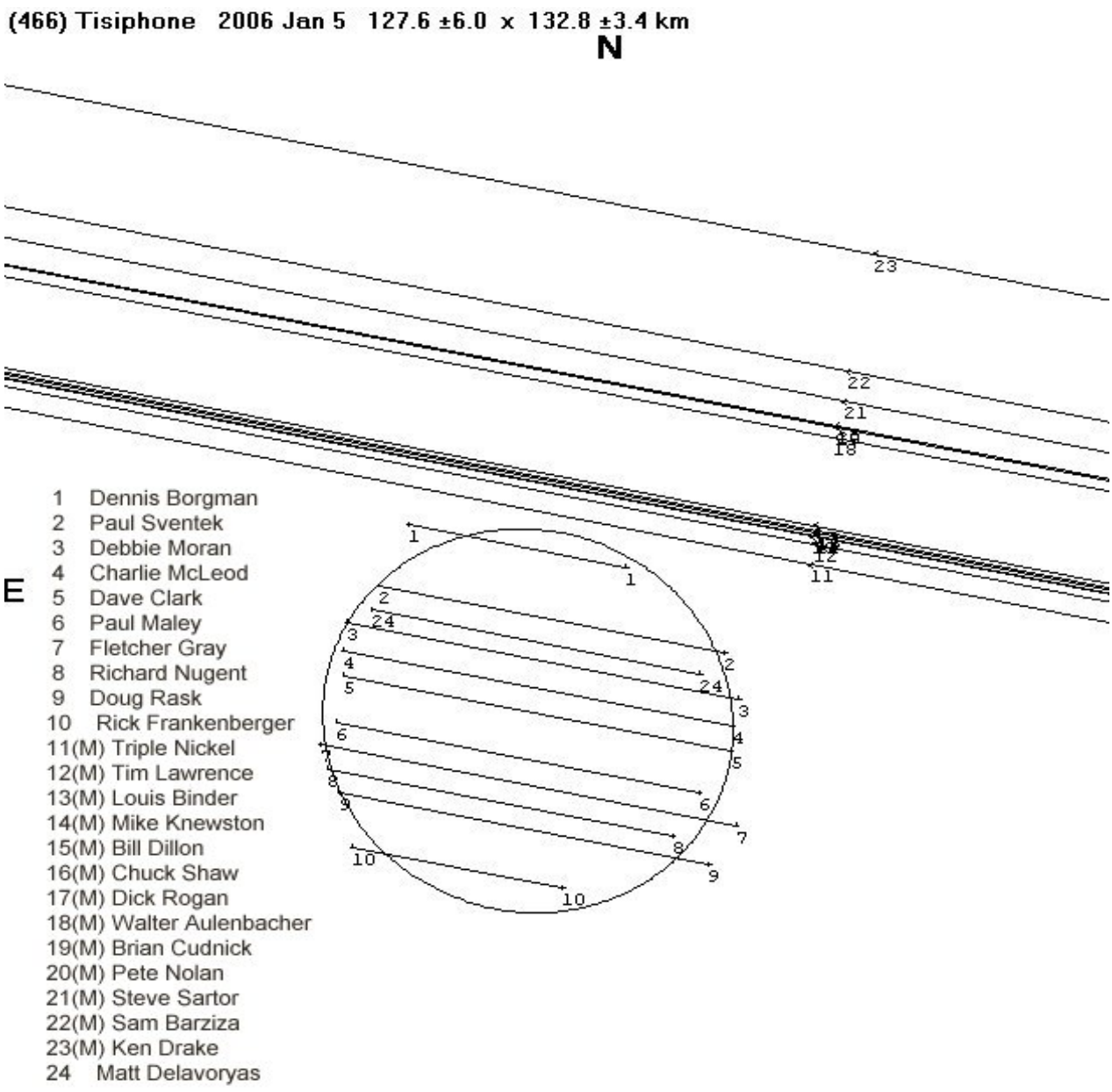
Occultation Newsletter

Volume 12, Number 3 July 2005 $5.00 North Am./$6.25 Other



Profile of 466 Tisiphone from 5 January 2006

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ON THE COVER:

Profile from the 2006 Jan. 5 occultation of 9.2 magnitude SAO 97354 by 466 Tisiphone

Graphic provided by Richard Nugent

Publication Date for this issue: March 2006

Please note: The date shown on the cover is for subscription purposes only and does not reflect the actual publication date.

The next issue, Volume 12, Number 4 will be published in April.

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All other areas-Jan Manek; (see address at left)

ON Publication Information

Occultation Newsletter (ISSN 0737-6766) is published quarterly by the International Occultation Timing Association, Inc. (IOTA), 5403 Bluebird Trail, Stillwater, OK 74074, USA. IOTA is a tax-exempt organization under sections 501(c)(3) and 509(a)(2) of the Internal Revenue Code USA, and is incorporated in the state of Texas. First class postage paid at Stillwater, OK, USA. Printing by Tony Murray of Georgetown, GA, USA. Circulation: 400

"Incredibly Lucky", The Surprise Graze of ZC 2131

Derek C Breit, BREIT IDEAS Observatory

It started out as any other day of videotaping total lunar occultations. On Sunday, July 25th 2004 local time, I was setup to videotape some events. These would turn out to be the 6th – 9th events recorded to video with my new Watec 802h videocamera.

I was quite enthralled with the occultation game to begin with and this new camera was like the Holy Grail to me. I had immediately imaged the nucleus of the Andromeda Galaxy, the Orion Nebula, and other similar objects. There was no beating this camera!

This was a Sunday, my usual off day, so I was going to observe whatever was around, regardless of how spectacular or not the predicted events were going to be. So I generated predictions with WinOCCULT. There were quite a few, but these are the ones I successfully observed on video with WWV time signals.

```
04 07 26  3 58  8 d X 38668 F8 10.4   61+ 103  -7 31 200  53N  69  52  54
04 07 26  4 27 59 d  158899 G8  8.4   61+ 103 -12 29 207  53N  69  47  54
04 07 26  5 33 47 d    2131 F5  7.7   62+ 104     21 222   6S 190 156 175
04 07 26  5 37 37 d X 38718 F8 10.2   62+ 104     21 223  41S 155 121 141
```

Being July in California, the weather was quite comfortable. This caused my wife to come see what I was doing at a very convenient time. The moment was fast approaching for the total occultation of ZC 2131 at a cusp angle of 6 degrees south. I was very new to occultations, but I learned quickly about the ruggedness of the terrain near the South Pole of the Moon.

"Honey, if we are really lucky, this star (on the TV Monitor) will blink off and on behind a mountain", I said, employing one of my favorite traits – *wishful thinking*. Seconds later, the star disappeared at 05h 33m 19.5s UT. "Come on back! Come on back!" I kept repeating. Julie and I were amazed when it did just that at 05h 33m 34.4s with a gradual reappearance. At 05h 33m 46.0s, it disappeared for good. I plotted the grazeline and learned I was 121 km north of the southern limit. An event like this would have to be, by its nature, pretty rare.

How rare? Just how lucky was I? Let's see if we can find out!

Dr. Mitsuru Soma wrote on August 1st 2004 –
Derek's deepest point was -26.301" from the mean lunar limb at 05:42:17.860 UTC… As may be seen from my reduction shown below, Derek's multiple events are due to a very steep profile of the Moon.

```
 WA      Height    WH    Diff   l     b        Star      Phen
   o        "       "      "    o     o
174.55 +1.782 +1.50 +0.28 -5.88 +2.06  ZC  2131   DD
174.92 +0.278 +0.06 +0.22 -5.88 +2.06  ZC  2131   RD
175.21 -0.866   -0.83 -0.03  -5.88 +2.06  ZC  2131   DD
WA: Watts angle
Height: Observed height from mean lunar limb
WH: Height in Watts' charts
Diff: Height - WH
l,b: Libration of the Moon
```

So this is all fantastic, but was does it take to see a representation of the profile that gives some context to how incredibly lucky I was to observe this event? I tried a standard graze prediction from OCCULT. No matter what I did, I could not generate a profile for this event at a Watts Angle of 174.92, the middle event mentioned by Dr. Soma above. After some extended conversations with the author of WinOCCULT, I can now demonstrate how to display any profile.

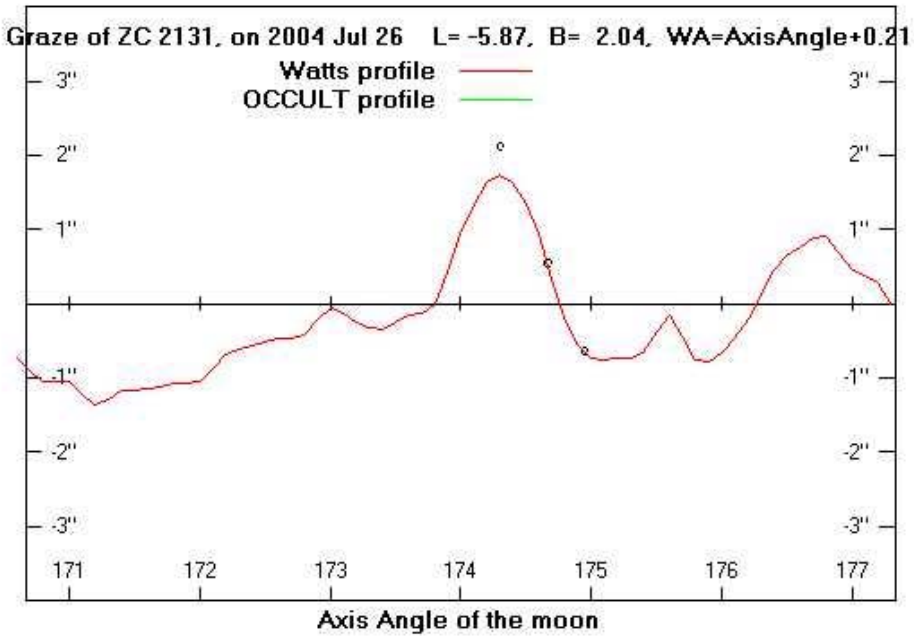
First, let's return to my results. I record all my observations in the Report Observations module. At the time, this was the 38th, 39th, and 40th event of my occultation career. The prior events were all total occultations. There are 43 observations in this file. Here are the ones that pertain to this graze.

```
38200407260533195  R   2131        1VSRS3 01 1   22221  6          AAA
   WWV Good on 5mc
39200407260533344  R   2131        2VSRS3 01 1   22221  6          AAA
   WWV Good on 5mc- Gradual R
40200407260533460  R   2131        1VSRS3 01 1   22221  6          AAA
   WWV Good on 5mc
```

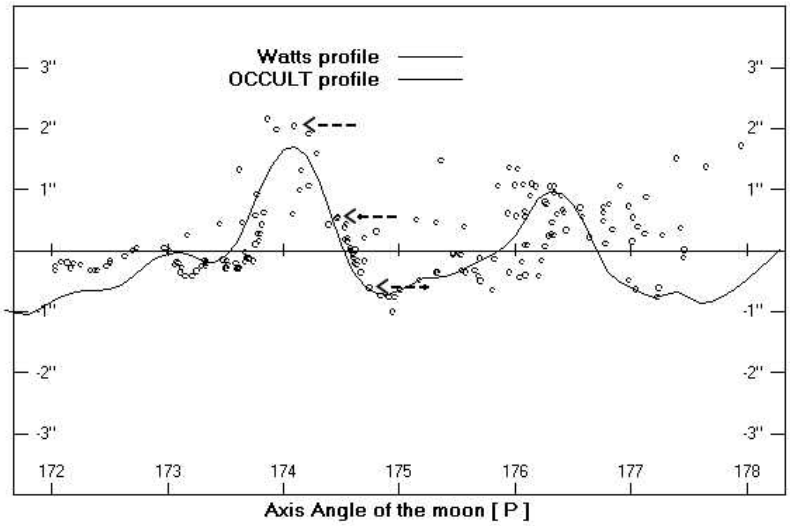
If you use OCCULT to record your observations, the above will be familiar to you. If you are new to OCCULT, when you enter your observations, you will end up with something similar. This is a very useful file!

If you "open the Reductions module, select the 'Reduce Lunar Occultations' option, and reduce the observations in this file. In doing this, select 'Normal', and 'apply corrections'. You will now have displayed a short text list of the reduced observations. On that form, under 'with displayed observations' select 'Plot against profile - Graze observations only'.

The results look like this for this surprise graze.



Then you select the menu option 'Profile information... Display P,D profile from Historical grazes and you get the following, which I have highlighted to point to the three events shown above.



This puts an excellent context to the events I saw. This is a very useful feature and one I will use frequently, but possibly in a manner not thought of by others. I will use this feature not only to visualize what I have seen, but to *visualize what I may see*!

I will generate a set of total predictions. I will take any predicted event and note the predicted time and create a temporary observation file that contains 3 events. First event will be 15s before predicted, second will be the predicted time, and the third will be 15s after predicted. Using the instructions and examples above, I will learn what features may effect the observation and I will have a graphic representation of the direction of the Moon's motion at the time of the event. Who knows? Maybe using this great feature of OCCULT, I may be able to become even more *INCREDIBLY LUCKY*! ■

New Double Star Discoveries

Henk Bulder

This is the follow-up of my article in *Occultation Newsletter*, Number 12, Volume 2.

I received some corrections from Jean Bourgeois on previous double star discoveries he made, resulting in OCC numbers 860, 912, 913, 963, 991, 1001, 1002, 1004 and 1005 being recorded as single stars.

All reports received until the end of 2004 are published in this November 2005 update. They resulted in the following new double stars (table 1 in XZ order).

OCC	X	SAO/ZC	MAG1	MAG2	SEP	PA	DATE	DISCOVERER	REMARKS
1028	599	128803	8.9	10.0	.35	64	20010129	J Bourgeois	
1029	972	109439	9.4	10.0	.05	65	20041219	J Bourgeois	
1030	2336	110046	7.1	7.1	.1	111	20041123	H Bulder	
1031	4303	93378	8.8	11.0	.04	122	20040226	J Bourgeois	
1032	4558	93480	9.4	9.4	.05	105	20030209	H Bulder	
1033	5197	93704	9.7	9.7	.06	241	20000919	J Bourgeois	
1034	5680	76591	7.1	7.1	.03	317	20040906	J Bourgeois	(Aa)
1035	5681		9.7	10.5	.02	293	20040906	J Bourgeois	
1036	5788	93963	7.7	7.7	.03	337	20000823	R Venable	(Aa)
1037	6439	76911	9.7	9.7	.02	282	20030918	J Bourgeois	
1038	6635	77016	8.9	9.5	.05	306	20020221	N Wuensche	
1039	6950	77176	10.3	10.3	.05	108	20010331	T Cook	
1040	6975		10.7	10.7	.05	60	20010331	T Cook	
1041	7167	77289	9.8	9.8	.03	296	20031016	J Bourgeois	
1042	7368	77407	9.2	9.2	.05	134	20040327	J Bourgeois	
1043	7399	77429	9.0	9.0	.04	88	20040327	J Bourgeois	
1044	7721	94918	9.8	9.8	.1	141	20000409	H Bulder	
1045	7801	77682	9.2	9.2	.03	236	20030919	J Bourgeois	
1046	7932	77757	8.7	8.7	.04	285	20000921	J Bourgeois	
1047	7959		10.4	10.4	.1	276	20030919	J Manek	
1048	7963	900	5.6	5.6	.06	221	20030919	J Manek	
1049	8004	77803	9.0	9.0	.02	188	20000921	J Bourgeois	
1050	8088	77849	9.9	9.9	.05	60	20040229	H Bulder	
1051	8406		10.2	10.2	.1	316	20020902	H Bulder	
1052	8435	78041	8.6	8.6	.04	237	20040908	J Bourgeois	
1053	8525	78081	8.6	8.6	.04	170	20030212	J Manek	
1054	9689	78680	10.2	10.2	.1	167	20030312	H Bulder	
1055	9795	78737	10.1	10.1	.1	77	20020322	H Bulder	
1056	10028		10.2	10.2	.15	77	20000410	H Bulder	
1057	10235	78959	10.4	10.4	.1	111	20010428	H Bulder	
1058	10280	78984	9.3	9.3	.15	39	20030213	H Bulder	
1059	10547	79114	9.3	9.3	.1	104	20030213	H Bulder	
1060	10694		11.0	11.0	.1	232	20020903	H Bulder	

OCC	X	SAO/ZC	MAG1	MAG2	SEP	PA	DATE	DISCOVERER	REMARKS
1061	10907	1110	9.0	9.0	.5	136	20010401	T Weiland	(BC)
1062	10984	79342	10.2	10.2	.2	111	20040329	H Bulder	
1063	11109	79400	10.1	10.1	.02	205	20031018	J Bourgeois	
1064	11153	79425	8.3	8.3	.08	81	20010109	H Bulder	
1065	11254		10.2	10.2	.04	36	20010305	J Bourgeois	
1066	11322	79509	10.1	10.1	.05	59	20010305	H Bulder	
1067	11549	79623	8.7	8.7	.04	223	20001020	J Bourgeois	
1068	11721	97268	7.7	7.7	.04	95	19990226	J Bourgeois	
1069	12138	79901	10.1	10.1	.2	68	20030507	H Bulder	
1070	12456	80039	9.2	9.2	.04	112	20010402	J Bourgeois	
1071	12518	80066	10.2	10.2	.05	62	20040330	H Bulder	
1072	12912	80242	9.2	9.2	.05	121	20010306	N Wuensche	
1073	13031		9.6	10.5	.35	237	20001117	J Bourgeois	
1074	13151	80340	8.8	8.8	.05	111	20010306	H Bulder	
1075	13532	80496	8 6	8.6	.1	115	20040427	H Bulder	
1076	13585	80516	10.1	10.1	.08	152	20030508	H Bulder	
1077	13737	98314	9.7	9.7	.25	98	20010430	T Weiland	
1078	16063		9.6*	10.5	.02	279	20001023	J Bourgeois	
1079	16082	99271	11.0	11.0	.17	222	20001023	J Bourgeois	(AC)
1080	16082	99271	11.0	11.0	.05	222	20001023	J Bourgeois	(AB)
1081	16313	99327	8.6	8.6	.12	111	20030607	B Loader	
1082	17835	119120	9.7	9.7	.15	140	20040528	H Bulder	
1083	18324	138724	7.9	7.9	.04	350	19951216	J Bourgeois	
1084	18938	139057	9.5	9.5	.1	360	20001219	H Bulder	
1085	19361	139325	8.2	8.2	.08	339	20020302	H Bulder	
1086	20522	158737	9.6	9.6			20030422	A Gilmore & P Kilmartin	(ISABELLA)
1087	21852	183955	9.3	9.3	.05	145	20030710	B Loader	
1088	25491	186977	8.4	8.4	.1	227	20010414	H Bulder	
1089	28734	189547	10.3	10.3	.05	78	20031128	B Loader	
1090	29668	164280	8.9	8.9	.05	67	20001104	H Bulder	
1091	31543	146683	7.9	7.9	.05	34	20041120	H Bulder	(Aa)
1092	32209	3536	5.2	5.2	.05	140	20021115	R Venable	
1093	60009		10.5*	10.5	.6	99	20020217	H Bulder	
1094	83303		11.3*	11.3	.08	135	20020322	R Venable	
1095	83548		10.6	10.6	.2	116	20020222	H Bulder	
1096	84053		10.5	10.5	.15	59	20020222	H Bulder	
1097	84223		10.8*	10.8	.08	110	20020222	H Bulder	
1098	87333		9.9*	9.9	.1	94	20030408	H Bulder	
1099	88138		10.5*	10.5	.1	98	20030408	H Bulder	
1100	91726		10.3	10.3	.2	92	20030312	H Bulder	
1101	93659		10.1	10.1	.04	281	20030920	J Manek	
1102	96716		10.8*	10.8	.1	145	20010428	H Bulder	
1103	101330		10.7*	10.7	.08	250	20031018	H Bulder	
1104	119775		11.2	11.2	.1	173	20010502	H Bulder	
		120035	9.4	9.4			20010315	R Vasundhara et al	(DIOTIMA)
(GSC 2495 0265)			12.3	12.3			20020131	R Venable	(BONONIA)

TABLE 1 New double star discoveries till 1-1-2005

The last two entries of table 1 concern stars that are not in XZ80Q catalog hence they will not be included in XZDoubles Discoveries and XZDoubles.

Confirmations of earlier discoveries are in the next table (table 2 in OCC order). This table contains only confirmations of discoveries made by occultations work or discoveries by unknown discoverers (0000 numbers).

OCC	X	SAO/ZC	DATE	CONFIRMER
0000	10903	79291	20000826	J Bourgeois
0000	13149	98020	20010306	H Bulder
0000	14173	1387	20000606	H Bulder
0000	20667	2117	20030611	A Gabel
0000	24144	185900	20030904	J Bourgeois
0000	31446	146620	20031201	B Loader
210	7268	77350	20040327	J Bourgeois
251	4911	552	19720707	R Sandy
251	4911	552	19720707	T Webber
401	23863	2547	20001004	R Nugent
588	3612	93059	20010715	C Bader
700	9294	78490	20031017	J Bourgeois
752	12196	79932	20030507	H Bulder
805	12078	79871	20000923	J Bourgeois
821	23623	2524	20030711	T Weiland
843	9833		20000410	H Bulder
1074	13151	80340	20010306	N Wuensche

TABLE 2 Confirmations of double star discoveries till 1-1-2005

About individual events.

On 6 March 2001 Henk Bulder discovers XZ13151 to be double in the Netherlands (OCC 1074). This was confirmed a few minutes later by Nicolas Wuensche in Germany.

For six known double stars new components are discovered.

Three new double stars are discovered during observations of occultations by asteroids bringing the total of such discoveries to five. Only one of them is in the XZ80Q catalog.

In case of the confirmation of duplicity of X20667 Alfons Gabel states that the components are clearly different in magnitude, the second component being about 2 magnitudes fainter.■

Special Note Regarding the Next *Occultation Newsletter*

John Graves, Editor *Occultation Newsletter*

Beginning with the next issue, Volume 12, Number 4, of *Occultation Newsletter*, members accessing the IOTA Member site and the ON online at http://www.occultations.org will need to receive a new login id and password. As of 15 April 2006, your current login id and password will no longer be valid.

To receive your new login id and password please e-mail Art Lucas at alucas0217@aol.com anytime beginning Sunday, 19 March. He will check your membership status and issue your new login and password via return e-mail. ■

An Introduction to Limovie and Digitizing Occultations

Arthur C. Lucas

The membership of IOTA is eternally inquisitive in its activities. In its history it began its activities with visual observations noted on a wrist watch, a procedure still employed effectively with some modification. As time progressed we added video recording, time insertion, WWV audio and the like to further quantitate and validate observations. A more recent step has been taken in making computer based, digital analysis of star brightness as recorded by video cameras. The most progressive form of this analysis is embodied in the program named LiMovie created by Kazuhisa Miyashita in Japan.

Digital analysis of images in astronomy is not new. It is deeply embedded in professional astronomical activities in the fundamental routines of IRAF, the SKY, and the CCD routines of the CCD camera providers. Further, video frames are commonly analyzed in the medical profession using rather high-level programming. What has been lacking was the program easily implemented by the amateur in modern digital camera and computer context. LiMovie is a bold step in that direction.

I wish, in this short tome, to provide a single source stating the references that will enable IOTA members to download programs and instructions for using them. Along with that I'm providing a description of the mechanics of working the program in my environment. Doing this, I recognize that there will be many other methods developed with equal or greater value. To get started I simply wish to describe one working method.

Resources

The LiMovie program is available free at:

http://www005.upp.so-net.ne.jp/k_miyash/occ02/limovie_en.html

At that same location you will find excellent instructions in English written by David Herald. To download those instructions click on:

LiMovie.doc

By a combination of these instructions and the fine instructions given by the author in association with Mitsuru Soma, the downloading will proceed easily.

In my implementation, I simply click on the screen icon and the program comes up ready for me to load a file.

The Equipment

I give as an example my tape from the IOTA2004 meeting. I observed a short occultation by the asteroid Nanon in a small, desert town in Southern California. I recorded the Watec 902 video using the Sharp, VL-Z3 Camcorder. This is a small handheld camera which records on MiniDV tape. The recording is digital, not analogue as we are accustomed to using with VHS. The camera is equipped with a full retinue of wires and plugs. One set will accept the analogue signal from the Watec 902 camera and audio from a microphone. Another set will allow playing the tape into a computer.

I'm using a Dell computer running at 1.8 Ghz and operating under the WINDOWS XP © Home Edition system. I download from web service using a 56K modem. It is equipped with a read/write CD module. Other than that it has a mind of its own.

But wait--my computer was not ready. Friends told me about Firewire (IEEE 1394). I trembled at the thought! It was really pretty simple. I just went to the local Wal-Mart and saw a blister pack on the rack that read "Firewire". It cost about $30 and came equipped with a really nice, metal braided, cable. The card is installed into the motherboard of my computer and, after installing the accompanying software, just works easily. The plugs and receptacles are each different than those we normally use, both on the computer end and on the camera end. There is no possibility of mixing up the plugs and jacks. They are each different. The camera downloads video from the "DV" jack and stills from the "USB" jack. Once connected the computer and camera seem to know what to do without my help. Just tell the computer where to put the file when it asks. I put it into the LiMovie directory on my hard drive.

Running the Program

So, now I have a movie in computer memory. Watch your memory here. It is used up very quickly. So I click on the LiMovie icon. Up comes this really great screen with Visual Basic buttons all over. The problem is that it spills over the edge of the screen and I am mystified about what to do. Finally I realize that, my eyesight being poor, I am set for large letters and words. So, hoping I have more screen, I go back to the starting screen and:

Right click on the open screen
Select Properties
Select Settings
Drag the scroll bar to higher screen resolution

Fortunately my screen displays 1024 x 768 pixels and LiMovie fits.

Now I can see the "AVI File Open" button. Don't worry about all the settings yet. Just try to load the movie. It will likely work as you have a better computer/camera than mine. If you get an error such as "Could not Open .AVI file" refer to the section on The Codec below.

Shortly the movie will be on screen. From here its a dream program of exploration. I won't go through all the buttons and adjustments. David Herald, Mitsura Soma, and Kazuhisa Miyashita have done that in the references which I quote above. I'll just lead you through the top-level points from here.

Find your star in the still image. Click on it. You will see a set of concentric rings surround the star. Don't wait to adjust yet. Just watch it work the first time. Click on

"Measurement START"..

The screen to the right will start filling with numbers as the movie plays. It looks horrible at this point but gets really good soon. Now click on:

"Measurement STOP'

The scrolling data will stop scrolling. Now click on

"Save to CSV File"

You now have a comma-delimited file that can be loaded into EXCEL for analysis. There is a bunch of data there. Concentrate on the first and 5th columns and plot a graph. This is a trace of the brightness of the star as a function of frame number. So here is the result for my Nanon observation of the year 2004. In this raw state the data are plotted as a function of frame number and the data are in pixel brightness with background subtracted.

The Codec sources

Now the author refers to something called a "DV Codec" called "Iris", an old name in image processing. He provides a reference and web site. He readily admitted it was written in Japanese and could be challenging to some of us. I was too anxious to get to work and did not download Iris, but found that, in the end, my movie did not load into LiMovie. I got it into computer memory but, when I tried to load it an error message said "Could not Load the .AVI file". Tony George pointed me to a freeware equivalent called Virtual Dub that seemed to do the job. I found the site by using the search engine on my computer.

http://www.virtualdub.org/download

You can follow the download directions via SourceForge to get the program and unzip it so that you have

virtualdub.exe

in your directory along with the LiMovie program. So, when LiMovie refuses to load your movie even though it is an *.AVI file, just load VIRTUALDUB, process the movie, give it a changed name, and LiMovie will be happier.

Since I began this work Kazuhisa Miyashita, the LiMovie author, has referred me to another source for the DV Codec. It is found at:

http://users.tpg.com.au/mtam/install_panvfwdv.htm

This site allows installation of the VFW* DV Codec (developed by Panasonic). It works in his computer environment as well as the DV Codec, Iris and the site is supported in English. I further quote him:

" *VFW: Video for Windows
This is a legacy interface to read the .AVI file in Windows.
LiMovie does not use Direct Show as a new interface now and cannot
load the *.AVI file itself. However, LiMovie can read the *.AVI file and
display the frame with the help of VFW Codec."

I downloaded this "pdvcodec" easily from the site. When I tried to run its setup I got a message saying "This program is not approved for this version of WINDOWS ©. Perhaps it would work with one of the other versions of XP but I have not tried that.

So there you have several, rather simple, sources for the DV Codec that will help you in time of need. One of them worked for me.

Where from Here

There are many more tomes that can and will be written about the use of LiMovie in analysis of our occultation data. There is, clearly, a statistical tome to be written about the adjustment of the measurement circle size, the background circle size and the averaging or smoothing of the data. There is sound here. We can correlate WWV shortwave signals with the video. There is time insertion on some of our videos. We can, and some have, done auto analysis of those inserted times. There is a bold step to see fainter and fainter occultations and smaller and smaller changes in magnitude.

All this considered, we have now launched this amateur association into a new era of quantitating the observations we make. We will be able to further validate size and multiplicity effects, support our precision and accuracy, and, generally, give greater credence to this work that we do.■

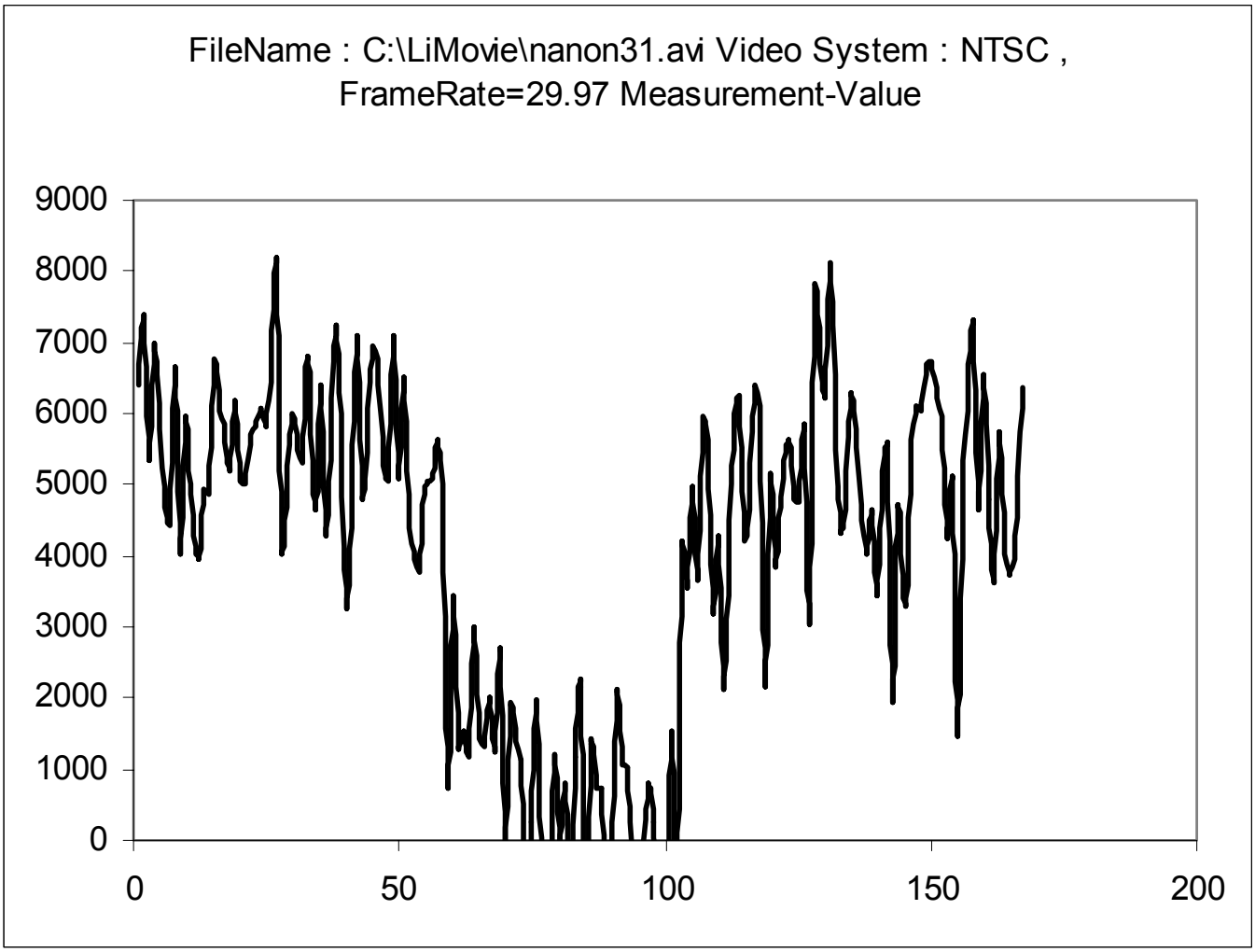


Figure 1. LiMovie analysis of the Nanon occultation of SAO161827 on July 1, 2004

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.

The Offices and Officers of IOTA

IOTA European Section (IOTA·ES)

Observers from Europe and the British Isles should join IOTA/ES, sending a Eurocheck for EURO 25,00 (bank-transfer-costs included) 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. Sending EURO 20 EU-members must use the IBAN- and BIC-code as additional bank-address (IBAN: DE97 2501 0030 0555 8293 03, BIC: PBNKDEFF). 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 one 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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IOTA on the World Wide Web

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

IOTA Member Site
http://www.occultations.org

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 Lunar Occultations, Eclipses, and Asteroidal and Planetary Occultations Site
http://www.lunar-occultations.com

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