BAA COMET SECTION (Director: M.J.Hendrie)

UK VISUAL OBSERVATIONS OF COMET HALLEY Bulletin No.3. December 1985

VISUAL CO-ORDINATOR:
G.S.Keitch, 2 South Meadows, Wrington, Avon. BS18 7PF, England.
(Tel: 0934 862924 (evenings, weekends). 0272 290566 Ext.548 (office hours)

VISUAL PHOTOMETRY

The following table gives a rough indication of the comets' photometric performance to date. The values prior to mid-October are telescopic total magnitudes whereas those secured from the middle of the month onwards relate to binocular estimates.

DATE 1985	Approx M_v	DATE 1985	Approx M_v
Late July	15	Early October	$10\frac{1}{2}$
Early August	$14\frac{1}{2}$	Mid October	$9\frac{1}{2}$
Mid August	14	Late October	$8\frac{1}{2}$
Late August	$13\frac{1}{2}$	Late November	7
Early September	13	Mid November	6
Mid September	$12\frac{1}{2}$	Late November	$5\frac{1}{2}$
Late September	$11\frac{1}{2}$	Early December	$4\frac{1}{2}$-5

A preliminary analysis of observations secured from Wrington during the period September 11th - November 12th indicate that after a rather slow start the comet brightened more rapidly than anticipated. The following standard photometric formula was found to apply during this period:

$$M_v = 2.04 + 5\log\Delta + 19.5 \log r$$

Subsequent observations during November indicate that the formula is still applicable although we cannot be certain that this level of performance will be sustained indefinitely. Infact, early December observations suggest that the rapid rate of brightness increase is beginning to level off slightly. (December 5.80 UT; M_1 = 4.8 in 10x50B, GSK Wrington). Nevertheless, the prospects are encouraging and the comet could reach mag 3 over Christmas and 1^m or 2^m by 1986 January.

With decreasing distance from Earth towards late November, the coma became extremely large ($\frac{1}{2}°$) and well condensed and this has presented considerable difficulties for visual photometry. My own 10x50B would not defocus sufficiently and on several occasions, the image has been so large, bright and detailed that a small opera glass had to be used. I anticipate other observers will have experienced similar problems and this is likely to produce consdierable scatter in results. With the comet now approaching mag $4\frac{1}{2}$, the smallest possible aperture and magnification will be required for realistic visual photometry although observers with large instruments should continue to secure estimates for comparison with the 1910 data set.

Attempts at nuclear or inner coma photometry should also be made.

Comparison stars with photoelectric V-mags should be selected and most observers should have no difficulty in obtaining these from the AAVSO Atlas or other catalogues now that the comet is so bright. Please also take care that early observations with the naked eye really do refer to the comet and not faint groups of mag 5-6 stars.

TAIL OBSERVATIONS

During the first week or two of November, several UK members of the IHW Real Time Monitor Net reported the presence of a gas tail up to $\frac{1}{2}^{\circ}$ long which generally pointed towards the NW. Sometime around November 12th/13th very rapid and considerable tail developments took place. The following measurements of photographs by Mansbridge, Manning and Buczynski have been made by G.Hurst (TA).

November 12.08	No tail
November 12.961	Tail 38" wide for 3'.8 in PA 170° curving to PA 155° for further 1'.5
November 13.02	Tail 50" wide for 5'.4 in PA 180° curving to PA 165° for further 4'.0
November 13.084	Tail for 6' in PA 187" curving to PA 172° for further 8'.5.

Other tails have appeared visually and photographically in various other position angles although it is not too clear whether the variations relate to the same feature distorted by perspective effects or nuclear rotation. Some of the events could also be purely transient. At the time of writing various structure is being recorded to the east of the coma as seen in binoculars from Wrington.

SIMULTANEOUS OBSERVATIONS

The following dates have been identified by the IHW as key dates for intensive observations by partcipants in all disciplines:

1985 December 8-13
1986 January 4-6
February 17-19
March 4-18, 28-30
April 6-13
1986 May 3-5
June 1-3
August 1-3
November 12-14
1987 January 6-8

In addition, we have established contact with astronomers at the Institute of Astrophysics, Tenerife who are being kept informed of our visual coverage to assist in the planning of observations with 100" INT and the 60" infra-red telescope etc: When weather and Sahara dust (or the absence of it!) permits, we are hopeful of being able to obtain simultaneous visual observations to correlate with their results. Observers wishing to participate should let me have their 'phone number please so that they can be contacted, probably at short notice. We are principally interested to hear from large aperture users with the ability to record low contrast inner coma detail.

P/G-Z AND OTHERS

Please forward any outstanding observations of P/G-Z as we hope to carry out a full analysis of this comet as soon as possible. Although the priority object is P/Halley, coverage of Hartley-Good, Thiele etc., should continue especially as these other objects may well receive close examination from professional observations on account of the great interest in comets at the present time.

GIOTTO

The latest word on Giotto is that all is going extremely well. The onboard camera has returned some excellent views of the earth and moon and all the experiments appear to be functioning properly. Serious thought is now being given to the possibilities of decreasing the fly-by distance from 500 km to nearer 200 km.
Plans are also being made for a future comet sample return mission whereby cometary material will be brought back to a near Earth environment for analysis in space lab.

BAA Comet Section (Director: M J Hendrie)

UK VISUAL OBSERVATIONS OF COMET HALLEY

Bulletin No 2 August 1985

Visual Co-ordinator

G S Keitch, 2 South Meadows, Wrington, Avon BS18 7PF

Tel: 0934 862924 (evenings, weekends) 0272 290566 Ext 549 (office hours)

Visual Photometry

Standard sequences have been established for visual photometric observations of both P/Halley and P/Giacobini-Zinner (G-Z). The sequences are based on AAVSO vs charts and those intended for Halley have been checked by R H Stanton at Harvard using photoelectric techniques. The photoelectric V magnitudes are underlined and should be used in preference to non-photoelectric values.

This bulletin also contains vs charts for P/G-Z although some observers may prefer to take values straight from the AAVSO Atlas now that the comet has become a bright binocular object. The charts are summarised below.

P/G-Z

021558	S	Per	use July 31-Aug 25	
060547	SS	Aur	Aug 25-Sept 9	
	CZ	Ori	Sept 9 -Sept 23	
061702	V	Mon	Sept 23-Oct 15)	To be issued later
072820b	Z	Pup	Oct 15 -Oct 31)	

P/Halley

SU Tau
CZ Ori (also use for P/G-Z)
Y Tau
V Tau

(The above charts should be used until 1 November; observers should then use the AAVSO Atlas . IHW participants will find the relevant charts for 1 Nov onwards reproduced in their Manuals.)

A future bulletin will contain further charts should they become necessary for either of these two comets.

The following points should be kept in mind when carrying out visual photometry of the coma.

1) The I-O (In-Out) method is generally recommended. The infocus comet image is compared with several out of focus comparison stars. If the comet is small, bright and strongly condensed then it is permissible to defocus the eyepiece slightly to smooth out the worst irregularities in its appearance before making comparisons with infocus stars (Morris method). However, this should not be necessary if one is using a small enough instrument at low power which, in itself is an important point to bear in mind (see 2 below). Please state the method used.

2) Binoculars should be used for comets brighter than mag 9, ie 10x50B or 20x80B. When using a telescope, use the lowest power that shows the comet clearly. This usually results in an exit pupil of about 5mm although higher powers are sometimes required for very small faint objects. Make simultaneous estimates with various instruments but avoid unnecessary changes in instrumentation.

3) Proper comparison stars must be used and quoted. Use at least 2 comparison stars. preferably not more than 1^m apart with the comet somewhere in between in brightness. Comparison stars should be at the same altitude as the comet and as near as possible to the comet field. Rarely will they both lie in the same field so please make a note in your observation when you experience problems with atmospheric differentiation.

4) Be sure to expand the stars fully to avoid underestimated values of the comet's brightness.

5) Look critically at your estimates so that you can identify and rectify any problems as you go along. If an uncertainty exceeding $\pm$ 0.3 occurs please quote your observation as being approximate.

Do not hesitate to request a copy of the BAA Journal paper produced by the Section on this subject if you require more information. Send your sae to me please.

The Real Time Monitor Network (RTMN)

This small international net has been established by the IHW to collate essential details of visual observations secured by experienced comet specialists. As primary UK contact in this network, I will be communicating our results to JPL by telephone on a regular basis. Any observer wishing to give me a telephone update of their observations should contact me a day before the contact dates given below.

RTMN Contact Dates

1985 Aug 22, Sept 12, Sept 24, Oct 10, Oct 22, Nov 7, Nov 19, Dec 5, Dec 19.
1986 Jan 2, Jan 16, Jan 30

Future Bulletins

Please ensure that I am in receipt of a small supply of stamped addressed envelopes should you wish to be kept informed of developments. We anticipate our first visual sightings of P/Halley in the next week or two and this should be the beginning of an exciting time for us all.

Good luck.

Graham Keitch

BAA Comet Section (Director: M.J.Hendrie)

UK VISUAL OBSERVATIONS OF COMET HALLEY. Bulletin No.1. June 1985

Visual Co-ordinator:

G.S.Keitch, 2 South Meadows, Wrington, Avon, BS18 7PF

(Tel: 0934 862924 (evenings, weekends). 0272 290566 Ext. 549 (office hours)

Bulletin For Visual Observers

This bulletin has been produced by the BAA Comet Section for observers who intend to carry out visual studies of Halleys Comet. Subsequent issues are planned over the course of the next year to distribute general information, comparision star data, ephemerides etc. These will be made available to any serious BAA observer planning to follow the comet. Non BAA members registered with the IHW will also be circularized as the IHW Amateur Observer Co-ordinator, Stephen Edberg (Jet Propulsion Laboratory, Pasadena) has requested that we collate all UK IHW visual observations. If you wish to receive subsequent bulletins, please send me a couple of s.a.e. We want our observations to be of a high and consistant standard and it would be beneficial for us to keep in contact with one another. This bulletin should provide a means of communication during the coming year although observers should not hesitate to contact me (preferably by 'phone) if there are any outstanding matters not covered in these notes.

We anticipate that numerous visual observations will be attempted by amateurs of varying degrees of experience. As with all observing sections, we aim to maintain the high standards associated with the BAA and at the same time, we need to encourage the beginner. However, to set the record straight from outset, we should make it clear that these particular notes are compiled with the former objective in mind; i.e., the acquisition and co-ordination of high quality observations of the comet. Such observations are not easily secured by the beginner although we anticipate useful input from observers of other disciplines, especially planetary and VS observers. In order that good quality data can be processed quickly in the appropriate manner and to identify those needing encouragement or guidance (and to give the right priorities to each) we would ask observers to study this bulletin carefully please.

IHW Contributions from BAA and non BAA Members

As the UK has a relatively large observing network, I have been asked to act as national co-ordinator for all UK IHW visual observations. Participants should already have registered their interest with Stephen Edberg (JPL) and a copy of the registration form should have been sent to either Mike Hendrie or myself. Do not worry if you have not followed this procedure as Stephen has forwarded photstat copies to us for observers who were not aware of the arrangements.

All UK visual observers should send their IHW observations to me please (at the Wrington address given at the beginning of this bulletin) so that I can collate the data and provide JPL with regular summaries, possibly by telephone or computer link. As primary UK contact for the Real Time Monitor Network (described elsewhere in these notes), I need to ensure that the communication of results is carried out effectively according to the instructions we have been given. It is also important that

communication channels do not become confused by observers 'doing their own thing'. In particular, we need to insist that extra care is taken when the comet is faint and first located, probably sometime in August. Inaccurate claims of 'visual recovery' can be scientifically misleading and are likely to cause us embarrassment if improperly handled. We have been asked to check and evaluate all observations first before onward transmission to IHW headquarters. Please send both positive and negative IHW results to me throughout the apparition on a monthly basis sometime during the moonlit period. BAA members need not complete the usual Comet Section report forms if they have sent me an IHW form. Instead, please send a duplicate marked 'Duplicate BAACS copy'.

BAA Comet Section observations from non IHW contributors

Members of the section who are not registered with the IHW should send their observations to me in the usual way please on standard Comet Section report forms. Those making extensive observations should send them on a monthly basis (ideally during the moonlit period). Certainly, we would like to have all preperihelion observations by end February 1986 and initial postperihelion results from the southern hemisphere should be sent in by end May 1986 please.

BAA members, non Comet Section and non IHW

BAA members who do not at present contribute regularly to the Comet Section should request a supply of Comet Section report forms if they anticipate making more than just the occasional observation. For convenience we would much prefer to work from our report forms rather than having to extract details from a letter. Individuals in this category are advised to study the various details issued by the Section in recent years regarding our observing techniques. (For details, please write with an s.a.e., to Peter Stanley, 20 Elsted Close, Ifield, Crawley, West Sussex, RH11 OBH).

Few non Comet Section members will have first hand experience of our procedures and discussions on the more demanding subject of comet photometry and we would not encourage non comet observers to carry out this work as much practise is required. However, we are looking for some useful input from planetary observers and other individuals with a keen eye for detail who can produce inner coma drawings while VS observers can be usefully engaged in monitoring the brightness of the 'nucleus' using standard VS techniques.

JAS members, TA and other groups

Naturally, the BAA as a body cannot undertake to process observations from non members except for in the case of IHW contributors where special arrangements have been made. As Director of the JAS Comet Section, I will be asking JAS observers to send their results to me sometime in the first few months of 1986. Inexperienced BAA observers may care to follow the JAS Comet Halley Project which will be announced shortly in more detail.

The experienced Comet Section observer Guy Hurst is also editor of TA and will keep in regular contact with me as part of the Real Time Monitor Network. He will pass on any details secured by the TA network. As far as visual comet work is concerned, most of the regular UK contributors to TA Comet Notes are also active Comet Section members but in addition, TA also attracts a substantial quantity of European contributions and it will be helpful to be kept informed of their activities. The Comet Section and TA are also co-operating over the subject of comparision star data for visual photometry. Non BAA members and unaffilliated groups may care to send their visual results to The Astronomer, C/O G.M.Hurst, 16 Westminster Close, Kempshott Rise, Basingstoke, Hants, RG22 4PP (unless they are intended for the IHW archives).

The IHW Real Time Monitor Network

This particular IHW network is being organised along the lines of the other professional disciplines by Charles S.Morris at JPL. Essentially, the network consists

of a small international team of experienced observers who will keep in regular direct contact with JPL to report summaries of their observations probably on a fortnightly or weekly basis. I have been asked to act as the primary contact for the U.K. and there are three other members of our team, namely George Alcock, Guy Hurst and Roy Panther. Our other very experienced visual observer Jonathan Shanklin is part of the British Antartic Survey and as such, has his own direct links with JPL from Cambridge. I will also maintain regular contact with the other Comet Section and IHW co-ordinators for astrometric and photographic studies i.e., the Director Mike Hendrie and Harold Ridley whose fine comet photographs will be known to readers of the Journal. While these few experienced observers have been singled out for mention because of their specific duties, the Real Time Monitor Network is the body to which any observer should report anything unusual with respect to the comet. My evening (home) telephone number is available all night (0934 862924) in this connection. All 'phone calls relating details of such observations should be followed immediately by written confirmation. An alternative all night number is 0256 471074-Guy Hurst.

IHW Manual

All IHW contributors should have studied and (more importantly) actually practised the procedures outlined in the IHW Amateur Observer's Manual for Scientific Comet Studies. The manual is generally very helpful and well produced although there are a few points worth raising. In my copy the drawings by John Bortle which illustrate the DC scale are rather misleading. This almost certainly results from the difficulty of reproducing subtle pencil shades in print; such shades generally have to be rather exaggerated to reproduce properly. My copy grossly exaggerates the condensation and the illustration for DC3 shows a strong condensation which I would rate nearer DC6. A coma of DC3 should only show a gradual and rather weak brightening towards centre whereas DC6 would represent a definite and quite intense central region. Similarly, I would rate DC1 as being more or less totally diffuse with only the slightest hint of a very weak brightening towards centre whereas the illustration shows a definite (although admittedly not strong) brighter centre which in reality would be nearer DC3. Observers relying purely on these illustrations may report misleading values whereas in practice, most experienced observers rarely disagree very much over DC estimates. The anomaly referred to here is either a function of printing techniques or the result of one observer's interpretation when committing pencil to paper, both of which are rather difficult processes to affect unambiguously. The written description of the DC scale given in the manual is probably much more useful.

We discourage our observers from using the cross bow method when measuring tail lengths. The more scientific methods of using an atlas or measuring RA and Dec for start and end points (and then applying the necessary formulae) are preferred. Similarly, members should not use field diameters as a means of estimating coma size or tail length as this again is unsatisfactory (unless no field stars are visible and the comet is being observed in virtual daylight!)

The manual does not provide comparision star data for the comet when fainter than the limit of the reproduced AAVSO Atlas charts, i.e., mag 9-10. Those attempting photometric observations when the comet is fainter than this will require access to accurate comparision star data. A suitable AAVSO VS chart has since been selected and has been checked for accuracy using photoelectric photometry. To standardize our results, this chart will be circulated via a future bulletin. As a back up, Guy Hurst and I have also identified some other photoelectric sequences which will also be made available if necessary. Guy is currently checking the USNO catalogue to find photoelectric V-mags for brighter stars near the comet's track in the range mag 10-7. The AAVSO Atlas magnitudes for stars brighter than mag $6\frac{1}{2}$ are generally photoelectric and should be quite reliable.

General guidelines for visual observers

When the comet is fainter than mag $9\frac{1}{2}$, observers will require the standard sequences

referred to above for visual photometry. Suitable instrument specifications are given below with a rough indication of limiting cometary magnitude in perfect conditions.

APERTURE (cm)	MAGNIFICATION (x)	FAINTEST COMET (mag)
35	70	14.0
30	60	13.5
25	50	13.0
20	40	12.5
15	30	12.0

The magnification is an important factor and the values given here for each aperture size should be matched as closely as possible unless the comet is particularly difficult when faint, in which case, perhaps a little more magnification may be required with the larger apertures.

When the comet is faint, observers will need access to a suitable photographic atlas, i.e., Vehrenberg's Falkau Atlas or Atlas Stellarum with a limiting magnitude near their instrument's threshold. This is essential for knowing exactly where to look and to ensure correct identification. Although such atlases are expensive, they are most essential to the serious observer of faint comets and our shortage of such observations probably reflects the fact that few observers have acquired such resources. Even when the comet is brighter and can be recognised without difficulty, such an atlas is still very valuable to enable tails to be drawn in and measured in length and PA. In addition, star separations can be measured from the photographic atlas with a high power magnifier and graticule (i.e., a pocket microscope) to enable fairly accurate coma dimensions to be determined. Alternatively, one can also use a micrometer or cross hair facility at the eyepiece.

When the comet is brighter than approximately mag 9-9½, visual photometric, coma size and tail observations should be made with 20x80 binolculars which are readily obtainable and generally regarded as the standard among comet observers. The contrast provided by 10x80 B or 11x80 B is generally not good enough for fainter binocular comets. When the comet reaches mag 8 - 8½, observers should switch to 10 x 50 B. If you find such instruments ineffective, it is probable that you have not acquired sufficient experience in observing faint diffuse objects or that your seeing and skies are simply not good enough for this type of work and you would be more usefully engaged in studies of nuclear or coma structure using a larger instrument. In addition to using binoculars, observers should also use larger instruments to monitor the comet's structure as plasma tails and jets are sometimes more easily recorded with larger apetures and magnification.

Few people like to be reminded, but clear dark skies are a pre-requisite for most aspects of comet work and those with poor skies should take advantage of the fact that binoculars (and the necessary photographic tripod to support them) can be transported to a darker site. Incidently, a small number of nearby bright lights are often less devastating than a general background glow caused by hundred of city lights at some distance, provided of course that an observatory or shield has been erected to protect the observer from direct view of the offending source.

This leads to the subject of deep-sky/comet filters. Experiments with such devices to enhance the view are certainly not discouraged but in no circumstances should they be used for visual photometry. Planetary or deepsky observers attempting coma drawings should note the time to within 5 minutes and the scale, orientation and instrument specification should also be recorded. Those attempting photometry of the nucleus should be aware that nuclear resolution is a function of aperture and magnification. It is therefore quite pointless to keep switching magnification as such data would be

almost impossible to assimilate. Nuclear estimates ideally should be supported by measurements (in arcsecs) of the actual nuclear disc, more correctly known as the nuclear condensation. Large refractors are suitable for this type of work. They can also be used to secure observations similar to those made in 1910 for comparison purposes. This should be attempted by someone not otherwise engaged in 1985-type observations as parallel results from one observer may well be subject to bias.

Finally, we hope these bulletins will be useful to pass on comments and to clarify the arrangements in general. I would be interested to hear from anyone wishing to pass on any further information to our readership.

Graham Keitch.

Late Note:
Approved IHW comparison star fields for P/Giacobini-Zinner are as follows:

AAVSO REFERENCE	VS FIELD	PERIOD OF SUITABILITY
230759	V Cas	1985 July
021558	S Per	July 31-Aug 26
060547	SS Aur	Aug 24-Sept 10
061115	CZ Ori	Sept 8-Sept 24
061702	V Mon	Sept22-Oct 16
072820B	Z Pup	Oct 14-Oct 31

Charts for the above will be issued with the next bulletin.