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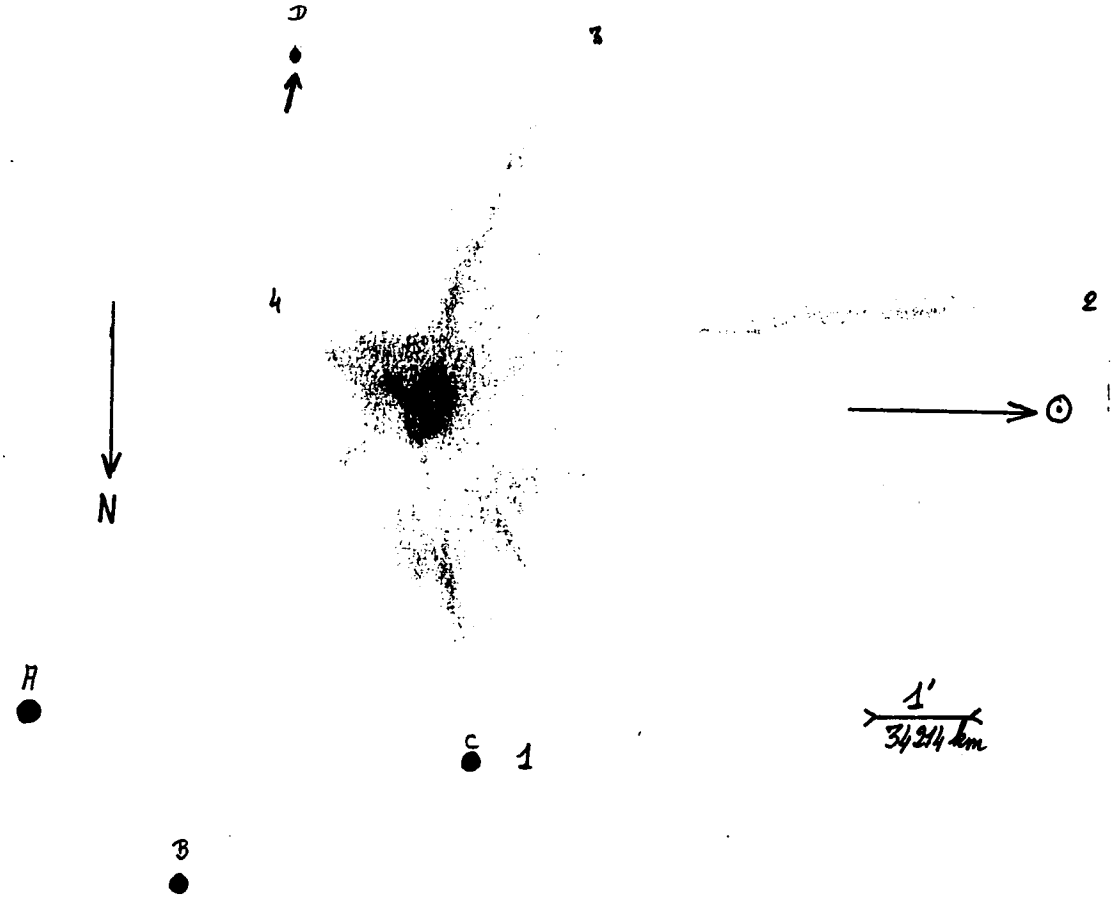

Drawing of Periodic Comet Hartley 2 (1991t) by Stéphane Garro of Orcières-Merlette, France, made on 1991 Aug. 22.14 UT using a 20.3-cm *f*/10 reflector (T) at 167×.

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

The regular (invoiced) subscription rate is US$24.00 per year (price includes the annual *Comet Handbook*; the price without the *Handbook* is US$16.00 per year). Subscribers who do not wish to be billed may subscribe at the special rate of US$20.00 per year (rate is $12.00 without *Handbook*). [The last set of digits (after the hyphen) on the top line of the mailing address label gives the Whole Number that signifies the last *ICQ* issue which will be sent under the current subscription status.] Make checks or money orders payable in U.S. funds (and drawn on a U.S. bank) to *International Comet Quarterly* and send to Daniel Green; Smithsonian Astrophysical Observatory; 60 Garden St.; Cambridge, MA 02138, U.S.A. [Group subscription rates available upon request.] Back issues are $4.00 each — *except* for "current" *Comet Handbooks*, which are available for $10.00 ($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 *ICQ* Editor at the above address.

Manuscripts will be reviewed for possible publication (if possible, send via computer networks; or, send typed, double-spaced copy to the Editor at the Cambridge address above); authors should first obtain a copy of "Information and Guidelines for Authors" from the Editor. Cometary observations also 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 manuscripts and observational data in machine-readable form are encouraged to do so [especially through e-mail via the computer networks *BITNET* (GREEN@CFA) or *SPAN* (CFAPS2::GREEN), or via floppy disks that can be read on an IBM PC], and should contact the Editor for further information.

Among the Observation Coordinators (OCs) listed below, those with postal addresses have e-mail contacts with the *ICQ* Editor (or regularly send data to the Editor on IBM PC-compatible floppy disks); 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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International Workshop on Periodic Comets

Julio A. Fernandez sends the following communication: "An International Workshop on Periodic Comets took place in Montevideo, Uruguay, during August 5-7. There were 21 participants coming from different countries. This relatively small number allowed an ample discussion on different topics related to the physics and dynamics of periodic comets that included two round tables. Among the problems that deserved special attention: the dynamical origin of the short-period comet family (Oort cloud vs. Kuiper belt), sizes and masses of comet nuclei and their aging processes, the action of nongravitational forces, dust particles in the coma and tail, and the population size and discovery rate of periodic comets. For information regarding the published *Proceedings* of the Workshop, please contact: J. A. Fernandez, Dept. Astronomia, Facultad de Ciencias, Tristan Narvaja 1674, Montevideo 11200, Uruguay; e-mail ASTRONOM@FISICA.EDU.UY."

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IAU Circulars

The *Circulars* of the International Astronomical Union (*IAUCs*) are an important source for information concerning recoveries and new discoveries of comets. Some 200-300 of these postcard-size *Circulars* are mailed each year, and they are also available in machine-readable form via e-mail and by connecting to a "computer service". The monthly rate for the printed *IAUCs* is currently $10.00 at the special, uninvoiced rate; the monthly cost for the computer service (which includes the printed *IAUCs*) is $22.50. Contact the *ICQ* Editor for more information.

PERIODIC COMETS FOR THE VISUAL OBSERVER IN 1992

Alan Hale
Department of Astronomy, New Mexico State University

There is a possibility that the long-awaited Periodic Comet Swift-Tuttle (1862 III) will return in 1992; if so, one can expect a comet close to naked-eye brightness near the end of the year. Otherwise, 1992 is a rather bleak year for short-period comets, with little to interest the visual observer.

P/Swift-Tuttle

This famous comet was discovered in 1862 independently by the American comet hunters Lewis Swift and Horace Tuttle; in August of that year it reached 2nd magnitude and displayed a tail 25° to 30° long. Positions obtained then indicated the comet was traveling in an elliptical orbit with a period of ~ 120 years. Schiaparelli later showed that the comet travels in the same orbit as the Perseid meteor stream; the comet is now regarded as the parent object of the Perseids.

The computed period of 120 years suggested a return in the early 1980s, and while several predictions were published and several intense searches were made at that time, the comet was not recovered. An attempt by Marsden (1973) to identify a previous return of P/Swift-Tuttle revealed one semi-promising candidate: comet 1737 II, observed by the Jesuit missionary Kegler in China. Marsden was able to force a linkage between the two comets, but only by assuming unusually large non-gravitational forces; furthermore, the linkage required an orbital period close to 130 years, rather than 120. Under the assumption that the two comets are indeed the same object, Marsden predicted a perihelion date of 1992 November 25 (q = 0.96 AU). Although this prediction has never been regarded as especially promising, recent reports which indicate the Perseids exhibited a very strong but brief display in 1991 (*IAUC* 5330, 5340, 5342, 5345) suggest that the comet may indeed return in 1992.

Assuming that P/Swift-Tuttle does return and that the late November perihelion date is approximately correct, the comet is well placed during the first few months of 1992 near $\delta \sim +50°$, although probably too faint then for visual observations. After conjuction some 35° north of the sun in late July, the comet enters the morning sky and may become visually observable at $m_1 \sim$ 10-12 by about mid-August. After reaching a maximum northern declination near +61° in late September, the comet travels rapidly southward and brightens; by perihelion it is some 45° west of the sun in the morning sky. It disappears into the solar glare by about the end of the year, reappearing into southern circumpolar skies by about February 1993. Any brightness predictions are necessarily uncertain, but if the comet behaves similarly to its 1862 return a peak brightness near $m_1 \sim$ 4-4.5 may be achieved in early-mid November.

If the comet's perihelion date is earlier than November 25, the return is more favorable; a perihelion passage in late July (which, however, is outside the nominal uncertainty of ± 2 months) would bring the comet very close to the earth about August 12 (unfortunately, near full moon in 1992). A later perihelion date means a less favorable return; if perihelion were to occur in January or February 1993 the comet would remain close to the sun throughout the period of maximum brightness (although it should still be observable); in that case the peak brightness will probably not exceed $m_1 \sim$ 5-6.

Other comets

P/Schwassmann-Wachmann 1 is at opposition in November 1991 and should be accessible for the first three or four months of 1992 before entering the solar glare. It is accessible again later in the year, with opposition occuring in mid-December. The comet is conveniently placed for observers in the northern hemisphere during both viewing seasons, being near $\delta \sim +30°$. Visual observers should continue to monitor the comet for outbursts; one such outburst, to $m_1 \sim$ 12, occurred in August 1991.

P/Wirtanen (1991s) and P/Hartley 2 (1991t), both at perihelion in September 1991, may still be accessible to visual observers in early 1992, but both comets will probably be faint ($m_1 \sim$ 12-13) and quite diffuse. They will both probably fade beyond visual range by the end of January.

P/Faye (1991n), at perihelion on 1991 November 16 (q = 1.59 AU) and near 11th magnitude at this writing, may still be as bright as $m_1 \sim$ 11-12 at the beginning of 1992. Visual observations should be possible until perhaps February or March, before the comet finally fades beyond visual range.

P/Shoemaker 1 (1991p) is at perihelion on 1991 December 18 (q = 1.99 AU) and should be near a peak brightness of $m_1 \sim$ 12-13 at that time, the comet then being some 60° from the sun in the evening sky. The brightness should be similar in early 1992, but the comet will begin entering the solar glare by about early February.

P/Chernykh (1991o)

This comet, making its first predicted return, is at perihelion on 1992 January 25 (q = 2.36 AU). Although the comet exhibited a peak brightness of $m_1 \sim$ 12.5 in late 1977 prior to its perihelion passage in early 1978 — a return very similar geometrically to the present one — it has to this writing remained rather elusive visually, with only suspected observations being obtained with large visual instruments. This, combined with recent reports of the comet's having split (see "Recent News and Research Concerning Comets" elsewhere in this issue), make brightness predictions for the remainder of the return problematical. *(Continued on next page...)*

The comet is at opposition in mid-September 1991 and is accessible in the evening sky until about March 1992; it is to be hoped that a peak brightness near $m_1 \sim$ 12-13 may still be achieved around perihelion passage.

P/Grigg-Skjellerup

This comet will be encountered by the Giotto spacecraft on 1992 July 10. Although most of Giotto's instruments are still functioning normally, the Multi-Color Camera is not, thus no imaging will be obtained from this encounter. The comet itself is at perihelion on July 22, at $q = 0.99$ AU, and unfortunately this return is not very favorable, with the elongation remaining between 45° and 50° (in the evening sky) for several months on either side of perihelion passage. A brightness analysis by Green (1991) from observations of the comet at its 1982 and 1987 returns predicts a peak brightness near 13th magnitude occurring in mid-July. The comet's declination is some 15° south of the sun's at that time, so any visual observations will probably be limited to observers in the southern hemisphere.

P/Giclas

P/Giclas is predicted to pass perihelion on 1992 September 13, at $q = 1.85$ AU; this return is quite favorable, with opposition occurring in late November. The comet reached 13th magnitude during its previous return in 1985, which was similar to that of 1992; thus, a peak brightness near $m_1 \sim 13.5$ may be expected about September-October.

P/Ciffreo

This comet will be making its first predicted return; perihelion passage is predicted to occur on 1993 January 22, at $q = 1.71$ AU. It is at opposition in mid-September 1992 and is conveniently placed in the evening sky for the last few months of the year; the comet should reach a peak brightness of $m_1 \sim 13$ about the end of 1992.

P/Schaumasse

P/Schaumasse makes a very favorable return in 1993; perihelion passage is expected on March 4, at $q = 1.20$ AU. The comet may become visually observable, at $m_1 \sim$ 12-13, as early as October 1992, brightening to $\sim$ 11th magnitude when at opposition in late November, then to $\sim$ 9th magnitude by the end of the year. After passing just over 0.5 AU from the earth in late January 1993, the comet should reach a peak brightness of $m_1 \sim$ 7-8 around perihelion.

The following comets are not among those which might normally be included in a list of candidates for visual observation, but experienced observers with large telescopes might wish to give them a try.

P/Kowal 2 remains unrecovered as of this writing. The predicted perihelion date is 1991 December 28, at $q = 1.50$ AU, but because the comet has not been well observed in the past — being missed at the previous return in 1985, in fact — this prediction is rather uncertain. Assuming that this perihelion date is approximately correct, the comet is conveniently placed for observation in late 1991 and early 1992. The photographic brightness at the comet's discovery apparition in 1979, which was very similar in quality to the present one, was estimated at $m_1 \sim$ 16-17.

The 'annual comet' P/Smirnova-Chernykh passes perihelion on 1992 August 5, at $q = 3.57$ AU. It is at opposition in early February. This return is very similar to the comet's discovery return in 1975 — the respective perihelion dates being less than a day apart — and the brightness was photographically estimated at $m_1 \sim 15$ at discovery, which occurred in March of that year. There do not seem to have been any visual observations attempted at the comet's intervening return in 1984.

P/Wolf is at perihelion on 1992 August 28, at $q = 2.43$ AU; this return is quite favorable, with opposition occurring in mid-October. The comet always remains quite distant, and there do not seem to have been any visual observations attempted for several returns.

The past several returns of P/Daniel have been quite unfavorable, and that of 1992 is only slightly better: at perihelion (September 1, at $q = 1.65$ AU) the comet will be some 50° from the sun in the morning sky. Despite the rather poor observing circumstances, observation attempts should be encouraged, since this is the only return within a several decade span in which visual observations are even possible; perturbations at the next aphelion will increase the comet's perihelion distance by 0.5 AU and will place the next subsequent perihelion passages at the same time of year as the past several previous ones.

P/Schuster was discovered in 1977 and was missed in 1985 due to poor placement, but returns under moderately favorable circumstances in 1992 and should be recovered. Perihelion passage is predicted for September 6, at $q = 1.54$ AU. The comet is rather well placed for observation during the latter part of 1992, with opposition occurring in mid-January 1993. At the discovery return, which was similar in quality to the present one, the peak photographic brightness was estimated at $m_1 \sim$ 15-16.

The following asteroids which are noteworthy in the context of cometary-asteroidal relationships are candidates for visual observation in 1992. A discussion of these and similar objects is given in the review by Weissman *et al.* (1989).

(944) Hidalgo was widely observed at its opposition in late 1990 enroute to its perihelion passage in April 1991. It is at opposition again in late March 1992, but probably won't be any brighter than 16th magnitude.

(3552) Don Quixote was discovered in 1983; this object makes its first predicted perihelion passage on 1992 April 10, at $q = 1.21$ AU. It is not well placed at that time, being only 40° from the sun in the morning sky and probably no brighter than $m_v \sim 15.5$; since its declination is south of the sun's, any observation attempts will have to be made from the southern hemisphere. Later in the year the object moves north and becomes conveniently placed, passing opposition in November; by that time, however, it will have faded to 17th magnitude.

(Continued on next page...)

(2060) Chiron continues to display increasing signs of cometary activity; most interesting has been the reported detection of CN emission in spectra taken in early 1990 (Bus *et al.* 1991). It is at opposition in late January 1992 and is accessible for the next several months; it is again accessible late in the year, enroute to its next opposition in February 1993. Although not normally expected to be any brighter than $m_v \sim 15.5$, visual observation attempts should be worthwhile, especially since the object seems to be experiencing occasional outbursts, similar to (although significantly smaller than) those of P/Schwassmann-Wachmann 1. Chiron will pass perihelion in February 1996, at $q = 8.47$ AU.

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RECENT NEWS AND RESEARCH CONCERNING COMETS

Since I wrote the July column, there have been 8 new comet discoveries, three by Robert Houston McNaught at Siding Spring (Australia), one by Tom Gehrels at Kitt Peak (U.S.A.), and four by Carolyn S. Shoemaker at Palomar (U.S.A.). The new discovery by Gehrels, 1991x, is a short-period comet and has been named P/Spacewatch (after the CCD scanning telescope that was used to find the comet); it is exceedingly faint (mag 20-21 upon discovery in early September).

P/Arend and P/Tsuchinshan 1 were recovered as comets 1991u and 1991c_1, respectively, by T. Seki at Geisei, Japan.

McNaught found all of his new comets on U.K. Schmidt Telescope plates taken in August and September by K. S. Russell and S. M. Hughes. Both comets McNaught-Russell (1991v and 1991w) have large perihelion distances, with comet 1991w registering at a remarkable $q = 7.0$ AU. McNaught's third find, 1991y, has an orbital period of 6.7 years and has been named P/McNaught-Hughes.

The record for comet names and discoveries

During October and November, Carolyn Shoemaker discovered her four new comets on films taken at the Palomar 18-inch Schmidt telescope by herself, Eugene M. Shoemaker, and David H. Levy. This means that there are now 26 comets with the name Shoemaker, which ties the all-time record held by the French observer Jean Louis Pons (1761-1831), as listed in Brian G. Marsden's *Catalogue of Cometary Orbits* (*CCO*). But it is known that Pons discovered more than 26 comets; if so, what is *the* record for most discoveries?

The *CCO* lists 22 long-period comets with Pons' name alone, plus 1 long-period comet where he shares the name, for a total of 23 long-period comets. Also, there are 3 short-period comets named for Pons, for the grand total of 26, all found in the period 1801-1827. In addition, he discovered 4 more short-period comets that aren't named for him: P/Encke (twice), P/Biela, P/Grigg-Skjellerup, and P/Crommelin. Outside of the *CCO*, Vsekhsvyatskii infers (in his *Physical Characteristics of Comets*) that Pons independently discovered the following additional comets: Great Comet of 1807; Great Comet 1811 I; P/Blanpain 1819 IV; Gambart 1822 I; Scheithauer 1824 II; and possibly the Great Comet of 1823. So Vsekhsvyatskii's gives 5 (and possibly 6) additional comets, for a grand total of 36 discoveries of 35 comets (and possibly 37 discoveries of 36 comets).

In reality and in all due fairness, however, Carolyn Shoemaker has independently discovered many more comets in the past decade than 26, but these were found to be already-known comets (sometimes newly-discovered comets that had *just* been announced, unknown to the Shoemakers). This fact offsets Pons' additional independent finds, though many of these "uncredited" discoveries by Pons probably shouldn't be named for him, anyway, as noted below.

Concerning P/Encke, it had been previously discovered (prior to Pons' first discovery of it in 1805) by Méchain in 1786 and by Caroline Herschel in 1795. Also, P/Biela was first discovered by Montagne in 1772, decades before Pons' discovery of it. Pons' discovery of P/Grigg-Skjellerup was never confirmed at the time, and has only been confirmed in the last few years due to extensive orbital computations. Pons discovered the Great Comet of 1807 nearly two weeks after it was first observed in Sicily, and he discovered the Great Comet 1811 I more than two weeks after it was first observed by Flaugergues. Pons discovered P/Blanpain a full week after Blanpain did. Pons discovered comet Gambart 1822 I only two days after Gambart did, and Scheithauer 1824 I only one day after Scheithauer did. Had today's computational and communication technology been available, with all other things remaining the same, Pons might arguably have his name attached to P/Grigg-Skjellerup and Scheithauer 1824 I, and possibly P/Biela, P/Crommelin (which was poorly observed by Pons; no orbit was available until Coggia and Winnecke re-discovered it many years later), and Gambart 1822 I — thus 2, and possibly 5, additional comets (Great Comet of 1823 not considered here). Here I have only included comets with orbits; F. Baldet lists several more comets that Pons claimed to have discovered, but which evidently were never confirmed by other observers.

So if there's a realistic total number to shoot for, in terms of record number of comet discoveries by Pons, it should perhaps be 30. Anyway, here's the most recent list of comet names, listed by observers with 10 or more (asterisks indicating they are still actively observing): Shoemaker, 26*; Pons, 26; Brooks, 21; Levy, 16*; Barnard, 16; Bradfield, 14*; Swift, 14; Mrkos, 13*; Tempel, 13; Giacobini, 12; Honda, 12; Messier, 12; Hartley, 11*; Borrelly, 11; Peltier, 10; Winnecke, 10. Note that Levy has found only 7 himself (all visually); the other 9 were photographic and actually found by Carolyn Shoemaker, whereby Levy and Eugene Shoemaker were assisting observers.

Other comets under observation

In this column for the July issue, I noted the accidental recovery of P/Hartley 2, which was given the provisional designation 1991t. This comet has been very well observed during the past few months, as can be seen from the hundreds of tabulated observations in this issue; it reached total visual magnitude 8 in September and October. The current apparition of P/Faye has also been its best observed; the comet reached $m_1 = 9$ in October.

The nucleus of P/Chernykh (1991o) has split, as first reported by Jane Luu (Harvard-Smithsonian Center for Astrophysics) and David Jewitt (University of Hawaii) using a 2.4-m reflector in Arizona in mid-September. Thanks to good measurements of the separation of the two nuclei made by Steve Larson and by Jim Scotti and Tom Gehrels (all of the University of Arizona) during September, October, and November, Zdenek Sekanina (Jet Propulsion Laboratory) has determined that the two nuclei separated in mid-April 1991, when the comet was 3.3 AU from the sun. The separation velocity was "found to be higher than that for any other split comet", ~ 15 meters per second (*IAUC* 5391).

The Fifth Edition of the ICQ Archive on Magnetic Tape

Following the publication of the July issue (*ICQ* 79), the fifth edition of the *ICQ* Archive on 9-track magnetic tape was announced. This contains 46,741 observations of 107 short-period comets and 182 long-period comets, where one observation is a single 80-character line containing information by one observer at one Universal Time with one set of instrumentation specifications and one set of magnitude reference/method details. Of this total, there are 44,132 magnitude estimates and 863 'negative' magnitude estimates (limiting magnitude estimates when the comet was not seen). There are 24,792 magnitude estimates of long-period comets and 16,876 of short-period comets.

Max Beyer's extensive lists of data, published in *Astronomische Nachrichten* from the 1930s until the early 1970s, have been added to this latest edition of the *ICQ* Archive. The top 20 observers, in terms of numbers of magnitude estimates plus numbers of 'negative' magnitude estimates, are as follows (listed by 3-letter, 2-digit observer codes): BEY, 2325+71; BOR, 2227+80; JON, 2066+1; MOR, 2044+61; PEA, 1070+47; BOU, 1034+9; HAL, 942+407; GRE, 918+3; NAK01, 790; KEI, 742+3; MOR03, 736; SEA, 732+1; SHA02, 731+20; SPR, 680; ISH02, 665; KEE, 654; MOE, 654; CLA, 575; KAN, 573; MER, 503+22. Attention should be called to those 4 observers with over 2000 observations. I would also like to note the special contributions of Alan Hale [HAL], who has worked hard in his attempts to find faint comets — a result of his efforts is that numerous short-period comets, which were noted as being quite faint (mag 15 or fainter) by photographic observers, are in fact much brighter visually.

Some other interesting statistics have been determined from the fifth edition of the *ICQ* Archive. The most-used magnitude methods are the Sidgwick (S) method with 21,802 estimates; Bobvonikoff (B), 7199; no method stated, 6783; Morris method (M), 4112; "out-of-focus method" — no specific method stated (O), 646; in-focus (I), 626; Beyer method (E), 263. This listing does not include the 2325 estimates by Beyer, which supposedly were all done using the Beyer method. As far as references for comparison stars, AAVSO charts were stated as being used for making 20,846 magnitude estimates — nearly half the total! The AAVSO Atlas (code AA) was stated as being used for 8,438 of these estimates. Not included in the 20,846 are the 619 estimates made using the North Polar Sequence (code NP), which presumably were all made using the AAVSO charts; Charles Morris notes that Northern-Hemisphere observers should make much heavier use of the NP charts, which have good magnitudes over a very large range of brightness. Other frequently-used sources, with the number of magnitude estimates made, are as follows: SAO Star Catalog (S), 6937; no reference stated, 3876; Sky Catalogue 2000.0 (SC), 1558; acceptable variable-star charts — specific source not noted (V), 1152; variable-star charts of societies other than AAVSO (VB, VF, VN), 924; Skalnate Pleso Catalogue (SP), 907; B.A.A. Charts as published in the IHW Observers' Manual (WW), 898; Yale Bright Star Catalogue (Y), 689. Concerning instruments, 16,891 observations were made with binoculars and 15,988 were made with reflectors (Newtonian-type assumed, but not always certain). Naked-eye observations constitute 1,701 observations in the Archive, and refractors 7,837.

The top 20 comets represented in the *ICQ* Archive are now as follows (the 1700 observations in this issue are not included here): P/Halley, 6446; Levy 1990c, 3389; Bradfield 1987 XXIX, 1966; Austin 1989c_1, 1619; Okazaki-Levy-Rudenko 1989 XIX, 1196; Liller 1988 V, 1178; Kohler 1977 XIV, 1040; P/Brorsen-Metcalf, 970; P/Giacobini-Zinner, 923; Austin 1982 VI, 871; P/Borrelly, 836; Wilson 1987 VII, 759; P/Encke, 624; P/Kopff, 622; P/Stephan-Oterma, 616; Kobayashi-Berger-Milon 1975 IX, 607; Panther 1981 II, 600; P/Schwassmann-Wachmann 1, 597; Bradfield 1979 X, 580; P/Churyumov-Gerasimenko, 568.

CRAF

After a real roller-coaster ride during the past several months, the CRAF spacecraft program was first deleted, then brought back into the FY 1992 budget by a conference of the U.S. Congress. It survives for now on a reduced budget, which has postponed the schedule launch date. The target comet has again switched from P/Tempel 2 to P/Kopff, as anticipated in my July column. Launch is now tentatively scheduled for launch in April 1997, and the flight would involve close approaches to Mars and twice to Earth for "gravity assists"; flybys of asteroids Thisbe and Fortuna would also be on the itinerary, after the Mars encounter and in between the two Earth encounters. After possibly another flyby of a third asteroid (following the second Earth encounter), CRAF would arrive at P/Kopff in late January 2006, some 3 years prior to perihelion. Though this is an exciting itinerary, it is tentative due to the year-to-year uncertainty in the budget.

The Nov. 14 issue of *Nature* reports that Germany is considering withdrawing (or delaying) its pledge of ~ US$73 million for CRAF; Germany is supposed to pay about one-sixth of this amount during 1992-93. CRAF still survives, however, until the budget battles of next year.

— *Daniel W. E. Green (1991 November 20)*

TABULATION OF COMET OBSERVATIONS

As we are rather behind schedule in getting this issue to press, we include below only that descriptive information which was sent to us in machine-readable form. Other descriptive information (meaning that sent on paper) complementing the tabulated data in this issue will be published in the January issue. The meaning of each column of tabulated data was described in the July issue.

Corrigenda. In the October 1990 issue, concerning the descriptive information for comet Levy 1990c, there were two errors on page 116; in both cases, the observer was JON. On Aug. 28.35 and 29.33, Jones used a 7.0-cm $f/10$ R at 21×, and he estimated the respective degrees of condensation (DC) as 5 and 7; no coma diameter estimates were made on either night.

Descriptive Information (to complement the Tabulated Data):

◇ *Comet Levy 1990c* ⟹ 1990 Nov. 22.64 and 30.63 and 1991 Feb. 22.43 and 23.43: in 31.7-cm $f/5$ L (86×), coma dia. 2′.5, DC = 6 [JON]. 1990 Nov. 27.63: small bright cond.; brighter part of tail 0°.1 long; fainter part of tail 0°.6 long in 31.7-cm $f/5$ L (86×) [JON]. Nov. 28.63: in 31.7-cm $f/5$ L (86×), coma dia. 2′.5, DC = 6-7 [JON]. Dec. 10.62: in 7.8-cm $f/8$ R (30×), coma dia. 3′, DC = 2; in 31.7-cm $f/5$ L (86×), DC = 6-7, trace of tail [JON]. Dec. 13.62: in 31.7-cm $f/5$ L (86×), coma dia. 3′, DC = 3 [JON]. Dec. 14.61, 15.62, 16.61, 17.62, 18.62, and 20.62: "very faint diffuse tail in 31.7-cm $f/5$ L (86×)" [JON]. Dec. 20.62, 23.62, 25.62, and 27.62: in 31.7-cm $f/5$ L (86×), coma dia. 3′, DC = 6 [JON]. Dec. 29.63: in 31.7-cm $f/5$ L (86×), DC = 6; in 7.8-cm $f/8$ R (30×), coma dia. 4′.5, DC = 2 [JON]. 1991 Jan. 3.64: in 31.7-cm $f/5$ L (86×), coma dia. 2′, DC = 5 [JON]. Jan. 5.62: in 31.7-cm $f/5$ L (86×), coma dia. 3′.5, DC = 5 [JON]. Jan. 7.60: in 31.7-cm $f/5$ L (86×), coma dia. ~ 2′.5, DC = 7 [JON]. Jan. 10.63: in 31.7-cm $f/5$ L (86×), coma dia. 4′, DC = 6 [JON]. Jan. 18.62: in 31.7-cm $f/5$ L (86×), coma dia. 4′, DC = 6-7 [JON]. Feb. 3.39 and 4.43: in 31.7-cm $f/5$ L (86×), coma dia. 2′.5, DC = 7 [JON]. Feb. 8.42: in 31.7-cm $f/5$ L (86×), coma dia. 3′, DC = 7 [JON]. Feb. 9.625: w/ 300-mm $f/2.8$ telephoto-lens, 10-min exposure on Fuji Super HG400 film shows an anti-tail 1°.4 long in p.a. 155° (Masami Ohkuma, Shirahama, Chiba-Ken, Japan). Feb. 14.45: "cond. of mag 11.3 (stars slightly defocused; ref: GA) in 31.7-cm $f/5$ L (86×)" [JON]. Feb. 14.45: in 31.7-cm $f/5$ L (86×), coma dia. 4′, DC =7 [JON]. Feb. 16.71: in 10×70 B, m_1 = 8.0, DC = 4 (Masami Ohkuma, Shirahama, Chiba-Ken, Japan). Feb. 19.41: in 31.7-cm $f/5$ L (86×), coma dia. 3′.3, DC = 7 [JON]. Feb. 19.41: cond. of magnitude 9.2 (stars slightly defocused, ref GA) in 31.7-cm $f/5$ L (86×) [JON]. Feb. 22.43: cond. of mag 10.5 (ref GA) in 31.7-cm $f/5$ L [JON]. Apr. 12.33: small diffuse patch in 31.7-cm $f/5$ L (86×) [JON]. Oct. 14.50: "some interference from twilight" [HAL].

◇ *Comet Tsuchiya-Kiuchi 1990i [all observations by JON]* ⟹ 1990 Nov. 24.60 and 27.59, in 31.7-cm $f/5$ L (86×), DC = 3. Nov. 28.61: "comet too close to star to use 4.5-cm R". Nov. 30.61: "comet in Milky Way — too crowded to use 4.5-cm R". Dec. 12.47: in 31.7-cm $f/5$ L (86×), coma dia. 4′.5, DC = 3. Dec. 13.44: in 31.7-cm $f/5$ L (86×), coma dia. 3′.3, DC = 2. Dec. 14.43: in 7.8-cm $f/8$ R (30×), coma dia. 3′.5, DC = 1. Dec. 15.45 and 20.60: in 31.7-cm $f/5$ L (86×), coma dia. 3′, DC = 2. Dec. 16.60: in 31.7-cm $f/5$ L (86×), DC = 2. Dec. 17.61: in 31.7-cm $f/5$ L (86×), coma dia. 4′, DC = 2; in 7.8-cm $f/8$ R (30×), coma dia. 4′.3. Dec. 18.60: in 31.7-cm $f/5$ L (86×), coma dia. 3′, DC = 2-3. Dec. 22.62: in 31.7-cm $f/5$ L (86×), coma dia. 3′, DC = 1. Dec. 23.61: in 31.7-cm $f/5$ L (86×), DC = 1-2. Dec. 25.60: in 31.7-cm $f/5$ L (86×), coma dia. 4′, DC = 1. Dec. 29.62: "comet barely visible in 7.8-cm R".

◇ *Comet Shoemaker-Levy 1991d* ⟹ 1991 Nov. 5.52: "coma slightly fan-shaped" [HAL].

◇ *Comet Helin-Lawrence 1991l* ⟹ 1991 July 4.17: "altitude fairly low, background sky somewhat bright; the comet was very vague" [HAL].

◇ *Comet Helin-Alu 1991r* ⟹ 1991 July 4.20: "the surrounding star field is very sparse, and the comet's position very difficult to locate; one candidate was suspected and estimated to be m_1 = 13.5, but was shown by POSS prints to be located ~ 15′ away from the comet" [HAL].

◇ *Comet Shoemaker-Levy 1991a$_1$* ⟹ 1991 Oct. 11.25: "during all attempts the comet was assumed to be a small, condensed object; during this observation attempt the sky conditions were very good; three nearby faint UGC galaxies were seen" [HAL].

◇ *Periodic Comet Wild 2 (1989t)* ⟹ 1991 July 4.22: "estimate is of a faint suspect, which was shown on POSS prints to be composed of three faint stars" [HAL].

◇ *Periodic Comet Wolf-Harrington (1990e)* ⟹ 1991 Apr. 14.16: "comet glimpsed, but seeing was very poor" [MOR].

◇ *Periodic Comet Swift-Gehrels (1991c)* ⟹ 1991 Apr. 6.16 and 13.16: "comet was too low for an accurate magnitude estimate" [MOR].

◇ *Periodic Comet Takamizawa (1991h)* ⟹ 1991 Aug. 6.18: "mediocre sky conditions" [HAL]. Aug. 7.18: "sky conditions quite good; the comet's position was very close to two 11th-magnitude stars; the field was watched for ~ 1.2 hr, and no moving object was detected" [HAL]. Aug. 10.21 and 11.22: "unconfirmed suspect (m_1 = 14.0); poor seeing" [MOR]. Oct. 27.11: "low altitude" [HAL].

◇ *Periodic Comet Faye (1991n)* ⟹ 1991 Aug. 8.39: "a couple of candidates were suspected, but neither could be confirmed" [HAL]. Aug. 11.39: "observation made through a break in the clouds" [MOR]. Aug. 12.40: "coma is small, condensed, and fan-shaped; the coma has maintained this general appearance throughout the apparition" [HAL]. Sept. 2.933: 7-min exp. w/ 20-cm *f*/2 Baker-Schmidt camera (+ gas-hypered TP2415 film), shows coma dia. 0.'7, DC = 9; coma appears stellar; fan-shaped 0.°12 tail in p.a. 255° [MIK]. Sept. 3.93: "delicate fan-shaped tail" [MIK]. Sept. 10.13: "stellar-like nucleus visible clearly" [MIK]. Sept. 15.07: mag of central cond. ~ 13 [JAH]. Oct. 3.894: 4-min unfiltered 574×384 CCD exp. w/ 19-cm *f*/4 flat-field Schmidt Cassegrain camera (field 38′ × 57′) shows coma dia. 4.'3, DC = 7, straight narrow gas tail ~ 0.°6 long in p.a. 255°, probably extending even beyond the frame [MIK]. Oct. 5.29: "comet had a parabolic coma" [MOR]. Oct. 5.90: "fan-shaped tail" [MIK]. Oct. 5.975: 2-min CCD exp. using instrumentation described for Oct. 3.894 reveals coma dia. 5.'6, DC = 8, straight gas tail 1.°1 long in p.a. 255° [MIK]. Oct. 10.16: "condensed coma; straight, narrow tail surrounded by weak fan" [MIK]. Oct. 15.99: in 15-cm L, "parabolic coma open towards SW; central cond. of mag 10; non-stellar center" [PER01]. Oct. 17.37: in 41-cm *f*/4 L (83×), 0.°18 tail in p.a. 250° [HAL]. Oct. 30.23: "interference from a nearby 9th-magnitude star; this star was in the tail's expected direction" [HAL]. Nov. 8.28: "in 41 cm L, the coma, still fan-shaped, appeared slightly larger than previously; both ends of this fan appeared to extend into faint tails (p.a. ~ 265°, 315°), each ~ 5′ long" [HAL]. Nov. 8.82: 4-min unfiltered 574×384 CCD exp. w/ 19-cm *f*/4 flat-field Schmidt Cassegrain camera (field 38′ × 57′) shows coma dia. 7.'5, DC = 8; fan-like tail 0.°4 long with the weavy structure of which axes points toward the comet nucleus [MIK].

◇ *Periodic Comet Chernykh (1991o)* ⟹ 1991 Aug. 4.31: "probable observation (m_1 = 14.0)" [MOR]. Aug. 11.36: "unconfirmed suspect (m_1 = 14.2)" [MOR]. Sept. 30.23: "a faint candidate was suspected, but was shown by POSS prints to be a faint star" [HAL]. Oct. 3.860 and 3.912: unfiltered 574×384 CCD exp. w/ 19-cm *f*/4 flat-field Schmidt Cassegrain camera (field 38′ × 57′) failed to yield a suitable candidate on four 1-min frames" [MIK].

◇ *Periodic Comet Shoemaker 1 (1991p)* ⟹ 1991 Aug. 6.18: "probable observation (m_1 = 14.1)" [MOR]. Nov. 7.15: "an extremely faint candidate was suspected; although nothing was seen in this position on POSS prints, the 'candidate' had not moved when observed the following evening" [HAL]. Nov. 9.13: "possible interference from cirrus" [HAL].

◇ *Periodic Comet Levy (1991q)* ⟹ 1991 July 15.39: "in 26-cm L, non-stellar cond. in coma was offset toward the tail" [MOR]. July 16.44: "in 41 cm L, comet appears more condensed than previously; there is significant enhancement when viewed with a Lumicon Swan Band filter" [HAL]. July 23.04: "faint outer part of the coma suspected" [MEY]. July 23.04: "faint outer part of the coma suspected" [MEY]. Aug. 7.11, in 20.3-cm *f*/10 T (62×), m_1 = 9.5, coma dia. 2′, DC = 4 [GAR02]. Aug. 8.46: "a faint coma extension, starting toward the east and extending through south to the southwest, was suspected" [HAL]. Aug. 23.08: "very faint and weak, not quite sure" [MEY]. Sept. 15.49: "some interference from twilight and possible cirrus" [HAL]. Nov. 3.46: "unconfirmed suspect (m_1 = 13.3)" [MOR].

◇ *Periodic Comet Wirtanen (1991s)* ⟹ 1991 Sept. 11.125: 6 min exp. w/ 20-cm *f*/2 Baker-Schmidt camera (+ gas-hypered TP2415 film), shows coma dia. 1.'7, DC = 7, trace of 0.°08 fan-like tail in p.a. 270° [MIK]. Oct. 25.18: "this object faded considerably; not seen even in 36-cm T at 80×; moonlight" [MIK].

◇ *Periodic Comet Hartley 2 (1991t)* ⟹ 1991 Aug. 11.43: "observation made through a break in the clouds" [MOR]. Sept. 2.12: "a star of mag ~ 7, located ~ 4′ from the comet, affected observation" [MIK]. Sept. 11.085: 7 min exp. w/ 20-cm *f*/2 Baker-Schmidt camera (+ gas-hypered TP2415 film), shows coma dia. 2.'6, DC = 7; coma strongly condensed; slightly curved 0.°5 tail in p.a. 290° [MIK]. Sept. 12.12: "additional tail ~ 0.°05 long in p.a. 334° [JAH]. Sept. 14.07 and 14.12: "a double star was used as comparison star" [JAH]. Sept. 14.08: "additional tail ~ 0.°16 long in p.a. 299° [JAH]. Sept. 15.47: "tail was narrow and faint" [MOR]. Oct. 6.48: "in 51-cm L, the coma was elongated ⊥ and had a pronounced disk of material with a very faint stellar cond. in the center; tail was extremely faint" [MOR]. Oct. 16.23: "in 15-cm L, a 10th-mag star was involved with outer coma; two fairly distinct levels of brightness within coma" [PER01]. Nov. 6.25: "comet near 8th mag star" [PER01].

◇ *Periodic Comet Shoemaker-Levy 6 (1991b$_1$)* ⟹ 1991 Nov. 12.21: "comet was very diffuse with low surface brightness; at 156×, toward the coma's center there was a diffuse patch of material with a very faint (m_2 ~ 14:) stellar cond." [MOR]. Nov. 14.29: "comet is diffuse with a very low surface brightness; there was neither enhancement nor degradation when observed with a Lumicon Swan Band filter" [HAL].

◇ *P/Arend-Rigaux* ⟹ 1991 Oct. 6.49: "for all attempts the comet was assumed to be a very small, condensed object" [HAL].

◇ *P/Machholz* ⟹ 1991 Aug. 6.15: "low altitude; sky conditions fairly poor; a faint coma extension (not quite a tail) to the east was suspected" [HAL].

◇ *P/Schwassmann-Wachmann 1* ⟹ 1991 Aug. 12.44: "the coma is larger and more diffuse than it was on Aug. 8" [HAL]. Sept. 11.115: on 6-min exp. w/ 20-cm *f*/2 Baker-Schmidt camera (+ gas-hypered TP2415 film), 2.'0 coma, DC = 0; "weak, uniform circular coma [MIK]. Oct. 3.92: "two 10th-mag stars near the position of comet affected obs." [MIK]. Oct. 3.939: 4-min unfiltered 574×384 CCD exp. w/ 19-cm *f*/4 flat-field Schmidt Cassegrain camera (field 38′ × 57′) shows "faint halo of circular coma ~ 6′ dia. and weak central cond. ~ 0.'4 in dia.; at the same time, we failed to detect the comet with the 36-cm reflector at 80× under very good conditions" [MIK]. Oct. 5.988: 4-min unfiltered 574×384 CCD exp. w/ 20-cm *f*/2 Baker-Schmidt camera (field 1.°02 × 1.°08) shows faint circular coma of dia. ~ 8′ w/ central cond.; the comet was not seen in 36-cm reflector at 80× under very good conditions [MIK]. Nov. 8.862: 4-min unfiltered CCD exp. (same instrumentation as for Oct. 3.939, above) shows coma dia. 4.'5, DC = 5; "the comet was not seen in the 36-cm reflector at 80× under very good conditions" [MIK].

Key to observers with observations published in this issue, with 2-digit numbers between Observer Code and Observer's Name indicating source [16 = Yamaneko Group of Comet Observers (c/o Akimasa Nakamura, Aichi, Japan); 28 = German observers (c/o Jost Jahn), 31 = "Betelgeuse" observing group, Minsk, U.S.S.R., etc.]. Those with asterisks (*) preceding the 5-character code are new additions to the Observer Key:

CODE	S	OBSERVER, LOCATION
AND01	21	Karl-Gustav Andersson, Sweden
BOA		Andrea Boattini, Italy
BOR		John E. Bortle, NY, U.S.A.
*BRU	31	Ivan S. Brukhanov, Minsk, U.S.S.R.
*BUL01	07	Robert Bullen, England
BUN		Robert Bunge, OH, U.S.A.
CAM03	14	Paul Camilleri, Australia
COM	11	Georg Comello, The Netherlands
DAH	24	Haakon Dahle, Norway
DAN01	21	Jorgen Danielsson, Sweden
DEA		Vicente Ferreira de Assis Neto, Brazil
GAR01	14	Gordon Garradd, N.S.W., Australia
GAR02		Stephane Garro, France
GRA04	24	Bjoern Haakon Granslo, Norway
HAL		Alan Hale, U.S.A.
HAS02		Werner Hasubick, West Germany
HAV		Roberto Haver, Italy
HER02		Carl Hergenrother, NJ, U.S.A.
ISH02	16	Akiyoshi Ishikawa, Japan
IWA01	16	Yoshitaka Iwaki, Japan
JAH		Jost Jahn, West Germany
JON	09	Albert F. Jones, New Zealand
KAN	16	Kiyotaka Kanai, Japan
KEE		Richard A. Keen, CO, U.S.A.
*KHR	26	Michael Khrisanenkov, U.S.S.R.
KOB01		Juro Kobayashi, Japan
KON03	16	Eitoshi Konno, Japan
*KON04	26	Maxim Konovalov, U.S.S.R.
KOR01	19	Valeriy L. Korneyev, Zelenograd, U.S.S.R.
KOS	31	Attila Kosa-Kiss, Romania
*LAV	26	D. N. Lavrikov, U.S.S.R.
LOO01	11	Frans R. van Loo, Belgium
LUE		Hartwig Luethen, West Germany
MAM	31	V. Mamedov, Krasnovodsk, U.S.S.R.
MEY	28	M. Meyer, Germany
MID01	24	Oernulf Midtskogen, Norway
MIK		Herman Mikuz, Yugoslavia
MIT	16	Shigeo Mitsuma, Japan
MOD		Robert J. Modic, OH, U.S.A.
MOE		Michael Moeller, West Germany
MOR		Charles S. Morris, U.S.A.
MOR03		Warren C. Morrison, Canada
NAG04	16	Kazuro Nagashima, Japan
NAK01	16	Akimasa Nakamura, Japan
NAK05	16	Tetsuya Nakamura, Japan
*NAK09	31	A. A. Nakhaiko, Minsk, U.S.S.R.
*OBR	26	Andrew Y. Obraztsov, Kazakhstan, U.S.S.R.
OBU	16	Yasushi Obuchi, Japan
OKA05	16	Takuma Oka, Japan
OST		Andrew Y. Ostapenko, U.S.S.R.
PAN	07	Roy W. Panther, England
PER01		Alfredo Jose Serra Pereira, Portugal
PRY		Jim Pryal, WA, U.S.A.
REN		Alexandre Renou, France
SCH04	11	A. H. Scholten, The Netherlands
SEA	14	David A. J. Seargent, Australia
SHA02	07	Jonathan D. Shanklin, England
SHA04		Gregory T. Shanos, U.S.A.
*SHU	26	Sergey Shurpakov, U.S.S.R.
*SHU01	31	V. V. 'Shukin, Starropol, U.S.S.R.
*SKO01	26	Boris A. Skorichenko, Mezmai, U.S.S.R.
SOW	16	Toshihide Sowa, Japan
SPR		C. E. Spratt, BC, Canada
TAK05	16	Kesao Takamizawa, Japan
TOM01		Maura Tombelli, Italy
TSU02	16	Mitsunori Tsumura, Japan
*VIE		Jean-Francois Viens, Quebec, Canada
WAR01	21	Johan Warell, Sweden
WAS	16	Shinsyo Washi, Japan
WOL01	09	Graham W. Wolf, New Zealand
YAS	16	Masanori Yasuki, Japan
ZHU		Sergey Valentinowich Zhuiko, U.S.S.R.

Comet Liller 1988 V

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 05 11.94	B	6.3	S	11	L	7	32	5	5	0.35	20	OST
1988 05 12.63	S	6.3	AA	5.0	B		7	& 6	5	0.33		ISH02
1988 05 12.88	B	6.2	S	11	L	7	32	6	6	0.30	20	OST
1988 05 12.94	B	6.4	S	11	L	7	32	6	6	0.30		OST
1988 05 13.61	S	6.4	AA	5.0	B		7	& 6	4	0.25		ISH02
1988 05 13.88	B	6.4	S	11	L	7	32	5	4	0.33		OST
1988 05 13.94	B	6.4	S	11	L	7	32	5	3	0.33		OST
1988 05 14.88	B	6.6	S	11	L	7	32	7	4	0.25		OST
1988 05 16.86	B	6.5	S	11	L	7	32	5	3	0.20	40	OST
1988 05 17.88	B	6.6	S	11	L	7	32	4	3	0.13		OST
1988 05 23.73	S	6.8	AA	5.0	B		7	5	3			ISH02
1988 05 27.92	B	7.8	S	11	L	7	32	4	4	0.10		OST

Comet Okazaki-Levy-Rudenko 1989 XIX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 09 25.56	B	8.7	S	14	R	10	56	3	4			OST
1989 09 26.50	B	8.6	S	14	R	10	56	2	3			OST
1989 09 27.51	B	8.4	S	14	R	10	56	2	3			OST
1989 10 01.57	B	7.8	S	14	R	10	56	4	4			OST
1989 10 02.50	B	7.4	S	14	R	10	56	4	5			OST
1989 10 02.59	B	7.8	S	14	R	10	56	4	4			OST
1989 10 03.59	B	7.5	S	14	R	10	56	3	4			OST
1989 10 04.53	B	7.6	S	14	R	10	56	4	6			OST
1989 10 05.52	B	7.2	S	14	R	10	56	4	5			OST
1989 10 09.50	B	7.0	S	14	R	10	56	5	4			OST
1989 10 11.51	B	7.2:	S	14	R	10	56	4	4			OST

Comet Aarseth-Brewington 1989 XXII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 01.95	S	7.9	S	11.4	L	8	40		6			VIE

Comet Aarseth-Brewington 1989 XXII [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 05.93	S	6.5	S	11.4	L	8	40		6			VIE
1989 12 08.46	S	6.3	S	5.0	B		10		6			VIE
1989 12 12.44	S	5.4	S	5.0	B		10		6			VIE
1989 12 13.44	S	4.5	S	5.0	B		10		6			VIE
1989 12 14.44	S	5.3	S	5.0	B		10		6			VIE
1989 12 18.46	S	4.5	S	5.0	B		10		6			VIE
1989 12 19.47	S	4.3	S	5.0	B		10		6			VIE

Comet Cernis-Kiuchi-Nakamura 1990b

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 18.75	B	7.9	S	11	L	7	32	5	4			OST
1990 03 19.43	S	8.5	S	15.0	B		25	2.5				TAK05
1990 03 19.43	S	8.7	AA	12.0	B		20	3	4			MIT
1990 03 19.45	M	8.1	AA	20	L	6	46	4.5	5			NAK01
1990 03 19.46	S	8.3	AA	31	L	6	62	3.5	7			KOB01
1990 03 19.47	M	8.0	S	16	W	4	49	3				TSU02
1990 03 20.45	S	8.5	AA	31	L	6	62	3	6			KOB01
1990 03 21.43	S	8.2	S	15.0	B		25	2	6			TAK05
1990 03 21.43	S	8.7	AA	12.0	B		20	3	5			MIT
1990 03 22.00	B	8.5	S	11	L	7	32	5	4			OST
1990 03 22.45	S	8.5	AA	31	L	6	62	2	6			KOB01
1990 03 23.84	B	8.2	VF	8.0	B		12	& 5	5			REN
1990 03 23.88	B	8.0	S	11	L	7	32	4	6			OST
1990 03 25.43	M	8.0	AC	20	L	6	46	6	4/			NAK01
1990 03 25.47	S	8.3	AA	31	L	6	62	4.5	5			KOB01
1990 03 25.86	B	8.4	VF	8.0	B		12	& 4	5/			REN
1990 03 26.44	S	8.8	AA	13	L	6	24	3	3			ISH02
1990 03 26.46	M	8.2	S	16	W	4	49	3	5			TSU02
1990 03 26.46	S	8.5	AA	31	L	6	62	4.5	3			KOB01
1990 03 26.86	B	8.8	S	11	L	7	32	4	4			OST
1990 03 28.04	S	9.3:	S	11.4	L	8	40		3			VIE
1990 03 28.78	B	9.1	S	11	L	7	32	4	5			OST
1990 03 29.02	B	8.5	S	11	L	7	32	5	5			OST
1990 03 29.07	S	9.4:	S	11.4	L	8	40		3			VIE
1990 03 29.88	B	8.8	S	11	L	7	32	4	5			OST
1990 04 02.52	S	9.0	AC	13	L	6	24	3	3			ISH02
1990 04 05.45	S	9.1	AC	13	L	6	44	2.5	2			ISH02
1990 04 11.85	S	8.5	VF	12	L	6	40	4.5	4			REN
1990 04 12.90	S	8.6	VF	12	L	6	40		4			REN
1990 04 14.51	S	9.1	AC	20	L	6	58	4	2/			NAK01
1990 04 23.50	S	9.9	AC	13	L	6	44	2.5	1			ISH02
1990 04 24.47	S	10.1	AC	20	L	6	58	5.5	1/			NAK01
1990 05 11.89	S[	10.2:	VF	12	L	6	40	! 3				REN

Comet Austin 1989c1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 02 12.40	S	8.5	S	12.0	B		20					MIT
1990 02 12.41	S	7.9	AA	13	L	6	62	3	3			ISH02
1990 02 16.43	S	7.8	AA	31	L	6	62	5	5	0.33	100	KOB01
1990 02 17.41	S	7.7	AA	31	L	6	62	5	4	0.2	100	KOB01
1990 02 20.42	S	7.5	AA	31	L	6	62	4	4	0.1	100	KOB01
1990 02 21.40	S	8.2	S	12.0	B		20	3	2			MIT
1990 02 21.41	S	7.7	AA	13	L	6	62	3	4			ISH02
1990 02 24.43	S	7.4	AA	31	L	6	62	6	5	0.25	100	KOB01
1990 03 08.43	S	6.9	AA	31	L	6	62	5	6	0.1	100	KOB01
1990 03 09.42	S	6.8	AA	31	L	6	62	5	6	0.17	100	KOB01
1990 03 10.40	S	6.7	AA	13	L	6	62	2.5	4			ISH02

Comet Austin 1989c1 [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 12.43	S	6.3	AA	31	L	6	62	5	5	0.25	100	KOB01
1990 03 13.41	S	6.7	AA	13	L	6	62	3	4			ISH02
1990 03 13.43	S	6.0	AA	31	L	6	62	5	5	0.33	100	KOB01
1990 03 15.43	S	5.9	AA	31	L	6	62	2	4			KOB01
1990 03 21.43	S	6.2	AC	8.0	B		20	3	6			YAS
1990 03 25.43	S	4.9	AA	31	L	6	62	8	6	0.42	80	KOB01
1990 03 26.42	S	5.2	AA	8.0	B		15	4	5			ISH02
1990 03 26.44	S	4.8	AA	31	L	6	62	4	5	0.25	80	KOB01
1990 03 29.41	B	6.0	AA	20	T	10	50	3	4/			OBU
1990 03 30.41	B	5.8	AA	8	R	8	30	3	4/			OBU
1990 04 01.42	B	5.5	S	8	R	8	30	3	4/			OBU
1990 04 02.42	B	5.5	S	8	R	8	30	3	5/			OBU
1990 04 02.42	S	5.3	AA	13	L	6	24	2	6	0.17		ISH02
1990 04 02.42	S	5.5	AA	8.0	B		15	2	6			ISH02
1990 04 02.44	S	4.5	AA	31	L	6	62	5	5	0.13	90	KOB01
1990 04 05.42	B	5.0	AA	12.0	B		20	2	7	0.5		MIT
1990 04 05.42	S	5.1	AA	8.0	B		15	2	6	0.17		ISH02
1990 04 05.42	S	5.1	AA	13	L	6	24	2	6			ISH02
1990 04 05.44	S	4.2	AA	31	L	6	62	5	5	0.25	45	KOB01
1990 04 05.71	B	4.0:	A	5.0	B		7	6	7			OST
1990 04 06.42	S	4.9	AA	13	L	6	24	2	7			ISH02
1990 04 06.42	S	5.0	AA	8.0	B		15	2	7			ISH02
1990 04 06.45	S	4.0	AA	7.0	B		10	5	6			KOB01
1990 04 06.71	B	4.4	A	11	L	7	32	5	6			OST
1990 04 08.42	M	4.5	AA	12.0	B		20	1	8			MIT
1990 04 08.42	S	5.0	AA	8.0	B		15	2	7			ISH02
1990 04 09.75	B	4.5	A	11	L	7	32	5	6			OST
1990 04 09.82	B	4 :	HR	12	L	6	40		8			REN
1990 04 11.83	B	4.2:	HR	12	L	6	40		8			REN
1990 04 13.84	B	4.0	HR	8.0	B		12	& 2.5	8			REN
1990 04 18.36	S	5.1	S	5.0	B		10		6		345	VIE
1990 04 18.80	B	4.5	AC	8.0	B		11	3.5	7	2		WAS
1990 04 18.81	S	5.3	AA	31	L	6	62	4	7	0.5	350	KOB01
1990 04 19.78	B	3.5	AA	8	R	8	30	2	7/	>0.5		OBU
1990 04 19.83	S	4.8	AA	7.0	B		10	4	5	0.5	345	KOB01
1990 04 21.99	B	5.1	A	11	L	7	32	7	6			OST
1990 04 22.09	B	5.0	S	5.0	B	5	7	5	9	1.4	350	KOS
1990 04 23.79	B	3.8	AA	5.0	B		7	5	6	1	330	SOW
1990 04 24.09	B	4.6	S	5.0	B	4	7	6	9	2.5	345	KOS
1990 04 24.35	S	5.5	S	5.0	B		10		6		315	VIE
1990 04 24.75	B	5.2	AA	5.0	B		7	3	7	1.8	325	KAN
1990 04 24.76	B	4.3	AA	8	R	8	30	3	6/	2	270	OBU
1990 04 24.77	M	4.9	AA	12.0	B		20	3	7	2	325	MIT
1990 04 24.78	S	4.5	AA	7.0	B		10	5	7			YAS
1990 04 24.78	S	5.6	AA	8.0	B		15	4	6	1.5		ISH02
1990 04 24.79	S	5.7	AA	13	L	6	24	4	5	1		ISH02
1990 04 24.80	B	3.5	AA	5.0	B		7	5	6	3	330	SOW
1990 04 25.76	B	4.5	AA	8	R	8	30	3	6/	>1	270	OBU
1990 04 25.96	B	5.5	A	11	L	7	32	5	6			OST
1990 04 26.77	S	5.5	AA	8.0	B		15	3	5	0.5		ISH02
1990 04 26.78	S	5.6	AA	13	L	6	24	3	5	0.3		ISH02
1990 04 29.10	B	5.3	HR	8.0	B		12	6	7	2.2	306	REN
1990 04 29.75	M	5.2	AA	12.0	B		20	4	6	1.5	315	MIT
1990 04 29.76	S	5.7	AA	8.0	B		15	5	5	0.4		ISH02
1990 04 29.77	B	4.7	AC	8.0	B		11	4	7	1		WAS
1990 04 29.77	B	5.4	AA	5.0	B		7	3.5	7	0.7	310	KAN
1990 04 29.77	S	5.7	AA	13	L	6	24	5	5	0.3		ISH02
1990 04 29.79	S	4.6	AA	10.0	B		14	8	7	1		IWA01
1990 04 29.79	S	5.3	AA	7.0	B		10	9	5	1.5	300	KOB01

Comet Austin 1989c1 [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 04 29.96	B	5.3	A	11	L	7	32	6	5			OST
1990 04 30.11	B	5.3	HR	8.0	B		12	6	7	>1	307	REN
1990 04 30.33	S	5.3	S	5.0	B		10		5			VIE
1990 04 30.76	S	5.3	AA	8.0	B		20	7	6	0		YAS
1990 04 30.76	S	5.6	AA	8.0	B		15	6.5	5	1		ISH02
1990 04 30.77	S	5.4	AA	7.0	B		10	9	4	2.0	295	KOB01
1990 04 30.77	S	5.6	AA	13	L	6	24	6	5	0.7		ISH02
1990 04 30.78	S	4.7	AA	10.0	B		14	7	6	0.83		IWA01
1990 04 30.95	B	5.0	A	11	L	7	32	6	5			OST
1990 05 01.13	B	5.4	HR	8.0	B		12		7			REN
1990 05 01.98	B	4.3	A	0.0	E		1	9	5			OST
1990 05 01.98	B	4.8	A	5.0	B		7	7	6			OST
1990 05 02.07	B	5.0	S	5.0	B	4	7	5	9	1.5	295	KOS
1990 05 02.12	B	5.5	HR	8.0	B		12	8	7	2.3	299	REN
1990 05 02.98	B	4.9	A	5.0	B		7	6	5			OST
1990 05 03.07	B	4.9	S	5.0	B	4	7	6	9	1.6	295	KOS
1990 05 03.31	S	5.5	S	5.0	B		10		5		300	VIE
1990 05 04.05	B	5.7	S	5	R	4	7	5	7			BRU
1990 05 04.11	B	5.5	HR	8.0	B		12	8	6/	1.5	290	REN
1990 05 04.31	S	5.7	S	5.0	B		10		5		300	VIE
1990 05 04.99	B	5.1	A	5.0	B		7	5	5	1.4	60	OST
1990 05 05.05	B	5.7	S	5	R	4	7	5	8			BRU
1990 05 05.74	M	5.2	AA	12.0	B		20	7	5	1		MIT
1990 05 05.78	S	5.4	AA	7.0	B		10	10	6			YAS
1990 05 06.07	B	5.8	S	5.0	B	4	7	6	8	1.0	290	KOS
1990 05 06.11	B	5.5	HR	8.0	B		12	6	6/	0.6	277	REN
1990 05 07.04	B	5.6	S	5	R	4	7	16	7			BRU
1990 05 07.07	B	5.6	S	5.0	B	4	7	7	8	1.2	290	KOS
1990 05 07.30	S	5.6	S	5.0	B		10		5			VIE
1990 05 08.95	B	4.9	A	5.0	B		7	6	4			OST
1990 05 09.05	B	5.4	S	5.0	B	4	7	7	8	0.6	280	KOS
1990 05 09.05	B	5.6	S	5	R	4	7	10	6			BRU
1990 05 09.76	S	5.9	AA	8.0	B		15	8	4			ISH02
1990 05 09.77	S	5.8	AA	7.0	B		10	8	4			ISH02
1990 05 10.96	B	5.0	A	5.0	B		7	5	5			OST
1990 05 11.05	B	5.6	S	5	R	4	7					BRU
1990 05 12.10	B	5.5	HR	8.0	B		12	6.5	5/			REN
1990 05 12.96	B	5.3	A	11	L	7	32	4	4	0.8	70	OST
1990 05 13.95	B	5.2	A	11	L	7	32	6	5	0.5	65	OST
1990 05 14.88	S	6.0	S	3	R		6	6.2	4			SHU01
1990 05 15.29	S	5.7	S	5.0	B		10		3			VIE
1990 05 15.75	S	5.8	AA	7.0	B		10	10	4			ISH02
1990 05 15.76	S	5.9	AA	13	L	6	24	9	4			ISH02
1990 05 15.78	S	5.5	AA	7.0	B		10	15	5			YAS
1990 05 15.90	S	5.9	S	3	R		6	6.8	3/			SHU01
1990 05 16.31	S	5.7	S	5.0	B		10					VIE
1990 05 16.73	M	5.5	AA	8.0	B		11	10	4			MIT
1990 05 17.05	B	5.7	S	5.0	B	4	7	7	7	0.6	275	KOS
1990 05 19.05	B	6.1	S	5	R	4	7	12	5	0.5	355	BRU
1990 05 19.69	S	5.9	AA	7.0	B		10	10	3			ISH02
1990 05 19.70	S	5.9	AA	13	L	6	24	10	3			ISH02
1990 05 19.98	B	5.8	A	11	L	7	32	11	4			OST
1990 05 20.04	B	5.3	S	5.0	B	4	7	7	7	0.2	235	KOS
1990 05 20.05	B	6.3	S	5	R	4	7	8	4			BRU
1990 05 21.66	S	5.7	AA	7.0	B		10	>15	5			YAS
1990 05 21.85	B	5.9	S	3	R		6	11.3	3			SHU01
1990 05 22.05	B	6.1	S	5	R	4	7	10	4	0.3	345	BRU
1990 05 22.68	B	5.4	AA	5.0	B		7	15	3			SOW
1990 05 23.70	S	5.7	AA	7.0	B		10	>15	5			YAS

Comet Austin 1989c1 [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 24.04	B	5.4	S	5.0	B	4	7	10	6	0.1	260	KOS
1990 05 24.10	B	5.7	HR	8.0	B		12	12	4			REN
1990 05 24.26	S	5.3	S	5.0	B		10		3			VIE
1990 05 24.66	S	5.7	AA	7.0	B		10	>15	5			YAS
1990 05 24.74	B	5.5	AA	5.0	B		7	20	5			SOW
1990 05 24.85	S	6.0	S	3	R		6	11	3			SHU01
1990 05 25.06	B	5.5	HR	6	R	5	9	16	4			REN
1990 05 25.24	S	5.2	S	5.0	B		10		3			VIE
1990 05 25.61	S	4.9	AA	10.0	B		14	10	1	0.33		IWA01
1990 05 25.77	S	5.8	AA	7.0	B		10	>15	5			YAS
1990 05 26.08	B	6.3	HR	8.0	B		12	15	4			REN
1990 05 26.60	S	5.1	AA	10.0	B		14		1			IWA01
1990 05 26.67	B	5.8	AC	12.0	B		20	>30	4			WAS
1990 05 26.71	S	5.7	AA	5.0	B		7		5			YAS
1990 05 26.72	S	5.8	AA	7.0	B		10	13	3			ISH02
1990 05 26.73	S	5.7	AA	13	L	6	24	13	3			ISH02
1990 05 26.74	B	5.5	AA	5.0	B		7	20	6			SOW
1990 05 26.85	B	6.0	S	5.0	B	4	7	10	5	0.3	265	KOS
1990 05 27.08	B	6.1	HR	6	R	5	9	20	4/	?		REN
1990 05 27.60	M	5.8	AA	8.0	B		11	20	1			MIT
1990 05 27.77	S	5.8	AA	7.0	B		10	>15	5			YAS
1990 05 27.99	B	6.3	A	11	L	7	32	22	2			OST
1990 05 28.29	S	5.4	S	5.0	B		10		3			VIE
1990 05 29.71	S	6.1	AA	7.0	B		10	10	3			ISH02
1990 05 29.72	S	6.1	AA	13	L	6	24	10	2			ISH02
1990 05 30.79	B	6.2	S	5	R	4	7	9	3			MAM
1990 05 30.87	B	6.1	S	5.0	B	4	7	8	3			KOS
1990 05 31.21	S	6.2	S	5.0	B		10		3			VIE
1990 06 01.08	B	6.4	HR	8.0	B		12	12	4			REN
1990 06 02.06	B	6.5	S	5.0	B	4	7	5	2			KOS
1990 06 02.71	S	6.4	AA	7.0	B		10	15	3			ISH02
1990 06 02.72	S	6.5	AA	13	L	6	24	13	3			ISH02
1990 06 03.06	B	6.7	S	5.0	B	4	7	5	2			KOS
1990 06 05.67	S	6.8	AC	13	L	6	24	8	2			ISH02
1990 06 05.74	S	6.4	AA	7.0	B		10	12	3	>1	330	YAS
1990 06 16.58	M	8.5	AA	12.0	B		20	7	2			MIT
1990 06 16.61	S	9.0	AC	13	L	6	44	6	1			ISH02
1990 06 22.59	S	10.0	AA	12.0	B		20	5	1			MIT

Comet Skorichenko-George 1989e1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 27.41	S	10.6	AC	20	L	6	106	1.8	5/			NAK01
1989 12 30.40	S	10.4	AC	25	L	5	170	2	3			NAK05
1989 12 30.40	S	10.7	AC	20	L	6	106	1.1				NAK01
1989 12 31.38	S	10.5	AC	13	L	6	62	3	3			ISH02
1990 01 01.40	S	10.3	AC	13	L	6	62	3	2			ISH02
1990 01 03.40	S	10.3	AC	13	L	6	62	2	2			ISH02
1990 01 04.40	S	10.2	AC	13	L	6	62	3	2			ISH02
1990 01 05.39	S	10.4	AC	13	L	6	62	2	2			ISH02
1990 01 13.43	S	9.7	AC	20	L	6	58	3.0	3			NAK01
1990 01 21.41	S	9.5	AC	20	L	6	58	3.2	4			NAK01
1990 01 27.40	S	10.0	AC	13	L	6	62	3	2			ISH02
1990 01 27.41	S	9.6	AC	20	L	6	58	2.6	4			NAK01
1990 02 16.45	S	9.4	S	31	L	6	62	4	3			KOB01
1990 02 17.43	S	9.3	AC	20	L	6	58	3.0	5			NAK01
1990 02 23.79	S	9.5	VF	12	L	6	40	3.5	3			REN
1990 03 03.83	S	9.3	VF	12	L	6	40	& 3	4/			REN
1990 03 13.43	S	9.7	AA	20	L	6	106	2.0	3			NAK01

Comet Skorichenko-George 1989e1 [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 15.45	S	9.2	S	31	L	6	62	2	3			KOB01
1990 03 16.83	S	9.0	VF	12	L	6	40	3.5	3/			REN
1990 03 19.43	S	9.4	AC	20	L	6	58	3.5	5			NAK01
1990 03 21.43	S	9.2	S	15.0	B		25	3.5	3			TAK05
1990 03 21.43	S	9.2	S	15.0	B		25	3.5	3			TAK05
1990 03 23.86	S	9.3	VF	12	L	6	40	3.5	3/			REN
1990 03 25.45	S	9.2	S	31	L	6	62	4	2			KOB01
1990 03 25.47	S	9.7	AC	20	L	6	106	2				NAK01
1990 04 12.89	S	10 :	VF	12	L	6	40	& 3	4			REN
1990 04 24.45	S	10.2	AC	20	L	6	106	1.6	5			NAK01

Comet Levy 1990c

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 25.08	S	10.2	VF	25	L	6	85	2	5			REN
1990 05 26.75	S	9.7	AC	20	L	6	48	2.5	4			YAS
1990 05 27.07	S	10.1	VF	25	L	6	85	2	5			REN
1990 06 01.10	S	10.1	VF	12	L	6	40	1.5	5			REN
1990 06 02.74	S	9.8	AC	13	L	6	44	3	4			ISH02
1990 06 05.72	S	9.9	AC	13	L	6	44	3	3			ISH02
1990 06 05.76	S	9.5	AC	12	L	7	44	2	5			YAS
1990 06 16.70	M	9.5	AA	12.0	B		20	2	4			MIT
1990 06 16.71	S	9.5	AC	13	L	6	44	4	3			ISH02
1990 06 19.69	M	9.3	AA	12.0	B		20	3	4			MIT
1990 06 21.00	S	9.2	VF	12	L	6	40	4	4			REN
1990 06 21.03	B	9.1	SP	15.6	L	10	56	3	3			KOS
1990 06 21.69	B	8.8	S	20	L	6	30	3.6	4			NAG04
1990 06 22.64	M	8.8	AA	12.0	B		20	5	4	0.2		MIT
1990 06 22.75	S	8.6	AC	12	L	7	44	3.5	5			YAS
1990 06 25.03	B	8.8	SP	15.6	L	10	56	5	4			KOS
1990 06 25.04	B	9.1	VF	12	L	6	40	5	5/			REN
1990 06 25.08	B	9.1	VF	8.0	B		12	5	5			REN
1990 06 28.03	B	8.7	SP	15.6	L	10	56	3	6			KOS
1990 06 29.26	S	8.3	S	11.4	L	8	40		3			VIE
1990 06 30.03	B	8.6	SP	15.6	L	10	56	2	7			KOS
1990 07 02.24	S	8.2	S	11.4	L	8	40		3			VIE
1990 07 03.27	S	8.1	S	11.4	L	8	40		3		280	VIE
1990 07 03.68	S	8.3	AC	12	L	7	44	3	5			YAS
1990 07 04.94	B	8.9:	SP	15.6	L	10	56	2	7			KOS
1990 07 05.02	B	8.6	SP	15.6	L	10	56	2	7			KOS
1990 07 05.26	S	8.1	S	11.4	L	8	40		4		280	VIE
1990 07 05.96	S	8.4	V	11	L	7	32	5	2			SHU01
1990 07 06.26	S	8.1	S	11.4	L	8	40		4		280	VIE
1990 07 06.95	S	8.5	V	11	L	7	32	4	3			SHU01
1990 07 10.30	S	7.9	S	11.4	L	8	40					VIE
1990 07 12.27	S	7.8	S	11.4	L	8	40		4			VIE
1990 07 12.78	S	8.0	AA	12	L	7	44	4.5	5			YAS
1990 07 13.29	S	7.8	S	11.4	L	8	40		4			VIE
1990 07 13.82	S	8.5	V	11	L	7	32	5	4			SHU01
1990 07 14.82	S	8.7	V	11	L	7	32	4	5			SHU01
1990 07 15.90	B	7.3	SP	15.6	L	10	56	5	7			KOS
1990 07 16.88	B	7.2	SP	15.6	L	10	56	5	7			KOS
1990 07 17.65	B	8.3	AA	12.0	B		20	6	4			MIT
1990 07 17.77	S	7.6	AA	12	L	7	44	5	5			YAS
1990 07 18.95	S	8.0	V	11	L	7	32	7	4	0.36	250	SHU01
1990 07 19.92	S	7.6	V	11	L	7	32	7	5	0.1	260	SHU01
1990 07 20.74	S	7.3	AA	12	L	7	44	6.5	6			YAS
1990 07 20.95	S	7.6	V	11	L	7	32	4	5	0.2	260	SHU01
1990 07 20.98	B	7.0	VF	5.0	B		7		5/		220	REN

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 21.52	M	7.0	AA	12.0	B		20	7	4	0.5	250	MIT
1990 07 21.73	S	6.6	AA	5.0	B		7					YAS
1990 07 22.98	B	6.8	VF	5.0	B		10					REN
1990 07 23.94	S	7.3	V	11	L	7	32	6	5	0.18	265	SHU01
1990 07 23.97	B	6.9	SP	15.6	L	10	56	5	7	0.17	270	KOS
1990 07 24.89	M	7.1	V	11	L	7	32	7	4			SHU01
1990 07 24.93	B	7.3	S	5	R	4	7	8	6			BRU
1990 07 24.99	B	6.8	SP	15.6	L	10	56	6	7	0.18	265	KOS
1990 07 25.88	M	7.3	V	11	L	7	32	7	4			SHU01
1990 07 26.28	S	6.6	S	5.0	B		10		4		230	VIE
1990 07 26.84	M	7.5	V	11	L	7	32	5	5			SHU01
1990 07 26.99	B	6.6	SP	15.6	L	10	56	7	7	0.17	265	KOS
1990 07 27.25	S	6.4	S	5.0	B		10		4		230	VIE
1990 07 27.94	M	7.1	V	11	L	7	32	7	5			SHU01
1990 07 28.6	S	6.3	AA	7.0	B		10					YAS
1990 07 29.00	B	6.4	SP	15.6	L	10	56	7	7	0.17	260	KOS
1990 07 29.94	B	6.7	S	5	R	4	7	& 8	6			BRU
1990 07 29.99	M	6.8	V	11	L	7	32	7	5			SHU01
1990 07 30.25	S	6.2	S	5.0	B		10		4		230	VIE
1990 07 30.58	S	6.1	AA	7.0	B		10	>10	5			YAS
1990 07 30.85	B	7.1	S	5	R	4	7	11	6			BRU
1990 07 30.90	M	7.3	V	11	L	7	32	6	5			SHU01
1990 07 31.77	S	5.8	AA	7.0	B		10	>10	5			YAS
1990 08 01.63	M	6.5	AA	12.0	B		20	7	5			MIT
1990 08 01.92	M	6.8	V	11	L	7	32	7	5			SHU01
1990 08 02.23	S	5.8	S	5.0	B		10		5		220	VIE
1990 08 03.07	B	6.1	SP	15.6	L	10	56	7	8	0.18	235	KOS
1990 08 03.24	S	5.7	S	5.0	B		10				220	VIE
1990 08 03.64	S	6.3	AA	7.0	B		10	6	5			ISH02
1990 08 03.73	S	5.7	AA	7.0	B		10	>10	6			YAS
1990 08 03.93	B	6.8	S	5	R	4	7	15	6		225	BRU
1990 08 04.66	S	6.1	AA	7.0	B		10	6	5			ISH02
1990 08 04.73	M	5.5	AA	8.0	B		11	9	4	0.7		MIT
1990 08 04.89	B	6.7	S	5	R	4	7	10	6			BRU
1990 08 05.01	B	5.9	SP	15.6	L	10	56	8	8	0.18	235	KOS
1990 08 06.58	M	5.5	AA	8.0	B		11	12	5			MIT
1990 08 06.59	S	5.5	AA	7.0	B		10	15	6	>1	220	YAS
1990 08 06.62	S	5.7	AA	7.0	B		10	& 8	5			ISH02
1990 08 08.61	S	5.2	AA	7.0	B		10	>10	6			YAS
1990 08 09.21	S	5.0	S	5.0	B		10					VIE
1990 08 10.75	M	6.7	V	11	L	7	32	7	6			SHU01
1990 08 10.84	B	5.3	SP	5.0	B	4	7	6	9			KOS
1990 08 11.76	M	5.9	V	11	L	7	32	11	5			SHU01
1990 08 11.90	B	4.8	HR	3.0	B		8		6	1.7	215	REN
1990 08 12.85	B	5.1	SP	5.0	B	4	7	7	9			KOS
1990 08 12.94	B	5.6	S	5	R	4	7	20	7	&1	215	BRU
1990 08 13.49	S	4.6	AA	7.0	B		10	>20	6			YAS
1990 08 13.85	B	5.0	SP	5.0	B	4	7	10	9			KOS
1990 08 13.90	B	4.7	HR	3.0	B		8		6	1.3	210	REN
1990 08 14.50	M	4.5	AA	8.0	B		11	15	5	0.8	265	MIT
1990 08 14.52	B	4.0	S	5.0	B		7	20	6			SOW
1990 08 14.57	S	4.1	AA	0.0	E		1		3			YAS
1990 08 14.58	S	4.0	AA	7.0	B		10	18	5	0.5		ISH02
1990 08 14.85	M	5.8	V	11	L	7	32	10	6			SHU01
1990 08 14.91	B	5.1	S	5	R	4	7	20	8	0.7	208	BRU
1990 08 15.18	S	4.1	S	0.0	E		1	20	5	1.0	195	VIE
1990 08 15.52	B	4.0	S	5.0	B		7	20	7			SOW
1990 08 15.54	M	4.3	AA	8.0	B		11	20	5	1.7	260	MIT
1990 08 15.57	S	4.0	AA	7.0	B		10	18	5	0.33		ISH02

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 15.62	S	4.1	AA	0.0	E		1					YAS
1990 08 16.06	S	4.0	S	0.0	E		1					VIE
1990 08 16.22	B	4.3	AA	0.9	E		1					KEE
1990 08 16.54	B	4.0	S	5.0	B		7	20	7			SOW
1990 08 16.79	K	5.7	V	11	L	7	32	9	6			SHU01
1990 08 17.22	S	4.0	S	5.0	B		10		5			VIE
1990 08 17.74	E	4.8	S	6.5	R	4	11	12	7			MAM
1990 08 17.82	M	5.7	V	11	L	7	32	13	6			SHU01
1990 08 17.92	B	4.4	HR	3.0	B		8	24	6/	1	195	REN
1990 08 18.20	B	3.9	AA	0.9	E		1					KEE
1990 08 18.24	B	4.2	AA	4.0	B		8	19	5	0.7	165	KEE
1990 08 18.65	B	4.0	S	5.0	B		7	30	7			SOW
1990 08 18.74	E	4.5	S	6.5	R	4	11	12	7			MAM
1990 08 18.93	M	5.4	V	11	L	7	32	12	5			SHU01
1990 08 18.99	B	4.4	SP	5.0	B	4	7	15	8	0.4	90	KOS
1990 08 19.86	B	4.2	SP	5.0	B	4	7	18	8	0.6	90	KOS
1990 08 19.86	B	4.8	S	5.0	R	4	7	20	7	0.5	157	BRU
1990 08 19.86	E	3.1	S	6.5	L	8	33			0.2		NAK09
1990 08 19.92	B	4.2	HR	3.0	B		8	24	6/	0.8	160	REN
1990 08 20.17	S	3.7	S	0.0	E		1	25	5		155	VIE
1990 08 20.21	B	4.1	AA	0.9	E		1					KEE
1990 08 20.23				12.0	B		20	22	5	1.5	155	KEE
1990 08 20.57	B	4.0	AA	0.0	E		1					MIT
1990 08 20.59	S	3.8	AA	3	R		6		4			ISH02
1990 08 20.78	M	5.5	V	11	L	7	32	13	6			SHU01
1990 08 21.19	S	3.6	S	0.0	E		1		5			VIE
1990 08 21.55	S	3.9	AA	7.0	B		10	30	6	>0.5		YAS
1990 08 21.61	B	3.9	S	5.0	B		7	30	7			YAS
1990 08 21.70	B	4.4	S	6.5	R	4	11	14	7			MAM
1990 08 21.72	E	4.4	S	6.5	R	4	11	16				MAM
1990 08 21.84	M	5.3	V	11	L	7	32	15	6			SHU01
1990 08 21.97	B	4.5	S	6.5	R	4	11	16	6			MAM
1990 08 22.17	S	3.6	S	0.0	E		1		5			VIE
1990 08 22.52	S	3.8	AA	0.0	E		1	18	6	0.34	50	MIT
1990 08 22.57	M	3.8	AA	7.0	B		10	30	6	0.7		ISH02
1990 08 22.82	M	5.4	V	11	L	7	32	14	6			SHU01
1990 08 22.93	B	4.0	HR	3.0	B		8	24	6			REN
1990 08 23.14	S	3.7	S	0.0	E		1		5			VIE
1990 08 23.70	B	4.0	S	6.5	R	4	11	13	7			MAM
1990 08 23.85	B	3.8	SP	5.0	B	4	7	25	8			KOS
1990 08 23.89	B	3.9	HR	3.0	B		8	25	5/			REN
1990 08 23.91	B	4.1	S	5	R	4	7	20	8	0.2	35	BRU
1990 08 24.23	S	3.5	S	0.0	E		1		5			VIE
1990 08 24.24	B	3.5	AA	0.9	E		1					KEE
1990 08 24.75	B	4.0	S	6.5	R	4	11					MAM
1990 08 25.11	S	3.5	S	0.0	E		1					VIE
1990 08 25.25				12.0	B		20	17	4	1.6	80	KEE
1990 08 25.25	B	3.4	AA	0.9	E		1					KEE
1990 08 25.81	B	3.8	SP	5.0	B	4	7	20	8	0.8	60	KOS
1990 08 25.84	M	5.2	V	11	L	7	32	13	7			SHU01
1990 08 26.06	S	3.5	S	0.0	E		1		5			VIE
1990 08 26.21	B	3.5	AA	0.9	E		1					KEE
1990 08 26.59	M	3.6	AA	7.0	B		10	25	6	0.7		ISH02
1990 08 26.83	M	5.1	V	11	L	7	32	9	7	0.2	90	SHU01
1990 08 26.88	B	4.3	S	5	R	4	7	18	7	1.3	30	BRU
1990 08 27.13	B	3.6	AA	0.9	E		1					KEE
1990 08 27.75	M	5.1	V	11	L	7	32	10	7	0.2	90	SHU01
1990 08 27.83	B	3.8	SP	5.0	B	4	7	13	9	0.9	80	KOS
1990 08 27.85	B	4.4	S	5	R	4	7	9	7	0.4	63	BRU

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 27.95	B	4.2	HR	3.0	B		8		5/			REN
1990 08 28.13	S	3.7	S	0.0	E		1		5			VIE
1990 08 28.20	B	3.6	AA	0.9	E		1					KEE
1990 08 28.21				12.0	B		20	17	5	1.5	60	KEE
1990 08 28.79	M	5.1	V	11	L	7	32	10	7	0.2	90	SHU01
1990 08 28.83	B	4.5	S	5	R	4	7	30	7	1	68	BRU
1990 08 28.83	E	4.2	S	6.5	L	8	33	10	5			NAK09
1990 08 29.21	B	3.6	AA	0.9	E		1					KEE
1990 08 30.08	S	3.7	S	0.0	E		1		5			VIE
1990 08 30.72	E	5.1	S	6.5	R	4	11	8	4			MAM
1990 08 31.09	S	3.7	S	5.0	B		10		5			VIE
1990 08 31.55	S	4.0	AA	7.0	B		10	15	4			ISH02
1990 09 01.08	S	4.1	S	5.0	B		10		5			VIE
1990 09 02.55	M	4.3	AA	7.0	B		10	10	4			ISH02
1990 09 03.12	S	4.2	S	5.0	B		10					VIE
1990 09 03.46	B	5.0	AA	8.0	B		11	8	4/			MIT
1990 09 04.10	S	4.2	S	5.0	B		10		5			VIE
1990 09 06.05	S	4.4	S	5.0	B		10		5			VIE
1990 09 06.72	E	4.4	S	6.5	R	4	11	10	4			MAM
1990 09 07.83	B	5.2	HR	3.0	B		8	20	5/			REN
1990 09 08.06	S	4.3	S	5.0	B		10					VIE
1990 09 08.43	S	4.5	AA	5.0	B		7	20	5	0.33	90	KON03
1990 09 08.47	S	4.5	AA	7.0	B		10	10	4			ISH02
1990 09 08.49	S	4.7	AA	7.0	B		10	10	7			YAS
1990 09 08.70	E	5.1	S	6.5	R	4	11	9	4			MAM
1990 09 09.04	S	4.5	S	5.0	B		10		5			VIE
1990 09 09.69	B	5.2	S	6.5	R	4	11	9	3			MAM
1990 09 09.83	B	5.3	HR	3.0	B		8	20	5			REN
1990 09 11.12	! B	4.9	SP	4.0	B		8	10	3	1.0	75	KEE
1990 09 13.12	B	4.9	SP	4.0	B		8	10	3	1.3	80	KEE
1990 09 15.11	! B	4.7	SP	4.0	B		8	7	3	1.0	75	KEE
1990 09 15.42	M	4.9	A	0.0	E		1					GAR01
1990 09 15.42	M	4.9	A	5.0	B		10			2.0		GAR01
1990 09 18.41	M	5.5	AA	12.0	B		20	5	5			MIT
1990 09 19.42	M	5.2	A	5.0	B		10					GAR01
1990 10 07.46	M	5.8	AA	5.0	B		7		3			WOL01
1990 10 09.38	M	5.8	AA	5.0	B		7		3			WOL01
1990 10 13.41	M	5.7	A	5.0	B		10		8	1.0		GAR01
1990 10 17.36	M	6.0	AA	5.0	B		7		3			WOL01
1990 11 22.64	S	6.5	SC	4.5	R	6	13					JON
1990 11 25.72	M	6.2	A	5.0	B		10					GAR01
1990 11 27.63				31.7	L	5	86		6/	0.6	220	JON
1990 11 27.63	S	6.4	SC	4.5	R	6	13					JON
1990 11 28.63	S	6.2	SC	4.5	R	6	13					JON
1990 11 30.63	S	6.3	SC	4.5	R	6	13					JON
1990 12 10.62	S	7.0	SC	4.5	R	6	13					JON
1990 12 13.62	S	7.0	SC	4.5	R	6	13					JON
1990 12 14.61				31.7	L	5	86	2.5	6	0.25	255	JON
1990 12 14.61	S	7.1	SC	4.5	R	6	13					JON
1990 12 15.62				31.7	L	5	86	3.5	6/	0.25	265	JON
1990 12 15.62	S	7.0	SC	4.5	R	6	13					JON
1990 12 16.61				31.7	L	5	86	3	7	0.2	265	JON
1990 12 16.61	S	7.2	SC	4.5	R	6	13					JON
1990 12 17.62				31.7	L	5	86	3	7	0.1	265	JON
1990 12 17.62	S	7.0	SC	4.5	R	6	13					JON
1990 12 18.62				31.7	L	5	86	2	6/	0.1	260	JON
1990 12 18.62	S	7.0	SC	4.5	R	6	13					JON
1990 12 20.62	S	7.1	SC	4.5	R	6	13					JON
1990 12 22.61				31.7	L	5	86	3	6/	0.1	280	JON

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 12 22.61	S	7.1	SC	4.5	R	6	13					JON
1990 12 23.62	S	7.0	SC	4.5	R	6	13					JON
1990 12 25.62	S	7.1	SC	4.5	R	6	13					JON
1990 12 27.42	M	7.0	AA	5.0	B		7		3			WOL01
1990 12 27.62	S	7.2	SC	4.5	R	6	13					JON
1990 12 29.63	S	7.2	SC	4.5	R	6	13					JON
1991 01 03.64	S	7.9	SC	7.8	R	8	30					JON
1991 01 05.62	S	7.2	SC	4.5	R	6	13					JON
1991 01 07.60	S	7.5	SC	4.5	R	6	13					JON
1991 01 10.63	S	7.4	SC	4.5	R	6	13					JON
1991 01 11.60				31.7	L	5	86	3	6/	0.5	295	JON
1991 01 11.60	S	7.1	SC	4.5	R	6	13					JON
1991 01 13.60				31.7	L	5	86	2.5	7	0.25	295	JON
1991 01 13.60	S	7.7	SC	4.5	R	6	13					JON
1991 01 18.62	S	7.6	SC	4.5	R	6	13					JON
1991 01 22.44	S	7.9	AC	6	R	15	36	4.5	3			MOR03
1991 02 02.45	S	9.1	C	31.7	L	5	86	1.2	7			JON
1991 02 03.39	S	7.7	C	4.5	R	6	13					JON
1991 02 04.43	S	7.8	SC	4.5	R	6	13					JON
1991 02 08.42	S	8.0	SC	4.5	R	6	13					JON
1991 02 10.19	S	8.6	AC	15	R	5	31	5	4			MOR03
1991 02 12.20	S	8.5	AC	6	R	15	36	5.5	4			MOR03
1991 02 14.45	S	7.7	S	4.5	R	6	13					JON
1991 02 17.92	S	8.2	S	31.6	L	5	62	2.5	7			MID01
1991 02 18.00	S	7.5	AA	10.0	B		14	8	4			LOO01
1991 02 18.10	S	8.1	AC	15	R	5	31	5.5	4			MOR03
1991 02 18.42	M	8.3	AA	5	B		7		3			WOL01
1991 02 19.41	S	8.0	S	4.5	R	6	13					JON
1991 02 19.99	S	9.5:	A	20.0	T	10	77	& 2	1			COM
1991 02 20.17	S	8.5	S	10.0	B		25	2.7	4			HAS02
1991 02 21.42	M	8.5	AA	5	B		7		3			WOL01
1991 02 22.43	S	7.9	CS	4.5	R	6	13					JON
1991 02 23.43	S	8.5	CS	7.8	R	8	30					JON
1991 02 23.85	S	7.7:	A	11	L	7	32	8	5			OST
1991 03 03.38	M	9.0	AA	21	L	9	75	3.5	3	0.12		WOL01
1991 03 03.85	S	8.0	AA	12.0	R	4	20	5	5			LOO01
1991 03 03.87	S	9.1	A	28.0	T	10	88	2	3			COM
1991 03 03.91	S	8.0:	A	11.0	L	7	32	& 5	2			SCH04
1991 03 04.40	M	9.0	AA	6.2	R	11	39		3			WOL01
1991 03 04.79	S	9.0:	A	11	L	7	32	3	3			OST
1991 03 06.21	M	8.9	AC	15	R	5	31	5.5	4			MOR03
1991 03 06.38	M	9.0	AA	6.2	R	11	39		3			WOL01
1991 03 07.23	S	9.3	AA	20.0	T	10	87	1.0	3			SHA04
1991 03 07.36	S	10.5	GA	31.7	L	5	86	2	7			JON
1991 03 07.38	M	9.0	AA	6.2	R	11	39		3			WOL01
1991 03 07.80	S	8.0	A	11	L	7	32	3	3			OST
1991 03 07.87	S	9.5:	A	28.0	T	10	88	& 2	2/			COM
1991 03 07.97	B	8.8	VF	12	L	6	40	5	5			REN
1991 03 08.15	S	9.3	AA	20.0	T	10	87	1.2	3			SHA04
1991 03 08.23	M	9.0	AC	15	R	5	31	5	4			MOR03
1991 03 08.76	S	8.3	A	11	L	7	32	4	3			OST
1991 03 08.87	S	9.1	AA	20	L	4	37	4.5	3			PAN
1991 03 08.97	B	8.7	VF	8.0	B		12	6	6			REN
1991 03 09.09	M	9.2	AC	15	R	5	31	6	4			MOR03
1991 03 10.36	M	9.3	AA	6.2	R	11	39		3			WOL01
1991 03 10.37	M	10.4	L	31.7	L	5	86					JON
1991 03 10.37	S	10.4	L	31.7	L	5	86	2	6			JON
1991 03 10.90	S	9.1	AA	10.0	B		25	3.5	3			HAS02
1991 03 11.21	S	9.3	AA	20.0	T	10	87	1.7	4			SHA04

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 03 11.68	S	9.6	SM	20.3	L	7	56					CAM03
1991 03 11.93	S	9.0	A	11.0	L	7	32	8	2/			SCH04
1991 03 12.19	S	9.5	AA	20.0	T	10	87	1.9	2			SHA04
1991 03 12.44	S	10.5	L	31.7	L	5	86	1.5	6			JON
1991 03 12.84	S	8.4	A	11	L	7	32	3	2			OST
1991 03 13.06	M	9.5	AC	15	R	5	31	4	4			MOR03
1991 03 13.38	M	9.5	AA	6.2	R	11	39		3			WOL01
1991 03 13.93	S	8.4	AA	12.0	R	4	20	4	5			LOO01
1991 03 14.38	M	9.5	AA	6.2	R	11	39		3			WOL01
1991 03 16.21	S	9.9	AC	15	R	5	31	4.5	3			MOR03
1991 03 16.36	M	10.0	VN	21	L	9	75	7.5	5			WOL01
1991 03 16.79	S	8.7	A	11	L	7	32	4	3			OST
1991 03 16.82	S	9.2	AC	10.0	B		25	4.5	3			HAS02
1991 03 17.01	B	9.2	VF	12	L	6	40	6	5			REN
1991 03 17.04	S	10.0:	S	25.4	L	6	57		3			VIE
1991 03 17.34	M	10.9	L	31.7	L	5	86	1	5			JON
1991 03 17.34	S	10.8	L	31.7	L	5	86	1	5			JON
1991 03 17.80	S	9.0	A	11	L	7	54	3	4			OST
1991 03 18.17	M	8.8	AA	31.8	L	4	33	4	3			KEE
1991 03 18.41	M	10.8	L	31.7	L	5	86					JON
1991 03 18.41	S	10.7	L	31.7	L	5	86	1	5			JON
1991 03 18.80	S	8.9	A	11	L	7	54	3	2			OST
1991 03 19.40	M	10.9	L	31.7	L	5	86					JON
1991 03 19.40	S	10.9	L	31.7	L	5	86	& 1	4			JON
1991 03 20.40	S	10.9	L	31.7	L	5	86	& 1	4			JON
1991 03 21.41	S	11.0	L	31.7	L	5	86	& 1	4			JON
1991 03 21.85	S	9.8	AA	20	L	4	37	4	2			PAN
1991 03 23.01	S	10.4:	S	25.4	L	6	57		3			VIE
1991 04 02.84	S	9.3	AA	12.0	R	4	20	6	3			LOO01
1991 04 03.13	S	11.0	AC	15	R	5	62	2.5	3			MOR03
1991 04 06.20	M	10.2	NP	25.6	L	4	45	3.4	3/	0.11	195	MOR
1991 04 08.06	S	11.4	AC	15	R	5	62	2.0	1			MOR03
1991 04 09.91	S	10.9	A	28.0	T	10	88	1	1			COM
1991 04 11.89	S	11.0	A	28.0	T	10	88	1	1			COM
1991 04 12.06	S	11.6	AC	15	R	5	62	2.6	1			MOR03
1991 04 12.33	S	11.2	MV	31.7	L	5	86					JON
1991 04 12.94	S	11.0:	A	28.0	T	10	88					COM
1991 04 13.21	M	10.8	NP	25.6	L	4	67	3.3	3			MOR
1991 04 14.23	M	10.9	NP	50.8	L	4	78	2.7	3	0.05	160	MOR
1991 04 15.34	S	11.4	MV	31.7	L	5	86		4/			JON
1991 05 04.09	S	13.3	AC	44.5	L	4	167	1.0	1			MOR03
1991 05 04.88	S	11.4	AC	20.3	T	10	80	1	2			GAR02
1991 05 12.21	S	11.8	NP	50.8	L	4	78	2.2	2/			MOR
1991 05 13.17	S	11.5	AC	31.8	L	4	63	2	1			KEE
1991 06 02.19	! S	13.5	NP	50.8	L	4	195	1.0	2			MOR
1991 06 08.20	! S	13.6	NP	50.8	L	4	275	0.81	2			MOR
1991 10 14.50	I[	13.0		41	L	4	183					HAL
1991 11 07.51	I[	13.5		41	L	4	183					HAL

Comet McNaught-Hughes 1990g

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 05 12.34	S	12.8	NP	50.8	L	4	120	2.1	1/			MOR
1991 06 02.26	S	13.7	NP	50.8	L	4	195	1.0	2			MOR
1991 06 08.31	S[	14.0	NP	50.8	L	4	195					MOR

Comet Tsuchiya-Kiuchi 1990i

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 17.50	S	8.6	S	15.0	B		25	4.5	3			TAK05
1990 07 21.48	M	8.7	AA	12.0	B		20	5	3			MIT
1990 07 21.49	S	8.5	AC	20	L	6	46	5	3			NAK01
1990 08 15.45	M	8.3	AA	12.0	B		20	4	4			MIT
1990 08 16.45	S	8.2	S	20	L	6	58	2.5	3/			NAK01
1990 10 02.81	S	7.3	S	20	L	6	58	3.5	4/			NAK01
1990 10 10.82	M	7.6	AA	12.0	B		20	3	5			MIT
1990 10 15.82	S	7.1	AA	7.0	B		10		6			YAS
1990 10 16.39	S	7.3	S	5.0	B		10		3			VIE
1990 10 16.50	M	7.8	AA	15.2	L	3	16	4	2			KEE
1990 10 16.82	S	7.1	AA	7.0	B		10					YAS
1990 10 18.06	B	8.5:	S	10	T	7	31	3				SKO01
1990 10 19.05	B	8.3	S	10	T	7	31	3				SKO01
1990 10 19.80	M	7.5	S	12.0	B		20	4	5			MIT
1990 10 19.82	S	7.0	AA	7.0	B		10					YAS
1990 10 19.83	S	6.9	AA	25	L	5	40	5	5			NAK05
1990 10 20.83	B	8.5	AC	17.5	L	5	36	3	6			SOW
1990 10 21.39	S	7.1	S	11.4	L	8	40		4			VIE
1990 10 21.82	S	7.0	AA	7.0	B		10		6			YAS
1990 10 23.42	S	7.3	S	5.0	B		10					VIE
1990 10 23.80	M	7.5	S	3.5	B		7	5	5			TSU02
1990 10 26.79	M	7.5	AA	12.0	B		20	5	5			MIT
1990 10 28.77	M	7.7	S	20	L	6	46	5.5	5		280	NAK01
1990 10 28.83	S	7.3	AA	7.0	B		10					YAS
1990 10 28.84	M	7.2	AA	31	L	4	40	5	5			TSU02
1990 10 29.50	K	7.4	S	4.0	S		8	7	3			KEE
1990 10 30.20	B	7.5	VF	8.0	B		12	5	5			REN
1990 10 31.78	M	7.7	S	20	L	6	46	5	5			NAK01
1990 11 01.20	B	7.5	VF	8.0	B		12	5	5/			REN
1990 11 04.22	S	8.9	AA	20	L	4	37	4	3			PAN
1990 11 05.76	S	7.6	AA	13	L	6	24	3	3			ISH02
1990 11 06.22	S	9.0	AA	20	L	4	37	4.5	3			PAN
1990 11 10.81	S	7.1	AC	13	L	6	24	5	3			ISH02
1990 11 11.80	S	7.6	AC	20	L	6	46	6	3			NAK01
1990 11 11.81	S	7.2	AC	13	L	6	24	5	3			ISH02
1990 11 11.82	S	6.8	AA	25	L	5	40	5	5			NAK05
1990 11 11.85	S	7.9	AA	12	L	7	44	3	4			YAS
1990 11 13.82	S	7.8	AA	12	L	7	44	4.5	4			YAS
1990 11 14.61	S	7.5	SC	4.5	R	6	13	5				JON
1990 11 14.85	S	7.9	AA	12	L	7	44	4	4			YAS
1990 11 15.05	B	8.0:	S	10	T	7	31	6				SKO01
1990 11 15.79	S	7.5	AC	20	L	6	46	7	3			NAK01
1990 11 15.82	M	7.5	S	3.5	B		7	6	4			TSU02
1990 11 16.02	B	8.4	S	10	T	7	31	5				SKO01
1990 11 17.04	B	8.5	S	10	T	7	31	5				SKO01
1990 11 17.79	B	7.5	S	25	L	5	40	7	1			NAK05
1990 11 17.81	S	8.2	AA	12	L	7	44	3	4			YAS
1990 11 21.79	S	7.7	AC	20	L	6	46	7	4			NAK01
1990 11 21.81	S	7.8	AA	13	L	6	24	4	3			ISH02
1990 11 22.04	B	8.7	S	10	T	7	31	5				SKO01
1990 11 22.74	B	7.8	S	25	L	5	40	8	2			NAK05
1990 11 23.04	B	8.7	S	10	T	7	31	5				SKO01
1990 11 23.78	M	7.5	S	12.0	B		20	7	4			MIT
1990 11 23.78	S	7.6	AC	20	L	6	46	6.5	3			NAK01
1990 11 23.81	M	7.6	S	3.5	B		7	6				TSU02
1990 11 24.60	S	7.5	SC	4.5	R	6	13	3	1			JON
1990 11 24.82	S	8.3	S	12	L	7	44	3.5	3			YAS
1990 11 25.20	B	7.5:	VF	8.0	B		12	6.5	5			REN
1990 11 26.78	S	7.8	AA	20	L	6	46	6.5	4			NAK01

Comet Tsuchiya-Kiuchi 1990i [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 11 27.59	S	7.6	AA	4.5	R	6	13	6	1			JON
1990 11 28.61	S	8.5	C	7.8	R	8	30					JON
1990 11 30.61	S	8.5	C	7.8	R	8	30					JON
1990 12 04.74	S	8.9	AA	13	L	6	62	3	2			ISH02
1990 12 08.74	S	8.8	AA	13	L	6	62	3	3			ISH02
1990 12 10.68	S	8.2	AA	20	L	6	46	6	2			NAK01
1990 12 12.47	S	8.1	RC	4.5	R	6	13		1			JON
1990 12 12.65	S	8.3	S	20	L	6	46	6.5	1			NAK01
1990 12 12.66	S	8.9	AC	13	L	6	44	4	2			ISH02
1990 12 13.44	S	8.1	RC	4.5	R	6	13					JON
1990 12 14.43	S	8.1	RC	4.5	R	6	13					JON
1990 12 15.45	S	9.0	RC	7.8	R	8	30					JON
1990 12 15.63	S	7.8	AA	25	L	5	40	10	2			NAK05
1990 12 16.60	S	8.9	RC	4.5	R	6	13	4				JON
1990 12 16.61	S	9.0	S	13	L	6	62	3	2			ISH02
1990 12 17.61	S	8.3	RC	4.5	R	6	13	4.3	0			JON
1990 12 17.79	B	7.2	S	5.6	B		8		4			OKA05
1990 12 18.60	S	8.6	RC	4.5	R	6	13					JON
1990 12 19.57	S	8.9	AC	13	L	6	44	4	2			ISH02
1990 12 19.59	S	8.6	AA	20	L	6	46	7	2			NAK01
1990 12 20.60	S	8.9	RC	7.8	R	8	30					JON
1990 12 21.60	M	9.2	S	31	L	4	40	4	1			TSU02
1990 12 22.62	S	8.9	RC	7.8	R	8	30					JON
1990 12 23.55	S	9.3	AC	13	L	6	44	3	2			ISH02
1990 12 23.61	S	9.3	RC	7.8	R	8	30					JON
1990 12 25.60	S	9.3	RC	7.8	R	8	30					JON
1990 12 27.61	S	10.4	RC	31.7	L	5	86	2.5	1/			JON
1990 12 29.62	S	10.6	RC	31.7	L	5	86	2.2	1/			JON
1991 01 05.43	S	10.8	GA	31.7	L	5	86	2.3	2			JON
1991 01 07.45	S	11.2	GA	31.7	L	5	86	2.5	2			JON
1991 01 08.46	S	10.2	AC	20	L	6	58	5.5	1			NAK01
1991 01 09.43	S	11.2	GA	31.7	L	5	86	2	1/			JON
1991 01 11.45	S	11.5	GA	31.7	L	5	86	2.5	1			JON
1991 01 18.42	S	10.7	AC	20	L	6	58	4	0			NAK01
1991 01 18.44	S	10.9	GA	31.7	L	5	86	2.5	1			JON
1991 01 19.47	S	10.9	AC	20	L	6	58	3	0			NAK01

Comet Arai 1991b

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 01 07.96	S	11.7	AA	20	L	4	37	6	1			PAN
1991 01 09.05	S	11.3	AA	20	L	4	37	4.5	1			PAN
1991 01 13.92	S	11.7	AA	20	L	4	37	7	1			PAN
1991 01 22.45	S	11.8	AC	15	R	5	62	2.0				MOR03
1991 01 26.45	S	12.0	AC	15	R	5	62	1.8				MOR03
1991 02 05.23	S	13.1	AC	31.8	L	4	150	0.6	1			KEE

Comet Shoemaker-Levy 1991d

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 04 06.22	S	13.6	NP	25.6	L	4	156	0.7				MOR
1991 04 13.22	S	13.6	NP	25.6	L	4	156	0.8	2			MOR
1991 04 14.24	S	13.6	NP	50.8	L	4	120	0.9	3			MOR
1991 05 12.23	S	13.5	NP	50.8	L	4	195	0.8	3			MOR
1991 06 02.20	S	13.3	NP	50.8	L	4	195	1.1	2/			MOR
1991 06 08.22	S	13.4	NP	50.8	L	4	195	0.9	3			MOR
1991 10 08.12	S	12.9:	NP	25.2	L	4	140	1.4	1/			KOR01
1991 10 09.12	S	12.9:	NP	25.2	L	4	140	1.6	2			KOR01
1991 11 05.52	! M	12.3	AC	41	L	4	83		6			HAL

Comet Shoemaker-Levy 1991d [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 11 17.52	! M	11.8	AC	41	L	4	83					HAL

Comet Helin-Lawrence 1991l

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 05 17.98	S	12.9	A	28.0	T	10	165	0.5	1			COM
1991 06 02.24	S	13.7	NP	50.8	L	4	195	0.6	1/			MOR
1991 06 08.26	S	13.8	NP	50.8	L	4	275	1.0	2			MOR
1991 06 30.69	I[	13.0	UM	25.2	L	4	35					KOR01
1991 07 01.70	S	12.8	UM	25.2	L	4	35	2	2			KOR01
1991 07 01.71	[	12.8	UM	22.9	L	4	56					ZHU
1991 07 02.70	I[	13.3	UM	25.2	L	4	35					KOR01
1991 07 03.71	[	13.3	UM	22.9	L	4	56					ZHU
1991 07 04.17	! S	13.5	AC	41	L	4	183					HAL

Comet Helin-Alu 1991r

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 07 04.20	I[	13.0		41	L	4	183					HAL

Comet Shoemaker-Levy 1991a1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 10 11.25	I[	14.0		41	L	4	183					HAL
1991 10 30.28	I[	13.5		41	L	4	183					HAL
1991 11 08.30	I[	14.0		41	L	4	183					HAL

Periodic Comet Encke

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 30.46	S	11.7	AC	31.8	L	4	63	1.5	0			KEE
1990 09 17.27	S	9.5:	S	25.4	L	6	57		3			VIE
1990 09 18.74	S	9.8	S	15.0	B		25	2	4			TAK05
1990 09 19.16	S	9.2	VF	12	L	6	40	3	4/			REN
1990 09 19.28	S	9.2:	S	25.4	L	6	57		3			VIE
1990 09 19.49	M	10.2	AA	31.8	L	4	63	2	3			KEE
1990 09 20.79	S	10.0	AA	20	L	6	48	3	3			YAS
1990 09 21.78	S	9.3	AC	20	L	6	58	3.5	3			NAK01
1990 09 21.82	M	8.3	S	31	L	4	40	3	4			TSU02
1990 09 22.75	M	10.0	AA	12.0	B		20	4	3			MIT
1990 09 22.80	S	9.3	AA	25	L	5	40	3.5	4			NAK05
1990 09 24.17	S	8.8	VF	12	L	6	40	4	4	&0.13	100	REN
1990 09 26.81	S	8.8	AC	20	L	6	48	3	3			YAS
1990 09 28.15	S	8.8	VF	12	L	6	40	5	4	?	90	REN
1990 10 01.49	M	8.6	S	31.8	L	4	63	3	3			KEE
1990 10 02.77	S	8.0	AA	20	L	6	58	3.5	5			NAK01
1990 10 03.36	S	8.2	S	11.4	L	8	40		3			VIE
1990 10 09.83	S	8.4	AA	25	L	5	40	1.5	7			NAK05
1990 10 10.81	B	7.8	AA	12.0	B		20	2	6			MIT
1990 10 15.83	S	7.8	S	20	L	6	48	1.5	6			YAS
1990 10 16.41	S	8.0	S	11.4	L	8	40		6			VIE
1990 10 16.49	M	8.5	S	15.2	L	3	16	2	2			KEE

Periodic Comet Schwassmann-Wachmann 3 (1989d1)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 24.01	B	9.6	S	11	L	7	32	5	4			OST
1990 03 28.03	B	9.4	S	11	L	7	32	4	4			OST
1990 03 29.04	B	9.7	S	11	L	7	32	4	4			OST

Periodic Comet Schwassmann-Wachmann 3 (1989d1) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 04 05.15	S	10.9	VF	12	L	6	60	2.5	4			REN
1990 04 29.14	S	10 :	VF	12	L	6	40	2.5	4			REN
1990 04 30.12	S	10.1	VF	12	L	6	40	2.5	4/			REN

Periodic Comet Honda-Mrkos-Pajdušáková (1990f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 17.77	S	8.5	AC	20	L	6	58	3.5	1/			NAK01
1990 08 18.13	S	10 :	VF	12	L	6	60	3	3			REN
1990 08 18.79	S	8.8	AC	8.0	B		20	3.5	4			YAS
1990 08 20.11	S	9.3	VF	12	L	6	40	3	4			REN
1990 08 20.77	S	9.0	S	15.0	B		25	3	5			TAK05
1990 08 21.77	S	8.6	AA	13	L	6	44	3	3			ISH02
1990 08 21.78	S	9.0	AA	12.0	B		20	3	3			MIT
1990 08 24.14	S	9.0	VF	12	L	6	40	3	4			REN
1990 08 24.76	S	7.9	AC	20	L	6	46	5.5	4			NAK01
1990 08 24.77	S	8.5	S	15.0	B		25	3	5			TAK05
1990 08 25.45	K	8.8	AA	12.0	B		20	3.5	2			KEE
1990 08 26.77	S	7.8	AC	20	L	6	46	5	4/			NAK01
1990 08 26.79	M	8.5	S	16	W	4	49	5	6			TSU02
1990 08 31.80	B	7.7	AA	25	L	5	40	4	7			NAK05
1990 09 01.22	B	8.1	S	12.0	B		20	3	2			KEE
1990 09 03.79	S	8.0	AA	13	L	6	24	3	4			ISH02
1990 09 03.80	M	8.3	AA	12.0	B		20	3	4			MIT
1990 09 09.79	M	8.1	AA	12.0	B		20	3	6			MIT
1990 09 21.80	S	8.7	AC	20	L	6	46	2.5	7			NAK01
1990 09 22.81	M	8.5	AA	12.0	B		20	2	6			MIT
1990 09 24.18	S	8.5	VF	12	L	6	40	1.5	7			REN
1990 09 28.18	S	9.0:	VF	12	L	6	40		7			REN
1990 10 02.80	S	9.2	AC	20	L	6	58	3.0	3			NAK01

Periodic Comet Hartley 1 (1991j)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 05 12.37	S	13.9	NP	50.8	L	4	120	1.1	3/			MOR
1991 06 08.28	S[	14.0	NP	50.8	L	4	275					MOR

Periodic Comet Machholz

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 07 13.70	M	8.6	AA	6	R	11	39	1.9	3			WOL01
1991 07 28.06	S[	5.5	NO	12.0	B		20					BOR
1991 07 31.89	S	8.9	AA	15.0	L	4	26	& 5	6/			PER01
1991 08 01.07	S[	8.0	NO	12.0	B		20					BOR
1991 08 01.22	S	8.8	AA	20.0	T	10	64	5	3			SPR
1991 08 02.68	S	8.7	AA	25.2	L	4	35	6	5	0.06	290	KOR01
1991 08 03.68	S	9.0	AA	25.2	L	4	35	4	4			KOR01
1991 08 04.17	M	9.0	AA	50.8	L	4	78	0.8	6	0.10	90	MOR
1991 08 04.22	S	9.2	AA	20.0	T	10	64	4	3			SPR
1991 08 04.68	S	9.2	AA	25.2	L	4	35	6	5	0.06	295	KOR01
1991 08 06.08	S	10.0	AC	50.0	L	5	78	1.0	3			BOR
1991 08 06.15	! M	9.5	AC	41	L	4	83					HAL
1991 08 06.22	S	9.5	AA	20.0	T	10	64	4	3			SPR
1991 08 06.68	S	9.5:	AA	25.2	L	4	35	5	4			KOR01
1991 08 08.67	S	9.7	AA	25.2	L	4	35	5	4			KOR01
1991 08 08.68	S	9.8	AA	25.2	L	4	70	6	4	0.05	295	KOR01
1991 08 09.67	S	10.0	AA	25.2	L	4	35	4	3			KOR01
1991 08 10.18	M	9.6	AA	50.8	L	4	78	1.8	3/	0.07	70	MOR
1991 08 10.67	S	10.3	AA	25.2	L	4	35	5	3	0.05	300	KOR01

Periodic Comet Machholz [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 08 10.68	S	10.2	AA	25.2	L	4	70	4	3	0.05	295	KOR01
1991 08 11.19	M	9.8	AA	50.8	L	4	78	1.7	3/			MOR
1991 08 11.67	S	10.5	AA	25.2	L	4	35	5	2/			KOR01
1991 08 12.07	S[	11.0	AC	31.7	L	6	68					BOR
1991 08 13.16	! S	10.3	AC	41	L	4	83	5	2/			HAL
1991 08 28.12	I[	12.0		41	L	4	83					HAL
1991 09 02.13	I[	13.0		41	L	4	183					HAL

Periodic Comet Mrkos (1991k)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 04 14.28	! S	14.1	NP	50.8	L	4	195	0.7	4			MOR

Periodic Comet Wirtanen (1991s)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 08 08.45	S	11.4	WA	41	L	4	83		1			HAL
1991 08 18.44	S	11.3	NP	25.6	L	4	67	2.6	2			MOR
1991 08 20.14	S	11.8	AC	20.3	T	10	62	1.5	1			GAR02
1991 08 20.47	S	11.1	WA	41	L	4	83					HAL
1991 08 21.13	S	11.4	AC	20.3	T	10	62	1.5	2			GAR02
1991 09 06.09	S	10.0	AC	20.4	L	6	72	1.7	2			JAH
1991 09 07.36	S	9.9	AC	31.7	L	6	68	1.3	4			BOR
1991 09 07.46	S	10.6	WA	41	L	4	83					HAL
1991 09 08.47	M	10.7	NP	25.6	L	4	67	2.2	2/			MOR
1991 09 09.12	S	10.0	S	10.0	B		14	1.3	3			HAS02
1991 09 11.13	S	10.9	AC	20.0	L	4	40	1.5	3			MIK
1991 09 11.13	S	11.0	AC	20.0	L	4	40	& 2	3			MIK
1991 09 12.09	B	9.8:	S	20.4	L	6	72	4.6	3			JAH
1991 09 12.09	S	10.0	AC	20.4	L	6	72					JAH
1991 09 12.11	S	9.2	AG	20.3	T	10	80	2.2	2/			GRA04
1991 09 12.38	S	9.8	AC	31.7	L	6	68	2.2	3			BOR
1991 09 13.37	S	9.9	AC	31.7	L	6	68	1.6	3			BOR
1991 09 14.09	S	10.0	AC	20.4	L	6	72	& 4.0	2			JAH
1991 09 14.48	! M	10.3	NP	25.6	L	4	45	3.1	3			MOR
1991 09 15.12	S	9.9	AC	20.4	L	6	72	2.4	4			JAH
1991 09 15.47	M	9.7	CA	41	L	4	83					HAL
1991 09 15.50	! M	10.2	NP	25.6	L	4	45	3.4	3	0.08	270	MOR
1991 09 21.38	S	9.6	AC	31.7	L	6	68	1.3	4			BOR
1991 09 25.10	S	9.9	AA	25.2	L	4	70	3.5	4			KOR01
1991 09 25.14	S	10.8	AC	20.0	L	4	67	& 2	3			MIK
1991 09 26.11	S	9.7	AA	25.2	L	4	70	3	4			KOR01
1991 09 27.10	S	9.7	AA	25.2	L	4	70	3.2	3			KOR01
1991 10 01.11	S	9.8	AA	25.2	L	4	70	3.4	4			KOR01
1991 10 04.10	S	9.7	AA	25.2	L	4	70	3.7	3			KOR01
1991 10 05.11	S	9.7	AA	25.2	L	4	70	4.1	4			KOR01
1991 10 05.52	! M	10.0:	AA	25.6	L	4	67	3.0	3/			MOR
1991 10 06.40	S	10.1	AC	41	L	4	83					HAL
1991 10 06.52	! M	9.8:	AA	50.8	L	4	78	2.6	2/			MOR
1991 10 07.11	S	9.6	AA	25.2	L	4	70	3.5	3			KOR01
1991 10 08.11	S	9.7	AA	25.2	L	4	70	3.2	4			KOR01
1991 10 09.10	S	9.8	AA	25.2	L	4	70	3.1	4			KOR01
1991 10 09.18	S	10.8	AC	33	L	4	50	1.5	4/			BOA
1991 10 10.15	S	10.4	AC	20.0	L	4	40	& 4	3			MIK
1991 10 12.49	M	10.2	AC	31.8	L	4	48	2	1			KEE
1991 10 13.49	S	10.4	AC	41	L	4	83					HAL
1991 10 19.51	S	10.3	AC	41	L	4	83					HAL
1991 10 25.18	[	11.0	AC	20.0	L	4	40					MIK
1991 11 03.52	S	11.0	NP	25.6	L	4	111	2.8	1			MOR

Periodic Comet Wirtanen (1991s) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 11 06.51	S	11.3	AC	41	L	4	83					HAL
1991 11 12.53	S	11.4	NP	25.6	L	4	111	2.0	1/			MOR
1991 11 18.52	S	11.6	AC	41	L	4	83		1			HAL

Periodic Comet Arend-Rigaux

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 10 05.47	S[	13.0	NP	25.6	L	4	156					MOR
1991 10 06.49	I[	13.5		41	L	4	183					HAL
1991 10 06.50	S[	13.7	NP	50.8	L	4	275					MOR
1991 10 14.47	I[	14.0		41	L	4	244					HAL
1991 11 03.51	S[	13.0	NP	25.6	L	4	156					MOR
1991 11 06.48	I[	14.0		41	L	4	183					HAL

Periodic Comet Wild 2 (1989t)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 11 18.45	S	12.9	AC	44.5	L	4	167	0.8	2			MOR03
1991 01 13.45	S	13.8	AC	44.5	L	4	167	0.5				MOR03
1991 01 26.25	S	11.1	S	31.6	L	5	62	1.1	3			MID01
1991 04 13.46	S	13.3	NP	25.6	L	4	156	1.1	2			MOR
1991 05 21.30	S	13.4	GA	40	L	7	190	0.40	3			MOD
1991 06 05.23	S	13.3	GA	35.9	L	7	214	0.5	1			MOD
1991 06 06.26	S	13.4	GA	40	L	7	190	0.35	3			MOD
1991 06 07.26	S	13.4	GA	40	L	7	190	0.30	3			MOD
1991 06 08.33	M	13.0	NP	50.8	L	4	195	0.8	4			MOR
1991 06 13.29	S	13.4	GA	40	L	7	190	0.40	2			MOD
1991 06 15.26	M	13.0	NP	50.8	L	4	195	0.7	4/			MOR
1991 06 21.27	S	13.4	GA	40	L	7	190	0.35	3			MOD
1991 07 04.22	S[	13.3	AC	41	L	4	183	1				HAL
1991 07 06.19	S	14.1	GA	40	L	7	190	0.25	3			MOD
1991 07 09.21	S	14.3	GA	40	L	7	250	0.22	1			MOD
1991 07 10.20	S	14.4	GA	40	L	7	190	0.20	1			MOD
1991 07 11.20	S[	14.5	GA	40	L	7	190	! 0.2				MOD
1991 07 15.15	S[	14.8	GA	40	L	7	190	! 0.25				MOD
1991 07 16.19	S[	14.8	GA	40	L	7	190	! 0.25				MOD
1991 08 04.25	S	14.2	NP	50.8	L	4	275	0.45	4			MOR

Periodic Comet Takamizawa (1991h)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 08 04.22	S	14.0	NP	50.8	L	4	275	0.74	2			MOR
1991 08 06.18	I[	13.0		41	L	4	183					HAL
1991 08 07.18	I[	13.5		41	L	4	183					HAL
1991 08 10.21	S[	13.7	NP	50.8	L	4	275					MOR
1991 08 10.70	I[	14.8		25.2	L	4	98					KOR01
1991 08 11.18	S[	13.7	NP	50.8	L	4	275					MOR
1991 08 11.70	S	12.4:	NN	25.2	L	4	98	1.5	7			KOR01
1991 08 12.70	S	13.7	NN	25.2	L	4	98	1.2	7			KOR01
1991 08 13.19	I[	13.5		41	L	4	183					HAL
1991 08 13.70	I[	14.9		25.2	L	4	98					KOR01
1991 09 02.15	I[	13.5		41	L	4	183					HAL
1991 09 25.79	S	12.7:	NP	25.2	L	4	140	1.6	2			KOR01
1991 09 26.79	S	12.9:	NP	25.2	L	4	140	1.5	2/			KOR01
1991 09 30.11	I[	13.5		41	L	4	183					HAL
1991 10 06.14	S[	14.0	NP	50.8	L	4	275					MOR
1991 10 08.10	I[	13.0		41	L	4	183					HAL
1991 10 27.11	I[	13.0		41	L	4	183					HAL

Periodic Comet Hartley 2 (1991t)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 07 09.92		11.5:		25.2	L	4	35	&10	2			KOR01
1991 07 09.93		11.5:		22.9	L	4	56	&10	1			ZHU
1991 07 10.88		11.0:	SC	22.9	L	4	56	&15	1			ZHU
1991 07 10.94	S	10.5:	A	25.2	L	4	35	&10	1			KOR01
1991 07 11.91	S	10.5	A	11.0	B		20	9	1			SHU
1991 07 11.92		11.0:	SC	22.9	L	4	56	&10	1			ZHU
1991 07 11.95	S	10.3	A	25.2	L	4	35	10	1			KOR01
1991 07 12.88		11.0:	SC	22.9	L	4	56	&15	1/			ZHU
1991 07 12.92	S	10.4	A	25.2	L	4	35	14	2			KOR01
1991 07 12.93	S	10.4	A	11.0	B		20	8	1			SHU
1991 07 13.92	S	10.6	A	22.9	L	4	56	10	2/			ZHU
1991 07 13.94	S	10.4	A	11.0	B		20	10	1			SHU
1991 07 13.94	S	10.4	A	25.2	L	4	35	10	2			KOR01
1991 07 13.94	S	10.4	A	25.2	L	4	70	8	2			KOR01
1991 07 15.43	M	9.4	AA	8.0	B		20	9	1/			MOR
1991 07 15.87	S	10.3	A	25.2	L	4	35	12	1			KOR01
1991 07 15.89	S	10.4	A	22.9	L	4	56	14	2			ZHU
1991 07 15.90	S	10.4	A	11.0	B		20	10	1			SHU
1991 07 16.42	M	10.2	AC	41	L	4	83					HAL
1991 07 16.89	S	10.3	A	22.9	L	4	32	10	2/			ZHU
1991 07 17.83	S	10.3	A	22.9	L	4	32	15	2/			ZHU
1991 07 17.83	S	10.3	A	25.2	L	4	35	15	2			KOR01
1991 07 17.90	S	10.4	A	11.0	B		20	10	2			SHU
1991 07 18.83	S	10.2	A	25.2	L	4	35	14	2/			KOR01
1991 07 18.85	S	10.3	A	11.0	B		20	9	2			SHU
1991 07 18.88	S	10.1	A	22.9	L	4	32	13	3			ZHU
1991 07 21.99	B	10.8	AC	20.4	L	6	72	2.8	3			JAH
1991 07 22.06	S	10.6	AC	20.0	L	4	40	3	2			MIK
1991 07 22.91	S	9.8	AA	25.2	L	4	35	8	3			KOR01
1991 07 23.06	B	10.6:	AC	20.4	L	6	72	& 3.6	1			JAH
1991 07 23.07	S	10.5	AC	20.0	L	4	40	3	3			MIK
1991 07 23.94	S	9.8	AA	25.2	L	4	35	12	3			KOR01
1991 07 24.08	S	10.4	AC	20.0	L	4	40	& 3	2			MIK
1991 07 24.95	S	9.7	AA	25.2	L	4	35	13	3			KOR01
1991 08 04.94	S	8.8	AA	25.2	L	4	35	11	3			KOR01
1991 08 05.32	S	8.9	AA	15.2	L	5	30	4				HER02
1991 08 05.94	S	8.7	AA	25.2	L	4	35	13	2/			KOR01
1991 08 05.99	S	9.0	AA	20.0	L	4	52	10	3			ZHU
1991 08 06.29	M	9.9	GA	20.0	L	5	35	1.7	4			MOD
1991 08 06.30	S	9.0	AA	15.2	L	5	30					HER02
1991 08 06.33	S	9.0	NO	8.0	B		20	5.6	2			BOR
1991 08 06.33	S	9.5	NO	31.7	L	6	68	3.4	4			BOR
1991 08 06.90	S	8.7	AA	25.2	L	4	35	9	3	0.1	150	KOR01
1991 08 07.02	S	9.7	S	20.3	T	10	51	2.3	3			HAS02
1991 08 07.06	B	10.2	CS	12.7	T	10	40	3.5	2			GAR02
1991 08 07.39	M	9.8	GA	20.0	L	5	35	2.0	3			MOD
1991 08 07.94	S	8.5	AA	25.2	L	4	35	8	3	0.09	150	KOR01
1991 08 07.96	S	8.5	AA	25.2	L	4	70	9	4	0.11	155	KOR01
1991 08 08.01	S	9.3:	AC	20.3	T	10	80	3.5	5			DAH
1991 08 08.03	S	8.8	AG	31.6	L	5	62	4.5	4			MID01
1991 08 08.03	S	9.2	AC	20.3	T	10	80	3.0	1			GRA04
1991 08 08.08	M	9.6	AC	20.0	L	4	40	4.5	6			MIK
1991 08 08.34	M	9.1	GA	5.0	B		10	6.6	3			MOD
1991 08 08.37	M	9.3	GA	20.0	L	5	35	5.1	5			MOD
1991 08 08.43	S	9.0	PC	5.0	B		10					HAL
1991 08 08.94	S	8.3	AA	25.2	L	4	35	9	4			KOR01
1991 08 08.96	S	8.7	AC	15.2	L	5	44	4.5	2			MOE
1991 08 08.97	S	8.3	AA	25.2	L	4	70	8	4			KOR01
1991 08 08.97	S	9.4	AC	20.3	T	10	80	3.8	3			DAH

Periodic Comet Hartley 2 (1991t) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 08 09.00	S	9.4	AG	31.6	L	5	62	2.7	4			MID01
1991 08 09.01	S	8.9	AC	20.3	T	10	80	3.9	1/			GRA04
1991 08 09.02	S	8.5	SC	21	L	7	89	4	3	0.05	180	BUL01
1991 08 09.10	S	9.6	AC	6.0	B		20	& 4	6			MIK
1991 08 09.88	B	8.2	AA	5.0	R	4	7	10	4			KOR01
1991 08 09.90	B	8.2	AA	12.0	R	5	20	10	4			KOR01
1991 08 09.90	S	8.5	A	24	L	4	32		4			LAV
1991 08 09.96	S	8.2	AA	25.2	L	4	35	11	5			KOR01
1991 08 10.08	M	8.7	AA	6.0	B		20	& 5	5			MIK
1991 08 10.09	S	8.8	AA	5.0	B		7	& 6	3			MIK
1991 08 10.47	M	8.3	AA	8.0	B		20	7	6			MOR
1991 08 10.84	S	8.1	AA	12.0	R	5	20	10	4			KOR01
1991 08 10.90	S	8.1	AA	8.0	B		25	9	4			KOR01
1991 08 10.90	S	8.2	AA	24.0	L	4	32	10	4			KOR01
1991 08 10.91	B	8.2	AA	5.0	R	4	7	10	3			KOR01
1991 08 10.92	S	8.1	AA	25.2	L	4	70	8	4	0.09	142	KOR01
1991 08 10.93	S	8.3	A	24	L	4	32	6	4			LAV
1991 08 10.94	K	8.2	A	8.0	B	5	25		5			LAV
1991 08 11.10	S	8.6	AC	8.0	B		20					TOM01
1991 08 11.33	M	9.1	GA	20.0	L	5	35	3.8	5			MOD
1991 08 11.34	M	8.4	GA	5.0	B		10	12	3			MOD
1991 08 11.35	S	8.4	AA	15.2	L	5	30	6	7			HER02
1991 08 11.43	M	8.4:	AA	8.0	B		20					MOR
1991 08 11.90	S	8.0	AA	25.2	L	4	98	10	3	0.1	146	KOR01
1991 08 11.90	S	8.1	AA	25.2	L	4	35	9	3			KOR01
1991 08 11.90	S	8.4	A	8	M	6	20	6	5			OST
1991 08 12.07	S	8.8	AC	8.0	B		20					TOM01
1991 08 12.32	S	8.5	S	7.0	B		10	4	1			DEA
1991 08 12.34	S	8.6	NO	8.0	B		20	8.0	3			BOR
1991 08 12.46	S	9.0	WA	5.0	B		10					HAL
1991 08 12.90	S	8.5:	A	24	L	4	32	7	5			LAV
1991 08 12.93	B	8.0	AA	5.0	R	4	7	7	3			KOR01
1991 08 12.94	S	7.9	AA	25.2	L	4	35	8	3	0.08	123	KOR01
1991 08 12.95	S	10 :	S	14.0	S	4	56	2.5		0.07	260	WAR01
1991 08 12.97	S	8.8	AC	20.3	T	10	80	3.7	2			GRA04
1991 08 13.10	B	9.6	CS	12.7	T	10	51	3.5	2			GAR02
1991 08 13.32	S	8.5	S	7.0	B		10	3	3			DEA
1991 08 13.34	M	8.5	GA	5.0	B		10	4.0	4			MOD
1991 08 13.34	M	9.1	GA	20.0	L	5	35	3.1	4			MOD
1991 08 13.90	S	7.9	A	8.0	B	5	25	8.5	4			LAV
1991 08 13.91	S	7.9	A	12	R	5	20	7	4			LAV
1991 08 13.92	B	7.9	AA	5.0	R	4	7	7	3			KOR01
1991 08 13.92	S	8.1	A	8	M	6	20	6	5			OST
1991 08 13.92	S	8.1	A	24	L	4	32	8.5	3			LAV
1991 08 13.93	S	7.9	AA	25.2	L	4	35	7	3	0.1	120	KOR01
1991 08 13.93	S	7.9	AA	25.2	L	4	98	8	2/	0.07	119	KOR01
1991 08 14.03	S	7.9	A	25	L	4	35	9	4			LAV
1991 08 14.33	M	9.0	GA	20.0	L	5	35	2.3	4			MOD
1991 08 14.35	M	8.5	GA	5.0	B		10	7.0	4			MOD
1991 08 14.96	S	7.9	AA	25.2	L	4	35	8	3	0.05	121	KOR01
1991 08 14.97	B	7.9	AA	5.0	R	4	7	10	3			KOR01
1991 08 14.97	S	7.9	AA	12.0	R	5	20	9	3			KOR01
1991 08 14.98	S	7.8	AA	25.2	L	4	98	7	3	0.06	122	KOR01
1991 08 14.99	S	7.9	A	8	M	6	20	7.5	4			OST
1991 08 15.00	S	9.1	AC	20.3	T	10	80	3.2	2			GRA04
1991 08 15.01	S	10.5:	S	14.0	S	4	56	5	4			WAR01
1991 08 15.05	S	7.9	A	24	L	4	32	8	5			LAV
1991 08 15.10	S	7.9	A	25	L	4	35	8	5			LAV
1991 08 15.10	S	8.5	SC	21	L	7	89	4	3	0.05	180	BUL01

Periodic Comet Hartley 2 (1991t) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 08 15.96	S	7.9	AA	12.0	R	5	20	8	3			KOR01
1991 08 15.96	S	8.7	AA	20.0	L	4	52	10	4			ZHU
1991 08 16.12	B	9.2	VF	12	L	6	40	6	6			REN
1991 08 16.41	S	8.7	S	8.0	B		11	3.5	2			PRY
1991 08 16.94	S	7.8	AA	8.0	B		25	8	4			KOR01
1991 08 16.94	S	7.9:	A	8	M	6	20	8	3			OST
1991 08 16.98	S	8.7	AA	20.0	L	4	52	8	3			ZHU
1991 08 17.00	S	9.1	AC	20.3	T	10	80	3.1	4			DAH
1991 08 17.04	S	8.5	S	20.3	T	10	100	3.5	2/			GRA04
1991 08 17.06	B	9.7	CS	12.7	T	10	40	4	2			GAR02
1991 08 17.10	M	8.2	AA	6.0	B		20	& 6	5			MIK
1991 08 17.11	S	7.7	A	8.0	B	5	25	10	5			LAV
1991 08 17.11	S	8.3	AA	5.0	B		7	& 4	8			MIK
1991 08 17.11	S	8.6	AC	8.0	B		11		4			TOM01
1991 08 17.32	S	8.2	S	7.0	B		10	4	4			DEA
1991 08 17.92	S	7.9	AA	8.0	B		25	9	4			KOR01
1991 08 18.06	B	8.2	S	20.4	L	6	72	& 1.8	5	&0.10	13	JAH
1991 08 18.40	S	8.4	AA	20.0	T	10	88	1.7	2			SHA04
1991 08 18.43	M	8.6	AA	8.0	B		20		7			MOR
1991 08 19.02	S	8.3	SC	21	L	7	89	4	6	0.05	180	BUL01
1991 08 19.02	S	8.4	S	20.3	T	10	80	3.5	2			GRA04
1991 08 19.14	B	9.2	VF	12	L	6	40	5	5			REN
1991 08 19.14	B	9.4	CS	12.7	T	10	40	3	3			GAR02
1991 08 19.32	S	8.3	S	7.0	B		10	3	4			DEA
1991 08 19.36	M	8.4	GA	5.0	B		10	3.7	3			MOD
1991 08 19.36	M	8.9	GA	35.9	L	7	45	2.5	4			MOD
1991 08 20.03	S	8.3	SC	21	L	7	89	4	6	0.05	180	BUL01
1991 08 20.06	B	8.3	CS	12.7	T	10	40	4	3			GAR02
1991 08 20.07	S	8.4	AA	6.0	B		20	5.5	5			MIK
1991 08 20.99	S	9.4	S	14.0	S	4	56	3.5	4			WAR01
1991 08 21.00	S	8.5	S	20.3	T	10	80	3.6	2			GRA04
1991 08 21.03	S	8.1	S	10.0	L	6	33	3	3			LUE
1991 08 21.09	B	8.3	CS	5	R		8	2	5			GAR02
1991 08 21.12	B	8.9	VF	12	L	6	40	5	5			REN
1991 08 21.45	S	9.0	WA	5.0	B		10					HAL
1991 08 22.03	S	8.5	AA	13.0	L	6	36	6	5			MEY
1991 08 22.08	S	8.3	S	10.0	L	6	33	2	2			LUE
1991 08 22.09	B	8.2	CS	5	R		8	2.5	5			GAR02
1991 08 22.10	S	8.4	AC	8.0	B		11		4			TOM01
1991 08 22.37	M	8.8	GA	20.0	L	5	35	2.0	3			MOD
1991 08 22.39	M	8.4	GA	5.0	B		10	4.4	3			MOD
1991 08 23.08	S	8.6	AA	13.0	L	6	36	5	6			MEY
1991 08 23.09	B	8.7	S	20.4	L	6	72	3.2	4			JAH
1991 08 23.09	S	8.6	S	6.0	R	5	9	3	2			JAH
1991 08 23.41	M	8.9	GA	20.0	L	5	35	1.9	3			MOD
1991 08 23.87	B	8.1	A	11	L	7	54	5.2	2			OBR
1991 08 24.08	S	7.7	AA	12.0	R	5	40	7	4			KOR01
1991 08 24.36	M	8.9	GA	20.0	L	5	35	1.3	3			MOD
1991 08 24.95	S	8.0	AA	20.0	L	4	52	10	4			ZHU
1991 08 25.08	S	7.6	AA	12.0	R	5	20	9	4			KOR01
1991 08 26.09	S	7.7	AA	12.0	R	5	40	8	4			KOR01
1991 08 27.04	S	8.6	S	20.3	T	10	80	3.5	3			GRA04
1991 08 29.87	B	8.1:	A	11	L	7	54	5.5	2			OBR
1991 08 31.07	S	8.5	S	10.0	L	6	60	3.0	2			LUE
1991 08 31.09	S	7.9	AA	12.0	R	5	40	6	3			KOR01
1991 08 31.12	S	8.4	AA	6.0	B		20	& 5	3			MIK
1991 09 01.00	S	8.4	A	20	R	15	60	5	2			OST
1991 09 01.06	B	9.0	S	20.4	L	6	72					JAH
1991 09 01.06	S	8.5	AC	20.4	L	6	72	3.1	3			JAH

Periodic Comet Hartley 2 (1991t) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 09 01.06	S	8.6	S	20.4	L	6	72					JAH
1991 09 01.07	S	8.1	S	20.3	T	10	80	3.5	2/			GRA04
1991 09 01.10	S	7.9	AA	25.2	L	4	35	6	4			KOR01
1991 09 01.97	S	8.1	AA	20.0	L	4	30	7	4			ZHU
1991 09 01.98	S	8.2	AA	20.0	L	4	52	6	3			ZHU
1991 09 02.01	S	8.1	A	20	R	15	60	7	3			OST
1991 09 02.09	S	8.0	AA	25.2	L	4	35	6	4			KOR01
1991 09 02.12	S	8.4	AA	6.0	B		20	& 4	5			MIK
1991 09 02.97	S	8.3	AA	20.0	L	4	52	4	3			ZHU
1991 09 02.99	S	8.2	A	20	R	15	60	6	3			OST
1991 09 03.09	B	8.0	AA	5.0	R	4	7	& 6	3			KOR01
1991 09 03.09	S	8.1	AA	25.2	L	4	35	5	4			KOR01
1991 09 03.98	S	8.2	A	20	R	15	60	6	3			OST
1991 09 04.07	S	8.7	AC	20.4	L	6	72	2.6	3			JAH
1991 09 04.09	B	8.0	AA	5.0	B		7	& 7	3			KOR01
1991 09 04.09	S	8.1	AA	25.2	L	4	35	5	3			KOR01
1991 09 04.93	S	8.4	AA	20.0	L	4	52	7	3			ZHU
1991 09 04.95	S	8.6	AA	20.0	L	4	129	2	3			ZHU
1991 09 04.98	S	8.2	A	8	R	10	28	5	3			OST
1991 09 05.06	S	7.9	AG	20.3	T	10	80	3.7	4			GRA04
1991 09 05.08	B	7.7	AG	3.5	B		7	4				GRA04
1991 09 05.08	M	8.0	AC	20.4	L	6	72					JAH
1991 09 05.08	M	8.0	S	20.4	L	6	72	2.1	5			JAH
1991 09 05.09	S	8.2	AA	25.2	L	4	35	5	3	0.1		KOR01
1991 09 05.14	B	8.5	VF	12	L	6	40	4.5	4			REN
1991 09 05.39	M	8.1	AA	20.0	L	5	35	1.9	4			MOD
1991 09 06.05	S	8.0:	HP	20.3	T	10	80	3.0	4/			GRA04
1991 09 06.06	S	7.2	S	6.0	R	5	9	7.0	2			JAH
1991 09 06.06	S	7.9:	HP	3.5	B		7					GRA04
1991 09 06.07	B	8.6:	S	20.4	L	6	72	& 4.0	6			JAH
1991 09 06.07	M	8.4	AA	6.0	B		20	4	7			MIK
1991 09 06.12	B	7.6	S	5.0	R	10	13					JAH
1991 09 06.12	S	7.5	S	5.0	R	10	13	4.3	2			JAH
1991 09 06.16	B	8.5	VF	6.0	B		9	4	4			REN
1991 09 06.39	M	8.1	AA	20.0	L	5	35	2.0	4			MOD
1991 09 06.40	M	8.0	AA	5.0	B		10	3.0	4			MOD
1991 09 06.97	S	8.6	SC	6.3	B		9	5	5			AND01
1991 09 06.99	S	8.3	A	8	R	10	28	5	3			OST
1991 09 07.10	S	8.3	AA	25.2	L	4	35	6	3	0.12		KOR01
1991 09 07.33	S	7.5	S	7.0	B		10	5	7			DEA
1991 09 07.35	S	7.8	AC	8.0	B		20	2.2	5			BOR
1991 09 07.36				40	L	7	100	2.2	5	0.08	274	MOD
1991 09 07.37	M	8.1	AA	20.0	L	5	35	2.8	5			MOD
1991 09 07.39	M	8.1	AA	5.0	B		10	2.3	4			MOD
1991 09 07.44	M	8.6	NP	5.0	B		10					HAL
1991 09 07.92	S	8.4	A	5.0	B		10	7	2			OST
1991 09 07.98	S	8.8	SC	6.3	B		9	4	5			AND01
1991 09 08.06	S	8.8	AA	20.0	L	4	52	3	3			ZHU
1991 09 08.07	S	9.1	AA	20.0	L	4	129	1	3			ZHU
1991 09 08.08	B	8.4	VF	8.0	B		12	3.5	5			REN
1991 09 08.09	S	8.4	AA	25.2	L	4	35	5.5	4			KOR01
1991 09 08.09	S	8.5	AG	20.3	T	10	80	2.8	4			GRA04
1991 09 08.12	S	8.3	AA	8.0	B		20	1.8	5			SHA02
1991 09 08.44	M	7.8	AA	8.0	B		20	6	7/			MOR
1991 09 08.45				25.6	L	4	111	3	4/	0.10	270	MOR
1991 09 08.92	S	8.3	A	5.0	B		10	6	3			OST
1991 09 09.12	S	8.1	AC	10.0	B		25	2.5	4			HAS02
1991 09 09.33	S	8.4	S	7.0	B		10	4	7			DEA
1991 09 10.11	M	8.0	AA	6.0	B		20	4.5	7			MIK

Periodic Comet Hartley 2 (1991t) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 09 11.10	S	7.9	AA	25.2	L	4	70	6.7	4	0.22		KOR01
1991 09 11.89	B	8.0	A	11	L	7	54	4.2	2			OBR
1991 09 12.08	B	8.7	S	5.0	R	10	13	7	6			JAH
1991 09 12.10	M	8.0	S	20.3	T	10	80	3.5	5			GRA04
1991 09 12.10	S	7.9	AA	25.2	L	4	70	6.6	3	0.2		KOR01
1991 09 12.12	B	8.5	S	20.4	L	6	72	3.7	5	0.15	292	JAH
1991 09 12.38	S	7.8	AC	8.0	B		20	3.3	6			BOR
1991 09 12.87	B	8.2	A	11	L	7	54	5.0	2			OBR
1991 09 12.98	S	8.5	AA	20.0	L	4	30	6	3			ZHU
1991 09 12.98	S	8.6	AA	20.0	L	4	52	5	3/			ZHU
1991 09 12.98	S	8.8	AA	20.0	L	4	129	3	3/			ZHU
1991 09 13.35				31.7	L	6	68	2.8	5	0.15	280	BOR
1991 09 13.35	S	7.8	AC	8.0	B		20	3.4	5			BOR
1991 09 14.07	B	7.5	S	6.0	R	5	9	4.6	3			JAH
1991 09 14.08	B	8.8:	S	20.4	L	6	72	4.5	5	&0.16	356	JAH
1991 09 14.12	B	7.5	S	5.0	R	10	13	4.6	2			JAH
1991 09 14.12	S	7.4	S	5.0	R	10	13					JAH
1991 09 14.47	M	8.1	AA	8.0	B		20	6	7			MOR
1991 09 15.10	B	8.3	S	6.0	R	5	9	4.8	3			JAH
1991 09 15.11	B	8.5:	S	20.4	L	6	72	2.6	7			JAH
1991 09 15.11	S	8.2	AA	25.2	L	4	70	4.4	4	0.1		KOR01
1991 09 15.46	M	8.5	NP	5.0	B		10					HAL
1991 09 15.47	M	8.2	AA	8.0	B		20	6	7			MOR
1991 09 17.19	B	8.5	AA	15.0	L	4	26					PER01
1991 09 17.19	M	8.2	AA	15.0	L	4	26					PER01
1991 09 17.19	S	8.1	AA	15.0	L	4	26	& 5	5			PER01
1991 09 18.12	S	8.5	AA	25.2	L	4	70	4.7	4			KOR01
1991 09 18.99	S	9.0	A	11	L	7	32	4	4			OST
1991 09 19.06	M	8.5	AA	20.0	L	4	30	6	3/			ZHU
1991 09 19.07	M	8.6	AA	20.0	L	4	52	5	3/	?0.1	150	ZHU
1991 09 19.07	S	8.8	AA	20.0	L	4	129	4	3			ZHU
1991 09 19.09	S	8.2	AG	20.3	T	10	80	3.7	4			GRA04
1991 09 20.15	S	8.1	AA	8.0	B		20	3.6	4			SHA02
1991 09 21.36				31.7	L	6	68	2.1	6	?	280	BOR
1991 09 21.36	S	7.9	AC	8.0	B		20	4.7	5			BOR
1991 09 23.08	S	8.5	AG	20.3	T	10	80	1.7	4			GRA04
1991 09 24.12	S	8.9	AA	25.2	L	4	98	3.4	3	0.1		KOR01
1991 09 25.10	S	8.6	AA	6.0	B		20	4	5			MIK
1991 09 25.12	S	9.0	AA	25.2	L	4	98	3.6	3			KOR01
1991 09 26.12	S	9.1	AA	25.2	L	4	70	3.3	3			KOR01
1991 09 27.12	S	9.2	AA	25.2	L	4	70	3.1	4			KOR01
1991 09 27.22	S	8.6	AA	15.0	L	4	26	& 3	4			PER01
1991 10 04.07	S	8.7	AA	6.0	B		20	& 4	6			MIK
1991 10 04.09	S	8.8	AA	25.2	L	4	70	6.4	4	0.15		KOR01
1991 10 05.02	S	8.8	A	20	R	15	60	6	3	0.1	290	OST
1991 10 05.09	S	8.7	AA	25.2	L	4	70	6.2	4	0.2		KOR01
1991 10 05.14	S	8.0	AA	10.0	B		25	2.8	4			HAS02
1991 10 05.48	S	8.8	AC	5.0	B		10					HAL
1991 10 05.49	M	8.6	AA	8.0	B		20	4	5			MOR
1991 10 06.04	S	8.8	AA	20.0	L	4	52	3	3/			ZHU
1991 10 06.05	S	9.1	AA	20.0	L	4	129	2	3			ZHU
1991 10 06.08	S	8.8	A	20	R	15	60	7	3			OST
1991 10 06.48	M	8.1	AA	8.0	B		20	3	8			MOR
1991 10 07.05	S	8.9	A	20	L	5	40	7	2	0.15	300	OST
1991 10 07.10	S	8.8	AA	25.2	L	4	70	5.4	3			KOR01
1991 10 07.49	M	8.6	NP	5.0	B		10					HAL
1991 10 08.00	S	8.8	AA	20.0	L	4	52	5	3			ZHU
1991 10 08.08	S	8.9	A	20	L	5	40	6	3			OST
1991 10 08.10	S	8.9	AA	25.2	L	4	70	5.2	4	0.1		KOR01

Periodic Comet Hartley 2 (1991t) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 10 09.02	S	8.7	AA	22.9	L	4	56	6	3/			ZHU
1991 10 09.09	S	9.0	A	20	L	5	40	6	4			OST
1991 10 09.10	S	8.9	AA	25.2	L	4	70	5.0	4	0.13		KOR01
1991 10 10.10	S	8.9	A	20	L	5	40	5	3			OST
1991 10 10.12	S	9.0	AA	6.0	B		20	& 5	6			MIK
1991 10 11.08	! S	8.7	AA	20.0	L	4	52	6	3			ZHU
1991 10 12.47	M	9.1	AA	31.8	L	4	48	3	2			KEE
1991 10 14.49	M	8.7	NP	5.0	B		10					HAL
1991 10 16.23	S	8.1	AA	3.4	B		9	& 5	4			PER01
1991 10 16.23	S	8.4	AA	15.0	L	4	26	& 4.5	3			PER01
1991 10 19.49	S	8.8	NP	5.0	B		10					HAL
1991 10 25.16	S	9.5	AA	20.0	L	4	40	& 4	3			MIK
1991 11 03.49	M	9.2	AC	41	L	4	83					HAL
1991 11 03.49	S	9.3	AA	25.6	L	4	45	4.1	2			MOR
1991 11 06.16	S	9.4	AC	20.3	T	10	80	3.0	4			GRA04
1991 11 06.25	S	9.9	AA	15.0	L	4	26	& 3	3			PER01
1991 11 11.20	S	10.1	AC	20.0	L	4	40	& 4	1			MIK
1991 11 12.52	M	9.4	AA	25.6	L	4	45	3.9	3			MOR
1991 11 17.14	S	10.6	AC	20.3	T	10	100	2.5	3			GRA04
1991 11 17.49	M	10.2	AC	41	L	4	83					HAL

Periodic Comet Wild 4 (1990a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 02 16.60	S	12.3	AC	20	L	6	106	1.2	6			NAK01
1990 02 17.46	S	12.0	AC	20	L	6	106	1.6	6/			NAK01
1990 02 17.61	S	12.6	AC	31	L	6	120	1.5	3			KOB01
1990 02 24.51	S	11.8	AC	20	L	6	106	1.6	6			NAK01
1990 03 19.47	S	12.1	AC	20	L	6	106	1.3	4/			NAK01
1990 03 25.45	S	11.9	AC	20	L	6	106	1.9	5			NAK01
1990 03 26.52	S	12.6	AC	31	L	6	120	2	3			KOB01
1990 04 14.52	S	12.2	AC	20	L	6	106		6			NAK01
1990 04 24.49	S	12.0	AC	20	L	6	106	1.1	5			NAK01
1990 04 24.57	* S	12.5	AC	31	L	6	120	1.5	3	0.02	265	KOB01
1990 04 29.49	S	12.2	AC	20	L	6	106	1.1	5			NAK01
1990 05 26.48	S	12.2	AC	20	L	6	106	1.3	4			NAK01

Periodic Comet McNaught-Hughes (1991y)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 10 08.22	I[	13.5		41	L	4	183					HAL

Periodic Comet Faye (1991n)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 06 20.32	S[	14.0	GA	40	L	7	190	! 0.5				MOD
1991 07 15.32	S[	14.5	GA	40	L	7	190	! 0.5				MOD
1991 08 03.91	I[	12.0		20.3	T	10	62					GAR02
1991 08 06.97	I[	13.2		20.3	T	10	62					GAR02
1991 08 07.34	M	14.1	GA	40	L	7	190	0.15	8			MOD
1991 08 08.29	M	13.0	GA	40	L	7	100	0.7	5			MOD
1991 08 08.39	I[	13.0		41	L	4	183					HAL
1991 08 08.92	S	13.5:	NN	25.2	L	4	70	& 1.5	1			KOR01
1991 08 09.93	S	13.5:		25.2	L	4	70	& 2.0	1/			KOR01
1991 08 10.86	S	13.4:		25.2	L	4	70	2.0	2			KOR01
1991 08 11.29	M	13.1	GA	20.0	L	5	68	1.0	3			MOD
1991 08 11.39	S	12.5:	NP	50.8	L	4	195	0.74	2			MOR
1991 08 11.95	S	13.4:		25.2	L	4	98	1.5	2			KOR01
1991 08 12.40	M	12.7	AC	41	L	4	183					HAL

Periodic Comet Faye (1991n) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 08 12.95		S 13.3:		25.2	L	4	98	1.5	2	0.01	105	KOR01
1991 08 12.98		S[12.5	AC	20.3	T	10	123					GRA04
1991 08 13.28		M 13.0	GA	20.0	L	5	68	0.7	4			MOD
1991 08 13.94		S 13.6:		25.2	L	4	98	1.6	2	0.01	105	KOR01
1991 08 14.28		M 12.9	GA	20.0	L	5	68	0.70	3			MOD
1991 08 14.96		S 13.4:		25.2	L	4	98	1.5	1/	0.01	100	KOR01
1991 08 16.94		S 12.6	AG	31.6	L	5	62	0.9	3			MID01
1991 08 17.00		S 12.7	AC	20.3	T	10	100	0.9	3			GRA04
1991 08 17.98		S 12.1	AC	20.4	L	6	72	2.0	2			JAH
1991 08 19.33		M 13.0	GA	35.9	L	7	85	0.8	5			MOD
1991 08 20.42		M 12.5	AC	41	L	4	83					HAL
1991 08 20.95		S 12.8	AC	20.3	T	10	100	1.0	3			GRA04
1991 08 22.12		I[13.0		20.3	T	10	62					GAR02
1991 09 01.23	!	M 12.3	NP	25.6	L	4	111		3			MOR
1991 09 01.88		S 11.8	AC	30.0	L	7	64	0.7	3			HAS02
1991 09 01.90		S 12.7	AG	31.6	L	5	130	0.4	5			MID01
1991 09 02.01		S 12.6	PC	25.2	L	4	70	& 2	3			KOR01
1991 09 02.18		M 12.5	GA	35.9	L	7	85	0.6	4			MOD
1991 09 02.27		M 12.3	NP	25.6	L	4	67	1.5	3			MOR
1991 09 02.89		S 11.6:	AC	15.2	L	5	44	& 1.5	3			MOE
1991 09 02.92		S 12.5	AC	35.5	T	11	80	2.5	6			MIK
1991 09 03.02		S 12.4	PC	25.2	L	4	70	2.2	3			KOR01
1991 09 03.22	!	M 12.2	NP	25.6	L	4	67	1.5	3			MOR
1991 09 03.31		M 12.1	AC	41	L	4	83					HAL
1991 09 03.86		S 11.7:	AC	15.2	L	5	100	& 1.5	2			MOE
1991 09 03.93		S 12.4	AC	35.5	T	11	80	& 2	6	0.1	300	MIK
1991 09 04.01		S 12.4	PC	25.2	L	4	70	2.1	3			KOR01
1991 09 04.09		S 12.0:	AC	20.4	L	6	72	& 1.0	1			JAH
1991 09 04.87		S 11.6:	AC	15.2	L	5	100	& 1.5	2			MOE
1991 09 05.06		S 12.0	AC	20.4	L	6	72	1.4	3			JAH
1991 09 05.86		S 11.5:	AC	15.2	L	5	44	& 1.5	2			MOE
1991 09 06.02		S 12.2	PC	25.2	L	4	70	2.1	2	0.15	295	KOR01
1991 09 06.03		S 11.8	AC	20.4	L	6	72	1.5	3			JAH
1991 09 06.10		S 12.1	AC	20.0	L	4	40	1.5	3			MIK
1991 09 07.22		M 12.0	GA	35.9	L	7	85	0.55	5			MOD
1991 09 07.28		M 11.6	GA	20.0	L	5	35	1.0	5			MOD
1991 09 08.02		S 12.1	PC	25.2	L	4	70	2.4	2	0.1	300	KOR01
1991 09 08.39		M 10.9	NP	25.6	L	4	67	1.9	5	0.03	270	MOR
1991 09 08.83		S 11.2	AC	15.2	L	5	44	2	2			MOE
1991 09 08.88		S 11.7	AC	30.0	L	7	64	0.6	4			HAS02
1991 09 08.89		S 11.3	AC	15.2	L	5	100	2	2			MOE
1991 09 09.02		S 12.0	PC	25.2	L	4	70	2.6	2	0.1	297	KOR01
1991 09 10.13		S 11.9	AC	20.0	L	4	40	2.0	5			MIK
1991 09 10.95		S 11.0	AC	20.3	T	10	80	1.4	5			GRA04
1991 09 11.02		S 11.7	PC	25.2	L	4	70	2.5	3			KOR01
1991 09 11.85		S 11.5	AC	15.2	L	5	100	2	2			MOE
1991 09 12.02		S 11.7	PC	25.2	L	4	70	2.7	3			KOR01
1991 09 12.05		B 11.2	AC	20.4	L	6	72	2.2	7	&0.03	264	JAH
1991 09 12.05		S 11.4	AC	20.4	L	6	72					JAH
1991 09 12.85		S 11.2	AC	15.2	L	5	44	2.5	2			MOE
1991 09 12.86		S 11.3	AC	15.2	L	5	100	2.5	2			MOE
1991 09 12.96		S 11.6	NN	20.0	L	4	52	1.5	2			ZHU
1991 09 12.97		S 11.8	NN	20.0	L	4	129	1.0	2			ZHU
1991 09 13.84		S 11.0	AC	15.2	L	5	44	2.5	2			MOE
1991 09 14.02		B 12.0	AC	20.4	L	6	72					JAH
1991 09 14.02		S 11.6	AC	20.4	L	6	72	1.2	7	0.06	242	JAH
1991 09 14.34		M 10.7	NP	25.6	L	4	67	1.7	6		270	MOR
1991 09 14.97		S 11 :	S	20.0	T	10	200	1.0	5			DAN01
1991 09 15.07		B 11.7	AC	20.4	L	6	72					JAH

Periodic Comet Faye (1991n) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 09 15.07	S	11.6	AC	20.4	L	6	72	2.9	6			JAH
1991 09 15.36	M	10.5	NP	25.6	L	4	67	1.8	6			MOR
1991 09 15.42	M	11.2	AC	41	L	4	83					HAL
1991 09 16.00	S	10.7	VF	20.3	T	10	80	1.7	4			GRA04
1991 09 16.02	S	11.5	PC	25.2	L	4	70	3.2	3			KOR01
1991 09 17.06	S	11.3	AC	30	R	18	95	1.3	4			SHA02
1991 09 17.90	S	10.8	AC	15.2	L	5	44	2.5	3			MOE
1991 09 18.02	S	11.5	PC	25.2	L	4	70	3.1	3			KOR01
1991 09 19.07	S	10.6	VF	20.3	T	10	80	1.7	4			GRA04
1991 09 20.10	S	11.3	AC	30	R	18	95	1.5	4			SHA02
1991 09 26.02	S	11.2	PC	25.2	L	4	140	2.9	2			KOR01
1991 09 27.02	S	11.1	PC	25.2	L	4	140	3.0	2	0.1	304	KOR01
1991 09 28.05	S	10.4	VF	20.3	T	10	80	1.2	5			GRA04
1991 09 30.02	S	10.9	PC	25.2	L	4	70	2.5	3	0.2	305	KOR01
1991 10 01.02	S	10.9	PC	25.2	L	4	70	2.6	4	0.15	300	KOR01
1991 10 01.85	S	9.9	AC	15.2	L	5	44	3.5	2			MOE
1991 10 02.91	S	10.1	AC	40	L	5	40	2.5	4			BOA
1991 10 03.09	S	10.2	AA	15.0	L	4	26	& 1.5	5			PER01
1991 10 03.29	M	10.2	PC	41	L	4	83			0.08	270	HAL
1991 10 03.88	S	10.0	AC	10.0	B		25	1.2	4			HAS02
1991 10 03.91	S	10.2	AC	33	L	4	50	2.5	3/			BOA
1991 10 04.01	S	11.0	PC	25.2	L	4	98	3.3	3	0.1	300	KOR01
1991 10 04.04	M	9.8	AC	20.0	L	4	40	2.5	7	0.3	255	MIK
1991 10 04.82	S	10.9	NN	20.0	L	4	52	3.5	4			ZHU
1991 10 04.89	S	9.9	AC	33	L	4	50	2.5	4			BOA
1991 10 05.02	S	10.9	PC	25.2	L	4	98	3.2	3	0.1	300	KOR01
1991 10 05.16	S	10.0	AC	10.0	B		25	1.2	4			HAS02
1991 10 05.29	M	9.8	NP	25.6	L	4	45	1.8	6	0.17	260	MOR
1991 10 05.80	S	11.2	A	20	R	15	60	2	5			OST
1991 10 05.86	S	10.8	NN	20.0	L	4	52	3	4			ZHU
1991 10 05.88	S	11.1	NN	20.0	L	4	129	2	4			ZHU
1991 10 05.90	M	10.4	AC	20.0	L	4	40	& 3	7	0.2	260	MIK
1991 10 05.94	S	9.8	AC	15.2	L	5	44	3.5	2			MOE
1991 10 06.27	M	9.8	NP	50.8	L	4	78	1.6	6/	0.13	263	MOR
1991 10 06.75	S	11.0	A	20	L	5	40	3	4			OST
1991 10 06.81	! S	11.1	NN	20.0	R	15	60	2	4/			ZHU
1991 10 06.89	M	10.6	AC	20.0	L	4	40	& 3	5	0.15	265	MIK
1991 10 06.93	S	9.9	VF	20.3	T	10	80	2.7	5	&0.05	270	GRA04
1991 10 07.01	S	10.8	PC	25.2	L	4	98	3.3	4	0.2	300	KOR01
1991 10 07.79	S	11.0	A	20	L	5	40	3	5			OST
1991 10 08.01	S	10.9	PC	25.2	L	4	98	3.2	4	0.1		KOR01
1991 10 08.04	S	10.9	NN	20.0	L	4	52	2.5	4			ZHU
1991 10 08.30	M	10.0	PC	41	L	4	83			0.07	256	HAL
1991 10 08.80	S	10.9	A	20	L	5	40	2	6			OST
1991 10 08.88	S	9.8	AC	15.2	L	5	44	3.5	3			MOE
1991 10 08.94	S	9.7	S	8.0	B	4	20	2	4			DAN01
1991 10 08.95	S	9.5	S	25.4	L	6	45	2.5	6			DAN01
1991 10 08.95	S	9.6	AC	33	L	4	50	2.5	5/			BOA
1991 10 08.99	M	10.8	NN	22.9	L	4	56	4.5	5			ZHU
1991 10 09.01	S	10.9	PC	25.2	L	4	98	3.2	3/	0.07		KOR01
1991 10 09.73	S	11.0	A	20	L	5	40	3	5			OST
1991 10 09.85	S	9.8	S	25.4	L	6	145	1.8	6			DAN01
1991 10 10.02	S	11.2	A	20	L	5	40	3	5			OST
1991 10 10.16	M	10.6	AC	20.0	L	4	40	& 3	7	0.2	240	MIK
1991 10 11.87	S	9.9	AC	15.2	L	5	44	3	2			MOE
1991 10 12.25	M	9.8	AC	31.8	L	4	63	1	4	0.07	270	KEE
1991 10 13.88	S	9.5	AC	33	L	4	50	3	6/			BOA
1991 10 14.89	S	9.7	AC	15.2	L	5	44	3.5	4			MOE
1991 10 15.99	S	9.5	AA	15.0	L	4	26	& 3.5	5/			PER01

Periodic Comet Faye (1991n) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 10 16.34	M	9.7	PC	41	L	4	83			0.13	248	HAL
1991 10 16.85	S	10.0	AC	33	L	4	50	2.5	4/			BOA
1991 10 17.37	S	9.6	NP	5.0	B		10					HAL
1991 10 17.77	S	9.8:	AC	15.2	L	5	44	3	3			MOE
1991 10 17.88	S	9.6	AC	15.2	L	5	44	4.5	4			MOE
1991 10 19.91	S	9.7	AC	15.2	L	5	44	4	4			MOE
1991 10 20.06	S	9.9	VF	20.3	T	10	80	1.8	5			GRA04
1991 10 26.74	S	9.7:	AC	15.2	L	5	44	4	4			MOE
1991 10 27.78	S	9.3	AC	15.2	L	5	44	5.5	4			MOE
1991 10 28.90	S	8.7:	AC	15.2	L	5	44	5.5	5			MOE
1991 10 29.83	S	9.7	AC	6.0	B		20	4.5	5			MIK
1991 10 29.87	S	8.9	AC	15.2	L	5	44	6	4			MOE
1991 10 30.23	M	9.4	PC	41	L	4	83					HAL
1991 10 30.89	S	8.8	AC	15.2	L	5	44	6	2			MOE
1991 10 31.11	S	10.3	GA	31.1	L	5	52					BUN
1991 11 01.83	S	9.7	AC	6.0	B		20	& 5	5			MIK
1991 11 02.34	S	9.5	NP	5.0	B		10					HAL
1991 11 03.25	M	9.2	NP	25.6	L	4	45	2.8	6	0.33	275	MOR
1991 11 03.26	M	9.2	AA	8.0	B		20	3	4/	0.33	275	MOR
1991 11 05.04	S	9.1	S	7.0	B		10	4	3			DEA
1991 11 06.02	S	8.7	S	7.0	B		10	5	3			DEA
1991 11 06.02	S	9.7	AA	15.0	L	4	26	& 2	5			PER01
1991 11 06.06	S	10.4	GA	31.1	L	5	52					BUN
1991 11 07.03	S	9.9	AC	15.0	L	4	26	& 2.5	4/			PER01
1991 11 08.28	S	9.5	NP	5.0	B		10					HAL
1991 11 10.87	S	9.8	AC	6.0	B		20	& 4	5			MIK
1991 11 12.23	M	9.4	AA	25.6	L	4	45	2.5	7	0.13	290	MOR
1991 11 13.95	M	9.7	VF	20.3	T	10	80	1.9	5			GRA04

Periodic Comet Metcalf-Brewington (1991a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 01 11.43	S	9.6	GA	31.7	L	5	86	1.6	2			JON
1991 01 11.78	S	9.0	AA	20	L	4	37	4	3			PAN
1991 01 13.70	S	9.5	AG	31.6	L	5	62	1.6	6			MID01
1991 01 13.77	S	8.9	AA	20	L	4	37	4	3			PAN
1991 01 16.40	S	10.0	GA	31.7	L	5	86	& 1	1			JON
1991 01 18.41	S	10.1	GA	31.7	L	5	86	1.5	2			JON
1991 02 03.39	S	10.9	GA	31.7	L	5	86	1	1			JON
1991 02 04.00	S	10.4	AC	15	R	5	62	2.9				MOR03
1991 02 08.16	! M	10.2	AA	31.8	L	4	48	3	2			KEE
1991 02 08.39	S	10.8	GA	31.7	L	5	86	& 1	1			JON
1991 02 14.38	S	11.6	L	31.7	L	5	86	2	1			JON
1991 02 17.78	S	10.6	S	31.6	L	5	130	1	4			MID01
1991 03 03.40	M	10.0	AA	21	L	9	75	1.8	3			WOL01
1991 03 05.91	B	9.9	A	15	C	10	78	1.1	6	0.1		KON04
1991 03 07.80	S	9.4	A	11	L	7	32	3	3			OST
1991 03 07.90	B	10.0	A	15	C	10	78	1.8	3	0.1		KON04
1991 03 08.78	S	9.4	A	11	L	7	32	3	4			OST
1991 03 08.84	B	10.0	A	11	L	7	169	1.9	3	0.5		KHR
1991 03 11.04	S	11.3	AC	44.5	L	4	80	1.9	1			MOR03
1991 03 12.80	S	9.6	A	11	L	7	32	3	3			OST
1991 03 15.91	B	10.5	A	15	C	10	78	1.5	3	0.05		KON04
1991 03 16.78	S	9.6	A	11	L	7	32	2	3			OST
1991 03 17.75	S	9.6	A	11	L	7	32	3	3			OST
1991 03 17.85	B	10.7	A	11	L	7	169	1.2	3	0.5		KHR
1991 03 18.75	S	10.0	A	11	L	7	54	3	3			OST
1991 04 01.80	B	10.9	A	11	L	7	169	1.0	3	0.5	48	KHR

Periodic Comet Wolf-Harrington (1990e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 04 13.17	S	11.6	NP	25.6	L	4	111		1/			MOR
1991 04 14.16				50.8	L	4	195	1.4				MOR

Periodic Comet Shoemaker 1 (1991p)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 09 30.13	I[	13.5		41	L	4	183					HAL
1991 10 05.13	I[	13.0		41	L	4	183					HAL
1991 10 06.18	M[	14.0	NP	50.8	L	4	275	0.7	2			MOR
1991 10 08.13	I[	13.5		41	L	4	183					HAL
1991 10 27.08	I[	13.5		41	L	4	183					HAL
1991 11 02.16	I[	13.5		41	L	4	183					HAL
1991 11 07.15	I[	13.5		41	L	4	244					HAL
1991 11 09.13	I[	13.0		41	L	4	183					HAL

Periodic Comet Shoemaker-Levy 5 (1991z)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 10 05.25	I[	13.5		41	L	4	183					HAL
1991 10 08.27	I[	13.5		41	L	4	183					HAL
1991 11 07.24	I[	13.5		41	L	4	183					HAL

Periodic Comet Shoemaker-Levy 6 (1991b1)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 11 12.21	S	10.7	NP	25.6	L	4	45	6	0/			MOR
1991 11 14.29	S	11.4	AC	20	L	6	55		2			HAL

Periodic Comet Swift-Gehrels (1991c)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 04 06.16		12.5:		25.6	L	4	156		2			MOR
1991 04 13.16		12.5:		25.6	L	4	156	1.0	2			MOR

Periodic Comet Chernykh (1991o)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 08 03.93	I[	12.0		20.3	T	10	62					GAR02
1991 08 04.31	S[	13.7	NP	50.8	L	4	275		1/			MOR
1991 08 06.35	I[	13.0		41	L	4	183					HAL
1991 08 06.95	I[	13.2		20.3	T	10	62					GAR02
1991 08 11.36	S[	14.0	NP	50.8	L	4	275	0.7	1			MOR
1991 08 13.29	I[	13.0		41	L	4	183					HAL
1991 08 14.99	S[	11.8	AG	31.6	L	5	62					MID01
1991 08 17.00	S	11.6	AG	31.6	L	5	62	1.2	4			MID01
1991 08 21.47	I[	13.5		41	L	4	183					HAL
1991 08 22.12	I[	13.2		20.3	T	10	62					GAR02
1991 08 31.95	S	12.0	AG	31.6	L	5	130	0.8	4			MID01
1991 09 01.89	S	12.2	AG	31.6	L	5	130	0.6	3			MID01
1991 09 03.28	I[	13.5		41	L	4	183					HAL
1991 09 08.37	S[	13.3	NP	25.6	L	4	156					MOR
1991 09 14.31	S[	13.3	NP	25.6	L	4	156					MOR
1991 09 15.38	I[	13.5		41	L	4	183					HAL
1991 09 30.23	I[	13.0		41	L	4	183					HAL
1991 10 03.25	I[	13.5		41	L	4	183					HAL
1991 10 05.20	S[	13.3	NP	25.6	L	4	156					MOR
1991 10 06.20	S[	13.7	NP	50.8	L	4	275					MOR
1991 10 06.88	S	12.7:	NP	25.2	L	4	140	2.1	4			KOR01
1991 10 07.88	S	12.8:	NP	25.2	L	4	140	2.1	4			KOR01

Periodic Comet Chernykh (1991o) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 10 08.26		I[13.5		41	L	4	183					HAL
1991 10 08.86		S 12.8:	NP	25.2	L	4	140	2.3	4/			KOR01
1991 10 16.30		I[13.5		41	L	4	183					HAL
1991 10 27.13		I[13.5		41	L	4	183					HAL
1991 10 30.18		I[13.5		41	L	4	183					HAL
1991 11 03.15		S[13.3	NP	25.6	L	4	156					MOR
1991 11 07.22		I[13.5		41	L	4	244					HAL

Periodic Comet Schwassmann-Wachmann 1 (1989 XV)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 09 20.29	S	12.1	AC	31.8	L	4	63	2	0			KEE
1991 02 04.10	S[	12.8	GA	40	L	7	100	! 1.0				MOD
1991 07 11.47	I[	12.0		20	L	6	122					HAL
1991 07 15.34	S[	14.1	GA	35.9	L	7	164	! 0.5				MOD
1991 07 16.32	S[	14.3	GA	40	L	7	190	! 0.5				MOD
1991 07 16.45	I[	13.0		41	L	4	183					HAL
1991 08 07.38	M	12.0	GA	20.0	L	5	68	0.65	3			MOD
1991 08 08.03	S[	11.6	AG	31.6	L	5	62					MID01
1991 08 08.06	S	11.8:	AC	35.5	T	11	80	1.3	7			MIK
1991 08 08.26	S	12.6	GA	40	L	7	100	0.55	2			MOD
1991 08 08.36	S	12.6	GA	20.0	L	5	68	0.60	2			MOD
1991 08 08.41	M	12.1	PC	41	L	4	83					HAL
1991 08 08.95	S[	11.9	AG	31.6	L	5	62					MID01
1991 08 09.08	S	12.3	AC	35.5	T	11	80	1.5	6			MIK
1991 08 10.06	S	12.4	AC	35.5	T	11	80	1.5	6			MIK
1991 08 11.32	S	12.0	GA	20.0	L	5	68	1.3	1			MOD
1991 08 11.42	S	11.9:	NP	50.8	L	4	120		2			MOR
1991 08 12.44	M	12.1	PC	41	L	4	83					HAL
1991 08 13.31	S	12.5	GA	20.0	L	5	68	0.9	2			MOD
1991 08 14.31	M	12.2	GA	20.0	L	5	68					MOD
1991 08 14.31	S	12.3	GA	20.0	L	5	68	1.3	2			MOD
1991 08 16.98	S	12.7	AC	20.3	T	10	123	0.7	1			GRA04
1991 08 16.99	S	13.1	AC	20.3	T	10	133	0.6	3			DAH
1991 08 17.08	S	12.9	AC	35.5	T	11	80	2.0	2			MIK
1991 08 18.47	S	12.2	NP	50.8	L	4	120	1.3	1			MOR
1991 08 19.04	I[	13.0		20.3	T	10	62					GAR02
1991 08 19.34	M	12.5	GA	35.9	L	7	85	0.60	2			MOD
1991 08 20.04	I[	13.2		20.3	T	10	62					GAR02
1991 08 20.09	S	13.0	AC	35.5	T	11	80	2.5	2			MIK
1991 08 20.44	S	12.2	PC	41	L	4	183					HAL
1991 08 21.08	S	12.8	AC	20.3	T	10	62	2	1			GAR02
1991 08 22.09	S	12.8	AC	20.3	T	10	62	1.5	2			GAR02
1991 08 22.34	M	12.9	GA	35.9	L	7	85	1.0	2			MOD
1991 08 22.35	M	12.5	GA	20.0	L	5	68	1.6	2			MOD
1991 08 23.38	M	13.3	GA	20.0	L	5	68	0.8	1			MOD
1991 09 06.11		[12.5	AC	20.0	L	4	40					MIK
1991 09 07.35	M	14.2	GA	40	L	7	100	1.0	1			MOD
1991 09 07.40	I[	13.5		41	L	4	183					HAL
1991 09 08.42	S[	13.0	NP	25.6	L	4	156					MOR
1991 09 10.12		[12.5	AC	20.0	L	4	40					MIK
1991 09 11.10	S	14.0:	AC	35.5	T	11	80	& 3	1			MIK
1991 09 14.37	S[	13.3	NP	25.6	L	4	156					MOR
1991 09 15.43	I[	13.5		41	L	4	183					HAL
1991 09 27.01	S	12.9	PC	25.2	L	4	140	1.4	2			KOR01
1991 10 01.01	I[	14.4	PC	25.2	L	4	140					KOR01
1991 10 03.30	I[	13.5		41	L	4	183					HAL
1991 10 03.92		[13.5	AC	35.5	T	11	80					MIK
1991 10 04.02	S	13.3	PC	25.2	L	4	140	2.1	3			KOR01

Periodic Comet Schwassmann-Wachmann 1 (1989 XV) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 10 05.02	S	13.4:	PC	25.2	L	4	140	2.2	2/			KOR01
1991 10 05.32	S[	13.3	NP	25.6	L	4	156					MOR
1991 10 06.02	[	14.0	AC	35.5	T	11	80					MIK
1991 10 06.28	S[	14.0	NP	50.8	L	4	275					MOR
1991 10 07.02	S	13.2:	PC	25.2	L	4	140	2.5	3			KOR01
1991 10 08.32	I[	13.5		41	L	4	183					HAL
1991 10 16.36	I[	13.5		41	L	4	183					HAL
1991 10 29.84	[	13.5	AC	35.5	T	11	80					MIK
1991 10 30.25	I[	13.5		41	L	4	183					HAL
1991 11 01.84	[	13.5	AC	35.5	T	11	80					MIK
1991 11 03.29	S[	13.3	NP	25.6	L	4	156					MOR
1991 11 07.25	I[	13.5		41	L	4	244					HAL
1991 11 08.92	[	13.5	AC	35.5	T	11	80					MIK
1991 11 11.01	[	14.0	AC	35.5	T	11	80					MIK
1991 11 18.49	I[	13.5		41	L	4	183					HAL

Periodic Comet Van Biesbroeck (1989h1)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 06 08.40	S	13.3	NP	50.8	L	4	195	1.3	1/			MOR
1991 06 14.31	S	14.1	GA	40	L	7	190	0.45	3			MOD
1991 06 20.31	S	14.3	GA	40	L	7	190	0.40	3			MOD
1991 06 21.32	S	14.3	GA	40	L	7	190	0.40	3			MOD
1991 07 06.22	S[	14.3	GA	40	L	7	190	! 0.5				MOD
1991 07 06.82	[	12.3	UM	22.9	L	4	56					ZHU
1991 07 09.28	S	14.0	GA	40	L	7	190	0.45	3			MOD
1991 07 10.27	M	14.0	GA	40	L	7	190	0.45	3			MOD
1991 07 15.27	M	14.5	GA	40	L	7	190	0.35	4			MOD
1991 07 15.39	S	13.3	NP	25.6	L	4	156	0.9	3			MOR
1991 07 15.83	[	12.3	UM	22.9	L	4	56					ZHU
1991 07 16.29	M	14.5	GA	40	L	7	190	0.35	5			MOD
1991 07 17.33	M	14.2	GA	40	L	7	190	0.50	4			MOD
1991 08 04.32	S	13.7	NP	50.8	L	4	195	0.45	6			MOR
1991 08 06.32	M	12.8	AC	41	L	4	183					HAL
1991 08 07.13	S	12.8	AC	50.0	L	5	157	0.7	4			BOR
1991 08 07.31	M	13.8	GA	40	L	7	190	0.50	3			MOD
1991 08 11.19	M	13.8	GA	20.0	L	5	167	0.40	4			MOD
1991 08 11.35	M	13.4	NP	50.8	L	4	195	0.67	4			MOR
1991 08 12.17	M	13.8	GA	20.0	L	5	167	0.40	4			MOD
1991 08 13.27	M	13.3	AC	41	L	4	183					HAL
1991 09 01.14	M	14.8	GA	35.9	L	7	164	0.33	3			MOD
1991 09 02.15	M	14.6	GA	35.9	L	7	164	0.35	3			MOD
1991 09 02.25	I[	13.5		41	L	4	183					HAL
1991 09 07.11	S[	15.0	GA	40	L	7	190	! 0.35				MOD
1991 09 29.05	S[	15.1	GA	40	L	7	190	! 0.3				MOD
1991 10 06.20	S[	14.0	NP	50.8	L	4	275					MOR

Periodic Comet Levy (1991q)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 06 15.44	M	8.4	S	25.6	L	4	45	3.5	4			MOR
1991 06 15.46	M	8.5:	AA	8.0	B		20	4.4	6			MOR
1991 06 15.82	S	8.3	AA	8.0	B		15					SEA
1991 06 16.46	M	8.7	AA	8.0	B		20	4.4	6			MOR
1991 06 19.07	S	8.4	AA	8.0	B		15	4.5	3/			HAV
1991 06 20.34	M	9.3	GA	35.9	L	7	85	1.8	4			MOD
1991 06 20.36	S	9.1	GA	20.0	L	5	35	1.8	2			MOD
1991 06 21.32	S	8.7	AC	8.0	B		20	2.9	4			BOR
1991 06 21.34	M	9.5	AA	35.9	L	7	85	2.0	4			MOD

Periodic Comet Levy (1991q) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 06 21.35	S	9.3	AA	20.0	L	5	35	2.0	2			MOD
1991 06 21.81	S	8.4	AA	8.0	B		15					SEA
1991 06 22.45	M	8.6	AA	8.0	B		20	3	6			MOR
1991 06 24.06	S	8.2	AA	8.0	B		15	5	3			HAV
1991 06 24.31	S	8.7	MP	8.0	B		20					BOR
1991 06 24.31	S	8.8	AC	8.0	B		20	2.8	4			BOR
1991 06 24.35	M	9.5	AA	35.9	L	7	85	2.1	4			MOD
1991 06 24.36	M	9.1	AA	20.0	L	5	35	2.2	3			MOD
1991 06 24.36	S	9.0	AA	20.0	L	5	35					MOD
1991 06 29.29	S	8.6	S	11.4	L	8	40		4			VIE
1991 06 29.77	S	9.6	CS	31.7	L	5	86	1	1			JON
1991 06 30.29	S	8.4	S	11.4	L	8	40		4			VIE
1991 06 30.94	S	8.1	AA	25.2	L	4	35	8	3			KOR01
1991 06 30.96	S	8.4:	AA	22.9	L	4	56	& 5	3			ZHU
1991 07 01.78	S	9.2	MS	31.7	L	5	86	1	1/			JON
1991 07 01.92	S	8.2	AA	25.2	L	4	35	5	2			KOR01
1991 07 01.96	S	8.3	AA	22.9	L	4	56	& 5	3	?0.1	160	ZHU
1991 07 02.29	S	8.4	S	11.4	L	8	40		3			VIE
1991 07 02.77	S	9.2	MS	31.7	L	5	86	1	1/			JON
1991 07 02.92	S	8.2	AA	25.2	L	4	35	4	2			KOR01
1991 07 02.95	S	8.3	AA	22.9	L	4	56	& 4	3			ZHU
1991 07 03.77	S	9.0	MS	31.7	L	5	86	1.5	2			JON
1991 07 04.77	S	9.0	MS	31.7	L	5	86	2	3			JON
1991 07 04.92	S	8.1	AA	25.2	L	4	35	9	2	0.06		KOR01
1991 07 04.94	S	8.2	AA	11.0	B		20	& 3	3			SHU
1991 07 04.94	S	8.2	AA	22.9	L	4	56	6	2			ZHU
1991 07 05.35	M	9.1	GA	20.0	L	5	35	1.4	4			MOD
1991 07 05.91	S	8.1	AA	25.2	L	4	35	8	3	0.1		KOR01
1991 07 05.94	S	8.0	AA	11.0	B		20	& 4	3			SHU
1991 07 06.35	M	8.9	GA	20.0	L	5	35	1.6	4			MOD
1991 07 06.90	S	8.1	AA	11.0	B		20	5	4			SHU
1991 07 06.90	S	8.1	AA	25.2	L	4	40	7	4	0.1		KOR01
1991 07 06.94	S	8.2	AA	22.9	L	4	32	6	2	?0.1	160	ZHU
1991 07 07.02	S	8.8	S	20.3	T	10	50	3.0	3			LUE
1991 07 07.03	S	8.6	S	20.3	T	10	111	3.0	3			LUE
1991 07 07.92	S	8.0	AA	11.0	B		20	6	5			SHU
1991 07 07.92	S	8.1	AA	25.2	L	4	40	7	4			KOR01
1991 07 07.93	S	8.1	AA	22.9	L	4	32	6	4			ZHU
1991 07 08.89	S	8.1	AA	11.0	B		20	6	4			SHU
1991 07 08.90	S	8.0	AA	8.0	R	10	29	8	3			KOR01
1991 07 08.91	S	8.1	AA	25.2	L	4	35	6	4			KOR01
1991 07 08.92	S	8.0	AA	22.9	L	4	32	5	4/			ZHU
1991 07 08.95	S	8.1	AA	12.0	R	5	20	6	3			ZHU
1991 07 09.31	S	8.7	NO	8.0	B		20	3.7	5			BOR
1991 07 09.34	S	8.2	AA	15.2	L	5	30	3				HER02
1991 07 09.35	M	8.9	GA	20.0	L	5	35	1.7	5			MOD
1991 07 09.88	S	8.1	AA	11.0	B		20	7	5			SHU
1991 07 09.92	S	8.1	AA	25.2	L	4	35	8	4			KOR01
1991 07 09.93	S	8.1	AA	22.9	L	4	32	7	4			ZHU
1991 07 09.95	S	8.1	AA	12.0	R	5	20	7	4			KOR01
1991 07 09.96	S	8.1	AA	12.0	R	5	20	8	3/			ZHU
1991 07 10.30	S	8.3	S	11.4	L	8	40		4			VIE
1991 07 10.31	S	8.7	NO	8.0	B		20	3.2	5			BOR
1991 07 10.34	B	8.3	S	7.0	B		10	4	5			DEA
1991 07 10.34	S	8.3	AA	15.2	L	5	30	2.5				HER02
1991 07 10.36	M	8.9	GA	20.0	L	5	35	1.6	5			MOD
1991 07 10.88	S	8.0	AA	8.0	R	10	29	10	4			KOR01
1991 07 10.90	S	7.9	AA	25.2	L	4	35	9	4			KOR01
1991 07 10.91	S	7.9	AA	11.0	B		20	6	4			SHU

Periodic Comet Levy (1991q) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 07 10.92	S	8.0	AA	22.9	L	4	32	9	3/			ZHU
1991 07 10.93	S	7.9	AA	12.0	R	5	20	10	4			ZHU
1991 07 10.93	S	8.0	AA	12.0	R	5	20	10	4			KOR01
1991 07 11.06	S	8.4	AA	8.0	B		15	4	4	0.20	260	HAV
1991 07 11.33	B	8.3	S	7.0	B		10	6	5			DEA
1991 07 11.33	S	8.4	AA	15.2	L	5	30	3.5				HER02
1991 07 11.34	M	9.3	GA	35.9	L	7	85	1.6	6			MOD
1991 07 11.36	M	8.9	GA	20.0	L	5	35	1.8	5			MOD
1991 07 11.46	M	8.6	NP	5.0	B		10					HAL
1991 07 11.90	S	7.9	AA	11.0	B		20	6	4			SHU
1991 07 11.90	S	8.0	AA	8.0	L	10	29	7	4			KOR01
1991 07 11.91	S	7.9	AA	25.2	L	4	35	9	4			KOR01
1991 07 11.93	S	7.9	AA	22.9	L	4	32	7	4			ZHU
1991 07 12.33	S	8.2	AA	15.2	L	5	30	4	6			HER02
1991 07 12.34	M	8.9	GA	20.0	L	5	35	1.6	5			MOD
1991 07 12.91	S	7.9	AA	11.0	B		20	7	4			SHU
1991 07 12.91	S	7.9	AA	22.9	L	4	32	8	4			ZHU
1991 07 12.92	S	7.9	AA	25.2	L	4	35	11	4			KOR01
1991 07 13.93	S	7.9	AA	22.9	L	4	32	7	3/			ZHU
1991 07 13.94	S	7.9	AA	25.2	L	4	35	7	4	0.05	110	KOR01
1991 07 13.94	S	8.0	AA	11.0	B		20	6	4			SHU
1991 07 13.94	S	8.0	AA	25.2	L	4	70	6	3			KOR01
1991 07 15.33	B	8.4	AA	15.2	L	5	30	4.5	7			HER02
1991 07 15.37	M	8.9	GA	20.0	L	5	35	1.6	5			MOD
1991 07 15.46	M	8.5	AA	8.0	B		20		7/	0.83	300	MOR
1991 07 15.47				25.6	L	4	45		7	0.50	290	MOR
1991 07 15.47				25.6	L	4	45		7	0.83	300	MOR
1991 07 15.90	S	7.9	AA	22.9	L	4	32	8	4/			ZHU
1991 07 15.92	S	7.9	AA	11.0	B		20	8	3			SHU
1991 07 15.94	S	8.0	AA	25.2	L	4	35	7	3			KOR01
1991 07 16.05	S	8.4	AA	8.0	B		15	4	5	0.20	270	HAV
1991 07 16.09	B	8.5	VF	12	L	6	40	4.5	5/			REN
1991 07 16.29	S	8.2	S	11.4	L	8	40		4			VIE
1991 07 16.32	S	8.8	NO	8.0	B		20	3.0	6			BOR
1991 07 16.33	M	8.5	GA	5.0	B		10	3.0	4			MOD
1991 07 16.34				35.9	L	7	85	1.3	6	0.05	265	MOD
1991 07 16.37	M	8.9	GA	20.0	L	5	35	1.3	5			MOD
1991 07 16.44	M	8.3	PC	5.0	B		10					HAL
1991 07 16.92	S	8.0	AA	22.9	L	4	32	9	4/			ZHU
1991 07 16.96	S	8.0	AA	5.0	B		10	10	4			KOR01
1991 07 17.06	S	8.4	AA	8.0	B		15	4	5	0.38	270	HAV
1991 07 17.09	S	8.7	AA	33	L	4	62	4	4			BOA
1991 07 17.34	M	8.5	GA	5.0	B		10	3.2	4			MOD
1991 07 17.35	M	8.9	GA	20.0	L	5	35	1.6	5			MOD
1991 07 17.91	S	7.9	AA	11.0	B		20	& 8	4			SHU
1991 07 17.92	S	8.0	AA	22.9	L	4	32	9	4	0.1	180	ZHU
1991 07 17.94	S	7.9	AA	25.2	L	4	35	6	4			KOR01
1991 07 18.06	B	8.6	VF	8.0	B		12		5			REN
1991 07 18.07	B	8.8	VF	12	L	6	40	4.5	5/			REN
1991 07 18.92	S	7.8	AA	25.2	L	4	35	9	5	0.06	80	KOR01
1991 07 18.94	S	7.9	AA	11.0	B		20	7	4			SHU
1991 07 19.09	S	8.8	AA	33	L	4	62	3.5	3/			BOA
1991 07 21.40	S	8.8:	AA	20.0	T	10	88	1.0	5			SHA04
1991 07 22.08	S	9.0:	AA	20.0	L	4	40	2.5	7			MIK
1991 07 22.93	S	7.8	AA	25.2	L	4	35	7	4			KOR01
1991 07 23.04	S	9.2	GA	13.0	L	6	23	> 4	5			MEY
1991 07 23.04	S	9.2	GA	13.0	L	6	23	> 4	5			MEY
1991 07 23.09	S	9.0	AA	20.0	L	4	40	& 3	7			MIK
1991 07 23.93	S	7.8	AA	25.2	L	4	35	8	4			KOR01

Periodic Comet Levy (1991q) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 07 23.93	S	7.9	AA	25.2	L	4	70	8	4	0.09	70	KOR01
1991 07 24.04	S	8.9	GA	13.0	L	6	36	5	6			MEY
1991 07 24.04	S	8.9	GA	13.0	L	6	36	5	6			MEY
1991 07 24.94	S	7.8	AA	25.2	L	4	35	7	4	0.05	70	KOR01
1991 07 24.94	S	7.8	AA	25.2	L	4	70	7	6	0.1	70	KOR01
1991 07 25.09	S	9.0	AA	20.0	L	4	40	& 2.5	7			MIK
1991 07 25.36	M	9.0	GA	20.0	L	5	35	1.6	5			MOD
1991 07 25.94	S	7.7	AA	25.2	L	4	35	5	4			KOR01
1991 07 26.95	S	7.9	AA	25.2	L	4	35	4	3			KOR01
1991 07 27.95	S	7.9	AA	25.2	L	4	35	6	3			KOR01
1991 07 28.32	S	8.5	S	11.4	L	8	40		3			VIE
1991 07 28.94	S	8.1	AA	25.2	L	4	35	4	3			KOR01
1991 07 28.95	S	8.1	AA	25.2	L	4	70	5	3			KOR01
1991 07 29.32	S	8.4	S	11.4	L	8	40		3			VIE
1991 07 30.32	S	8.7	S	11.4	L	8	40		3			VIE
1991 07 30.91	S	8.1	AA	25.2	L	4	35	5	3			KOR01
1991 07 30.94	S	8.2	AA	25.2	L	4	70	6	3	0.05	80	KOR01
1991 07 31.91	S	8.4	AA	25.2	L	4	35	5	3			KOR01
1991 07 31.95	S	8.4	AA	25.2	L	4	70	5	3/	0.05	80	KOR01
1991 08 01.07	S	9.6	AA	20.0	L	4	40	& 3	6			MIK
1991 08 01.08	S	8.9	A	11	L	7	32	4	4			OST
1991 08 01.17	S	8.5	AA	15.0	L	4	26	& 4	5/			PER01
1991 08 01.89	S	9.0	A	11	L	7	32	3	4			OST
1991 08 01.93	S	8.4	AA	25.2	L	4	35	6	3/	0.05	100	KOR01
1991 08 01.96	S	8.8	AA	30.0	R	15	113	5	4			ZHU
1991 08 02.93	S	8.5	AA	25.2	L	4	35	4	3			KOR01
1991 08 02.98	S	9.1	A	11	L	7	32	4	3			OST
1991 08 02.99 !	S	8.8:	AA	30.0	R	15	281					ZHU
1991 08 03.47	M	9.2	AA	8.0	B		20		6/			MOR
1991 08 03.92	S	8.5	AA	25.2	L	4	35	4	4	0.06	75	KOR01
1991 08 04.93	S	8.6	AA	25.2	L	4	35	5	3			KOR01
1991 08 04.93	S	8.6	AA	25.2	L	4	70	6	3	0.05		KOR01
1991 08 05.36	S	9.3	AA	15.2	L	5	30	4				HER02
1991 08 05.94	S	8.7	AA	25.2	L	4	35	5	3			KOR01
1991 08 05.97	S	9.0	AA	20.0	L	4	52	5	4			ZHU
1991 08 06.34	S	8.6	AA	15.2	L	5	30	3				HER02
1991 08 06.34	S	9.4	AC	31.7	L	6	68	1.4	4			BOR
1991 08 06.38	M	9.6	GA	20.0	L	5	35	1.7	4			MOD
1991 08 07.04	S	9.5	S	20.3	T	10	51	2.5	3			HAS02
1991 08 07.09	S	10.2:	AA	20.0	L	4	40	& 3	5			MIK
1991 08 07.33	S	9.1	S	25.4	L	6	57		4			VIE
1991 08 07.37	M	9.6	GA	20.0	L	5	35	1.7	3			MOD
1991 08 07.96	S	9.0	AA	25.2	L	4	35	3	3			KOR01
1991 08 07.96	S	9.0	AA	25.2	L	4	70	3.5	3	0.06	65	KOR01
1991 08 08.10	S	9.9	AC	20.0	L	4	40	2.7	7			MIK
1991 08 08.33	S	9.2	S	25.4	L	6	57		3			VIE
1991 08 08.46	M	9.1	WA	41	L	4	83					HAL
1991 08 08.98	S	9.1	AA	25.2	L	4	35	4	4			KOR01
1991 08 09.00	S	9.7	AG	31.6	L	5	62	1.1	6			MID01
1991 08 09.00	S	10.2	AC	20.3	T	10	80	1.8	2/			GRA04
1991 08 09.01	S	9.5	AC	20.3	T	10	133	1.4	5			DAH
1991 08 09.32	S	9.1	S	5.0	B		10					VIE
1991 08 09.96	S	9.2	AA	25.2	L	4	35	5	4	0.06	115	KOR01
1991 08 10.48	M	9.8	NP	8.0	B		20	10	6/			MOR
1991 08 10.92	S	9.3	AA	25.2	L	4	35	4	3			KOR01
1991 08 10.97	S	9.1	A	24	L	4	32	4	6			LAV
1991 08 11.90	S	9.2	A	8	M	6	20	3	2			OST
1991 08 11.96	S	9.3	AA	25.2	L	4	70	4	3	0.04	107	KOR01
1991 08 12.11	S	9.4	AA	8.0	B		15	3.5	4/			HAV

Periodic Comet Levy (1991q) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 08 12.36	S	9.6	AC	31.7	L	6	68	2.7	5			BOR
1991 08 12.95	S	9.5	AA	25.2	L	4	70	3	3	0.03	104	KOR01
1991 08 13.01	S	10.3	AC	20.3	T	10	80	2.2	2			GRA04
1991 08 13.33	S	9.5:	S	25.4	L	6	57		3			VIE
1991 08 13.92	S	9.6	A	8	M	6	20	4	2			OST
1991 08 13.95	S	9.5	AA	25.2	L	4	35	4	3			KOR01
1991 08 13.95	S	9.6	AA	25.2	L	4	98	3.5	3	0.03	102	KOR01
1991 08 14.10	S	9.2:	A	25	L	4	35	7	6			LAV
1991 08 14.11	S	9.4	AA	8.0	B		15	3	4			HAV
1991 08 14.95	S	9.6	AA	25.2	L	4	35	3	3			KOR01
1991 08 14.96	S	9.6	AA	25.2	L	4	98	3.2	2/	0.04	100	KOR01
1991 08 14.98	S	9.5	A	8	M	6	20	3	3			OST
1991 08 15.30	S	9.3:	A	25	L	4	35	7	4			LAV
1991 08 15.96	S	9.4	AA	20.0	L	4	52	3	3			ZHU
1991 08 15.96	S	9.6	AA	12.0	R	5	20	3	3			KOR01
1991 08 16.3	S	9.4	A	8	M	6	20	4	2			OST
1991 08 17.02	S	10.0	AC	20.3	T	10	100	1.9	2			GRA04
1991 08 17.12	B	10.5	CS	20.3	T	10	62	2.5	1			GAR02
1991 08 18.47	M	10.1	NP	8.0	B		20		4			MOR
1991 08 18.48	M	9.8	NP	25.6	L	4	20		5			MOR
1991 08 20.11		[11.0	AC	20.0	L	4	40					MIK
1991 08 20.13	S	10.5	CS	20.3	T	10	62	2	2			GAR02
1991 08 20.48	S	9.1	WA	41	L	4	83					HAL
1991 08 21.14	B	9.5:	VF	12	L	6	40	4	3			REN
1991 08 21.14	B	10.3	CS	20.3	T	10	62	2	3			GAR02
1991 08 22.08	S	9.7	AA	8.0	B		15	3	3			HAV
1991 08 23.08	S	10.1:	GA	13.0	L	6	36	2	4			MEY
1991 08 23.12		11.0:		20.4	L	6	72	& 1.2	1			JAH
1991 08 26.08	S	9.9	AA	12.0	R	5	40	3	4			KOR01
1991 08 27.09	S	10.0	AA	12.0	R	5	40	3	4			KOR01
1991 08 31.08	S	10.1	AA	12.0	R	5	40	2.5	3			KOR01
1991 09 01.07	S	10.1	AA	25.2	L	4	70	2.4	3			KOR01
1991 09 02.07	S	10.2	AA	25.2	L	4	70	2.5	2			KOR01
1991 09 03.08	S	10.3	AA	25.2	L	4	70	3.1	3			KOR01
1991 09 04.08	S	10.3	AA	25.2	L	4	70	3	3			KOR01
1991 09 05.08	S	10.4	AA	25.2	L	4	70	2.4	3			KOR01
1991 09 06.10	S	11 :	VF	25	L	6	150		2/			REN
1991 09 07.08	S	10.5	AA	25.2	L	4	70	2.3	3			KOR01
1991 09 07.37	S	10.5	AC	31.7	L	6	68	1.4	2			BOR
1991 09 07.48	S	10.5	WA	41	L	4	83					HAL
1991 09 08.08	S	10.6	AA	25.2	L	4	70	& 2	4			KOR01
1991 09 08.14	S	11.0	AA	30	R	18	95	1.0	2			SHA02
1991 09 08.49	S	10.8	NP	25.6	L	4	67	3.0	2			MOR
1991 09 09.08	S	10.6	PC	25.2	L	4	70	2.4	3			KOR01
1991 09 11.08	S	10.7	PC	25.2	L	4	98	2.2	3			KOR01
1991 09 12.11	B	10.7	AC	20.4	L	6	72					JAH
1991 09 12.11	S	10.4	AC	20.4	L	6	72	3.7	2			JAH
1991 09 12.11	S	10.8	PC	25.2	L	4	98	2.1	3			KOR01
1991 09 13.38	S	10.6	AC	31.7	L	6	68	2.2	1			BOR
1991 09 14.10	S	10.7	AC	20.4	L	6	72	2.2	1			JAH
1991 09 14.50	S	10.9	NP	25.6	L	4	67	3.0	1/			MOR
1991 09 15.09	S	11.0	AC	20.4	L	6	72	4.8	1			JAH
1991 09 15.12	S	10.9	PC	25.2	L	4	98	2.3	3			KOR01
1991 09 15.49	S	10.7:	CA	41	L	4	83		1			HAL
1991 09 15.50	S	11.0	NP	25.6	L	4	67	3.1	1/			MOR
1991 09 16.11	S	10.9	PC	25.2	L	4	98	& 2	4			KOR01
1991 09 18.12	S	10.9	PC	25.2	L	4	98	1.8	4			KOR01
1991 09 24.12	S	11.1	PC	25.2	L	4	98	1.7	5			KOR01
1991 09 25.12	S	11.1	PC	25.2	L	4	98	1.8	5			KOR01

Periodic Comet Levy (1991q) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 09 26.12		S 11.2	PC	25.2	L	4	98	& 1.5	5			KOR01
1991 09 27.10		S 11.3	PC	25.2	L	4	98	& 1.5	5			KOR01
1991 10 04.09		I[13.6	PC	25.2	L	4	98					KOR01
1991 10 05.11		I[13.8	PC	25.2	L	4	98					KOR01
1991 10 05.45		S 11.7	AC	41	L	4	83		1			HAL
1991 10 05.50		S 11.5	NP	25.6	L	4	67	3.0	0/			MOR
1991 10 06.46	!	S 11.8	NP	50.8	L	4	78	2.5	0/			MOR
1991 10 07.12		S 11.9:	NP	25.2	L	4	140	1.9	4			KOR01
1991 10 08.11		S 12.1:	NP	25.2	L	4	140	1.6	5			KOR01
1991 10 09.12		S 12.3:	NP	25.2	L	4	140	1.7	5			KOR01
1991 10 19.48		S 12.8	CA	41	L	4	183					HAL
1991 11 03.46		S[12.5	NP	25.6	L	4	111	1.1	1			MOR

Φ Φ Φ

The Last 30 Comets to Receive Provisional Letter Designations

Listed below, for handy reference, are the last 30 comets which have been given letter designations (1989a is the first comet to be discovered or recovered in 1989, 1989b is the second comet..., etc.). After the "equal sign" is given the name, preceded by a star (⋆) if the comet is a new discovery (as opposed to a recovery from predictions of a previously-known short-period comet); a 'sharp' sign (#) is used to indicate a 're-discovery' of a comet that had been lost for many years. 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 second-to-last column indicate the *IAU Circular* containing the discovery/recovery announcement. A new addition here is the last column, which lists the 3-digit code for short-period comets as used internally in archival data (first 3 characters), and which should be used by those observers contributing data in computer-readable form. [This list updates the previous list in the July 1991 issue, p. 142.]

Desig.			*Comet*	*P*	*T*	*q*	*IAUC*	P/ code
1991a	=	#	P/Metcalf-Brewington	7.8	1/5/91	1.6	5155	705
1991b	=	⋆	Arai		12/10/90	1.43	5157	
1991c	=		P/Swift-Gehrels	9.2	2/22/91	1.36	5164	802
1991d	=	⋆	Shoemaker-Levy		12/31/91	2.3	5175	
1991e	=	⋆	P/Shoemaker-Levy 3	7.2	12/12/90	2.8	5183	646
1991f	=	⋆	P/Shoemaker-Levy 4	6.5	7/14/90	2.0	5185	727
1991g	=	⋆	McNaught-Russell		10/18/90	4.8	5187	
1991h	=		P/Takamizawa	7.2	8/17/91	1.6	5192	636
1991i	=		P/Kowal 1	15.0	3/10/92	4.7	5195	913
1991j	=		P/Hartley 1	6.0	5/17/91	1.8	5209	521
1991k	=	⋆	P/Mrkos	5.6	3/18/91	1.4	5212	523
1991l	=	⋆	Helin-Lawrence		1/20/92	1.5	5213	
1991m	=		P/Giacobini-Zinner	6.6	4/13/92	1.03	5225	613
1991n	=		P/Faye	7.3	11/16/91	1.6	5246	701
1991o	=		P/Chernykh	14.0	1/25/92	2.4	5285	915
1991p	=		P/Shoemaker 1	7.3	12/18/91	2.0	5286	722
1991q	=	⋆	P/Levy	51	7/8/91	0.98	5291	951
1991r	=	⋆	Helin-Alu		2/20/92	4.8	5292	
1991s	=		P/Wirtanen	5.5	9/20/91	1.08	5303	619
1991t	=		P/Hartley 2	6.3	9/11/91	0.95	5304	637
1991u	=		P/Arend	8.0	5/26/91	1.85	5322	712
1991v	=	⋆	McNaught-Russell		5/3/92	3.2	5333	
1991w	=	⋆	McNaught-Russell		11/18/90	7.0	5335	
1991x	=	⋆	P/Spacewatch	5.6	12/22/90	1.54	5341	524
1991y	=	⋆	P/McNaught-Hughes	6.7	6/13/91	2.1	5354	647
1991z	=	⋆	P/Shoemaker-Levy 5	8.7	12/13/91	2.0	5359	728
$1991a_1$	=	⋆	Shoemaker-Levy		7/23/92	0.83	5363	
$1991b_1$	=	⋆	P/Shoemaker-Levy 6	7.5	10/13/91	1.13	5382	729
$1991c_1$	=		P/Tsuchinshan 1	6.6	8/30/91	1.5	5383	624
$1991d_1$	=	⋆	Shoemaker-Levy		9/15/91	1.23	5389	