
INTERNATIONAL COMET QUARTERLY

Whole Number 103

JULY 1997

Vol. 19, No. 3



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

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

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

Credit cards may be used for payment of subscriptions, though a minimum of US\$20.00 can be accepted for each charge. Credit-card orders may be placed by e-mail (to iausubs@cfa.harvard.edu), by fax (to USA 617-495-7231), or by telephone (to USA 617-495-7280, generally between 14:00 and 21:00 UT, Monday to Friday). When sending orders by fax or e-mail, please include the following information: (1) your name (as given on the credit card); (2) card type (MasterCard, Visa, or Discover); (3) credit-card number and expiration date; (4) address at which the card is registered; (5) which services you wish to subscribe to; (6) if the payment is for the renewal of a current or expired account, please include your account number.

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

Cometary observations should be sent to the Editor in Cambridge; all data intended for publication in the *ICQ* that is not sent via computer electronic mail should be sent on standard *ICQ* observation report forms, which can be obtained upon request from the Editor. Those who can send observational data (or manuscripts) in machine-readable form are encouraged to do so [especially through e-mail via the computer networks SPAN (6700::DAN) or Internet (ICQ@CFA.HARVARD.EDU), or via floppy disks that can be read on an IBM PC], and should contact the Editor for further information. The *ICQ* has extensive information for comet observers on the World Wide Web, including the Keys to Abbreviations used in data tabulation (see URL <http://cfa-www.harvard.edu/cfa/ps/icq.html>). The *ICQ* has produced a 225-page *Guide to Observing Comets*, available in first-edition form to *ICQ* subscribers for \$8.00 (one copy only), or to non-subscribers for \$15.00 per copy. The second edition will be available in late 1997 for \$15.00 to *ICQ* subscribers and for \$25.00 per copy to non-subscribers.

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

ICQ EDITORIAL STAFF:

Daniel W. E. Green.....Editor
Charles S. Morris.....Associate Editor
Syuichi Nakano.....*Comet Handbook* Editor

OBSERVATION COORDINATORS:

AUSTRALIA Paul Camilleri (51 Mookarri Street; Cobram 3644, Victoria); David A. J. Seargent
BELARUS Vitali S. Nevski (Moskovski pr. h.11/5, ap.27; Vitebsk, 210015)
BRAZIL José Guilherme de S. Aguiar (R. Candido Portinari, 241; 13089-070 - Campinas - S.P.)
BULGARIA Veselka Radeva (Astronomical Observatory and Planetarium; P.O.B. 120; 9000 Varna)
CHINA Chen Dong Hua (101 Quan Zhou Road; Gulangyu, Xiamen 361002)
CZECH REPUBLIC Petr Pravec (Astronomical Institute; CS-25165 Ondřejov); Vladimir Znojil
FRANCE Stephane Garro (Horizon 1800; Batiment A; 05170 Orcieres-Merlette)
GERMANY Andreas Kammerer (Johann-Gregor-Breuer-Str. 28; 76275 Ettlingen)
HUNGARY Krisztián Sárneczky (Kadar u. 9-11., H-1132 Budapest)
ITALY G. Antonio Milani (Dip. Scienze Biomediche; via Trieste 75; 35121 Padova)
JAPAN Akimasa Nakamura (P.O. Box 9, Kuma Post Office; Kuma-cho, Ehime 791-12)
Syuichi Nakano (P.O. Box 32; Sumoto Post Office; Hyogo-Ken, 656-91)
THE NETHERLANDS Alex Scholten (Horsterdijk 6a; NL-6961 KP Eerbeek)
NEW ZEALAND Alan C. Gilmore and Pamela Kilmartin (P.O. Box 57; Lake Tekapo 8770)
NORWAY Bjoern H. Granslo (Postboks 1029; Blindern; N-0315 Oslo 3)
POLAND Janusz Pleszka and Tomasz Sciezor (Faculty of Physics and Nuclear Technique; University of Mining and Metallurgy; Al. Mickiewicza 30; 30-059 Cracow)
PORTUGAL Alfredo Pereira (R. Antero de Quental 8, 2 dto; Carnaxide; 2795 Linda-a-Velha)
SLOVENIA Herman Mikuž (Kersnikova 11; 61000 Ljubljana)
SOUTHERN AFRICA Tim Cooper (P.O. Box 14740; Bredell 1623; Kempton Park; South Africa)
SPAIN Jose Carvajal Martinez (San Graciano 7; 28026 Madrid)
SWEDEN Joergen Danielsson (Hasselstigen 2D; 386 00 Farjestaden)
UKRAINE Alexandr R. Baransky (Komarova 12; Vladimir — Volynsky; Volynska 264940)
UNITED KINGDOM Jonathan Shanklin (11 City Road; Cambridge CB1 1DP; England)
Guy M. Hurst (16 Westminster Close; Kempshott Rise; Basingstoke, Hants RG22 4PP; England)
former U.S.S.R. Klim I. Churyumov (Astronomical Observatory; Kiev University; Observatorna 3; Kiev 254053; Ukraine)

EDITORIAL ADVISORY BOARD:

Michael F. A'Hearn, *University of Maryland*
Brian G. Marsden, *Harvard-Smithsonian Center for Astrophysics*
David D. Meisel, *State University College of New York, Geneseo*
Zdenek Sekanina, *Jet Propulsion Laboratory, California Institute of Technology*
Michel Festou, *Observatoire Midi-Pyrenees, Toulouse*
Thomas L. Rokeske, *Appalachian State University*

+++++

This issue is No. 103 of the publication originally called *The Comet* (founded March 1973) and is Vol. 19, No. 3, of the *ICQ*. [ISSN 0736-6922]

© Copyright 1997, Smithsonian Astrophysical Observatory.

Corrigenda

In the April 1997 issue, page 146, "Comet 81P/Wild 2", the observation on 1997 03 04.88 by observer HAS02 is to be deleted.

In the April 1997 issue, page 149, "Comet 118P/Shoemaker-Levy 4", the observation on 1997 03 04.85 by observer HAS02 is to be deleted.

EUGENE M. SHOEMAKER (1928-1997)

Gene Shoemaker, renowned both as a geologist and an astronomer, and a member of the Board of Directors of The Spaceguard Foundation, was killed instantly on the afternoon of July 18, when his car collided head-on with another vehicle on an unpaved road in the Tanami Desert northwest of Alice Springs, in the Northern Territory of Australia. His wife Carolyn, who had closely collaborated with him in both his geological and his astronomical activities for many years, was injured in the accident and admitted to the Alice Springs Hospital in stable condition before being released some days later.

Born in Los Angeles, California, on 1928 April 28, Eugene Merle Shoemaker graduated from the California Institute of Technology in Pasadena at the age of 19. A thesis on the petrology of Precambrian metamorphic rocks earned him a master's degree only a year later, at which point he joined the United States Geological Survey, an organization with which he remained at least partly associated for the rest of his life. His first work for the USGS involved searching for uranium deposits in Colorado and Utah. While doing this, he also became interested in the moon, the possibility of traveling there, and of establishing the relative roles of asteroidal impacts and volcanic eruptions in forming the lunar craters. He then embarked on work for a Ph.D. at Princeton University, intending to continue his study of metamorphic petrology, although this was interrupted when the USGS again sent him to the field, this time leading him to an investigation of volcanic processes, for it was in the eroded vents of ancient volcanoes that the uranium deposits were often located.

Gene Shoemaker and Carolyn Spellman were married in 1951. A visit to Arizona's Meteor Crater the following year began to set Gene toward the view that both it and the lunar craters were due to asteroidal impacts. In 1956 he tried to interest the USGS in the construction of a geological map of the moon. This work was sidelined, because the national interest in the production of plutonium led him to study of the craters formed in small nuclear explosions under the Yucca Flats in Nevada and invited a comparison with Meteor Crater. It was then that he did his seminal research on the mechanics of meteorite impacts that included the discovery, with Edward Chao, of coesite, a type of silica produced in a violent impact. Awarded a master's degree in 1954, Gene Shoemaker received his doctorate from Princeton in 1960 with a thesis on Meteor Crater.

In 1961 he took a leading role in the USGS venture, in Flagstaff, Arizona, into the study of "astrogeology", the Ranger missions to the moon and the training of the astronauts. It had long been Gene's dream to go to the moon himself, but in 1963 he was diagnosed as having Addison's disease, a condition that prevented him from becoming an astronaut. When the USGS Center of Astrogeology was founded in Flagstaff in 1965, he was appointed its chief scientist and organized the geological activities planned for the lunar landings. In 1969 he returned to Caltech as a professor of geology and served for three years as chairman of the Division of Geological and Planetary Sciences there. Until he retired from the professorship in 1985 he divided his time between Pasadena and Flagstaff. He continued to maintain an office in the USGS Astrogeology building after his formal retirement in 1993, while at the same time taking up a position at the Lowell Observatory.

It was shortly after the 1969 arrival in Pasadena that he became interested in extending his geological knowledge of the formation and distribution of terrestrial and lunar impact craters to the study of the astronomical objects that formed them. With Eleanor Helin he developed a plan to search for such objects — the Apollo asteroids — with the 0.46-m Schmidt telescope at Palomar. This search program had its first success in July 1973 and was soon, with the help also of a number of students and of collaborations using other Schmidt telescopes, significantly augmenting the rather meager knowledge that had been accrued on these objects during the previous four decades.

Carolyn became involved with measuring images from the Palomar films in 1980, and in 1982 the Helin and the Shoemaker observing programs with the 0.46-m Schmidt went their separate ways. Carolyn proved to be very adept at scanning the Schmidt films, and this new phase of the search program had its first success with the discovery of (3199) Nefertiti, an Amor asteroid with its perihelion 0.13 astronomical unit outside the earth's orbit. In 1983 the first of the record 32 comets associated with the Shoemaker name was discovered. By the time the observing program ended, in late 1994, it had produced 40 of the — now — 417 known Amor, Apollo and Aten asteroids (the orbits of this last group being smaller than that of the earth). Together with the other observing programs at Palomar, the Shoemakers have ensured that Palomar recently became and is likely to remain the leading site for the discovery of asteroids, with currently more than 13 percent of asteroids that have been numbered having been found there. A few months before the Shoemaker program was terminated came its "defining moment", with Gene receiving the thrill of his lifetime when some 20 components of one of those 32 comets were observed to crash into the planet Jupiter with astoundingly dramatic results.

Carolyn also went along on Gene's annual trips to Australia to examine impact craters, and the tragic irony that his own death should occur there as the instantaneous result of another violent impact would not have been lost on him. Gene lived as he died, active to the hilt, his enquiring mind participating in the adventure of ever learning more over an unusually large range of scientific disciplines. His many honors included the Wetherill Medal of the Franklin Institute in 1965, election to membership in the National Academy of Sciences in 1980, the Gilbert Award of the Geological Society of America in 1983 and the Kuiper Prize of the American Astronomical Society in 1984. Above all, he was truly the "father" of the science of near-earth objects, to the discovery and study of which The Spaceguard Foundation is dedicated, and his expertise and drive will be sorely missed.

Brian G. Marsden

SOME ADDITIONAL THOUGHTS

I was among those who felt the deep shock upon hearing on July 18 that Gene Shoemaker had been killed earlier that day in a terrible automobile accident in Australia. We are most grateful that Carolyn Shoemaker survived that accident and is gaining her strength through her rapid recovery. The preceding obituary of Gene Shoemaker, written by Brian Marsden for the Spaceguard Foundation, gives more details on his career (and their careers as husband and wife). I will add a few details and comments here.

Carolyn sent a message around to friends, in which she said the following: "Gene and I were traveling on the Tanami Track in Northern Territory close to the Western Australia border when the no-fault accident occurred. We were to meet Dan Milton in a few days to help field check the geology and mapping of Goat Paddock, an impact structure. The accident occurred on one of the few bends in the road where you could not see another vehicle coming. It was an unlikely place considering all the places we have traveled, yet it was a blind curve on a very rough track. There is no question that Gene died immediately in the vehicle on impact. . . . It is remarkable I survived at all considering that mostly what was left of our vehicle was the bed of the truck." A vehicle carrying paramedics passed by very soon after the accident, and they radioed for the Royal Flying Doctors to transport Carolyn to the hospital in Alice Springs, some 500 km distant in the vast central Australian desert. (The other vehicle contained a family of four; the male driver sustained minor injuries, while the other three persons were uninjured.) Friends and family immediately went to Alice Springs to aide Carolyn in her recovery. Carolyn adds that, "although the death of Gene is still a shock and a great loss to us all, Gene would have felt it was a good way to go. He was out doing something he loved away from all the pressures of the world, in a country he loved, with the woman who had been his life partner for 46 years, and he died quickly."

Readers of the *ICQ* are very familiar with the name Shoemaker, and indeed a record 32 comets are named (or co-named) 'Shoemaker' as a result of the expert scanning of photographs by Carolyn Shoemaker in a search program carried out by the couple along with various part-time assistants during 1983-1994. I was fortunate to have interacted with them in this program, as part of my work with the Minor Planet Center and the Central Bureau for Astronomical Telegrams, via announcing their discoveries of comets and minor planets to the world. At first, much discussion surrounding their discoveries would take place via telephone, but that gradually moved to the world of e-mail in the second half of the 1980s.

In March 1984, I spent a couple of nights observing with the Shoemakers, back when they did most of their observing without additional assistants. That third person — helping load films, guide photographs, and develop film throughout the night — permitted Carolyn to spend some time at night scanning the films; when Gene and Carolyn worked alone, much more of the searching of films for unusual objects would have to wait until their observing run was finished (and they were back in Flagstaff, Arizona). The Shoemakers wrote about their observing program in the January 1985 issue of this publication (*ICQ* 7, 3). In observing with them, I was awed by their compatible teamwork and by how quickly and tirelessly they worked; the Shoemakers would go to bed about an hour or so after dawn, after developing the last films, sleep for only 4 or 5 hours, and head out to scan films in the afternoon and prepare for observing the next night. Gene and Carolyn graciously invited me to stay with them on a sofa in their cottage during that observing run in 1985, and I'll never forget their kind hospitality.

We are thankful that Carolyn Shoemaker survived the July accident in Australia, and the community of comet observers and researchers will not forget Gene Shoemaker. As a team, the Shoemakers have contributed greatly to our knowledge of comets, near-earth objects, and solar-system impacts — a legacy that will live on for centuries to come.

— Daniel W. E. Green

Φ Φ Φ

Jürgen H. Rahe

Jürgen H. Rahe, 57, Science Program Director for Exploration of the Solar System at NASA Headquarters in Washington, DC, died tragically on June 18 during a severe storm, when a tree fell on his car as he was driving near his home in Potomac, MD. Jürgen had a distinguished career at NASA and in the field of astronomy and space exploration, and he was well known in the cometary-science community. In his most recent position, he was responsible for overall general management, budget, and strategic planning for NASA's Solar System Exploration programs, including the Galileo mission to Jupiter and several recent and upcoming missions to Mars, including the recent Mars Pathfinder. Jürgen also oversaw various observing programs involving comets and minor planets.

Jürgen grew up in the Hamburg area and did his Ph.D. thesis on comets under Karl Wurm. He went to Goddard Space Flight Center on a postdoc as a NASA Resident Research Associate, where he worked closely with Bert Donn and later with both Donn and Jack Brandt. He spent time at the Technical University in Berlin before moving to the University of Erlangen-Nuremberg, where he became a professor and director of the Dr. Remeis Observatory in Bamberg. Jürgen published many papers in scientific journals and books, edited more than a dozen books and conference proceedings, and served as President and/or member of three International Astronomical Union committees.

Before joining NASA Headquarters full-time in 1989, Jürgen was a staff member at the Jet Propulsion Laboratory in Pasadena, CA. He also served as the Co-Leader of the International Halley Watch; Co-Investigator on the European Space Agency's Giotto mission; Program Scientist for the Clementine, Rosetta, and NEAR (Near Earth Asteroid Rendezvous) missions; and as the Associate Program Scientist for the Hubble Space Telescope. Jürgen published three major cometary atlases: *Atlas of Cometary Forms, Structures Near the Nucleus* (with B. Donn and K. Wurm), NASA SP-198 (1970); *Atlas of Comet Halley 1910 II* (with Donn and J. C. Brandt), NASA SP-488 (1986); and *The International Halley Watch Atlas of Large-Scale Phenomena* (with Brandt and M. B. Niedner), Boulder (1992).

Perhaps as important as his research was the support he gave to those working in the field. At NASA he promoted participation in Keck II, he helped iron out difficulties in space flight missions such as STARDUST, and he strongly supported ground-based research on comets.

— from NASA Press Release 97-137, June 19, forwarded by Andrew J. Butrica; and from information kindly supplied by Ray Newburn, Jr.

Φ Φ Φ

DESIGNATIONS OF RECENT COMETS

Listed below, for handy reference, are the last 30 comets to have been given designations in the new system. The name, preceded by a star (★) if the comet was a new discovery (compared to a recovery from predictions of a previously-known short-period comet). Also given are such values as the orbital period (in years) for periodic comets, date of perihelion, T (month/date/year), and the perihelion distance (q , in AU). Four-digit numbers in the last column indicate the *IAU Circular* (4-digit number) containing the discovery/recovery or permanent-number announcement.

Not included below are numerous recently-discovered comets observed only with the ESA/NASA Solar and Heliospheric Observatory (SOHO) spacecraft — and seen only close to the sun with the SOHO instruments — that are presumed to be Kreutz sungrazers that are no longer in existence (*IAUC* 6653, 6669, 6676, 6685, 6688, 6692, 6693, 6701, 6713, 6714): C/1996 B3, C/1996 D1, C/1996 F2, C/1996 H1, C/1996 M1, C/1996 M2, C/1996 Q2, C/1996 Q3, C/1996 S3, C/1996 X1, C/1996 X2, C/1996 Y1, C/1997 B2, C/1997 K1, C/1997 L3, C/1997 L4, C/1997 M1, and C/1997 P1. [This list updates that in the April 1997 issue, p. 73.]

<i>New-Style Designation</i>	<i>P</i>	<i>T</i>	<i>q</i>	<i>IAUC</i>
★ C/1996 J1 (Evans-Drinkwater)		12/30/96	1.30	6397
★ C/1996 N1 (Brewington)		8/3/96	0.93	6428
★ P/1996 N2 (Elst-Pizarro)	5.6	4/18/96	2.63	6456
126P/1996 P1 (IRAS)	13.3	10/29/96	1.70	6446
★ C/1996 P2 (Russell-Watson)		3/1/96	2.01	6448
★ C/1996 Q1 (Tabur)		11/3/96	0.84	6455
★ C/1996 R1 (Hergenrother-Spahr)		8/29/96	1.90	6470
★ P/1996 R2 (Lagerkvist)	7.3	1/18/97	2.62	6473
★ C/1996 R3		5/30/96	1.8	6564
127P/1996 S1 (Holt-Olmstead)	6.3	2/6/97	2.15	6475
128P/1996 S2 (Shoemaker-Holt 1)	9.5	11/20/97	3.05	6477
129P/1996 U1 (Shoemaker-Levy 3)	7.2	3/4/98	2.82	6494
★ C/1997 A1 (NEAT)		6/19/97	3.16	6532
★ P/1997 B1 (Kobayashi)	25.2	3/2/97	2.05	6553
★ C/1997 BA ₆ (Spacewatch)		11/26/99	3.4	6561
★ P/1997 C1 (Gehrels)	17.4	1/29/96	3.6	6549
★ C/1997 D1 (Mueller)		10/11/97	2.25	6562
55P/1997 E1 (Tempel-Tuttle)	33.2	2/27/98	0.98	6579
★ P/1997 G1 (Montani)	21.8	4/26/97	4.2	6622
★ C/1997 G2 (Montani)		4/16/98	3.1	6626
130P/1997 H1 (McNaught-Hughes)	6.7	2/23/98	2.1	6640
★ C/1997 J1 (Mueller)		5/3/97	2.3	6642
★ C/1997 J2 (Meunier-Dupouy)		3/10/98	3.0	6648
★ C/1997 H2 (SOHO)		5/2/97	0.14	6650
★ C/1997 L1 (Xinglong)		11/21/96	4.9	6677
★ C/1997 L2 (SOHO)		6/10/97	0.04	6684
★ C/1997 N1 (Tabur)		8/15/97	0.40	6692
131P/1997 M2 (Mueller 2)	7.0	11/22/97	2.4	6695
P/1997 N2 (Helin-Roman-Alu 2)	8.2	11/10/97	1.9	6704
★ C/1997 O1 (Tilbrook)		7/13/97	1.37	6705

IWCA II

At the first International Workshop on Cometary Astronomy (IWCA) in Selvino, Italy, in February 1994, it was proposed that such IWCA's be held every five years, with the second one to be held in Cambridge, England, in conjunction with the total solar eclipse of 1999 August 11. This proposal was again circulated in these pages one year ago (*ICQ* 18, 103). In response to that announcement, one 'continental' European comet observer expressed his desire to hold the IWCA II somewhere on the 'continent' instead — at which point, the Cambridge meeting chairman (Jonathan Shanklin) and I decided to put the matter up for discussion, leading to my remarks in the October 1996 issue (*ICQ* 18, 182).

Very few additional negative remarks were received concerning the Cambridge site, and no firm offers to host the meeting in 'continental' Europe were received. Having a dedicated, competent, and enthusiastic local organizing group is of highest importance to conducting a useful meeting, and we have that in the way of Shanklin and the British Astronomical Association. Furthermore, a good lecture hall at Cambridge University will be available at no cost, keeping registration costs to a bare minimum.

We therefore announce enthusiastically that we will indeed hold the second IWCA in Cambridge, England, during 1999 August 14-16 (Saturday-Monday), allowing two full days after the solar eclipse for travel from 'continental' eclipse-observing sites to Cambridge. One goal of this meeting is to bring together the greatest number of comet discoverers ever assembled in one place at one time, and we will be personally inviting as many such individuals as possible in the hopes that the combined eclipse and comet meeting will draw them to England for the IWCA II. Further information will be made available both in upcoming issues of the *ICQ* and on the *ICQ* World Wide Web site, as new news is forthcoming on IWCA II. We hope to have as much information available by mid-1998 as possible, so that plans may be made in advance by those who have far to travel for the IWCA II. At this time, we ask individuals who may possibly attend (or who definitely plan to attend) to contact me either by postal mail or e-mail (icq@cfa.harvard.edu) to be placed on a mailing list. To save time and costs, please provide an e-mail address for future mailings if possible. By so "pre-registering" your (possible) intention to attend the IWCA II, you will also be helping us determine such issues as the size of the meeting hall.

— D. W. E. Green

Φ Φ Φ

BOOK REVIEW: Under an English Heaven

Under an English Heaven: The Life of George Alcock, by Kay Williams (£29.95 from Genesis Publications Ltd.; 9 Pilgrim House; Quarry Street; Guildford, Surrey GU1 3XY; England — or \$44.95 from Govinda Gallery; 1227 34th St., NW; Washington, DC 20007; U.S.A.), 224 pages (1996) [ISBN 0-904351 55 6].

Kay Williams, the mother of Minor Planet Center Associate Director Gareth Williams, got the idea to write a biography of the well-known British amateur astronomer George Alcock during a visit by Brian and Nancy Marsden a few years ago (and the book is dedicated to Nancy Marsden for this reason). Alcock's colorful life was well known to Brian Marsden following many years of letters and numerous meetings; the latter having directing the Central Bureau for Astronomical Telegrams (where all of Alcock's five comets and five novae were officially announced to the world). That a town schoolteacher such as Alcock has had such a productive and colorful life is vividly drawn out by Kay Williams in this wonderful book; her strong background in editing and writing (including several previous biographies) ensures that this book is delightful reading from beginning to end. It would be difficult to find one problem with this book (a true rarity amongst astronomy books today!), as it is superbly researched and produced.

George Alcock has always been keen at observing the world around him, and his adventures in Africa and Italy during World War II make for fascinating reading along side his astronomical observing ventures over many decades. His attention to details was enthusiastically returned to his school pupils, as Alcock patiently taught them to draw buildings and scenery, fauna and flora — thereby using the accompanying necessity of discerning detail in things as part of the educational process. Alcock would take his students on field trips to see birds, hear music in a cathedral, and observe the stars and planets. Numerous students testify in Williams' book about how they obtained a lifelong love of learning from Alcock the schoolteacher.

ICQ readers certainly know the name 'Alcock' from those comets named after him, the most recent being comet C/1983 H1 (IRAS-Araki-Alcock; O.S. 1983 VII = 1983d), which he found at the age of 70 from his home looking through a glass window with his binoculars. As Brian Marsden notes in his Foreword to this biography, Lewis Swift discovered a comet in 1899 at age 79 (a record), and Alcock discovered his last nova (Nova Herculis 1991) at the same age. Alcock's comet and nova discoveries were all visual. Alcock had superb eyesight and a gifted ability to reproduce his observations in the form of drawings. Included is mention of the frustration that Alcock bore when British astronomy groups would not believe all of the planetary detail present in Alcock's drawings — and the thrill experienced years later when photographs with large telescopes showed the small details that Alcock had seen with a smaller telescope. Alcock's artistic skill is displayed in this book in numerous black-and-white and color sketches of comets, planets, landscapes, clouds, plants, and birds.

Under An English Heaven is an inspirational book to both astronomers and non-astronomers, showing his dedication to and love for astronomy, to the world around him, and to learning. Kay Williams and Genesis Publications have hereby published a splendid book that can be recommended to all.

— D. W. E. Green

Tabulation of Comet Observations

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

◊ *Comet C/1993 Y1 (McNaught-Russell; O.S. 1993v)* $\Rightarrow$ 1994 Apr. 8.84: w/ 20×70 B, 0.1 and 0.3 tails in p.a. 96° and 71° [TAN02].

◊ *Comet C/1995 O1 (Hale-Bopp)* $\Rightarrow$ 1996 June 7.96: strong central cond.; tail spans p.a. 335° - 26° , w/ $8'$ jet in p.a. 0° [LEH]. Aug. 11.08: tail curved S [NOW]. Aug. 16.90 and 19.87: sharp nucleus [LOO01]. Sept. 2.85 and 9.82: bright blue nucleus [LOO01]. Sept. 4.83: 'V'-shaped coma [LOO01]. Sept. 8.82 and 17.80: nucleus weaker/fainter [LOO01]. Sept. 18.81: weak nucleus [LOO01]. Oct. 3.77: as during preceding weeks, comet shows point-like central cond.; $60'$ fan tail spans p.a. 90° - 60° [LEH]. Oct. 5.97: yellow color [NOW]. Oct. 14.73 and 26.73: $m_2 = 9.0$ [KOS]. Oct. 29.88: sharp nucleus [LOO01]. Nov. 4.69: starlike nucleus [KOS]. Nov. 4.69-12.71: $m_2 = 8.5$ [KOS]. Nov. 14.71 and 30.72: sharp pseudo-nucleus [LOO01]. Nov. 16.68: $m_2 = 8.0$, disklike nucleus [KOS]. Nov. 24.71: fan tail spans p.a. 15° - 75° [BAR]. Dec. 1.71: fan tail spans p.a. 30° - 70° [BAR].

1997 Jan. 9.43: fan tail spans p.a. 0° - 50° ; ion tail in p.a. 50° [DID]. Jan. 11.25: fan tail spans p.a. 20° - 50° [BAR]. Jan. 12.46: $3'$ jet at p.a. 175° , curving toward E [DID]. Jan. 13.25: yellowish [LOO01]. Jan. 15.43: at $162\times$, $3'$ spikes in p.a. 165° and 365° [DID]. Jan. 19.43: -22° F during obs. [NOW]. Jan. 29.22: fan tail spans p.a. 345° - 15° ; haze [BAR].

Feb. 8.42 and 16.40: coma has yellow color [NOW]. Feb. 10.20: yellowish head [LOO01]. Feb. 10.43: " 10×50 B shows the tail to consist of two elements, w/ a straight 'plume' that can be tracked for 6.5 centered on p.a. 315° (edges at 310° and 320°), which looks very much like the 'plumes' in the tail of comet C/1975 V1 (West) ~ 2 weeks after perihelion; also, a much fainter, slightly curving tail at least 4.5 long w/ its trailing edge at p.a. $\sim 285^\circ$; coma dia. $10'$, DC = 8; the great fountain was just detectable w/ the binoculars; w/ 41-cm L ($56 \times$ - $174\times$), incredibly intense, almost stellar nucleus, from which arises a gigantic fountain spanning p.a. $\sim 160^\circ$ - 235° ; the edge at p.a. $\sim 160^\circ$ is by far the brighter (it is so intense as to look solid or like a painting!; it rises at least $2'$ from the nucleus before curving back toward the tail, where it can be followed far beyond the field); roughly opposite this feature is a much fainter, narrow, rather diffuse jet directed toward p.a. $\sim 5^\circ$, which creates the leading (E) side of the main tail (it is linear and can be traced ~ 2.5); the nucleus, fountain, and in fact the entire coma are distinctly yellowish in hue; immediately adjacent to the nucleus (which is of $m_2 \approx 7.8$ at $70\times$) and on the trailing edge of the fountain (i.e., p.a. $\approx 235^\circ$ relative to the nucleus) is an intense knot or secondary nucleus perhaps 2-3 mag fainter than the primary (it is not more than a few arcsec in dia. and certainly $< 5''$ from the nucleus; its edges are soft — the primary nucleus is very hard and sharp — but it appears otherwise quite solid, and as twilight advances it becomes progressively sharper and more separate from the surrounding bright material); separating this object from the nucleus is an intensely dark, minute wedge extending inward from the anti-solar direction!; the great "plume" in the tail is seen to originate from the joining of both the jet on the tail's E boundary and the great fountain initially directed toward the W; the two merge into a single feature a couple of degrees behind the coma (the area between these bright streams of material is of much lower surface brightness); ahead of the bright, parabolic outline of the obvious portion of the coma is a faint but distinct hood, like that seen in the drawings of comet C/1858 L1 (Donati) [BOR]. Feb. 12.47: w/ 7×50 B, coma dia. $8'$, DC = 7, 2° tail [SIM]. Feb. 14.17 and Mar. 2.19: 3° dust tail [LOO01]. Feb. 14.19: fan coma spans p.a. 300° - 340° [BAR].

Feb. 16.42: "w/ 7×50 B, ion tail is 7.5 long in p.a. 316° , and dust tail is 4.8 (now clearly separate from the ion tail except where they meet at the comet's head) w/ trailing edge at p.a. $\approx 268^\circ$; coma dia. $8'$, DC = 8; w/ 41-cm L ($170\times$), there are two subsidiary nuclei or knots! (both $\approx 2''$ - $3''$ in dia., of mag ≈ 11.5 , and moderately condensed; they are situated on opposite edges of the giant fountain — the first $9''$ from the primary nucleus at p.a. $\approx 195^\circ$ and the second $21''$ distant from the primary in p.a. $\approx 225^\circ$; each is accompanied by a tiny, dark, semi-circular vacancy or wedge-shaped discontinuity in the fountain on its side toward the primary nucleus; in fact, for the body nearest the primary nucleus, the dark feature seems sometimes to extend outside the fountain, looking like a fully circular tiny dark hole in the coma!; the subnucleus toward p.a. 225° seems to be the same feature that I saw on Feb. 10.43 UT, except that it is now about twice its original distance from the primary nucleus — amazing!") [BOR]. Feb. 20.41: "in moonlight, w/ 10×50 B, a 4.3 ion tail centered on p.a. 313° , dust tail 2.2 long w/ trailing edge near p.a. 275° ; w/ 41-cm f/5 L ($170\times$), coma's structure is so complex as to almost defy description: in general, the coma is parabolic in outline and $\approx 5'$ wide at the latus rectum; the tiny, brilliant but clearly-non-stellar pseudo-nucleus is elongated in a ratio of 2:1 or 3:1, axis p.a. 175° - 355° ; a giant curved fountain structure lies to the SE of nucleus, its leading edge, at p.a. 175° , formed by an intensely brilliant jet (a prolongation of the nucleus-bar) which, in moments of the best seeing, seems to break down into a series of minute knots or condensations; the trailing edge of the fountain is defined by an arc of very bright material directed roughly toward p.a. 227° (perhaps 0.3 in length); where they meet, the N end of the arc is situated very slightly sunward of the middle of the pseudo-nucleus and bowed sunward; overall, it has a mottled appearance to it; immediately behind (tailward) of this arc is a small, dark void; a similar but much more elongated finger of darkness separates the S end of the arc from the rest of the fountain; the bright outflow of the fountain can be traced at least a couple of deg tailward; two additional weaker jets appear toward p.a. 65° and roughly 45° relative to the nucleus; the former is the leading edge of a faint but enormous curved sheet of material w/ a counter-clockwise spiral outline (it extends well ahead of the parabolic coma in the sunward direction, forming a striking hood to the bright parabolic coma); near where this jet joins w/ the pseudo-nucleus is another dark, oval void separating it from the leading edge of the brilliant fountain; $\Rightarrow$

◊ Comet C/1995 O1 (Hale-Bopp) [text continued from page 157] ⇒

the central region of the tail remains of much lower surface brightness than the edges; the entire head of the comet has a pale golden yellow hue about it"; at 70×, coma dia. 5'2, DC = 8 [BOR]. Feb. 23.42: w/ 41-cm L (170×), the internal structure of coma appears distinctly changed from Feb. 20; pseudo-nucleus is now oval in shape, axis p.a. $\approx 60^\circ$ - 240° (elongation was nearly at right angles to this several days ago and the nucleus was like a bright bar of light) and it has a distinct bright center; giant fountain structure coming off pseudo-nucleus, w/ edges at roughly p.a. 175° and 240° , is unchanged but w/in it are several tiny, very bright arcs just sunward of the nucleus (the inner-most is ≈ 0.4 from the pseudo-nucleus and originates from that feature's W tip); at ≈ 0.7 sunward, there is another larger, very bright arc; SW of the pseudo-nucleus is a shorter arc-segment, roughly midway between the distance of the other two; each has an accompanying dark, narrow lane or void separating it from the others [BOR]. Feb. 25.42: comet is stunning this morning, being more compact and star-like to the unaided eye than previously; a short but distinct tail is evident even in bright moonlight; w/ 10×50 B, the ion tail is traced at least 5.6 in p.a. 318° , while the slightly curving dust tail (much stronger than before) is seen to 5.7 , centered on p.a. 286° [268°?]; as seen w/ a 41-cm L at 57×-170×, the details in the inner coma seem to be intensifying and evolving on a daily basis; this morning the detail near the nucleus is far more obvious than ever before — being strikingly apparent at all magnifications; the nucleus is very small but clearly non-stellar and is w/in a tiny, roughly bar-shaped structure aligned along p.a. 65° - 245° (and is significantly offset therein toward p.a. 65°); near the W end of the bar, and at right angles to it, arises an intense, fairly narrow sunward spiraling arc traceable through perhaps 150° in p.a. and standing $\approx 18''$ sunward of the nucleus at its mid-point; beyond it is a second bright arc at $\approx 30''$ from the nucleus, which can be followed through $\approx 120^\circ$ of p.a.; each arc is bordered on either side by a dark lane; a third more distant and much weaker arc is suspected; the mid-points of the arcs are not far from the leading edge of the giant fountain at p.a. 168° (its trailing edge being near p.a. 245°); telescopically the coma subtends $\approx 4'$; the N side of the tail appears much weaker than the S side, which is being fed by the fountain; the area near the tail's central axis is much less luminous than the sides; the overall appearance of the comet is reminiscent to some of the J. Schmidt and G. Bond drawings of Donati's 1858 comet [BOR]. Feb. 26.19: 2° dust tail in p.a. 287° [LOO01]. Feb. 26.42: w/ 7×50 B, twin tails $\approx 7^\circ$ long, at p.a. 318° (ion) and 293° (dust); w/ 10×50 B, nucleus is very intense and like a star of $m_2 = 2.5$; obvious curved fountain originates on SW side of nucleus and resulting bright streamer can be followed 1° out into dust tail [BOR]. (text continued on next page)

◊ ◊ ◊

Below: drawings of comet C/1995 O1 by Richard Didick (Taunton, MA) with a 25.4-cm f/4.5 L (127×) on 1997 Mar. 7.21 [left] and with 10×50 B on Mar. 11.39 [right].



Right: Wide-field view of comet C/1995 O1 by Herman Mikuž at Crni Vrh Observatory, Slovenia, obtained on 1997 Mar. 11.149 UT (beginning of 1-min exp.) with a 90-mm f/2.8 camera lens + CCD + V filter. Histogrammic equalization was used in order to bring out the tail's extension. The field-of-view is 7.5×5.0 .



◇ ◇ ◇

◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 158] ⇒

Mar. 1.16: dust tail in p.a. 303° ; $m_2 = 1.0$; w/ 6.3-cm f/13 R (52 $\times$), coma dia. 12' [KOS]. Mar. 1.18-1.19: w/ naked eye, gas tail 6.5° , dust tail also clearly visible; the surface brightness of the plasma tail was comparable to the Cyg Milky Way; w/ 10 $\times$ 50 B, tails 10° in p.a. 323° (ion), 4.0° in p.a. 295° (dust); in 20.3-cm T (123 $\times$), the false nucleus appeared elongated w/ longest axis (which was $\sim 4''$ long) along p.a. $\sim 60^\circ$ - 240° ; a bright fountain was radiating from this nucleus w/ p.a. spanning $\sim 200^\circ$ - 260° ; moonlight; comet alt. 31° [GRA04]. Mar. 1.21: 2° dust tail; $m_2 = 1.8$ (ref = AA) [LOO01]. Mar. 2-May 13: reported tail length and p.a. is for dust tail only [BIV]. Mar. 2.16: dust tail in p.a. 305° ; $m_2 = 1.0$; w/ 6.3-cm f/13 R (52 $\times$), 12' coma [KOS]. Mar. 2.19: 2.5° dust tail [LOO01]. Mar. 3.16: dust tail in p.a. 294° ; $m_2 = 0.6$; w/ 6.3-cm f/13 R (52 $\times$), 12' coma [KOS]. Mar. 4.11: w/ naked eye, gas tail 5.5° ; w/ 10 $\times$ 50 B, tails 11° (ion) and 4.0° (dust) long in p.a. 326° and 301° ; the dust tail contained a streamer $\sim 0.7^\circ$ long; near the comet's head, the gas tail was considerably fainter than the dust tail, but its brightness outwards from the head decreased much more slowly than the dust tail; the intensity of the plasma tail was equal to or slightly brighter than the Cyg Milky Way; the color of the comet's head was comparable to Capella (sp. type G5); comet alt. 20° [GRA04]. Mar. 4.15: dust tail in p.a. 307° ; $m_2 = 0.6$; w/ 6.3-cm f/13 R (52 $\times$), 12' coma [KOS]. Mar. 4.48: w/ naked eye, ion tail 11° long and dust tail 6° long; in 20-cm and 41-cm L, two strong "ripples" (with hint of a third) asymmetrically surrounding the very bright central cond.; observed w/ naked eye until 25 min before sunrise, w/ 10 $\times$ 50 B until 16 min before sunrise, and w/ 41-cm L until 1 min after sunrise [Alan Hale, Cloudcroft, NM].

Mar. 5.11: w/ 10 $\times$ 50 B, tails 4.5° (ion) and 3.0° (dust) long in p.a. 325° and 305° ; difficult obs. (heavy altostratus clouds) [GRA04]. Mar. 5.15: dust tail in p.a. 302° ; $m_2 = 0.6$; w/ 6.3-cm f/13 R (52 $\times$), 12' coma [KOS]. Mar. 6.15: dust tail in p.a. 315° ; gas tail 9.5° long in p.a. 325° ; $m_2 = 0.6$; w/ 6.3-cm f/13 R (52 $\times$), 14' coma [KOS]. Mar. 6.83-6.87: w/ naked eye, the tail disappeared behind a cloud layer; w/ 10 $\times$ 50 B, tails 11° (ion) and 4.0° (dust) long in p.a. 326° and 305° ; the gas tail was clearly visible for $\sim 7^\circ$; the dust tail was very bright for 2.5° ; first evening obs. in 1997 in a dark sky and at reasonable alt. (12.5 - 9°) [GRA04]. Mar. 6.83: dust tail 5° long in p.a. 295° - 335° [MIY01]. Mar. 7.39: w/ naked eye, ion tail 9° long in p.a. 326° ; dust tail 5.3° long in p.a. 303° (w/ 7 $\times$ 50 B, dust tail had same length) [BOR]. Mar. 8.13: 5° dust tail in p.a. 295° [LOO01]. Mar. 8.14: dust tail in p.a. 290° ; gas tail 9.8° long in p.a. 312° ; $m_2 = 0.4$; w/ 6.3-cm f/13 R (52 $\times$), 14' coma [KOS]. Mar. 8.86-8.89: w/ naked eye, tails 12° (gas), 6° (dust); w/ 10 $\times$ 50 B, tails 13° (gas) and 6.0° (dust) in p.a. 325° and 296° ; both tails curved clockwise, the dust tail showed the strongest curvature; the outer portion of the ion tail appeared broad (width $\sim 2^\circ$); comet alt. 11.5 - 9.5° [GRA04]. Mar. 9.39: "w/ 41-cm L (57 $\times$ -170 $\times$), the coma's internal structure is so complex that it is difficult to convey all the details in words alone; there is a brilliant, star-like nucleus of perhaps 5th mag, the purely stellar nature of the nucleus becoming steadily more obvious as twilight advances; the nucleus is at the base of a tiny, trumpet or bullet-shaped emission feature $< 15''$ in height; both the nucleus and its minute sunward appendage are situated just w/in the dark void of the tail's center; the sunward end of the appendage from the nucleus blossoms into a small, bright, slightly curved bar positioned at right-angles to the nuclear jet; the SW end of the bar is attached to the innermost of three extraordinary, narrow envelopes or arcs; these envelopes are not concentric w/ the nucleus but appear to be sections of spiral arcs opening toward the SW; the innermost and probably brightest of the arcs stands $\approx 40''$ sunward of the stellar nucleus; the second arc is $\approx 60''$ sunward and the third arc, which is much fainter and no more than half the length of the other two, is roughly $80''$

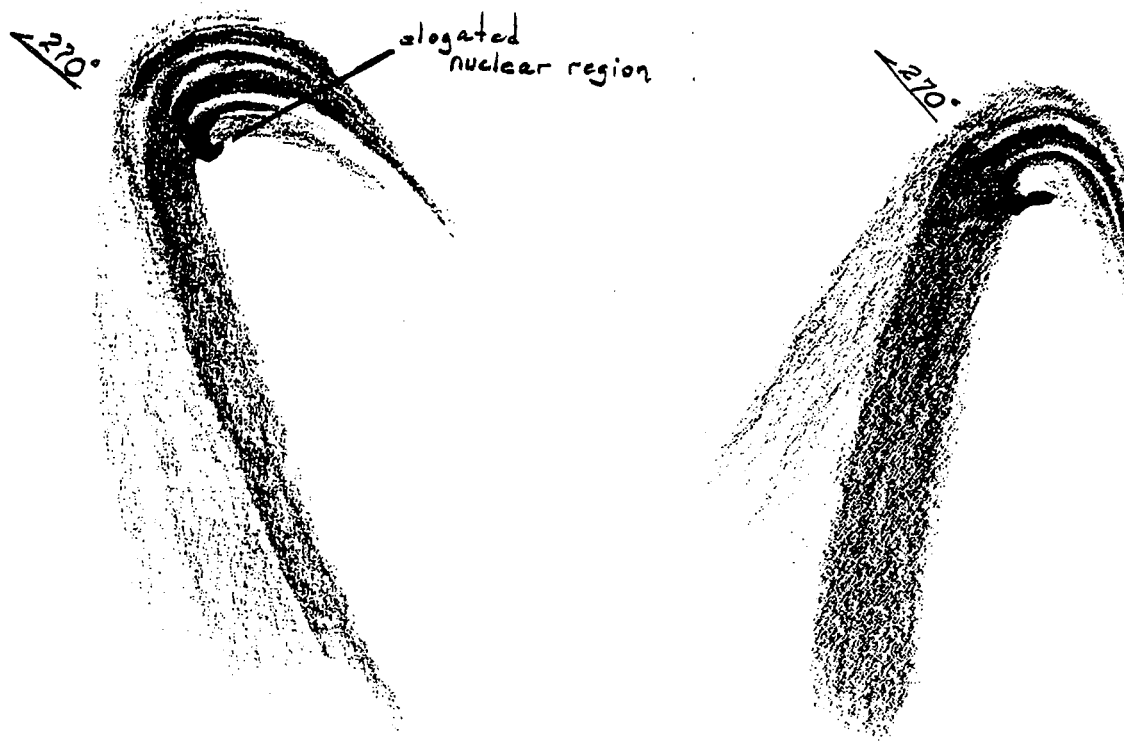
◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 159] ⇒

from the nucleus; each envelope is separated from the next by a dark lane; all the envelopes are situated w/in the giant fountain structure that has been under observation since conjunction; the edges of the fountain — currently at p.a. 160° and 270° — mark the ends of the bright portions of the envelopes; E of the fountain's leading edge, weak indications of the envelopes are also apparent but these are slightly tilted tailward relative to their brighter counterparts, the break very obviously occurring right where the envelopes cross the fountain's leading edge!; among the larger-scale features, there is the great bright dust streamer, originating from the fountain, which can be traced far out into the tail; likewise, there is a huge, faint, counter-clockwise spray of material that fills much of the sunward portion of the coma, eventually wrapping around tailward and enveloping the dust streamer; although its boundaries are not well defined, the center of the tail is darker than the areas nearer the edges (this is a large, broad feature and not the 'shadow of the nucleus')"; tail in p.a. 306° is 7°5 long w/ naked eye and 7°7 long w/ 10×50 B [BOR].

Mar. 10.00: w/ naked eye, 5° dust tail; w/ 10×50 B, tails 6°5 in p.a. 333° (ion), 3°5 in p.a. 307° (dust); broad dust tail curved towards S; hazy sky [GRA04]. Mar. 10.14: dust tail in p.a. 290°; gas tail 100° long in p.a. 340°; $m_2 = 0.2$; w/ 6.3-cm f/13 R (52×), 14' coma [KOS]. Mar. 10.2: 4° dust tail [LOO01]. Mar. 10.83: w/ naked eye, tails 13° in p.a. 328° (ion), 5°5 in p.a. 302° (dust); w/ 10×50 B, tails 13° in p.a. 330° (ion), 6°0 in p.a. 302° (dust); comet alt. 16° [GRA04]. Mar. 10.83: dust tail 10° long in p.a. 290°-325° [MIY01]. Mar. 10.99: w/ 10×50 B, 4°8 tail in p.a. 332° [BOR]. Mar. 11.14: dust tail in p.a. 320°; gas tail 115° long in p.a. 352°; $m_2 = 0.2$; w/ 6.3-cm f/13 R (52×), 14' coma [KOS]. Mar. 11.82: dust tail 10° long in p.a. 300°-345° [MIY01]. Mar. 11.87: w/ naked eye, tails 13° in p.a. 336° (gas), 6°5 in p.a. 306° (dust); w/ 10×50 B, tails 11° in p.a. 331° (gas), 7°5 in p.a. 304° (dust); the dust tail was very bright for 3° and clearly visible for 5°; the gas tail also appeared brighter than before and was easily seen for 8°, the tails appeared equally bright at 3°-4° from the head; the dust tail was wide and showed a strong clockwise curvature, its N boundary was more sharply defined than its S side; the gas tail also curved somewhat in the same direction (the width of its outer part was ~ 1°5); comet alt. 13°5 [GRA04]. Mar. 11.94: w/ 20.3-cm f/10 T (123×), there was a bright fountain spanning p.a. 140°-240°; two dark arcs were visible in this fountain; this obs. made near lower culmination [GRA04]. Mar. 12.14: w/ 25.6-cm f/5 L (169×), the second arc off the nucleus extends to a full circle from p.a. 165° (at 25") down to 0°-290° (at 35" from the nucleus) [BIV]. Mar. 12.40: "naked-eye tails 9° (ion) and 7° (dust) long in p.a. 331° and 313°; w/ 41-cm L (70×-170×), the following structure is noted near the nucleus: the old giant fountain continues to grow weaker and more ill-defined, although its tailward streamer seems as strong as ever; the fountain's edges are near p.a. 170° and 260°; at its base is an essentially stellar nucleus enclosed w/in a tiny cond.; bright material comes off the nucleus toward p.a. ~ 240°, spiraling outward in a clockwise direction, making the nucleus/envelope look like a comma; at its midpoint this bright arc stands ~ 18" above the nucleus and spans perhaps 130° in p.a.; two additional envelopes are apparent, ⇒

◇ ◇ ◇

Below: drawings of comet C/1995 O1 by Richard Didick with a 25.4-cm f/4.5 L on 1997 Mar. 12.42 at 127× [left] and on Mar. 13.39 at 162× [right].





Above: Drawings of C/1995 O1 by Richard Didick with his 25-cm L on Mar. 16.39 at 127× [left] and on Mar. 23.34 at 90× [right].

◇ ◇ ◇

◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 160] ⇒

the next outward being the brightest of all and spanning over 180° in p.a.; at its nearest point (p.a. ~ 210°), it is ≈ 40" from the nucleus; both this envelope and the next one outward clearly are more sharply bounded on their sunward sides, trailing off gently in brightness toward the nucleus, each being separated from the next by a dark lane; the most distant envelope is 63" from the nucleus and can only be tracked over 90° in p.a., showing separate weak condensations w/in itself; none of these arcs is centered on the nucleus, nor is their shape a continuous spiral — rather, their shape reminds me of the outline of peaked church windows (although not so extreme), their curvature being broken at the point where they pass over the leading edge of the giant fountain (this shape is quite extraordinary); none of the envelopes extends beyond the trailing edge of the giant fountain, but the innermost and the next outward envelope extend far beyond its leading edge (at p.a. 170°); w/ 7× 50 B, coma dia. 13' [BOR]. Mar. 12.81: dust tail 10° long in p.a. 295°-350° [MIY01]. Mar. 13.39: "this morning the comet's nucleus was followed telescopically well past the time of sunrise; comet now rivals C/1969 Y1 (Bennett; O.S. 1970 II = 1969i), although the latter's tail was much more impressive; w/ the unaided eye, ion tail can be traced 16°5 in p.a. 338°, while the brighter dust tail can be tracked some 9° centered on p.a. 319°; the ion tail is very faint over almost its full length; w/ 41-cm L (70×-170×), the coma's inner structure continues to be very complex; four envelopes are visible to the SW of the brilliant star-like nucleus; the inner-most is attached to the nucleus on the latter's W side, forming a comma-shaped feature (it is the brightest of the envelopes); the envelopes seem to be situated at very regular intervals from the nucleus, w/ their estimated radii being 22", 41", 60", and ≈ 80"; each more distant envelope is fainter than the previous; the outer-most envelope is a true hood, as it appears as a parabolic layer of bright material rather than a 'wave' and extends around the entire inner coma and far out into the tail; the middle two envelopes are contained fully w/in the weakening giant fountain, subtending ≈ 90° in p.a.; the inner-most envelope, however, extends well beyond the E boundaries of the fountain, spanning a p.a. of ~ 120°-130°; none of the envelopes or arcs are circular in outline but rather seem to be sections of ellipses, although the general impression is that the nucleus would not occupy either focus"; w/ 10×50 B, coma dia. 14', DC = 8/ [BOR].

Mar. 15.05-15.11: w/ 10×50 B, tails 11° in p.a. 313° (ion), 7°5 in p.a. 313° (dust); in 20.3-cm f/10 T (123×), to the W side of the false nucleus there was a bright fountain (spanning p.a. ~ 170°-260°), and 3 hoods were seen in this fountain [GRA04]. Mar. 15.13: w/ naked eye, tails 16° in p.a. 340° (ion), 7°5 in p.a. 317° (dust); comet alt. 25° [GRA04]. Mar. 16.00: w/ 7×50 B, tail 9°5 long in p.a. 341° [BOR]. Mar. 16.19: pink tail, blue coma [BAR]. Mar. 16.39: "there is a decided difference between evening and morning magnitudes, and although the comet can only be meaningfully observed against very late twilight in the evening, as compared to pre-twilight in the a.m., the differences are rather larger than I would expect; likewise, estimated magnitudes derived by the naked-eye focal method have long since stopped increasing, while those by extra-focal means (particularly employing eye glasses) continue to increase!; in general terms, the comet appears no more impressive to me w/ the unaided eye now than a week ago; another problem I strongly suspect is that many observers are including the Cepheus 'spur' of the Milky Way in their estimates of the ion tail's length; ⇒

◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 161] ⇒

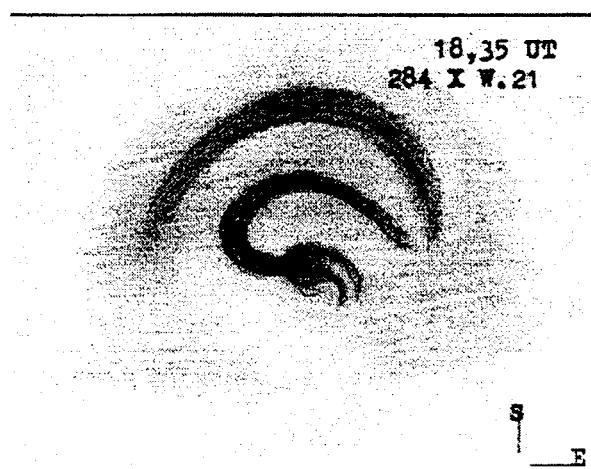
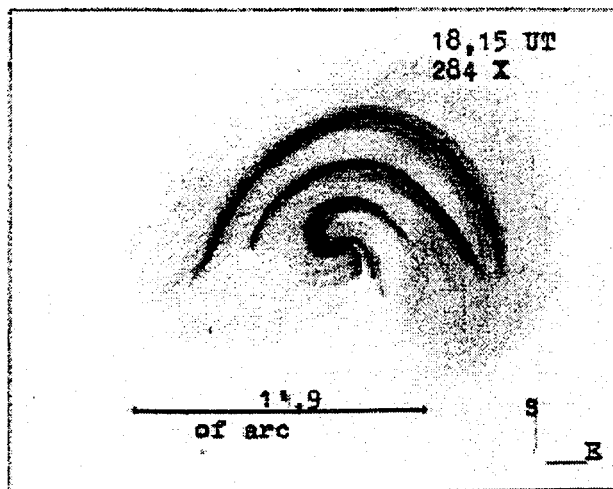
for nearly a week, this feature has been roughly in line w/ the extension of the ion tail and looks very convincing — except it makes the outer reaches of the ion tail seem slightly curved (just as many observers are reporting); if this is true, reports of the ion tail's length will probable drop toward the last week in Mar.; coma parabolic in outline, but boundaries seem to be becoming steadily less well-defined; the outlines of the old giant fountain coming off the SW side of the nucleus are now extremely vague, but there is still a dramatic dichotomy in the coma's brightness along the radius vector; the leading edge of the weak fountain may be said to be near p.a. 173° , subtending perhaps 100° in p.a.; three envelopes are visible this morning, their general arrangement being almost identical to that seen on Mar. 8/9 — at the nearest point to the nucleus, their distances are roughly $35''$, $65''$, and $90''$ (they extend $\sim 180^\circ$, 150° , and 90° in p.a., respectively, and are bounded by dark lanes; each is more sharply defined on their sunward side); the nucleus is clearly non-stellar this morning; the void in the tail-axis is steadily growing narrower; the telescopic appearance is striking similar to Donati's comet as rendered by G. P. Bond"; w/ naked eye and 7×50 B, $10^{\circ}5$ tail in p.a. 320° [BOR]. Mar. 16.39: $1'$ jet at p.a. 105° [DID]. Mar. 17.01: w/ 7×50 B, tail $4^{\circ}4$ long in p.a. 327° [BOR]. Mar. 17.38: both ion and dust tails can be traced 13° this morning (the former is directed toward p.a. 346° , the latter toward p.a. 324°); the ion tail is very faint overall, while the dust tail is quite bright and obvious for the first $6^\circ-7^\circ$; w/ 7×50 B, tail $6^{\circ}7$ long in p.a. 324° [BOR]. Mar. 18.13: dust tail in p.a. 320° ; gas tail 140° long in p.a. 353° ; $m_2 = -0.3$; w/ 6.3-cm f/13 R ($52\times$), $15'$ coma [KOS]. Mar. 18.80-May 9.87: magnitudes were taken from the bright stars in Table 46 of Norton's *Star Atlas*; original source of mags unknown [MCK].

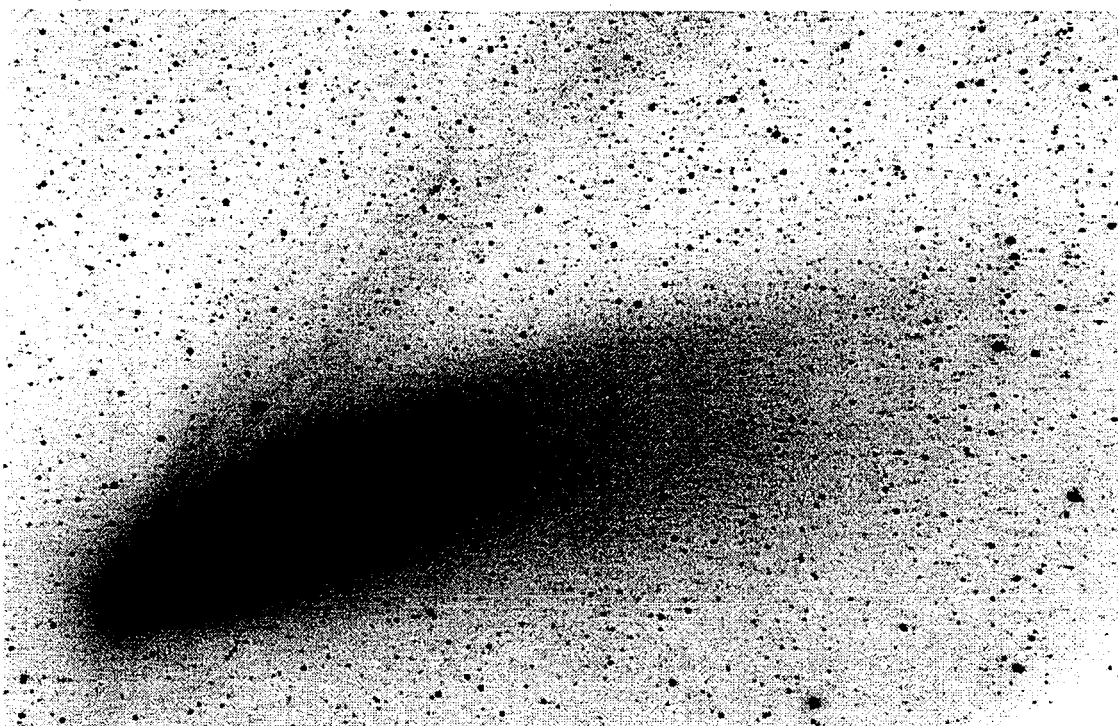
Mar. 21.01: w/ 7×50 B, tail $> 6^\circ$ long in p.a. 345° [BOR]. Mar. 22.08: tab. dust tail; ion tail $\sim 2^\circ$ long; bright moonlight [WIL11]. Mar. 23.02: "w/ 7×50 B, ion tail $10^{\circ}5$ in p.a. 347° , dust tail $6^{\circ}7$ in p.a. 339° ; w/ a 41-cm L ($70\times$, $114\times$), there are three envelopes at intervals of $\approx 28''$, $55''$, and $83''$ from the nucleus (the inner-most is joined to the nucleus on its W end by a short bar of bright material); the arc-shaped envelopes span $\sim 180^\circ$, 130° , and 90° , respectively, in p.a., all terminating near p.a. 270° ; coma and even the tiny, brilliant nucleus itself are clearly bi-colored, being reddish on the W side and strongly bluish on the E side!; little evidence of the old 'Giant Fountain', although its bright dust streamer in the tail remains" [BOR]. Mar. 24.03: 7×50 B show a $10^{\circ}5$ -long ion tail (which is very faint) toward p.a. 357° , and a $6^{\circ}0$ dust tail toward p.a. 346° ; 41-cm L ($114\times$) indicates three envelopes at estimated intervals of $75''$, $52''$, and $26''$ sunward of the nucleus (the inner-most is connected to the nucleus by a short bar near its W end); on the opposite side of the nucleus is another hook-shaped extension directed eastward; overall the appearance is very much like that of a barred-spiral galaxy [BOR]. Mar. 24.38: "comet appears noticeably fainter than the previous evening, obviously an effect of relative alt.; w/ 7×50 B, no indication of ion tail at all!; dust tail extends $8^{\circ}5$ in p.a. 342° ; 41-cm L ($70\times-114\times$) shows the three envelopes once again, their distances from the nucleus being $\approx 75''$, $55''$, and $40''$ (thus little if any change from the previous evening)" [BOR]. Mar. 24.44: tail extends in p.a. $290^\circ-350^\circ$ [MIY01].

Mar. 25.03: "the comet is certainly not very close to mag -1.0 (I've seen such comets and they certainly looked brighter than this one does); interesting changes in the near-nucleus structure last night, making it much more complex; 7×50 B indicate an $8^{\circ}0$ ion tail toward p.a. 358° and a $6^{\circ}7$ dust tail in p.a. 342° (latter tail 4° long to naked eye), coma dia. = $10'$, DC = 9; 41-cm L ($70\times-170\times$) shows a tiny, brilliant, round nucleus, essentially centered in an S-shaped formation whose central axis is aligned roughly E-W (the structure has the general appearance of a barred-spiral galaxy); the sunward portion of the 'S' forms the first envelope, but careful examination shows this to be much more complex in nature (the brightest effusion of material coming off the nucleus is directed toward the NE, not centrally into the axis of the 'S' or bar; at the W end of the central bar, some material also curves tailward — while most curves sunward; ⇒

◇ ◇ ◇

Below: drawings of comet C/1995 O1 by Massimo Cicognani (Collina, Forlì, Italy) with a 41-cm f/17.4 C ($284\times$) on 1997 Mar. 26.76 [left] and Apr. 5.77 [right].





Above: Wide-field image of comet C/1995 O1 obtained on 1997 Mar. 27.828 (start time of 30-sec exp.) with 90-mm $f/2.8$ camera lens + CCD + V filter by Herman Mikuš. The field of view is 7.5×5.0 .

◇ ◇ ◇

◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 162] ⇒

having passed sunward of the nucleus, the trailing end of this portion of the envelope assumes a parabolic outline, extending straight off for some distance in an antisolar direction to become a true hood); the E side — i.e., that on the ion-tail side of the comet — of the next envelope outward is also seen to extend in a parabolic fashion toward the anti-solar direction; the third envelope outward is rather short and very faint, mainly visible in a SW direction from the nucleus; two much larger, but very-low-surface-brightness, features are noted; this first could be characterized as a very large, weak fountain extending from the sunward direction around through W and curving back into the tail (it comprises most, if not all, of the coma in this direction); clearly originating from the nuclear region is another large, narrower fountain (probably the origin of the ion tail) that springs outward initially in an easterly direction $\sim 60^\circ$ – 70° from sunward, then curves back into the ion tail" [BOR]. Mar. 25.81–May 6.89: instrument described as "35-mm camera on frosted glass" [LOO01]. Mar. 28.07: to the naked eye, the comet looks like "Rigel w/ a tail", although the star is $\approx 7^\circ$ higher up, and it is dramatically inferior to Sirius in brightness; there is a 10° ion tail in p.a. 3° and a broad 16° dust tail that is initially directed toward p.a. 348° ; w/ 41-cm L ($70\times$ – $170\times$), even the outer coma displays very complex structure, obviously being composed of a series of layers w/ differing directions of material out-flow; in the near-nuclear region, there are four envelopes — that nearest the nucleus emanates from it at p.a. 255° , passing very roughly $20''$ to the sunward; the subsequent envelopes are at distances of $\approx 55''$, $85''$, and perhaps $115''$ sunward (each is parabolic in outline w/ its sunward edge being sharper than the trailing); they all cut off rather abruptly near p.a. 307° ; the nucleus itself is very small but clearly non-stellar [BOR]. Mar. 28.79, 30.79, Apr. 1.79, and 3.79: type-I tail in p.a. 19° , 17° , 14° , and 20° , respectively [BAR]. Mar. 29.77: dust tail in p.a. 347° ; gas tail 155° long in p.a. 15° ; $m_2 = -0.6$; w/ 6.3-cm $f/13$ R ($52\times$), $25'$ coma [KOS]. Mar. 30.12: "estimate only a guess, but was included for the novelty of having been made on the corner of Seventh and Hope Streets in downtown Los Angeles; $\sim 1^\circ$ of tail visible in a very bright sky" [SEA]. Mar. 30.78: dust tail in p.a. 350° ; gas tail 150° long in p.a. 15° ; $m_2 = -0.6$; w/ 6.3-cm $f/13$ R ($52\times$), $25'$ coma [KOS]. Mar. 30.83 and Apr. 8.80: ion and dust tails 7° long [MAN02]. Mar. 31.00: w/ naked eye, $m_1 = -1.5$; w/ 24.5-cm $f/4.5$ L ($162\times$), $1'$ jet at p.a. 90° and a larger jet at p.a. 270° both curve toward anti-solar direction [DID]. Mar. 31.78: dust tail in p.a. 352° ; gas tail 155° long in p.a. 20° ; $m_2 = -0.8$; w/ 6.3-cm $f/13$ R ($52\times$), $26'$ coma [KOS]. Mar. 31.81: dust tail 11° long [MEY].

Apr. 1.81 and 2.81: dust tail 12° long [MEY]. Apr. 2.02 and 03.02: yellow and blue colors seen in tail [NOW]. Apr. 2.04: w/ naked eye and 7×50 B, 17° tail in p.a. 2° [BOR]. Apr. 2.80: ion and dust tails 7.5° long [MAN02]. Apr. 3.04: w/ naked eye, ion tail 18° long in p.a. 15° and dust tail 19° long in p.a. 7° (trailing edge of dust tail at p.a. 318°); w/ 41-cm L, there are 3 and possibly 4 envelopes, w/ the two innermost ones joined to the brilliant nucleus; the ends of each envelope terminate at p.a. different from the adjacent one; origin/out-flow of innermost envelope initially directed toward p.a. 200° [BOR]. Apr. 3.85: w/ 8×40 B, 2.3° tail in p.a. 36° [TAY]. Apr. 3.88: w/ naked eye, tails 14° in p.a. 22° (ion), 16° in p.a. 4° (dust); w/ 10×50 B, tails 14° in p.a. 26° (ion), 13° in p.a. 8° (dust); ⇒

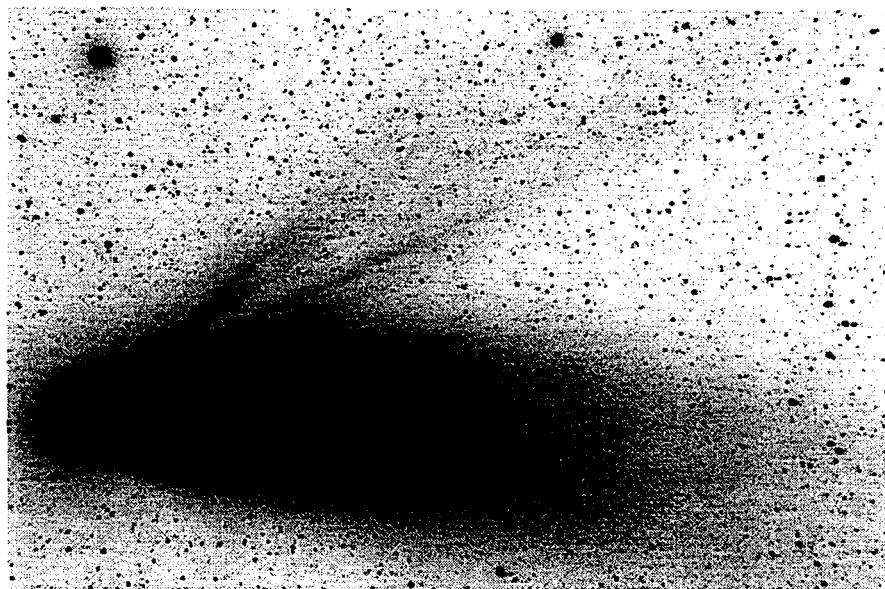
◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 163] ⇒

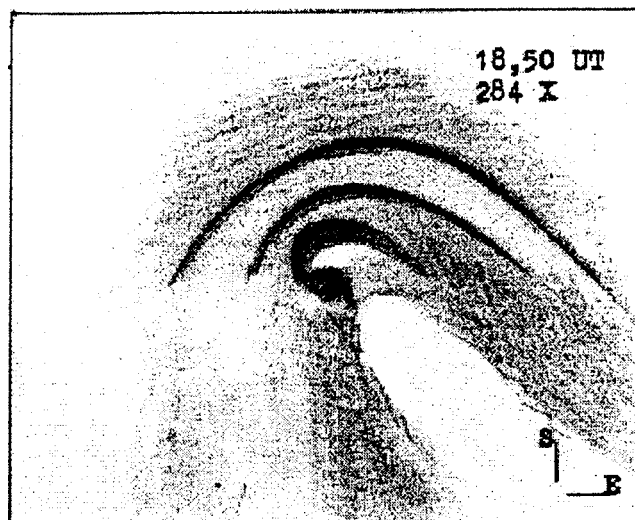
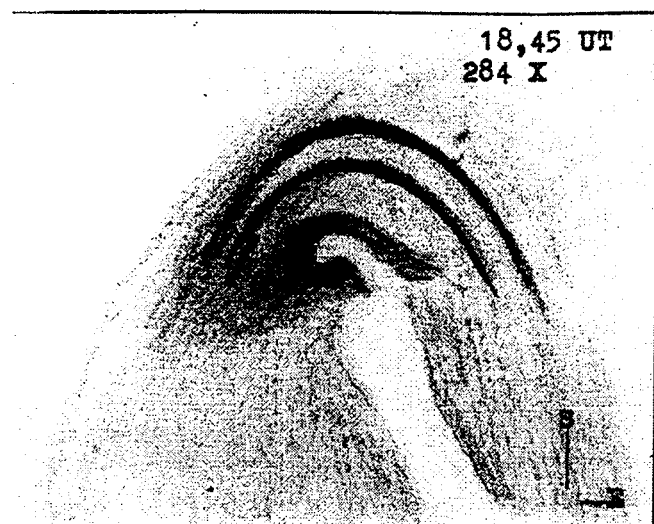
several streamers seen in the ion tail; comet alt. 23° [GRA04]. Apr. 3.90: w/ naked eye, tails 13° (gas) and 15° (dust) long [SKI]. Apr. 4.79: w/ 7×50 B, tail pink [BAR]. Apr. 4.81: dust tail 14° long [MEY]. Apr. 4.91: w/ naked eye, tails 14° in p.a. 23° (ion), 19° in p.a. 7° (dust); w/ 10×50 B, tails 14° in p.a. 23° (ion), 13° in p.a. 5° (dust); several streamers were seen in the gas tail; the gas tail was clearly seen to split in two parts a few degrees from the nucleus; comet alt. 20° [GRA04].

Apr. 5.03: to the unaided eye, as viewed in-focus, the comet's head matches the star Rigel (at a similar alt.) in brightness; ion tail 13° in p.a. 19°, dust tail 19° in p.a. 12°; w/ 7×50 B, coma dia. 15', DC = 9, very broad dust tail has several components or layers of brightness; w/ 41-cm L (70×), coma's sunward radius is 5'5; brilliant non-stellar nucleus surrounded by three bright envelopes, inner-most joined w/ nucleus at p.a. 246°; most of coma, plus nucleus, distinctly yellow or orangish-yellow in color; great dust streamer in tail very weak tonight; weak void or darkness in center of tail; telescopically, central axis of comet measured to be at p.a. 24° [BOR]. Apr. 5.77: dust tail in p.a. 355°; gas tail 150° long in p.a. 23°; $m_2 = -0.6$; w/ 6.3-cm f/13 R (52×), 28' coma [KOS]. Apr. 5.88-5.94: w/ naked eye, tails 13° in p.a. 25° (gas), 15° (dust); comet clearly seen in reversed 7×50 B; it was first seen in 7×50 B and naked eye at solar alt. -2°4 and -3°6, respectively; w/ 10.2-cm R (84×) at Apr. 5.94, three bright arcs were clearly seen (the distance between the two innermost arcs was slightly larger than the separation between arcs no. 2 and 3; the innermost arc was located near the nucleus) [SKI]. Apr. 5.93: w/ naked eye, tails 13° in p.a. 25° (ion), 20° in p.a. 3° (dust); w/ 10×50 B, tails 12° in p.a. 25° (ion), 13° in p.a. 8° (dust); the dust tail was broad and diffuse and curved strongly (its p.a. decreased from 8° to 337°); at least three streamers were seen in the ion tail, and two components were seen near the head w/ notable darkness between them; comet alt. 17°5 [GRA04]. Apr. 6.80: ion and dust tails 8° long [MAN02]. Apr. 6.90: w/ naked eye, tails 13° in p.a. 29° (ion), 19° in p.a. 12° (dust); in 10×50 B, tails 13° in p.a. 32° (ion), 14° in p.a. 13° (dust); both tails clearly seen for 10°; the outer portion of the gas tail was broad (its width reached ~ 3°), passing over the open cluster M34, and several streamers were seen in this tail, especially near the head; the dust tail was strongly curved, its p.a. at the end was 335° [GRA04]. Apr. 6.92: w/ naked eye, tails 12° in p.a. 25° (gas), 16° (dust); dust tail was glimpsed for 20°; the E edge of the gas tail was passing in front of M34; using 7×50 B, several streamers were visible in the gas tail (these structures were more evident than previously) [SKI]. Apr. 8.04: comet clearly not as brilliant as three nights ago; ion tail traced 6° in p.a. 28° w/ naked eye (10° w/ 7×50 B); dust tail immense, very broad near its terminus, stretching 21° w/ the naked eye; its initial p.a. is ~ 30°, and the nucleus looks like a star of mag +1.1; w/ 41-cm L (70×-114×), three envelopes, all weaker and more diffuse than previously; inner-most envelope joined to nucleus on the SW; only just a trace of the great dust streamer in the comet's tail tonight, and the tail void has essentially filled in completely; outline of coma not strictly parabolic but seems superimposed on a large diffuse glow or halo [BOR]. Apr. 8.17: observed from near Yosemite National Park; twin plasma tails visible in 10×50 B and envelopes seen in coma using 80-mm R; w/ naked eye, 10° tail in p.a. 30° [SEA]. Apr. 8.80: dust tail 23° long in p.a. 350° [PLS]. Apr. 8.81: dust tail in p.a. 355°; gas tail 150° long in p.a. 30°; $m_2 = 0.0$; w/ 6.3-cm f/13 R (52×), 30' coma [KOS]. Apr. 8.81: w/ 8×30 B, $m_2 = 1.5$, coma dia. 17'; w/ 10×60 B, DC = S2; the N edge of the dust tail was sharp, whereas the S edge was diffuse; the dust tail started at p.a. 0°, curving around to p.a. 20° at its full length; the gas tail was split into two components, one 5° long in p.a. 35°, and the other 15° long in p.a. 27° [CSU]. Apr. 9.88: w/ naked eye, 20° tail (dust); dust tail seen for this length despite disturbing street lights; gas tail was also visible, but only w/ difficulty [SKI]. ⇒

◇ ◇ ◇

Below: Wide-field image of comet C/1995 O1 obtained on 1997 Apr. 8.807 (start of 1-min exp.) by Herman Mikuš with a 90-mm f/2.8 camera lens + CCD + V filter; field-of-view 7°.5 × 5°.0.





Above: drawings of comet C/1995 O1 by Massimo Cicognani with a 41-cm $f/17.4$ C (284 $\times$) on 1997 Apr. 19.78 [left] and Apr. 23.78 [right].

◇ ◇ ◇

◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 164] $\Rightarrow$

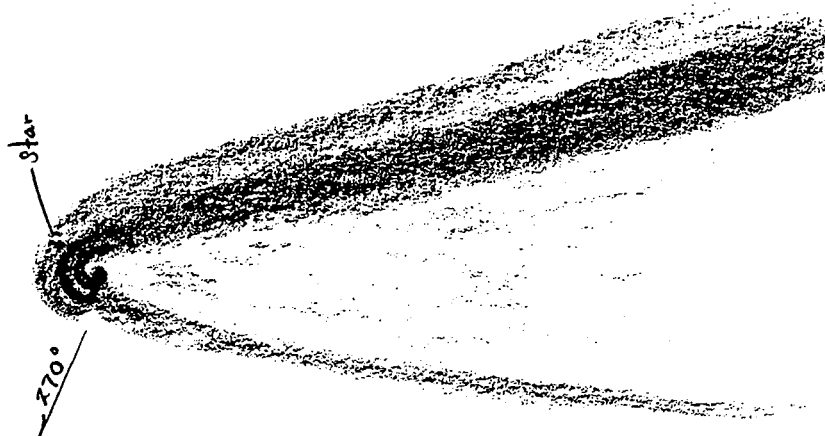
Apr. 10.04: notable fading of ion tail seen since last obs. (Apr. 3.02) [NOW]. Apr. 10.05: comet looks less brilliant tonight and various alternate mag methods give m_1 closer to mag 0.0; no ion tail to the unaided eye, but dust tail can be tracked for 23° w/ an initial p.a. of 22° ; 7×50 B show an 11° ion tail in p.a. 28° w/ a possible detached streamer 3.5 long in p.a. 33° near head — ion and gas tails' initial p.a. are now almost identical; 41-cm L indicates envelopes to be stronger than two nights ago — there are three, w/ the two inner-most being quite bright, outer one very weak; envelope nearest nucleus (passing $\approx 20''$ sunward) seems highly complex in structure w/ bright knots and perhaps filamentary structure (it emanates from the nucleus at p.a. 267° , but splits N/S when it begins to curve); next outer envelope passes roughly $45''$ sunward of nucleus; very weak "great dust streamer" in tail; dark void in tail a little stronger than two nights ago; undoubtedly this is the final "Grand View" of the comet, as the waxing crescent moon was visible low in the W [BOR]. Apr. 10.06: w/ naked eye, tail 10° (dust); strongly curving and very wide dust tail (gas tail was not seen w/ naked eye); the naked eye "nucleus" was of mag 0.7; in 9×63 B, coma dia. $11'$, DC = 8/, tails 4° (gas) and 9° (dust) long; the gas tail was faintly visible [DAH]. Apr. 10.47: tail extends in p.a. 335° – 45° [MIY01]. Apr. 10.85: w/ 8×40 B, 2.1 tail in p.a. 10° [TAY]. Apr. 10.92: w/ naked eye, tails 11° in p.a. 29° (ion), 17° in p.a. 20° (dust); the dust tail was strongly curved and by far the most prominent tail component; a considerable display of aurora borealis was seen near and below the comet; w/ 10×50 B, tails 11° in p.a. 29° (ion), 14° in p.a. 20° (dust); several streamers were seen in the gas tail [GRA04]. Apr. 10.98: w/ naked eye, tails 7° (gas) and 20° (dust) long; auroral light; comet alt. 11.5° ; the comet was seen at nearly the same position as C/1996 B2 (Hyakutake) exactly one year ago [SKI]. Apr. 11.05: ion tail not detected w/ unaided eye, but w/ 7×50 B is 8.5 long in p.a. 30° ; dust tail 18° long w/ unaided eye, w/ an initial p.a. of 27° ; 41-cm L ($70\times$ – $114\times$) indicates three envelopes, the outer-most being very weak; middle envelope passes $\approx 50''$ sunward of nucleus and spans $\approx 160^\circ$ in p.a.; inner-most envelope is highly complex in structure, just as on Apr. 10, and passes $\approx 30''$ sunward of nucleus, spanning fully 180° in p.a.; this envelope is joined to the nucleus at p.a. 262° and shows the same "split fountain" effect as last night, w/ material going both sunward and tailward; roughly opposite it is a short spiral arm coming off the nucleus toward the E; once again, these inner-envelope features are mottled in appearance; rather dark void tailward of nucleus; origins of ion tail clearly visible as a separate outflow from the nuclear region toward the E; thick crescent moon in the Hyades [BOR]. Apr. 11.80: dust tail 20° long in p.a. 0° [PLS and HOR02]. Apr. 11.90: w/ naked eye, tails 11° in p.a. 29° (ion), 18° in p.a. 21° (dust); w/ 10×50 B, tails 13° in p.a. 29° (ion), 14° in p.a. 20° (dust); two streamers were seen in the gas tail (this tail was faint w/ the naked eye, but obvious in 10×50 B); the dust tail was strongly curved, broad, and diffuse (due to its extent, it was better defined w/ naked eye than w/ 10×50 B); w/ reversed 10×50 B, the comet was brighter than Mars (its visibility as such comparable to stars of mag 3.5 w/ naked eye), implying a total mag of ~ -1.5 ; crescent Moon; comet alt. 18.5° [GRA04]. Apr. 12.87: dust tail 8° long [MEY]. Apr. 13.80: dust tail in p.a. 5° ; gas tail 175° long in p.a. 30° ; $m_2 = 0.3$; w/ 6.3-cm $f/13$ R ($52\times$), $21'$ coma [KOS]. Apr. 13.81: gas tails $3^\circ 45'$ and 5° long in p.a. 45° and 40° ; dust tail starts at p.a. 14° and curves around to p.a. 350° where last visible [CSU]. Apr. 13.81 and 14.80: w/ 8×30 B, $m_2 = 1.8$, coma dia. $17'$; w/ 10×60 B, DC = S2 [CSU]. Apr. 13.81: dust tail 17° long in p.a. 0° [HOR02]. Apr. 13.81: dust tail 12° long in p.a. 5° [PLS]. Apr. 13.99: w/ naked eye, tails 6° in p.a. 34° (ion), 15° in p.a. 20° (dust); w/ 10×50 B, tails 9° in p.a. 34° (ion), 13° in p.a. 20° (dust); the dust tail was bright and showed a strong clockwise curvature; the gas tail was faint to the naked eye, but clearly seen in binoculars; first-quarter Moon; comet alt. 9.5° ; [GRA04] Apr. 14.99: w/ 10×50 B, tails 7° in p.a. 34° (ion), 10° in p.a. 23° (dust); dust tail was broad and diffuse; the gas tail only seen w/ difficulty due to the first-quarter Moon and the comet's low alt. (8.5°); m_1 is uncertain due to large extinction correction [GRA04]. $\Rightarrow$

◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 165] ⇒

Apr. 15.05: no ion tail w/ naked eye; dust tail 13° long w/ an initial p.a. of 28°, brilliant star-like cond. in tiny, weak coma; w/ 7×50 B, the ion tail is 11° long in p.a. 30° and the coma is 7' in dia.; brightest portion of the dust tail is bordered by a fainter envelope on the W that also extends $\approx 2/3$ of the way around the parabolic coma (this feature is also very evident telescopically); 41-cm L (70×-114×) indicates three and possibly four envelopes (inner-most is much broader than usual and almost touches the nuclear cond. over its entire arc, originating from the nucleus at p.a. $\approx 265^\circ$ and curves in a clockwise direction back around to p.a. 125°; next envelope outward can be traced from p.a. 155°, through sunward, to 295°, while those exterior to it span rather less of an arc); 7.5-day moon near Pollux [BOR]. Apr. 15.05: w/ naked eye, 6° dust tail; moonlight and light pollution; w/ 9×63 B, coma dia. 14', 7° dust tail [DAH]. Apr. 16.00: only the dust tail was seen; m_1 uncertain due to low alt. (7°5) and thin clouds in direction of comet; w/ 10×50 B, coma dia. $\sim 15'$, 6° tail [GRA04]. Apr. 16.06: "brilliant, completely star-like head w/ the unaided eye and a 9°5 dust tail directed initially toward p.a. 39°; only 7×50 B show the ion tail, which extends 6° in p.a. 39°; ion tail is now much narrower than a month ago — probably due to our increasing viewing angle; binoculars indicate that the coma's dia., across the *latus rectum*, is growing very small — measured as not more than 6' tonight" [BOR]. Apr. 16.85: slightly curving dust tail, longest 14° in p.a. 0° [BOU]. Apr. 16.90: ion tail not seen [GRA04]. Apr. 17.86: slightly curving dust tail, longest 13° in p.a. 3°; strong cond., yellowish in color [BOU]. Apr. 18.34: comet's alt. 3°; uncertain mag estimate [SEA01]. Apr. 18.78: haze, clouds, moonlight; $m_2 = 1.5$; w/ 6.3-cm f/13 R (52×), 16' coma [KOS]. Apr. 18.82: dust tail 6° long [MEY]. Apr. 18.88: w/ naked eye, tails 6° in p.a. 34° (ion), 13° in p.a. 23° (dust); ion tail only seen w/ difficulty; the dust tail showed a very notable curvature; gibbous Moon [GRA04]. Apr. 19.89: w/ 10×50 B, tails 7° in p.a. 38° (ion), 9° in p.a. $\sim 30^\circ$ (dust); gas tail not seen w/ naked eye; moonlight [GRA04].

Apr. 20.88: ion tail not seen w/ certainty; moonlight [GRA04]. Apr. 21.81: dust tail 12° long in p.a. 15° [ZNO]. Apr. 21.82: dust tail [HOR02]. Apr. 21.88: only the dust tail was seen; the comet was seen through a moderate display of aurora borealis, which limited the visibility of the tail; it was not visible in reversed 10×50 B; astronomical twilight, moonlight [GRA04]. Apr. 22.83: w/ 25.6-cm f/5 L (169×), second event similar to the Mar. 12 one, though first arc outcoming from the nucleus extends much more in p.a. than other ones — from p.a. 260° down to 10° (8"-15" from the nucleus), instead of vanishing around p.a. 120° [BIV]. Apr. 23.44: parabolic coma w/ distinct orange hue that may have been influenced by the bright twilight sky background; faint tail seen to the NE [PEA]. Apr. 23.80: dust tail 9° long in p.a. 25° [ZNO]. Apr. 23.82: ion tail 2° long in p.a. 45° [HOR02]. Apr. 23.82: ion tail 2° long in p.a. 40° [PLS]. Apr. 24.25: obs. over Pacific Ocean on Vancouver-to-Sydney flight (elev. $\sim 33,000$ feet) [SEA]. Apr. 24.44: broad tail w/ S portion of tail distinctly brighter than the remainder; fainter fan visible in the tail on the N portion; very intense central cond.; easily seen w/ the naked eye in twilight [PEA]. Apr. 24.76: w/ 12×80 B, 0°25 tail in p.a. 240° [MEN03]. Apr. 24.80: dust tail in p.a. 30°; gas tail 6°7 long in p.a. 52°; $m_2 = 1.6$; w/ 6.3-cm f/13 R (52×), 15' coma [KOS]. Apr. 24.81: w/ 8×30 B, $m_2 = 2.0$, coma dia. 17'; w/ 10×60 B, DC = S6; gas tail 4°5 long in p.a. 39°; dust tail starts at p.a. 33° and curves around to p.a. 2° [CSU]. Apr. 24.81: dust tail 17° long in p.a. 15° [ZNO]. Apr. 24.82: ion tail 7° long in p.a. 45° [PLS]. Apr. 24.82: ion tail 3° long in p.a. 45° [HOR02]. Apr. 24.90: w/ naked eye, 18° dust tail that was curved and bright near the head and gradually fainter outwards; gas tail not detected w/ certainty, neither w/ the naked eye nor 7×50 B; comet visible w/ reversed 7×50 B, but Capella not seen; comet alt. 12°5 [SKI]. Apr. 24.93: only the dust tail was seen; observed in a partly-cloudy sky (tail involved in clouds, but clear in direction of the head); alt. 8°; full moon [GRA04].

Apr. 25.79: dust tail 16° long in p.a. 26°; $m_2 = 1.7$; w/ 6.3-cm f/13 R (52×), 30' coma [KOS]. Apr. 25.92-25.93: "w/ naked eye, 20° dust tail; the gas tail was invisible and I could not see it w/ certainty in 7×50 B; Milky Way was faintly visible; in 10.2-cm R f/15 R (84×) on Apr. 25.93, two hoods were seen (the innermost was easiest to detect); there was a distinct contrast between the E edge of the coma and the sky background; the outer boundary of the coma looked like a parabolic band, which had a higher surface brightness than the coma inside; this band was visible for whole field-of-view on the E part of the coma, while it was only for a short distance from the false nucleus on the W side" [SKI]. Apr. 25.95: low alt. (6°) and some interference from clouds; only the dust tail was visible w/ naked eye and 10×50 B; in 25.4-cm f/6 L (108×) on Apr. 25.90, two hoods were seen, spanning p.a. $\sim 150^\circ$ to $\sim 240^\circ$, the innermost originating from the apparently-stellar pseudo-nucleus [GRA04]. Apr. 26.88: w/ naked eye, 3° dust tail; m_1 uncertain due to a thin cloud layer in front of the comet [SKI]. Apr. 26.91: obs. affected by twilight (at Apr. 26.89 when the m_1 estimate was made, comet alt. of comet was 12°5) and high clouds; the tail was observed at Apr. 26.93, mean timing is listed above; no gas tail was seen w/ certainty, but the dust tail was impressive sight to the naked eye despite the less-than-ideal conditions, curving clockwise from p.a. 42° to 354° [GRA04]. Apr. 27.09: ion tail very faint but apparently up to 8° long in p.a. 47°; strongly-curved dust tail very faint after first few degrees, but traced for 20°, w/ an initial p.a. of 47°; telescopically (41-cm L, 70×-114×), the tiny, non-stellar nucleus is very intense (surface brightness dozens of times greater than that of immediately surrounding coma); from the W side of nucleus originates a fairly obvious spiral arc/envelope, subtending $\approx 180^\circ$ in p.a.; a much weaker envelope is exterior to the first and spans not more than 90° in p.a.; ion tail side of comet's central axis much brighter than corresponding dust side — just the opposite of the situation in March and early April; no trace of the old "great dust streamer" in tail [BOR]. Apr. 27.80: dust tail 16° long in p.a. 23°; $m_2 = 2.3$; w/ 6.3-cm f/13 R (52×), 25' coma [KOS]. Apr. 27.87: w/ naked eye, 2° dust tail; observed in twilight; later observing was not possible due to clouds [SKI]. Apr. 28.25: "w/ naked eye, tails 9° (gas) and 21° (dust) long; comet was well inside the zodiacal-light cone, which made mag estimation quite difficult; the mag estimate was made w/ my glasses removed, which made the comparison stars and the comet appear as 2°7-dia. disks; (this is also true for all my other mag estimates of C/1995 O1 during March-May 1997); the zodiacal light interfered significantly w/ the obs. of the gas tail, whereas the dust tail curved out of the zodiacal-light cone and ended in a fairly dark region of the sky; in 9×63 B, DC = 8, tails 9° (gas) and 20° (dust) long; considerable structure is revealed in the gas tail, including four different streamers of very different appearance w/ increasing length w/ decreasing distance from the dust tail; the longest streamer, ⇒



Above: Drawing of C/1995 O1 by Richard Didick with his 25-cm L (127×) on 1997 Apr. 27.04.

◇ ◇ ◇

◇ Comet C/1995 O1 (Hale-Bopp) [text continued from page 166] ⇒

which was closest to the dust tail, had a brighter portion in the interval between 4° and 6° from the nucleus; the innermost 15° of the dust tail were very easily visible both w/ the naked eye and in 9×63 B; observed from the 'hotel' of Mauna Kea Obs. at elev. 2840 m [DAH]. Apr. 28.33: observed from The Entrance, Australia, when very low in bright twilight [SEA]. Apr. 29.25-29.28: w/ naked eye, tails 10° (gas) and 23° (dust) long; the first 15° of the dust tail was very easy to see; the zodiacal light still interferes w/ the mag and gas-tail-length estimates; using 9×63 B, coma dia. $22'$, DC = 7/, tails 10° (gas) and 22° (dust) long; several streamers seen in the gas tail, but no signs of major disturbances in this tail; observed from near the summit of Mauna Kea (elevation 4200m) w/o extra oxygen; the lack of oxygen made it somewhat difficult to focus my eyes on faint stars, but ZLM ~ 7.0 [DAH]. Apr. 29.89-29.94: w/ naked eye, dust tail 7° long; hazy sky; in 7×50 B at Apr. 29.94, dust tail 8° long; it was difficult to see the outermost portion of the tail [SKI]. Apr. 30.05: w/ 7×50 B, DC = 8/, tail $\approx 10^\circ$ long in p.a. 49° [BOR]. Apr. 30.26-30.27: w/ naked eye, tails 10° (gas) and 36° (dust) long; the innermost 20° of the (dust) tail was fairly easy to see (the rest was very faint); the comet gave a clear impression of being fainter than on previous night; the zodiacal light interfered w/ the mag and tail-length estimates; using 9×63 B, coma dia. $22'$, DC = 8, tails 13° (gas) and 24° (dust) long; in addition to the main component of the gas tail, there were two shorter streamers in the gas tail, further away from the dust tail in p.a.; there was no evidence for major disturbances in the gas tail, but the gas tail seemed broader and more diffuse than on previous nights; the coma and false nucleus had a distinctly yellow/orange color, which may have been due to the low alt. of the comet; obs. from near the summit of Mauna Kea, w/o extra oxygen, but more physiologically adjusted to the height than previous night [DAH]. Apr. 30.81: ion tail 6° long in p.a. 70° [ZNO].

May 1.27: "w/ naked eye, tails 12° (gas) and 36° (dust) long; zodiacal light still a problem for the mag and gas-tail-length estimates; in 9×63 B, coma dia. $22'$, DC = 8, tails 10° (gas) and 24° (dust) long; two streamers seen in the gas tail in addition to the main gas-tail component, which was broad and diffuse; no major disturbances in the gas tail; obs. from near the summit of Mauna Kea, while inhaling bottled oxygen; the additional oxygen didn't make very much of a difference from previous nights: the visibility of the faint outer part of the dust tail was slightly improved, and it was easier to concentrate and focus my eyes" [DAH]. May 1.84: w/ 9×63 B, $18'$ coma, DC = S7 [KAM01]. May 1.87: w/ naked eye, 3° tail in p.a. 55° [SHA02]. May 2.21: w/ 7×50 B, comet shows a very broad and distinctly-curved dust tail some $7^\circ+$ in length [SPR]. May 2.81: ion tail 7° long in p.a. 70° [ZNO]. May 2.87: comet only 7° above horizon; w/ naked eye, dust tail 8° long, curving from p.a. 80° to 10° , the end pointing near ι Aur; central cond. of mag 1.2; w/ 9×63 B, ion tail only suspected at p.a. 70° ; 3° broad dust tail showing a sharp leading edge and a very diffuse trailing side; w/ 20-cm T (50×), very steep brightness gradient on the E side of the coma/dust tail; no jet and no envelope detectable at $111\times$, but a bright fan of material to the SE of the false nucleus and a considerably brighter E branch of the paraboloid coma; w/ 1×63 B, $17'$ coma, DC = S7 [KAM01]. May 2.87: w/ 7×50 B, dust tail nearly 0.5° long; obs. in strong twilight in a partly-cloudy sky; mag uncertain due to lack of suitable comparison stars; the comet was only visible for 7 min, and it was not seen w/ certainty w/o optical aid [SKI]. May 2.90: only the dust tail was visible; observed in early astronomical twilight and at low alt. (6°); from this latitude (60° N), viewing circumstances now similar to the comet's evening apparition in Jan. and early Feb. [GRA04]. May 3.45: "extremely condensed coma w/ a yellowish hue; S portion of tail brighter than the remainder; appearance of the coma and tail gives the impression that we are looking directly head-on at the comet, w/ the tail streaming out behind" [PEA]. May 3.88: only the dust tail was seen; observed in nautical twilight and low alt. (8°), but comet was still clearly visible to the naked eye [GRA04]. May 3.89: ion tail is very faint and narrow beyond 3° from the comet's nucleus [DES01]. May 3.89: despite strong twilight, comet not difficult to see w/ the naked eye; m_1 uncertain due to variable cloud cover; comet and comparison star α CMi not seen simultaneously; w/ 10×50 B, DC = 8, dust tail 1° long [SKI]. May 4.44: "overall appearance similar to last night; S edge of tail parabolic in shape and very sharply defined, in contrast to a rather vague N edge" [PEA]. May 4.80: w/ 7×50 B, $20'$ coma; $m_2 = 2.5$; tab. tail is dust tail; also 4° gas tail in p.a. 21° [KOS]. ⇒

◊ *Comet C/1995 O1 (Hale-Bopp)* [text continued from page 167] ⇒

May 5.06: w/ 7×50 B, tail 9°5 long in p.a. 60° [BOR]. May 5.44: tail subtends an arc of ~ 60°-70°; hint of a very faint, broad, diffuse N edge of the tail, w/ a brighter S edge [PEA]. May 5.79: w/ naked eye, $m_1 = 1.7$, 4.5 coma, DC = 8, tail in p.a. 40° [APE]. May 5.80: w/ 7×50 B, 18' coma; $m_2 = 2.5$; tab. tail is dust tail; also 3° gas tail in p.a. 3° [KOS]. May 8.21: comet low on horizon (alt. ~ 10°); in 7×50 B, comet shows a very broad and distinctly-curved dust tail some 4°+ in length [SPR]. May 8.84: comet 8° above horizon, sun 11° below horizon; w/ 9×63 B, dust tail traceable for 3° (p.a. ~ 40°-110°); w/ 20-cm T (111×), broad fan of bright material SE of the very bright false nucleus, spanning ~ 90°, and a conspicuous fountain to the N [KAM01]. May 9.79: w/ 30-cm f/5 R, $m_1 = 1.9$ (MM = B, ref = SC), 3' coma, DC = 8, 0°13 tail [APE]. May 10.87: comet's true alt. 7°2; seen above the Atlantic; many clouds elsewhere in the sky [PER01 and VIT01]. May 11.20: comet alt. ~ 10°, in bright twilight [SPR]. May 11.78: w/ 30-cm f/5 R, $m_1 = 1.9$ (MM = B, ref = SC), 1' coma, DC = 8/ [APE]. May 12.84: w/ 10×50 B, 0°3 tail in p.a. 85° [GLI]. May 13.80: w/ 7×50 B, 15' coma, DC = S8 [KOS]. May 13.87: comet's true alt. 7°0-5°4 during estimates; 3° tail to the naked eye; twilight and moonlight; reduction using basically the estimates against α Per and γ Per (other stars used but discarded due to red color and larger alt. difference); scattered cumulus, strong wind, excellent transparency [PER01]. May 17.90: ion tail very faint, w/ a vague blue color [DES01]. May 24.34: poor conditions; observed through break in low clouds [SEA]. May 28.44: "central cond. slightly 'softer' in appearance since last obs., 3 weeks ago; tail 2° long in p.a. 125°, although tail starts out from coma at p.a. 130° before curving around to a final p.a. of ~ 90°; I get the distinct impression that we are looking almost head-on into the comet, w/ the tail streaming out directly behind" [PEA]. May 29.89: dust tail yellow, very bright for first 4°5 of its length [DES01].

June 2.33: w/ 10×50 B, 2°8 tail in p.a. 30° [SEA01]. June 3.43: hurried obs. made through breaks in cloud; tail still easily visible in binoculars [PEA]. June 7.32: w/ 10×50 B, 1° tail in p.a. 45° [SEA01]. June 8.33: w/ 10×50 B, 2°0 tail in p.a. 40° [SEA01]. June 14.44: ~ 0°5 of a curved broad tail visible in p.a. 155° [PEA]. June 16.44: ~ 0°3 of a broad tail visible in p.a. 140°; very intense central cond. visible in 20-cm L; tail is very broad and subtends an arc of ~ 70° centered on p.a. 140°, which shows a distinct curvature to the E w/ increasing distance from the coma; tail of high surface brightness makes it difficult to distinguish between coma and tail in 20×80 B [PEA]. June 23.44: comet only 3° above sea horizon and still reasonably bright and condensed; elongation of the coma suggests that the tail is still visible [PEA]. June 25.34: w/ 25×100 B in very bright twilight, $m_1 \sim 2.5$ [SEA].

July 9.82: comet more symmetrical than previously as observed through 25×100 B; bright fan-shaped tail < 0°5 long in twilight, brighter down the center of the fan [SEA]. July 10.92: first post-conjunction obs. in the morning sky; parabolic-shaped coma w/ a bright tail easily visible, tail length 0°5 in p.a. 190°; tail broad and of high surface brightness, and appears as an extension of the coma [PEA]. July 11.92: wedged- or triangular-shaped tail, which subtends arc of ~ 30°; tail length 0°5 in p.a. 195°, w/ first 0°25 of tail of very high surface brightness [PEA]. July 14.82: "when observed w/ 25×100 B, tail appeared as a short bright fan surrounding two diverging rays; there was a strong impression of the tail folding back on itself and extending for perhaps 2° in a sunward direction as a broad, diffuse, band; however, I could not be sure if this was really a part of the comet or part of the rich stellar background marginally seen in twilight" [SEA]. July 14.92: broad tail of length 0°4 in p.a. 200°, w/ first 0°2 of tail of very high surface brightness [PEA]. July 16.82: north-pointing tail confirmed; through 25×100 B, the bright fan extended ~ 20' in p.a. 200°; this was seen to be the brighter, E segment of a parabolic envelope that folded back on itself and extended as a broad and fainter tail in a N direction to at least 3°3; the E edge of this was also brighter (though far less intense than the fan) and extended in p.a. 5°; this N tail was visible to the naked eye for ~ 1°, almost || w/ the E horizon; the head of the comet as seen w/ the naked eye resembled a larger and brighter ω Cen and must have included the fan, although this could not be distinguished from the coma [SEA]. July 16.92: broad, wedged-shaped tail of length 0°35 in p.a. 200° [PEA].

◊ *Comet C/1995 Y1 (Hyakutake)* ⇒ 1996 Feb. 17.31: fanlike coma in p.a. 338°; slightly brighter w/ Swan-band filter [DEA].

◊ *Comet C/1996 B1 (Szczepanski)* ⇒ 1996 Feb. 3.22 and 4.21: w/ 10×50 B, $m_1 = 8.4$, coma dia. 5', DC = 4 and 2 [OHA01]. Feb. 18.23: brighter w/ Swan-band filter [DEA]. Feb. 26.17 and Mar. 1.80: small, strong central cond. [LEH]. Mar. 9.79, 15.90, 17.88, and 20.94: weak central cond. [LEH]. Mar. 16.07: comet strongly enhanced and more condensed w/ Swan-band filter [DEA]. Mar. 19.02: comet unchanged w/ Swan-band filter [DEA].

◊ *Comet C/1996 B2 (Hyakutake)* ⇒ [the corresponding tabulated data for the following observations by PER01 and VIT01 were published in ICQ 98] 1996 Feb. 18.21: seq. T Lib, VY Lib AAVSO; in 15.0 cm f/4.25 L (26×), coma dia. ~ 5', DC = 3/ [PER01]. Mar. 4.24: moon low in the west [PER01]. Mar. 12.06: observed before moonrise; comet low [PER01]. Mar. 12.13: observed after moonrise; tail spans p.a. 280°-320° [PER01]. Mar. 13.06: w/ naked eye, comet seen as a faint, nearly-circular patch [PER01]. Mar. 14.11: w/ naked eye, comet obvious as a diffuse circular glow [PER01]. Mar. 15.05: comet very obvious to naked eye [PER01]. Mar. 15.22: central cond. of mag ~ 4.9 [PER01]. Mar. 20.10: comp. stars ι Dra, ζ Dra, γ UMi, η Dra, γ UMa, β UMa, β UMi, ζ UMa, η UMa, α UMa, ϵ UMa [PER01]. Mar. 21.07: comp. stars β UMi, β Leo, δ Leo, θ Leo, γ UMa, ϵ UMa, ζ UMa, η UMa, α UMa, α CrB, α Vir; in 9×34 B, coma ~ 28', DC = 5, tail > 4°5 near p.a. 260° [PER01]. Mar. 21.12: starlike bright point at center of coma; numerous jets in p.a. 260°-285°, the longest having length 8° [LEH]. Mar. 21.14: the comet seems clearly brighter than 2 hr earlier; first few degrees of tail very evident; comp. stars α UMa, η UMa, ζ UMa, β Leo, α Vir [PER01]. Mar. 22.12: high clouds possibly interfering [PER01]. Mar. 23.94: w/ 11×80 B, coma dia. 75', DC = 1 [GUB]. Mar. 23.98: blue tail is remarkably conspicuous; in 25.3 cm f/5.6 L (58×), 4' bright jet near p.a. of tail; comp. stars α Leo, α Gem, α UMa, β Gem, ϵ UMa, α Boo, α Aur [PER01]. Mar. 25.86: in moonlight; comp. stars α CMi, α Aur, α Leo [PER01]. Mar. 26.01: still in moonlight; comp. stars α Boo, α Aur [PER01]. Mar. 26.11: comp. stars α Lyr, α Boo [PER01]. Mar. 27.10: comp. stars α Lyr, α Boo [PER01]. Mar. 27.18: comp. stars α Lyr, α Boo, ζ UMa, η UMa, ϵ UMa [PER01]. ⇒

◇ *Comet C/1996 B2 (Hyakutake)* [text continued from page 168] ⇒

1996 Mar. 28.14: w/ 11×80 B, coma dia. 48', DC = 2 [GUB]. Mar. 28.81: in strong twilight; moonlight; comet easy to the naked eye; no tail seen; estimate made to assess the influence of twilight, yielding $m_1 \sim 2.2$; comp. stars α Aur, α UMa, α Per, γ UMa, β UMa [PER01]. Mar. 28.85: moonlight; comp. stars α Aur, α Per, α Leo, ϵ UMa [PER01]. Mar. 29.15: observed after moonset; comp. stars α Leo, α Cyg, α Lyr, ϵ UMa, α Boo, β UMi [PER01]. Mar. 29.87: moonlight; comet easy naked-eye object; comp. stars β Tau, α Per, α Aur [PER01].

Apr. 1.89: strong moonlight; comet still very easy naked-eye object w/ short tail; briefly seen; many clouds; comp. stars α Per, γ Per [PER01]. Apr. 2.93: comet still very easy naked-eye object, in spite of moonlight; mag-4.1 star near outer coma; tail glimpsed w/ the unaided eye, very obvious in 9×34 B; comp. stars α Per, γ Per [PER01]. Apr. 3.84: very thin uniform cirrostratus; comp. stars α Per, γ Per [PER01]. Apr. 5.87: obs. at moonrise; first 5° of tail easy to the naked eye; in 9×34 B, tail is extremely narrow and intense; comp. stars α Per, γ Per, ζ Per, ϕ Per; differential extinction corrections < 0.1 mag [PER01]. Apr. 7.87: comp. stars α Per, γ Per, δ Per, ϵ Per, δ Cas, ϵ Cas; differential extinction corrections < 0.2 mag [PER01]. Apr. 8.87: comp. stars ϵ Per, β Aur, θ Aur, β Tau, α Per, γ Per [PER01]. Apr. 10.86: through thin cirrostratus; differential extinction corrections < 0.3 mag; comp. stars ϵ Per, α Per, γ Per, δ Per [PER01]. Apr. 13.86: twilight; differential extinction corrections < 0.2 mag; comp. stars ϵ Per, α Per, ζ Per, γ Per, δ Per [PER01]. Apr. 13.88: tail still very intense but broader; dark spine inside tail; differential extinction corrections 0.7-0.9 mag; comp. stars ϵ Per, α Per, ζ Per, γ Per, δ Per [PER01]. Apr. 16.87: in 9×34 B, coma dia. $\sim 6'$; differential extinction corrections ~ 0.6 mag; comp. stars ϵ Per, α Per, γ Per, δ Per, α Cas, δ Cas [PER01]. Apr. 17.87: comp. stars ϵ Per, γ Per, δ Per, γ And, α Cas, δ Cas [PER01]. Apr. 22.86: comet easy to naked eye; twilight, moonlight; comp. stars 41 Ari, α Cas, β Cas, γ And, Mercury, η Tau, ϵ Per, ι Per, θ Per, κ Per, τ Per, 16 Per [PER01]. Apr. 24.86: strong twilight; moonlight; smoke/cirrus/haze band above clear horizon; comp. stars γ And, 16 Per, 17 Per, Mercury [PER01].

◇ *Comet C/1996 N1 (Brewington)* ⇒ 1996 July 8.94 and 9.95: brighter w/ Swan-band filter [DEA]. Aug. 5.92: much brighter w/ Swan-band filter [DEA].

◇ *Comet C/1996 Q1 (Tabur)* ⇒ 1996 Sept. 11.29: bright diffuse central cond. w/ faint outer coma [DID]. Sept. 21.31: comet brighter w/ Swan-band filter [DEA]. Sept. 24.30: comet brighter w/ Swan-band filter; fan-like coma in p.a. 279° [DEA]. Oct. 4.99: w/ 25.2-cm f/4.2 L (53×), coma dia. 8', DC = 6 [LOO01]. Oct. 6.14: interfering clouds [KOS]. Oct. 6.19: yellow-blue color seen in 20×100 B [NOW]. Oct. 12.41: notable drop in brightness and DC in 3 days [KOS]. Oct. 12.31: bright, diffuse, fan-type central cond., similar to C/1996 B2 [DID]. Nov. 19.17: "elliptical cloud", possibly associated w/ comet, of size 20' × 16', $m_1 = 8.0$, and DC = 0, aligned in p.a. 85°-265°; seen also w/ 7×50 B [KOS]. Nov. 20.18: comet not found w/ 6.3-cm R (52×) in clear sky (limiting naked-eye mag 7.1) [KOS].

◇ *Comet C/1997 D1 (Mueller)* ⇒ 1997 May 13.2: central cond. of dia. $\approx 2''$ and mag 15.5; extended coma displayed a moderate amount of expected asymmetry, aligned w/ the tabulated p.a. of the diffuse tail [ROQ].

◇ *Comet C/1997 J1 (Mueller)* ⇒ 1997 May 7.92: "comet near star of mag 10, so dia. may be underestimated; missed the discovery of C/1997 J2" [MEY]. May 13.02: comet only 2' from star of mag 11 [BOU].

◇ *Comet C/1997 J2 (Meunier-Dupouy)* ⇒ 1997 May 9.90 and June 7.93: no enhancement w/ Lumicon Swan Band Filter [MEY]. May 10.03: comet close to star of mag 13 [BOU]. May 28.89: photometry obtained with 20-cm f/2 Baker-Schmidt camera + V filter + CCD [MIK]. May 30.98: comet only 2' from star of mag 10.5 [BOU]. June 15.92: photometry obtained with 36-cm f/6.7 T + V filter + CCD [MIK]. June 22.93: comet immediately seen; sky conditions worsening towards the end of obs. [VIT01].

◇ *Comet C/1997 L1 (Xinglong)* ⇒ 1997 July 1.19: coma appeared very faint and irregular, w/ no indication of a tail [ROQ]. July 7.20: coma appeared faint and irregularly-shaped, w/ no recognizable central cond. [ROQ].

◇ *Comet C/1997 N1 (Tabur)* ⇒ 1997 July 6.92: coma moderately condensed w/ fainter outer perimeter [PEA]. July 7.80: very diffuse but somewhat enhanced through Swan Band filter [SEA]. July 9.81: enhanced a little when viewed through Swan Band filter [SEA].

◇ *Comet C/1997 O1 (Tilbrook)* ⇒ 1997 July 25.35: comet enhanced by using Swan Band Filter [SEA].

◇ *Comet 2P/Encke* ⇒ 1997 May 31.34: comet found accidentally during a deep-twilight comet sweep w/ 25×100 B and subsequently identified w/ 2P/Encke [SEA]. June 9.43: difficult obs. w/ comet only 4° above local horizon [PEA]. June 14.44: comparison star (at $\alpha = 6^h 30^m 30^s$, $\delta = +4^\circ 19' 9''$, equinox 2000.0) is listed as mag 7.3 in AAVSO Atlas, which is the basis of the mag estimate; however star's mag in GSC is 7.0 [PEA]. June 15.44: coma quite small and diffuse w/ no hint of a central cond. [PEA]. June 16.44: coma quite diffuse and ill-defined, which made it fairly difficult to see against a sky background that is starting to suffer adversely from moonlight [PEA]. June 21.44: coma diffuse and ill-defined w/ very low surface brightness, which made it fairly difficult to see against the sky background; obs. made w/ moon still < 5° above E horizon [PEA]. June 23.45: "excellent conditions, this probably being the first obs. made in a truly dark sky; extensive outer coma visible and a slight brightening at the center of the coma; hints that the coma may be significantly larger if observed at a higher alt.; easily visible in 20×80 B for the first time" [PEA]. June 25.35: very diffuse and involved w/ stars; somewhat enhanced using Swan Band filter [SEA]. June 25.45: slightly murky sky conditions; extensive outer coma visible, which is very diffuse and vague [PEA]. June 26.46: "distinct fade in brightness over the last 3 days, very difficult to see in 20×80 B, whereas 3 days ago it was relatively easy; vague diffuse coma of low surface brightness" [PEA]. June 30.46: large, vague, diffuse coma of low surface brightness; excellent sky conditions, comet seen w/ relative ease [PEA]. ⇒

◇ *Comet 2P/Encke* [text continued from page 169] ⇒

July 3.35: "located using Swan Band filter and subsequently found w/ extreme difficulty w/o the filter; very difficult to observe, being of such low surface brightness against the Milky Way background" [SEA]. July 3.45 and 7.45: large vague coma w/ surface brightness not much brighter than the background sky [PEA]. July 10.45: comet not visible in a reasonably dark sky; comet's position quite close to a 9th-mag star [PEA].

◇ *Comet 9P/Tempel 1* ⇒ 1983 May 13.94: w/ 26-cm L (80×), $m_1 \sim 11.5$ (MM = S, ref = U); coma dia. 3' [HUR].

◇ *Comet 19P/Borrelly* ⇒ 1981 Jan. 31.00 and Feb. 2.00: w/ 20-cm f/10 T, 4' coma, $m_1 \sim 10.0$ [VER02]. 1987 Nov. 4.82: w/ 11×80 B, $m_1 = 9.3$ (ref = AC), coma dia. 0'4, DC = 2 [STO]. Nov. 5.79: w/ 11×80 B, $m_1 = 9.3$ (ref = AC), coma dia. 0'3 [STO]. 1988 Jan. 7.85: w/ 22-cm f/7 L (40×), $m_1 \sim 9.0$, coma dia. 2'5 [STU]. Jan. 13.95: w/ 15-cm L (28×), $m_1 \sim 9.0$ (ref = S), coma dia. 2'5, DC = 2 [FIS]. Jan. 19.82: w/ 22-cm f/7 L (40×), $m_1 \sim 10.0$, coma dia. 3'6, DC = 3 [STU]. Jan. 20.90: w/ 22-cm f/7 L (40×), $m_1 \sim 10.0$, coma dia. 2'7, DC = 2 [STU]. Jan. 22.82: w/ 22-cm f/7 L (40×), $m_1 \sim 10.5$, coma dia. 2'1, DC = 1 [STU]. 1994 Dec. 28.24: tails 20' and 5' long in p.a. 270° and 110° [KEE].

◇ *Comet 22P/Kopff* ⇒ 1983 May 5.97: w/ 20-cm T, coma dia. 3', DC = 4, $m_1 = 9.1$ [KAM01]. May 11.94: w/ 20-cm T, coma dia. 5', DC = 3, $m_1 = 8.8$ [KAM01]. May 14.02: w/ 15-cm f/5 A, photo shows $m_1 \sim 9.5$, coma dia. 0'6, tail 0'06 long in p.a. 40° [HEN]. May 15.90: w/ 10.2-cm f/15 R (60×), coma dia. 15', $m_1 \sim 10.0$ [MED]. June 12.43: w/ 22.5-cm f/16 R (90×), coma dia. $\sim 10'$, DC = 1, $m_1 \sim 8.0$ [PRI]. June 13.43: w/ 27.5-cm f/10 T, coma dia. 12', DC = 1, $m_1 = 8.7$ [PRI]. June 16.52: w/ 7×50 B, coma dia. 6', DC = 0, $m_1 = 9.0$ (MM = S) [PRI]. Aug. 7.47: w/ 15×80 B, $m_1 \sim 9.6$, coma dia. 6', DC = 0 [PRI]. Aug. 8.47: w/ 15×80 B, $m_1 = 9.9$, coma dia. 6', DC = 0 [PRI]. Aug. 10.58: w/ 15×80 B, $m_1 = 9.8$, coma dia. 7', DC = 0 [PRI]. Aug. 12.43: w/ 15×80 B, $m_1 = 9.9$, coma dia. 8', DC = 0 [PRI]. Aug. 13.50: w/ 15×80 B, $m_1 = 10.0$, coma dia. 9', DC = 0 [PRI]. 1996 June 12.08: comet unchanged w/ Swan-band filter [DEA]. July 9.04: comet fainter w/ Swan-band filter [DEA].

◇ *Comet 23P/Brorsen-Metcalf* (O.S. 1989o = 1989 X) ⇒ 1989 Aug. 13.05: w/ 3×30 B, 5' coma, $m_1 = 6.5$ (ref = AA), DC = 3, 0'20 tail in p.a. 290° [BIR]. Aug. 28.12: w/ 3×30 B, 4' coma, $m_1 = 6.0$ (ref = AA), DC = 4, 0'8 tail in p.a. 309° [BIR].

◇ *Comet 29P/Schwassmann-Wachmann 1* ⇒ 1997 Feb. 4.82: central cond. elongated in p.a. 335°, then curved clockwise [NAK01]. May 30.17: central cond. of mag 14.7; coma somewhat asymmetrical toward p.a. 328° [ROQ]. June 12.19: central cond. appeared sharp and distinct, w/ dia. $\approx 3''$ and mag 15.3; coma was symmetrical, w/ no associated tail [ROQ]. June 22.19: central cond. of dia. $< 2''$ and mag 16.7; coma faint and symmetrical; no tail [ROQ]. June 27.18: central cond. diffuse and poorly defined, w/ mag 16.1; the coma, although generally symmetrical, was irregularly-shaped and faint; no indication of a tail [ROQ]. July 4.17: coma was symmetrical, but faint; no tail evident [ROQ]. July 9.17: coma symmetrical, but very faint with no perceptible central cond. [ROQ].

◇ *Comet 45P/Honda-Mrkos-Pajdušáková* ⇒ 1996 Feb. 3.25: w/ 10×50 B, $m_1 = 7.5$, 15' coma [OHA01].

◇ *Comet 46P/Wirtanen* ⇒ 1997 Apr. 5.89: this comet's appearance resembled 81P/Wild 2; m_1 ref. was AAVSO T Tau chart; also faintly seen in 7.5-cm R (48×) [GRA04]. May 2.86: strong enhancement w/ Lumicon SB-Filter [MEY]. May 14.16: central cond. of dia. $\approx 3''$ and mag 15.9; all levels of the coma displayed only a slight asymmetry toward p.a. 90° [ROQ]. May 25.47: 3'4 anti-tail in p.a. 256° [NAK01]. May 26.17: central cond. w/ mag 15.7 and dia. $\approx 2''$; coma slightly asymmetrical and somewhat brighter toward p.a. 99°; no indication of a tail [ROQ].

◇ *Comet 64P/Swift-Gehrels* (O.S. 1981j = 1981 XIX) ⇒ 1981 Nov. 19.92, 20.88, and 21.88: w/ 36-cm T, $m_1 \sim 11.0$ [VER02].

◇ *Comet 67P/Churyumov-Gerasimenko* ⇒ 1982 Nov. 14.06: w/ 22-cm L (120×), $m_1 \sim 10.0$, coma dia. 1'9, tail in p.a. 270° [STU]. 1983 Jan. 7.94: w/ 22-cm L, $m_1 \sim 10.0$, coma dia. 1'1 [STU]. Jan. 21.93: w/ 22-cm L (166×), $m_1 \sim 11.0$, coma dia. 1' [STU]. Jan. 30.79: w/ 22-cm L (72×), $m_1 \sim 12.0$ [STU]. Jan. 31.81: w/ 30-cm f/3 L (50×), $m_1 = 12.0$, coma dia. 5', DC = 2 [TUB]. Feb. 1.83: w/ 22-cm L (120×), $m_1 \sim 11.5$, coma dia. 1'3 [STU].

◇ *Comet 81P/Wild 2* ⇒ 1997 Feb. 6.85-Apr. 17.85: strong central cond. [LEH]. Mar. 1.07: comet faintly visible due to Moon and light pollution [GRA04]. Mar. 8.41: comet fainter through Swan Band filter [SEA01]. Mar. 8.93: possible tail towards E; also clearly visible in 10.2-cm T [GRA04]. Mar. 8.94: sequence AAVSO U Gem [SKI]. Mar. 16.91: comet located close to the dwarf nova U Gem and only 2' W from its mag-12.3 comparison star (AAVSO seq.); first-quarter Moon 21° from 81P [GRA04]. Apr. 2.82: elongated coma [MEY]. Apr. 26.92: some interference from high clouds; sequence AAVSO U Gem [GRA04]. May 2.91: w/ 20-cm T (50×), condensed coma that seemed to be elongated to the E or extending into a broad, 2'-long tail; at 111×, no false nucleus detectable [KAM01]. May 25.16: central cond. of mag 14.3 and dia. $\approx 3''$; coma showed some asymmetry toward p.a. 94° (directed toward a broad, diffuse tail centered at the tab. p.a., which encompassed a slightly brighter linear component of equal length at p.a. 115°) [ROQ]. May 25.92 and 28.93: RY Leo AAVSO seq. [PER01]. May 30.91: in spite of better conditions, comet significantly more difficult than two nights ago; 13th-mag stellar pseudo-nucleus; RY Leo AAVSO seq. [PER01]. May 30.91: 12.5-mag stellar central cond. and very diffuse outer coma; RY Leo AAVSO seq. [VIT01]. June 5.16: central cond. of mag 13.9 and dia. 5''; minimal image enhancement showed that the diffuse tail was fan-shaped, encompassing an angle of 47°, centered at p.a. 93° and extending for at least 4' to the frame edge [ROQ]. June 19.17: coma dia. $\approx 2''$ w/ mag 13.9; the coma showed some asymmetry toward p.a. 113°, but w/ no positive indication of a tail w/in that region [ROQ]. June 26.17: central cond. w/ dia. $\approx 2''$ and mag 14.1; the coma appeared strongly asymmetrical toward p.a. 112° [ROQ]. June 29.52: faint anti-tail in p.a. 295° [NAK01]. ⇒

◊ Comet 81P/Wild 2 [text continued from page 170] ⇒

July 3.18: coma was asymmetrical toward p.a. 94° w/ an associated, diffuse tail at p.a. 112°, which extended 3.7' (to field edge) [ROQ]. July 5.22: central cond. of dia. 2'' and mag 14.4; coma asymmetrical toward p.a. 102° w/ a broad, diffuse tail evident at p.a. 114°; additionally, a very faint, diffuse sunward projection extended at least 3' at p.a. 280° [ROQ]. July 14.16: central cond. of dia. ≈ 2'' and mag 14.6; tab. tail appeared very diffuse w/ no apparent secondary features [ROQ].

◊ Comet 85P/Boethin (O.S. 1985n = 1986 I) ⇒ 1986 Jan. 14.76 and 19.76: w/ 30-cm f/5 L (65×), $m_1 \sim 8.0$, DC = 2, coma dia. 1.9 and 1.4 [STO02].

◊ Comet 96P/Machholz 1 ⇒ 1986 May 17.05, 19.03, and 21.01: w/ 20-cm L, $m_1 = 10.5$, coma dia. 0.7-0.8, DC = 2 [JAH]. 1996 Oct. 13.45 and 14.74: obs. made with the Large Angle Spectroscopic Coronagraph (LASCO) onboard the SOHO spacecraft (see G. E. Brueckner *et al.* 1995, *Solar Phys.* **162**, 357) and the C3 Coronagraph + clear filter (400-850 nm), which observes the solar corona from 3.7 to 30 $R_\odot$ [CYR].

◊ Comet 98P/Takamizawa (O.S. 1984j = 1984 VII) ⇒ 1984 Aug. 3.53: w/ 9×63 B, $m_1 = 9.5$, coma dia. 1', 0°07' tail in p.a. 379° [MCN]. Aug. 4.55: w/ 9×63 B, $m_1 = 9.1$, coma dia. 2' [MCN]. Aug. 21.90: w/ 20-cm T (63×), $m_1 = 10.3$, coma dia. 1.9, DC = 2/ [LIN02].

◊ Comet 118P/Shoemaker-Levy 4 ⇒ 1997 June 17.17: central cond. of dia. ≈ 3'' and mag 14.8; coma symmetrical w/ a constant radial brightness and a relatively sharp cut-off at its edge [ROQ].

◊ Comet 121P/Shoemaker-Holt 2 ⇒ 1997 May 27.19: central cond. of mag 17.7; coma relatively symmetrical, but faint and poorly defined [ROQ].

◊ Comet 126P/IRAS ⇒ 1983 Sept. 7.00, 10.00, 11.00, and 12.00: w/ 35-cm T, $m_1 = 12.5$ [VER02]. Oct. 28.87: w/ 8.5-cm f/6 A (photograph), $m_1 \sim 11.7$, coma dia. 1', DC = 4 [HEN].

◊ Comet P/1994 P1 (Machholz 2; O.S. 1994o) ⇒ 1994 Sept. 9.45: AAVSO chart T Lyn; three lesser components all NNE (p.a. 30°) from 'A': (A....D.....C....B), where one space is roughly 1'; A-B ≈ 30'; A-D = 5'; C-B = 6'; this places 'C' much farther from 'B' than the 43'' noted on *IAUC* 6070; possibly this object is not C, but a different component; also of note is coma of 'A' is elongated to NNE, with 'D' located at the tip of (but within) the elongated coma of 'A' [KEE].

◊ ◊ ◊

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

ABB	07	James Abbott, Witham, England	CSU	32	Matyas Csukas, Salonta, Romania
ALC	07	G. E. D. Alcock, England	*CYR		O. C. St. Cyr, Goddard Space F. Ctr
ANZ		Fabio Anzellini, Italy	DAH	24	Haakon Dahle, Norway
*BAG01	07	J. W. Baguley, Derby, U.K.	DEA		Vicente F. de Assis Neto, Brazil
BAR		Sandro Baroni, Italy	DES01		Jose G. de Souza Aguiar, Brazil
BEA	07	Sally Beaumont, Cumbria, England	DID		Richard Robert Didick, MA, U.S.A.
BEC01		Stefan Beck, Stuttgart, Germany	DIL		William G. Dillon, VA, U.S.A.
BEN	15	Jack C. Bennett, South Africa	DIN01	07	E. L. Dinham, Plymouth, England
BIR	07	P. Birtwhistle, England	DVO	23	Denisa Dvorakova, Czech Republic
BIV		Nicolas Biver, France	ENT	07	L. Entwisle, England
*BLA03	07	Blair (apparently U.K.)	ERG	20	Jens Ergon, Sweden
BOJ01	34	Eva Bojurova, Bulgaria	EVA	07	Steve Evans, Towcester, England
BOR		John E. Bortle, NY, U.S.A.	FAU	39	Gerard Faure, France
BOU		Reinder J. Bouma, The Netherlands	*FEI01		Walter A. Feibelman, MD, U.S.A.
BUL	07	J. S. Bullivant, England	FOG		Sergio Foglia, Italy
BUL01	07	Robert Bullen, England	FRA01	07	James Fraser, Scotland
*BUS05	07	John Bush, Hailsham, E. Sussex, U.K.	FRY	07	D. Frydman, England
CAM03	14	Paul Camilleri, Australia	GIL01	11	G. Gilein, The Netherlands
*CER	45	Norberto Cerruti, Uruguay	*GIU	07	Massimo Giuntoli, Italy
CHE03	33	Kazimieras T. Cernis, Lithuania	GLI		Gunnar Glitscher, Germany
COL03	07	Emilio Colombo, Brughiero, Italy	GON05		Juan Jose Gonzalez, Asturias, Spain
*CRA	07	J. Craven, Salisbury, U.K.	GRA04	24	Bjoern Haakon Granslo, Norway

GRE		Daniel W. E. Green, U.S.A.	NAN02		Kouji Naniwada, Houya, Tokyo, Japan
GUB		Herbert Gubo, Germany	NEV 42		Vitali S. Nevski, Vitebsk, Belarus
HAS02		Werner Hasubick, Germany	NOW		Gary T. Nowak, VT, U.S.A.
HAS06 20		Bengt Hasseus, Sweden	*OHA01 07		Brian O'Halloran, Ireland
HAV		Roberto Haver, Italy	OKS 07		Gabriel Oksa, Slovak Republic
HEN 07		Michael J. Hendrie, England	OWE 07		R. M. Owens, South Wales
*HIC01		Michael Hicks, University of Arizona	PAN 07		Roy W. Panther, England
*HILO3		Richard Hill, AZ, U.S.A.	PAP01		Janos Papp, Budapest, Hungary
HIN 07		Keith B. Hindley, Isle Of Man, U.K.	PEA 14		Andrew R. Pearce, Australia
HOR02 23		Kamil Hornoch, Czech Republic	*PEN01 07		Walter Pennell, Waddington, U.K.
HUR 07		Guy M. Hurst, England	PER01		Alfredo Jose Serra Pereira, Portugal
JAH		Jost Jahn, Germany	PLS 23		Martin Plsek, Czech Republic
JON 09		Albert F. Jones, New Zealand	POT 07		A. Potts, England
KAM01		Andreas Kammerer, Germany	POY 07		Gary Poyner, Birmingham, England
KAT01 16		Taichi Kato, Kyoto, Japan	PRI 07		Robert T. Price, Australia
KEE		Richard A. Keen, CO, U.S.A.	PRY		Jim Pryal, WA, U.S.A.
KEE01 07		David Russell Keedy, England	RAD01 17		Veselka Radeva, Bulgaria
KEI 07		Graham Keitch, England	ROG02		John H. Rogers, Cambridge, England
KID		Mark Kidger, Canary Islands	ROQ		Paul Roques, AZ, U.S.A.
KIE01 07		Norman S. Kiernan, England	ROS01		Luigi Rossi, Italy
KOH		Truman P. Kohman, PA, U.S.A.	SAN04 38		Juan Manuel San Juan, Madrid, Spain
KOR		Stefan Korth, Germany	SCH05 07		Patrick Schmeer, Germany
KOS		Attila Kosa-Kiss, Salonta, Romania	SCH12 07		Richard W. Schmude, Jr., TX, U.S.A.
KRY02		Washington Kryzanowski, Uruguay	SC001		James V. Scotti, AZ, U.S.A.
LAU01 24		Andreas Lauvstad, Norway	SEA 14		David A. J. Seargent, Australia
LEH		Martin Lehky, Czech Republic	SEA01 14		John Seach, Australia
LIB 23		Jan Libich, Jihlava, Czech Republic	SEM 42		Ruslan V. Semyonov, Vitebsk, Belarus
LIC01		Javier Andrs Licandro, Uruguay	SER 42		Ivan M. Sergey, Molodechno, Belarus
LOO01		Frans R. van Loo, Belgium	SHA02 07		Jonathan D. Shanklin, England
LOU 35		Romualdo Lourencon, Brazil	SHA04		Gregory T. Shanos, U.S.A.
LOV		Terry Lovejoy, Australia	*SHI06 07		Kevin Shilling, Cowplain, U.K.
LOW		Dennis Lowe, Australia	*SHO 07		Andy Shorten, Norwich, Norfolk, U.K.
LUE		Hartwig Luethen, Germany	SIM		Karl Simmons, FL, U.S.A.
MAD 07		P. J. Madej, England	SIM01		Wanda Simmons, FL, U.S.A.
MAN 07		B. Manning, England	SKI 24		Oddleiv Skilbrei, Norway
*MAN02 23		Roman Manak, Lipov, Czech Republic	*SQU01 35		Willian Carlos de Souza, Brazil
MAR02 13		Jose Carvajal Martinez, Spain	SPR		Christopher E. Spratt, BC, Canada
MAR03		Brian G. Marsden, MA, U.S.A.	STO03 07		David Storey, Oxfordshire, England
MCK 07		Richard McKim, Oundle, England	STU 07		K. M. Sturdy, England
MCN 07		Robert Houston McNaught, Australia	TAN02		Tony Tanti, Malta
*MCN01 07		M. S. McNeill, Winnersh, U.K.	TAY 07		Melvyn D. Taylor, Yorkshire, England
MEN03 07		Haldun I. Menali, Istanbul, Turkey	TRI		Josep Maria Trigo i Rodriguez, Spain
MER		Jean-Claude Merlin, France	TSU02 16		Mitsunori Tsumura, Wakayama, Japan
MEY 28		Maik Meyer, Germany	TUB 12		Vince Tuboly, Hegyhatsal, Hungary
MID01 24		Oernulf Midtskogen, Norway	VAN06		Gabriele Vanin, Italy
MIK		Herman Mikuz, Slovenia	VER02		M. Verdenet, France
MIN02 07		Raymond Minty, Banff, Scotland	VIC 32		Zoltan Vician, Hehalom, Hungary
MIY01 16		Osamu Miyazaki, Tsukuba, Ibaraki, Japan	VIT01 40		Catarina Vitorino, Portugal
MOB 07		Martin Mobberley, England	WES02		Margareta Westlund, Sweden
MOE		Michael Moeller, Germany	WIL03		Patrick Wils, Belgium
MOR03		Warren C. Morrison, Canada	*WIL11		Barbara Wilson, TX, U.S.A.
MOR06 16		Masayuki Moriyama, Japan	YOS02 16		Katsumi Yoshimoto, Yamaguchi, Japan
NAG02 16		Takashi Nagata, Akashi, Hyogo, Japan	YOS04 16		Seiichi Yoshida, Ibaraki, Japan
NAG08 16		Yoshimi Nagai, Matsumoto, Nagano, Japan	ZEK		Hans Zekl, Einhausen, Germany
NAKO1 16		Akimasa Nakamura, Kuma, Ehime, Japan	ZNO 23		Vladimir Znojil, Czech Republic

Comet C/1972 E1 (Bradfield)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 05 03.70			8.6	S	12	R		21	3				BEN

Comet C/1973 A1 (Heck-Sause)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1973 01 27.20			11.5:		26	L	5						PEN01
1973 01 30.94			11.1		15	L		36	1.5				PAP01

Comet C/1973 E1 (Kohoutek)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1973 10 18.20		S	10.0:		32	R	18		0.5				ROG02
1973 11 17.07			7.0	S	12	R		21				280	BEN
1973 11 20.24		S	7.3		12.5	R	5		5		0.13		HIN
1973 11 23.07			6.3	S	12	R		21			0.5	280	BEN
1973 11 26.25			5.9		10.5	B		25			1		ALC
1973 11 27.25			5.0		5.0	B		10					PEN01
1973 11 27.25			5.8		10.5	B		25			1		ALC
1973 11 29.24		S	6.0		12.5	R	5		7				HIN
1973 12 01.25			5.6		10.5	B		25			0.5		ALC

Comet C/1974 V2 (Bennett)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1974 11 13.07			9.0:	S	12	R		21	2				BEN
1974 11 14.07			8.5	S	12	R		21					BEN
1974 11 15.07			8.3	S	12	R		21	2.5				BEN
1974 11 22.07			[11.0	S	12	R		21					BEN

Comet C/1987 P1 (Bradfield)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 08 17.46		S	8.8	SA	5.0	B		12	5	3			CAM03
1987 10 23.41		S	6.6	SA	5.0	B		12	10	3	1.5	45	CAM03
1987 10 26.42		S	6.5	SA	5.0	B		12	11	3	1.0	50	CAM03

Comet C/1988 Y1 (Yanaka)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 01 13.66		S	11.7	MM	20.3	L	7	35	1	3			CAM03
1989 01 14.66		S	11.7	MM	20.3	L	7	35	1	3			CAM03

Comet C/1989 A1 (Yanaka)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 01 13.66		S	11.8	MM	20.3	L	7	35	3	2			CAM03
1989 01 14.66		S	11.8	MM	20.3	L	7	35	3	2			CAM03

Comet C/1990 K1 (Levy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 16.50		I	4.0	SC	0.7	E		1					CAM03
1991 03 17.46		S	10.0	MM	20.3	L	7	56	1.5				CAM03
1991 04 11.45		S	11.5	MM	20.3	L	7	56	2	1			CAM03

Comet C/1990 N1 (Tsuchiya-Kiuchi)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 01 10.54		S	10.0	SM	20.3	L	7	35	2	0			CAM03

Comet C/1991 T2 (Shoemaker-Levy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1992 06 22.95		S	9.2	S	13.0	L	5	40	4	3			BEC01
1992 06 29.99		S	8.8	S	13.0	L	5	40	2	6			BEC01
1992 07 08.90		S	8.2	S	13.0	L	5	40	1.5	7			BEC01

Comet C/1991 X2 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1992 02 01.89		S	11.2	S	30.0	L	5	125	3.4	1			MAR02
1992 02 04.87		S	10.8	S	30.0	L	5	125	4.6	1			MAR02

Comet C/1991 Y1 (Zanotta-Brewington)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1992 01 06.74		S	8.5	S	13.0	L	5	72	1.5	3			BEC01
1992 01 21.73		S	9.0	S	13.0	L	5	40		3			BEC01

Comet C/1992 F1 (Tanaka-Machholz)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1992 04 11.08		S	8.8	S	13.0	L	5	74	3.5	2			BEC01
1992 04 11.09		S	8.7	S	13.0	L	5	40	4	2			BEC01
1992 04 11.12		S	8.7	S	13.0	L	5	40	4	5			BEC01
1992 04 25.04		S	9.0	S	13.0	L	5	40	3	3			BEC01
1992 04 25.05		S	9.0	S	13.0	L	5	40	2.5	3			BEC01
1992 05 22.91		S	8.7	S	13.0	L	5	74	3.5	5			BEC01
1992 05 25.05		S	8.5	S	13.0	L	5	40	2.5	5			BEC01
1992 05 28.95		S	8.4	S	13.0	L	5	40	2.5	6			BEC01
1992 05 30.05		S	8.4	S	13.0	L	5	40	2.5	5			BEC01

Comet C/1993 A1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 09 21.96		S	9.8	AA	10.0	B		20	3.0	4			KEI
1993 09 23.16		S	9.7	AA	10.0	B		20	3.4	3			KEI
1993 09 24.13		S	9.8	AA	10.0	B		20	3.2	3			KEI
1993 09 27.17		S	9.7	AA	10.0	B		20	3.3	3			KEI
1993 09 29.21		S	9.5	AA	10.0	B		20	3.4	3			KEI
1993 10 17.83		S	9.8	AC	25.0	L	4	35	8	3			PAN
1993 11 17.76		B	9.1	AA	15.5	L	10		4	5			KOS
1993 11 18.92		S	8.7	AA	13.0	R				5			BEA
1993 11 19.92		S	8.7	AA	13.0	R				5			BEA
1993 11 19.92		S	9.2	AA	35	L	4	50	2	4			PAN
1993 12 04.77		S	9.2	AA	25.0	L	4	35	3	3			PAN
1993 12 04.90		S	8.6	AA	13.0	R				5		45	BEA
1993 12 07.82		S	9.5	AA	25.0	L	4	35	4	2			PAN
1993 12 16.81		S	9.5	AA	25.0	L	4	35	3	2			PAN
1994 01 02.81		S	10.2	AC	25.0	L	4	35	6	1			PAN

Comet C/1993 Y1 (McNaught-Russell)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 03 28.87		S	6.4	SC	5.0	B		8	5	2			MIN02
1994 03 29.84		S	6.4	AA	25.0	L	4	36	6	4			PAN
1994 03 29.84		S	8.1	SC	8.0	B		16	10	3			TAY
1994 03 29.87		S	6.5	SC	5.0	B		8	4.5	3			MIN02
1994 03 30.78		M	7.1	AA	7.0	B		20	4	5			TAN02
1994 03 31.78		M	7.0	AA	7.0	B		20	7	4			TAN02
1994 04 01.84		S	6.5	SC	8.0	B		15	6	5			PAN
1994 04 01.84		S	7.8	SC	8.0	B		16	12	3			TAY
1994 04 01.91		S	7.0	AA	8.0	B		15	8	4			HUR
1994 04 02.86		S	6.3	SC	5.0	B		8	4	5	0.25	200	MIN02
1994 04 02.89		S	6.9	AA	8.0	B		15	8	4			HUR
1994 04 04.85		S	7.5	AA	8.0	B		16	8	4			TAY
1994 04 04.88		S	7.1	AA	5.0	B		7	4	3			EVA
1994 04 04.89		S	7.2	HP	8.0	B		15	7.0	3			HUR

Comet C/1993 Y1 (McNaught-Russell) [cont].

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 04 04.92		S	6.6	SC	5.0	B		8	5	3	0.16	270	MINO2
1994 04 05.78		S	7.0	AA	7.0	B		20	7	4			TANO2
1994 04 05.85		S	7.0	SC	21.0	L	5	42	6	3			TAY
1994 04 05.88		S	6.4	SC	8.0	B		15	6	5			PAN
1994 04 05.88		S	7.5	SC	5.0	B		10	10	5			FRA01
1994 04 07.78		S	6.9	AA	7.0	B		20	9	4			TANO2
1994 04 07.89		S	7.3	SC	5.0	B		10	8	5			FRA01
1994 04 07.90		S	7.5	SC	15.2	L	8	49	4.5	4			LAU01
1994 04 07.96		S	7.0	SC	5.0	B		8	6	4	0.16	260	MINO2
1994 04 08.88		S	6.7	AA	8.0	B		15	9.0	4			HUR
1994 04 08.90		S	7.2	AA	5.0	B		7	4	4			EVA
1994 04 09.80		S	7.3	AA	7.0	B		20	7	4			TANO2
1994 04 10.86		S	7.2	AA	20.0	L	10	77	2.0	4			POY
1994 04 10.86		S	7.5	SC	21.0	L	5	42	2.5	4			TAY
1994 04 10.86		S	7.7	SC	8.0	B		16					TAY
1994 04 11.80		S	7.4	AA	7.0	B		20	10	3			TANO2
1994 04 12.80		S	7.2	AA	7.0	B		20	7	3			TANO2
1994 04 12.90		S	7.7	SC	5.0	B		10	9	4			FRA01
1994 04 12.98		S	7.6	SC	5.0	B		8	4	4			MINO2
1994 04 13.80		S	7.4	AA	7.0	B		20	11	3			TANO2
1994 04 13.87		S	6.6	SC	8.0	B		15	12	3			PAN
1994 04 13.87		S	7.6	AA	8.0	B		15	9.0	3			HUR
1994 04 13.89		S	7.3	SC	5.0	B		10	5	4			FRA01
1994 04 13.91		S	7.3	AA	5.0	B		7	5	4			EVA
1994 04 13.96		S	7.8	SC	5.0	B		8	4	2			MINO2
1994 04 14.91		S	7.7	SC	5.0	B		8	2.5	5			MINO2
1994 04 16.86		S	7.6	A	20.0	L	10	77	3	3			POY
1994 04 17.87		S	8.7	SC	21.0	L	5	42	2.5	4			TAY
1994 04 17.91		S	8.0	SC	8.0	B		16	5.0	2			TAY
1994 04 19.96		S	8.0	SC	5.0	B		8	2	4			MINO2
1994 04 27.85		B	9.3	AA	15.5	L	10	54	6	2	0.4	345	KOS
1994 04 28.83		B	9.4	AA	15.5	L	10	54	7	2	0.4	15	KOS
1994 04 29.84		B	9.6	AA	15.5	L	10	54	6	2	0.3	55	KOS
1994 04 29.87		S	8.5	HS	15.0	L	5	75	3	2			BEC01
1994 04 30.84		B	9.7	AA	15.5	L	10	54	6	2	0.3	110	KOS
1994 05 02.83		B	9.7	AA	15.5	L	10	54	5	2	0.7	260	KOS
1994 05 03.87		B	10.0	AA	15.5	L	10	54	5	2	0.5	305	KOS
1994 05 04.85		B	10.4	AA	15.5	L	10	54	6	2	0.4	340	KOS
1994 05 07.86		S	9.4	HS	15.0	L	5	75	3	3			BEC01
1994 05 09.88		B	11.2	AA	15.5	L	10	54	3	2			KOS
1994 05 11.89		S	9.3	HS	15.0	L	5	42	2	1			BEC01
1994 05 13.89		S	9.4	HS	15.0	L	5	42	3	3			BEC01

Comet C/1994 G1 (Takamizawa-Levy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 04 23.10		S	10.0	AA	20.3	T	10	80	1.5	2			TANO2
1994 04 23.72		S	10.7	GA	31.7	L	5	53	0.8	4			JON
1994 05 07.94		S	9.5	HS	15.0	L	5	75	2	8			BEC01
1994 05 11.99		S	9.3	HS	15.0	L	5	42	2	3			BEC01
1994 05 13.97		S	9.2	HS	15.0	L	5	75	3	4			BEC01
1994 05 28.99		S	9.4	AA	8.0	B		15	5.5	2			PAN
1994 05 30.95		S	9.9	HS	15.0	L	5	42	1.5	3			BEC01
1994 05 30.98		S	8.6	S	8.0	B		15	7	3			HUR
1994 06 14.01		S	9.4	AA	25.0	L	4	36	5.5	3			PAN
1994 06 28.04		S	9.9	AA	35.0	L	4	50	1.5	4			PAN

Comet C/1994 J2 (Takamizawa)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 05 12.73		S	10.3	GA	31.7	L	5	63	0.6				JON
1994 05 13.71		S	10.9	GA	31.7	L	5	63	0.6	1			JON
1994 05 14.47		S	10.4	GA	31.7	L	5	63	0.6	2			JON
1994 05 15.46		S	10.2	GA	31.7	L	5	63	1.5	2/			JON
1994 05 17.48		S	10.4	GA	31.7	L	5	63	1	3			JON

Comet C/1994 J2 (Takamizawa) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 05 29.35		S	10.6	GA	31.7	L	5	63	1.3	3			JON
1994 05 30.39		S	10.7	GA	31.7	L	5	63	1.3	3			JON
1994 05 31.40		S	10.8	GA	31.7	L	5	63	1.5	3			JON
1994 06 01.42		S	11.3	GA	31.7	L	5	63		2/			JON
1994 06 03.36		S	11.2	GA	31.7	L	5	63		3			JON
1994 06 04.35		S	11.3	GA	31.7	L	5	63		3			JON
1994 06 05.42		S	11.3	GA	31.7	L	5	63	1	3			JON
1994 06 06.40		S	11.5	GA	31.7	L	5	63					JON
1994 06 07.43		S	11.4	GA	31.7	L	5	63	0.5	3			JON
1994 06 29.39		S	11.3	GA	31.7	L	5	63	0.7	2			JON
1994 06 30.31		S	11.3	GA	31.7	L	5	63	1	3			JON
1994 07 06.36		S	11.9	GA	31.7	L	5	63					JON
1994 07 09.34		S	11.9	GA	31.7	L	5	63					JON

Comet C/1994 N1 (Nakamura-Nishimura-Machholz)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 07 12.00		S	9.7	AA	35.0	L	4	50	3.0	3			PAN
1994 07 14.97		S	9.5	AA	35.0	L	4	50	4.5	3			PAN
1994 07 16.96		S	9.6	AA	35.0	L	4	50	5.0	2			PAN
1994 07 19.02		S	9.6	AA	35.0	L	4	50	5.0	3			PAN
1994 07 29.93		S	9.6	AA	35.0	L	4	50	5.0	1			PAN
1994 08 09.93		S	8.5	HS	15.0	L	5	42	5	2			BEC01
1994 08 14.00		M	8.4	AA	6.0	B		20	15	1			CSU
1994 08 14.92		S	9.6	AA	35.0	L	4	50	6	1			PAN
1994 08 14.93		B	8.4	AA	6.0	B		20	15	1			CSU
1994 08 27.93		S	8.9	AA	35.0	L	4	50	5	2			PAN
1994 08 30.88		S	9.6	AA	35.0	L	4	50	5	1			PAN
1994 09 03.86		S	8.5	HS	15.0	L	5	42	4	3			BEC01
1994 09 04.87		S	8.8	HS	15.0	L	5	42	3	3			BEC01
1994 09 08.28		S	8.3	S	15.2	L	3	16	15	1			KEE

Comet C/1994 T1 (Machholz)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 10 27.90		S	9.6	AC	10.0	B		20	4.0	1			KEI
1994 12 28.15		M	11.3	AC	31.8	L	4	63	2	3			KEE

Comet C/1995 01 (Hale-Bopp)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 03 16.42	w	S	9.1	AC	15	R	5	42	3.5	3			MOR03
1996 03 17.41	w	S	8.6	AC	15	R	5	42	3.5	3			MOR03
1996 03 24.41	w	S	8.4	AC	15	R	5	42	4	3			MOR03
1996 03 27.41	w	S	8.4	AC	15	R	5	42	4	3			MOR03
1996 03 31.40	w	S	8.5	AC	15	R	5	42	3.5	3			MOR03
1996 04 28.32		S	8.2	AC	15	R	5	42	3	S4			MOR03
1996 05 13.29		S	8.2	AC	15	R	5	42	3	S5			MOR03
1996 05 19.31		S	7.9	AC	15	R	5	42	4	S3			MOR03
1996 05 21.04		S	7.2	SC	8.0	B		40	2	1		340	BAR
1996 05 24.32		S	8.0	AC	15	R	5	42	4	S5			MOR03
1996 05 25.21		B	8.5	AA	8.0	B	4	15	2	0			NOW
1996 05 29.32		S	7.2	AC	3.5	B		7	6.5				MOR03
1996 06 06.14		B	6.5	AA	10.0	B	4	20	10	2	15 m	45	NOW
1996 06 07.95		M	7.3	S	10.0	B	4	25	4	5/			LEH
1996 06 07.96					20	R	17	140	2	6	8 m	0	LEH
1996 06 15.26		S	6.9	AC	3.5	B		7	8				MOR03
1996 06 23.31		S	6.9	AC	3.5	B		7	9	4			MOR03
1996 07 05.14		S	6.7	AC	3.5	B		7	12	4			MOR03
1996 07 08.92		S	6.4	SC	8.0	B		20	6	7	0.30	355	BAR
1996 07 09.88		S	6.1	AA	8.0	B		20	10	6	0.25	345	BAR
1996 07 10.14		S	6.1	AC	3.5	B		7	10.5	4			MOR03
1996 07 16.96		S	5.3	AA	20	T	10	60	17	3	0.25	10	OWE
1996 07 20.14		S	6.0	AC	3.5	B		7	14	4			MOR03
1996 07 20.22		S	5.7:	AA	20.0	T	10	50	4.2	5	&1	320	SHA04

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 21.20		S	5.6	AA	20.0	T	10	50	4.4	5	&1	350	SHA04
1996 07 22.12		S	5.9	AC	3.5	B		7	10	4			MOR03
1996 07 22.20		S	5.6	AA	20.0	T	10	50	5.2	6	&1	8	SHA04
1996 07 22.95		S	6.5	AA	6.3	B		9	8	2			DIN01
1996 07 23.96		S	6.0	AA	6.3	B		9	8	2			DIN01
1996 07 24.96		S	6.0	AA	6.3	B		9	6	2	0.08		DIN01
1996 08 02.99		S	6.0	AA	6.3	B		9	8	2			DIN01
1996 08 03.93		S	5.6	AA	8.0	B		20	9	4			BAR
1996 08 04.94		S	6.0	AA	20	T	10	60	20	5	0.33	27	OWE
1996 08 05.13		S	5.9	AC	3.5	B		7	15	4			MOR03
1996 08 09.84		M	6.2	S	8.0	B		10	15	5		320	LEH
1996 08 10.17		S	5.9	AC	3.5	B		7	15	4			MOR03
1996 08 10.84		M	6.2	S	8.0	B		10	15	5/		320	LEH
1996 08 11.08		B	5.7	AC	10.0	B	4	20	12	3	30 m	180	NOW
1996 08 12.85		S	5.3	AA	8.0	B		20	10	5			BAR
1996 08 15.06		B	5.8	AC	6.3	B	4	9	10	2	5 m	90	NOW
1996 08 15.83		M	6.0	S	8.0	B		10	17	6/	4 m	320	LEH
1996 08 16.90		S	6.3	AA	10.0	B		14	8	4			LO001
1996 08 18.91		S	6.0	AA	4.0	R	7	10	6.5	4			LO001
1996 08 19.08		S	5.8	AC	3.5	B		7	13	4	0.30	90	MOR03
1996 08 19.84		M	6.0	S	8.0	B		10	18	6			LEH
1996 08 19.87		S	5.9	AA	4.0	R	7	10	6	3			LO001
1996 08 23.82		S	5.2	AA	8.0	B		20	7	4		325	BAR
1996 08 29.83		M	5.5	S	8.0	B		10	18	6/			LEH
1996 08 30.84		M	5.5	S	8.0	B		10	18	6/			LEH
1996 08 30.85		S	6.0	AA	6.3	B		9	8	S2		50	DIN01
1996 08 31.82		S	5.8	AA	4.0	R	7	10	10	3			LO001
1996 09 01.80		S	5.1	AA	8.0	B		20	10	6			BAR
1996 09 01.86		S	5.7	AA	6.3	B		9	5	S2	0.25	45	DIN01
1996 09 02.85		S	6.0	AA	4.0	R	7	10	8	4			LO001
1996 09 03.07		S	5.8	AC	3.5	B		7	11	4	0.23	95	MOR03
1996 09 03.84		S	6.3	AA	4.0	R	7	10	6.5	7			LO001
1996 09 04.06		S	5.5	AA	20.0	T	6	53	4.7	8	&1	345	SHA04
1996 09 04.83		S	6.2	AA	4.0	R	7	10	8	7			LO001
1996 09 05.82		S	6.2	AA	5.0	B		10	6	7			LO001
1996 09 06.79		S	6.2	AA	5.0	R		10	10	7			LO001
1996 09 07.81		S	5.0	AA	8.0	B		20	9	5		30	BAR
1996 09 07.83		S	5.8	AA	5.0	R		10	10	7			LO001
1996 09 08.82		S	6.2	AA	5.0	R		10	8	7			LO001
1996 09 08.87		S	5.4	AA	5.0	B		10	12	4/			HAV
1996 09 09.82		S	6.4	AA	5.0	R		10	8	7			LO001
1996 09 13.81		S	5.0	AA	8.0	B		20	11	5			BAR
1996 09 14.83		S	5.3	AA	5.0	B		10	11	4/	0.5	79	HAV
1996 09 15.81		S	6.2	AA	6.0	B		20	15	7	0.33	100	CSU
1996 09 16.82		S	6.2	AA	3.0	R		8	6	7			LO001
1996 09 17.80		S	6.2	AA	3.0	R		8	6	7			LO001
1996 09 18.81		S	6.4	AA	5.0	B		10	7	7	0.5	325	LO001
1996 09 19.81		S	6.2	AA	3.0	R	7	8	6	7			LO001
1996 09 19.82		M	5.1	S	8.0	B		10	20	6/			LEH
1996 09 24.05		S	5.9	AC	3.5	B		7	10	S6			MOR03
1996 09 26.80		S	5.5	AA	6.3	B		9	10	5			DIN01
1996 09 27.80		M	5.0	S	5.0	B		10	20	5			LEH
1996 09 28.77		S	4.9	AA	8.0	B		20	9	6			BAR
1996 09 30.82		M	5.0	S	5.0	B		10	20	5			LEH
1996 10 01.74		S	6.0	AA	6.3	R	13	52	15	4	2.6	95	KOS
1996 10 01.77		S	6.2	AA	6.0	B		20	6	6/	0.23	102	CSU
1996 10 02.02		S	5.7	AC	3.5	B		7	7.5	S5	0.38	95	MOR03
1996 10 02.82		S	5.0	AA	6.3	B		9	15	6	0.58	95	DIN01
1996 10 03.72		K	5.7	AA	3.0	B		8	15	5			SEM
1996 10 03.75		S	4.7	AA	8.0	B		20	11	5	0.30	30	BAR
1996 10 03.77		M	5.3	S	8.0	B		10	21	5/	1.0	75	LEH
1996 10 03.77		S	6.3	AA	9.0	R	8	30	12	6			LO001
1996 10 04.75		S	6.0	AA	6.0	B		20	6	5/	0.23	102	CSU
1996 10 05.97		B	5.7	AC	5.0	B	4	7	12	4	24 m	90	NOW
1996 10 07.01		S	5.8	AC	3.5	B		7	7	S6	0.33	95	MOR03

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.	
1996 10 07.76		S	6.0	AA	6.0	B		20	6	5			CSU	
1996 10 08.73		K	5.6	AA	11.0	B		20	7	6	1		SEM	
1996 10 08.81		S	4.8	AA	6.3	B		9	15	6/	0.67	110	DIN01	
1996 10 11.00		S	5.7	AC	3.5	B		7	10	S5	0.33	95	MOR03	
1996 10 11.74		S	6.0	AA	6.0	B		20	6	5	0.23	102	CSU	
1996 10 11.75		M	5.2	S	8.0	B		10	20	5/	50	m	80	LEH
1996 10 12.05		B	6.0	AC	10.0	B	4	20	12	5	35	m	90	NOW
1996 10 12.74		M	5.2	S	8.0	B		10	14	5/	30	m	80	LEH
1996 10 12.76		S	5.2	AA	5.0	R		10	10	6				L0001
1996 10 13.71		S	5.7	AA	5.0	B		7	23	4	2.6	90	KOS	
1996 10 13.74		B	5.8	AA	3.0	B		8	14	4				SER
1996 10 13.77		S	5.3	AA	5.0	R		10	15	6				L0001
1996 10 14.73		S	5.6	AA	6.3	R	13	52	18	S5	3.1	90	KOS	
1996 10 14.74		S	5.8	AA	6.0	B		20	6	5	1.25	62	CSU	
1996 10 14.82		M	5.2	S	8.0	B		10	14	6				LEH
1996 10 15.00		S	5.7	AC	3.5	B		7	7	S6	0.32	95	MOR03	
1996 10 15.06		B	5.5	A	5.0	B		7		6				SIM01
1996 10 15.06		B	6.0	A	5.0	B		7		6				SIM
1996 10 15.78		S	5.8	AA	6.0	B		20	6	5				CSU
1996 10 15.81		S	4.8	AA	6.3	B		9	12	7	0.50	100	DIN01	
1996 10 17.87		S	5.3	AA	5.0	R		10	6.6	6				L0001
1996 10 19.75		S	4.7	AA	8.0	B		20	8	6				BAR
1996 10 21.79		S	5.0	AA	6.3	B		9	10	7	0.33	80	DIN01	
1996 10 26.73		S	5.8	AA	6.3	R	13	52	12	S5	1.0	85	KOS	
1996 10 28.68		S	5.5	AA	7	R	4	10	&15	6				NEV
1996 10 28.81		S	5.0	AA	6.3	B		9	10	7	0.42	80	DIN01	
1996 10 29.78		S	6.4	AA	5.0	B		10	4.8	4	0.24	94	ABB	
1996 10 29.88		S	5.3	AA	10.0	B		14	14	6				L0001
1996 10 30.72		S	5.3	AA	6.3	R	13	52	24	6	3.0	85	KOS	
1996 10 30.72		S	5.4	AA	6.0	B		20	6	5	3	109	CSU	
1996 11 01.76		S	4.9	AA	5.0	B		10	10	7/	1.3	81	HAV	
1996 11 01.77		S	4.8	SC	5.0	B		7	15	6	1.0	75	OKS	
1996 11 02.98		S	5.6	AC	3.5	B		7	8	S6	0.27	80	MOR03	
1996 11 04.69		S	5.1	AA	6.3	R	13	52	25	6	4.3	85	KOS	
1996 11 04.77		S	4.5	SC	5.0	B		7	13	7	1.2	80	OKS	
1996 11 05.70		S	5.1	AA	6.3	R	13	52	20	6	4.5	83	KOS	
1996 11 05.78		S	5.5	AA	6.3	B		9	8	7	0.42	80	DIN01	
1996 11 06.70		S	5.3	AA	6.0	B		20	8	5/	0.60	61	CSU	
1996 11 06.74		S	4.8	AA	5.0	R		10	6	7	0.5	297	L0001	
1996 11 07.78		S	5.5	AA	6.3	B		9	8	7	0.33	70	DIN01	
1996 11 08.68		S	5.0	AA	6.3	R	13	52	20	6	5	80	KOS	
1996 11 08.70		S	5.3	AA	6.0	B		20	10	s5	3	79	CSU	
1996 11 08.77		S	4.8	AA	5.0	R		10	6	7	0.5			L0001
1996 11 08.77	a	S	4.5	SC	5.0	B		7	10	5/				OKS
1996 11 09.69		S	4.9	AA	6.3	R	13	52	20	6	5	75	KOS	
1996 11 09.72		S	5.3	AA	6.0	B		20	10	s5	3	79	CSU	
1996 11 10.98		S	5.3	AC	3.5	B		7	6.5	S5	0.32	85	MOR03	
1996 11 11.70		S	4.8	AA	6.3	R	13	52	20	6	6	70	KOS	
1996 11 12.71		S	4.8	AA	6.3	R	13	52	20	6	6.5	65	KOS	
1996 11 12.72		S	5.1	AA	6.0	B		20	14	s6	7	85	CSU	
1996 11 12.98		S	5.3	AC	3.5	B		7	7	S6	0.38	80	MOR03	
1996 11 13.75	a	S	4.3	SC	5.0	B		7	8	6				OKS
1996 11 14.71		S	5.3	AA	5.0	B		10		5				L0001
1996 11 16.77		S	5.1	AA	6.3	B		9	10	7	0.42	65	DIN01	
1996 11 17.76		S	4.7	AA	20	T	10	60	6	5/	0.17	35	OWE	
1996 11 22.77		S	4.7	AA	6.3	B		9	5	7				DIN01
1996 11 23.74		S	5.3	AA	5.0	B		10	4.2	7	0.21	72	ABB	
1996 11 24.71		S	4.2	AA	8.0	B		20	9	7	0.25	45	BAR	
1996 11 24.71		S	4.5	AA	5.0	B		12	4	1				GIU
1996 11 27.97		M	5.1	AC	3.5	B		7	7	S5	0.50	75	MOR03	
1996 11 28.74		S	5.5	AA	5.0	B		10	5.3	7	0.85	86	ABB	
1996 11 28.78		S	4.8	AA	6.3	B		9	10	7/	0.90	55	DIN01	
1996 11 28.96		M	5.0	AC	3.5	B		7	7.5	S5	0.37	70	MOR03	
1996 11 30.72		S	5.3	AA	10.0	B		14		7				L0001
1996 12 01.71		S	4.2	AA	8.0	B		20	9	7	0.5	50	BAR	

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 01.72		B	4.6	AA	0.0	E		1					VAN06
1996 12 01.72		S	4.5	AA	5.0	B		12	4	2	0.33		GIU
1996 12 01.74		S	4.2:	SC	5.0	B		7	6	7	0.75	45	OKS
1996 12 02.77		S	4.8	AA	6.3	B		9	8	8	0.92	55	DIN01
1996 12 04.74		S	4.7	AA	5.0	B		10	5.3	6	0.67	84	ABB
1996 12 04.75		S	3.9	SP	5.0	B		10	20	0	1	80	KIE01
1996 12 05.72		S	4.3	AA	5.0	B		12	4	2			GIU
1996 12 05.75		S	3.9	SP	5.0	B		10	20	0	1	80	KIE01
1996 12 08.71		S	5.2	AA	10.0	B		14	4	6	1.5		LO001
1996 12 09.78		S	4.8	AA	6.3	B		9	10	8	0.67	60	DIN01
1996 12 11.72		B	4.4	S	5.0	B		7	8	6	1.5		FAU
1996 12 13.74		S	3.5	AA	20	T	10	60	9	5/	0.30	18	OWE
1996 12 14.70		S	3.8	AA	8.0	B		20	6	7/	0.5	40	BAR
1996 12 16.68		S	4.7	AA	6.3	R	13	52	15	S7	5	70	KOS
1996 12 27.69	a	S	3.5:	SC	5.0	B		10	16	6			OKS
1996 12 27.71		S	3.5	AA	8.0	B		20	6	6			BAR
1996 12 27.72		S	4.7	S	7.0	B		16	6	3	0.25	62	TAY
1996 12 28.71		S	4.9	AA	10.0	B		14	4	7	1.0		LO001
1996 12 31.74		S	2.9	AA	20	T	10	50	9	5	0.30	34	OWE
1997 01 01.73	!	S	3.7	AA	5.0	B		7	9	5	0.35	40	SHA02
1997 01 02.73	!	M	3.7	AA	5.0	B		7	9	5	1	32	SHA02
1997 01 07.26		S	3.7	AA	5.0	B		8	40	6	1.20	30	BEA
1997 01 09.43		S	2.5	SC	5.0	B		10	10	s1	0.8	50	DID
1997 01 09.48		B	3.1	AC	5.0	B	4	7	10	6	2	315	NOW
1997 01 11.25		S	3.2	AA	8.0	B		20	10	7	0.5	35	BAR
1997 01 12.46		S	2.5	SC	25.4	L	4	46	45	d2	0.5	20	DID
1997 01 13.25		S	3.6	AA	5.0	B		10		7			LO001
1997 01 13.43		S	2.5	SC	25.4	L	4	46	20	d2	0.5	10	DID
1997 01 14.24	!	S	3.6	AA	5.0	B		7	9	6	0.9	350	SHA02
1997 01 14.25		S	3.6	AA	5.0	B		10		7	0.5		LO001
1997 01 14.27	!	S	4.0	AA	0.7	E		1	12	7			SHA02
1997 01 14.28		S	3.1	AA	5.0	B		8	40	6	1	30	BEA
1997 01 15.23		S	3.5	AA	5.0	B		10		8			LO001
1997 01 15.43		S	2.5	SC	25.4	L	4	46	20	d2	0.3	350	DID
1997 01 16.24		S	3.6	AA	5.0	B		10		8			LO001
1997 01 16.25	!	S	3.1	AA	5.0	B		7	8	7	1.8	330	SHA02
1997 01 16.25	!	S	3.4	AA	0.8	E		1	6	8	0.25	340	SHA02
1997 01 17.23		S	3.0	AA	8.0	B		20	9	8	1	0	BAR
1997 01 19.28		S	3.1	AA	5.0	B		8	40	6	1	350	BEA
1997 01 19.43		B	3.0	AC	6.3	B	5	9	12	6	3	270	NOW
1997 01 19.44		S	2.5	SC	25.4	L	4	46	20	D2	2	328	DID
1997 01 21.25		S	3.0	AA	5.0	B		8	40	7	1	350	BEA
1997 01 21.45		B	3.6	A	5.0	B		7		5	0.5		SIM
1997 01 23.24		S	3.7	AA	5.0	B		10		9	0.5		LO001
1997 01 25.24		S	2.9	AA	5.0	B		7	4	7	0.6	333	SHA02
1997 01 25.25		S	3.0	AA	0.7	E		1	5	8			SHA02
1997 01 26.25		S	2.7	AA	5.0	B		7	4	7	1	330	SHA02
1997 01 26.25		S	3.0	AA	0.7	E		1	5	8			SHA02
1997 01 27.22		S	2.6:	S	5.0	B		10	10	6	0.5	315	LUE
1997 01 28.18		S	2.5	SP	3.5	B		7	5	D7			WES02
1997 01 28.25		S	2.4	AA	5.0	B		7	5	6	1	350	SHA02
1997 01 28.26		S	2.6	AA	5.0	B		8	45	7	1.3	320	BEA
1997 01 29.22		S	2.5	AA	5.0	B		7	11	8	1	345	BAR
1997 01 29.43		S	2.0	SC	25.4	L	4	46	20	D5			DID
1997 01 31.25		M	2.4	S	5.0	B		10	8	8	1	330	LUE
1997 01 31.25	G	S	2.4	S	0.8	E		1	8	8			LUE
1997 02 01.20	G	S	2.2	S	0.8	E		1	13	7	1	315	LUE
1997 02 01.21		S	2.5	SP	3.5	B		7	5	D8	0.7	343	WES02
1997 02 02.20		M	2.1:	S	6.0	B		20	10	7	3.5	318	LUE
1997 02 02.20	G	S	2.1	S	0.8	E		1	10	8	2	318	LUE
1997 02 02.21		S	2.3	SP	3.5	B		7	5	D8	0.9	330	WES02
1997 02 02.23	a	I	2.2	AA	0.8	E		1					HAS02
1997 02 02.24		S	3.0	AA	5.0	B		10		8	2	335	LO001
1997 02 02.44	a	B	2.4	TI	5.0	B		10	7	7/	3.8	317	BOR
1997 02 02.44	a	B	2.4	TI	5.0	N		1					BOR

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 02 02.44	a	I	2.4	TI	0.0	E		1	18	6/			BOR
1997 02 03.26		S	2.2	AA	5	R		8	5	6	0.83	347	OWE
1997 02 05.18		S	2.4	SP	3.5	B		7	5	D8	1.3	322	WES02
1997 02 06.20		S	2.4	SP	3.5	B		7	5	D8	2.3	310	WES02
1997 02 07.20		S	2.2	AA	5.0	B		7	11	8	1	320	BAR
1997 02 07.44			1.7	SC	0.0	E		1		S7			DID
1997 02 08.20		M	1.9	S	5.0	B		10	9	8	4	317	LUE
1997 02 08.20	G	S	1.9	S	0.8	E		1	10	8	4	317	LUE
1997 02 08.23	G		2.3	SC	0.7	E		1	12	D7	2	318	HEN
1997 02 08.23	a	I	1.9	AA	0.8	E		1					HAS02
1997 02 08.25		S	1.9	AA	5	R		8	5	6	0.25	358	OWE
1997 02 08.42		B	2.3	AC	10.0	B	4	20	45	9	10	270	NOW
1997 02 09.22	a	I	1.6	AA	0.8	E		1					HAS02
1997 02 09.86		M	1.7	AA	8.0	B		11	20	7			MOR06
1997 02 10.21	a	I	1.8	AA	0.8	E		1					HAS02
1997 02 10.22		S	1.9	AA	5.0	B		7	12	8	1.1	310	BAR
1997 02 10.22		S	2.2	AA		A		0		8	2		LO001
1997 02 10.43	Ga	B	2.1	TI	0.0	E		1					BOR
1997 02 10.43	a	B	2.1	TI	5.0	B		10	10	8	6.5	315	BOR
1997 02 10.43	a	B	2.1	TI	5.0	N		1					BOR
1997 02 10.43	a	I	2.1	TI	0.0	E		1	24	7	2	315	BOR
1997 02 10.44		B	1.1	Y	0.0	E		1					MAR03
1997 02 10.48			1.7	SC	0.0	E		1		d7/			DID
1997 02 11.18		S	1.9	AA		A		0		8	2	315	LO001
1997 02 11.23	G		1.8	SC	0.7	E		1	12	D7	3	305	HEN
1997 02 12.46		A	1.8	A	0.0	E		1		7	1		SIM
1997 02 13.21	a	I	1.5	AA	0.8	E		1					HAS02
1997 02 13.43			1.7	SC	0.0	E		1		d7/			DID
1997 02 13.43	a	B	1.7	TI	5.0	B		10	8	8	7.7	315	BOR
1997 02 13.43	Ga	B	1.8	TI	0.0	E		1					BOR
1997 02 13.43	a	B	1.8	TI	5.0	N		1					BOR
1997 02 13.43	a	I	1.8	TI	0.0	E		1	17	8			BOR
1997 02 14.17		S	1.7	AA		A		0		9	4		LO001
1997 02 14.19	G		1.6	SC	0.7	E		1	15	D7	5	310	HEN
1997 02 14.19		S	1.6	AA	5.0	B		7	13	8	1.5	300	BAR
1997 02 14.23	a	I	1.4	AA	0.8	E		1					HAS02
1997 02 15.19		S	1.5	S	5.0	B		10	9	8	5	311	LUE
1997 02 15.22	G		1.5	SC	0.7	E		1	15	D7	5	310	HEN
1997 02 15.26		S	1.5	AA	5	R		8	8	6	1.3	323	OWE
1997 02 15.49	G	S	1.5	SC	0.0	E		1					DIL
1997 02 16.17		B	1.4	S	0.8	E		1	10	8	8	310	LUE
1997 02 16.19		S	1.4	AA	0.0	E		1	15	7	2.5	305	BAR
1997 02 16.40		B	1.7	AC	6.3	B	5	9	0.75	9	15	270	NOW
1997 02 16.42	a	I	1.6	TI	0.0	E		1	24	7/			BOR
1997 02 16.43	Ga	B	1.5	TI	0.0	E		1					BOR
1997 02 16.43	a	B	1.6	TI	5.0	B		10	9	8	7.5	315	BOR
1997 02 16.43	a	B	1.6	TI	5.0	N		1					BOR
1997 02 16.44		B	0.9	Y	0.0	E		1					MAR03
1997 02 17.23	a	I	1.4	AA	0.8	E		1					HAS02
1997 02 17.39		I	1.1	OH	0.0	E		1					FEI01
1997 02 18.18	a	I	1.1	AA	0.8	E		1					HAS02
1997 02 19.18		B	1.4	SC	0.0	E		1	30	6			BIV
1997 02 19.22		S	1.5	AA		A		0		9			LO001
1997 02 19.22	a	I	1.1	AA	0.8	E		1					HAS02
1997 02 19.47			1.6	A	0.0	E		1	8	7	2		SIM
1997 02 20.18		S	1.5	AA		A		0		9			LO001
1997 02 20.21		B	1.5	SC	0.0	E		1	30	7			BIV
1997 02 20.22	G		1.1	SC	0.7	E		1	20	D7	4	310	HEN
1997 02 20.25		S	1.4	AA	5.0	B		7	8	6	1.2	334	OWE
1997 02 20.41	Ga	B	1.2	TI	0.0	E		1					BOR
1997 02 20.41	a	B	1.4	TI	5.0	B		10	8	8	4.3	313	BOR
1997 02 20.41	a	B	1.5	TI	5.0	N		1					BOR
1997 02 20.41	a	I	1.4	TI	0.0	E		1	21	8/	3	313	BOR
1997 02 20.42		B	0.8	Y	0.0	E		1					MAR03
1997 02 21.74	G	S	1.1	S	0.8	E		1	15	5			LUE

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 02 22.17		S	1.3	AA		A		0		8			L0001
1997 02 22.49	G	S	0.9	SC	0.0	E		1					DIL
1997 02 23.20		S	1.1	AA	5.0	B		7	15	8	3	300	BAR
1997 02 23.21		S	1.1	AA	0.0	E		1	20	7	5	300	BAR
1997 02 23.23		B	1.3	SC	0.0	E		1	30	8			BIV
1997 02 23.35			1.0	SC	0.0	E		1		d7/			DID
1997 02 23.41		I	0.8	OH	0.0	E		1					FEI01
1997 02 23.42	Ga	B	1.2	TI	0.0	E		1					BOR
1997 02 23.42	a	B	1.3	TI	5.0	N		1					BOR
1997 02 23.42	a	B	1.4	TI	5.0	B		10	9	8/	3.8	304	BOR
1997 02 23.42	a	I	1.2	TI	0.0	E		1		8/	2	304	BOR
1997 02 24.23	G		0.8	SC	0.7	E		1	20	D7	3	315	HEN
1997 02 24.51	!	J	0.9	SC	25.4	T	4		&60	D6/	290.4s	284	ROQ
1997 02 25.21	G	S	0.9	S	0.8	E		1	10	8	8	320	LUE
1997 02 25.23		B	0.7	S	0.0	E		1	20	8			TRI
1997 02 25.23		B	0.8	S	5.0	B		7	25	7	8	330	TRI
1997 02 25.35			0.7	SC	0.0	E		1		d7/			DID
1997 02 25.42		I	0.7	OH	0.0	E		1					FEI01
1997 02 25.42	Ga	B	1.0	TI	0.0	E		1					BOR
1997 02 25.42	a	B	1.0	TI	5.0	B		10	8	8/	5.6	318	BOR
1997 02 25.42	a	B	1.2	TI	5.0	N		1					BOR
1997 02 25.42	a	I	1.1	TI	0.0	E		1	15	9	4	318	BOR
1997 02 25.75	G	S	1.0	S	0.8	E		1	10	7	2	320	LUE
1997 02 26.19		B	1.1	SC	0.0	E		1	25	7			BIV
1997 02 26.19		S	1.3	AA		A		0		8	4.5	339	L0001
1997 02 26.23		B	1.2	SC	0.0	E		1	25	7			BIV
1997 02 26.24		B	0.6	S	0.0	E		1	15	8			TRI
1997 02 26.24		B	0.7	S	5.0	B		7	20	7	6	330	TRI
1997 02 26.42					5.0	B		7	10	8/	6.8	318	BOR
1997 02 26.42	Ga	B	1.0	TI	0.0	E		1					BOR
1997 02 26.42	a	B	1.1	TI	5.0	N		1					BOR
1997 02 26.42	a	I	1.0	TI	0.0	E		1	20	9			BOR
1997 02 27.16	G	S	0.7	S	0.8	E		1	10	7	5	319	LUE
1997 02 27.18		B	1.0	SC	0.0	E		1	25	7			BIV
1997 02 27.21	G		1.0	SC	0.7	E		1		D7	1	315	HEN
1997 02 27.22	!	S	1.6	AA	5.0	B		7	30	8	1	295	COL03
1997 02 27.24		B	0.6	S	0.0	E		1	15	8			TRI
1997 02 27.24		B	0.8	S	5.0	B		7	25	7	8	330	TRI
1997 02 28.18		B	0.9	SC	0.0	E		1	20	7			BIV
1997 02 28.21		S	0.8	AA	5.0	B		10	35	6	4	290	FOG
1997 02 28.21		S	0.9	AA	0.0	E		1	36	6	3.2	290	FOG
1997 02 28.22		S	1.7	AA	0.7	E		1		8	0.5		COL03
1997 02 28.35			0.7	SC	0.0	E		1		d7/			DID
1997 03 01.16	*	S	0.0	AA	0.0	E		1		S9	30	337	KOS
1997 03 01.18		M	0.6	YG	0.7	E		1		8	6.5		GRA04
1997 03 01.19		N	2.7	YG	5.0	B		10	12	7/	10	323	GRA04
1997 03 01.21	G		0.6	SC	0.7	E		1		D7	5	310	HEN
1997 03 01.21		S	0.9	AA		A		0		8	3		L0001
1997 03 01.24		S	0.7	AA	5	R		8		6/	2	304	OWE
1997 03 01.84	a	M	-0.3	AA	0.0	E		1					TSU02
1997 03 01.84	*a	M	-0.3	AA	0.0	E		1			3.0	330	TSU02
1997 03 01.86		M	0.5	YG	3.0	B		8	15	7	2	300	KAT01
1997 03 02.14		S	0.5	AA	5.0	B		10	50	7	3.8	330	FOG
1997 03 02.16	*	S	-0.1	AA	0.0	E		1		S9	36	340	KOS
1997 03 02.19		B	0.8	SC	0.0	E		1	20	8	1.8	320	BIV
1997 03 02.19		S	0.4	AA		A		0		8	5		L0001
1997 03 02.19		S	0.5	AA	5.0	B		10		9	6		L0001
1997 03 02.24		B	0.4	S	0.0	E		1	15	8			TRI
1997 03 02.24		B	0.6	S	5.0	B		7	25	7	7	340	TRI
1997 03 02.24		O	0.4:	Y	0.0	E		1	10		2		ZEX
1997 03 03.16	G	S	0.4	S	0.8	E		1	17	7	16	329	LUE
1997 03 03.16	*	S	-0.3	AA	0.0	E		1		S9	40	315	KOS
1997 03 03.18					5.0	B		7	16	8	4.3	299	BAR
1997 03 03.18		S	0.5	AA	0.0	E		1					BAR
1997 03 03.21		S	0.7	AA	5	R		8	7	6/	3	307	OWE

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 04.11	!	M	0.1	YG	0.7	E		1		8	5.5		GRA04
1997 03 04.11	!	N	2.4	YG	5.0	B		10	14	7/	11	326	GRA04
1997 03 04.15	*	S	-0.3	AA	0.0	E		1		S9	40	317	KOS
1997 03 04.16	G	S	0.3	S	0.8	E		1	15	8	5	330	LUE
1997 03 04.77	G	S	0.5:	S	0.8	E		1	10	6	5	290	LUE
1997 03 04.82	*w	B	0.3	YG	0.0	E		1	&15	7	10	320	MIY01
1997 03 04.82	*w	B	0.3:	YG	5.0	B		7	10	S7	10	320	MIY01
1997 03 04.83		S	0.2	S	15.0	R	5	25	25	7	6		NAG02
1997 03 05.11					5.0	B		10	15	7/	4.5	325	GRA04
1997 03 05.11	!	M	0.4:	YG	0.7	E		1		7/	3		GRA04
1997 03 05.15	*	S	-0.4	AA	0.0	E		1		S9	42	330	KOS
1997 03 05.16	a	M	0.3	S	5	R		1	25	8	20	310	PLS
1997 03 05.17	G	S	0.3	S	0.8	E		1	15	7	5	320	LUE
1997 03 05.23		B	0.3	S	5.0	B		7	25	7	6	340	TRI
1997 03 05.24		B	0.2	S	0.0	E		1	15	8			TRI
1997 03 05.83	*w	B	0.4	YG	0.0	E		1	&10	7	15	315	MIY01
1997 03 05.83	*w	B	0.4:	YG	5.0	B		7	10	S7	10	315	MIY01
1997 03 06.11	Gw		0.4	AA	0.0	E		1	20	9	13	326	NEV
1997 03 06.15	*	S	-0.5	AA	0.0	E		1		S9		325	KOS
1997 03 06.18	G		0.5	SC	0.7	E		1		D7	5	320	HEN
1997 03 06.22		S	0.6	AA	5	R		8	10	6/	3	312	OWE
1997 03 06.24		B	0.2	S	0.0	E		1	15	8			TRI
1997 03 06.24		B	0.3	S	5.0	B		7	25	7	4	340	TRI
1997 03 06.47			1.2	A	0.0	E		1	10	7	1		SIM
1997 03 06.75	G	S	0.1	S	0.8	E		1	15	7	5	330	LUE
1997 03 06.83	!	M	-0.1	YG	0.7	E		1		8	>4		GRA04
1997 03 06.83	w	B	0.3	YG	0.0	E		1	&10	7	15	330	MIY01
1997 03 06.83	w	B	0.3:	YG	5.0	B		7	10	S7	10	330	MIY01
1997 03 06.87	!	N	2.5	YG	5.0	B		10	15	7/	11	326	GRA04
1997 03 07.16	G	S	0.0	S	0.8	E		1	17	7	8	330	LUE
1997 03 07.22		B	0.6	SC	0.0	E		1					BIV
1997 03 07.23		S	0.3	AA		A		0		8			L0001
1997 03 07.39					5.0	B		10	13	8/	6.6	326	BOR
1997 03 07.39	a	B	0.3	TI	5.0	N		1					BOR
1997 03 07.39	Ga	B	0.4	TI	0.0	E		1					BOR
1997 03 07.39	a	I	0.4	TI	0.0	E		1	12	9	9.0	326	BOR
1997 03 07.42			0.0	SC	0.0	E		1		D7/			DID
1997 03 07.80		B	0.6	SC	0.0	E		1	25	7	2.0	315	BIV
1997 03 07.82	*a	S	0.1	AA	0.0	E		1	&15	7/	10	330	NAG08
1997 03 07.83		M	0.3	YG	3.0	B		8	15	7	5	310	KAT01
1997 03 07.83		S	0.0	S	15.0	R	5	25	26	7/	10		NAG02
1997 03 08.11	Gw		0.5	AA	0.0	E		1	20	9	13	329	NEV
1997 03 08.13		S	0.1	AA		A		0		9	10	324	L0001
1997 03 08.14	*	S	-0.8	AA	0.0	E		1		S9		312	KOS
1997 03 08.15	a	M	-0.1	S	5	R		1	40	7/	18	325	HOR02
1997 03 08.16	a	M	-0.2	S	5	R		1	30	7/	15	320	PLS
1997 03 08.20		S	-0.1	AA	0.0	E		1	16	8	5	306	BAR
1997 03 08.21		B	0.4	SC	0.0	E		1	30	7	5	310	BIV
1997 03 08.23		B	0.1	S	5.0	B		7	20	7	9	350	TRI
1997 03 08.82	w	B	0.1	YG	0.0	E		1	&10	7	15	325	MIY01
1997 03 08.82	w	B	0.5:	YG	5.0	B		7	10	S7	14	325	MIY01
1997 03 08.83		M	0.3	YG	3.0	B		8	15	7	5	310	KAT01
1997 03 08.85	a	B	0.0	AA	0.0	E		1			5		YOS02
1997 03 08.86	!	M	-0.3	YG	0.7	E		1		8	12		GRA04
1997 03 08.89	!	N	2.3	YG	5.0	B		10	15	7/	13	325	GRA04
1997 03 09.14	G	S	0.0	S	0.8	E		1	15	8	10	340	LUE
1997 03 09.15	a	M	-0.2	S	5	R		1	35	7/	14	330	HOR02
1997 03 09.21		B	0.3	SC	0.0	E		1	30	7	7	310	BIV
1997 03 09.23		B	0.0	S	5.0	B		7	20	7	13	355	TRI
1997 03 09.35		B	0.4	AC	8.0	B	4	15	0.75	8	17.5	250	NOW
1997 03 09.39	a	B	0.0	TI	5.0	B		10	13	9	9.5	326	BOR
1997 03 09.39	Ga	B	0.2	TI	0.0	E		1					BOR
1997 03 09.39	a	B	0.2	TI	5.0	N		1					BOR
1997 03 09.39	a	I	0.6	TI	0.0	E		1	15	9	10.5	326	BOR
1997 03 09.74	G		0.5	AA	0.0	E		1	20	9	12	325	NEV

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 09.77	Ga		-0.3	AA	0.8	E		1					HAS02
1997 03 09.77	a	I	-0.5	AA	0.8	E		1					HAS02
1997 03 09.82	*a	S	-0.1	AA	0.0	E		1	&15	7/	11	330	NAG08
1997 03 09.83		M	0.2	YG	3.0	B		8	15	7	5.0	310	KAT01
1997 03 10.00	!	M	0.0	YG	0.7	E		1		8	5		GRA04
1997 03 10.00	!	N	2.2	YG	5.0	B		10	12	8	6.5	333	GRA04
1997 03 10.11	Gw		0.5	AA	0.0	E		1	20	9	12	325	NEV
1997 03 10.14	*	S	-1.0	AA	0.0	E		1		S9		340	KOS
1997 03 10.15	G	S	0.0	S	0.8	E		1	15	7	16	337	LUE
1997 03 10.18	Ga		0.0	AA	0.8	E		1					HAS02
1997 03 10.18	a	I	-0.2	AA	0.8	E		1					HAS02
1997 03 10.2		S	0.1	AA		A		0		9	6		LO001
1997 03 10.20		S	-0.2	AA	0.0	E		1	12	8	5	313	BAR
1997 03 10.23		B	0.3	SC	0.0	E		1	30	7	8	310	BIV
1997 03 10.23		B	-0.2	S	5.0	B		7	20	7	5	335	TRI
1997 03 10.23		B	-0.3	S	0.0	E		1	25	8	5	335	TRI
1997 03 10.81		B	0.4	SC	0.0	E		1					BIV
1997 03 10.83					5.0	B		7	10	S7	14	320	MIY01
1997 03 10.83	!	M	-0.1	YG	0.7	E		1		8	13	328	GRA04
1997 03 10.83	!	N	2.0	YG	5.0	B		10	15	7/	13	330	GRA04
1997 03 10.83	w	B	0.1	YG	0.0	E		1	&10	7	15	320	MIY01
1997 03 10.99					5.0	B		10	8	9	3.2	313	BOR
1997 03 10.99	Ga	B	0.2	TI	0.0	E		1					BOR
1997 03 10.99	a	I	0.2	TI	0.0	E		1					BOR
1997 03 11.14	*	S	-1.1	AA	0.0	E		1		S9		352	KOS
1997 03 11.18		B	0.3	SC	0.0	E		1	30	7	6	315	BIV
1997 03 11.21		B	-0.3	S	0.0	E		1	25	8	3	330	TRI
1997 03 11.39			-0.1	SC	0.0	E		1		D7/			DID
1997 03 11.81	*a	S	-0.1	AA	0.0	E		1	&15	7/	5	300	NAG08
1997 03 11.82		B			5.0	B		7	10	S7	15	340	MIY01
1997 03 11.82	w	B	0.3	YG	0.0	E		1	&10	7	15	340	MIY01
1997 03 11.83		S	-0.1	S	15.0	R	5	25	28	7/	12		NAG02
1997 03 11.85		M	0.0	YG	3.0	B		8	10	8	3.0	310	KAT01
1997 03 11.87	!	M	-0.3	YG	0.7	E		1	&12	8	13	336	GRA04
1997 03 11.87	!	N	1.9	YG	5.0	B		10	15	7/	11	331	GRA04
1997 03 11.94		N	5.0	YG	20.3	T	10	123					GRA04
1997 03 12.10	Ga		0.3	AA	0.0	E		1	18	9	12	335	NEV
1997 03 12.20		B	0.2	SC	0.0	E		1	30	7	8	320	BIV
1997 03 12.23		B	-0.2	S	5.0	B		7	20	7	13	350	TRI
1997 03 12.23		B	-0.3	S	0.0	E		1	25	8	5	0	TRI
1997 03 12.40	a	B	-0.1	TI	5.0	N		1					BOR
1997 03 12.40	Ga	B	-0.2	TI	0.0	E		1					BOR
1997 03 12.40	a	I	0.2	TI	0.0	E		1	18	9	9.1	331	BOR
1997 03 12.42			-0.1	SC	0.0	E		1		D7/			DID
1997 03 12.75	Ga		0.3	AA	0.0	E		1	17	9			NEV
1997 03 12.81					5.0	B		7	10	S7	10	310	MIY01
1997 03 12.81					8.0	B		11	10	S7	12	310	MIY01
1997 03 12.81	w	B	0.2	YG	0.0	E		1	&10	7	15	310	MIY01
1997 03 12.83					2.4	B		10	15	S7	4	320	YOS04
1997 03 12.83	a	B	0.4	YG	0.0	E		1	15	S5	3	310	YOS04
1997 03 12.85	G		0.3	SC	0.7	E		1		D7	7	320	HEN
1997 03 13.00					5.0	B		7	11	8/	5.0	323	BOR
1997 03 13.00	Ga	B	0.3	TI	0.0	E		1					BOR
1997 03 13.00	a	I	0.3	TI	0.0	E		1		9	2	323	BOR
1997 03 13.11	Ga		0.3	AA	0.0	E		1	17	9	12	335	NEV
1997 03 13.20	G		0.2	SC	0.7	E		1		D7	7	340	HEN
1997 03 13.22		B	-0.4	S	0.0	E		1	25	8	8	340	TRI
1997 03 13.23		B	-0.3	S	5.0	B		7	20	7	15	340	TRI
1997 03 13.39			-0.1	SC	0.0	E		1		D7/			DID
1997 03 13.39	a	B	-0.1	TI	5.0	N		1					BOR
1997 03 13.39	Ga	B	-0.3	TI	0.0	E		1					BOR
1997 03 13.39	a	I	0.1	TI	0.0	E		1	15	9	16.5	338	BOR
1997 03 13.76	G		0.0	SC	0.7	E		1		D7	2		HEN
1997 03 14.23		B	-0.3	S	5.0	B		7	20	7	17	350	TRI
1997 03 14.23		B	-0.5	S	0.0	E		1	25	8	10	350	TRI

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 14.79		B	-0.1	SC	0.0	E		1	20	8			BIV
1997 03 14.81	G!		-0.8	AE	0.7	E		1	30	6			MCK
1997 03 15.05	!	N	1.5:	YG	5.0	B		10	15				GRA04
1997 03 15.09	Gw		0.2	AA	0.0	E		1	14	9	11	341	NEV
1997 03 15.11		N	5.1	YG	20.3	T	10	123			10	336	GRA04
1997 03 15.13	!	B	-0.4	YG	0.7	E		1		8/	16	340	GRA04
1997 03 15.17		B	0.0	SC	0.0	E		1	20	7	9	320	BIV
1997 03 15.18		B	-0.4	S	5.0	B		7	25	7	15	310	TRI
1997 03 15.19		B	-0.5	S	0.0	E		1	30	7	12	310	TRI
1997 03 15.77	G		0.0	SC	0.7	E		1		D7		330	HEN
1997 03 15.79	G!		-0.8	AE	0.7	E		1	30	8	6		MCK
1997 03 16.00					5.0	B		7	10	8/	5.0	324	BOR
1997 03 16.00	Ga	B	0.1	TI	0.0	E		1					BOR
1997 03 16.00	a	I	0.1	TI	0.0	E		1		9			BOR
1997 03 16.12	G	S	-0.3	S	0.8	E		1	15	8	10	350	LUE
1997 03 16.18		B	-0.5	S	0.0	E		1	30	8	10	320	TRI
1997 03 16.18		B	-0.5	S	5.0	B		7	25	7	15	320	TRI
1997 03 16.19		S	-0.5	AA	0.0	E		1	22	8	7	324	BAR
1997 03 16.39					5.0	B		7	13	8/	11.5	336	BOR
1997 03 16.39			-0.1	SC	0.0	E		1		d8			DID
1997 03 16.39	a	B	-0.1	TI	5.0	N		1					BOR
1997 03 16.39	Ga	B	-0.3	TI	0.0	E		1					BOR
1997 03 16.39	a	I	0.2	TI	0.0	E		1	14	9	16.5	336	BOR
1997 03 16.76	!	S	0.7	AA	0.7	E		1	15	8	1	325	COL03
1997 03 16.84		S	-0.2	S	15.0	R	5	25	28	7/	12		NAG02
1997 03 16.84	a	B	-0.1	AA	0.0	E		1			6		YOS02
1997 03 17.00		B	0.3	AC	5.0	B	4	7	0.75	9	7	350	NOW
1997 03 17.01					5.0	B		7	10	9	6.7	340	BOR
1997 03 17.01	a	B	0.2	TI	5.0	N		1					BOR
1997 03 17.01	Ga	B	-0.2	TI	0.0	E		1					BOR
1997 03 17.01	a	I	-0.1	TI	0.0	E		1	15	9	3	327	BOR
1997 03 17.19		B	-0.7	S	0.0	E		1	30	8	15	325	TRI
1997 03 17.20		B	-0.6	S	5.0	B		7	25	7	20	325	TRI
1997 03 17.38					5.0	B		7	10	9	5.6	346	BOR
1997 03 17.38	a	B	-0.1	TI	5.0	N		1					BOR
1997 03 17.38	Ga	B	-0.2	TI	0.0	E		1					BOR
1997 03 17.38	a	I	0.3	TI	0.0	E		1	12	9	13	346	BOR
1997 03 17.42	a	B	-0.1	Y	0.0	E		1			3		YOS02
1997 03 17.79		B	-0.2	SC	0.0	E		1	20	7			BIV
1997 03 17.81	!	S	1.0	AA	0.7	E		1	15	8	1	325	COL03
1997 03 17.81	*w	S	-0.5	AA	0.0	E		1	&15	7/	12	350	NAG08
1997 03 17.82		S	-0.3	S	15.0	R	5	25	28	7/	15		NAG02
1997 03 17.82	a	M	-0.7	AA	0.0	E		1					TSU02
1997 03 18.13	*	S	-1.5	AA	0.0	E		1		S9		353	KOS
1997 03 18.18		B	-0.8	S	0.0	E		1	35	8	15	325	TRI
1997 03 18.41		M	0.3	YG	3.0	B		8			6		KAT01
1997 03 18.73	G		0.0	AA	0.0	E		1	25	9			NEV
1997 03 18.79		B	-0.4	SC	0.0	E		1	20	7	5	320	BIV
1997 03 18.80	G		-1.1	UN	0.7	E		1		9	5		MCK
1997 03 18.81	a	S	-0.2	AA	0.0	E		1	&15	7/	3	320	NAG08
1997 03 18.83		B	-0.6	S	0.0	E		1	20	8	7	325	TRI
1997 03 19.19		B	-0.8	S	0.0	E		1	25	8	15	325	TRI
1997 03 19.77		S	0.7	AA	0.7	E		1	18	8	1.5	335	COL03
1997 03 19.79	G		-0.5	SC	0.7	E		1		D7	5	345	HEN
1997 03 19.80		B	-0.5	SC	0.0	E		1	20	7	4	330	BIV
1997 03 19.84		B	0.1	YF	0.5	E		1	15	8	9	350	ENT
1997 03 20.12	G	S	-0.3	S	0.8	E		1	15	8	12	355	LUE
1997 03 20.18		B	-0.8	S	0.0	E		1	30	8	18	330	TRI
1997 03 20.19		S	-0.8	AA	0.0	E		1	28	8	9	329	BAR
1997 03 20.22		S	-0.5	AA	5	R		8	10	7/	3	336	OWE
1997 03 20.77	!	S	-0.3	AA	0.0	E		1					ANZ
1997 03 20.78		S	0.7	AA	0.7	E		1	15	8	2	335	COL03
1997 03 20.78		S	-0.8	AA	0.0	E		1	30	8	9	333	BAR
1997 03 20.81	a	S	-0.3	AA	0.0	E		1	&15	8	8	350	NAG08
1997 03 20.82		B	-0.4	SC	0.0	E		1	20	8			BIV

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 21.01					5.0	B		7	10	8/	6.2	333	BOR
1997 03 21.01	Ga	B	-0.3	TI	0.0	E		1					BOR
1997 03 21.01	a	I	-0.3	TI	0.0	E		1		9	3	345	BOR
1997 03 21.20		O	-0.6	SC	0.7	E		1			6		ROG02
1997 03 21.77	G		0.0:	SC	0.7	E		1	12	D7	1	350	HEN
1997 03 21.8		S	-0.3	AA		A		0		9	4		L0001
1997 03 21.81		B	-0.5	SC	0.0	E		1	20	7			BIV
1997 03 21.83	G	S	-0.5	S	0.8	E		1	18	7	8	350	LUE
1997 03 21.83	!	S	0.6	AA	0.7	E		1	18	8	2	335	COL03
1997 03 22.08	&	S	-0.8	SC	0.0	E		1		8	4.5		WIL11
1997 03 22.10	G		0.0:	SC	0.7	E		1			5	350	HEN
1997 03 22.20		O	-0.6	SC	0.7	E		1			4		ROG02
1997 03 22.43		S	-0.3	S	15.0	R	5	25	20	7/	10		NAG02
1997 03 22.78	G	S	-0.5	S	0.8	E		1	20	8	8	358	LUE
1997 03 22.82		B	-0.5	SC	0.0	E		1	20	7	6	325	BIV
1997 03 22.83		S	-0.4	S	15.0	R	5	25	25	7/	10		NAG02
1997 03 23.02					5.0	B		7	10	8/	10.5	346	BOR
1997 03 23.02	a	B	0.4	TI	5.0	N		1					BOR
1997 03 23.02	Ga	B	-0.3	TI	0.0	E		1					BOR
1997 03 23.02	a	I	-0.2	TI	0.0	E		1		9	3.0	339	BOR
1997 03 23.34			-1.0	SC	0.0	E		1		D			DID
1997 03 23.80	G		0.0:	SC	0.7	E		1			5	350	HEN
1997 03 23.83	G		-1.1	UN	0.7	E		1		9	5		MCK
1997 03 24.03					5.0	B		7	9	9	10.5	357	BOR
1997 03 24.03	a	B	0.1	TI	5.0	N		1					BOR
1997 03 24.03	Ga	B	-0.3	TI	0.0	E		1					BOR
1997 03 24.03	a	I	0.0	TI	0.0	E		1		9	4	346	BOR
1997 03 24.38					5.0	B		7	9	9	8.5	342	BOR
1997 03 24.38	Ga	B	0.1	TI	0.0	E		1					BOR
1997 03 24.38	a	B	0.4	TI	5.0	N		1					BOR
1997 03 24.38	a	I	0.4	TI	0.0	E		1		9	5	342	BOR
1997 03 24.41	w	B	-0.2	YG	0.0	E		1		8	1	0	YOS04
1997 03 24.42	M		0.0	YG	3.0	B		8			7		KAT01
1997 03 24.43	a	S	-0.1	AA	0.0	E		1	&15	8	4	340	NAG08
1997 03 24.44					5.0	B		7	8	S7	5	325	MIY01
1997 03 24.44					8.0	B		11	8	S7	5	325	MIY01
1997 03 24.44		S	-0.6	S	15.0	R	5	25	30	7/	12		NAG02
1997 03 24.44	w	B	0.1	YG	0.0	E		1	&10	7	5	325	MIY01
1997 03 24.82					2.4	B		10	12	S7	2	0	YOS04
1997 03 24.82		B	-0.9	S	0.0	E		1	25	8	10	330	TRI
1997 03 24.82	a	B	-0.4	YG	0.0	E		1		8	1.5	0	YOS04
1997 03 24.83	G		-1.2	UN	0.7	E		1	16	9	8		MCK
1997 03 24.84		B	0.1	YF	0.5	E		1	15	8	8	340	ENT
1997 03 24.85		S	-1.0	AA	5	R		8	8	7/	6	334	OWE
1997 03 25.03					5.0	B		7	10	9	8.0	358	BOR
1997 03 25.03	a	B	0.1	TI	5.0	N		1					BOR
1997 03 25.03	Ga	B	-0.3	TI	0.0	E		1					BOR
1997 03 25.03	fa	B	-0.3	TI	0.0	E		1					BOR
1997 03 25.03	a	I	0.1	TI	0.0	E		1		9	4	358	BOR
1997 03 25.20		O	-0.6	SC	0.7	E		1			5		ROG02
1997 03 25.77					5.0	B		7	25	8/	7	343	BAR
1997 03 25.77		S	-0.8	AA	0.0	E		1					BAR
1997 03 25.81		B	-0.5	SC	0.0	E		1	25	7			BIV
1997 03 25.81		S	0.3	SC		A		0		9	2		L0001
1997 03 26.18		S	1.2	SC		A		0		9	3		L0001
1997 03 26.20		B	-0.8	S	0.0	E		1	25	8	15	330	TRI
1997 03 26.80		O	-0.5	SC	0.7	E		1			9		ROG02
1997 03 26.82		B	-1.0	S	0.0	E		1	30	8	18	330	TRI
1997 03 26.83	G		-0.9	UN	0.7	E		1	16	9	10		MCK
1997 03 26.85	G		0.0	SC	3.5	B		9		7	7	359	HEN
1997 03 27.08	G	S	-0.6	S	0.8	E		1	15	7	11	344	LUE
1997 03 27.20		B	-1.1	S	0.0	E		1	30	8	20	330	TRI
1997 03 27.41	!	M	-0.4	YG	3.0	B		8					KAT01
1997 03 27.43	a	S	-0.1	AA	0.0	E		1	&15	8	6	340	NAG08
1997 03 27.44	a	M	-0.6	AA	0.0	E		1					TSU02

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 27.46		S	-0.8	S	15.0	R	5	25	25	7	12		NAG02
1997 03 27.81		B	-0.4	SC	0.0	E		1	25	7	6	350	BIV
1997 03 27.81		B	-1.1	S	0.0	E		1	30	8	22	345	TRI
1997 03 27.81		S	-1.5	SC		A		0		9	11		LO001
1997 03 27.82	\$	I	1.1	YG	0.0	E		1	&10	7	5		MIY01
1997 03 27.85	G		-0.9	UN	0.7	E		1					MCK
1997 03 28.01			0.5	A	0.0	E		1	20	8	4		SIM
1997 03 28.07					5.0	B		7	10	8/	9.7	3	BOR
1997 03 28.07	a	B	-0.3	TI	5.0	N		1					BOR
1997 03 28.07	Ga	B	-0.4	TI	0.0	E		1					BOR
1997 03 28.07	fa	B	-0.4	TI	0.0	E		1					BOR
1997 03 28.07	a	I	-0.1	TI	0.0	E		1		9	9.7	3	BOR
1997 03 28.14	!	S	-0.5	SC	0.0	E		1	&15	D9	18		LOV
1997 03 28.79		S	-0.9	AA	0.0	E		1	30	9	10	353	BAR
1997 03 28.80		B	-1.1	S	0.0	E		1	30	8	16	345	TRI
1997 03 28.80		U	-0.5:	SC	0.7	E		1			10		ROG02
1997 03 28.81		S	0.4	SC		A		0		9	8		LO001
1997 03 28.83	G		-0.5	UN	0.7	E		1		9	11		MCK
1997 03 28.83		B	-0.6	SC	0.0	E		1	25	7	14	0	BIV
1997 03 28.84		B	-0.3	YF	0.5	E		1	15	8	10		ENT
1997 03 28.90	G		-0.5	SC	0.7	E		1	15	7	10	5	HEN
1997 03 28.90		S	-1.0	AA	5	R		8	6	7/	8	333	OWE
1997 03 28.98			-1.5	SC	0.0	E		1		d			DID
1997 03 29.17		S	-1.0	SC		A		0		8	6		LO001
1997 03 29.18	!	S	-0.7	SC	0.0	E		1	&15	D9	18		LOV
1997 03 29.77	*	S	-1.8	AA	0.0	E		1		S9		15	KOS
1997 03 29.82		B	-0.5	SC	0.0	E		1	30	7	14	0	BIV
1997 03 29.83	G		-0.5	UN	0.7	E		1		9	11		MCK
1997 03 29.88		B	0.1	YF	0.5	E		1	15	8	11	355	ENT
1997 03 29.88	G	S	-0.5	S	0.8	E		1	25	7	17	15	LUE
1997 03 30.12		I	-0.5:		0.0	E		1					SEA
1997 03 30.16	!	S	-0.9	SC	0.0	E		1	&15	D9	20		LOV
1997 03 30.43		S	-0.8	S	15.0	R	5	25	28	7/	12		NAG02
1997 03 30.44	w	S	-0.2	YG	0.0	E		1	&13	8	13	20	NAG08
1997 03 30.45	w	B	-0.9	Y	0.0	E		1			16	20	YOS02
1997 03 30.78	*	S	-1.8	AA	0.0	E		1		S9		15	KOS
1997 03 30.79		S	-0.9	AA	0.0	E		1	30	8/	10	357	BAR
1997 03 30.79	!	S	0.1	AA	0.7	E		1	25	8	10		COL03
1997 03 30.80		U	-0.4	SC	0.7	E		1			11		ROG02
1997 03 30.83	G	S	-0.6	S	0.8	E		1	20	8	17	14	LUE
1997 03 30.83		S	-0.7	S	6	R	10	30		7/	20		MAN02
1997 03 30.83		S	-1.5	SC		A		0		9	8		LO001
1997 03 30.84	G		-0.9	UN	0.7	E		1					MCK
1997 03 30.84		B	-0.4	SC	0.0	E		1	30	7	11	355	BIV
1997 03 30.87		B	-0.1	YF	0.5	E		1	15	8	12		ENT
1997 03 30.90	G		-0.8	SC	0.7	E		1		7			HEN
1997 03 30.90		S	-0.9	AA	5.0	B		7	6	7/	10	350	OWE
1997 03 31.02	fa	B	-0.4	TI	0.0	E		1					BOR
1997 03 31.02	Ga	B	-0.4	TI	0.0	E		1		9	4		BOR
1997 03 31.15	!	S	-0.8	SC	0.0	E		1	&15	D9	20		LOV
1997 03 31.16	r	S	-0.4	AA	2.5	B		2			10		SEA
1997 03 31.42	a	B	-0.1:	YG	0.0	E		1		8	0.5	0	YOS04
1997 03 31.44	!	M	-0.5	YG	3.0	B		8			8		KAT01
1997 03 31.44	a	B	-0.1	YG	0.0	E		1			8	350	NAK01
1997 03 31.44	a	S	-0.2	YG	0.0	E		1	&13	8	8	20	NAG08
1997 03 31.78	*	S	-2.0	AA	0.0	E		1		S9		20	KOS
1997 03 31.80		U	-0.4	SC	0.7	E		1			9		ROG02
1997 03 31.80	!	S	0.1	AA	0.7	E		1	10	8	2	0	COL03
1997 03 31.81		B	-1.0	S	0.0	E		1	25	8	20	350	TRI
1997 03 31.81		S	-1.3	SC		A		0		9	10		LO001
1997 03 31.81	s	M	-0.5	AA	0.6	E		1		S8	12		MEY
1997 03 31.82	G		-0.9	UN	0.7	E		1			11		MCK
1997 03 31.83	G	S	-0.6	S	0.8	E		1	20	7	10	10	LUE
1997 03 31.85	G		-0.5	SC	0.7	E		1			8		HEN
1997 03 31.85		B	-0.4	SC	0.0	E		1	30	7			BIV

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 31.88		B	-0.2	YF	0.5	E		1	15				ENT
1997 03 31.93		S	-0.9	AA	5.0	B		7	6	7/	10	345	OWE
1997 04 01.16	r	S	-0.1	AA	2.5	B		2					SEA
1997 04 01.42	!	M	-0.7	YG	3.0	B		8			6		KAT01
1997 04 01.43					8.0	B		11	8	S7	5	0	MIY01
1997 04 01.43	a	B	-0.1	YG	0.0	E		1	&10	S7	3	0	MIY01
1997 04 01.44		S	-0.9	S	15.0	R	5	25	25	7/	11		NAG02
1997 04 01.45	a	M	-0.4	YG	0.0	E		1					TSU02
1997 04 01.78		B	-0.9	S	0.0	E		1	25	8	16	350	TRI
1997 04 01.79		S	-0.9	AA	0.0	E		1	30	9	10	358	BAR
1997 04 01.80		O	-0.2	SC	0.7	E		1					ROG02
1997 04 01.80		S	-0.6	SC	0.6	E		1	15	8/	12	355	OKS
1997 04 01.81	s	M	-0.4	AA	0.6	E		1		S8	15		MEY
1997 04 01.83		B	-0.4	SC	0.0	E		1	30	7	10	5	BIV
1997 04 01.84		S	-0.9	SC		A		0		9	4		L0001
1997 04 01.84	!	S	0.1	AA	0.7	E		1		8			COL03
1997 04 01.85	G	S	-0.4	S	0.8	E		1	20	7	15	9	LUE
1997 04 02.02		B	-0.5	AC	10.0	B	4	20	0.92	9	20	350	NOW
1997 04 02.04					5.0	B		7	15	8/	12.5	12	BOR
1997 04 02.04	Ga	B	-0.3	TI	0.0	E		1					BOR
1997 04 02.04	fa	B	-0.3	TI	0.0	E		1					BOR
1997 04 02.04	a	I	0.1	TI	0.0	E		1		9	14	12	BOR
1997 04 02.06			-0.4	A	0.0	E		1	20	8	9		SIM
1997 04 02.06			-0.5	A	0.0	E		1		8	11		SIM01
1997 04 02.15	!	S	-0.8	SC	0.0	E		1	&15	D9	20		LOV
1997 04 02.80		O	-0.7	S	0.0	E		1		7	15		MAN02
1997 04 02.80		S	-0.7	SC	0.6	E		1	20	8/	16	360	OKS
1997 04 02.81	!	S	0.1	AA	0.7	E		1		8	5	5	COL03
1997 04 02.81	s	M	-0.3	AA	0.6	E		1		S8	14		MEY
1997 04 02.82		B	-0.9	S	0.0	E		1	30	8	22	350	TRI
1997 04 02.85	G		0.5:	SC	0.7	E		1					HEN
1997 04 03.02		B	-0.5	AC	5.0	B	4	7	0.83	9	35	345	NOW
1997 04 03.04					5.0	B		7	15	8/	13.5	15	BOR
1997 04 03.04	a	B	-0.2	TI	5.0	N		1					BOR
1997 04 03.04	Ga	B	-0.5	TI	0.0	E		1					BOR
1997 04 03.04	fa	B	-0.5	TI	0.0	E		1					BOR
1997 04 03.04	a	I	0.1	TI	0.0	E		1		9	18	15	BOR
1997 04 03.20	!	S	-0.7	SC	0.0	E		1	&15	D9	22		LOV
1997 04 03.77		S	-1.1	SC		A		0		9	4		L0001
1997 04 03.79					5.0	B		7	25	8	9	5	BAR
1997 04 03.79		S	-0.7	AA	0.0	E		1					BAR
1997 04 03.80		O	-0.3	SC	0.7	E		1			8		ROG02
1997 04 03.81		B	-0.4	SC	0.0	E		1	25	7			BIV
1997 04 03.81	G	S	-0.3	S	0.8	E		1	15	7	14	18	LUE
1997 04 03.81	!	S	-0.2	AA	0.7	E		1		8	5	5	COL03
1997 04 03.85	G		-0.5	SC	0.7	E		1		D7	10		HEN
1997 04 03.85	G		-1.2	UN	0.7	E		1		9	10		MCK
1997 04 03.85	!	B	-0.1	AA	4.0	B		8	15	7	3.2	17	TAY
1997 04 03.86		B	-0.7	S	0.0	E		1	25	8	14	350	TRI
1997 04 03.88	!	B	-0.7	YG	0.7	E		1		8	16	4	GRA04
1997 04 03.88	!	N	1.7	YG	5.0	B		10	22	7/	14	26	GRA04
1997 04 03.90	!	B	-0.6	YG	0.7	E		1		8	15		SKI
1997 04 03.94		S	-0.9	AA	5.0	B		7	6	7/	14	14	OWE
1997 04 04.02			-1.5	SC	0.0	E		1		D			DID
1997 04 04.19	!	S	-0.6	SC	0.0	E		1	&15	D9	20		LOV
1997 04 04.21		S	-1.0	SC		A		0		9	6		L0001
1997 04 04.76	!	S	0.0	AA	0.7	E		1		8	5	5	COL03
1997 04 04.79					5.0	B		7	22	8	10	15	BAR
1997 04 04.79		S	-0.7	AA	0.0	E		1					BAR
1997 04 04.80		O	-0.1	SC	0.7	E		1			10		ROG02
1997 04 04.81	a	B	-1.2	S	0.0	E		1	25	8	15	355	TRI
1997 04 04.81	a	M	-0.3	AA	0.6	E		1		S8	15		MEY
1997 04 04.83		B	-0.4	SC	0.0	E		1	25	7	10	5	BIV
1997 04 04.84	G		-0.5	UN	0.7	E		1		9	9		MCK
1997 04 04.84	G	S	-0.3	S	0.8	E		1	15	7	20	346	LUE

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 04.91	!	B	-0.7	YG	0.7	E		1		8	19	7	GRA04
1997 04 04.91	!	N	1.7	YG	5.0	B		10	20	7/	14	23	GRA04
1997 04 05.03	Ga	B	-0.5	TI	0.0	E		1					BOR
1997 04 05.03	fa	B	-0.5	TI	0.0	E		1					BOR
1997 04 05.03	a	I	0.2	TI	0.0	E		1		9	13	19	BOR
1997 04 05.03	ra	I	-0.9	TI	5.0	B		7					BOR
1997 04 05.03	ra	I	-1.1	TI	2.5	B		2					BOR
1997 04 05.03	a	M	0.4	TI	5.0	B		7	15	9	13	19	BOR
1997 04 05.17	!	S	-0.7	SC	0.0	E		1	&15	D9	22		LOV
1997 04 05.77		S	-1.7	AA	0.0	E		1		S9		355	KOS
1997 04 05.79					5.0	B		7	20	8	10	24	BAR
1997 04 05.79		S	-0.7	AA	0.0	E		1					BAR
1997 04 05.80	a	B	-1.0	S	0.0	E		1	25	8	15	355	TRI
1997 04 05.86		B	-0.4	SC	0.0	E		1	25	7	21	10	BIV
1997 04 05.87	!	S	0.0	AA	0.7	E		1		8	5	5	COL03
1997 04 05.88	!	B	-0.6	YG	0.7	E		1		8	15		SKI
1997 04 05.93	!	B	-0.7	YG	0.7	E		1		8	20	3	GRA04
1997 04 05.93	!	N	1.8	YG	5.0	B		10	23	7/	13	8	GRA04
1997 04 06.20	!	S	-0.4	SC	0.0	E		1	&15	D9	21		LOV
1997 04 06.45	a	B	-0.4	YG	0.0	E		1			14	0	NAK01
1997 04 06.46	a	B	-0.5	Y	0.0	E		1					YOS02
1997 04 06.74		B	0.2	AA	8.0	B		12	15	9	3.5	25	MEN03
1997 04 06.79		S	-0.5	SC	0.6	E		1	12	9	16	5	OKS
1997 04 06.79		S	-0.7	AA	0.0	E		1	20	8	9	32	BAR
1997 04 06.80		O	-0.3	S	0.0	E		1		8	8		MAN02
1997 04 06.80		S	-1.2	SC		A		0		9	10		L0001
1997 04 06.80	!	S	0.1	AA	0.7	E		1		8	5	5	COL03
1997 04 06.85	G		-0.5	SC	0.7	E		1		D7	10		HEN
1997 04 06.85		B	-0.3	SC	0.0	E		1	25	8	21	15	BIV
1997 04 06.85	G	S	-0.5	S	0.8	E		1	15	7	21	344	LUE
1997 04 06.90	!	B	-0.6	YG	0.7	E		1		8	19	12	GRA04
1997 04 06.90	!	N	1.8	YG	5.0	B		10	23		14	13	GRA04
1997 04 06.92	!	B	-0.5	YG	0.7	E		1		8	16		SKI
1997 04 07.18		B	-0.1	AA	0.0	E		1					SEA
1997 04 07.46	a	B	-0.8	Y	0.0	E		1			13	25	YOS02
1997 04 07.46	a	M	-0.4	YG	0.0	E		1					TSU02
1997 04 07.49		S	-1.0	S	15.0	R	5	25	25	7/	<10		NAG02
1997 04 07.79		S	-0.6	SC	0.6	E		1	15	9	14	10	OKS
1997 04 07.82		B	-0.3	SC	0.0	E		1	20	7			BIV
1997 04 07.84	!	B	0.0	AA	4.0	B		8	11	6	2	21	TAY
1997 04 07.85	G		-0.2	SC	0.7	E		1			10		HEN
1997 04 07.87	G		-0.4	UN	0.7	E		1		9	10		MCK
1997 04 07.87	G	S	-0.3	S	0.8	E		1	15	7	7	15	LUE
1997 04 07.88		B	0.1	YF	0.5	E		1	15	7	9	10	ENT
1997 04 08.04	fa	B	-0.2	TI	0.0	E		1					BOR
1997 04 08.04	Ga	B	-0.3	TI	0.0	E		1					BOR
1997 04 08.04	a	I	0.3	TI	0.0	E		1	12	9	6	28	BOR
1997 04 08.04	a	I	0.5	TI	5.0	N		1					BOR
1997 04 08.04	ra	I	-0.7	TI	2.5	B		2					BOR
1997 04 08.04	a	M	0.5	TI	5.0	B		7	13	8/	10	28	BOR
1997 04 08.17		B	-0.2	AA	0.0	E		1			18	5	SEA
1997 04 08.19	!	S	-0.6	SC	0.0	E		1	&15	D9	22		LOV
1997 04 08.47		S	-0.9	S	15.0	R	5	25	22	7/	10		NAG02
1997 04 08.79		S	-0.7	SC	0.6	E		1	12	9	20	10	OKS
1997 04 08.80		O	-0.2	S	0.0	E		1		8	10		MAN02
1997 04 08.80	a	M	-1.1	S	10	R		1	55	7	10	35	PLS
1997 04 08.81		S	-0.3	AA	0.7	E		1			20	0	CSU
1997 04 08.81		S	-1.2	AA	0.0	E		1		S9		355	KOS
1997 04 08.85		B	-0.4	SC	0.0	E		1	20	7	18	15	BIV
1997 04 08.88		S	-1.2	SC		A		0		9	7		L0001
1997 04 09.18	!	S	-0.6	SC	0.0	E		1	&15	D9	26		LOV
1997 04 09.42	a	S	-0.1:	YG	0.0	E		1	&13	8	&3	340	NAG08
1997 04 09.73		B	0.2	AA	8.0	B		12	15	9	1.7	30	MEN03
1997 04 09.79		S	-0.6	AA	0.0	E		1	20	8	8	32	BAR
1997 04 09.82	G	S	-0.4	S	0.8	E		1	12	8	8	0	LUE

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 09.85		B	-0.2	SC	0.0	E		1	20	7	15		BIV
1997 04 09.85	a	B	-0.5	AA	0.7	E		1		8			BOU
1997 04 09.88		S	-1.2	SC		A		0		9	7		L0001
1997 04 09.88	!	B	-0.5	YG	0.7	E		1		8	20		SKI
1997 04 09.89		B	0.1	YF	0.5	E		1	15	7	9	27	ENT
1997 04 09.93	!	B	0.5	AA	5.0	B		10	11	7	2	21	TAY
1997 04 10.04		B	-0.3	AC	8.0	B	4	11	0.58	9	15	0	NOW
1997 04 10.05	a	B	0.2	TI	5.0	N		1					BOR
1997 04 10.05	Ga	B	-0.2	TI	0.0	E		1					BOR
1997 04 10.05	fa	B	-0.3	TI	0.0	E		1					BOR
1997 04 10.05	a	I	0.2	TI	0.0	E		1	11	9	23	22	BOR
1997 04 10.05	a	M	0.6	TI	5.0	B		7	8	8/	11	28	BOR
1997 04 10.06	!	B	-0.7	YG	0.7	E		1		9	10		DAH
1997 04 10.19	!	S	-0.6	SC	0.0	E		1	&15	D9	27		LOV
1997 04 10.42	!	M	-0.2	YG	3.0	B		8	10		6		KAT01
1997 04 10.43	a	B	0.2	YG	0.0	E		1		8	0.7	10	YOS04
1997 04 10.44	a	S	-0.2	YG	0.0	E		1	&13	8	8	350	NAG08
1997 04 10.46					8.0	B		11	&10	S7	12	10	MIY01
1997 04 10.47	w	B	-0.3	YG	0.0	E		1	&10	S7	12	5	MIY01
1997 04 10.50					5.0	B		7	&15	S7	15	5	MIY01
1997 04 10.75		B	0.2	AA	8.0	B		12	15	9	2	30	MEN03
1997 04 10.79					5.0	B		7	18	8	7	32	BAR
1997 04 10.79		S	-0.5	AA	0.0	E		1					BAR
1997 04 10.80		O	0.2	SC	0.7	E		1			15		ROG02
1997 04 10.80	a	B	-0.8	S	0.0	E		1	20	8	20	355	TRI
1997 04 10.83		B	-0.2	SC	0.0	E		1	20	7			BIV
1997 04 10.85	!	B	0.2	AA	4.0	B		8	16	7	4.2	33	TAY
1997 04 10.85	a	B	-0.4	AA	0.7	E		1		7/	15	355	BOU
1997 04 10.87	G		0.8	UN	0.7	E		1		9	12		MCK
1997 04 10.92	!	B	-0.5	YG	0.7	E		1		8	17	20	GRA04
1997 04 10.92	!	N	2.1	YG	5.0	B		10	18	7/	14	20	GRA04
1997 04 10.98	!	B	-0.7	YG	0.7	E		1		8	20		SKI
1997 04 11.05	Ga	B	-0.2	TI	0.0	E		1					BOR
1997 04 11.05	fa	B	-0.2	TI	0.0	E		1					BOR
1997 04 11.05	a	I	0.4	TI	0.0	E		1	15	9	18	27	BOR
1997 04 11.05	a	M	0.4	TI	5.0	B		7	8	8/	8.5	30	BOR
1997 04 11.16		B	-0.2	AA	0.0	E		1			11	5	SEA
1997 04 11.80		B	0.2	AA	8.0	B		12	15	9	2	35	MEN03
1997 04 11.80		O	0.1	SC	0.7	E		1			14		ROG02
1997 04 11.80	a	M	-0.8	S	5	R		1	50	7	10	40	PLS
1997 04 11.81		B	0.1	YF	0.5	E		1	15	8	6		ENT
1997 04 11.81	a	M	-0.9	S	5	R		1	35	8	10	40	HOR02
1997 04 11.82		B	-0.1	SC	0.0	E		1	20	7			BIV
1997 04 11.82	a	B	-0.7	S	0.0	E		1	20	8	14	0	TRI
1997 04 11.83		S	0.1	SC		A		0		9			L0001
1997 04 11.83	G	S	-0.2	S	0.8	E		1	15	7	8	2	LUE
1997 04 11.85	G		0.3	UN	0.7	E		1		8	9		MCK
1997 04 11.85	!	B	0.4	AA	4.0	B		8	14	7	3.5	15	TAY
1997 04 11.87	a	B	-0.4	AA	0.7	E		1		7/	16	355	BOU
1997 04 11.90	!	B	-0.5	YG	0.7	E		1		8	18	21	GRA04
1997 04 11.90	!	N	2.0	YG	5.0	B		10	18	7/	14	20	GRA04
1997 04 12.13		B	-0.1	AA	0.0	E		1			12	5	SEA
1997 04 12.43	a	B	-0.2	YG	0.0	E		1	15	8	6	10	YOS04
1997 04 12.44	a	M	-0.3	YG	0.0	E		1					TSU02
1997 04 12.44	a	S	-0.4	YG	0.0	E		1	&13	7/	&5	350	NAG08
1997 04 12.46	a	B	-0.4	Y	0.0	E		1			8	10	YOS02
1997 04 12.8			0.0	SC	0.0	E		1					DID
1997 04 12.81		S	-0.5	AA	0.0	E		1	15	8/	12	32	BAR
1997 04 12.81	a	B	-0.6	S	0.0	E		1	20	8	12	0	TRI
1997 04 12.82		B	0.0	SC	0.0	E		1	20	7	4	25	BIV
1997 04 12.83	a	M	-0.8	S	5	R		1	35	8	10	0	HOR02
1997 04 12.84	G		0.3	UN	0.7	E		1		8	7		MCK
1997 04 12.87	a	B	-0.4	AA	0.7	E		1		7	14	357	BOU
1997 04 12.87	s	M	-0.4	AA	0.6	E		1		S8/	3		MEY
1997 04 12.95	!	S	0.5	AA	7.0	B		16	12	6	2	15	TAY

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 13.44		S	-0.7	S	15.0	R	5	25	25	7/	10		NAG02
1997 04 13.45	a	M	-0.2	YG	0.0	E		1					TSU02
1997 04 13.45	a	S	-0.3	YG	0.0	E		1	&12	8	2	0	NAG08
1997 04 13.80		S	-0.8	AA	0.0	E		1		S9		5	KOS
1997 04 13.81		S	0.0	AA	0.7	E		1			9	14	CSU
1997 04 13.81	a	M	-0.7	S	5	R		1	40	7/	8	40	PLS
1997 04 13.81	a	M	-0.8	S	5	R		1	30	8	9	40	HOR02
1997 04 13.83	!	S	0.0	AA	0.7	E		1		8	2.5		COL03
1997 04 13.84		B	0.0	SC	0.0	E		1	20	7			BIV
1997 04 13.85	G		0.3:	UN	0.7	E		1		9			MCK
1997 04 13.85	a	B	-0.5	S	0.0	E		1	20	8	10	0	TRI
1997 04 13.99	!	B	-0.7:	YG	0.7	E		1		8	15	20	GRA04
1997 04 13.99	!	N	1.8	YG	5.0	B		10	20	7/	13	20	GRA04
1997 04 14.44					3.5	B		7	&12	7	6	10	NAG08
1997 04 14.44	a	S	-0.2	YG	0.0	E		1	&10	8	1	10	NAG08
1997 04 14.80		0	0.0	SC	0.7	E		1			12		ROG02
1997 04 14.80		S	0.0	AA	0.7	E		1					CSU
1997 04 14.81		S	-0.5	AA	0.0	E		1	15	8	7	30	BAR
1997 04 14.83	G		0.3	UN	0.7	E		1		9	8		MCK
1997 04 14.83	a	B	-0.4	S	0.0	E		1	20	8	7	0	TRI
1997 04 14.90	G		0.3	SC	0.7	E		1		D7	5		HEN
1997 04 14.99	!	B	-0.6:	YG	0.7	E		1		8	11		GRA04
1997 04 14.99	!	N	1.7	YG	5.0	B		10	18	7/	10	23	GRA04
1997 04 15.04		B	0.0	AC	8.0	B	4	11	0.55	9	14	0	NOW
1997 04 15.05	!	B	-0.5	YG	0.7	E		1	14	8	8		DAH
1997 04 15.05	Ga	B	0.1	TI	0.0	E		1					BOR
1997 04 15.05	a	B	-0.1	TI	5.0	N		1					BOR
1997 04 15.05	fa	B	-0.2	TI	0.0	E		1					BOR
1997 04 15.05	a	I	0.4	TI	0.0	E		1	11	9	13	28	BOR
1997 04 15.05	a	M	0.6	TI	5.0	B		7	7	8/	11	30	BOR
1997 04 15.76		B	0.2	AA	8.0	B		12	15	9	2	35	MEN03
1997 04 15.80	a	B	-0.4	S	0.0	E		1	20	8	5	0	TRI
1997 04 15.81		S	-0.4	AA	0.0	E		1	20	9	15	28	BAR
1997 04 15.81		S	-0.4	SC	0.6	E		1	12	9	12	25	OKS
1997 04 15.82		S	0.6	SC		A		0		9	5		LO001
1997 04 15.83	!	S	0.3	AA	0.7	E		1		8	3	25	COL03
1997 04 15.85		B	0.2	SC	0.0	E		1	20	7	2.5	35	BIV
1997 04 15.85	!	B	0.5	AA	4.0	B		8	10	7	2.1	37	TAY
1997 04 15.86	G		0.3	UN	0.7	E		1	12	9	9		MCK
1997 04 15.86		S	-0.5	AA	5.0	B		8	30	8	5	40	BEA
1997 04 15.87	G		-0.1	S	0.8	E		1	15	7	8	8	LUE
1997 04 15.88		B	0.1	YF	0.5	E		1	15	8	6		ENT
1997 04 15.88		S	-0.6	AA	5.0	B		7	8	7/			OWE
1997 04 16.00	!	B	0.0:	YG	0.7	E		1		7	6		GRA04
1997 04 16.06	Ga	B	-0.2	TI	0.0	E		1					BOR
1997 04 16.06	fa	B	-0.3	TI	0.0	E		1					BOR
1997 04 16.06	a	I	0.3	TI	0.0	E		1	11	9	9.5	39	BOR
1997 04 16.06	a	M	0.3	TI	5.0	B		7	6	9	6	39	BOR
1997 04 16.42	!	M	-0.2	YG	3.0	B		8	10		6		KAT01
1997 04 16.45		S	-0.4	S	15.0	R	5	25	20	7/	8		NAG02
1997 04 16.85	a	B	-0.4	AA	0.7	E		1		7	8	40	BOU
1997 04 16.86	G		-0.1	S	0.8	E		1	15	7	8	4	LUE
1997 04 16.90	!	B	-0.2	YG	0.7	E		1		7/	4		GRA04
1997 04 16.90	!	N	1.8	YG	5.0	B		10	12	7/	5	33	GRA04
1997 04 17.80		0	0.2	SC	0.7	E		1			8		ROG02
1997 04 17.81		S	-0.3	AA	0.0	E		1	15	8	7	34	BAR
1997 04 17.84		B	0.1	SC	0.0	E		1	20	8	2	40	BIV
1997 04 17.84	G		-0.1	S	0.8	E		1	15	7	7	10	LUE
1997 04 17.84	Ga		-0.6	AA	0.8	E		1			7.7	350	HAS02
1997 04 17.85		S	0.4	SC		A		0		8			LO001
1997 04 17.86	G		0.3	UN	0.7	E		1		9	10		MCK
1997 04 17.86	a	B	-0.4	AA	0.7	E		1		7	6.5	42	BOU
1997 04 17.89		0.0	AA	0.6	E			1	10	8	6.5	15	GIL01
1997 04 18.34	a	S	-0.7:	WW	5.0	B		10	9	3			SEA01
1997 04 18.75		B	0.3	AA	10.8	L	4	16	12	9	2	45	MEN03

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 18.78		S	0.3	AA	0.0	E		1		S9			KOS
1997 04 18.78	!	S	0.4	AA	0.7	E		1		8	2.5	35	COL03
1997 04 18.81		S	-0.3	AA	0.0	E		1	13	8	6	37	BAR
1997 04 18.82	Ga		-0.4	AA	0.8	E		1			6.2	350	HAS02
1997 04 18.82	s	M	0.0	AA	0.6	E		1		S8	2.5		MEY
1997 04 18.83		B	0.2	SC	0.0	E		1	15	7	1.5	45	BIV
1997 04 18.88	!	B	-0.2	YG	0.7	E		1		8	13	23	GRA04
1997 04 18.96	!	N	2.2	YG	5.0	B		10	12	7/	6		GRA04
1997 04 19.42	!	M	-0.2	YG	3.0	B		8	10		5		KAT01
1997 04 19.44	a	S	-0.1	YG	0.0	E		1	&10	8	3	30	NAG08
1997 04 19.45					8.0	B		11	&10	S7	3	35	MIY01
1997 04 19.45	a	B	0.0	YG	0.0	E		1			13	40	NAK01
1997 04 19.45	a	B	0.1	YG	0.0	E		1	&10	S7	4	35	MIY01
1997 04 19.45	a	B	0.2:	YG	0.0	E		1		8	1.5	30	YUS04
1997 04 19.84		B	0.1	SC	0.0	E		1	15	8	3		BIV
1997 04 19.85		S	0.9	SC		A		0		8	4		L0001
1997 04 19.87	G		0.3	UN	0.7	E		1					MCK
1997 04 19.89	!	B	-0.1	YG	0.7	E		1		8	11		GRA04
1997 04 19.89	!	N	2.2	YG	5.0	B		10	15	7/	9	30	GRA04
1997 04 19.93	!	S	0.4	AA	4.0	B		8	14	7	2.1	40	TAY
1997 04 20.46		S	-0.1	S	15.0	R	5	25	18	7	7		NAG02
1997 04 20.74		B	0.3	AA	8.0	B		12	12	9	2.5	45	MEN03
1997 04 20.77	Ga		-0.3	AA	0.8	E		1					HAS02
1997 04 20.82		S	-0.3	AA	0.0	E		1	15	9	6	43	BAR
1997 04 20.84		B	0.2	SC	0.0	E		1	15	7	2.5		BIV
1997 04 20.85	G	S	0.0	S	0.8	E		1	15	7	7	16	LUE
1997 04 20.86	!	B	0.6	AA	4.0	B		8	11	7	2.4	35	TAY
1997 04 20.87	G		0.5	UN	0.7	E		1		9	7		MCK
1997 04 20.87	a	B	-0.3	AA	0.7	E		1		7	9	20	BOU
1997 04 20.88		S	0.9	SC		A		0		8	3		L0001
1997 04 20.88	!	B	-0.1	YG	0.7	E		1		7/	10		GRA04
1997 04 20.88	!	N	2.3	YG	5.0	B		10	17	7/	7	42	GRA04
1997 04 20.89		B	0.2	YF	0.5	E		1	15	8	5		ENT
1997 04 20.90	G		0.3	SC	0.7	E		1			5		HEN
1997 04 20.91		S	-0.5	AA	5.0	B		8	30	8	5	45	BEA
1997 04 21.34	a	S	-0.3	AA	5.0	B		10	7	4	15 m		SEA01
1997 04 21.81	a	O	-0.2	SP	0.0	E		1	30	7/	12	50	ZNO
1997 04 21.82	a	M	-0.4	S	5	R		1	20	8/	10	10	HOR02
1997 04 21.83		S	1.0	SC		A		0		9			L0001
1997 04 21.83	a	M	-0.4	S	5	R		1	25	8	7	5	PLS
1997 04 21.84		B	0.3	SC	0.0	E		1	15	8	1.5		BIV
1997 04 21.88	!	B	-0.1	YG	0.7	E		1		7/	8		GRA04
1997 04 21.88	!	N	2.1	YG	5.0	B		10	16	7/	8	43	GRA04
1997 04 21.89		S	-0.1	AA	5.0	B		7	6	7/			OWE
1997 04 21.89		S	-0.5	AA	5.0	B		8	30	8	5	45	BEA
1997 04 22.05					5.0	B		7	8	9	2.5	45	BOR
1997 04 22.05	Ga	B	0.3	TI	0.0	E		1					BOR
1997 04 22.05	a	I	0.4	TI	0.0	E		1		9			BOR
1997 04 22.20		B	0.0	AA	0.0	E		1					SEA
1997 04 22.34	a	I	-0.2	AA	0.0	E		1		9			SEA01
1997 04 22.34	a	M	-0.2	AA	5.0	B		10	10	7	30 m		SEA01
1997 04 22.76		B	0.4	AA	8.0	B		12	12	9	2.5	45	MEN03
1997 04 22.80		O	0.5	SC	0.7	E		1					ROG02
1997 04 22.81		S	-0.2	AA	0.0	E		1	12	9	4	44	BAR
1997 04 22.82	a	B	-0.2	S	0.0	E		1	15	8	4	20	TRI
1997 04 22.84		B	0.3	SC	0.0	E		1	15	7			BIV
1997 04 22.86	!		0.5:	AA	0.6	E		1	10	8	3.0	43	GIL01
1997 04 22.86	!	B	0.1	YG	0.7	E		1		8	9		GRA04
1997 04 22.86	!	N	2.0	YG	5.0	B		10	12	7/	7	40	GRA04
1997 04 22.91	!	N	5.8	YG	20.3	T	10	123					GRA04
1997 04 23.23	a	I	0.2	AA	0.0	E		1		9			SEA01
1997 04 23.34	a	M	0.2	AA	5.0	B		10	9	5	10 m		SEA01
1997 04 23.44	!	M	-0.1	YG	3.0	B		8	10		5		KAT01
1997 04 23.44	\$a	S	0.0	AA	8.0	B		20		9	0.5	65	PEA
1997 04 23.44	a	S	0.0	YG	0.0	E		1	&10	7/	2	40	NAG08

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 23.44	\$a	S	-0.1	AA	0.0	E		1		9			PEA
1997 04 23.80	a	0	-0.1	SP	0.0	E		1	18	7/	7	60	ZNO
1997 04 23.81		S	-0.2	AA	0.0	E		1	12	8	4	44	BAR
1997 04 23.82	a	M	-0.2	S	5	R		1	30	8/	10	5	PLS
1997 04 23.82	a	M	-0.4	S	5	R		1	20	8/	13	10	HOR02
1997 04 23.82	a	0	-0.4	S	0.0	E		1	30	7/	6	345	MAN02
1997 04 23.83	!	S	1.1	AA	0.7	E		1	15	8	2.5	50	COL03
1997 04 23.85		B	0.3	SC	0.0	E		1	15	7	2		BIV
1997 04 23.87	G!		1.4	UN	0.7	E		1		9	6		MCK
1997 04 23.89	!	B	0.0	YG	0.7	E		1		7/	8		GRA04
1997 04 23.89	!	N	2.0	YG	5.0	B		10	15	7/	6	41	GRA04
1997 04 24.25		B	0.0	AA	0.0	E		1					SEA
1997 04 24.35	!	S	-0.1	SC	0.0	E		1	&10	D9	8		LOV
1997 04 24.42	w	I	0.4	YG	0.0	E		1	&10	S7	3	25	MIY01
1997 04 24.43					8.0	B		11	&10	S7	5	35	MIY01
1997 04 24.43	w	B	0.0	YG	0.0	E		1	&10	S7	10	25	MIY01
1997 04 24.44	!	M	-0.2	YG	3.0	B		8	10		5		KAT01
1997 04 24.44	a	S	0.0	YG	0.0	E		1	&10	7/	9	20	NAG08
1997 04 24.44	\$a	S	-0.1	AA	8.0	B		20		9	1.0	70	PEA
1997 04 24.44	\$a	S	-0.2	AA	0.0	E		1		9			PEA
1997 04 24.45	!	M	0.0	YG	3.0	B		8			5		KAT01
1997 04 24.46					5.0	B		7	&10	S7	7	35	MIY01
1997 04 24.76		B	0.4	AA	0.7	E		1	20	9	6	45	MEN03
1997 04 24.80		S	0.7	AA	0.0	E		1		S9	6.7	52	KOS
1997 04 24.81		S	0.4	AA	0.7	E		1			13	33	CSU
1997 04 24.81	a	0	-0.1	SP	0.0	E		1	20	7/	7	55	ZNO
1997 04 24.81	a	S	0.1	SC	0.6	E		1	10	8	8	30	OKS
1997 04 24.82		S	-0.1	AA	0.0	E		1	15	8	5	47	BAR
1997 04 24.82	a	M	-0.4	S	5	R		1	25	8	23	10	HOR02
1997 04 24.82	a	M	-0.4	S	5	R		1	50	8	20	5	PLS
1997 04 24.83	a	0	-0.3	S	0.0	E		1	35	8	8		MAN02
1997 04 24.85		B	0.5	SC	0.0	E		1	15	7	2		BIV
1997 04 24.90	!	B	-0.1	YG	0.7	E		1		8/	18		SKI
1997 04 24.93	!	B	-0.1	YG	0.7	E		1		7/	5		GRA04
1997 04 24.93	!	N	2.2	YG	5.0	B		10	13	7/	6	44	GRA04
1997 04 25.44	a	S	0.2	YG	0.0	E		1	&10	7/	8	20	NAG08
1997 04 25.44	a	S	0.2:	YG	3.5	B		7	11	7	10	20	NAG08
1997 04 25.47					5.0	B		7	&10	S7	15	35	MIY01
1997 04 25.48					8.0	B		11	&10	S7	10	35	MIY01
1997 04 25.76	Ga		-0.2	AA	0.8	E		1		8	13.2	355	HAS02
1997 04 25.77		B	0.4	AA	8.0	B		12	15	9	3	45	MEN03
1997 04 25.79		S	0.8	AA	0.0	E		1		S9	22	52	KOS
1997 04 25.92	!	B	-0.1	YG	0.7	E		1		8	20		SKI
1997 04 25.95	!	B	0.3	YG	0.7	E		1		8	12		GRA04
1997 04 25.95	!	N	2.3	YG	5.0	B		10	12	7	10	43	GRA04
1997 04 26.33	a	M	0.0	AA	5.0	B		10	6	7	8	m	SEA01
1997 04 26.34	a	I	-0.4	AA	0.0	E		1		9			SEA01
1997 04 26.42	a	B	0.8:	YG	0.0	E		1		8	0.5	40	YOS04
1997 04 26.44		S	0.2	S	15.0	R	5	25	17	7/	9		NAG02
1997 04 26.45	a	M	-0.2	YG	0.0	E		1					TSU02
1997 04 26.45	a	S	0.3	YG	0.0	E		1	&10	7/	6	20	NAG08
1997 04 26.46	a	B	0.0	YG	0.0	E		1			6	25	NAK01
1997 04 26.47	a	B	-0.2	Y	0.0	E		1			10	5	YOS02
1997 04 26.77		B	0.4	AA	8.0	B		12	15	9	2.5	50	MEN03
1997 04 26.88	!	B	0.3:	YG	0.7	E		1		8	3		SKI
1997 04 26.91	!	B	0.3	YG	0.7	E		1		8	20		GRA04
1997 04 26.93					5.0	B		10	15	7/	10	42	GRA04
1997 04 27.02		B	1.1	AC	5.0	B	4	7	0.5	9	14	0	NOW
1997 04 27.04			1.0	SC	0.0	E		1		S			DID
1997 04 27.09	fa	B	0.3	TI	0.0	E		1					BOR
1997 04 27.09	a	B	0.7	TI	5.0	N		1					BOR
1997 04 27.09	Ga	B	0.8	TI	0.0	E		1					BOR
1997 04 27.09	a	I	1.1	TI	0.0	E		1	9	9	20	47	BOR
1997 04 27.09	a	M	0.9	TI	5.0	B		7	10	9	8	47	BOR
1997 04 27.33	a	I	0.2	AA	0.0	E		1		9			SEA01

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 27.33	a	M	0.2	AA	5.0	B		10	10	7	30 m		SEA01
1997 04 27.75		B	0.5	AA	8.0	B		12	15	9	2	55	MEN03
1997 04 27.77	Ga		-0.1	AA	0.8	E		1			9.7	10	HAS02
1997 04 27.80		S	1.2	AA	0.0	E		1		S9	25	47	KOS
1997 04 27.82		S	0.0	AA	5.0	B		7	12	9	4	58	BAR
1997 04 27.84		B	0.6	SC	0.0	E		1	10	7			BIV
1997 04 27.87	!	B	0.4:	YG	0.7	E		1			2		SKI
1997 04 28.25	!	B	-0.3	YG	0.7	E		1		8/	21		DAH
1997 04 28.33		B	0.7	AA	0.0	E		1					SEA
1997 04 28.33	a	I	0.3	AA	0.0	E		1		8			SEA01
1997 04 28.33	a	M	0.4	AA	5.0	B		10	10	7	2.5		SEA01
1997 04 28.47	a	B	0.4	Y	0.0	E		1			12	0	YOS02
1997 04 28.77		B	0.5	AA	8.0	B		12	15	9	2	55	MEN03
1997 04 28.80	a	O	-0.3	S	0.0	E		1	30	7/	5		MAN02
1997 04 28.85		B	0.4	SC	0.0	E		1	15	7	2		BIV
1997 04 28.89	!	S	0.3	AA	7.0	B		16	9	7	2	49	TAY
1997 04 29.25	!	B	-0.3	YG	0.7	E		1		9	23		DAH
1997 04 29.33	a	I	0.3	AA	0.0	E		1		8	2		SEA01
1997 04 29.33	a	M	0.4	AA	5.0	B		10	10	8	5		SEA01
1997 04 29.45					5.0	B		7	& 8	S7	15	35	MIY01
1997 04 29.45					8.0	B		11	& 8	S7	8	35	MIY01
1997 04 29.45		S	0.4	S	15.0	R	5	25	16	7	7		NAG02
1997 04 29.45	a	B	0.3	YG	0.0	E		1	& 8	S7	15	35	MIY01
1997 04 29.80		O	0.5	SC	0.7	E		1			9		ROG02
1997 04 29.80	a	B	-0.1	S	0.0	E		1	20	8	10	20	TRI
1997 04 29.86	!	B	0.8	SC	0.7	E		1	15	7	5.4	44	SHA02
1997 04 29.88	G		1.3	UN	0.7	E		1		9	10		MCK
1997 04 29.89		B	0.8	YF	0.5	E		1	15	7	5	42	ENT
1997 04 29.89	!	B	0.3	AA	4.0	B		8	15	7	2	31	TAY
1997 04 29.89	!	B	0.4	YG	0.7	E		1		8	7		SKI
1997 04 29.91	!	M	0.4	YG	0.7	E		1		7/	6		GRA04
1997 04 29.91	!	N	2.5	YG	5.0	B		10	10	7/	8	52	GRA04
1997 04 30.05	Ga	B	0.8	TI	0.0	E		1					BOR
1997 04 30.05	fa	B	1.0	TI	0.0	E		1					BOR
1997 04 30.05	a	I	1.0	TI	0.0	E		1	9	9	13	49	BOR
1997 04 30.26	!	B	-0.1	YG	0.7	E		1		9	36		DAH
1997 04 30.33	a	I	-0.1	AA	0.0	E		1		S9	1.5		SEA01
1997 04 30.33	a	M	0.0	AA	5.0	B		10	9	S8	2.5		SEA01
1997 04 30.42		B	0.4	AA	0.0	E		1					SEA
1997 04 30.79	Ga		-0.1	AA	0.8	E		1			12.4	350	HAS02
1997 04 30.80		O	0.5	SC	0.7	E		1			8		ROG02
1997 04 30.81	a	B	0.1	S	0.0	E		1	20	8	12	20	TRI
1997 04 30.81	a	O	0.1	SP	0.0	E		1	20	7	11	35	ZNO
1997 04 30.82		S	0.3	AA	5.0	B		7	12	8/	4	65	BAR
1997 04 30.84	!	S	1.3	AA	0.7	E		1		8	2	80	COL03
1997 04 30.85		B	0.8	SC	0.0	E		1	10	6			BIV
1997 04 30.85		S	1.8	SC		A		0		9	3		L0001
1997 04 30.87	!	B	0.9	SC	0.7	E		1	15	7	7.9	41	SHA02
1997 04 30.89			0.3	AA	0.0	E		1	25	7	>4	40	DES01
1997 05 01.05	fa	B	0.0	Y	0.0	E		1		7/	&3		GRE
1997 05 01.27	!	B	-0.2	YG	0.7	E		1		9	36		DAH
1997 05 01.35		B	0.0	AA	0.0	E		1					SEA
1997 05 01.44	\$a	S	0.4	AA	0.0	E		1		9			PEA
1997 05 01.44	\$a	S	0.5	AA	8.0	B		20	9	9			PEA
1997 05 01.44	a	S	0.5	YG	0.0	E		1	&10	7/	3		NAG08
1997 05 01.45		S	0.5	S	15.0	R	5	25	16	7	7		NAG02
1997 05 01.83		S	0.4	AA	5.0	B		7	10	8	3	67	BAR
1997 05 01.84	G	S	0.6	S	0.8	E		1	12	6	3	24	LUE
1997 05 01.84	Gs		0.7	AA	0.6	E		1		S7			KAM01
1997 05 01.85		B	0.9	SC	0.0	E		1	15	7	3	55	BIV
1997 05 01.85	!		0.6:	AA	0.6	E		1	10	8	2.5	55	GIL01
1997 05 01.86		S	1.5	SC		A		0		8	8		L0001
1997 05 01.86	a	S	0.6	AA	5.0	B		10	10	8	4	40	MOE
1997 05 01.87	!	B	1.1	SP	0.7	E		1	15	7	8	41	SHA02
1997 05 01.87	a	B	0.1	AA	0.7	E		1		7	10	30	BOU

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 01.88		B	0.1	S	0.0	E		1	25	8	15	5	MAR02
1997 05 01.88		B	-0.3	S	0.0	E		1	20	8	10	0	SAN04
1997 05 01.88		M	0.2	S	5.0	B		7	10	S9	15		GON05
1997 05 01.89			0.4	AA	0.0	E		1	25	7/	5	40	DES01
1997 05 01.89	G		1.0	SC	0.7	E		1			3		HEN
1997 05 01.90	a		0.4	AA	0.0	E		1	15	9	2	45	LOU
1997 05 01.91	S		-0.1	AA	5.0	B		8	25	8	7	60	BEA
1997 05 02.21	a	S	0.7	AA	0.0	E		1	10	9	5	340	SPR
1997 05 02.33	a	I	0.1	AA	0.0	E		1		S8	0.8		SEA01
1997 05 02.33	a	M	0.2	AA	4.0	B		8	12	S8	2.3		SEA01
1997 05 02.80	a	0	0.7	S	0.0	E		1	20		3		LIB
1997 05 02.81	a	0	0.2	SP	0.0	E		1	25	7/	13	50	ZNO
1997 05 02.82	a	M	0.3	S	5	R		1	15	8/	7	30	HOR02
1997 05 02.85	s	B	0.4	SC	0.0	E		1	12	8	8	45	GLI
1997 05 02.85	s	M	0.9	AA	0.6	E		1		S7	6		MEY
1997 05 02.86	B		0.9	SC	0.0	E		1	15	7	16	60	BIV
1997 05 02.86	!		1.1:	AA	0.6	E		1	8	9	1.5	60	GIL01
1997 05 02.87	B		0.7:	YG	5.0	B		7		7/	0.5		SKI
1997 05 02.87	!	B	1.4	SP	0.7	E		1	15	7			SHAO2
1997 05 02.87	!	B	1.5	SP	5.0	B		7	12	8	1	47	SHAO2
1997 05 02.87	G\$		0.6	AA	0.6	E		1		S7	8	80	KAM01
1997 05 02.87	Ga		0.1	AT	0.0	E		1					PER01
1997 05 02.88	S		2.1	SC		A		0		8	3		LOO01
1997 05 02.88	Ga		0.1	AT	0.0	E		1					VIT01
1997 05 02.88	a	I	-0.3	AT	0.0	E		1					PER01
1997 05 02.88	a	I	-0.4	AT	0.0	E		1			12	10	VIT01
1997 05 02.88	a	M	0.4	AT	3.4	B		9					VIT01
1997 05 02.88	a	M	1.0:	AT	3.4	B		9					PER01
1997 05 02.90			0.4	AA	0.0	E		1	25	8	5	40	DES01
1997 05 02.90	!	M	0.8	YG	0.7	E		1		7/	3		GRA04
1997 05 02.90	!	N	2.3	YG	5.0	B		10	8	7/	4	53	GRA04
1997 05 02.90	!	S	0.2	AA	4.0	B		8	11	7	2.1	29	TAY
1997 05 03.06	fa	B	0.3	Y	0.0	E		1		7/	&8		GRE
1997 05 03.33	a	I	0.2	AA	0.0	E		1		S			SEA01
1997 05 03.33	a	M	0.3	AA	5.0	B		10	9	S8	0.3		SEA01
1997 05 03.45	\$a	S	0.6	AA	0.0	E		1		9			PEA
1997 05 03.45	\$a	S	0.6	AA	8.0	B		20		9	2	80	PEA
1997 05 03.77	a	B	0.1	SC	0.0	E		1		8			RAD01
1997 05 03.83	S		0.4	AA	5.0	B		7	12	8/	4	70	BAR
1997 05 03.83	!	S	1.4	AA	0.7	E		1		8	2	70	COL03
1997 05 03.84	Ga		-0.1	AA	0.8	E		1			9.6	10	HAS02
1997 05 03.85	\$	B	0.3:	AA	0.0	E		1		7	3	45	CHE03
1997 05 03.88	!	M	0.7	YG	0.7	E		1		7	1		GRA04
1997 05 03.88	!	M	2.7	YG	3.5	B		7	9	7/	1.5	55	GRA04
1997 05 03.89			0.4	AT	0.0	E		1	20	8	>5	50	DES01
1997 05 03.89	B		0.7:	YG	0.7	E		1					SKI
1997 05 04.44					8.0	B		11	& 8	S7	2	55	MIY01
1997 05 04.44	a	B	0.8	YG	0.0	E		1	& 8	S7	5	50	MIY01
1997 05 04.44	\$a	S	0.7	AA	0.0	E		1		9			PEA
1997 05 04.44	\$a	S	0.8	AA	8.0	B		20		9	2	80	PEA
1997 05 04.44	s	S	0.7	YG	5.6	B		8	& 6	8	1		NAN02
1997 05 04.45	S		0.7	S	15.0	R	5	25	15	7	6		NAG02
1997 05 04.45	!	M	0.8	YG	3.0	B		8					KAT01
1997 05 04.45	a	S	0.9	YG	0.0	E		1	& 8	7/	&2		NAG08
1997 05 04.45	a	S	0.9	YG	3.5	B		7	& 7	7/	5		NAG08
1997 05 04.46	a	B	1.1	Y	0.0	E		1			3		YOS02
1997 05 04.46	a	M	1.1	Y	3.5	B		7	10	8	2.5	40	YOS02
1997 05 04.46	s	M	0.3	YG	0.0	E		1					TSU02
1997 05 04.77	a	B	0.1	SC	0.0	E		1		8			RAD01
1997 05 04.78	a	B	0.1	SC	0.0	E		1			7		BOJ01
1997 05 04.80	S		1.6	AA	0.0	E		1		S8	13	3	KOS
1997 05 04.81	s	0	0.5	SP	0.0	E		1	20	7	7	55	ZNO
1997 05 04.82	a	0	0.9	S	0.0	E		1	20		2		LIB
1997 05 04.83	\$	B	0.5	AA	0.0	E		1		7	3	45	CHE03
1997 05 04.84	s	B	0.5	SC	0.0	E		1	12	8			GLI

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 04.86	G!		1.8	UN	0.7	E		1	21	9	6		MCK
1997 05 04.88	!	B	0.8	AA	4.0	B		8	11	6	1.5	40	TAY
1997 05 04.88	!	S	1.0:	SP	5.0	B		7	10	8	1	69	SHA02
1997 05 04.89			0.4	AT	0.0	E		1	25	7/	>5	50	DES01
1997 05 04.89	!	B	1.1	SP	0.7	E		1	12	8	3	42	SHA02
1997 05 04.92		B	1.0	AA	5.0	B		7	45	8	2.5		KRY02
1997 05 04.93		B	1.3	AA	6.0	B		20	30	7	2		CER
1997 05 05.05	fa	B	0.5	Y	0.0	E		1		7/	&5		GRE
1997 05 05.06	Ga	B	1.0	TI	0.0	E		1					BOR
1997 05 05.06	a	I	1.4	TI	0.0	E		1	10	8			BOR
1997 05 05.06	a	M	1.0	TI	5.0	B		7	14	9	7.5	60	BOR
1997 05 05.44	\$a	S	0.8	AA	0.0	E		1		9			PEA
1997 05 05.44	\$a	S	0.9	AA	8.0	B		20	9	9	2	75	PEA
1997 05 05.45	a	S	0.9	YG	0.0	E		1	& 8	7/	6		NAG08
1997 05 05.76	a	B	0.2	SC	0.0	E		1		8			RAD01
1997 05 05.80		S	1.6	AA	0.0	E		1		S8	14	3	KOS
1997 05 05.88		M	0.4	S	5.0	B		7	10	S9	12		GON05
1997 05 05.90			0.6	AT	0.0	E		1	20	7/	>5	50	DES01
1997 05 06.34		B	0.6:	AA	0.0	E		1					SEA
1997 05 06.44	\$a	S	0.8	AA	0.0	E		1		9			PEA
1997 05 06.45	-	S	1.0	S	15.0	R	5	25	18	7/	6		NAG02
1997 05 06.45	a	S	0.8	YG	0.0	E		1		8	&1	40	NAG08
1997 05 06.45	a	S	0.9	YG	3.5	B		7	5	7/	6	40	NAG08
1997 05 06.80		0	1.2	SC	0.7	E		1					ROG02
1997 05 06.82		S	0.4	AA	5.0	B		7	10	7/	4	77	BAR
1997 05 06.87	G!		1.3	UN	0.7	E		1		9	1.5		MCK
1997 05 06.88	!	S	1.3	SP	0.7	E		1	12	7	2	51	SHA02
1997 05 06.89		S	2.3	SC		A		0		9			LOO01
1997 05 07.05	Ga	B	1.1	TI	0.0	E		1					BOR
1997 05 07.05	a	I	1.2	TI	0.0	E		1	10	9			BOR
1997 05 07.33	a	I	0.5	AA	0.0	E		1		S	0.3		SEA01
1997 05 07.33	a	M	0.6	AA	5.0	B		10	9	S8	1		SEA01
1997 05 07.84		S	0.5	S	5.0	B		10	9	8	3	80	LUE
1997 05 07.84	a	B	0.8:	SC	0.0	E		1	12	8	3	50	GLI
1997 05 07.85	G	S	0.7	S	0.8	E		1	9	8	2	80	LUE
1997 05 07.85	a	S	0.9	AA	5.0	B		10	9	7	1.5	60	MOE
1997 05 07.86		B	1.3	SC	0.0	E		1	10	6			BIV
1997 05 07.89			0.8	AT	0.0	E		1	20	7	>5	50	DES01
1997 05 08.21	a	S	0.9	AA	0.0	E		1	9	9	2	80	SPR
1997 05 08.35		B	0.5	AA	0.0	E		1					SEA
1997 05 08.82		S	0.5	AA	5.0	B		7	10	7	3.5	80	BAR
1997 05 08.84	G\$		1.1:	AA	0.6	E		1		S7			KAM01
1997 05 08.84	a	B	0.6	SC	0.0	E		1	12	7/	1	55	GLI
1997 05 08.85	a	B	0.9	S	0.0	E		1	15	8	5	25	TRI
1997 05 08.89			0.8	AT	0.0	E		1	20	7	>5	50	DES01
1997 05 09.34	a	I	0.4	AA	0.0	E		1		S8	0.5		SEA01
1997 05 09.34	a	M	0.4	AA	5.0	B		10	11	S7/	1.2		SEA01
1997 05 09.43	a	S	1.1	YG	5.6	B		8	& 6	8	1		NAN02
1997 05 09.44	!	M	1.0	YG	3.0	B		8					KAT01
1997 05 09.45					5.0	B		7	& 8	S7	7	50	MIY01
1997 05 09.45		S	1.3	S	15.0	R	5	25	12	7	4		NAG02
1997 05 09.45	a	B	1.1	YG	0.0	E		1	& 8	S7	5	40	MIY01
1997 05 09.45	a	I	1.1	YG	0.0	E		1		9			YOS04
1997 05 09.45	a	M	1.2:	YG	3.5	B		7					TSU02
1997 05 09.46	\$	S	1.0	YG	0.0	E		1		8	1	40	NAG08
1997 05 09.47	a	M	1.1	Y	3.5	B		7	& 8	8	2.0	50	YOS02
1997 05 09.82		S	0.6	AA	5.0	B		7	10	7	3	83	BAR
1997 05 09.85	a	B	1.0	S	0.0	E		1	15	8	4	25	TRI
1997 05 09.87	G!		1.3	UN	0.7	E		1		8/			MCK
1997 05 09.89	G!		0.6:	SP	0.7	E		1	6	7			SHA02
1997 05 09.90			0.9	AT	0.0	E		1	20	7	5	50	DES01
1997 05 10.33	a	I	0.5	AA	0.0	E		1		S	0.2		SEA01
1997 05 10.33	a	M	0.6	AA	5.0	B		10	8	S7/	0.8		SEA01
1997 05 10.43	a	S	1.1	YG	5.6	B		8	& 6	8			NAN02
1997 05 10.45	a	S	1.2:	YG	0.0	E		1		8	&1	50	NAG08

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.	
1997 05 10.45	a	S	1.5:	YG	3.5	B		7	& 7	7	&3	50	NAG08	
1997 05 10.81	a	O	0.8	SP	0.0	E		1	20	7/	>3		ZNO	
1997 05 10.82	\$	B	1.3:	AA	0.0	E		1		8	0.3		CHE03	
1997 05 10.82	\$	S	0.9:	SC	3.0	B		4	10	8/	2	60	OKS	
1997 05 10.82	a	M	0.4:	S	5	R		1	15	8/			PLS	
1997 05 10.82	a	M	0.5:	S	5	R		1	15	7/			HOR02	
1997 05 10.87	a\$	I	0.4	AT	0.0	E		1					PER01	
1997 05 10.87	a\$	I	0.6	AT	0.0	E		1					VIT01	
1997 05 10.89			0.9	AT	0.0	E		1	20	8	5	50	DES01	
1997 05 10.90	a	S	0.5	AA	5.0	B		7	15	8/	2	47	LOU	
1997 05 11.20	a	S	1.2	AA	5.0	B		7	8	9	1	90	SPR	
1997 05 11.81	\$	B	0.8:	AA	4.0	B		12	& 5	6			CHE03	
1997 05 11.82	\$	S	0.7:	SC	5.0	B		7	10	8	1	65	OKS	
1997 05 12.05	%a	B	1.3	Y	5.0	B		12		6/			GRE	
1997 05 12.05	%a	I	1.0	Y	0.0	E		1					GRE	
1997 05 12.05	%a	M	1.2	Y	5.0	B		12		6/			GRE	
1997 05 12.33	a	I	1.2	AA	0.0	E		1		S	0.2		SEA01	
1997 05 12.35	B		0.4	AA	0.0	E		1			4		SEA	
1997 05 12.84	\$	I	0.8:	SC	0.0	E		1	6	7			GLI	
1997 05 12.88	!	S	0.4:	SP	5.0	B		7	6	7			SHA02	
1997 05 12.89			1.0	AT	0.0	E		1	15	8	>4.5	55	DES01	
1997 05 13.83	\$	M	0.8:	SC	5.0	B		10	5	7	0.2	100	GLI	
1997 05 13.84	B		1.3	SC	0.0	E		1	15	6	1	80	BIV	
1997 05 13.87	a\$	I	1.3	AT	0.0	E		1					VIT01	
1997 05 13.87	a\$	I	1.6	AT	0.0	E		1			3		PER01	
1997 05 13.90			1.2	AT	0.0	E		1	15	8	>4.5	55	DES01	
1997 05 16.87	a\$	I	1.7	AT	0.0	E		1					PER01	
1997 05 17.33	!	S	1.0	SC	0.0	E		1	&10	D9	2		LOV	
1997 05 17.33	a	I	1.0	AA	0.0	E		1		S			SEA01	
1997 05 17.34	B		0.8	AA	0.0	E		1			&4		SEA	
1997 05 17.46	S		1.9	S	15.0	R	5	25	10	8	3		NAG02	
1997 05 17.46	\$	S	1.7:	YG	3.5	B		7		7/	&0.5	80	NAG08	
1997 05 17.85	B		1.6	SC	0.0	E		1	15	6			BIV	
1997 05 17.90			1.5	AT	0.0	E		1	15	7/	>4	55	DES01	
1997 05 18.34	a	I	0.5	AA	0.0	E		1		S	0.2		SEA01	
1997 05 18.85	B		1.6	SC	0.0	E		1	8	6			BIV	
1997 05 18.91			1.5	AT	0.0	E		1	15	7/	>4	55	DES01	
1997 05 19.32	a	I	1.9	AA	0.0	E		1					SEA01	
1997 05 19.33	!	S	1.3	SC	0.0	E		1	&10	D9	3		LOV	
1997 05 19.34	a	M	1.1	AA	5.0	B		10	9	7	1.5		SEA01	
1997 05 19.89			1.6	AT	0.0	E		1	15	7	>4	55	DES01	
1997 05 20.32	a	I	1.6	AA	0.0	E		1		6	0.6		SEA01	
1997 05 20.45	S		2.0	S	15.0	R	5	25	8	8	1		NAG02	
1997 05 20.89			1.6	AT	0.0	E		1	15	7/	>4	55	DES01	
1997 05 21.32	a	I	1.5	AA	0.0	E		1					SEA01	
1997 05 21.45	S		2.0	S	15.0	R	5	25	8	7/	1.2		NAG02	
1997 05 21.45	a	M	2.0:	YG	3.5	B		7					TSU02	
1997 05 23.33	a	I	1.6	AA	0.0	E		1					SEA01	
1997 05 24.33	a	M	1.3	AA	5.0	B		10					SEA01	
1997 05 24.34	B		1.2	AA	1.0	E		1					SEA	
1997 05 25.33	a	I	1.6	AA	0.0	E		1	10	8	20	m	35	SEA01
1997 05 25.34	!	S	1.3	SC	0.0	E		1	&10	D9	5		LOV	
1997 05 26.33	a	I	2.1	AA	0.0	E		1					SEA01	
1997 05 26.33	a	M	1.8	AA	5.0	B		10	8	7	2	50	SEA01	
1997 05 26.35	!	S	1.3	SC	0.0	E		1	&10	D9	1		LOV	
1997 05 26.91	B		1.0	AA	5.0	B		7	30	6	2.0		KRY02	
1997 05 27.33	a	I	2.2	AA	0.0	E		1					SEA01	
1997 05 27.34	B		1.3	AA	0.0	E		1			&2		SEA	
1997 05 27.34	!	S	1.3	SC	0.0	E		1	&10	D9	4		LOV	
1997 05 28.33	B		1.4	AA	0.0	E		1					SEA	
1997 05 28.33	a	I	2.1	AA	0.0	E		1					SEA01	
1997 05 28.34	a	M	2.0	AA	5.0	B		10	10	7	5.5	50	SEA01	
1997 05 28.44	\$a	S	1.8	AA	0.0	E		1		8			PEA	
1997 05 28.44	\$a	S	1.8	AA	8.0	B		20	8	8	2	125	PEA	
1997 05 28.91	B		1.2	AA	5.0	B		7	30	5	1.7		KRY02	

Comet C/1995 01 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 29.44	\$a	S	1.8	AA	0.0	E		1		8			PEA
1997 05 29.89			1.6	AT	0.0	E		1	20	7/	3	70	DES01
1997 05 29.90	a	S	1.6	AA	0.0	E		1	20	6	2	88	LOU
1997 05 30.34		B	1.6	AA	0.0	E		1			&6		SEA
1997 05 31.34		B	1.6	AA	0.0	E		1					SEA
1997 05 31.34	a	I	1.5	AA	0.0	E		1			0.5	30	SEA01
1997 05 31.89			1.7	AT	0.0	E		1	20	7/	3	75	DES01
1997 06 01.33		B	1.6	AA	0.0	E		1					SEA
1997 06 01.33		I	2.0	AA	0.0	E		1					SEA01
1997 06 01.90			1.7	AT	0.0	E		1	20	7/	3	75	DES01
1997 06 02.33		B	1.7	AA	0.0	E		1					SEA
1997 06 02.33	a	I	2.0	AA	0.0	E		1					SEA01
1997 06 02.43	\$a	S	2.0	AA	0.0	E		1		8			PEA
1997 06 03.33	a	I	1.7	AA	0.0	E		1					SEA01
1997 06 03.34		B	1.6	AA	0.0	E		1					SEA
1997 06 03.43	\$a	S	2.4	AA	0.0	E		1		8			PEA
1997 06 04.32	a	I	2.4	AA	0.0	E		1					SEA01
1997 06 04.33		B	1.7	AA	0.0	E		1					SEA
1997 06 05.32	a	I	2.0	AA	0.0	E		1					SEA01
1997 06 05.33		B	1.8	AA	0.0	E		1					SEA
1997 06 06.33	a	M	1.9	AA	5.0	B		10	10	7	1.9	30	SEA01
1997 06 07.32	a	I	2.2	AA	0.0	E		1					SEA01
1997 06 07.34		B	1.6	AA	0.0	E		1					SEA
1997 06 07.88		S	2.1	AT	8.0	B		11	15	6/	>2.5	135	DES01
1997 06 07.89	a	S	2.2	AA	8.0	B		20	15	5/	2	110	LOU
1997 06 08.33	a	I	1.8	AA	0.0	E		1					SEA01
1997 06 09.33	a	I	1.9	AA	0.0	E		1					SEA01
1997 06 09.33	a	M	2.0	AA	5.0	B		10	8	7	40 m	30	SEA01
1997 06 09.34		B	1.7	AA	0.0	E		1					SEA
1997 06 09.43	\$a	S	2.6	AA	8.0	B		20	8	8	1.0	130	PEA
1997 06 14.34		B	2.0	AA	0.0	E		1					SEA
1997 06 14.44	\$a	S	2.7	AA	8.0	B		20	9	7	0.5	155	PEA
1997 06 15.44	\$a	S	2.5	AA	8.0	B		20	9	6/	0.5	140	PEA
1997 06 16.44	\$a	S	2.7	AA	8.0	B		20	8	7	0.3	140	PEA
1997 06 17.44	\$a	S	2.8	AA	8.0	B		20		7			PEA
1997 06 23.44	\$a	S	2.8	AA	8.0	B		20		7			PEA
1997 07 09.82	w	S	2.9	AA	0.0	E		1					SEA
1997 07 10.92	\$a	S	3.3	AA	8.0	B		20	4	7	0.5	190	PEA
1997 07 11.92	\$a	S	3.6	AA	8.0	B		20	5	7	0.5	195	PEA
1997 07 14.82	w	B	3.4	AA	0.0	E		1					SEA
1997 07 14.92	\$a	S	3.8	AA	8.0	B		20	5	7	0.4	200	PEA
1997 07 15.38		B	4.1	AA	5.0	B		7	18	4	0.9		KRY02
1997 07 16.82	w	B	3.1	AA	0.0	E		1					SEA
1997 07 16.92	\$a	S	3.9	AA	8.0	B		20	3.5	7	0.35	200	PEA
1997 07 24.35		S	3.9	AA	8.0	B		11	15	6	>2.5	205	DES01
1997 07 25.35		S	3.9	AA	8.0	B		11	15	6/	>2.5	210	DES01
1997 07 26.35		S	3.9	AA	8.0	B		11	15	6	>2.5	210	DES01
1997 07 27.35		S	4.0	AA	8.0	B		11	15	6/	>2.5	210	DES01
1997 07 28.35		S	4.0	AA	5.0	B		7	15	5			SOU01
1997 07 28.35		S	4.0	AA	8.0	B		11	15	5/	>2.5	210	DES01
1997 07 29.34		S	4.0	AA	8.0	B		11	15	5/	>2.5	210	DES01
1997 07 30.35		S	4.0	AA	8.0	B		11	15	5/	>2.5	210	DES01

Comet C/1995 Y1 (Hyakutake)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 01 31.58		S	8.4	S	20	T	10	63	3.1	5			PRY
1996 02 15.57		S	8.6	S	20	T	10	63	3.2	5			PRY
1996 02 17.31		B	8.4	S	7.0	B		10	7.2	6			DEA
1996 02 26.15		M	8.8	S	10.0	B	4	25	7	3			LEH
1996 02 29.57		S	8.5	S	20	T	10	63	3.4	5			PRY
1996 03 02.57		S	8.6	S	20	T	10	63	3.5	4			PRY

Comet C/1996 B1 (Szczepanski)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 02 07.15		M	10.8	TI	20	R	17	140	3	3			LEH
1996 02 09.95		M	10.2	TI	20	R	17	140	3	3			LEH
1996 02 10.26		S	8.6	AA	20	T	10	63	5.6	2			PRY
1996 02 11.29		S	8.5	AA	20	T	10	63	5.5	2			PRY
1996 02 13.01		S	9.0	HS	40.0	L	5	77	6.0	4			POY
1996 02 15.58		S	8.1	S	20	T	10	63	5.7	2			PRY
1996 02 18.23		S	8.6	S	7.0	B		10	11.2	3			DEA
1996 02 25.82		M	8.5	S	10.0	B	4	25	11.5	4			LEH
1996 02 26.02		S	8.0	SC	5.0	B		10	9	0			FRA01
1996 02 26.17		M	8.4	S	10.0	B	4	25	12	4			LEH
1996 02 27.06		S	9.4	HS	40.0	L	5	77	8.0	4			POY
1996 02 29.56		S	8.4	S	20	T	10	63	5.4	2			PRY
1996 03 01.80		M	8.4	S	10.0	B	4	25	10	4			LEH
1996 03 02.56		S	8.0	S	20	T	10	63	5.4	2			PRY
1996 03 08.87		M	8.6	S	10.0	B	4	25	12	3			LEH
1996 03 09.79		M	8.7	S	10.0	B	4	25	10	2			LEH
1996 03 15.90		M	8.2	S	10.0	B	4	25	14	2			LEH
1996 03 16.07		S	8.5	AA	7.0	B		10	13.2	3			DEA
1996 03 17.88		M	8.3	S	10.0	B	4	25	12	2			LEH
1996 03 19.02		S	8.5	AA	7.0	B		10	9.9	4			DEA
1996 03 20.94		M	8.5	S	10.0	B	4	25	10	2			LEH

Comet C/1996 B2 (Hyakutake)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 02 07.18		M	10.6	TI	20	R	17	140	3	4			LEH
1996 02 26.09		M	7.6	S	10.0	B	4	25	12	4/			LEH
1996 02 27.20		S	7.5	AA	8.0	B		11	5.3	7	0.16	270	BUL01
1996 02 29.54		S	6.9	S	20	T	10	63	4.7	7	2 m	280	PRY
1996 03 02.55		S	6.4	S	20	T	10	63	5.1	7	3 m	280	PRY
1996 03 09.11		M	5.4	S	10.0	B	4	25	15	4			LEH
1996 03 12.43		O	5.0	YF	5.0	B		10					KOH
1996 03 13.38		O	4.9	YF	5.0	B		10					KOH
1996 03 16.01	G		4.0	S	0.8	E		1	20	4			LEH
1996 03 16.03					10.0	B	4	25	14	4	31 m	287	LEH
1996 03 16.30		S	3.7	SC	0.0	E		1			1	293	HIL03
1996 03 18.28		S	3.4	SC	0.0	E		1			3		HIL03
1996 03 19.07		M	2.5	S	0.8	E		1	60	4			LEH
1996 03 19.27		S	2.8	SC	0.0	E		1			3.8		HIL03
1996 03 20.15					8.0	B		11	50	3	2.5	295	GUB
1996 03 20.26		S	2.3	SC	0.0	E		1			4		HIL03
1996 03 21.01		M	1.9	S	0.8	E		1	90	5	3	270	LEH
1996 03 21.12					8.0	B		10	60	7/	8	270	LEH
1996 03 21.90		M	1.6	S	0.8	E		1	120	5	3	275	LEH
1996 03 23.16		S	1.0	SC	0.0	E		1			20		HIL03
1996 03 24.01		S	-0.1	AA	5.0	B		7	50	3	2	224	OWE
1996 03 24.91		M	0.2	S	0.8	E		1	180	5	20	230	LEH
1996 03 25.27		S	0.5	SC	0.0	E		1			40		HIL03
1996 03 25.29	G		0.5	SC	0.0	E		1	50	4	47	215	PRY
1996 03 25.87					8.0	B		11	45	1	12	205	GUB
1996 03 25.89		M	0.0	S	0.8	E		1	240	5	30	210	LEH
1996 03 26.13		S	0.8	SC	0.0	E		1			45		HIL03
1996 03 27.16		S	1.0	SC	0.0	E		1			30		HIL03
1996 03 27.92		M	0.2	S	0.8	E		1	180	5	45	64	LEH
1996 03 29.86		M	1.6	S	0.8	E		1	180	6	>5		LEH
1996 03 29.96		S	1.0	AA	5.0	B		7	24	3	3.5	48	OWE
1996 03 30.19		S	0.3	AA	5.0	B		7	25	5	2	92	OWE
1996 03 30.83		M	2.0	S	0.8	E		1	120	6	>10		LEH
1996 03 30.84					8.0	B		11	25	2	12	320	GUB
1996 03 31.82		M	2.2	S	0.8	E		1	120	6	>10		LEH
1996 04 01.80		M	2.4	S	0.8	E		1	90	6	>10		LEH
1996 04 01.87		S	0.3	AA	5.0	B		7	18	5	4	49	OWE
1996 04 02.87		S	0.9	AA	5.0	B		7	15	5	2	62	OWE
1996 04 04.91		S	1.6	AA	5.0	B		7	10	5	2	53	OWE
1996 04 05.88		S	2.1	AA	5.0	B		7	10	5	4.5	51	OWE

Comet C/1996 B2 (Hyakutake) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 04 06.80		M	2.7	S	0.8	E		1	30	6	>20	49	LEH
1996 04 07.80		M	2.6	S	0.8	E		1	30	6	>20	50	LEH
1996 04 07.86		S	2.5	AA	5.0	B		7	8	5	2.5	50	OWE
1996 04 09.81		M	2.4	S	0.8	E		1	30	6	>20	50	LEH
1996 04 10.88		S	2.9	AA	5.0	B		7	5	5	4	44	OWE
1996 04 15.82		M	2.0	S	0.8	E		1	30	8	30	40	LEH
1996 04 15.82	a	M	2.2	AA	8.0	B		11	12	7	6	325	GUB
1996 04 16.24		S	2.9	SC	5.0	B		10	7	7	7	41	PRY
1996 04 16.81		M	2.0	S	0.8	E		1	30	8	>20	40	LEH
1996 04 17.82		M	2.1	S	0.8	E		1	30	8	>20	40	LEH
1996 04 18.25		S	3.0	SC	5.0	B		10	7	7	8	38	PRY
1996 04 18.81		M	2.2	S	0.8	E		1	20	6	>10	40	LEH
1996 04 19.81		M	2.2	S	0.8	E		1	20	6	>10	40	LEH
1996 04 20.24		S	3.2	SC	5.0	B		10	5	7	2.5	35	PRY
1996 04 20.81		M	2.0	S	0.8	E		1	20	6	>5		LEH
1996 04 21.25		S	3.5	SC	5.0	B		10	4	7	2	34	PRY
1996 04 21.81		M	1.9	S	0.8	E		1	20	6	>5		LEH
1996 04 22.82		M	1.9	S	0.8	E		1	20	7	>5		LEH

Comet C/1996 E1 (NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 08 10.04		M	10.5	TI	20	R	17	140	2	3/			LEH
1996 08 11.06		M	10.9	TI	20	R	17	140	3	2/			LEH
1996 09 19.86		M	11.2	TI	20	R	17	87	3	2/			LEH

Comet C/1996 J1 (Evans-Drinkwater)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 07 13.98		S	13.6	HS	35	L	5	237	0.8	2/			HOR02

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 06 16.05	!	V	15.7:	YF	36.0	T	7	a120	+ 0.6	2			MIK

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 06 16.05	!	V	15.9	YF	36.0	T	7	a120	+ 0.4	8			MIK

Comet C/1996 N1 (Brewington)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 08.94		S	8.5	S	7.0	B		10	7.2	2			DEA
1996 07 09.95		S	9.1	S	7.0	B		10	7.0	0			DEA
1996 07 21.11		S	8.8	AC	15	R	5	42	5	3			MOR03
1996 08 05.10		S	8.7	AC	15	R	5	42	4	3			MOR03
1996 08 05.92		B	7.9	S	7.0	B		10	4.8	2			DEA
1996 08 09.10		S	8.6	AC	15	R	5	42	5	3			MOR03
1996 08 11.10		S	8.3	AC	15	R	5	42	5.5	4			MOR03
1996 08 14.10		S	8.6	AC	15	R	5	42	5.5	4			MOR03
1996 08 19.08		S	8.7	AC	15	R	5	42	4	4			MOR03
1996 09 01.06		S	8.8	AC	15	R	5	42	5	3			MOR03
1996 09 03.06		S	9.0	AC	15	R	5	42	4	3			MOR03
1996 09 14.82		S	9.5	GA	8.0	B		15	6	2			HAV
1996 09 19.16		S	10.5	AC	15	R	5	42	3.5	0			MOR03

Comet C/1996 Q1 (Tabur)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 06.11		S	8.6	AA	25.2	L	4	53	7	7			L0001
1996 09 08.09		S	8.3	AC	25.2	L	4	53	7	4			L0001
1996 09 11.12		S	8.0	AA	10.0	B		14	7	5			L0001
1996 09 11.29		S	8.0	GA	25.4	L	4	46	5	3			DID

Comet C/1996 Q1 (Tabur) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 13.14		S	7.7	AA	10.0	B		14	8	4			L0001
1996 09 15.32		S	7.0	SC	25.4	L	4	46	8	4			DID
1996 09 16.12		S	7.2	AA	10.0	B		14	6	6			L0001
1996 09 16.31		S	7.1	S	7.0	B		10	12	4			DEA
1996 09 17.10		S	7.0	AA	10.0	B		14	7	5			L0001
1996 09 18.10		S	6.7	AA	10.0	B		14	6	5			L0001
1996 09 18.36		S	7.1	AC	3.5	B		7	6				MOR03
1996 09 19.13		S	7.0:	SC	6.3	B		9	5	2			DIN01
1996 09 19.36		S	7.0	SC	25.4	L	4	46	8	4			DID
1996 09 19.37		S	7.2	AC	3.5	B		7	9.5				MOR03
1996 09 20.27		S	6.8	SC	25.4	L	4	46	10	5			DID
1996 09 21.15		S	7.0:	SC	6.3	B		9	5	2			DIN01
1996 09 21.31		S	6.8	SC	25.4	L	4	46	8	5	70.3	260	DID
1996 09 21.31		S	7.4	S	7.0	B		10	9.6	5			DEA
1996 09 23.14		S	6.5:	SC	6.3	B		9	6	3			DIN01
1996 09 24.30		S	6.3	S	7.0	B		10	11	5			DEA
1996 09 24.35		S	6.5	SC	25.4	L	4	46	8	5	70.5	260	DID
1996 09 26.39		S	6.0	AC	3.5	B		7	8.5	2			MOR03
1996 09 27.14		S	6.0:	SC	6.3	B		9	10	2/			DIN01
1996 09 30.00		S	5.9	AA	6.0	B		20	11	3/			CSU
1996 09 30.41		S	5.8	AC	3.5	B		7	12.5	3			MOR03
1996 10 01.36		S	5.5	SC	6.0	R		16	10	3			DID
1996 10 01.41		S	5.8	AC	3.5	B		7	10	3			MOR03
1996 10 02.06		S	5.5	AA	6.0	B		20	10	4			CSU
1996 10 02.12		S	5.3	AA	6.3	R	13	52	26	4	2	305	KOS
1996 10 03.28		S	5.7	AC	3.5	B		7	9.5	3			MOR03
1996 10 04.13		S	5.6	AA	6.0	B		20	10	4/	0.58	285	CSU
1996 10 04.15		S	5.0	AA	5.0	B		7	25	4	3	300	KOS
1996 10 05.18		S	5.2	AA	10.0	B		14	10	6	0.3		L0001
1996 10 05.30		S	5.4	SC	25.4	L	4	46	8	5	0.6	325	DID
1996 10 05.41		S	5.6	AC	3.5	B		7	13	4			MOR03
1996 10 06.14		S	5.1	AA	5.0	B		7	20	5	6	280	KOS
1996 10 06.19		B	5.2	AC	10.0	B	4	20	12	5	2.5	315	NOW
1996 10 06.21		S	5.5:	SC	6.3	B		9	5	2/			DIN01
1996 10 06.41		S	5.4	AC	3.5	B		7	12	4			MOR03
1996 10 06.97		S	5.1	AA	5.0	B		10	23	6	0.8		L0001
1996 10 08.02		B	6.2	AA	3.0	B		8	14	2			SER
1996 10 08.15		S	5.0	AA	5.0	B		10	13	6	0.3		L0001
1996 10 08.74		K	5.9	AA	11.0	B		20	14	5			SEM
1996 10 08.92		K	5.8	AA	11.0	B		20	15	5			SEM
1996 10 09.06		S	4.9	AA	5.0	B		7	20	5	6.1	296	KOS
1996 10 11.38		S	5.7	AA	3.5	B		7	12	4			MOR03
1996 10 11.44		B	5.1	AA	8.0	B		11	15	2	0.5	250	SCH12
1996 10 12.14		S	5.6	AA	5.0	B		7	16	3	3.5	315	KOS
1996 10 12.20		S	6.3	SC	6.3	B		9	6	4	0.50	55	DIN01
1996 10 12.31		S	5.0	SC	25.4	L	4	46	15	6		335	DID
1996 10 12.35		B	5.6	AC	10.0	B	4	20	10	6	1	45	NOW
1996 10 12.41		B	5.4	AA	8.0	B		11	12	2			SCH12
1996 10 12.41		S	6.1	AA	3.5	B		7	13	3			MOR03
1996 10 12.97		S	5.0	SC	5.0	B		10					DID
1996 10 13.18		S	5.3	AA	5.0	B		10	13	6	0.5		L0001
1996 10 13.81		B	6.0	AA	3.0	B		8	20	5			SER
1996 10 14.00		S	5.0	SC	25.4	L	4	46	10	6			DID
1996 10 14.12		S	5.4	AA	5.0	B		7	16	5	3	325	KOS
1996 10 14.18		S	5.6	AA	3.0	B		8	34	6			L0001
1996 10 14.78		S	5.5	AA	6.0	B		20	9	3/			CSU
1996 10 15.13		S	5.5	AA	6.3	R	13	52	16	5	3.8	314	KOS
1996 10 15.40		S	5.0	SC	25.4	L	4	46	8	8	0.6	315	DID
1996 10 15.40		S	5.9	AA	3.5	B		7	9.5	5			MOR03
1996 10 15.45		B	5.7	AA	8.0	B		11	10	2			SCH12
1996 10 15.71		B	5.7:	AA	3.0	B		8	15	3			SER
1996 10 15.81		S	5.7	SC	6.3	B		9	6	3			DIN01
1996 10 16.09		S	5.8	AA	5.0	B		7	13	5	3	300	KOS
1996 10 16.11		B	5.9	AA	3.0	B		8	21	3			SER
1996 10 18.11		S	5.5	AA	5.0	R		10	7	6	0.5	348	L0001

Comet C/1996 Q1 (Tabur) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 10 20.13		S	6.8	AA	8.0	B		15	8.5	3/	0.9	345	HAV
1996 10 23.30		S	7.6	AA	10.0	R		14	5	3			L0001
1996 10 23.76		S	8.0	SC	10.0	R		14	3	2			L0001
1996 10 24.15		S	7.9	SC	25.2	L	4	53	3	2	1	0	L0001
1996 10 29.26		S	9.3	AC	25.2	L	4	53	2	2			L0001
1996 11 19.17		S	10.5	AA	6.3	R	13	52	5	1			K05

Comet C/1996 R1 (Hergenrother-Spahhr)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 14.85		S	10.3	GA	8.0	B		15	4	2			HAV
1996 10 11.07		S	14.0	AC	44.5	L	4	167	0.6	1			MOR03

Comet C/1997 A1 (NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 31.46		C	18.3:	GA	60.0	Y	6	a240	0.4			115	NAK01

Comet C/1997 BA6 (Spacewatch)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 31.52		C	19.6	GA	60.0	Y	6	a240		9			NAK01
1997 05 04.52		C	19.5	GA	60.0	Y	6	a240	0.2				NAK01

Comet C/1997 D1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 31.59		C	14.5	GA	60.0	Y	6	a120	1.2		3.0m	106	NAK01
1997 03 31.86		S	13.4	AC	25.4	L	5	104	0.5	2/			MEY
1997 04 01.85		S	13.5	AC	25.4	L	5	104	0.5	3			MEY
1997 04 02.92		S	13.4	AC	25.4	L	5	104	1	3			MEY
1997 04 29.93		S	13.9:	VB	30	R	18	170	0.5	2			SHA02
1997 05 01.94		S	[13.6	NP	20	T	10	135	! 0.5				SHA02
1997 05 04.55		C	14.9	GA	60.0	Y	6	a120	0.8		4.4m	79	NAK01
1997 05 06.96		I	[14.3	NP	20	T	10	135					SHA02
1997 05 09.92		S	13.3	AC	25.4	L	5	104	1	2/			MEY
1997 05 10.90		S	13.4	HS	35	L	5	237	1.2	1/			HOR02
1997 05 12.94		S	13.6	HS	30	R	18	170	0.4	3			SHA02
1997 05 13.2		J	13.4	SC	25.4	T	4		< 1	s3	62.6s	75	ROQ
1997 05 25.49		C	14.5	GA	60.0	Y	6	a120	0.95		3.7m	76	NAK01
1997 05 25.89		S	13.0	HS	35	L	5	237	1.0	1/			HOR02
1997 05 25.90		S	12.8	HS	35	L	5	237	1	3			PLS
1997 05 25.97		S	13.0:	NP	33	L	5	100	0.5	3			SHA02
1997 05 28.95		S	13.0:	HS	30	R	18	170	0.7	3			SHA02
1997 05 29.98		S	12.8:	NP	20	T	10	75	1.2	3			SHA02
1997 05 31.97		I	[12.8	HS	20	T	10	75					SHA02

Comet C/1997 G2 (Montani)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 03.41		C	17.7	FA	91.4	L	5		0.27		0.4m	359	SC001

Comet C/1997 H2 (SOHO)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 17.46		p	[11 :		16.0	W	4						TSU02

Comet C/1997 J1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 06.98		S	[13.0:	NP	20	T	10	135					SHA02
1997 05 07.92		S	12.9	AC	25.4	L	5	104	0.8	3			MEY
1997 05 09.52		C	13.3	GA	60.0	Y	6	a120	1.6		2.8m	100	NAK01
1997 05 09.90		S	12.1	AC	25.4	L	5	65	1.5	4			MEY
1997 05 09.95		S	13.0	AC	25.4	J	6	115	0.9	3			BOU

Comet C/1997 J1 (Mueller) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 10.00		S	12.5:	HS	20	R	14	90	1.4	3			SHA02
1997 05 10.85		M	13.5	HS	35	L	5	237	0.9	3			HOR02
1997 05 10.86		S	13.6:	HS	35	L	5	237	1	3			PLS
1997 05 10.87	!	V	12.6	YF	20.0	T	2	a120	+ 2.2	5			MIK
1997 05 10.94		S	12.2	AC	25.4	L	5	65	1.5	3			MEY
1997 05 10.95		S	13.7:	NP	33	L	5	100	0.6	3			SHA02
1997 05 12.99		S	13.5:	HS	20	R	14	110	1.0	2			SHA02
1997 05 13.02		S	13.2	AC	25.4	J	6	115	0.9	2			BOU
1997 05 13.05		S	13.7	NP	33	L	5	100	1.0	3			SHA02
1997 05 25.50		C	13.2	GA	60.0	Y	6	a120	1.7		4.7m	77	NAK01
1997 05 25.88		M	12.6	HS	35	L	5	158	1.1	3			HOR02
1997 05 25.88		S	12.8	HS	35	L	5	158	1.2	2			PLS
1997 05 25.98		S	13.2:	NP	33	L	5	150	0.7	3			SHA02
1997 05 27.53		C	13.3	GA	60.0	Y	6	a120	1.6		3.6m	76	NAK01
1997 05 28.01		S	12.0:	HS	25.6	L	5	84	2	4			BIV
1997 05 28.11		S	12.5	AC	40.6	L	5	114	0.8	5			BOR
1997 05 28.91	!	V	12.0	YF	20.0	T	2	a120	+ 4.5	5			MIK
1997 05 28.98		S	13.3:	NP	33	L	5	100	1.8	2			SHA02
1997 05 30.00		S	13.0:	NP	20	T	10	75	0.8	2			SHA02
1997 05 30.97		S	13.2	AC	25.4	J	6	115	0.8	1/			BOU
1997 05 30.98		S	13.3:	NP	33	L	5	100	1.0	2			SHA02
1997 05 31.91		M	12.2	HS	35	L	5	104	1.4	2/			HOR02
1997 05 31.99		S	13.2:	NP	20	T	10	135	1.1	1			SHA02
1997 06 01.92		M	12.5	HS	35	L	5	104	1.4	2			HOR02
1997 06 01.97		S	13.1	NP	33	L	5	100	1.0	2			SHA02
1997 06 02.97	a	S	13.2	AC	25.4	J	6	115	0.9	1/			BOU
1997 06 04.91		M	12.3	HS	35	L	5	104	1.5	3			HOR02
1997 06 04.92		M	12.7	HS	35	L	5	104	1.5	3			PLS
1997 06 07.91		M	12.0	HS	35	L	5	92	1.6	2/			HOR02
1997 06 07.92		S	12.7	AC	25.4	L	5	104	0.9	3			MEY
1997 06 08.00		S	[13.2	HS	33	L	5	100					SHA02
1997 06 09.90		M	12.1	TI	35	L	5	92	1.5	2/			HOR02
1997 06 29.50	a	C	13.6	GA	60.0	Y	6	a120	1.3		3.8m	67	NAK01
1997 07 07.92		M	12.1	HS	35	L	5	92	2	2			PLS

Comet C/1997 J2 (Meunier-Dupouy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 09.91		S	12.6	AC	25.4	L	5	104	0.9	3/			MEY
1997 05 10.02		S	13.4:	HS	20	R	14	140	0.5	3			SHA02
1997 05 10.03		S	12.8	AC	25.4	J	6	115	0.7	4			BOU
1997 05 10.87		M	13.3	HS	35	L	5	237	0.9	3/			HOR02
1997 05 10.89	!	V	13.3	YF	20.0	T	2	a120	+ 1.5	8	& 2	m 170	MIK
1997 05 10.94		S	12.7	AC	25.4	L	5	104	1	3			MEY
1997 05 10.96		S	13.2	NP	33	L	5	100	0.5	4			SHA02
1997 05 12.98		S	13.3:	HS	20	R	14	110	0.7	3			SHA02
1997 05 13.01		S	12.8	AC	25.4	J	6	88	0.8	3/			BOU
1997 05 13.04		S	13.2	NP	33	L	5	100	0.6	4			SHA02
1997 05 17.15		S	12.7	HS	20.3	T	10	133	1	6			BIV
1997 05 19.90		M	12.7	HS	35	L	5	237	0.8	3			HOR02
1997 05 25.51		C	13.1	GA	60.0	Y	6	a120	1.6		> 3.6m	169	NAK01
1997 05 25.87		M	12.0	HS	35	L	5	104	1.2	3/			PLS
1997 05 25.87		M	12.3	HS	35	L	5	104	1.1	4			HOR02
1997 05 25.93		S	12.7	AC	25.4	J	6	115	0.8	4			BOU
1997 05 25.95		S	12.8	NP	33	L	5	100	1.2	2			SHA02
1997 05 27.54		C	13.2	GA	60.0	Y	6	a120	1.5		3.8m	168	NAK01
1997 05 27.99		S	12.7	HS	25.6	L	5	84	2	5			BIV
1997 05 28.89	!	V	13.0	YF	20.0	T	2	a120	+ 2.3	9			MIK
1997 05 28.94		S	12.0	AS	25.3	L	6	58	& 1.0	4			PER01
1997 05 29.00		S	12.7	NP	33	L	5	100	0.5	3			SHA02
1997 05 30.00		S	13.0	NP	20	T	10	75	0.6	3			SHA02
1997 05 30.92		S	12.0	AS	25.3	L	6	58	& 1.1	2			VIT01
1997 05 30.92		S	12.4	AS	25.3	L	6	58	& 1.1	3			PER01
1997 05 30.97		S	12.7	NP	33	L	5	100	0.7	3			SHA02
1997 05 30.98		S	12.7	AC	25.4	J	6	88	0.9	3			BOU

Comet C/1997 J2 (Meunier-Dupouy) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 31.90		M	12.3	HS	35	L	5	104	1.1	4			HOR02
1997 06 01.00		S	13.0	NP	20	T	10	135	0.5	3			SHA02
1997 06 01.88		M	12.3	HS	35	L	5	104	1.1	4			HOR02
1997 06 01.99		S	13.2	NP	33	L	5	100	0.6	3			SHA02
1997 06 02.95		S	12.4	AS	25.3	L	6	58	& 0.8	5/			PER01
1997 06 02.95		S	12.4	AS	25.3	L	6	58	& 0.8	5/			PER01
1997 06 02.98		S	12.6	NP	25.4	J	6	115	1.0	3/			BOU
1997 06 04.88		M	12.4	HS	35	L	5	104	1.1	4			HOR02
1997 06 04.88		M	12.4	HS	35	L	5	104	1.2	3/			PLS
1997 06 07.89		S	12.2	HS	10	B		25	1.1	3			ZNO
1997 06 07.93		M	12.0	TI	35	L	5	92	1.4	4			HOR02
1997 06 07.93		S	12.4	AC	25.4	L	5	104	1	4			MEY
1997 06 07.99		S	13.5:	NP	33	L	5	100	0.7	2			SHA02
1997 06 08.01		S	13.3	NP	33	L	5	150	0.7	3			SHA02
1997 06 09.91		M	12.3	TI	35	L	5	92	1.3	4			HOR02
1997 06 10.13		S	12.4	AC	40.6	L	5	114	1.2	5			BOR
1997 06 15.92	!	V	12.8	YF	36.0	T	7	a120	+ 0.8	7	& 3	m 175	MIK
1997 06 23.93		S	11.9	AS	25.3	L	6	58	& 1.0	3			PER01
1997 06 23.93		S	12.0	AS	25.3	L	6	58	& 0.9	2			VIT01
1997 06 28.11	a	S	12.5	AC	40.6	L	5	114	0.8	4			BOR
1997 06 28.90		M	12.2	TI	35	L	5	104	1.1	4			HOR02
1997 06 29.50		S	13.2	HS	40.0	L	6	200	0.6	4			NAG08
1997 06 29.51		C	13.1	GA	60.0	Y	6	a120	1.6		3.0m	187	NAK01
1997 06 29.53		M	12.9	HS	25.0	L	6	120	0.7	3			TSU02
1997 07 03.95		S	12.1	AS	25.3	L	6	58	& 1.3	3			PER01
1997 07 03.95		S	12.2	AS	25.3	L	6	58	& 1.2	1/			VIT01
1997 07 05.93		S	11.9	AS	25.3	L	6	58	& 1.1	3			PER01
1997 07 06.93		S	12.0	AS	25.3	L	6	58	& 1.0	4			PER01
1997 07 06.93		S	12.0	AS	25.3	L	6	58	& 1.3	2/			VIT01
1997 07 07.94		M	12.2	HS	35	L	5	92	1.6	3/			PLS
1997 07 11.97		S	12.3	AC	25.4	J	6	143	1.1	3			BOU
1997 07 12.90		M	12.0	TI	35	L	5	104	1.0	3			HOR02
1997 07 13.97		M	12.0	TI	35	L	5	92	1.0	3/			HOR02

Comet C/1997 L1 (Xinglong)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 07 01.19		J	17.2	SC	25.4	T	4		0.29	d1			ROQ
1997 07 07.20		J	16.8	SC	25.4	T	4		0.28	0			ROQ

Comet C/1997 N1 (Tabur)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 07 06.92		S	10.0	VN	20.0	L	4	45	1.6	4			PEA
1997 07 07.80		S	10.3	AA	10.0	B		25		1			SEA
1997 07 07.91		S	10.2	VN	20.0	L	4	45	1.8	3/			PEA
1997 07 08.91		S	10.4	VN	20.0	L	4	45	1.6	3/			PEA
1997 07 09.81		S	10.4	AA	10.0	B		25	2	4			SEA
1997 07 10.91		S	10.4	VN	20.0	L	4	45	2.0	4			PEA
1997 07 11.91		S	10.3	VN	20.0	L	4	45	2.0	4			PEA
1997 07 14.82		S	10.0	AA	10.0	B		25					SEA
1997 07 14.91		S	10.0	VN	20.0	L	4	45	1.5	3/			PEA
1997 07 16.81		S	10.1	AA	10.0	B		25					SEA
1997 07 16.91		S	9.8	VN	20.0	L	4	45	2.4	4			PEA

Comet C/1997 01 (Tilbrook)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 07 25.35		S	9.4	AA	10.0	B		25					SEA

Comet 2P/Encke

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 10 11.92			10.0:		22	L		83	3				BLA03
1980 10 19.08			9.0:		12	R		75	5	1			FRY

Comet 2P/Encke [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 11 03.18			7.8		12.5	R		18	3.6				HIN
1980 11 12.23			7.0:		5.0	B		7	8				SHI06
1993 10 23.98		C	17.0:		20.3	L	6						MAN
1994 01 13.77		S	9.3	AC	25.0	L	4	35	6	3			PAN
1994 01 16.77		S	9.0	AC	25.0	L	4	35	3.5	4			PAN
1994 01 19.79		S	8.9	AA	25.0	L	4	35	4	3			PAN
1994 03 03.69		S	10.6	CS	31.7	L	5	53					JON
1994 03 04.70		S	10.0	MV	31.7	L	5	53	1	1			JON
1994 03 06.70		S	10.3	MV	31.7	L	5	53	1	1			JON
1994 03 07.69		S	10.6	MV	31.7	L	5	53		1			JON
1994 03 09.70		S	11.7	MV	31.7	L	5	53	0.7	1			JON
1997 05 31.34			6.5:		10.0	B		25					SEA
1997 06 01.34		S	6.2	AA	10.0	B		25	1	4			SEA
1997 06 03.34		S	6.3	AA	10.0	B		25					SEA
1997 06 04.34		S	6.2	AA	10.0	B		25					SEA
1997 06 05.33		S	6.9	SC	8.0	B		15	1.5	4			SEA01
1997 06 07.33		S	6.5	SC	8.0	B		15	4	4			SEA01
1997 06 09.43	\$	S	6.5	AA	20.0	L	4	45	2.5	3			PEA
1997 06 14.44		S	7.1	AA	20.0	L	4	45	2.8	3			PEA
1997 06 15.44		S	7.3	AA	20.0	L	4	45	3	2			PEA
1997 06 16.44		S	7.3	AA	20.0	L	4	45	3.3	2			PEA
1997 06 21.44		S	7.4	AA	20.0	L	4	45	3.5	1			PEA
1997 06 23.45		S	7.3	AA	8.0	B		20	6.5	2			PEA
1997 06 23.45		S	7.4	AA	20.0	L	4	45	4.8	2			PEA
1997 06 25.35		S	7.9	AA	10.0	B		25	16	1			SEA
1997 06 25.45		S	7.5	AA	8.0	B		20	6.5	1			PEA
1997 06 25.45		S	7.6	AA	20.0	L	4	45	5	1/			PEA
1997 06 26.46		S	7.8	AA	8.0	B		20	5	1			PEA
1997 06 26.46		S	7.9	AA	20.0	L	4	45	4.5	1			PEA
1997 06 30.46		S	8.4	AA	20.0	L	4	45	6.2	0			PEA
1997 07 01.45		S	8.6	AA	20.0	L	4	45	5	0			PEA
1997 07 03.35		S	8.5	AA	10.0	B		25		0			SEA
1997 07 03.45		S	8.9	AA	20.0	L	4	45	5	0			PEA
1997 07 07.45		S	9.7	AA	20.0	L	4	45	3.5	0			PEA
1997 07 10.45		S[	9.8	AA	20.0	L	4	45					PEA

Comet 4P/Faye

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 11 02.13			12.9	AC	41	L		130	0.8	6			WILO3
1992 02 01.87		S	11.4	S	30.0	L	5	125	1	1			MAR02

Comet 6P/d'Arrest

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 07 15.80			12.5:		31	L		110					VER02
1976 07 17.99			10.0		21.6	L				1			BUL
1976 07 19.89			12.0:		31	L		110					VER02
1976 07 20.85			11.0:		31	L		110					VER02
1976 07 20.96			9.5		21.6	L			4	2			BUL
1976 07 21.00			11.0:		15	L			2				BIR
1976 07 22.00			10.5		31	L			3				BIR
1976 07 28.99			8.2		21.6	L			4				BUL
1976 07 29.84			9.3		5.4	R		21					VIC
1976 07 30.93			9.0:		5.0	B		10					MCN01
1976 07 31.98			8.2		21.6	L		40	3	4			BUL
1976 07 31.98			9.0:		5.0	B		10					MCN01
1976 08 01.03	P		7.5		5.0	B		7	5				BAG01
1976 08 01.04			8.8		5.0	B		10	10				CRA
1976 08 01.92			8.0		5.0	B		10			0.25		VER02
1976 08 03.85			7.5		5.0	B		10					VER02
1976 08 03.99			7.7		5.0	B		10	3				BUL
1976 08 03.99			8.0		5.0	B		16	10				POT
1976 08 05.05			8.5		5.0	B		10	10				CRA
1976 08 17.92			7.0		5.0	B		10					VER02

Comet 6P/d'Arrest [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 08 17.92			7.0		5.0	B		10	20				VER02
1976 08 20.01			6.0		5.0	B		10					BUL
1976 08 21.90			7.0		5.0	B		10					VER02
1976 08 22.90			6.9		5.0	B		10					VER02

Comet 7P/Pons-Winnecke

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 19.21		C	19.9	FA	91.4	L	5		2.43				SC001

Comet 8P/Tuttle

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 11 03.16			9.8		12.5	R		18	3				HIN
1980 11 12.01			8.5		20	L		56	5	2			SHO
1980 11 12.07			8.0		12.3	R			4				FRY

Comet 9P/Tempel 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 04 15.96	--	S	11.4	VB	20	L		35	2	1			PAN
1983 05 05.91			9.9	A	20	T		80	1.6	2			KAM01
1983 06 02.93			9.8	S	20	L		63	2.8	2			KAM01
1983 07 03.48		S	11.0:	A	48	L	6	100	2	3			LOW
1994 05 07.88		S	10.4	HS	15.0	L	5	42	1.5	4			BEC01
1994 05 11.92		S	11.0	HS	15.0	L	5	42	1.5	4			BEC01
1994 05 12.89		S	10.8	HS	15.0	L	5	75	2	4			BEC01
1994 05 13.89		S	10.7	HS	15.0	L	5	75	2	4			BEC01
1994 05 29.96		S	9.6	AA	25.0	L	4	36	4.5	2			PAN

Comet 10P/Tempel 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 07 22.08		S	9.7:	VB	33	L	5	45	1.5	3			SHAO2
1988 08 07.39		S	9.4	MM	5.0	B		12	3	3			CAM03
1988 08 07.83		S	10.0	AA	8.0	B		15	3.5	2/			HAV
1988 08 08.50		S	9.3	MM	5.0	B		12	4	3			CAM03
1988 08 09.50		S	9.0	MM	5.0	B		12	5	4			CAM03
1988 08 11.44		S	9.0	MM	5.0	B		12	6	4			CAM03
1988 08 11.84		S	9.4	AA	8.0	B		15	6.5	2/			HAV
1988 08 12.40		S	8.8	MM	5.0	B		12	7	4			CAM03
1988 08 13.45		S	8.8	MM	5.0	B		12	7	4			CAM03
1988 08 14.39		S	8.8	MM	5.0	B		12	7	4			CAM03
1988 09 03.81		S	7.7	AA	8.0	B		15	11	2			HAV
1988 09 11.81		S	10.5:	AC	20	L	5	35	3.4	0/			ROS01
1988 09 15.48		S	7.8	MM	20.3	L	7	56	7	4	0.1	360	CAM03
1988 09 29.77		S	8.6	AA	8.0	B		15	12	0/			HAV
1988 11 05.76		S	9.3	AA	8.0	B		15	6.5	2			HAV
1997 03 05.59		C	20.0	GA	60.0	Y	6	a240		9			NAK01

Comet 19P/Borrelly

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 01 28.00			11.0:		53	L			2				VER02
1981 04 03.91			11.0:		22	L			3				STU
1987 09 26.15		M	10.3	AC	20	T	10	80	3.3	5			GRA04
1987 09 29.19		M	10.4	AC	20	T	10	80	3.0	4			GRA04
1987 11 20.98		S	9.1	S	21	L	5	44	1.3	2			TAY
1987 11 23.94		S	8.0	AA	20	T	10	50	4	3			SCH05
1987 11 30.93		S	9.2	S	21	L	5	44	2.0	7		160	TAY
1987 12 06.91		S	8.5	AA	25	L	4	50	3	3			PAN
1987 12 07.80		B	8.0:	AA	5	R	10	12	4.0	2			JAH
1987 12 07.89		S	9.2	S	21	L	5	44	1.6	7			TAY
1987 12 10.90		S	8.0	AC	5.0	B		12					KID
1987 12 11.76		S	7.8	AA	8.0	B		11	6	4			ROS01

Comet 19P/Borrelly [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 12 11.77		S	7.9	AA	5.0	B		10	7	5			ROS01
1987 12 11.80		S	7.5	AA	7.0	B		20	8.7	4/			TAN02
1987 12 11.82		M	7.4	AA	5.0	B		12	12.7	5			TAN02
1987 12 12.93		S	7.8	AA	8.0	B		15	12	3			PAN
1987 12 13.82		S	7.6	AA	7.0	B		20	9.3	4			TAN02
1987 12 14.88		S	9.0	S	21	L	5	44	1	4			TAY
1987 12 15.98		S	7.9	AC	5.0	B		12					KID
1987 12 16.83		S	7.7	AA	7.0	B		20	9.5	4			TAN02
1987 12 18.87		S	7.5	AA	7.0	B		20	9.9	4/			TAN02
1987 12 18.97		S	7.3	AA	8.0	B		15	9	4			PAN
1987 12 20.84		S	7.8	AA	7.0	B		20	9.4	4			TAN02
1987 12 21.79		S	7.8	AA	7.0	B		20	8.7	4/			TAN02
1987 12 22.80		S	7.8	AA	7.0	B		20	7.4	4			TAN02
1987 12 24.82		S	7.6	AA	7.0	B		20	8.1	4/			TAN02
1987 12 25.79		S	7.7	AA	7.0	B		20	8.8	4			TAN02
1987 12 27.77		S	9.0	S	21	L	5	44	1.3	7			TAY
1987 12 27.84		S	8.6	S	7.0	B		16	4	2			TAY
1988 01 06.75		S	8.1	AA	7.0	B		20	7.6	4/			TAN02
1988 01 07.80		S	8.4	AA	8.0	B		15	6	2			PAN
1988 01 11.80		S	8.1	AA	8.0	B		20		4			BOU
1988 01 11.90		S	8.7	AC	20	T	10	50	2.5	4			SCH05
1988 01 12.83		B	8.1	AG	5	R	10	13	6.8	2			JAH
1988 01 12.94		S	8.7	AC	20	T	10	50	2.6	4			SCH05
1988 01 13.82		S	8.3	AA	7.0	B		20	8.1	2/			TAN02
1988 01 17.93		S	8.1	SC	8.0	B		11	7.1	3			ROS01
1988 01 19.88		S	8.9	AA	36	T	11	123	2	4			KOR
1988 01 20.78		S	9.4	S	21	L	5	44	1	3			TAY
1988 01 22.80		S	8.9	S	21	L	5	44	1	2			TAY
1988 01 23.99		S	9.3:	AA	6	R	11	28	4.5	2			ROS01
1988 02 09.91		S	10.3	AC	20	L	5	35	2.2	2			ROS01
1988 02 10.91		S	10.4	AC	20	L	5	35	2.3	2			ROS01
1988 02 11.76		S	9.6	AA	20	T	10	50	2.3	3/			TAN02
1988 02 15.84		S	10.2	AC	36	T	11	123	2.5	2/			KOR
1988 02 16.91		S	11.0	AC	20	L	5	70	2.0	2			ROS01
1988 02 18.89		S	11.4	AC	20	L	5	70	1.3	1/			ROS01
1988 02 20.89		S	11.0	PA	20	T	10	80	1.2	3			SCH05
1994 09 10.18		S	9.9	AC	36.0	L	5	71	1.6	3			KEI
1994 09 11.15		S	9.8	AC	10.0	B		20	3.2	3			KEI
1994 10 02.04		S	10.1	HS	15.0	L	5	42	2	3			BEC01
1994 10 11.09		M	9.7	AA	6.3	R	13	52	5.5	4			CSU
1994 10 12.14		M	9.8	AA	6.3	R	13	28	5.5	4			CSU
1994 10 28.16		M	9.8	AA	20	L	7	30	3.5	1			CSU
1994 12 28.24					31.8	L	4	63	2.5	6	20	m 270	KEE
1994 12 28.25		M	9.5	AA	31.8	L	4	33					KEE
1994 12 28.26		M	9.3	AA	15.2	L	3	23					KEE

Comet 21P/Giacobini-Zinner

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 07 10.04		S	9.5		20	L		27	5				PAN
1972 07 12.01		S	10.0		20	L		27	4				PAN
1972 07 15.03		S	9.8		20	L		27	3				PAN
1972 07 17.02		S	10.0		20	L		27	4				PAN

Comet 22P/Kopff

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 05.42		S	10.5	V	20	L	8	64		9			LOW
1983 05 06.50		S	10.5	V	48	L	6	100		6			LOW
1983 05 11.50		S	10.0	V	20	L	8	64		6			LOW
1983 05 14.45		S	9.0	A	15	R	16	50	5	2			PRI
1983 05 16.47		S	9.0	A	15	R	5	50	5	2			PRI
1983 05 17.45		S	9.0	A	9	M	13	80	5	1			PRI
1983 06 02.45		S	9.0	A	8.0	B		15	8	1			PRI
1983 06 02.48		M	10.0	V	48	L	6	100	2.2	6			LOW

Comet 22P/Kopff [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 06 02.94			8.5	S	20	L		63	4.5	4			KAM01
1983 06 04.41		S	9.0	A	8.0	B		15	9	0			PRI
1983 06 05.42		S	9.0	A	8.0	B		15	10	0			PRI
1983 06 06.92			8.4	S	14	L		42	4.5	3			KAM01
1996 03 16.39		S	11.8	AC	44.5	L	4	80	1.6	1			MOR03
1996 03 17.40		S	12.0	AC	44.5	L	4	167	1.4	1			MOR03
1996 04 15.9		S	9.2	AA	25.2	L	4	53	1	4			LO001
1996 04 18.32		S	10.1	AC	15	R	5	42	3	1			MOR03
1996 04 28.32		S	9.9	AC	15	R	5	42	3.5	1			MOR03
1996 05 13.29		S	9.4	AC	15	R	5	42	3.5	1			MOR03
1996 05 14.15		S	9.0	S	7.0	B		10	8	2			DEA
1996 05 19.33		S	9.5	AC	15	R	5	42	3.5	2			MOR03
1996 05 22.88		B	8.0:	AA	8.0	B		11		0			SCH12
1996 05 24.32		S	9.4	AC	15	R	5	42	3	2			MOR03
1996 05 29.32		S	9.3	AC	15	R	5	42	4	2			MOR03
1996 06 07.98		M	8.0	S	10.0	B	4	25	4	3			LEH
1996 06 11.27		B	8.5	AA	8.0	B		11	4	0			SCH12
1996 06 12.08		S	8.8	S	7.0	B		10	10	0			DEA
1996 06 13.18		B	8.0:	AA	8.0	B		11	5	0			SCH12
1996 06 23.09		S	7.6	AA	7.0	B		10	8	3			DEA
1996 06 23.31		S	9.2	AC	15	R	5	42	3.5	2			MOR03
1996 06 25.17		B	8.0:	AA	8.0	B		11	&10	0			SCH12
1996 07 09.04		S	8.7	S	7.0	B		10	5.4	5			DEA
1996 07 10.14		S	9.3	AC	15	R	5	42	3	3			MOR03
1996 07 10.27		B	8.0:	AA	8.0	B		11	5	0			SCH12
1996 07 11.18		S	8.6	AC	15	R	5	42	4	4			MOR03
1996 07 13.21		B	7.7	AA	8.0	B		11	15	0			SCH12
1996 07 14.06		S	8.6	S	7.0	B		10	7.2	4			DEA
1996 07 16.15		S	8.7	AC	15	R	5	42	4.5	2			MOR03
1996 07 20.13		S	8.8	AC	15	R	5	42	4.5	3			MOR03
1996 07 22.13		S	8.5	AC	15	R	5	42	5.5	2			MOR03
1996 08 04.13		S	9.5	AC	15	R	5	42	2.5	1			MOR03
1996 08 09.89		M	9.0	S	20	R	17	87	3	2/			LEH
1996 08 10.90		M	9.0	S	20	R	17	87	2.5	2/			LEH
1996 08 14.10		S	9.9	AC	15	R	5	42	2.5	1			MOR03

Comet 23P/Brorsen-Metcalf

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 07 15.06		S	9.8	AC	20	T	10	80	4	1			SCH05
1989 07 16.06		S	9.7	AC	20	T	10	80	3	1			SCH05
1989 07 29.08		S	8.6	AA	20	T	10	50	3	2			SCH05
1989 07 31.03		S	7.6	AA	8.0	B		20	11	2/			BIR
1989 07 31.94		S	8.0	SC	5.0	B		7	20	2			ERG
1989 07 31.94		S	8.0	SC	10.2	R	15	60	10	2			ERG
1989 08 01.00		S	7.0	S	8.0	B		11	9				KEE01
1989 08 01.02		S	6.8	AA	7.0	B		20	8	3			TAN02
1989 08 01.98		S	8.0	SC	5.0	B		7	15	3			ERG
1989 08 01.98		S	8.0	SC	25	L	7	70	8	3			ERG
1989 08 02.00		S	7.0	SC	5.0	B		7					HAS06
1989 08 02.98		S	7.2	S	8.0	B		11					KEE01
1989 08 02.99		B	7.8	SC	9	R	11	50	4.0	4			FRA01
1989 08 03.03		S	7.3	SC	5.0	B		10	9.0	3			FRA01
1989 08 03.04		S	6.8	AA	7.0	B		20	7	3			TAN02
1989 08 04.05		S	6.8	AA	7.0	B		20	8	3			TAN02
1989 08 05.06		M	6.8	AA	7.0	B		20	8	3/			TAN02
1989 08 05.06		S	7.3	S	5	R	10	13	16	4			JAH
1989 08 09.05		M	6.4	AA	7.0	B		20	9	4	0.5	277	TAN02
1989 08 09.10		S	6.5	AA	8.0	B		20	7	3			BIR
1989 08 10.06		M	6.3	AA	7.0	B		20	8	4	0.5	280	TAN02
1989 08 11.99		B	6.7	SC	5.0	B		10	8.0	6			FRA01
1989 08 12.09		M	6.3	AA	7.0	B		20	7	4	0.5	273	TAN02
1989 08 14.10		M	6.4	AA	7.0	B		20	8	4			TAN02
1989 08 15.01		B	6.6	SC	5.0	B		10	6.0	6			FRA01
1989 08 17.10		S	6.5	AA	8.0	B		20	5	3/	0.2	290	BIR

Comet 23P/Brorsen-Metcalf [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 30.13		M	5.8	AA	7.0	B		20	2.6	6/	0.7	312	TAN02
1989 09 01.13		M	5.9	AA	7.0	B		20	2.0	6			TAN02
1989 09 02.13		M	5.5	AA	7.0	B		20	2.1	7/			TAN02
1989 09 03.12		I	5.8	AA	3.0	B		3	1.5	4	0.4	306	BIR
1989 09 04.15		M	5.8	AA	7.0	B		20	1.6	7/			TAN02

Comet 24P/Schaumasse

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 10 30.13			10.1	AC	41	L		85	3	1			WIL03
1984 10 31.13			9.6	AC	41	L		60	4	2			WIL03
1984 11 02.13			9.8	AC	41	L		60	4	2			WIL03
1993 02 22.79		S	10.5	GA	13.0	L	6	40	5	0			BEC01
1993 03 12.81		S	8.5	GA	13.0	L	6	40	5	2			BEC01
1993 03 13.79		S	9.0	GA	13.0	L	6	40		1			BEC01
1993 03 19.82		S	9.4	GA	13.0	L	6	40	4.5	1			BEC01
1993 03 29.79		S	10.0	GA	13.0	L	6	40		0			BEC01

Comet 26P/Grigg-Skjellerup

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 04 27.00			12.0:		36	T							VER02
1982 06 19.00			10.8		36	T							VER02

Comet 27P/Crommelin

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 12 29.00			12.8		53	L			1				VER02
1984 01 08.00			12.8		53	L			1				VER02
1984 02 05.77		S	10.5		26	L		80	2.0	1			HUR
1984 02 05.79			9.2	V	26	L	6	63	4				MER
1984 02 09.79		S	8.7	CS	8.0	B		15	2	2			HUR
1984 03 03.82		S	8.4	AC	20	L		35	4.5	2			PAN

Comet 29P/Schwassmann-Wachmann 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 11 25.00			11.7		15	L		64					MAD
1979 01 26.84			11.0:		16	L	4	50	4				MAD
1981 04 22.00			11.0		26	L	6	63	0.8	7		200	MER
1981 04 22.83			11.0		20	T	10		2				VER02
1981 04 23.85			11.1		26	L	6	63	0.7	7			MER
1981 04 24.86			11.0		26	L	6	63	1.0	6			MER
1981 05 06.84			12.0:		53	L			6				VER02
1981 05 06.85			11.6		26	L	6	63	1.9	3			MER
1981 05 25.88			12.0:		26	L	6	63	3	1			MER
1982 04 13.89			11.5	V	26	L	6	130	1.0	5		215	MER
1982 04 14.00			11.5	AC	36	T			1				VER02
1982 04 15.00			11.5	AC	36	T			1				VER02
1989 10 21.86		S	12.9	AC	36	T	11	325	0.5	3			KOR
1997 02 04.82		C	12.9	GA	60.0	Y	6	a120	4.1	s1			NAK01
1997 02 04.82		c	16.9	GA	60.0	Y	6	a120					NAK01
1997 02 09.79		C	12.9	GA	60.0	Y	6	a120	4.1	s0/			NAK01
1997 02 09.79		c	16.3	GA	60.0	Y	6	a120					NAK01
1997 03 01.73		C	13.5	GA	60.0	Y	6	a120	3.2	s0			NAK01
1997 03 01.73		c	17.0	GA	60.0	Y	6	a120					NAK01
1997 03 04.79		C	13.6	GA	60.0	Y	6	a120	3.0	s0			NAK01
1997 03 04.79		c	17.0	GA	60.0	Y	6	a120					NAK01
1997 03 11.67		C	13.5	GA	60.0	Y	6	a120	3.3	s0			NAK01
1997 03 11.67		c	17.0	GA	60.0	Y	6	a120					NAK01
1997 03 31.63		C	13.5	GA	60.0	Y	6	a120	3.1	s0/			NAK01
1997 03 31.63		c	16.8	GA	60.0	Y	6	a120					NAK01
1997 04 07.63		C	13.6	GA	60.0	Y	6	a120	2.8	s0/			NAK01
1997 04 07.63		c	16.6	GA	60.0	Y	6	a120					NAK01
1997 04 10.68		C	13.7:	GA	60.0	Y	6	a120	2.8	s0/			NAK01

Comet 29P/Schwassmann-Wachmann 1 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 10.68		c	16.7:	GA	60.0	Y	6	a120					NAK01
1997 04 12.60		C	13.8	GA	60.0	Y	6	a120	2.7	s0/			NAK01
1997 04 12.60		c	16.8	GA	60.0	Y	6	a120					NAK01
1997 04 28.59		C	13.3	GA	60.0	Y	6	a120	2.5	8/			NAK01
1997 04 28.59		C	14.9	GA	60.0	Y	6	a120	+ 0.25				NAK01
1997 04 29.58		C	13.4	GA	60.0	Y	6	a120	2.3	8/			NAK01
1997 04 29.58		C	15.1	GA	60.0	Y	6	a120	+ 0.25				NAK01
1997 04 29.95		I	[14.0	VB	30	R	18	170					SHA02
1997 05 01.95		I	[14.0	HS	20	T	10	135					SHA02
1997 05 01.95		S	13.1	NP	44.5	L	5	100	1.5	2			MAR02
1997 05 01.95		S	13.8	NP	44.5	L	5	100	1	2			SAN04
1997 05 04.57		C	13.5	GA	60.0	Y	6	a120	2.3	s1			NAK01
1997 05 04.57		c	16.3	GA	60.0	Y	6	a120					NAK01
1997 05 06.94		I	[14.2	HS	20	T	10	135					SHA02
1997 05 09.55		C	13.4	GA	60.0	Y	6	a120	2.5	s1/			NAK01
1997 05 09.55		c	16.7	GA	60.0	Y	6	a120					NAK01
1997 05 09.98		S	13.9:	HS	30	R	18	170	0.6	3			SHA02
1997 05 10.94		S	13.4:	VB	33	L	5	100	0.8	3			SHA02
1997 05 12.95		S	13.7:	HS	30	R	18	170	0.7	2			SHA02
1997 05 25.52		C	12.8	GA	60.0	Y	6	a120	2.7	7			NAK01
1997 05 25.52		C	13.8	GA	60.0	Y	6	a120	+ 0.5				NAK01
1997 05 28.97		S	12.3:	HS	33	L	5	100		3			SHA02
1997 05 29.97		S	12.0:	HS	20	T	10	75	1.8	3			SHA02
1997 05 30.17		J	11.4	SC	25.4	T	4		1.89	d1			ROQ
1997 05 31.17		C	13.9	FA	91.4	L	5		2.5				SC001
1997 05 31.17		c	19.9	FA	91.4	L	5						SC001
1997 06 01.19		c	18.9	FA	91.4	L	5		2.2				SC001
1997 06 01.90		S	11.0	TI	35	L	5	92	2.5	1/			HOR02
1997 06 01.94		S	11.5:	HS	33	L	5	75	2.1	3			SHA02
1997 06 02.18		C	13.8	FA	91.4	L	5		2.46				SC001
1997 06 02.18		c	18.9	FA	91.4	L	5						SC001
1997 06 03.17		C	13.5	FA	91.4	L	5		2.14				SC001
1997 06 03.17		c	16.1	FA	91.4	L	5						SC001
1997 06 04.90		S	10.9	TI	35	L	5	104	2.0	2/			PLS
1997 06 04.91		S	11.0	TI	35	L	5	92	2.5	1/			HOR02
1997 06 07.87		S	11.8	TI	10	B		25	1.6	2/			ZNO
1997 06 07.88		S	11.4	TI	35	L	5	104	2.2	1/			HOR02
1997 06 12.19		J	11.8	SC	25.4	T	4		2.22	s6			ROQ
1997 06 22.19	!	J	13.4	SC	25.4	T	4		1.72	s1/			ROQ
1997 06 27.18	!	J	13.4	SC	25.4	T	4		0.90	d1/			ROQ
1997 07 04.17	!	J	13.3	SC	25.4	T	4		1.56	d1			ROQ
1997 07 07.88		S	11.7	TI	35	L	5	104	1.5	2			PLS
1997 07 09.17	!	J	13.5	SC	25.4	T	4		1.11	0			ROQ

Comet 32P/Comas Solá

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 01 18.87		C	16.8	GA	60.0	Y	6	a120	0.7		3.4m	287	NAK01
1997 02 09.82		C	17.0	GA	60.0	Y	6	a240	0.65		3.4m	292	NAK01
1997 04 07.73		C	16.4	GA	60.0	Y	6	a240	0.85		3.9m	289	NAK01
1997 05 04.64		C	16.8	GA	60.0	Y	6	a240	0.55				NAK01
1997 05 31.22		C	18.1	FA	91.4	L	5		0.27		0.6m	124	SC001

Comet 38P/Stephan-Oterma

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 11 10.00			9.3		12.3	R			2				FRY
1980 11 11.88		S	8.8		26	L		80	3	4			HUR
1980 11 12.03			9.3		12.3	R			1.5				FRY
1980 11 29.83			8.7		25	L	5		2	5/			BUS05
1980 11 30.00			8.0:		22	L		60	5				STU
1980 11 30.95			8.0:		22	L		60	5				STU
1981 01 30.00			12.0		53	L			2				VER02
1981 02 04.83			11.5:		22	L			3				STU

Comet 43P/Wolf-Harrington

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 10 29.10			12.5	AC	41	L		130	1	2			WIL03
1984 10 30.11			12.0	AC	41	L		85	1	3			WIL03
1984 10 31.11			11.9	AC	41	L		85	1.5	4			WIL03
1984 11 02.12			12.1	AC	41	L		85	1.5	4			WIL03

Comet 45P/Honda-Mrkos-Pajdušáková

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 01 31.59		S	8.4	S	20	T	10	63	4.4	2			PRY

Comet 46P/Wirtanen

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 09.70		R	18.9	LA	100	L	2						HIC01
1997 03 07.85		B	10.3	HS	25.6	L	5	42	2	3			BIV
1997 03 08.39	&	S	10.6	VN	25.4	L	6	46	1.5	2			SEA01
1997 03 08.82		B	9.5	NP	17.3	L	6	42	2	5			TRI
1997 03 10.40	&	S	10.6	VN	25.4	L	6	46	2	2			SEA01
1997 03 13.03	a	S	9.9	AC	40.6	L	5	70	2.0	2/			BOR
1997 03 31.80		S	10.0	PA	25.4	L	5	65	2	3			MEY
1997 04 01.80		S	9.8	PA	25.4	L	5	65	2	3			MEY
1997 04 02.04		B	9.0	AC	10.0	B	4	20	4	2			NOW
1997 04 02.81		S	9.9	PA	25.4	L	5	65	2.5	2/			MEY
1997 04 05.89		S	9.6	AC	25.4	L	6	93	3	4			GRA04
1997 04 06.81		S	10.0:	PA	8.0	B		20	2	3			OKS
1997 04 08.06	a	S	9.8	AC	40.6	L	5	70	1.7	1			BOR
1997 04 10.06	a	S	9.8	AC	40.6	L	5	70	2.1	0/			BOR
1997 04 21.80		M	10.3	TI	10	B		25	2	2			ZNO
1997 04 29.89	!	S	12.2	VB	20	R	14	90	3.3	1			SHA02
1997 05 01.91		S	10.1	NP	44.5	L	5	74	2	1			MAR02
1997 05 01.91		S	10.4	NP	44.5	L	5	100	2	2			SAN04
1997 05 01.91	!	S	12.2	VB	20	T	10	75	1.3	0			SHA02
1997 05 02.82		M	11.2	TI	10	B		25	2	2			ZNO
1997 05 02.86		S	10.6	AC	25.4	L	5	65	2.5	2			MEY
1997 05 02.89		S	10.2:	HS	20.3	T	10	50	& 2.5	0			KAM01
1997 05 02.93		S	11.2	HS	25.6	L	5	84	2	3			BIV
1997 05 04.46	a	C	12.1	GA	60.0	Y	6	a120	2.2				NAK01
1997 05 06.91		S	11.1:	HS	20	T	10	75	1.9	1			SHA02
1997 05 07.87		S	10.4	AC	25.4	L	5	65	1.5	2/			MEY
1997 05 09.87		S	10.5	AC	25.4	L	5	65	2.5	2			MEY
1997 05 10.82		M	10.8	TI	10	B		25	2	3			ZNO
1997 05 10.90		S	11.4:	VB	20	R	14	90	0.7	3			SHA02
1997 05 14.16	!	J	11.7	SC	25.4	T	4		4.80	s3			ROQ
1997 05 17.92		S	12.1:	HS	20.3	T	10	133	1	4			BIV
1997 05 25.47	a	C	13.4	GA	60.0	Y	6	a120	1.7			80	NAK01
1997 05 26.17	!	J	12.6	SC	25.4	T	4		1.40	d2			ROQ
1997 05 27.92		S	11.8	HS	25.6	L	5	169	1.5	2			BIV
1997 05 28.85	!	V	12.6	YF	20.0	T	2	a 60	+ 3.0	3			MIK

Comet 47P/Ashbrook-Jackson

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 10 01.87			11.5		26	L		80	1	3/	0.02		HUR
1985 08 12.65			13.4	AC	32	L		76	0.3	2			MCN
1985 08 13.52			13.5	AC	32	L		76	0.3	2			MCN
1985 08 19.67			13.6	AC	32	L		76		0			MCN

Comet 48P/Johnson

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 06 03.40		c	20.4	FA	91.4	L	5		0.22		31.8s	270	SC001

Comet 57P/du Toit-Neujmin-Delporte

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 08 10.08		M	11.6	HS	20	R	17	140	3	3			LEH
1996 08 11.09		M	12.0	HS	20	R	17	140	3	3			LEH

Comet 64P/Swift-Gehrels

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 11 01.79			11.9		26	L	6	63	2	1			MER
1981 11 01.84			12.0:		36	T			10				VERO2
1981 11 02.80			11.8		26	L	6	63	2.7				MER
1981 11 15.75			11.5:		36	T							VERO2
1981 11 22.88			11.5		36	T							VERO2
1981 12 01.92			11.5		36	T			4				VERO2
1981 12 19.78			11.5		36	T			3				VERO2
1981 12 30.80			12.0:		22	L		35	3.0	1			STU
1982 01 17.79			12.8		36	T			1				VERO2
1982 01 18.82			13.0		36	T							VERO2
1982 01 23.86			10.5	AA	26	L		80	3	2			HUR
1982 01 25.78			13.2		36	T							VERO2

Comet 65P/Gunn

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 06 06.16		S	12.8	AC	44.5	L	4	167	0.7	3			MOR03

Comet 67P/Churyumov-Gerasimenko

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 11 16.93		S	10.4	VB	26	L	6	80	1	5			HUR
1982 12 08.84		S	10.4	AC	20	L		35	1.5	4			PAN
1982 12 10.94		S	10.5	AC	20	L		35	1				PAN
1982 12 17.86		S	10.4	AC	20	L		35	3				PAN
1982 12 18.94		S	10.4	AC	20	L		35	3				PAN
1983 01 06.88		S	10.6	AC	20	L		35	1.5			230	PAN
1983 01 09.85		S	10.6	AC	20	L		35	1.5	4			PAN
1983 01 18.88		S	10.6	AC	20	L		35	3.5	3			PAN
1997 05 31.19		C	21.6	FA	91.4	L	5				1.4m	297	SC001

Comet 68P/Klemola

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 09 26.95		S	12.5	AC	36	L	11	325	0.3	6			KOR
1987 10 17.97		S	13.4	AC	41	L	5	82	2.0	0			BOU
1987 10 23.87		S	13.6	AC	51	L	4	115	1.3	0			BOU

Comet 71P/Clark

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 18.20		C	21.4	FA	91.4	L	5		0.15		14.4s	221	SC001

Comet 81P/Wild 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 01 17.73		S	12.5	MM	20.3	L	7	56	1.5	3			CAM03
1995 03 28.97		S	9.8	AC	20.3	T	10	123	2.0	4			GRA04
1996 11 17.47		C	14.6	FA	91.4	L	5		0.65		3.5m	283	SC001
1996 12 02.51		C	13.6	FA	91.4	L	5		1.0		523.2s	283	SC001
1997 01 01.06		S	12.7	VB	30	R	18	100	0.8	3			SHA02
1997 01 02.02		S	12.8	VB	30	R	18	170	0.5	4			SHA02
1997 01 07.00		S	12.7	VB	30	R	18	100	0.9	s3			SHA02
1997 01 16.33					91.4	L	5		4.3		912.6s	282	SC001
1997 01 25.79		S	11.5	VB	30	R	18	100	0.9	3			SHA02
1997 01 28.78		S	11.7	VB	30	R	18	170	0.9	3			SHA02
1997 02 06.44		S	10.7	VN	25.4	L	6	46	2	4			SEA01
1997 02 07.05		S	9.8	AC	40.6	L	5	70	2.2	7			BOR
1997 02 08.56		S	10.7	VN	25.4	L	6	46	1.5	3			SEA01

Comet 81P/Wild 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 02 09.46		S	10.6	VN	25.4	L	6	46	2	4			SEA01
1997 02 10.05		S	9.8	AC	40.6	L	5	70	2.4	7			BOR
1997 02 10.46		S	10.6	VN	25.4	L	6	46	2	3			SEA01
1997 02 25.02		S	9.7	AC	40.6	L	5	70	2.0	7			BOR
1997 02 27.51		M	9.2	HS	12.5	L	6	23	4.0	4			TSU02
1997 02 28.06		S	9.8	AC	40.6	L	5	70	2.2	6/			BOR
1997 03 01.05		S	9.6	AC	40.6	L	5	70	2.4	6/			BOR
1997 03 01.07		S	9.9	AC	20.3	T	10	123	2.1	5			GRA04
1997 03 01.93		S	10.3	AA	20	C		10	1.5	3			FOG
1997 03 01.94		S	10.2	HS	25.6	L	5	42	2	5			BIV
1997 03 03.54		S	9.3	S	15.0	R	5	25	6	4			NAG02
1997 03 04.85		S	9.5	AC	10.0	B		25	1.3	4			HAS02
1997 03 07.58		S	9.2	S	15.0	R	5	25	5	4			NAG02
1997 03 07.92		B	10.3	HS	25.6	L	5	42	3	5			BIV
1997 03 08.14		S	9.8	AC	40.6	L	5	70	2.0	6/			BOR
1997 03 08.41		M	10.5	VN	25.4	L	6	46	1.5	5			SEA01
1997 03 08.66		S	9.1	S	15.0	R	5	25	6	4			NAG02
1997 03 08.91		B	9.7	NP	17.3	L	6	42	3	4			TRI
1997 03 08.93		M	9.4	AC	35.6	T	11	154	3.3	5		90	GRA04
1997 03 09.41		S	10.4	VN	25.4	L	6	46	1.5	4			SEA01
1997 03 09.82		E	10.0	NP	30	L	5	60	4	5			NEV
1997 03 10.39		S	10.6	VN	25.4	L	6	46	1.3	4			SEA01
1997 03 11.06		S	9.7	AC	40.6	L	5	70	3.5	7			BOR
1997 03 12.39		S	10.6	VN	25.4	L	6	46	1.3	4			SEA01
1997 03 12.78		E	10.5	NP	30	L	5	60	3	3			NEV
1997 03 13.09		S	9.7	AC	40.6	L	5	70	2.8	7			BOR
1997 03 13.42		S	10.5	VN	25.4	L	6	46	1.3	4			SEA01
1997 03 14.42		S	10.5	VN	25.4	L	6	46	1.5	4			SEA01
1997 03 16.91		S	9.7	AC	20.3	T	10	123	2.0	4			GRA04
1997 03 27.37		S	9.9	VN	25.4	L	6	46	2	2			SEA01
1997 03 27.46		M	9.6	HS	12.5	L	6	60					TSU02
1997 03 28.11		S	9.7	AC	40.6	L	5	70	2.1	6/	0.07	105	BOR
1997 03 30.46		S	9.0	S	15.0	R	5	25	6	3/			NAG02
1997 03 30.51		S	9.1	S	10.0	B		20	6	3			YOS02
1997 03 30.55		S	9.2:	VG	10.0	B		20	5.0	3			NAG08
1997 03 31.50		S	10.9	HS	40.0	L	6	120	1.6	4			NAG08
1997 03 31.83		S	9.5	AC	25.4	L	5	65	3	3/			MEY
1997 04 01.83		S	9.5	AC	25.4	L	5	65	4.5	4			MEY
1997 04 01.85		S	10.0	CA	8	R	11	67	2	3			OKS
1997 04 02.05		B	10.0	AC	10.0	B	4	20	& 2	1			NOW
1997 04 02.82		S	9.5	AC	25.4	L	5	65	3	4			MEY
1997 04 02.84		S	9.7:	CA	8	R	11	33	2	3			OKS
1997 04 05.14		S	9.9	AC	40.6	L	5	70	2.2	6/			BOR
1997 04 06.80		S	9.9	AC	25.2	L	4	53	2	6			L0001
1997 04 08.10		S	9.8	AC	40.6	L	5	70	2.1	6/	<0.05	87	BOR
1997 04 08.38		S	9.6	VN	25.4	L	6	37	2	3			SEA01
1997 04 08.84		S	9.6	CA	8	R	11	33	3	4			OKS
1997 04 09.37		S	9.7	VN	25.4	L	6	37	2	2			SEA01
1997 04 10.09		S	9.8	AC	40.6	L	5	70	2.3	6/	<0.05	110	BOR
1997 04 10.36		S	9.7	VN	25.4	L	6	37	2	3			SEA01
1997 04 10.59		B	10.6	HS	31.7	L	6	63	2	5			MIY01
1997 04 12.54		S	9.4	HS	25.4	T	6	60	3	3			YOS04
1997 04 12.54		S	9.5	S	15.0	R	5	25	5	3/			NAG02
1997 04 12.66		M	8.8:	S	12.5	L	6	23					TSU02
1997 04 21.81		M	9.8	TI	10	B		25	2.5	4			ZNO
1997 04 22.92		S	10.3	AC	10.8	L	4	97	1.5	2			MEN03
1997 04 25.47		S	11.2	HS	40.0	L	6	120	1.9	4			NAG08
1997 04 26.92		S	9.9	AC	25.4	L	6	93	2.2	3/			GRA04
1997 04 27.13	a	S	10.2	AC	40.6	L	5	70	2.0	6	<0.05	95	BOR
1997 04 28.42		S	10.5	VN	25.4	L	6	37	2	2			SEA01
1997 04 29.41		S	10.1	VN	25.4	L	6	37	2.3	3			SEA01
1997 04 29.91		S	10.7	VB	20	R	14	90	1.9	2			SHA02
1997 04 30.36		S	10.3	VN	25.4	L	6	37	3.5	2			SEA01
1997 04 30.94		S	10.8	VB	20	R	14	90	1.5	2			SHA02
1997 05 01.90		S	10.3	AC	25.2	L	4	53	1.5	2			L0001

Comet 81P/Wild 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 01.91		S	10.6	VB	20	T	10	75	1.3	3			SHA02
1997 05 01.92		M	9.7	NP	44.5	L	5	74	3.5	4			SAN04
1997 05 01.92		M	9.9	NP	44.5	L	5	74	3	5			MAR02
1997 05 02.42		S	10.2	VN	25.4	L	6	59	2.5	3			SEA01
1997 05 02.83		M	10.8	TI	10	B		25	2.5	4/	0.05	110	ZNO
1997 05 02.84		M	10.9	TI	10	B		25		4			DVO
1997 05 02.87		B	10.7	HS	25.6	L	5	42	3	5	0.1	100	BIV
1997 05 02.87		S	10.6	AC	25.4	L	5	65	2	S4/			MEY
1997 05 02.89		S	10.9	VB	30	R	18	170	1.5	2			SHA02
1997 05 02.91		S	10.2	HS	20.3	T	10	50	1.9	4			KAM01
1997 05 05.10	a	S	10.2	AC	40.6	L	5	70	1.8	5			BOR
1997 05 06.92		S	10.2	VB	20	T	10	75	1.4	3			SHA02
1997 05 07.88		S	10.4	AC	25.4	L	5	65	2	3/			MEY
1997 05 09.40		S	10.2	VN	25.4	L	6	37	3	2			SEA01
1997 05 09.89		S	10.5	AC	25.4	L	5	65	2	4			MEY
1997 05 09.91		S	11.0	VB	20	R	14	40	2.6	3			SHA02
1997 05 10.42		S	10.0	VN	25.4	L	6	37	3	2			SEA01
1997 05 10.56		S	9.9	HS	25.4	T	6	32	4.6	2/			YOS04
1997 05 10.83		M	10.4	TI	10	B		25	2.5	3/	0.1	110	ZNO
1997 05 10.88		M	9.8	TI	20	L	5	48	4	3/			PLS
1997 05 10.89		M	9.7	TI	20	L	5	48	2.5	3			HOR02
1997 05 10.91		S	11.7	VB	20	R	14	90	2.4	2			SHA02
1997 05 12.92		S	11.7	VB	30	R	18	100	1.3	2			SHA02
1997 05 17.94		B	11.8:	HS	20.3	T	10	77	1.5	6			BIV
1997 05 23.93		S	11.3	VB	33	L	5	100	1.3	3			SHA02
1997 05 25.16		J	10.8	SC	25.4	T	4		2.96	s6	2.7m	110	ROQ
1997 05 25.91		M	10.1	TI	35	L	5	104	3.5	3/			PLS
1997 05 25.91		M	10.6	TI	35	L	5	104	2.3	1/			HOR02
1997 05 25.92		S	10.2	AC	25.3	L	6	58	& 2.5	3			PER01
1997 05 25.92		S	10.9	AC	25.3	L	6	58	& 2.2	4			VIT01
1997 05 25.93		S	11.4	VB	33	L	5	75	1.7	3			SHA02
1997 05 26.35		S	10.5	VN	25.4	L	6	47	2	2			SEA01
1997 05 27.12	a	S	10.6	AC	40.6	L	5	70	1.7	5			BOR
1997 05 27.35		S	10.5	VN	25.4	L	6	47	1.2	3			SEA01
1997 05 27.50		M	10.6	HS	12.5	L	6	60					TSU02
1997 05 27.93		B	11.0	HS	25.6	L	5	42	2	5			BIV
1997 05 28.10	a	S	10.7	AC	40.6	L	5	70	1.9	4			BOR
1997 05 28.34		S	10.5	VN	25.4	L	6	37	2	2			SEA01
1997 05 28.88	!	V	10.8	YF	20.0	T	2	a120	+ 5.7	7			MIK
1997 05 28.90		S	10.6	HS	20.3	T	10	77	1.9	3			KAM01
1997 05 28.93		S	10.1	AC	25.3	L	6	58	& 3.0	1/			PER01
1997 05 28.93		S	11.1:	HS	30	R	18	100	1.7	2			SHA02
1997 05 28.93		S	11.2	AC	25.3	L	6	58	& 1.9	2/			VIT01
1997 05 29.95		S	11.1	NP	20	T	10	75	2.2	2			SEA02
1997 05 30.18	c	17.2	FA	91.4	L	5					10.2m	287	SC001
1997 05 30.21	C	13.0	FA	91.4	L	5			3.16		9.9m	113	SC001
1997 05 30.91		S	10.8	AC	25.3	L	6	58	& 1.7	2/			PER01
1997 05 30.91		S	10.8	AC	25.3	L	6	58	& 1.8	3			VIT01
1997 05 31.35		S	10.6	VN	25.4	L	6	37	1.4	2			SEA01
1997 05 31.88		M	10.0	TI	35	L	5	92	2.5	1/			HOR02
1997 05 31.94		S	10.6	HS	20	T	10	75	1.0	2			SHA02
1997 06 01.95		S	11.7:	HS	33	L	5	75	1.4	2			SHA02
1997 06 02.93		S	10.3	AC	25.3	L	6	58	& 2.8	3			PER01
1997 06 02.93		S	10.3	AC	25.3	L	6	58	& 2.8	3			PER01
1997 06 03.35		S	10.5	VN	25.4	L	6	37	2.5	3			SEA01
1997 06 05.16		J	10.2	SC	25.4	T	4		2.75	s6	4.1m	93	ROQ
1997 06 05.38		S	10.6	VN	25.4	L	6	37	2	3			SEA01
1997 06 06.35		S	10.8	VN	25.4	L	6	59	1.4	3			SEA01
1997 06 07.35		S	10.8	VN	25.4	L	6	59	1.5	4			SEA01
1997 06 07.88		M	10.7	TI	10	B		25	3.2	3/			ZNO
1997 06 07.89		M	10.2	TI	35	L	5	92	2.6	2/			HOR02
1997 06 07.91		S	10.7	AC	25.4	L	5	65	2	3/			MEY
1997 06 07.95		S	11.1:	HS	33	L	5	75	1.6	3			SHA02
1997 06 08.38		S	10.7	VN	25.4	L	6	59	1.4	4			SEA01
1997 06 09.10	a	S	10.8	AC	40.6	L	5	70	1.9	3			BOR

Comet 81P/Wild 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 06 19.17		J	11.1	SC	25.4	T	4		0.94	s6			ROQ
1997 06 26.17		J	11.0	SC	25.4	T	4		1.40	s6/			ROQ
1997 06 28.86		M	11.2	TI	10	B		25	2.2	4			ZNO
1997 06 29.49		S	12.0:	HS	40.0	L	6	200	1.2	1			NAG08
1997 06 29.51		M	11.5	HS	25.0	L	6	62	2.5	3			TSU02
1997 06 29.52	a	C	12.0	GA	60.0	Y	6	a120	3.3		3.5m	113	NAK01
1997 06 30.50		S	11.0	VN	20.0	L	4	45	2.2	4			PEA
1997 07 01.46		S	11.0	VN	20.0	L	4	45	2.0	3/			PEA
1997 07 03.18	!	J	10.9	SC	25.4	T	4		1.35	s3	3.7m	112	ROQ
1997 07 03.46		S	11.1	AA	20.0	L	4	45	2.0	4			PEA
1997 07 05.22	!	J	10.9	SC	25.4	T	4		2.26	s3	4.2m	114	ROQ
1997 07 07.90		M	10.9	TI	35	L	5	92	2.1	2/			PLS
1997 07 14.16	!	J	11.7	SC	25.4	T	4		1.19	s4	3.2m	109	ROQ

Comet 85P/Boethin

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 01 03.76		S	8.1	AA	8.0	B		15	6	4			HUR
1986 01 11.77		S	7.4	S	8.0	B		15	8	4			HUR
1986 01 12.79		S	8.1	S	8.0	B		15	7.5	4			HUR
1986 01 13.78			7.9	AA	8.0	B		15	4.5	3/			HAV
1986 01 19.81		S	8.4	AA	20	L	4	35	3.4	3			PAN
1986 01 23.80		S	8.9	AA	31	L	5	60	3.2	2			PAN
1986 01 27.74			8.1	AC	8.0	B		10	4	3			MIK
1986 02 20.80		S	9.4	AA	31	L	5	60	3.5	2			PAN
1986 02 26.82		S	9.3	AA	20	L	4	35	4	2			PAN
1986 03 02.82		S	10.0	AA	20	L	4	35	3	1			PAN

Comet 91P/Russell 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 18.52		C	20.7	FA	91.4	L	5			9			SC001
1996 11 19.53		C	21.2	FA	91.4	L	5			9			SC001
1997 03 04.66	a	C	18.1	GA	60.0	Y	6	a240	0.4			300	NAK01
1997 03 31.61	a	C	18.0	GA	60.0	Y	6	a240	0.4		0.9m	300	NAK01
1997 04 29.57		C	18.2	GA	60.0	Y	6	a240	0.4				NAK01
1997 05 09.54		C	18.2	GA	60.0	Y	6	a240	0.35				NAK01
1997 05 31.16		c	22.5	FA	91.4	L	5				30	s 123	SC001
1997 05 31.18		C	19.0	FA	91.4	L	5		0.28		126	s 295	SC001

Comet 94P/Russell 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 07.63		C	16.1	GA	60.0	Y	6	a120	0.75			2.5m 288	NAK01
1997 04 15.37		C	16.4	FA	91.4	L	5		0.40		103.2s	289	SC001
1997 04 28.60		C	16.5	GA	60.0	Y	6	a120	0.55		2.4m	291	NAK01
1997 05 26.55		C	17.1	GA	60.0	Y	6	a240	0.45				NAK01
1997 06 01.16		c	19.7	FA	91.4	L	5				45.0s	294	SC001
1997 06 01.19		C	17.7	FA	91.4	L	5		0.28		45.6s	114	SC001
1997 07 03.51	a	C	18.0	GA	60.0	Y	6	a240	0.35				NAK01

Comet 95P/Chiron = (2060) Chiron

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 31.64	a	C	15.8	GA	60.0	Y	6	a120		9			NAK01

Comet 96P/Machholz 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 10 13.45		C	4.5:		1.8	R	9				&2		CYR
1996 10 14.74		C	4.5:		1.8	R	9				&2		CYR

July 1997

215

INTERNATIONAL COMET QUARTERLY

Comet 98P/Takamizawa

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 08 08.82			9.7	V	12	B		20	0.7				MCN
1984 08 21.87			9.7	S	20	T		63	2.2	4			KAM01
1984 08 23.56			11.0	V	32	L		76	1.5				MCN
1984 08 30.58			12.5	V	32	L		76	0.7				MCN

Comet 100P/Hartley 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 07.71		C	15.1	GA	60.0	Y	6	a120	1.1				NAK01
1997 04 12.66		C	15.0	GA	60.0	Y	6	a120	1.2				NAK01
1997 04 15.42		C	15.6	FA	91.4	L	5		1.22		48 s	215	SC001
1997 04 28.61		C	15.1	GA	60.0	Y	6	a120	1.0		1.3m	128	NAK01
1997 05 26.56		C	15.9	GA	60.0	Y	6	a120	0.65			100	NAK01
1997 06 02.19		C	16.3	FA	91.4	L	5		0.40		184.2s	102	SC001
1997 06 29.53	a	C	16.3	GA	60.0	Y	6	a240	0.7				NAK01

Comet 102P/Shoemaker 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 10 28.80			11.2	AC	41	L		60	3	3			WIL03
1984 10 29.88			10.8	AC	41	L		60	3	4			WIL03
1984 10 30.90			10.5	AC	41	L		60	4	3			WIL03
1984 11 02.01			11.3	AC	41	L		60	4	4			WIL03

Comet 103P/Hartley 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 09 07.05		S	7.8	SC	22.0	L	7	89	5.5	5	0.09	270	BUL01
1991 09 08.08		S	8.5	S	13.0	L	5	40					BEC01
1991 09 08.14		S	7.8	SC	22.0	L	7	89	5.5	5	0.05	270	BUL01
1991 09 08.17		S	8.7	AA	5.0	B		8	5	3	0.16	270	BEA
1991 09 15.13		S	8.6	AA	5.0	B		8	3	3	0.25	270	BEA
1991 09 18.07		S	9.0	S	13.0	L	5	40					BEC01
1991 10 04.08		S	8.5	S	13.0	L	5	40					BEC01
1991 10 05.08		S	8.5	S	13.0	L	5	40					BEC01
1991 10 06.20		S	9.0:	AA	5.0	B		8	5	2	0.25	270	BEA
1991 10 21.20		S	8.9:	AA	5.0	B		8	3	2	0.33		BEA
1997 05 03.16	R	19.7	LA	82	C	11	A800	& 0.09					LIC01
1997 05 05.18	R	19.6	LA	82	C	11	A200	& 0.09					LIC01

Comet 108P/Ciffréo

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 11 14.88			11.8	AC	35	T		200	2	2			VER02

Comet 109P/Swift-Tuttle

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1992 10 18.75		S	7.8	S	13.0	L	5	40	5	6			BEC01
1992 10 22.89		S	7.5	S	13.0	L	5	40	5.5	3			BEC01
1992 10 29.75		S	6.2	A	13.0	L	5	40	7	6			BEC01
1992 11 02.74		S	5.7	S	5.0	B		7					BEC01
1992 11 02.74		S	6.0	S	13.0	L	5	40	7	6			BEC01
1992 11 03.76		S	5.5	S	13.0	L	5	40	6	5			BEC01
1992 11 13.71		S	5.0	S	5.0	B		7					BEC01
1992 11 14.73		S	4.9	S	13.0	L	5	40	6	6			BEC01
1992 11 16.79		S	5.1	S	5.0	B		7		6			BEC01
1992 11 19.73		S	5.0	S	13.0	L	5	40	6	6			BEC01
1992 11 23.72		S	5.1	S	0.7	E		1					BEC01
1992 11 30.71		S	5.0	S	13.0	L	5	40	5	5			BEC01

Comet 111P/Helin-Roman-Crockett

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 17.46		C	20.8	FA	91.4	L	5		0.18		76.8s	277	SC001
1997 01 11.66		C	19.5	GA	60.0	Y	6	a240	0.25				NAK01
1997 01 16.35		C	20.2	FA	91.4	L	5				21.0s	297	SC001
1997 02 01.55		C	19.3	GA	60.0	Y	6	a240	0.25				NAK01

Comet 113P/Spitaler

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 11 11.84		C	17.0:		47		L						MOB

Comet 116P/Wild 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 01.89		S	12.0	S	31.6	L	5	130	1.8	6			MID01
1990 03 02.93		S	11.8	S	31.6	L	5	130	2	5			MID01
1990 04 22.41		S	12.8	LM	20.3	L	7	56	3	7			CAM03
1996 02 06.85		M	13.3	HS	20	R	17	140	2	4			LEH
1996 02 09.82		M	13.2	HS	20	R	17	140	2	4/			LEH
1996 02 25.78		M	12.3	HS	20	R	17	140	2	4			LEH
1996 03 08.94		M	11.9	HS	20	R	17	140	3	4			LEH
1996 03 09.81		M	11.9	HS	20	R	17	140	2.5	3/			LEH
1996 03 15.87		M	11.9	TI	20	R	17	140	2	4			LEH
1996 03 17.12		S	13.5	AC	44.5	L	4	167	0.7	3			MOR03
1996 03 17.85		M	12.2	HS	20	R	17	140	2	3/			LEH
1996 03 20.92		M	11.6	HS	20	R	17	140	2	3/			LEH
1996 03 25.80		M	11.5	HS	20	R	17	140	1.5	4			LEH
1996 04 06.89		M	11.6	TI	20	R	17	140	2	4/			LEH
1996 04 07.82		M	11.4	TI	20	R	17	140	1.5	4			LEH
1996 04 09.83		M	11.5	TI	20	R	17	140	2	5			LEH
1996 04 11.10		S	13.5	AC	44.5	L	4	167	0.6	3			MOR03
1996 04 15.85		M	11.4	TI	20	R	17	140	2	4			LEH
1996 04 16.83		M	11.7	TI	20	R	17	140	2	3/			LEH
1996 04 17.85		M	11.8	TI	20	R	17	140	2	3			LEH
1996 04 18.84		M	11.7	TI	20	R	17	140	1.5	3/			LEH
1996 04 19.89		M	11.7	TI	20	R	17	140	1.5	3/			LEH
1996 04 22.09		S	13.4	AC	44.5	L	4	167	0.7	3			MOR03
1996 05 07.10		S	13.1	AC	44.5	L	4	167	1.0	3			MOR03

Comet 118P/Shoemaker-Levy 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 17.44		C	14.5	FA	91.4	L	5		0.77		343.8s	275	SC001
1997 01 02.00		S	13.5	VB	30	R	18	170	0.6	1			SHA02
1997 01 07.02		S	13.8	VB	30	R	18	170					SHA02
1997 04 07.48		C	15.2	GA	60.0	Y	6	a120	0.85			100	NAK01
1997 05 04.47		C	15.3	GA	60.0	Y	6	a120	1.0				NAK01
1997 06 17.17	!	J	11.9	SC	25.4	T	4		1.11	s5/			ROQ

Comet 119P/Parker-Hartley

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 10 22.80		C	17.4	GA	60.0	Y	6	a240	0.4		2.0m	280	NAK01
1996 11 06.79		C	17.3	GA	60.0	Y	6	a240	0.4		2.0m	278	NAK01
1996 11 17.45		C	17.2	FA	91.4	L	5		0.27		212.4s	282	SC001
1996 12 02.50		c	20.0	FA	91.4	L	5		0.22		94.2s	282	SC001
1997 01 11.64		C	16.3	GA	60.0	Y	6	a120	0.5			290	NAK01
1997 02 09.54		C	16.4:	GA	60.0	Y	6	a120	0.5				NAK01
1997 03 07.47		C	16.8:	GA	60.0	Y	6	a120	0.35				NAK01
1997 03 31.48		C	17.6	GA	60.0	Y	6	a240	0.4				NAK01

Comet 120P/Mueller 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 18.48		C	20.4	FA	91.4	L	5		0.22		14.4s	239	SC001

Comet 121P/Shoemaker-Holt 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 19.50		C	15.8	FA	91.4	L	5		0.35		88.2s	283	SC001
1997 01 16.38		C	15.1	FA	91.4	L	5				273 s	280	SC001
1997 01 16.41		C	15.0	FA	91.4	L	5		0.48		454.2s	282	SC001
1997 03 04.88		S	13.7	HS	44.0	L	5	156	0.3	5			HAS02
1997 03 31.58		C	15.5	GA	60.0	Y	6	a120	0.8			235	NAK01
1997 04 29.56		C	16.2	GA	60.0	Y	6	a120	0.6				NAK01
1997 05 26.52		C	16.4	GA	60.0	Y	6	a240	0.7				NAK01
1997 05 27.19		J	15.2	SC	25.4	T	4		< 1	d1			ROQ
1997 07 03.49	a	C	17.5	GA	60.0	Y	6	a240	0.35				NAK01

Comet 122P/de Vico

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 09 29.18		S	4.6	AA	20	T	10	80	5	3			OWE
1995 10 01.15		M	5.7	AA	5.0	B		12	3.0	7	1.0	273	TAN02
1995 10 02.14		M	5.5	AA	5.0	B		12	2.2	7			TAN02
1995 10 03.15		M	5.5	AA	5.0	B		12	3.1	7	0.9	274	TAN02
1995 10 04.15		M	5.4	AA	5.0	B		12		6			TAN02
1995 10 04.20		S	4.6	AA	20	T	10	60	5	3			OWE
1995 10 05.19			5.2	AA	0.7	E		1					KEI
1995 10 05.19		M	5.4	AA	5.0	B		10					KEI
1995 10 05.19		S	5.4	AA	7.0	B		15	6	8	1.0		PAN
1995 10 06.19		S	5.5	AA	21.0	L	7	64	4.5	8	0.28	280	BUL01
1995 10 08.14		S	5.7	AA	21.0	L	7	64	4	8	0.23	280	BUL01
1995 10 08.20		S	5.4	AA	7.0	B		15	5	7	1.0	320	PAN
1995 10 16.16		M	5.6	AA	5.0	B		12		6			TAN02
1995 10 19.20		S	5.7	SC	7.0	B		15	6	5	1.0	310	PAN
1995 10 22.19		S	7.4	SC	8.0	B		20	4.0	6			ST003
1995 10 28.22		S	6.4	SC	7.0	B		15	6	5			PAN
1995 10 28.22		S	7.6	SC	8.0	B		20	2.6	6			ST003
1995 10 31.78		S	6.5	AA	8.0	B		11					BUL01
1995 11 02.76		S	6.7	AA	21.0	L	7	64	4	7	0.16	215	BUL01
1995 11 02.78		S	7.2	VB	5.0	B		10		4	0.5	0	OHA01

Comet 126P/IRAS

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 10 28.91			12.3	V	26	L		80	1	3			HUR
1983 10 29.79			12.5	V	26	L		80	1.5	3			HUR

Comet 129P/Shoemaker-Levy 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 11 19.20		C	19.2	FA	91.4	L	5		0.15		13.8s	247	SC001

Comet D/1978 R1 (P/Haneda-Campos)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 09 20.78			11.0		30	L	3		2	5			TUB
1978 09 25.79			10.5		30	L	3		2.5	6			TUB

Comet D/1989 A3 (Bradfield 2)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 01 12.50		S	11.9	MM	20.3	L	7	35	3	2			CAM03

Comet P/1994 A1 (Kushida)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 02 04.48		S	11.0	S	31.7	L	5	53	1	2			JON
1994 02 06.65		S	11.6	L	31.7	L	5	93	0.5				JON
1994 02 08.47		S	11.2	L	31.7	L	5	93	1.5	1			JON

Comet P/1994 P1 (Machholz 2)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 09 05.02		S	7.0	HS	15.0	L	5	42	2	7			BE001

Comet P/1994 P1 (Machholz 2) [component A]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 09 09.45		M	7.4	S	31.8	L	4	63	6	3			KEE
1994 09 09.46		B	7.4	S	5.0	B		7					KEE

Comet P/1994 P1 (Machholz 2) [component B]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 09 09.45		S	11.0	AC	31.8	L	4	116	3	0			KEE

Comet P/1994 P1 (Machholz 2) [component C]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 09 09.45		S	12.2	AC	31.8	L	4	116	2	0			KEE

Comet P/1994 P1 (Machholz 2) [component D]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 09 09.45		S	12.0	AC	31.8	L	4	116	2	0			KEE

Comet P/1996 A1 (Jedicke)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 01 11.79		C	17.7	GA	60.0	Y	6	a240	0.45			295	NAK01
1997 01 19.84		C	17.9	GA	60.0	Y	6	a240	0.4		1.0m	294	NAK01
1997 02 04.83		C	17.9	GA	60.0	Y	6	a240	0.6		2.4m	291	NAK01
1997 03 11.68		C	17.7	GA	60.0	Y	6	a240	0.55		2.0m	293	NAK01
1997 04 12.61		C	17.6	GA	60.0	Y	6	a240	0.65		2.5m	295	NAK01
1997 05 02.23		C	18.9	FA	91.4	L	5		0.22				SC001
1997 05 09.56		C	18.3	GA	60.0	Y	6	a240	0.3		132 s	296	NAK01

Comet P/1996 R2 (Lagerkvist)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 28.44		a C	17.2	GA	60.0	Y	6	a240	0.65				NAK01

Comet P/1997 B1 (Kobayashi)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 31.55		C	17.2	GA	60.0	Y	6	a240	0.35	8/			NAK01
1997 04 29.54		C	17.6	GA	60.0	Y	6	a240	0.4				NAK01
1997 05 26.51		C	18.3	GA	60.0	Y	6	a240	0.35				NAK01

Comet P/1997 C1 (Gehrels)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 02 03.32		C	17.8	FA	91.4	L	5		0.23		183 s	290	SC001
1997 03 31.50		C	18.8	GA	60.0	Y	6	a240	0.4		0.9m	289	NAK01
1997 05 01.21		C	19.8	FA	91.4	L	5		0.18		15 s	283	SC001
1997 05 04.51		C	19.5	GA	60.0	Y	6	a240	0.3				NAK01

Comet P/1997 G1 (Montani)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 25.48		a C	19.5	GA	60.0	Y	6	a480	0.2				NAK01
1997 05 26.48		a C	19.3	GA	60.0	Y	6	a240	0.25				NAK01

◇ ◇ ◇

Corrigenda. The following tabulated observations of C/1995 O1 by KOS in the April 1997 issue (pp. 116-129) are to be deleted: 1997 Mar. 1.16, 2.16, 3.16, 4.15, 5.15, 6.15, 8.14, 10.14, 11.14, 18.13, 29.77, 30.78, and 31.78. Some of the data are made with different instruments, and they are republished correctly in this issue.