Occultation Newsletter

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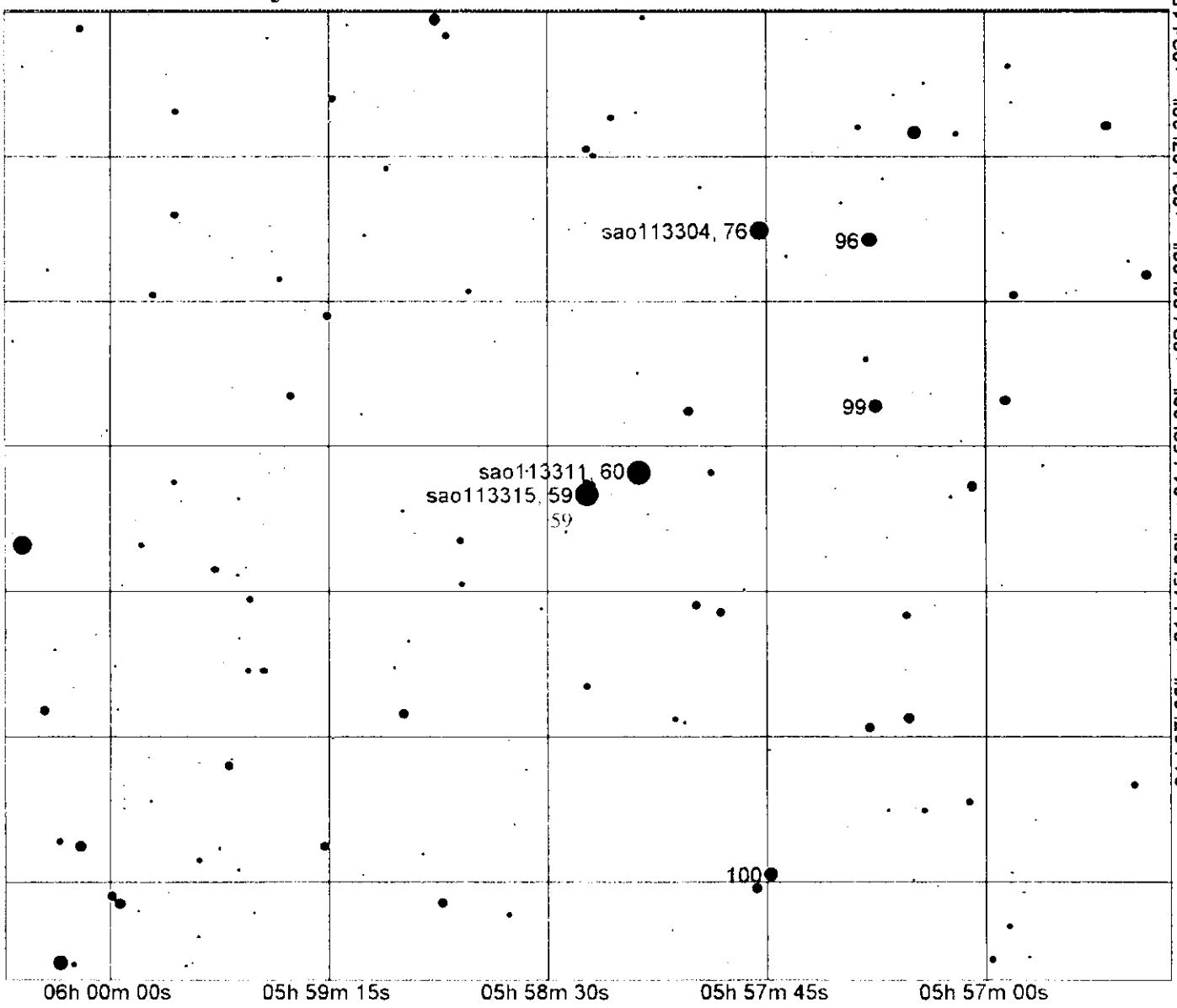
Asteroid Chaldaea Occulting SAO 113315 and 113311



SAO 113315

SAO Mag: 6.1
Spectral: A5
Flamsteed-Bayer: 59 Orionis

HD: 40372
GSC 117:1338 (Stellar)
Magnitude: 5.9

In This Issue

For subscription purposes, this is the first issue of 1998.

On the cover:
Asteroid Chaldaea occulting SAO 113315 and 113311, 6.0 magnitude with a drop of 5.4 magnitues lasting 14 seconds on 1999 January 7. (The chart was produced with TheSky Level IV v4.00.105.)

International Occultation Timing Association, Inc. (IOTA)

What to Send to Whom

Send new and renewal memberships and subscriptions, back issue requests, address changes, email address changes, graze prediction requests, reimbursement requests, special requests, and other IOTA business, **but not observation reports**, to:

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Tokyo 181-8588, Japan
Email: SomaMT@cc.nao.ac.jp

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Richard P. Wilds
7328 SW 23 Terr.
Topeka KS 66614-6060 USA
Email: DarkMatter-at-HART@worldnet.att.net

Send Total Occultation and copies of Lunar Grazing Occultation reports to:

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Geodesy and Geophysics Division
Hydrographic Department
Tsukiji-5, Chuo-ku
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Email: ILOC@cue.jhd.go.jp

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Jan Manek, V.P. for Planetary Occultation Services
Stefanik Observatory
Petrin 205
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Send observations of occultations that indicate stellar duplicity to:

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Noorderstraat 10E
NL-9524 PD Buinerveen
The Netherlands
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IOTA Publications

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- Graze Limit and Profile predictions US$1.50 per graze.
- Papers explaining the use of the above predictions US$2.50
- IOTA Observer's Manual US$5.00

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- **South America**--Orlando A. Naranjo; Universidad de los Andes; Dept. de Fisica; Mérida, Venezuela
- **Europe**--Roland Boninsegna; Rue de Mariembourg, 33, B-6381 DOURBES; Belgium or IOTA/ES (see back cover)
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- **Japan**--Toshiro Hirose; 1-13 Shimomaruko 1-chome; Ota-ku, Tokyo 146, Japan
- **All other areas**-Jan Manek; (see address at left)

ON Publication Information

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International Occultation Timing Association, Inc. (IOTA)

MOONLIMB - New Lunar Limb Data from Occultation Observations

(Dietmar Büttner, Zeunerstraße 7, D-09117 Chemnitz)

Introduction: Occultation observations have revealed time and time again that the Watts' Charts, though being the only comprehensive source for lunar limb data, are seriously in error in many cases. Regrettably, grazing occultation expeditions often suffered from having no contacts due to bad profile predictions. Thanks to the progress in positional astronomy during the last years very precise lunar ephemerides and stellar positions are available. They render the limb corrections to be the most inaccurate component in predicting and analyzing occultations.

MOONLIMB is the first known project to derive new limb corrections from occultations at a comprehensive extent. It is primarily run by Dietmar Büttner with considerable contributions from Reinhold Büchner and Eberhard Riedel, all members of IOTA/ES.

Principle of solution: The main idea of MOONLIMB is to evaluate all available observations of total and grazing occultations within a common analysis using the same databases and algorithms. In this method the data from graze expeditions are not considered only within one particular case, but they do confirm or complement one another. The creation of limb data is quite independent from the Watts charts, i.e. it is not a partial or total correction of Watts data. This enables a concise solution without all confusing empirical corrections. For each observation the residual to a circular lunar limb is taken as a possible limb correction. In this procedure the positions of the stars and of the Moon are considered to be free of any error. Even if this may be not quite correct, it provides a defined relation to the modern system of astronomical constants and allows correct predictions by programmes using the same constants. The profile reconstruction is made in the same way as the observations were achieved and as the data are needed for future predictions, namely as a specific view of the limb for a given libration at a given Watts angle (WA). This is a correct solution of the 3-D-problem, whereas the sometime used P-D-system is only a 2-D-approximation.

Observation data base: For the first two versions of MOONLIMB the following data collected and provided by the ILOC were used.
Time span: 1972-1993
Total number of observations provided by the ILOC: 153,991
Number of observations remaining after the initial error checks: 144,333
Number of observations ±30° around the N/S poles: 29,809
Number of observations used: 10,166 (including 8,316 known graze contacts)
Number of derived profile points: 5,010
Number of reconstructed profile segments: 182

The evaluations have been limited to the polar regions (WA ±30° around the poles) because limb data only in these regions are needed for grazing occultation predictions. The observations are rather unevenly distributed resulting from more disappearances than reappearances, from occultations of bright stars and of star clusters like the Pleiades. Compared to the Watts charts with their evenly distributed points in a 0.2° grid of libration and WA the current MOONLIMB set contains only 0.1 % of points. But the much higher number of points in the Watts data files feigns a none existing resolution because the data there are partly inter- or extrapolated over intervals of several degrees. The 1° grid for the librations used by MOONLIMB causes no real loss in profile resolution but needs much fewer observations.

Realization of the profile reconstruction: The task was performed in three clearly distinguished steps:
a) detailed error checks in the observation data base (by R. Büchner), all observations with incomplete or apparently wrong entries have been rejected
b) calculation of the residuals
c) evaluation of the residuals to derive the new limb data

While the calculation of the residuals mainly needs highly precise algorithms does the handling of more than 100,000 observations require a well designed data management (storage, access, selection). All calculations were made with software developed by D. Büttner. From 1995 to 1998 the author spent about 1,000 hours of spare time on the MOONLIMB project (including software development).

The calculation of residuals is based on the lunar ephemerides LE 403, on the PPM positions of the stars and on the observers positions in the WGS 84 system.

The evaluation of the residuals was done visually. Within a grid of 1° in the librations all 10° segments of WA containing at least 20 observations were displayed at the computer monitor. All observations which did not fit the profile contour resulting from the majority of neighboring observations were rejected. Even if this method seems rather time consuming it provides an instructive impression on the situation in a given profile region. The elimination of isolated or deviating observations may cause the exclusion of many points

which could fit well if more observations would be available. However, the profile points derived from the remaining observations are considered to be highly reliable. And this is the main goal of MOONLIMB. After the above selection process all remaining observations have been transformed to a fixed grid of 0.1° in WA and 1" in the librations by computing mean values.

Results of profile reconstruction: The most important result is the conclusion that a detailed and precise profile reconstruction from occultations is possible at a comprehensive extent. Consequently, two sets of new limb data for the northern and southern polar regions have been created. They are named MOONLIMB version ML97A and ML98A, respectively.

The primary result of MOONLIMB are precise limb corrections at individual Watts angles under individual librations. Depending on the distribution and on the density they represent either continuous profile contours or only a few single points. MOONLIMB enables a partial profile reconstruction in a total of 182 segments. Although the profiles have a high resolution partly, they do not represent the highest mountains and deepest valleys necessarily. However, even such profiles which consist from a few points only, are valuable because they give a reliable idea on the rough contour and it's place. This may be of high interest in preventing a miss for a graze expedition. It should be noted that in a considerable number of cases no profiles could be derived due to the large scatter in the residuals or due to the lack of observations.

Comparison with the profiles from Watts charts: Partly the MOONLIMB profiles fit well with the profiles from Watts charts, but partly the new profiles revise the Watts data completely. For most of the reconstructed profile segments the situation lies somewhere between these two extremes. In many cases the MOONLIMB data confirm the general contour and/or the height level of the Watts profiles. Additionally, the MOONLIMB data improve the detail resolution mostly. Often an offset in the height level or in the WA between profiles from the two sources was found.

Error discussion: Many MOONLIMB profile segments contain observations from different stars and days. Mostly they confirm each other well. However, there are considerable disagreements in some cases. Even if all observations concern the same star at the same day often a few single points lie far away from the majority of the observations. This results mostly from a single station, probably due to errors in the observers position or in relating the stop watch to the UTC. In some cases the profiles in a particular region resulting from different stars and/or different graze expeditions give similar profile contours with a systematic offset. Such effects may result from erroneous star position, from double star components or from wrong geodetic datum statement in the reports.

As many as possible detectable and systematic errors have been eliminated or corrected in processing the observations, e.g. by rejecting observations with formal errors in the reports or by correcting observers positions for geodetic datum. Possible large accidental errors have been prevented by excluding observations not fitting to other points in the neighborhood. Furthermore, possible small accidental errors are smoothed by calculating means if more than one point exist within a particular grid mesh. In flat profile regions or in graze expeditions with many stations the profile resolution sometimes decreased from computing this mean values for the transition into a fixed grid.

As the analysis has a clear statistic nature, the quality of the profiles depends on the number and on the distribution of the observations. Generally, the relative accuracy of profile points resulting from one day or one graze expedition is much better than the absolute accuracy of all points with respect to the mean circular limb. This is due to the various possible error sources in reducing all observations of many stars from many dates and from many observers to one unique system.

One main source of uncertainty results from double star occultations, because in most of such observations the actual occulted component was not specified in the report and because no double star source for a real reliable use was available to me.

It is expected to have a relative accuracy of ±0.1" within a given particular profile segment and an absolute accuracy of ±0.2" to ±0.4" for all points.

Use of the MOONLIMB data: MOONLIMB is the first project using amateur occultation observations at a large scale to improve the prediction data base. It is a work by amateurs for amateurs. Even if MOONLIMB only provides limb data for a limited number of particular segments instead of the whole polar regions, it is a very useful source because the data are considered to be highly reliable. This will, hopefully, result in a considerably improved accuracy of graze predictions, reducing the number of miss expeditions. The first comprehensive use of the northern polar data (ML97A) was made by F. Riedel in computing the graze predictions for 1998. His GRAZEREG version 5.0 prefers the MOONLIMB data, if available, over the Watts data. The southern limb data (ML98A) will be added starting with the predictions for 1999.

Conclusions for the observers: From the MOONLIMB work a number of important conclusions for the observers were deduced. They are given as a rule below:

1. Amateur observations of lunar occultations are still welcome and pressingly needed, even if a long term continuous work in this field seems much less spectacular than a once time observation, such as solar eclipse.
2. Due to the statistic character of the analysis work the value of the observations is increasing with their number and henceforth with the

years.

3. Many visual observations are much more valuable than a few photoelectric (video, CCD, ...) observations. Although an automatic observation process is more accurate in timing, it does not remove the many other error sources such as wrong star identification, false observer position or wrong star position.

4. While grazing occultations, of course, provide a higher density of profile points, total occultations are still needed because their value increases largely with their number.

5. In spite of the possibility of individual reductions by the observer with programs as OCCULT, each observer should absolutely continue in sending his observations to IOC. Only if all observations are collected by one central responsible instance, they may be used together in a combined analysis in the present and in the future. The maximum value of a single observation is only given if combined with as many other observations as possible.

6. The report of the observations should be performed with high care. Only the observer knows the circumstances and details of his own observations. Incomplete or wrong reports are subjected to be removed because they should be considered to be not reliable.

7. Fill in really all appropriate items to the report, especially such subjects as star identification, graze event code, double star component and geodetic datum.

8. In case of an ambiguity of the star identification (e.g. more than one occultation within a few seconds) compare carefully with the predictions via time, CA or PA and star magnitude in order to identify the stars correctly.

9. Consider the double star code in the predictions. If appropriate state the observed event as 'double star component unknown'.

10. Do only use standard time signals as reference, but never use such questionable sources as time displays in the video text of TV programmes. The latter sources may have errors in the order of 30 s or more, as investigations by the author have revealed.

11. Write legibly on the report if it is written manually.

12. If possible, key in your observations by yourself and report them via electronic medium (diskette or email). This reduces errors possibly caused by other persons. The OCCULT program by D. Herald is a useful tool for this task.

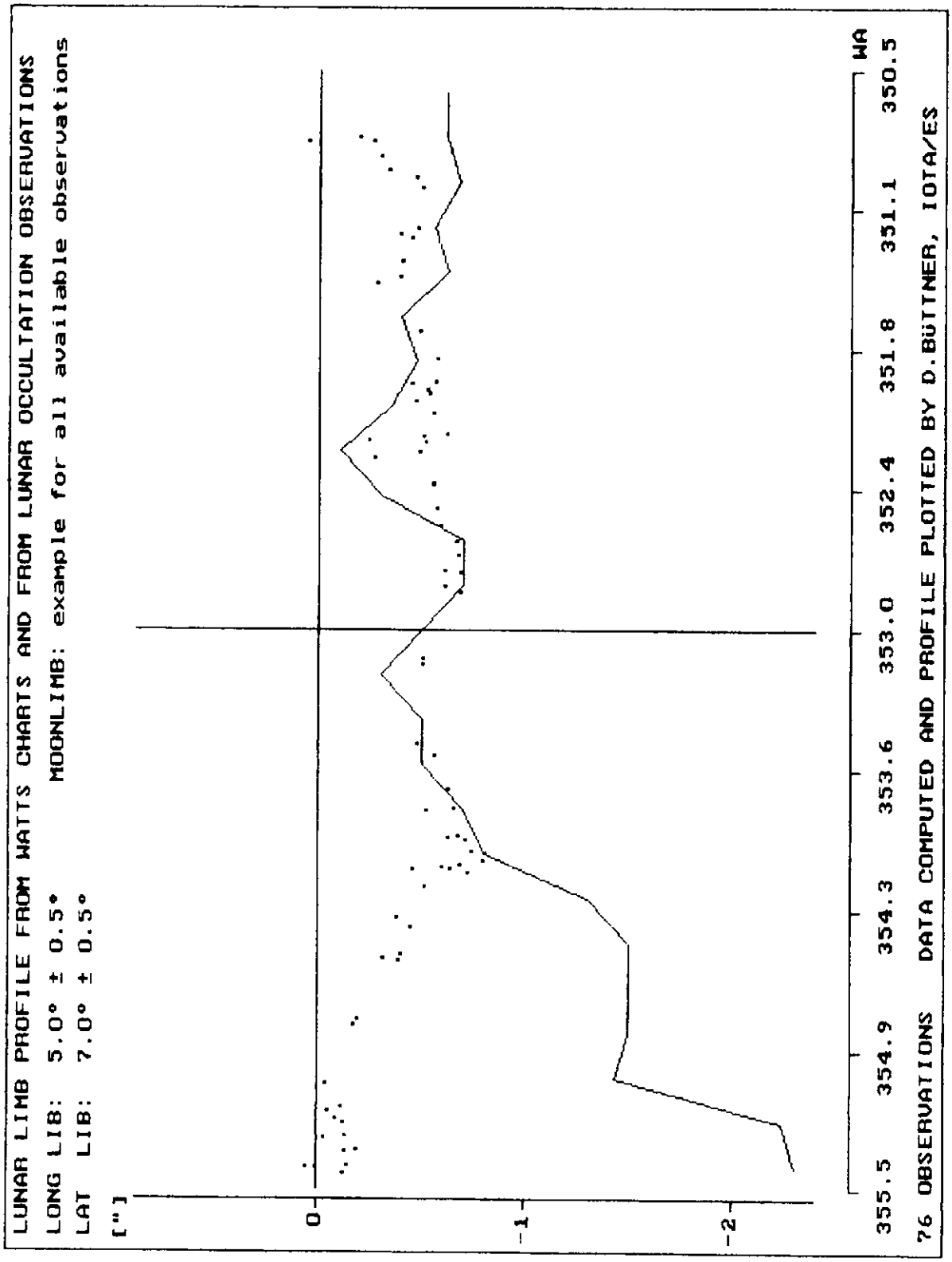
Acknowledgments: Thanks should be expressed to the following persons who and institutions that made possible the MOONLIMB project by their contributions:

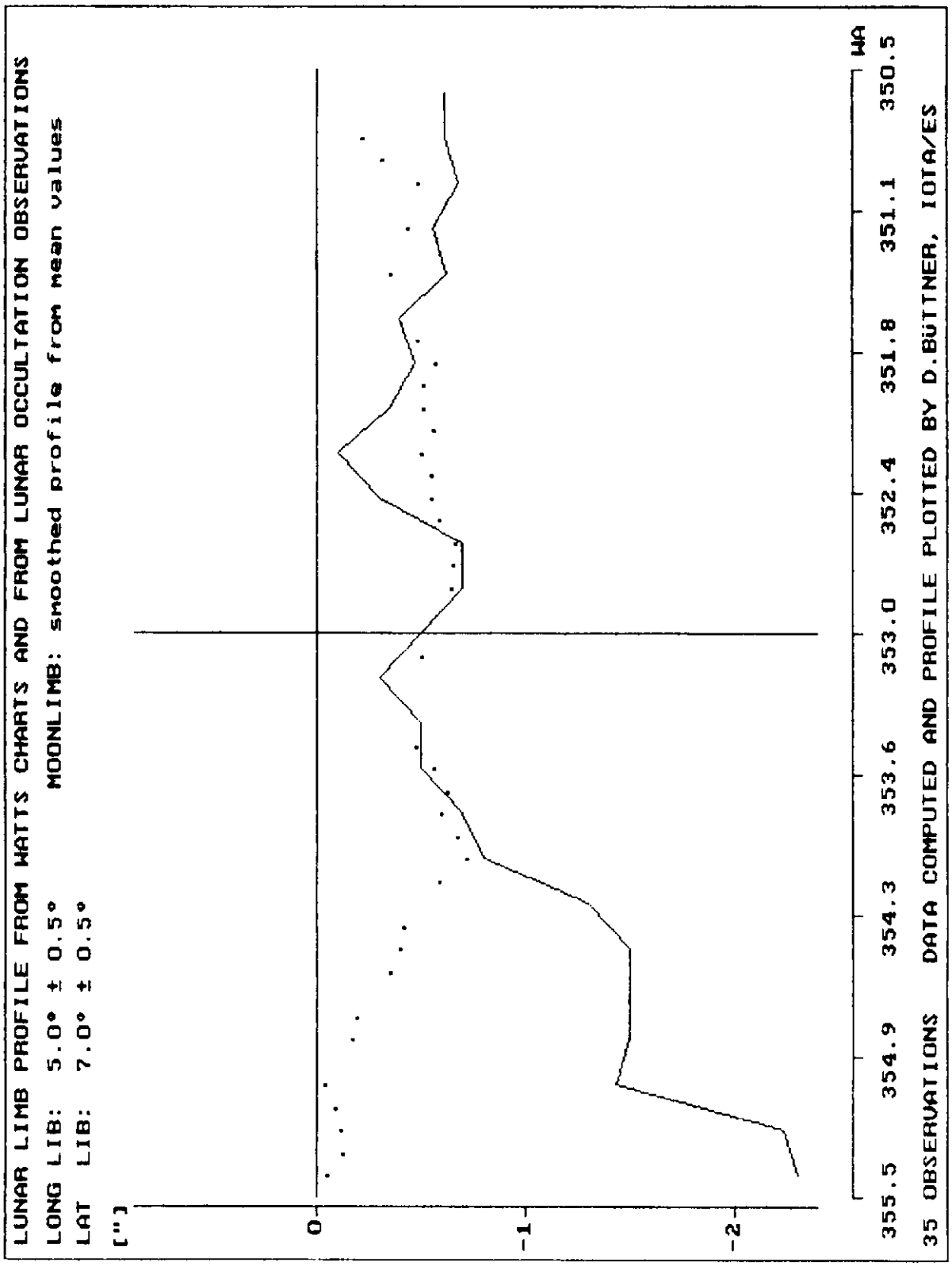
- hundreds of observers, mostly amateur astronomers, for making thousands of observations, doing mostly in their spare time during the night time hours
- IOC for collecting the observations worldwide and providing them kindly to me
- Reinhold Büchner for extended discussion on many details, for providing various data sources and for performing the formal error checks of the observation files
- Wolfgang Zimmermann for providing the Watts data and the cross reference star catalogues
- Eberhard Riedel for many discussions and for incorporating the MOONLIMB data into his GRAZEREG program

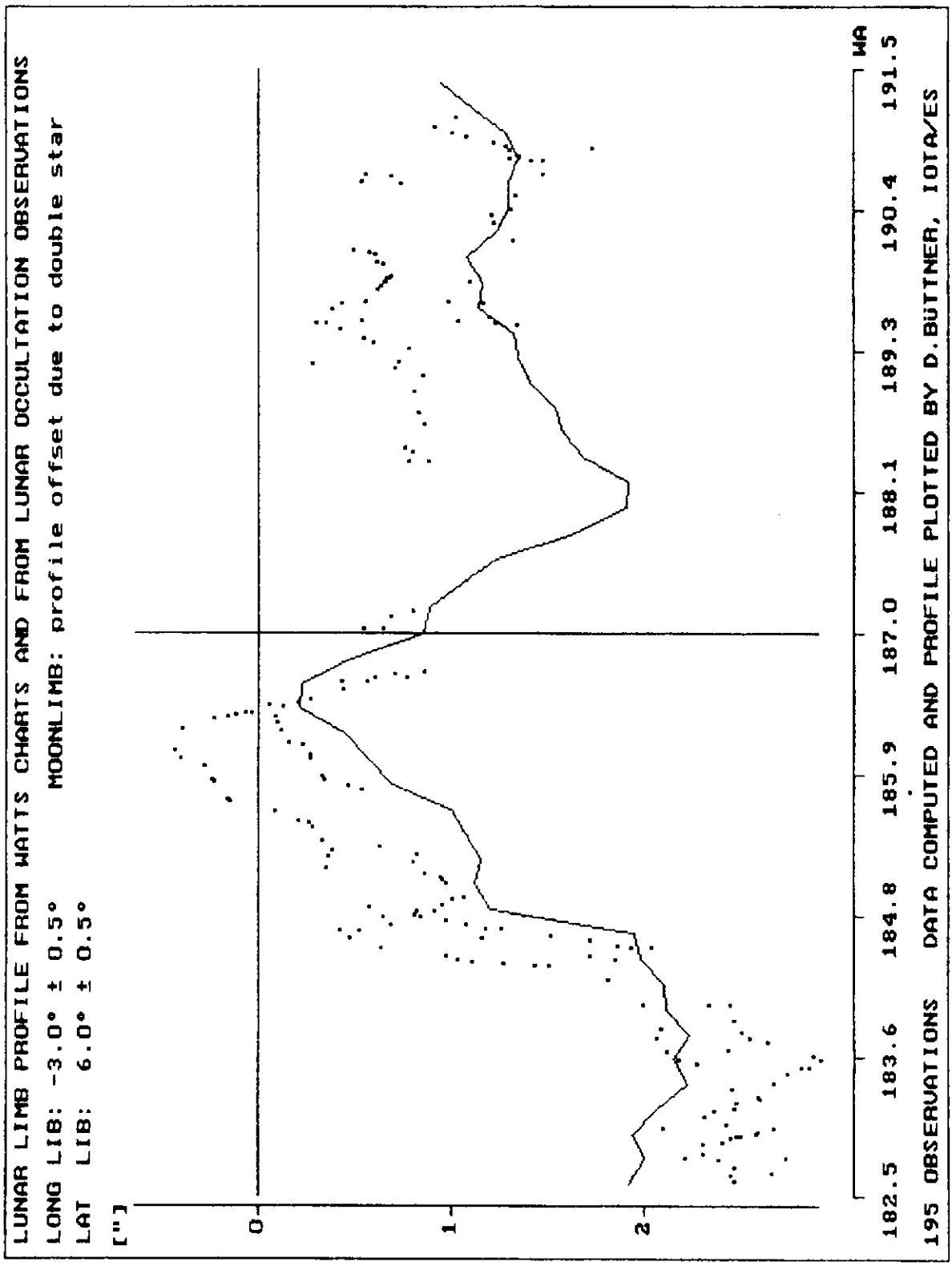
Future MOONLIMB work: The following activities in the MOONLIMB work are planned for the future:

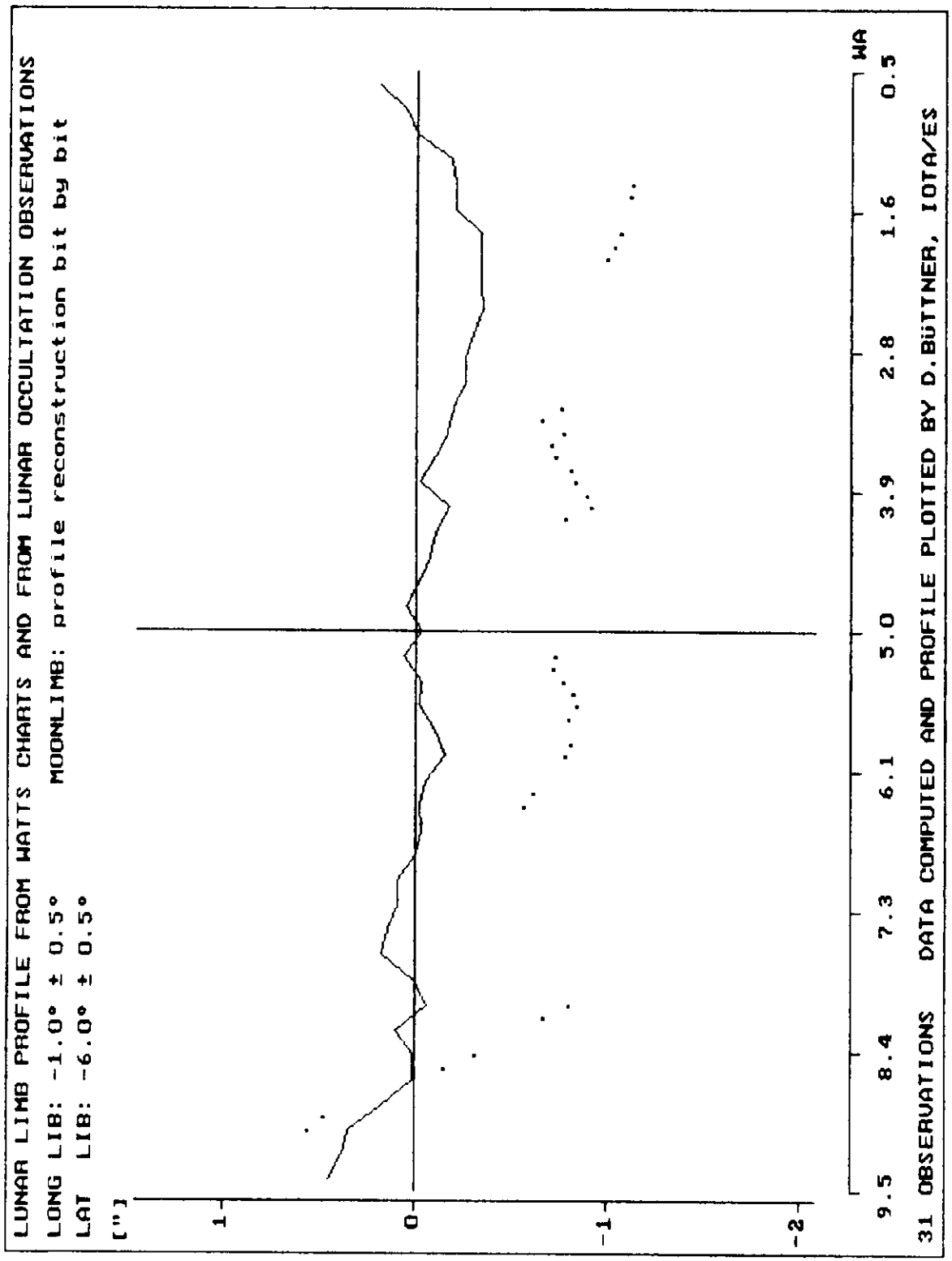
- inclusion of further observation data bases (observations collected by the Royal Greenwich Observatory and more recent files of IOC)
- consideration of double star data
- repeated reduction of all available observations using most recent lunar ephemerides and star catalogues
- repeated profile reconstruction by using the newer observations in conjunction with the already evaluated data in order to reduce the number of observations which are rejected due to the spare distribution in some regions
- automated profile reconstruction eliminating the need for the visual evaluation and semi-manual selection of the data to be used

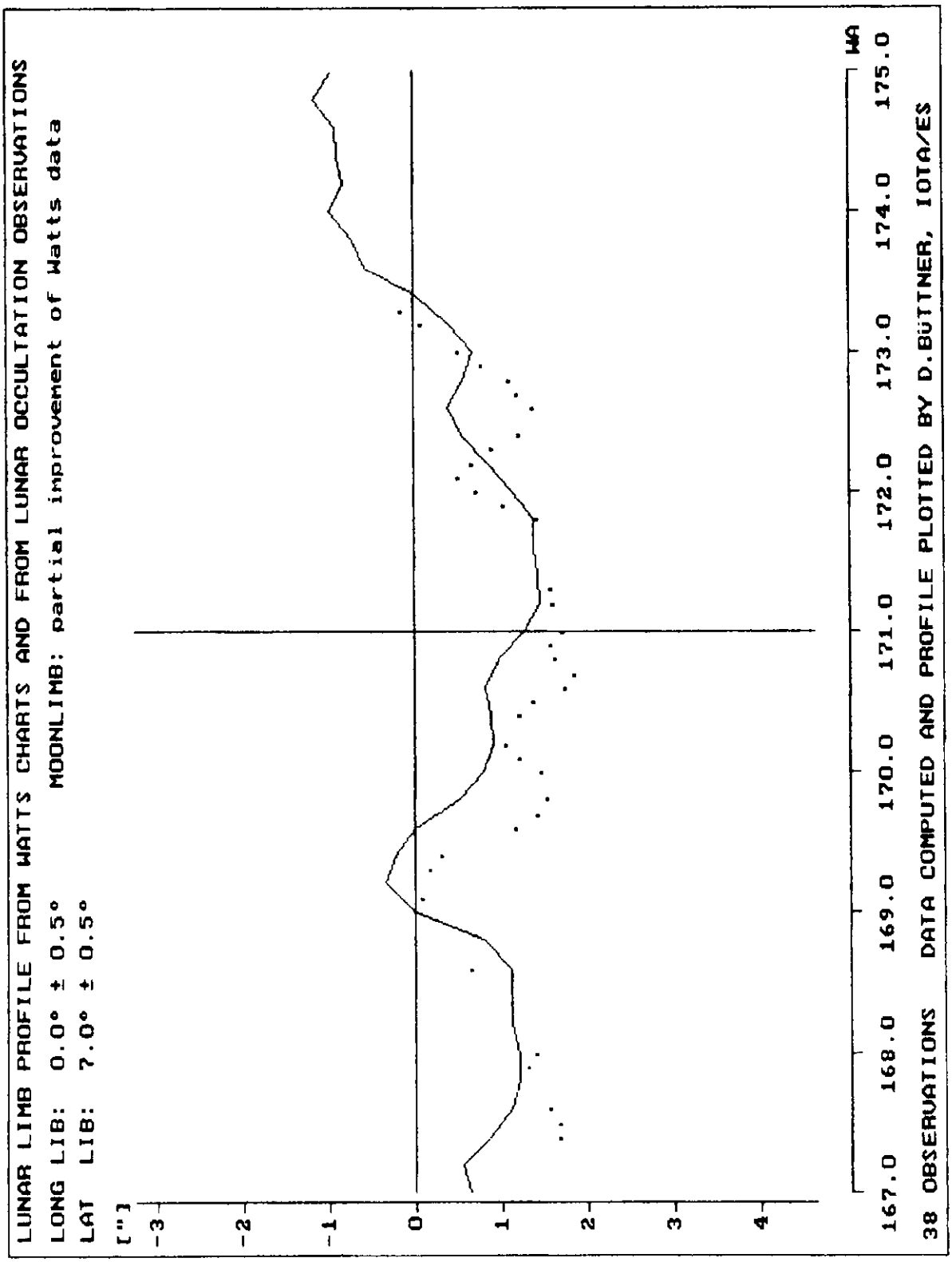
The figures show same examples of the MOONLIMB profiles (represented by the dots) in comparison with the Watts Charts profiles (solid continuous line). The two plots for LONG LIB 5° / LAT LIB 7° demonstrate how the scattered profile from all available single observations is smoothed by calculating mean values within a given grid. Another plot (LONG LIB -3° / LAT LIB 6°) is a typical case of a profile offset within all available observations, probably due to a double star effect. All other figures give profiles from mean values, either continuous or in single segments.

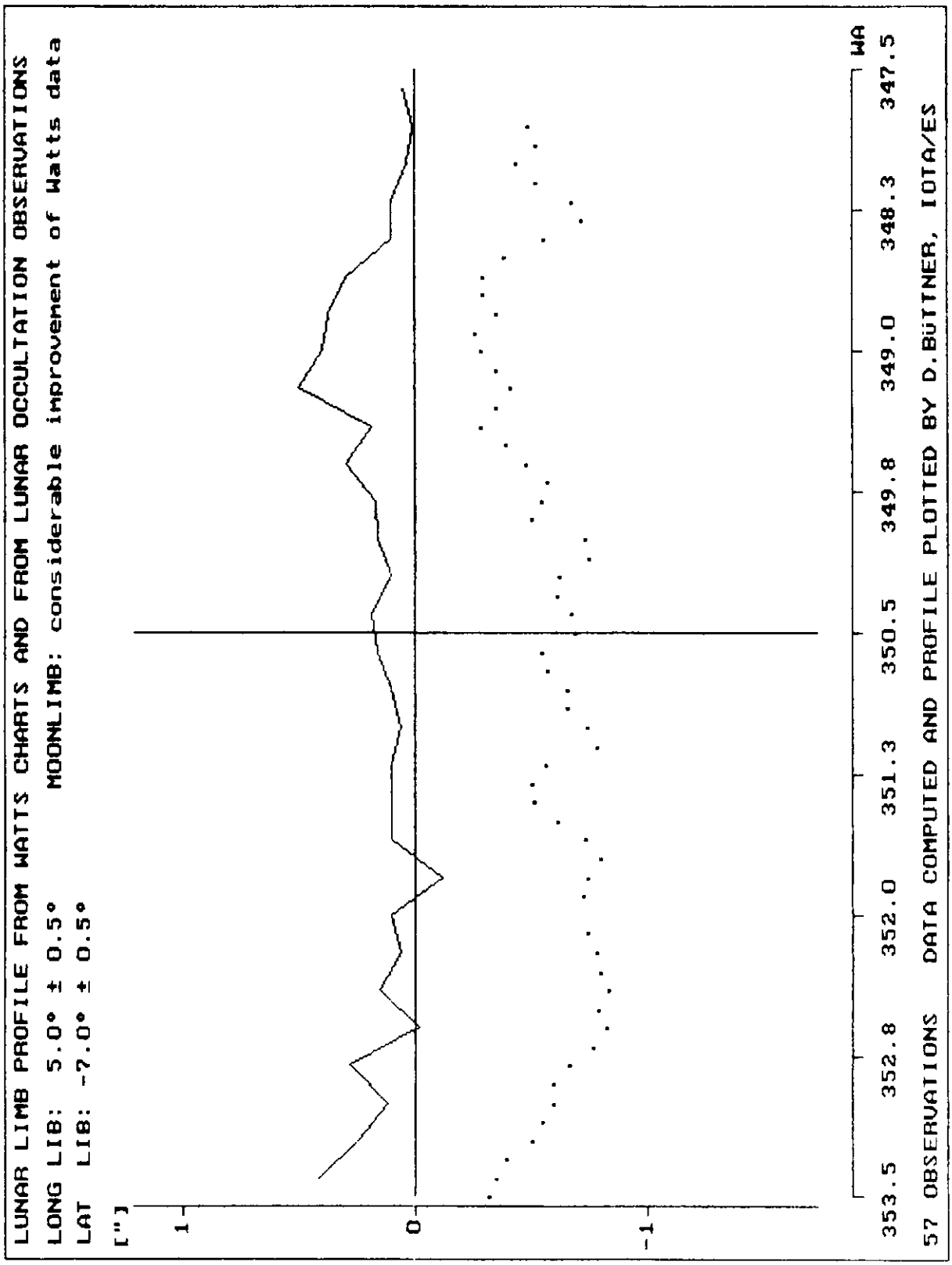

LUNAR LIMB PROFILE FROM WATTS CHARTS AND FROM LUNAR OCCULTATION OBSERVATIONS
LONG LIB: 5.0° ± 0.5°
LAT LIB: 7.0° ± 0.5°
MOONLIMB: example for all available observations
["]
0
-1
-2
355.5 354.9 354.3 353.6 353.0 352.4 351.8 351.1 350.5
WA
76 OBSERVATIONS DATA COMPUTED AND PROFILE PLOTTED BY D.BÜTTNER, IOTA/ES


LUNAR LIMB PROFILE FROM WATTS CHARTS AND FROM LUNAR OCCULTATION OBSERVATIONS
LONG LIB: 5.0° ± 0.5°
LAT LIB: 7.0° ± 0.5°
MOONLIMB: smoothed profile from mean values
["]
0
-1
-2
355.5
354.9
354.3
353.6
353.0
352.4
351.8
351.1
350.5
WA
35 OBSERVATIONS DATA COMPUTED AND PROFILE PLOTTED BY D.BÜTTNER, IOTA/ES


LUNAR LIMB PROFILE FROM WATTS CHARTS AND FROM LUNAR OCCULTATION OBSERVATIONS
LONG LIB: -3.0° ± 0.5°
LAT LIB: 6.0° ± 0.5°
MOONLIMB: profile offset due to double star
["]
0
1
2
182.5
183.6
184.8
185.9
187.0
188.1
189.3
190.4
191.5
WA
195 OBSERVATIONS DATA COMPUTED AND PROFILE PLOTTED BY D.BÜTTNER, IOTA/ES


LUNAR LIMB PROFILE FROM WATTS CHARTS AND FROM LUNAR OCCULTATION OBSERVATIONS
LONG LIB: -1.0° ± 0.5°
LAT LIB: -6.0° ± 0.5°
MOONLIMB: profile reconstruction bit by bit
["]
1
0
-1
-2
9.5
8.4
7.3
6.1
5.0
3.9
2.8
1.6
0.5
WA
31 OBSERVATIONS DATA COMPUTED AND PROFILE PLOTTED BY D.BÜTTNER, IOTA/ES


LUNAR LIMB PROFILE FROM WATTS CHARTS AND FROM LUNAR OCCULTATION OBSERVATIONS
LONG LIB: 0.0° ± 0.5°
LAT LIB: 7.0° ± 0.5°
MOONLIMB: partial improvement of Watts data
["]
-3
-2
-1
0
1
2
3
4
167.0
168.0
169.0
170.0
171.0
172.0
173.0
174.0
175.0
WA
38 OBSERVATIONS DATA COMPUTED AND PROFILE PLOTTED BY D.BÜTTNER, IOTA/ES


LUNAR LIMB PROFILE FROM WATTS CHARTS AND FROM LUNAR OCCULTATION OBSERVATIONS
LONG LIB: 5.0° ± 0.5°
LAT LIB: -7.0° ± 0.5°
MOONLIMB: considerable improvement of Watts data
["]
1
0
-1
353.5
352.8
352.0
351.3
350.5
349.8
349.0
348.3
347.5
WA
57 OBSERVATIONS DATA COMPUTED AND PROFILE PLOTTED BY D.BÜTTNER, IOTA/ES

Astronomical Tables Second Edition Released

Jean Meeus

The second edition of my Astronomical Tables was published in 1995 (Willmann-Bell, ed.). The book contains data and elements about all occultations of first-magnitude stars and planets by the Moon taking place from 1990 to 2020, together with formulae, a program in BASIC, and numerical examples. Best regards. ↓

New EVANS Program - No XZ Numbers

Wolfgang Zimmermann, zimmer*a*pzimm.han.de

When in 1992 the old mainframe at the USNO was powered down, all the prediction software had to be migrated to a different platform. Even at that time we, i.e. David Dunham and some members from IOTA/ES, thought that a PC has enough power to do this job. The only problem was the migration of the several thousand lines of hardware specific Fortran code. But there was a small group of volunteers that started this job. In Munich Eberhard Riedel developed a complete new program for the predictions of grazing occultation. In Rome Claudio Costa selected all required programs for the computation of the local circumstances of total occultations, eliminated the hardware dependent coding and made it portable and runnable on a PC. This program is called EVANS program. In Hannover I created an updated version of the XZ catalog by integrating modern PPM positions and wrote a complete new cycle of programs to create a file with Besselian elements, the input for the EVANS program. At that time restrictions existed that the file with Besselian element should be used by other software, too.

Now the different software packages are stabilized. That's the moment when software vendors get the idea to create a new and better package--with newer and better bugs. Well, this was not the reason why I modified the EVANS program. The explanation can be found in *OA* 16, vol. 6, pp. 397-398 (December 1997): "XZ94E . . . has many more stars . . ., but some of the stars numbered 1 to 32221 . . . are NOT the same in the two catalogs . . ." Oh dear, that's what I definitely did not intend! The bad thing: Davis is right. In some cases my cross-refereneing failed.

In the following time David, Mitsuru Sôma, Wayne Warren, and I had an intensive email discussion about this thing. First I thought that it's not so important. I'll correct it with the next XZ94 and be done, but the others had a very good argument that this bug is more serious than I believed. Observers report an occultation with my wrong XZ number to the IOC. There a reduction is computed, but with wrong coordinates. Perhaps years later additional reductions will be computed, again with wrong coordinates. They all required that the identifications must be stable in the sense that even years later the star can be identified correctly.

No question, they are right. But I believe that they were not completely clear about the consequences at that time. Probably they were shocked about some remarks I made, but let us analyze it.

I have only vague ideas, how the first XZ80 was created. As far as I understood, Tom Van Flandern took the Zodiacal version of the SAO catalog (called SZ catalog), cross-referenced these stars with the ZC and probably added some stars (the SZ has some 25,000 stars, the XZ80 32,000). With his first XZ he defined a unique cross-reference between SAO numbers and XZ numbers. Later on coordinates of some stars were updated and replaced by better ones. And just from here on a minimum risk exists that a star might be cross-referenced incorrectly. In 1993 I replaced the coordinates by PPM coordinates and added some references to other catalogs (SZ, PPM, FK5, etc.). I retained the structure of the first 113 bytes, added the new information at the end and called this catalog XZ94. I also added stars from other catalogs, especially the different parts of the PPM, and continued the numbering starting with 32,301. Version F, created in 1996, was not so lucky. But due to a dangerous illness in my family I had to stop all my activities and could not fix the bugs in version F. When I continued my work at the end of 1997, it was too late.

Back to the requirement "Stable identifications". What does it mean? Well, I tried to work carefully, but nevertheless I identified some stars incorrectly. Consequently "stable identifications" can only mean: do not modify an existing catalog! This is guaranteed for all the published catalogs like SAO, PPM, etc. Nobody will replace coordinates there. What do we need for predictions? Good stellar coordinates. We take them from different catalogs. But if we take the coordinates from these catalogs, why not also the designations of the stars? This is a stable identification. The price for it is to give up the XZ catalog and the XZ numbers. Well, this makes the predictions stable, but still the problem of cross-identification remains for all those who compute reductions. That's right, but not so time critical as the yearly creation of the file with Besselian elements (the so called BESELE). We had our discussion not on account of 32,000 stars, but 100 or even less. I think it will be better if we concentrate all our energy on the correct identification of these problem cases instead of replacing coordinates in the XZ by even better catalogs.

Well, I announced my new procedure and implemented it. The file with Besselian elements has a new structure. It does not contain cross-references like SAO numbers and DM numbers in the old version. The EVANS program can process these records, but the output format had to be changed. I eliminated the columns "USNO reference number", "SAO number" and "DM number" and used these bytes to print the source catalog and the designation of the star in this catalog. The new heading for these columns is "Object". It is not only for stars because there are also predictions for nebular objects, but also, because I re-integrated the prediction of occult. ↓ on

of planets and minor planets. This function existed in the old USNO version with the USNO version of the file with Besselian elements, but it did not work correctly, when I tried to use it in 1996. Now I create Besselian elements in the way Jean Meeus described in his book "Astronomical Tables" and process them in the appropriate way in the EVANS program which means that I added code.

I made all these updates to the EVANS program very carefully. I started, as if it were a black box. And it was one! Nearly no comments! Now I know what a difficult job Claudio had in 1993. I modified the program and documented the parameter lists, whenever I recognized what they were good for. I tested after each modification, whether the old output could be reproduced by the new program. Claudio distributed some sample predictions. In the mean time I added some others with different output options. And the new version contains a small BEFILE in the new format and the corresponding output lists. Well, the new EVANS seems to be stable. But it has a new name now: OCCMOON. No, it's not because I didn't like the old name, I wanted to avoid a confusing mixup of these two versions. It's only a technical reason, not a political one.

The new format of the prediction list has additional consequences. Observers now can only report the designation given in the list. In most cases it will be a PPM number. At the ESOP XVII I didn't know how to report it in the form for the ILOC, but in between I got an email with the actual catalog qualifiers. "M" is used for PPM ("P" is reserved for the Pleiades catalog). Nevertheless, there are a lot of modern catalogs for which no one letter designation exists. Another thing is the 8 byte field for the number of the star. It is too short for Tycho numbers. David and Mitsuru Sôma addressed these problems to the ILOC and we are hoping for a new form. I promised to support ILOC with cross-references. But I also promised not to create another XZ catalog. And XZ94F? It's not from me, it's a corrected version from Mitsuru Sôma. My dangerous activities range only from XZ94A to XZ94E. (The BEFILE is available at: **ftp://astro1.physik.uni-siegen.de/pub/iota/evans** and the complete application is at: **ftp://astro1.physik.uni-siegen.de/pub/iota/evansall**) ι

New Website for RASNZ Occultation Section

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The Occultation Section of the Royal Astronomical Society of New Zealand is pleased to announce that its new website is now open for business. The site has two functions:

1) To promote all types of occultation observing by providing basic information of interest to any amateur astronomers wishing to contribute useful scientific results;

2) To provide timely information about occultation events in the vicinity of New Zealand, Australia and the southwest Pacific.

Graphics have (at this stage) been kept to a minimum to keep the site fast-loading. Pages up so far include:

* Total Lunar Occultations (with predictions for bright 1999 New Zealand events);
* Grazing Occultations (including downloadable predictions for upcoming New Zealand [and shortly Australian] 1998 grazes; how to plan, observe and report a graze; and recent graze results);
* Planetary Occultations (including how to observe planetary occultations, selected downloadable predictions and charts for 1998, and advance notice of events for 1999);
* Eclipses of Jupiter's Satellites;
* Downloadable report forms for most types of occultation observing; and
* A comprehensive set of links to other occultation and general astronomy sites.

If you maintain an astronomy website (or know of someone who does) please place a link to us on your site. (If you advise us we will place a return link on our Links page). If you are (or know) the editor of a local astronomy newsletter or magazine, please advise our URL to your members. You can find the site at:

http://occsec.wellington.net.nz

If you visited the "pre-publication" version of the site prior to 01 September 1998 please hit the Reload button on your browser to ensure you have the latest changes. ι

International Occultation Timing Association, Inc. (IOTA)

Asteroid Occultation Predictions 1999: Availability on the Internet

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Starting with the 1999 predictions of minor planet occultations, the PostScript files for all events will be made available on the FTP site of the "Vereniging voor Sterrenkunde" (VVS, the Flemish Astronomical Association). The URL is :

ftp://ftp.ster.kuleuven.ac.be/dist/vvs/asteroids/1999

The complete text of the README.TXT file is given hereafter. In addition, I would encourage European observers to subscribe to the PLANOCCULT mailing list for last-minute updates and observation reports. Send a message

To: listserv@aula.com
Subject not needed
Message text:
subscribe planoccult YourName, Country

In case of problems or questions, contact Jan Van Gestel (Geel, Belgium) at his email address: Jan@key.be

Occultations of Stars by Major and Minor Planets in 1999

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The files in this directory give all information about occultations of stars by major and minor planets in 1999.

1. Overview of the files

There are 3 types of files :

- Files with extension .GZ are PostScript files compressed with GZIP
- Files with extension .TXT are text files
- Files with extension .DOC are MicroSoft Word 6.0 files

1.1. Files OCC99Rnn.GZ, with nn = 00 - 08

These files give an overview of all events in region nn (16 events per page). The details for each event are contained in the file whose name is given in the top right corner (file names A99_MMNN.PS, B99_MMNN.PS and P99_MMNN.PS). The regions are :

```
Region 01 = North and Central America
Region 02 = South America
Region 03 = Europe, North Africa and Middle East
Region 04 = South Africa
Region 05 = Russia
Region 06 = Pakistan, India and South-East Asia
Region 07 = Japan, China and Taiwan
Region 08 = Australia and New Zealand
```

1.2. Files A99_MMNN.GZ, B98_MMNN.GZ and P99_MMNN.GZ

Each of these files gives a one-page overview of all information regarding one particular occultation : general information about the minor planet and the star, finder star chart, detailed star chart and location of the predicted shadow track on the Earth. The meaning of the file names is as follows (see also 1.4):

```
A99 = minor-planet occultation with the merged catalogue
B99 = minor-planet occultation with the GSC 1.1 catalogue
P99 = occultation by a major planet
MM  = number of the month
NN  = sequential number
```

1.3. File OCC99REG.TXT

This file contains a list of all occultations, one line per event and per region. It allows the user to create subsets or sort the list as desired (per region, per minor planet, per date . . .). The data on each line are :

Columns	Format	Description
01 - 02	I2	region number
03 - 07	I5	year
08 - 10	I3.2	month
11 - 13	I3.2	day
14 - 16	I3	hours
17 - 21	F5.1	minutes
22 - 27	I6	minor planet number (blank for major planets)
29 - 44	A16	planet name
45 - 58	A14	star designation
60 - 70	A11	name of PostScript file of the event

1.4. File OCCUI.99.DOC (MicroSoft Word 6.0 file)

This file gives a 4-page explanation on the calculation of the occultations, and information on the graphs described in 1.2.

2. Suggested use

The suggested way of using the data is as follows :

- download the file OCC99Rnn.GZ corresponding to your region, decompress and print it
- select the events you wish to observe
- download the corresponding files A/B/P99_MMNN.GZ, decompress and print them

3. Interesting Web sites

For more up-to-date information on predictions, finder charts and occultation news, consult the following home pages :

- IOTA site for asteroidal occultations :
  http://www.anomalies.com/iota/splash.htm

- European events :
  http://sorry.vse.cz/~ludek/mp/1999 (and /1998 this year's events)
  http://www.ast.cam.ac.uk/~baa/occ.html

Grazing Occultation Observations

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The table is a continuation of the one given on p. 7 of *ON* Vol. 7, No. 2 (July 1998) and lists all successful or partly successful expeditions for lunar grazing occultations that I received and that have not been reported in the past *ON*. Under the column headed by CA, the cusp angles of the central graze in degrees from the north or south cusp are usually given, but when the graze was observed in the umbra during a lunar eclipse, the umbral distance of the star in units of the semi-diameter of the umbra is given in percentage with the code U.

Please send reports of all lunar grazing occultations to me, preferably in ILOC's 80-column format (as attached files when sent

by email) or in IOTA's email76 format by email or on 3.5 inch floppy disk. I can also accept other reasonably well organized formats giving complete information about the station coordinates (longitude, latitude, and height above sea-level, as well as the reference geodetic datum) and timings. Shifts from the predicted profile or other values such as % Snl and CA no longer need to be given in the reports since I can calculate them. Be sure to indicate to whom copies of your report have been sent. When ILOC is not included there, I will copy your report and send it to ILOC. ↓

Lunar Grazing Occultation Observations

Date Mo Dy V	Star Numbers XZ/ZC	SAO	Star Mag	% Sn	CA °	Location	# Sta	# Tm	S	Ap cm	Organizer	Shift "	WA °	b °
1993														
01 25	ZC 3326	146239	6.3	9+	0S	Manchester, CT, USA	2	28	1	12	Phil Dombrowski	0.0	173	-6.2
11 29	ZC 646	76571	5.9	100-	+22U	Ft. Nelson B.C., Canada	7	20			Russ Sampson	0.2N	4	+1.1
11 29	ZC 646	76571	5.9	100-	+93U	Juarez,Baja Cal., Mexico	1	8			Paul Maley	0.0	181	+0.6
1995														
02 14	ZC 1341	98267	4.3	99+	+25N	Mizusawa, Iwate, Japan	4	8			Atsushi Miyamoto	0.3	4	+6.9
03 28	ZC 659	93854	6.1	40+	+9N	Yakumo, Hokkaido, Japan	6	18	1	8	Masaki Takahashi	0.0	11	+3.7
04 04	ZC 593	93721	5.9	16+	+0N	Kanazawa,Ishikawa, Japan	2	10			Miyoshi Ida	0.2N	11	+3.3
04 04	ZC 593	93721	5.9	16+	+8N	Saito, Saitama, Japan	5	21			N. Suzuki	0.2N	12	+3.3
04 04	ZC 593	93721	5.9	16+	+7N	Iwai, Ibaraki, Japan	4	30			Fujio Ohba	0.2N	12	+3.3
06 09	ZC 1805	157933	1.0	79+	+1S	Oceanside, CA, USA	3	16			Don Lynn	0.1S	176	+2.1
06 09	ZC 1825	157933	1.0	79+	+1S	Salton Sea, CA, USA	1	4			Steve Edberg	0.1S	176	+2.1
08 03	X 20193	158492	7.4	47+	+9S	Barcelona, Spain	3	7	2	10	D.Fernandez-Barba	0.0	173	+5.1
08 04	ZC 2118	158840	2.8	53+	-2S	Shintomi,Miyazaki,Japan	5	17	1	9	Atsushi Kisanuki	0.1S	181	-1.0
08 19	ZC 697	94036	6.5	38-	+4N	Avalon, TX, USA	2	12			Mike McCants	0.1N	356	+4.8
09 05 V	ZC 2826	162512	3.9	80+	+17S	Calera, AL, USA	2	4	1	20	Scott Smith	0.0	177	-6.0
09 05	ZC 2826	162512	3.9	80+	+11S	New Church, VA, USA	3	21	2	10	Wayne Warren	0.0	171	-6.0
09 05	ZC 2826	162512	3.9	80+	+12S	Bathhamville, VA, USA	1	11	1	6	Donald McAfee	0.0	171	-6.0
09 20	X 13477	98174	7.8	15-	+2S	Saito, Miyazaki, Japan	4	13	1	9	Atsushi Kisanuki	0.0	177	+6.8
09 20	X 13574	163464	8.0	36+	+6S	Hamada,Hokkaido, Japan	3	6	2	20	Shin-ya Watanabe	0.2N	182	-4.6
10 02 V	ZC 2826	162512	3.9	59+	+7S	Miyakonojo, Japan	10	54	1	5	Atsushi Kisanuki	0.0	174	-6.0
10 02 V	ZC 2826	162512	3.9	59+	+6S	Miura, Kanagawa, Japan	5	42	1	7	Kenji Kawasaki	0.1S	177	-6.0
10 02 V	ZC 2826	162512	3.9	59+	+6S	Misawa, Chiba, Japan	11	102	1	6	KatsuhikoKitazaki	0.1S	177	-6.0
10 02 V	ZC 2826	162512	3.9	59+	+6S	Kukukuri, Ooita, Japan	4	32	2	8	Hideo Takahashi	0.1S	177	-6.0
11 11	ZC 1011	95883	7.3	82-	+4S	Sueyoshi,Kagoshima,Japan	4	7	1	10	Atsushi Kisanuki	0.2S	189	+6.8
11 15	ZC 1440	117908	7.1	47-	+3N	Hyuga, Miyazaki, Japan	4	5	3	10	Atsushi Kisanuki	0.5S	356	+6.1
11 28	X 29942	164565	8.2	40+	+7S	Misai, Mie, Japan	3	14	2	20	Miyoshi Ida	1.0S	173	-5.3
11 28	X 29942	164565	8.2	40+	+7S	Miyazaki-shi, Japan	4	19	1	15	Atsushi Kisanuki	0.5S	173	-5.3
1996														
01 29	ZC 648	93907	3.8	73+	+9N	Olst, Netherlands	8	35	1	8	Alex Scholten	0.0	9	+5.4
01 29	ZC 648	93907	3.8	74+	+9N	Stapelkotten, Netherlands	3	8	1	15	Henk Bulder	0.0	9	+5.4
01 29	ZC 648	93907	3.8	74+	+10N	Zilina, Slovakia	4	25			Pavol Rapavy	0.0	10	+5.4
01 29	ZC 648	93907	3.8	74+	+10N	Muenster, Germany	8	20			Bredner	0.0	9	+5.4
02 17	ZC 603	94586	6.7	62+	+10N	Shirakawa, Japan	6	16	1	10	Atsushi Miyamoto	0.2N	11	+6.6
02 28	ZC 451	95456	6.6	71+	+10N	Kitamurawa, Japan	5	21	1	15	Atsushi Miyamoto	0.0	8	+6.9
03 01	ZC 1434	97628	6.1	98+	+6N	De Lidkip, Netherlands	2	2	1	15	Henk Bulder	0.0	6	+5.1
03 01	ZC 1434	97628	6.1	88+	+6N	Almen, Netherlands	1	1	1	30	K. Boschloo	0.0	0	+5.1
03 29	ZC 1434	97688	6.7	69+	+6N	Oakland, OR, USA	2	7			K. Morgan	0.1S	4	+7.1
03 30	ZC 1341	98267	4.3	78+	+9N	Riverhead, NY, USA	1	2			Claudio Veliz	0.0	5	+6.8
03 30	ZC 1410	117751	5.1	83+	+7N	Renthuizen, Netherlands	6	12	1	11	Henk Bulder	0.0	2	+6.2
03 30 V	ZC 1410	117751	5.1	83+	+7N	Siebengewald,Netherlands	8	19	1	10	Eric Limburg	0.0	2	+6.2
04 23	ZC 334	95337	6.4	25+	+6N	Becker, FL, USA	1	0			Hal Povenmire		10	+7.2
04 25	X 10337	97619	6.2	46+	+6N	Aomori, Japan	5	12	2	8	Sigeyosi Odagiri	0.0	6	+7.2
04 26	ZC 1341	98267	4.3	56+	+6N	Higashideri, Japan	4	20	1	14	Atsushi Miyamoto	0.0	5	+6.8
04 27	ZC 1410	117751	5.1	63+	+4N	Pine Prairie, TX, USA	3	8	1	11	Wayne Hutchinson	0.0	3	+6.2
04 27	ZC 1410	117751	5.1	63+	+6N	Eugene, OR, USA	4	28			Larry Dunn	0.0	5	+6.2
04 27	X 14718	117890	7.1	65+	+8N	Chuzu, Saitama, Japan	10	38	2	6	Miyoshi Ida	0.0	6	+6.9
04 27	ZC 1440	117908	7.0	66+	+6N	Sannohe, Aomori, Japan	2	11	1	14	Atsushi Miyamoto	0.3N	3	+6.0
05 21	ZC 1029	96015	5.2	12+	0N	Stony Creek, VA, USA	2	6			David Dunham	0.0	8	+5.4
06 25	X 18954	139067	8.4	60+	+4S	Jones, OK, USA	1	14	2	25	Anthony George		175	+2.6
07 26 V	ZC 2361	159918	4.1	28+	0S	Yaqui, China, Japan	7	4	7	16	Miyoshi Ida	1.0S	182	-4.7
08 03	ZC 90	109392	7.6	75+	+4N	Kawamachi, Japan	1	1	1	16	Masayuki Yamamoto	0.4N	358	+3.7
08 26	ZC 3015	164771	5.2	94+	+9S	Middenmeer, Netherlands	4	5	2	15	Henk Bulder	0.6S	178	-4.9
09 03	X 4952	93614	8.5	61-	+5N	Kamishihoan, Japan	2	4	2	13	Miyoshi Ida	0.1S	357	+5.8
09 21	ZC 2826	162512	3.9	67+	+2S	Keylargo, FL, USA	1	5	1	15	Hal Povenmire		179	-6.0
09 27	ZC 1 35	164119	6.2	100-	84N	Union Center SW, IA, USA	1	2	1	15	Robert Sandy	0.2N	2	+2.5
10 04	ZC 1029	96015	5.2	51-	+6N	Lucilla, MO, USA	2	12	1	9	Robert Sandy	0.1S	354	+7.3
10 04	ZC 1029	96015	5.2	51-	+8N	Tucson, AZ, USA	2	2			Jim Stamm	0.1S	353	+7.3
10 04	ZC 1029	96015	5.2	51-	+6N	Boston, MA, USA	1	1			Roger Sinnot	0.1S	352	+7.3

Date Mo Dy V	Star Numbers ZC/2C SAO	Star Mag	% Snl	PA °	Location	# Sta	# Tm	S	Ap cm	Organizer	Shift "	WA °	b °
1996 (continued)													
10 04	ZC 1029 96015	5.2	51-	+5N	Holyoke, MA, USA	3	3			Scott Tracy	0.1S	357	+7.3
10 07	ZC 1341 98267	4.5	26-	0S	Babiety Wlk., Poland	7	17	1	6	Artur Wrembel	0.0	177	+6.1
10 08	ZC 1468 118044	4.7	15-	-1S	Riverton, IA, USA	4	20	1	9	Robert Sandy	0.0	174	+4.7
10 20	ZC 2995 163645	6.1	58+	+7S	Tokyane, Chiba, Japan	5	12	1	20	Fujio Ohba	0.1N	175	-5.3
10 30	X 7649 94874	7.3	82-	+8N	Miura, Kanagawa, Japan	1	4	3	20	Kenji Karasaki	0.0	357	+7.0
11 05	ZC 1571 118489	8.0	27-	+1S	Ohsato, Miyagi, Japan.	2	2	3	13	Akira Matsui	0.2S	178	+3.3
11 09	ZC 1973 139544	6.0	3-	-3S	Tucson, AZ, USA	4	9	3	13	Jim Stamm	0.2N	180	-2.1
11 16	ZC 2903 163066	7.7	27+	+5S	Waller, TX, USA	4	27	1	15	Waye Hutchinson	0.0	174	-5.6
1997													
01 17	ZC 404 93083	5.4	63+	+5N	Louisville, GA, USA	3	6			Hal Povenmire	0.0	5	+4.7
01 17	ZC 404 93083	5.4	63+	+4N	Calera, AL, USA	4	20			Greg Robinson	0.0	4	+4.7
01 20	ZC 814 94554	5.4	89+	+9N	Selkirk, Canada	4	12			Chris Brown	0.0	4	+7.1
02 02	ZC 2271 159563	4.1	36-	+4S	Maastand, Netherlands	4	28	1	11	Henk Bril	0.0	183	-5.0
02 02 V	ZC 2271 159563	4.1	36-	+4S	Mainz, Germany	15	51	1	6	Hans Ehrenberg	0.0	184	-5.0
02 13	ZC 352 93902	7.1	85-	0S	Mellwood, MI, USA	1	5	2	11	Joe Sedlak	0.0	183	+4.5
02 15	ZC 697 94407	6.9	61+	-6S	Oh-Izumi, Japan	1	1	2	25	Satoshi Suzuki	0.0	186	+6.7
02 17	ZC 1029 96015	5.2	82+	+9N	Hvezdarna, Czech Rep.	5	7	2		Petr Zeleny	0.0	5	+7.2
02 27	ZC 2064 158650	6.5	76-	+7S	Moriyama, Shiga, Japan	5	7	2	15	Miyoshi Ida	0.1S	185	-3.7
03 16	ZC 977 95672	6.3	58+	+3N	Bojan, Poland	2	15	1	6	Artur Wrembel	0.2N	3	+7.4
03 16	ZC 961 95519	6.3	57+	-2S	Lodz, Poland	3	4	1	10	Marek Zawilski	0.0	181	+7.4
03 24	X 10202 138662	9.0	100-	7S	Mamo Hb, AZ, USA	1	3	1	20	Jim Stamm	0.5N	179	-0.3
04 11	ZC 729 94158	7.1	19+	+3N	Ashio, Tochigi, Japan	1	3	3	25	Shigeo Uchiyama	0.0	8	+7.0
04 13	ZC 1029 96015	5.2	38+	+4N	Yokohama, Japan	3	18	2	25	Satoshi Suzuki	0.0	6	+7.2
04 13	ZC 1029 96015	5.2	38+	+4N	Atsugi, Kanagawa, Japan	2	6	2	13	Mikiya Sato	0.0	6	+7.2
04 13	ZC 1029 96015	5.2	38+	+4N	Ebina, Kanagawa, Japan.	3	6	3	13	Hajime Yamanaka	0.0	6	+7.2
04 13	ZC 1029 96015	5.2	38+	+4N	Fujisawa,Kanagawa, Japan	1	6	2	28	KatsuhikoKitazaki	0.0	6	+7.2
04 17	ZC 1478 98779	8.5	73+	-7S	Blue Springs, MO, USA	2	5	1	15	Robert Sandy	0.0	184	+4.4
05 17	ZC 1757 97762	7.3	69+	+1N	Hoogvet, Netherlands	5	14	1	9	Wim Vanstra	0.0	2	+6.0
05 31	X 1111 109556	7.6	54-	+6S	Tuita, Tochigi, Japan	1	3	1	25	Shigeo Uchiyama	0.1N	186	+2.8
06 25	ZC 3185 148465	8.7	67-	+5S	Uesenske, Slovakia	5	8		6	Pavol Rapavy	0.1S	185	-0.1
07 14 V	ZC 2098 158677	6.2	66+	+4S	Kunitomi,Miyazaki,Japan	7	49	1	8	Atsushi Kisanuki	0.0	176	-4.3
07 29 V	ZC 692 94027	0.9	23-	+1N	Bemidji, MN, USA	5	41			Stuart Levy	0.0	355	+7.3
07 29 V	ZC 692 94027	0.9	23-	+1N	Tooele, UT, USA	1	4	3	11	Derald Nye	0.0	356	+7.3
07 29 V	ZC 692 94027	0.9	23-	0N	Gushine, PA, USA	4	26	2	8	David Dunham	0.0	356	+7.3
08 12	ZC 2291 159625	5.5	60+	+5S	Miyazaki-shi, Japan.	2	2	2	8	Atsushi Kisanuki	0.2N	175	-5.7
08 28 V	ZC 1069 96015	5.2	21-	+1N	Krakowa, Poland	15	52	1	6	L. Benedyktowicz	0.1S	353	+7.1
09 08	ZC 2291 159625	5.5	37+	+3S	Barcelona, Spain	5	19	2	10	D.Fernandez-Barba	0.7N	175	-5.7
09 08	ZC 2291 159625	5.5	37+	+2S	Pontmetrada, Spain	2	2	2	10	Jose G. Castano	0.7N	176	-5.7
10 19	ZC 692 94027	0.9	86-	+9N	West of Pouce, Canada	16	86		10	Franklin C.Loehle	0.1S	357	+7.3
12 07	ZC 3353 146362	3.7	47+	+6S	Riverview, FL, USA	2	38	1	20	Tom Campbell	0.0	176	0.0
12 07	ZC 3353 146362	3.7	47+	+6S	Winter Haven, FL, USA	3	50	1	15	Chris Stephan	0.0	176	0.0
12 07	ZC 3353 146362	3.7	47+	+6S	Titusville, FL, USA	19	167	1	6	Hal Povenmire	0.0	176	0.0
1998													
04 28 V	ZC 692 94027	0.9	8+	-8N	Lodz, Poland	21	93	1	6	Marek Zawilski	0.0	4	+7.3
04 28	ZC 692 94027	0.9	8+	-8N	Poznan, Poland	2	18	1	6	KrzysztofKaminski	0.0	4	+7.3
05 01	ZC 1141 96985	5.5	34+	-1S	Jaroslaw, Poland	1	5	1	15	Robert Bodzon	0.0	181	+5.5
05 20	ZC 3389 146508	7.1	37-	+5S	Plymouth, NC, USA	1	5	1	20	Robert Stewart	0.3N	186	+1.7
06 15	ZC 3353 164327	6.6	70-	+5S	Christchurch, NewZealand	1	6	2	20	Brian Loader	0.2S	187	-0.8
06 19	ZC 192 109793	5.1	32-	-3N	Bydgoszcz, Poland	1	3	1	15	Artur Wrembel	0.1N	2	+5.6
08 16	ZC 741 94227	5.5	32-	+6N	San Mateo, CA, USA	1	5	1	10	Alan Adler	0.1S	352	+7.2
08 17	ZC 343 95397	6.6	19-	+6N	Fujimi, Nagano, Japan	1	1	3	8	Mikiya Sato		349	+6.3
08 17	ZC 343 95397	6.6	19-	+6N	Mitsumimaki, Nagano, Japan.	2	12	3	8	Hirokazu Koyama	0.0	349	+6.3
09 12	ZC 692 94027	0.9	58-	+9N	Meyersdale, PA, USA	1	7	2	25	John Holtz	0.1S	351	+2.5

Grazing Occultation Tips

Scott Degenhardt, dega@nashville.com
http://nashville.com/~dega/grztips.htm

Preparation Days Before the Event

Know where you are going! Visit the graze site days in advance as well as the meeting place that you will meet at right before the graze, and after if it applies.

Make sure you have these at least the day before the graze:

1) Batteries for flashlights and recorders or motor drives, etc.

2) Blank Tapes! I don't know how many times I spent frantically looking for a tape at the last second before an event.

3) Maps of the graze site in case you spaz and completely draw a blank on where it was you were supposed to be.

4) Turn on your tape recorder and shortwave radio at least the day before the event to make sure they still work. As a side note, I just turned on my spare time cube a few minutes ago right before I was getting ready to type this only to find it **no longer works**!!!

5) Don't forget to pack a Bright flashlight (white light) for clean up after the graze. There's nothing like driving off after the graze and leaving an eyepiece behind only to remember it the day after the guy who's property you set up on mowed!

6) Be prepared to do some surveying. Bring a piece of paper to draw a quick map of your location and measure from the center of the road to where your scope is. Also bring a small flag or tent stake to mark your location so the graze leader can double check your work in case some discrepancy arises.

The Day of the Graze

1) Preload the car early and double check everything to make sure you haven't forgotten something.

2) Check it again.

3) Make sure you pack the actual graze predictions that give the exact time, duration, and what part of the moon to be looking at.

4) Make sure to get plenty of rest and show up early enough so that you can be relaxed and actually enjoy the thrill of chasing of the moon's shadow.

During and after the Graze

1) Don't talk during the graze and pay attention.
2) As a matter of reality, be aware of your surroundings (i.e. wild dogs, snakes, homeowners with guns, etc.).
3) Don't forget to record your temperature, sky conditions (stability and transparency).
4) Again, don't forget to mark the location of where your scope is and do a quick survey.
5) Don't forget to estimate your equation of time correction (how slow or fast your calls were).
6) Don't forget to note any other unusual circumstances.
7) Turn in your data ASAP, preferably immediately after the graze if there is a post meeting.

Check List--Don't Forget Things Like:

Eyepieces (I have personally done this one!!!)
Taperecorder
Telescope
SW radio
A folding chair
Jacket in case it gets chilly
Coffee
Snacks for after (**not during**!)
Maps of the graze site
Graze predictions
Cellular phone if you have one (for security)

Reports of Asteroidal Occultations in 1996

Jim Stamm, nemo*@*flash.net

If you do not have a regional coordinator who forwards your reports, they should be sent to me at: 11781 N. Joi Dr. Tucson, AZ 85737, USA, or preferably by email to nemo*@*flash.net. Names and addresses of regional coordinators are given under "IOTA Publications" near the front of each issue of Occultation Newsletter. All times in this report are UTC.

Jan 24 (14) Irene and SAO 079988. See *ON* (vol.6, no.13, p.300).

Jan 29 (893) Leopoldina and SAO 114705. The following information was received from Roland Boninsegna:

The occultation was positive for four observers:

BAKKER Klaas near Douai (F)
BONINSEGNA Roland at Dourbes (B)
POLFLIET Tim at Gent (B)
REGHEERE Gilles at Valenciennes (F)

Moreover, a determination of least seperation was obtained from the Astronomical Observatory of Mallorca (E) using 6 CCD frames obtained after closest approach.

Concerning the visual observers, there were two problems:

POLFLIET, Tim recorded the beginning of the occultation at 21h58min12.7s. Comparing with the position of the three other visual observers, his timing is around 13s late. The duration seems correct however. For the moment, I do not know what could be the reason of the time shift of Tim POLFLIET. I hope to have more news.

REGHEERE, Gilles has reported poor accuracy in his timings (+/- 3s) but better precision concerning the duration (4s +/- 1s). In fact, both the accuracy and the duration of the occultation matched BAKKER and BONINSEGNA observations quite well.

I have used the three late observations and slided the one of POLFLIET to obtain a preliminary form for Leopoldina.

Leopoldina is not spherical but egg-shaped: His major axis (perpendicularly to his motion) is around 105 km long, but his minor one is more accurate, around 65 km.

The CCD observations are almost correct: the time of least seperation was around 38s late and the distance was around 0.03" shorter.

This is a preliminary reduction.

I just want to point out that the diameter of 893 Leopoldina I have calculated (105 x 65 km) was the larger possibility. In fact a more plausible diameter would be 90 x 65 km. For publication, I prefer the last one.

Feb 18 (532) Herculina and PPM 100492. Isao Sato sent the following report:

The occultation . . . was successfully observed from at least two sites from Japan.

Kiyoo Uta, Shigaraki Town, Shiga Pref., caught a sure extinction deeper than 1.0mag. from 11h43m35.7s+/-0.3s to 11h43m52s (the time is when he recognized the emersion) UT with his 13cm reflector. The site is E136d04'35".6, N34d53'30", h=275m (Tokyo Datum). He reported the disappearance was gradual and reappearance was more gradual. Only the object star was extincted and other field stars were visible.

Miyoshi Ida, Yokaichi City, Shiga Pref., caught an unclear extinction of about 1 mag. from 11h43m32s to 11h43m56s (the time is when he recognized the recovery of brightness) UT with his 26cm reflector. The site is E136d12'34".9, N35d05'54".0, h=140m (Tokyo Datum).

Two observations are visual and coincident. Therefore they are certain. The occultation track must pass over Tokyo, Yokohama, Nagoya, Kyoto, and possibly Osaka. But unfortunately it was cloudy in Tokyo including NAO.

The observations are the nineth time of successful asteroidal occultations from Japan. The eighth time is Irene occultation on January 24, and the seventh time is Interamnia occultation on December 6, last year. It is great that three asteroidal occultations have been successful in three months!

Apr 18 (39) Laetitia and PPM 205061. Four negatives and Walter Nissan's report for the one positive:

Robert N. Bolster Franconia, VA
John Holtz Coraopolis PA
Shawn Dvorak Ontario, OH
Robert Modic Huntsburg Township, OH

Walter J. Nissen, Jr Nissen, OH Long: -81.86371 Lat: 41.37355

UTC h m s	interval s	raw watch times offset to UTC, not corrected		
9 52 5.26		dis	1/2 s late +/- 1 s	all 4 events
9 52 8.10	2.84	reapp	1/2 s late +/- 1 s	were "soft",
9 52 31.53	23.43	dis	1/2 s late +/- 1 s	about 80%(?)
9 52 36.34	4.81	reapp	1/2 s late +/- 1 s	certain

There were a few very short untimed intervals when I lost sight of the star, but an eyelid blink restored its visibility. I didn't believe they were real while observing (could be wrong, it is possible they were real).

Tearing, watering up was a threat throughout and there is a small(?) probability the timed events might not be real. The probability I lost sight of the star is virtually 100%; the probability that was due to imperceptible clouds, or watery eye cannot be eliminated. If real, they were certainly unusual. Slow, somehow soft. Not sharp, but no smooth fade evident. With the ambient light pollution and the twilight, the star was not easy at the beginning of the obs and became fairly uncertain at the end of obs. It is unusual that the accuracy recorded for all 4 timings is the same, and so poor, but I am very comfortable with this. Conditions were not easy.

May 14 (119) Althaea and PPM 156887. The following comes from Isao Sato:

Tatsuo Minobe reported that he caught just 0.2 second extinction . . . in visual with 50cm reflector . . . . .

A discussion followed that debated the validity of a single observation regardless of the precision with which it was made. The conclusion was that while very little information can be obtained from a single (short) occultation, that it was still a bona fide observation, and that the data should be received on it's own merit.

Jun 10 (1) Ceres and PPM 231555. Three reports were received about positive observations of this event. The first, from Javier Licandro:

I received a report from Observatorio Astronomico Cristo Rey (Rosario, ARGENTINA). They observed the SAO 159866 (= PPM 231555) occultation by CERES, using an SSP5 photometer attached to the 250mm f/15 telescope of the Observatorio Astronomico Gemini Austral (long= 60:38:56 W, lat= -32:57:53, alt= 36m). They sent me via fax a light curve (counts vs. time), that shows a strange shape, not symetrical. It goes from 1800 count to 1000 count (about 0.6 magnitudes). The minimum occured at about 2h35m15s (as I can see the time resolution is 1s). The observers were J.L.Sanchez, V.A.Buso, L.A.Mansilla, G.Ballan, M.V.Jasinkas, and G.A.Ubrig.

The second report (on the same observation) is from Rene Duffard:

This weekend I went to Rosario and I saw the persons who observed the occultation by Ceres last June 10. They used a photometer SSP-5 Optec and record in video tape the counts and a chronometer in the same image. The photometer has a 4 digit display and they put a chronometer beside it. In the video tape they recorded 20 minutes of the event. The photometer was connected to a time precision of 1 second, so the time resolution is that. They used the Johnson B filter. Here I copy (Ed: a part of) a table with time vs counts after 2:45 TU.

8	1718
9	1706
10	1560
11	1483
12	1376
13	1135
14	999
15	1026

16 1655
17 1720
18 1771

The correct pubication of the telescopes with the photometer is: lat. S 32 59.064; long. W 60 39.488; elev. idem
These coordinates were taken with sattelite.

The third report on a South African effort is from Danie Overbeek:

The predicted track of the shadow fell over the Cape and we had some hopes of good observations. The writer contacted a number ofindividuals who do not participate in the programme regularly. He suggested that the SAAO attempt photoelectric observations but there were difficulties, probably due to the short lead time given. He travelled to Malmesbury as the Gauteng area was adequately covered and rather far from the centre line of the track. In the event, cloud, mist and bad seeing foiled most of the attempts. Also, Ceres proved to be rather bright compared with the target star, making visual observations difficult in less than ideal conditions.

In Pinelands, C Turk had some mist but reported a disappearance at SAST 0426, 28seconds, +or- 2 seconds. In Rondebosch, C Rijsdijk observed a disappearance at SAST 0435, 36 seconds and a reappearance at SAST 0437, 40 seconds. In the same area, (I) and T Lloyd Evans using a small reflector, could not be sure of a definite dis- or reappearance. In Simon's Town, P van Blommestein had a misty sky and was not sure of his observations. In Sedgefield, J Hers had bad seeing and was not sure. In Pretoria, J Smit observed an appulse at the predicted time. In Britstown, N Krick observed an appulse but did not time it, as did T. Smith in Keetmanshoop. Bredell, Erasmia, Malmesbury and Vanderbijlpark had cloud or mist. The observers cannot be accused of not trying!

In addition to the initial astrometry predictions generated by Martin Federspiel, he subsequently determined the orbit of Ceres several times. The following is his report and conclusions from his most recent determination:

I re-determined the orbit of Ceres from CAMC positions (1984-1996), this time reduced to the ICRS reference frame also used by Hipparcos. The residuals are quite good: RA 0.16", DE 0.19". The star is listed both in the Hipparcos Main Mission catalogue and in the Tycho catalogue, allowing a consistent calculation of the event. The proper motions in the two catalogues are not in good agreement. The CAMC position of the star used for my last year's prediction agrees with the Hipparcos position within 0.1". In the following I use the the Hipparcos Main Mission catalogue position for the star.

Central line for an occultation by (1) Ceres

(1) Ceres occults PPM 23155 = HIP 19 20 29.306 DE -18 41 25.13)
orbit Ceres from CAMC positions only, star Hipparcos Main Mission catalogue

Minimum geocentric distance:
date: 1996 6 10 time: 2 43 44.131 d=1.67", PW=172.18 deg,pi=4.92",mu=32.35"/h
substellar point on earth (lat., long.), PA of least distance:
-18.68 -54 60 172.18

[Editor's note: I have selected only parts of Martin's table]

Lat.	Long.	hh:mm:ss UT	StarAlt	StarAz	SunAlt	SunAz
-14.60	31.86	2:35:18. !	10.0	253.1	-23.1	70.9
-17.51	24.40	2:35:36. !	17.5	255.4	-30.7	73.2
-19.42	19.18	2:35:54. !	22.7	257.2	-35.9	75.1
-20.98	14.85	2:36:13. !	26.9	259.0	-40.1	77.0
-39.19	-59.42	2:44:44. !	69.1	12.2	67.7	228.8
-39.40	-61.97	2:45: 2. !	68.4	18.4	-66.1	232.9
-39.59	64.55	2:45:21. !	67.5	24.3	-64.4	236.6

This central line has shifted a bit compared to the predictions distributed last year. Rosario is now about 0.5" north of this path, the observed minimum time (according to Licandro's report) is 9 minutes too early. However, I thought people at Rosario measured the minimum at 2 45 14 UT, which is about 0.5 minutes later than my prediction. Cape Town is about 1.1" south of the path, the time given

by C. Rijsdijk sounds reasonable, whereas C. Turk's time is much too early. My conclusion is that neither site observed a real occultation by Ceres. The offsets are so large that I would exclude the possibility of large errors in the position of the star or the orbit of Ceres.

Jun 21 (824) Anastasia and PPM 706340. A report from Juan Pastor Erades at Aspe Alicante, Spain: of an occultation beginning at 21:06:55.4 and finishing at 21:07:01 +/- 0.8s.

Oct 17 (54) Alexandra and DM -26 3064. From Graham Blow (RASNZ): Peter Skilton, observing from Frankston Heights, Victoria reports two separate disappearences for this event. The primary was between 09:58:14.41 and 09:58:17.07, and a further event between 09:58:22:23 and 09:58:23.07. Although Peter feels definite about the primary event, he states that there is a small possibility that cloud may have influenced the other. Ken Bryant observing 3 km NE of Peter, and nearly in the same track, saw no extinction, but he said that it was possible for a short occultation to have taken place. Jim Blanksby, observing from a track 18 km north of Peter's saw no event.

Assuming the diameter of Alexandra to be 171 km, and the maximum duration of any event to be 5.6 sec., Peter's main event suggests that he was about 10 km from the edge of the shadow. On this basis, Jim Blanksby would have been about 8 km outside the northern limit of the path. Peter Anderson at Brisbane, Queensland got a no event.

Nov 09 (892) Seeligeria and GSC 4695 543. Richard Miles, observing from Chesire, U.K. (Lat. 53.2453N, Long. 2.7375W Alt. 75m) sent this report:

Observations began about 01:42 UT, when a few thin clouds appeared (naturally!). These soon cleared (the Anti-Spode Law operating on this occasion) and intensive monitoring began around 01:46 UT. Watching intently and comparing the target star with its two companions, I suddenly hit the button on my stopwatch as I reacted to the object seeming to disappear. I immediately looked to the other two stars to check they were visible, which was the case, then switched to averted vision - nothing there! I measured the UT of mid-occultation to be 01:50:55 +/-2 sec. The duration of the occultation was 4.97 sec.

The observed duration of the occultation translates to a chord of 62.0 +/- 2.4 km in length, neatly fitting within the catalogued diameter for 892 Seeligeria of 78.5 +/- 1.7 km. The difference indicates that my location in mid-Cheshire was located about 20-25 km from mid-track. Since Seeligeria was at a relatively low altitude in the sky (<20 deg), this difference projected onto the Earth's surface actually amounts to about 70-90 km from mid-track.

Nov 25 (93) Minerva and PPM 070495. Isao Sato contributed this report: See ON (vol. 6, no. 13, p. 300).

The occultation was successfully observed by two observers in Okayama, Japan. Fortunately, both observations were both photoelectric and video monitored. Further, the occulted star was found to be double. The raw result is as follows:

observer	Nobuo Ohkura	Hidehiko Akazawa
site	Okayama City	Funao, Okayama
longitude (Tokyo Datum)	E 133d52'36.1"	E 133d42'43.3"
latitude	N 34d36'24.8"	N 34d34'42.6"
height	3m	8m
telescope	0.36m SC	0.28m SC
	(UTC) counts	(UTC) counts
	2479.5+/-3.8	2432.4+/-3.8
immersion of primary	16h51m46.5s	16h51m47.1s
	1855.0+/-47.0	1862.0+/-24.2
immersion of secondary	16h51m46.8s	16h51m47.5s
	1261.5+/-5.1	1634.1+/-4.3
emersion of primary	16h51m52.9s	16h51m54.5s
	2078.9+/-21.9	2173.2+/-13.5
emersion of secondary	16h51m54.0s	16h51m55.4s
	2459.5+/-3.8	2432.4+/-3.8

From the photon counts, the magnitude difference of the primary and the secondary is 0.81+/-0.02mag in V-band.

Since the four occultation chords are close, ellipse fitting is not adequate. Circle fitting for four chords shows the diameter of Minerva

is 132km, the seperation of binary is only 6.5 milliaresec in the position angle 249d. The separation is one seventh of HST resolution!

1998 September 10 Occultation of PPM 172432 by Asteroid 1574 Meyer

Richard Miles, rmiles@baa.u-net.com

Hazel McGee, Journal Editor for the BAA, reports a positive observation of this event as seen from West Clandon, near Guildford, Surrey, England. Hazel reported that this was her eleventh serious attempt to witness an asteroid occultation, the previous 10 all of which were negative. This observation represents only the second successful one ever made from the UK. The measured duration of the event was 3.87 seconds but after allowing for a longer personal equation for starting the watch compared with the reappearance timing, she estimates the rounded timing at 4.0 seconds duration. Given Hazel's persistence and determination faced with adverse weather conditions on this and other occasions, she well deserves our congratulations on her achievement. Observational details are:

Location 51deg 16min North, 0deg 30min West (Clandon, Surrey, UK)
Instrument 305mm SCT x 117
Time of obs. 02.08 to 02.10 UT approx., Thurs 1998 September 10
Conditions Broken cloud and light rain. Very clear between the clouds, strong moonlight did not interfere.
Disappearance 02:09:12.0 UT
Reappearance 02.09.16.0 UT

Text of Report:

I am delighted to report a positive observation of the occultation of PPM 172432 by 1574 Meyer about 20 minutes ago. I was very lucky to get it--broken cloud was blowing across very fast, and light rain was falling. Fortunately I had set up on the star earlier (after 1796 Riga, which was negative) and it would seem the telescope tracks well over a long period! During the observation *window* I draped a towel over the telescope and opened the dome slit a crack to watch the sky--fortunately the rain was only a light shower. When it looked like it would be clear for a few minutes I pulled off the towel, grabbed my stopwatches and jumped to the eyepiece. The little triangle of stars was still in the field, although not central. It was swimming in and out of cloud, but in a brief clear patch the brighter one suddenly winked out, and a few seconds later back again. Both timings felt good, i.e. not fumbled or unduly delayed, but I have never done a reaction test--I suspect I am about a second slow. The main watch recorded 3.87 secs,so I have rounded that up to 4 secs. My UT time is taken from a second watch that I start at a noted time by a radio-controlled clock, then stop it at the event.

Looking forward to hearing other reports, I do hope someone else got it also. Formal details below. Off to bed now!

Best regards, Hazel

P.S. I have a cartoon on my office wall which reads 'DON'T GIVE UP'. Having now observed both a solar eclipse (1988 in the Philippines) and an occultation in the rain, I would endorse that sentiment wholeheartedly.

A Complete Portable Astrovideography Setup

Scott Degenhardt, dega@nashville.com
http://nashville.com/~dega/vidsetup.htm

With the advent of sensitive CCD video cameras, the dramatic decrease in the price of electronic equipment and the need for the accurate data astrovideography provides, I thought it would be good to have a well organized list of the resources now available for these products. Below is a list of the items I either already use as well as items I have ordered and intend to use. These items can make an observer completely independent of 110 VAC! By using all 12 VDC equipment you also eliminate the annoying "buzz" associated with 12 VDC to 110 VAC inverters. By using video documentation of astronomical events you also eliminate human subjectivity and time delays associated with the human reaction time.

Here is a list in no particular order that I highly recommend:

1) The CCD video camera:

There are several high resolution, high sensitivity video cameras available on the open market that work well with astronomy. The most inexpensive, and oddly enough the most sensitive camera I have used to date is from a company by the name of Supercircuits

(http://www.supercircuits.com 1-800-335-9777). The camera is a Topica model TP505D/3 (Supercircuits part number PC-23C) at a current price of only $90! This includes a built in microphone for audio: http://www.supercircuits.com/page28.html

For an idea on some documented performances of this camera verses a GBC 505 see: http://nashville.com/~dega/sbs.htm

Soon I will have a page showing a comparison of identical stars through a 6" f/4.5, 6" f/8, 8" f/6, 10" f/8, 12.5" f/10 newtonians, and 14" cassegrain: http://nashville.com/~dega/compare.htm

If you can't fabricate an adaptor to plug the camera straight into your 1 1/4" focuser you can order a C mount to 1 1/4" adaptor from Orion Telescope Center (1-800-447-1001). You will have to order two different parts to make the connection but there is a bonus for ordering this configuration. The 1 1/4" barrel has threads for standard eyepiece filters. This could be handy for doing spectrum work or planetary videography to enhance contrast.

Orion part #5264 Universal Camera Adaptor $24.95 + $3.86 shipping
Orion part #7127 "1" to "C" Video Camera Adaptor $27.50 + $3.86 shipping

http://www.oriontel.com

2) VCR and monitor:

There are several manufactures that make a 12 VDC TV-VCR combo for about $300. Wal-Mart sells an Orion brand that has a 9" color monitor with a 2 head VCR with HQ. Electronic express sells the Samsung version of this. GE, Magnovox, Panasonic and Quasar have comparable models. The biggest advantage of one of these is reduced set up time as well as fewer SNAKES (cords)! The more connections you can eliminate the more reliable any system is. The only bummer in these systems is they are all 2 head VCR's and do not run in single step slow motion which is needed to get your timings. But Wal-Mart and other stores have 4 head VCR's for as cheap as $120.

3) Time inserter:

This will place an encoded time signal on the recorded video image. Although one can live without this for a while, ultimately it will be needed to get true 0.033 millisecond accuracy. Supercircuits sells a 110 VAC time inserter for $120 that I have purchased and will convert to 12 VDC. I also will find a way to modify it to trigger off of the top of the second mark of WWV. If all goes well I (Scott Degenhardt dega@nashville.com) will be willing to provide the same modification for anyone for a very minimal charge. I will keep everyone posted on this. http://www.supercircuits.com/page43.html

There is also a time inserter kit available through IOTA's Derald Nye (nye@goodnet.com). You will have to buy about $150 worth of parts and you will have to assemble it and you will have to have more than a basic understanding of electronics to accomplish this.

4) Shortwave Radio:

(digital tuning is HIGHLY recommended). These seem to be harder and harder to come by these days. Radio Shack sells one for $100. If anyone knows a good source for a reliable battery operated digital SW radio that will get at least 5, 10 and 15 MHZ please email me the info.

5) Assorted cables.

For the 12 VDC power (coaxial plug) and video signal connection from the video camera output (BNC type connector) to the video input of the VCR (RCA type input) I use the following setup:

a) Buy a 25 foot WHITE video cables from Wal-Mart (these show up REALLY WELL at night. I don't know how many times I tripped over my black ones until I switched to white). These will have the screw on Type F connecters on the ends. This cable will be used to go from your camera to the VCR.

Also at Wal-Mart in the auto dept. buy two sets of alligator type battery clips for the power cord to the camera and the monitor. Make sure they have one Red and one Black in each set so that you know which one will be used for + (red) and - (black).

b) At Radio Shack buy (these are for the video):
1 each of a 278-251 (Type F to BNC adaptor). $2.99 each
1 each of a 278-252 (Type F to RCA, sometimes called phono plug adaptor). $1.99

(for the TV/VCR 12 VDC power and video camera power) also at Radio Shack:

2 each of a 274-1570 (5 mm O.D. X 1.6 mm I.D. coaxial plug). $1.89

Note: When you get home, make sure the coaxial plug fits into the 12 VDC connector of the camera. If it is too small, take it back and try a 274-1567. You may want to take the camera with you for this part to try out at the store. The second connecter will be for your monitor

WARNING: MAKE SURE THAT YOU WIRE THE "+" (POSITIVE) 12 VDC TO THE CENTER CONDUCTOR OF THE PLUG TO THE CAMERA. THE "-" GOES TO THE OUTER CONDUCTOR. We will have to wait to see what the polarity on the monitor is, but it is probably the same (+ on the center).

6) 12 VDC Power source:

The first source that comes to mind is your own car battery. I would recommend connecting to your car battery with alligator clips like the ones from the auto parts section mentioned in #5 above. A cigarette lighter plug is simply not reliable. I have had one of these back out of the plug and work itself loose before while in use. This would be disastrous after driving hundreds of miles for an occultation by a rare asteroid only to be lost by this. Your car battery will work good for the TV /VCR and other accessories, but I have always run the camera off of its own lawn and garden battery (to keep as much electrical noise off of the video image as possible). These batteries run about $25. Just make sure you learn how long you can run your entire setup off of your battery WITHOUT running your car battery down! Also, you should never run ANY battery below 50% of its capacity or you will greatly reduce its lifetime. Deep cycle batteries similar to those used in marine applications are designed for deep and frequent charges and discharges.

Batteries will probably outweigh all other pieces of equipment (sometimes even your telescope). I like to put my batteries inside some kind of plastic battery box, for safe living with battery acid and to make them easier to carry. For lawn and garden batteries, I like to put them inside a dry box like ones sold at Wal-Mart in the fishing section. This will then close and have a handle on top for easy carrying. Make sure to drill several small holes in this dry box. It has a VERY good seal and you do not want hydrogen gas to build up inside the box and create a very efficient bomb!

7) GPS unit for surveying:

I prefer the Eagle Explorer GPS unit. Read the following page to get more info on how to use a $150 GPS unit to find your longitude and latitude to within 15 feet after only 3 hours of "graphical averaging":
http://nashville.com/~dega/gps00.htm (background on the research)
http://nashville.com/~dega/gpssteps.htm (actual procedures to use)

8) Some other items to consider:

a) At Wal-Mart in the video cable section I purchased a "coaxial cable twist-on "F" connector". Throw a box of these (2 in a box) in with your video cable. If one of your video cable ends suddenly comes unerimpted and pulls apart in the field you can repair it in a matter of minutes.

b) There is always a debate on the best quality video tape to record on. I personally use "Maxell HGX-Gold Premium High Grade" T-120 VHS tapes. When bought in a 3-pack at Wal-Mart they are not too expensive. They yield a very high playback quality WHEN THE RECORDING IS DONE IN "SP" (slow play mode)! I don't know how many of my early observations were less than clear by forgetting to record in SP mode. I believe it is almost impossible to tell the difference between the quality of the playback from the recorded signal with this tape.

A note on tapes in cold weather. The medium that the magnetic material is attached to is very similar to scotch tape. This medium becomes VERY stiff and brittle at very low temperatures. This will cause the tape to not run properly across the video heads and pinch rollers. Besides ruining the quality of the recording it can actually cause the tape to get chewed up in the machine. Make sure the VCR stays in an environment warmer than about 55 °F to assure quality (keep it in a warm car, etc.). I have ruined a tape from this very problem.

c) Don't forget to pack a regular tape recorder. This can serve as an emergency last minute backup incase you suffer an unrecoverable video problem in the field. The same can be said for eyepieces!

d) If you really want to be lazy, spend another $90 on a second Supercircuits camera and $50 at Wal-Mart for a 5" monitor and convert your finder scope into a video finder! No more getting on your knees to try to stare in the inverted view of the finder with an eyepiece to

see where you are for an asteroidal occultation. This second camera can then substitute as a back up camera in the event one of them fails.

e) For an additional $250 you can buy a Differential GPS Beacon Receiver (DGPS) for you Eagle GPS and a few accessories and eliminate the need for the 3 hour average to determine your longitude and latitude. A word of caution before purchasing this accessories, there is not coverage over the whole United States yet. See the US Coast Guard Page to determine if this is worth it for your area:
http://www.navcen.uscg.mil/dgps/coverage/default.htm (DGPS beacon coverage)
http://www.navcen.uscg.mil/ADO/DgpsSelectStatus.asp (Status of a DGPS beacon)
http://www.eaglegps.com/locator/locator.htm (to find a Eagle Dealer) t

Advanced Video System with Real-Time GPS Video Time Insertion

Rex L. Easton, SkyGazer*a* inlandnet.net

Here is a description of an advanced video system for astronomy. We at the Heartland Astronomical Research Team (HART) have pooled our financial and knowledge resources together for several years now and have come up with a very good video system for timing occultations of all kinds. Below is a list of our equipment with a brief explanation of its benefits.

Video Camera

Adirondack Video Astronomy (http://ourworld.compuserve.com/homepages/avaastro/, Orders: 888-799-0107, Information: 518-761-0390) Astrovid 2000, US$595.00, 600 TV lines; 1.7 x 1.9 x 3.75 inches, 300g: This is an excellent video camera. The chip size is slighty larger than the SBIG ST-7 CCD. It has full control in a convenient control box instead of having to use the controls at the back of the camera. We strongly recommend this camera.

GPS Video Time Inserter

Horita (http://www.horita.com, 949-489-0240) GPT-50, US$589.00, 2 inches x 2 x 3, 9 to 14 VDC: This unit takes the time and position information from your GPS unit in real time and overlays it on the video. You can display the time, the position, or both. You can also put one or two lines of your own title on the video--such as the star name or the place name, etc. You can position this information anywhere on the screen. It stores the setup information so you only have to set it once. The GPT-50 puts a small white vertical bar on the left hand column of the video frame to tell you exactly on which frame the second begins. Video (NTSC) runs at 30 frames per second on average. Sometimes it's 29 and sometimes it's 31 frames per second. Knowing exactly on which frame the second starts allows you to count frames in single step mode accurately.

The GPT-50 works with any GPS unit that provides the NMEA 0183 standard sentences, which is nearly all of the units you can buy today. It specifically uses the $GPGGA and $GPGGL sentences. It also used the 1 pulse per second (1 pps) timing pulse from the GPS unit. It has a pass through for the GPS information so that you can connect multiple GPT-50's together for use with multiple video sources and only need one GPS unit. This works great for setting up two video stations 100 feet apart (50 ft in opposite directions) from one vehicle. If you have any questions about the GPT-50 or it's use with your GPS unit talk to Bob Pargee. He's great to work with and knows his stuff.

Video Tape

Maxell Professional S-VHS, HQ Broadcast Quality, Back Coated Tape, US$10.00: (Even though this is Super VHS tape it works in VHS VCRs.) Good tape is crucial. It's the least expensive piece of the video system and it makes a significant contribution to the quality of your video system. It will help tremendously when doing single frame stepping to get the exact time on an event. The noise will be much less making it possible to time fainter stars. Before we got the GPS video time inserter we recorded some events with WWV audio and sent the tapes to Tom Campbell for time insertion with the post processing video time inserter. He said that the quality of our copies were better than most of the original tapes he has time inserted.

Video Monitor

Crest VM-91WDC, US$175.00, 9 inch black and white monitor, 900 TV lines, 12 VDC, 12 inches x 12 x 12: This is an excellent quality portable monitor. It's a nice little, light weight cube. It gives an excellent picture so you can see all of the detail that your camera is giving you.

DC-AC Power Inverter

Tripp Lite PV400FC Power Inverter; 30 amps, 400 Watts continuous; 7 x 7 x 10 inches, 14 pounds; $200.00: This unit works great. It produces good, clean power with very little noise. I put my shortwave radio two feet from it and the noise was barely above the background static. It did not interfere with WWV at all. It's rated for computers and other power sensitive equipment.

Notes about video systems

It's important that you match the TV lines of each piece of equipment. The camera will state how many TV lines it puts out. Make sure that your VCR and monitor handle at least that many. Otherwise, you won't get recorded or see as good an image as your camera is giving you. ι

Plans for the February 1999 Annular Eclipse

Byron Soulsby, minnah@spirit.com.au
Calwell Lunar Observatory, Australia
http://jump.to/lunar-eclipse

My wife Cathie and myself are planning to observe and time/video record Baily's Beads probably near the Southern limit south of Geralton We have booked our flights from Canberra and plan to drive up from Perth to the eclipse by private car on the morning of the event and then on to Geralton and stay two nights (16 and 17 Feb), at the Batavia Motor Inn at Fitzgerald Street 500 m sw of the post office. The day after the eclipse we plan to drive North to Monkey Mia, a great tourist attraction, return to Geralton that night and then back to Perth the next day.

I have recorded and analyzed Bailey Beads (with David Herald) from previous eclipses and discussed techniques and results from the project with Alan Fiala at the USNO on two occasions. David has offered to analyze any results obtained from this annular eclipse which promises to be great for bead timings.

I would be pleased to coordinate and discuss our planned observations with others, particularly those whom plan to observe near the Northern limit (Paul, etc.), as we know that timings from **both** limits are crucial to obtain a result for the size of the sun. ι

Might anyone from Australia or New Zealand be attempting to observe next February's annular eclipse? With the Moon almost as large as the Sun in angular size, it should be a good one for Baily's beads. See Paul Maley's message and plans below.

From: "MALEY, PAUL D. (JSC-DO)" <paul.d.maley1@jsc.nasa.gov>
To: "'beisker@gsf.de'" <beisker@gsf.de>,
"'Dunham, David (primeH)'"
<dunham@erols.com>
Subject: NASA JSCAS SOLAR ECLIPSE
Date: Mon, 3 Aug 1998 07:25:19 -0500

Wolfgang:

If you are going to IOTA/ES I would encourage you to try to coordinate IOTA/ES plans for February 1999 so we can see if anyone there is going to go to Australia to cover that eclipse. My plans have been made for a year and two of us will be at the northern limit near Geraldton. If nobody from IOTA/ES goes, we will have a third person branch off and go to the south limit but there will only be one site at each limit--a very risky proposition. But I am determined to maintain the continuity of observing these events.

with best regards,
Paul

Paul D. Maley
United Space Alliance
DO5/Cargo Operations
NASA Johnson Space Center
Houston TX 77058 USA
tel. 281-244-0208; fax: 281-244-1140
email: paul.d.maley1@jsc.nasa.gov
latitude 29.6049 north, longitude 95.1086 west, elev 6m

Date: Wed, 5 Aug 1998 09:12:13 +0800 (WST)
From: Maurice Leonard Clark <clark@fizzy.murdoch.edu.au>

To: Joan and David Dunham <dunham@erols.com>
Subject: Re: Anyone trying next Feb. annular eclipse in Australia?

Dear David,

I am intending to observe the eclipse next February along with quite a number of others from the Murdoch Astronomical Society (near Perth, Western Australia).

As yet though, I have been unable to locate an accurate path of the eclipse that I can plot onto a 1:250,000 map of the region of the west coast of Western Australia. Do you know of anywhere that such a plot would be available?

Regards,

Maurice Clark
clark@fizzy.murdoch.edu.au
Postgraduate student in surface physics.
Atoms by day.....Galaxies by night!

From: John.Morland@ato.gov.au
Subject: 1999 annular eclipse

Dear Joan and David

I received an email from Dave Herald asking if anyone is organising atrip for this eclipse.

As a matter of fact I have organised a group of 16 (many from Canberra Astronomical Society members) to view this at place called Greenough, just south of Geralton -Western Australia. I have organised other eclipse trips including South Africa in 1992 (we hired a jet from Cape Town), Bolivia (at Potossi) 1994, India (at Agra)1995, even sent a member (not me) to Mongolia in 1997 and finally to the Caribbean (on Holland America's ship Veendam) in 1998.

I have booked 8 rooms at Greenough River Motel Resort (phone no. 61 8 99215888)for nights of 15/16 Feb. The accomodation is _A78 per night per person which includes dinner and breakfeast. As far as I can ascertain, the resort is in the path of annularity. As the resort has only 15 rooms, I suggest you book early. If not there is plenty of accommodation at Geralton - but it lies outside the path of annularity.

If you wish I can book a room for you, a deposit of 20% (I think) is required arounf October/November.

My Email address is john.morland@ato.gov.au
The Moon will be 99.05% of Sun's diameter - should be interesting.

John Morland
Canberra Australia

From: beisker@gsf.de
Date: Tue, 4 Aug 98 19:19:51 MEZ
To: <dunham@erols.com>, <Paul.d.maley.1@jsc.nasa.gov>
Subject: Possible Pluto occultation in Australia

It has to be mentioned, that only 15 days before the sun eclipse, is a possible occultation of a 14m7 mag star by Charon and/or Pluto. Possible range of visibility is Australia!

Wolfgang

Date: 05 Aug 1998 23:40:00 +0200
From: bode@kphunix.han.de

Copy To: dunham@erols.com
Subject: eclipses 1998 1999

Dear Paul,

Concerning Feb. 1999, we shall go to Australia too: there will be about 4 - 6 stations we plan to establish at both edges. "Joe" Caminiti (David knows him) already got contact to David Herald to find a got observing site.
Thank all of you and best wishes

Hans

From: "Kruijshoop, Alfred" <AKruijsh@vtrlmel1.telstra.com.au>
To: "/Beisker_Wolfgang@gsf.de" <beisker@gsf.de>, clark@fizzy.murdoch.edu.au,
"/moy_mike@uq.edu" <dm.moy@mailbox.uq.edu.au>,
Joan and David Dunham <dunham@erols.com>,
"'/Dawes_Glenn@'"
<gdawes@s054.aone.net.au>,
Graham.Blow@actrix.gen.nz,
"'/Grida, Joe, Adelaide'" <gridaj@camtech.net.au>,
heraldd@canberra.DIALix.oz.au,
"/bacon ian@uwa" <ibacon@uniwa.uwa.edu.au>, johnw@interworx.com.au,
"/George_Martin@qvmag.tased"
<martin@qvmag.tased.edu.au>,
minnah@spirit.com.au, northp@ozemail.com.au,
"'/nelson@descomp'" <pnelson@descomp.com.au>,
"/Purvinskis_Robert@"
<robcol@senet.com.au>,
"'/larkin_patricia@'" <soltek@eisa.net.au>
Cc: "'a.kruijshoop@trl.oz.au'" <a.kruijshoop@trl.oz.au>,
paul.d.maley1@jsc.nasa.gov
Subject: FW: Aus Plans for Feb. 1999
Date: Fri, 7 Aug 1998 09:53:00 +1000

Dear David and Wolfgang,
Just a brief note to let you know that indeed many groups are making plans for this event. I noted that you already copied your message to David Herald, who is of course very well known in this field.

Personally I will not be involved but I am forwarding your message to:
* In Victoria to Jim Blanksby (IOTA member) and Pat Larkin, who have been active solar eclipse observers world-wide.
* In Queensland to Mike Moy, well known to Wolfgang from earlier work.
* In New South Wales to Glenn Dawes (publisher of the Australian "de facto" National Ephemeris) who has wide contact across Australia.
* In Tasmania to Martin George, who has the best publicity contacts.
* In Western Australia to Ian Bacon (other University from Maurice Clark).
* In South Australia to Joe Grida and Robert Purvinskis.
Hope this is of some use to somebody.
Best regards to all, Alfred

ZC741 Graze Results

Walt Morgan, WVM13@aol.com

We had a very successful graze expedition early this morning (Sunday, Aug 16, 1998). I especially want to thank both David Dunham and Mitsuru Soma for your very prompt response to my inquiry a week ago about the accuracy of the star declination. We positioned stations quite close to the predicted northern limit; my preliminary assessment is that there was very little shift, if any.

The star was ZC741, an equal-component double with combined magnitude of 5.7. The double spacing was only 0.08 sec of arc, and no one reported any brightening or dimming events because of the double, but it is possible that some of the video records will reveal that. Central graze time was at 10:26 UT. The expedition was positioned on Clements Road, 20 miles north and east of Stockton, CA. By copy of this message I am suggesting to Rick Baldridge, the expedition leader, that the location name used on the report be Clements, CA, although there might have been another town somewhat closer.

The northernmost predicted peak was at -1.1 miles. Eight stations at -1.2 miles and further south all recorded at least 6 events, probably 60 to 70 events total. A station more than 2 miles south recorded 12 events. A ninth station, Kent Okasaki, took a position considerably further north on the chance that he might catch a high peak. He said that there was a "flash," but it is assumed for now that he had a miss. He recorded with video, so a re- play should be able to determine whether it was a graze-related event.

Of the eight successful stations, three used the PC-23C CCD cameras, with good results. Rick Baldridge fed the video to his camcorder, which disabled the camcorder audio. He introduced optical flashes in synch with WWV before and after the graze to have an absolute time reference on tape, and plans to somehow rig a microphone to the camcorder for future use. I used my six-inch f/8 Newtonian for the first time with video, tripling the resolution compared with my use of an 80 mm f/5 refractor. The larger f/ number with the Newtonian seems to significantly reduce the "halo" problem which I experienced for the moon's surface with the small refractor. I will send a copy of my video to David tomorrow. Sandy Bumgarner was the third person to use the PC-23C. His telescope is the 3.5-inch Questar.

In setting up the stations there was some confusion about conflicting profiles. I insisted that the ACLPPP profile had to be the only reliable one, and that was used. It would seem appropriate to once again publicize this problem. I would suggest that the difference between the "reg" and "rgn" letter groupings in the prediction file names be used to help the membership select the correct file. Better yet, more distinctive letter groupings might be used for these files in the future. Possibilities for the profiles: acl; ppp; ***; best; best.plt. Possibilities for the limit line predictions: limit; tab; limit.tab; lmt.tab; latlong; latlng. (Probably it is necessary to keep the "reg" part for the Grazereg output; is it feasible to suppress the profile plots in those output files? At least until those profiles become reliable?) ι

Observation of August 16, 1998 Graze of ZC741 (SAO 94227)

Alan Adler, aadler@worldnet.att.net

Ken Lum and I set up in San Mateo in the parking lot of a school on Kehoe Avenue between Van Buren and Herschel (a fitting street for an astronomical observation). The sky was beautifully clear and the seeing was eight to nine out of ten.

Coordinates per my Garmin III GPS (averaged for 42 minutes) were -122:17.765, 37:33.945. Altitude=166 feet. The GPS estimated its accuracy as 33.9 feet. This point plots as 0.9975 statute miles (1.605 Km) from the limit line (measured as the shortest distance to the line). The predicted "zero" time for this location (proportional calculation from Dunham memo) is 10:25:29 U.T.

I observed with a 4" refractor at 127X and recorded my observation on audio tape with WWV in the background.

The recording said	Estimated Corrected Time After Zero
"dim" at 10:25:39 U.T.	8-9 sec
"out" at 10:25:53	23-24 sec
"in" at 10:25:57	27-28 sec

The estimated corrected times above are a fraction of a second earlier to account for my response time. All of this (even the "dim") appear to agree almost perfectly with the IOTA graphical diagram (asterisk line) for 1.6 Km below the limit line.

Upon request I will mail my tape and my graphical diagrams to IOTA. ι

Triple Graze of 1998 September 12 in Tennessee, USA: Part 1

Scott Degenhardt, degaa@home.com

On July 29 of 1997 several observers and I drove a long 2,250 miles round trip to the middle of South Dakota for one of the last grazing occultation of the brightest star (except for the Sun) that can contact the moon, Aldebaran. Had I paid a little more attention to my *Occultation Newsletter* I would have seen that a far more favorable graze of Aldebaran would be passing through my backyard (celestially speaking) only a year later!

On the eighth of December I sent out the notice to the group of people on my astronomy email list notifying them of this very favorable, and possibly once in a lifetime opportunity to witness such a spectacular celestial event and not have to travel more than about 30 miles to see it! Not only that, the graze limit line would skirt both the largest and second largest cities in the State of Tennessee passing within a very short drive to literally millions of people. And as if to make it most enticing, it was on a weekend morning.

Then in May of 1998 came the decision to have the annual IOTA meeting in Nashville, TN on Saturday and Sunday of the weekend of the twelfth of September in association with the graze of Aldebaran. Finding a meeting place came easy compared to locating graze sites for distant travelers to find at 2:00 AM! But along with the announcement of the meeting came the revelation that not just one but three grazes were possible that morning with Aldebaran and two other Hyades stars, ZC 680 and SAO 94056. The limit lines for all three were separated by about 30 miles of distance with central graze times separated by about 2 hours of time.

While this arrangement seems possible on paper and theoretically can be done, reality generally stinks and Murphy frolics with such folly.

I began to start planning for the grazes shortly after the May announcement. I first prioritized my planning in this order. First and foremost the Aldebaran graze will be the highest priority for accuracy and suitable graze sites that can be easily accessed with permission of all landowners so no one would end up with lead poisoning [gun shot] in the wee hours of the morning. Second, I wanted to make sure that everyone including us videoites would have the minimum of at least an hour setup time before the Aldebaran graze. This gave the distinct possibility that the graze before Aldebaran may have to be out of the question. If close sites could not be secured to assure that the travel time between the first graze and Aldebaran were possible without traveling at 100 mph through small towns and ending up sharing a jail cell, but I digress. The point is, Tennessee is mostly forest, and hills and rednecks who have already once at gunpoint told me to "Take your star #!$%* somewhere else!"

Besides the Nashville area graze sites I also had to plan expeditions for the Memphis Astronomical Society, Gallatin TN's Cumberland Astronomical Society (which was a mere 4 miles from the graze limit), the Director of Western Kentucky University's Astronomy Dept. (who actually had the graze zone pass through his front yard), and several other expeditions. So for several months I was buried neck deep in planning for the one weekend in September! What the heck, we would probably have the earliest snowfall in Tennessee history anyway on the night of 11 September 1998!!! Actually, we came close to this type of disaster. As late as 7:00 PM local time we were completely overcast with the fringes of a Tropical Storm FRANCES. More on her later.

So with lots of last minute scrambling to get permission from all the landowners at least I had all of Aldebaran planned by about a week before show time. I also had preliminary sites located for the graze following Aldebaran, SAO 94056. Then, three weeks before graze time several groups started to express interest in trying for the graze before Aldebaran, ZC 680. Using my Street Atlas USA V5.0 it was obvious that this just wasn't possible for the Memphis area since there simply weren't enough highways running North-South that could get you from the first graze to Aldebaran to guarantee enough time to setup even visual timing. The same was true for the Gallatin area. But at least Nashville had I-24 running that way and it was only 15 miles from my chosen Aldebaran site. However, the best I could do for the first graze was some streets that were actually in Kentucky. With no time left to hunt I had to just go with what I had come up with.

Then came Friday the 11 of September. I planned on checking into my hotel 12 miles from the Aldebaran graze by 3:00 PM. I didn't get there until an hour later, not a good way to start my already *tight* schedule. All of the months of planning seemed a little moot for most of the day since our star, the Sun, wasn't even out! It seems that a tropical storm had struck Louisiana earlier in the day and boy was she wide. The edge of the system reached all the way to Kentucky. This scared a lot of people off at the very last minute from the Middle Tennessee expeditions. David Dunham called to say that his group had stopped in Kentucky to observe since it looked like little hope for TN. In fact I spoke with the local Weather person at Channel 2 who told me the very same thing. David invited anyone who was interested to join him in KY. Gerry Samolyk also aborted the TN trip and stayed back in KY. Harold and Katie Povenmire aborted and went all the way to Pennsylvania! But as people started showing up from different states we all met for dinner at the new Steak and Shake and while we were eating we noticed that by the time we were done there was an extremely colorful sunset outside and not a cloud in the sky! So I guess it wasn't going to snow after all?

By about 8:00 PM I had heard from everyone except the Topeka, KS group. They finally arrived and we planned to meet at their Hotel and drive straight to the first graze site so that we would have time to record some of the bright total occultations that would occur before the graze of ZC 680. Due to the continually growing size of the group of observers it was becoming harder to meet schedules. But despite all of the good maps I published in the days before the event I was still afraid of loosing someone in the backwoods of Tennessee. So we had to travel in such a large group. Consequently, we left at least 15 minutes later than what I considered to be the latest I wanted to be on the road from Nashville heading for that first graze.

Somewhere in Murphy Theory there must exist a clause that states "The strength of the Murphy Effect Field is *exponentially* proportional to the size of the group." The absolute worst possible scenario played out on the Interstate on the way to the first graze!

Our convoy was at least 5 cars long as we headed North at around 10:00 PM (6 cars after the Channel 2 Newsman met up with us). As we threaded our way through the maze of the Interstate loops of Nashville we neared a section under construction (at 10:00 PM at night?!?) and three of the worst things happened. First, we came to a grinding halt! This was not good for our already lacking momentum in trying to get to the first graze. Second, four lanes of traffic *instantly* merged into one! This had the same effect as taking 5 golf balls and stirring them together with 60 *more balls*, some being bowling balls. Not only were we all completely separated from each other, we had tractor trailers between ourselves and were not even within sight of each other! And thirdly, all of this occurred at a critical fork in the Interstate that if one took the wrong fork would get hopelessly lost in the Nashville Interstate system. Will we ever see each other again? Stay tuned for part two in the next issue.

International Occultation Timing Association, Inc. (IOTA)

Official 1998 Annual Business Meeting IOTA/ES

Dr. Eberhard H. R. Bredner, Secretary IOTA/ES
VHS113-Hamm@t-online.de

A: Report of the Members of the Board

H. J. Bode (President IOTA/ES) welcomed 12 members for the session and presented the first two clocks that use the signals of GPS-satellites and can generate the time at any place of the world with an accuracy that is sufficient for our work. He gave a short overlook to our activities which where often troubled by the weather conditions.

By proposition of the secretary the assembly fixed the membership fee beginning with 1999 to "20 EURO" (about 25 US$). If members have financial problems to pay that amount they should send an information to the board of directors (secretary) to reduce the fee for that special case.

ESOP XVII DE HAAN : IOTA/ES supports the attendance of observers who have problems with the payment of their subscription to ESOP's. If anybody wants a support he/she should send a notice to the secretary IOTA/ES with a short description explaining his/her situation and a declaration in which matter there could be a lecturer presented as part of the conference IN ADVANCE so that the board of directors can decide, whether a support of IOTA/ES is possible or not.

B: Scientific Projects 1999 / 2000

We discussed several projects for the next years, all members will get information in detail with their calculations 1999 or by extra post. Dr. Eberhard Riedel presented in DE HAAN a first overview of outstanding grazing occultations with 31 events. These list is the official list for our grazing-work in 99. Any member organizing a graze may get an official LOA (Letter Of Attestation) from the secretary to present himself as IOTA/ES-organizer if he/she expects that could support the preparation.

The calculations 1999 suffer by a delay due to problems with the current star catalogs. Reporter of total occultations for 1999 shall be very carefully by describing the star so that ILOC can verify their measurement. Because of new star catalogs the ILOC-form must be changed during the next month. (We hope for an explanation by ILOC to clear the situation).

C: Results 1998

We had some nice results this year but another number of organized observations where clouded out by a very bad weather-period in Central Europe.

D: Electronics

We discussed possibilities to reduce video-tapes with weak signals (disturbed by haze, etc.). If possible they should be digitized before the reduction.

Rainer Joreczyk <RJoreczyk@t-online.de> has a solution for a wide-range use (Europe total) of the DCF-77 time signal receiver feed by a ferrite antenna.

At the end of 1998 some more IOC-cameras will be ready. All holder of IOC-cameras (delivery DE HAAN) should report first results to Dr. Beisker <beisker@gsf.de> for further developments.

E: ESOP 1999 in Stuttgart, Eclipse 1999

ESOP XVIII (eighteen) will be held in Stuttgart August 5-7 (additional part - 11) in the next year. 50 beds have been prebooked up to now. The center line crosses Stuttgart. So the city expects a lot of observers from Europe and other parts of the world (a Japanese group was already there to look for observation sites). You should announce your attendance as fast as possible, see www.sternwarte.de/ESOP-99/ or stuttgart-tourist@t-online.de.

VdS < Vereinigung der Sternfreunde - the German astronomical amateur association> and IOTA/ES will immediately connected to ESOP in Stuttgart arrange a symposium "Research Amateur Astronomy in the VLT Era" in Garching near Munich at the headquarter of ESO (European Southern Observatory) August 8 - 11 see: http://neptun.uni-sw.gwdg.de/sonne/eclipse99_conference.html. The conference will be ended by an eclipse party in the "Buergerhaus Garching" with first results from the event.

F: IOTA/ES Sections

In order to spread out our work, we have added, from now on, these sections:

Section	Leader
Minor Planets	Otto Farago, Farago@t-online.de
Total Occultations	Reinhold Buechner, r.buechner@t-online.de
Grazing Occultations	Dr. E. Bredner, VHS113-Hamm@t-online.de

By the way H. J. Bode president IOTA/ES has e new email address: IOTA *@* kph.de

G: Publications
We will try (!) to present our work more regularly in any publication that is available.

H: Add On's
The audience had to decide where the ESOP XIX (nineteen) in 2000 shall be organized. A wide range discussion of all aspects led at the very end to the decision. IOTA/ES ask Marek Zawilsky <mrkzaw*@*ek-sg.p.lodz.pl> to organize ESOP XIX (nineteen) at Krakau, Pologne (Krakow, Poland) August 25 - 27, 2000 (conference), followed by an additional astronomical program. IOTA/ES thanks all members who tried to make arrangements for ESOP XIX at their country during the last weeks. We had to decide the place during the meeting in Hannover. We would be glad if the others will organize another ESOP in the new millennium!

Organized by Dr. Wolfgang Beisker and Evi Hummel IOTA/ES will try to establish a home page with the address www.iota-es.de. ↵

The 1998 IOTA Annual Meeting

By Richard Nugent, Executive Secretary

The sixteenth annual meeting of the International Occultation Timing Association was held Saturday and Sunday September 12-13, 1998 at the Arthur J. Dyer Observatory in Brentwood, Tennessee, just south of Nashville, Tennessee. This was a perfect meeting place since it was the day after a rare triple grazing occultation, which included the spectacular Aldebaran graze.

The meeting was arranged by IOTA member Scott Degenhardt working with the Observatory's Director, Dr. Douglas S. Hall. Scott Degenhardt had also done an excellent job in arranging the triple graze expedition along with providing hotel information for travelers outside of the Nashville area on his web site.

Twenty four members were present at the Saturday meeting and seventeen members at the Sunday meeting and included: Officers President David W. Dunham from Maryland; Treasurer and Secretary Craig and Terri McManus, Occultation Newsletter ***(ON)*** Editor Rex Easton, and Richard Wilds from Kansas. Other members present included: Wayne Warren from Maryland; Scott Degenhardt, Chris Reese, Dudley Pitts, Ben Hodges from Tennessee; Bob Sandy, David Neuenschwander, Wayne and Nancy Clark from Missouri; Benny Roberts from Mississippi; Richard Nugent from Texas, Bob Manske, Neil Simmons from Wisconsin, Danny Falla from California, Jim and Yvonne Roe from Oaxaca, Mexico; Chuck Bueter from Ohio; Mike Nicholas from Kentucky; and Derald Nye from Arizona.

Prior to the start of the meeting, a brief history of the Dyer Observatory was given by its Director, Dr. Douglas S. Hall. The Observatory is operated by Vanderbilt University and has been very active in past years. One of the main instruments is the Seyfert 24" f/17.5 Cassegrain telescope named in honor of Carl Seyfert who first recognized active galactic nuclei in the 1950's (Seyfert galaxies). The Observatory also contains an outstanding library and is the most complete astronomical library in the southeast United States. Unfortunately, Dr. Hall mentioned that at the present time the Observatory is under utilized, and has offered it to visiting astronomers with research proposals.

David Dunham opened the meeting with a discussion about the 19 year Meton cycle and the 18.6 year Saros cycle. He compared the similarity of grazes from 19 years ago over southern California to the early morning's triple graze. He mentioned that the Aldebaran and ZC 680 grazes were observed successfully in 1979 despite the fact that predictions were not as accurate back then. Triple graze history was made the night of September 12, 1998 as several observers recorded 3 grazing occultations - ZC 680 (m=6.7), Aldebaran (m=0.8) and SAO 94056 (m=8.3). The only previous successful triple graze observation in one night was the one involving the same three stars observed by Richard Nolthenius on Sept. 12, 1979.

David Dunham showed a press release he distributed in the Baltimore area encouraging the general public to record the Aldebaran occultation with camcorders. The press release also asked camcorder observers to record a local station, WBAL, before and after the occultation so that their tapes could be calibrated with radio station WWV time signals.

Results of the September 12, 1998 graze reported at the meeting:

Lexington, Kentucky: Dunham/Warren - had equipment problems but did obtain timings for each of the 3 grazes.

Nashville, Tennessee - Degenhardt, et. al -10 observers participated, saw and recorded all 3 grazes. Scott Degenhardt described how his Dodge Caravan flushed out numerous deer (for the other drivers) along the 125 mile round trip to all three graze sites along unchecked Tennessee and Kentucky back roads.

Memphis, Tennessee - Clouded out.

David Dunham briefly discussed the new reference catalogs being used for IOTA predictions, the HIPPARCOS (**HI**gh Precision **PAR**allax **CO**llecting Satellite, 118,000 stars) TYCHO (over 1 million stars) and ACT (nearly a million stars) catalogs. The low standard errors of the HIPPARCOS positions create a reference frame (on the order of a few milliarcseconds) of unmatched precision. This has helped tremendously in the prediction of asteroid occultations. Previous to the HIPPARCOS and ACT catalogs, asteroid occultation predictions used the GSC 1.2 catalog (average standard error = 0.3 arcsecond) which was a re-reduction of the original GSC using the Position and Proper Motion (PPM) catalog reference frame. Along with "last minute CCD astrometry" the predictions could only pin down the asteroidal shadow to 2 or so path widths. Last minute CCD astrometry updates usually have large standard errors of 0.2 - 0.4 arc seconds and thus these observations cannot always be used for such occultation predictions especially when a large number of observers are planning extensive travel to an uncertain shadow path. With the new HIPPARCOS and ACT reference frames, experience has shown asteroid occultation predictions are now usually accurate to within ½ path width. With the highly accurate observations provided by meridian circle observations of the target star and asteroid, along with the HIPPARCOS and ACT catalogs as reference frames, asteroid occultation predictions can now be made accurately a week or more in advance thus allowing a much narrower uncertainty in the path.

David Dunham also mentioned that E. Goffin has put together a temporary "All Sky Catalog" for use in the 1999 asteroid occultation predictions complete to about m = 10. Wayne Warren cautioned that the proper motions in this catalog are not in the standard format. He also said that problems with the double stars in this catalog are being identified. These problems are being worked on by Mitsuru Sôma in Japan. Richard Wilds mentioned that when a target star in a grazing occultation expedition is actually a double, this can cause a disaster, if the components are more than a couple of tenths of an arc second apart and this is not taken into account properly in the predicted profile.

David Dunham passed out a compiled list of all observed asteroid occultations from 1958 until 8-17-98 containing 181 occultations. Dunham also showed derived asteroid profiles of some recent successful events:

1437 Diomedes, 11-17-97, 5 chords, Japan
105 Artemis , 12-4-97, 9 chords, Arizona
39 Laetitia, 3-21-98, 19 chords, Southern Europe
25 Phocaea, 5-13-98, 4 chords, Phoenix
248 Lameia, 6-27-98, 5 chords, South Africa

Dunham mentioned that the Astronomical League (AL) is interested in helping IOTA identify potential asteroid occultation observers. They have requested a short form asking for observer's location, telescope, equipment, etc. to be published either in the *REFLECTOR* newsletter or distributed by other means. Along these lines Alan MacRoberts of *Sky and Telescope* asked that IOTA members help reduce video tapes from casual observers of Aldebaran type occultations.

Dinner was from 7:15 to 8:55 PM. Following dinner, Derald Nye showed a video of the rare Venus/Jupiter occultation by the Moon on April 23, 1998 at Ascension island in the South Atlantic. Although thin clouds often hampered the view, all 4 events were clearly seen and recorded.

Richard Nugent then showed his video of the Baily's Beads phenomena from the February 26, 1998 total solar eclipse southern limit on the island of Curacao. At his site, he was joined by IOTA member Chuck Herold from Austin, along with Jay Miller from Bethesda Maryland, Isao Sato from Japan (who was after the "flash" spectrum). Wayne Warren was set up approximately 1 km north of Nugent's site. Under clear skies, the Beads on the video clearly showed that Nugent was just outside the path of totality as one single Bead did not vanish during mid eclipse. The success of this Baily's Beads effort was remarkable considering that the island was covered with rain showers earlier that morning.

David Dunham described his results from the northern limit of the February 26, 1998 eclipse from a small Venezuelan island. His expedition was arranged and joined by Dr. Patricia Rosenzweig of the Universidad de Los Andes, Merida, Venezuela. He briefly described the reduction procedure of solar eclipse tapes for the purpose of obtaining a solar

radius. As of this date, tapes of 8 eclipses have been reduced. Due to the complexity and time required to reduce solar eclipse tapes, funding has been actively sought by David Dunham and Wayne Warren to reduce the backlog of tapes.

David Dunham showed a long video consisting of numerous total, grazing and asteroid occultations taken by himself and by several other observers in different countries using a wide variety of equipment. Bob Sandy then showed a video of his first video graze of Aldebaran from the previous night using a Supercircuits PC-23 video camera. This is the same camera that other IOTA members are "swearing" by (Supercircuits, One Supercircuits Plaza, Leander, Texas 78641, www supercircuits com, 1-800-335-9777). Scott Degenhardt showed the video of the triple graze from the night before again taken with the PC-23 video camera. Then Chuck Bueter showed the Aldebaran graze event taken with his camcorder mounted on a tripod with the digital zoom "maxed out". Aldebaran was resolved clearly on Chuck's video disappearing and reappearing.

Following the videos Derald Nye offered several extra time inserter boards he has used for $25 each to members who wish to build their own video time inserter. Derald mentioned that in order to complete the video time inserter, about $100-125 in parts are needed which he has a list of.

The meeting closed shortly after 11:00 PM and a brief tour of the 24" Cassegrain telescope and equipment inside the 5 ton dome was provided by Dr. Douglas Hall, the Observatory's Director.

Sunday, September 13, 1998

Prior to the continuation of the IOTA annual meeting, at 9:30 AM group photos were taken outside the Observatory by Bob Sandy, Derald Nye and Richard Nugent.

David Dunham opened up the business meeting by announcing the nominations for Officers and positions within IOTA, since this is an election year. Nominations were presented to all IOTA members by either email and publication in the *ON* July 1998 issue. The list of nominees were:

President	David Dunham
Vice President	Paul Maley
Executive Secretary	Richard Nugent
Secretary	Craig McManus
Treasurer	Terri McManus
V.P. for Grazing Occultation Services	Mitsuru Sôma
V.P. for Planetary Occultation Services	Jim Stamm
V.P. for Lunar Occultation Services	Walt Robinson
Editor for *Occultation Newsletter*	Rex Easton

David Dunham moved to vote for the new slate of Officers and there was no opposition. The motion was seconded. Dunham then moved to close the elections. The motion was seconded.

Next, Terri McManus presented the Treasurer's report. Terri passed out copies of the Profit and Loss Comparison for the period 12/1/96 - 6/30/97 and 7/1/97 - 8/31/98 and the Cash Flow Report covering the time period 7/1/97 thru 9/12/98. The income/expenses showed IOTA to be in good financial shape as there is a slight positive cash flow of approximately $5 for the 12 month period ending 8/31/98. One item elaborated on by Terri McManus was a $500 cash contribution handled by Derald Nye. Derald had become aware of some unclaimed money from an old Denver Astronomical Society checking account. After contacting current persons in the Society, it was agreed that the funds would be divided between the Association of Lunar and Planetary Observers (ALPO), the Astronomical League (AL) and IOTA. IOTA's share was $500. Terri closed the Treasurer's Report by stating that the current balance in the checking account is approximately $7,000. David Dunham moved to approve the Treasurer's Report. Richard Wilds seconded the Motion. The Report was approved as presented. The Cash Flow report is shown below.

CASH FLOW REPORT
7/1/97 Through 9/12/98

Category Description	7/1/97-9/12/98
INFLOWS	
Back Issues	20.00
Contributions	682.58
Interest Income	132.82
Member	5,580.00
OM	5.00
Other Income	1.00
Rebate	70.00
Subscriber	770.00
TOTAL INFLOWS	7,261.40
OUTFLOWS	
Card Cost	78.18
Internet Cost	235.40
Office Supplies	557.75
Postage	1,469.70
Printing	2,069.79
Reimburse	193.54
TOTAL OUTFLOWS	4,604.36
OVERALL TOTAL	2,657.04

Derald Nye presented to David Dunham three sets of *ON* complete to Volume 4 that he has been keeping in his garage. One copy was given to the McManuses and one will be sent to IOTA/ES. Since the *ON* is referenced in major astronomical journals, it was suggested that older issues be scanned and be put online like other professional journals.

IOTA's Vice President Paul Maley was unable to attend this years meeting but was visited by Terri McManus while she came to the NASA Johnson Space Center in Houston this past summer. Maley had given Terri several suggestions to be discussed at the meeting. They are:

1. Put the *ON* on the Web (with a password)
2. Charge for predictions, *ON* and postage (no more freebies)
3. Search for grant money, need more fund raising
4. Need a business plan
5. Need ways to increase membership
6. Work with Foundations to raise funds
7. Awards for Observers similar to the Messier and Herschel awards

There was discussion among the attendees about Paul Maley's suggestions and several were debated directly. Craig McManus continued the discussion and passed out a list of 27 parties (many in former communist countries) that currently get the *ON* at no charge. This represents 10% of postage and mailing costs, since most of these parties are overseas.

David Dunham said the current version of the IOTA Occultation manual should be converted into an easier format for distribution. The current version is an ASCII text version compressed in a zip file on the IOTA web site, however it mangles the equations and tables. Wayne Warren will look into converting the manual to a more flexible format. The chapters on asteroid occultations and video applications will be rewritten and updated.

Craig McManus described that the North American asteroid occultation supplements were very expensive to print and mail and suggested only sending them out by request only. David Dunham suggested putting them on a password

protected website, the details to be studied ASAP. Terri McManus suggested that any IOTA publication be put on a hidden website with a password for IOTA members. Without such password protection, there would be no reason to join IOTA. Scott Degenhardt offered to scan the North American 1999 asteroidal occultation charts and put them on website he has containing some 15 megabytes of space.

The discussion continued about the world going on line by the members present at the meeting. With the widespread popularity of the Web, David Dunham, Craig and Terri McManus suggested (and it was agreed by the members present) that all future IOTA predictions and the *ON* be put on a hidden URL to save the high costs of postage and printing. Following this discussion about placing IOTA publications on-line, David Dunham and the McManuses suggested a new IOTA membership fee structure be proposed and adopted:

Membership (including subscription):

New fee	Membership type	Includes
A. $15	Online (Password)	Supplements
B. $30	North America Paper	Supplements
C. $35	International Paper	Supplements

anyone "A"
N.A. I = "B"
(N.A.) I = "C"

Subscriptions Only:

New fee	Subscription type	Includes
D. $10	Online (Different password)	No supplements
E. $20	N. America paper	No supplements
F. $25	International paper	No supplements

Additional membership and subscription levels may be needed as more experience is obtained with the new fee structure and member input.

David Dunham then went over the list of the 27 parties (mostly international) who currently receive free paper mailings of IOTA publications and supplements. In discussions with those present, David decided who should receive "drop letters" based upon how they would fit into the proposed new A through F fee structure above based upon their need and online capability.

The proposed online membership/supplements will now allow *ON* editor Rex Easton to put timely articles on line immediately. Hard copies of the *ON* will continue to be mailed as before to non-online members/subscribers. Rex Easton suggested that all IOTA website/online material be put on a master website such as www.IOTA.Occultations.org with links to all other IOTA web sites for occultations, grazes, etc. Such a move would place keywords such as IOTA, Occultation, asteroid, graze, etc. available on search engines making it easier for the casual observer to locate rapidly IOTA information.

Craig McManus suggested Certificates be sent to observers who complete their first grazing occultation. This would help promote IOTA and assist in marketing additional IOTA activities. The attending members agreed with this idea.

Derald Nye suggested plans for including IOTA as a beneficiary in people's wills so that useful computer/telescope/video equipment can continue to be used to help meet IOTA objectives.

David Dunham briefly discussed (and presented handouts) tables and charts showing thirty-three grazes brighter than m = 6.0 and several asteroid occultations visible North America during 1999.

David Dunham moved to close the business meeting at 12:35 PM. Craig McManus seconded the motion and the meeting was adjourned. Attendees then went out for lunch before traveling home. ι

IOTA's Mission

The International Occultation Timing Association, Inc. was established to encourage and facilitate the observation of occultations and eclipses. It provides predictions for grazing occultations of stars by the Moon and predictions for occultations of stars by asteroids and planets, information on observing equipment and techniques, and reports to the members of observations made.

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IOTA European Service (IOTA/ES)

Observers from Europe and the British Isles should join IOTA/ES, sending a Eurocheck for DM 40.00 to the account IOTA/ES, Bartold-Knaust Strasse 8, D-30459 Hannover, Germany; Postgiro Hannover 555 829-303; bank-code-number (Bankleitzahl) 250 100 30. German members should give IOTA/ES an "authorization for collection" or "Einzugs-Ermaechtigung" to their bank account. Please contact the secretary for a blank form. Full membership in IOTA/ES includes the supplement for European observers (total and grazing occultations) and minor planet occultation data, including last-minute predictions, when available. The addresses for IOTA/ES are:

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International Occultation Timing Association, Inc. (IOTA)

IOTA on the World Wide Web

(IOTA maintains the following web sites for your information and rapid notification of events.)

IOTA Administrative Site
http://www.inlandnet.net/~iota

This site contains information about the organization known as IOTA and provides information about joining IOTA and IOTA/ES, topics related to the *Occultation Newsletter*, and information about the membership--including the membership directory.

IOTA Asteroidal and Planetary Occultations Site
http://www.anomalies.com/iota/splash.htm

This site contains information on asteroidal and planetary occultations and the latest information on upcoming events and how to report them.

IOTA Lunar Occultations and Eclipses Site
http://www.sky.net/~robinson/iotandx.htm

This site contains information on lunar occultations and eclipses and the latest information on upcoming events. It also includes information explaining what occultations are and how to report them.

IOTA's Telephone Network

The Occultation Information Line at 301-474-4945 is maintained by David and Joan Dunham. Messages may also be left at that number. When updates become available for asteroidal occultations in the central USA, the information can also be obtained from either 708-259-2376 (Chicago, IL) or 713-480-9878 (Houston, TX)