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

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

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

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CORRIGENDA

• In the July 1997 issue, page 152, bottom (second corrigendum), *for* "Comet 118P/Shoemaker-Levy 4" *read* "Comet 121P/Shoemaker-Holt 2"

• In the July 1998 issue, page 153, "Comet 88P/Howell", the observation on 1998 04 28.94 by observer SHA02 is to be deleted.

• In the July 1998 issue, page 157, the observation by observer RES attributed to 'Comet 114P/Wiseman-Skiff' belongs to 'Comet 118P/Shoemaker-Levy 4'.

Editor's Note: The idea for the following essay was proposed by the authors a couple of years ago, and was contributed last summer. It was decided that several experienced comet observers and archivists should be shown this essay prior to publication, with the offer of publishing rebuttals or commentary. After the essay by Kammerer and Bortle, then, are the replies of several ICQ readers who reviewed this essay prior to publication (several of whom saw two pre-publication drafts of the essay).

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Opinion/Editorial Essay:

Does the Instantaneous Publication Of Observations Cause Severe Problems for the ICQ Archives?

by Andreas Kammerer and John E. Bortle

During the past several years, worldwide communication within the astronomical community via the Internet has increased dramatically. Today it is possible to have access to the very latest discoveries of comets, novae, and other fascinating objects within minutes of their being first recognized. This has proved very helpful in facilitating immediate follow-up observations by a great number of observers and a multitude of instruments. In the same sense, it is possible to see details of observations obtained sometimes only minutes earlier. However, as the authors will attempt to demonstrate in the following editorial, there are indications that it also has the potential to influence observers in some very negative ways.

Instantaneous publication of potential discoveries

This editorial, however, is not the first in presenting some possible negative influences of the Internet to a broader audience. On *IAU Circulars* 6736, 6737, and 6739, Brian Marsden discussed at length the disadvantages of the new electronic media in the case of announcing a possible discovery (of a supernova) via the Internet without thoroughly checking for other possibilities, such as an asteroid passing very slowly in front of a galaxy. There are two reasons for a potential discoverer to act like this: (1) the lack of appropriate catalogues and programs to check the suspicious object, and (2) the fear, particularly in the amateur community, of possibly losing credit for the discovery due to a delayed announcement.

The second situation has become more important in the last few years because an increasing number of amateur astronomers possess instrumentation that was only accessible to professionals just a couple of decades ago, and because of the possibility of accessing institutions within minutes. Thus, without having a manual defining the steps that a potential discoverer should follow and listing those reference sources that he or she should consult prior to announcing a find, it can be expected that the number of "false alarms" will grow in the near future. Similar concerns can be found in two recent articles published in the English journal *The Astronomer* (Mobberley and Hurst 1997; Hurst 1998).

The authors think, however, that instantaneous publication of discovery announcements, without a thorough check for possible misidentification or errors, is only one part of the problem. Another potential problem concerns the instantaneous publication of otherwise ordinary observational data and its impact on other observers. The discussion below addresses its significance to the field of comet observations, but it may well apply to observational data from other areas as well.

The Case of Comet C/1996 B2 (Hyakutake)

Since the potential for the Internet's World Wide Web (WWW) to serve as bulletin board for observational data was recognized a few years ago, a growing number of both professional and amateur astronomers have created "specialty" pages pertaining to their specific fields of interest. Among these have been a number of sites addressing comets. The intention of such web "pages" is clear and straightforward: to establish a forum for the instantaneous publication of observations, ephemerides, and discovery announcements.

These electronic comet pages experienced their first big boost with the appearance of comet C/1996 B2 (Hyakutake) in early 1996. The first bright comet in 20 years, it proved to be of great interest. Accesses or "hits" at various comet-related sites reached dizzying numbers. In some cases, not only were the numbers of observations breathtaking, but so were some of the reports themselves! The worldwide enthusiasm even infected the Central Bureau for Astronomical Telegrams, which closely documented the development of this comet by placing in the Web scores of brightness and tail-length estimates. However, the bulk of the observations published on the *IAU Circulars* were those giving the brightest reported magnitudes and longest tail lengths. When the scatter in the estimates of experienced observers exceeded a full magnitude and tail lengths differed by a factor of two or three, *ICQ* editor Dan Green e-mailed a large number of the most experienced observers worldwide, asking them to check their methodologies!

The "Hyakutake-mania" was at its peak in the last days of March when the IAU Central Bureau also became visibly concerned. *IAUC* 6360 was the first to cast doubt on some of the reported tail-length estimates, noting: "Several readers, notably A. W. Harris, Jet Propulsion Laboratory, have pointed out that, if the tail of a comet corresponds to the extended radius vector (as is particularly likely for a gas tail), it is physically impossible for its angular extent to exceed the phase angle. They therefore question some of the reported observations of tail length, particularly on *IAUC* 6355."

Suddenly the enthusiasm of those days gave way to marked concern. What had happened? Who was right? The discussion soon focused upon two alternatives: Were the observers reporting exceedingly long tails indeed correct, or perhaps was it the result of some sort of physiological effects or other outside influence, as discussed in detail by Kammerer (1996, 1998)?

The Situation With Comet C/1995 O1 (Hale-Bopp)

Just one year after the display of comet C/1996 B2 (Hyakutake), comet C/1995 O1 (Hale-Bopp) filled the sky and its observations filled many WWW pages. This particular object displayed a large dust tail. However, except very near the coma, this appendage was of a much lower surface brightness than the dust tails of most other comets of similar brilliance. While the reported tail-length estimates did not exceed the phase angle in the case of C/1995 O1, there were some reports of tail lengths that exceeded the average values obtained by equally good observers under favorable sky conditions by a factor of two! The validity of these reported values must also be questioned.

The first author notes that a group of experienced and very-well-equipped German observers were situated in the Alps during April of 1997 and experienced quite a number of excellent and very dry nights at an elevation of 3150 meters. They were never able to see or photograph the dust tail as being any longer than about 23°.

Not only was the length of the comet's tail in question, but there also emerged quite some dispute over the published brightness estimates. Whereas the majority of the observers reported magnitudes at $\simeq -0.5$ at maximum, a very significant number of reports stated the comet was nearly as bright, or even equal to, Sirius. Historically, the most experienced comet observers have typically reported the highest magnitude values, while those who have spent a lesser time in this pursuit derive noticeably lower values. On this occasion the situation was largely reversed!

What could cause these discrepancies? Could it be that these estimates were influenced by some sort of outside feedback? In an attempt to define the possible sources of outside influence, the authors examined a number of effects that might tend to produce exaggerated results. Those considered the most significant by the authors are included below.

Physiological Effects — Tricking the Eye

Physiological effects surely play an often-underestimated role in the case when one is observing low-contrast objects, especially if they are elongated. Our eye-brain system seems to be notoriously prone to lengthen linear features at the threshold of detection, or to mentally link such a feature with other low-contrast or weak objects that lay beyond them in the same general direction. This produces the illusion that a feature is much longer than it really is. Such a scenario was surely played out to an extreme degree with comets 1P/Halley in 1986, C/1983 H1 (IRAS-Araki-Alcock), and C/1996 B2 (Hyakutake). The longest visual tail lengths reported to co-author Bortle for *Sky and Telescope*'s 'Comet Digest' for these three objects were 70°, 50°, and 117°! These observations were made by what the authors consider to be fairly respectable observers. But in each case, the authors consider the values to be utterly out of the question. This is because more experienced observers, under better skies, saw much shorter tail lengths. The same problem may well relate to past long-tailed comets as well (1843, 1861, 1P/Halley in 1910, etc.).

In the case of comet C/1996 B2 (Hyakutake), for example, the comet's tail temporarily lined up with the Coma cluster and the gegenschein near the time of closest approach to the earth. In this respect, it is in no ways inconsistent that some observers felt that the visual tail passed right through the gegenschein.

A striking example of prolongation effect was noted by a group of German comet observers while observing under crystal-clear skies in the Alps in mid-April 1996. After the end of twilight, one, then two observers claimed seeing the tail of C/1996 B2 (Hyakutake) right up to the zenith (meaning a tail length of about 70°), whereas the remainder of the group could not confirm this. About two hours later, when the coma and the brighter parts of the tail had set, none of the observers, including the two who reported the 70° appendage, could see even a trace of a tail, although the tail's terminus should have still been high in the sky.

Further evidence for this explanation comes from a project initiated by the first author to compare visually and photographically derived tail lengths of comet C/1995 O1 (Hale-Bopp). It gave two interesting results: (a) the visual tail lengths were often quite similar to the ones measured on the best photographs, and (b) in the very few cases when the visually derived tail length exceeded the photographically measured one, the tail was oriented toward asterisms/extended objects such as the Cepheus spur of the Milky Way or the bright stars of Cassiopeia.

Under this same heading might be addressed the related problem of observers unconsciously out-pacing reality with their observations and finding no way to go but up. This "no retreat" scenario goes as follows. Let's say that an individual reported a tail length of 60° for C/1996 B2 (Hyakutake) on a given night some days before closest approach to the earth and, in fact, this was really a gross over-estimate. Five nights later (with the comet significantly nearer to the earth), he can only see 55° of tail. Knowing that the comet is closer, the natural assumption is that the tail MUST really be longer. Rather than report what is seen, there is the tendency to force the current observation to conform to expectations, and the tail might come out as 75° long — even though it's really 55°! The same goes for magnitudes. The second author can provide numerous examples of "anticipated magnitudes" in the field of variable-star observation, where some variable stars (such as Mira-type) have light curves that can be somewhat anticipated.

Although the mentioned effects are not new, we think that they have become more relevant today, due to the influence that the instantaneous publication of such biased observations could have on other observers.

Sadly, there is also a darker psychological effect that may tend to influence certain individuals, namely the need to be a "champion" observer — one born out of a need for recognition and a quick rise to "fame." Individuals of this sort (in most cases unknown to the astronomical community until that date) seem to have become increasingly common in recent years, perhaps even more so since electronic bulletin boards and instantaneous data exchange sprang up. In some instances, these disturbed individuals totally fabricate their "observations", but after a time this generally becomes fairly obvious. While many of us will just disregard such posting, they could just as easily tend to influence, mislead, or at least confuse other observers.

The Influence Of Computer Bulletin Boards

While the tendency for the eye/mind combination to extend the apparent length of elongated objects has long been established, the authors feel that they have identified an additional psychological effect that almost certainly has played a significant role in skewing the observational data of the two recent brilliant comets. This new effect arises from an observer's knowledge of a comet's current physical status through the almost-instantaneous publication of observations on various computer bulletin boards prior to making his own observations. It can be regarded as a modern form of the known "ephemeris influence", but is suspected of having a greater impact due to the fact that daily-updated Web pages are more convincing than any ephemeris can ever be. This can highly degrade the "independence" of the data and, in the authors' opinion, may well be playing a highly significant role in today's comet observations.

While one might think this sort of thing would be largely a problem for newcomers, the authors contend that seeing reports of exaggerated tail lengths or total magnitudes may even lead more level-headed observers to "upping" their observed values to mimic more closely the reported extremes. Such a procedure (rounding to the next higher 5° or even 10°) was noted in the course of a survey of the German observers with the longest reported tail lengths for comet C/1996 B2 (Hyakutake)!

In the course of this survey, a comparison was also made between the tail-length estimates of members who consulted bulletin boards extensively against the estimates of members without access to computer bulletin boards. Taking into account the different skills and conditions at the observing sites, a greater tail length on average for the first group could be recognized. Nevertheless, because of the relatively small data base and the complex nature of a visual comet measurement, this result should only be regarded as an additional hint to the proposed effect. It is, however, interesting to note that the two estimates exceeding the phase angle within the German Comet Section were both reported by observers with extensive use of computer bulletin boards.

The same effect can also be recognized by comparing different "comet pages" on the Web. There are Web pages that tend to quote significantly higher values for the brightness or tail length than others, although the observers do not show significant differences concerning observing skills or sky conditions.

Conclusions and Recommendations

In this extended editorial, the authors wished to address their considerable concern over factors whose impacts on observations until now seems to have been either unrecognized or at least significantly underestimated: physiological effects on observers and the "bulletin-board-effect" produced by consulting computer bulletin boards. While physiology seems to play a significant role only under rare circumstances, the impact of the bulletin boards is sure to become more and more severe with growing instantaneous information exchange.

Because the effects discussed are complex and subtle at first glance, the authors cannot finally state the degree of their severity. However, it is very interesting to note that similar discussions are recently emerging within other groups like the AAVSO!

Before the comet archives are endangered by acquiring volumes of erroneous data, with the final consequence of professionals turning away from the good visual data gathered by most comet observers, the authors propose that serious contributors to this field should act in the sense of a "codex for comet observation". This would imply that an observer:

(1) minimizes the potential of being influenced by published estimates. Extending the long-accepted recommendation of not looking at the ephemeris predictions, an observer should not access a bulletin board immediately in advance of an observation — especially in the case that the intended observation will take place after a break of several days due to bad weather or the moon.

(2) always reports what he or she sees, even if the estimate seems to contradict his or her expectations or does not fit well with published observations.

(3) always considers the possibility of physiological effects and tries to minimize them.

(4) should be in every case self-critical and emotionless to his or her observations (everybody, even the most experienced observers, sometimes produces bad estimates).

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Commentary on the Kammerer/Bortle Essay. I.

Reinder J. Bouma

Groningen, The Netherlands

I would like to note that I find the general tone of the article rather pessimistic. Maybe the authors wanted to concentrate in this forum only on the negative side of WWW homepages and bulletins boards. In my opinion, though, the advantages of the 'new' media far outweigh the disadvantages. I certainly do not want to go back to the times when distribution of comet discoveries, orbital elements, and the like was much slower, by telephone and snail-mail. And the occasional peek at one of the comet homepages really can help in planning a night of observing. A rough indication of the recent brightness of a comet — and thus the knowledge that it could be in reach of your telescope — can help in setting the priorities right: this may be important if incoming clouds or a rising Moon limit the available time for observing. And following the final recommandations by the authors is really not that difficult, if you realize that observations on homepages and electronic bulletin boards are only preliminary (not checked for errors), are made under different sky conditions, may suffer from poor methodology (brighter is *not* always better) or poor reference stars (GSC magnitudes, some AAVSO sequences, etc.), and all sorts of bias. Then it is not difficult to believe only your own eyes.

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Commentary on the Kammerer/Bortle Essay. II.

Guy M. Hurst

Basingstoke, Hants, England

As Editor of *The Astronomer*, I share the concerns of both authors on the effect of bias caused by immediate availability of data on such mediums as the WWW. Of even more concern is the announcement of discoveries via this medium by individuals who have not taken the trouble to thoroughly investigate their claims.

In recent meetings of the 'Professional-Amateur Liaison Committee' in London, both sides expressed severe reservations about the practice of announcing claims that so often become false alarms, because — in the case of amateurs (and sometimes also professionals) — there seems to be a tendency to 'believe' these announcements as though the WWW adds a curious authenticity to the details.

Sadly, I suspect that 'peer group pressure' is to blame for many errors in discovery claims and also exaggerated magnitude/tail estimates. The issue is also certainly evident in areas other than comets, and I fear that this will not only distort databases and affect future research but may also lower the standing of the work done by amateur astronomers in the eyes of professionals. Let us hope that all the readers of the *ICQ* examine their conscience and decide whether new techniques and methods are needed. I shall be doing this personally, since none of us can ignore these issues — no matter how experienced we are in the observation of comets and other objects.

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Commentary on the Kammerer/Bortle Essay. III.

Charles S. Morris

ICQ Associate Editor

I think that it is important that the readers are aware that I have commented on an earlier draft of this article (to little effect, unfortunately). Thus, this response, particularly the last half, will sound a lot like a critical review of the paper.

It is also important to note that two issues are being discussed in the Kammerer-Bortle paper (henceforth denoted as the "K-B paper"), and they are not as connected as the authors would have you believe. The first, and most important, issue is whether the Internet, via its bulletin boards and web pages, is or could corrupt the *ICQ* (or other astronomical) databases that rely on visual observations. The second, less important, issue involves outlying or "extreme" observations and why they are wrong.

The Effect of the Internet

Does the rapid publishing of information on the Internet have an effect on the reported observations? . . . No doubt. Whether this is a positive or negative effect is the question. Also, there is the question of what, if anything, should be done to "correct" the situation from the Internet side. This latter issue was not addressed in the K-B paper despite my request to do so.

It is generally recognized that the *ICQ* archive includes a lot of pre-Internet magnitude data that tend to be faint — some as much as two magnitudes faint. This has generally be attributed to "personal corrections", poor methodology, poor comparison-star sequences, and (most importantly) inexperience. Edberg and Morris[1] demonstrated that experience made the greatest difference in brightness estimates of 1P/Halley in 1985-86.

Ideally, you would like the "correct" brightness for a given time period (*e.g.*, a day) to be the statistical average of all the brightness estimates. Even though magnitude data (again for a given day) tend to be Gaussian (meaning that an average should produce the "correct" answer statistically), the brightness generally considered to be correct was always the estimates by the more experienced observers, which tended to be brighter than the average. If the data from the fainter observers were used in analyses (and often they weren't), they were typically corrected to agree (on average) with the brighter observers. So the data in the *ICQ* archive had their problems prior to the Internet.

Post-Internet, the situation has changed. Based on what is reported to me on the "Comet Observation Home Page",[2] most of the faint observations are gone, and yet there is typically still scatter in the observations of 0.5-1.0 magnitude. Shouldn't this be considered a good thing? Now the observers who were brightest, pre-Internet, are closer to the average. Considering this from a positive view, the rapid information provided on the Internet allows observers to learn more quickly than in the pre-Internet days. If one takes the negative view, all these observers are being strongly biased by what they see on the Internet.

It is certainly true that a percentage of observers are biased by what they are told or read, and a very small number actually "cheat". Fellow observers and even the comet's ephemeris can influence observers, as has been demonstrated many times in the past. So it is not surprising that some observers will bias their observations based on what they see on the Internet. (Interestingly, it has been my personal experience that such biases tend to make the observations closer to the "expected" values, not the extreme values. There is generally more pressure to conform to the majority than to be with the minority.) There is absolutely no excuse for falsifying observations — I have always wondered how one could possibly get any gratification doing something like that. These people do get caught. Fortunately, cheaters are rare — although rapid publication on the Internet may increase this problem.

I believe that it is important to realize that it is ultimately up to the analysts to decide what data should be used in their analyses.

The Influence of Computer Bulletin Boards

In the corresponding section with this same heading, the authors claim that German observers that used computer bulletin boards had higher tail-length estimates. I requested details of this study so that I could evaluate the claim. The "study" is still mentioned in the paper — toned down a bit, but with no real details. The unpublished explanation by Mr. Kammerer was "In response of the suggestions I did a new analysis and have to admit that the effect visible to me would not be very convincing to others."

Prior to raising a red flag about the Internet, two conditions must be established: first, that there is a significant change in reported physical parameters resulting from the rapid publication of observations; and second, that this change represents an incorrect bias or distortion of the observed parameters. The authors haven't established either of these conditions. (As stated earlier, I do believe that it should be possible to establish that changes have taken place in the distribution of magnitude estimates.)

Case Studies of "Extreme" Observations

The second issue raised by the authors deals with observations that they feel are impossible and thus are incorrect. Unfortunately for me, I have been involved in at least two of the cases they cite. I have been told by John Bortle that their comments do not represent an "attack" on my observations, but it sure feels that way, particularly when the authors choose not to address valid scientific objections to their comments that I have raised in my previous review of this paper. So here are my comments.

The Case of Comet C/1996 B2 (Hyakutake)

I think that it should be pointed out that a scatter of about one magnitude in the brightness observations is not unexpected, given the size of this comet's coma (generally over a degree in diameter at closest approach). Also, tail-length differences of a factor of 2-3 are typical for any bright comet. Observers in cities will always see much shorter tails.

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[1] S. J. Edberg and C. S. Morris (1986), "Observational Factors Affecting Studies of P/Halley's Visual Light Curve", in *20th ESLAB Symposium on the Exploration of Halley's Comet*, I, 609-612.

[2] `http://encke.jpl.nasa.gov`

The issue of unphysically long tail lengths is of concern, of course. However, the tail lengths are only unphysical assuming that the comet's tail lies (in three dimensions) along the comet's anti-solar direction. Deviations from this assumption will lead to longer possible physical tail lengths. I was easily able to find images of comet gas tails that deviated from the anti-solar direction by 20°-30°. So from that standpoint, it is "possible" that the reported long tail lengths are not in error. After the *IAU Circular* was published with Dr. Harris' concern on it, I had discussions with him about the possibility of modeling the tail of C/1996 B2. To my knowledge, this has never been done.

Is it possible that a number of experienced observers were tricked by the Coma cluster and the gegenschein? The answer is yes. Unlike the case with C/1995 O1 (Hale-Bopp), the extremely long tail of C/1996 B2 (Hyakutake) could not be verified by a critical method that I use for confirming long tails — the night-to-night movement against the background stars. Although I have a excellent sequence of observations up to closest approach, the comet's tail, when at its longest, pivoted around a point in the sky about where Kammerer and Bortle say we were being fooled. Do I think we were fooled? No, but I do admit the possibility. This is an interesting problem that is worth further study.

A comment needs to be made concerning the discussion in the K-B paper about German observers who saw the long tail on C/1996 B2 (Hyakutake) in mid-April 1996. After the comet's head had set, the long tail was no longer seen. The reason for this, ignored by the authors, is simple: increased atmospheric extinction as the faint tail got lower in the sky. This is a "striking" example of ignoring a reasonable explanation of the facts because it doesn't fit your view of the world.

The Situation with Comet C/1995 O1 (Hale-Bopp)

I am also guilty of seeing the long tail on comet C/1995 O1. After having been through the ridicule caused by my C/1996 B2 observations, the last thing I wanted was to see another long tail on any comet! But my observations of both the dust and gas tails of C/1995 O1 were longer, in some cases significantly longer, than what was seen by other observers. I honestly considered not reporting these observations. The ridicule of the C/1996 B2 observations had been significant and had included a nasty joke circulated on the Internet by a professional astronomer, who later apologized.

In the case of C/1995 O1 (Hale-Bopp), these long tails moved, night-to-night, against the background stars. When the long dust tail was first observed, I even used one of Kammerer's suggested tests of blocking out the comet and then determining where the tail ended from the end of the tail — I still got the very long tail length.

The K-B paper mentions that visual and photographic observations were compared of the tail of C/1995 O1. The fact is that the only valid way of comparing visual and photographic observations is by using a densitometer to determine where the tail ends on the image. Otherwise, you are trying to interpret an image using the *eye* to confirm an observation made of the sky by the eye. Obviously, the film used probably did not exactly reproduce all the different spectral intensities in the sky. So trying to interpret the image with the eye does not provide one with an absolute measure of the tail length, but only a measure of what the eye can see on the image. Using a densitometer certainly helps, but if the image didn't record the entire tail (assuming it exists), even this is not an absolute measure of tail length. So photographic tail observations can confirm a visually reported tail length, but they can not disprove it. Ultimately, the best way to resolve the tail-length issue in the future will be using (very-)wide-field CCD systems.

The fact that reported long tail lengths extend towards "asterisms/extended objects" or bright stars is not surprising. For tails in excess of 25° in length, it is difficult to find a portion of the sky that doesn't contain one of these objects.

Summary

Surprisingly, after all is said and done, it is easy to mostly agree with the recommended codex for comet observation. However, I know from experience that reporting what one sees, as recommended in point (2), can lead to an unpleasant situation — if your observations do not fall into the expected range of acceptable values. This peer-pressure effect, not mentioned in the authors' paper, must have a chilling effect on certain observers and is just as dangerous as any of the effects mentioned in the authors' paper. (Does anyone believe that the other observers stayed quiet when those two German observers reported the long tail length?) Good observers (yes, I do count myself among that group) will check and run tests on their own observations as part of observing (point 4).

In reality, one can minimize exposure to other estimates (point 1), but there are disadvantages, as well. For instance, you might not have the correct instrument available if you don't know the approximate size and brightness of the comet. There is value in checking your observations against others — as part of the self-testing. This doesn't mean you change your observation for the sake of conforming, however.

Well before the Internet, comet observers were discussing their observations routinely with one another (via telephone). It is natural to want to share what you have seen with other observers and to compare it with what they have observed. The sharing of observations is not new. The Internet has only made this easier to do.

Ultimately, it is not how much information you have seen that makes a good observer — it is being able to make an independent estimate using the proper techniques. I do believe that most observers try to do this.

The question as to whether the Internet has helped or harmed observations is a mixed bag. I think on the whole the influence has been positive. And we are going to have to live with it because, as the saying goes, the cat is out of the bag. The only possible way to put the cat back in the bag is by having some form of censorship on observations imposed — that is, preventing (where possible) or discouraging the publication of observations on the Internet (for a period of time, for instance). I think that is both unworkable and would be very bad.

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Commentary on the Kammerer/Bortle Essay. IV.

Stephen James O'Meara
Volcano, Hawaii

In response to the Kammerer/Bortle opinion essay, I find their concerns valid, and I appreciate the effort that went into this work. It is an important article and one well worth pondering.

I do see a situation (one not discussed), however, that creates a 'Catch 22' for new observers. In summary, the authors encourage new observers to strive to report what they see and not what is published. Of course, if new observers report what they see without comparing their estimates to more experienced observers, they will undoubtedly "fall off the curve" and risk being considered bad observers.

My concern, then, is: if a beginner sees experts arguing over who is correct in their magnitude or tail-length estimates, who are they to follow? Does bickering over the extreme magnitude and tail-length estimates made of two extraordinary and uncommon comets, C/1996 B2 (Hyakutake) and C/1995 O1 (Hale-Bopp), help or hinder novice observers? (Certainly, unless I'm badly mistaken, the authors' concern is with how experienced observers can influence the opinion of non-experienced observers.)

Arguably, a beginner's reputation in the field is judged largely on not how honest they are but how well their data measure up to those of certain individuals (and perhaps those who stomp their foot the loudest). As we all have learned when we were young, the best way to gain experience is in fact to monitor the varying estimates from experienced observers, then to go out and, using various magnitude-estimate methods, derive what works best for us, so that our estimates are at least in the ballpark. Practice on different comets of varying natures over the years hones an observer's skills and helps that person gain confidence. Consider the following quote from the *ICQ Guide to Observing Comets* (4.5.5, page 73): "Observers should compare their observations *later* with those data published by more experienced observers, and look for ways to improve data if the magnitude estimates differ by more than 0.5 mag or so consistently; but data should *never* be changed later!"

The discussions that I've been involved with lately between experienced comet observers over magnitude estimates of C/1996 B2 and C/1995 O1 have certainly been eye-opening; the problems with these comets were multifold. The head of C/1996 B2 was uncommonly large; only those who saw comet C/1983 H1 (IRAS-Araki-Alcock) might have appreciated the difficulty in trying to estimate such a large and diffuse head; so, as one might expect, the separation between magnitude observations increased as C/1996 B2 neared the earth and its coma swelled in size. During that apparition, *ICQ* Editor Green encouraged the use of a 'comet monocular' for making magnitude estimates, the use of which helped many observers get back on track. That was a wonderful solution to a problem that we comet observers probably won't face for another decade or more. Also during that time, Green and I had several discussions about comet color and its influence on the human eye (because, arguably, the comet did display color); individuals may be sensitive to different spectral responses, which will therefore lead to disparate comet-magnitude estimates. It's not a well documented phenomenon, but it is one to consider. The problem is that we do not know ***absolutely*** what is 'right' and what is 'wrong' when it comes to different comet magnitudes, due to the different styles, techniques, and physical influences (some of which may be difficult or impossible to control as observers). The AAVSO recently ran a program to help determine if different observers have different color sensitivities, which could influence or help explain why certain observers are continually bright or faint with respect to certain variable stars — a positive solution to an obvious problem.[1] We should adopt a similar program to help determine such color sensitivities in comet observers. Further study is also needed by specialists of what exactly is happening when a visual (or CCD) photometric measurement of a comet is obtained in terms of the theory of methodology, to contribute some more useful information to those of us who may be firmly entrenched in our views. New methods have been formulated even recently, as with the 'Modified-Out' method that Charles Morris and I independently derived two decades ago.

As for the reported tail lengths of comet C/1996 B2 (Hyakutake), I find the reports interesting and stimulating, not alarming. To think that the human eye could not be fooled would be folly; but to assume that the eye *is* being fooled is also folly. Indeed, I did revise one observation from a definite to a *possible* 100° tail length, because the following night's observation showed that the tail on the previous evening was aligned with a faint star chain — and I couldn't say with certainty if my eye had not been tricked into creating a tail extension by following the line of stars. So I believe the situation existed for the eye to be fooled. But, on all the other cases I could only report what I saw, despite what the geometry of the situation indicated.

Which brings us to the next paradox. If a number of leading comet observers around the world all report tail lengths that exceed predictions by 20° or more, doesn't that indicate that there is something radical going on here worth investigating? Isn't investigating the problem a better approach than announcing that these individuals are wrong because their observations did not match published phase angles? In a skewed sense, then, Kammerer and Bortle seem to be cautioning observers who are following the authors' advice — reporting what you see, not what is published. As I see it, there was either one "mean" psychological effect going on that fooled some of the world's best visual observers (which is extremely interesting in itself) or there was an unknown physical reason that manifested itself (perhaps a disconnection event) that allowed the tail lengths to exceed prediction. I believe that it is very wrong to imply that one observer is wrong because another observer could not achieve the same sighting, even if they were standing side by side;

[1] see *ICQ* **20**, 159

observing at the limits of vision is not a hard science yet. Has anyone ever questioned E. E. Barnard's solo sighting of comet 1P/Halley's tail that stretched from horizon to horizon?

Finally, as for the darker psychological effects that "may tend to influence certain individuals", there will always be that mysterious someone who crawls out of the fabric of the night to claim some great glory in the hopes of a quick rise to "fame". If their observations are real, these individuals should, however, pass the test of time and skepticism. But we are exposed to advertising continually, and that doesn't mean that we're going to 'buy' whatever is being advertised. We cannot control the Internet. We can try to impart critical judgement to younger observers so that they will not be drawn in to bad habits. We also cannot make decisions for others who want to be drawn in to what we might consider 'cometary parapsychology'. So, these "fakes" will rise and fall unpredictably over time like cometary outbursts. All we can do is monitor their behavior, speak out when the need arises, and hope that anyone interested in science has adopted a system of critical judgement and employs it.

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Commentary on the Kammerer/Bortle Essay. V.

Alfredo Pereira

ICQ Observation Coordinator, Portugal

Concern for the possibility that comet WWW sites could bias m_1 data was clearly expressed at least as far back as October 1996 in an article by C. Vitorino and me.[1] That article was posted on our (then-newly-created) web site and includes a chapter titled "The Risk of Bias", where we warned that "With the rapid exchange of information nowdays, there is growing concern with the possibility of observers being influenced by knowing [their] colleagues' results obtained just before they observe. One should totally abstract [himself or herself] from recent results, ours or someone else's, and try to make each measurement independent from the previous one. The observer should start the [estimation procedure] without any preconception of what the result might or should be."

When listing the advantages of the WWW, it is also appropriate to mention the invaluable use of WWW sites to improve and standardize methodology, to provide access to reliable comparison-star sequences, and to attract new observers, providing them with a convenient tool to learn how to observe comets. I believe that, overall, the WWW is having a very positive impact exactly on the quality of data, by allowing wide discussion of the many problems (like biasing) that always existed and that linger unsolved. At least as our 'Comet Observers' Forum' WWW site goes, the primary intention is not so much the instantaneous publication of data, but rather to discuss methodology and other problems (via several articles), to promote exchanges of ideas between observers, and to regularly publish light-curve analyses.

Unfortunately, Kammerer and Bortle do not quote the archive sources and statistical procedures for achieving their peak-brightness result of mag -0.5 for C/1995 O1 (Hale-Bopp). My analysis of 622 *ICQ* observations spanning 1997 Mar. 25.00-Apr. 4.00 UT yields a clearly defined peak in the interval Mar. 29.0-31.0, at $m_1 = -0.80$, (with 0.24-mag standard deviation within the individual observations for experienced observers). If we accept these parameters and a normal distribution of errors, a 3σ cut-off will include data from -0.1 to -1.5. It is perfectly normal that some isolated points should fall 0.5 or even 0.7 mag away. The data in the *ICQ* also deny the conclusion that "the situation was largely reversed", for there is no evidence that less-experienced observers have arrived at significantly brighter m_1 results. The differences are always too small to be relevant. Further, I do not see the large scatter here that was the case with C/1996 B2 (Hyakutake), when visual m_1 estimates by experienced observers ranged all the way from $+0.9$ to -0.8.

I also checked the peak brightness of C/1995 O1 (Hale-Bopp) for each of several *ICQ* experienced observers. There is no evidence for a majority of observers reporting a peak brightness close to -0.5. As it turned out, only four out of 16 saw a peak m_1 fainter than or equal to -0.7. I was further puzzled by the authors claiming a value of $m_1 = -0.5$, as Kammerer had given $m_1 = -0.7$ as the peak brightness of C/1995 O1 in his own analysis (posted at the German Comet Section homepage).

Regarding the brighter estimates for comet C/1995 O1, the problems involved (including the problems I personally felt) were extensively discussed in an article posted in April 1997.[2] The major problem was inclusion of part of the bright dust tail in the m_1 estimate. I have discussed this, having been quite self-critical, I would say. But how not to include the bright tail near the comet's head? As the article discusses, every method/instrument had serious flaws. I think it would be useful if Kammerer and Bortle explained whether they successfully managed to exclude the bright tail, whilst simultaneously using scotopic (rod) vision or lateral vision, which is the "photometric system" that we visual observers must strive to use for all comets over their full range, if we want to maintain consistency. I think this point deserves further discussion, in relation to observations of all comets, and not just these two recent bright objects.

Self-criticism

The authors warn that "daily updated Web pages are more convincing than any ephemeris can ever be", but I would like to express my concern regarding the *comments* that some observers repeatedly put forward in some WWW sites,

[1] "The Visual Photometry of Comets", `http://correio.cc.fc.ul.pt/~apereira/meth.html`

[2] "On the scatter in C/1995 O1 (Hale-Bopp) m_1 estimates near peak brightness", `http://correio.cc.fc.ul.pt/~apereira/hb_met.html`

written in an admonishing tone to other observers — *e.g.*, Bortle at Morris' WWW site; a printed copy appeared later in *ICQ* **19**, 162: "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)".

The authors recommend (and I think everyone will agree) to "be in every case self-critical and emotionless to his observations". I would further propose that all observers should abstain from writing "persuasive" comments, at least when sending comments to be posted in the WWW. Again we cannot compare the influence of "exaggerated" observations by "unknown" observers with the influence of comments by well-known observers. The latter will surely have a much higher potential for biasing influence.

I maintain that biasing is mainly a problem with *some* newcomers, particularly those who observe only the more "news-media-prominent" (or "mediatic") comets. Why should "more level-headed observers" wish to "more closely mimic the reported extremes"? To try to show that they have better sky conditions, or have better vision? I am reluctant to think that any regular observer will degrade the quality of the data, just to show any of this. But maybe we should clearly state that quality observations do not necessarily mean that these should be "on top of" or very close to the (mean) value that may be later derived from the whole set of results. There are too many factors involved, and there may be particular reasons related to conditions/instruments, or personal variations in methodology, that may account for a data point appearing a bit off from others. But all these effects can ultimately be understood, and the data point will eventually retain its usefulness. Let us keep in mind that what counts is consistency, while also providing full information on all relevant details concerning and affecting the observation, so that the result can be understood.

I would also recommend that we clearly explain to everyone that, if all observers try to keep their data unbiased, the errors will tend to distribute more randomly (apart from the usual systematic instrumental and other effects) and therefore tend to cancel each other when we put many observations together. Therefore, even those data points that fall a bit away from the average will be contributing to the quality and confidence of the average. Biased data points may look "nice", but will yield a delusive average.

Extracting bias statistically

Bias is indeed difficult to extract out of the vast data, but maybe that's exactly what we should be discussing — *i.e.*, the ways of statistically sorting out biased data from the bulk of data. Below are several possibilities that occur to me (however, given the time constraints for publication of this commentary, I do not have the chance right now to research whether they are viable or not).

At times when comets undergo rapid unpredicted changes, m_1 data can be analyzed in order to try sorting out any biasing. Also, the sequence of m_1 data for each observer can be tested, perhaps using a serial correlation test; but the details need to be worked out carefully. Further, there is the chance that at least the presence of biasing in a data set may be detected via the shape of the m_1 statistical distribution (or even the relation between m_1 and other parameters like coma diameter). A more lengthy but perhaps more secure way would involve recording the exact times of posting updates on the main web sites, and carefully searching for statistically significant trends of any observers whose data *systematically* approach the results of others. I believe it is in this general direction that we should turn our efforts, even if it is lengthy, hard work.

On the tail-lengths survey

Regarding the comparison of tail-length estimates in the two groups of observers (those who consulted the WWW, against those without access to the WWW), the authors do not explain exactly how the "different skills and conditions" were evaluated and taken into account. The authors should have attempted characterizing the two groups (number of observers in each group, number of observations used). Also, at least some quantitative classification regarding experience level, observing-site conditions, *etc.*, must have been possible. Finally, the average tail lengths in each group (with standard errors given) should also have been provided.

Final comments

The presented paper is unfortunately too vague, with no actual statistical results whatsoever given to support the authors' claims. Many of the statements should have been backed up with evidence. This important subject deserves deeper research; nevertheless, I think that the extensive discussion present in this issue of the *ICQ* should serve as the best way to eventually overcome some of the problems raised.

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Commentary on the Kammerer/Bortle Essay. VI.

Jonathan Shanklin

Director, British Astronomical Association Comet Section

Andreas Kammerer and John Bortle raise some interesting questions about the reliability of observers submitting observations to national groups and to the *ICQ*/CBAT. I too have become increasingly concerned that some observers are only trying to 'beat' other observers, rather than report objective observations. I feel that it is not only bright comets that are being affected by the problems described in their essay, but also those near the limit of an observers

grasp.[1] When analyzing BAA observations of comet C/1995 O1 (Hale-Bopp), I have used the upper quartile as the most likely tail length and the median as the most likely brightness estimate; this should go some way to removing 'suspect' observations. Most comets, however, do not have sufficient observations to allow this procedure, resulting in severe perturbation to the derived magnitude parameters.

I have noted that my own estimates of some of the recent comets are significantly fainter than those of other observers, but I cannot convince myself that these comets are any brighter than I see them. I mostly use the old long-focus Northumberland refractor (used by Challis in the hunt for Neptune), so some of this difference may be due to the known difference between reflectors and refractors. Other contributions may be due to my systematic personal effect and some to the Cambridge sky conditions. There may also be a contribution from magnitude errors in the *Guide Star Catalogue*, which is usually around 0.3 magnitude brighter than Tycho catalogue values or BAA variable-star sequences. Once these contributions are eliminated, there remains the real possibility that some observers are either reporting something that they only think they can see, or are knowingly fabricating the observation. If we have clear skies during the International Workshop on Cometary Astronomy (IWCA) next year, it may be possible to investigate these effects further, and I will try and set up some 'blind' tests for participants.

There is always the likelihood that observers will see what they expect or want to see, and there are countless examples of this in the history of astronomy (*e.g.*, canals on Mars). A good observer should try to keep an open mind and only report what is actually seen; however, this is easier said than done. I am not always convinced when I think that I have seen a comet at the limit of the conditions. BAA practice is to note a reliability for the observation on a scale of 1 (good) to 3 (bad), which goes some way toward distinguishing between these possibilities. Although some uncertainty can be indicated in *ICQ* reports by the use of a colon for m_1 estimates, there is perhaps a requirement for a better indication of the observer's estimate of the error in the observation.

I will confess to regularly checking the 'Recent Magnitudes' on the *ICQ*/CBAT web pages, and I also list recent observations on the BAA pages (though the index page only gives an indication of the likely magnitude). I think that it is helpful to have a rough idea of how bright any comet is likely to be, as this can help one to choose which comets to observe first on any night. One thing, however, is clear. We cannot go backwards — and must accept that observers have access to the Internet and instant communication of observations. Good observers must, however, take these reports as a guide, just as they take ephemeris predictions as a guide, and should report what they do see and not what they think they should see. This is difficult, but provided that we encourage observers to be objective and not necessarily believe what they read (after all who believes what they read in newspapers?), we should continue to receive reliable observations.

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From the Editor: Thoughts on the Kammerer/Bortle Essay and on the Commentaries

The essay and commentaries printed in the preceding pages represent discussions that had been circulating at a low level for many years, but which became very extensive during the apparition of comet C/1996 B2 (Hyakutake) during its peak brightness in March and April 1996. I think that such discussion is a good thing, and I'd like to highlight some of the comments made above, and add some additional thoughts from my perspective as an observer and an editor/archivist.

My first thought is that it is ironic to suggest that magnitude data may be undergoing problematic influences at a time when the observational situation is better than it has ever been, from the perspectives of international standardization of observing and archiving procedures and of improved instrumentation (larger telescopes; ready access to CCDs; etc.) and access to better star catalogues and other resources. The scatter in m_1 observations amongst most experienced observers (there are always notable exceptions) has been admirably small for the last couple of decades — generally around several tenths of a magnitude. Nonetheless, there is an inherent problem in the archiving of comet photometry whereby the archivist can only check the incoming observational data to a certain point — unlike the situation with archiving astrometric observations of comets, where even slight problems with the data are readily apparent at the arcsecond level. Because of the inherent problems in obtaining CCD magnitudes of comets, such magnitudes may be not much more accurate than carefully-measured visual magnitudes.

We do have ways of checking incoming photometric data (some manually, some via computer program), but given that the vast majority of comet photometry is now arriving via e-mail (and that we are getting much more of it than years ago, due to the widespread international visibility that the *ICQ* now has), some problematic data still are published. This is why we ask observers to check and double-check their data. We have had minor problems with two types of errant data in the *ICQ* — (a) typographical errors (which account for most of the errors that are caught, and usually corrected in print), and (b) fraudulent observers. Yes, we have caught a few observers over the years who were a bit overly eager in their wish to publish comet magnitudes; there was a recent case involving a southern-hemisphere observer whose data briefly appeared on the *ICQ*/CBAT/MPC web page for one of the recent bright comets, in which another observer pointed out that the reported times of observation were impossible from that longitude — and upon confronting the observer directly, he promptly 'disappeared' from the scene without defending his evidently fraudulent data, whereupon

[1] *The Comet's Tale* 5(1), 1998 May.

his data were deleted from the web site (and never made it into print in the *ICQ*). Such fraud is rarely detected, however; while fraud may be somewhat more common with bright comets, when numerous new observers always appear on the scene (most of them very briefly), such data is usually ignored in analyses, where it would be foolish of any analyst to use the data of all observers of bright comets (unless they are specifically looking at scatter problems amongst observers of varying experience). Among the observers who contribute hundreds (or thousands) of magnitude estimates of both bright and faint comets over many years, it is very unlikely that there is much outright fraud; they've simply put in too much time and effort to consider the nonsense and risk of fraud. We do appreciate readers of the *ICQ* who notify us when they find questionable observations, because this leads to investigations that often lead to correcting or deleting the relevant data (careful *ICQ* readers are aware of the large number of corrigenda that regularly appear in these pages).

Contrary to what Kammerer and Bortle say in their conclusions about "professionals turning away from the good visual data", I note that more professional astronomers than ever are seeking *ICQ* archival data for comparison with their observations at other wavelengths. However, very few professional astronomers know how to deal with the visual data, and they need a lot of suggestions (which I routinely offer when asked for data) as to how to separate the good from the poor and how to get useful results from a given data set. Those who do not seek such advice from people heavily experienced in the use of visual comet data will invariably have problems in their own analyses. I take this opportunity to remark that some of the worst professional utilizations of visual comet magnitudes in the astronomical literature are easily sighted from their referencing only data that appear on the *IAU Circulars*.

Bright and large comets are rather uncommon, so that we do not get a lot of experience in observing them in general. The problems of observing very bright transient astronomical objects are not limited to comets, of course; there are atmospheric fireballs and bolides, and there are the rare Milky Way supernovae that we are long overdue for. In the case of comets brighter than visual magnitude +1 or so, there is the problem of finding useful comparison stars of similar brightness; as such, one must go back to 1976 for such a bright comet until C/1996 B2 came along, and the scatter was large among m_1 estimates of bright comets, such as C/1965 S1 (Ikeya-Seki; O.S. 1965 VIII) and C/1975 V1 (West; O.S. 1976 VI) when they were near peak brightness — and also then near the horizon, as most very bright comets usually are (being near perihelion). C/1996 B2 was remarkable in being near visual mag 0 and nearly overhead — and with a very large apparent coma; this was thus a new experience for most observers. I'm a little surprised that there was a 1.5-mag difference in the peak brightness of C/1996 B2 amongst very experienced observers. But in the case of C/1995 O1, a large majority of the 25-or-so most experienced visual observers measured a peak m_1 that fell within a range of only about half a magnitude.

As for those extreme values (magnitudes, tail lengths, coma diameters) reported by experienced observers, I agree that we must remain cautiously open as to their reality or validity. More work certainly does need to be undertaken into such issues as tail bending, differing spectral responses of different observers' eyes, *etc.* I think that most serious, experienced visual observers of comets take pride in their observations — which, after all, take considerable effort and time. As such, they *want* to make their *own* measurements, and if they have enough pride and confidence in their own work, they will report what they measure in the most careful manner. Indeed, I know that many highly experienced observers each trust their own m_1 measurements so deeply that they use their own data as a yardstick against which to compare other observers; while this may *seem* a bit arrogant, such data is probably less likely to be biased by other observers or by predictions than are data made by less-confident observers. Observers who lack such confidence should be patient: more observations of more comets will inevitably create greater confidence and negate any desire to be biased by ephemeris predictions or the m_1 estimates of other observers.

That said, it is well known that many comet observers talk about the long tail length of 1P/Halley in 1910 seen by Barnard, or when the first and last observations (visual and non-visual) of the same comet at its last return were. A famous, bright comet will have such observation records (with their observers and instruments) published and discussed for years (perhaps even centuries) to come, and extra efforts are often expended to warrant placement in such a "record book"; it is this concept that part of the essay by Kammerer and Bortle deals with, and it does deserve thought. But I do have enough confidence in, and respect for, the observations of many of the observers who reported long visual tail lengths for the two recent bright comets that I think both a tail bending (for C/1996 B2) and different eye spectral responses should be seriously studied to fully assess the situation.

The *ICQ*/CBAT/MPC comet-magnitudes web page[1] was established several years ago chiefly because of "popular demand" from some news-media reporters (including *Sky and Telescope*), as a way to cut down on the number of phone calls that we get from such individuals who request information from us. When I first "opened" that Web page, I curiously did not really appreciate that observers would eventually come to use it extensively as a tool for planning observing sessions (not thinking that so many amateurs would gain access to the Web so quickly, I suppose), or that many of the concerns raised by Kammerer and Bortle would be created. The Web has evolved so quickly in this manner that we are sort of developing ideas as we go along; it was nearly impossible to plan for all that has happened as a result of the Web, particularly in the case of the observation of comets (where hours or days can make a big difference in observational data). We do, however, require that any comet-magnitude data to be posted on the *ICQ*/CBAT/MPC Web page must be contributed by observers who have contributed complete data to the *ICQ*; new observers are thus actively urged to contribute information on magnitude method, comparison-star reference, *etc.*, and their data will not be posted unless they comply. This is one small but important way to improve the quality of visual data on the Web. (And I add that, contrary to what Reinder Bouma says, I check data posted on the *ICQ*/CBAT/MPC comet-magnitudes web page and *frequently* correct — often after consultation with the sender — or delete erroneous or clearly problematical data.)

When the Kammerer/Bortle essay first arrived last July, I wondered if they thought that we should suggest a waiting period (such as a few weeks) before posting comet magnitudes on the Web. This was discussed by several people who have written material in this issue of the *ICQ*, and I have become convinced that this would probably serve no useful

[1] `http://cfa-www.harvard.edu/cfa/ps/icq/CometMags.html`

purpose. That said, I am now generally posting data on the *ICQ*/CBAT/MPC web page generally only once or twice a week. I agree with Charles Morris that, in the case of highly interesting comets like C/1996 B2 and C/1995 O1 near their peak brightnesses, earnest comet observers thirst for observational information *rapidly* from other observers — it's interesting, motivating, and just plain fun to know what other experienced observers are getting in terms of brightness and tail length. Indeed, quick discussions via the Internet in the case of C/1996 B2 allowed numerous observers to modify their observing procedures to more easily estimate the brightness of so large and bright a comet (notably with the comet monocular that Steve O'Meara mentions in his commentary). So it is probably unreasonable to post data of such comets on the web only once a week; for most comets, however, this is probably a good policy.

I would like to comment on something stated by Kammerer and Bortle regarding C/1996 B2: I was not too concerned about the tail lengths of that comet. I "e-mailed a large number of the most experienced observers" as a result of discussions specifically with Bortle at that time because I was concerned about how to get observers to use an easy and reasonable technique for estimating m_1 when that comet was so large. I thought, correctly, that it was far better to get a discussion going in the midst of the comet's apparition, so that observers could immediately go out and test various methodologies. This showed the real power of the Internet in a most advantageous manner.

As for the very limited visual comet photometric data that appear on *IAU Circulars*, I have long admonished analysts of cometary brightness from using such data. Listing such data on the *IAUCs* is meant to be merely a service to readers, as a way to document in very abbreviated form how the brighter comets are behaving. Both professional and amateur astronomers historically used such data in planning observing sessions. The data are chosen generally in a manner that 'shares' the exposure amongst different regular contributors of such magnitudes, while trying not to give a false picture of a comet fading from a random selection of magnitudes over a short period of time. We try to be representative, and there is both objectivity and subjectivity to this method; serious users should go to the source — the *ICQ*. As for the long tail lengths of C/1996 B2 that appeared on *IAUCs*, we published such visual tail lengths for well-known observers of comets; because there were so many experienced observers reporting rather long lengths, we felt that it was appropriate to list some of them on the *IAUCs*.

For some years we have thought about adding some sort of observer-estimated "quality" code to *ICQ* data, and following Jonathan Shanklin's remark (above) about doing this in BAA data, we discussed this again extensively. Specifically, Charles Morris and I discussed introducing an "uncertainty" code for magnitude estimates, but we found that it was exceedingly difficult to come up with any reasonable definition of "uncertainty" that observers could easily use and that analysts could easily understand. For example, we toyed with the idea of using a scale in which an observer provides code letters based on how uncertain they feel an m_1 estimate is — from, say, an uncertainty of $\pm$ 0.2 mag or less, to one of 1.0 mag or more (or just a mere guess). The problem is *how* to determine this uncertainty: does the observer add in such factors as distance of comparison stars from the comet, number of comparison stars, color index of comparison stars, altitude of comet *vs.* comparison stars, affect of clouds or haze, light pollution, *etc.*? If so, just how does an observer go about doing this in a way that is really meaningful (more objective than subjective)? We concluded our most recent discussions on this topic by deciding to wait for possible suggestions from other experienced observers and/or analysts; it is unlikely that any change will be made in the near future, because it can be argued that analysts would not be able to get any more use out of comet m_1 data with additional archived information that they cannot already get out now.

There is great value in an individual observer's photometric data on comets — provided that he or she remains as objective and honest and careful as possible in measuring and reporting what he or she sees (regardless of what others report). There is no value to the field of cometary science in contributions where the observer permits himself or herself to be strongly influenced by other m_1 estimates. There is, of course, a learning phase for all newcomers to the field, and experience suggests that such learning takes much time and effort to become 'good at it' — meaning perhaps on the order of 50-100 m_1 estimates as a minimum, but necessarily including a good sample of different comets of widely-differing brightnesses and morphologies, and closely heeding the advice of veterans such as that in the *ICQ Guide to Observing Comets* (always using the smallest instrument needed to easily see the comet; using proper methods based on comet morphology; *etc.*). But if one has worked hard enough in this learning phase to use methodology and references properly, he or she should feel confident enough to be able to make reasonably accurate m_1 estimates that will stand the test of comparison with the data of other experienced observers. Note that beginning observers generally do not really *know* what they are doing in terms of making m_1 estimates of comets; much later, those that become seasoned observers with dozens of comets registered in their logbooks will usually acknowledge that their early data are of pretty poor quality.

All experienced observers occasionally make a somewhat faint or somewhat bright estimate; comet-magnitude estimation is not an easy task. But because of this, nobody should get 'hung up' on specific m_1 estimates of others. Indeed, we may find that individual eye spectral responses and other factors eventually prove that there *must* be a difference in m_1 estimates from one observer to another.

In closing, I'd like to mention an area that has been mentioned frequently over the years — one related to the Kammerer/Bortle essay topics: observing comets near the limit of observability. There are numerous visual observers today who are frequently (fairly routinely) observing comets in the visual range 13.5-16. Numerous observers have complained to me that they cannot see comets (with larger instruments and possibly better skies) that some visual observers have reported in the range m_1 = 13.5-15.5. While I doubt that there is any fraud in most of these cases, I do worry that observers are exercising enough care and caution. A specific concern of mine regarding the *ICQ*/CBAT/MPC web page, which contains many fainter CCD magnitudes of comets (as well as visual magnitudes), is that visual observers of faint comets need to prevent themselves from being overly influenced by the CCD magnitudes. Just because a CCD observer reports a total magnitude of a given comet near, say, mag 14.5 does *not* mean that it will automatically be visible in a telescope whose limiting visual *stellar* magnitude is 15.5. All very experienced visual observers of comets know that it is all too easy to see "something" at the predicted position of a comet near the limit of observability — even when the comet is not visible. We again ask that all observers of comets within two magnitudes of the *stellar*

magnitude limit of their telescope on a given night be extremely careful in verifying that they have ***absolutely*** made a visual detection of the comet that they are looking for. All such observers should take copies of the Digital Sky Survey to the telescope for proper verification of a comet, noting its motion with respect to nearby stars.

And my last plea to observers is this: please do not put numbers of observations above quality. It is far better to observe one or two comets in a single night very well (with very careful measurements) than to observe 10 comets poorly.

— *Daniel W. E. Green*

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Comets for the Visual Observer in 1998

Alan Hale

Southwest Institute for Space Research

Although there are no especially bright comets predicted for visibility in 1999, several interesting objects should become bright enough for visual observations. With the exception of comets C/1998 M5 and C/1998 P1, ephemerides for all the objects described below are given in the *ICQ 1999 Comet Handbook* (Nakano and Green 1998).

— Long-Period Comets —

C/1995 O1 (Hale-Bopp). Visual observations near the time of this writing (September 1998), made when this comet was 1.5 years past perihelion, indicate that it is still at a relatively bright $m_1 \sim 10$. If it continues to fade at the rate that it has been fading, it should remain visible in larger visual instruments throughout 1999, fading from $m_1 \sim 11$ in January to perhaps $m_1 \sim 13$ by year's end. In mid-December, its heliocentric distance (r) will exceed 10.0 AU. The comet will remain in south-circumpolar skies throughout the year, being at a declination of $\delta = -74°$ in early January (after being at opposition in December 1998), moving north to $\delta \sim -63°$ in May and June (when near conjunction), and south to $\delta \sim -78°$ in December, when it is again at opposition.

C/1998 P1 (Williams). This comet, discovered on 1998 August 10, is at perihelion on 1998 October 17 at $q = 1.147$ AU, at which time it will be located on the far side of the sun as seen from Earth. It should become visible in the morning sky by late November 1998 at $m_1 \sim 10$ — and maintain this brightness through perhaps the end of January 1999, when it will be closest to the earth ($\Delta_{min} = 1.07$ AU). The comet is at opposition a couple of weeks later, and should fade rapidly after that, probably being beyond the range of visual observations by the end of March.

C/1998 M5 (LINEAR). This comet is at perihelion on 1999 January 24 ($q = 1.745$ AU) and is in conjunction in mid-January, although its northerly declination of $\sim +5°$ should keep it observable from the northern hemisphere; the brightness should be near $m_1 \sim 10$. It is closest to the earth ($\Delta = 1.53$ AU) in early March, and on March 15 it passes within 5′ of the north celestial pole and should be near its peak brightness of $m_1 \sim 9$. Presumably fading thereafter, the comet should remain visually detectable until May or June.

C/1997 BA_6 (Spacewatch). This distant object emerges into the morning sky in late 1998 and may be visually detectable in larger instruments at $m_1 \sim 14$. It may brighten a half to a full magnitude by the time it is at opposition in mid-February 1999; with its then being at $\delta = -49°$, southern-hemisphere observers will be favored. It may continue to brighten slightly throughout the remainder of the year, but since it spends the last several months of 1999 in south-circumpolar skies, observations will be restricted to the southern hemisphere. It is in conjunction in early August, and when at perihelion on 1999 November 27 ($q = 3.437$ AU), it will be near its highest southerly declination of $-77°$.

— Short-Period Comets: The Brighter Ones —

21P/Giacobini-Zinner. After reaching a peak brightness of $m_1 \sim$ 8-9 around the time of its perihelion passage on 1998 November 21 ($q = 1.034$ AU), this comet will probably have faded to $m_1 \sim 10$ by the beginning of 1999. It should remain visually observable for perhaps the next two months before fading beyond visual range in late February or early March; the comet will remain in the evening sky throughout this period.

10P/Tempel 2. This comet is at perihelion on 1999 September 8, at $q = 1.482$ AU. This return is quite similar to the favorable one in 1988, with the respective perihelion dates being only eight days apart; the perihelion distance in 1999, however, is 0.1 AU larger than in 1988, and consequently the comet will probably not become quite as bright as it did then.

10P/Tempel 2 exhibits a light curve that is significantly asymmetric with respect to perihelion (Bortle 1983, 1984). Taking the comet's behavior in 1988 as a guide and making allowances for the increased perihelion distance, it can be expected that comet 10P should become visually observable at $m_1 \sim$ 12-13 in July, then reach a peak brightness near $m_1 \sim 9$ in late September, and slowly fade to $m_1 \sim 12$ by the end of the year.

P/1994 P1 (Machholz 2). This comet was discovered in August 1994 and is making its first predicted return in 1999. Perihelion passage (q = 0.749 AU) is predicted for December 8; the comet will pass 0.305 AU from the earth on 2000 January 14.

The comet exhibited erratic brightness behavior in 1994, being at $m_1 \sim 10$ when discovered, but rapidly brightening to $m_1 \sim 7$ within three weeks. Furthermore, it was accompanied by several companion objects throughout much of its apparition, with one of these briefly becoming brighter than the main component. Consequently, brightness predictions for 1999 are extremely problematical. A rough prediction loosely based upon 1994 data suggests a peak brightness of $m_1 \sim 8$ occurring in December 1999 and January 2000, but the comet could well be much fainter than this. There is even a possibility that it may no longer exist.

— Short Period Comets: The Fainter Ones —

93P/Lovas 1. This comet's 1998 return (perihelion October 14, at q = 1.692 AU) is essentially identical to that of 1989, with the respective perihelion dates being only four days apart. It is at opposition at the very end of 1998, and visual observations from the 1989 return suggest that it should be visually detectable at $m_1 \sim 13$ for perhaps the first month of 1999.

52P/Harrington-Abell. This comet's 1999 return is the most favorable since its discovery in 1955, with opposition occurring less than three weeks prior to its perihelion passage on January 27 (q = 1.756 AU). No visual observations from previous returns have ever been reported, but in light of the favorable geometry in 1999, Hale (1997) predicted that a peak brightness of $m_1 \sim$ 13-14 might be achieved around perihelion. Recovery observations in July 1998 indicated, however, that it was substantially brighter than predicted ($m_1 \sim 12$), suggesting that a major outburst had occurred. Observations up through the time of this writing (September 1998) indicate that the brightness has remained relatively constant, although a "normal" brightening pattern would suggest that it should have brightened 1.5-2 magnitudes during this interval.

Brightness predictions for the remainder of the comet's apparition are thus quite problematical. From the standpoint of geometry, the comet should remain accessible up through almost mid-year 1999. Its declination of +40° around the time of opposition in early January will favor observers in the northern hemisphere.

60P/Tsuchinshan 2. Visual observations have apparently never been obtained of this object at previous returns. The 1999 return is moderately favorable, however, with perihelion occurring on March 8 at q = 1.770 AU, and with opposition occurring at the very end of 1998 followed by closest approach to the earth (Δ_{min} = 0.88 AU) less than two weeks later. The peak brightness may possibly reach $m_1 \sim$ 12-13 during the first two to three months of 1999.

37P/Forbes. This comet's 1999 return is the most favorable since the rather similar return of 1974. Perihelion passage in 1999 (May 4) is some two weeks later than in 1974 — but, on the other hand, the current perihelion distance of 1.446 AU is $\approx$ 0.1 AU less than it was then. Based upon brightness data from 1974 a peak brightness of $m_1 \sim$ 12-12.5 may be expected during May-July. The comet is at opposition in late September but will probably have faded beyond the range of visual observations by then.

114P/Wiseman-Skiff. Perihelion passage for this comet occurs on 2000 January 11, at q = 1.568 AU. It is at opposition in mid-November 1999 and at Δ_{min} = 0.70 AU three weeks later. The comet's pre-perihelion light curve is ill-defined, but post-perihelion visual observations obtained at the discovery return of 1986-87 suggest that a peak brightness of $m_1 \sim 13$ may occur near the end of 1999.

29P/Schwassmann-Wachmann 1. This object emerges into the morning sky at the very end of 1998, is at opposition in early May 1999, and remains accessible until approximately the end of September. The comet's declination of −29° near opposition will slightly favor southern-hemisphere observers throughout this viewing season.

Comet 29P has remained relatively active during recent years, with 1–2 outbursts per year being recorded; a dramatic outburst to $m_1 \sim 12$ occurred in late January 1998. Monitoring of the comet for additional events during the 1999 viewing season is encouraged.

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Corrigenda

In the April 1998 issue, page 87, the observations by observer RES attributed to 'Comet C/1997 J1 (Mueller)' belong to 'Comet C/1997 J2 (Meunier-Dupouy)'.

In the July 1998 issue of the *ICQ*, page 154, 'Comet 103P/Hartley 2', the first observation (1997 02 27.79 by observer RES) is to be deleted.

LEO S. BOETHIN (1912-1998)

Most of this information was kindly provided by Father Badillo in the Philippines via Imelda Joson (Sky Publishing Corp.). This text was edited by D. W. E. Green, with some additions also by him.

The Rev. Leo S. Boethin died on 1998 Sept. 15 at the age of 86 in Bangued, Abra, the Phillippines. A funeral mass was to have been held on Saturday afternoon, September 19. Boethin was born on 1912 June 6 in Roggenhausen, Chelmno, Germany, and he resided in the Philippines for more than 50 years. Fr. Boethin joined the Society of the Divine Word (SVD) on 1924 April 25 in Steyl, Holland, and he was ordained as a priest in Germany on 1940 July 7. He arrived in the Philippines in December 1949, where Fr. Boethin served as parish priest in various towns and barrios of the Provinces of Cagayan and Abra. He retired in 1988 to live in the SVD headquarters in Bangued, where he maintained nightly observations of the skies from the third-floor roof of the Divine Word College, a short distance from his residence.

Boethin is known for his short-period comet, now known as 85P/Boethin, which he discovered on 1975 Jan. 4 (see his 1981 article on the discovery circumstances in *ICQ* **3**, 63). His comet was discovered when Boethin was parish priest at Mudeng, La Paz, Abra. Boethin was always proud of his discovery and was eager to observe his comet on subsequent returns to perihelion.

What follows is taken from the speech he gave on receiving the Padre Faura Astronomy Medal in 1975:

"The early days of my boyhood were spent watching and observing skies, following closely the dramatic changes of weather typical for moderate latitudes. My diary about atmospheric events produced at the time of high school and college proves my genuine interest in God's nature.

"A great astronomical event at that time aroused my interest. It was not a lunar or solar eclipse that impressed me most, but a great spectacular meteor shower [during] 1933 Oct. 9-10. . . . As usual, after supper, we seminarians went out for a stroll through the gardens. When I took the first steps outside, I was struck at once by a spectacular celestial show. The whole moonless and starry sky was filled with shooting stars. At Hamburg Astronomical Observatory, rates up to 350 meteors per minute were systematically observed at the height of the shower at 9 p.m. Some radio stations in Europe interrupted their scheduled program and called the attention of the listeners to the great spectacular show.

"What did actually happen? The earth passed through the meteor stream of the Giacobinids or October Draconids, predicted by Crommelin in May 1933 in the Journal of the British Astronomical Associaton. The comet itself crossed the orbit three months earlier. Crommelin concluded it from similar positions of the comet to the earth in 1913 and 1926. The intensity and short duration of the event — for more than 2 hours only — indicated a dense and comparatively compact but very limited meteoric cloud.

"In 1949, I was appointed for the Philippines to the province of Abra. Besides daily meteorological measurements, meteor observing was my particular interest. Thus I have a record of thousands of meteors which are the basis of for my monthly calendar of minor and major meteor streams. But even non-members of a stream, [those] so-called sporadic meteors, must be considered in order to locate the radiant. But after 1960, I intensified my observation of comets. Comet [C/1963 A1 (Ikeya); O.S. 1963a] and the sungrazing comet [C/1963 R1 (Pereyra); O.S. 1963e] were the first ones I observed in a 3-inch refractor and of which I made detailed observations. In 1965, I acquired an 8-inch f/7.5 Newtonian reflector that enabled me to observe many periodic and non-peoridic comets down to magnitude 13.0."

Boethin was given the PAGASA Centennial Award earlier this year. The Federal Republic of Germany gave Boethin the Cross of Merit with Band on 1989 Dec. 12. Boethin was a long-time *ICQ* subscriber and contributor of visual magnitude estimates.

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Tabulation of Comet Observations

The descriptive information for tabulated observations of C/1995 O1 that appear in this issue will be published in the January issue.

Alfredo Pereira has commented that many of the *ICQ* references for comparison-star magnitudes can be very difficult for many observers to access, and that access to such material on the World Wide Web is very helpful. He has begun using some *V* sequences produced by Brian Skiff for fields of variable stars, which have been posted at `http://www.kusastro.kyoto-u.ac.jp/vsnet/catalogs/skiffchart.html`. However, we will refrain from assigning *ICQ* reference codes until they are published in the *IBVS*; many such sequences have already been so published, and the remainder are being planned for *IBVS* publication. The following sequences have been published, and *ICQ* reference codes will be assigned as observers report the use of these sequences in their cometary m_1 estimates: HP And, *IBVS* 4603; XY Aql, *IBVS* 3972; V345 and V553 Aql, *IBVS* 3984; R Aur, *IBVS* 4058; AQ Aur, *IBVS* 4057; V Boo, *IBVS* 4053; ZZ Dra, *IBVS* 4055; KU Cas, *IBVS* 3982; WZ Cas, *IBVS* 3974; V418 Cas, *IBVS* 3967 (7 stars, V = 10.9-13.3); N Cas 1993, *IBVS* 3983; AV and DV Cyg, *IBVS* 3968; YZ Dra, *IBVS* 3971; EL Lyr, *IBVS* 3973; V431 Ori, *IBVS* 4065; S Per, *IBVS* 4054; VX Tau, *IBVS* 4056; M81, *IBVS* 3906. The *Information Bulletin on Variable Stars (IBVS)* is available on the Web at `http://www.konkoly.hu/IBVS/IBVS.html`.

Skiff adds: "*ICQ* contributors might also want to be reminded about the big list of photometric reference stars (I won't call them 'standards') compiled from the literature at `ftp://ftp.lowell.edu/pub/bas/starcats/loneos.stds` [this can be accessed with a regular Web browser], which has about 16000 stars in it now. About half are between mag 10 and 13.5, while nearly all the rest fall between mag 13.5 and 18.5 (a few as faint as mag 22)."

New code for comparison-star references:
LC = Landolt (1975, *PASP* **87**, 379) magnitude sequence for 33 stars near V1057 Cyg (V magnitude range 5.5-15.5)

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

◇ *Comet C/1984 V1 (Levy-Rudenko; O.S. 1984 XXIII = 1984t)* ⟹ 1994 Jan. 18 and 23: weak 1.′5 central cond. [HAV]. Jan. 25 and 28: weak 2′ central cond. [HAV]. Jan. 31: weak 4.′5 central cond.; fan-shaped, very faint coma; possible false nucleus (mag 10); faint concentric inner condensations 2′ and 4′ in dia. [HAV].

◇ *Comet C/1995 O1 (Hale-Bopp)* ⟹ 1997 May 25.34: twilight [WIL02]. 1998 Jan. 25.55: stellar core of mag 9 [WIL02]. Jan. 27.45: diffuse w/ core of mag 9 [WIL02].

◇ *Comet C/1996 B2 (Hyakutake) [all obs. by NES]* ⟹ 1996 Mar. 12.04: w/ 5-cm R (20×), central cond. of dia. 2.′5; blue coma. Mar. 12.98: w/ 11-cm B (20×), central cond. of dia. 2′; slightly oval. Mar. 14.99 and 16.06: w/ 5-cm R (20×), central cond. of dia. 3′. Mar. 15.01: w/ 11-cm B (20×), central cond. of dia. 2.′5. Mar. 17.11: w/ 5-cm R (20×), central cond. of dia. 4′. Mar. 17.99-18.05: w/ 7×50 B and 5-cm R (20×), central cond. of dia. 2′; w/ 11-cm B (20×), central cond. of dia. 1′; dust tail appeared as a wide fan w/ darker bands embedded. Mar. 18.98-19.04: w/ 5-cm R (20×), central cond. of dia. 2.′5; w/ 11-cm B (20×), central cond. of dia. 3′; w/ E, central cond. of dia. 5′. Mar. 20.02-20.06: w/ E, central cond. of dia. 5′; w/ 5-cm R (20×), central cond. of dia. 3.′5; w/ 11-cm B (20×), central cond. of dia. 4.′5. Mar. 20.94-20.99: w/ 7×50 B, central cond. of dia. 4.′5. Mar. 21.89-21.99: w/ E, central cond. of dia. 2′; small curve in the gas tail; w/ 7×50 B, central cond. of dia. 4′; w/ 5-cm R (20×), central cond. of dia. 2.′5; w/ 11-cm B (20×), central cond. of dia. 2′, four halos are noticeable, 8° dust tail. Mar. 22.94-23.01: w/ 7×50 B, central cond. of dia. 3′; w/ E, central cond. of dia. 3′; 8° dust tail; w/ 11-cm B (20×), central cond. of dia. 3′, 10° dust tail; w/ 5-cm R (20×), central cond. of dia. 4′. Mar. 23.93-24.01: w/ E, central cond. of dia. 4′, 10° dust tail; "I notice that the tail's breaking off"; w/ 7×50 B, central cond. of dia. 4′; 10° dust tail; w/ 5-cm R (20×), central cond. of dia. 2.′5, dust tail 3°; w/ 11-cm B (20×), central cond. of dia. 5′, 5° dust tail. Mar. 24.76-24.78: w/ E, central cond. of dia. 3.′5; 5° dust tail; w/ 7×50 B, central cond. of dia. 5′; 10° dust tail. Mar. 25.08-25.09: w/ E, central cond. of dia. 5′; w/ 5-cm R (20×), central cond. of dia. 3′; 5° dust tail; w/ 7×50 B, central cond. of dia. 4′; 7° dust tail. Mar. 25.76-26.05: w/ 8-cm R (28×), central cond. of dia. 4′; 3° dust tail; w/ E, central cond. of dia. 6′; w/ 7×50 B, central cond. of dia. 5′; 5° dust tail; w/ 5-cm R (20×), central cond. of dia. 6′; w/ 11-cm B (20×), central cond. of dia. 2.′5; 8° dust tail. Mar. 26.97-27.00: the maximum tail length was ≃ 110°; "I confirm the observations of BAR06 and SCO01 (see *IAUC* 6355) — when the comet's head was situated near α UMi, the ending of its tail was around ϵ Vir!"; w/ 5-cm R (20×), central cond. of dia. 5′; w/ 11-cm B (20×), central cond. of dia. 3′.

◇ *Comet C/1997 D1 (Mueller)* ⟹ 1997 Mar. 5.87: strong central cond. [LEH]. 1998 Jan. 25.79 and Jan. 26.76: weak central cond. [LEH].

◇ *Comet C/1997 J1 (Mueller)* ⟹ 1997 May 31.92, June 3.90, 4.91, 10.91: strong central cond. [LEH]. July 12.90: weak central cond. [LEH].

◇ *Comet C/1997 J2 (Meunier-Dupouy)* ⟹ 1997 July 8.90: weak central cond. [LEH]. Sept. 16.75: strong central cond.; obs. during total lunar eclipse [LEH]. Oct. 21.73, 26.72, 28.73, 31.85, Nov. 1.81: small, strong central cond. [LEH]. Dec. 16.71: small, weak central cond. [LEH].

1998 Apr. 24.05, May 20.01, June 20.97, Aug. 14.87, 16.86, 24.83, 27.84, 30.83: small, strong central cond. [LEH]. June 19.91: round coma [BAR06]. June 22.91: fan-like, diffuse coma [BAR06]. June 26.93: comet near bright star; star-like nucleus of mag 13.5 (Ref: HS), involved in diffuse coma [BAR06]. July 19.99: round coma; brighter in p.a. 30°-210° [BAR06]. July 24.91: fan-like coma [BAR06]. July 27.91: starlike inner coma and diffuse outer coma [BAR06]. July 28.93: no starlike central cond. [BAR06]. Aug. 3.21: central cond. of dia. ≈ 3″ and mag 14.9; the image maintained a general symmetry in R, V, and B [ROQ]. Aug. 13.88: comet involved with 12th-mag star [BOU]. Aug. 15.87: comet near bright star [BAR06]. Aug. 15.88: comet close to star of mag 10 [BOU]. Aug. 18.89: comet involved w/ star of mag 12 [MEY]. Aug. 23.86 and 25.87: reference-star magnitudes for ref. TT were I magnitudes; those from HS were V magnitudes, all extracted from "Guide6" (Project Pluto) software; comparison-star spectral types unknown; CCD images obtained w/ TI 245 chip and RG695 filter (peak sensitivity close to 750-800 nm) [MIL02]. Aug. 25.91: diffuse coma w/ starlike central cond. of mag 13.3 (Ref: HS) [BAR06]. Aug. 27.17: central cond. of mag 13.6 and dia. slightly > 2″; coma symmetrical with no apparent associated tail [ROQ]. Aug. 31.98: diffuse coma w/ starlike central cond. of mag 13.2 (Ref: HS) [BAR06].

Sept. 9.84: near Moon [BAR06]. Sept. 11.13: central cond. of dia. ≈ 2″ and mag 14.5; inner coma appeared symmetrical, while the outer coma was strongly asymmetrical toward p.a. 344° [ROQ]. Sept. 15.99: also used some Tycho (ref. TJ) comparison stars near TT Del, but estimate made essentially with GSPC sequence (ref. GA) [PER01, VIT01]. Sept. 20.19: central cond. of dia. ≈ 3″ and mag 14.1; coma strongly asymmetrical toward p.a. 345°, blending in a broad, diffuse, tail-like extension [ROQ]. Sept. 26.10: central cond. of dia. ≈ 3″ and mag 14.5; inner coma was symmetrical; outer coma was strongly asymmetrical toward p.a. 340°, where it blended into a very diffuse 'extension';

some jet activity noted at p.a. 218° [ROQ]. Oct. 11.09: central cond. of dia. > 2″ and mag 15.3; entire coma has displayed consistently pronounced asymmetry extending over 3′ at p.a. 345° [ROQ]. Nov. 2.10: central cond. of dia. < 2″ and mag 14.4; coma irregularly asymmetrical in p.a. 270° [ROQ].

◇ *Comet C/1997 L1 (Zhu-Balam)* ⟹ 1998 July 27.19: another image yields $m_1 = 21.2$; fan-shaped tail spans p.a. 168°-205° [SCO01]. Aug. 30.14 and 30.15: other images yield $m_1 = 21.2$ and 21.8 [SCO01].

◇ *Comet C/1997 T1 (Utsunomiya)* ⟹ 1997 Oct. 24.78, 28.77: small, strong central cond. [LEH]. Nov. 4.81: comet near γ Lyr [LEH].

◇ *Comet C/1998 H1 (Stonehouse)* ⟹ 1998 Apr. 29.95: fan-like coma, possible tail, and starlike nucleus [BAR06]. Apr. 30.85, May 1.90, 4.89: weak central cond. [LEH].

◇ *Comet C/1998 J1 (SOHO)* ⟹ 1998 May 16.44: "an impressive sight; intense central cond. appeared distinctly blue-green in color; parabolic shaped tail 2° long in p.a. 110° with the central cond. at the focus; first 0°.5 of tail of high surface brightness and visible easily in the bright twilight sky" [PEA]. May 17.44: comet seen in a slightly darker sky than on previous night, a very impressive object reminiscent of C/1995 O1 when at similar brightness [PEA]. May 23.44: impressive sight amongst the stars of the belt of Orion; coma possessed a distinct blue-green color; 2°.7 tail visible in p.a. 106°, although tail is losing the intensity it displayed a week ago [PEA]. May 24.36: w/ 10×50 B, 180′ tail in p.a. 130° [WIL02]. May 24.44: thin cirrus cloud may have affected tail-length estimate; however, tail 1°.5 long in p.a. 110° [PEA]. May 28.37: low alt. [WIL02]. May 29.44: thin cirrus cloud made tail hard to see, apart from the very bright section immediately adjacent to the coma [PEA]. June 24.46: comet has undergone a mini-outburst in brightness over the last 24 hr or so; the central cond. has undergone a very slight increase in intensity; however, it appears that the increase can be attributed to an overall increase in the surface brightness of the total coma [PEA].

◇ *Comet C/1998 K1 (Mueller)* ⟹ 1998 May 19.90-June 20.89: small, strong central cond. [LEH].

◇ *Comet C/1998 K5 (LINEAR)* ⟹ 1998 May 31.95: strong central cond. [LEH]. June 2.93-July 26.98: very strong pointlike central cond. [LEH]. July 31.96-Aug. 27.94: very strong central cond. [LEH]. Aug. 2.43: central cond. of dia. ≈ 2″ and mag 12.4; the inner coma was unexpectedly very bright with pronounced and irregular asymmetry toward the tail; however, no substructure was evident in *R*, *V*, or *B* [ROQ]. Aug. 23.11: still star-like cond. [MAR02]. Aug. 28.48: w/ 25.6-cm *f*/5 L (507×), possible condensations at distance 10″ outward in the 24″ tail, which is in p.a. 265° [BIV]. Aug. 30.58: w/ 25.6-cm *f*/5 L (507×), weak cond. in the tail at 8″ and 20″ [BIV]. Sept. 1.03: starlike nucleus in contact w/ star of mag 12.7 (Ref: HS) [BAR06]. Sept. 1.06: "image seemed elongated, possible tail?" [MEY]. Sept. 2.61: w/ 25.6-cm *f*/5 L (507×), faint cond. in the tail at distances of ≈ 8″, 18″, and 30″ [BIV]. Sept. 5.62: w/ 25.6-cm *f*/5 L (507×), starlike condensations (?) of mag 14.3 at distance 8″ and mag 14.4 at 24″ (main nucleus of mag 12.9; tail 40″ long) in p.a. 265°; good seeing and minor moonlight interference [BIV]. Sept. 13.42 and 13.50: w/ 25.6-cm *f*/5 L (507×), condensations in the tail at distances of 11″, 37″, and 1′.2 (faint) in p.a. 265° [BIV]. Sept. 15.51: w/ 25.6-cm *f*/5 L (507×), condensations of mag 14-15 in the tail at distances of 9″, 0′.6, and 0′.8 (positions from visual obs./drawing; uncertainty 10-20%) [BIV]. Sept. 16.144: obs. details as noted for notes under comet 52P (Sept. 16.156); "comet looks very strange (there is no separation between coma and tail)" [COZ]. Sept. 18.45: w/ 25.6-cm *f*/5 L (507×), cond. at distances of 14″ and 34″ [BIV]. Sept. 19.43: w/ 25.6-cm *f*/5 L (507×), cond. at distances of 9″ and 33″ [BIV]. Sept. 20.59: w/ 25.6-cm *f*/5 L (507×), cond. at distances of 9″-13″, 40″, and 1′.1 [BIV]. Sept. 22.42: w/ 25.6-cm *f*/5 L (507×), cond. at distances of 14″, 41″, and 1′ [BIV]. Sept. 26.53: w/ 25.6-cm *f*/5 L (507×), cond. at distances of 12″, 30″, and 45″ [BIV]. Sept. 30.52: w/ 25.6-cm *f*/5 L (507×), cond. at distances of 11″, 27″, and 50″ [BIV]. Oct. 12.91, 14.98, and 18.96: comet virtually stellar, but small, faint coma suspected; not certain because of variable seeing [BOU]. Oct. 24.05: only seen with averted vision; motion noted during half an hour [KAR02].

◇ *Comet C/1998 M1 (LINEAR)* ⟹ 1998 July 25.17: another image yields $m_1 = 15.6$; tail curves through p.a. 153° (where it has length 0′.4) to p.a. 249° (where its length is 3′.2) [SCO01].

◇ *Comet C/1998 M2 (LINEAR)* ⟹ 1998 June 25.94-Aug. 20.83, Aug. 27.83 and 30.81: small, strong central cond. [LEH]. July 25.199: tail curves through p.a. 183° (where its length is 1′.6) to p.a. 194° (where its length is 7′.5) [SCO01]. Aug. 24.82: small, strong central cond.; comet near 14th-mag star GSC 1545.00099 [LEH]. Oct. 16.78: comet not seen [KAR02].

◇ *Comet C/1998 M3 (Larsen)* ⟹ 1998 July 25.19: another image yields $m_1 = 18.1$ [SCO01]. Aug. 26.17: another image yields $m_1 = 18.2$ [SCO01].

◇ *Comet C/1998 M5 (LINEAR)* ⟹ 1998 July 18.91, Aug. 9.89: strong central cond. [LEH]. July 19.92-Aug. 8.88, Aug. 10.90, 11.88, 14.89, 16.88, 17.88, 20.86, 29.87: small, strong central cond. [LEH]. July 19.96: no enhancement w/ a Lumicon Swan Band Filter [MEY]. July 27.93: fan-like, diffuse coma [BAR06]. Aug. 15.84: starlike central cond., disklike inner coma, conical 2′.5 × 1′.5 outer coma [BAR06]. Aug. 15.89: comet involved with 13th-mag star [BOU]. Aug. 16.85: coma involved w/ star of mag 12 [BAR06]. Aug. 17.88: condensed center surrounded by faint outer halo [MEY]. Aug. 18.85: starlike central cond., $m_2 = 13.5$ (Ref: HS); diffuse round coma [BAR06]. Aug. 19.19: central cond. of dia. slightly > 2″ and mag 14.4; coma was symmetrical and merged into a diffuse tail that had an imbedded faint, narrow central core; collective tail structure curved eastwardly from p.a. 180° to 174° [ROQ]. Aug. 20.83: disk-like inner coma; diffuse, slightly elongated outer coma [BAR06]. Aug. 22.95: w/ Swan Band filter, dia. 3′ [MAR02]. Aug. 23.88: starlike central cond. [BAR06]. Aug. 24.84: strong central cond. [LEH].

Sept. 1.01 and 8.79: compact, round coma [BAR06]. Sept. 10.84: coma slightly elongated in p.a. 140°-320° [BAR06]. Sept. 12.12: central cond. of dia. $\approx 2''.5$ and mag 14.0; tail was diffuse with a narrow, faint embedded central core extending $\simeq 50''$ [ROQ]. Sept. 12.87: comp. stars BD +43°3771 ($V = 10.08$, $B-V = +0.47$), GSC 3179-1137 (11.11, 0.57), GSC 3179-0492 (11.33, 0.47), GSC 3179-0207 (12.06, 0.73), GSC 3179-0042 (12.27, 0.87) [PER01]. Sept. 12.87: comet equal or very slightly brighter than GSC 3179-1137; incoming cloud bank did not allow further careful estimates against other comp. stars, but uncertainity thought to be smaller than 0.2 mag [VIT01]. Sept. 16.02: comet close to γ Cyg [PER01]. Sept. 16.02: estimate done with the comet near the field edge due to the comet's close proximity to glare from γ Cyg [VIT01]. Sept. 16.88: comet appears fainter than previous night [PER01]. Sept. 16.89: thin cirrus clouds elsewhere in the sky, but comet and comparison-star fields were apparently clear; comet looked more condensed than yesterday and it was very close to a star of mag 11 [VIT01]. Sept. 19.79: starlike nucleus; coma elongated in p.a. 80°-260° [BAR06]. Sept. 21.11: central cond. of $\approx 3''$ and mag 13.8; tail was faint and irregularly formed, without substructure [ROQ]. Sept. 27.10: central cond. of dia. $\approx 2''$ and mag 13.9; very faint, diffuse tail without substructure [ROQ]. Sept. 30.05 and Oct. 8.83: similar estimate using photometry of stars in the field of CI Cyg by Brian Skiff (in preparation for the *IBVS*, but now available at the URL `http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet/msg00840.html`) [PER01 and VIT01]. Oct. 10.13: central cond. of dia. $> 2''$ and mag 13.9; bright inner coma had a sharp boundary that marked the beginning of a much fainter outer coma, which in turn blended into a faint, diffuse tail [ROQ]. Oct. 14.42: comet very close to star [SEA]. Oct. 16.40: comet less visible using Swan Band filter [SEA]. Oct. 18.94: comet clearly brighter than five nights ago; five comparison stars within 0.2 mag of the comet's m_1 [PER01]. Oct. 20.83: w/ 20-cm T (161×), false nucleus of mag 13 [KAM01]. Oct. 23.99: comet much larger and brighter than just a week or two ago; w/ 114×, a tiny but clearly non-stellar central knot of 13th mag [BOR]. Nov. 2.06: central cond. of dia. $> 2''$ and mag 14.7; coma asymmetrical in p.a. 105°, blending into a faint, diffuse tail [ROQ].

◇ *Comet C/1998 M6 (Montani)* $\Longrightarrow$ 1998 July 15.37: obs. by Tom Gehrels; "very faint and tentatively visible tail" (as tabulated) [SCO01].

◇ *Comet C/1998 P1 (Williams)* $\Longrightarrow$ 1998 Aug. 10.52: conditions poor with bright moonlight, but comet surprisingly easy to see; no obvious change in appearance using Swan Band filter [SEA]. Aug. 13.66: comet only 0°.8 from α Cen; quite bright in 20×80 B and moderately condensed [PEA]. Aug. 14.34: obs. difficult due to close proximity to α Cen [RAE]. Aug. 17.47: well condensed tonight; appears to have brightened [RAE]. Aug. 18.32: poor conditions [RAE]. Aug. 20.31: poor conditions; obs. made through gap in cloud; Morris method gave same m_1 [RAE]. Aug. 28.35: w/ 10×50 B, $m_1 = 8.3$, coma dia. 7′, DC = 4 [RAE].

◇ *Comet C/1998 Q1 (LINEAR)* $\Longrightarrow$ 1998 Aug. 31.64: broad and faint tail extends toward NE [NAK01]. Sept. 16.56 and 17.57: faint, broad tail extends northward [NAK01].

◇ *Comet 4P/Faye* $\Longrightarrow$ 1991 Nov. 10.85: strong central cond. [LEH].

◇ *Comet 9P/Tempel 1* $\Longrightarrow$ 1994 June 12.91: strong central cond. [LEH].

◇ *Comet 19P/Borrelly* $\Longrightarrow$ 1994 Sept. 10.06: strong central cond. [LEH]. Sept. 11.05: very strong pointlike central cond. [LEH].

◇ *Comet 21P/Giacobini-Zinner* $\Longrightarrow$ 1998 May 31.93, June 2.94, 20.94, 25.95, Aug. 10.85-19.84, Aug. 27.82-30.80: small, strong central cond. [LEH]. Aug. 15.19: central cond. of mag 14.9 and apparent dia. slightly $< 3''$; "tail, although appearing generally diffuse, was somewhat furcated" [ROQ]. Aug. 18.88: no enhancement w/ a Lumicon Swan Band Filter [MEY]. Aug. 22.92: w/ Swan Band filter, no enhancement in m_1 or dia., but DC = 6 [MAR02]. Aug. 27.13: central cond. of mag 15.6 and dia. $\approx 3''$; very faint tail was broad and diffuse without significant substructure [ROQ]. Aug. 30.13: another image yields $m_1 = 13.1$ [SCO01].

Sept. 11.11: central cond. of dia. $\approx 3''$ and mag 14.1; tail was faint and diffuse without readily-apparent substructure [ROQ]. Sept. 12.86: comet involved w/ two faint stars, hampering coma-dia. and DC est. [VIT01]. Sept. 12.92: observing with J. Carvajal (Toledo, Spain) [DES01]. Sept. 13.84: at 100×, faint near-stellar cond. visible of mag $\sim$ 13.5 [BOU]. Sept. 16.16: S Her b and d AAVSO charts used [SPR]. Sept. 16.87: thin cirrus clouds elsewhere in the sky, but comet and comparison stars fields were apparently clear; comet was a very easy object [VIT01]. Sept. 16.87: higher surface brightness than on Sept. 12, but no change in m_1; estimate using S Her AAVSO (1930) sequence yields similar m_1; cirrus elsewhere in the sky [PER01]. Sept. 17.49: GUIDE ver. 6.0 software was used [YOS02]. Sept. 18.03: at 70×, the coma consists of a fairly bright central region surrounded by an extensive but very faint outer halo; at 170×, there is a pseudo-nucleus of mag $\sim$ 12.5 and $< 0'.1$ in dia. [BOR]. Sept. 20.09: central cond. of dia. $\approx 2''$ and mag 14.0; diffuse and featureless tail was of similar intensity in R, V, and B [ROQ]. Sept. 22.78: disk-like and bright central region surrounded by faint outer halo [MEY]. Sept. 23.81: star of mag 11.7 in coma [BOU]. Sept. 24.02: Lumicon Swan-band comet filter seems to enhance comet very little, if at all; w/ 114×, there is a tiny, bright, central knot of mag $\sim$ 13.0 and not more than $0'.1$ in dia., contained within a bright central mass [BOR]. Sept. 24.80: w/ 20-cm L (70×), star-like central cond., $m_2 = 12.9$ (Ref: HS) [BAR06]. Sept. 25.10: central cond. of dia. $\approx 3''$ and mag 14.8; diffuse tail with a faint central core that was barely visible in R [ROQ].

Oct. 8.41, 9.42, 18.40, 25.41: `HOC2.exe` software was used [NAG08]. Oct. 8.43: GUIDE ver. 6 software was used [YOS02]. Oct. 8.82: 12th-mag, nearly starlike central cond. strongly offset towards WNW; intermediate $1'.5$ circular-shaped brightness plateau in inner coma, also strongly offset towards WNW [PER01]. Oct. 9.87: 12th-mag, nearly-starlike central cond. strongly offset towards NW [PER01]. Oct. 10.09: central cond. of dia. $> 2''$ and mag 14.0; tab. tail length was limited by the field-of-view, with the tail probably extending another 20% in length [ROQ]. Oct. 10.50: moderately condensed coma with central cond. appearing almost starlike at low power, cond. contributing most of the brightness,

w/ a faint outer coma [PEA]. Oct. 13.78: comet 27° over horizon [OKS]. Oct. 14.99: at 114×, there is a virtually stellar nucleus of mag 13.1 surrounded by a bright central mass [BOR]. Oct. 16.74: stellar knot of mag 12.3 in center [KAR02]. Oct. 16.75: comet in the 'finger' of Milky Way in Oph; GSC 434.1336 (star of mag 9.9, ES) in coma [OKS]. Oct. 18.28: w/ 25.6-cm *f*/5 L (169×), central cond. of mag 14.4 [BIV]. Oct. 18.35: possible 2′ extension (tail?) glimpsed at p.a. 65° [RAE]. Oct. 19.50: very pronounced central cond. with starlike false nucleus, very faint outer coma [PEA]. Oct. 20.00: coma distinctly elongated in p.a. 65°-245° w/ area of greatest cond. obviously offset sunward; diffuse column of bright material seen flowing tailward (p.a. 65°) from nucleus of mag 13.0 [BOR]. Oct. 20.08: central cond. of dia. > 5″ and mag 13.6; tail appeared generally faint and diffuse w/ some jet-like activity within and adjacent to the "tail head" in *R* and *B* [ROQ]. Oct. 20.28: w/ 25.6-cm *f*/5 L (169×), central cond. of mag 13.5 [BIV]. Oct. 20.81: w/ 20-cm T (161×), tiny bright knot of material w/ false nucleus of mag 13.5, just glimpsed [KAM01]. Oct. 20.99: at 70×, coma is seen to be elogated in a ratio of 3:2 in p.a. 75°-255°; weak tail suspected in the former p.a.'s direction; center of coma strongly condensed but lacks any definite nucleus tonight [BOR]. Oct. 22.74: comet distinctly brighter and more condensed than on Oct. 16.75 [OKS]. Oct. 22.99: comet obvious with 20×80 B and quite large; 40.6-cm L at 114× shows a not-quite-stellar nucleus of mag 13.0 displaying an obvious outflow of bright material tailward (p.a. 70°) for several arcmin [BOR]. Oct. 23.28: w/ 25.6-cm *f*/5 L (169×), central cond. of mag 12.7, substantial brightening in a few days [BIV]. Oct. 23.35: "appears strikingly different from last obs.; larger, more diffuse coma, stubby fan-like tail?" [RAE]. Oct. 23.74: very high humidity [OKS]. Oct. 24.04: tail very narrow but easily visible [CRE01]. Oct. 24.29: w/ 25.6-cm *f*/5 L (169×), central cond. of mag 13.1 [BIV]. Oct. 24.79: pseudo-nucleus of mag 11.9 [KAR02]. Oct. 25.35: moonlight interference [RAE]. Oct. 25.99: Moon 4.5 days old, 20° from comet's position, somewhat hindering obs. [BOR]. Oct. 26.49: "seemed to be elongated 1′.5-2′ in p.a. 260° (tail?)" [BIV]. Oct. 26.72: hurried obs. after rain between clouds; 6-day-old Moon ~ 19° from comet [OKS]. Nov. 4.07: central cond. of dia. > 3″ and mag 13.2; tail appeared diffuse with no apparent substructure [ROQ].

◇ *Comet 23P/Brorsen-Metcalf (O.S. 1989o = 1989 X)* ⟹ 1989 July 30.02: weak central cond.; appearance like galaxy M51 in CVn [LEH]. Aug. 6.01: strong central cond.; tail ~ 7′ long at p.a. 335° [LEH]. Aug. 7.04: strong central cond.; tail ~ 5′ long in p.a. 303° [LEH]. Aug. 10.05: strong central cond.; tail ~ 6′ long in p.a. 296° [LEH].

◇ *Comet 45P/Honda-Mrkos-Pajdušáková* ⟹ 1995 Dec. 27.70 and 29.70: comet only 8° above horizon [LEH].

◇ *Comet 46P/Wirtanen* ⟹ 1997 Feb. 2.73: small, weak central cond. [LEH]. Mar. 10.77, 11.78, 12.77: strong central cond. [LEH]. May 2.83: weak central cond. [LEH].

◇ *Comet 52P/Harrington-Abell* ⟹ 1998 July 25.03, Aug. 1.02: small, weak central cond. [LEH]. July 25.45: another image yields $m_1 = 12.8$ [SCO01]. July 29.12: significant change in appearance of comet from July 21; unfiltered CCD images w/ 90-cm D show $m_1 = 10.9$, $m_2 = 15.2$; tail 5′ long [Alain Maury, Observatorie de la Côte d'Azur, Caussols, France]. Sept. 2.62: w/ 25.6-cm *f*/5 L (169×), central cond. elongated 1′ in p.a. 270° [BIV]. Sept. 16.156: obs. 152.4-cm *f*/8 telescope + Loral 2000×2000 CCD at Bologna-Loiano Astronomical Observatory; image processed with ESO-MIDAS (Munich Image Data Analysis System); m_1 determined using MIDAS [COZ]. Sept. 19.33: "central cond. of dia. 3″ and mag 15.1; well-defined tail showing some structure near tail head" [ROQ]. Sept. 20.58: w/ 25.6-cm *f*/5 L (169×), coma elongated 2′ in p.a. 270°; m_1 affected by nearby stars [BIV]. Sept. 22.57: w/ 25.6-cm *f*/5 L (169×), coma elongated or tail 1′.5 in p.a. 265° [BIV]. Oct. 16.94: obs. during a power failure in the neighborhood [KAR02]. Oct. 18.28: central cond. of dia. > 4″ and mag 14.8; well-defined, fan-shaped tail [ROQ].

◇ *Comet 55P/Tempel-Tuttle* ⟹ 1998 Jan. 17.72, 25.77, 26.74: small, weak central cond. [LEH].

◇ *Comet 59P/Kearns-Kwee* ⟹ 1998 Aug. 30.35: another image yields $m_1 = 20.7$ [SCO01].

◇ *Comet 62P/Tsuchinshan 1* ⟹ 1998 Mar. 26.80: small, strong central cond. [LEH].

◇ *Comet 65P/Gunn* ⟹ 1997 Oct. 28.81: weak central cond. [LEH]. Oct. 31.91: small, strong central cond. [LEH].

◇ *Comet 67P/Churyumov-Gerasimenko* ⟹ 1996 Jan. 21.77, 22.77: small, strong central cond. [LEH].

◇ *Comet 68P/Klemomla* ⟹ 1998 July 25.01: small, strong central cond. [LEH].

◇ *Comet 69P/Taylor* ⟹ 1998 Mar. 23.84, 29.85, Apr. 30.83, June 21.90: small, strong central cond. [LEH].

◇ *Comet 73P/Schwassmann-Wachmann 3* ⟹ 1995 Dec. 29.75 and 30.71: small, strong central cond. [LEH].

◇ *Comet 78P/Gehrels 2* ⟹ 1997 Nov. 1.95, 1998 Jan. 17.85, Mar. 23.85, 25.83, 26.84: small, strong central cond. [LEH]. Dec. 21.85: small, weak central cond. [LEH].

◇ *Comet 81P/Wild 2* ⟹ 1997 Feb. 2.78, 3.74, 7.82: small, weak central cond. [LEH]. Feb. 22.81, 23.77, Mar. 2.79, 5.79-12.81, May 24.88, 31.89, June 3.92: small, strong central cond. [LEH]. 1998 July 15.36: obs. by Tom Gehrels; measured (as usual) by Scotti [SCO01].

◇ *Comet 82P/Gehrels 3* ⟹ 1998 July 27: hunted without success to limiting mag $V \approx 21.5$ [SCO01].

◇ *Comet 88P/Howell* ⟹ 1998 Apr. 20.92, 23.95, May 31.91: small, strong central cond. [LEH]. June 24.17: obs. by Jeff Larsen; another image yields $m_1 = 15.7$ [SCO01]. Aug. 22.88: w/ Swan Band filter disk-like cond. w/ dia. 6′ and DC = 4/ [MAR02]. Sept. 13.44: comet appeared brighter through Swan Band filter [SEA]. Sept. 16.41: comet close to star [SEA]. Oct. 13.65: observing from Makes, Réunion [LAN02].

◇ *Comet 91P/Russell 3* ⟹ 1998 July 27.26: another image yields $m_1 = 18.6$ [SCO01].

◇ *Comet 93P/Lovas 1* ⟹ 1998 June 24.46: obs. by Jeff Larsen; measured (as usual) by Scotti [SCO01]. July 24.031: CCD exposures of length 500, 800, and 600 sec taken w/ the 60-/90-/180-cm Schmidt telescope of the Konkoly Observatory at Piszkesteto with *I* filter yield $m_1 \sim 17$ (comet image is trailed due to tracking at the sidereal rate) [Imre Toth]. July 27.46: another image yields $m_1 = 16.8$ [SCO01]. Aug. 18.06: small, strong central cond. [LEH]. Oct. 16.90: comet next to a star of mag 12.3; obs. during a power failure in the neighborhood [KAR02].

◇ *Comet 103P/Hartley 2* ⟹ 1997 Sept. 20.81: very strong pointlike central cond. [LEH]. Sept. 21.80, 28.79, Dec. 21.72, 25.70, 26.86: strong central cond. [LEH]. Oct. 19.76: small, strong central cond.; looks like C/1997 J2 [LEH]. Oct. 21.75, 31.84, Nov. 1.80, 4.74, 10.73, Dec. 14.74, 16.72: small, strong central cond. [LEH]. Oct. 26.74, 1998 Mar. 20.84, 25.81: small, weak central cond. [LEH]. 1998 Jan. 26.72: small, weak central cond. [LEH].

◇ *Comet 104P/Kowal 2* ⟹ 1997 Oct. 19.78, 21.77, 24.77: small, strong central cond. [LEH].

◇ *Comet 118P/Shoemaker-Levy 4* ⟹ 1996 Dec. 28.81, 30.78, 1997 Jan. 26.80, 31.78, Feb. 1.76-Mar. 7.81: strong central cond. [LEH]. 1998 June 23.17: stellar appearance [SCO01]. June 24.166 and 24.178: separate images yielded $m_1 = 18.1$; comet image is stellar; obs. by Jeff Larsen [SCO01]. July 26.17: another image yields $m_1 = 19.9$ [SCO01].

◇ *Comet 124P/Mrkos* ⟹ 1998 Aug. 30: hunted for this comet "without obvious success; I did a short scan that covered ± 1 day" [SCO01].

◇ *Comet 126P/IRAS* ⟹ 1996 Dec. 26.72-30.74: strong central cond. [LEH].

◇ *Comet 129P/Shoemaker-Levy 3* ⟹ 1998 Jan. 26.81: strong central cond. [LEH].

◇ *Comet 132P/Helin-Roman-Alu 2* ⟹ 1997 Oct. 31.95, Nov. 1.90: small, with weak central cond. [LEH]. 1998 Jan. 1.75: strong central cond. [LEH].

◇ *Comet P/1988 V1 (Ge-Wang)* ⟹ 1998 July 26: "hunted for this comet, but nothing obvious; I also scanned over it on June 18, covering at least ± 4 days on both dates to our usual limit, which I'll conservatively call about $V = 21$; I feel comfortable w/ those limits, especially in last nights scan and review" [SCO01].

◇ *Comet P/1991 V2 (Shoemaker-Levy 7)* ⟹ 1998 July 25.46: separate image yields $m_1 = 20.7$ [SCO01]. July 26.459: separate image yields $m_1 = 20.3$; faint tail [SCO01].

◇ *Comet P/1996 A1 (Jedicke)* ⟹ 1998 July 27: hunted without success to limiting mag $V \approx 21.5$ [SCO01].

◇ *Comet P/1998 QP$_{54}$ (LONEOS-Tucker)* ⟹ 1998 Sept. 18.18: central cond. of dia. 2″ and mag 16.4; diffuse, faint tail devoid of apparent substructure [ROQ]. Sept. 28.18: central cond. of size > 2″ and mag 16.2; tail was very faint and diffuse, without well-defined form [ROQ]. Oct. 11.13: central cond. of dia. < 2″ and mag 16.9; coma was strongly asymmetrical toward p.a. 153°; no readily-apparent tail [ROQ]. Oct. 17.13: central cond. of dia. < 3″ and mag 17.3; coma appeared highly asymmetrical toward p.a. 151°; no recognizable tail [ROQ].

◇ *Comet P/1998 U2 (Mueller)* ⟹ 1998 Oct. 23.30: "three CCD exposures taken in excellent seeing with the 0.9-m Spacewatch telescope on Kitt Peak during the course of scanning; effective exposure times were ≈ 150 sec; the comet has a strong central cond., w/ coma dia. subtending 6″-7″; an amorphous dust tail centered on p.a. 130° is broad, fan-shaped, and bright, of length 15″; a remarkably sharp and straight ion tail in p.a. 250° stretches for 67″ from the nucleus, and has a width of 4″; the overall appearance is as of a miniature or distant comet C/1995 O1 (Hale-Bopp)" [Joe Montani].

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TABULATED DATA

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

"MM" = the method employed for estimating the total (visual) magnitude; see article on page 186 of the Oct. 1996 issue [B = VBM method, M = Morris method, S = VSS or In-Out method, I = in-focus, C = unfiltered CCD, c = same as 'C', but for 'nuclear' magnitudes, V = electronic observations — usually CCD — with Johnson *V* filter, *etc.*]. "MAG." = total (visual) magnitude estimate; a colon indicates that the observation is only approximate, due to bad weather conditions, *etc.*; a left bracket ([) indicates that the comet was not seen, with an estimated limiting magnitude given (if the comet IS seen, and it is simply estimated to be fainter than a certain magnitude, a "greater-than" sign (>) must be used, not a bracket). "RF" = reference for total magnitude estimates (see pages 98-100 of the October 1992 issue, and Appendix C of the *ICQ Guide to Observing Comets*, for all of the 1- and 2-letter codes). "AP." = aperture in centimeters of the instrument used for the observations, usually given to tenths. "T" = type of instrument used for

the observation (R = refractor, L = Newtonian reflector, B = binoculars, C = Cassegrain reflector, A = camera, T = Schmidt-Cassegrain reflector, S = Schmidt-Newtonian reflector, E = naked eye, *etc.*). "F/" and "PWR" are the focal ratio and power or magnification, respectively, of the instrument used for the observation — given to nearest whole integer (round even); note that for CCD observations, in place of magnification is given the exposure time in seconds (see page 11 of the January 1997 issue).

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

A complete list of the Keys to abbrevations used in the *ICQ* is available from the Editor for $4.00 postpaid (available free of charge via e-mail); these Keys are also now available in the new *Guide to Observing Comets* and via the *ICQ*'s World Wide Web site. *Please note that data in archival form, and thus the data to be sent in machine-readable form, use a format that is different from that of the Tabulated data in the printed pages of the ICQ;* see pages 59-61 of the July 1992 issue, p. 10 of the January 1995 issue, and p. 100 of the April 1996 issue for further information [note correction on page 140 of the October 1993 issue]. Further guidelines concerning reporting of data may be found on pages 59-60 of the April 1993 issue, and in the *ICQ Guide to Observing Comets.*

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

AMO01	35	Alexandre Amorim, Brazil
BAR06	37	Alexandr R. Baransky, Ukraine
BIV		Nicolas Biver, France
BOR		John E. Bortle, NY, U.S.A.
BOU		Reinder J. Bouma, The Netherlands
CHE03	33	Kazimieras T. Cernis, Lithuania
COM	11	Georg Comello, The Netherlands
COO02		Tim P. Cooper, South Africa
COZ		Elia Cozzi, Mozzate, Italy
CRE01		Phillip J. Creed, OH, U.S.A.
DEA		Vicente F. de Assis Neto, Brazil
DES01		Jose G. de S. Aguiar, Brazil
DID		Richard Robert Didick, MA, U.S.A
DIE02		Alfons Diepvens, Belgium
DIO		Massimo Dionisi, Italy
*DRE01		Colin E. Drescher, Qld., Australia
FRE01	45	Jose Rodriguez Freitas, Uruguay
FUK02	16	Hideo Fukushima, Mitaka, Japan
GAS01	33	Darius Gasiunas, Lithuania
GEY	14	M. J. Geyser, South Africa
GIL01	11	G. Gilein, Noordwijk, Netherlands
HAS02		Werner Hasubick, Germany
HAS08	16	Yuji Hashimoto, Hiroshima, Japan
HAV		Roberto Haver, Italy
HOR02	23	Kamil Hornoch, Czech Republic
*JAN05	33	Rimas Janulis, Moletai, Lithuania
JON		Albert F. Jones, New Zealand
*KAK02	33	Gunaras Kakaras, Kaldiniai, Lithuania
KAM01		Andreas Kammerer, Germany
KAR02		Timo Karhula, Sweden
KER	32	Ákos Kereszturi, Hungary
KOS		Attila Kósa-Kiss, Romania
KRY02		Washington Kryzanowski, Uruguay
LAN02	32	Zsolt Lantos, Budapest, Hungary
LEH		Martin Lehky, Czech Republic
LOO01		Frans R. van Loo, Belgium
LOU	35	Romualdo Lourencon, Brazil
LUE		Hartwig Luethen, Germany
MAR02	13	Jose Carvajal Martinez, Spain
MAT08		Michael Mattiazzo, S. Australia
MEY		Maik Meyer, Germany
MIK		Herman Mikuz, Slovenia
MIL02		Giannantonio Milani, Italy
MIY01	16	Osamu Miyazaki, Tsukuba, Japan
MOE		Michael Moeller, Germany
NAG08	16	Yoshimi Nagai, Kofu, Japan
NAK01	16	Akimasa Nakamura, Kuma, Japan
NEK		Andrey N. Nekrasov, Belarus
NES	37	Yurij V. Nesterov, Russia
NEV	42	Vitali S. Nevski, Belarus
OKS	07	Gabriel Oksa, Slovak Republic
PEA		Andrew R. Pearce, Australia
PER01		Alfredo J. S. Pereira, Portugal
PLS	23	Martin Plšek, Czech Republic
RAE		Stuart T. Rae, New Zealand
RES		Maciej Reszelski, Poland
ROQ		Paul Roques, AZ, U.S.A.
SAL01	42	Mihail Saltanov, Minsk, Belarus
SAN04	38	Juan Manuel San Juan, Spain
SAN07	32	Gábor Sánta, Hungary

SARO2	32	Krisztián Sárneczky, Hungary	TOT03	32	Zoltán Tóth, Hungary
SCO01		James V. Scotti, AZ, U.S.A.	*TRO02	35	Victor Trombotto, Almafuerte, Argentina
SEA		David A. J. Seargent, Australia	TSU02	16	Mitsunori Tsumura, Wakayama, Japan
SEA01		John Seach, Australia	TUR	15	Cliff Turk, Pinelands, Cape Town
SHA02	07	Jonathan D. Shanklin, England	VIT01	40	Catarina Vitorino, Portugal
SHU	42	Sergey E. Shurpakov, Baran, Belarus	WIL02		Peter F. Williams, Australia
SPR		Christopher E. Spratt, BC, Canada	YOS02	16	Katsumi Yoshimoto, Hirao, Japan
SUZ02	16	Masayuki Suzuki, Utsunomiya, Japan	YOS04	16	Seiichi Yoshida, Ibaraki, Japan
SZA		Sándor Szabó, Sopron, Hungary	ZNO	23	Vladimír Znojil, Czech Republic
TAY	07	Melvyn D. Taylor, Yorkshire, England			

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Comet C/1984 N1 (Austin)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 09 03.13		S	6.8	AA	8.0	B		15	2.5				HAV

Comet C/1984 V1 (Levy-Rudenko)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 12 10.72		S	8.7	AA	8.0	B		15	3				HAV
1984 12 11.73		S	8.5	AA	8.0	B		15	3.5				HAV
1984 12 14.73		S	8.5	AA	8.0	B		15	3.5				HAV
1984 12 15.73		S	8.2	AA	8.0	B		15	4				HAV
1984 12 24.76		S	8.0	AA	8.0	B		15	5				HAV
1984 12 25.74		S	7.9	AA	8.0	B		15	4.5				HAV
1984 12 26.73		S	7.9	AA	8.0	B		15	4				HAV
1985 01 18.16		S	7.6	AA	8.0	B		15	8.5				HAV
1985 01 23.20		S	7.6	AA	8.0	B		15	7				HAV
1985 01 25.17		S	7.7	AA	8.0	B		15	8				HAV
1985 01 28.19		S	7.8	AA	8.0	B		15	9				HAV
1985 01 30.16		S	7.7	AA	8.0	B		15	9.5				HAV
1985 01 31.16		S	7.9	AA	8.0	B		15	9.5				HAV
1985 02 20.19		S	8.6	AA	8.0	B		15	7				HAV
1985 02 20.81		S	8.6	AA	8.0	B		15	11.5	0/			HAV

Comet C/1991 B1 (Shoemaker-Levy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 10 08.56		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet C/1993 Q1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 06 01.47		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet C/1995 O1 (Hale-Bopp)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 06 07.95		M	7.3	S	10	B	4	25	4	5/			LEH
1996 08 09.84		M	6.2	S	8.0	B		10	15	5		320	LEH
1996 08 10.84		M	6.2	S	8.0	B		10	15	5/		320	LEH
1996 08 15.83		M	6.0	S	8.0	B		10	17	6/	0.07	320	LEH
1996 08 19.84		M	6.0	S	8.0	B		10	18	6			LEH
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 09 19.82		M	5.1	S	8.0	B		10	20	6/			LEH
1996 09 27.80		M	5.0	S	5.0	B		10	20	5			LEH
1996 09 30.82		M	5.0	S	5.0	B		10	20	5			LEH
1996 10 03.77		M	5.3	S	8.0	B		10	21	5/	1	75	LEH
1996 10 11.42		S	6.2	AC	5.0	B		10		4	2.5		WIL02
1996 10 11.75		M	5.2	S	8.0	B		10	20	5/	0.8	80	LEH
1996 10 12.40		S	6.0	AC	5.0	B		10		4			WIL02
1996 10 12.74		M	5.2	S	8.0	B		10	14	5/	0.5	80	LEH

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 10 13.39		S	6.2	AC	5.0	B		10		4			WIL02
1996 10 14.82		M	5.2	S	8.0	B		10	14	6			LEH
1996 10 25.76		M	5.2	S	8.0	B		10	14	6			LEH
1996 12 21.69		M	3.6	S	0.8	E		1	20	3			LEH
1996 12 22.69		M	4.0	S	8.0	B		10	20	5			LEH
1996 12 26.69		M	3.5	S	0.8	E		1	30	4			LEH
1996 12 28.69		M	3.5	S	0.8	E		1	30	4			LEH
1996 12 30.69		M	3.8	S	8.0	B		10	25	5			LEH
1997 02 01.19		M	2.5	TI	0.8	E		1	30	7/			LEH
1997 02 02.18		M	2.6	TI	0.8	E		1	20	8			LEH
1997 02 03.18		M	2.5	TI	0.8	E		1	20	8			LEH
1997 02 15.19		M	1.9	TI	0.8	E		1	20	8	2.5	315	LEH
1997 02 23.18		M	0.8	TI	0.8	E		1	20	8	1	300	LEH
1997 03 02.17		M	0.7	BC	0.8	E		1	20	8	3		LEH
1997 03 02.71		M	0.6	BC	0.8	E		1	15	8	2		LEH
1997 03 03.75		M	0.6	BC	0.8	E		1	15	7/	3	310	LEH
1997 03 04.75		M	0.1	BC	0.8	E		1	15	7/	3		LEH
1997 03 05.76		M	-0.1	BC	0.8	E		1	15	8	3		LEH
1997 03 07.77		M	-0.3	BC	0.8	E		1	15	7/	10	320	LEH
1997 03 08.17		M	-0.1	BC	0.8	E		1	20	7/	10	320	LEH
1997 03 08.76		M	-0.1	BC	0.8	E		1	20	7/	4	320	LEH
1997 03 09.05		B	1.0:	HD	0.0	E		1	2.5	8	7		NES
1997 03 09.05		B	1.2:	HD	5.0	B		7	4	8			NES
1997 03 10.69		B	1.3	HD	5	R		20	3.5	8	1		NES
1997 03 10.71		B	1.3:	HD	5.0	B		7	3	8	1.5		NES
1997 03 10.75		M	-0.3	BC	0.8	E		1	20	7/	10	320	LEH
1997 03 10.97		B	0.8	HD	11	B		20	4	8	1		NES
1997 03 11.08		B	1.3:	HD	5.0	B		7	4	8	1		NES
1997 03 11.10		B	1.3	HD	5	R		20	3.5	8	1		NES
1997 03 11.16		M	-0.1	BC	0.8	E		1	25	7/	11	320	LEH
1997 03 11.76		M	-0.3	BC	0.8	E		1	20	7/	9	320	LEH
1997 03 11.99		B	1.0	HD	0.0	E		1	4	8	12		NES
1997 03 12.00		B	0.9	HD	5	R		20	3.5	8	10		NES
1997 03 12.01		B	1.1	HD	5.0	B		7	3.5	8	10		NES
1997 03 12.17		M	-0.2	BC	0.8	E		1	25	7/	11	320	LEH
1997 03 12.76		M	-0.5	BC	0.8	E		1	20	7/	9	320	LEH
1997 03 13.01		B	1.0	HD	0.0	E		1	4	8	6		NES
1997 03 13.03		B	0.9	HD	5.0	B		7	3.5	8	6		NES
1997 03 13.04		B	0.8	HD	11	B		20	3	8	8		NES
1997 03 17.07		B	0.7	HD	11	B		20	3	8	12		NES
1997 03 17.09		B	0.7	HD	5.0	B		7	3.5	8	12		NES
1997 03 17.76		M	-0.5	BC	0.8	E		1	20	8	5		LEH
1997 03 18.05		B	0.7	HD	5.0	B		7	4	8	15		NES
1997 03 18.07		B	0.7:	HD	11	B		20	3	8	10		NES
1997 03 18.09		B	1.0:	HD	0.0	E		1	3	8	17		NES
1997 03 19.06		B	0.6	HD	0.0	E		1	3	9	12		NES
1997 03 19.07		B	0.6	HD	5.0	B		7	2.5	9	5		NES
1997 03 19.09		B	0.5	HD	11	B		20	1.5	8	8		NES
1997 03 21.70		B	0.4	HD	5.0	B		7	3	9	3		NES
1997 03 21.71		B	0.4	HD	0.0	E		1	3	9			NES
1997 03 21.74		B	0.4	HD	11	B		20	3	9	5		NES
1997 03 22.09		B	0.6	HD	11	B		20	3	9	5		NES
1997 03 22.78		M	-0.9	BC	0.8	E		1	25	7/	10		LEH
1997 03 23.77		M	-0.9	BC	0.8	E		1	25	7	15		LEH
1997 03 24.05		B	0.5	HD	0.0	E		1	3	8			NES
1997 03 24.05		B	0.5	HD	5.0	B		7	3.5	8	5		NES
1997 03 24.08		B	0.5	HD	11	B		20	2.5	8	5		NES
1997 03 26.05		B	0.4	HD	5.0	B		7	3.5	8	5		NES
1997 03 26.07		B	0.4	HD	0.0	E		1	4	8	5		NES
1997 03 26.08		B	0.4	HD	11	B		20	3.5	8	7		NES
1997 03 27.76		B	0.4	HD	0.0	E		1	2.5	8	7		NES
1997 03 29.76		B	0.3	HD	5.0	B		7	3	8			NES
1997 03 30.79		M	-1.0	BC	0.8	E		1	30	7	22	340	LEH
1997 03 30.94		B	0.1	HD	0.0	E		1	3.5	8	5		NES
1997 03 30.96		B	0.1	HD	5.0	B		7	2.5	9	5		NES

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 31.08		B	0.2	HD	11	B		20	2.5	8			NES
1997 03 31.76		B	0.4	HD	11	B		20	2.5	8	8		NES
1997 03 31.76		M	-1.0	BC	0.8	E		1	30	7	22	340	LEH
1997 03 31.78		B	0.3	HD	5.0	B		7	3	8	12		NES
1997 04 01.79		M	-1.0	BC	0.8	E		1	30	7	15	340	LEH
1997 04 02.78		M	-0.7	BC	0.8	E		1	30	7	10	340	LEH
1997 04 07.82		M	-0.9	BC	0.8	E		1	30	7	17	345	LEH
1997 04 08.81		M	-0.9	BC	0.8	E		1	30	7	17	345	LEH
1997 04 12.83		M	-0.5	BC	0.8	E		1	25	7	15	350	LEH
1997 04 13.80		M	-0.5	BC	0.8	E		1	25	7	15	350	LEH
1997 04 20.82		M	-0.1	BC	0.8	E		1	25	7	5		LEH
1997 05 01.75		B	1.6:	HD	0.0	E		1	6	8			NES
1997 05 02.75		B	1.7	HD	0.0	E		1	6.5	8	5	52	NES
1997 05 02.82		M	0.5	BC	0.8	E		1	20	7	5		LEH
1997 05 04.75		B	1.3	HD	0.0	E		1	5	8	2	49	NES
1997 05 04.77		B	1.3	HD	5	R		20	4.5	8	3.2	47	NES
1997 05 04.78		B	1.3	HD	8	R		28	4	8	3	47	NES
1997 05 06.76		B	1.7	HD	0.0	E		1	5	8	1.5	43	NES
1997 05 06.77		B	1.7	HD	5	R		20	6.5	7			NES
1997 05 06.78		B	1.7	HD	8	R		28	6	8			NES
1997 05 08.76		B	1.9	HD	0.0	E		1	5	7			NES
1997 05 08.77		B	1.9	HD	5	R		20	4.5	7			NES
1997 05 10.76		B	2.1	HD	8	R		28	4.6	8			NES
1997 05 12.76		B	2.1	HD	8	R		28	4	8			NES
1997 05 25.34		I	1.4	AC	0.0	E		1		9			WIL02
1998 01 25.55		S	7.8	VN	5.0	B		10		6			WIL02
1998 01 27.45		S	7.8	VN	5.0	B		10		6			WIL02
1998 02 01.05		M	8.2	HS	7	R	4	25	5.6	3/			LEH
1998 02 01.47		S	7.9	VN	5.0	B		10		4			WIL02
1998 02 05.01		M	8.2	HS	7	R	4	25	5.6	3/			LEH
1998 02 09.06		M	8.2	HS	7	R	4	25	5.9	4			LEH
1998 02 14.01		M	8.3	HS	7	R	4	25	5.9	4/	0.40	61	LEH
1998 02 15.99		M	8.1	HS	7	R	4	25	6.0	4			LEH
1998 02 16.02		S	8.0	VN	5.0	B		10		1			WIL02
1998 02 16.99		M	8.1	HS	7	R	4	25	5.7	4			LEH
1998 02 17.96		M	8.3	HS	7	R	4	25	6.1	4/	0.38	65	LEH
1998 02 20.99		M	8.4	HS	7	R	4	25	5.5	4	0.18	70	LEH
1998 02 21.99		M	8.3	HS	7	R	4	25	5.5	3	0.16	72	LEH
1998 02 22.99		M	8.4	HS	7	R	4	25	5.0	2/			LEH
1998 02 24.02		M	8.4	HS	7	R	4	25	5.5	3/	0.18	75	LEH
1998 02 24.99		M	8.4	HS	7	R	4	25	5.8	3/	0.18	76	LEH
1998 02 26.01		M	8.4	HS	7	R	4	25	5.3	3/	0.16	79	LEH
1998 02 27.00		M	8.4	HS	7	R	4	25	5.3	3/	0.16	79	LEH
1998 06 27.31		S	10.6	TT	31.7	L	5	64	1	2/			JON
1998 07 02.76		S	9.6	AA	8.0	B		15	2.5	3			SEA01
1998 07 03.75		S	10.1	TT	31.7	L	5	64	1	4			JON
1998 07 05.74		S	9.3	AA	8.0	B		15	2.6	3			SEA01
1998 07 14.78		S	9.9	AA	25.4	L	6	61	1.5	3			SEA01
1998 07 15.78		S	10.2	AA	25.4	L	6	61	1.8	3			SEA01
1998 07 16.78		S	10.0	AA	25.4	L	6	61	1.5	4			SEA01
1998 07 20.78		S	9.9	AA	25.4	L	6	61	1.6	4			SEA01
1998 07 21.73		S	9.9	AA	25.4	L	6	61	1.5	4			SEA01
1998 07 22.79		S	9.8	AA	25.4	L	6	61	1.8	4			SEA01
1998 07 26.73		S	10.0	TT	31.7	L	5	64	1.8	2			JON
1998 07 28.70		S	10.2	AA	25.4	L	6	61	2	5			SEA01
1998 07 29.71		S	10.2	AA	25.4	L	6	61	1.5	5			SEA01
1998 07 30.70		S	9.8	AA	8.0	B		15	2	2			SEA01
1998 07 31.70		S	9.9	AA	8.0	B		15	1.9	2			SEA01
1998 08 02.75		S	10.7	TT	31.7	L	5	64	1	1			JON
1998 08 05.76		S	10.5	TT	31.7	L	5	64	2	1			JON
1998 08 06.80		S	10.1	AA	25.4	L		61	1.2	2/			SEA01
1998 08 11.78		S	10.3	VN	25.4	L		61	1	6			SEA01
1998 08 13.78		S	10.3	VN	25.4	L	6	61	1.3	6			SEA01
1998 08 17.76		S	10.2	VN	25.4	L	6	61	2	6			SEA01
1998 08 18.80		S	9.6	AA	5.0	B		10	2.5	2			SEA01

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 19.72		S	10.3	AA	25.4	L	6	61	1.5	3			SEA01
1998 08 22.79		S	9.3	AA	5.0	B		10	2.2	1			SEA01
1998 08 24.78		S	9.5	AA	8.0	B		15	2	2			SEA01
1998 08 26.77		S	9.6	AA	8.0	B		15	1.5	2			SEA01
1998 08 29.76		M	9.9	AA	10.0	B		25	2	5			SEA
1998 09 01.70		S	9.7	AA	10.0	B		25					SEA
1998 09 01.72		S	9.4	AA	5.0	B		10					SEA
1998 09 15.67		S	9.7	VN	25.4	L	6	61	2.0	3			SEA01
1998 09 16.62		S	10.2	TI	20	L	7	45	1.5	4			MAT08
1998 09 17.72		S	9.9	VN	25.4	L	6	61	1.4	3			SEA01
1998 09 18.67		S	9.4	AA	5.0	B		10	2.0	2			SEA01
1998 09 20.76		S	9.9	VN	25.4	L	6	61	1.3	3			SEA01
1998 09 22.67		S	10.1	VN	25.4	L	6	61	1.2	3			SEA01
1998 09 23.68		S	9.8	VN	25.4	L	6	61	1.2	3			SEA01
1998 09 27.60		S	10.0	AA	10.0	B		25					SEA
1998 09 27.66		S	10.1	VN	25.4	L	6	61	1.2	2			SEA01
1998 09 28.70		S	9.9	VN	25.4	L	6	61	1.5	2			SEA01
1998 09 29.68		S	10.2	VN	25.4	L	6	61	1.1	2			SEA01
1998 10 01.69		S	10.0	VN	25.4	L	6	61	1.2	2			SEA01
1998 10 02.75		S	10.2	VN	25.4	L	6	61	1.5	2	5	m 170	SEA01
1998 10 13.53		S	9.9	AA	5.0	B		10					SEA
1998 10 13.62		S	10.3	TI	20	L	7	45	2	4			MAT08
1998 10 13.94		S	10.8	AC	35.6	T	11	150		3			LAN02
1998 10 15.56		S	10.2	AA	10.0	B		25	5				SEA
1998 10 19.80		S	10.5	VN	41	L	4	90	1.8	3			PEA
1998 10 20.80		S	10.5	VN	41	L	4	90	1.8	2/			PEA
1998 10 21.65		S	10.5	TI	20	L	7	45	2	4			MAT08

Comet C/1995 Q1 (Bradfield)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 02 19.49		C	[18.5:	GA	60.0	Y	6	a240	! 0.3				NAK01

Comet C/1995 Q2 (Hartley-Drinkwater)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 10 17.43		C	[18.5:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 10 20.42		C	[18.5:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 10 25.41		C	[18.5:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet C/1996 B2 (Hyakutake)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 03 12.04		B	4.7	HD	5	R		20	6	5			NES
1996 03 12.98		B	4.5	HD	11	B		20	4.5	5			NES
1996 03 14.99		B	4.3	HD	5	R		20	7	5	0.5		NES
1996 03 15.01		B	4.3	HD	11	B		20	5	5	0.7		NES
1996 03 16.06		B	4.2	HD	5	R		20	7	5	0.5		NES
1996 03 17.11		B	3.8	HD	5	R		20	8	6	1.0		NES
1996 03 17.99		B	3.5	HD	5.0	B		7	8	4	2		NES
1996 03 18.01		B	3.5	HD	5	R		20	8	4	2.0		NES
1996 03 18.05		B	3.5	HD	11	B		20	8	4	3		NES
1996 03 18.98		B	3.2	HD	5	R		20	10	5	2.5		NES
1996 03 19.02		B	3.2	HD	11	B		20	12	5	5		NES
1996 03 19.04		B	3.0	HD	0.0	E		1	20	4	0.7		NES
1996 03 20.02		B	2.5	HD	0.0	E		1	15	6	1.5		NES
1996 03 20.03		B	2.5	HD	5	R		20	12	6	4		NES
1996 03 20.94		B	2.1	HD	5.0	B		7	20	6	5		NES
1996 03 20.96		B	2.0	HD	0.0	E		1	15	6	7		NES
1996 03 20.96		B	2.1	HD	5	R		20	15	6	7		NES
1996 03 20.98		B	2.1	HD	11	B		20	30	7	2.5		NES
1996 03 21.89		B	1.6	HD	0.0	E		1	30	6	7		NES
1996 03 21.96		B	1.6	HD	5	R		20	38	4	14		NES
1996 03 21.96		B	1.6	HD	5.0	B		7	45	4	14		NES
1996 03 21.99		B	1.6	HD	11	B		20	28	5	15		NES

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 03 22.94		B	0.7	HD	0.0	E		1	30	6	15		NES
1996 03 22.95		B	0.7	HD	5.0	B		7	60	6	15		NES
1996 03 22.99		B	0.8	HD	11	B		20	60	6	15		NES
1996 03 23.01		B	0.8	HD	5	R		20	48	6	15		NES
1996 03 23.93		B	0.5	HD	0.0	E		1	60	7	17.5		NES
1996 03 23.94		B	0.5	HD	5.0	B		7	72	6	25		NES
1996 03 23.96		B	0.4	HD	5	R		20	60	6	30		NES
1996 03 24.01		B	0.5	HD	11	B		20	102	6	35		NES
1996 03 24.76		B	0.3	HD	0.0	E		1	60	5	>45		NES
1996 03 24.76		B	0.4	HD	5	R		20	60	6	25		NES
1996 03 24.78		B	0.4	HD	5.0	B		7	90	6	45		NES
1996 03 25.08		B	0.3	HD	0.0	E		1	42	6	30		NES
1996 03 25.09		B	0.8	HD	5	R		20	72	6	>30		NES
1996 03 25.09		S	0.3	HD	5.0	B		7	60	6	>30		NES
1996 03 25.09		S	0.3	HD	5.0	B		7	60	6	>30		NES
1996 03 25.75		B	0.1	HD	8	R		28	60	6	50		NES
1996 03 25.99		B	0.2	HD	0.0	E		1	42	6	30		NES
1996 03 26.01		B	0.1	HD	5.0	B		7	48	7	50		NES
1996 03 26.02		B	0.1	HD	5	R		20	48	7	50		NES
1996 03 26.05		S	0.1	HD	11	B		20	72	6	60		NES
1996 03 26.97		B	-0.2	HD	5	R		20	48	7	30		NES
1996 03 27.00		B	-0.3	HD	11	B		20	90	7	40		NES

Comet C/1996 E1 (NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 03.41		C	[18.5:	GA	60.0	Y	6	a240	! 0.3				NAK01

Comet C/1997 D1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 05.87		B	13.5	HS	20	R	17	140	1.5	4			LEH
1997 11 01.00		M	11.7	HS	42	L	5	81	2.1	3			LEH
1997 11 01.97		M	11.6	HS	42	L	5	81	1.7	3			LEH
1997 12 21.83		M	12.1	TI	42	L	5	81	2.4	3			LEH
1997 12 30.82		B	13.4	HS	42	L	5	162	1.5	3			LEH
1997 12 31.76		B	13.8	HS	42	L	5	162	1.3	3			LEH
1998 01 01.77		B	13.8	HS	42	L	5	162	1.6	3			LEH
1998 01 17.82		B	14.2	HS	42	L	5	162	1.1	3			LEH
1998 01 25.79		B	14.1	HS	42	L	5	263	1.3	2			LEH
1998 01 26.76		B	13.8	HS	42	L	5	162	1.2	2			LEH
1998 09 02.78	a	C	17.6	GA	60.0	Y	6	a240	0.5				NAK01

Comet C/1997 J1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 31.92		B	13.5	HS	42	L	5	81	1.3	4			LEH
1997 06 03.90		B	12.9	HS	42	L	5	81	1.4	4			LEH
1997 06 04.91		B	12.3	HS	42	L	5	81	1.5	4			LEH
1997 06 10.91		B	12.5	HS	42	L	5	162	1.1	3/			LEH
1997 07 11.93		M	13.8	HS	42	L	5	162	1.4	3			LEH
1997 07 12.90		B	13.3	HS	42	L	5	162	1.9	2/			LEH
1997 07 13.90		B	13.3	HS	42	L	5	162	1.5	3			LEH

Comet C/1997 J2 (Meunier-Dupouy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 31.94		M	12.4	HS	42	L	5	81	2.2	3			LEH
1997 06 03.94		B	13.1	HS	42	L	5	81	2	3			LEH
1997 06 04.92		B	12.6	HS	42	L	5	81	1.8	3			LEH
1997 06 10.93		B	13.3	HS	42	L	5	162	0.8	3			LEH
1997 07 08.90		M	12.0	HS	42	L	5	81	1.6	2/			LEH
1997 07 11.94		M	12.3	HS	42	L	5	81	1.2	3			LEH
1997 07 12.91		M	12.5	HS	42	L	5	81	2.0	3			LEH
1997 07 13.91		M	12.0	HS	42	L	5	81	2.0	3			LEH

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 08 10.87		M	11.4	HS	42	L	5	81	2.9	4			LEH
1997 08 12.86		M	11.5	HS	42	L	5	81	2.1	4			LEH
1997 09 12.82		M	11.3	HS	42	L	5	81	2.3	4			LEH
1997 09 14.78		M	11.3	HS	42	L	5	81	2.5	4			LEH
1997 09 15.77		M	11.2	HS	42	L	5	81	2.5	4			LEH
1997 09 16.75		M	11.2	HS	42	L	5	81	2.6	4			LEH
1997 09 20.79		M	11.4	TI	42	L	5	81	2.4	3/			LEH
1997 09 21.78		M	11.4	TI	42	L	5	81	2.5	3/			LEH
1997 09 27.84		S	11.3	GA	15.2	L	5	30	2.5	3			HAV
1997 09 28.77		M	11.6	TI	42	L	5	81	2.5	4			LEH
1997 10 19.74		M	11.1	HS	42	L	5	81	2.6	4			LEH
1997 10 21.73		M	11.6	HS	42	L	5	81	2.6	4			LEH
1997 10 24.74		M	11.2	TI	42	L	5	81	3.2	3/			LEH
1997 10 25.78		S	10.9	GA	15.2	L	5	30	2	2			HAV
1997 10 26.72		M	11.0	TI	42	L	5	81	2.6	4			LEH
1997 10 28.73		M	11.2	TI	42	L	5	81	3.3	4			LEH
1997 10 31.85		M	11.6	HS	42	L	5	81	2.3	4			LEH
1997 11 01.81		M	11.5	TI	42	L	5	81	3.3	4			LEH
1997 11 04.73		M	11.2	TI	42	L	5	81	2.6	3/			LEH
1997 11 10.72		M	11.0	TI	42	L	5	81	2.6	3/			LEH
1997 11 20.73		M	11.4	TI	42	L	5	81	2.9	3/			LEH
1997 12 14.72		M	9.9	TI	10	B	4	25	3.0	3/			LEH
1997 12 16.71		M	10.0	TI	10	B	4	25	2.6	2/			LEH
1997 12 21.71		M	10.6	TI	10	B	4	25	2.3	3			LEH
1997 12 30.71		M	11.0	TI	10	B	4	25	2.1	3			LEH
1997 12 31.70		M	10.8	TI	10	B	4	25	2.1	3			LEH
1998 01 01.71		M	10.6	TI	10	B	4	25	2.1	3			LEH
1998 01 17.74		M	10.6	TI	10	B	4	25	2.2	3			LEH
1998 01 25.74		M	11.0	TI	10	B	4	25	2.1	3			LEH
1998 01 26.71		M	10.7	TI	10	B	4	25	2.3	3			LEH
1998 04 24.05		M	11.2	TI	42	L	5	81	3.7	4/			LEH
1998 04 30.02		S	11.5	VF	20	L	5	70	2	1/			BAR06
1998 05 01.02		S	11.6	GA	20	L	5	70	2	1			BAR06
1998 05 02.03		M	10.8	TI	42	L	5	81	2.2	3			LEH
1998 05 20.01		M	11.4	TI	42	L	5	81	2.0	4			LEH
1998 05 23.98		S	11.1	GA	20	L	5	70	2.3	2			BAR06
1998 05 29.98		S	11.5	GA	20	L	5	70	1.6	2			BAR06
1998 05 30.03		M	11.3	TI	10	B	4	25	1.9	3			LEH
1998 05 30.98		S	11.4	GA	20	L	5	70	1.7	1/			BAR06
1998 05 31.96		M	11.3	TI	42	L	5	81	2.0	3/			LEH
1998 05 31.98		S	11.2	GA	20	L	5	70	1.8	2			BAR06
1998 06 02.08		S	11.1	GA	20	T	10	80	1.5	3			DIO
1998 06 02.95		M	11.3	TI	42	L	5	81	2.2	3			LEH
1998 06 13.89		S	11.2	GA	20	L	5	70	1.4	3			BAR06
1998 06 19.91		S	11.1	GA	20	L	5	70	1.2	3			BAR06
1998 06 20.97		M	11.2	TI	42	L	5	81	2.4	4			LEH
1998 06 21.94		S	11.3	GA	20	L	5	70	1.7	2			BAR06
1998 06 21.99		M	10.9	TI	10	B	4	25	3.2	3			LEH
1998 06 22.08		S	11.1	GA	15	L	6	100	2	2			DIO
1998 06 22.91		S	11.1	GA	20	L	5	70	2.0	2			BAR06
1998 06 25.99		M	10.7	TI	10	B	4	25	3.1	3			LEH
1998 06 26.93		S	11.4:	HS	20	L	5	70	1.5	3			BAR06
1998 06 27.92		M	10.7	TI	10	B	4	25	3.0	3			LEH
1998 06 28.90		M	10.7	TI	10	B	4	25	3.0	3			LEH
1998 06 30.95		S	11.2	HS	20	L	5	70	2.3	1			BAR06
1998 07 01.94		S	11.4	HS	20	L	5	70	2.4	1			BAR06
1998 07 18.17		B	11.5	HS	31	T	10	55	2.2	4			DEA
1998 07 18.90		M	10.9	TI	10	B	4	25	2.6	3			LEH
1998 07 18.92		S	11.3	HS	20	L	5	70	2.3	2			BAR06
1998 07 19.16		S	10.9	AC	40.6	L	5	114	1.5	6			BOR
1998 07 19.94	x	S	11.4	HV	25.4	L	5	65	2.3	2/			MEY
1998 07 19.95		M	10.9	TI	10	B	4	25	2.6	3			LEH
1998 07 19.99		S	11.3	HS	20	L	5	70	2.5	3			BAR06
1998 07 20.90		M	10.9	TI	10	B	4	25	2.4	3			LEH
1998 07 20.94	x	S	11.2	HV	25.4	L	5	65	2.2	2			MEY

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 21.99		S	11.2	HS	20	L	5	70	2.2	2			BAR06
1998 07 22.01		S	11.4	AC	30.5	T	10	78	& 2	2			COM
1998 07 22.98		S	11.3	HS	20	L	5	70	2.2	2			BAR06
1998 07 23.87		M	10.8	TI	10	B	4	25	2.6	3			LEH
1998 07 24.89		M	10.9	TI	10	B	4	25	2.6	3			LEH
1998 07 24.91		S	11.2	HS	20	L	5	70	2.2	1			BAR06
1998 07 24.98		S	11.4	AC	30.5	T	10	78	& 2	3			COM
1998 07 25.00		S	11.0	HS	44.5	L	4	82	3	5/			SAN07
1998 07 25.00		S	11.5	HS	44.5	L	4	82	2.5	d5			SAR02
1998 07 25.15		S	10.9	AC	32.0	L	5	50	2.5	5			BOR
1998 07 25.94	x	S	11.2	HV	25.4	L	5	65	2.1	2/			MEY
1998 07 25.99		S	11.5	GA	15	L	6	75	2	2			DIO
1998 07 26.93		M	10.9	TI	10	B	4	25	2.8	3			LEH
1998 07 27.91		S	11.5	HS	20	L	5	70	1.5	3			BAR06
1998 07 28.86		M	10.9	TI	10	B	4	25	2.7	3			LEH
1998 07 28.93		S	11.5	HS	20	L	5	70	1.7	1			BAR06
1998 07 30.02		S	10.8	HS	44.5	L	4	72	1.5	4			SAR02
1998 07 30.02		S	11.0	HS	44.5	L	4	82	3.5	3			SAN07
1998 07 30.57		S	11.5	HS	25.6	L	5	42	1.8	4			BIV
1998 07 30.88		C	12.1	HS	40.6	T	6	120	1.6		1.8m	330	CHE03
1998 07 30.89		c	12.5	HS	40.6	T	6	120	1.3				JAN05
1998 07 30.95		S	11.2	HS	13.5	R	5	40	2.2	2			BAR06
1998 07 31.00		S	11.3	HS	44.5	L	4	82	3	5			SAN07
1998 07 31.00		S	11.4	HS	44.5	L	4	82	2	d5			SAR02
1998 07 31.88		M	10.9	TI	10	B	4	25	2.8	3			LEH
1998 07 31.95		S	10.9	AC	25.0	L	6	61	2.5	2/			RES
1998 08 01.05		C	12.5	HS	40.6	T	6	30	1.2				CHE03
1998 08 01.20		S	10.9	AC	40.6	L	5	70	2.3	5			BOR
1998 08 01.88		S	11.2	HS	20	L	5	70	2.0	2			BAR06
1998 08 02.01		C	12.2	HS	40.6	T	6	120	1.5		2.0m	330	CHE03
1998 08 02.02		c	13.2	HS	40.6	T	6	60	0.6				CHE03
1998 08 02.03		S	11.1	AC	25.0	L	6	61	2.2	2/			RES
1998 08 02.57		S	11.5	HS	25.6	L	5	42	1.8	3			BIV
1998 08 02.93		S	12.4	VB	30	R	20	185	1.0	3			SHA02
1998 08 02.98		S	11.2	HS	20	L	5	70	2.0	2			BAR06
1998 08 03.21		J	11.5	SC	25.4	T	5	a 60	2.60	s3/			ROQ
1998 08 03.29		S	11.0	AC	20.0	T	10	125	2.0	2/			SPR
1998 08 03.96		S	11.0	AC	25.0	L	6	61	2.0	2/			RES
1998 08 04.55		S	11.3	HS	25.6	L	5	42	1.7	4			BIV
1998 08 04.75		C	11.7	GA	60.0	Y	6	a120	2.4		> 5.0m	337	NAK01
1998 08 05.92		c	13.0	HS	40.6	T	6	60	0.5				CHE03
1998 08 05.93		c	13.1	HS	40.6	T	6	60	0.6				JAN05
1998 08 06.10		S	13.0	VB	30	R	20	185	0.6	4			SHA02
1998 08 07.94		c	12.9	HS	40.6	T	6	120	0.4				KAK02
1998 08 07.96		c	13.0	HS	40.6	T	6	120	0.5				KAK02
1998 08 08.87		M	11.0	TI	10	B	4	25	2.3	3			LEH
1998 08 09.88		M	11.1	TI	42	L	5	81	2.1	3			LEH
1998 08 10.81		S	11.0	HS	20	L	5	70	2.3	3			BAR06
1998 08 10.87		S	10.8	AC	25.0	L	6	61	1.8	3/			RES
1998 08 10.88		M	11.1	TI	42	L	5	81	2.1	3			LEH
1998 08 10.90		S	10.8	TI	35	L	5	92	2.7	2/			HOR02
1998 08 11.82		S	11.0	HS	20	L	5	70	2.6	3			BAR06
1998 08 11.85		M	11.0	TI	10	B	4	25	2.2	3			LEH
1998 08 11.99		C	11.8	HS	40.6	T	6	30	1.2				CHE03
1998 08 11.99		c	11.8	HS	40.6	T	6	30	1.2		> 1.5m	330	JAN05
1998 08 12.00		C	11.9	HS	40.6	T	6	60	1.2		1.5m	330	CHE03
1998 08 12.83		S	10.9	HS	20	L	5	70	2.8	3			BAR06
1998 08 13.03		c	12.8	HS	40.6	T	6	20	0.4				CHE03
1998 08 13.30		S	11.4	TJ	25.6	L	5	42	2.0	5			BIV
1998 08 13.84		S	11.0	HS	20	L	5	70	2.7	2			BAR06
1998 08 13.88		S	10.7	AC	25.0	L	6	61	2.1	3			RES
1998 08 13.88	x	S	11.3	TT	25.4	J	6	72	2.2	3			BOU
1998 08 13.94		S	10.4	SE	25	L	4	64	2.5	3/			SHU
1998 08 14.87		M	11.0	TI	42	L	5	81	2.4	4			LEH
1998 08 14.98		S	10.8	AC	25.0	L	6	61	2.2	3			RES

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1998 08 15.34		S	11.4	TJ	25.6	L	5	42		2.0	5			BIV
1998 08 15.57		S	11.5	HS	20	L	7	45		2	2			MAT08
1998 08 15.66		C	11.8	GA	60.0	Y	6	a120		2.3		> 5.1m	342	NAK01
1998 08 15.87		M	11.0	TI	10	B	4	25		2.5	3			LEH
1998 08 15.87		S	11.4:	HS	20	L	5	70	&	2.0	1/			BAR06
1998 08 15.88		S	11.3	GA	25.4	J	6	100		2.0	3/			BOU
1998 08 16.34		S	11.3	HS	25.6	L	5	42		2.0	4			BIV
1998 08 16.86		M	11.0	TI	42	L	5	66		2.5	4			LEH
1998 08 16.88		S	11.3	HS	20	L	5	70		2.1	1			BAR06
1998 08 16.89		S	11.2	HS	13.5	R	6	40		2.3	2			BAR06
1998 08 16.93		S	11.4	GA	25.4	J	6	100		2.0	3/			BOU
1998 08 17.86		M	11.2	TI	42	L	5	66		2.1	3/			LEH
1998 08 17.86		S	11.0	CD	30	L	5	60		2.8	2			NEV
1998 08 17.89		S	10.9	AC	25.4	L	5	65		2.5	2/			MEY
1998 08 17.91		S	10.7	AC	25.0	L	6	61		2.3	3/			RES
1998 08 17.97		S	11.0	TT	13	L	8	69		2.4	3			HOR02
1998 08 17.98		S	11.8	SE	25	L	4	64		1.5	3/			SHU
1998 08 17.99		S	11.7	SE	19	L	5	60		2.1	3			NEK
1998 08 18.01		S	11.4	NP	32	L	5	75		2	3			SAN04
1998 08 18.01		S	11.6	NP	32	L	5	75		2	4			MAR02
1998 08 18.87		S	11.3	HS	20	L	5	70	&	2.1	2			BAR06
1998 08 18.89		S	10.9:	AC	25.4	L	5	65		2.3	2			MEY
1998 08 18.96		S	11.3	NP	32	L	5	75		2	3/			SAN04
1998 08 18.96		S	11.4	NP	32	L	5	75		3	4			MAR02
1998 08 18.97	x	M	11.3	TT	25.4	J	6	72		2.0	3			BOU
1998 08 19.01		S	10.9	AC	25.0	L	6	61		2.2	3			RES
1998 08 19.34		S	11.4	HS	25.6	L	5	42		1.7	5			BIV
1998 08 19.86		M	10.9	TT	35	L	5	92		2.2	2/			HOR02
1998 08 19.86		S	10.9	TI	10	B		25		2.2	3			ZNO
1998 08 19.87		M	11.2	TI	10	B	4	25		2.4	3			LEH
1998 08 19.87		S	11.3	AC	25.4	L	5	65		2.8	2/			MEY
1998 08 19.91		S	11.0	AC	25.0	L	6	61		2.0	3			RES
1998 08 19.96		S	11.7	SE	25	L	4	64		2	2			SHU
1998 08 19.97		S	11.5	SE	19	L	5	60		1.5	2			NEK
1998 08 19.98		S	11.8	SE	25	L	4	64		0.6	1			SAL01
1998 08 20.01		M	11.2	NP	32	L	5	75		2	3/			MAR02
1998 08 20.01		S	11.3	NP	32	L	5	75		1.5	3/			SAN04
1998 08 20.34		S	11.1	TJ	25.6	L	5	42		2.0	6			BIV
1998 08 20.52		M	11.0	TT	25.0	L	6	62		2.0	3			TSU02
1998 08 20.85		M	11.1	TI	42	L	5	81		2.2	3/			LEH
1998 08 20.86		S	11.5	CD	30	L	5	100		2	2			NEV
1998 08 20.88		S	10.9	HS	11	L	7	50		2.5	3			BAR06
1998 08 20.88		S	11.2	HS	20	L	5	70		2.2	3			BAR06
1998 08 20.89		S	11.0	AC	25.0	L	6	61		2.0	3			RES
1998 08 22.06		M	11.3	NP	32	L	5	75		3	4/			MAR02
1998 08 22.92		S	13.1	VB	30	R	20	185		0.7	3			SHA02
1998 08 22.94		M	11.0	NP	32	L	5	75		2	4/			MAR02
1998 08 23.63		S	11.2	HS	20	L	7	45		2	3			MAT08
1998 08 23.85		M	10.8	TT	13	L	8	69		2.8	2			HOR02
1998 08 23.86	x	C	12.0	TT	20.0	L	4			1.4				MIL02
1998 08 23.86	x	C	12.2	HS	20.0	L	4			1.4				MIL02
1998 08 23.87		S	11.1	AC	25.0	L	6	61		2.0	3			RES
1998 08 23.87		S	11.2	CD	30	L	5	100		2	3			NEV
1998 08 23.91		S	11.2	HS	20	L	5	70		2.3	1/			BAR06
1998 08 23.91	!	V	12.5	YF	36.0	T	7	a120	+	2.2	7	& 6 m	335	MIK
1998 08 24.38		S	11.2	HS	25.6	L	5	42		1.8	4			BIV
1998 08 24.83		M	11.1	TI	42	L	5	66		2.3	4			LEH
1998 08 24.91		S	11.1	AC	25.0	L	6	61		2.2	3			RES
1998 08 24.91		S	12.0	VB	33	L	5	75		1.2	3			SHA02
1998 08 24.97		S	11.2	NP	32	L	5	75		2	3			MAR02
1998 08 25.67		C	11.8	GA	60.0	Y	6	a120		2.3		> 5.2m	341	NAK01
1998 08 25.83		M	10.9	TI	10	B		25		2.0	3			ZNO
1998 08 25.84		M	10.8	TT	35	L	5	92		2.9	3			HOR02
1998 08 25.87	x	C	12.0	TT	20.0	L	4			1.9				MIL02
1998 08 25.91		S	11.1	HS	20	L	5	70		2.8	s4			BAR06

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DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 25.94		S	10.8	HS	11	L	7	50	2.7	2/			BAR06
1998 08 26.81		M	11.2	CD	30	L	5	100	2.6	4			NEV
1998 08 26.83		M	11.1	TI	10	B		25	2.2	3			ZNO
1998 08 26.84		S	10.9	HS	20.3	T	10	93	1.1	3			HAS02
1998 08 27.17		J	10.2	SC	25.4	T	5	a 60	2.69	s4			ROQ
1998 08 27.84		M	10.9	TI	42	L	5	66	2.6	4			LEH
1998 08 27.89		S	11.2	AC	25.0	L	6	61	2.0	2/			RES
1998 08 28.11		S	11.0	AC	40.6	L	5	114	1.2	5			BOR
1998 08 28.38		S	11.0	HS	25.6	L	5	42	2.0	6			BIV
1998 08 28.83		M	11.2	TI	35	L	5	92	2.2	2/			HOR02
1998 08 28.96		S	11.1	NP	32	L	5	75	2	2/			MAR02
1998 08 29.84		M	11.4:	TI	35	L	5	92	2	2/			HOR02
1998 08 29.89		M	10.9	TI	42	L	5	81	2.2	3/			LEH
1998 08 29.93		S	10.9	AC	25.0	L	6	61	2.0	3			RES
1998 08 29.94		S	11.1	HS	20.3	T	10	77	1.4	3			KAM01
1998 08 30.47		S	11.2	HS	25.6	L	5	42	2.0	4			BIV
1998 08 30.83		M	11.0	TI	42	L	5	81	2.4	4			LEH
1998 08 30.88		S	11.1	TI	35	L	5	92	2.2	2/			HOR02
1998 08 30.94	x	M	11.4	TT	25.4	J	6	88	1.7	4			BOU
1998 08 31.93		S	11.0	AC	25.0	L	6	61	1.9	2/			RES
1998 08 31.97	x	S	11.4	TT	25.4	J	6	88	1.9	3			BOU
1998 08 31.98		S	10.8	HS	11	L	7	50	2.5	3			BAR06
1998 08 31.98		S	11.0	HS	20	L	5	70	2.7	s3			BAR06
1998 09 01.01		S	11.0	TI	13	L	8	69	1.9	2/			HOR02
1998 09 01.01	x	S	11.3	HV	25.4	L	5	65	2.0	3			MEY
1998 09 01.96		S	10.9	AC	25.0	L	6	61	1.9	2/			RES
1998 09 02.57		S	11.3	TJ	25.6	L	5	42	1.6	5			BIV
1998 09 03.02		S	10.9	AC	25.0	L	6	61	2.0	2			RES
1998 09 04.05		S	10.9	AC	25.0	L	6	61	2.2	2			RES
1998 09 08.85		S	11.2	AC	25.0	L	6	61	1.8	2/			RES
1998 09 09.51		C	11.9	GA	60.0	Y	6	a120	2.2				NAK01
1998 09 09.81		S	11.2	TI	35	L	5	92	2.3	2/			HOR02
1998 09 09.84		S	11.0:	HS	20	L	5	70	& 2.8	3			BAR06
1998 09 10.53		S	11.6	HS	20	L	7	45	1	2			MAT08
1998 09 10.53		S	11.6	HS	20	L	7	45	1	2			MAT08
1998 09 10.82		S	11.2	HS	20	L	5	70	2.1	2			BAR06
1998 09 10.83	x	S	11.6	TT	25.4	J	6	88	1.8	3			BOU
1998 09 11.13		J	11.1	SC	25.4	T	5	a 60	2.69	s5			ROQ
1998 09 11.30		S	11.7	HS	25.6	L	5	42	1.5	4			BIV
1998 09 11.84		S	11.3	HS	20	L	5	70	1.9	1/			BAR06
1998 09 11.84	x	S	11.7	TT	25.4	J	6	88	1.6	3/			BOU
1998 09 12.94		S	11.5	NP	10	R	5	27	1.5	1/			MAR02
1998 09 12.94		S	11.6	NP	10	R	5	27	2	1			DES01
1998 09 13.31		S	11.7	HS	25.6	L	5	42	1.7	4			BIV
1998 09 13.79	a	S	12.1	CD	30	L	5	100	2	2			NEV
1998 09 13.79	a	S	12.1	CD	30	L	5	100	2	2			NEV
1998 09 13.85	x	S	11.7	TT	25.4	J	6	88	2.0	2/			BOU
1998 09 13.89		S	11.4	AC	30.5	T	10	117	& 3	1/			COM
1998 09 15.35		S	11.6	HS	25.6	L	5	42	1.6	5			BIV
1998 09 15.92		S	11.3	NP	32	L	5	75	1.5	2			MAR02
1998 09 15.99		S	11.6	GA	25.3	L	6	58	& 2	3			PER01
1998 09 15.99		S	11.8	GA	25.3	L	6	58	& 3	2/			VIT01
1998 09 16.45		S	11.5	HS	20	L	7	45	2	2			MAT08
1998 09 16.78		S	11.4	HS	20	L	5	70	2.1	2			BAR06
1998 09 17.56		C	11.9	GA	60.0	Y	6	a120	2.4		> 5.3m	348	NAK01
1998 09 18.04		S	11.8	AC	40.6	L	5	90	1.5	3			BOR
1998 09 18.37		S	11.8	HS	25.6	L	5	42	1.4	3			BIV
1998 09 18.95		B	12.1	HS	40.6	T	10	65	1.5	1/			CHE03
1998 09 19.38		S	11.7	HS	25.6	L	5	42	1.3	3			BIV
1998 09 19.45		S	11.9	HS	20	L	7	158	2	2			MAT08
1998 09 19.79		S	11.2:	TI	35	L	5	92	2	2/			HOR02
1998 09 19.80		S	11.3	HS	25.0	L	6	61	1.6	2/			RES
1998 09 19.92		S	12.3	HS	20.3	T	10	77	1.1	3			KAM01
1998 09 20.16		S	12.3	HS	31	T	10	125	1.23	3			DEA
1998 09 20.19		J	11.0	SC	25.4	T	5	a 60	2.17	d3	?		ROQ

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DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 20.33		B	11.8	HS	25.6	L	5	42	1.5	4			BIV
1998 09 20.49		S	13.6	HS	31.7	L	6	152	0.8	4			MIY01
1998 09 20.50		S	13.3	HS	31.7	L	6	152	0.8	4			YOS04
1998 09 20.80		S	11.3	HS	25.0	L	6	61	1.6	2/			RES
1998 09 20.82		S	11.1	TI	35	L	5	92	2.3	2/			HOR02
1998 09 21.77	a	S	12.3	CD	30	L	5	100	1.5	2			NEV
1998 09 21.81		S	11.1	TI	35	L	5	92	2.1	2/			HOR02
1998 09 21.83		S	11.4	HS	25.0	L	6	61	1.7	2/			RES
1998 09 21.83		S	11.6	SE	25	L	4	64	0.9	2/			SHU
1998 09 21.92		B	12.2	HS	40.6	T	10	65	1.5	1/			CHE03
1998 09 22.47		S	11.6	HS	25.6	L	5	42	1.5	3			BIV
1998 09 22.80		S	11.9	AC	25.4	L	5	65	2.3	2			MEY
1998 09 22.81		S	11.4	TT	35	L	5	92	2.1	2/			HOR02
1998 09 22.83		S	11.8	HS	20	L	5	70	1.8	2			BAR06
1998 09 22.84	x	S	11.9	TT	25.4	J	6	100	1.3	2			BOU
1998 09 23.80		S	11.5	TT	35	L	5	92	1.9	2/			HOR02
1998 09 23.80		S	11.8	HS	20	L	5	70	1.7	2			BAR06
1998 09 23.84	x	S	12.0	TT	25.4	J	6	100	1.4	1/			BOU
1998 09 24.78		S	11.4	TT	35	L	5	92	2.1	2/			HOR02
1998 09 24.82		M	11.4	TI	10	B		25	1.8	3/			ZNO
1998 09 24.82		S	11.5	HS	25.0	L	6	61	1.7	2/			RES
1998 09 24.82		S	12.0	HS	20	L	5	70	1.4	2/			BAR06
1998 09 24.83	x	S	11.9	TT	25.4	J	6	88	1.6	2			BOU
1998 09 24.84		S	12.2	HS	25.4	L	6	104	1.8	d4			SAR02
1998 09 25.78		S	12.0	HS	20	L	5	70	1.5	2/			BAR06
1998 09 25.80		I[	13.0	CD	30	L	5	100					NEV
1998 09 25.96		S	11.9	GA	25.3	L	6	58	& 1.5	3			PER01
1998 09 25.96		S	12.1	GA	25.3	L	6	58	& 1.7	2			VIT01
1998 09 26.10		J	11.3	SC	25.4	T	5	a 60	2.25	s5			ROQ
1998 09 26.51		S	12.2	HS	25.6	L	5	42	1.5	3			BIV
1998 09 26.79		S	11.4	TT	35	L	5	92	1.8	2/			HOR02
1998 09 26.82		S	11.6	HS	25.0	L	6	61	1.5	2/			RES
1998 09 26.86		S	11.9	HS	25.4	L	6	104	1.6	0			KER
1998 09 26.86		S	12.2	HS	25.4	L	6	104	1.9	1			SAR02
1998 09 29.96		S	11.9	HS	20	L	5	70	1.9	3			BAR06
1998 09 30.48		S	11.8:	HS	25.6	L	5	84	1.5	4			BIV
1998 10 07.51		S	12.1	VN	41	L	4	200	1.0	4			PEA
1998 10 08.26		S	11.8	HS	25.6	L	5	42	1.2	3/			BIV
1998 10 09.28		S	12.2	HS	25.6	L	5	84	1.2	3			BIV
1998 10 10.51		S	12.3	VN	41	L	4	200	1.0	3			PEA
1998 10 11.09		J	12.0	SC	25.4	T	5	a 60	2.47	s5	?		ROQ
1998 10 11.52		C	13.4	GA	20.3	T	9	a 60	0.6				SUZ02
1998 10 11.55		S	12.7	HS	31.7	L	6	152	1	2			MIY01
1998 10 11.90		S	13.1	HS	30	R	20	185	0.5	2			SHA02
1998 10 13.47		S	12.6	GA	25.4	L	4	71					SEA
1998 10 13.81		S	11.9	AC	25.0	L	6	61	1.5	2/			RES
1998 10 13.87		S	12.0	HS	35	L	5	207	1.2	2/			HOR02
1998 10 14.75	a	S	12.5	CD	30	L	5	100	1	1			NEV
1998 10 14.80	a	S	12.3	GA	25.4	J	6	100	1.3	2			BOU
1998 10 14.84		S	12.1	HS	20	L	5	70	1.3	3			BAR06
1998 10 15.46		S	12.5	HS	20	L	7	158	1	2			MAT08
1998 10 16.76		S	12.5	HS	44.5	L	5	100	0.9	3			KAR02
1998 10 16.79		S	12.3	HS	20	L	5	70	1.3	2			BAR06
1998 10 16.82		S	12.1	AC	25.0	L	6	61	1.3	2			RES
1998 10 17.43		S	12.8	GA	25.4	L	4	71					SEA
1998 10 17.80	a	S	12.5	GA	25.4	J	6	100	1.4	1			BOU
1998 10 18.11		c	17.7	FA	91.4	L	5						SCO01
1998 10 18.13		C	13.3	FA	91.4	L	5		2.05		19.9m	344	SCO01
1998 10 18.36		S	12.5	HS	25.6	L	5	84	1.0	3			BIV
1998 10 18.78	a	S	12.5	GA	25.4	J	6	100	1.4	1/			BOU
1998 10 18.80		S	12.3	AC	25.0	L	6	61	1.2	2/			RES
1998 10 18.83		S	12.8:	HS	33	L	5	100	1.0	2			SHA02
1998 10 19.52		S	12.5	VN	41	L	4	200	0.9	3			PEA
1998 10 20.29		S	12.8	HS	25.6	L	5	84	0.8	4			BIV
1998 10 21.45		C	12.9	GA	60.0	Y	6	a120	2.1		> 4.7m	352	NAK01

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 21.51	x	S	12.7:	HS	25.4	L	4	113	1.5	1			YOS02
1998 10 21.74		S	11.8	HS	35	L	5	92	1.5	2			HOR02
1998 10 23.39		S	12.8	HS	25.6	L	5	84	1.0	3			BIV
1998 10 24.31		S	12.7	HS	25.6	L	5	84	0.9	3			BIV
1998 10 24.77		S	12.6	HS	44.5	L	5	100	1.3	2			KAR02
1998 10 25.47		[	12.8	HS	31.7	L	6	152	! 1				YOS04
1998 10 25.77		S	12.5	HS	44.0	L	5	156	0.5	3			HAS02
1998 10 26.39		S	12.7	HS	25.6	L	5	84	1.0	3			BIV
1998 10 26.83		S	12.4	AC	25.0	L	6	61	1.2	2			RES
1998 11 02.10		J	13.5	SC	25.4	T	5	a 60	2.69	s4/			ROQ

Comet C/1997 L1 (Zhu-Balam)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 27.19		C	20.7	FA	91.4	L	5		0.10		0.6m	186	SC001
1998 07 27.19		c	22.5	FA	91.4	L	5						SC001
1998 08 30.16		C	20.9	FA	91.4	L	5				21.6s	191	SC001

Comet C/1997 P2 (Spacewatch)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 29.45		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet C/1997 T1 (Utsunomiya)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 19.80		M	9.9	TI	10	B	4	25	3.8	3			LEH
1997 10 21.78		M	10.1	TI	10	B	4	25	3.5	3			LEH
1997 10 24.78		M	10.1	TI	10	B	4	25	3.3	3/			LEH
1997 10 25.76		S	9.5	GA	15.2	L	5	30	5	3			HAV
1997 10 28.77		M	9.9	TI	10	B	4	25	4.1	3/			LEH
1997 10 31.87		M	9.7	TI	10	B	4	25	3.9	3			LEH
1997 11 01.82		M	9.5	TI	10	B	4	25	4.5	3			LEH
1997 11 02.72		M	9.7	TI	10	B	4	25	4.9	3/			LEH
1997 11 04.81		M	9.1	TI	42	L	5	81	3.6	3/			LEH
1997 11 10.75		M	9.1	TI	10	B	4	25	4.6	3/			LEH
1997 11 20.72		M	10.0	TI	10	B	4	25	4.1	3			LEH
1997 12 14.70		M	10.3	TI	10	B	4	25	2.3	3			LEH
1997 12 16.69		M	9.8	TI	10	B	4	25	3.5	3/			LEH
1997 12 21.70		M	10.2	TI	10	B	4	25	2.2	3			LEH
1997 12 30.70		M	10.1	TI	10	B	4	25	3.0	3			LEH
1997 12 31.69		M	10.1	TI	10	B	4	25	3.0	3			LEH
1998 01 01.70		M	10.2	TI	10	B	4	25	2.0	3			LEH
1998 04 22.03		S	[11.5	HS	27	L	6	83					TOT03
1998 04 23.98		M	13.0	HS	42	L	5	162	1.3	3/			LEH
1998 05 01.98		B	13.8	HS	42	L	5	162	1.4	3			LEH
1998 05 19.96		B	14.1	HS	42	L	5	162	0.9	3			LEH
1998 05 29.84		B	13.7	HS	42	L	5	162	1.3	3			LEH
1998 05 31.92		B	14.0	HS	42	L	5	162	1.2	3			LEH

Comet C/1998 H1 (Stonehouse)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 04 28.02		S	10.7	VF	11	L	7	50	4	2/			BAR06
1998 04 28.02		S	11.0	VF	20	L	5	70	4.5	2			BAR06
1998 04 28.98		S	10.6	VF	15	L	6	32	7	3			BAR06
1998 04 29.02		S	10.3	VF	11	B		20	10	2			BAR06
1998 04 29.95		S	10.4	VF	20	L	5	40	10	1/			BAR06
1998 04 30.85		M	11.1	TI	42	L	5	81	3.2	2			LEH
1998 04 30.92		S	11.6	HS	27	L	6	83	3	3			TOT03
1998 04 30.94		S	10.5	VF	20	L	5	40	8	2			BAR06
1998 04 30.94		S	10.7	VF	20	L	5	70	7	2/			BAR06
1998 04 30.96		S	10.6	VF	11	L	7	50	7	2/			BAR06
1998 05 01.00		S	11.8	HS	35	L		70	2.5	2			SZA
1998 05 01.90		M	10.8	TI	10	B	4	25	6.1	2			LEH

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1998 05 01.94		S	10.4	GA	20	L	5	70		7	2			BAR06
1998 05 04.89		M	10.6	TI	10	B	4	25		6.5	2/			LEH
1998 05 12.83		S	11.0	GA	20	L	5	70		3.5	3/			BAR06
1998 05 13.88		S	11.0	GA	15	L	6	53		3	3			BAR06
1998 05 13.88		S	11.1	GA	15	L	6	32		3	3			BAR06
1998 05 14.86		S	12.5	HS	27	L	6	83		1.5	2/			TOT03
1998 05 16.90		S	11.4	GA	20	L	5	70		3	2/			BAR06
1998 05 17.94		S	11.6	GA	20	L	5	70		2.5	2			BAR06
1998 05 19.11		S	11.3	AC	40.6	L	5	70		2.5	1			BOR
1998 05 19.98		M	11.9	HS	42	L	5	81		2.7	3			LEH
1998 05 23.12		S	11.5	AC	40.6	L	5	70		2.0	1			BOR
1998 05 23.92		S	12.1	GA	20	L	5	70		2.1	2			BAR06
1998 05 26.91		M	12.0	HS	42	L	5	81		2.5	3			LEH
1998 05 27.91		M	12.1	HS	42	L	5	81		2.1	3			LEH
1998 05 27.94		S[	12.5	HS	27	L	6	83	!	1.5				TOT03
1998 05 28.92		S	12.3	GA	20	L	5	70		1.7	1			BAR06
1998 05 29.94		M	12.6	HS	42	L	5	81		1.8	3			LEH
1998 05 29.94		S	11.8	GA	20	L	5	70		1.5	3			BAR06
1998 05 30.95		S	11.7	GA	20	L	5	70		1.5	3/			BAR06
1998 05 31.91		M	12.4	HS	42	L	5	81		1.8	3			LEH
1998 05 31.99		S	11.9	GA	20	L	5	70		1.4	3			BAR06
1998 06 02.89		M	12.5	HS	42	L	5	81		1.9	3			LEH
1998 06 20.92		B	13.6	HS	42	L	5	162		1.3	3			LEH
1998 06 21.93		B	13.9	HS	42	L	5	162		1.3	3			LEH
1998 06 25.93		B	14.0	HS	42	L	5	162		0.9	3			LEH
1998 06 27.91		B	14.0	HS	42	L	5	162		1.0	3			LEH
1998 07 18.88		B	14.6	HS	42	L	5	162		1.3	3			LEH
1998 07 19.88		B	14.6	HS	42	L	5	162		1.2	3			LEH
1998 07 20.88		B	14.5	HS	42	L	5	162		1.3	3			LEH
1998 07 23.86		B	14.5	HS	42	L	5	162		1.3	3			LEH
1998 07 24.86		B	14.5	HS	42	L	5	162		1.2	3			LEH
1998 07 26.87		B	14.4	HS	42	L	5	162		1.2	3			LEH
1998 07 31.86		B	14.4	HS	42	L	5	162		1.2	3/			LEH
1998 08 10.84		B	14.6	HS	42	L	5	210		0.8	3/			LEH
1998 08 15.82		O[	14.8	HS	42	L	5	162	!	0.5				LEH

Comet C/1998 J1 (SOHO)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 05 16.44		S	3.3	AA	8.0	B		20	3	9	2	110	PEA
1998 05 17.44		S	3.5	AA	8.0	B		20	2.5	9	4	100	PEA
1998 05 22.44		S	4.5	AA	8.0	B		20	3	8	3	105	PEA
1998 05 23.44		S	4.6	AA	8.0	B		20	2.7	8	2.7	106	PEA
1998 05 24.36		I	4.1	AC	0.0	E		1					WIL02
1998 05 24.44		S	4.5	AA	8.0	B		20	3	7	1.5	110	PEA
1998 05 28.37		I	4.7	AC	0.0	E		1					WIL02
1998 05 29.44		S	5.4	AA	8.0	B		20	3.8	7			PEA
1998 06 06.46		S	5.7	AA	8.0	B		20	6.2	6			PEA
1998 06 14.45		S	6.7	AA	8.0	B		20	6.3	5			PEA
1998 06 16.68		S	6.9	S	11.2	L	8	50	2.5	5			C0002
1998 06 18.69		S	7.0	S	11.2	L	8	50		5			C0002
1998 06 20.30		S	7.0	TT	7.8	R	8	30	4				JON
1998 06 21.44		S	7.5	AA	8.0	B		20	6.8	4			PEA
1998 06 21.68		S	7.4	S	11.2	L	8	50		3			C0002
1998 06 23.44		S	7.7	AA	8.0	B		20	6.5	4/			PEA
1998 06 24.46		S	6.8	AA	8.0	B		20	7	5			PEA
1998 06 25.68		S	7.5	S	11.2	L	8	50		3			C0002
1998 06 26.68		S	7.8	S	20.0	L	8	83	2.1	3			C0002
1998 06 27.32		S	7.8	TT	7.8	R	8	30	4	2			JON
1998 06 27.69		S	8.0	S	20.0	L	8	83		3			C0002
1998 06 28.33		S	8.0	TT	7.8	R	8	30	2	2			JON
1998 06 29.31		S	8.2	TT	7.8	R	8	30	2	2			JON
1998 06 30.69		S	8.3	S	20.0	L	8	83		2			C0002
1998 07 01.36		S	8.0	AA	8.0	B		15	4.5	2			SEA01
1998 07 02.34		S	8.2	AA	8.0	B		15	2.8	2			SEA01

Comet C/1998 J1 (SOHO) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 03.30		S	9.5	TT	31.7	L	5	64	1.5	3/			JON
1998 07 05.35		S	8.3	AA	8.0	B		15	2.8	3			SEA01
1998 07 05.68		S	9.0	S	20.0	L	8	83		1			C0002
1998 07 06.34		S	8.8	AA	25.4	L	6	61	1.3	4/			SEA01
1998 07 10.69		S[	9.2	S	20.0	L	8	83					C0002
1998 07 14.35		S	10.0	VN	25.4	L	6	61	2	6			SEA01
1998 07 15.35		S	10.0	VN	25.4	L	6	61	1.8	4			SEA01
1998 07 19.31		S	10.3	TT	31.7	L	5	64	1.5	1			JON
1998 07 19.35		S	10.5	VN	25.4	L	6	61	1.2	3			SEA01
1998 07 20.35		S	10.6	VN	25.4	L	6	61	2.0	3			SEA01
1998 07 22.35		S	10.8	VN	25.4	L	6	61	1.7	3			SEA01
1998 08 10.42		S	12.3	HS	20	L	7	158	1	2			MAT08
1998 08 12.40		S	12.5	HS	20	L	7	158	1	2			MAT08
1998 08 15.42		S[	12.5:		20	L	7	158					MAT08

Comet C/1998 K1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 05 19.90		B	14.8	HS	42	L	5	162	0.4	4			LEH
1998 05 26.89		B	14.8	HS	42	L	5	263	0.5	4			LEH
1998 05 27.89		B	14.7	HS	42	L	5	263	0.5	4			LEH
1998 05 29.91		B	14.8	HS	42	L	5	263	0.7	4			LEH
1998 05 31.88		B	14.9	HS	42	L	5	263	0.8	4			LEH
1998 06 20.89		B	14.8	HS	42	L	5	162	1.0	4			LEH
1998 06 21.91		B	14.6	HS	42	L	5	162	0.9	4			LEH
1998 06 25.90		B	14.7	HS	42	L	5	162	0.8	4			LEH

Comet C/1998 K3 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 26.17		C	18.8	FA	91.4	L	5		0.12		20.4s	102	SC001
1998 07 26.18		c	20.6	FA	91.4	L	5						SC001

Comet C/1998 K5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 05 31.95		B	14.6	HS	42	L	5	162	0.4	5			LEH
1998 06 02.93		B	14.3	HS	42	L	5	162	0.4	6/			LEH
1998 06 20.98		B	13.5	HS	42	L	5	162	0.4	8			LEH
1998 06 21.97		B	13.2	HS	42	L	5	162	0.5	7/			LEH
1998 06 25.97		B	13.2	HS	42	L	5	81	0.2	8			LEH
1998 07 01.02		S	12.7	HS	27	L	6	167	0.0	9			TOT03
1998 07 19.97		M	12.6	HS	42	L	5	81	0.3	8			LEH
1998 07 19.98		I	12.5	AC	25.4	L	5	104	< 0.1	9			MEY
1998 07 20.97		M	12.5	HS	42	L	5	162	0.3	8			LEH
1998 07 20.98		I	12.7	AC	25.4	L	5	65	< 0.1	9			MEY
1998 07 24.94		M	12.5	HS	42	L	5	81	0.3	8			LEH
1998 07 25.02		S	12.8	AC	30.5	T	10	78	& 0.5	4			COM
1998 07 26.00		I	13.1	AC	25.4	L	5	104	< 0.1	9			MEY
1998 07 26.98		M	12.6	HS	42	L	5	81	0.2	8			LEH
1998 07 30.56		B	12.6	HS	25.6	L	5	169	0.05	9	0.3m	270	BIV
1998 07 31.07		S	12.6	HS	44.5	L	4	230	0.16	8			SAR02
1998 07 31.96		M	12.8	HS	42	L	5	81	0.2	8			LEH
1998 08 01.02		S	13.1	AC	25.0	L	6	121	< 0.1	8/			RES
1998 08 01.06		S	13.1	HS	44.5	L	4	230	0.3	S8			SAN07
1998 08 02.02		S	13.1	AC	25.0	L	6	121		9			RES
1998 08 02.43		J	12.2	SC	25.4	T	5	a 40	0.38	s5	0.9m	280	ROQ
1998 08 02.55		B	12.4	HS	25.6	L	5	169	0.1	8/			BIV
1998 08 03.01		S	12.7	HS	30	R	20	185	< 0.1	9			SHA02
1998 08 03.99		S	12.9	AC	25.0	L	6	61		9			RES
1998 08 04.63		B	12.7	HS	25.6	L	5	169	0.1	9			BIV
1998 08 04.76		C	12.4	GA	60.0	Y	6	a120	0.45	8	1.1m	280	NAK01
1998 08 06.08		S	12.6	HS	30	R	20	185	< 0.1	9			SHA02
1998 08 15.94		I	12.7	AC	25.4	J	6	100		9			BOU
1998 08 15.99		M	13.0	HS	42	L	5	162	0.2	8			LEH

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 16.45		B	12.9	HS	25.6	L	5	169	0.1	8/	0.3m	270	BIV
1998 08 16.96		I	12.6	HS	25.4	J	6	100		9			BOU
1998 08 17.96		I	12.7	AC	25.4	L	5	104	< 0.1	9			MEY
1998 08 18.00		M	13.1	HS	42	L	5	162	0.2	8			LEH
1998 08 18.02		S	13.0	AC	25.0	L	6	121		9			RES
1998 08 18.98		I	12.6	HS	25.4	J	6	100		9			BOU
1998 08 19.04		B	13.0	AC	25.0	L	6	121		9			RES
1998 08 19.96		M	12.8	HS	42	L	5	81	0.2	8			LEH
1998 08 19.97		M	11.9	HS	20	L	5	125	0.4	7/			PLS
1998 08 19.99		B	12.3	TI	35	L	5	92	0.15	8/			HOR02
1998 08 20.04		B	13.3	AC	25.0	L	6	121		9			RES
1998 08 20.09		B	12.1	NP	32	L	5	75	0.5	7/			MAR02
1998 08 20.09		S	11.8	NP	32	L	5	75	0.5	6			SAN04
1998 08 20.52		B	12.8	HS	25.6	L	5	169	0.05	9	0.4m	270	BIV
1998 08 22.11		B	12.0	NP	32	L	5	75		8			MAR02
1998 08 22.11		S	12.1	NP	32	L	5	75		9			SAN04
1998 08 23.03		S	13.1	VB	30	R	20	105	< 0.1	9			SHA02
1998 08 23.11		B	11.9	NP	32	L	5	75		8			MAR02
1998 08 23.97	!	V	12.6	YF	36.0	T	7	a120	+ 1.0	8			MIK
1998 08 23.99		I	12.8	HS	20	L	5	70	0.3	S8			BAR06
1998 08 24.43		B	12.6	HS	25.6	L	5	169	0.1	8/	0.4m	270	BIV
1998 08 25.80		C	13.0	GA	60.0	Y	6	a120	0.4	8	1.5m	275	NAK01
1998 08 25.98		I	12.9	HS	20	L	5	70	0.3	S8			BAR06
1998 08 26.91		S	12.1	HS	44.0	L	5	156	0.0	9			HAS02
1998 08 27.94		M	12.8	HS	42	L	5	162	0.2	8			LEH
1998 08 28.03		S	12.9	AC	25.0	L	6	61		9			RES
1998 08 28.47		B	12.8	HS	25.6	L	5	169	0.1	8/	0.3m	265	BIV
1998 08 29.92		M	12.5	HS	35	L	5	207	0.3	8	0.01	285	HOR02
1998 08 30.57		B	12.6	HS	25.6	L	5	169	0.1	8/	0.4m	270	BIV
1998 08 30.93		M	12.3	HS	35	L	5	207	0.3	8	0.01	285	HOR02
1998 08 31.00		I	12.7	HS	25.4	J	6	100		9			BOU
1998 08 31.99		S	13.0	AC	25.0	L	6	61		9			RES
1998 09 01.00		M	12.3:	HS	13	L	8	69	0.3	8			HOR02
1998 09 01.03		I	12.9:	HS	20	L	5	70	0.3	S8			BAR06
1998 09 01.04		I	12.8	HS	20.3	T	10	93	0.0	9			HAS02
1998 09 01.06		I	12.5	AC	25.4	L	5	104	< 0.1	9			MEY
1998 09 01.99		S	12.9	AC	25.0	L	6	121	0.1	8/	0.3m	300	RES
1998 09 02.60		B	12.7	HS	25.6	L	5	169	0.1	8/	0.5m	265	BIV
1998 09 02.76		C	12.9	GA	60.0	Y	6	a120	0.5	8	1.6m	273	NAK01
1998 09 03.04		S	12.8	AC	25.0	L	6	121	0.1	7/	0.4m	300	RES
1998 09 04.05		S	12.8	AC	25.0	L	6	121	0.1	8			RES
1998 09 05.50		B	12.8	HS	25.6	L	5	169	0.15	8	0.5m	270	BIV
1998 09 08.47		B	12.9	HS	25.6	L	5	169	0.2	7/	0.5m	270	BIV
1998 09 11.46		B	12.7	HS	25.6	L	5	169	0.25	7	0.5m	270	BIV
1998 09 13.41		B	12.7	HS	25.6	L	5	169	0.3	7	1.0m	270	BIV
1998 09 15.41		B	12.7	HS	25.6	L	5	169	0.25	8	0.7m	270	BIV
1998 09 16.14	!	V	12.2	HV	152.4	L	8	a600	0.25		1.5m	270	COZ
1998 09 16.98		I	13.0	HS	20	L	5	70	0.2	S8			BAR06
1998 09 18.44		B	13.0	HS	25.6	L	5	169	0.25	7/	1.0m	260	BIV
1998 09 18.95		S	12.7	HS	44.5	L	4	230	0.3	S7			SAR02
1998 09 19.05		I	13.0	HS	20	L	5	70	0.2	S8			BAR06
1998 09 19.43		B	12.7	HS	25.6	L	5	169	0.3	7/	0.8m	260	BIV
1998 09 19.89		M	12.5	HS	35	L	5	207	0.25	8	0.01	245	HOR02
1998 09 20.00		S	13.1	AC	25.0	L	6	121	0.1	7/			RES
1998 09 20.05		S	12.2	AC	25.4	L	5	104	< 0.1	8		265	MEY
1998 09 20.43		B	12.5	HS	25.6	L	5	169	0.3	7/	1.0m	260	BIV
1998 09 21.00		S	13.1	AC	25.0	L	6	121	0.1	7/			RES
1998 09 22.02		S	12.4	AC	25.4	L	5	104	< 0.1	8		260	MEY
1998 09 22.08		M	12.3	HS	35	L	5	207	0.2	8	0.01	260	HOR02
1998 09 22.13		S	13.1	AC	25.0	L	6	121	0.2	7/			RES
1998 09 22.42		B	12.4	HS	25.6	L	5	169	0.2	8	0.9m	260	BIV
1998 09 23.09		M	12.5	HS	35	L	5	207	0.2	8	0.01	260	HOR02
1998 09 23.96		I	12.9	HS	20	L	5	70	0.2	S8			BAR06
1998 09 24.98		I	13.0	HS	20	L	5	70	0.2	S8			BAR06
1998 09 24.98		M	12.6	HS	25.4	L	6	104	0.25	S7			SAR02

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 25.06		S	12.9	AC	25.0	L	6	61	< 0.1	8			RES
1998 09 26.49		B	13.2	HS	25.6	L	5	169	0.3	8	1.0m	265	BIV
1998 09 26.98		M	12.5	HS	25.4	L	6	104	0.2	S7			SAR02
1998 09 28.63		B	13.2	HS	25.6	L	5	169	0.3	7/	0.9m	270	BIV
1998 09 30.02		I	13.2	HS	20	L	5	70	0.1	S8			BAR06
1998 09 30.51		B	13.2	HS	25.6	L	5	169	0.3	8	1.0m	270	BIV
1998 10 02.73		C	13.5	GA	60.0	Y	6	a120	0.35	8/	1.7m	266	NAK01
1998 10 02.76		V	13.1	LA	50.0	C	12	a180	0.25	8	2.2m	266	FUK02
1998 10 04.50		B	13.4	HS	25.6	L	5	169	0.2	8	0.7m	270	BIV
1998 10 11.92		S	14.2	HS	30	R	20	185	< 0.2	8			SHA02
1998 10 12.91		I	13.7	GA	25.4	J	6	150		9			BOU
1998 10 13.88		M	13.4	HS	35	L	5	207	0.25	7/	0.01	265	HOR02
1998 10 14.98		I	13.6	GA	25.4	J	6	100		9			BOU
1998 10 16.85		I	13.3	HS	20	L	5	70	0.3	S8			BAR06
1998 10 18.05		I	13.0	HS	20	L	5	70	0.2	S8			BAR06
1998 10 18.06		S	14.2	HS	30	R	20	185	0.2	8			SHA02
1998 10 18.42		B	13.6	HS	25.6	L	5	169	0.3	7	0.9m	270	BIV
1998 10 18.61		V	13.5	LA	50.0	C	12	a180	0.23	8	1.8m	264	FUK02
1998 10 18.96		I	13.8	GA	25.4	J	6	115		9			BOU
1998 10 19.81		S	13.0	VN	41	L	4	200	1.1	3			PEA
1998 10 20.43		B	13.5	HS	25.6	L	5	169	0.3	7	0.6m	270	BIV
1998 10 20.81		S	13.0	VN	41	L	4	200	1.1	3/			PEA
1998 10 21.01		M	13.7	HS	35	L	5	207	0.2	7			HOR02
1998 10 22.00		S	14.2	HS	30	R	20	240	0.2	8			SHA02
1998 10 22.09		M	13.7	HS	35	L	5	207	0.25	7			HOR02
1998 10 22.83		M	13.7	HS	35	L	5	207	0.25	7			HOR02
1998 10 23.51		B	14.1	HS	25.6	L	5	169	0.2	7	0.6m	260	BIV
1998 10 24.05		I	13.8	HS	20.3	T	10	102	0.6	8			KAR02
1998 10 24.44		B	14.0	HS	25.6	L	5	169	0.3	7	0.5m	260	BIV
1998 10 24.68		C	14.0	GA	60.0	Y	6	a120	0.4	8/	1.7m	263	NAK01
1998 10 24.99		S	14.1	AC	25.0	L	6	121	< 0.1	8/			RES
1998 10 25.68		V	13.8	LA	50.0	C	12	a180	0.22	8	1.8m	263	FUK02
1998 10 25.79		S	13.5	HS	44.0	L	5	226	0.2	6			HAS02
1998 10 26.44		B	14.3	HS	25.6	L	5	169	0.25	7	0.6m	250	BIV
1998 10 26.92		S	14.1	AC	25.0	L	6	121		9			RES
1998 10 29.18		S	14.3	VB	30	R	20	185	0.5	6			SHA02
1998 10 29.67		C	14.2	GA	60.0	Y	6	a120	0.35	8/	1.6m	264	NAK01
1998 11 01.17		S	14.7	VB	30	R	20	185	0.4	7			SHA02

Comet C/1998 M1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 25.17		c	19.2	FA	91.4	L	5						SCO01
1998 07 25.18		C	15.5	FA	91.4	L	5		0.38		3.2m	249	SCO01
1998 07 29.87		S[	13.5	HS	44.5	L	4	230	! 1				SAR02
1998 09 16.44	a	C	16.1	GA	60.0	Y	6	a120	0.45			140	NAK01

Comet C/1998 M2 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 06 21.95		B	14.8	HS	42	L	5	162	0.7	3/			LEH
1998 06 25.94		B	14.7	HS	42	L	5	162	0.6	4			LEH
1998 07 19.91		B	14.0	HS	42	L	5	162	1.4	4			LEH
1998 07 20.92		B	13.9	HS	42	L	5	162	1.4	4			LEH
1998 07 24.90		B	13.9	HS	42	L	5	162	1.1	4			LEH
1998 07 25.20		C	14.7	FA	91.4	L	5		0.68		7.5m	194	SCO01
1998 07 25.20		c	17.8	FA	91.4	L	5						SCO01
1998 07 26.90		B	14.0	HS	42	L	5	162	1.2	4			LEH
1998 07 29.96		S	14.3:	HS	44.5	L	4	230	1	0			SAN07
1998 07 29.96		S	14.5	HS	44.5	L	4	230	0.8	4			SAR02
1998 07 30.59		C	14.4:	GA	60.0	Y	6	a120	0.85			145	NAK01
1998 07 30.92		S	14.0:	HS	44.5	L	4	230	1.2	2			SAR02
1998 07 30.92		S	14.2	HS	44.5	L	4	230	1	1			SAN07
1998 07 31.91		B	14.0	HS	42	L	5	162	0.9	4			LEH
1998 08 10.87		B	14.2	HS	42	L	5	140	0.9	4			LEH

Comet C/1998 M2 (LINEAR) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 11.86		B	14.3	HS	42	L	5	162	0.9	4			LEH
1998 08 14.85		B	14.2	HS	42	L	5	162	0.8	4			LEH
1998 08 15.85		B	14.5	HS	42	L	5	162	0.8	4			LEH
1998 08 16.84		B	14.5	HS	42	L	5	162	0.8	4			LEH
1998 08 17.84		B	14.5	HS	42	L	5	162	0.8	4			LEH
1998 08 17.91		S	13.7	AC	25.0	L	6	121	0.5	2			RES
1998 08 17.99		S	12.8	NP	32	L	5	75	< 1	1			MAR02
1998 08 17.99		S	13.0	NP	32	L	5	75	1	1			SAN04
1998 08 19.85		S	14.0	HS	35	L	5	207	0.9	2			HOR02
1998 08 19.86		B	14.4	HS	42	L	5	162	0.7	4			LEH
1998 08 19.89		S	13.5:	AC	25.0	L	6	121	0.6	2			RES
1998 08 19.99		S	12.8	NP	32	L	5	125	0.5	1			MAR02
1998 08 20.83		B	14.3	HS	42	L	5	162	0.8	4			LEH
1998 08 20.88		S	13.5	AC	25.0	L	6	121	0.6	2			RES
1998 08 22.02		S	11.9	NP	32	L	5	125	< 0.75	1			MAR02
1998 08 22.93		S	12.5	NP	32	L	5	75	< 1	1			MAR02
1998 08 23.87		S	13.6	AC	25.0	L	6	121	0.5	2/			RES
1998 08 24.82		B	14.4	HS	42	L	5	162	0.7	4			LEH
1998 08 24.91		S	13.6	AC	25.0	L	6	121	0.5	3			RES
1998 08 24.94		S	12.0	NP	32	L	5	125	1	1			MAR02
1998 08 25.83		S	13.9	HS	35	L	5	207	0.8	2			HOR02
1998 08 25.84		S	14.3	HS	15	R	13	200	0.7	2			ZNO
1998 08 26.90		S	13.5	HS	44.0	L	5	156	0.4	3			HAS02
1998 08 27.83		B	14.3	HS	42	L	5	162	0.7	4			LEH
1998 08 27.88		S	13.5	AC	25.0	L	6	121	0.7	3			RES
1998 08 28.97		S	11.2	NP	32	L	5	75	2	1/			MAR02
1998 08 29.87		S	13.8	HS	35	L	5	207	0.9	2/			HOR02
1998 08 29.88		S	13.7	AC	25.0	L	6	121	0.5	3			RES
1998 08 30.81		B	14.3	HS	42	L	5	162	0.6	4			LEH
1998 08 30.92		S	13.8	HS	35	L	5	207	0.7	2			HOR02
1998 08 31.92		S	13.5	AC	25.0	L	6	121	0.6	3			RES
1998 09 01.96		S	13.5	AC	25.0	L	6	121	0.5	2/			RES
1998 09 09.80		S	14.1	HS	35	L	5	207	0.7	2			HOR02
1998 09 16.47		C	15.1	GA	60.0	Y	6	a120	0.65			130	NAK01
1998 09 17.46		C	15.1	GA	60.0	Y	6	a120	0.65			130	NAK01
1998 09 19.80		S	13.7	AC	25.0	L	6	121	0.5	2			RES
1998 09 19.80		S	13.9	HS	35	L	5	207	0.7	2/			HOR02
1998 09 20.80		S	13.7	AC	25.0	L	6	121	0.5	2			RES
1998 09 20.81		S	14.1	HS	35	L	5	207	0.7	2			HOR02
1998 09 21.78		S	14.1	HS	35	L	5	207	0.7	2/			HOR02
1998 09 21.82		S	13.8	HS	25.0	L	6	121	0.4	3			RES
1998 09 22.79		S	14.1	HS	35	L	5	207	0.8	2/			HOR02
1998 09 23.81		S	14.2	HS	35	L	5	207	0.7	2/			HOR02
1998 09 24.80		S	14.2	HS	35	L	5	207	0.7	2/			HOR02
1998 09 24.82		S	13.7	AC	25.0	L	6	121	0.4	3			RES
1998 09 24.82		S	13.9:	HS	25.4	L	6	159	0.8	2/			SAR02
1998 10 09.43		C	15.2	GA	60.0	Y	6	a120	0.7				NAK01
1998 10 13.82		S	14.8	HS	35	L	5	207	0.5	2			HOR02
1998 10 16.78		[	14.0	HS	44.5	L	5	100					KAR02
1998 10 21.40		C	15.4	GA	60.0	Y	6	a120	0.55				NAK01
1998 10 22.77		S	14.0	HS	44.0	L	5	156	0.4	4			HAS02

Comet C/1998 M3 (Larsen)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 25.19		C	17.9	FA	91.4	L	5		0.28		1.5m	166	SC001
1998 07 25.19		c	20.8	FA	91.4	L	5						SC001
1998 08 26.16		c	20.9	FA	91.4	L	5						SC001
1998 08 26.17		C	18.1	FA	91.4	L	5		0.15		110.4s	154	SC001

Comet C/1998 M4 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 29.99		S	14.8	HS	44.5	L	4	82	1	3			SAR02
1998 07 29.99		S	15.0:	HS	44.5	L	4	230	0.5	0			SAN07

Comet C/1998 M5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 17.96		S	12.1	HS	27	L	6	83	0.5	3/			TOT03
1998 07 18.91		M	12.0	HS	42	L	5	81	1.5	5			LEH
1998 07 19.92		M	12.3	HS	42	L	5	81	1.8	4/			LEH
1998 07 19.96		S	12.2	AC	25.4	L	5	65	1.3	4			MEY
1998 07 20.95		M	12.1	HS	42	L	5	81	1.9	4/			LEH
1998 07 20.96		S	11.9	AC	25.4	L	5	65	1.5	3			MEY
1998 07 22.00		S	12.0	AC	30.5	T	10	78	& 0.5	8			COM
1998 07 22.03		S	12.3	HS	27	L	6	214	0.5	4/			TOT03
1998 07 23.90		M	12.0	HS	42	L	5	81	2.2	4/			LEH
1998 07 24.92		M	12.1	HS	42	L	5	81	2.2	4/			LEH
1998 07 24.96		S	12.1	AC	30.5	T	10	78	& 2	6/			COM
1998 07 24.97		S	12.2	HS	44.5	L	4	82	3	3			SAR02
1998 07 25.94		M	12.0	NP	30	L	5	100	3	5			NEV
1998 07 25.96		S	12.1	AC	25.4	L	5	65	1.2	3			MEY
1998 07 26.96		M	11.8	HS	42	L	5	81	2.3	4/			LEH
1998 07 27.93		S	12.3	HS	20	L	5	70	1.8	1			BAR06
1998 07 28.70		S	12.3	HS	31.7	L	6	152	0.7	3			MIY01
1998 07 29.01		S	12.2	HS	27	L	6	83	0.7	2/			TOT03
1998 07 29.85		S	12.4	HS	44.5	L	4	82	1.5	d5			SAR02
1998 07 29.86		S	12.0	HS	44.5	L	4	230	2.5	3			SAN07
1998 07 30.60		B	12.4	HS	25.6	L	5	84	1.0	5			BIV
1998 07 30.89		M	12.0	NP	30	L	5	100	2	4			NEV
1998 07 30.99		S	12.3	HS	20	L	5	70	1.3	1			BAR06
1998 07 31.00		S	12.3	HS	44.5	L	4	230	1	4/			SAN07
1998 07 31.01		S	12.0	HS	44.5	L	4	82	1.5	4			SAR02
1998 07 31.93		M	11.8	TI	42	L	5	81	2.0	4/			LEH
1998 07 31.93		S	11.5	AC	25.0	L	6	61	1.4	2/			RES
1998 08 01.20		S	12.6	AC	40.6	L	5	114	0.9	6			BOR
1998 08 01.88		M	12.0	NP	30	L	5	100	1.8	3			NEV
1998 08 01.92		S	11.4	AC	25.0	L	6	61	1.5	2			RES
1998 08 02.04		S	12.4	HS	44.5	L	4	82	1.5	3			SAN07
1998 08 02.07		S	12.2	HS	44.5	L	4	82	2.5	3/			SAR02
1998 08 02.76		C	12.8:	GA	60.0	Y	6	a120	1.1		2.4m	194	NAK01
1998 08 02.89		S	11.4	AC	25.0	L	6	61	1.5	3/			RES
1998 08 02.95		S	12.9	VB	30	R	20	185	0.5	3			SHA02
1998 08 03.94		S	11.2	AC	25.0	L	6	61	1.7	2/			RES
1998 08 04.61		S	12.3	HS	25.6	L	5	84	1.0	5			BIV
1998 08 04.76		C	12.8	GA	60.0	Y	6	a120	1.1		2.0m	194	NAK01
1998 08 07.97		c	12.7	HS	40.6	T	6	60	0.4				CHE03
1998 08 07.97		c	12.7	HS	40.6	T	6	60	2.2				CHE03
1998 08 07.98		c	12.6	HS	40.6	T	6	60	0.3				CHE03
1998 08 08.88		M	11.1	TI	10	B	4	25	2.0	4			LEH
1998 08 09.89		M	11.2	TI	42	L	5	81	1.9	5			LEH
1998 08 10.87		S	10.7	AC	25.0	L	6	61	1.8	2			RES
1998 08 10.89		S	11.3	TI	35	L	5	92	2.4	2			HOR02
1998 08 10.90		M	11.2	TI	42	L	5	81	2.2	4			LEH
1998 08 11.88		M	11.1	TI	42	L	5	66	2.3	4			LEH
1998 08 11.90		S	13.0	HS	30	R	20	185	0.6	4			SHA02
1998 08 12.00		C	12.3	HS	40.6	T	6	60	0.7		1.2m	180	CHE03
1998 08 12.01		c	12.5	HS	40.6	T	6	60	0.7		1.2m	190	JAN05
1998 08 12.02		C	12.4	HS	40.6	T	6	60	0.7		1.2m	180	CHE03
1998 08 13.05		c	13.5	HS	40.6	T	6	30	0.2				CHE03
1998 08 13.07		C	12.6	HS	40.6	T	6	30	0.5				CHE03
1998 08 13.16		M	11.3	NP	20	L	4	74	1.9	4			CRE01
1998 08 13.35		S	11.8	HS	25.6	L	5	84	1.3	5			BIV
1998 08 13.87		S	10.9	AC	25.0	L	6	61	1.9	1			RES
1998 08 13.90		M	11.9	AC	25.4	J	6	100	1.2	6			BOU
1998 08 14.89		M	11.2	TI	42	L	5	66	2.3	4			LEH
1998 08 14.95		S	11.3	HS	20.3	T	10	77	1.2	3/			KAM01
1998 08 14.98		S	10.9	AC	25.0	L	6	61	1.9	3			RES
1998 08 15.37		B	11.7	HS	25.6	L	5	84	1.2	5			BIV
1998 08 15.61		S	11.8	HS	20	L	7	158	2	2			MAT08
1998 08 15.67		C	12.7	GA	60.0	Y	6	a120	1.2		2.4m	179	NAK01
1998 08 15.84		S	11.2	HS	20	L	5	70	2.5	4			BAR06
1998 08 15.89		M	10.9	TI	10	B	4	25	2.5	3/			LEH

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 15.89		M	11.7	AC	25.4	J	6	58	1.8	5			BOU
1998 08 16.37		S	11.4	HS	25.6	L	5	84	1.2	5			BIV
1998 08 16.85		S	11.2:	HS	20	L	5	70	1.8	2			BAR06
1998 08 16.88		M	10.9	TI	42	L	5	66	2.6	4			LEH
1998 08 16.95		M	11.7	GA	25.4	J	6	72	1.6	6			BOU
1998 08 17.84		S	11.5	CD	30	L	5	100	1.7	3			NEV
1998 08 17.87		S	11.4	HS	20	L	5	70	1.7	3			BAR06
1998 08 17.88		M	11.1	TI	42	L	5	66	2.4	4/			LEH
1998 08 17.88	x	S	11.3	HV	25.4	L	5	65	2.0	D4			MEY
1998 08 17.93		S	10.8	AC	25.0	L	6	61	1.9	3/			RES
1998 08 17.95		S	11.0	TT	13	L	8	69	2.5	2/			HOR02
1998 08 17.97		S	11.5	SE	25	L	4	64	1	2			SHU
1998 08 17.99		S	11.5	SE	19	L	5	60	1.2	2			NEK
1998 08 18.85		S	11.5	HS	20	L	5	70	1.8	s4			BAR06
1998 08 18.90	x	S	11.4	HV	25.4	L	5	65	1.6	d3			MEY
1998 08 18.98		S	12.0	NP	32	L	5	75	1.5	3/			MAR02
1998 08 18.98		S	12.1	NP	32	L	5	75	1	4			SAN04
1998 08 18.98	x	M	11.6	TT	25.4	J	6	88	1.5	5/			BOU
1998 08 19.02		S	10.9	AC	25.0	L	6	61	2.0	2/			RES
1998 08 19.19		J	11.0	SC	25.4	T	5	a 60	2.60	s5	2.9m	174	ROQ
1998 08 19.27		M	11.3	NP	20	L	6	38	1.6	3/			CRE01
1998 08 19.36		S	11.3	HS	25.6	L	5	42	1.5	5			BIV
1998 08 19.83		M	11.0	TT	35	L	5	92	2.5	3			HOR02
1998 08 19.85		M	10.8	TI	10	B		25	2.4	4			ZNO
1998 08 19.86		S	11.4:	HS	20	L	5	70	2.0	3			BAR06
1998 08 19.88	x	S	11.3	HV	25.4	L	5	65	1.9	D4/			MEY
1998 08 19.89		M	11.1	TI	10	B	4	25	2.5	3			LEH
1998 08 19.90		S	10.8	AC	25.0	L	6	61	2.3	4/			RES
1998 08 20.00		S	11.6	SE	19	L	5	60	1	2			NEK
1998 08 20.00		S	11.7	SE	25	L	4	64	0.8	1			SHU
1998 08 20.02		M	11.7	NP	32	L	5	75	1.5	4			MAR02
1998 08 20.02		S	10.5	TI	20	L	5	48	2.6	2			PLS
1998 08 20.02		S	11.4	SE	25	L	4	64	0.7	2/			SAL01
1998 08 20.02		S	11.6	NP	32	L	5	75	3	3			SAN04
1998 08 20.36		S	11.5	TJ	25.6	L	5	42	1.5	5			BIV
1998 08 20.53		M	11.5	HS	25.0	L	6	120	1.2	3	1.6m	180	TSU02
1998 08 20.70		C	12.5:	GA	60.0	Y	6	a120	1.4		3.0m	167	NAK01
1998 08 20.83		S	11.5	HS	20	L	5	70	1.8	d3/			BAR06
1998 08 20.86		M	11.0	TI	42	L	5	81	2.3	4/			LEH
1998 08 20.88		M	11.2	CD	30	L	5	100	1.8	s5			NEV
1998 08 20.89		S	10.7	AC	25.0	L	6	61	2.2	4/			RES
1998 08 22.07		M	11.7	NP	32	L	5	75	2.5	3/			MAR02
1998 08 22.07		S	11.6	NP	32	L	5	75	1.5	3/			SAN04
1998 08 22.93		S	13.1	VB	30	R	20	105	0.5	4			SHA02
1998 08 22.95		M	12.2	NP	32	L	5	75	0.5	4			MAR02
1998 08 23.65		S	11.9	HS	20	L	7	158	2	2			MAT08
1998 08 23.85		M	10.8	TT	13	L	8	69	2.5	3			HOR02
1998 08 23.87		S	10.7	AC	25.0	L	6	61	2.0	4			RES
1998 08 23.88		M	11.0	CD	30	L	5	100	2	4/			NEV
1998 08 23.88		S	11.4	HS	20	L	5	70	1.7	s3			BAR06
1998 08 24.34		S	11.4	HS	25.6	L	5	84	1.4	6			BIV
1998 08 24.84		M	11.2	TI	42	L	5	66	2.6	5			LEH
1998 08 24.91		S	12.5	VB	33	L	5	75	0.8	4			SHA02
1998 08 24.92		S	10.7	AC	25.0	L	6	61	2.3	4/			RES
1998 08 24.93		S	11.1	AA	15.0	R	15	141	1.5	3			DIE02
1998 08 25.82		M	10.7	TI	10	B		25	2.5	4			ZNO
1998 08 25.86		M	11.2	TT	35	L	5	92	1.5	4			HOR02
1998 08 26.82		M	11.5	CD	30	L	5	100	1.4	s5			NEV
1998 08 26.85		M	10.8	TI	10	B		25	2.2	3/			ZNO
1998 08 26.85		S	11.4	HS	20.3	T	10	93	0.5	4			HAS02
1998 08 27.83		M	11.0	TT	35	L	5	92	2.0	3/			HOR02
1998 08 27.86		M	11.0	TI	42	L	5	66	2.4	3/			LEH
1998 08 27.88		S	10.8	AC	25.0	L	6	61	2.3	3/			RES
1998 08 28.40		B	11.4	TJ	25.6	L	5	42	1.3	5			BIV
1998 08 28.83		M	11.0	TT	35	L	5	92	1.6	3/			HOR02

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 29.83		M	11.4	TI	35	L	5	92	1.6	3/			HOR02
1998 08 29.87		M	11.0	TI	42	L	5	81	2.0	4			LEH
1998 08 29.92		S	10.8	AC	25.0	L	6	61	2.3	5			RES
1998 08 29.97		S	11.2	HS	20.3	T	10	77	1.0	4			KAM01
1998 08 30.55		S	11.6	HS	25.6	L	5	84	1.3	5			BIV
1998 08 30.82		M	10.9	TI	42	L	5	81	2.3	4/			LEH
1998 08 30.90		M	11.0	TT	35	L	5	92	1.7	4			HOR02
1998 08 30.96	x	M	11.0	TT	25.4	J	6	72	2.4	4			BOU
1998 08 31.96		S	10.7	AC	25.0	L	6	61	2.2	4			RES
1998 09 01.00	x	M	11.1	TT	25.4	J	6	72	2.1	4/			BOU
1998 09 01.01		S	11.2	HS	20	L	5	70	1.7	3			BAR06
1998 09 01.02	x	S	11.2	HV	25.4	L	5	65	1.8	3/			MEY
1998 09 01.03		S	11.1	TT	13	L	8	69	1.7	3			HOR02
1998 09 01.96		S	10.8	AC	25.0	L	6	61	2.0	3/			RES
1998 09 02.60		S	11.2	TJ	25.6	L	5	84	1.5	6			BIV
1998 09 03.02		S	10.8	AC	25.0	L	6	61	1.9	3/			RES
1998 09 04.04		S	10.7	AC	25.0	L	6	61	2.0	3			RES
1998 09 08.64		C	12.5	GA	20.3	T	9	a 30	0.7				SUZ02
1998 09 08.79		S	11.1	HS	20	L	5	70	1.8	4			BAR06
1998 09 08.85		S	10.6	AC	25.0	L	6	61	1.8	3			RES
1998 09 09.50	a	C	12.1	GA	60.0	Y	6	a120	1.7		3.7m	143	NAK01
1998 09 09.80		M	10.9	TI	35	L	5	92	2.2	3/			HOR02
1998 09 09.82		S	10.9	HS	20	L	5	70	1.8	3/			BAR06
1998 09 10.83		S	11.2	AA	15.0	R	15	141	1.5	3			DIE02
1998 09 10.84		S	10.8	HS	20	L	5	70	2.0	3/			BAR06
1998 09 10.84	x	M	10.8	TT	25.4	J	6	72	2.1	6			BOU
1998 09 11.32		S	11.4	HS	25.6	L	5	42	1.4	5	2.5m	150	BIV
1998 09 11.85		S	11 :	AC	30.5	T	10	78	& 2.5	4			COM
1998 09 11.85	x	M	10.9	TT	25.4	J	6	72	2.1	6			BOU
1998 09 11.86		S	10.9	HS	20	L	5	70	1.6	3			BAR06
1998 09 12.12		J	10.7	SC	25.4	T	5	a 60	2.77	s5	3.5m	152	ROQ
1998 09 12.63		C	12.6	GA	20.3	T	9	a 60	0.7				SUZ02
1998 09 12.87		S	11.0	LC	25.3	L	6	58	& 1.6	3			VIT01
1998 09 12.87		S	11.2	LC	25.3	L	6	58	& 1.7	4			PER01
1998 09 13.34		S	11.1	TJ	25.6	L	5	42	2.0	5	2.5m	140	BIV
1998 09 13.78		M	12.0	CD	30	L	5	100	1.2	4			NEV
1998 09 13.78		M	12.0	CD	30	L	5	100	1.2	4			NEV
1998 09 13.85		S	11.1	AC	30.5	T	10	78	& 2.5	3			COM
1998 09 13.86	x	M	10.9	TT	25.4	J	6	72	2.2	6			BOU
1998 09 13.87		S	11.1	HS	20.3	T	10	64	1.7	2			KAR02
1998 09 13.87		S	11.3	NP	25	L	4	64	1	2/			SHU
1998 09 15.31		S	11.3	HS	25.6	L	5	42	1.4	6			BIV
1998 09 15.94		M	11.1	NP	32	L	5	75	2	3			MAR02
1998 09 16.02		S	11.4	LC	25.3	L	6	58	& 1.7	3/			PER01
1998 09 16.02		S	11.6	LC	25.3	L	6	58	& 1.6	1/			VIT01
1998 09 16.46		S	11.3	HS	20	L	7	45	1.5	2			MAT08
1998 09 16.53		C	11.9	GA	60.0	Y	6	a120	1.8		4.0m	134	NAK01
1998 09 16.88		S	11.6	LC	25.3	L	6	58	& 1.5	2/			PER01
1998 09 16.89		S	11.2	LC	25.3	L	6	58	& 1.8	4			VIT01
1998 09 16.90		S	11.2	HS	20	L	5	70	2.0	s4			BAR06
1998 09 18.35		S	11.2	TJ	25.6	L	5	42	1.5	4/			BIV
1998 09 18.92		B	11.8	HS	40.6	T	10	65	1.0	2			CHE03
1998 09 18.96		S	11.0	HS	44.5	L	4	82	3	5/	0.13	130	SAR02
1998 09 19.03		S	10.9	HS	20	L	5	70	2	s4			BAR06
1998 09 19.04		S	11.5	AC	40.6	L	5	70	1.0	6			BOR
1998 09 19.61		H	11.9	LA	50.0	C	12	a180	1.00	5	3.9m	135	FUK02
1998 09 19.77		M	10.5	TT	35	L	5	92	2.3	4			HOR02
1998 09 19.79		S	10.9	HS	20	L	5	70	2.5	s4			BAR06
1998 09 19.81		S	10.9	HS	25.0	L	6	61	2.0	3			RES
1998 09 19.82		S	11.3	HS	25.0	C	5	39	1.5	1			CHE03
1998 09 19.94		S	11.1	TJ	20.3	T	10	77	1.2	4/			KAM01
1998 09 20.01		S	11.0	HS	20	L	5	70	2.0	3			BAR06
1998 09 20.03		S	11.5	HS	31	T	10	125	0.96	4			DEA
1998 09 20.31		S	11.3	TJ	25.6	L	5	42	1.5	4/			BIV
1998 09 20.49		S	10.5:	HS	25.4	T	6	62	1.2	5			YOS04

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 20.51		S	12.0	HS	31.7	L	6	152	0.5	3			MIY01
1998 09 20.78		M	10.7	TT	35	L	5	92	2	4			HOR02
1998 09 20.81		S	10.9	HS	25.0	L	6	61	2.0	3			RES
1998 09 20.83		S	11.0	AA	15.0	R	15	141	1.5	2			DIE02
1998 09 21.11		J	10.7	SC	25.4	T	5	a 60	1.82	s3/	0.6m	142	ROQ
1998 09 21.78		M	11.5	CD	30	L	5	100	1.5	4			NEV
1998 09 21.80		S	10.8	TI	35	L	5	92	2	4			HOR02
1998 09 21.83		S	10.8	HS	25.0	L	6	61	2.1	4			RES
1998 09 21.85		B	11.5:	HS	35.0	M	4	55		1			CHE03
1998 09 21.85		S	11.3	NP	25	L	4	64	1	2			SHU
1998 09 21.90		B	11.5	HS	40.6	T	10	65	1.1	2			CHE03
1998 09 21.96	x	S	11.4	HV	25.4	L	5	65	2.0	D4			MEY
1998 09 22.45		S	11.2	HS	25.6	L	5	42	1.5	4/			BIV
1998 09 22.78		M	10.8	TT	35	L	5	92	2.0	4			HOR02
1998 09 22.81	x	S	11.4	HV	25.4	L	5	65	2.0	D4			MEY
1998 09 22.85	x	M	10.9	TT	25.4	J	6	72	1.8	5			BOU
1998 09 23.84		S	11.4:	AC	30.5	M	10	117	& 2	4			COM
1998 09 23.87	x	M	11.0	TT	25.4	J	6	72	1.8	5			BOU
1998 09 23.92		S	10.8	TJ	20.3	T	10	77	1.7	4			KAM01
1998 09 24.00		S	11.4	HS	20	L	5	70	1.7	3/			BAR06
1998 09 24.80		M	10.6	TT	35	L	5	92	2.2	3/			HOR02
1998 09 24.80		M	10.9	TI	10	B		25	2.0	4			ZNO
1998 09 24.81		S	10.7	AC	25.0	L	6	61	2.0	4			RES
1998 09 24.82		S	11.6	AC	30.5	T	10	117	& 2	3			COM
1998 09 24.88		S	11.7:	HS	20	L	5	70	1.3	4			BAR06
1998 09 24.90		S	11.0	HS	25.4	L	6	104	1.7	3			SAR02
1998 09 25.93		S	11.3	LC	25.3	L	6	58	& 1.8	2/			PER01
1998 09 25.93		S	11.6	LC	25.3	L	6	58	< 1.7	4/			VIT01
1998 09 26.38		S	11.3	HS	25.6	L	5	42	1.5	4/			BIV
1998 09 26.79		M	10.7:	TT	35	L	5	92	2.0	3/			HOR02
1998 09 26.81		M	11.0	HS	25.4	L	6	104	1.7	d4/	0.1	130	SAR02
1998 09 26.82		S	10.6	AC	25.0	L	6	61	2.0	3/			RES
1998 09 27.10		J	10.2	SC	25.4	T	5	a 60	3.73	s3/	2.1m	133	ROQ
1998 09 30.05		S	11.5	LC	25.3	L	6	58	& 1.6	3/			PER01
1998 09 30.05		S	11.8	LC	25.3	L	6	58	& 1.4	3			VIT01
1998 09 30.47		S	11.2	TJ	25.6	L	5	84	1.3	4			BIV
1998 10 02.57		C	12.5	GA	20.3	T	9	a 60	0.9				SUZ02
1998 10 08.28		S	11.4:	HS	25.6	L	5	42	1.3	4			BIV
1998 10 08.83		S	11.0	LC	25.3	L	6	58	& 2.5	3/			PER01
1998 10 09.31		S	11.3	HS	25.6	L	5	42	1.4	4			BIV
1998 10 09.44		C	12.0:	GA	60.0	Y	6	a120	1.6		3.2m	115	NAK01
1998 10 09.46		S	11.3	HS	31.7	L	6	63	1	3			MIY01
1998 10 10.13		J	10.4	SC	25.4	T	5	a 60	3.03	s4	3.7m	113	ROQ
1998 10 10.85		S	12.0:	VB	33	L	5	100	0.7	4			SHA02
1998 10 11.10		S	11.2	NP	20	L	4	38	2.6	2			CRE01
1998 10 11.50		C	12.1	GA	20.3	T	9	a 60	1.0				SUZ02
1998 10 11.56		S	11.4	HS	31.7	L	6	152	1	4			MIY01
1998 10 11.86		S	12.5	VB	30	R	20	105	0.6	4			SHA02
1998 10 12.89	x	M	10.8	TT	25.4	J	6	72	1.8	4/			BOU
1998 10 13.82		S	10.6	AC	25.0	L	6	61	2.4	4/			RES
1998 10 13.86		M	10.4	TT	35	L	5	92	2.8	4			HOR02
1998 10 13.95		S	11.3	TJ	25.3	L	6	58	& 2.3	3			PER01
1998 10 14.42		S	11 :	GA	25.4	L	4	114					SEA
1998 10 14.76		M	10.7	CD	30	L	5	60	4	4			NEV
1998 10 14.83	x	M	10.8	TT	25.4	J	6	72	2.0	4/			BOU
1998 10 14.84		S	11.1	AC	30.5	T	10	117	& 2	4			COM
1998 10 14.88		S	10.7	HS	20	L	5	70	2.5	3			BAR06
1998 10 15.00		S	11.3	AC	40.6	L	5	70	1.3	5			BOR
1998 10 15.85		S	10.8	GA	19.5	L	5	50	0.7	5			GAS01
1998 10 16.40		S	10.8	GA	25.4	L	4	71					SEA
1998 10 16.79		M	10.8	CD	30	L	5	60	3	4			NEV
1998 10 16.82		S	10.7	AC	25.0	L	6	61	2.0	3/			RES
1998 10 16.82		S	10.7	HS	20	L	5	70	3.0	3			BAR06
1998 10 16.84		S	11.0	HS	44.5	L	5	100	2.0	3			KAR02
1998 10 16.89		M	10.5	SE	25	L	4	64	5	5			SHU

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 16.89		M	10.7	SE	19	L	5	60	3	4			NEK
1998 10 17.41		S	10.6	GA	25.4	L	4	71					SEA
1998 10 17.77		M	10.9	TI	10	B		25	2.5	3			ZNO
1998 10 17.77		S	11.0	TT	10	B		25	2.2	3			HOR02
1998 10 17.78		S	10.7	HS	20	L	5	70	2.8	3			BAR06
1998 10 17.79		S	11 :	AC	30.5	T	10	117	& 2	3			COM
1998 10 17.81	x	M	10.8	TT	25.4	J	6	72	2.2	4/			BOU
1998 10 18.30		S	11.2	TJ	25.6	L	5	42	1.5	4			BIV
1998 10 18.52		V	12.0	LA	50.0	C	12	a180	1.27	4	3.2m	117	FUK02
1998 10 18.80		S	10.3	TT	20.3	T		67	5	3			LUE
1998 10 18.80		S	10.8	AC	25.0	L	6	61	2.3	4			RES
1998 10 18.81		S	11 :	AC	30.5	T	10	117	& 2.5	3/			COM
1998 10 18.81		S	11.2	VB	33	L	5	75	2.1	4			SHA02
1998 10 18.82		S	11.2	AC	30.5	L	5	58	& 2	3			GIL01
1998 10 18.94		S	10.9	TJ	25.3	L	6	58	& 2.0	4/			VIT01
1998 10 18.94		S	11.0	TJ	25.3	L	6	58	& 1.8	3			PER01
1998 10 18.95	x	M	10.8	TT	25.4	J	6	72	2.0	5			BOU
1998 10 19.71		M	10.9	CD	30	L	5	60	1.8	s5			NEV
1998 10 19.80	x	M	10.8	TT	25.4	J	6	72	2.0	5			BOU
1998 10 19.83		S	10.9	GA	19.5	L	5	50	0.6	4			GAS01
1998 10 19.83		S	11 :	AC	30.5	T	10	117	& 2	3/			COM
1998 10 19.88		S	10.9	TJ	25.3	L	6	58	& 1.8	3/			VIT01
1998 10 19.88		S	11.1	TJ	25.3	L	6	58	& 2	3			PER01
1998 10 20.31		S	10.9	TJ	25.6	L	5	42	2.0	5			BIV
1998 10 20.75		S	10.7	AC	15.2	L	5	42	3.0	3			MOE
1998 10 20.80		S	11.1	AC	30.5	L	5	72	& 2.5	4			GIL01
1998 10 20.83		S	10.5	TJ	20.3	T	10	77	1.8	5			KAM01
1998 10 21.05		S	11.0	AC	40.6	L	5	70	2.0	5			BOR
1998 10 21.45		C	11.6	GA	60.0	Y	6	a120	2.2		4.5m	108	NAK01
1998 10 21.49	x	S	11.2	TT	25.4	L	4	113	1.2	4			YOS02
1998 10 21.74		M	10.9	TT	35	L	5	92	2.3	3			HOR02
1998 10 21.81		M	11.4	SE	25	L	4	64	1.5	2/			SHU
1998 10 21.83		S	10.5	NP	10	R	5	27	3	2			MAR02
1998 10 21.95		S	11.1	VB	20	R	14	110	1.3	3			SHA02
1998 10 22.76		S	11.8	HS	44.0	L	5	156	0.3	3			HAS02
1998 10 22.81		M	10.8	TT	35	L	5	92	3	3			HOR02
1998 10 23.37		B	11.1:	TJ	25.6	L	5	42	1.5	5			BIV
1998 10 23.75		S	10.7	TI	8	R	11	67	1.5	2			OKS
1998 10 23.99		S	10.7	AC	40.6	L	5	70	2.7	3			BOR
1998 10 24.08		M	10.5	NP	20	L	4	73	3.7	3			CRE01
1998 10 24.24		S	10.8	TJ	25.6	L	5	42	2.0	5			BIV
1998 10 24.80		M	11.6	SE	25	L	4	64	1	2			SHU
1998 10 25.45		S	10.3	TJ	31.7	L	6	63	3.4	3/			YOS04
1998 10 25.71		M	11.0	CD	30	L	5	60	1.5	3			NEV
1998 10 25.77		S	10.9	HS	44.0	L	5	156	0.6	4			HAS02
1998 10 25.85		S	11.4	VB	30	R	20	105	1.4	4			SHA02
1998 10 26.36		S	10.7	TJ	25.6	L	5	42	1.5	4			BIV
1998 10 26.83		S	10.7	AC	25.0	L	6	61	2.5	4			RES
1998 11 02.06		J	11.1	SC	25.4	T	5	a 60	3.47	s5	2.1m	99	ROQ

Comet C/1998 M6 (Montani)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 15.35		c	22.0	FA	91.4	L	5						SCO01
1998 07 15.37		C	19.0	FA	91.4	L	5		0.23		0.3m	183	SCO01
1998 08 02.67		C	18.7	GA	60.0	Y	6	a240	0.25				NAK01
1998 08 15.62		C	18.6	GA	60.0	Y	6	a240	0.25				NAK01
1998 08 25.61		C	18.6	GA	60.0	Y	6	a240	0.2				NAK01
1998 09 16.50		C	19.0:	GA	60.0	Y	6	a240	0.2				NAK01
1998 10 21.43		C	19.3:	GA	60.0	Y	6	a240	0.2				NAK01

Comet C/1998 P1 (Williams)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 10.52		S	9.5	AA	10.0	B		25	3	4			SEA

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 12.42		M	8.4	TI	20	L	7	45	4	5/			MAT08
1998 08 12.43		M	8.7	TT	25.4	L	6	39	4	5			DRE01
1998 08 12.69		S	8.8	S	20.0	L	8	83		2			C0002
1998 08 12.98		S	8.3	S	7.0	B		10	7.5	4			DEA
1998 08 13.42		M	8.6	TI	20	L	7	45	4	5			MAT08
1998 08 13.47		M	8.6	TT	25.4	L	6	39	4	6			DRE01
1998 08 13.66		S	8.9	AA	8.0	B		20	9	3/			PEA
1998 08 13.72		S	8.6	S	20.0	L	8	83	3.0	3			C0002
1998 08 14.34		S	8.4	S	11	L	4	16	4	4			RAE
1998 08 14.51		M	8.6	TI	20	L	7	45	4	5			MAT08
1998 08 14.67		S	8.8	AA	8.0	B		20	9.5	3			PEA
1998 08 14.70		S	8.8	S	30.7	L	9	110		3			GEY
1998 08 14.72		S	8.7	S	20.0	L	8	83	2.5	3			C0002
1998 08 14.97		S	8.3	S	7.0	B		10	7.0	4			DEA
1998 08 15.32		S	8.5	S	11	L	4	16	4	5			RAE
1998 08 15.41		M	8.6	TI	20	L	7	45	4.5	5			MAT08
1998 08 15.64		S	8.8	AA	8.0	B		20	5.5	4			PEA
1998 08 15.81		B	9.0	AA	20.0	L	8	64		2			TUR
1998 08 16.30		S	8.7	S	11	L	4	16	4	5			RAE
1998 08 16.41		M	8.7	TI	20	L	7	45	4	5			MAT08
1998 08 16.52		S	8.4	AA	8.0	B		20	8				PEA
1998 08 16.72		S	8.7	S	20.0	L	8	83		4			C0002
1998 08 16.78		B	9.0	AA	20.0	L	8	64		2			TUR
1998 08 17.36		S	8.0	TT	5.0	B		10	12	6			SEA01
1998 08 17.47		M	8.3	S	11	L	4	16	5	6			RAE
1998 08 17.71		S	8.7	S	20.0	L	8	83		4			C0002
1998 08 18.32		S	8.5	S	11	L	4	16	4.5	5			RAE
1998 08 18.36		S	9.0	VN	25.4	L	6	61	2	4			SEA01
1998 08 18.41		M	8.6	TI	20	L	7	45	4	5			MAT08
1998 08 18.94		S	8.3	S	7.0	B		10	6.4	4			DEA
1998 08 19.38		S	7.5	AA	8.0	B		15	12	6			SEA01
1998 08 19.96		S	8.2	S	7.0	B		10	5.1	4			DEA
1998 08 20.25		S	8.9:	TJ	25.6	L	5	42	3.0	5			BIV
1998 08 20.31		S	8.2:	TT	11	L	4	16	4	5			RAE
1998 08 20.92		S	9.5	AA	25.0	L		46	4	1			KRY02
1998 08 21.00		S	9.3	AA	21.0	L		80	5	2			FRE01
1998 08 21.31		M	8.0	S	11	L	4	16	4	5			RAE
1998 08 21.46		M	7.8	S	5.0	B		10	7	4			RAE
1998 08 21.71		S	8.2	S	20.0	L	8	83		5			C0002
1998 08 22.32		M	7.8	S	5.0	B		10	8.5	4			RAE
1998 08 22.36		S	7.3	TT	5.0	B		10	10	6			SEA01
1998 08 22.48		S	7.8	VN	8.0	B		20		4			WIL02
1998 08 23.41		S	7.8	VN	8.0	B		20		4			WIL02
1998 08 23.43		M	7.8	AA	10.0	B		25	4	6			SEA
1998 08 23.71		S	7.7	S	20.0	L	8	83	2.0	5			C0002
1998 08 24.35		S	7.3	TT	5.0	B		10	8	4			SEA01
1998 08 24.40		S	7.8	VN	8.0	B		20		4			WIL02
1998 08 24.54		S	8.2	AA	8.0	B		20	7	4			PEA
1998 08 24.95		S	8.7	AA	21.0	L		80	4	3			FRE01
1998 08 24.97		S	8.9	AA	25.0	L		46	3	2			KRY02
1998 08 25.36		S	7.4	TT	5.0	B		10	7	4			SEA01
1998 08 25.50		M	7.8	TI	20	L	7	45	5	5			MAT08
1998 08 25.72		S	7.8	S	20.0	L	8	83	2.3	5			C0002
1998 08 25.95		S	8.8	AA	21.0	L		80	3	3			FRE01
1998 08 25.96		S	9.3	AA	20.0	L	6	170	4	3			TR002
1998 08 25.98		S	9.2	AA	25.0	L		46	3	2			KRY02
1998 08 26.38		S	7.6	VN	8.0	B		20		3			WIL02
1998 08 26.52		M	8.0	TI	20	L	7	45	6	5			MAT08
1998 08 26.96		S	8.2	AA	8.0	B		20	4	5			LOU
1998 08 27.35		S	7.4	TT	5.0	B		10	3.5	2			SEA01
1998 08 28.05		S	9.5:	AC	5.0	R	12	50	& 2	0/			AM001
1998 08 28.35		M	8.4	TT	11	L	4	16	5.5	5			RAE
1998 08 28.70		S	7.8	S	20.0	L	8	83		5			C0002
1998 08 29.35		S	7.5	TT	8.0	B		15	3.8	2			SEA01
1998 08 29.39		M	7.9	AA	10.0	B		25	4	4			SEA

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 29.39		M	7.9	AA	10.0	B		25	4	4			SEA
1998 08 29.97		S	8.9	AA	25.0	L		46	4	0			KRY02
1998 08 30.32		M	8.1	TT	11	L	4	16	5.5	5/			RAE
1998 08 30.95		S	8.7	AA	21.0	L		80					FRE01
1998 08 30.99		S	9.5:	AC	5.0	R	12	50	& 1	0/			AM001
1998 08 31.33		M	8.2	TT	11	L	4	16	5	5			RAE
1998 08 31.71		S	8.0	S	20.0	L	8	83	1.8	4			C0002
1998 08 31.98		S	9.0	AA	20.0	L	6	100	3	2			TR002
1998 09 02.72		S	8.2	S	20.0	L	8	83		4			C0002
1998 09 04.33		M	8.0	TT	11	L	4	16	5	5			RAE
1998 09 06.95		S	9.0	AA	21.0	L		80		0			FRE01
1998 09 06.97		S	8.8	AA	25.0	L		46	5	0			KRY02
1998 09 08.37		M	8.1	AA	10.0	B		25					SEA
1998 09 08.37		M	8.1	AA	10.0	B		25					SEA
1998 09 09.34		M	8.5	TT	11	L	4	16	4	4			RAE
1998 09 09.40		M	8.2	AA	10.0	B		25					SEA
1998 09 09.93		S	8.6	AA	25.0	L		46	5	0			KRY02
1998 09 10.33		M	8.2	TT	11	L	4	16	4	5			RAE
1998 09 10.43		M	8.3	TI	20	L	7	45	3.5	6			MAT08
1998 09 10.43		M	8.3	TI	20	L	7	45	3.5	6			MAT08
1998 09 11.33		M	8.1	TT	11	L	4	16	4	5/			RAE
1998 09 12.31		M	8.2	TT	11	L	4	16	4	5			RAE
1998 09 14.31		M	8.1	TT	11	L	4	16	4	5			RAE
1998 09 14.93		S	8.5	AA	25.0	L		46	5	0			KRY02
1998 09 15.40		M	8.2	AA	10.0	B		25					SEA
1998 09 15.41		S	8.4	AA	25.4	L	6	61	2.2	6	10 m		SEA01
1998 09 16.42		M	8.3	TI	20	L	7	45	3.5	6			MAT08
1998 09 17.37		S	8.8	AA	25.4	L	6	61	2.2	5			SEA01
1998 09 19.36		S	9.0	AA	25.4	L	6	61	2.1	4			SEA01
1998 09 19.42		M	8.4	TI	20	L	7	45	3.5	6			MAT08
1998 09 20.33		S	8.2:	TT	11	L	4	16	3.5	5			RAE
1998 09 20.38		M	8.9	AA	25.4	L	6	61	1.4	4	8 m		SEA01
1998 09 22.33		M	8.3	TT	11	L	4	16	3.5	5			RAE
1998 09 22.38		S	9.2	AA	25.4	L	6	61	1.4	3			SEA01
1998 09 23.37		S	8.6	AA	25.4	L	6	61	1.5	2			SEA01
1998 09 27.38		S	8.9	AA	25.4	L	6	61	1.4	4			SEA01
1998 10 04.63		S	9.2	AC	7.2	R	6	80		4			LAN02

Comet C/1998 Q1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 25.91	!	V	15.5	YF	36.0	T	7	a120	+ 0.6	6			MIK
1998 08 26.90		S	14.6	HS	44.0	L	5	222	0.3	4			HAS02
1998 08 29.89		S	14.9	HS	35	L	5	207	0.8	3			HOR02
1998 08 29.95		S	14.0	AC	25.0	L	6	200	0.2	3			RES
1998 08 31.64		C	15.6:	GA	60.0	Y	6	a240	0.6				NAK01
1998 09 02.70		C	15.7	GA	60.0	Y	6	a120	0.6				NAK01
1998 09 16.56		C	16.0	GA	60.0	Y	6	a240	0.65				NAK01
1998 09 17.57		C	16.2	GA	60.0	Y	6	a240	0.6				NAK01

Comet C/1998 T1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 13.85		S	14.3	HS	35	L	5	207	0.8	2/			HOR02
1998 10 13.90	!	V	16.6	YF	36.0	T	7	a180	+ 0.3	8			MIK
1998 10 14.63		C	16.1	GA	60.0	Y	6	a240	0.45				NAK01
1998 10 15.89	!	V	16.4	YF	36.0	T	7	a180	+ 0.3	8			MIK
1998 10 21.58		C	16.2	GA	60.0	Y	6	a120	0.4				NAK01
1998 10 21.83		S	13.9	HS	35	L	5	207	0.9	2			HOR02
1998 10 24.57		C	16.1	GA	60.0	Y	6	a120	0.4		0.5m	59	NAK01
1998 10 24.99		S	13.5	HS	25.0	L	6	121	0.7	2/			RES
1998 10 26.91		S	13.5	HS	25.0	L	6	121	0.7	2			RES
1998 10 29.59		C	16.1	GA	60.0	Y	6	a120	0.5		0.6m	57	NAK01

Comet C/1998 U1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 24.66		C	18.4	GA	60.0	Y	6	a240	0.25				NAK01
1998 10 29.70		C	18.8:	GA	60.0	Y	6	a240	0.25				NAK01

Comet C/1998 U5 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 01.18		S	12.3	VB	30	R	20	105	1.3	4			SHA02

Comet 2P/Encke

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 09 08.51		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1994 10 02.44		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 10 17.44		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 12 03.49		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 4P/Faye

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 11 10.85		M	10.8	HS	20	R	17	87	1.7	5			LEH
1991 11 24.76		M	10.8	TI	20	R	17	87	1	5			LEH
1991 12 02.80		M	11.9	TI	20	R	17	87	1.5	3			LEH
1991 12 08.91		M	12.1	HS	20	R	17	87	1	2			LEH
1991 12 09.81		M	12.0	TI	20	R	17	87	1	2			LEH
1991 12 11.83		M	11.6	TI	20	R	17	87	1.5	3			LEH
1998 07 27.24		c	18.7	FA	91.4	L	5						SC001
1998 07 27.25		C	17.3	FA	91.4	L	5		0.23		0.9m	231	SC001
1998 07 30.63		C	17.0:	GA	60.0	Y	6	a240	0.3				NAK01
1998 08 15.60		C	16.9	GA	60.0	Y	6	a240	0.3				NAK01
1998 08 25.59		C	16.5	GA	60.0	Y	6	a240	0.35				NAK01
1998 09 09.47		C	16.4	GA	60.0	Y	6	a120	0.35				NAK01
1998 09 16.47		C	16.1	GA	60.0	Y	6	a120	0.35				NAK01
1998 10 09.46		C	16.0	GA	60.0	Y	6	a120	0.45			95	NAK01
1998 10 15.10		c	19.0	FA	91.4	L	5						SC001
1998 10 15.11		C	15.6	FA	91.4	L	5		0.25		36.6s	81	SC001
1998 10 21.42		C	15.8	GA	60.0	Y	6	a120	0.45				NAK01

Comet 6P/d'Arrest

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 04 07.78		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 7P/Pons-Winnecke

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 03 20.55		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 04 03.53		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 04 20.55		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 05 18.52		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 06 20.49		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 8P/Tuttle

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 11 03.43		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1993 12 08.43		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1994 01 05.44		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1994 01 30.44		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1994 02 02.43		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 9P/Tempel 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 12.89		S	10.0	AA	8.0	B		15	2				HAV
1993 10 27.83		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 9P/Tempel 1 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 11 14.82		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1994 06 12.91		M	10.6	TI	20	R	17	87	3.5	3/			LEH
1995 08 07.76		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 10P/Tempel 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 02 24.44		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 15P/Finlay

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 10 26.79		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 10 27.80		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 16P/Brooks 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 05 06.79		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 19P/Borrelly

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 09 10.06		M	11.2	TI	20	R	17	140	2.5	4			LEH
1994 09 11.05		M	11.1	TI	20	R	17	140	3	4/			LEH

Comet 21P/Giacobini-Zinner

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 05 31.93		B	14.9	HS	42	L	5	162	0.6	4			LEH
1998 06 02.94		B	14.8	HS	42	L	5	162	0.8	4			LEH
1998 06 20.94		B	14.7	HS	42	L	5	162	0.9	4			LEH
1998 06 21.96		B	14.5	HS	42	L	5	162	0.8	3			LEH
1998 06 25.95		B	14.6	HS	42	L	5	162	0.8	4			LEH
1998 07 19.12		S	[13.7	AC	40.6	L	5	170					BOR
1998 07 19.90		B	14.2	HS	42	L	5	162	1.3	3/			LEH
1998 07 20.91		B	14.3	HS	42	L	5	162	1.3	3			LEH
1998 07 24.88		B	14.1	HS	42	L	5	162	1.4	3			LEH
1998 07 24.95		S	13.7:	AC	30.5	T	10	78	& 1	4			COM
1998 07 25.92		S	13.0:	AC	25.4	L	5	104	0.7	2/			MEY
1998 07 26.88		B	14.1	HS	42	L	5	162	1.4	3/			LEH
1998 07 29.41		S	13.7	HS	25.6	L	5	169	0.6	5			BIV
1998 07 30.45		S	13.6	HS	25.6	L	5	169	0.6	5			BIV
1998 07 30.58		C	14.1:	GA	60.0	Y	6	a120	1.3		1.3m	128	NAK01
1998 07 30.90		S	12.8	HS	44.5	L	4	230	1.5	4/			SAN07
1998 07 30.90		S	13.3	HS	44.5	L	4	230	1	4			SAR02
1998 07 31.90		B	13.8	HS	42	L	5	162	1.4	3/			LEH
1998 07 31.94		S	13.4	AC	25.0	L	6	121	0.9	2/			RES
1998 08 01.97		S	13.1	AC	25.0	L	6	121	0.8	2			RES
1998 08 02.92		S	13.3:	VB	30	R	20	185	0.6	3			SHA02
1998 08 10.85		M	13.3	HS	42	L	5	140	1.6	4			LEH
1998 08 10.87		S	12.6	AC	25.0	L	6	121	1	2/			RES
1998 08 11.31		S	13.3	HS	25.6	L	5	169	1.0	4			BIV
1998 08 11.84		M	13.0	HS	42	L	5	140	1.8	4			LEH
1998 08 11.89		S	13.5	VB	30	R	20	185	0.8	3			SHA02
1998 08 12.30		S	13.3	HS	25.6	L	5	169	1.0	5			BIV
1998 08 13.33		S	13.1	HS	25.6	L	5	169	1.0	5			BIV
1998 08 13.87		S	12.4	AC	25.0	L	6	61	1.2	2/			RES
1998 08 13.89		S	13.0	AC	25.4	J	6	100	1.1	1/			BOU
1998 08 14.83		M	12.6	HS	42	L	5	140	2.0	4			LEH
1998 08 15.19		J	11.7	SC	25.4	T	5	a 60	2.20	s3	2.5m	118	ROQ
1998 08 15.30		S	12.2	HS	25.6	L	5	84	1.5	4			BIV
1998 08 15.46		S	[12.5:		20	L	7	158					MAT08
1998 08 15.84		M	12.6	HS	42	L	5	81	2.3	4			LEH
1998 08 15.89		S	12.8	GA	25.4	J	6	100	1.5	1/			BOU

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 16.32		B	12.1	HS	25.6	L	5	84	1.2	5			BIV
1998 08 16.83		M	12.5	HS	42	L	5	81	2.3	4			LEH
1998 08 16.92		S	12.7	AC	25.4	J	6	100	1.4	1/			BOU
1998 08 17.83		M	12.4	HS	42	L	5	81	2.4	4			LEH
1998 08 17.86		S	12.2	AC	25.4	L	5	65	2.1	2/			MEY
1998 08 17.88		S	12.2	AC	25.0	L	6	61	1.4	2			RES
1998 08 17.98		S	12.2	NP	32	L	5	75	1.5	1			MAR02
1998 08 17.98		S	12.4	NP	32	L	5	75	2	2			SAN04
1998 08 18.88		S	12.1	AC	25.4	L	5	65	1.7	1/			MEY
1998 08 18.92		S	11.5	NP	32	L	5	75	3	2			SAN04
1998 08 18.92		S	11.7	NP	32	L	5	75	2.5	2/			MAR02
1998 08 18.94		S	12.5	AC	25.4	J	6	100	1.6	1/			BOU
1998 08 19.32		S	12.3	HS	25.6	L	5	84	1.3	4			BIV
1998 08 19.84		M	12.0	HS	42	L	5	81	2.4	4			LEH
1998 08 19.84		S	12.2	TI	35	L	5	92	1.5	2			HOR02
1998 08 19.86		S	12.0	AC	25.4	L	5	65	3.0	2/			MEY
1998 08 19.88		S	11.8	AC	25.0	L	6	61	1.8	2			RES
1998 08 19.99		M	11.7	NP	32	L	5	75	> 1.5	3			MAR02
1998 08 19.99		S	11.4	NP	32	L	5	75	> 1.5	1/			SAN04
1998 08 20.32		S	12.2	HS	25.6	L	5	84	1.5	5			BIV
1998 08 20.50		M	12.4	HS	25.0	L	6	120	1.3	4			TSU02
1998 08 20.82		M	11.7	HS	42	L	5	81	2.4	3/			LEH
1998 08 20.85		S	12.6	HS	20	L	5	70	1.0	2			BAR06
1998 08 20.88		S	11.7	AC	25.0	L	6	61	1.6	2			RES
1998 08 21.99		M	10.8	NP	10	R	5	27	2.5	2/			MAR02
1998 08 22.91		S	12.4	VB	30	R	20	185	1.1	3			SHA02
1998 08 22.92		M	11.2	NP	32	L	5	75	3.5	4			MAR02
1998 08 23.86		S	11.1	AC	25.0	L	6	61	2.2	2			RES
1998 08 23.90		S	12.2	HS	20	L	5	70	1.2	2			BAR06
1998 08 24.31		S	12.5	HS	25.6	L	5	84	1.3	5			BIV
1998 08 24.81		M	11.9	HS	42	L	5	81	2.5	3/			LEH
1998 08 24.89		S	12.5	VB	33	L	5	75	1.3	3			SHA02
1998 08 24.91		S	11.1	AC	25.0	L	6	61	2.4	2			RES
1998 08 25.82		M	11.1	TI	35	L	5	92	2.3	2			HOR02
1998 08 25.84		S	11.6	TI	10	B		25	1.7	4			ZNO
1998 08 25.93		S	11.9	HS	20	L	5	70	2	2			BAR06
1998 08 26.81		S	11.6	TI	10	B		25	2.2	4			ZNO
1998 08 26.83		S	12.2	HS	20.3	T	10	93	1.1	3			HAS02
1998 08 27.13		J	11.9	SC	25.4	T	5	a 60	3.73	s3	1.9m	101	ROQ
1998 08 27.82		M	11.1	TI	42	L	5	81	2.6	4/			LEH
1998 08 27.88		S	11.0	AC	25.0	L	6	61	2.3	2			RES
1998 08 28.06		S	11.6	AC	40.6	L	5	90	1.4	3			BOR
1998 08 28.36		S	11.6	HS	25.6	L	5	42	2.0	3			BIV
1998 08 28.84		M	11.0	TT	35	L	5	92	1.9	2/			HOR02
1998 08 29.84		S	11.0	TT	35	L	5	92	1.6	2/			HOR02
1998 08 29.86		M	11.1	TI	42	L	5	81	2.3	4			LEH
1998 08 29.90		S	10.8	AC	25.0	L	6	37	2.2	2			RES
1998 08 30.13		c	17.1	FA	91.4	L	5						SC001
1998 08 30.15		C	13.0	FA	91.4	L	5		1.87		309.0s	103	SC001
1998 08 30.80		M	10.9	TI	42	L	5	81	2.2	4			LEH
1998 08 30.90		S	11.4	TI	35	L	5	92	1.6	2			HOR02
1998 08 30.93		S	11.5	AC	25.4	J	6	88	1.8	3			BOU
1998 08 31.92		S	10.8	AC	25.0	L	6	61	2.2	2			RES
1998 09 01.95		S	10.7	AC	25.0	L	6	61	2.2	1/			RES
1998 09 08.25		S	11.3	HS	25.6	L	5	42	1.5	4			BIV
1998 09 08.49		C	12.2	GA	20.3	T	9	a 60	1.2				SUZ02
1998 09 08.78		S	10.7	TI	20	L	5	70	3	2/			BAR06
1998 09 08.86		S	10.5	AC	25.0	L	6	61	2.0	2			RES
1998 09 09.43		H	11.9	LA	50.0	C	12	a180	0.94	5	2.1m	93	FUK02
1998 09 09.45		C	12.0	GA	60.0	Y	6	a120	2.1		2.8m	99	NAK01
1998 09 09.79		M	11.1	TI	35	L	5	92	2.4	3/			HOR02
1998 09 10.43		H	12.0	LA	50.0	C	12	a180	0.94	5	2.1m	93	FUK02
1998 09 10.47		S	11.4	HS	20	L	7	45	2	3			MAT08
1998 09 10.47		S	11.4	HS	20	L	7	45	2	3			MAT08
1998 09 10.79		S	10.4	TI	11	L	7	50	3.5	3/			BAR06

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 10.79		S	10.5	TI	20	L	5	70	3.5	3			BAR06
1998 09 10.82		S	11.5	AA	15.0	R	15	141	1.0	1			DIE02
1998 09 10.83	x	S	10.9	TT	25.4	J	6	72	2.0	3/			BOU
1998 09 10.91		S	10.9	TJ	25.3	L	6	58	& 2	2			PER01
1998 09 10.91		S	10.9	TJ	25.3	L	6	58	& 2	3/			VIT01
1998 09 11.11		J	11.2	SC	25.4	T	5	a 60	1.55	s3/	1.8m	97	ROQ
1998 09 11.27		S	11.2	TJ	25.6	L	5	42	2.0	5	2.5m	90	BIV
1998 09 11.80		S	10.4	TI	20	L	5	70	3	2/			BAR06
1998 09 11.81		S	10.3	TI	11	L	7	50	4	3			BAR06
1998 09 11.83	x	M	10.9	TT	25.4	J	6	72	2.5	4			BOU
1998 09 11.85		S	11.3	AC	30.5	T	10	78	& 3	2			COM
1998 09 12.86		S	10.8	TJ	25.3	L	6	58	& 2	3			PER01
1998 09 12.86		S	10.9	TJ	25.3	L	6	58	& 2	3			VIT01
1998 09 12.92		S	11.0	NP	10	R	5	27	3.5	2			MAR02
1998 09 12.92		S	11.0	NP	10	R	5	27	4	1			DES01
1998 09 13.28		B	11.0	TJ	25.6	L	5	42	2.0	6	2.5m	80	BIV
1998 09 13.77	a	M	10.9	CD	30	L	5	60	3.5	s5			NEV
1998 09 13.77	a	M	10.9	CD	30	L	5	60	3.5	s5			NEV
1998 09 13.84		S	11.1	AC	30.5	T	10	78	& 2	2			COM
1998 09 13.84	x	M	10.8	TT	25.4	J	6	72	2.5	4			BOU
1998 09 14.03		S	10.8	TI	40.6	L	5	70	2.3	3			BOR
1998 09 15.18		S	10.8	AC	20.0	T	10	125	2.4	3			SPR
1998 09 15.33		S	11.1	TJ	25.6	L	5	42	1.8	6	2.0m	85	BIV
1998 09 16.16		S	10.6	AC	20.0	T	10	102	2.6	3/			SPR
1998 09 16.42		H	11.7	LA	50.0	C	12	a180	1.12	4	2.2m	90	FUK02
1998 09 16.44		S	11.3	HS	20	L	7	45	2	3			MAT08
1998 09 16.46		H	11.7	LA	50.0	C	12	a180	1.12	4	2.2m	90	FUK02
1998 09 16.86		S	10.6:	TI	11	L	7	50	3	2/			BAR06
1998 09 16.87		S	10.8	TJ	25.3	L	6	58	& 1.6	3			PER01
1998 09 16.87		S	10.8	TJ	25.3	L	6	58	& 1.7	3/			VIT01
1998 09 16.88		S	10.4	NP	32	L	5	75	2	2			MAR02
1998 09 17.44		C	11.3	GA	60.0	Y	6	a120	2.7		3.4m	95	NAK01
1998 09 17.49	x	S	11.1:	TT	10.0	B		37	3				YOS02
1998 09 18.03		S	10.4	TI	40.6	L	5	70	2.5	4/			BOR
1998 09 18.29		S	11.0	TJ	25.6	L	5	42	2.5	5			BIV
1998 09 18.80		S	10.7	HS	25.0	C	5	39	2	1			CHE03
1998 09 19.03		S	10.3	TI	40.6	L	5	70	2.0	4			BOR
1998 09 19.04		M	10.7	NP	20	L	4	31	2.0	3			CRE01
1998 09 19.32		B	10.9	TJ	25.6	L	5	42	2.5	5			BIV
1998 09 19.38		S	11.5	VN	25.4	L	6	61	1.3	1			SEA01
1998 09 19.41		H	11.5	LA	50.0	C	12	a180	1.73	4	3.9m	88	FUK02
1998 09 19.44		S	11.0	HS	20	L	7	45	2.5	3			MAT08
1998 09 19.79		M	10.6	TT	35	L	5	92	2.5	3/			HOR02
1998 09 19.79		S	10.2	AC	25.0	L	6	61	2.7	2/			RES
1998 09 19.81		S	10.4	HS	25.0	C	5	39	2	1			CHE03
1998 09 20.09		J	10.3	SC	25.4	T	5	a 60	3.55	s5	1.8m	90	ROQ
1998 09 20.28		S	10.8	TJ	25.6	L	5	42	2.5	6	3.0m	85	BIV
1998 09 20.38		S	11.5	VN	25.4	L	6	61	1.2	1			SEA01
1998 09 20.45		H	11.5	LA	50.0	C	12	a180	1.92	4	4.4m	88	FUK02
1998 09 20.48		S	11.1	HS	25.4	T	6	116	1.0	4			YOS04
1998 09 20.48		S	11.4	HS	31.7	L	6	63	1.7	4			MIY01
1998 09 20.79		M	10.6	TT	35	L	5	92	3.1	3/			HOR02
1998 09 20.79		S	10.2	AC	25.0	L	6	61	2.7	2/			RES
1998 09 21.76	a	M	10.3	CD	30	L	5	60	3.5	d5			NEV
1998 09 21.77		S	10.4	TT	35	L	5	92	2.9	3/			HOR02
1998 09 21.80		S	10.3	TI	20	L	5	70	4	2/			BAR06
1998 09 21.81		B	10.5	HS	35.0	M	4	55	2	1			CHE03
1998 09 21.82		S	10.0	AC	25.0	L	6	61	2.5	2/			RES
1998 09 21.88		M	10.0	SE	25	L	4	64	2.5	3/			SHU
1998 09 21.89		B	10.6	HS	40.6	T	10	65	2.5	2			CHE03
1998 09 22.38		S	11.3	VN	25.4	L	6	61	1.2	2			SEA01
1998 09 22.77		M	10.4	TT	35	L	5	92	2.7	3/			HOR02
1998 09 22.78	x	M	10.3	HV	25.4	L	5	65	2.4	D4/			MEY
1998 09 22.81		S	10.2	TI	11	L	7	50	3.5	2/			BAR06
1998 09 22.81		S	10.3	TI	20	L	5	70	2.6	3			BAR06

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 22.81	x	M	10.4	TT	25.4	J	6	58	2.8	3/			BOU
1998 09 22.83		S	10.9	AC	30.5	T	10	117	& 2.5	3/			COM
1998 09 23.18		S	10.4	AC	20.0	T	10	102	2.7	3			SPR
1998 09 23.38		S	11.2	VN	25.4	L	6	61	1.4	3			SEA01
1998 09 23.75	a	M	10.3	CD	30	L	5	60	3.5	4			NEV
1998 09 23.80		M	10.4	TT	35	L	5	92	3.0	3			HOR02
1998 09 23.81		S	10.1	TI	11	L	7	50	2	2			BAR06
1998 09 23.81	x	S	10.3	TT	25.4	J	6	72	2.8	3/			BOU
1998 09 23.82		S	9.8	TJ	20.3	T	10	77	1.9	2			KAM01
1998 09 24.02		S	10.2	TI	40.6	L	5	70	2.4	5			BOR
1998 09 24.04		M	10.6	NP	20	L	4	31	2.8	2/			CRE01
1998 09 24.32		S	10.4	TJ	25.6	L	5	42	3.0	3/			BIV
1998 09 24.78		S	9.9	TI	10	B		25	4	2/			ZN0
1998 09 24.79		M	10.4	TT	35	L	5	92	2.8	3/			HOR02
1998 09 24.80		S	10.2	TI	20	L	5	70	3.4	s4			BAR06
1998 09 24.80		S	10.7	HS	25.4	L	6	104	1.8	4/			SAR02
1998 09 24.81		S	10.8	AC	30.5	T	10	117	& 2.5	3			COM
1998 09 24.82		S	10.0	AC	25.0	L	6	61	2.5	2/			RES
1998 09 24.82	x	M	10.2	TT	25.4	J	6	72	2.6	4			BOU
1998 09 25.10		J	10.9	SC	25.4	T	5	a 60	4.59	s6	3.5m	91	ROQ
1998 09 25.79		M	10.3	HS	25.4	L	6	104	2.5	5			SAR02
1998 09 25.79	a	M	10.5	CD	30	L	5	60	3	s5			NEV
1998 09 25.81		S	10.1	TI	20	L	5	70	3.1	s4			BAR06
1998 09 25.82	x	S	10.2	HV	10.0	B		20	4	3			MEY
1998 09 25.83	a	M	9.9	SE	25	L	4	64	2	3			SHU
1998 09 25.92		S	10.7	TJ	25.3	L	6	58	& 2.2	3			VIT01
1998 09 25.92		S	10.8	TJ	25.3	L	6	58	& 2.2	3			PER01
1998 09 26.78		M	10.2	TT	35	L	5	92	2.9	3			HOR02
1998 09 26.82		S	9.8	AC	25.0	L	6	61	2.4	2/			RES
1998 09 27.27		S	10.5	TJ	25.6	L	5	42	3.0	4			BIV
1998 09 29.02		S	9.9	TI	40.6	L	5	70	2.2	4			BOR
1998 09 30.02		S	9.8	TI	40.6	L	5	70	2.1	5			BOR
1998 10 02.45		V	11.3	LA	50.0	C	12	a180	2.39	4	> 8.7m	82	FUK02
1998 10 07.43		S	10.2	TI	20	L	7	45	2.5	4			MAT08
1998 10 07.50		S	10.2	VN	41	L	4	90	2.2	4			PEA
1998 10 08.25		S	10.2	TJ	25.6	L	5	42	3.5	5	0.05	80	BIV
1998 10 08.41		V	11.0	LA	50.0	C	12	a180	2.54	4	> 8.3m	77	FUK02
1998 10 08.41	x	S	10.2	TJ	10.0	B		20	2.8	5			NAG08
1998 10 08.43	x	M	9.9	TT	25.4	L	4	81	3.0	4	6 m	75	YOS02
1998 10 08.44		S	10.3	HS	15.0	B		25	2.5	4			HAS08
1998 10 08.82		S	10.1	TT	25.3	L	6	58	& 3	3			PER01
1998 10 08.84		S	9.8	TT	10.0	B		14	& 4	4			PER01
1998 10 09.25		S	10.0	TJ	25.6	L	5	42	4.0	5	0.1	80	BIV
1998 10 09.42	x	S	10.0:	TJ	10.0	B		20	& 3	5			NAG08
1998 10 09.43		C	10.9	GA	60.0	Y	6	a 60	2.5		5.1m	76	NAK01
1998 10 09.44		S	10.2	HS	31.7	L	6	63	1.7	4			MIY01
1998 10 09.44		S	10.2	TI	20	L	7	45	2.5	4			MAT08
1998 10 09.87		S	10.0	TT	25.3	L	6	58	& 3	4/			PER01
1998 10 09.87		S	10.2	TT	25.3	L	6	58	> 2	4			VIT01
1998 10 09.88		S	9.8	TT	10.0	B		14	& 4	4/			PER01
1998 10 09.88		S	9.9	TT	10.0	B		14	& 3	2/			VIT01
1998 10 10.09		J	9.2	SC	25.4	T	5	a 60	4.59	s6	3.3m	83	ROQ
1998 10 10.50		S	9.9	VN	41	L	4	90	2.5	5			PEA
1998 10 10.82		S	10 :	AC	20.3	T	10	79	& 3	5			COM
1998 10 10.84		S	8.6:	VT	33	L	5	60	1.4	2			SHA02
1998 10 11.04		M	9.8	NP	20	L	4	38	3.8	4			CRE01
1998 10 11.41		V	10.6	LA	50.0	C	12	a180	2.59	4	> 9.5m	78	FUK02
1998 10 11.45		C	10.8	GA	20.3	T	9	a 60	1.5		>0.03	82	SUZ02
1998 10 11.80		S	9.5	VT	33	L	5	60	1.8	5			SHA02
1998 10 11.82		S	9.6	TT	10.0	B		14	& 5	5			PER01
1998 10 11.82		S	9.8	TT	10.0	B		14	& 3.5	3			VIT01
1998 10 11.83		S	9.8:	AC	30.5	T	10	117	& 3	5			COM
1998 10 12.01		S	9.6	TI	40.6	L	5	70	2.7	6	0.1	60	BOR
1998 10 12.41		S	9.8	AA	10.0	B		25					SEA
1998 10 12.77	x	M	9.7	TT	25.4	J	6	58	2.7	5			BOU

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 12.79		S	9.9	AC	20.3	T	10	79	& 3	5			COM
1998 10 12.82		S	9.4	AC	6.0	B		20	2.5	3			RES
1998 10 13.45		S	9.8	TI	20	L	7	45	2.5	4/			MAT08
1998 10 13.77		S	9.7	TT	10.0	B		25	4.6	3			HAS02
1998 10 13.78	a	S	9.6	NP	8.0	B		20	3.6	3			OKS
1998 10 13.80		M	9.2	TT	35	L	5	92	4	4	0.12	85	HOR02
1998 10 13.81		S	9.3	AC	25.0	L	6	61	2.8	4	0.2	75	RES
1998 10 13.81		S	9.4	AC	6.0	B		20	2	2			RES
1998 10 13.82		S	9.6	TT	10.0	B		14	& 4.5	5			PER01
1998 10 14.43		M	9.9	AA	10.0	B		25					SEA
1998 10 14.76		S	9.8	AC	30.5	T	10	117	& 3	5			COM
1998 10 14.77	a	M	9.7	CD	30	L	5	60	4.5	s6			NEV
1998 10 14.78		M	9.7	SE	25	L	4	64	4	s5			SHU
1998 10 14.78	x	M	9.7	TT	25.4	J	6	58	2.5	5			BOU
1998 10 14.80		S	9.6	TI	20	L	5	70	3.0	4/	0.1	75	BAR06
1998 10 14.85		S	9.5	TT	10.0	B		14	& 5	3			PER01
1998 10 14.85		S	9.6	TT	10.0	B		14	& 3.5	3/			VIT01
1998 10 14.99		S	9.6	TI	40.6	L	5	70	2.3	6	&0.05	60	BOR
1998 10 15.45		S	9.9	TI	20	L	7	45	2.5	5			MAT08
1998 10 15.78		S	9.4	AA	15.0	R	15	141	4.0	6			DIE02
1998 10 15.81		S	9.5	AC	12.0	B		20	4.5	7			LOO01
1998 10 15.83		B	10.0	AA	19.5	L	5	50	2.5	4			GAS01
1998 10 16.11		S	9.4	AA	20.0	T	10	64	3.0	4			SPR
1998 10 16.74		S	9.3	HS	44.5	L	5	64	1.7	6	0.07	80	KAR02
1998 10 16.75		S	9.5	TI	20	L	5	70	3.0	4/	0.1	85	BAR06
1998 10 16.75		S	9.5:	NP	8.0	B		20	3.8	3	0.08	54	OKS
1998 10 16.75	a	M	9.7	CD	30	L	5	60	4	s6			NEV
1998 10 16.77		M	9.8	SE	25	L	4	64	3	s5	5 m	70	SHU
1998 10 16.78		M	10.3	SE	19	L	5	60	2.3	3/			NEK
1998 10 16.82		S	9.2	AC	25.0	L	6	61	3.5	3/			RES
1998 10 16.85		S	9.6	TT	10.0	B		14	& 4	4			VIT01
1998 10 16.85		S	9.6	TT	10.0	B		14	& 4	5/			PER01
1998 10 17.72		S	9.7	AA	6.3	R	13	52	4	5			KOS
1998 10 17.75		M	9.5	TI	10	B		25	4.5	2/	0.2	80	ZNO
1998 10 17.75		S	9.1:	TT	10	B		25	4.5	2/			HOR02
1998 10 17.75		S	9.6	TI	11	L	5	50	3.2	4	0.1	85	BAR06
1998 10 17.77	x	M	9.5	TT	25.4	J	6	58	3.0	4/			BOU
1998 10 17.78		S	9.8	AC	20.3	T	10	80	& 3	5			COM
1998 10 17.79		S	10.3	VT	22	L	7	64	1.1	s3			TAY
1998 10 18.12		S	9.2	AA	10.0	R	5	27	3.0	3			SPR
1998 10 18.27		S	9.6	TJ	25.6	L	5	42	4.0	5	0.1	80	BIV
1998 10 18.35		S	9.7:	TT	11	L	4	16	2	5			RAE
1998 10 18.40	x	S	10.0	TJ	10.0	B		20	3	5			NAG08
1998 10 18.41		V	10.3	LA	50.0	C	12	a180	2.24	5	> 9.9m	70	FUK02
1998 10 18.76	x	M	9.5	TT	25.4	J	6	72	2.8	4/			BOU
1998 10 18.77		S	9.7	TT	12.5	R	5	25	3	6			GIL01
1998 10 18.78		S	9.4	TT	20.3	T		67	3	7	0.1	60	LUE
1998 10 18.79		S	9.7	AC	30.5	T	10	56	& 3	5/			COM
1998 10 18.80		S	8.8	AC	6.0	B		20	4	2/			RES
1998 10 18.80		S	8.9	AC	25.0	L	6	61	3.5	3/			RES
1998 10 18.80		S	9.5	VT	33	L	5	45	3.5	4			SHA02
1998 10 18.80		S	9.6	AC	25.0	L	4	53	4.0	6			LOO01
1998 10 19.50		S	10.0	VN	41	L	4	90	1.9	5/			PEA
1998 10 19.70	a	M	9.8	CD	30	L	5	60	3	s6	6 m	82	NEV
1998 10 19.76	x	M	9.4	TT	25.4	J	6	58	3.0	5			BOU
1998 10 19.82		S	9.3	TT	10.0	B		14	& 5	4/			PER01
1998 10 19.82		S	9.5	TT	10.0	B		14	& 5	3			VIT01
1998 10 19.82		S	9.7	AC	30.5	T	10	56	3	5			COM
1998 10 19.90		B	9.8	AA	19.5	L	5	50	2.0	4			GAS01
1998 10 20.00		S	9.5	TI	40.6	L	5	70	2.6	6	0.1	65	BOR
1998 10 20.08		J	9.7	SC	25.4	T	5	a 60	4.42	s5/	4.2m	79	ROQ
1998 10 20.26		B	9.7	TJ	25.6	L	5	42	3.5	6	0.15	70	BIV
1998 10 20.74		M	9.6	TT	35	L	5	92	3.8	3/	0.12	70	HOR02
1998 10 20.74		S	9.8	AC	15.2	L	5	42	3.5	3			MOE
1998 10 20.77		S	9.6:	TT	12.5	R	5	42	& 3	4			GIL01

Comet 21P/Giacobini-Zinner [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 20.81		S	8.9	TJ	20.3	T	10	50	3.1	4			KAM01
1998 10 20.82		S	9.2	TT	10.0	B		14	& 6	4/			PER01
1998 10 20.99		S	9.4	TI	40.6	L	5	70	2.2	6	&0.05	75	BOR
1998 10 21.41		C	10.0	GA	60.0	Y	6	a 60	3.1		> 6.5m	75	NAK01
1998 10 21.44	x	M	9.9	TT	25.4	L	4	81	2.7	4/	5 m	75	YOS02
1998 10 21.45		S	9.7	AA	10.0	B		25					SEA
1998 10 21.45	x	S	9.6	TT	10.0	B		20	3	5			YOS02
1998 10 21.73		M	9.6	TT	35	L	5	92	3.5	3/	0.13	80	HOR02
1998 10 21.76		S	9.7	AA	6.3	R	13	52	4	5			KOS
1998 10 21.79		M	9.1	PA	25	L	4	64	2.5	s5	3 m		SHU
1998 10 21.82		M	8.8	NP	10	R	5	27	5	5/			MAR02
1998 10 21.82		S	9.1	TT	10.0	B		14	& 6	5			PER01
1998 10 21.82		S	9.3	TT	10.0	B		14	& 6	5			VIT01
1998 10 22.71		S	9.6	AA	6.3	R	13	52	4	5			KOS
1998 10 22.74		S	9.2	NP	8.0	B		20	4.2	4/			OKS
1998 10 22.74		S	9.5	TT	10.0	B		25	3.8	4			HAS02
1998 10 22.76		M	9.5:	TT	35	L	5	92	4	3			HOR02
1998 10 22.99		S	8.7	TI	8.0	B		20	6	3/			BOR
1998 10 22.99		S	9.4	TI	40.6	L	5	70	3.7	6/	0.15	70	BOR
1998 10 23.24		B	9.3	TJ	25.6	L	5	42	4.0	6	0.15	70	BIV
1998 10 23.25		B	9.1	TJ	5.0	R		10	5	5			BIV
1998 10 23.35		S	8.9	TT	11	L	4	16	5	4	0.05	85	RAE
1998 10 23.73		S	9.8	AA	6.3	R	13	52	3	4			KOS
1998 10 23.74		S	9.4	TI	8	R	11	34	3.7	4			OKS
1998 10 23.79		S	9.8	VT	22	L	7	64	1.6	2/			TAY
1998 10 24.04		M	9.5	NP	20	L	4	73	3.3	6	0.1	80	CRE01
1998 10 24.28		B	9.3	TJ	25.6	L	5	42	4.0	6	0.2	70	BIV
1998 10 24.29		B	9.2	TJ	5.0	R		10	5	5			BIV
1998 10 24.35		S	8.7	TT	11	L	4	16	5.5	4			RAE
1998 10 24.46		S	9.9	HS	15.0	B		25	3	4			HAS08
1998 10 24.77		M	8.6	SE	25	L	4	64	4	5	2 m	35	SHU
1998 10 24.79		S	8.8	HS	44.5	L	5	64	1.9	6	0.1	75	KAR02
1998 10 25.35		S	9.3	TT	11	L	4	16	4.5	4			RAE
1998 10 25.41		C	9.9	GA	20.3	T	9	a 60	2.8		>0.10	75	SUZ02
1998 10 25.41	x	S	9.5	TJ	10.0	B		20	3	5			NAG08
1998 10 25.44		S	8.4	TJ	31.7	L	6	63	4.0	5			YOS04
1998 10 25.69	a	M	9.6	CD	30	L	5	60	3	s6	6 m	81	NEV
1998 10 25.99		S	8.8	TI	8.0	B		20	& 4.5	5			BOR
1998 10 25.99		S	9.3	TI	40.6	L	5	70	2.2	6			BOR
1998 10 26.72		S	8.6	AC	6.0	B		20	4.0	3			RES
1998 10 26.72		S	9.1:	TI	8.0	B		20	4.0	4			OKS
1998 10 26.72		S	9.9	HS	6.0	B		20	7	3			SAR02
1998 10 26.75		S	9.2	VT	33	L	5	45	2.1	4			SHA02
1998 10 27.12		S	8.9	AA	20.0	T	10	64	4.0	4			SPR
1998 10 28.75		S	8.5:	AC	6.0	B		20	3.5	2/			RES
1998 11 04.07		J	9.3	SC	25.4	T	5	a 60	4.51	s5	4.2m	89	ROQ

Comet 22P/Kopff

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 12.95		S	9.3	AA	8.0	B		15	4.5				HAV

Comet 23P/Brorsen-Metcalf

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 07 30.02		M	8.2	S	10	B	4	25	9	2			LEH
1989 08 06.01		M	7.5	S	10	B	4	25	4.5	5	0.12	335	LEH
1989 08 07.04		M	7.6	S	10	B	4	25	3.5	5	0.08	303	LEH
1989 08 10.05		M	6.7	S	10	B	4	25	4	6	0.10	296	LEH

Comet 29P/Schwassmann-Wachmann 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 04 20.91		B	13.7	HS	42	L	5	162	1.4	4/			LEH
1998 04 23.94		M	13.0	HS	42	L	5	162	1.9	3/			LEH

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

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 04 30.91		M	13.5	HS	42	L	5	162	1.3	3/			LEH
1998 05 01.88		B	13.8	HS	42	L	5	162	1.3	3/			LEH
1998 05 19.94		B	13.7	HS	42	L	5	162	1.3	4			LEH
1998 05 29.89		B	14.0	HS	42	L	5	162	1.2	3/			LEH
1998 05 31.90		B	13.9	HS	42	L	5	162	1.2	4			LEH
1998 08 15.43		S	[12.5:		20	L	7	158					MAT08

Comet 30P/Reinmuth 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 08 03.75		C	[19.5:	GA	60.0	Y	6	a480	! 0.2				NAK01
1994 08 05.73		C	[19.5:	GA	60.0	Y	6	a480	! 0.2				NAK01
1994 08 15.78		C	[19.5:	GA	60.0	Y	6	a480	! 0.2				NAK01

Comet 31P/Schwassmann-Wachmann 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 07 26.52		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 07 31.51		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 32P/Comas Solá

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 07 03.52		C	[18.5:	GA	60.0	Y	6	a240	! 0.3				NAK01

Comet 36P/Whipple

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 09 20.79		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 10 22.77		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 37P/Forbes

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 01 05.49		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 41P/Tuttle-Giacobini-Kresák

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 02 24.48		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 03 19.45		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 03 31.45		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 04 23.47		C	[18.5:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 05 17.47		C	[18.5:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 42P/Neujmin 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 09 10.44		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 43P/Wolf-Harrington

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 10.67		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 07 16.66		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 45P/Honda-Mrkos-Pajdušáková

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 10 25.40		C	[18.0:	GA	60.0	Y	6	a120	! 0.2				NAK01
1995 12 27.70	&	M	7.0	S	10	B	4	25	5	3			LEH
1995 12 29.70	&	M	6.9	S	20	R	17	87	5.5	4			LEH
1996 02 07.21		M	10.3	TI	20	R	17	140	12	3			LEH
1996 02 26.11		O	[11.5	TI	20	R	17	140	! 1				LEH

Comet 46P/Wirtanen

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 24.69			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 12 26.70			M 12.0	HS	20	R	17	140	2.5	4			LEH
1996 12 27.70			M 12.1	HS	20	R	17	140	2.5	4			LEH
1996 12 28.71			M 12.3	HS	20	R	17	140	2	4			LEH
1996 12 30.72			M 12.5	HS	20	R	17	140	2	4			LEH
1997 01 26.76			M 12.9	HS	20	R	17	140	2	3			LEH
1997 01 31.76			M 12.8	HS	20	R	17	140	2	3/			LEH
1997 02 01.72			M 12.8	HS	20	R	17	140	2	3/			LEH
1997 02 02.73			M 12.6	HS	20	R	17	140	2.6	2/			LEH
1997 02 11.73			M 12.0	TI	20	R	17	140	2.5	3			LEH
1997 02 22.78			M 9.7	TI	20	R	17	87	2	3			LEH
1997 02 23.76			M 9.0	TI	10	B	4	25	2	3			LEH
1997 03 01.78			M 9.2	TI	10	B	4	25	4	3			LEH
1997 03 02.77			M 9.1	TI	10	B	4	25	5.1	3			LEH
1997 03 03.80			M 9.1	TI	10	B	4	25	3.5	3			LEH
1997 03 05.78			M 9.0	TI	10	B	4	25	3.5	3			LEH
1997 03 07.78			M 9.3	TI	10	B	4	25	5.4	3			LEH
1997 03 10.77			M 8.6	TI	10	B	4	25	4.6	4			LEH
1997 03 11.78			M 8.4	TI	10	B	4	25	5	4			LEH
1997 03 12.77			M 8.5	TI	10	B	4	25	5	4			LEH
1997 03 30.82			M 9.8	TI	10	B	4	25	4	3			LEH
1997 05 02.83			M 10.3	TI	10	B	4	25	3.5	2/			LEH
1997 05 14.87			M 9.9	TI	10	B	4	25	3	3			LEH
1997 05 24.88			M 10.4	TI	10	B	4	25	3.2	2			LEH
1997 05 31.88			M 11.2	HS	10	B	4	25	2.3	2			LEH

Comet 47P/Ashbrook-Jackson

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 02 24.57			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 49P/Arend-Rigaux

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 07 05.74			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1997 11 19.43			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 51P/Harrington

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 04 13.80			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 52P/Harrington-Abell

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 25.03			M 12.0	HS	42	L	5	162	2.1	2			LEH
1998 07 25.04			S 11.4	HS	44.5	L	4	82	2	2			SAR02
1998 07 25.44			c 18.0	FA	91.4	L	5						SC001
1998 07 25.47			C 11.6	FA	91.4	L	5		1.00		4.3m	258	SC001
1998 07 26.04			S 12.2:	AC	25.4	L	5	104	1.0	3			MEY
1998 07 28.99			S 12.1	HS	20	L	5	70	2.0	1			BAR06
1998 07 30.05			S 11.6	HS	44.5	L	4	72	1.5	3			SAR02
1998 07 30.05			S 11.8	HS	44.5	L	4	230	1.5	2			SAN07
1998 07 30.58			S 12.1	HS	25.6	L	5	42	1.5	2			BIV
1998 07 30.99			S 12.4	HS	20	L	5	70	1.3	3			BAR06
1998 07 31.04			S[12.0	HS	27	L	6	83	! 1				TOT03
1998 08 01.02			M 12.2	HS	42	L	5	81	2.0	2			LEH
1998 08 01.02			S 12.2	AC	25.0	L	6	121	1.5	2/			RES
1998 08 02.01			S 12.5:	HS	20	L	5	70	1.0	1			BAR06
1998 08 02.02			S 12.5:	AC	25.0	L	6	61	1.2	2/			RES
1998 08 02.63			S 12.7	HS	25.6	L	5	84	1.0	3			BIV
1998 08 04.60			S 12.7	HS	25.6	L	5	84	1.0	2			BIV
1998 08 04.79	a		C 13.4	GA	60.0	Y	6	a120	0.8		5.0m	259	NAK01
1998 08 06.09			S 12.5:	HS	30	R	20	185	0.7	3			SHA02
1998 08 15.97			M 12.8	HS	42	L	5	162	1.9	3			LEH

Comet 52P/Harrington-Abell [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 18.03		M	12.9	HS	42	L	5	162	1.4	3			LEH
1998 08 18.03		S	12.3	AC	25.0	L	6	61	1.1	2			RES
1998 08 19.05		S	12.5	AC	25.0	L	6	121	1.3	2			RES
1998 08 19.99		M	12.6	HS	42	L	5	81	1.9	2/			LEH
1998 08 20.00		S	12.3	HS	20	L	5	125	1.2	2			PLS
1998 08 20.01		S	12.3	TI	35	L	5	92	1.5	1/			HOR02
1998 08 20.05		S	12.7	AC	25.0	L	6	121	1.1	2			RES
1998 08 20.08		S	11.9	NP	32	L	5	75	1.5	1/			MAR02
1998 08 20.55		S	12.2	HS	25.6	L	5	84	1.5	3			BIV
1998 08 20.76		M	11.3:	TT	25.0	L	6	62					TSU02
1998 08 22.13		S	12.2	NP	32	L	5	75	1	1			MAR02
1998 08 23.05		S	13.7:	VB	30	R	20	185	0.5	3			SHA02
1998 08 23.13		S	11.8	NP	32	L	5	75	< 1	1			MAR02
1998 08 24.01		S	12.4:	HS	20	L	5	70	1.8	2			BAR06
1998 08 24.55		S	12.1	HS	25.6	L	5	84	1.5	2			BIV
1998 08 25.81		C	13.5	GA	60.0	Y	6	a120	1.0		6.6m	262	NAK01
1998 08 26.00		S	12.6:	HS	20	L	5	70	1.8	2			BAR06
1998 08 28.03		S	12.5	AC	25.0	L	6	61	1.5	1/			RES
1998 08 28.51		S	12.4	HS	25.6	L	5	84	1.3	2			BIV
1998 08 29.96		S	12.7	HS	35	L	5	207	1.1	2/			HOR02
1998 08 30.60		S	12.8	HS	25.6	L	5	84	1.2	3			BIV
1998 08 30.95		S	12.4	HS	35	L	5	207	1.1	2			HOR02
1998 08 31.01		S	12.3	GA	25.4	J	6	100	1.6	0/			BOU
1998 08 31.99		S	12.4	AC	25.0	L	6	61	1.3	2			RES
1998 09 01.04		S	12.4	HS	20	L	5	70	1.7	3/			BAR06
1998 09 01.04		S	12.5	HS	20.3	T	10	93	0.8	1			HAS02
1998 09 01.05		S	12.2	AC	25.4	L	5	104	1.5	2			MEY
1998 09 01.99		S	12.4	AC	25.0	L	6	61	1.2	2			RES
1998 09 02.62		S	12.8	HS	25.6	L	5	84	1.2	2			BIV
1998 09 02.81		C	13.6	GA	60.0	Y	6	a120	0.95		6.3m	263	NAK01
1998 09 03.03		S	12.5	AC	25.0	L	6	61	1.4	2			RES
1998 09 04.05		S	12.4	AC	25.0	L	6	61	1.4	1/			RES
1998 09 09.75		H	12.7	LA	50.0	C	12	a300	0.18	6	2.4m	270	FUK02
1998 09 15.50		S	12.2:	HS	25.6	L	5	84	1.2	2			BIV
1998 09 16.16	!	V	12.8	HV	152.4	L	8	a600	0.17		1.2m	265	COZ
1998 09 16.72		H	12.7	LA	50.0	C	12	a300	0.35	6	3.2m	271	FUK02
1998 09 17.02		S	12.2	HS	20	L	5	70	1.3	3/			BAR06
1998 09 18.50		S	12.7	HS	25.6	L	5	84	1.4	2			BIV
1998 09 18.97		S	12.3	HS	44.5	L	4	230	1.5	2/			SAR02
1998 09 19.33	!	J	12.3	SC	25.4	T	5	a 60	1.39	s5	2.5m	265	ROQ
1998 09 19.70		H	12.7	LA	50.0	C	12	a180	0.68	6	4.1m	265	FUK02
1998 09 19.93		S	13.0	HS	35	L	5	207	1.1	2			HOR02
1998 09 20.00		S	12.3:	AC	25.0	L	6	121	1.4	2			RES
1998 09 20.07		S	12.2	AC	25.4	L	5	104	1.3	2/			MEY
1998 09 20.57		S	13.1	HS	25.6	L	5	84	1.0	2			BIV
1998 09 21.00		S	12.3:	AC	25.0	L	6	121	1.4	2			RES
1998 09 22.03		S	12.4	AC	25.4	L	5	104	1.6	2/			MEY
1998 09 22.07		S	12.6	HS	35	L	5	207	2.0	2			HOR02
1998 09 22.13		S	12.4	AC	25.0	L	6	61	1.2	2			RES
1998 09 22.56		S	12.6	HS	25.6	L	5	84	1.3	1/			BIV
1998 09 23.07		S	12.2	TI	35	L	5	92	2.1	2			HOR02
1998 09 23.98		S	12.4	HS	20	L	5	70	1.6	3			BAR06
1998 09 24.98		S	12.3	HS	20	L	5	70	1.8	3			BAR06
1998 09 25.05		S	12.5	HS	25.4	L	6	104	1.5	3			SAR02
1998 09 25.06		S	12.6	AC	25.0	L	6	61	1.2	2/			RES
1998 09 26.55		S	12.7	HS	25.6	L	5	84	1.5	2	2.0m	260	BIV
1998 09 27.03		S	12.6	HS	25.4	L	6	104	1.6	2			SAR02
1998 09 30.04		S	12.4	HS	20	L	5	70	1.7	3			BAR06
1998 09 30.54		S	12.6	HS	25.6	L	5	84	1.0	2			BIV
1998 10 02.72		V	13.6	LA	50.0	C	12	a180	0.73	6	> 8.6m	270	FUK02
1998 10 02.82		C	13.2	GA	60.0	Y	6	a120	1.2		> 7.4m	268	NAK01
1998 10 04.64		S	12.6	HS	25.6	L	5	84	1.0	3			BIV
1998 10 08.78		V	13.3	LA	50.0	C	12	a180	0.73	6	> 9.1m	271	FUK02
1998 10 14.06		S	13.0	HS	35	L	5	207	1.5	1/			HOR02
1998 10 15.02		S	13.0	GA	25.4	J	6	100	1.3	2			BOU

Comet 52P/Harrington-Abell [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 16.94		S	12.4	HS	44.5	L	5	100	1.8	1			KAR02
1998 10 18.09		S	14.1	HS	30	R	20	185	0.4	2			SHA02
1998 10 18.28	!	J	13.1	SC	25.4	T	5	a 60	0.43	s5/	3.2m	265	ROQ
1998 10 18.45		S	12.7	HS	25.6	L	5	84	1.0	2			BIV
1998 10 20.46		S	12.7	HS	25.6	L	5	84	1.0	2			BIV
1998 10 21.02		S	12.2	TI	35	L	5	207	1.6	2/			HOR02
1998 10 22.10		M	12.1	TI	35	L	5	92	1.6	2			HOR02
1998 10 23.53		S	12.5	HS	25.6	L	5	84	1.3	3	1.5m	95	BIV
1998 10 24.46		S	12.2	HS	25.6	L	5	84	1.2	2			BIV
1998 10 25.00		S	12.6	AC	25.0	L	6	61	1.3	3			RES
1998 10 26.50		S	12.6	HS	25.6	L	5	84	1.5	2			BIV
1998 10 26.92		S	12.6	AC	25.0	L	6	61	1.5	2/			RES
1998 10 29.17		S	13.0	VB	30	R	20	185	0.2	5			SHA02
1998 10 29.75		C	13.0	GA	60.0	Y	6	a120	1.2		> 6.7m	274	NAK01
1998 11 01.23		S	13.9	VB	30	R	20	185	0.5	5			SHA02

Comet 55P/Tempel-Tuttle

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 26.54		C[	19.5:	GA	60.0	Y	6	a480	! 0.2				NAK01
1997 11 03.84		C[	18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1998 01 10.78		M	8.9	TI	10	B	4	25	8.1	3			LEH
1998 01 11.71		M	8.2	TI	10	B	4	25	9.4	3			LEH
1998 01 17.72		M	7.5	TI	8.0	B		10	19	2			LEH
1998 01 17.78		S	8.0	TT	15.2	L	5	30	9.5	2			HAV
1998 01 18.75		M	7.8	AC	5.0	B		10	11	0/			SAN07
1998 01 24.78		S	8.1	TT	15.2	L	5	30	7	2			HAV
1998 01 25.74		M	7.2	AC	5.0	B		10	13	1/			SAN07
1998 01 25.77		M	7.7	TI	10	B	4	25	10.7	2			LEH
1998 01 26.74		M	8.5	TI	10	B	4	25	7.1	2/			LEH
1998 01 26.75		S	8.3	AA	27	L	6	83	6	1			TOT03
1998 01 27.00		S	9.5	GA	25.4	L	4	46	5	2			DID
1998 02 14.77		S	9.3	AC	25.0	L	4	53	4	3			LOO01
1998 02 15.76		S	9.3	TT	15.2	L	5	30	3	3/			HAV

Comet 58P/Jackson-Neujmin

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 04 26.78		C[	19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 06 01.70		C[	19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 03 10.46		C[	17.5:	GA	60.0	Y	6	a120	! 0.3				NAK01

Comet 59P/Kearns-Kwee

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 08 30.34		c	21.8	FA	91.4	L	5						SC001
1998 08 30.37		C	20.2	FA	91.4	L	5		0.12		7.8s	224	SC001

Comet 62P/Tsuchinshan 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 08 28.76		C[	19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1997 09 29.74		C[	19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1997 12 04.49		C[	19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1998 01 26.77		O[	14.6	HS	42	L	5	263	! 0.5				LEH
1998 03 25.80		M	13.3	HS	20	R	17	140	1.1	3/			LEH
1998 03 26.80		M	13.1	HS	11	R	15	110	1.0	4			LEH
1998 03 29.81		M	12.5	HS	11	R	15	110	2.3	3/			LEH
1998 05 19.85		M	12.6	HS	42	L	5	162	1.4	3/			LEH

Comet 65P/Gunn

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 28.81		B	14.9	HS	42	L	5	162	0.5	2			LEH
1997 10 31.91		B	15.2	HS	42	L	5	162	0.4	4			LEH

Comet 65P/Gunn [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1997 11 01.87		B	15.2	HS	42	L	5	162		0.5	3/			LEH
1997 11 20.80		B	15.3	HS	42	L	5	162		0.5	3			LEH
1997 12 21.80		B	15.3	HS	42	L	5	162		0.5	2/			LEH
1997 12 30.77		O[	15.5	HS	42	L	5	162	!	0.5				LEH
1998 10 02.78		C	18.1	GA	60.0	Y	6	a240		0.3			240	NAK01
1998 10 24.69		C	17.9	GA	60.0	Y	6	a240		0.3		0.8m	254	NAK01

Comet 67P/Churyumov-Gerasimenko

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1996 01 21.77		M	12.1	TI	20	R	17	140		3	4			LEH
1996 01 22.77		M	12.0	TI	20	R	17	140		3	4			LEH
1996 02 06.78		M	12.4	HS	20	R	17	140		2	3			LEH
1997 01 19.85		C[	19.0:	GA	60.0	Y	6	a240	!	0.2				NAK01

Comet 68P/Klemola

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1997 05 27.55		C[	19.0:	GA	60.0	Y	6	a240	!	0.2				NAK01
1997 06 04.57		C[	19.5:	GA	60.0	Y	6	a480	!	0.2				NAK01
1998 07 20.01		B	13.5	HS	42	L	5	162		1.4	3			LEH
1998 07 21.01		B	13.7	HS	42	L	5	162		1.6	3/			LEH
1998 07 25.01		B	13.9	HS	42	L	5	162		1.1	4			LEH
1998 08 01.03		S	13.1:	AC	25.0	L	6	121		0.7	2/			RES
1998 08 05.78		C	16.5	GA	60.0	Y	6	a240		0.65		2.4m	252	NAK01
1998 08 18.03		S[	13.0:	AC	25.0	L	6	121						RES
1998 08 18.05		B	14.1	HS	42	L	5	162		1.3	3			LEH
1998 08 20.00		B	14.1	HS	42	L	5	162		1.1	3/			LEH
1998 08 20.06		S	13.7	AC	25.0	L	6	121		0.7	3			RES
1998 08 25.79		C	17.4	GA	60.0	Y	6	a240		0.45		1.7m	256	NAK01
1998 08 28.04		S	13.7	AC	25.0	L	6	121		0.7	2/			RES
1998 08 29.98		[	14.0	HS	35	L	5	207	!	0.7				HOR02
1998 09 01.01		S[	13.5	AC	25.0	L	6	121						RES
1998 09 02.01		S[	13.7	AC	25.0	L	6	121	!	0.7				RES
1998 09 02.77		C	17.6	GA	60.0	Y	6	a240		0.45		1.8m	254	NAK01
1998 09 03.04		S[	13.7	AC	25.0	L	6	121	!	0.7				RES
1998 10 02.75		C	18.0	GA	60.0	Y	6	a240		0.5	s0/	2.0m	257	NAK01
1998 10 02.75		c	18.8	GA	60.0	Y	6	a240						NAK01
1998 10 29.68		C	18.0	GA	60.0	Y	6	a240		0.45	s0/		255	NAK01
1998 10 29.68		c	18.8	GA	60.0	Y	6	a240						NAK01

Comet 69P/Taylor

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1998 01 25.83		B	13.6	HS	42	L	5	162		1.8	3			LEH
1998 01 26.81		B	13.4	HS	42	L	5	162		1.9	3			LEH
1998 03 20.88		S	13.0	HS	27	L	6	214		0.7	3/			TOT03
1998 03 23.84		M	12.1	HS	11	R	15	110		2.8	4			LEH
1998 03 25.84		M	12.2	HS	20	R	17	140		1.4	3			LEH
1998 03 26.85		M	12.4	HS	11	R	15	110		1.8	3			LEH
1998 03 29.85		M	12.8	HS	11	R	15	110		1.8	4			LEH
1998 04 17.88		S[	13.0	HS	27	L	6	214	!	1				TOT03
1998 04 20.90		M	13.4	HS	42	L	5	162		1.6	3			LEH
1998 04 23.88		M	13.2	HS	42	L	5	162		1.4	3			LEH
1998 04 30.83		M	13.1	HS	42	L	5	162		1.8	4			LEH
1998 05 01.83		B	13.7	HS	42	L	5	162		1.3	3/			LEH
1998 05 19.92		B	13.9	HS	42	L	5	162		1.1	3/			LEH
1998 05 25.88		B	13.7	HS	42	L	5	81		1.3	3/			LEH
1998 05 26.87		B	13.9	HS	42	L	5	162		1.2	3/			LEH
1998 05 27.87		B	14.0	HS	42	L	5	162		1.2	3			LEH
1998 05 29.87		B	14.0	HS	42	L	5	162		1.1	3			LEH
1998 05 31.87		B	14.0	HS	42	L	5	162		1.1	3			LEH
1998 06 20.90		B	14.4	HS	42	L	5	162		1.2	3			LEH
1998 06 21.90		B	14.6	HS	42	L	5	162		1.0	4			LEH
1998 06 25.89		B	14.7	HS	42	L	5	162		0.9	3			LEH

Comet 70P/Kojima

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 12 11.82		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 73P/Schwassmann-Wachmann 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 03 08.66		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 12 27.74		M	8.6	S	10	B	4	25	4	3			LEH
1995 12 29.75		M	9.6	TI	20	R	17	87	4	3			LEH
1995 12 30.71		M	10.2	TI	20	R	17	87	5	4			LEH
1996 02 06.76		O	[12.1	HS	20	R	17	140	! 1				LEH

Comet 74P/Smirnova-Chernykh

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 02.80		C	18.3	GA	60.0	Y	6	a240	0.25		1.1m	253	NAK01
1998 10 29.72		C	17.8	GA	60.0	Y	6	a240	0.3		0.9m	250	NAK01

Comet 75P/Kohoutek

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 10 08.57		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1993 11 03.42		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1993 12 07.40		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1994 01 05.42		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1994 01 30.43		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1994 10 14.83		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 78P/Gehrels 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 05 24.74		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 07 13.64		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 07 16.61		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 10 11.44		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1997 11 01.95		M	12.8	HS	42	L	5	162	1.6	4			LEH
1997 12 21.85		M	12.6	HS	42	L	5	162	1.6	2/			LEH
1997 12 30.83		M	11.9	HS	42	L	5	162	1.9	3			LEH
1997 12 31.79		M	12.5	HS	42	L	5	162	1.7	3/			LEH
1998 01 17.85		M	13.0	HS	42	L	5	162	1.7	4			LEH
1998 01 25.81		M	12.9	HS	42	L	5	162	1.7	3/			LEH
1998 01 26.78		M	13.1	HS	42	L	5	162	1.4	3			LEH
1998 03 23.85		M	13.1	HS	11	R	15	110	1.2	4			LEH
1998 03 25.83		M	13.3	HS	20	R	17	140	1.3	4			LEH
1998 03 26.84		M	13.1	HS	11	R	15	110	1.2	4			LEH
1998 03 29.83		M	13.1	HS	11	R	15	110	0.9	3/			LEH
1998 04 20.88		M	12.7	HS	42	L	5	162	1.6	3			LEH
1998 04 23.86		M	12.8	HS	42	L	5	162	1.5	3			LEH

Comet 81P/Wild 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 30.85		M	12.0	HS	20	R	17	140	2.5	3			LEH
1997 01 31.81		M	10.1	TI	20	R	17	87	3	3/			LEH
1997 02 01.77		M	10.2	TI	20	R	17	87	2.5	3			LEH
1997 02 02.78		M	9.7	TI	10	B	4	25	3.7	3			LEH
1997 02 03.74		M	9.6	TI	10	B	4	25	4	3			LEH
1997 02 07.82		M	10.0	TI	10	B	4	25	2.5	2/			LEH
1997 02 10.77		M	9.6	TI	10	B	4	25	3.2	2/			LEH
1997 02 11.76		M	9.6	TI	10	B	4	25	3.5	3			LEH
1997 02 14.81		M	9.7	TI	10	B	4	25	2.5	3			LEH
1997 02 22.81		M	9.2	TI	20	R	17	87	3	3/			LEH
1997 02 23.77		M	9.0	TI	10	B	4	25	3	3/			LEH
1997 03 01.79		M	9.1	TI	10	B	4	25	5	3			LEH
1997 03 02.79		M	9.1	TI	10	B	4	25	5	3/			LEH
1997 03 03.79		M	9.1	TI	10	B	4	25	4.5	3			LEH

Comet 81P/Wild 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 04.76		M	9.3	TI	10	B	4	25	4	3/			LEH
1997 03 05.79		M	9.4	TI	10	B	4	25	4	3/			LEH
1997 03 07.79		M	9.8	TI	10	B	4	25	5.5	3/			LEH
1997 03 10.78		M	9.5	TI	10	B	4	25	4.5	3/			LEH
1997 03 11.86		M	9.3	TI	10	B	4	25	4.5	3/			LEH
1997 03 12.81		M	9.3	TI	10	B	4	25	4.5	3/			LEH
1997 03 30.83		M	9.8	TI	10	B	4	25	3	3			LEH
1997 03 31.83		M	9.9	TI	10	B	4	25	3	3			LEH
1997 04 01.82		M	9.9	TI	10	B	4	25	3	3			LEH
1997 05 02.84		M	10.8	TI	10	B	4	25	5.1	3			LEH
1997 05 24.88		M	10.7	TI	10	B	4	25	3.7	4			LEH
1997 05 31.89		M	10.5	HS	10	B	4	25	4.4	3/			LEH
1997 06 03.92		M	10.6	HS	10	B	4	25	3.8	3/			LEH
1997 06 04.88		M	10.4	HS	42	L	5	75	3.8	3			LEH
1997 06 06.89		M	11.0	HS	42	L	5	81	3.1	3			LEH
1997 06 07.88		M	10.2	TI	10	B	4	25	4	3			LEH
1997 06 10.89		M	10.9	TI	42	L	5	81	2.9	3			LEH
1998 07 15.36		c	20.5	FA	91.4	L	5						SC001
1998 07 15.38		C	17.9	FA	91.4	L	5		0.52		9.7m	258	SC001
1998 07 27.29		c	20.4	FA	91.4	L	5						SC001
1998 07 27.30		C	17.1	FA	91.4	L	5		0.38		4.3m	259	SC001
1998 08 02.68		C	17.0:	GA	60.0	Y	6	a240	0.45				NAK01

Comet 82P/Gehrels 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 10 27.82		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 85P/Boethin

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 03.83		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 86P/Wild 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 01 08.82		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1994 01 15.83		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 87P/Bus

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 12 11.83		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 88P/Howell

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 04 20.92		B	14.9	HS	42	L	5	162	0.6	4			LEH
1998 04 23.95		B	14.8	HS	42	L	5	263	0.8	4			LEH
1998 05 01.97		B	14.9	HS	42	L	5	162	0.8	3/			LEH
1998 05 15.96		S	[12.0:	VB	30	R	18	170					SHA02
1998 05 16.93		S	[12.7:	VB	30	R	18	170					SHA02
1998 05 19.95		B	14.1	HS	42	L	5	162	0.9	3/			LEH
1998 05 21.96		I	[14.7:	HS	30	R	18	170					SHA02
1998 05 21.96		S	13.9:	HS	30	R	18	170	0.3	2			SHA02
1998 05 28.88		S	[12.5	HS	27	L	6	214	! 1				TOT03
1998 05 29.89		B	13.9	HS	42	L	5	162	1.2	3/			LEH
1998 05 29.94		S	13.7:	HS	30	R	18	210	0.5	2			SHA02
1998 05 31.91		B	13.8	HS	42	L	5	162	1.2	4			LEH
1998 06 20.91		B	13.2	HS	42	L	5	162	1.6	3/			LEH
1998 06 21.92		B	13.2	HS	42	L	5	162	1.7	3			LEH
1998 06 24.17		c	19.0	FA	91.4	L	5						SC001
1998 06 24.18		C	15.6	FA	91.4	L	5		0.65		63.6s	108	SC001
1998 06 25.91		B	13.1	HS	42	L	5	162	1.9	3			LEH
1998 06 27.90		B	13.1	HS	42	L	5	162	1.8	3			LEH

Comet 88P/Howell [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 19.86		M	12.3	HS	42	L	5	162	1.7	3/			LEH
1998 07 20.87		M	12.2	HS	42	L	5	162	1.9	3			LEH
1998 07 27.16		c	18.6	FA	91.4	L	5						SC001
1998 07 27.17		C	14.9	FA	91.4	L	5		1.97		4.1m	108	SC001
1998 08 10.43		S	11.7	HS	20	L	7	45	2	3			MAT08
1998 08 11.28		S	12.2	HS	25.6	L	5	42	2.0	2			BIV
1998 08 12.27		S	11.8	HS	25.6	L	5	42	2.5	2			BIV
1998 08 12.41		S	11.8	HS	20	L	7	45	2	3			MAT08
1998 08 15.28		S	11.5	HS	25.6	L	5	42	3.0	3			BIV
1998 08 15.44		S	11.6	HS	20	L	7	45	3	3			MAT08
1998 08 16.30		S	11.1	HS	25.6	L	5	42	3.0	2			BIV
1998 08 19.30		S	11.3:	TJ	25.6	L	5	42	2.5	2			BIV
1998 08 20.29		S	11.4	TJ	25.6	L	5	42	3.0	3			BIV
1998 08 22.88		S	10.8	NP	32	L	5	75	4	2			MAR02
1998 08 24.28		S	11.0	TJ	25.6	L	5	42	3.0	2			BIV
1998 09 08.24		S	10.6	TJ	25.6	L	5	42	3.5	4			BIV
1998 09 10.45		S	10.8	TI	20	L	7	45	3.5	4			MAT08
1998 09 10.45		S	10.8	TI	20	L	7	45	3.5	4			MAT08
1998 09 11.25		S	10.3	TJ	25.6	L	5	42	4.5	3			BIV
1998 09 12.35		S	10.2	TT	11	L	4	16	4	3			RAE
1998 09 13.25		S	10.4	TJ	25.6	L	5	42	4.5	3			BIV
1998 09 13.44		S	10.2	AA	10.0	B		25					SEA
1998 09 15.27		S	10.2	TJ	25.6	L	5	42	4.0	3			BIV
1998 09 15.41		S	10.4	AA	10.0	B		25	5				SEA
1998 09 15.44		S	11.5	VN	25.4	L	6	61	1.5	3			SEA01
1998 09 16.41		S	10.2:	VN	10.0	B		25					SEA
1998 09 16.43		S	10.6	TI	20	L	7	45	3.5	3			MAT08
1998 09 17.38		S	10.8	VN	25.4	L	6	61	1.6	2			SEA01
1998 09 17.41		S	10.1	AA	10.0	B		25					SEA
1998 09 18.26		S	10.2	TJ	25.6	L	5	42	4.0	3			BIV
1998 09 19.26		S	10.4	TJ	25.6	L	5	42	4.0	3			BIV
1998 09 19.37		S	10.9	VN	25.4	L	6	61	1.4	2			SEA01
1998 09 19.42		S	10.0	AA	10.0	B		25					SEA
1998 09 19.43		S	9.9	TI	20	L	7	45	3.5	3			MAT08
1998 09 20.25		S	10.4	TJ	25.6	L	5	42	4.0	3			BIV
1998 09 20.38		S	10.7	VN	25.4	L	6	61	1.6	2			SEA01
1998 09 21.38		S	10.7	VN	25.4	L	6	61	1.2	2			SEA01
1998 09 22.33		S	9.8:	TT	11	L	4	16	3.5	3			RAE
1998 09 22.38		S	10.6	VN	25.4	L	6	61	1.6	3			SEA01
1998 09 23.37		S	10.3	VN	25.4	L	6	61	1.4	2			SEA01
1998 09 24.25		S	10.3	TJ	25.6	L	5	42	4.0	3			BIV
1998 09 27.25		S	9.9:	TJ	25.6	L	5	42	3.5	3			BIV
1998 10 07.42		S	10.3	TI	20	L	7	45	3.5	3			MAT08
1998 10 07.49		S	10.2	VN	41	L	4	90	2.2	3/			PEA
1998 10 08.23		S	9.7	TJ	25.6	L	5	42	4.5	3			BIV
1998 10 09.23		S	9.8	TJ	25.6	L	5	42	4.0	4			BIV
1998 10 09.43		S	10.1	TI	20	L	7	45	3.5	3			MAT08
1998 10 10.50		S	9.8	VN	41	L	4	90	2.4	3			PEA
1998 10 12.43		S	10.2	AA	10.0	B		25					SEA
1998 10 13.44		S	10.3	TI	20	L	7	45	3	3			MAT08
1998 10 13.65		S	11.0	AC	35.6	T	11	150		2			LAN02
1998 10 14.44		S	10.4	AA	10.0	B		25					SEA
1998 10 15.35		S	10.1	TT	11	L	4	16	3	3			RAE
1998 10 15.44		S	10.3	TI	20	L	7	45	3	3			MAT08
1998 10 16.36		S	10.0	TT	11	L	4	16	3	3			RAE
1998 10 17.35		S	9.9	TT	11	L	4	16	3.5	3/			RAE
1998 10 18.24		S	10.1	TJ	25.6	L	5	42	3.0	3			BIV
1998 10 19.51		S	10.5	VN	41	L	4	90	1.8	2			PEA
1998 10 20.24		S	10.2	TJ	25.6	L	5	42	3.0	3			BIV
1998 10 23.26		S	10.0	TJ	25.6	L	5	42	3.5	2			BIV
1998 10 26.72		S	9.8:	AC	25.0	L	6	61	1	2			RES

Comet 89P/Russell 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1994 08 26.48			C[19.0:	GA	60.0	Y	6	a240	!	0.2				NAK01

Comet 91P/Russell 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 27.25			c 21.1	FA	91.4	L	5						SC001
1998 07 27.26			C 18.4	FA	91.4	L	5		0.15		0.6m	223	SC001

Comet 93P/Lovas 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1998 06 24.46			C 17.6	FA	91.4	L	5			0.20		22.2s	255	SC001
1998 06 24.46			c 20.3	FA	91.4	L	5							SC001
1998 07 27.46			C 16.7	FA	91.4	L	5			0.28		2.1m	252	SC001
1998 07 27.46			c 19.8	FA	91.4	L	5							SC001
1998 07 31.02			S[13.5	HS	44.5	L	4	230	!	1				SAR02
1998 08 05.77			C 15.7	GA	60.0	Y	6	a240		0.5		0.8m	244	NAK01
1998 08 18.06			B 14.2	HS	42	L	5	162		1.2	4			LEH
1998 08 19.06			S 13.4:	AC	25.0	L	6	121		0.8	2			RES
1998 08 19.97			B 14.1	HS	42	L	5	162		1.2	3/			LEH
1998 08 20.03			S 14.1	HS	35	L	5	207		0.8	2/			HOR02
1998 08 20.05			S 13.5	AC	25.0	L	6	121		0.8	2			RES
1998 08 22.10			S 14.2	NP	32	L	5	125		0.5	0			MAR02
1998 08 23.97	!		V 16.0	YF	36.0	T	7	a120	+	0.3	4			MIK
1998 08 25.81			C 15.5:	GA	60.0	Y	6	a120		0.5				NAK01
1998 08 28.03			S 13.6	AC	25.0	L	6	121		0.8	2			RES
1998 08 29.94			S 13.7	HS	35	L	5	207		1.0	2/			HOR02
1998 09 01.99			S 13.5	AC	25.0	L	6	121		0.8	2			RES
1998 09 02.79			C 15.1	GA	60.0	Y	6	a120		0.8				NAK01
1998 09 03.03			S 13.6	AC	25.0	L	6	121		0.7	3			RES
1998 09 04.05			S 13.3	AC	25.0	L	6	121		0.9	2/			RES
1998 09 18.99			S 13.2:	HS	44.5	L	4	230		1	3			SAR02
1998 09 22.06			S 13.8	HS	35	L	5	207		1.0	3			HOR02
1998 09 23.08			S 13.6	HS	35	L	5	207		1.1	2/			HOR02
1998 09 25.03			S 13.5:	HS	25.4	L	6	159		1.2	1			SAR02
1998 09 25.06			S 12.9	AC	25.0	L	6	121		1.0	2/			RES
1998 09 27.01			S 13.4	HS	25.4	L	6	104		1.2	1			SAR02
1998 09 30.56			S 13.6	HS	25.6	L	5	169		0.8	3			BIV
1998 10 02.83			C 14.5	GA	60.0	Y	6	a120		0.85				NAK01
1998 10 14.05			S 13.5:	HS	35	L	5	207		0.8	2			HOR02
1998 10 15.00			S 13.6	GA	25.4	J	6	100		1.0	1/			BOU
1998 10 16.90			S 13.0:	HS	44.5	L	5	100		0.9	5			KAR02
1998 10 18.07			I[14.5	HS	30	R	20	185						SHA02
1998 10 20.56			S 13.8	HS	25.6	L	5	169		0.8	2			BIV
1998 10 21.02			S 13.3	HS	35	L	5	207		1.0	2			HOR02
1998 10 22.12			S 13.3	HS	35	L	5	207		1.1	2/			HOR02
1998 10 23.56			S 13.8	HS	25.6	L	5	169		1.0	3			BIV
1998 10 25.00			S 13.0	AC	25.0	L	6	121		1.0	2/			RES
1998 10 26.52			S 13.7	HS	25.6	L	5	169		0.8	3			BIV
1998 10 26.93			S 12.7	AC	25.0	L	6	121		1.0	3/			RES
1998 10 29.74			C 13.9	GA	60.0	Y	6	a120		1.2		1.9m	255	NAK01
1998 11 01.22			S 14.1:	VB	30	R	20	185		0.6	3			SHA02

Comet 94P/Russell 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1995 11 16.59			C[19.0:	GA	60.0	Y	6	a240	!	0.2				NAK01
1995 12 17.58			C[19.0:	GA	60.0	Y	6	a240	!	0.2				NAK01
1996 10 22.84			C[19.0:	GA	60.0	Y	6	a240	!	0.2				NAK01

Comet 96P/Machholz 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1997 05 05.79			C[19.0:	GA	60.0	Y	6	a240	!	0.2				NAK01

Comet 103P/Hartley 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 09 20.81		B	13.5	HS	42	L	5	162	1.4	5/			LEH
1997 09 21.80		B	13.8	HS	42	L	5	162	1.5	5			LEH
1997 09 28.79		B	13.2	HS	42	L	5	162	0.7	5			LEH
1997 10 19.76		M	11.1	HS	42	L	5	81	2	4			LEH
1997 10 21.75		M	11.6	HS	42	L	5	81	1.8	4			LEH
1997 10 24.76		M	12.0	HS	42	L	5	81	2	3/			LEH
1997 10 26.74		M	11.9	TI	42	L	5	81	1.6	2/			LEH
1997 10 28.74		M	11.9	TI	42	L	5	81	1.8	3			LEH
1997 10 31.84		M	10.9	TI	42	L	5	81	2	3/			LEH
1997 11 01.80		M	10.7	TI	42	L	5	81	2.5	3/			LEH
1997 11 04.74		M	10.7	TI	42	L	5	81	2.3	4			LEH
1997 11 10.73		M	10.7	TI	42	L	5	81	2.9	4			LEH
1997 11 20.71		M	9.7	TI	10	B	4	25	3.2	3			LEH
1997 12 14.74		M	9.1	TI	10	B	4	25	4.5	4			LEH
1997 12 16.72		M	8.4	TI	10	B	4	25	5.0	4			LEH
1997 12 21.72		M	8.1	TI	10	B	4	25	7.3	4			LEH
1997 12 25.70		M	8.1	TI	10	B	4	25	8.0	4			LEH
1997 12 26.86		M	7.5	TI	10	B	4	25	9.5	4			LEH
1997 12 27.73		M	8.0	TI	10	B	4	25	8.5	3/			LEH
1997 12 30.72		M	8.7	TI	10	B	4	25	7.0	3/			LEH
1997 12 31.00		S	8.3	SA	25.4	L	4	46	5	3		180	DID
1997 12 31.72		M	8.7	TI	10	B	4	25	5.8	3/			LEH
1997 12 31.96		S	8.1	SA	25.4	L	4	46	5	5		170	DID
1998 01 01.72		M	8.8	TI	10	B	4	25	4.0	3			LEH
1998 01 10.77		M	8.8	TI	10	B	4	25	6.7	3/			LEH
1998 01 11.72		M	8.6	TI	10	B	4	25	6.5	3/			LEH
1998 01 15.96		S	8.5	SA	25.4	L	4	46	6	s4			DID
1998 01 17.75		M	8.9	TI	10	B	4	25	5.9	3/			LEH
1998 01 17.76		S	8.2	TT	15.2	L	5	30	6	3			HAV
1998 01 24.77		S	8.5	TT	15.2	L	5	30	5	3			HAV
1998 01 25.72		M	9.4	TI	10	B	4	25	6.7	3			LEH
1998 01 25.97		S	8.7	SA	25.4	L	4	46	7	2			DID
1998 01 26.72		M	9.3	TI	10	B	4	25	5.8	2/			LEH
1998 01 27.00		S	8.5	SA	25.4	L	4	46	4	1			DID
1998 02 15.77		S	9.6	TT	15.2	L	5	30	4	2			HAV
1998 02 16.00		S	10.6	SA	25.4	L	4	46	5	0/			DID
1998 03 20.84		M	11.4	TI	10	B	4	25	2.2	2/			LEH
1998 03 23.82		M	11.6	TI	11	R	15	63	2.3	3			LEH
1998 03 25.81		M	11.7	HS	20	R	17	87	2.0	2/			LEH
1998 03 26.82		M	11.5	HS	11	R	15	63	2.1	3			LEH
1998 03 29.82		M	12.0	HS	11	R	15	63	2.3	3			LEH
1998 04 20.85		M	12.5	HS	42	L	5	81	1.5	3			LEH
1998 04 23.84		M	12.3	HS	42	L	5	81	1.3	3			LEH

Comet 104P/Kowal 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 19.78		B	14.3	HS	42	L	5	162	0.5	4/			LEH
1997 10 21.77		B	14.6	HS	42	L	5	162	0.6	4			LEH
1997 10 24.77		B	14.4	HS	42	L	5	162	0.7	4			LEH
1997 10 28.76		B	14.5	HS	42	L	5	162	0.6	3			LEH
1997 10 31.89		B	14.1	HS	42	L	5	162	0.8	3			LEH
1997 11 01.83		B	13.9	HS	42	L	5	162	1.0	3			LEH
1997 11 04.79		B	14.0	HS	42	L	5	162	0.8	3			LEH
1997 11 20.75		B	14.1	HS	42	L	5	162	0.8	3/			LEH
1997 12 16.74		B	13.8	HS	42	L	5	162	1.0	3			LEH
1997 12 21.74		B	13.9	HS	42	L	5	162	1.4	3			LEH
1997 12 30.75		B	13.6	HS	42	L	5	162	1.6	3			LEH
1997 12 31.73		B	13.7	HS	42	L	5	162	1.6	3			LEH
1998 01 01.74		B	13.5	HS	42	L	5	162	1.3	3			LEH
1998 01 17.78		M	13.1	HS	42	L	5	162	1.4	3			LEH
1998 01 25.76		B	13.7	HS	42	L	5	162	1.7	3			LEH
1998 01 26.75		M	13.4	HS	42	L	5	162	1.7	3			LEH
1998 03 23.80		M	13.2	HS	11	R	15	110	2.3	3			LEH
1998 03 25.78		M	13.3	HS	20	R	17	140	1.8	3			LEH

Comet 104P/Kowal 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 03 26.78		M	13.3	HS	11	R	15	110	1.4	3			LEH
1998 03 29.79		M	13.0	HS	11	R	15	110	1.3	3			LEH
1998 04 20.83		B	13.7	HS	42	L	5	162	0.8	3			LEH

Comet 111P/Helin-Roman-Crockett

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 09 05.79		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 112P/Urata-Niijima

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 09 25.81		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01
1993 09 26.81		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 114P/Wiseman-Skiff

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1993 11 14.83		C	[18.5:	GA	60.0	Y	6	a120	! 0.2				NAK01

Comet 115P/Maury

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1994 05 06.77		C	[18.0:	GA	60.0	Y	6	a120	! 0.3				NAK01
1994 05 16.76		C	[18.0:	GA	60.0	Y	6	a120	! 0.3				NAK01

Comet 117P/Helin-Roman-Alu 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 24.58		C	16.5	GA	60.0	Y	6	a240	0.4		1.0m	244	NAK01

Comet 118P/Shoemaker-Levy 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 28.81		M	12.8	HS	20	R	17	140	1.5	4/			LEH
1996 12 30.78		B	12.9	HS	20	R	17	140	1	4			LEH
1997 01 26.80		B	13.0	HS	20	R	17	140	1	5/			LEH
1997 01 31.78		B	13.6	HS	20	R	17	140	0.5	5/			LEH
1997 02 01.76		B	13.8	HS	20	R	17	140	0.5	5			LEH
1997 02 02.76		B	13.5	HS	20	R	17	140	0.7	5/			LEH
1997 02 07.80		B	13.9	HS	20	R	17	140	0.5	5			LEH
1997 02 10.76		B	13.4	HS	20	R	17	140	1.3	5			LEH
1997 02 11.76		B	13.1	HS	20	R	17	140	1	5			LEH
1997 03 01.83		B	13.2	HS	20	R	17	140	1.5	4			LEH
1997 03 05.82		B	12.9	HS	20	R	17	140	1.1	4			LEH
1997 03 07.81		B	13.5	HS	20	R	17	140	0.9	5			LEH
1998 06 23.19		C	18.0	FA	91.4	L	5			9			SC001
1998 06 24.19		C	17.9	FA	91.4	L	5			9			SC001
1998 07 26.15		c	22.2	FA	91.4	L	5						SC001
1998 07 26.18		C	19.7	FA	91.4	L	5		0.13				SC001

Comet 119P/Parker-Hartley

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 09.48		C	[18.5:	GA	60.0	Y	6	a240	! 0.3				NAK01

Comet 120P/Mueller 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 10 22.77		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 123P/West-Hartley

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 08 23.80		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 123P/West-Hartley [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 31.66			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1997 06 12.62			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 124P/Mrkos

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 10 26.67			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 11 16.52			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 12 17.57			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 125P/Spacewatch

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 09 10.69			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 126P/IRAS

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 26.72			B 13.0	HS	20	R	17	140	1.5	5			LEH
1996 12 27.72			B 13.1	HS	20	R	17	140	1.5	5			LEH
1996 12 28.72			B 13.7	HS	20	R	17	140	1	5			LEH
1996 12 30.74			B 13.2	HS	20	R	17	140	1	5/			LEH

Comet 127P/Holt-Olmstead

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 16.72			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 07 24.71			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 07 26.70			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 08 19.64			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1996 10 11.46			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet 128P/Shoemaker-Holt 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 21.86			B 14.7	HS	42	L	5	162	0.9	3/			LEH
1997 12 30.84			B 14.9	HS	42	L	5	162	0.8	3			LEH
1997 12 31.77			B 14.9	HS	42	L	5	162	0.8	3			LEH
1998 01 01.78			B 14.9	HS	42	L	5	162	0.8	3			LEH
1998 01 17.88			O[15.3	HS	42	L	5	162	! 0.5				LEH

Comet 129P/Shoemaker-Levy 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 08 31.81			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1998 01 26.81			B 14.9	HS	42	L	5	263	0.4	4			LEH

Comet 130P/McNaught-Hughes

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 02 09.84			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1997 04 07.76			C[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1998 08 04.77			C 19.1	GA	60.0	Y	6	a240	0.2			235	NAK01
1998 09 02.75			C 18.7	GA	60.0	Y	6	a240	0.3				NAK01
1998 10 24.61			C 18.6	GA	60.0	Y	6	a240	0.25				NAK01

Comet 132P/Helin-Roman-Alu 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 31.95			B 14.7	HS	42	L	5	162	0.7	2			LEH
1997 11 01.90			B 14.7	HS	42	L	5	162	0.7	2/			LEH
1997 11 20.83			B 14.9	HS	42	L	5	162	0.7	3			LEH
1997 12 21.82			B 14.8	HS	42	L	5	162	0.7	3			LEH
1997 12 30.79			B 15.0	HS	42	L	5	162	0.8	3			LEH
1997 12 31.74			B 15.0	HS	42	L	5	162	0.8	3			LEH

Comet 132P/Helin-Roman-Alu 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 01.75		B	14.9	HS	42	L	5	162	0.7	4			LEH
1998 01 17.81		O	[15.4	HS	42	L	5	162	! 0.5				LEH

Comet 136P/Mueller 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 06 23.43		c	22.4	FA	91.4	L	5						SC001
1998 06 23.45		C	20.8	FA	91.4	L	5		0.23				SC001
1998 08 31.62		C	18.2	GA	60.0	Y	6	a240	0.25				NAK01
1998 09 16.55	a	C	18.4	GA	60.0	Y	6	a240	0.25				NAK01
1998 09 17.50	a	C	18.3	GA	60.0	Y	6	a240	0.25				NAK01
1998 10 15.12		C	19.1	FA	91.4	L	5		0.18		34.2s	21	SC001
1998 10 15.12		c	22.2	FA	91.4	L	5						SC001
1998 10 21.47		C	18.7	GA	60.0	Y	6	a240	0.25				NAK01

Comet 138P/Shoemaker-Levy 7

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 07 25.45		C	20.4	FA	91.4	L	5		0.10		0.5m	264	SC001
1998 07 25.46		c	22.5	FA	91.4	L	5		0.10		9 s	275	SC001
1998 07 26.46		c	22.1	FA	91.4	L	5						SC001
1998 07 26.47		C	20.1	FA	91.4	L	5						SC001

Comet P/1993 X1 (Kushida-Muramatsu)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 04 23.60		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 04 26.58		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet P/1994 J3 (Shoemaker 4)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 08 01.74		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet P/1994 N2 (McNaught-Hartley)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 08 23.78		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet P/1994 X1 (McNaught-Russell)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1995 03 19.47		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1995 03 20.44		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet P/1996 A1 (Jedicke)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 06 23.16		c	22.5	FA	91.4	L	5						SC001
1998 06 23.18		C	21.3	FA	91.4	L	5		0.20		82.2s	290	SC001

Comet P/1996 R2 (Lagerkvist)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 09 10.79		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet P/1997 G1 (Montani)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 04.49		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01
1997 05 09.47		C	[19.0:	GA	60.0	Y	6	a240	! 0.2				NAK01

Comet P/1998 QP54 (LONEOS-Tucker)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 09 16.62		C	15.8	GA	60.0	Y	6	a240	0.5		1.1m	220	NAK01
1998 09 17.63		C	15.7	GA	60.0	Y	6	a240	0.55		1.1m	220	NAK01
1998 09 18.18		J	15.6	SC	25.4	T	5	a 60	0.35	s3	1.6m	226	ROQ
1998 09 19.89		I[	15.2	HS	35	L	5	207	! 0.2				HOR02
1998 09 28.18		J	15.7	SC	25.4	T	5	a 60	0.69	s4/	0.7m	186	ROQ
1998 10 11.13		J	16.2	SC	25.4	T	5	a 60	0.34	s3			ROQ
1998 10 13.84		S	14.8	HS	35	L	5	207	0.4	2			HOR02
1998 10 14.52		C	15.8	GA	60.0	Y	6	a120	0.35		0.7m	131	NAK01
1998 10 17.13		J	16.5	SC	25.4	T	5	a 60	2.08	s5			ROQ
1998 10 29.57		C	15.8	GA	60.0	Y	6	a120	0.5		1.0m	127	NAK01

Comet P/1998 S1 (LINEAR-Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 20.89		S	14.3	HS	35	L	5	207	0.7	4			HOR02
1998 10 21.54		C	15.7	GA	60.0	Y	6	a120	0.45		0.8m	223	NAK01
1998 10 21.82		S	14.0	HS	35	L	5	207	0.6	3			HOR02
1998 10 22.82		S	14.0	HS	35	L	5	207	0.7	3			HOR02
1998 10 24.56		C	15.7	GA	60.0	Y	6	a120	0.45		0.8m	221	NAK01
1998 10 26.83		S	13.7:	HS	25.0	L	6	121	0.4	2/			RES
1998 10 26.91		S	13.7	HS	25.0	L	6	121	0.5	2/			RES
1998 10 29.60		C	15.7	GA	60.0	Y	6	a120	0.6		0.7m	224	NAK01

Comet P/1998 U2 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 24.63		C	16.1	GA	60.0	Y	6	a120	0.5		0.5m	126	NAK01
1998 10 29.60		C	16.3	GA	60.0	Y	6	a120	0.45		0.5m	133	NAK01

Comet P/1998 U3 (Jäger)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 10 26.49		S	12.3	HS	25.6	L	5	84	1.3	4			BIV
1998 10 29.15		S	12.8	VB	30	R	20	105	1.3	s3			SHA02
1998 10 29.73		C	12.9	GA	60.0	Y	6	a120	1.2		> 6.0m	284	NAK01
1998 11 01.19		S	12.7	VB	30	R	20	105	1.0	3			SHA02

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DESIGNATIONS OF RECENT COMETS

Listed below, for handy reference, are the last 10 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 (see lists and references in October 1997 *ICQ*, p. 286, and July 1998 *ICQ*, p. 160). [This list updates that in the July 1998 issue, p. 160.]

Corrigenda. In the July 1998 issue, page 160, the name of comet C/1997 L1 was changed from 'Xinglong' to 'Zhu-Balam' (cf. *IAUC* 6811). Also, in line 1 on the same page, *for* 35 comets *read* 40 comets

	New-Style Designation	*P*	*T*	*q*	*IAUC*
⋆	C/1998 P1 (Williams)		10/17/98	1.15	6986
⋆	C/1998 Q1 (LINEAR)		6/29/98	1.58	6995
⋆	P/1998 QP_{54} (LONEOS-Tucker)	8.6	10/6/98	1.88	7012
⋆	P/1998 S1 (LINEAR-Mueller)	9.1	11/2/98	2.55	7031
⋆	C/1998 T1 (LINEAR)		6/25/99	1.47	7026
⋆	C/1998 U1 (LINEAR)		5/3/98	4.0	7033
⋆	P/1998 U2 (Mueller)	8.7	10/20/98	2.02	7035
⋆	P/1998 U3 (Jäger)	15.4	3/7/99	2.15	7038
⋆	P/1998 U4 (Spahr)	13.1	3/4/99	3.83	7042
⋆	C/1998 U5 (LINEAR)		12/21/98	1.24	7044

IWCA II: Early Registration Form

Because a large deposit must be given to New Hall by March 1999, we need to ask those planning to attend the IWCA II next August to register early, if at all possible. Please make a copy of the form below (which is also posted at the *ICQ* web site) and return it with payment for the first day of room and board costs. Those in Great Britain paying in pounds sterling should make payment around 1999 March 1 directly to Jonathan Shanklin or the BAA main office (checks payable to "British Astronomical Association"; the rates in pounds are given at the *ICQ* web site). No refunds. Additional forms will be mailed later regarding the number of days/nights you plan to be at New Hall, and possible field trips (such as Stonehenge).

SECOND INTERNATIONAL WORKSHOP ON COMETARY ASTRONOMY

to be held at
NEW HALL, UNIVERSITY OF CAMBRIDGE
CAMBRIDGE, ENGLAND

Saturday-Monday, 1999 August 14-16

(PLEASE PRINT OR TYPE)

Date:_____

Name_____

Full Postal Address_____

_____

E-mail address_____

Please enclose payment with your registration for the first day of the meeting (choose from the daily rates in the table below; the column headed "1998" means that those rates apply if you register before January 1, 1999, in which case you will be guaranteed the same rate for all the days at the IWCA -- ditto for the other columns).

Please state amount paid with this form: $_____

If paying by check or money order, make it payable to "International Comet Quarterly" in U.S. funds (drawn on a U.S. bank), and send with this registration form to: IWCA; c/o International Comet Quarterly; M.S. 18; 60 Garden St.; Cambridge, MA 02138; U.S.A. If paying by credit card, please fill in the appropriate spaces below.

Credit-card payments for early-registration deposit:

Check type of credit card: ___ MasterCard ___ Visa ___ Discover

Credit-card number: _____ Expiration date: _____

Full Name of cardholder: _____

Your address at which the card is registered: _____

_____

Below are the rates now scheduled for room and board, in U.S. dollars (please check the rate you will be using in the left column below):

		1998	1999 Jan-Apr	May-July	Aug.
___	Daily full board, shared*	$115	$120	$125	$137
___	Daily full board, en-suite*	140	145	150	165
___	Day visitor with lunch	27	28	30	33
___	Discount for sharing twin room	15	15	15	15

* "en-suite" means shower and toilet internal to the room; "shared" means that they are external in separate rooms and shared with other rooms.