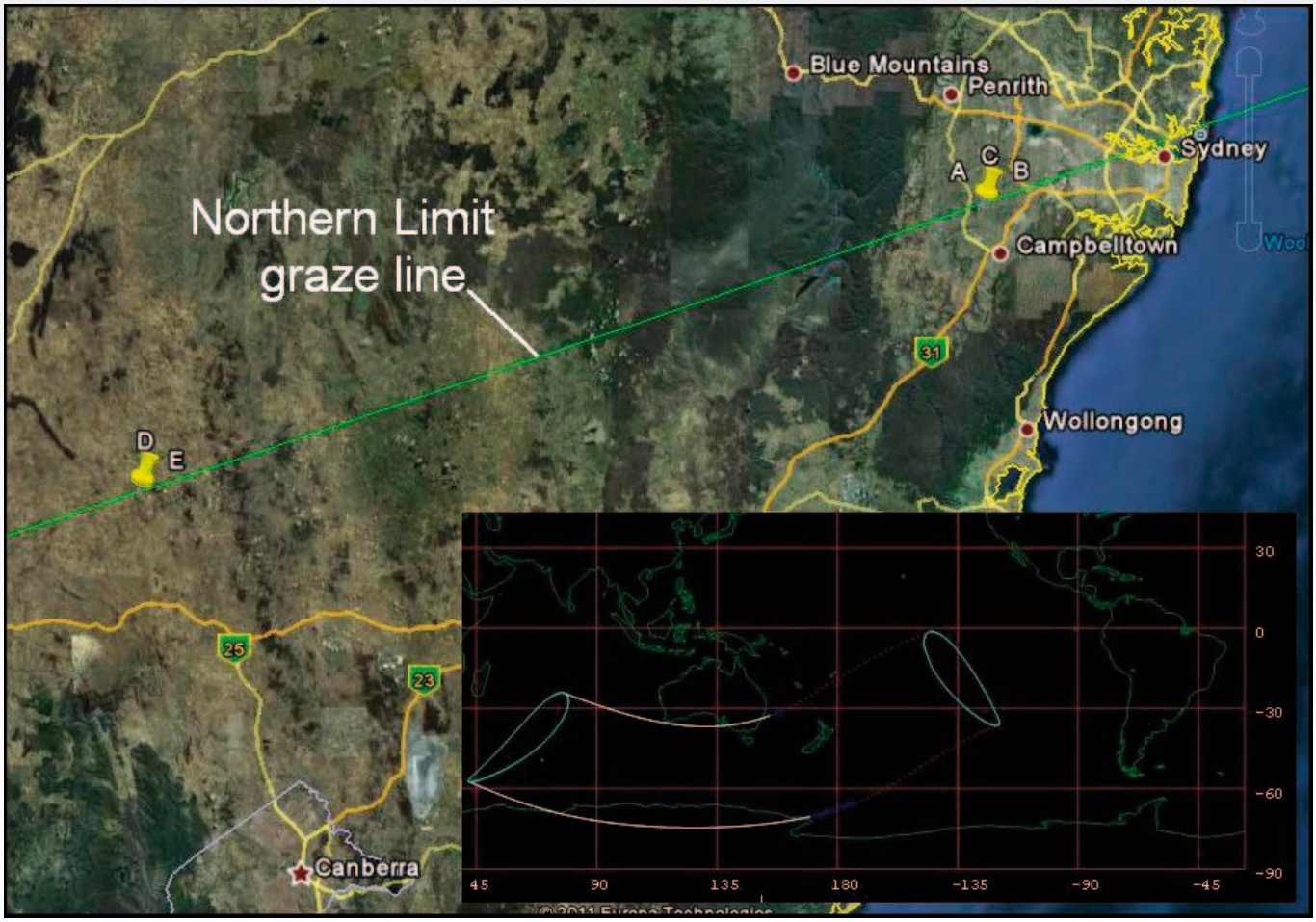
Journal for Occultation Astronomy

2011-04

FORMERLY OCCULTATION NEWSLETTER

Observation report on: The Lunar Graze of ZC 2810 – 23rd April 2010 (UT)

Dave Gault – davegee@tpg.com.au and Dave Herald – drherald@bigpond.net.au



Early on Easter Sunday morning the 24th April 2011, two teams of observers, representing 3 Astronomical Societies of Australia, met to observe the northern lunar limb graze past the star ZC 2810 (aka SAO 162368) a mag. 7.6 star in the constellation Sagittarius. The star was predicted to be grazing 11 degrees from the northern cusp, of the 63% illuminated (waning) moon that was at an altitude of 76 degrees.

The broad plan was to have two sites suitable for Canberra and Sydney observers. Canberra observers would be on the Lachlan Valley Highway, south of Boorowa and Sydney observers would be on Deepfields Road, south-east of Bringelly.

As is usual with these sorts of events, much planning and weather watching occupies the minds of the observers in the days leading up

Journal for
Occultation Astronomy

Dear reader,

I am very sorry but this time we are really late!

Unfortunately one reason is the result of our blocked server so we were forced to change the "paths". The second reason is quite simple: Some of the writers of the articles did not pay attention to the press-date September 15th – the next date should be December 15th and I hope it will be…

Minimum amount of pages shall be 16 – there is no sense in producing less so we were waiting until the very last moment to reach that goal. We know it is in your spare-time when you are writing articles without being paid for it and you better like to observe instead of writing. But think of all the readers who are interested in your results and possible improvements you made to your equipment: You have to write articles for JOA!

We have been asked if it is possible to produce a printed version of the JOA.

Sure, that is possible! We made a rough calculation for the planned 4 issues per year and as result we have to increase the membership fee up to 35 Euro (printing & mailing costs) for those members who are interested in receiving the printed JOA.

Please do send us a mail anyway which version you want.

One of the topics of this issue by sure will be the article written by Wolfgang Beisker concerning the joint meeting of the European Planetary Science Congress (EPSC) and the Division for Planetary Sciences (DPS) of the American Astronomical Society held in Nantes, France from the 2nd to the 7th of October this year. As far as I know only Wolfgang and our professional friends joined that meeting – due to business-reasons I could not attend it. It would be good, if some more IOTA members could come to the next meeting in September 2012 in Madrid. It will "only" be the meeting of the EPSC, not together with the DPS meeting, but nevertheless an exciting conference from the European planetary scientists!

Have a look at Bruno Sicardys & our website (http://www.lesia.obspm.fr/perso/bruno-sicardy/ & www.IOTA-ES.de) where a lot of interesting TNO-events in 2012 are presented, three Quaoar-occultations should stay within the European focus.

Hans-Joachim Bode, November 2011

■ JOA 2011-4 ■ For IOTA supscription purposes ON Vol.15, No. 1
October 2011 · $ 5.00 · $ 6.25 OTHER · (ISSN 0737-6766)

In this issue:

Writing articles for JOA:

The rules below should be regarded while writing an article; using them will greatly facilitate the production and layout of ON!

If your article does not conform to these rules, please correct it.

There are 3 different possibilities for submitting articles:

- pdf-articles (must be editable – these can be converted)
- unformatted Word *.doc-files containing pictures/graphs or their names (marked red: <figure_01>) at the desired position(s)
- *.txt-files must contain at the desired position the name of each graph/picture

The simplest way to write an article is just use Word as usual and after you have finished writing it, delete all your format-commands by selecting within the push-down-list "STYLE" (in general it's to the left of FONT & FONTSIZE) the command "CLEAR FORMATTING". After having done this you can insert your pictures/graphs or mark the positions of them (marked red: <figure_01>) within the text.

txt-files: Details, that should be regarded

- Format-commands are forbidden
- In case of pictures, mark them within the text like <picture001> where they should be positioned

Name of the author should be written in the 2nd line of the article, right after the title of the article; a contact e-mail address (even if just of the national coordinator) should be given after the author's name.

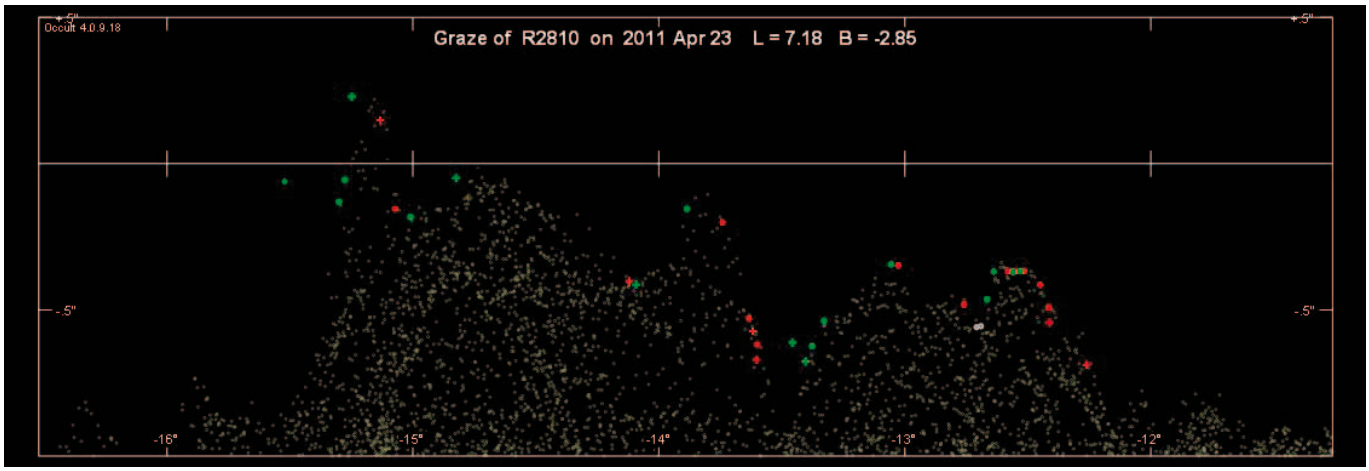
IMPORTANT:Use only the end-of-line command (press ENTER) if it's really necessary (new paragraph, etc.) and not when you see it's the end of the line!

Sending articles to JOA:

Each country / state has a coordinator who will translate your article to English – if necessary.

In case there is no one (new country) please send a mail to the editorial staff at: **info@occultations.info**

Africa:	NN
America:	David Dunham - dunham@starpower.net
Australia / New Zealand:	NN
Europe:	Pawel Maksym - p.maksym@astronomia.pl + Alfons Gabel - alfons.gabel@t-online.de
England:	Alex Pratt - alexander.pratt@btinternet.com
Finland:	Matti Suhonen - suhonen@ursa.fi
Germany:	Alfons Gabel - alfons.gabel@t-online.de
Greece:	Vagelis Tsamis - vtsamis@aegean.gr
Italy:	NN
Japan:	Mitsuru Soma - mitsuru.soma@gmail.com
Netherland:	Harrie Rutten - h.g.j.rutten@home.nl
Poland:	Pawel Maksym - p.maksym@astronomia.pl
Spain:	Carles Schnabel - cschnabel@foradorbita.com



to the event. And as seems perfectly normal for the Sydney area, the Easter holidays means overcast and rain - which meant many visits to the Bureau of Meteorology web site to study the satellite images. The Canberra observers' only worry was ground fog. However the Sydney observers suffered total cloud cover for 3 days before the event; the only ray of hope was provided by the on-line forecast 7Timer, which predicted 0% cloud for the event, which in the end proved to be 100% correct – just!

In the end, Dave Herald and Margaret Streamer of Canberra Astronomical Society (CAS), Brett and Wendy McMillan of Sutherland Astronomical Society Inc (SASI) and Tony Barry and Dave Gault of Western Sydney Amateur Astronomical Group (WSAAG) made the observing team.

The Canberra observers set out with perfectly clear skies - with just the occasional bit of ground fog on the way (yes, winter is just around the corner). In Google Earth and Street View the sites appeared to be located along a stretch of road that offered good verges where you could easily set up well off from the roadway. However this turned out to be totally illusory – there was a ditch along both sides of the road for the whole length of where it was desirable to observe the graze. This limited the site locations to two access roads, one of which was perilously close to the graze limit. To add to the dramas, Margaret's video recorder decided to play up at the last minute - which meant she had to change her plans and observe the event visually. Margaret observed 8 events while Dave recorded 10 events on video, with the subsequent analysis showing that if he was a mere 150 meters further up the road, the moon would have passed by the star without being occulted.

The Sydney observers only decided that the event was "GO" at 3am, the plan to meet at the Bringelly shops, then proceed to the sites on Deepfields Road. Setting up the telescopes was accompanied by the almost continuous barking of the neighbouring dogs, and we worried that the police might be called to investigate the intruders. However this didn't happen, although Wendy was asked to move on by one disgruntled householder. The sky clouded over about 15 minutes before the first event was due, and luckily, the cloud cleared away 3 minutes before the first disappearance and a beautiful graze event was observed. The brightness of the moon, the faintness of the star and probably the intrusion of the disgruntled householder was too much for Wendy. Brett visually observed 4 good events, Tony observed 8 events and Dave observed 6 events.

A total of 36 events were observed and the limb plot is shown on top

The plot is read right-to-left and red are disappearance events, grey are flash events and green are reappearance events.

Congratulations to the successful observers. Commiserations to all observers who planned to observe but were put off by the weather or some other issue. Remember, the only definite in graze observing is that you will observe zero events if you stay at home!

If you wish to be included in the invitation to the next graze event, please contact Dave Herald or Dave Gault.

Thanks
Dave and Dave

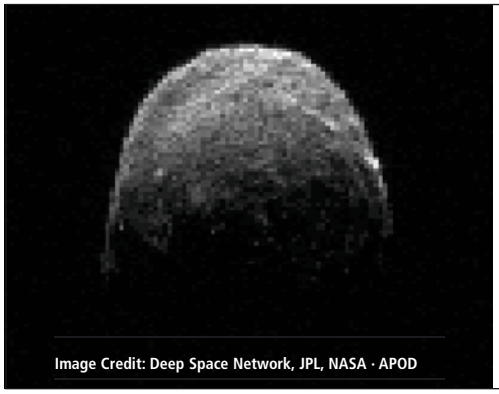


Image Credit: Deep Space Network, JPL, NASA · APOD

Asteroid 2005 YU55 passed by the Earth November 9, posing no danger. The space rock, estimated to be about 400 meters across, coasted by just inside the orbit of Earth's Moon. Although the passing of smaller rocks near the Earth is not very unusual – in fact small rocks from space strike Earth daily – a rock this large hasn't passed this close since 1976. Were YU55 to have struck land, it might have caused a magnitude seven earthquake and left a city-sized crater. A perhaps larger danger would have occurred were YU55 to have struck the ocean and raised a large tsunami. The above radar image was taken two days ago by the Deep Space Network radio telescope in Goldstone, California, USA. YU55 was discovered only in 2005, indicating that other potentially hazardous asteroids might lurk in our Solar System currently undetected. Objects like YU55 are hard to detect because they are so faint and move so fast. However, humanity's ability to scan the sky to detect, catalog, and analyze such objects has increased notably in recent years.

Journal for Occultation Astronomy

The Graze of 37 Tauri on August 22, 2011, a Spectacular First Graze

Ernest W. Iverson, 128 Autumn Lake Dr. Lufkin, TX, USA ewiverson@consolidated.net

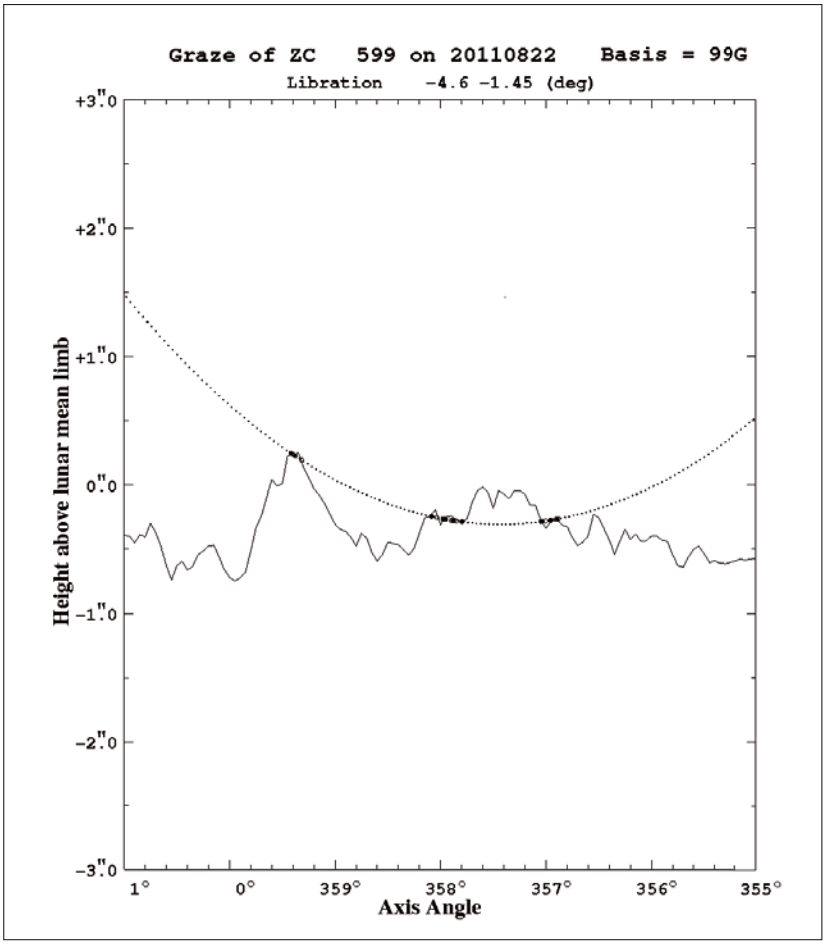


Figure 1. A comparison of the observed occultation events with the Kaguya satellite high resolution lunar profile data.

My first introduction to occultation timing occurred when I listened to a guest lecture given by Dr. David Dunham at a monthly meeting of the South Bay Astronomical Society. I was living near Los Angeles, California at the time and had been invited by Dr. Dunham to hear his presentation. As I recall, Dr. Dunham showed a number of video examples of both asteroid occultations and lunar grazes. That is all it took. I've been hooked on occultations ever since. My first graze attempt was going to be in Orange County, about an hour across town so I packed my 8 inch LX200GPS and all of the hardware that went with it into the pickup. The date was February 2006. I was still, very much, a newcomer to amateur astronomy and the LX200GPS was my first motorized telescope. It was also back in the day when I took everything except the kitchen sink with me on an outing. Essential hardware included things like a full size VCR, a 9 inch CRT video monitor, a power inverter, a car battery, etc. And then there was redundancy to think about. I've made a lot of progress since then in determining what is really needed and how big it can be. Unfortunately, my first effort ended in failure. I was able to track the star through a layer of cirrus clouds, but a heavy ground fog settled in an hour before the event. With all the bulky hardware it was just too difficult to dash off to another site. Plus a nervous homeowner in the neighborhood added to the experience by calling the police. They were very understanding and good natured about everything. Especially once they understood what I was doing and why I needed to be at that location. My second attempt also ended in failure. This time I managed to get the pickup stuck in soft sand between two large rocks. I was trying to turn around on a questionable road in California's Mojave Desert. After that, I pretty much gave up on observing grazes until this year.

Earlier this year I started thinking about trying another graze. I've done numerous total lunar occultations and have experienced a few positive asteroid occultations. When Dr. Dunham's email appeal for observers arrived it caught my attention. He pointed out how close I lived to the shadow path of a really good graze of the magnitude 4.4 star 37 Tauri or RC599. A quick check of the predicted path revealed it would be about an hour away. Next I checked the Google map satellite imagery and found an area with several potential observing sites. I was committed at this point. After a quick discussion with Dr. Dunham about the appropriate telescope, it was decided that I should use the ETX-125. The f/10 focal ratio would give a narrower field of view thus eliminating some of the glare from the sunlit side of the moon. Fortunately, I now organize and store my equipment whenever possible in a grab-and-go configuration. So loading the pickup was quick and easy this time. I just unpacked the telescope and tripod from their storage containers. I picked a camera, grabbed a battery box containing two 12 volt 7 Amp/Hr batteries, and the suitcase. Everything can run off one battery, but the second battery has saved the day on more than one occasion. The suitcase contains a KIWI video time inserter, a video splitter, a Sony Video Walkman, plus an interface box for both video and power signals. I used it, for the first time, to record the (234) Barbara occultation at the 2009 IOTA Annual Meeting in Orlando, Florida. This also just happened to be my very first positive asteroid occultation.

I left the house in plenty of time so that I was not rushed driving to Onalaska, a small community on the north east shore of Lake Livingston.

I had plenty of time to check out the potential sites picked from the satellite imagery. I decided on a large vacant lot on top of a hill. The skies were clear and dark with just a light breeze at times.

As the moon slowly rose over the distant tree line, I could see the target star and moon slowly approaching each other. It was thrilling to watch the star finally blink off and then back on again for the first time. All of my expectations had just been met. The trip was a success. But then it happened again, and my excitement jumped another notch. The star continued to blink off and on several more times, each time adding to my excitement. I actually lost track of the count in real time, but a careful replay and analysis with Limovie revealed a total of ten off-on cycles. The unsteady atmosphere and smoke from a distant wild fire caused several fluctuations in signal amplitude that suggested, at first, that 37 Tauri might have a close companion star. The star is a known wide double and is listed in the Washington Double Star Catalogue (WDS) as 04047+2205 or STT 558AB. 37 Tauri and its companion star were last measured in 2003, and the companion star was separated from 37 Tauri by 134.3 arc seconds at a position angle of 193 degrees. The companion star is too far away, and not in the proper position to be occulted by the lunar profile. The companion's magnitude is listed in the WDS as 10.01. It is clearly well beyond the limiting magnitude of the ETX-125. The WDS also lists a second companion, STG 4AC, that is placed even further away at a separation of 235.3 arc seconds. The possibility of a new, unknown close double seems unlikely since the fluctuations occur randomly.

A more likely explanation is that the fluctuations are the result of atmospheric turbulence. A movie of the graze is available on You Tube at **http://www.youtube.com/watch?v=CkEl-tDD2rU** . Dr. Mitsuru Sôma, Japanese National Observatory, reduced the event times and plotted the results against the high resolution lunar profile data obtained the Kaguya satellite (Figure 1). The observed occultation event times correspond closely to the lunar profile.

What is the next challenge? Perhaps it will be an occultation of a star by a planet or even a TNO event.

Journal for Occultation Astronomy

(42) Isis – continuing Andrew's legacy – another positive UKasteroidal occultation.

Alex R Pratt

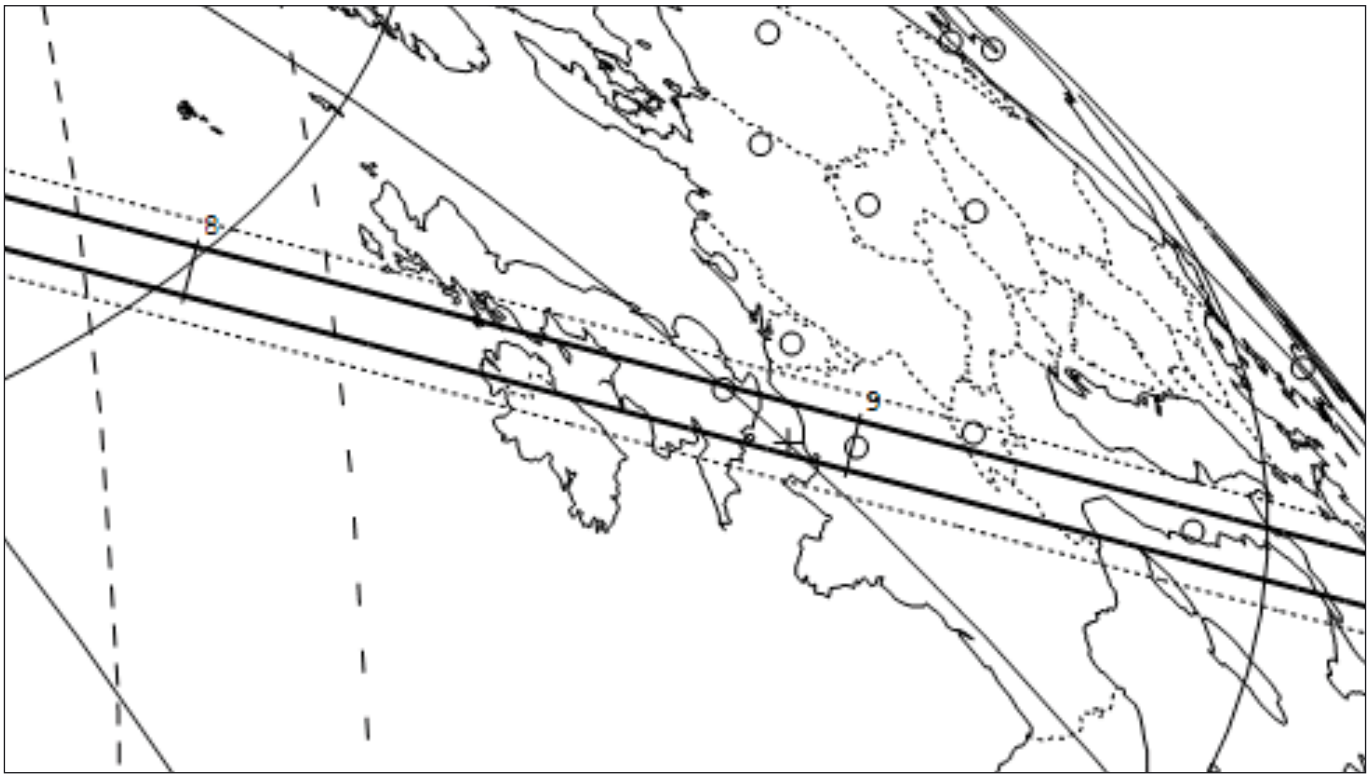


Figure 1. Shadow path predicted by Steve Preston.

Abstract

On the night of 3rd May 2011 the asteroid (42) Isis occulted an 11th magnitude star in Gemini. The shadow track passed over the British Isles and several observers in England attempted to record the event, resulting in three positive observations. Their timings, when combined with another positive observation from Switzerland, allowed a profile of the asteroid to be estimated.

Details of the event

The anticipated track of the shadow of (42) Isis, moving from NW to SE across the British Isles and continental Europe, is shown in figure 1, extracted from the detailed prediction by Steve Preston. The 13.3 magnitude asteroid (42) Isis was expected to occult a magnitude 11.5 star for up to 4.4 seconds, with a magnitude drop of 2.0. The event occurred just after 22:00 UT, with the target area at a good altitude in Gemini and a shadow track 100km across, which encouraged several observers to monitor the occultation.

Not all UK asteroid observers use Occult Watcher or are registered with Planoccult. Tim Haymes publicised the event to all members of the British Astronomical Association's Asteroids and Remote Planets Section, and coordinated their observing reports. The maximum predicted duration of the occultation was 4.4 seconds, which required accurate timings from integrating video cameras with GPS time inserters, or good quality CCD drift scans.

Results

Luckily, the skies were clear over much of the UK on the night of 3rd May. My station was 6km outside the 1-sigma zone, with a 13% chance of success, yet I recorded a disappearance of 2.20 seconds. It seems that the actual shadow path was NE of the predicted track. Other

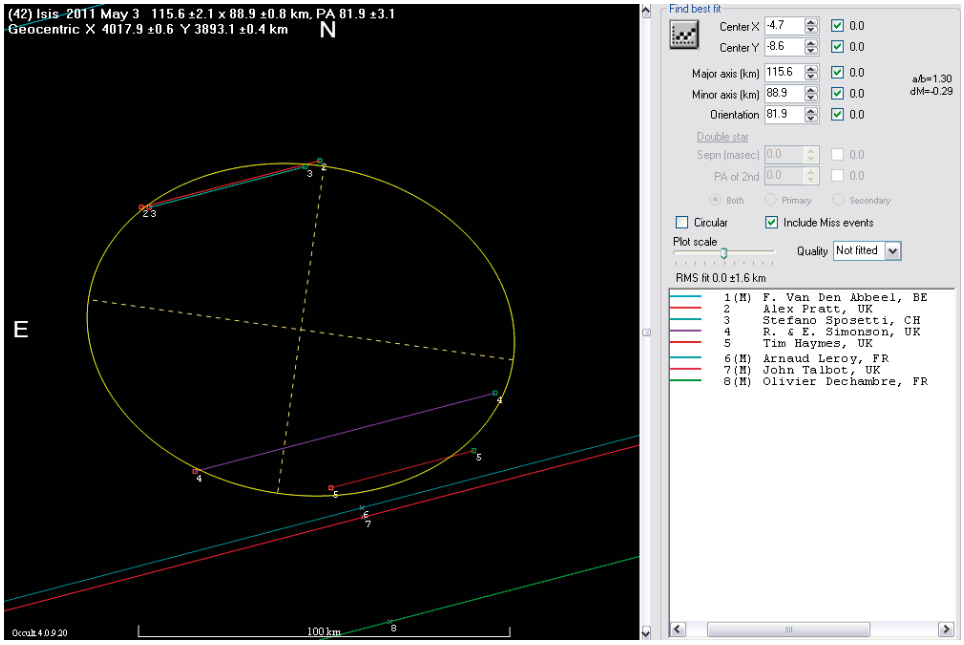


Figure 2: Provisional profile derived by Eric Frappa.

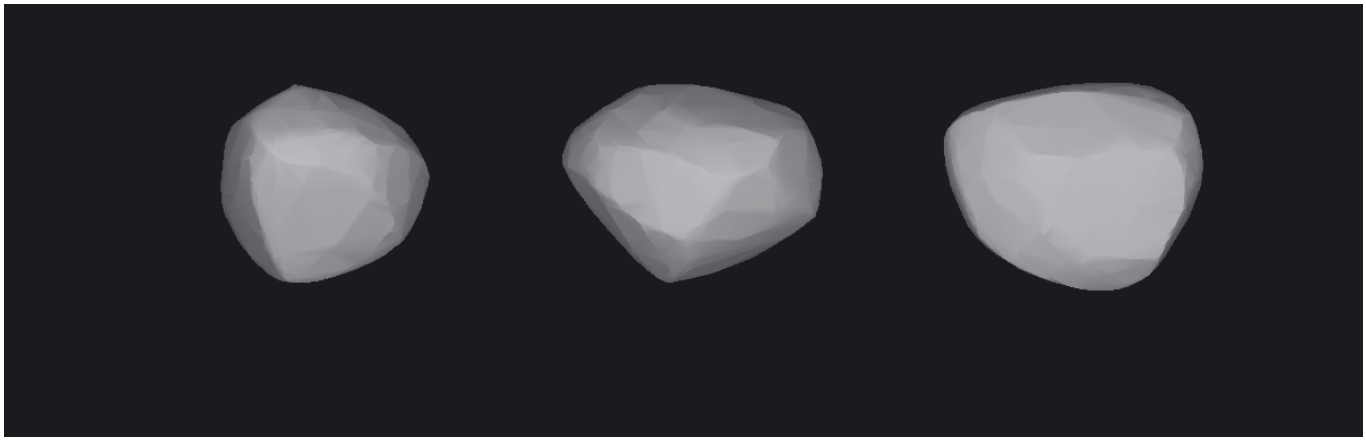


Figure 3: (42) Isis – 2011 April 21 – Josef Durech
Database of Asteroid Models from Inversion Techniques (DAMIT)
http://astro.troja.mff.cuni.cz/projects/asteroids3D/

positive observations were reported by Tim Haymes (England), Robert and Edward Simonson (England), and Stefano Sposetti (Switzerland).

Valuable negative observations were reported from England, Belgium and France, including some near misses, as seen from the resultant asteroid profile. Five other English stations could not observe because of obstructed horizons or technical problems.

Eric Frappa collated the reported timings and derived a provisional profile, shown in figure 2.

"Frappa, E. - European Asteroidal Occultation Results - www.euraster.net – 2011"

The estimated dimensions of (42) Isis obtained from the shape profile are 115.6 km ± 2.1 km x 88.9 km ± 0.8 km.

It is interesting to compare figure 2 with the profiles derived by Josef Durech using the lightcurve inversion technique, shown in figure 3.

Conclusion

We were disappointed that we did not obtain more positive observations of the asteroidal occultation. This would have confirmed the shape profile of (42) Isis derived from only four chords. However, we were pleased that a number of UK observers attempted to record the event, which is very promising for the future.

Another UK success to continue the legacy of Andrew Elliott.
Alex R Pratt (Leeds, England)

References

Steve Preston – Occultation prediction
http://www.asteroidoccultation.com/2011_05/0503_42_23699.htm

Eric Frappa – Timings, chords and profile
http://www.euraster.net/results/2011/index.html#0503-42

Josef Durech – Lightcurve inversion profile
http://astro.troja.mff.cuni.cz/projects/asteroids3D/web.php

Journal for Occultation Astronomy

Timing measurements on a Mintron video camera with EXposure Time Analyzer – EXTA

Gerhard Dangl, IOTA/ES, gerhard@dangl.at

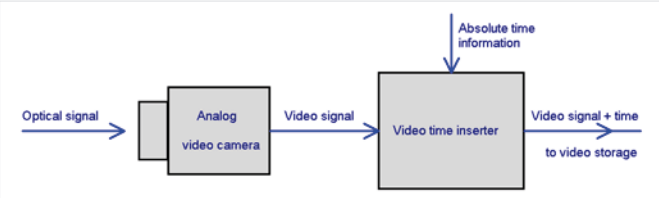


Figure 1: Signal path from video camera to video data storage

Abstract

The author presents the results of measurements about the internal timing characteristics of a Mintron 12V1 MTV EX video camera. The measurements were made with the EXposure Time Analyzer – EXTA during ESOP 2011 in Berlin at the Archenhold Observatory. Furthermore some important differences in comparison to other integrating video cameras will be explained.

1. Introduction

Within the last decade analog video cameras have become a widespread technical standart in observation work of asteroidal star occultations. In conjunction with video time inserters occultation events can be captured and recorded with very accurate absolute time informations. For this every video field of a standart analog video camera output signal gets an individual time stamp inserted. In this way all the characteristics of the signal way from camera output to the final video storage can not affect the time information. Figure 1 shows a typical signal path from video camera to video data storage.

But there is a remaining uncertainty in the first part of the signal way. Meaning the internal timing characteristics of the video camera. Today many different types of video cameras are in practical useage. And cameras with an integration feature are a growing part of all. Different integration times will produce different internal signal delays. So for every video camera in use one has to know about the time span from video field exposure to the signal output in all possible modes.

To determine the signal delay of a non integrating video camera is a relative simple task. A flashing LED triggered by a one pulse per second output (1PPS) of a GPS sensor can be used for this. But with integrating cameras the measurement is much more complicated. To determine the internal delays of several modes with one flashing LED only can be a work of many hours with a high number of records necessary. Several years ago the author determined in this way the internal timing characteristics of the WAT-120N video camera.

2. EXposure Time Analyzer - EXTA

In the year 2010 the development of a special measurement device, the EXposure Time Analyzer - EXTA, was started by the author for easier measurements on video cameras. After the device assembly had finished in 2011 the first measurements could be started on video cameras.

Figure 2 shows a function overview. EXTA consits of two LED matrix displays. A big one with 20x50 LED's showing fractions of a UTC second and a smaller one with 6x10 LED's showing the seconds of the UTC time. The display is conntrolled by five microcontrollers. The source of UTC time is a Garmin GPS 18x LVC sensor with 1PPS output.

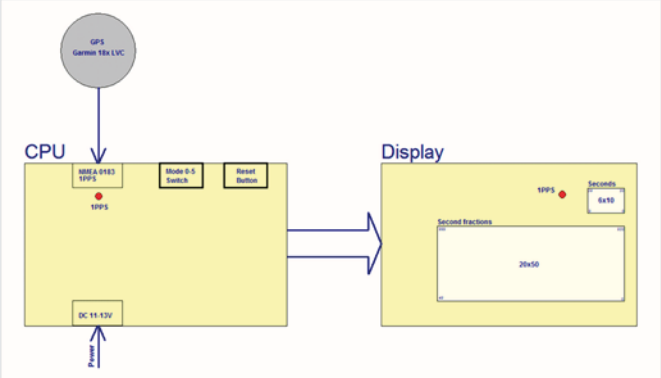


Figure 2: EXTA function overview

3. Mintron video camera 12V1 MTV EX

This video camera was one of the first commercial integrating video cameras used for astronomy work. And many astronomers are still using this camera for occultation recording in this years. The Mintron 12V1 MTV EX is equipped with a SONY ExView ICX-429ALL CCD sensor. In comparison to the WAT-120N this camera is not controlled via a cable box. All settings have to be done with five buttons on the backside of the camera using an on-screen menue on a monitor. And this also means one always has to touch the system for settings change.

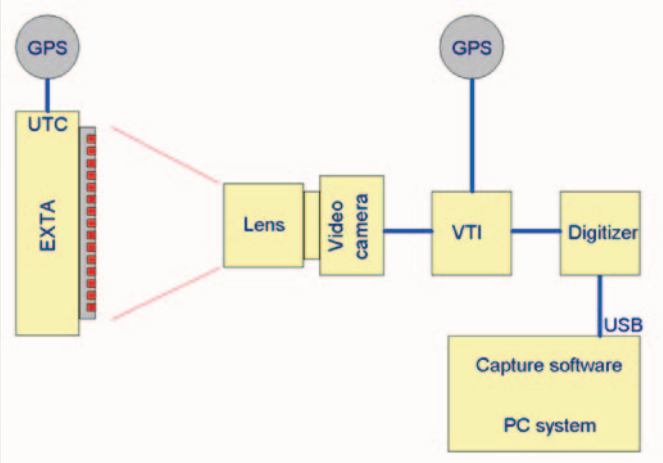


Figure 3: EXTA measurement setup for analog video camera Mintron 12V1 MTV EX

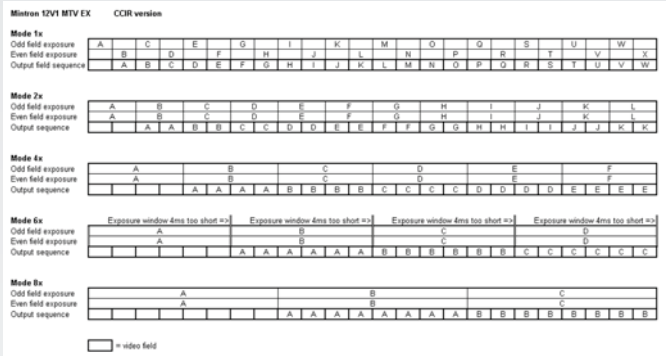


Figure 4: Measurement results for modes 1x, 2x, 4x, 6x and 8x

But this is not the only difference to the WAT-120N. The internal integrating and timing characteristics is a total different one. To determine this details and present the results to the astronomy community measurements with EXTA were planned as soon as possible. The author does not own a Mintron camera.

4. Measurements

During the ESOP 2011 in Berlin at the Archenhold Observatory it was possible to make several measurements with the help of Helmut Denzau from Panker, Germany. In a room of the Observatory his Mintron camera was used in a measurement setup to determine the timing details of this type of integrating video camera. Figure 3 shows the used measurement setup.

After analyzing the measurements it was clear that the environment in the observatory room was too bright for testing the longer integration modes. In this modes the camera did not use all the chosen number of frames for integration. The automatic overruled the manually menue setting and made integration sequences shorter because the image brightness was not dark enough. So for the Mintron camera the selected number of frames for integration is only a maximum value and this value can be shortened by the camera electronic. A total different characteristics in comparison to a WAT-120N camera. On a WAT-120N no automatic will overrule the manually settings. And one can expect always the full integration time chosen by a setting.

On a dark sky location it can be assumed that the Mintron is using the full integration length. But if some bright objects like the terminator of the moon are in the field of view it can not be excluded that the camera electronic works with shorter integration times as selcted in the menus setting.

5. Results

As mentioned before only some short integration sequences were measured without the influence of the camera electronic. The results for this modes are shown in Figure 4. In mode 6x the exposure window was only 116ms of expected 120ms. If this shortened exposure was caused by a too bright environment can not be determined at the moment.

6. Conclusion

For the mode 6x and all longer integration modes 16x, 24x, 32x, 48x, 64x, 96x and 128x further measurements under absolute dark environment conditions have to be done to get accurate results.

After a change of the integration mode in the menue setting this camera does not immediately change the exposure behaviour. One has to wait several seconds until the camera has changed and reached the new integration mode. So during this phase of change the timing of the camera is not well defined in the individual video fields. Because of this uncertainty a setting change should be done before recording start and avoided later during event recording.

If the automatic overruled the manually menue setting and made integration sequences shorter, in some modes gaps in the exposure sequence occurred. For instance: In mode 64x the real exposure time was only 608ms and not maximum value of 1.28s. But additional between every 608ms integration sequence an exposure gap of 33ms existed. This is a relative big hole in the data sequence. Because of this only modes with assured full integration lengths should be used. Every situation with bright light sources in the field of view like a moon terminator can make accurate timming impossible.

With the knowledge about all of this behaviour nevertheless this camera is usable for occultation timing.

Acknowledgement

Many thanks to Helmut Denzau for the measurement help and providing the Mintron camera. And also many thanks for the excellent support during the measurements at the Archenhold Observatory to the organisation team of ESOP 2011.

References

G. Dangl, EXposure Time Analyzer – EXTA, (2011)
http://www.dangl.at/exta/exta_e.htm

Journal for Occultation Astronomy

Joint EPSC-DPS conference in Nantes, 2nd - 7th October 2011

Wolfgang Beisker, IOTA-ES

From the 2nd to the 7th of October the joint meeting of the European Planetary Science Congress (EPSC) and the Division for Planetary Sciences (DPS) of the American Astronomical Society was held in Nantes, France, at the La Cité Internationale des Congrès Nantes Métropole. It was the first time, the two societies had a large joint meeting. The conference brought together more than 1600 planetary scientists from all over the world. The official report stated, that about 780 scientists from the European Union, more than 550 scientists from the USA and about 220 scientists from other countries joined in the meeting. All aspects of planetary sciences were covered in this large conference. Scientific reports from space missions, earth bound astronomy as well as discussions about communication issues were held on the six days in many parallel sessions. There were more than 1750 presentations during the conference.

A report about all aspects of this large conference would be far out of the scope of this journal, the focus will be on science linked to occultation astronomy. One session with the focus on occultation astronomy was the session about dwarf planets of the outer solar system, on Tuesday the 4th of October. Results from occultations by Eris, Makemake, AZ84 and Quaoar from the occultation team around Bruno Sicardy (LESIA-Observatoire de Paris, CNRS), showed the stunning results of the year 2011. The precision of the astrometry, mostly done by the RIO Team, guided the observers to the sites in South-America and with an unbelievable amount of luck they succeeded in recording the occultation tracks.

B. Sicardy presented data from the occultation of a 17m1 (V-Band) star observed positively from 2 sites in Chile (La Silla and San Pedro de Atacama) and negatively from El Leoncito, Argentine. From the two chords a radius of 1163km +/- 6km assuming a spherical shape was evaluated. Because Pluto's radius is assumed to be between 1150 and 1200 km, Eris seems to be a Pluto twin. Remarkable is the high albedo of around 0.96, leading to the assumption of a surface covered with ice, perhaps similar to Pluto at its aphelion. One can speculate, that in its perihelion at 38 AU, the ice sublimates, giving an atmosphere similar to the one, we can observe on Pluto. A Nature paper just published on October 25th (Nature ###) gives a detailed analysis of the event. From the recorded chords, a substantial atmosphere could not be detected with a surface pressure larger than 1nbar.

J.L. Ortiz from the Instituto de Astrofisica de Andalucia (CSIC, Spain) presented data from an occultation by Makemake on April 23, 2011. 5 Sites with 8 observed chords were successful. The faint NOMAD star 1181-0235723 had an V-Band magnitude of 18m2, resulting in a drop of only 0.3mag. The occultation was successfully recorded from the 3.5m NTT and the 0.6m TRAPPIST telescope at La Silla, the 0.84m telescope at Cerro de Armazores Observatory, the VLT 8m instrument (Unit3) at Paranal, the 0.4m and 0.5m telescopes at S. Pedro de Atacama and the 0.6m instrument at Pico dos Diaz, Brazil. If the chords approximate an elliptically shaped body, an equatorial diameter of 1610 km +22/-180 km (poorly constrained) and a much better constrained polar diameter of 1444 km ± 9 km have been obtained.

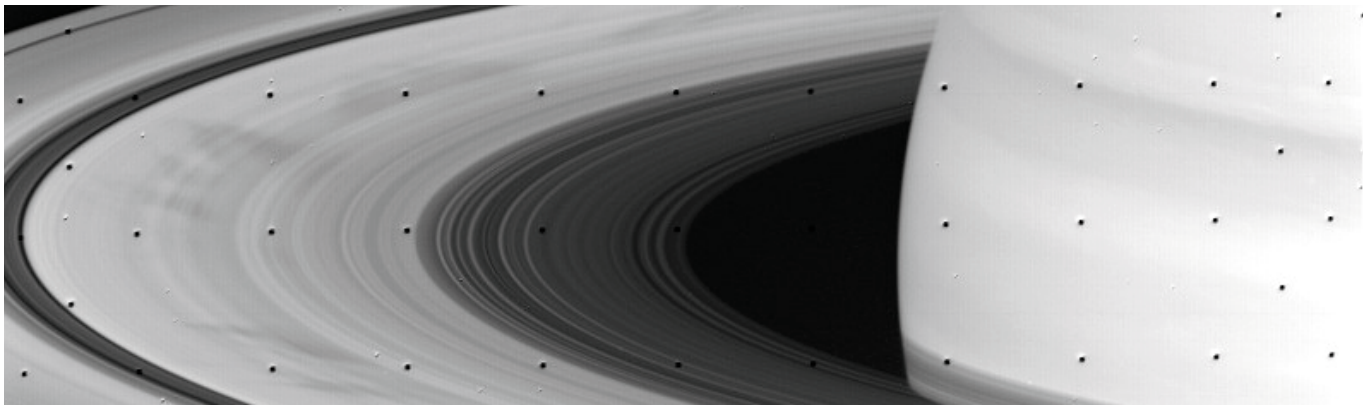
F. Braga-Ribas found the size of Quaoar bigger than previously thought, 1045 to 1084 kilometers from 5 positive occultation chords out of 16 sites, distributed in Uruguay, Chile, Argentine and Brazil. The fit for the ellipse had been rather poor, which led the audience to the remark, that it may be a contact binary, what Bragas-Ribas could not rule out.

These talks were followed by an investigation of Pluto's lower atmosphere by Cathy Olkins from SouthWest Research Institute (SWRI), USA. The team used the observation of a central flash observed from Mt. John, NZ, Mt Canopus, Tasmania and from a mobile station in Mussleroe Bay, Tasmania. A distinctive double peak central flash had been recorded in a dual wavelength approach. From modeling the central flash light curves she concluded an ellipticity of Pluto's atmosphere of around 0.085 and ruled out a solution of the lower atmosphere by extinction only. Because a central flash probes the deep atmosphere (in this case a layer around 1130km from the center of Pluto), either it may have a thermal gradient or a combination of extinction on thermal gradient near the ground.

In a different session, Tom Mueller (Max Planck Institute for Extraterrestial Physics, Munich), talked about the most exotic KBO Makemake. He reported results from Herschel and Spitzer data. As he pointed out, Makemake may have a surface with very heterogeneous material, as reflective as the surface of Eris (an albedo around 0.95) but in a patchwork like structure. Other material is as dark as the surface of a comet.

One problem for the author was, that many sessions were in parallel, what of course is obligatory for such large conventions. This does not allow to join every interesting session. A good compensation however were the poster sessions, a very important part of the conference. There the opportunity was given to talk to many of the scientists about their work in a very informal and direct way. With a glass of Cidre, Wine or other drinks in your hand, it was always very inspiring. Besides the many presentations about the larger planets, many posters dealed with light curves of asteroids and their interpretation. Some authors used the profiles of asteroids measured by occultation work, others compared the light curves with images recorded from space probes as well. Precise light curve data in well defined spectral ranges are generally needed, as the impression of many authors was. A poster about astrometry and asteroids showed, that, as expected, the most precise astrometric observations are occultation observations, but of course only with a very low number of observations. This should be an encouragement for occultation work.

As expected, one focus of the conference were reports from the different space missions. Specially to be mentioned is the Messenger



probe, with its large number of images. In two Mercury years, 5000 images have been recorded together with more than 2 million spectra from UV to the infrared. The magnetometer of the mission found out, that Mercury's magnetic field is symmetric with respect to the axis, but with a large offset towards north of Mercury's center. Around Mercury's north pole, a large region of volcanism has been found, with flow features producing islands due to later erosion. A topographic map of Mercury was shown covering the northern hemisphere done by laser measurements. The difference of the highest to the lowest terrain is around 10 km, compared to 20km for the moon and 30km for Mars. So its pretty flat country out there.

Special attention had been made on the conference to Saturn's storms as well as to Phobos and Lutetia. The storm on Saturn started on about the 5th of December 2010. It was first detected by amateur astronomers and further by radio emissions, recorded by Cassini. Peak lightning rates were very high, around 10 per minute.

The recent Mars Express mission has frequent encounters with Phobos. The probe passed Phobos at a minimum distance of 111km only, leading to spectacular images, where many groves on Phobos could be seen. These groves seem to consist of rows of small craters, as could be seen by low sun angles. From measurements of its gravity field it could be concluded, that Phobos is very porous with density anomalies. Perhaps Phobos is formed from parts of a disrupted body.

The Rosetta mission had a fly by of Lutetia. The mass of Lutetia could be determined to 1.7 10^{18} kg, much less than from determination by perturbations of other orbits. The new mass determination resulted in a density of 3.4 g/cm^3. This is very high, so combined with the known amount of porosity, it may be mostly rock with metal combined.

A special part of the conference was devoted to "Outreach, Education, Policy and Amateur Astronomy". Besides many talks on educational programs, there were a session of the contribution of amateur astronomy to planetary sciences, where the author himself gives a talk on "Observations of Stellar Occultations by Dwarf Planets and TNOs" with an overview of international observation campaigns for these objects. Talks about the atmosphere watch of outer planets showed the extremely high standard of images taken by amateurs as well as the systematical access to these data with a database.

First ground observations of Saturn's spokes at the 2009 equinox again presented the high standard of imaging. The coordination of observations within the Europlanet Network NA1 was presented by M. Scherf from Graz, who pointed out the concern how this work can be continued after the end of the European funding for it at the end of 2012. There will be a meeting for it in Vienna end of January 2012. In the session were about 30 attendants, not only from the amateur community. To have the amateur session together with education and public outreach in one block, was perhaps not such a good idea of the convener organization, the link between these two groups is not very high. At this point, it has to be gratefully remarked, that for amateurs the full conference fee was lowered to a very moderate fee of only 50 Euros. This was a great idea to bring amateurs to the meetings.

Part of every DPS meeting is the NASA night and so it was in Nantes. A representative of NASA's Science Mission Directorate speaks about the achievements and the funding for the upcoming time. The comments from the NASA, given by Jim Green, Planetary Science Division Director, were somewhat frustrating for the planetary science community because of the economic situation. As he explained, there are three budget scenarios, he showed graphs for a budget going down in the next years, flattening out for a decade or so.

This seems a very likely scenario. Flattening the budgets means a 1 billion dollar cut! He emphasized the USA science community should to talk about their concern to their congressmen and -woman, to get the budget plans revised and to put pressure on congress. The situation is so bad, that they feared a cut specially to successful ongoing missions, what would be a dramatic loss of science. There is the real concern, that the high cost of the James Webb Space Telescope will draw money away from the planetary science missions, a situation similar to the one, when the Hubble Space Telescope was installed.

The situation of ESA is somewhat more comfortable as Luigi Colangeli, Head of ESA's Solar System Missions Division explained. A fixed proportion of the European budget is spent for ESA with a yearly increase of 3.8%. Its called the Cosmic Vision program. There is a planned funding for 3 billion Euros for new missions, separate from the funding for already running missions. Additionally funding comes from the member states of ESA.

Summarizing, it was an inspiring conference, not only with respect to occultation astronomy. Everyone, with interest in more scientific work in astronomy, should join such a meeting. It gives ideas for the next years of work to come, to be prepared for the scientific and technologic demands of the upcoming time. The next meeting of this kind, but only with the European Planetary Science Congress (EPSC) will be in Madrid, Spain, from 23rd to 28th of September 2012. The website of IOTA-ES will inform you about this meeting in advance.

Journal for Occultation Astronomy

Journal for Occultation Astronomy

ESOP XXX Berlin

Personal Impressions

Harrie Rutten

On this ESOP a very old tradition was revived. What later grew into great ESOP buffets was originally a barbecue and Konrad Guhl and his friends again wanted to revive that tradition.

But before that barbecue would start two workshops were on the program. These were held in German by Dr. Eberhard Bredner and Wolfgang Rothe. Eberhard's was about the observing techniques and equipment of a mobile station and Wolfgang's on the Limovie-analysis of a short film of a star occulted by a minor planet.

Both workshops were public meetings, so distinct from the ESOP as such. Compared to the faces later present at the ESOP quite a few interested people were missing. Let's hope that all of them become members of IOTA-ES.

After the workshop of W. Rothe the main conference ESOP XXX started. The number of the 'Old Faithfuls' among the participants was rather large, but it was positive to also see many new faces. The majority came from the Berlin vicinity. It was nice to also greet participants with whom I had discussed about occultations on German internet forums but who never had been to an ESOP before. So apparently it is possible to also attract attention through these sites.

Saturday morning the program began at nine o'clock with the opening by the director of the Archenhold Observatory and the president of IOTA-ES, followed by two public lectures.

None less than Bruno Sicardy of l'Observatoire de Paris, a specialist on ring dynamics and TNOs, held a lecture of our solar system beyond the orbit of the planet Neptune. This is an interesting topic because this research involves many occultations. In addition, he found a new extremely light sensitive camera, the Raptor, based on an EMCCD chip at a price of only 6000 Euro. Then there was a public lecture by Szilárd Csizmadia of Hungary from the German Aerospace Center in Berlin. He delivered a detailed report about exo-planets transit times and its perception by terrestrial star guards, including amateurs.

After a frugal lunch, especially with bockwurst (type of sausage) and rolls, the real ESOP began. There were participants and lecturers not only from Europe but also from the USA, Peru, and Brazil. There were about 55 participants from 17 countries.

The first lecture was held by Marcelo Assafin from Brazil. He works at the Observatorio Nacional Brazil and deals mainly with the astrometry of TNOs. This is very important in order to be able to predict occultations by these objects. Occultations by Pluto, Charon and more of these far distant objects are very important because we still know too little of these bodies. In that respect we have the advantage that Pluto crosses the Milky Way from 2001 to 2020 and thus a large number, especially faint, stars will be occulted. They work at the observatory with a 60 cm and a 1.6 m Cassegrain telescope The observatory has an average seeing of 0.8 "to 1.5". Generally, the measurement error of the position is better than 0.05" and only rarely more than 0.1". The average measurement error in right ascension was -0.008"with a standard deviation of 0.075" and 0.02" in declination with the same error. It turned out that the error depended on the brightness of the object. Down to magnitude 16.5, the mean deviation is 0.001", two magnitudes fainter it climbs to 0.02" and then to remain constant to mag. 22.

The next talk was by Felipe Braga Ribas from France. He is a PhD student and works with Bruno Sicardy at the l'Observatoire de Paris to select observations of TNOs. There is a big difference in observing these occultations compared to asteroids.

An asteroid has an average width of 100 km at a distance of about 3 astronomical units (AU) while TNOs average 1450 km in width at a distance of 40 AUs. There is an average orbit period of 3 years for minor planets and 300 years for a TNO. This means that the orbits of asteroids generally are well known, but those of TNOs only by 3%! The mean apparent size of both is about 50 mas (milli arc seconds) which is the same as a 2 Euro-coin at a distance of 120 km (!). If you want to have an observing success you need a very accurate position of the star and of the occulting object. Then the "fun" begins to select the telescope.

With a 60 cm telescope which is readily available you reach down to mag. 18. A 1-m telescope reaches down to mag. 20 but these instruments are available for 1 week at most per year, whereas the availability of a 2-m telescope with a sensitivity down to mag. 22 shrinks down to a few days per year .

A timeline should to be followed additionally. One to three years in advance the error between tracks is approx. 1 arcsec, six months before the occultation the accuracy improves to about 0.1 arcsec. Finally, if the astrometry is redone, 1 month in advance an accuracy of 20 mas and 60 mas for the star of the TNO can be achieved. Then the actual observation campaign can start where members of IOTA-ES often participated in distant countries such as Brazil, Hawaii, South Africa, China etc. An observation only makes sense when an occultation was seen at two slightly spaced observation sites. Successes have been there with Eris, Makemake, Varuna and Quaoar.

Then it was the turn of the President of IOTA-ES, Hans-Joachim Bode. He is one of the more energetic people to travel around the world to observe occultations by Pluto and its moons. This time he tried to catch the shadow of Pluto and a few days later in a combined event the shadow of the tiny satellite of Pluto, Hydra. It was an international campaign with observers from many countries in Australia, the Pacific islands, the Philippines, the Hawaiian islands and others. The idea was, to pinpoint Pluto's orbit by an occultation a

few days before, then calculate the correct offset of Pluto and derive from that the occultation track of Hydra. This project was originating in the precise determination of the Hydra orbit, done by Marc Buie from the South Western Research Institute, USA (SWRI), however, the star position was wrong and together with other problems, no occultation whatsoever could be observed by Hans Bode.

After the lecture of Hans-J Bode, Bruno Sicardy told his story about the lessons taught by the Hydra occultation. Essentially it was the same story as that of Hans, but more from the view of a scientist. The technique to improve the prediction of an occultation by an occultation of the same body a few days before, but with a different star, should work. However, the relative positions of the two stars are still a problem. This prevented in this case, along with other obstacles, a successful Hydra event.

The first session of two hours was over and we were ready for a coffee break. That only lasted twenty minutes, too short to enjoy a chat.

Then Mike Kretlow started his presentation "On the Reduction of Occultations by Minor Planets". Mike's effort is a program of the IOTA-ES for predictions, reductions and archiving. The final result should be a database including all this. The database with the observations has been finished. He publishes the results automatically every day at midnight using the new observation reports Eric Frappa publishes on Euraster. Mikes data base can be found at http://sky-lab.net/occrep. The prediction program was written by him, now in its test phase and not yet published on the web. He expects it to be ready at the end of this year.

Anyway - you can use Dave Herald's Winoccult or Edwin Goffin's predictions too. Steve Preston is offering many recent predictions also for Europe. Unfortunately, the occultation-report-list is not complete. Many observations are not published by Planoccult and go directly to Eric Frappa. But worst of all: many observers who have a negative event do not publish it at all. They obviously aim at a high score, while a negative perception also can be a valuable observation.

Wolfgang Rothe then held the next presentation on "Where should one observe?". Unfortunately he gave no direct answer to this question because it is almost impossible to be answered. His conclusion was to observe regardless of the circumstances, even if you are far beyond the 1-sigma zone. He used the table of Raymond Dusser. (Later in my talk I showed that this table is very likely wrong (which I know almost for sure). Of course, even if you are far beyond the 1-sigma zone and it is unlikely to have a positive observation, it has been proven that positive results have been achieved).

Then Claus-Peter Heidmann held a lecture on the occultations by Antiope in 2009 and Makemake in 2011. Antiope is a binary minor planet, each about 85 km in diameter and very close to each other. They have an orbital period of approximately 16.5 hours around the center of gravity.

After showing Keck images which revealed the binary nature of Antiope and the results of an occultation on January 3, 2008 in Japan, he presented the light curve of his own observation which was severely affected by clouds. From close inspection, a single positive event appears probable.

Then an observation of an event by Makemake on April 23 this year was reported. The challenge of this event was the combined brightness of about 17m and the expected drop of 25% only. Although of low signal to noise ratio, in this case the lightcurve data are indicative of a negative observation.

It was up to Eberhard Bredner now to give his presentation about the occultation by Antiope. A few weeks ago he spontaneously went to the U.S. for two combined reasons: The annual meeting of the IOTA and an occultation by Antiope. The prediction by Steve Preston turned out to be perfect. There were not less than 88 observation sites. A large number were operated by remote unmanned stations with cameras on small telescopes directed by Degenhardt, Wenable, and Dunham. Eberhard's observing site was exactly between the two components of Antiope, where he saw no occultation. Never before he was so happy about a miss, he reported still very excited, because now he is one of the six persons who saw this "strange" on earth. The effect of this occultation is spectacular. No doubt one of the two bodies clearly has a "missing piece", probably due to a collision with another object.

Alexander Pratt then entered the pulpit. His presentation was about the positive occultation by ISIS on May 3rd this year. There were three positive observations. Alexander contributed this observation to the recently deceased Andrew Elliot.

The last lecture on Saturday afternoon was canceled because time was running out, so the final presentation of that day was the one by Harrie Rutten (me). In the introduction I said that my talk would deal about the question: 'Are the probabilities after Raymond Dusser's method correct?'. Due to time constraints I told a very short and clear story and asked for a discussion. Unfortunately chairman Konrad Guhl gave no opportunity for that and suggested to leave it for the social dinner. I will present an article about it in a later issue of JOA.

In the evening the social dinner started at 8 o'clock in a restaurant called 'Essen statt Kochen' which means: "Not cooking but eating"! It was a nice buffet, nice wines and lots of talks. Tempus Fugit, the time ran too fast.

Sunday, the second day of the ESOP, started with the postponed lecture by Edwin Goffin. His talk was about statistics. This involved improvements in the orbit of minor planets and statistical analyses of the reductions and the relation to occultations by minor planets.

Obviously each orbit and its position in the sky is described by six parameters, such as period, long and short axis (eccentricity), inclination, location of the nodes, etc. When an orbit is calculated it is compared with new observations and the theoretical position which leads to a more accurate orbit. The observations are weighted and the weighting factor is inversely proportional to the square of the standard deviation of the observation.

However, there are some problems. Reductions with a deviation of more than 3-sigma have not been included. Moreover, observations before 1890 that had a deviation of 3 arcsec or more were also removed, and so were deviations from 2 arcsec for observations from 1890 to 1950 and 1 arcsec for later observations.

This is caused by the observation technique: meridian passages were done in early times while today CCD imaging is used.

With visual observations there was also a relationship between the brightness of the planet and the telescope size. These initially were quite small (compared to today's standards), a refractor of 186 mm aperture. Errors in the beginning had a standard deviation of 1.5 arcsec, now observations achieve values of 0.02 arcsec! This indicates that today's modern high-precision position measurement calculation show that the orbit calculations are much better which results in better predictions. Thus the probability of a successful observation of an occultation by a minor planet is increased considerably.

Then the original program resumed. It began with a presentation by Carles Schnabel about binary stars at grazing occultations. Recently there was a grazing occultation of a triple star that was observed from Sabadell and from Menorca. He showed a spectacular image of a Limovie analysis and generated Excel graphs of the grazing occultation of this triple star.

train and had to get another one. In the hustle he lost his suitcase, and the USB stick with the presentation that he had in his pocket was lost too. The presentation of the results will be in one of the coming JOAs.

Then Konrad Guhl held a lecture about the atmosphere of the moon. It wasn't to prove seriously but this was a more historical overview since that theory exists. The first one was Plutarch who lived from 45 to 125, but also Kepler (1571-1630) was convinced that the moon had an atmosphere. Clavius observed an annular eclipse on April 9th, 1567 that, to his opinion, should be total: from the annularity he concluded that the moon must have an atmosphere. Halley observed a total solar eclipse in 1706 and 1715 and described the corona as the atmosphere of the moon. The same error happened to du Sejour in 1764.

On June 28th of that year Venus was occulted by the moon. Some saw a red coloring Venus disappearing behind the moon and reappearing later reddish too, others saw no evidence of an atmosphere. Hevelius assumed active volcanoes have led to an atmo-

Because Eberhard Riedel did not make it to the conference, Wolfgang Beisker presented the GrazPrep program from Eberhard Riedel from a PowerPoint file Eberhard had prepared. Eberhard had presented a beta version of this program last year in York at ESOP XXIX. Now the program is ready and can be downloaded from the IOTA-ES site.

After that Roman Kostenko from Ukrainian Vladislavovich told about the amateur astronomers association of Poltava. This association was founded in 1962 and is dedicated to the observation of lunar occultations. The observations are made with a 20 cm Zeiss refractor! It's a very active association. The average number of observations is 173 per year with a maximum of 407 in 1979. The total is more than 8000 observations! It is a formidable competitor for the Dutch society DOA (in that period more than 11,500 observations max 595 in 1995).

Since the observatory is at the edge of the range of the DCF time signal, the time signal station of Moscow is used. They also did investigations on the visual personal equation compared with electronic monitoring.

After that Jan Manek was supposed to give a summary of the observations of 2010 to answer the question: Who was the nation or observer with the most reports last year? The Netherlands in 2010 certainly would not have scored as it was in 2009 because the weather was too bad. Unfortunately, in Prague Jan had missed his

sphere. One of its "best" observations is that of Gruithuisen in 1848 who believed to see a real city on the moon. The latest in: They found sodium at a distance of 9 moon radii to the moon.

After a coffee break with drinks and biscuits it was Apostolos Christou's turn, He is Greek, working at Armagh Observatory in Northern Ireland and an active observer. His story was about the mutual occultations of the moons of Jupiter. He pointed out the special relations between the orbits of the moons: Europe is 2:1 with Io, and Ganymede 4:1. As a result, there are considerable tidal effects on the moons themselves, not only tidal force on the surface (especially Io, as known by his outbursts), but also some effects on their speed in the orbit. This can be very accurately determined by mutual occultations. Apostolos did his observations not only in Northern Ireland, but also in Greece. He therefore called for in the 2014-2015 winter observations. Then Jupiter is always high in the sky.

After that it was time for the talk of Myriam Pajuelo from Peru. This was the first time I saw a female speaker at the pulpit of the ESOP conference. She works at the University of Peru. Unfortunately, her presentation was in Spanish. She presented the astronomical activities in her country. There is a planned cooperation between the Observatoire de Paris and Peru. They are planning to build a 50 cm instrument for general astronomy, an observatory, which if finished, could fill one of the many gaps in South America north of Paranal. The lecture was supplemented by a presentation of her colleague

Erick Meza about the astronomical student group of the Technical University of Peru in Sicaya. Both offered support to observers wanting to go to Peru for observations or other activities.

Subsequently, Tom Aldeweireldt from Belgium showed an impression of the total eclipse on Easter Island last year which was also observed by Wim Nobel. Konrad Guhl spoke again about his favorite subject, Baily's Beads, why he always observes at the edge of the predicted path. He did these observations together with Andreas Tegtmeier.

The last contribution before lunch was by Andrea Raponi from Italy. He works at the University of Rome, along with Costantino Sigismondi, who had previously visited a few ESOPs, but was ill this time. He is active in measuring the diameter of the sun and gives a lot of scientific support. The main observations are made during solar eclipses. The idea is that the sun has a lower radiation during sunspot minima (0.1 %!).This seems to be confirmed by the famous Dutch paintings of winter scenes by Hendrick Avercamp (1585-1643) which he painted during the Maunder minimum. During the Dalton minimum it was clearly colder on our globe. If you look at the actual activity of the sun, you would expect that the climate would get colder, (in contrast to the global warming everyone is talking about today). The observations showed that during the cold periods the sun has a slightly larger diameter. He believes this can partly be proven by observing Baily's Beads like Konrad already reported. In this case, the differences (a few hundredths arcsec) are very small,.

Fotos: Farago, Rutten, Teuscher

There was plenty of time to strengthen networks and relationships. The last session began with a presentation of one of the most active observers of occultations by minor planets, the Austrian Gerhard Dangl. He is an extremely precise observer and maintains a most interesting website devoted to this subject with many interesting facts about the behavior of video cameras. Now he went a step further by exactly determining the behavior of the Watec, Mintron and other cameras. He examined this with a self made measuring device called EXTA. Starting with a one millisecond exposure time and GPS time stamps of time inserters he can measure the time delay at different exposure times. All details are available at his site: www.dangl.at.

Wolfgang Beisker then presented a comparison of CCD cameras. There are major differences when you take into account aperture, noise, background brightness, quantum efficiency of the chip as well as focal length. The EMCCD camera Raptor as proposed by Bruno Sicardy was also discussed. He compared a QHY6 camera with a standard ICX255 chip with the Raptor camera having a EMCCD chip from Texas Instruments. Over all, the Raptor records about 1 magnitude fainter stars. But since the simple QHY6 camera can reach 17th mag. with an exposure time of 1s at a 38 cm Newton f/4 telescope the high price of the Raptor (Euro 6000) must be questioned. A software (OCCSIM) has been developed to simulate occultation events according to many different camera and telescope parameters. In one of the next JOAs, an article about this program will be published.

The last lecture was by Pawel Maksym from Poland. As a TV-producer he was one of the most interesting persons at ESOP conference. His talk was about a remote station for observing occultations. A few years ago he built an observatory in Lodz, but not all problems are solved yet. We all know the advantages of remote observing: such an instrument can be operated from anywhere in the world with an internet connection and is readily available without having to travel, But there are also disadvantages he encountered. The software is not stable, remote observatories often lack local support, the Watec can not be operated remotely. So remote operating is always a risk. Pawel Maksym is now practicing diligently, controlling the telescope in the top of a tower from the warm climate in the office room of the observatory. The whole equipment is constantly viewed by a number of infra-red security cameras (cheapest models, for instance from the electronic distributor Conrad) so especially the cables don't get tangled up when the telescope passes the meridian.

Then the announcement of next year's ESOP was nearly the last part of this symposium. Costantino Sigismondi agreed to organize the next ESOP in Pescara in Italy. The Italian commitment was so short termed that no presentation could be made so Andrea Raponi invited us personally. He pointed out that it is important to book early as Pescara is a famous holiday resort about 200 km east of Rome.

Hans-J Bode had asked for a second site parallel to Pescara, so this will now be used in 2013. Therefore the location of the ESOP XXXII is already known. It is Sabadell or Barcelona. In 2014 the ESOP may be back to northern Europe again.

After the break there were two parallel workshops: one by Jan Manek about "How to work with the new version of Winoccult" and the second one by Wolfgang Beisker "On the evaluation of CCD cameras". In the evening we met for dinner on a clipper at the lakeside close to the observatory, while on Monday and Tuesday excursions were included tn the program.

Journal for Occultation Astronomy

Call for Observation

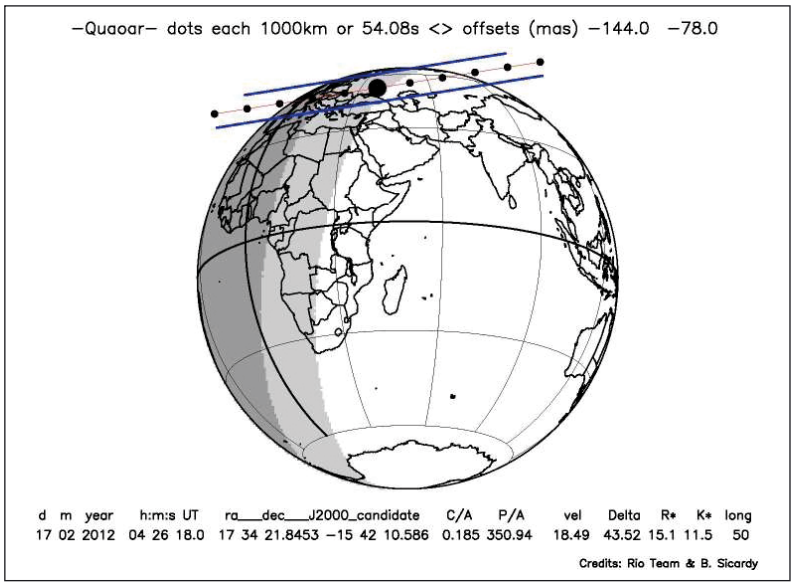
European QUAOAR – Occultations in 2012

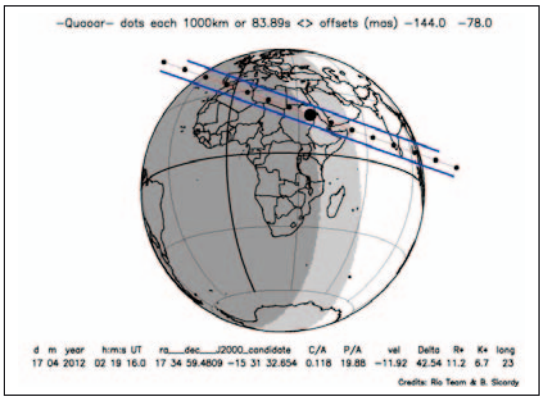
Quaoar is one of the larger Trans-Neptunian-Objects (TNO) supposed to have an atmosphere as indicated by a few successful occultation-observations in the past .

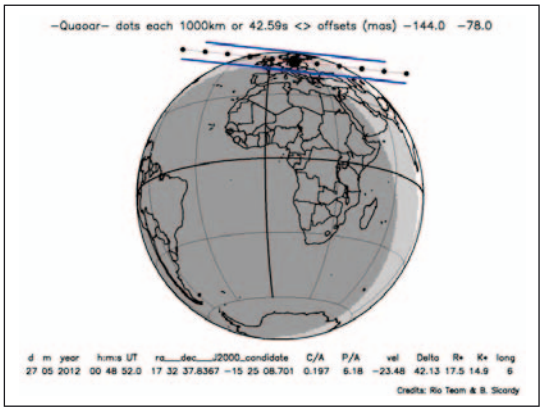
To get more evidence about this assumption anybody interested in TNO-observations should participate in the recording of this event, keeping in mind that the prediction path yet may change due to last.minute-astrometry. Additionally anyone known living in the vicinity of the occultation path should be contacted to join our measurements.

This event on April 17th should especially be observed over a wide range. Observers can easily record this occultation of a relatively bright star (R=11.2 mag). In case you know somebody in northern Africa having a telescope also these observers should be informed. A few years ago IOTA-ES-members stayed at a Moroccan hotel having its own observatory (14" & 16" telescopes). This observatory will be used again for this event. To determine the shape of this object it is sufficient to do the observation with a Watec- or Mintron-Camera, but to record the possible atmosphere you should use a 16 bit-resolution-system.

Hans-J. Bode







Journal for Occultation Astronomy

Baily Bead observation during the annular eclipse 2010 January 15

Konrad Guhl (IOTA/ES) · Andreas Tegtmeier (IOTA/ES)

General

Observations and reductions of Baily Beads during an annular or total solar eclipse have a long tradition for IOTA and IOTA/ES. A complete summery of the work, has been done at last year's presentation [1]. Observations of the eclipses in 2010 are highly requested to find a solar diameter during the minimum of solar activity. For the annular solar eclipse of January 15th, 2010 IOTA/ES made plans for 4 expedition teams: Bode on Seychelle islands, Caminiti on Maledives Islands, Guhl in Kenya and Tegtmeier in India. The observer on the islands and the station in Africa was clouded out and only A. Tegtmeier was able to obtain a convenient video tape.

Observation and results

The used equipment follows the IOTA/ES recommendation and is based on a 100/1000 mm Maksutov optic, a non-automatic camera and the IOTA/ES filter (see [1]). The observation conditions are acceptable but strong influences by snoopy people staying all around and considerable wind which resulted in some vibrations to the instrument. Following the station code, created in [1] the station is called 2010INN1 and was settled at the northern edge at:

Latitude 11°06,158'N; Longitude 79°27,268'E;
Height 18 m (WGS84)

The video tape has been analysed visually by the authors. The inspection was done twice on different computers, days and by differnts persons to be sure receiving independent data. Only beads easy to identify are filled in the table of results. An obvious identification leads to the Watts angle which can be found by the eclipse simulation software [3].

Addionally some light curves were recorded using some disappearing beads and presented in [2].

Following the data table format of [1] the observation are listed in table 1:

Time/hms (UTC)	D/R	Watts angle[°]	Remarks
07h53m46.2	R	192.7	
07h53m48.7	R	185.9	
07h53m49.3	R	188.4	
07h53m57.1	R	170.9	
07h53m57.9	R	181.5	
07h53m59.2	R	171.1	
07h54m00.2	R	176.7	
07h54m03.9	R	175.3	
07h54m12.7	R	173.5	
07h54m31.3	R	165.6	
07h55m05.5	R	158.5	uncertain, wind
07h56m58.3	D	145.7	
07h57m02.6	D	123.5	uncertain, wind

Table 1 identified beads and contact times

Reduction and preliminary result

All observation are simulated by the software tool „Baily Bead Analysis" of the software [3], where the version V 4.0.9. includes the Kaguya data. So the analysis was done only in this way. All other simulation/calculation tools e.g. SUNBEADS are using the old Watts data. The simulation shows the distance of the limb of the moon (based on Kaguya data) to the calculated diameter of the sun in arc-second per watts angle. So the offset of the solar radius is given as output data.

From all 13 observations the average is -0.3" +/-0.11". Skipping away both observation influenced by wind the average from 11 bead is -0.29" +/- 0.1".

The observed solar diameter is definitely smaller than the official value – now during the minimum of solar activity.

[1] Sigismondi et. al. "Baily's Beads Atlas in 2005-2008 Eclipses", Solar Physics, Volume 258, Issue 2, pp 191-202.

[2] Raponi, A. "The measurement of Limb Darkening Function with the eclipse observation" lecture on ESOP XXX, Berlin 2010

[3] D. Herald "WinOccult V 4.0.9." software tool

[4] Andersson, Guhl, Haupt: "Sonnenstrahlen im Kiselevka Tal – eine erfolgreiche Expedition der IOTA/ES", Journal für Astronomie No. 30, S. 70-72 and No. 31, S. 96-99, Heppenheim 2009

Journal for
Occultation
Astronomy

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

Occultation Newsletter – Impressum

Editorial staff: Wolfgang Beisker, Hans-Joachim Bode, Michael Busse, Eberhard Riedel, Brigitte Thome
Responsible in terms of the German press law: Hans-Joachim Bode
Publisher: IOTA/ES Hans-Joachim Bode
Journal of Occultation Astronomy: IOTA/ES; Bartold-Knaust-Strasse 8; D-30459 Hannover, Germany
Phone: 00 49-5 11-42 42 88 (in Germany 0511-42 42 88)
email: joa@iota-es.de
Layout artist: IOTA/ES Michael Busse
Webmaster: IOTA/ES Wolfgang Beisker
Publication dates: 4 times a year
Press date: **April-June:** **March 15,** **July-Sept.:** **June 15,** **Oct.-Dec.:** **Sep. 15,** **Jan.-March:** **Dec. 15**
Membership fee IOTA/ES: 20,– Euro a year (incl. JOA: free of charge)

For subscription purposes of Non-European members: This issue can be regarded as Vol. 14, No. 4

IOTA on the World Wide Web

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

IOTA Member Site:
http://groups.google.com/group/iota_us

This site contains information about the organization known as IOTA and provides information about joining IOTA and IOTA/ES, topics related to the Journal of Occulation Astronomy, and information about the membership – including the membership directory.

IOTA Lunar Occultations, Eclipses, and Asteroidal and Planetary Occultations Site:
http://asteroidoccultation.com/iota/

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.

Journal for Occultation Astronomy
(ISSN 0737-6766) is published quarterly in the USA by the International Occultation Timing Association, Inc. (IOTA), 2505 Jeannes Trail, Edmond OK 73012

98064-6356, 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.
Printed Circulation: 200

Regulations

The Journal of Occultation Astronomy (JOA) is not covenanted to print articles it did not ask for.

The author is responsible for the contents of his article & pictures.

If necessary for any reason JOA can shorten an article but without changing its sense or scientific contents.

JOA will always try to produce an article as soon as possible based to date & time of other articles it received – but actual announcements have the priority!

Articles can be reprinted in other Journals if JOA has been asked for permission.