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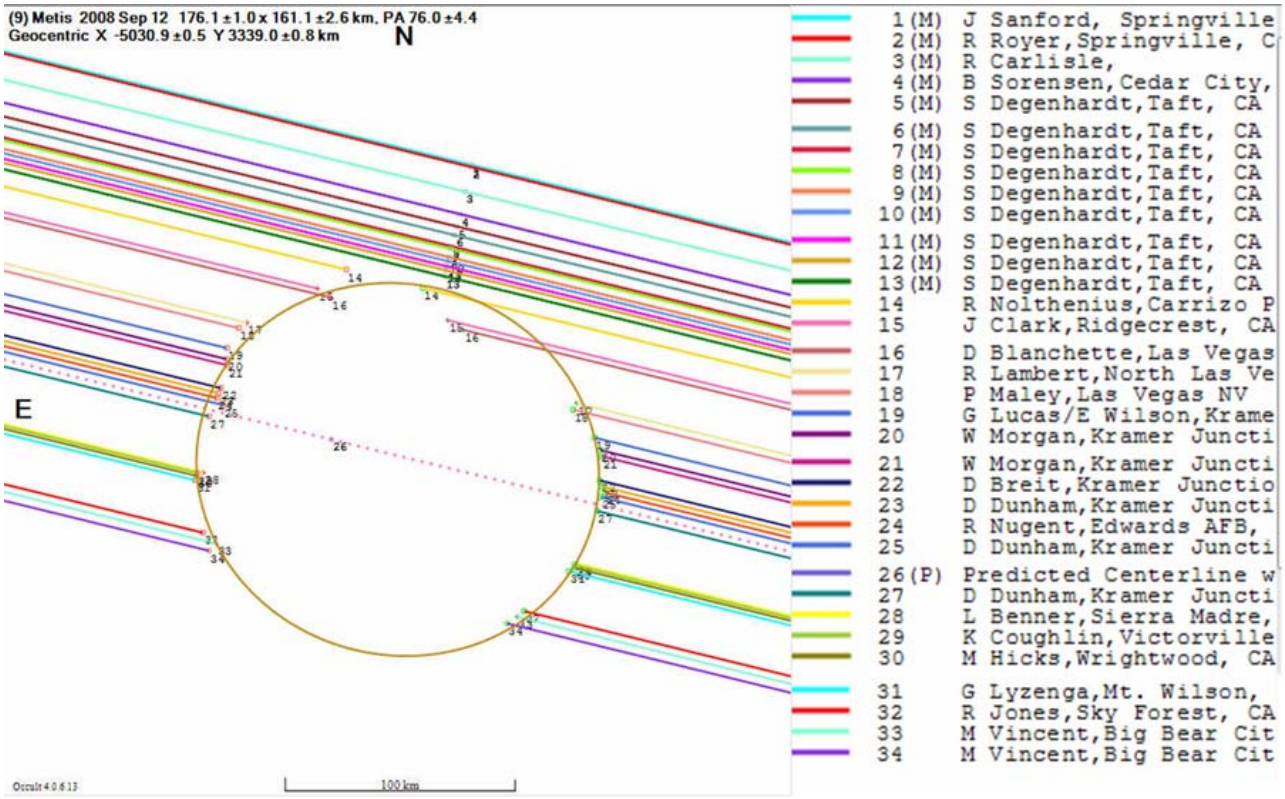

Mighty Mini Observing System – First Positive Result Obtained by David Dunham, September 12, 2008

In this Issue

ON THE COVER:

David Dunham captures the first positive event for Scott Degenhardt's new compact imaging system, the Might Mini, featured in Occultation Newsletter, Volume 13, Number 4, page 5.

Publication Date for this issue: Early July 2009

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

Please also note that with this issue, the cover date has advanced to January 2009. The last issue, Volume 13, Number 4, was dated October 2006, therefore there are no issues with a cover date in 2007 or 2008. This change has been made to make it possible for the cover date to eventually accurately reflect the date of actual publication. This will be accomplished by the last issue of 2009 in October. ***Subscription and membership accounting only takes into account the issue's volume number, so subscriptions and memberships are not affected in any way by this change.***

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Send interesting stories of lunar grazing occultations to:
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The International Lunar Occultation Centre (ILOC) has ceased operations. For detailed information on submitting Total Occultation reports and copies of Lunar Grazing Occultation reports please visit:
http://lunar-occultations.com/iota/lunarreport.htm

To report Asteroidal Appulse and Asteroidal Occultations, please visit:
http://www.asteroidoccultation.com/observations/

Click on the link to your region at the top of the page. If your area is not listed, please send a report to:
Dave Herald, **DRHerald@bigpond.net.au**

Send observations of occultations that indicate stellar duplicity to:

Henk Bulder
Noorderstraat 10E
NL-9524 PD Buinerveen
The Netherlands
Email: **hjjbulder@scarlet.nl**

Brian Loader, **palbri@clear.net.nz**, is interested in determining the actual separation and PA of close doubles from occultations accurately timed from two or more locations separated such that the occultation event occurs at PA's differing by approximately 20 degrees or more, so we recommend that you provide reports of well-observed step events to him, as well as to Henk Bulder.

Membership and Subscription Information

All payments made to IOTA must be in United States funds and drawn on a US bank, or by credit card charge to VISA or MasterCard. If you use VISA or MasterCard, include your account number, expiration date, and signature. (Do not send credit card information through e-mail. It is neither secure nor safe to do so.) Make all payments to **IOTA** and send them to the Secretary & Treasurer at the address on the left. Memberships and subscriptions may be made for one or two years, only.

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IOTA Publications

Although the following are included in membership, nonmembers will be charged for:

Local Circumstances for Appulses of Solar System Objects with Stars predictions US$1.00
Graze Limit and Profile predictions US$1.50 per graze.
Papers explaining the use of the above predictions US$2.50

Asteroidal Occultation Supplements will be available for US$2.50 from the following regional coordinators:
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Europe--Roland Boninsegna; Rue de Mariembourg, 33; B-6381 DOURBES; Belgium or IOTA/ES (see inside 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)

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The Metis Meteor

Scott Degenhardt[1] and Peter Gural[2]

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Introduction

The following report is about a serendipitous recording of a meteor on multiple video cameras that occurred during the asteroid Metis occultation timing experiment. The principle interest of one of the authors (SD) is in designing inexpensive narrow field of view camera systems and deploying them for asteroid occultations of stars to support the measurement of asteroid size and shape. The chance meteor appearance during a recent collection campaign, however, suggests an alternative way of doing meteor triangulation with short baseline observations. Thus, this paper describes the event, the observing method and equipment, and data reduction results that could prove to be inspirational to others in the meteor community.

Event Background

On the morning of September 12, 2008 the asteroid (9) Metis was predicted to pass in front of the 6th magnitude star HIP 14764 and would be visible from a 271km wide path on the ground across the United States. The International Occultation Timing Association (IOTA) scheduled its annual meeting to occur on the same date in Apple Valley, California to get as many people together in one general location and thus provide as many chords of occultation measurements as possible across the asteroidal body. The California location was chosen for its stable and generally clear weather during that time of year. For the Metis event, the plan was to deploy for the first time, fifteen of "Mighty Mini" observing systems.

These fifteen unattended systems were to be spaced approximately 3km from each other along a line roughly perpendicular to the ground path of the shadow. They were all pre-pointed to the same exact altitude and azimuth in the sky so that at precisely 06:21:59 UT, the star HIP 14764 would drift through the center of the field of view of each camera, and the miniDV recorders would record the video and hopefully capture the shadow of Metis whizzing past at 4km/s. This would appear as the star winking out for a short period of time that would be dependent on Metis' physical size and shape.

Initial Occultation Results

The actual occultation occurred with very little time between the end of twilight and the passing of Metis's shadow. Due to the low elevation (+16.8 degrees altitude), the severe haze up to about 20 degrees of elevation from the Exxon/Mobile oil field gas plumes burning in the distance, and one encounter with Security, only eleven stations were successfully pre-pointed with their recorders running. Each camera's recording was time stamped in UT with a GPS KIWI OSD system (accuracy +/-1ms).

All eleven of the recordings showed a miss on the asteroid Metis, but there did appear about a minute before the predicted occultation time, a meteor about half as bright as the 6th magnitude target star, which had streaked through the field of view of Station #08. Out of curiosity the other station's recordings were reviewed and the same meteor streak was discovered for stations #09, #10, #11, and #12. Thus five of the eleven stations had recorded the same meteor, and all of them displayed an easily visible parallax of the meteor's position relative to the star HIP 14764. Given the greatest camera separation of 12.5 km and timing accuracies to 1ms +/-8ms (the duration of one NTSC video field) an initial attempt was made to reduce these video observations and gleam as much information about the meteor as possible.

What initially came to mind was the possibility of determining the altitude of the meteor and the light curve from the ablation. With the GPS position known for each observation site, and the ability to determine the exact RA and Dec of the meteor at a given UT time, it was feasible that one could determine a rough orbit, or at a minimum, the radiant association with any active showers. In addition, the telescopic nature of the recording is rare in the field of meteor research and could prove interesting with the 18 arc second resolution available in the "Mini" camera systems.

Meteor Reduction Results

It took several weeks by the principle author (SD) of manipulating the raw data before a satisfactory reduction method was found, having had no past experience in the meteoric area of data analysis. Once an approach was finalized however, the actual processing per station was completed in less than an hour.

The first result concerns the light curve of the meteor. The correlation between intensity versus time for all five different views/recordings was simply amazing! This should not be so surprising on reflection, because if all the cameras are synchronized correctly and properly calibrated, then the results should be consistent since there is very little change in look aspect or recording position between the stations. It just wasn't expected that all five intensity profiles would lay right over each other as seen in Figure 1.

Converting the meteor track to RA and Dec was also more difficult than it should have been, but was accomplished for four of the five stations. Station #09 refused to scale properly so a bit of an average scaling was used to get the track to fall correctly on the plot in Figure 2. This did not significantly impact the end result, as Station #08 and Station #12 are the two most spatially separated stations that one would use to triangulate for altitude.

The following is a list of the initial measured parameters associated with the observation sites and meteor:

- Approximate peak meteor red magnitude: +6.87
- Time of peak intensity: 20080912 06:20:44.455 UT +/-8ms
- Station #08
  RA and Dec of peak intensity: 3h11m13.59s +11 19' 28.25"
  Longitude: -119 37.4429
  Latitude: +35 18.0885
  Elevation: +331.3m MSL
- Station #12
  RA and Dec of peak intensity: 3h09m54.16s +11 20' 54.84"
  Longitude: -119 40.2197
  Latitude: +35 24.3913
  Elevation: +158.7m MSL
- Duration: 50 NTSC fields so nearly 1 second long
- Angular line-of-sight separation between Station #08 peak and Station #12 peak: 19.541'
- Straight line distance between Station #08 and Station #12: 12.5km

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Visit IOTA on the WWW at:

http://www.lunar-occultations.com/iota/iotandx.htm

and IOTA · ES at:

http://www.iota-es.de

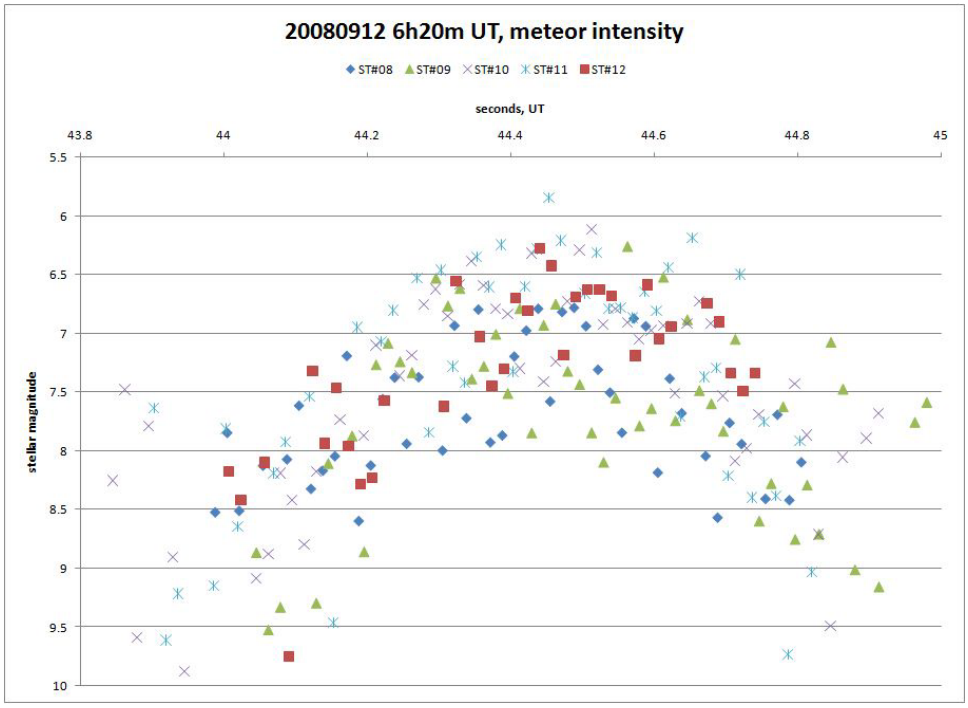


Figure 1. Calibrated light curves of the Metis meteor from the five stations with a video track.

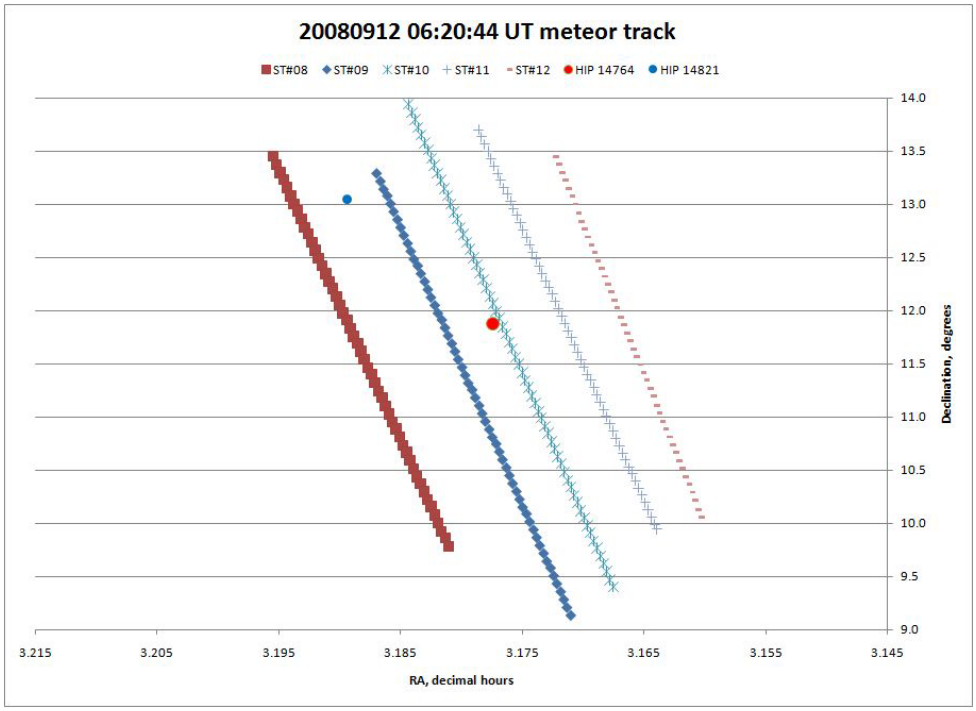


Figure 2. Meteor positions as observed from the five stations in stellar coordinates for each video frame.

A back of the envelope calculation placed the line-of-sight range to the observed track at 2200km or over 800km above the Earth's surface (locally under the object), making this initially appear more likely a satellite than a meteor! At this point, contact was made with US amateurs and professionals in the meteor community and the co-author (PG) offered to reduce the data further to get a more accurate estimate of the altitude and potential radiant association. Calibrating each camera's field of view from available star positions and using the intersecting planes solution given the meteor track points from stations numbered 8 and 12, yielded the following result:

- Apparent angular velocity = 2.33 deg/sec
- Range of the visible track went from 321 to 345 km - moving away from the observing sites
- Height of the visible track within the narrow FOV went from 92 km down to 90.5 km (Figure 3)
- Entry velocity = 32 km/sec
- Radiant association = Sporadic
- The focal plane trailing loss was 2.2 magnitudes
- The distance fading loss relative to 100 km was 2.6 magnitudes

These results were consistent when pairing other stations together. Clearly, this met the criteria of a meteor. The back propagation and entry velocity classify this particular meteoroid as a sporadic.

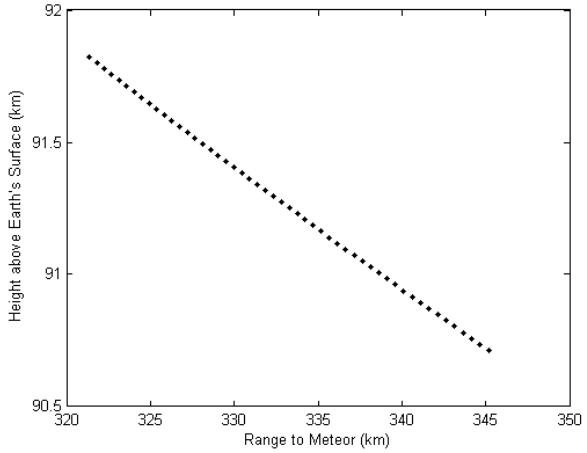


Figure 3. Meteor height as a function of the line-of-sight range.

Observing Equipment

As mentioned earlier, the Metis asteroidal occultation was the "first light" deployment for the Mighty Mini observing platform. This system consists of one optical objective from a Tasco Essentials 10x50 binocular mounted to two pieces of PVC plumbing hardware. The latter provides the optimal spacing given the objective's focal length to allow it to focus on a standard high sensitivity security camera (Supercircuits PC164CEX-2). The camera is placed at the back end of the optical train that includes an Owl focal reducer screwed onto a 12.7mm spacing video camera adapter to increase the effective field of view. The system provides a 2.4x3.2 degree FOV with a + 10.2 limiting stellar magnitude under dark sky conditions at 30 fps video frame rates. The total length of the Mighty Mini with the camera installed is only 20 cm (8 inches as shown in Figure 4) and thus very portable and easy to setup at multiple remote sites. A cautionary note is that the system is optimized for occultation work and despite the extreme magnitude sensitivity for stationary objects like stars, there can be up to a 4 magnitude loss for meteors. This is due to the extensive smearing of the meteor across the high-resolution pixels during a single video field integration period (1/60 second).

Figure 4. Mighty Mini video camera and objective lens system.

A complete observing platform consists of a Mighty Mini mounted on a MX350 tripod, a Canon ZR (Models ZR10-ZR300) miniDV camcorder acting as a VCR only, and a 9 cell battery pack of Duracell AA NiMH 2650mAh batteries. A KIWI OSD grabs the high accuracy clock signal from the GPS constellation of satellites for the time stamping/insertion into the video recording. The complete system can also be operated at prime focus to yield a smaller FOV that provides higher magnification for lunar occultations of stars. The complete telescopic portion of the system costs under $100 to build (excluding the cost of the PC164CEX-2, Owl focal reducer and KIWI OSD) and weighs less than 10 lbs.

Meteor Analysis Conclusions

- For an occultation observer, it was amazing that well over 200 meteor magnitude data points fit so nicely together in both time and intensity. This provided a reverse verification that the methods of time stamp placement and determination, as well as the software reduction tools in use for occultation work, are very efficient and accurate and transferable to meteor reduction and analysis.

- The wider field of view of the Mighty Mini relative to other occultation camera systems (reducing the apparent angular velocity of meteors over each pixel) coupled with the sensitivity of the PC164CEX-2 and the low price per system, would seem to make a very handy meteor observing tool that could be arranged to do triangulation analysis. Due to the high angular resolution of the narrow field of view cameras, a closer spacing between observing sites should be tolerable. The loss in spatial coverage can be partially compensated for by observing at low altitudes above the horizon as in the Metis collection geometry. This will cover a larger volume of the air cap at meteor ablation altitudes.

- In future asteroidal occultation deployments of multiple imagers, the video records will be scanned for other meteoric events. In addition, a test is planned during a future meteor shower to lay out several stations at varying distances to help determine the optimal separation distance between camera sites given the high angular resolution of the Mighty Minis. A large separation baseline of 40 km will provide the high accuracy results, while the closer stations can be tested to find the minimal distance acceptable for triangulation processing. If successful, this could lead to a short baseline and narrow FOV meteor orbit estimation concept of operations.

September 12, 2008 (9) Metis Occultation Results

For those who are interested to know the results of the asteroid shape measurement of that evening, the results were EXCELLENT! Over 30 nearly evenly spaced stations were set up by 20 individuals, and while the 11 deployed by SD as described in this paper were clean misses, David Dunham set up 3 stations using the Mighty Mini, and all 3 got positive measurements! This makes his three observations the first positive event for the Mighty Mini since its inception. The cover graphic shows the measurement chords obtained revealing the size and shape of Metis. ■

Tom Van Flandern, 1940 - 2009

David W. Dunham

This was written on Jan. 12, 2009, but I've added some more in early June. Alan Fiala sent the message below from Brenda Corbin, former librarian at the U. S. Naval Observatory, informing me of the sad passing of Tom Van Flandern. He died of complications from colon cancer, which ironically also killed Homer DaBoll in 1990.

From the mid-1960's into the 1970's, Tom and I worked closely together to establish the first comprehensive computer software system for predicting and analyzing lunar occultations, especially the then new field of grazing occultations. In those days, the work was more difficult than now, done with punched cards and mainframe computers, mainly at the U.S. Naval Observatory (USNO) where Tom worked at the time. Tom preferred to do the analysis while letting me organize the observer network that became IOTA, but he and his work were vital to IOTA's beginnings. He greatly expanded the small "Evans" program (named for Carroll Evans in California) to generate comprehensive modern-style total lunar occultation predictions, which inspired the similar predictions now produced by WinOccult and Lunar Occultation Workbench.

Tom also became interested in asteroidal occultations, especially after observing the occultation of a 9th-mag.star by (18) Melpomene photoelectrically at USNO on 1978 Dec. 11 [that was also my first asteroidal occultation, 30 years to the day before Scotty Degenhardt's remarkable 14-station success with (135) Hertha last month]. I used Tom's software to analyze asteroidal occultation observations until a few years ago, when that function is now performed with WinOccult. Tom listened when, in 1977 and 1978, Paul Maley and others described secondary occultations indicating that asteroids probably had satellites, many years before those objects were accepted as real by most astronomers, and published some pioneering papers discussing the dynamics of binary asteroids.

On 1970 March 7th, Tom observed a total solar eclipse from near the northern limit of totality, while I observed the same eclipse near the southern limit; this was the genesis of modern efforts to observe eclipses this way for solar radius measurements. Tom advocated making these observations, and has

organized the only sizeable public successful "Eclipse Edge" expeditions, starting in 1991 July in Mexico (I was with him there) and continuing through the 2002 December eclipse in Australia.

Besides our close astronomical collaboration, I am also indebted to Tom personally, he was a great friend who helped secure my employment with Computer Sciences Corporation in 1976 in spite of poor recommendations from my previous two "old school" bosses who did not appreciate my work. That led to my collaboration with Dr. Robert Farquhar ever since that year, on the design of orbits for numerous space missions, including the ISEE-3/ International Cometary Explorer (first space mission to a comet in Sept. 1985, along with many other "firsts") and the NEAR Shoemaker mission to (433) Eros in 2000 - 2001. Tom also introduced me to his employee, Joan Bixby, whom I married in 1970.

In 1991, Tom founded Meta Research, from which he espoused some very controversial ideas, such as the Exploding Planet Hypothesis and artificial structures on Mars. Unfortunately, some of this work, not subjected to scientific methods as well as most of his earlier important work, earned him notoriety and damaged his reputation among other astronomers. But I feel that overall his intentions were good, to try to support research that was not supported by other organizations. My memories of Tom are mainly from the earlier times, when he did so much to help establish the emerging work of the International Occultation Timing Association.

An asteroid, (52266) 1986 AD, was named "Van Flandern" on February 9; the citation published in the Minor Planet Circulars read: Discovered 1986 January 10 by Carolyn S. Shoemaker and Eugene M. Shoemaker at Palomar.

Tom Van Flandern (1940-2009) predicted and comprehensively analyzed lunar occultations at the U.S. Naval Observatory in the 1970s. In 1979 he published pioneering papers on the dynamics of binary minor planets. He helped improve GPS accuracies and established Meta Research to support alternative cosmological ideas.

Carolyn also wrote: This asteroid is a Phocaea-type asteroid with an H magnitude of 13.5, which makes it about 5 km in size - a nice piece of real estate and no taxes.

Much more about Tom is on the Meta Research Web site at http://www.metaresearch.org/. ■

Successful Observation -Triton occulted 2UCAC 27013747 on May 21st 2008

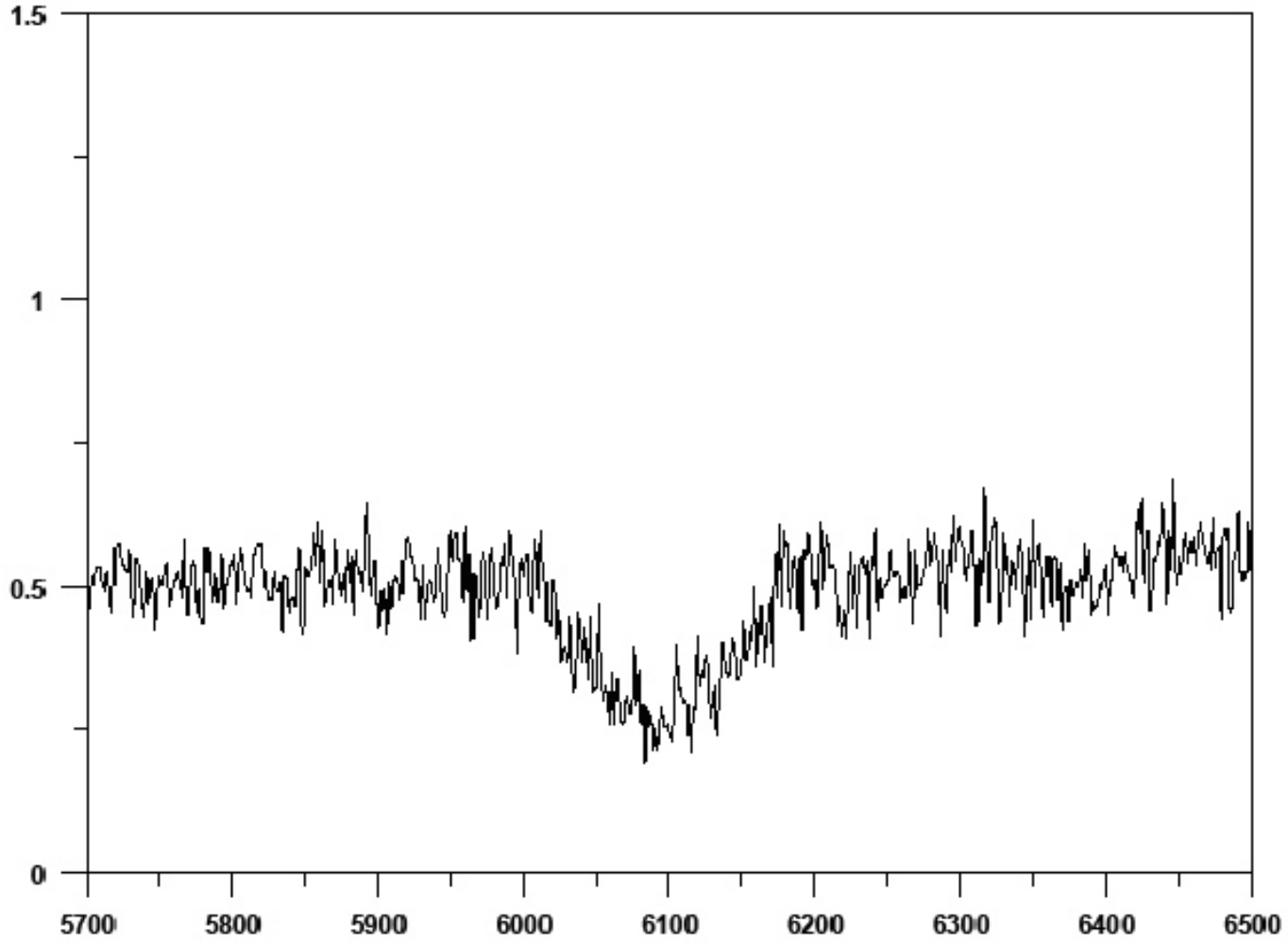
Hans-J. Bode

It took more than 7 years after 2001, that Triton occulted another relatively bright star (13^m1). The zone of visibility extended from southern Africa (Namibia / Angola) to the Indian Ocean (LaReunion). The occultation had been predicted for 21 May 2008 around 1h46 UT so data recording had been made between 1h30 – 2h00 UT.

Amazingly, just about 3 hours before a grazing occultation of Antares by the 99% illuminated moon had been calculated to be visible north of Windhoek: Impossible to observe both events!

A team of French astronomers and German IOTA-ES members decided to observe the Triton occultation in Namibia and La Reunion-Island because the centerline had been predicted to cross that African country and that pretty island as well. Additionally several observatories in South Africa were included in the campaign. Unfortunately, clouds and rain prevented measurements to be made in South Africa and southern Namibia where a few observers tried to escape by driving from S.A. to Namibia – but still not out of the clouds. Windhoek too was clouded out so only the observatories at Hakos-Farm and Tivoli-Farm in Namibia and the observers at LaReunion were successful.

3 observatories in Namibia (IAS is situated at Hakos-Farm)



Triton-Graze: The zero-line is the surface of Triton

As can be seen from the lightcurve, the observers did not succeed to be on the centerline to record the central flash but instead they recorded a near grazing occultation by Triton. The star never disappeared fully, as it is typical for a near graze with an object having a considerable atmosphere.

It will take some time to reduce all the data and to publish it later on in an astronomical journal. ■

IOTA North America Asteroidal Results Published

Brad Timerson

Watching a star blink out as an unseen asteroid occults its light can be an exciting and satisfying activity. Having your observation included with those of others to yield a high resolution profile of the asteroid is scientifically valuable. Now imagine combining these asteroidal occultation results with the independent work of others to verify the accuracy of these profiles. That's exactly what was done in the first-ever paper from IOTA North America published in the latest Minor Planet Bulletin.

Three events from 2008 produced high-resolution profiles; Fortuna on 18 June, Metis on 12 September, and Hertha on 11 December. IOTA results for these three events can be found on the 2008 Asteroidal Occultation Results webpage at: http://www.asteroidoccultation.com/observations/Results/index2008.html

It came to our attention that others were working on modeling asteroid shapes. The two sources used for this article were Asteroidal Light Curves from the website of the Minor Planet Observer (Palmer Divide Observatory) and the Database of Asteroid Models from Inversion Techniques, provided by Brian Warner and Josef Durech, respectively.

This paper, "A Trio of Well-Observed Asteroid Occultations in 2008", is now available in The Minor Planet Bulletin, Volume 36, Number 3, dated July-September 2009, pp. 98-100. That edition is available as a free download (PDF, 6.4 Mb) from: http://www.minorplanetobserver.com/mpb/default.htm

Lead author Brad Timerson was helped by many in the production of this paper. Co-authors Scotty Degenhardt, David Dunham, Josef Durech, Dave Herald, and Paul Maley are thanked for their many contributions. Thanks also to Brian Warner and the draft paper referee for their feedback and patience in the production of this paper.

We already have ideas for future papers, some of which will include findings from radar studies of asteroids. This is where all asteroidal occultation observers fit in – we need observations that include a large number of chords across the profile of an asteroid, thus providing the highest resolution. The next article will likely review one, or possibly two, of these well-observed events. ■

Report from ESOP XXVII

Martina Haupt

Once per year, as their time permits all amateur as well as professional European astronomers interested in occultation work gather on the last weekend in August to discuss recent results – each time in a different European country.

In 2008, the "European Symposium on Occultation Projects" (ESOP) took place at Drebach, Germany. Drebach is situated in the Ore Mountains near Chemnitz. Operator of this conference focusing almost entirely on occultation events is the European section of the International Occultation Timing Association (IOTA/ES).

The majority of the participants arrived already on Friday. After registering for the conference and checking in at the hotel, dinner was served. Later there was a reception in the observatory of Drebach.

The first presentation on Saturday was given by Wolfgang Beisker. He commemorated Bohumil Malecek, who died in May 2008 and had been, among other things, the organizer of three ESOP's in the Czech Republic.

After a presentation of the planetarium at Drebach, which served as the conference room, four lectures followed concerning the large field of occultations by asteroids. Three of them presented recent successful observations; the fourth one was a historical review about "Real observations of occultations or just close optically unresolved encounters".

Following this Eike Guenther, of the state observatory of Thueringen, reported about CoRoT. This satellite is serving in the search of exoplanets. With its technique, variations of stellar magnitudes caused by transits of their planets are measured. Then two lectures followed about Pluto and Triton, the latter having been successfully measured after more than 10 years. The preliminary results showed that there hadn't been an occultation of the star by the moon and the light drop fully resulted from atmospheric absorption of Triton. Following this, Michael Theusner spoke about the observation of exoplanets with amateur means.

The progress of the conference followed in its customary way, focusing on lunar occultations and solar eclipses, the latter being actually a special case of a lunar occultation with the observation and measurement of "Bailey's Beads" as the main goal. This was the major topic of the lecture held by Costantino Sigismondi of the Sapienza University in Rome. Five of the conference participants had been to Russia close to Novosibirsk to observe Bailey's Beads during the solar eclipse of August 1, 2008, so there was a lot to report about this.

The opening lectures on Sunday centered on technical equipment. Among other things VEXXA was presented, an electronic device to find out the exact length of an exposure and the exact starting time of the exposure of a frame during video recording. In addition, the software needed for this was not forgotten: Ralf Langhans of the Lohrmann Observatory in Dresden held a lecture about "Automatic and universal CCD-Astronomy of asteroids". The software he presented was developed to evaluate large amounts of data. Another interesting software, "OccultWatcher", was presented by Oliver Kloes. It is an online tool showing predictions of asteroidal occultations for a location chosen by the user.

A podium discussion followed next: Does the sun have a variable diameter? Of course, no final answer could be given due to the yet insufficiently available data. Costantino Sigismondi therefore suggested to publish all formerly made observations of Bailey's Beads in the journal Solar Physics. This suggestion was then initiated and accepted by the publisher a few weeks ago.

Then there was an international discussion via the Internet with David Dunham & Dave Herald (of the USA & Australia respectively) and the audience about how to handle the results of lunar occultation observations after ILOC shut down its support. For the very moment, no one volunteered to collect and check the data of observations made in Europe. The board of IOTA/ES therefore announced to set up a mail account where observers can send their results. This was recently established under lunoccult@iota-es.de.

The last contribution was an outlook on ESOP 2009. Pawel Maksym delivered his invitation to Niepolomice (close to Krakow) in Poland.

After 2 days of interesting lectures and discussions, an astronomically orientated program on Monday and Tuesday offered, among other things, a visit to the Lohrmann Observatory. ■

ESOP XXVIII Information
(Compiled from the ESOP XXVIII web page)

In the International Year of Astronomy 2009, the International Occultations Timing Association/European Section (IOTA-ES), the Department of Position and Occultations of Polish Association of Amateur Astronomers, the Youth Astronomical Observatory in Niepolomice, and the Royal Castle Foundation in Niepolomice are proud to invite you to participate in the XXVIII European Symposium on Occultation Projects. In this special year, the symposium is held in one of the most beautiful cities of Poland, in Niepolomice - only 25 km from Kraków. You will love this small town when you visit it during ESOP XVIII between August 28th and September 2nd. Let's talk about occultation astronomy together - be our guest!

Registration: Registration is 90 €. The fee for a partner will be approximately 60 €, depending on the program. The registration form can be found at http://91.199.22.87/~esop/registration/form/. The registration fee includes:

- Open cocktail
- Conference materials and souvenir
- Refreshments and hot drinks during breaks
- Lunches during conference
- Royal Dinner
- Astronomical Barbeque in Observatory
- Walk around Niepolomice and a visit to the Niepolomice Royal Residence exhibition of fine arts
- Conference room with staff
- Basic medical care

Program: The program is the most important part of every symposium. We hope that the program we have prepared will bring you a lot of valuable information. We also hope that your leisure time program will be filled with good discussions and impressions of the Polish culture and tradition. We are waiting for your contribution to the lecture sessions. For detailed information concerning paper submission, please see http://91.199.22.87/~esop/call-for-papers/.

During the conference sessions we are planning to organize a program for accompanying visitors, but please be patient - detailed information is in progress. The latest information can always be found on our web page at:

http://www.esop2009.pl/

Current Planned Program

Friday - 28 August
16:00 - Opening of ESOP registration office in the observatory
18:00 - Welcome cocktail in the Niepolomice Royal Residence
22:00 - Sky show in the observatory

Saturday - 29 August
8:00 - Opening of ESOP registration office in the observatory
9:00 - Opening Ceremony in the Conference Room of the Royal Residence
9:30 - Lecture Session
10:30 - Break
10:45 - Lecture Session
12:15 - Break
12:30 - Group photo in the Royal Residence
12:45 - Lecture Session
14:00 - Light Lunch
15:15 - Lecture Session
16:45 - Break
17:00 - Lecture Session
19:00 - Royal Dinner
22:00 - Sky show in the observatory

Sunday - 30 August
9:30 - Lecture Session
10:30 - Break
10:45 - Lecture Session
12:15 - Break
12:30 - Lecture Session
14:00 - Light Lunch
15:15 - Lecture Session
16:45 - Break
17:00 - Lecture Session
18:00 - Walk around Niepolomice and the Royal Residence
20:00 - Astronomical Barbeque in the observatory with a Sky show and a planetarium show

Monday - 31 August
Whole day visit of the Royal City of Kraków
- Additional program details to be announced
- Predicted price - 30 €

Tuesday - 1 September
Whole day visit of Zakopane - the heart of the Polish folklore
- Additional program details to be announced
- Predicted price - 40 €

Wednesday - 2 September
Visit of the newly erected observatory on top of Mt. Lubomir
Visit of two medieval citadels in the Pieniny Mountains and cruise on Lake Czorsztynskie
Visit of a traditional cottage with a show of making traditional farm-smoked cheese (called Oscypek)
- Additional program details to be announced
- Predicted price - 30 €

Accommodations

For comfortable accommodations, we recommend two hotels in Niepolomice. Also low cost observatory bungalows are also prepared and available for conference participants. When making reservations please inform the hotels that you are an ESOP participant to received the special ESOP pricing!

Hotel Royal Castle

Price for a double room is 300 PLN (Polish Zloty) ~ 65 euro incl. breakfast. This is an extraordinary accommodation for all – spend some time in former Royal Rooms! Free WiFi is available in all rooms. For reservations, please contact the hotel via e-mail at: hotel@zamekkrolewski.com.pl.

Hotel Novum

Price for a double room is 170 PLN (Polish Zloty) ~ 38 € including breakfast. This new hotel is a modern house. Free WiFi is available in all rooms. For reservations, please contact the hotel via e-mail at: recepcja@hotelnovum.pl.

Observatory Bungalows

Tourist class bungalows in the observatory are available. Bungalows are equipped with a bathroom and kitchen annex, An Internet connection is available in the observatory. Price per person, per night, is 30 PLN (Polish Zloty) ~ 7 €. For reservations, please contact us directly via e-mail at: esop2009@esop2009.pl

Tourist and travel information links

- http://www.poland.pl/ - Portal about Poland
- http://www.wrotamalopolski.pl/ - Portal about the Małopolska Region (in which Niepołomice is situated)
- http://www.krakow.pl/ - Kraków www
- http://www.promocja.zakopane.pl/ - Zakopane www
- http://www.krakowairport.pl/ - airport in Kraków
- http://www.katowice-airport.com/ - airport in Katowice
- http://www.lotnisko-chopina.pl/?lang=en - airport in Warszawa
- http://www.pks.krakow.pl/polacz_en.php - Bus service in Kraków area **Hotel information links**

- http://www.hotelnovum.pl/
- http://www.zamekkrolewski.com.pl/hotel/
- http://www.moa.edu.pl/noclegiwdomkach/noclegi.htm - photos of observatory tourist bungalows ■

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 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). PayPal account: hjb@occultations.info. 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.