L	5	158	1.5	2			HOR02
1998 11 12.73		S	12.4	AC	25.4	L	5	104	1.0	2			MEY
1998 11 12.77		M	12.9	HS	42	L	5	162	1.8	4			LEH
1998 11 16.09		J	12.6	SC	25.4	T	5	a 60	1.47	s5			ROQ
1998 11 17.31		S	13.0	HS	25.6	L	5	84	1	2			BIV
1998 11 19.79		M	12.9	HS	42	L	5	162	1.8	3			LEH
1998 11 21.28		S	13.4	HS	25.6	L	5	84	1	3			BIV
1998 11 21.75		M	13.0	HS	42	L	5	81	1.7	3/			LEH
1998 11 22.74		S	12.5	HS	20	L	5	70	1.3	2			BAR06
1998 11 23.30		S	13.4	HS	25.6	L	5	84	1	3			BIV
1998 11 23.42		C	13.2	GA	60.0	Y	6	a120	1.7				NAK01
1998 11 23.43		R	15.3	TJ	12.0	L	6	a120	0.45				YOS04
1998 12 09.71		S	12.9	HS	35	L	5	158	1.3	2/			HOR02
1998 12 09.72		M	13.1	HS	42	L	5	162	1.8	3			LEH
1998 12 12.41		C	13.4	GA	60.0	Y	6	a120	1.8				NAK01
1998 12 13.37		C	14.0	TJ	18.0	L	6	a 30	0.4				YOS04
1998 12 17.25		S	13.1	HS	25.6	L	5	169	1	3			BIV
1998 12 17.69		M	13.2	HS	42	L	5	162	1.7	3			LEH
1998 12 17.73		S	13.3	HS	44.0	L	5	156	1.1	3			HAS02
1998 12 18.69		B	13.4	HS	42	L	5	162	1.6	3			LEH
1998 12 20.25		S	13.1	HS	25.6	L	5	169	1	3			BIV

Comet C/1998 H1 (Stonehouse)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 04 28.03		E	11.3	VF	13.3	R	5	31	& 5.6	3			SCO04
1998 04 28.92		E	11.3	VF	13.3	R	5	31	5.6	3			SCO04

Comet C/1998 H1 (Stonehouse) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 04 29.94		E	11.4	VF	13.3	R	5	31	7.8	2			SC004
1998 04 30.94		E	11.1	VF	13.3	R	5	31	6.0	2			SC004
1998 05 01.97		E	11.4	VF	13.3	R	5	31	7.0	2			SC004

Comet C/1998 J1 (SOHO)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 05 13.88			> 2 :		7.0	B		10		9	0.66		DEA
1998 05 14.88		B	3.2	S	7.0	B		10	0.5	9			DEA
1998 05 21.90		B	4.9	AA	7.0	B		10	4.0	8	2.53	127	DEA
1998 05 22.90		B	5.0	AA	7.0	B		10	6	8	1.53	128	DEA
1998 05 31.89		B	5.2	AA	7.0	B		10	4.8	8	0.33	128	DEA
1998 06 01.89					7.0	B		10	15.2	8	1.2	138	DEA
1998 06 01.89			3.9	S	0.0	E		1					DEA
1998 06 04.89		B	5.8	S	7.0	B		10	7.2	7	0.53	137	DEA
1998 06 05.90		B	6.1	S	7.0	B		10	7	7			DEA
1998 06 06.90		S	6.2	S	7.0	B		10	6.4	7			DEA
1998 06 07.91		B	6.5	S	7.0	B		10	7	7			DEA
1998 06 09.90		B	6.1	S	7.0	B		10	11.1	6			DEA
1998 06 10.89		B	6.6	S	7.0	B		10	11.1	6			DEA
1998 06 12.91		B	6.6	S	7.0	B		10	12	6			DEA
1998 06 21.92		S	6.8	AA	7.0	B		10	12.3	5			DEA
1998 06 24.95		S	6.3	AA	7.0	B		10	11	5			DEA
1998 06 25.91		S	6.7	AA	7.0	B		10	10	4			DEA
1998 06 28.93		S	6.8	AA	7.0	B		10	8	4			DEA

Comet C/1998 K1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 24.83		C	15.8	TJ	18.0	L	6	a 60	0.6				YOS04
1998 12 24.86	a	C	17.1	GA	60.0	Y	6	a240	0.55		1.0m	326	NAK01
1999 01 04.83		C	17.2:	TJ	18.0	L	6	a 60	0.3				YOS04
1999 01 22.81		C	17.6:	TJ	18.0	L	6	a 60	0.2				YOS04

Comet C/1998 K5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 06 20.56		C	12.7	HS	7.2	A	7	a 60		9			YOS04
1998 07 13.90	x	I	13.2	TJ	35	M	10	146	0	9			DRA02
1998 07 19.92	x	I	12.1	TJ	35	M	10	146	0	9			DRA02
1998 08 10.96	x	I	12.7	TJ	35	M	10	229	0	9			DRA02
1998 08 15.94	x	I	12.3	TJ	15	L	6		0	9			DRA02
1998 08 16.94	x	I	12.2	TJ	15	L	6		0	9			DRA02
1998 08 20.98	x	B	12.3	TJ	20	T	10	112	0.1	S8/	0.02	270	PLE01
1998 08 20.99	x	S	12.8	TJ	20	T	10	200	0.2	S7/	0.02	259	DRA02
1998 08 23.99	x	B	12.6	TJ	20	T	10	200	0.1	S8/	0.02	274	PLE01
1998 08 28.98	x	B	12.5	TJ	20	T	10	118	0.2	S8/	0.02	272	PLE01
1998 08 28.99	x	B	12.2	TJ	15	M	10	150	0.2	S8/	0.02	272	PLE01
1998 08 29.02	x	S	12.2	TJ	20	T	10	143	0.2	S8	0.01	277	DRA02
1998 09 01.94	x	S	13.0	TJ	35	M	10	264	0.2	S8	0.01	270	DRA02
1998 09 04.08	x	M	12.2	TJ	35	M	10	206	0.3	S6/	0.01	255	DRA02
1998 09 23.90		M	13.1	HS	42	L	5	162	0.3	7/			LEH
1998 09 24.90		M	13.1	HS	42	L	5	162	0.2	8			LEH
1998 09 26.97	x	B	12.6	TJ	35	M	10	420	0.3	S8/	0.01	265	PLE01
1998 10 03.98	x	B	12.9	TJ	35	M	10	420	0.3	S8	0.01	262	PLE01
1998 10 16.98		S	14.2	AC	25.4	L	5	104	< 0.1	8			MEY
1998 10 16.99	x	B	13.5	TJ	35	M	10	420	0.5	S7/	0.02	257	PLE01
1998 10 17.05		B	13.8	HS	42	L	5	162	0.2	8			LEH
1998 10 17.89		E[11.9		VF	13.3	R	5	40	! 2				SC004
1998 10 17.99	x	B	13.4	TJ	35	M	10	600	0.5	S8	0.02	258	PLE01
1998 10 20.90		M	13.7	AC	25.4	L	5	104	0.4	S8			MEY
1998 10 20.92		B	13.9	HS	42	L	5	162	0.2	8			LEH
1998 10 23.89		M	13.9	HS	35	L	5	207	0.3	6/			HOR02
1998 10 24.90		B	14.3	HS	42	L	5	162	0.2	7/			LEH
1998 10 25.03	x	S	14.5	TJ	35	M	10	206	0.3	S7	0.02	266	DRA02

Comet C/1998 K5 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 25.88		B	14.3	HS	42	L	5	162	0.3	7			LEH
1998 10 27.01		I	14.2	GA	25.4	J	6	150		9			BOU
1998 10 28.04	x	B	13.6	TJ	35	M	10	480	0.4	S8/	0.02	260	PLE01
1998 10 28.47		B	14.1	HS	25.6	L	5	169	0.3	6	0.5m	260	BIV
1998 10 31.57		V	13.3	LA	50.0	C	12	a180	0.15	8	1.2m	263	FUK02
1998 11 07.77		M	14.2	HS	35	L	5	237	0.3	3			HOR02
1998 11 10.56		C	14.6	GA	60.0	Y	6	a120	0.45	8/	1.4m	264	NAK01
1998 11 10.95		S	14.8	VB	30	R	20	185	0.3	4			SHA02
1998 11 11.82		S	14.4	HS	35	L	5	237	0.3	4/			HOR02
1998 11 12.78		S	14.4	HS	35	L	5	207	0.3	3/			HOR02
1998 11 12.88		B	14.7	HS	42	L	5	162	0.2	8			LEH
1998 11 14.05	x	B	13.9	TJ	35	M	10	480	0.3	S8/	0.01	259	PLE01
1998 11 14.05		S	14.7	HS	44.5	L	4	230	0.2	5			SAR02
1998 11 17.32		B	14.5	HS	25.6	L	5	169	0.4	5	0.4m	250	BIV
1998 11 18.78		S	15.2	HS	44.0	L	5	226		6			HAS02
1998 11 19.86		B	14.6	HS	42	L	5	162	0.3	8			LEH
1998 11 20.54		V	14.5	LA	50.0	C	12	a180	0.18	8	1.1m	264	FUK02
1998 11 21.30		B	14.7	HS	25.6	L	5	169	0.3	5			BIV
1998 11 21.60		I	14.8:	HS	31.7	L	6	138	< 0.5				YOS04
1998 11 21.88		B	14.8	HS	42	L	5	162	0.3	8			LEH
1998 11 23.38		B	14.7	HS	25.6	L	5	169	0.3	5			BIV
1998 11 23.49		V	14.8	LA	50.0	C	12	a180	0.17	8	0.9m	265	FUK02
1998 11 23.58		C	15.4	GA	60.0	Y	6	a120	0.35	8/	1.2m	264	NAK01
1998 11 26.53		V	14.7	LA	50.0	C	12	a240	0.15	8	1.0m	264	FUK02
1998 12 12.44		C	16.1	GA	60.0	Y	6	a120	0.35	8/	1.1m	264	NAK01
1998 12 19.04	x	S	14.1	TJ	35	M	10	320	0.3	S9	0.01	263	PLE01
1998 12 26.44		C	16.1	TJ	18.0	L	6	a120	0.3				YOS04
1999 01 13.54		C	17.1	GA	60.0	Y	6	a240	0.3	8/	0.6m	266	NAK01
1999 01 16.46		C	17.1	TJ	18.0	L	6	a120	0.3				YOS04
1999 01 18.53		V	17.6	LA	50.0	C	12	a360	0.10	8	0.4m	265	FUK02
1999 01 21.54		V	17.1	LA	50.0	C	12	a480	0.13	8	0.7m	266	FUK02

Comet C/1998 M2 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 09.81		B	14.2	HS	42	L	5	162	0.7	4			LEH
1998 09 20.78		B	14.1	HS	42	L	5	162	0.6	4			LEH
1998 09 23.78		B	14.1	HS	42	L	5	162	0.6	4			LEH
1998 09 24.77		B	13.9	HS	42	L	5	162	0.6	4			LEH
1998 10 24.82		B	14.6	HS	42	L	5	162	0.7	4			LEH
1998 10 25.79		B	14.8	HS	42	L	5	162	0.7	4			LEH
1998 11 08.41		C	15.2	GA	60.0	Y	6	a120	0.7				NAK01
1998 11 11.76		B	14.6	HS	42	L	5	162	0.6	4			LEH
1998 11 12.74		B	14.8	HS	42	L	5	162	0.7	3/			LEH
1998 11 18.75		S[	14.0	HS	44.0	L	5	156					HAS02
1998 11 21.74		B	14.9	HS	42	L	5	162	0.6	4			LEH
1998 11 23.41		C	15.4	GA	60.0	Y	6	a120	0.6				NAK01
1998 12 12.43		C	15.5	TJ	18.0	L	6	a 60	0.35				YOS04

Comet C/1998 M5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 15.86	x	S	11.8	TJ	15	L	6	80	2.0	5			DRA02
1998 08 20.93	x	S	11.7	TJ	20	T	10	112	2.4	s4/			PLE01
1998 08 20.94	x	S	11.5	TJ	15	M	10	150	2.6	s5			PLE01
1998 08 20.94	x	S	11.6	TJ	20	T	10	143	1.7	4			DRA02
1998 08 23.98	x	S	11.2	TJ	20	T	10	112	2.0	s5			PLE01
1998 08 28.99	x	S	10.9	TJ	20	T	10	143	1.9	s4			DRA02
1998 08 28.99	x	S	11.0	TJ	15	M	10	150	2.4	s5			PLE01
1998 08 28.99	x	S	11.1	TJ	20	T	10	112	2.2	s4/			PLE01
1998 09 04.05	x	S	12.3	TJ	35	M	10	206	0.2	S8			DRA02
1998 09 07.86	x	I	13.1	TJ	35	M	10	206	0	9			DRA02
1998 09 09.84		M	11.1	TI	10	B	4	25	2.1	4			LEH
1998 09 12.61		C	12.0	HS	10.7	A	3	a 30	1.3		3.5m	147	YOS04
1998 09 12.68	I	C	11.9	HS	10.7	A	3	a 60	1.2		4.0m	148	YOS04

Comet C/1998 M5 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 23.85		M	10.3	TI	10	B	4	25	2.4	3/			LEH
1998 09 24.82		M	10.5	TI	10	B	4	25	2.1	3/			LEH
1998 09 24.82		O	11.2	TI	20	L	4	57	1.5	2			KYS
1998 09 26.92	x	S	10.8	TJ	35	M	10	90	2.0	s4			PLE01
1998 10 03.93	x	S	10.7	TJ	35	M	10	90	2.6	s3/			PLE01
1998 10 11.47		C	11.2	HS	10.7	A	4 a	30	1.4		1.4m	114	YOS04
1998 10 13.76		M	11.2	TI	10	B	4	25	2.1	3/			LEH
1998 10 14.78		S	11.1	TI	10	B		25	2.4	3			DRA02
1998 10 14.80		E	10.9	VF	13.3	R	5	40	2.2	4/			SCO04
1998 10 14.92	x	S	10.1	TJ	10	B		25	2.8	s2/			PLE01
1998 10 16.78		E[	11.8	VF	13.3	R	5	40	! 2				SCO04
1998 10 16.79	x	M	10.7	TJ	25.4	L	5	65	3.1	D5			MEY
1998 10 16.83		M	11.0	TI	10	B	4	25	2.0	3/			LEH
1998 10 16.93	x	S	10.6	TJ	35	M	10	90	2.5	s3/			PLE01
1998 10 17.75		E	11.8	VF	13.3	R	5	40	& 3.5	3			SCO04
1998 10 17.76		M	11.0	TI	10	B	4	25	2.0	3/			LEH
1998 10 17.78	x	S	11.4	TJ	35	M	10	206	1.0	S5			DRA02
1998 10 17.93	x	S	10.6	TJ	35	M	10	90	2.5	s3/			PLE01
1998 10 20.76		M	11.0	TI	10	B	4	25	2.1	4			LEH
1998 10 20.78		S	10.8	TI	35	M	10	90	2.2	s3			DRA02
1998 10 20.80	x	M	10.7	TJ	25.4	L	5	65	2.9	4			MEY
1998 10 20.96	x	S	10.9	TJ	35	M	10	90	1.5	s3			PLE01
1998 10 21.79		B	11.0:	AA	25	L	6	108	2	1			SWI
1998 10 21.96	x	B	10.8	TJ	10	B		25	2.5	S4			PLE01
1998 10 23.93		B	11.0	TI	25	L	5	70	2.0	s4			PLE01
1998 10 23.95		E	9.3	VF	13.3	R	5	70	4	2			SCO04
1998 10 24.83		B	11.0:	AA	25	L	6	70	3	1			SWI
1998 10 24.84		M	10.8	TI	10	B	4	25	2.3	3/			LEH
1998 10 24.91		S	10.6	TI	11	B		20	1.8	s4/			PLE01
1998 10 25.44		C	10.9	HS	10.7	A	3 a	60	1.5		3.6m	114	YOS04
1998 10 25.44	I	C	11.0	HS	10.7	A	3 a	60	1.3		3.3m	112	YOS04
1998 10 25.44	S	R	11.3	HS	10.7	A	4 a	60	1.7		3.5m	108	YOS04
1998 10 25.77		M	10.8	TI	10	B	4	25	2.2	3/			LEH
1998 10 26.95	x	M	10.7	TT	25.4	J	6	88	1.8	4			BOU
1998 10 27.81		S	10.8	HS	20	L	5	70	3.0	3			BAR06
1998 10 27.90		S	10.8	TI	10	B		25	2.0	s4/			PLE01
1998 10 27.95		E	12.0:	VF	13.3	R	5	70	1	d1			SCO04
1998 10 30.85		S	10.5	TT	35	L	5	92	2.0	3			HOR02
1998 11 01.49	S	R	11.5:	HS	10.7	A	4 a	60	2.0				YOS04
1998 11 05.50		C	12.1	GA	20.3	T	9 a	60	0.9		>0.02	103	SUZ02
1998 11 07.25		S	10.6	TJ	25.6	L	5	42	2	5			BIV
1998 11 07.45		S	11.0:	HS	15.0	B		25	& 1.5	2/			HAS08
1998 11 07.71		M	10.6	TT	35	L	5	92	2.6	3/			HOR02
1998 11 07.75	x	M	10.4	TJ	25.4	L	5	65	3.1	D4			MEY
1998 11 08.43		C	12.2	GA	20.3	T	9 a	60	1.1				SUZ02
1998 11 08.44		C	11.3	GA	60.0	Y	6 a	120	2.5		3.5m	97	NAK01
1998 11 08.46		S	10.9	TJ	25.4	T	6	62	1.5	4			YOS04
1998 11 08.48		S	11.1	HS	15.0	B		25	2.0	3			HAS08
1998 11 08.49	x	S	11.3	HS	25.4	L	4	113	1.4	4			YOS02
1998 11 08.70		M	10.6	TT	35	L	5	92	2.4	3			HOR02
1998 11 09.76		S	11.4	VB	33	L	5	75	1.3	4			SHA02
1998 11 10.44	x	S	11.0	TT	25.4	L	4	46	2.0	3			YOS02
1998 11 10.74	x	M	10.7	TT	15.6	L	5	45	2.0	3/			BOU
1998 11 10.76		S	10.9	VB	33	L	5	75	1.6	3			SHA02
1998 11 11.68		M	11.4	SE	25	L	4	64	1.5	2/			SHU
1998 11 11.72		M	10.6	TT	35	L	5	92	2.6	3/			HOR02
1998 11 11.73		M	10.6	TI	10	B	4	25	2.1	3/			LEH
1998 11 11.74	x	S	10.7	TT	15.6	L	5	45	1.9	4			BOU
1998 11 11.75		S	10.9	AC	30.5	L	5	72	& 2	4			GIL01
1998 11 12.52		S	10.0	TJ	25.4	T	6	62	2.1	4/			YOS04
1998 11 12.71		M	10.5	TI	10	B	4	25	2.3	3/			LEH
1998 11 12.71		M	10.5	TT	35	L	5	92	2.7	3			HOR02
1998 11 12.75		B	11.0:	AA	25	L	6	108	3	1			SWI
1998 11 12.75	x	M	10.4	TJ	25.4	L	5	65	1.9	s4			MEY
1998 11 12.81		O[	10.0	TI	10	L	10	43					LIB

Comet C/1998 M5 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 13.73		M	10.3	HS	44.5	L	4	82	3.5	5	0.1	120	SARO2
1998 11 13.75		S	10.7	TI	35	M	10	90	2.4	s4			DRAO2
1998 11 13.75		S	11.0	TI	35	M	10	90	2.5	s4			PLEO1
1998 11 14.46		S	11.3	HS	15.0	B		25	2.0	2/			HASO8
1998 11 14.76		S	10.9	TI	35	M	10	90	2.2	3/			PLEO1
1998 11 14.78		S[	11.0	TI	10	B		25	! 3.0	4			PLEO1
1998 11 15.42		C	11.8	GA	20.3	T	9	a 60	1.6				SUZO2
1998 11 15.46		S	10.0	TJ	25.4	T	6	62	2.0	4/			YOSO4
1998 11 16.76		S	10.4	AC	12.5	R	5	42	2	5			GILO1
1998 11 16.85		S	10.9	TJ	25.3	L	6	58	& 1.5	3			PERO1
1998 11 16.85		S	10.9	TJ	25.3	L	6	58	& 2	3/			VITO1
1998 11 17.24		B	10.7	TJ	25.6	L	5	42	3	5			BIV
1998 11 17.46		S	10.8	HS	20.3	T	10	78	2	3/			YOSO4
1998 11 17.74	x	M	10.6	TT	15.6	L	5	36	2.2	5			BOU
1998 11 17.75		S	10.7	AC	30.5	T	10	117	3	3			COM
1998 11 18.74		M	10.4	TT	13	L	8	69	2.9	3/			HORO2
1998 11 18.75		S	10.7	TT	44.0	L	5	93	1.9	4			HASO2
1998 11 19.72		E	9.7:	S	6	R	6	51	3	3/			ERO
1998 11 19.72		S	10.7	AC	15.2	L	5	42	2.5	3			MOE
1998 11 19.75		S	10.6	AC	30.5	L	5	72	2	4			GILO1
1998 11 19.76		M	10.4	TI	10	B	4	25	2.3	3/			LEH
1998 11 19.78		S	10.1:	TI	6	R	12	37	4.0	4			SVE
1998 11 19.93	x	S	10.6	TT	25.4	J	6	58	2.3	3/			BOU
1998 11 20.72		E	9.7:	S	6	R	6	51	3	3			ERO
1998 11 20.91	x	M	10.6	TT	25.4	J	6	58	2.2	4			BOU
1998 11 21.25		S	10.8	TJ	25.6	L	5	42	2.5	5			BIV
1998 11 21.72		S	10.8	AC	15.2	L	5	42	2	3			MOE
1998 11 21.73	x	S	10.6	TT	15.6	L	5	45	2.2	3/			BOU
1998 11 21.76		M	10.3	TI	10	B	4	25	2.4	3/			LEH
1998 11 21.78		S	10.6	AC	30.5	T	10	117	2.5	3/			COM
1998 11 21.83	x	S	10.3	TJ	10.0	B		20	3.6	3			MEY
1998 11 22.27		S	10.8	TJ	25.6	L	5	42	2	5			BIV
1998 11 22.48	x	S	10.6	TT	25.4	L	4	113	1.8	3			YOSO2
1998 11 22.67		M	10.0	PA	25	L	4	64	4	2/			SHU
1998 11 22.69		E	9.9:	S	6	R	6	51	2.5	3			ERO
1998 11 22.69		M	10.3	TI	10	B	4	25	2.5	3/			LEH
1998 11 22.72		S	10.8	HS	20	L	5	70	2.0	2			BARO6
1998 11 22.78		S	10.8	AC	15.2	L	5	42	2	3			MOE
1998 11 22.85		S	10.2	AC	25.0	L	6	61	2	4			RES
1998 11 23.26		S	10.8	TJ	25.6	L	5	42	2.5	5			BIV
1998 11 23.41		C	11.2	GA	60.0	Y	6	a120	2.7				NAKO1
1998 11 23.41		S	10.8	HS	25.4	T	6	116	2.0	4			YOSO4
1998 11 23.44		V	11.8	LA	50.0	C	12	a360	1.64	4	1.8m	86	FUKO2
1998 11 23.69		E	10.1:	S	6	R	6	51	2	2/			ERO
1998 11 23.76		S	10.6	HS	20	L	5	70	2.5	2			BARO6
1998 11 23.82		S	10.5	VF	21.5	L	6	80	& 1	2			SCOO4
1998 11 24.72		M	10.0	TI	10	B	4	25	2.5	4			LEH
1998 11 24.72		M	10.4	TT	35	L	5	92	2.4	3			HORO2
1998 11 24.77		E	11.9	VF	21.5	L	6	80	2	2/			SCOO4
1998 11 24.80		S	10.8	HS	20	L	5	70	1.9	2			BARO6
1998 11 25.05		J	10.1	SC	25.4	T	5	a 60	2.99	s5/	3.5m	94	ROQ
1998 12 01.42		V	10.7	LA	50.0	C	12	a360	1.44	5	2.4m	90	FUKO2
1998 12 01.70		S	10.7	AC	15.2	L	5	42	2	3			MOE
1998 12 04.74		S[	11.0	TI	25	L	5	70	! 3.0	4			PLEO1
1998 12 04.95		B	9.0	AC	6.3	B	4	9	8	1			NOW
1998 12 06.20		S	10.5	TJ	25.6	L	5	42	3	5			BIV
1998 12 06.74	x	S	10.5	TT	25.4	J	6	58	2.5	3/			BOU
1998 12 06.80		S	10.0	TJ	25.3	L	6	58	& 3.5	4			PERO1
1998 12 07.73	x	M	10.5	TT	25.4	J	6	72	2.4	4			BOU
1998 12 07.74		S	10.4	HS	20	L	5	70	2.8	2/	0.05	25	BARO6
1998 12 07.74		S	10.5	VF	21.5	L	6	80	1.8	3			SCOO4
1998 12 07.83		S	10.7	TT	25.3	L	6	58	& 1.5	4			PERO1
1998 12 08.69		E	9.8:	S	6	R	6	51	2.5	3			ERO
1998 12 08.70		S	10.8	AC	15.2	L	5	42	2.5	3			MOE
1998 12 09.72		M	10.0	TT	35	L	5	92	2.7	3/			HORO2

Comet C/1998 M5 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 09.73		M	9.9	TI	10	B	4	25	2.6	3			LEH
1998 12 09.79		S	10.3	TT	25.3	L	6	58	& 1.8	4			PER01
1998 12 10.71		S	10.5	AC	15.2	L	5	42	2.5	4			MOE
1998 12 11.20		S	10.2	TJ	25.6	L	5	42	3	5			BIV
1998 12 11.70		S	10.6	AC	15.2	L	5	42	2	4			MOE
1998 12 11.72	x	M	10.3	TJ	25.4	L	5	65	2.6	s4			MEY
1998 12 11.74		M	9.9	TI	10	B	4	25	2.4	3/			LEH
1998 12 12.38		S	10.1	AA	15.0	B		25	2	6			MIT
1998 12 13.02		B	9.5	AC	10.0	B	4	20	1	2			NOW
1998 12 13.43		S	9.9	TJ	25.4	T	6	62	2.8	4/			YOS04
1998 12 14.25		S	10.3	TJ	25.6	L	5	42	3	5			BIV
1998 12 15.70		S	9.8	HS	22	L	5	80	3.5	7			WAR01
1998 12 15.71		S	9.7	TT	10.0	B		25	2.6	4			HAS02
1998 12 15.83		S	10.4	HS	20.3	T	10	102	2.1	3			KAR02
1998 12 15.97		B	10.0	AC	10.0	B	4	20	1.5	4			NOW
1998 12 16.20	x	S	10.6	TT	25.4	J	6	72	2.1	3/			BOU
1998 12 17.21		S	10.0	TJ	25.6	L	5	42	3	4			BIV
1998 12 17.71		S	10.4	AC	15.2	L	5	42	3	4			MOE
1998 12 17.72		M	10.0	TI	10	B	4	25	2.4	3			LEH
1998 12 17.72	x	M	10.4	TJ	25.4	L	5	65	3.5	s4			MEY
1998 12 17.74		S	10.4	AC	30.5	T	10	117	& 3	4			COM
1998 12 17.75		S	10.4	AC	30.5	L	5	72	2	4			GIL01
1998 12 17.76	x	M	10.4	TT	25.4	J	6	58	2.6	4			BOU
1998 12 18.22		S	10.3	TT	35	L	5	92	2.4	3			HOR02
1998 12 18.71	x	S	9.9	TJ	10.0	B		20	3.5	3			MEY
1998 12 18.72		M	9.9	TI	10	B	4	25	2.6	3			LEH
1998 12 18.74		S[	11.0	TI	25	L	5	70	! 3.0	4			PLE01
1998 12 19.21		S	10.1	TJ	25.6	L	5	42	3	4			BIV
1998 12 19.77	x	S	10.3	TT	15.6	L	5	36	2.5	3/			BOU
1998 12 20.22		S	10.0	TJ	25.6	L	5	42	3	5			BIV
1998 12 20.43	x	S	10.7	TT	25.4	L	4	113	1.8	3			YOS02
1998 12 20.75		S	9.7	AC	6.0	B		20	2.0	2/			RES
1998 12 20.76		S	10.4	AC	15.2	L	5	42	2.5	4			MOE
1998 12 20.77	x	M	10.2	TT	25.4	J	6	58	2.7	4			BOU
1998 12 21.71		S	10.6	AC	15.2	L	5	42	2.5	3			MOE
1998 12 22.10		S	10.7	HS	22.0	L	5	80	2.5	5			WAR01
1998 12 22.67	w	M	10.4	PA	25	L	4	64	2.5	4			SHU
1998 12 22.75	a	S	10.5	PA	30	L	5	60	2.5	3			NEV
1998 12 22.77	x	S	10.2	TT	25.4	J	6	58	2.5	3/			BOU
1998 12 22.78		B	10.4	TJ	34	L	4	44	2				CHE03
1998 12 24.12		S	10.1	HS	20	L	5	70	2.6	2			BAR06
1998 12 25.69		M	9.9	TI	10	B	4	25	2.5	3/			LEH
1998 12 26.23	x	S	10.2	TT	25.4	J	6	58	2.5	4			BOU
1998 12 28.71		M	9.8	TI	10	B	4	25	2.7	3			LEH
1998 12 29.22	x	M	10.2	TT	25.4	J	6	58	2.2	5			BOU
1998 12 29.69		M	9.9	TI	10	B	4	25	2.6	3			LEH
1998 12 29.71		S	10.5	TT	35	L	5	92	2	3			HOR02
1998 12 30.69		M	9.8	TI	10	B	4	25	2.7	3			LEH
1998 12 30.70		S	10.0	TT	35	L	5	92	2.4	2/			HOR02
1998 12 31.24	x	M	10.2	TT	25.4	J	6	58	2.5	4			BOU
1999 01 06.72		S	9.9	HS	44.0	L	5	63	0.9	4			HAS02
1999 01 06.75		S	9.4	TJ	30.5	T	10	115	2.0	4/			KAM01
1999 01 07.71		S	10.2	AC	15.2	L	5	42	3.5	3			MOE
1999 01 09.38		C	10.8	TJ	10.7	A	4	a 60	3.1				YOS04
1999 01 09.74		S	10.3	AC	30.5	T	10	117	& 2.5	5			COM
1999 01 09.75		S	10.1	TT	12.5	R	5	31	3	4			GIL01
1999 01 09.75	x	M	9.8	TT	25.4	J	6	58	2.5	4			BOU
1999 01 10.71		M	9.9	TT	35	L	5	92	3	3			HOR02
1999 01 10.75		S	10.1	TT	12.5	R	5	31	3	4			GIL01
1999 01 10.79	x	M	9.7	TT	25.4	J	6	58	2.8	3/			BOU
1999 01 11.67	w	S	8.4	PA	25	L	4	64	2.5	3/			SHU
1999 01 11.84		M	10.0	HS	15.0	B		25	2	6			MIT
1999 01 12.71		M	9.6	TT	35	L	5	92	3.5	3			HOR02
1999 01 14.14		M	9.5	TT	35	L	5	92	3.3	3/			HOR02
1999 01 15.16		M	9.2	TT	8.0	B		10	5.5	3			HOR02

Comet C/1998 M5 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 17.16		M	9.5:	TT	8.0	B		10	4.5	3			HOR02
1999 01 17.80		S	10.3	TT	12.5	R	5	42	2.5	4			GIL01
1999 01 17.86		C	10.6	TJ	6.4	A	6 a	60	2.6				YOS04
1999 01 18.04	x	S	9.9	TT	25.4	J	6	72	3.0	3/			BOU
1999 01 18.73		S	10.2	AC	15.2	L	5	42	3	3			MOE
1999 01 18.74		S	9.8	TT	10.0	B		25	2.1	3			HAS02
1999 01 19.83		C	11.3	TJ	6.4	A	6 a	60	2.2				YOS04
1999 01 20.76		S	9.4	TJ	20.3	T	10	50	1.9	3			KAM01
1999 01 20.83		C	10.8	TJ	10.7	A	6 a	60	2.9				YOS04
1999 01 22.76		S	10.4:	HS	20	L	5	70	3	2			BAR06
1999 01 25.82		M	10.2	AC	15.0	B		25	2	5/			MIT
1999 01 26.15	x	M	9.9	TT	25.4	J	6	58	2.8	4			BOU
1999 01 27.63		S	10.1	TJ	25.6	L	5	42	3.5	4			BIV

Comet C/1998 P1 (Williams)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 12.95		S	9.0:	AA	8.0	B		11	4	5/			SOU01
1998 08 15.96		S	8.6	AA	8.0	B		11	4	4/			SOU01
1998 08 18.91		S	8.6:	AA	8.0	B		11	4	5			SOU01
1998 08 19.91		S	8.5	AA	8.0	B		11	3	5			SOU01
1998 08 26.92		S	8.2	AA	8.0	B		11	3	5			SOU01
1998 08 30.40		S	7.6	TT	8.0	B		15	2.8	2			SEA01
1998 09 03.91		S	8.0:	AA	8.0	B		11					SOU01
1998 11 16.65		S	9.6	TJ	25.6	L	5	42	3	5			BIV
1998 11 18.85		C	11.1	HS	10.7	A	4 a	30	2.0				YOS04
1998 11 19.64		M	9.6	TT	11	L	4	16	3.5	4/			RAE
1998 11 22.84		S	9.8	HS	15.0	B		25	3.0	4			HAS08
1998 11 24.65		S	9.5	TJ	25.6	L	5	42	3	6			BIV
1998 11 24.84		S	9.6	HS	15.0	B		25	2.0	4			HAS08
1998 11 25.63		M	9.5	TT	11	L	4	16	3.5	5			RAE
1998 11 25.65		B	9.0	TJ	5.0	B		7	4	7			BIV
1998 11 26.65		B	9.4	TJ	5.0	B		7	4	5			BIV
1998 11 26.82		S	9.6	AA	20	L	4	45	3.5	3			PEA
1998 11 27.63		S	9.2	TJ	25.6	L	5	42	4	6	0.15	160	BIV
1998 11 27.64		B	9.0:	TJ	5.0	B		7	4	5			BIV
1998 11 27.82		S	9.6	AA	20	L	4	45	3.8	3			PEA
1998 11 28.63		S	9.3	TJ	25.6	L	5	42	3	6			BIV
1998 11 29.66		S	9.3	TJ	25.6	L	5	42	3.5	6			BIV
1998 11 29.81		S	9.5	AA	20	L	4	45	3.5	3			PEA
1998 11 30.64		S	9.4	TJ	25.6	L	5	42	3	6			BIV
1998 12 01.65		S	9.5	TJ	25.6	L	5	42	3	6			BIV
1998 12 09.82		S	8.8	TJ	25.4	T	6	62	3.2	5			YOS04
1998 12 11.64		S	9.8	TJ	25.6	L	5	42	3	6			BIV
1998 12 12.64		S	9.8	TJ	25.6	L	5	42	3	6			BIV
1998 12 12.82		S	10.0	TJ	25.4	T	6	62	2.8	5			YOS04
1998 12 13.65		S	9.7	TJ	25.6	L	5	42	3.5	6			BIV
1998 12 13.82		M	9.1	AA	15.0	B		25	5	4			MIT
1998 12 14.59		S	9.6	TJ	25.6	L	5	42	4	5	0.23	160	BIV
1998 12 16.19	x	S	9.7	TT	25.4	J	6	58	3.0	4			BOU
1998 12 16.20		S	10.1	HS	20.3	T	10	102	2.0	5			KAR02
1998 12 16.25		S	9.0	TJ	10.0	B		14	& 7	4			PER01
1998 12 16.64		S	9.7	TJ	25.6	L	5	42	4	5	0.26	155	BIV
1998 12 16.84	a	C	10.1	GA	60.0	Y	6 a	60	4.0		> 4.7m	164	NAK01
1998 12 17.22		S	9.7	TT	10.0	B		25	2.7	4			HAS02
1998 12 17.26		S	9.1	TJ	10.0	B		14	& 6	4			PER01
1998 12 17.79		M	9.1	AA	15.0	B		25	5	5			MIT
1998 12 18.17		S	9.4	AC	6.0	B		20	2.5	2/			RES
1998 12 18.19		M	9.3	TT	35	L	5	92	3.5	2			HOR02
1998 12 18.19	x	M	9.9	TJ	25.4	L	5	65	3.0	4/			MEY
1998 12 18.23		S	9.6	TT	10.0	B		25	3.7	3			HAS02
1998 12 18.66		S	9.7	TJ	25.6	L	5	42	4	4			BIV
1998 12 18.73		S	9.7	TI	38	L	5	90	3	4			MAT08
1998 12 18.82		S	10.2	AA	20	L	4	45	4.2	3			PEA
1998 12 19.61		S	9.6	TJ	25.6	L	5	42	4	5	0.17	160	BIV

Comet C/1998 P1 (Williams) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/		PWR	COMA	DC	TAIL	PA	OBS.
1998 12 19.81		S	10.0	AA	20	L	4		45	3.7	3			PEA
1998 12 20.21	x	M	9.6	TT	25.4	J	6		58	3.2	4			BOU
1998 12 20.62		S	9.7	TJ	25.6	L	5		42	3	5			BIV
1998 12 20.78		S	9.8	AA	20	L	4		45	4.2	4			PEA
1998 12 20.79		S	9.4	AA	8.0	B			20	6	3			PEA
1998 12 20.82		S	9.0	TJ	25.4	T	6		62	5	6			YOS04
1998 12 21.20	x	S	9.6	TT	25.4	J	6		58	3.5	3			BOU
1998 12 21.79		S	9.4	AA	8.0	B			20	7.3	3/			PEA
1998 12 22.19		M	10.2	TI	10	B	4		25	2.7	3			LEH
1998 12 22.61		M	9.5	TT	11	L	4		16	5	4			RAE
1998 12 23.16		S	9.7	TJ	12	R	5		27	3.5				CHE03
1998 12 23.77		S	9.5	AA	20	L	4		45	4.6	4			PEA
1998 12 23.77		S	9.6	AA	8.0	B			20	5	3			PEA
1998 12 24.13		S	9.0	HS	8.0	B			12	6	2			BAR06
1998 12 24.13		S	9.4	HS	20	L	5		70	4	3			BAR06
1998 12 24.84	a	C	10.0	GA	60.0	Y	6	a	60	4.1		> 5.2m	165	NAK01
1998 12 25.13		S	9.4	HS	11	L	7		50	4	3			BAR06
1998 12 25.13		S	9.4	HS	11	L	7		50	4	3			BAR06
1998 12 25.59		M	9.7	TT	11	L	4		16	4.5	5/			RAE
1998 12 25.81		S	9.7	AA	20	L	4		45	4.0	4			PEA
1998 12 26.23	x	S	9.5	TT	25.4	J	6		58	& 4	3/			BOU
1998 12 26.26		S	8.9	TJ	10.0	B			14	& 5	5			PER01
1998 12 26.81		S	9.8	AA	20	L	4		45	3.8	3			PEA
1998 12 27.77		M	9.2	AA	15.0	B			25	5	5			MIT
1998 12 27.81		S	9.8	AA	20	L	4		45	3.9	3			PEA
1998 12 27.84		S	9.0	TJ	25.4	T	6		32	8	5			YOS04
1998 12 28.16		S	9.6	AC	6.0	B			20	2.0	2/			RES
1998 12 28.82		S	9.9	AA	20	L	4		45	3.2	3			PEA
1998 12 28.84		S	8.8	S	15.0	R	5		25	5	4/			NAG02
1998 12 29.17		S	9.5	AC	30.5	T	10		117	& 4	3/			COM
1998 12 29.21	x	S	9.5	TT	25.4	J	6		58	3.8	3			BOU
1998 12 29.80	x	S	9.6	TJ	32.0	L	5		58	5.6	5			NAG08
1998 12 30.12		M	9.4	TI	10	B	4		25	3.2	3/			LEH
1998 12 31.23	x	S	9.5	TT	25.4	J	6		58	4.0	3			BOU
1999 01 10.49		S	9.9:	TJ	25.6	L	5		42	3	5			BIV
1999 01 11.04	x	S	9.4	TT	25.4	J	6		47	4.2	3			BOU
1999 01 11.78		M	9.5	AA	15.0	B			25	6	5			MIT
1999 01 11.79		S	10.2	VN	20	L	4		45	4.0	2			PEA
1999 01 12.25		S	9.1	TJ	10.0	B			14	& 6	4			PER01
1999 01 12.47		S	9.7	TJ	25.6	L	5		42	4.5	5	0.25	160	BIV
1999 01 12.63		S	9.9	TI	15	L	8		40	4	3			MAT08
1999 01 12.80		S	10.2	VN	20	L	4		45	3.5	3			PEA
1999 01 13.08		M	9.2	TT	35	L	5		92	4.5	2			HOR02
1999 01 13.12		M	8.5	TT	8.0	B			10	10	2			HOR02
1999 01 14.14		S	9.3	AC	30.5	T	10		55	4	2			COM
1999 01 14.16		M	8.5	TT	8.0	B			10	10	2			HOR02
1999 01 14.80		S	10.2	VN	20	L	4		45	3.9	3			PEA
1999 01 15.15		M	8.5	TT	8.0	B			10	12	2/			HOR02
1999 01 16.53		B	9.4	TJ	25.6	L	5		42	5	5	0.3	165	BIV
1999 01 16.64		S	9.8	TI	15	L	8		40	4.5	4			MAT08
1999 01 16.82		S	10.3	VN	20	L	4		45	4.2	3			PEA
1999 01 17.17		M	8.6	TT	8.0	B			10	10	2/			HOR02
1999 01 17.47		S	9.7	TJ	25.6	L	5		42	4	5	0.25	160	BIV
1999 01 17.64		M	9.8	HS	15.0	B			25	5	3			HAS08
1999 01 17.81		S	10.2	VN	20	L	4		45	3.5	3			PEA
1999 01 18.03	x	S	9.5	TT	25.4	J	6		47	5.0	3			BOU
1999 01 19.80		M	10.0	AA	15.0	B			25	5	5			MIT
1999 01 20.02		S	10.0	TT	10.0	B			25	5.5	4			HAS02
1999 01 21.80		C	10.3	GA	60.0	Y	6	a	60	4.7		> 4.4m	163	NAK01
1999 01 21.93		S	9.8	HS	11	L	7		50	3.3	3			BAR06
1999 01 22.13		S	9.7	HS	11	L	7		50	3.5	3			BAR06
1999 01 22.31		S	10.3	TJ	23.0	L			67	2	5/			DES01
1999 01 23.30		S	10.3	TJ	23.0	L			67	2	5			DES01
1999 01 24.46		S	9.9	TJ	25.6	L	5		42	6	4	0.5	160	BIV
1999 01 24.62		M	9.5	TT	11	L	4		16	5	4			RAE

Comet C/1998 P1 (Williams) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 25.54		M	9.5	TT	11	L	4	16	4.5	4			RAE
1999 01 25.80		M	10.0	AA	15.0	B		25	6	4/			MIT
1999 01 26.08		S	9.2	TT	30.5	T	10	55	& 3.5	2			COM
1999 01 26.14	x	S	9.7	TT	25.4	J	6	47	4.6	2/			BOU
1999 01 27.61		S	9.5	TJ	25.6	L	5	42	7	4	0.5	160	BIV

Comet C/1998 Q1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 09.82		B	15.1	HS	42	L	5	263	0.6	5			LEH
1998 09 23.87		B	15.6	HS	42	L	5	263	0.4	4			LEH
1998 09 24.86		B	15.6	HS	42	L	5	263	0.4	4			LEH

Comet C/1998 T1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 13.77		B	14.6	HS	42	L	5	162	0.9	4			LEH
1998 10 17.03		B	14.5	HS	42	L	5	162	0.9	4			LEH
1998 10 18.63	I	C	15.4	HS	10.7	A	4	a120	< 0.9				YOS04
1998 10 20.90		B	13.7	HS	42	L	5	162	1.3	4			LEH
1998 10 24.87		B	13.9	HS	42	L	5	162	1.4	4			LEH
1998 10 25.84		B	13.9	HS	42	L	5	162	1.4	3/			LEH
1998 11 07.75		S	13.7	HS	35	L	5	237	1.0	2			HOR02
1998 11 08.52		C	16.3	GA	60.0	Y	6	a120	0.35			45	NAK01
1998 11 10.86		S	13.6	GA	25.4	J	6	115	0.7	1/			BOU
1998 11 11.78		S	13.9	HS	35	L	5	237	1.1	2			HOR02
1998 11 11.88		S	13.7	GA	25.4	J	6	150	0.7	1			BOU
1998 11 12.51		C	16.2	GA	60.0	Y	6	a120	0.45		0.9m	57	NAK01
1998 11 12.79		B	13.9	HS	42	L	5	162	1.4	3			LEH
1998 11 12.85		S	14.1	HS	35	L	5	207	1.0	2			HOR02
1998 11 18.78		S[	14.0	HS	44.0	L	5	226					HAS02
1998 11 19.80		B	13.8	HS	42	L	5	162	1.5	3/			LEH
1998 11 21.79		B	13.8	HS	42	L	5	162	1.4	3/			LEH
1998 11 23.52		C	16.2:	GA	60.0	Y	6	a120	0.45				NAK01
1998 11 25.57		C	15.6	TJ	12.0	L	6	a120	0.7				YOS04
1998 12 07.75		S	13.5	GA	25.4	J	6	100	1.0	2			BOU
1998 12 09.75		B	14.0	HS	42	L	5	162	1.2	3			LEH
1998 12 09.75		S	14.0	HS	35	L	5	207	1.3	1/			HOR02
1998 12 11.77		B	13.9	HS	42	L	5	162	1.3	3/			LEH
1998 12 12.43		C	16.5	GA	60.0	Y	6	a120	0.45		0.5m	55	NAK01
1998 12 13.42		C	15.0	TJ	18.0	L	6	a 60	0.45				YOS04
1998 12 17.74		S	14.0	HS	44.0	L	5	156	0.2	4			HAS02
1998 12 17.76		S	13.9	HS	35	L	5	207	1.2	1/			HOR02
1998 12 17.79		S	13.6	GA	25.4	J	6	100	0.8	2			BOU
1998 12 18.76		B	13.8	HS	42	L	5	162	1.4	3/			LEH
1998 12 20.76		S	13.5	AC	25.0	L	6	121	0.7	3			RES
1998 12 26.20		S	9.7	TI	35	M	10	90	3.3	s3			DRA02
1998 12 26.40		C	16.5	TJ	18.0	L	6	a 60	0.4				YOS04
1999 01 06.74		S	14.0	HS	44.0	L	5	156	0.2	4			HAS02
1999 01 10.76		S	13.4	HS	35	L	5	207	1.2	2			HOR02
1999 01 12.76		S	13.1	HS	35	L	5	207	1.4	1/			HOR02
1999 01 13.42		C	16.4	GA	60.0	Y	6	a240	0.45		0.6m	58	NAK01
1999 01 16.44		C	15.0	TJ	18.0	L	6	a 60	0.5				YOS04

Comet C/1998 U1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 10.58		C	18.5	GA	60.0	Y	6	a240	0.25			60	NAK01
1998 11 15.56		C	18.3	GA	60.0	Y	6	a240	0.3			60	NAK01
1998 11 23.59		C	18.5	GA	60.0	Y	6	a240	0.3				NAK01
1998 12 17.48		C	18.7	GA	60.0	Y	6	a240	0.3				NAK01
1999 01 13.49		C	19.3:	GA	60.0	Y	6	a240	0.25				NAK01

Comet C/1998 U5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 07.66		C	10.1	HS	10.7	A	4	a 60	1.9		2.2m	227	YOS04
1998 11 07.66	I	C	10.2	HS	10.7	A	4	a 60	1.9		2.6m	229	YOS04
1998 11 07.66	S	R	10.3	HS	10.7	A	4	a 60	2.0		2.7m	235	YOS04
1998 11 07.76		M	10.0	TT	35	L	5	92	2.8	5			HOR02
1998 11 08.72		S	10.2	HS	20.3	T	10	102	1.0	6			KAR02
1998 11 09.87	x	M	10.2	TT	25.4	J	6	58	2.5	5			BOU
1998 11 09.88		S	10.0	VT	33	L	5	75	1.9	4			SHA02
1998 11 10.49	x	M	9.7	TT	25.4	L	4	46	3.5	D6			YOS02
1998 11 10.65		C	10.1	GA	60.0	Y	6	a 60	3.5		4.3m	211	NAK01
1998 11 10.85		S	10.1	AC	30.5	T	10	117	& 3	5/			COM
1998 11 10.89	x	M	9.9	TT	25.4	J	6	58	3.0	4/			BOU
1998 11 10.90		S	10.3	VT	30	R	20	105	1.9	5			SHA02
1998 11 10.94		S	9.9:	TT	30.5	L	5	45	& 3	6			GIL01
1998 11 11.24		J	10.0	SC	25.4	T	5	a 60	1.04	s5	0.8m	207	ROQ
1998 11 11.55		S	9.5	HS	15.0	B		25	3.0	4/			HAS08
1998 11 11.76		M	9.8	TT	35	L	5	92	2.9	5	0.1	180	HOR02
1998 11 11.88		S	10.1	AC	15.2	L	5	42	3.5	4			MOE
1998 11 11.89	x	M	9.8	TT	25.4	J	6	58	3.0	5			BOU
1998 11 12.54		S	8.8	TJ	25.4	T	6	32	6	6			YOS04
1998 11 12.75		M	9.6	TT	35	L	5	92	2.9	5	0.12	170	HOR02
1998 11 12.76	x	M	9.4	TJ	25.4	L	5	65	3.9	S6			MEY
1998 11 12.82		M	8.9	TI	10	B	4	25	5.2	5			LEH
1998 11 13.06		S	9.3	VT	33	L	5	45	3.6	5			SHA02
1998 11 13.77		S	9.0	TI	10	B		25	6.5	s3			DRA02
1998 11 13.82		B	8.3	S	10	B		25	12	S4/			PLE01
1998 11 13.89		S	8.5	VB	10	B		14	6.6	4			SHA02
1998 11 14.06		M	9.3	HS	44.5	L	4	82	4	5			SAR02
1998 11 14.28		B	8.5	TJ	8.0	B		20	10	4			BIV
1998 11 14.47		S	9.2	HS	15.0	B		25	4.0	4/			HAS08
1998 11 14.53	x	S	10.6	TJ	40.0	L	6	69	2.2	6			NAG08
1998 11 14.84		B	8.6	S	35	M	10	90	10	5			PLE01
1998 11 14.84		S	8.9	TT	10.0	B		25	3.6	3			HAS02
1998 11 15.18		S	8.0	VB	8.0	B		10	9.2	3			SHA02
1998 11 15.18		S	8.3	VT	20	R	14	40	4.4	4			SHA02
1998 11 15.40	x	S	8.7	TJ	10.0	B		20	7	6			NAG08
1998 11 15.48		S	8.4	TJ	25.4	T	6	32	6.5	d6/			YOS04
1998 11 15.49		B	8.4	TJ	8.0	B		20	8	4			BIV
1998 11 15.50		S	8.2	TJ	5.0	B		7	10	4			BIV
1998 11 15.74	x	S	8.9	TT	10.0	B		20	5	6			YOS02
1998 11 15.88		M	8.2	TT	8.0	B		10	11	3			HOR02
1998 11 15.94		S	8.6	TJ	10.0	B		14	& 5	4/			VIT01
1998 11 16.02		S	8.5	TJ	3.4	B		9	& 9	3			PER01
1998 11 16.03		S	8.7	TJ	10.0	B		14	& 9	4			PER01
1998 11 16.07		S	7.4	AA	8.0	B		11	12	5/			SPR
1998 11 16.17		S	8.1	VB	8.0	B		10	9	3			SHA02
1998 11 16.74		M	7.6	TI	5.0	B		7	12	4/			LEH
1998 11 16.75		S	7.9	TT	12.5	R	5	20	11	5			GIL01
1998 11 16.81		S	8.7	AA	15.2	L	5	42	9	3			MOE
1998 11 16.88		S	8.8	S	8.0	B		11	6	3			GON05
1998 11 16.90		S	8.4	AA	15.0	R	8	75	5	7			DIE02
1998 11 16.91		M	8.1	TT	8.0	B		10	10	3			HOR02
1998 11 16.91		S	8.2	TT	30.5	L	5	58	5	4			GIL01
1998 11 16.98		S	8.4	TJ	3.4	B		9	& 8	4			PER01
1998 11 16.98		S	8.4	TJ	10.0	B		14	& 8	3			PER01
1998 11 17.21		S	7.8	TT	5.0	B		10	13	5			GIL01
1998 11 17.41		S	9.3	TJ	25.6	L	5	42	8	4			BIV
1998 11 17.43		S	8.6	TJ	5.0	B		7	10	4			BIV
1998 11 17.51		S	8.5	TJ	20.3	T	10	78	3	d7			YOS04
1998 11 17.57	x	S	8.2	TJ	10.0	B		20	6	5/			NAG08
1998 11 17.75		S	8.5	AC	30.5	T	10	55	& 5	3/			COM
1998 11 17.75	x	M	8.5	TT	15.6	L	5	24	6	4			BOU
1998 11 17.81		S	7.7	TT	5.0	B		10	14	5			GIL01
1998 11 17.89		S	8.3	AA	15.0	R	8	75	5	7			DIE02
1998 11 17.95		S	8.8	TJ	6.3	B		9	10.5	2/			KAM01
1998 11 18.69		M	7.8	TI	10	B	4	25	11	5			LEH

Comet C/1998 U5 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 18.72		S	8.0	TT	10.0	B		25	7.6	3			HAS02
1998 11 18.80		S	9.4:	AA	15.2	L	5	42	7	1			MOE
1998 11 18.83		M	8.8	NP	21	L	6	60	2	5			MAR02
1998 11 18.99		S	8.6	TJ	6.3	B		9	12	2/			KAM01
1998 11 19.18		M	8.9	NP	8.0	B		16	8.8	3			CRE01
1998 11 19.18		M	9.1	NP	20	L	4	44	5.8	4			CRE01
1998 11 19.21		S	8.4	AA	8.0	B		11	8.2	4			SPR
1998 11 19.41	x	S	8.2	TJ	10.0	B		20	7	6			NAG08
1998 11 19.71		M	8.6	TT	8.0	B		10	11	2/			HOR02
1998 11 19.71		S	9.9	AC	15.2	L	5	42	5	1			MOE
1998 11 19.74		S	8.7	TT	30.5	L	5	58	& 5	4			GIL01
1998 11 19.75		S	8.6	AC	30.5	T	10	55	& 5	4			COM
1998 11 19.78		M	8.1	TI	10	B	4	25	10	3			LEH
1998 11 19.81		S	8.3	AA	15.0	R	8	75	5	6			DIE02
1998 11 19.94	x	M	8.4	TT	8.0	B		15	6.5	4			BOU
1998 11 20.10		S	8.4	HI	10.0	B		14	& 6	4/	0.9	300	PER01
1998 11 20.12		S	9.1:	HI	25.3	L	6	58	& 3.2	4	>0.6		PER01
1998 11 20.73		S	7.9	HS	6.0	B		20	10	2/			RES
1998 11 20.82		M	8.4	NP	21	L	6	60	3	5/			MAR02
1998 11 20.91		M	8.4	TI	10	B	4	25	9.5	3			LEH
1998 11 20.92	x	M	8.5	TT	8.0	B		15	7.5	4			BOU
1998 11 21.11		S	8.7	HI	10.0	B		14	& 8	3			PER01
1998 11 21.33		S	9.2	TJ	25.6	L	5	42	8	4			BIV
1998 11 21.34		S	8.7	TJ	5.0	B		7	10	3			BIV
1998 11 21.49		S	8.8	TJ	31.7	L	6	63	5.4	d5			YOS04
1998 11 21.71		S	9.5	AC	15.2	L	5	42	5	2			MOE
1998 11 21.74		S	8.3	AA	15.0	R	8	75	4	5			DIE02
1998 11 21.78		M	8.5	TI	10	B	4	25	9.0	3			LEH
1998 11 21.80		M	8.5	TI	10	B		25	9	4			KUJ
1998 11 21.82		M	10.0	SE	25	L	4	64	5	4			SHU
1998 11 21.89	x	M	8.7	TJ	25.4	L	5	41	5.8	S6			MEY
1998 11 21.91		S	8.1	NP	10	R	5	27	4	5			SAN04
1998 11 21.91		S	8.2	NP	10	R	5	27	3	5/			MAR02
1998 11 21.94	x	S	8.6	TT	8.0	B		15	7	3			BOU
1998 11 22.04		M	9.0	NP	20	L	4	44	8.0	4			CRE01
1998 11 22.04		S	8.8	S	8.0	B		11	7	3			GON05
1998 11 22.31		S	9.5	TJ	25.6	L	5	42	8	4	0.2	100	BIV
1998 11 22.57	x	S	9.0	TT	10.0	B		20	7	6			YOS02
1998 11 22.70		M	8.8	TI	10	B	4	25	8.4	3			LEH
1998 11 22.73		M	8.5	TI	10	B		25	8	4			KUJ
1998 11 22.73		S	7.8	HS	6.0	B		20	9	3			RES
1998 11 22.75		M	9.7	SE	25	L	4	64	7	3/			SHU
1998 11 22.75		S	8.5	AA	15.0	R	8	75	4	4			DIE02
1998 11 22.77		S	8.1	HS	8.0	B		12	4	2			BAR06
1998 11 22.79		S	9.3	AC	15.2	L	5	19	7	3			MOE
1998 11 22.90		S	8.4	S	10	R	5	27	4	4/			MAR02
1998 11 22.93		S	8.3	HS	20	L	5	40	3.7	3			BAR06
1998 11 23.34		S	9.5	TJ	25.6	L	5	42	8	4	0.2	90	BIV
1998 11 23.36		S	8.7	TJ	5.0	B		7	10	3			BIV
1998 11 23.42		S	8.5	TJ	25.4	T	6	32	8	d5			YOS04
1998 11 23.75		S	7.8	HS	6.0	B		20	11	2/			RES
1998 11 23.92		S	7.8	HS	8.0	B		12	5	2			BAR06
1998 11 23.92		S	8.1	HS	20	L	5	40	4.5	3	0.1	250	BAR06
1998 11 24.00		S	8.9	AC	30.5	T	10	117	& 4	3			COM
1998 11 24.71		M	8.4	TT	8.0	B		10	9	3			HOR02
1998 11 24.73		M	9.1	TI	10	B	4	25	6.2	3/			LEH
1998 11 24.83		E	8.7	VF	21.5	L	6	80	&10	7			SCO04
1998 11 24.91		S	8.0	HD	6.0	B		20	5	2			SAR02
1998 11 24.96		S	8.3	TJ	10.0	B		14	& 9	3			PER01
1998 11 24.97		S	8.4	HS	20	L	5	70	4	2			BAR06
1998 11 25.05		S	8.6	HS	20	L	5	70	4	2			BAR06
1998 11 25.31		S	8.5	TJ	5.0	B		7	10	4			BIV
1998 11 25.39	x	S	8.5	TJ	10.0	B		20	6	5			NAG08
1998 11 25.46		M	9.4	AA	15.0	B		25	4	3			MIT
1998 11 26.08		J	8.9	SC	25.4	T	5 a	60	9.08	s5/	5.3m	79	ROQ

Comet C/1998 U5 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 26.42		S	8.4	TJ	5.0	B		7	10	3			BIV
1998 11 27.16		S	8.2	AA	8.0	B		11	4.5	3/			SPR
1998 12 01.69		S	9.7	AC	15.2	L	5	19	5	2			MOE
1998 12 01.73		S	8.4	HS	6.0	B		20	3	3			RES
1998 12 03.69		S	8.1	HS	11	L	7	50	6	4			BAR06
1998 12 04.86		B[	8.5	S	25	L	5	70	!10	4			PLE01
1998 12 05.71		S	9.3:	TT	13	L	8	69	5	2/			HOR02
1998 12 05.78		S	10.0:	LC	25.3	L	6	58	& 3	3/			VIT01
1998 12 05.78		S	10.2:	LC	25.3	L	6	58	& 4.5	3/			PER01
1998 12 06.24		S	9.2	TJ	25.6	L	5	42	7	4	0.2	70	BIV
1998 12 06.74		S	8.6	AA	15.0	R	8	75	3	1			DIE02
1998 12 06.75	x	M	9.4	TT	25.4	J	6	47	3.5	4			BOU
1998 12 06.82		S	9.5	TJ	25.3	L	6	58	& 3.5	2/			PER01
1998 12 06.84		S	9.1	TJ	10.0	B		14	& 5	3			PER01
1998 12 06.84		S	9.2	TJ	15.2	L	4	26	& 3.2	4			PER01
1998 12 07.74	x	M	9.4	TT	25.4	J	6	47	4.0	4			BOU
1998 12 07.76		S	8.8	HS	8.0	B		12	6	2			BAR06
1998 12 07.76		S	9.0	HS	20	L	5	70	5	3	0.1		BAR06
1998 12 07.78		S	9.8	VF	21.5	L	6	80	2.1	4			SCO04
1998 12 07.87		S	9.1	TJ	10.0	B		14	& 5	4			PER01
1998 12 07.87		S	9.3	TJ	25.3	L	6	58	& 2.5	2/			PER01
1998 12 08.69		S	9.8	AC	15.2	L	5	42	6	1			MOE
1998 12 08.87		S	9.5	TJ	25.3	L	6	58	& 3.3	3			PER01
1998 12 08.88		S	9.4	TJ	10.0	B		14	& 3.8	4			PER01
1998 12 09.73		S	9.0	TT	8.0	B		10	10	2			HOR02
1998 12 09.74		M	9.1	TI	10	B	4	25	6.0	2/			LEH
1998 12 09.80		S	9.7	TJ	25.3	L	6	58	& 2.4	3/			PER01
1998 12 10.70		S	10.1	AC	15.2	L	5	42	5	1			MOE
1998 12 11.28		S	9.4	TJ	25.6	L	5	42	6	4			BIV
1998 12 11.29		S	9.2	TJ	5.0	B		7	8	3			BIV
1998 12 11.70		S	10.0	AC	15.2	L	5	42	5	1			MOE
1998 12 11.73	x	M	9.4	TJ	25.4	L	5	65	5	s4/			MEY
1998 12 11.76		M	9.7	TI	10	B	4	25	5.8	2/			LEH
1998 12 12.43		C	11.2	GA	60.0	Y	6 a	60	3.0		4.9m	60	NAK01
1998 12 12.45		S	9.4	NP	15.0	R	5	25	5	3/			NAG02
1998 12 12.46		M	9.8	AA	15.0	B		25	5	4			MIT
1998 12 12.46	x	S	10.6	TJ	32.0	L	5	91	2.7	4			NAG08
1998 12 13.43		S	9.5	NP	15.0	R	5	25	5	3			NAG02
1998 12 13.44		S	10.3	TJ	25.4	T	6	62	2.9	4			YOS04
1998 12 14.18		S	9.4	AC	20.0	T	10	64	4.0	3			SPR
1998 12 14.28		S	9.6	TJ	25.6	L	5	42	4	4			BIV
1998 12 15.71		S	9.0	TT	10.0	B		25	3.8	4			HAS02
1998 12 15.81		S	10.0	HS	20.3	T	10	64	2.4	2			KAR02
1998 12 16.77		S	9.0:	AC	6.0	B		20	3	2/			RES
1998 12 17.28		S	9.9	TJ	25.6	L	5	42	4	3			BIV
1998 12 17.70		S	10.2	AC	15.2	L	5	42	4	1			MOE
1998 12 17.73		M	10.8	TI	10	B	4	25	4.5	3			LEH
1998 12 17.73		S	9.2	TT	8.0	B		10	7.5	2			HOR02
1998 12 17.74		S	8.7	AA	15.0	R	8	75	3	1			DIE02
1998 12 17.74	x	M	10.1	TJ	25.4	L	5	65	3.3	s3			MEY
1998 12 17.77	x	S	10.1	TT	25.4	J	6	47	3.5	2/			BOU
1998 12 17.87		S	9.5	TJ	20.3	T	10	77	2.5	1			KAM01
1998 12 18.72	x	S	9.6	TJ	10.0	B		20	6	3			MEY
1998 12 18.73		M	10.8	TI	10	B	4	25	4.6	3			LEH
1998 12 19.25		S	10.2	TJ	25.6	L	5	42	3.5	3			BIV
1998 12 19.78	x	S	10.2	TT	15.6	L	5	36	3.2	2			BOU
1998 12 20.28		S	10.3	TJ	25.6	L	5	42	3.5	3			BIV
1998 12 20.47	x	S	10.0	TT	25.4	L	4	46	2.6	3			YOS02
1998 12 20.74		S	10.0	AC	6.0	B		20	2.5	3			RES
1998 12 20.75		S	10.4	AC	15.2	L	5	42	4	1			MOE
1998 12 20.78	x	S	10.4	TT	25.4	J	6	58	3.0	2			BOU
1998 12 21.70		S	10.3	AC	15.2	L	5	42	4.5	1			MOE
1998 12 22.45		C	12.0	GA	20.3	T	9 a	40	1.6				SUZ02
1998 12 22.69		M	10.4	PA	25	L	4	64	5	3			SHU
1998 12 22.76	a	S	10.3	PA	30	L	5	60	3	2			NEV

Comet C/1998 U5 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 22.80	x	S	10.5	TT	25.4	J	6	58	2.7	2			BOU
1998 12 24.73		S	9.1	AA	15.0	R	8	75	3	1			DIE02
1998 12 26.75		S	10.3	AC	25.0	L	6	61	3.0	3			RES
1998 12 28.73		M	10.6	TI	10	B	4	25	3.7	3			LEH
1998 12 29.70		M	10.4	TI	10	B	4	25	3.7	3			LEH
1998 12 29.72		S	10.7	TT	35	L	5	92	2	2			HOR02
1998 12 30.70		M	10.8	TI	10	B	4	25	4.0	3			LEH
1999 01 05.72		S	10.7	TT	10.0	B		25	0.9	3			HAS02
1999 01 06.72		S	10.8	TT	44.0	L	5	63	1.9	3			HAS02
1999 01 06.77		S	10.6	TJ	30.5	T	10	115	1.4	3			KAM01
1999 01 08.74		S	9.8	AA	15.0	R	8	75	3	2			DIE02
1999 01 09.75	x	S	11.1	TT	25.4	J	6	72	2.0	2			BOU
1999 01 10.24		S	10.5:	TJ	25.6	L	5	42	1.5	2			BIV
1999 01 10.72		S	10.6	TT	36	L	5	92	2.6	2			HOR02
1999 01 12.23		S	10.8:	TJ	25.6	L	5	42	1.5	2			BIV
1999 01 12.73		S	10.6	TT	36	L	5	92	2.7	1/			HOR02
1999 01 14.23		S	10.6	TJ	25.6	L	5	42	2	2			BIV
1999 01 16.23		S	11.1	TJ	25.6	L	5	42	1.5	2			BIV
1999 01 19.73		S	11.6	HS	44.0	L	5	156	0.5	3			HAS02

Comet C/1998 W3 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 28.82		C	16.9	TJ	18.0	L	6	a 60	0.45				YOS04
1998 11 29.81		C	16.4	TJ	18.0	L	6	a 60	0.45				YOS04
1998 12 16.71		C	16.9	GA	60.0	Y	6	a240	0.45		0.8m	150	NAK01
1998 12 18.85		B	14.9	HS	42	L	5	162	0.5	4/			LEH
1998 12 21.71		C	16.8	GA	60.0	Y	6	a240	0.55		1.2m	154	NAK01
1998 12 21.90		O[	14.3	HS	35	L	5	237	! 0.6				HOR02
1998 12 24.71		C	16.8	TJ	18.0	L	6	a120	0.75				YOS04
1998 12 26.73		C	16.2	TJ	18.0	L	6	a120	0.4				YOS04
1999 01 04.81		C	16.5	TJ	18.0	L	6	a 60	0.4				YOS04
1999 01 05.73		C	16.1	TJ	18.0	L	6	a120	0.55				YOS04
1999 01 21.71		C	16.6	GA	60.0	Y	6	a240	0.6		1.5m	146	NAK01
1999 01 21.72		C	16.2	TJ	18.0	L	6	a 60	0.4		1.1m	140	YOS04
1999 01 22.75		C	16.4	TJ	18.0	L	6	a120	0.4				YOS04
1999 01 26.74		C	16.7	GA	60.0	Y	6	a240	0.45		0.9m	127	NAK01

Comet C/1999 A1 (Tilbrook)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 14.24		S	10.2	TJ	25.6	L	5	42	3.5	4			BIV
1999 01 14.49		B	10.7:	TJ	40	L	6	44	1.5	7/			FAR01
1999 01 14.55		S	10.6	VN	41	L	4	90	1.5	5			PEA
1999 01 15.39		C	11.3	TJ	10.7	A	4	a 30	1.9				YOS04
1999 01 15.48		S	10.3	TI	20	L	7	45	2	4			MAT08
1999 01 15.54		S	10.7	VN	41	L	4	90	1.5	4			PEA
1999 01 16.23		S	10.0	TJ	25.6	L	5	42	3.5	4			BIV
1999 01 16.38		C	12.4	TJ	18.0	L	6	a 60	1.3				YOS04
1999 01 16.47		S	9.8	AA	10.0	B		25	& 3.5				SEA
1999 01 16.49		B	10.4	TJ	40	L	6	44	1.3	6/			FAR01
1999 01 16.50		B	10.6	TJ	15	L	5	52	0.8	7			FAR01
1999 01 16.50		S	10.3	TI	20	L	7	45	2	3			MAT08
1999 01 16.54		S	10.6	VN	41	L	4	90	1.9	4			PEA
1999 01 17.25		S	10.0	TJ	25.6	L	5	42	3	5			BIV
1999 01 17.50		S	10.3	AA	10.0	B		25					SEA
1999 01 17.50		S	10.5	TI	20	L	7	45	2	4			MAT08
1999 01 18.44		S	10.1	AA	10.0	B		25	3	4			SEA
1999 01 18.48		B[	9.9	TJ	15	L	5	52					FAR01
1999 01 19.98		S	10.7	TJ	23.0	L		67	& 1	5/			DES01
1999 01 20.99		S	10.7	TJ	23.0	L		67		6			DES01
1999 01 21.48		B	10.1	TJ	40	L	6	44	1.1	4/			FAR01
1999 01 21.96		S	10.7	TJ	23.0	L		67	1.5	6			DES01

Comet 4P/Faye

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 23.81		B	15.2	HS	42	L	5	263	0.5	4			LEH
1998 09 24.79		B	15.1	HS	42	L	5	263	0.4	4			LEH
1998 10 16.75		B	14.6	HS	42	L	5	162	0.8	4			LEH
1998 10 24.79		B	14.7	HS	42	L	5	162	1.1	4			LEH
1998 10 25.78		B	14.8	HS	42	L	5	162	0.9	4			LEH
1998 11 08.43		C	15.5	GA	60.0	Y	6	a120	0.5			75	NAK01
1998 11 11.74		B	14.5	HS	42	L	5	162	1.1	4			LEH
1998 11 12.72		B	14.1	HS	42	L	5	162	1.2	4			LEH
1998 11 15.41		C	15.5	GA	60.0	Y	6	a120	0.5		0.6m	65	NAK01
1998 11 21.72		B	14.0	HS	42	L	5	162	0.8	4			LEH
1998 11 23.41	1	R[	15.1	TJ	12.0	L	6	a 60					YOS04
1998 12 09.70		B	14.0	HS	42	L	5	162	1.0	3			LEH
1998 12 12.39		C	15.0	TJ	18.0	L	6	a 60	0.35				YOS04
1998 12 12.40		C	14.9	GA	60.0	Y	6	a120	0.75		0.7m	55	NAK01
1998 12 13.39		C	15.8	TJ	18.0	L	6	a 60	0.4				YOS04
1998 12 17.73		S[	14.0	HS	44.0	L	5	226					HAS02
1998 12 18.71		B	13.8	HS	42	L	5	162	1.1	3/			LEH
1999 01 12.73		S	13.0	HS	35	L	5	207	0.8	2/			HOR02

Comet 9P/Tempel 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 22.63		C	19.6	GA	60.0	Y	6	a240		9			NAK01

Comet 10P/Tempel 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 22.79	1	C[	17.2	TJ	18.0	L	6	a 60					YOS04

Comet 21P/Giacobini-Zinner

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 20.88	x	S	11.6	TT	20	T	10	200	0.9	S7/			PLE01
1998 08 20.89	x	I	12.9	TJ	20	T	10	200	0.3	S8/			DRA02
1998 08 20.89	x	S	11.4	TT	15	M	10	150	0.8	S8			PLE01
1998 08 23.88	x	S	11.4	TT	15	M	10	150	1.5	S7/			PLE01
1998 08 28.88	x	S	11.1	TT	20	T	10	112	1.8	S7			PLE01
1998 09 09.80		M	10.9	TI	42	L	5	66	2.4	3/			LEH
1998 09 20.76		M	10.3	TI	10	B	4	25	2.8	3/			LEH
1998 09 23.76		M	10.1	TI	10	B	4	25	2.7	3/			LEH
1998 09 23.82		O[	10.0	TI	10	L	10	43					LIB
1998 09 24.78		E	10.5:	S	6	R	6	51	1.5	2			ERO
1998 09 24.78		S	10.2	TI	6.0	B		20	1.7	6			DRA02
1998 09 24.84		M	10.2	TI	10	B	4	25	2.7	3/			LEH
1998 09 25.78		E	10.4:	S	6	R	6	51	2	3			ERO
1998 09 26.96	x	S	10.6	TJ	35	M	10	90	2.5	s5			PLE01
1998 10 03.92		S	10.1	TI	35	M	10	90	4	4			PLE01
1998 10 08.38		S	10.5	VN	25.4	L	6	61	1.5	3			SEA01
1998 10 08.75		E	10.2:	S	6	R	6	51	2	3/			ERO
1998 10 09.75		E	10.3:	S	6	R	6	51	2	4			ERO
1998 10 10.38		S	10.5	CH	25.4	L	6	61	1.8	3/			SEA01
1998 10 10.79		S	10.6:	VT	22	L	7	107	0.6	3			TAY
1998 10 11.37		S	10.5	CH	25.4	L	6	61	2.0	4			SEA01
1998 10 11.78		E	10.4:	S	6	R	6	51	2.5	3			ERO
1998 10 12.78		E	10.5:	S	6	R	6	51	2	3			ERO
1998 10 13.39		S	10.5	CH	25.4	L	6	61	1.5	2			SEA01
1998 10 13.75		M	9.5	TI	10	B	4	25	3.0	4			LEH
1998 10 14.38		S	10.6	CH	25.4	L	6	61	1.5	3			SEA01
1998 10 14.75		E	9.2	AA	13.3	R	5	40	4.4	d2			SC004
1998 10 14.76		S	8.9	TI	10	B		25	7	3			DRA02
1998 10 14.77	!	B	9.6	AA	35	C	16	250	1.5	d3			CHR
1998 10 14.93		B	9.6	TI	35	M	10	90	7	2/			PLE01
1998 10 15.39		S	10.4	CH	25.4	L	6	61	2.1	3	4 m	110	SEA01
1998 10 15.74		E	10.4:	S	6	R	6	51	1.5	3/			ERO
1998 10 15.79		S	10.1	VT	22	L	7	64	1.3	4			TAY

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 16.72		S	9.7	AA	11	L	7	80	3	5			IVA03
1998 10 16.73		E	10.3:	S	6	R	6	51	2	3/			ERO
1998 10 16.73	!	B	9.4	AA	35	C	16	250	1.5	d3			CHR
1998 10 16.75		E	9.8	VF	13.3	R	5	40	3.4	d2			SCO04
1998 10 16.75	x	M	9.4	TJ	25.4	L	5	65	2.7	D3/			MEY
1998 10 16.82		M	9.4	TI	10	B	4	25	3.5	4			LEH
1998 10 16.91		B	9.2	TI	25	L	5	70	10	s3/			PLE01
1998 10 17.39		S	10.6	CH	25.4	L	6	61	2.0	3/	4 m		SEA01
1998 10 17.73		E	10.3	VF	13.3	R	5	40	3.3	4			SCO04
1998 10 17.73	!	B	9.4	AA	35	C	16	250	1.5	d3			CHR
1998 10 17.74		M	9.4	TI	10	B	4	25	3.2	3/			LEH
1998 10 17.74		S	9.0	TI	10	B		25	4	3			DRA02
1998 10 17.77		S	9.8:	AA	11	L	7	32	3	3			VEL03
1998 10 17.90		B	9.2	TI	35	M	10	90	8	2			PLE01
1998 10 18.39		M	10.5	CH	25.4	L	6	61	1.8	4	4 m	83	SEA01
1998 10 18.71		S	9.8	AA	11	L	7	32	3	4			VEL03
1998 10 18.77		S	9.3	AA	15.0	R	15	141	4	6			DIE02
1998 10 19.38		S	10.4	CH	25.4	L	6	61	1.8	3/			SEA01
1998 10 20.41		S	10.3	CH	25.4	L	6	61	2.0	3	5 m	120	SEA01
1998 10 20.75		M	9.2	TI	10	B	4	25	4.1	3/			LEH
1998 10 20.77		S	8.7	S	10	B		25	3.6	2			DRA02
1998 10 20.97		S	9.2	S	35	M	10	90	6	2			PLE01
1998 10 21.38		S	10.5	CH	25.4	L	6	61	2.2	3	4 m	60	SEA01
1998 10 21.70	!	B	9.2	S	6.8	R	12	40	1.5	d3			CHR
1998 10 21.74		S	9.4:	S	8	R	7	35	5	4			KWI
1998 10 21.75		B	9.4:	S	25	L	6	108	3	5			SWI
1998 10 21.95		S	9.0	S	10	B		25	8	2/			PLE01
1998 10 22.73		B	9.2	S	18	L	7	40	& 4	2			WLO
1998 10 22.77		S	8.6	S	10	B		25	6	4			DRA02
1998 10 23.68		S	9.6	AA	11	L	7	32	3.5	5			IVA03
1998 10 23.73		B	9.0	S	18	L	7	40	& 4	2			WLO
1998 10 23.73	!	B	9.2	S	6.8	R	12	40	1.5	d3			CHR
1998 10 23.78		S	9.0:	S	11	L	7	32	4.5	5			SAD
1998 10 23.93		B	9.3	TI	25	L	5	70	7	s3/			PLE01
1998 10 24.70		S	9.2	AA	11	L	7	32	3	3			VEL03
1998 10 24.73		B	9.0	S	18	L	7	40	& 4.5	2			WLO
1998 10 24.73	!	B	9.2	S	6.8	R	12	40	1.5	d3			CHR
1998 10 24.76		B	9.2	S	25	L	6	70	3	5			SWI
1998 10 24.76		S	9.6:	S	11	L	7	32	5	3			SAD
1998 10 24.80		B	9.2	TI	10	L	10	43	3.5				LIB
1998 10 24.81		M	8.9	TI	10	B	4	25	4.5	3/			LEH
1998 10 24.91		B	8.9	TI	11	B		20	10	s4			PLE01
1998 10 25.42		C	10.3	HS	10.7	A	4 a	30	1.8		6.0m	67	YOS04
1998 10 25.42	S	R	10.2	HS	10.7	A	4 a	30	2.0		6.4m	68	YOS04
1998 10 25.74		M	8.9	TI	10	B	4	25	4.4	4			LEH
1998 10 27.88		B	8.8	S	10	B		25	8	s4			PLE01
1998 10 29.24		S	8.9	TJ	5.0	B		7	8	5			BIV
1998 10 30.30		S	8.8	TJ	5.0	B		7	10	3			BIV
1998 10 30.89		B	8.9	S	25	L	5	70	6	s4			PLE01
1998 10 31.68	!	B	9.0	S	6.8	R	12	40		d3			CHR
1998 10 31.74		S	9.0	AA	8.0	B		40	3	5			BAR
1998 10 31.77		B	9.1	S	18	L	7	40	& 5	2/			WLO
1998 11 01.43		C	9.6	HS	10.7	A	4 a	60	2.6		3.0m	56	YOS04
1998 11 01.43	I	C	9.2	HS	10.7	A	4 a	60	1.8		6.6m	60	YOS04
1998 11 01.43	S	R	10.1	HS	10.7	A	4 a	30	1.2		2.8m	64	YOS04
1998 11 01.75		S	8.8:	TI	6	R	12	37	3	7			SVE
1998 11 02.02		S	8.5	TT	8.0	B		11	& 3	4			DES01
1998 11 04.79		S	8.4	AC	6.0	B		20	4	3			RES
1998 11 05.42		C	9.7	GA	20.3	T	9 a	60	3.1		>0.09	71	SUZ02
1998 11 05.68	!	B	9.0	S	6.8	R	12	40	1.5	d3			CHR
1998 11 05.74		B	9.0	S	18	L	7	40	& 5	3			WLO
1998 11 05.78		M	8.0	TI	10	B	4	25	4.3	3/			LEH
1998 11 06.02		S	8.5	TT	8.0	B		11	5				DES01
1998 11 06.80		M	8.8	S	10	R	5	27	3	4/			MAR02
1998 11 07.23		S	9.2	TJ	25.6	L	5	42	4.5	6			BIV

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 07.41	x	S	9.2	TJ	10.0	B		20	5	5	&10 m	70	NAG08
1998 11 07.44		S	9.5	HS	15.0	B		25	3.0	3			HAS08
1998 11 07.72		S	9.1	TT	8.0	B		10	5	3			HOR02
1998 11 07.74	x	M	9.3	TJ	25.4	L	5	65	2.9	4			MEY
1998 11 07.75		S	9.1	TI	6	R	12	37	3	5			SVE
1998 11 08.44		S	8.9	TJ	25.4	T	6	62	2.6	6			YOS04
1998 11 08.44		S	9.1	TI	20	L	7	45	2.5	5			MAT08
1998 11 08.46	x	S	9.0	TT	10.0	B		20	4	5			YOS02
1998 11 08.80		M	9.0	NP	21	L	6	60	4	4			MAR02
1998 11 08.81		S	8.8	TJ	10.0	B		14	& 5	4			VIT01
1998 11 08.81		S	8.8	TJ	10.0	B		14	& 5	5			PER01
1998 11 09.04		S	8.7	TT	8.0	B		11	5	5/			DES01
1998 11 09.12		S	8.5	AA	10.0	R	5	27	4.5	4/			SPR
1998 11 09.45		B	8.9	AA	10.0	B		25					SEA
1998 11 09.75		S	9.1	VT	33	L	5	45	2.8	3			SHA02
1998 11 10.41	x	S	8.7	TT	10.0	B		20	4	4	7 m	70	YOS02
1998 11 10.41	x	S	9.1	TJ	10.0	B		20	4	5			NAG08
1998 11 10.73	x	M	8.9	TT	15.6	L	5	29	4.0	4/			BOU
1998 11 10.75		S	8.6	VT	33	L	5	45	2.7	s3	0.33	55	SHA02
1998 11 11.40	x	S	9.1	TJ	10.0	B		20	4	5/			NAG08
1998 11 11.63		M	8.4	PA	25	L	4	64	3	4	6 m	60	SHU
1998 11 11.67		S	9.3	AA	11	L	7	80	2.5	5			IVA03
1998 11 11.71		M	8.0	TI	10	B	4	25	4.6	3			LEH
1998 11 11.72		S	8.9	AA	8.0	B		40	2	6			BAR
1998 11 11.73		M	8.5	TT	8.0	B		10	5.5	3			HOR02
1998 11 11.73		S	9.3	AA	15.0	R	15	141	3	7			DIE02
1998 11 11.74	x	S	8.8	TT	15.6	L	5	29	4.3	4			BOU
1998 11 11.78		S	8.3	AC	6.0	B		20	5.0	3			RES
1998 11 12.05		S	8.8	TT	8.0	B		11	4	6			DES01
1998 11 12.66		S	9.3	AA	11	L	7	80	2.5	5			IVA03
1998 11 12.69		B	9.0	S	25	L	6	108	3	4			SWI
1998 11 12.72		S	8.8	S	8	R	7	35	6	3			KWI
1998 11 12.73		B	9.2	S	18	L	7	40	& 4.5	3			WLO
1998 11 12.73		M	8.6	TT	8.0	B		10	5	3			HOR02
1998 11 12.74	x	M	9.0	TJ	25.4	L	5	65	3.0	D4			MEY
1998 11 12.75		M	8.2	TI	10	B	4	25	4.5	3/			LEH
1998 11 13.26		S	8.9	TJ	5.0	B		7	5	3			BIV
1998 11 13.73		S	8.8	S	8	R	7	35	6	3			KWI
1998 11 13.74		B	8.2	S	10	B		25	10	s2/			PLE01
1998 11 13.74		S	8.5	S	10	B		25	7	3			DRA02
1998 11 13.75		B	9.0	S	18	L	7	40	& 5	3			WLO
1998 11 14.27		S	8.8	TJ	5.0	B		7	10	4			BIV
1998 11 14.28		B	9.0	TJ	8.0	B		20	6	4	0.2	70	BIV
1998 11 14.40	x	S	8.7	TJ	10.0	B		20	5	5/			NAG08
1998 11 14.44		S	9.7	HS	15.0	B		25	3.0	4			HAS08
1998 11 14.75		B	8.3	S	10	B		25	8	s2/			PLE01
1998 11 14.94		S	8.6	AA	8.0	B		11	3	3/			SOU01
1998 11 14.94		S	8.6	TT	8.0	B		11	& 3	6			DES01
1998 11 15.24		B	9.4	TJ	8.0	B		20	5	4	0.2	70	BIV
1998 11 15.24		S	9.4	TJ	5.0	B		7	5	4			BIV
1998 11 15.39		C	9.9	GA	20.3	T	9 a	60	2.5		>0.05	66	SUZ02
1998 11 15.39	x	S	8.7	TJ	10.0	B		20	5	5/			NAG08
1998 11 15.40		M	9.7	AA	25.4	L	6	61	3.0	5			SEA01
1998 11 15.42		S	9.1	AA	10.0	B		25					SEA
1998 11 15.45		S	8.6	TJ	25.4	T	6	32	5.5	3/			YOS04
1998 11 16.06		J	9.1	SC	25.4	T	5 a	60	4.16	s5	3.8m	82	ROQ
1998 11 16.37		S	8.5	TT	5.0	B		10	8	4/			RAE
1998 11 16.40		M	9.7	AA	25.4	L	6	61	2.8	5	20 m		SEA01
1998 11 16.79		S	9.0	TT	10.0	B		14	& 6	4			PER01
1998 11 16.84		S	8.9	S	8.0	B		11	5	5			GON05
1998 11 16.94		S	8.7	AA	8.0	B		11	2	2			SOU01
1998 11 17.02		S	8.7	TT	8.0	B		11	4	6			DES01
1998 11 17.28		S	9.6	TJ	25.6	L	5	42	3.5	6	0.2	70	BIV
1998 11 17.37		S	8.7	TT	5.0	B		10	5	4			RAE
1998 11 17.73	x	S	8.9	TT	15.6	L	5	29	5.0	3/			BOU

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 18.37		S	8.6	TT	5.0	B		10	5	4/			RAE
1998 11 18.71		S	8.5	TT	8.0	B		10	5.5	2/			HOR02
1998 11 18.77		S	8.5	TT	10.0	B		25	2.5	4			HAS02
1998 11 18.82		M	8.6	NP	21	L	6	60	4	4			MAR02
1998 11 19.06		S	8.6	VT	8.0	B		20	3.2	4			SHA02
1998 11 19.40	x	S	8.4	TJ	10.0	B		20	5	4/			NAG08
1998 11 19.44		M	9.5	AA	25.4	L	6	61	4.0	5	15 m	50	SEA01
1998 11 19.71		E	8.6	S	6	R	6	51	4.5	4/			ERO
1998 11 19.73		B	8.4	S	11	B		20	8	s2/			PLE01
1998 11 19.73		S	9.1	AA	10.0	M	10	25	4	3			MOE
1998 11 19.74		M	8.1	TI	10	B	4	25	5.5	3			LEH
1998 11 19.77		S	7.9	TI	6	R	12	37	4.8	6			SVE
1998 11 20.09		S	8.9	VT	8.0	B		20	3.5	2			SHA02
1998 11 20.46		M	9.6	AA	25.4	L	6	61	3.0	5	20 m	50	SEA01
1998 11 20.70		S	8.1	AC	6.0	B		20	5	3			RES
1998 11 20.72		E	8.9	S	6	R	6	51	4	4			ERO
1998 11 20.73		S	9.0:	HS	11	L	7	45	4	3			BAR06
1998 11 20.75		S	8.6	AC	30.5	T	10	55	& 5	4			COM
1998 11 20.80		S	8.8	TT	10.0	B		14	& 6	3/			PER01
1998 11 20.80		S	8.9	TT	10.0	B		14	& 6	3			VIT01
1998 11 20.82		M	8.7	NP	21	L	6	60	3	4			MAR02
1998 11 20.99		S	8.8	TT	8.0	B		11	5	6/			DES01
1998 11 21.24		B	9.8	TJ	25.6	L	5	42	4	6	0.25	70	BIV
1998 11 21.29		S	9.4	TJ	5.0	B		7	8	4			BIV
1998 11 21.71		M	8.2	TI	10	B	4	25	5.8	3			LEH
1998 11 21.72		M	8.9	TI	10	B		25	7	2			KUJ
1998 11 21.72	x	S	8.9	TT	15.6	L	5	29	4.5	3			BOU
1998 11 21.73		S	9.2	AA	10.0	M	10	25	3.5	3			MOE
1998 11 21.83		M	8.8	NP	21	L	6	60	3	4			MAR02
1998 11 22.24		S	9.5	TJ	25.6	L	5	42	4	6	0.2	70	BIV
1998 11 22.45	x	S	9.0	TT	10.0	B		20	5	4	& 8 m	80	YOS02
1998 11 22.66		M	8.4	PA	25	L	4	64	5	4			SHU
1998 11 22.68	!	B	9.5	S	35	C	16	250		d2			CHR
1998 11 22.69		E	8.9	S	6	R	6	51	4.5	4			ERO
1998 11 22.70		S	9.2	HS	20	L	5	70	4	4			BAR06
1998 11 22.71		I	9.6:	S	11	L	7	46	3	s2			BUR04
1998 11 22.71	&	S	9.5:	S	25	L	5	66	4	1			KID01
1998 11 22.72		M	8.1	TI	10	B	4	25	6.2	3			LEH
1998 11 22.73		S	8.4	AC	6.0	B		20	5	3			RES
1998 11 22.98		S	8.8	TT	8.0	B		11	& 5	5			DES01
1998 11 23.29		S	9.4	TJ	25.6	L	5	42	4	6	0.27	70	BIV
1998 11 23.38		M	9.1	TT	11	L	4	16	7	4/			RAE
1998 11 23.38		V	10.0	LA	50.0	C	12	a180	2.33	4	>10.8m	69	FUK02
1998 11 23.39		S	9.0	TJ	25.4	T	6	62	2.4	s5	4.5m	75	YOS04
1998 11 23.55		S	9.3	VN	41	L	4	90	2.3	5			PEA
1998 11 23.70		E	9.2	S	6	R	6	51	3	3/			ERO
1998 11 23.74		B	8.9	S	18	L	7	40	& 4.5	2/			WLO
1998 11 23.74		S	9.4	HS	20	L	5	70	3.7	2			BAR06
1998 11 24.38		M	8.9	TT	11	L	4	16	6	4			RAE
1998 11 24.70		M	8.0	TI	10	B	4	25	5.0	3/			LEH
1998 11 24.72		[	9.0	S	25	L	5	66					KID01
1998 11 24.74		S	9.2:	HS	20	L	5	70	4	4			BAR06
1998 12 01.73		S	8.6:	AC	6.0	B		20	3	3			RES
1998 12 03.67		I	9.5:	S	11	L	7	46		s1/			BUR04
1998 12 04.72		B	8.6	S	25	L	5	70	10	s3			PLE01
1998 12 04.94		B	8.9	AC	6.3	B	4	9	6	1			NOW
1998 12 05.08		J	9.3	SC	25.4	T	5	a 60	6.05	s5/	3.3m	65	ROQ
1998 12 05.69		S	8.4	TT	8.0	B		10	6.5	2/			HOR02
1998 12 06.25		S	9.9	TJ	25.6	L	5	42	4.5	4	0.15	70	BIV
1998 12 06.44		S	9.8	AA	10.0	B		25					SEA
1998 12 06.68	!	B	10.0:	S	35	C	16	250	1.0	d2			CHR
1998 12 07.41		M	9.5	TT	11	L	4	16	3.5	4			RAE
1998 12 07.48		S	9.4	TI	20	L	7	45	2	4			MAT08
1998 12 07.72	x	S	9.9	TT	25.4	J	6	72	2.8	2/			BOU
1998 12 08.70		E	9.3	S	6	R	6	51	4	3/			ERO

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 09.71		S	8.7	TT	8.0	B		10	6	2/			HOR02
1998 12 09.73		M	8.7	TI	10	B	4	25	4.4	3			LEH
1998 12 10.72		S	9.5	AA	10.0	M	10	25	3	3			MOE
1998 12 11.24		S	9.9	TJ	25.6	L	5	42	4.5	5	0.17	65	BIV
1998 12 11.43		S	9.5	TT	11	L	4	16	3.5	3/			RAE
1998 12 11.71		B	9.2	S	25	L	5	70	12	s2/			PLE01
1998 12 11.71		S	9.5	AA	10.0	M	10	25	3	3			MOE
1998 12 11.71	x	M	9.6	TJ	25.4	L	5	65	2.8	3			MEY
1998 12 11.75		M	8.9	TI	10	B	4	25	4.3	3			LEH
1998 12 12.37		S	9.2	AA	15.0	B		25	5	5			MIT
1998 12 12.41		C	10.6	GA	60.0	Y	6 a	60	3.1		5.5m	60	NAK01
1998 12 12.43		S	9.6	TT	11	L	4	16	3.5	3			RAE
1998 12 13.42		S	9.2	TJ	25.4	T	6	62	3.9	5			YOS04
1998 12 13.56		S	9.8	VN	41	L	4	90	2.0	4			PEA
1998 12 14.24		S	10.2	TJ	25.6	L	5	42	4	5	0.16	60	BIV
1998 12 15.50		S	10.2	TI	20	L	7	45	2	5			MAT08
1998 12 15.70		S	9.7	TT	10.0	B		25	2.4	3			HAS02
1998 12 15.96		B	9.5	AC	10.0	B	4	20	6	1			NOW
1998 12 17.26		S	10.1	TJ	25.6	L	5	42	4	5	0.15	55	BIV
1998 12 17.71		S	8.7	S	11	B		20	15	s2			PLE01
1998 12 17.71	x	S	10.1	TJ	25.4	L	5	65	2.4	2/			MEY
1998 12 17.72		S	10.0	AC	10.0	M	10	25	2.5	3			MOE
1998 12 17.74		M	9.5	TI	10	B	4	25	4.0	3			LEH
1998 12 18.74		M	9.4	TI	10	B	4	25	3.9	3			LEH
1998 12 19.23		S	10.3	TJ	25.6	L	5	42	4	4	0.13	55	BIV
1998 12 19.43	a	M	9.8	AA	15.0	B		25	& 5	3			MIT
1998 12 20.25		S	10.0	TJ	25.6	L	5	42	4	4	0.16	55	BIV
1998 12 20.45	x	S	10.6	TT	25.4	L	4	113	1.5	5			YOS02
1998 12 20.57		S	9.9	AA	20	L	4	45	4.9	3/			PEA
1998 12 20.58		S	9.8	AA	8.0	B		20	6.5	2			PEA
1998 12 20.75		S	9.6	AC	25.0	L	6	61	2.2	3			RES
1998 12 21.43		S	10.2	TT	11	L	4	16	2.5	3			RAE
1998 12 21.52		S	10.3	TI	20	L	7	45	2	3			MAT08
1998 12 21.56		S	10.0	AA	20	L	4	45	4.5	4			PEA
1998 12 21.57		S	9.9	AA	8.0	B		20	5.3	3/			PEA
1998 12 23.43		S	10.0	TT	11	L	4	16	5.5	2/			RAE
1998 12 23.55		S	10.2	AA	20	L	4	45	3.2	4			PEA
1998 12 23.56		S	10.1	AA	8.0	B		20	5.1	3			PEA
1998 12 25.70		M	9.6	TI	10	B	4	25	3.8	3			LEH
1998 12 26.75		S	9.8	AC	25.0	L	6	61	2.0	2/			RES
1998 12 30.70		S	9.3:	TT	35	L	5	92	2.6	2/			HOR02
1999 01 04.07		J	9.4	SC	25.4	T	5 a	60	2.86	s5/	3.9m	69	ROQ
1999 01 04.43	x	S	10.7	TT	10.0	B		37	3	3			YOS02
1999 01 05.40		M	9.5:	TT	11	L	4	16	3.5	5			RAE
1999 01 06.43		S	10.3	TT	11	L	4	16	3	4			RAE
1999 01 06.54		S	11.0	VN	41	L	4	90	1.8	4			PEA
1999 01 06.73		S	11.5	HS	44.0	L	5	63	0.5	5			HAS02
1999 01 07.41		S	11.0	TT	11	L	4	16	2.5	4			RAE
1999 01 07.59		S	11.0	VN	41	L	4	90	1.6	3/			PEA
1999 01 09.41		S	11.5	HS	15.0	B		25	2	3			MIT
1999 01 09.59		S	11.2	VN	41	L	4	90	1.5	3			PEA
1999 01 10.61		S	11.3	VN	41	L	4	90	1.6	3			PEA
1999 01 10.73		S	9.7:	TT	35	L	5	92	2.5	2			HOR02
1999 01 11.46		S	10.6	TT	11	L	4	16	3	3			RAE
1999 01 11.50		S	11.0	TI	20	L	7	45	2	3			MAT08
1999 01 11.57		S	11.3	VN	41	L	4	90	1.6	3/			PEA
1999 01 12.26		S	10.8	TJ	25.6	L	5	42	2.7	5	0.07	55	BIV
1999 01 12.51		S	11.0	TI	20	L	7	45	2	3			MAT08
1999 01 12.56		S	11.4	VN	41	L	4	90	1.8	3/			PEA
1999 01 12.75		S	10.0	TT	35	L	5	92	2.8	1/			HOR02
1999 01 13.42	w	S	11.5	AC	15.0	B		25	2	3			MIT
1999 01 14.28		S	10.9	TJ	25.6	L	5	42	3	5	0.07	50	BIV
1999 01 14.50		S	11.0	TI	20	L	7	45	2	3			MAT08
1999 01 16.27		S	11.2	TJ	25.6	L	5	42	2.5	5	0.03	50	BIV
1999 01 16.54		S	11.5	VN	41	L	4	90	1.5	3			PEA

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 17.28		S	11.0	HS	25.6	L	5	42	2.5	5	0.08	60	BIV
1999 01 17.82		S	11.0	TT	35	M	10	90	2	3			PLE01
1999 01 18.41		V	12.5	LA	50.0	C	12	a180	1.18	4	1.9m	53	FUK02
1999 01 19.74		S	11.5	HS	44.0	L	5	156	0.9	3			HAS02
1999 01 20.30		S	11.2	HS	25.6	L	5	42	2	5			BIV
1999 01 21.41	a	C	11.7	GA	60.0	Y	6	a120	2.0			60	NAK01

Comet 22P/Kopff

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 17.26		S	8.5	NP	5.0	B		10	4				HAL
1996 07 23.30		S	8.4	NP	5.0	B		10	9				HAL
1996 08 10.27		S	9.2:	NP	5.0	B		10					HAL
1996 08 21.27		S	9.5	NP	5.0	B		10	4				HAL
1996 09 05.23		S	9.7	AC	41	L	4	72	5				HAL
1996 09 16.18		S	9.9	AC	41	L	4	72	3.5	1/			HAL
1996 10 03.11		S	11.2	AC	41	L	4	72	3	1/			HAL
1996 10 11.18		M	11.5	AC	41	L	4	72	4	2/			HAL
1996 11 04.12		S	12.6	AC	41	L	4	183	1.5	1/			HAL
1996 11 11.16		I	[13 :		41	L	4	183					HAL

Comet 29P/Schwassmann-Wachmann 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 10.53		I	[13.5:		41	L	4	183					HAL
1996 11 11.51		I	[13.5:		41	L	4	183					HAL
1996 11 12.50		I	[13.5:		41	L	4	183					HAL
1996 12 08.52		S	[13.4:	AC	41	L	4	183	1				HAL
1996 12 12.53		I	[13.5:		41	L	4	183					HAL
1998 12 05.86	1	C	[13.9	TJ	12.0	L	6	a 30					YOS04
1998 12 13.86	1	C	[14.9	TJ	12.0	L	6	a 60					YOS04
1998 12 18.87	1	C	[15.3	TJ	18.0	L	6	a 60					YOS04
1998 12 24.86	1	C	[16.5	TJ	18.0	L	6	a 60					YOS04
1999 01 04.85		C	17.5	TJ	18.0	L	6	a 60	0.35				YOS04
1999 01 17.80		S	[13.5	VN	41	L	4	200	! 0.5				PEA
1999 01 22.83		C	16.8	TJ	18.0	L	6	a 60	0.4				YOS04
1999 01 26.87	a	C	16.5	GA	60.0	Y	6	a120	0.6	s0/			NAK01
1999 01 26.87	a	c	17.8	GA	60.0	Y	6	a120					NAK01
1999 01 27.85		C	16.7	TJ	18.0	L	6	a 60	0.4				YOS04

Comet 46P/Wirtanen

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 07.11		I	[13.5:		41	L	4	183					HAL
1996 12 27.09		S	13.3	AC	41	L	4	183	1.5	1			HAL
1996 12 29.10	!	S	13.0	AC	41	L	4	72	2.5	1			HAL

Comet 48P/Johnson

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 21.60		C	18.1	GA	60.0	Y	6	a240	0.4				NAK01

Comet 49P/Arend-Rigaux

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 16.86		C	18.9	GA	60.0	Y	6	a120		9			NAK01
1998 12 24.85	a	C	18.7	GA	60.0	Y	6	a240	0.25	8/			NAK01
1999 01 26.85		C	19.1	GA	60.0	Y	6	a240		9			NAK01

Comet 52P/Harrington-Abell

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 20.99	x	S	12.5	TJ	20	T	10	112	1.8	1/			PLE01
1998 08 28.98	x	S	12.7	TJ	15	M	10	150	1.5	2			PLE01
1998 09 23.92		M	12.7	HS	42	L	5	162	2.0	3			LEH

Comet 52P/Harrington-Abell [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 24.93		M	12.5	HS	42	L	5	162	2.1	3			LEH
1998 10 17.01		S	12.3	AC	25.4	L	5	104	1.4	3			MEY
1998 10 17.06		M	12.9	HS	42	L	5	81	2.0	2/			LEH
1998 10 17.88		E[	11.9	VF	13.3	R	5	40	! 2				SCO04
1998 10 20.95		M	12.7	HS	42	L	5	81	1.9	3			LEH
1998 10 20.98		S	12.1	AC	25.4	L	5	104	1.5	S4			MEY
1998 10 24.92		M	12.5	HS	42	L	5	81	2.4	2/			LEH
1998 10 25.90		M	12.5	HS	42	L	5	81	2.2	2/			LEH
1998 10 27.00		S	12.5	AC	25.4	J	6	88	1.5	1/			BOU
1998 10 27.96	x	S[	13.0	TJ	35	M	10	90	! 2.0	1/			PLE01
1998 10 28.55		S	12.3	HS	25.6	L	5	84	1.2	3			BIV
1998 10 31.69		V	12.5	LA	50.0	C	12	a180	0.76	5	> 9.0m	274	FUK02
1998 11 10.97		S	13.6	VB	30	R	20	185	0.6	3			SHA02
1998 11 11.84		S	11.9	HS	35	L	5	158	1.5	2/			HOR02
1998 11 12.84		S	11.6	HS	35	L	5	92	1.5	2/			HOR02
1998 11 12.87		M	12.5	HS	42	L	5	162	2.0	2/			LEH
1998 11 12.92		S	11.9	AC	25.4	L	5	104	1.5	3			MEY
1998 11 15.23		J	11.7	SC	25.4	T	5	a 60	0.87	s5	3.5m	272	ROQ
1998 11 15.76		C	12.4	GA	60.0	Y	6	a120	1.5		> 6.9m	277	NAK01
1998 11 17.45		S	11.6	HS	25.6	L	5	42	1.8	2			BIV
1998 11 18.65		S	11.5	HS	25.6	L	5	42	2.5	3			BIV
1998 11 18.86		S	12.4	HS	44.0	L	5	156	0.5	3			HAS02
1998 11 19.83		M	11.9	HS	42	L	5	81	2.5	3			LEH
1998 11 19.89		S	11.4	HS	13	L	8	69	1.9	2/			HOR02
1998 11 20.95		S	12.2	GA	25.4	J	6	88	1.6	1/			BOU
1998 11 21.15		S	11.5	AC	25.3	L	6	58	& 1.7	4			PER01
1998 11 21.43		S	11.4	HS	25.6	L	5	42	1.8	3			BIV
1998 11 21.58		S	10.3	HS	25.4	T	6	62	1.8	4			YOS04
1998 11 21.85		M	12.0	HS	42	L	5	81	2.4	2/			LEH
1998 11 21.88		S	11.8	AC	25.4	L	5	104	1.4	3/			MEY
1998 11 22.74		S	12.0	HS	20	L	5	70	1.6	3			BAR06
1998 11 22.85		S	11.4	AC	25.0	L	6	61	2	3			RES
1998 11 23.46		S	11.5	HS	25.6	L	5	42	2	3			BIV
1998 11 23.58		V	11.8	LA	50.0	C	12	a180	1.35	4	> 9.9m	275	FUK02
1998 11 23.70		C	12.2	GA	60.0	Y	6	a120	2.1		> 6.4m	277	NAK01
1998 11 23.80		S	11.8	VN	41	L	4	200	0.7	2			PEA
1998 11 23.97		S	11.7	HS	20	L	5	70	1.8	2			BAR06
1998 11 24.25		S	11.5	AC	25.3	L	6	58	& 1.5	4			PER01
1998 11 24.87		S	11.8	HS	20	L	5	70	1.6	3			BAR06
1998 11 24.88		M	10.8	TI	35	L	5	68	2.0	2/			HOR02
1998 11 26.60		V	11.8	LA	50.0	C	12	a180	1.19	4	>10.0m	274	FUK02
1998 11 27.25		S	11.5	AC	25.3	L	6	58	& 1.7	5			PER01
1998 11 27.80		S	11.9	VN	41	L	4	200	1.2	3			PEA
1998 11 28.53		S	11.4	HS	25.6	L	5	42	1.4	3			BIV
1998 11 30.23		S	11.1	AC	25.3	L	6	58	& 1.7	6			PER01
1998 12 07.81	x	S	11.5	TT	25.4	J	6	100	1.8	3/			BOU
1998 12 09.75		M	10.9	TI	35	L	5	92	2.0	2/			HOR02
1998 12 09.78		M	11.7	HS	42	L	5	81	2.3	3			LEH
1998 12 09.81		S	10.9	TJ	25.4	T	6	62	1.8	4			YOS04
1998 12 10.90		M	10.9	TI	35	L	5	92	2.0	2/			HOR02
1998 12 11.38		S	11.2	HS	25.6	L	5	42	2	3			BIV
1998 12 11.81		M	11.7	HS	42	L	5	81	2.3	2/			LEH
1998 12 11.87		S	11.2	AC	25.4	L	5	65	1.8	3			MEY
1998 12 12.11		S	11.0	AC	25.3	L	6	58	& 2.0	s4			PER01
1998 12 12.56	x	S	11.0	TJ	32.0	L	5	91	1.6	3			NAG08
1998 12 12.81		S	10.8	TJ	25.4	T	6	62	2.5	5			YOS04
1998 12 13.46		S	10.1	TJ	25.4	T	6	62	2.5	4			YOS04
1998 12 13.80		S	11.2	HS	15.0	B		25	3	3			MIT
1998 12 14.35		S	11.2	HS	25.6	L	5	42	2	3	0.05	270	BIV
1998 12 15.19		S	10.7	AC	25.3	L	6	58	& 1.8	s4			PER01
1998 12 15.66		S	12.0:	HS	20	L	7	158	1	3			MAT08
1998 12 15.80		S	10.1	HS	22	L	5	80	2.0	3	0.06	275	WAR01
1998 12 15.84		S	10.9	HS	20.3	T	10	102	1.6	6			KAR02
1998 12 16.16		S	11.1	TJ	25.3	L	6	58	& 2.0	4			PER01
1998 12 16.18		M	11.5	GA	25.4	J	6	72	2.0	4/			BOU

Comet 52P/Harrington-Abell [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 16.60		S	10.9	HS	25.6	L	5	42	2	4	0.07	280	BIV
1998 12 16.68		C	11.7	GA	60.0	Y	6	a120	2.3		> 6.6m	273	NAK01
1998 12 16.79		S	10.6	AC	25.0	L	6	61	2.5	3			RES
1998 12 17.40		S	11.0	HS	25.6	L	5	42	2.5	4	0.08	280	BIV
1998 12 17.67	x	S	10.4	TJ	32.0	L	5	91	2.4	5			NAG08
1998 12 17.74		M	10.5	HS	15.0	B		25	3	3			MIT
1998 12 17.77		S	12.1	HS	44.0	L	5	156	0.5	4			HAS02
1998 12 17.79		M	11.4	TI	42	L	5	81	2.6	3			LEH
1998 12 17.81	x	S	10.8	TJ	25.4	L	5	65	2.5	3			MEY
1998 12 17.83		M	10.9	TT	35	L	5	92	2.4	3			HOR02
1998 12 17.84	x	M	11.3	TT	25.5	J	6	72	2.2	4			BOU
1998 12 17.85		S	10.6	AC	25.0	L	6	61	2.3	3			RES
1998 12 18.82		M	11.4	TI	42	L	5	81	2.6	3			LEH
1998 12 18.87	x	M	11.7	TJ	35	M	10	90	2.6	S7			DRA02
1998 12 19.39		S	11.1	HS	25.6	L	5	42	2	3			BIV
1998 12 19.51	x	S	10.9	TJ	32.0	L	5	91	1.7	4			NAG08
1998 12 19.85		S	11.8	TI	35	M	10	90	2.5	s6/			DRA02
1998 12 20.20	x	S	11.4	TT	25.4	J	6	72	2.0	3/			BOU
1998 12 20.32		S	11.2	HS	25.6	L	5	42	2	3	0.07	280	BIV
1998 12 20.53	x	S	11.0	TT	25.4	L	4	46	1.5	2	6 m	265	YOS02
1998 12 20.75		S	11.6	VN	20	L	4	45	2.1	3			PEA
1998 12 20.78		S	11.0	AC	15.2	L	5	42	1.5	4			MOE
1998 12 20.82		S	9.7	TJ	25.4	T	6	62	4	5			YOS04
1998 12 20.82		S	10.6	AC	25.0	L	6	61	2.6	3/			RES
1998 12 21.19	x	S	11.3	TT	25.4	J	6	72	2.2	3/			BOU
1998 12 21.63		S	11.5	HS	20	L	7	158	1.5	3			MAT08
1998 12 21.73		S	10.9	AC	15.2	L	5	42	1.5	5			MOE
1998 12 21.73		S	11.7	VN	20	L	4	45	2.0	3			PEA
1998 12 21.83		M	10.7	TT	35	L	5	92	2.5	3			HOR02
1998 12 21.89		M	10.8	TI	10	B	4	25	2.7	3			LEH
1998 12 21.92		S	10.4	HS	22.0	L	5	80	1.8	4	0.06	280	WAR01
1998 12 22.17		S	11.0	TJ	25.3	L	6	58	& 1.9	s4			PER01
1998 12 22.79		B	10.3	TJ	34	L	4	44	1.5				CHE03
1998 12 22.88		S	10.7	AC	25.0	L	6	61	2.2	3			RES
1998 12 23.19		J	10.6	SC	25.4	T	5	a 60	1.52	s6	5.5m	259	ROQ
1998 12 23.74		S	11.7	VN	20	L	4	45	1.0	3			PEA
1998 12 23.88	x	M	10.9	TJ	25.4	L	5	65	3.7	3/			MEY
1998 12 23.91		S	10.8	HS	20	L	5	70	2.5	3			BAR06
1998 12 24.52	x	S	10.6	TJ	32.0	L	5	58	2.4	4			NAG08
1998 12 25.01		S	10.7	TJ	25.3	L	6	58	& 1.9	4/			PER01
1998 12 25.10		S	10.9	HS	11	L	7	50	2.5	3			BAR06
1998 12 25.97	x	M	11.7	TJ	35	M	10	132	1.5	S7			DRA02
1998 12 26.04		S	10.9	TJ	25.3	L	6	58	& 2.1	4/			PER01
1998 12 26.79		M	10.5	TI	10	B	4	25	3.1	3			LEH
1998 12 27.76		M	10.0	HS	15.0	B		25	4	3			MIT
1998 12 27.83		S	10.6	TJ	25.4	T	6	62	3.5	5			YOS04
1998 12 28.73		C	11.6	GA	60.0	Y	6	a120	2.1		> 9.7m	274	NAK01
1998 12 29.20	x	S	11.2	TT	25.4	J	6	72	2.3	3			BOU
1998 12 30.10		S	10.7	HS	20	L	5	70	2.1	3/			BAR06
1998 12 31.23	x	S	11.1	TT	25.4	J	6	72	2.2	3/			BOU
1999 01 06.76		S	11.3	HS	44.0	L	5	63	0.6	4			HAS02
1999 01 07.73		S	10.6	AC	15.2	L	5	42	2	4			MOE
1999 01 08.15	!	J	11.8	SC	25.4	T	5	a 60	1.00	s5	3.2m	248	ROQ
1999 01 08.90		M	10.6	TT	13	L	8	69	2.5	3			HOR02
1999 01 09.48	x	S	10.7	TT	25.4	L	4	46	1.9	3			YOS02
1999 01 09.50	x	S	10.6	TJ	32.0	L	5	58	2.4	4/			NAG08
1999 01 09.54		S	11.1	GA	25.4	L	4	71					SEA
1999 01 09.80	x	S	10.9	TT	25.4	J	6	58	2.4	3			BOU
1999 01 10.34		S	10.7	TJ	25.6	L	5	42	2	5	0.05	270	BIV
1999 01 10.42	x	S	10.5	TJ	32.0	L	5	58	1.8	4			NAG08
1999 01 10.74		M	10.8	TT	35	L	5	92	2.3	3			HOR02
1999 01 10.84	x	S	10.9	TT	25.4	J	6	72	2.4	4			BOU
1999 01 12.13		S	10.6	TJ	25.3	L	6	58	& 2.5	3/			PER01
1999 01 12.30		S	10.5	TJ	25.6	L	5	42	3.5	5	0.15	265	BIV
1999 01 12.59		S	10.6	TI	20	L	7	45	1.5	4			MAT08

Comet 52P/Harrington-Abell [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 12.82		M	10.7	TT	35	L	5	92	2.4	4			HOR02
1999 01 13.55		M	10.6	AA	15.0	B		25	3	3			MIT
1999 01 14.31		S	10.8	TJ	25.6	L	5	42	3	3	0.12	270	BIV
1999 01 14.54		S	10.7	GA	10.0	B		25					SEA
1999 01 14.56		S	11.0	TI	20	L	7	45	2	3			MAT08
1999 01 14.81		S	10.4	AC	15.2	L	5	42	3	2			MOE
1999 01 14.84		M	10.8	TT	35	L	5	92	2.4	3/			HOR02
1999 01 16.35		S	10.5	TJ	25.6	L	5	42	3	3			BIV
1999 01 16.65		S	12.0	VN	41	L	4	200	0.8	3			PEA
1999 01 16.78		M	10.8:	TT	35	L	5	92	2.4	3/			HOR02
1999 01 17.34		S	10.7	HS	25.6	L	5	42	3	3			BIV
1999 01 17.43	x	S	10.2	TJ	32.0	L	5	58	2.7	4			NAG08
1999 01 17.56		M	10.5	HS	15.0	B		25	1.5	2/			HAS08
1999 01 17.83		S	10.6	TT	12.5	R	5	42	2.5	5			GIL01
1999 01 17.90		M	10.7	TT	35	L	5	92	2.7	3			HOR02
1999 01 18.01		S	10.9	TT	25.4	J	6	72	2.5	2/			BOU
1999 01 18.62		V	11.0	LA	50.0	C	12	a360	3.21	3	> 7.3m	268	FUK02
1999 01 18.74		S	10.3	AC	15.2	L	5	42	2	5			MOE
1999 01 18.77		S	11.3	HS	20.3	T	10	51	0.7	4			HAS02
1999 01 18.91		M	10.7	TT	35	L	5	68	2.4	3			HOR02
1999 01 19.98		S	10.3	TJ	30.5	T	10	75	1.7	3			KAM01
1999 01 20.35		S	11.1	HS	25.6	L	5	42	2.5	4			BIV
1999 01 20.96		S	10.4	TJ	30.5	T	10	75	2.1	4			KAM01
1999 01 21.64		V	11.1	LA	50.0	C	12	a360	3.78	3	> 8.5m	270	FUK02
1999 01 21.88		S	10.6	HS	11	L	7	50	2.0	2			BAR06
1999 01 22.55		C	11.4	GA	60.0	Y	6	a120	2.6		> 6.0m	275	NAK01
1999 01 22.76		S	10.7	HS	20	L	5	70	2.3	2			BAR06
1999 01 23.98		S	10.5	TJ	30.5	T	10	75	2.1	4			KAM01
1999 01 24.44		S	10.8	TJ	25.6	L	5	42	2.5	3			BIV
1999 01 27.58		S	11.1	HS	25.6	L	5	42	2.5	3			BIV

Comet 55P/Tempel-Tuttle

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 23.73		S	8.4	AA	11	L	7	32	8	3			VEL03
1998 01 23.73		S	8.5	AA	5.0	B		7		3			VEL03
1998 01 26.70		S	8.5	AA	11	L	7	32	5	3			VEL03
1998 01 26.70		S	8.7	AA	5.0	B		7					VEL03

Comet 57P/du Toit-Neujmin-Delporte

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 26.45		S	11.8:	PC	41	L	4	72	1	3			HAL
1996 08 12.41		S	13.3	AC	41	L	4	72	1.5	1/			HAL

Comet 59P/Kearns-Kwee

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 06.74		S	15.0	HS	44.0	L	5	226	0.1	3			HAS02

Comet 60P/Tsuchinshan 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 15.80		C	20.3:	GA	60.0	Y	6	a240		9			NAK01
1998 11 22.96		C	18.7:	HS	60.0	D	2						SAR02
1998 11 23.68		C	19.3	GA	60.0	Y	6	a240	0.2				NAK01
1998 11 25.04		C	19.4	HS	60.0	D	2				30 s	265	SAR02
1998 12 16.72		C	18.2	GA	60.0	Y	6	a240	0.25			290	NAK01
1998 12 21.63		C	17.9	GA	60.0	Y	6	a240	0.3			295	NAK01
1998 12 24.71		C	17.4	TJ	18.0	L	6	a120	0.3				YOS04
1999 01 19.84		S	[14.0	HS	44.0	L	5	226					HAS02
1999 01 21.70		C	16.9	GA	60.0	Y	6	a120	0.35				NAK01

Comet 65P/Gunn

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 17.21		S	13.1	AC	41	L	4	183	1				HAL
1996 08 12.15		S	13.2	AC	41	L	4	72	1	2/			HAL
1998 11 10.59		C	17.6	GA	60.0	Y	6	a240	0.35		0.8m	234	NAK01
1998 11 25.58		C	17.8	GA	60.0	Y	6	a240	0.3		0.8m	241	NAK01
1998 12 17.54		C	18.0	GA	60.0	Y	6	a240	0.35				NAK01
1998 12 19.52		C	17.2:	TJ	18.0	L	6	a 90	0.35				YOS04
1999 01 21.52		C	18.3	GA	60.0	Y	6	a240	0.3				NAK01

Comet 68P/Klemola

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 23.97		B	15.4	HS	42	L	5	263	0.4	4			LEH
1998 09 24.95		O[	15.4	HS	42	L	5	263	0.5				LEH
1998 11 15.58		C	18.4	GA	60.0	Y	6	a240	0.4	s0	1.2m	256	NAK01
1998 11 15.58		c	18.9	GA	60.0	Y	6	a240					NAK01
1998 11 18.79		S[	14.5	HS	44.0	L	5	226					HAS02
1998 11 25.67		C	18.5	GA	60.0	Y	6	a240	0.3	s0			NAK01
1998 11 25.67		c	19.0	GA	60.0	Y	6	a240					NAK01
1998 12 17.55		C	19.1	GA	60.0	Y	6	a240	0.35	s0			NAK01
1998 12 17.55		c	19.8	GA	60.0	Y	6	a240					NAK01
1998 12 17.75		S[	14.5	HS	44.0	L	5	156					HAS02

Comet 69P/Taylor

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 03 07.58		C	13.6:	HS	25.4	T	6	a 20	1.0				YOS04

Comet 74P/Smirnova-Chernykh

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 15.59		C	17.1	GA	60.0	Y	6	a240	0.35		1.4m	249	NAK01
1998 11 25.59		C	17.2	GA	60.0	Y	6	a240	0.35		0.8m	246	NAK01
1998 12 17.57		C	17.3	GA	60.0	Y	6	a240	0.4		1.1m	247	NAK01
1998 12 19.54		C	16.7:	TJ	18.0	L	6	a 90	0.3				YOS04
1999 01 21.50		C	17.4	GA	60.0	Y	6	a240	0.35				NAK01

Comet 81P/Wild 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 10 17.46		I[	13.5:		41	L	4	183					HAL
1996 11 07.44		S[	13.7	WA	41	L	4	183	1				HAL
1996 11 10.46		I[	14.0:		41	L	4	183					HAL
1996 12 04.33		S	12.5	CA	41	L	4	72	0.8	4/			HAL
1996 12 12.34		M	12.3	CA	41	L	4	72	1	4/			HAL
1996 12 30.20		M	11.4	CA	41	L	4	72	1.5	5/			HAL

Comet 88P/Howell

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 13.39		S	11.0	CH	25.4	L	6	61	1.6	3			SEA01
1998 10 14.40		S	11.1	CH	25.4	L	6	61	1.5	2			SEA01
1998 10 15.39		S	11.1	CH	25.4	L	6	61	1.4	1			SEA01
1998 10 17.40		S	11.2	CH	25.4	L	6	61	1.4	1/			SEA01
1998 10 18.38		S	11.1	CH	25.4	L	6	61	1.3	1/			SEA01
1998 10 25.73		M	10.3	TI	10	B	4	25	2.0	4/			LEH
1998 11 01.39	S1	R[	12.0	HS	10.7	A	4	a 60					YOS04
1998 11 01.40	1	C[	11.0	HS	10.7	A	4	a 30					YOS04
1998 11 07.21		S	10.7	TJ	25.6	L	5	42	3	3			BIV
1998 11 08.45		S	10.5	TI	20	L	7	45	3	3			MAT08
1998 11 11.70		S	10.9	HS	35	L	5	92	1.8	1/			HOR02
1998 11 12.70		M	10.9	TI	10	B	4	25	2.0	3/			LEH
1998 11 12.71		S	10.8	HS	35	L	5	158	1.6	1/			HOR02
1998 11 12.71	x	S	10.5	TJ	25.4	L	5	65	2.0	2			MEY
1998 11 15.40	a	C	11.7	GA	60.0	Y	6	a120	2.3				NAK01
1998 11 18.74		S	10.4	TT	44.0	L	5	156	1.3	3			HAS02

Comet 88P/Howell [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 21.22		S	10.8	TJ	25.6	L	5	42	3	3			BIV
1998 11 21.69		M	11.1	TI	10	B	4	25	2.0	3			LEH
1998 11 22.26		S	10.9	TJ	25.6	L	5	42	3	3			BIV
1998 11 22.42	x	S	10.7	TT	25.4	L	4	46	3.0	5			YOS02
1998 11 23.28		S	11.0	HS	25.6	L	5	42	3	3			BIV
1998 11 23.37		R	13.0	TJ	12.0	L	6	a 60	1.6	3			YOS04
1998 11 23.38		S	11.7	HS	25.4	T	6	116	1.1	3			YOS04
1998 11 23.40	a	C	11.7	GA	60.0	Y	6	a120	2.5				NAK01
1998 11 23.54		S	10.8	VN	41	L	4	90	1.8	1			PEA
1998 12 06.22		S	11.2	HS	25.6	L	5	42	3	2			BIV
1998 12 07.49		S	11.8	HS	20	L	7	45	2	2			MAT08
1998 12 07.71	x	S	11.5	TT	25.4	J	6	88	1.5	2/			BOU
1998 12 09.69		M	10.9	TI	10	B	4	25	2.2	3			LEH
1998 12 09.70		S	12.2	HS	35	L	5	158	1.6	2/			HOR02
1998 12 11.21		S	11.2	HS	25.6	L	5	42	2.5	2			BIV
1998 12 12.39		C	12.3	GA	60.0	Y	6	a120	2.8				NAK01
1998 12 13.38		C	12.2	TJ	18.0	L	6	a 60	0.8	2			YOS04
1998 12 13.41		S	10.5	TJ	25.4	T	6	116	2.4	5			YOS04
1998 12 14.22		S	11.4	HS	25.6	L	5	42	3	2			BIV
1998 12 15.49		S	[12.0	HS	20	L	7	158					MAT08
1998 12 15.95		B	10.5	AC	10.0	B	4	20	2	2			NOW
1998 12 17.23		S	11.6	HS	25.6	L	5	42	2	1			BIV
1998 12 17.70		M	11.2	TI	42	L	5	63	1.9	3			LEH
1998 12 17.72		S	13.9	HS	44.0	L	5	156	0.4	3			HAS02
1998 12 18.70		M	11.7	TI	42	L	5	81	1.7	3			LEH
1998 12 19.21		S	11.6	HS	25.6	L	5	42	2	2			BIV
1998 12 20.24		S	11.7:	HS	25.6	L	5	84	1.5	2			BIV
1998 12 26.74		S	11.3	AC	25.0	L	6	61	1.5	2/			RES
1999 01 10.27		S	12.1:	HS	25.6	L	5	84	1.5	2			BIV
1999 01 10.41		C	15.5	TJ	18.0	L	6	a 60	0.4				YOS04
1999 01 12.24		S	12.1	HS	25.6	L	5	84	1.5	2			BIV
1999 01 12.70		S	11.9	HS	35	L	5	207	1.7	2			HOR02
1999 01 14.26		S	12.6	HS	25.6	L	5	84	1.5	2			BIV
1999 01 16.25		S	12.5	HS	25.6	L	5	84	1.5	2			BIV
1999 01 17.26		S	12.4	HS	25.6	L	5	84	1.5	2			BIV

Comet 93P/Lovas 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 23.95		M	13.3	HS	42	L	5	162	1.4	3/			LEH
1998 09 24.92		M	13.1	HS	42	L	5	162	1.5	3/			LEH
1998 10 17.00		S	13.2	AC	25.4	L	5	104	0.7	2/			MEY
1998 10 17.08		M	13.0	HS	42	L	5	162	1.7	3			LEH
1998 10 20.94		B	13.0	HS	42	L	5	162	1.9	3			LEH
1998 10 20.99		S	13.1	AC	25.4	L	5	104	1.0	3			MEY
1998 10 23.91		S	13.1	HS	35	L	5	207	1.2	2/			HOR02
1998 10 24.91		M	13.0	HS	42	L	5	162	1.6	3			LEH
1998 10 25.89		M	12.9	HS	42	L	5	162	1.6	3			LEH
1998 10 27.03		S	13.3	GA	25.4	J	6	115	1.3	1/			BOU
1998 11 10.67		C	13.5	GA	60.0	Y	6	a120	1.7				NAK01
1998 11 10.90		S	13.4	GA	25.4	J	6	150	1.0	1/			BOU
1998 11 10.98		S	14.0:	VB	30	R	20	185	0.5	3			SHA02
1998 11 11.83		S	13.3	HS	35	L	5	158	1.1	2/			HOR02
1998 11 11.90		S	13.3	GA	25.4	J	6	100	1.1	1/			BOU
1998 11 12.83		S	13.3	HS	35	L	5	158	1.2	2			HOR02
1998 11 12.86		M	13.0	HS	42	L	5	162	1.6	3/			LEH
1998 11 12.95		S	13.0	AC	25.4	L	5	104	0.7	3			MEY
1998 11 13.99		S	13.4	HS	44.5	L	4	230	1.2	2/			SAR02
1998 11 18.85		S	14.0	HS	44.0	L	5	226	0.5	4			HAS02
1998 11 19.57		C	13.8	TJ	12.0	L	6	a120	0.7				YOS04
1998 11 19.82		B	13.2	HS	42	L	5	162	1.4	3/			LEH
1998 11 20.94		S	13.3	GA	25.4	J	6	100	1.2	1			BOU
1998 11 21.40		S	13.4	HS	25.6	L	5	84	1	4			BIV
1998 11 21.59		S	13.5	HS	25.4	T	6	116	1.3	3			YOS04
1998 11 21.84		B	13.2	HS	42	L	5	162	1.3	3/			LEH

Comet 93P/Lovas 1 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 21.91		S	13.1	AC	25.4	L	5	104	0.7	3			MEY
1998 11 23.42		S	13.5	HS	25.6	L	5	84	0.8	4			BIV
1998 11 23.65		C	13.5	GA	60.0	Y	6	a120	1.9		3.9m	278	NAK01
1998 11 24.73		C	13.6	TJ	12.0	L	6	a 60	0.95		2.0m	243	YOS04
1998 11 24.90		S	13.2	HS	35	L	5	158	1.1	2/			HOR02
1998 11 28.68		C	13.1	TJ	18.0	L	6	a120	0.7		1.5m	240	YOS04
1998 11 29.77		C	14.0	TJ	18.0	L	6	a 60	0.75				YOS04
1998 12 05.78		C	13.6	TJ	12.0	L	6	a 60	1.1				YOS04
1998 12 07.78		S	13.4	GA	25.4	J	6	115	0.8	1/			BOU
1998 12 09.77		B	13.6	HS	42	L	5	162	1.2	3			LEH
1998 12 09.85		S	13.1	HS	35	L	5	158	1.2	2			HOR02
1998 12 10.91		S	13.1	HS	35	L	5	92	1.2	1/			HOR02
1998 12 11.35		S	13.0	HS	25.6	L	5	84	1	3			BIV
1998 12 11.69		C	13.6	TJ	18.0	L	6	a 60	0.55				YOS04
1998 12 11.80		B	13.3	HS	42	L	5	162	1.1	3			LEH
1998 12 11.84		S	13.0	AC	25.4	L	5	104	1.3	2/			MEY
1998 12 13.81		C	13.6	TJ	12.0	L	6	a 60	1.1				YOS04
1998 12 14.30		S	12.8	HS	25.6	L	5	84	1	4			BIV
1998 12 16.67		C	13.4	GA	60.0	Y	6	a120	1.8				NAK01
1998 12 17.38		S	12.8	HS	25.6	L	5	84	1	3			BIV
1998 12 17.76		B	13.5	HS	42	L	5	162	1.1	3			LEH
1998 12 17.76		C	13.9	TJ	10.7	A	6	a 60	1.7				YOS04
1998 12 17.76		S	13.6	HS	44.0	L	5	156	0.4	4			HAS02
1998 12 17.78		S	12.8	AC	25.4	L	5	104	1.0	2/			MEY
1998 12 17.81		S	13.2	GA	25.4	J	6	100	1.2	1/			BOU
1998 12 17.84		S	12.9	HS	35	L	5	92	1.2	2/			HOR02
1998 12 17.85		S	13.1	AC	25.0	L	6	100	0.7	2/			RES
1998 12 18.78		B	13.4	HS	42	L	5	162	1.2	3			LEH
1998 12 18.78		C	14.1	TJ	18.0	L	6	a 60	0.7				YOS04
1998 12 19.37		S	12.9	HS	25.6	L	5	84	1	3			BIV
1998 12 19.57		C	13.6	TJ	18.0	L	6	a 60	0.5		0.9m	220	YOS04
1998 12 20.19		S	13.3	AC	25.4	J	6	100	1.0	1/			BOU
1998 12 20.31		S	12.7	HS	25.6	L	5	84	1.3	3			BIV
1998 12 20.79		C	13.4	TJ	18.0	L	6	a 60	1.0		1.4m	246	YOS04
1998 12 20.83		S	13.3	AC	25.0	L	6	121	0.7	3			RES
1998 12 21.89		S	12.7	HS	35	L	5	92	1.3	2/			HOR02
1998 12 22.88		S	13.3	AC	25.0	L	6	100	0.7	3/			RES
1998 12 23.84		S	12.9	AC	25.4	L	5	104	1.2	3			MEY
1998 12 24.67		C	13.5	TJ	18.0	L	6	a 60	1.1		1.3m	242	YOS04
1998 12 25.67		C	13.7	TJ	18.0	L	6	a 60	0.75				YOS04
1998 12 26.68		C	13.7	TJ	18.0	L	6	a 60	0.8				YOS04
1998 12 27.81		S	13.3	HS	25.4	T	6	116	1.1	4			YOS04
1998 12 28.70		C	13.3	GA	60.0	Y	6	a120	1.7				NAK01
1999 01 03.50		C	13.9	TJ	18.0	L	6	a 60	0.95				YOS04
1999 01 05.63		C	14.4	TJ	18.0	L	6	a 60	0.9				YOS04
1999 01 06.77		S	13.9	HS	44.0	L	5	156	0.2	3			HAS02
1999 01 09.44		C	14.2	TJ	10.7	A	4	a 60	1.2				YOS04
1999 01 09.48		S[	13.3	HS	32.0	L	5	192	! 1.0				NAG08
1999 01 10.41		S	13.0	HS	25.6	L	5	84	1	2			BIV
1999 01 10.45		C	14.4	TJ	18.0	L	6	a 60	0.7				YOS04
1999 01 10.77		M	13.0	HS	35	L	5	158	1.3	2/			HOR02
1999 01 10.86		S	13.5	GA	25.4	J	6	115	0.8	1/			BOU
1999 01 12.38		S	12.8	HS	25.6	L	5	84	1	3			BIV
1999 01 12.67		C	14.1	TJ	16.0	L	3	a 60	1.3				YOS04
1999 01 12.82		S	13.2	HS	35	L	5	207	1.2	3			HOR02
1999 01 14.86		M	12.7	HS	35	L	5	92	1.3	3			HOR02
1999 01 16.39		S	13.3	HS	25.6	L	5	84	0.7	3			BIV
1999 01 16.78		S	12.9	HS	35	L	5	158	1.3	3			HOR02
1999 01 17.36		S	13.1	HS	25.6	L	5	84	0.8	5			BIV
1999 01 17.91		S	12.9	HS	35	L	5	158	1.3	3			HOR02
1999 01 21.70		C	14.8	TJ	18.0	L	6	a 60	0.45		0.5m	210	YOS04
1999 01 22.54		C	14.2	GA	60.0	Y	6	a120	1.3				NAK01

Comet 94P/Russell 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 08.47			I[13.5:		41	L	4	183					HAL

Comet 95P/Chiron

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 03 07.77	1	C	[15.5		7.1	A	6	a180					YOS04
1999 01 22.84		C	17.0	TJ	18.0	L	6	a 60		9			YOS04

Comet 117P/Helin-Roman-Alu 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 10.52		C	16.5	GA	60.0	Y	6	a240	0.5		1.0m	243	NAK01
1998 12 17.44		C	17.3	GA	60.0	Y	6	a240	0.4		0.8m	237	NAK01

Comet 118P/Shoemaker-Levy 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 10 17.44		I	[13.5:		41	L	4	183					HAL
1996 11 07.30		S	13.0	WA	41	L	4	183	1	4			HAL
1996 11 11.36		M	13.1	WA	41	L	4	183	1	5			HAL
1996 12 02.26		M	12.9	WA	41	L	4	72	0.5	5/			HAL
1996 12 12.30		M	12.6	WA	41	L	4	72	1	4/			HAL
1996 12 29.16		M	12.0	WA	41	L	4	72	1	4			HAL

Comet 121P/Shoemaker-Holt 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 07.41		I	[14.0:		41	L	4	183					HAL
1996 12 22.53		I	[13.5:		41	L	4	183					HAL

Comet 126P/IRAS

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 30.12		S	11.9:	AC	41	L	4	72		3/			HAL
1996 10 07.21	!	S	12.4	AC	41	L	4	72	1	3/			HAL
1996 10 16.20	!	S	12.5	AC	41	L	4	72	1	2/			HAL
1996 10 31.16		S	12.6:	AC	41	L	4	72		2/			HAL
1996 11 04.16		S	12.5	AC	41	L	4	72					HAL
1996 11 11.19		S	12.6	AC	41	L	4	72		2/			HAL
1996 12 02.11		I	[13.5:		41	L	4	183					HAL

Comet 128P/Shoemaker-Holt 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 09.52		c	22.5	FA	91.4	L	5						SC001
1999 01 09.53		C	20.8	FA	91.4	L	5		0.08		51.6s	294	SC001
1999 01 11.52		c	22.0	FA	91.4	L	5						SC001
1999 01 11.55		C	20.3	FA	91.4	L	5		0.15		97.8s	291	SC001

Comet 130P/McNaught-Hughes

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 12.54		C	18.8	GA	60.0	Y	6	a240	0.2		0.6m	244	NAK01
1998 12 19.09		C	19.9	FA	91.4	L	5						SC001
1998 12 19.10		c	22.0	FA	91.4	L	5						SC001

Comet 133P/Elst-Pizarro

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 21.67		C	20.8:	GA	60.0	Y	6	a480		9			NAK01

Comet 136P/Mueller 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 15.42		C	18.8	GA	60.0	Y	6	a240	0.25				NAK01

Comet 138P/Shoemaker-Levy 7

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 15.77		C	19.8	GA	60.0	Y	6	a240	0.2				NAK01
1998 12 16.69		C	19.4	GA	60.0	Y	6	a240	0.25				NAK01

Comet 139P/Väisälä-Oterma

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 08.31		C	18.5	FA	91.4	L	5						SC001
1998 12 11.61		C	17.6	TJ	18.0	L	6	a 60	0.25				YOS04
1998 12 14.27		c	20.2	FA	91.4	L	5						SC001
1998 12 14.29		C	18.4	FA	91.4	L	5		0.13		1.2m	259	SC001
1998 12 17.53		C	18.1	GA	60.0	Y	6	a240	0.3				NAK01
1999 01 13.56		C	18.7	GA	60.0	Y	6	a240	0.3				NAK01
1999 01 14.19		c	21.5	FA	91.4	L	5						SC001
1999 01 14.20		C	19.2	FA	91.4	L	5		0.17		43.2s	263	SC001

Comet 140P/Bowell-Skiff

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 05.67		C	16.2	TJ	18.0	L	6	a180	0.45				YOS04
1999 01 12.72		C	16.1	TJ	16.0	L	3	a 60	0.7				YOS04
1999 01 13.59		C	16.3	GA	60.0	Y	6	a240	0.55				NAK01
1999 01 21.70		C	16.5	GA	60.0	Y	6	a240	0.4				NAK01

Comet P/1998 QP5 (LONEOS-Tucker)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 24.88		B	14.9	HS	42	L	5	162	0.4	4			LEH
1998 10 17.02		B	15.0	HS	42	L	5	162	0.8	4			LEH
1998 10 20.88		B	15.2	HS	42	L	5	162	0.5	4			LEH
1998 10 24.86		B	15.3	HS	42	L	5	162	0.5	4			LEH
1998 10 25.81		B	15.4	HS	42	L	5	162	0.4	5			LEH
1998 11 08.50		C	16.5	GA	60.0	Y	6	a120	0.4		0.8m	116	NAK01
1998 11 12.50		C	16.3	GA	60.0	Y	6	a240	0.55		0.9m	122	NAK01
1998 11 17.19		J	17.0	SC	25.4	T	5	a 60	0.34	d1			ROQ
1998 11 18.80		S	14.8	HS	44.0	L	5	226	0.3	4			HAS02
1998 11 23.51		C	16.9	GA	60.0	Y	6	a240	0.45		0.6m	113	NAK01
1998 12 12.46		C	16.5	TJ	18.0	L	6	a 60	0.4				YOS04
1998 12 14.14		C	17.7	FA	91.4	L	5		0.18		0.8m	95	SC001
1998 12 14.14		c	21.4	FA	91.4	L	5						SC001
1998 12 17.45		C	17.9	GA	60.0	Y	6	a240	0.35		0.8m	98	NAK01
1999 01 13.47		C	19.0	GA	60.0	Y	6	a240	0.25			65	NAK01
1999 01 21.43		C	19.4	GA	60.0	Y	6	a240	0.25				NAK01

Comet P/1998 S1 (LINEAR-Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 20.86		B	14.2	HS	42	L	5	162	1.2	4			LEH
1998 10 23.91		S	13.7	HS	35	L	5	207	0.7	4			HOR02
1998 10 24.88		B	14.4	HS	42	L	5	162	1.0	4			LEH
1998 10 25.86		B	14.1	HS	42	L	5	162	1.0	3/			LEH
1998 11 07.74		S	14.1	HS	35	L	5	207	0.9	2/			HOR02
1998 11 08.53		C	15.9	GA	60.0	Y	6	a120	0.45		0.5m	216	NAK01
1998 11 11.76		S	14.3	HS	35	L	5	237	0.5	2/			HOR02
1998 11 12.51		C	16.1	GA	60.0	Y	6	a120	0.4		0.6m	209	NAK01
1998 11 12.76		S	14.2	HS	35	L	5	207	0.6	3			HOR02
1998 11 12.81		B	13.9	HS	42	L	5	162	1.2	3			LEH
1998 11 18.81		S[	14.5	HS	44.0	L	5	226					HAS02
1998 11 19.85		B	14.1	HS	42	L	5	162	0.8	3/			LEH
1998 11 21.81		B	14.3	HS	42	L	5	162	0.6	4			LEH
1998 11 23.53		C	16.3	GA	60.0	Y	6	a120	0.45				NAK01
1998 12 09.76		B	14.5	HS	42	L	5	162	0.9	3/			LEH
1998 12 11.78		B	14.4	HS	42	L	5	162	0.8	4			LEH
1998 12 12.44		C	16.5	GA	60.0	Y	6	a120	0.5				NAK01
1998 12 12.46		C	14.9	TJ	18.0	L	6	a 60	0.5				YOS04
1998 12 14.15		c	19.5	FA	91.4	L	5						SC001

Comet P/1998 S1 (LINEAR-Mueller) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 14.16		C	16.4	FA	91.4	L	5		0.40		0.9m	224	SC001
1998 12 17.74		S	15.0	HS	44.0	L	5	226	0.1	5			HAS02
1998 12 18.77		B	14.9	HS	42	L	5	162	0.6	4			LEH
1999 01 13.46		C	16.5	GA	60.0	Y	6	a240	0.55				NAK01
1999 01 21.44		C	16.7	GA	60.0	Y	6	a120	0.6				NAK01

Comet P/1998 U2 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 08.53		C	17.1	GA	60.0	Y	6	a120	0.3		0.5m	134	NAK01
1998 11 11.85		O[	14.1	HS	35	L	5	237	! 0.6				HOR02
1998 11 12.52		C	16.8	GA	60.0	Y	6	a240	0.45				NAK01
1998 11 12.83		B	14.9	HS	42	L	5	162	0.5	4			LEH
1998 11 21.82		B[	15.1	HS	42	L	5	162	0.5				LEH
1998 11 23.54		C	17.4	GA	60.0	Y	6	a240	0.4		0.5m	122	NAK01
1998 12 12.49		C	17.1	TJ	18.0	L	6	a 60	0.45				YOS04
1998 12 17.47		C	18.1	GA	60.0	Y	6	a240	0.3				NAK01
1999 01 13.51		C	18.8	GA	60.0	Y	6	a240	0.25				NAK01
1999 01 21.45		C	19.4	GA	60.0	Y	6	a240	0.25				NAK01

Comet P/1998 U3 (Jäger)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 26.01		S	12.2	TI	13	L	8	69	1.7	2			HOR02
1998 10 26.97		S	12.3	GA	25.4	J	6	100	1.5	3/			BOU
1998 10 28.49		S	12.3	HS	25.6	L	5	42	1.2	3			BIV
1998 10 30.84		S	12.0	TI	35	L	5	92	1.5	2			HOR02
1998 11 07.69	I	C	11.6	HS	10.7	A	4	a 60	1.1		2.4m	288	YOS04
1998 11 07.69	S	R	11.5	HS	10.7	A	3	a 60	1.5		3.8m	297	YOS04
1998 11 07.79		S	11.7:	TI	35	L	5	92	2.3	2/			HOR02
1998 11 10.66		C	12.6	GA	60.0	Y	6	a120	1.5		6.9m	283	NAK01
1998 11 10.88		S	12.3	GA	25.4	J	6	100	1.3	2/			BOU
1998 11 10.92		S	12.4	HS	30	R	20	185	0.7	3			SHA02
1998 11 11.28		J	11.7	SC	25.4	T	5	a 60	0.43	s3	3.8m	275	ROQ
1998 11 11.80		S	11.2	TI	35	L	5	92	2.0	2			HOR02
1998 11 11.92		S	12.2	GA	25.4	J	6	100	1.4	3			BOU
1998 11 12.55		S	11.8	HS	25.4	T	6	116	1.0	3			YOS04
1998 11 12.82		M	11.3	TI	35	L	5	92	1.8	2/			HOR02
1998 11 12.85		M	11.2	HS	42	L	5	162	2.2	4			LEH
1998 11 12.90		S	11.7	AC	25.4	L	5	104	1.3	3			MEY
1998 11 13.08		S	12.3	VB	33	L	5	100	1.8	4			SHA02
1998 11 14.01		M	12.1	HS	44.5	L	4	230	1.1	d4			SAR02
1998 11 15.20		S	12.3	VB	20	R	14	140	1.0	4			SHA02
1998 11 15.55		S	11.6	HS	25.4	T	6	116	0.9	3			YOS04
1998 11 15.75		C	12.3	GA	60.0	Y	6	a120	1.9		> 6.8m	284	NAK01
1998 11 15.89		M	11.2	TI	13	L	8	69	2	3			HOR02
1998 11 16.10		S	11.7	AC	25.3	L	6	58	& 1.3	5			PER01
1998 11 17.10		S	11.9	AC	25.3	L	6	58	& 1.7	3/			PER01
1998 11 17.46		S	11.8	HS	25.6	L	5	42	2	3			BIV
1998 11 17.56		S	11.7	HS	20.3	T	10	147	1	4			YOS04
1998 11 18.85		S	12.7	HS	44.0	L	5	156	0.2	5			HAS02
1998 11 19.13		S	10.9	AC	25.3	L	6	58	& 1.6	5			PER01
1998 11 19.81		M	11.2	TI	42	L	5	81	2.0	3			LEH
1998 11 19.88		S	11.0	TI	13	L	8	69	2.1	2/			HOR02
1998 11 19.95		S	11.7	AC	30.5	L	5	72	1.5	4			GIL01
1998 11 19.96		M	11.8	GA	25.4	J	6	88	1.5	4/			BOU
1998 11 20.11		S	11.3	AC	25.3	L	6	58	& 1.5	4			PER01
1998 11 20.93		M	11.8	GA	25.4	J	6	88	1.5	4			BOU
1998 11 21.14		S	11.6	AC	25.3	L	6	58	& 1.9	3			PER01
1998 11 21.17		S	11.3	AC	30.5	T	10	117	3	4			COM
1998 11 21.41		S	11.9	HS	25.6	L	5	42	1.3	3	0.04	270	BIV
1998 11 21.57		S	11.5	HS	25.4	T	6	62	1.7	4			YOS04
1998 11 21.83		M	11.1	TI	42	L	5	81	2.1	3			LEH
1998 11 21.90		S	11.4	AC	25.4	L	5	104	1.4	3/			MEY
1998 11 22.54	x	S	11.6	HS	25.4	L	4	113	1.3	3			YOS02

Comet P/1998 U3 (Jäger) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 22.85		S	11.0	AC	25.0	L	6	61	2	2/			RES
1998 11 22.87		S	11.9	HS	20	L	5	70	1.6	2			BAR06
1998 11 22.92		S	12.5	VF	21.5	L	6	80	2	2			SCO04
1998 11 23.44		S	11.6	HS	25.6	L	5	42	2	3	0.05	280	BIV
1998 11 23.79		S	11.6	VN	41	L	4	200	1.4	2			PEA
1998 11 23.94		S	11.8	HS	20	L	5	70	1.8	3			BAR06
1998 11 24.24		S	11.4	AC	25.3	L	6	58	& 2	5			PER01
1998 11 24.81		E	13.2	VF	21.5	L	6	80	1.5	2			SCO04
1998 11 24.87		S	11.7	HS	20	L	5	70	2.0	3			BAR06
1998 11 24.89		M	11.1	TI	35	L	5	92	1.9	3			HOR02
1998 11 25.72		C	12.0	GA	60.0	Y	6	a120	2.0		> 6.8m	285	NAK01
1998 11 27.25		S	11.3	AC	25.3	L	6	58	& 1.9	4			PER01
1998 11 27.79		S	11.8	VN	41	L	4	200	1.0	3			PEA
1998 11 28.56		S	11.4	HS	25.6	L	5	42	2.3	3	0.1	280	BIV
1998 12 02.19		J	11.9	SC	25.4	T	5	a 60	1.08	s3	1.9m	260	ROQ
1998 12 07.72		S	11.6	HS	20	L	5	70	1.5	2			BAR06
1998 12 07.72		S	11.6	HS	20	L	5	70	1.5	2			BAR06
1998 12 07.79	x	S	11.3	TT	25.4	J	6	100	1.5	4			BOU
1998 12 08.80		S	10.9	AC	15.2	L	5	42	2	4			MOE
1998 12 09.80		M	10.6	TI	42	L	5	81	2.6	3			LEH
1998 12 09.80		S	10.5	TJ	25.4	T	6	62	2.4	3/			YOS04
1998 12 09.84		M	11.0	TT	35	L	5	92	1.7	3			HOR02
1998 12 10.80		S	11.0	AC	15.2	L	5	42	2	3			MOE
1998 12 10.91		M	10.8	TT	35	L	5	92	2.1	3			HOR02
1998 12 11.39		S	11.2	HS	25.6	L	5	42	2	3	0.05	280	BIV
1998 12 11.65	x	S	10.7	TJ	32.0	L	5	91	1.4	3/			NAG08
1998 12 11.79		S	10.8	AC	15.2	L	5	42	2	4			MOE
1998 12 11.83		M	10.6	TI	42	L	5	81	2.5	3			LEH
1998 12 11.85		S	10.5	AC	25.4	L	5	65	2.5	3/			MEY
1998 12 12.55	x	S	10.6	TJ	32.0	L	5	91	1.8	4			NAG08
1998 12 12.81		S	10.5	TJ	25.4	T	6	62	2.2	4			YOS04
1998 12 13.45		S	10.3	TJ	25.4	T	6	62	2.4	4			YOS04
1998 12 13.79		S	10.9	HS	15.0	B		25	2	4			MIT
1998 12 13.84		S	10.7	AC	15.2	L	5	42	2	3			MOE
1998 12 14.37		S	10.8	HS	25.6	L	5	42	2	4	0.05	280	BIV
1998 12 15.20		S	11.0	AC	25.3	L	6	58	& 1.1	5/			PER01
1998 12 15.65		S	11.0	TI	20	L	7	45	2	3			MAT08
1998 12 15.79		S	10.5	HS	20.3	T	10	64	1.6	4			KAR02
1998 12 16.17		S	11.0	TJ	25.3	L	6	58	& 2.0	4			PER01
1998 12 16.21	x	S	11.4	TT	25.4	J	6	88	1.5	4			BOU
1998 12 16.62		S	10.8	HS	25.6	L	5	42	2	3			BIV
1998 12 16.67		C	11.5	GA	60.0	Y	6	a120	2.1		> 6.7m	282	NAK01
1998 12 17.41		S	10.6	HS	25.6	L	5	42	2	5	0.10	290	BIV
1998 12 17.64	x	S	10.6	TJ	32.0	L	5	91	2.5	5			NAG08
1998 12 17.74		S	10.8	AC	15.2	L	5	42	2	4			MOE
1998 12 17.76		S	11.3	HS	44.0	L	5	156	0.2	4			HAS02
1998 12 17.77		M	10.7	TI	42	L	5	81	2.4	3			LEH
1998 12 17.80	x	S	10.9	TJ	25.4	L	5	65	2.1	s3			MEY
1998 12 17.84		M	10.8	TT	35	L	5	92	2.1	3/			HOR02
1998 12 17.85		S	10.8	AC	25.0	L	6	61	1.8	2/			RES
1998 12 17.85	x	S	11.2	TT	25.4	J	6	72	1.7	3/			BOU
1998 12 17.89		S	10.3	AA	15.0	R	8	75	3	8			DIE02
1998 12 18.13	!	J	10.6	SC	25.4	T	5	a 60	4.03	s3/	3.1m	269	ROQ
1998 12 18.29		M	10.6	NP	32	L	5	76	2.6	3			CRE01
1998 12 18.80		M	10.8	TI	42	L	5	81	2.5	3			LEH
1998 12 19.40		S	10.9	HS	25.6	L	5	42	2.5	5	0.08	290	BIV
1998 12 19.49	x	S	10.4	TJ	32.0	L	5	91	3.2	4/			NAG08
1998 12 19.55		M	11.0	HS	15.0	B		25	2.5	5			MIT
1998 12 20.19	x	S	11.2	TT	25.4	J	6	72	1.8	4			BOU
1998 12 20.34		S	10.6	HS	25.6	L	5	42	2	5			BIV
1998 12 20.50	x	S	11.2	HS	25.4	L	4	113	1.4	5			YOS02
1998 12 20.74		S	11.2	VN	20	L	4	45	2.4	3			PEA
1998 12 20.77		S	10.7	AC	15.2	L	5	42	2.5	3			MOE
1998 12 20.81		S	9.4	TJ	25.4	T	6	62	4	6			YOS04
1998 12 20.83		S	10.6	AC	25.0	L	6	61	1.9	3			RES

Comet P/1998 U3 (Jäger) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 21.19	x	M	11.1	TT	25.4	J	6	72	1.7	4/			BOU
1998 12 21.61		C	11.2	GA	60.0	Y	6	a120	2.6		> 6.8m	282	NAK01
1998 12 21.61		S	11.0	TI	20	L	7	45	2	2			MAT08
1998 12 21.72		S	10.8	AC	15.2	L	5	42	2.5	4			MOE
1998 12 21.72		S	11.1	VN	20	L	4	45	2.9	2			PEA
1998 12 21.83		M	10.6	TT	35	L	5	92	2.6	3/			HOR02
1998 12 21.88		M	10.6	TI	10	B	4	25	2.8	3			LEH
1998 12 21.95		S	11.3	HS	22.0	L	5	122	1.2	6			WAR01
1998 12 22.18		S	10.8	TJ	25.3	L	6	58	& 1.7	5			PER01
1998 12 22.82	x	M	11.0	TT	25.4	J	6	72	1.7	4/			BOU
1998 12 22.84		B	10.8	TJ	34	L	6	44	2.5				CHE03
1998 12 22.87		S	10.5	AC	25.0	L	6	61	2.1	3			RES
1998 12 23.73		S	11.2	VN	20	L	4	45	1.7	3/			PEA
1998 12 23.87	x	M	10.9	TJ	25.4	L	5	65	2.4	3/			MEY
1998 12 23.93		S	11.7	HS	20	L	5	70	1.7	2			BAR06
1998 12 24.51	x	S	10.3	TJ	32.0	L	5	58	2.2	5			NAG08
1998 12 24.78		S	10.8	AA	15.0	R	8	75	1.5	6			DIE02
1998 12 25.02		S	10.7	TJ	25.3	L	6	58	& 1.7	6			PER01
1998 12 26.05		S	10.7	TJ	25.3	L	6	58	& 1.7	5/			PER01
1998 12 26.21	x	M	10.9	TT	25.4	J	6	72	1.6	4/			BOU
1998 12 27.75		M	10.2	HS	15.0	B		25	2	5			MIT
1998 12 27.82		S	9.8	TJ	25.4	T	6	62	3	5			YOS04
1998 12 29.19	x	M	10.9	TT	25.4	J	6	72	1.9	5			BOU
1998 12 31.22	x	M	10.9	TT	25.4	J	6	72	2.1	4/			BOU
1999 01 05.75		S	10.8	HS	44.0	L	5	63	1.1	4			HAS02
1999 01 06.51		S	10.9	GA	25.4	L	4	71					SEA
1999 01 06.76		S	10.8	TT	44.0	L	5	63	0.7	4			HAS02
1999 01 06.81		S	11.1	AA	15.0	R	8	75	1	7			DIE02
1999 01 06.90		S	10.6	TJ	30.5	T	10	115	1.2	d5			KAM01
1999 01 07.72		S	10.6	AC	15.2	L	5	42	3	3			MOE
1999 01 08.11		J	10.9	SC	25.4	T	5	a 60	2.77	s6	3.8m	270	ROQ
1999 01 08.80		S	11.0	AA	15.0	R	8	75	1	6			DIE02
1999 01 08.93		M	10.3	TT	13	L	8	69	2.7	3/			HOR02
1999 01 09.44	x	M	10.4	TT	25.4	L	4	46	1.7	5			YOS02
1999 01 09.47	x	S	10.1	TJ	32.0	L	5	58	2.0	5/			NAG08
1999 01 09.56		S	10.6	GA	10.0	B		25					SEA
1999 01 09.76		S	11.0	AA	15.0	R	8	75	1	6			DIE02
1999 01 09.81	x	M	10.7	TT	25.4	J	6	58	2.3	3/			BOU
1999 01 09.86		S	10.9	AC	30.5	T	10	117	& 2	5			COM
1999 01 10.37		S	10.6	HS	25.6	L	5	42	2	4	0.09	290	BIV
1999 01 10.41	x	S	10.1	TJ	32.0	L	5	58	2.1	5			NAG08
1999 01 10.50		S	10.6	GA	10.0	B		25					SEA
1999 01 10.72		M	10.3	TT	35	L	5	92	2.7	3/			HOR02
1999 01 10.84	x	M	10.6	TT	25.4	J	6	58	2.4	3/			BOU
1999 01 11.92		S	10.8	AA	15.0	R	8	75	1	6			DIE02
1999 01 12.33		S	10.4	TJ	25.6	L	5	42	2	5	0.08	290	BIV
1999 01 12.58		S	10.8	TI	20	L	7	45	1.5	3			MAT08
1999 01 12.83		M	10.3	TT	35	L	5	92	2.8	4			HOR02
1999 01 14.32		S	10.5	TJ	25.6	L	5	42	2.5	3	0.13	285	BIV
1999 01 14.52		S	10.7	TI	20	L	7	45	2	3			MAT08
1999 01 14.54		S	10.4	GA	10.0	B		25					SEA
1999 01 14.80		S	10.6	AC	15.2	L	5	42	3	3			MOE
1999 01 14.85		M	10.3	TT	35	L	5	92	2.7	4			HOR02
1999 01 16.37		S	10.7	TJ	25.6	L	5	42	2	5			BIV
1999 01 16.63		S	11.3	VN	41	L	4	90	1.8	3/			PEA
1999 01 16.76		M	10.3	TT	35	L	5	92	2.9	4			HOR02
1999 01 17.35		S	10.8	TJ	25.6	L	5	42	3.5	4			BIV
1999 01 17.42	x	S	10.2	TJ	32.0	L	5	58	2.4	5			NAG08
1999 01 17.81		S	11.0	AC	12.5	R	5	42	3	4			GIL01
1999 01 17.90		M	10.5	TT	35	L	5	92	2.9	4			HOR02
1999 01 18.00	x	M	10.7	TT	25.4	J	6	72	2.2	4			BOU
1999 01 18.74		S	10.7	AC	15.2	L	5	42	2.5	4			MOE
1999 01 18.88		S	10.5	TT	20.3	T	10	51	1.0	4			HAS02
1999 01 18.91		M	10.2	TT	35	L	5	68	2.5	4			HOR02
1999 01 19.96		S	10.7	TJ	30.5	T	10	75	1.3	s5			KAM01

Comet P/1998 U3 (Jäger) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 20.96		S	10.6	TJ	30.5	T	10	75	1.3	d5			KAM01
1999 01 21.49		M	10.7	AC	15.0	B		25	2	3			MIT
1999 01 22.01		S	10.6	TJ	23.0	L		67	2	5/			DES01
1999 01 22.54		C	10.8	GA	60.0	Y	6	a120	3.3		> 6.8m	288	NAK01
1999 01 23.98		S	10.4	TJ	30.5	T	10	75	1.7	d5			KAM01
1999 01 24.22		S	10.2	HS	31	T	10	80	3.5	4			DEA
1999 01 24.43		S	10.5	TJ	25.6	L	5	42	3	4			BIV
1999 01 26.14	x	S	10.6	TT	25.4	J	6	72	2.5	3/			BOU
1999 01 27.57		S	10.9	HS	25.6	L	5	42	3	4			BIV

Comet P/1998 U4 (Spahr)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 10.61	a	C	17.3	GA	60.0	Y	6	a240	0.35		0.8m	296	NAK01
1998 11 12.61	a	C	17.3	GA	60.0	Y	6	a240	0.3		0.8m	301	NAK01
1998 11 15.71	a	C	17.3	GA	60.0	Y	6	a240	0.35		0.7m	302	NAK01
1998 11 18.30		J	16.1	SC	25.4	T	5	a 60	0.15	s3/	0.4m	332	ROQ
1998 11 23.60		C	17.5	GA	60.0	Y	6	a240	0.4		0.6m	305	NAK01
1998 12 17.58	a	C	17.5	GA	60.0	Y	6	a240	0.35			15	NAK01
1998 12 19.18		J	18.5	SC	25.4	T	5	a 60	0.23	s1			ROQ
1999 01 10.07	!	J	18.3	SC	25.4	T	5	a 60	0.3	s3			ROQ
1999 01 14.19		c	20.5	FA	91.4	L	5						SCO01
1999 01 14.21		C	17.9	FA	91.4	L	5		0.22		43.2s	350	SCO01
1999 01 21.47		C	17.8	GA	60.0	Y	6	a240	0.3		0.4m	55	NAK01

Comet P/1998 VS2 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 26.45	1	C[	17.2	TJ	18.0	L	6	a120					YOS04
1999 01 13.53		C	19.0	GA	60.0	Y	6	a240	0.3				NAK01
1999 01 16.46	1	C[	17.9	TJ	18.0	L	6	a120					YOS04

Comet P/1998 W1 (Spahr)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 20.25		J	15.8	SC	25.4	T	5	a 60	0.34	s3			ROQ
1998 11 20.64		C	15.8	GA	60.0	Y	6	a120	0.6				NAK01
1998 11 23.61		C	16.0	GA	60.0	Y	6	a120	0.45				NAK01
1998 11 24.67		C	14.9	TJ	12.0	L	6	a120	0.75				YOS04
1998 11 25.67		C	15.4	TJ	12.0	L	6	a120	0.45				YOS04
1998 11 28.65		C	15.6	TJ	18.0	L	6	a 60	0.4				YOS04
1998 12 09.81		B	14.4	HS	42	L	5	162	1.1	4			LEH
1998 12 09.87		S	13.9	HS	35	L	5	207	0.8	3			HOR02
1998 12 11.64		C	15.3	TJ	18.0	L	6	a 60	0.4				YOS04
1998 12 16.65		C	15.1	GA	60.0	Y	6	a120	0.9				NAK01
1998 12 18.83		B	14.1	HS	42	L	5	162	1.1	4/			LEH
1998 12 19.55		C	14.8	TJ	18.0	L	6	a 90	0.55				YOS04
1998 12 20.82		S	13.6	AC	25.0	L	6	121	0.6	2/			RES
1998 12 21.58		C	15.2	GA	60.0	Y	6	a120	0.8				NAK01
1998 12 21.93		S	13.9	HS	35	L	5	237	0.9	3			HOR02
1998 12 22.87		S	13.4	AC	25.0	L	6	100	0.8	3			RES
1998 12 26.47		C	15.5	TJ	18.0	L	6	a120	0.4				YOS04
1999 01 02.14		J	15.8	SC	25.4	T	5	a 40	0.29	s4			ROQ
1999 01 03.48		C	15.0	TJ	18.0	L	6	a 60	0.7				YOS04
1999 01 05.63		C	15.6	TJ	18.0	L	6	a 60	0.6				YOS04
1999 01 05.75		S	14.6	HS	44.0	L	5	226	0.3	3			HAS02
1999 01 10.46		C	15.4	TJ	18.0	L	6	a 60	0.55				YOS04
1999 01 10.64		S	14.2	VN	41	L	4	200	0.4	2			PEA
1999 01 10.76		S	14.2	HS	35	L	5	207	1.0	1/			HOR02
1999 01 10.83		S	13.8	GA	25.4	J	6	150	0.6	1			BOU
1999 01 12.81		S	14.2	HS	35	L	5	207	0.9	2/			HOR02
1999 01 13.57		C	15.3	GA	60.0	Y	6	a120	0.8				NAK01
1999 01 14.21		c	20.1	FA	91.4	L	5						SCO01
1999 01 14.22		C	15.8	FA	91.4	L	5		0.72				SCO01
1999 01 21.53		C	15.5	GA	60.0	Y	6	a120	0.8				NAK01

Comet P/1998 W2 (Hergenrother)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 23.13		C	18.2	FA	91.4	L	5		0.17		16.2s	69	SCO01
1998 11 23.14		c	21.0	FA	91.4	L	5						SCO01
1998 11 23.44		C	17.7	GA	60.0	Y	6	a240	0.3		0.6m	71	NAK01
1998 11 24.08		C	18.0	FA	91.4	L	5		0.15		40.8s	78	SCO01
1998 11 24.08		c	21.6	FA	91.4	L	5						SCO01
1998 12 19.07		C	18.2	FA	91.4	L	5		0.12		26.4s	77	SCO01
1998 12 19.07		c	21.6	FA	91.4	L	5						SCO01
1999 01 13.45		C	18.0	GA	60.0	Y	6	a240	0.3			60	NAK01

Comet P/1998 X1 (ODAS)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 20.84		C	17.9	TJ	18.0	L	6	a 60	0.35				YOS04
1998 12 21.74		C	18.7	GA	60.0	Y	6	a240	0.35				NAK01
1998 12 24.80		C	18.5	GA	60.0	Y	6	a240	0.3		0.9m	292	NAK01
1998 12 26.79		C	18.1	TJ	18.0	L	6	a120	0.25				YOS04
1999 01 21.76		C	18.5	GA	60.0	Y	6	a240	0.25		0.7m	306	NAK01
1999 01 22.77		C	18.2	TJ	18.0	L	6	a120	0.3				YOS04
1999 01 26.78		C	18.3	GA	60.0	Y	6	a240	0.3		0.7m	294	NAK01

Comet P/1998 Y1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 25.67		C	16.1	TJ	18.0	L	6	a 60	0.55				YOS04
1998 12 26.66		C	16.6	GA	60.0	Y	6	a240	0.5				NAK01
1998 12 26.66		C	16.7	TJ	18.0	L	6	a120	0.45				YOS04
1998 12 28.75		C	16.5	GA	60.0	Y	6	a240	0.6				NAK01
1998 12 29.19	!	J	16.6	SC	25.4	T	5	a 60	0.25	s3			ROQ
1999 01 05.67	1	C[	17.6	TJ	18.0	L	6	a180					YOS04
1999 01 10.51		C	17.3	TJ	18.0	L	6	a240	0.3				YOS04
1999 01 21.56		C	17.8	GA	60.0	Y	6	a120	0.3				NAK01

Comet P/1998 Y2 (Li)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 03.45		C	16.0	TJ	18.0	L	6	a 60	0.4				YOS04
1999 01 06.75		S[	14.5	HS	44.0	L	5	156					HAS02
1999 01 10.47		C	16.2	TJ	18.0	L	6	a 60	0.45				YOS04
1999 01 10.79		S	14.4	HS	35	L	5	207	0.7	3/			HOR02
1999 01 12.78		S	14.4:	HS	35	L	5	207	0.7	3			HOR02
1999 01 13.51		C	16.0	GA	60.0	Y	6	a120	0.55				NAK01
1999 01 14.12		J	16.3	SC	25.4	T	5	a 60	0.27	s5			ROQ
1999 01 21.46		C	16.3	GA	60.0	Y	6	a120	0.45			125	NAK01

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Book Review

Solar System Astronomy in America: Communities, Patronage, and Interdisciplinary Research, 1920-1960, by Ronald E. Doel (Cambridge University Press), 280 + xxii pages; $59.95 hardbound, 1996 [ISBN 0-521-41573-X].

This scholarly book covers a period that represented a relative lull in solar-system studies in the United States; the entire history of astronomy up to and including the 19th century had included the moon and sun, the planets and their satellites, and comets and meteors as a very major and even predominant part of the field of astronomy, but the new astrophysics of the late-19th century and early-20th century had caused planetary and cometary studies to subside considerably. This book, then, concentrates on only about a dozen or so astronomers who worked extensively on solar-system astronomy in the period 1920-1960.

Though Doel writes on the study of planets and their formation, the moon, and meteors and meteorites, I shall concentrate this review on that section of the book in Chapter 4 (covering the years 1950-1955) that discusses the origin of comets — for which Gerard P. Kuiper, Fred L. Whipple, and Jan H. Oort are highlighted. Oort came out with extensive papers on a "cloud" of comets out to 50,000 AU from the sun at about the same time (1949-1950) that Whipple published his dirty-snowball models. This was to inaugurate the modern era of comet research. But Kuiper is perceived today

as having much to do with cosmogony studies, including that pertaining to the origins of comets. People frequently refer to the hundred-or-so trans-Neptunian objects (all but Pluto having been discovered in this present decade) as being "Kuiper-belt" objects — but is this really appropriate?

Of course, readers are likely to be now aware that K. E. Edgeworth preceded Kuiper by almost a full decade, with a paper in the *Journal of the British Astronomical Association* (**53**, 186), in speculating on a region of comets beyond Neptune: "It may be inferred that the outer region of the solar system, beyond the orbits of the planets, is occupied by a very large number of comparatively small bodies." Edgeworth (1949, *MNRAS* **109**, 600) gradually developed his thoughts on solar-system formation into a *Monthly Notices* paper (submitted in early June 1949 and published immediately), which included the following prominently in its abstract: "In the region outside the orbit of Neptune the [residue of] material [from the condensing solar nebula] would also be highly attenuated, and here again condensations would be small and numerous, but the progress of evolution was slower, and the region is probably populated by a very large number of small clusters. Wandering clusters make their appearance from time to time as comets." (Note that this was just prior to Fred Whipple's publication of his "dirty snowball" theory for cometary nuclei, and the loose "sandbank" model was still widely held among astronomers.) Later (page 609), Edgeworth remarked that "it is not unreasonable to suppose that this outer region [beyond Neptune] . . . is in fact a vast reservoir of potential comets." Meanwhile, though Edgeworth had published over seven years in highly-visible astronomical publications on the possibility of innumerable comets being located currently in a region just beyond Neptune, Kuiper's first published words on such a possibility did not appear until 1950-1951, and fleeting reference to Edgeworth did not appear in Kuiper's writings until 1953 (when he referred to the 1949 paper, briefly dismissing it as resembling a paper by Schmidt in 1944).

I add this information here because Doel does not mention Edgeworth at all in his book, and this would seem to be somewhat of a glaring omission in properly placing the context of these astronomical developments in the history of American planetary science (especially since Doel discusses the impact of Oort in depth). After all, astronomers in one country did not work in isolation from the work done elsewhere; the *Monthly Notices* of the Royal Astronomical Society would have to rank in the world's top three or four of the most widely-read professional astronomical journals in 1950, and it is odd to think that Kuiper would not have been aware of what had been published in the *Monthly Notices* (or even the *Journal* of the B.A.A.). In fact, it seems odd that Kuiper seemed to take great pains to state that he wrote his chapter for J. A. Hynek's 1951 *Astrophysics: A Topical Symposium* in November 1949, as if the timing were highly important;[1] and sure enough, Kuiper has references in his Hynek chapter to (and discussion of) papers published in 1950 by Oort and Whipple, so he evidently had time to change his contribution for Hynek's book considerably in 1950 — and there was opportunity to cite Edgeworth, though we may never know if Kuiper's failure to do so was part of a habitual pattern of improper or even unethical work, as portrayed by Doel in his controversy with Urey, or due to an amazing ignorance of Edgeworth's two papers. Indeed, Doel begins his book with the very public controversy that occurred between Kuiper and Harold C. Urey in the 1950s, in which Doel notes that Urey was "furious with Kuiper for what [Urey] regarded — not without justification — as a pattern of misleading citations to [Urey's] work". According to Doel (p. 142), "Urey seriously considered leveling a charge of plagiarism against Kuiper", and Urey complained to a third party that "Kuiper in his writings minimizes the work of other people in the field by referring to minor things they do with pinpointed references, and then includes their important work at other places without references, so that the reader infers it is his own work" (p. 144).

Much of the widespread reference to a "Kuiper belt" by astronomers in recent years has been by those who probably have not read all the literature by Edgeworth, Kuiper, Fred Whipple, Al Cameron, and others during the 1940s, 1950s, and 1960s on the matter of comets or planetesimals in a region beyond Neptune.[2] This is most unfortunate, because Kuiper does not appear to be the astronomer who most deserves to have his name associated with these trans-Neptunian objects, for which several distinct dynamical groups already appear to be evident (meaning that any single term may be inappropriate for all of the TNOs). Kuiper mainly spoke of this region as being a region of comet formation and existence early in the solar system, whereas the other three authors all specifically spoke of such a belt as *currently* being likely to still include a great many comets.[3] Kuiper did briefly speculate on the possibility of "one or more small planets, like Ceres" beyond $r = 38$ AU, and on "remnants" of a circular ring of comets being probably still left beyond $r = 50$ AU, but he thought that Pluto would have swept away objects that we now have found with semi-major axes 30-40 AU.[4]

In reality, on-going studies by numerous individuals gradually gave way to this picture — not the least of which was early thinking on the formation of the outer solar system by Whipple (1948, *Scientific American* **178**, 34) — and a picture of intermingled ideas on the part of numerous players is the only appropriate way to look at the development of

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[1] Kuiper 1951, *Proc. Nat. Acad. Sci. U.S.A.* **37**, 14 (f.n. 5); Kuiper 1956, *JRASC* **50**, 115.

[2] I suspect that a major reason for this problem originates with Julio Fernández' highly-cited 1980 paper (*MNRAS* **192**, 481), in which Kuiper is given credit for "[pointing] out that such a belt would be the remnant of the outermost parts of the solar nebula". It appears that Fernández did not look very deeply into the literature on this matter. However, Fernández also deserves much of the credit for developing detailed studies in the 1980s for looking at how comets may have formed in the regions outward from Uranus, thereby re-focusing attention on the matter.

[3] In addition to Edgeworth's two papers cited above, see A. G. W. Cameron 1962, *Icarus* **1**, 67, and 1962, *Sky Tel.* **23**, 244; and F. L. Whipple 1964, *Proc. Nat. Acad. Sci.* **51**, 711 and **52**, 583. In 1972 [in *The Motion, Evolution of Orbits, and Origin of Comets*, ed. by G. A. Chebotarev *et al.* (Dordrecht: D. Reidel), p. 407], Whipple reminded astronomers that "because we still do not know whether such a comet belt exists, I hope that you will keep its possibility in mind". Even late in his life, Kuiper (1974, *Cel. Mech.* **9**, 324 and 346) did not seem to advocate the need for a current belt of objects, rather discussing such a region as a source for the original construction of comets.

[4] in *Astrophysics: A Topical Symposium*, ed. by J. A. Hynek (New York: McGraw-Hill), pp. 400-401. Also Kuiper 1951, *Proc. Nat. Acad. Sci.* **37**, 13. Even several years later, Kuiper (1956, *JRASC* **50**, 116) still spoke of a trans-Neptunian region of comets chiefly in terms of early-solar-system history.

the trans-Neptunian comet-disk theme. Whipple himself, in writing about the developments of models for a comet belt beyond Neptune in our 1985 book *The Mystery of Comets*, does not mention Kuiper at all (and says that the idea of a comet belt was a natural assumption to fall out of the work of Öpik, Oort, and the work of other contemporaries on comets including himself).

Yet Kuiper certainly did have some interesting ideas on comet formation, not really discussed by Doel; for example, he spoke of comets being formed in the primordial solar nebula throughout the heliocentric distances of the four giant jovian planets, the differing distances giving rise "to different genetic groups: solar-nebula comets, Neptune comets, Uranus comets, etc.", as Kuiper stated in a 1953 paper, involving varying "processes and time scales relevant to the shedding of these bodies [such that] some differences in composition are likely to exist between these groups [of comets], particularly in the carbon content",[5] though Urey's influence (via theoretical chemical models) may have been a factor here, too. I was interested to read of Doel's account regarding how Kuiper tried to visually determine the diameter of Pluto with the Palomar 200-inch reflector to see if its mass was large enough to sweep out a broad region of comets between $r = 30$ and 38 AU.

I was disappointed to see some significant typographical errors in Doel's book. For example, on page 126, he says that the Perseid meteor stream is associated with Halley's comet, and he attributes a 1950 *Sky and Telescope* article on "Pluto's Diameter" to Kuiper (page 258), when in fact it was an anonymous article evidently written by the magazine's staff (and the proper reference is to *Sky Tel.* **9**, 290, *not* **10**, 50).

But overall, *Solar System Astronomy in America* is an interesting read and shows a great deal of research by the author into original manuscripts and letters as well as published papers. — *D. W. E. Green*

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DESIGNATIONS OF RECENT COMETS

Listed below, for handy reference, are the last 20 comets to have been given designations in the new system. The name, preceded by a star (⋆) if the comet was a new discovery (compared to a recovery from predictions of a previously-known short-period comet) or a # if a re-discovery of a lost comet. Also given are such values as the orbital period (in years) for periodic comets, date of perihelion, T (month/date/year), and the perihelion distance (q, in AU). Four-digit numbers in the last column indicate the *IAU Circular* (4-digit number) containing the discovery/recovery or permanent-number announcement.

Not included below are numerous recently-discovered comets observed only with the ESA/NASA Solar and Heliospheric Observatory (SOHO) spacecraft — and seen only close to the sun with the SOHO instruments — that are presumed to be Kreutz sungrazers that are no longer in existence (see lists and references in October 1997 *ICQ*, p. 286, and July 1998 *ICQ*, p. 160). [This list updates that in the October 1998 issue, p. 227.]

	New-Style Designation	*P*	*T*	*q*	*IAUC*
⋆	C/1998 P1 (Williams)		10/17/98	1.15	6986
⋆	C/1998 Q1 (LINEAR)		6/29/98	1.58	6995
⋆	P/1998 QP_{54} (LONEOS-Tucker)	8.6	10/6/98	1.88	7012
⋆	P/1998 S1 (LINEAR-Mueller)	9.1	11/2/98	2.55	7031
⋆	C/1998 T1 (LINEAR)		6/25/99	1.47	7026
⋆	C/1998 U1 (LINEAR)		5/2/98	4.0	7033
⋆	P/1998 U2 (Mueller)	8.7	10/20/98	2.02	7035
⋆	P/1998 U3 (Jäger)	14.9	3/10/99	2.13	7038
⋆	P/1998 U4 (Spahr)	13.2	2/27/99	3.84	7042
⋆	C/1998 U5 (LINEAR)		12/21/98	1.24	7044
⋆	P/1998 VS_{24} (LINEAR)	9.6	11/2/98	3.41	7071
⋆	P/1998 W1 (Spahr)	6.6	1/17/99	1.73	7052
⋆	P/1998 W2 (Hergenrother)	7.0	12/5/98	1.42	7057
⋆	C/1998 W3 (LINEAR)		10/6/98	4.9	7063
#	139P/1998 WG_{22} (Väisälä-Oterma)	9.5	9/27/98	3.4	7064
⋆	P/1998 X1 (ODAS)	6.8	7/20/98	1.98	7067
#	140P/1998 X2 (Bowell-Skiff)	16.2	5/14/99	1.97	7076
⋆	P/1998 Y1 (LINEAR)	108	11/21/98	1.75	7072
⋆	P/1998 Y2 (Li)	15.1	12/17/98	2.52	7075
⋆	C/1999 A1 (Tilbrook)		1/29/99	0.73	7084

[5] G. P. Kuiper 1953, *Proc. Nat. Acad. Sci.* **39**, 1156.