RASNZ ISSN 1176-5038 OCCULTATION

CIRCULAR CN2007/4 March 2012

+.5

SECTION

+.5"

+170"



 +164*
 +165*
 +165*
 +167*
 +168*
 +169*

 Top: Profile diagram showing 38 recorded events for the graze of ZC 3253 (aka, 38 Aquarii, SAO 164910) on September 24th 2007.

Bottom: Profile diagram showing a total of 52 recorded events for the 16th October 2007 graze of SAO 185075.

These grazes were observed by Team Occultation - see page 52 for more details.

Visit the Occultation Section website at http://www.occultations.org.nz/

Newsletter of the Occultation Section of the Royal Astronomical Society of New Zealand

FROM THE DIRECTOR

Welcome to the re-launch of the RASNZ Occultation Section Quarterly Circulars. These Circulars have been in abeyance since the last issue appeared in March 2008, a situation which I regret and for which I, as Director, take full responsibility. However with the kind assistance of Murray Forbes, our new editor, I expect that the Circulars will from now on appear on a regular basis (even if they may not initially be quarterly.)

For subscription purposes this is the last Circular in the CN series for the 2007 subscription year. It is being distributed to those who were members of the Section at that time, and contains reports of both positive and negative observations made over the last quarter of 2007 and all of 2008. There will be no CN2008 series, and the following three Circulars will cover data from 2009, 2010, and 2011 respectively. Even though this data is now quite old I feel it is important to publish all reports received both to acknowledge the hard work put in by our observers, and also because these Circulars form the permanent archive of occultation results from New Zealand and Australia.

As our publication obligation to our 2007 subscribers has now been met, before the next Circular is distributed the Section will again be asking for subscriptions. However much has changed in the last four years: the price of postage has risen sharply, and much more material is now delivered via email and the web. For a reduced subscription no doubt some of you will prefer to receive future material as a PDF. Equally, others may prefer to pay extra to receive printed publications, given that sometimes all of us can become so buried in email that attached documents do not get read in a timely fashion - if at all. I welcome feedback from members about what their preferences might be, and I hope that this topic will be discussed at the forthcoming 6th Trans-Tasman Symposium on Occultations (TTSO6) meeting in Brisbane on Monday 9 April immediately following the NACAA convention. (See later in this Circular for the preliminary TTSO6 programme).

I would also like feedback on whether the Section's CA series of circulars should continue. The CA series published charts for selected minor planet events. I know some of you liked having printed charts available as a reminder for upcoming events, but the Cirulars are expensive to produce and details of many more events now appear on our website. In addition many regular observers use Hristo Pavlov's OccultWatcher software to remind them of what's coming up.

During 2011 the Section agreed to distribute the International Occultation Timing Association's Journal for Occultation Astronomy in Australasia. The JOA took over from the former Occultation Newsletter, and Issues 1 to 4 are available to Section members as a downloadable PDF from our website: www.occultations.org.nz.

Finally I would like to take this opportunity to thank all those who continue to assist in the smooth running of the Section. Minor planet predictions are annotated and posted to our website by the team of John Sunderland, Greg Bolt and Peter Litwiniuk. John Talbot continues to collate asteroidal observations and perform a preliminary analysis of positive events before posting them to the website. Brian Loader and Dave Gault collect and collate total occultation observations for New Zealand and Australia respectively, and Brian also publishes predictions and analyses for lunar occultation events involving suspected double stars. Dave Gault continues to moderate the RASNZOccultations Yahoo Group to which I hope all Section members have subscribed, while many others have assisted us in so many other ways. Finally I would like to make a special thanks to Murray Forbes whose diligent work over many months has seen this Circular come to fruition.

Graham Blow Director Graham@occultations.org.nz

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Positive Occultations by Observer

2007-last quarter

Dallow, A1	Purcell, P1	
Gault, D1	Russell, S1	
2008		
Allen, B	Dobosz, T2	Pavlov, H
Anderson, P 4	Gault, D2	Purcell, P1
Bradshaw, J9	Herald, D4	Quirk, S5
Brakel, A1	Kerr, S 8	Streamer, M1
Breadsell, D3	Loader, B4	Watson, D1
Broughton, J10	Lowe, D1	Wyatt, C1

Total number of positive occultations for 2008: 68

Monitored Appulses by Observer

2007-last quarter

Bradshaw, J1	Jaquiery, P1	Pavlov, H	
Brakel, A1	Kerr, S 6	Russell, S1	
Gault, D	Loader, B3	Watson, D4	
Herald, D2	Loader, P1		
Hussey, L1	Novak, Z1		
<u>2008</u>			
Adamson, F1	Gault, D21	Pavlov, H7	
Allen, B 3	Herald, D6	Pennell, A1	
Anderson, P7	Kerr, S	Quirk, S	
Bradshaw, J21	Loader, B56	Rowe, G1	
Brakel, A7	Loader, P2	Russell, S4	
Breadsell, D1	Lowe, D1	Talbot, J1	
Broughton, J14	Mason, E1	Watson, D9	
Dallow, A1	Palfreyman, J1	Wyatt, C6	
Total number of monitored appulses for 2008: 209			

Observational Reports: Events to December 2008

NOTE: Please always fill out a report form, even if you did not see an event. Your negative observation could be crucial in determining where the event did occur. Reports should, where possible, be submitted by email using the MicroSoft Excel report form available from our website. The preferred naming convention for reports is:

YYMMDD<+/_><Asteroid name>_<Observer name> (e.g. 050425 Alcathous Loader ; 050701+Liguria Gault)

where +/_ indicates a positive or negative observation respectively. Please ensure that all ancillary files (e.g. plots, drift scans) conform to the same naming convention. Email reports to John Talbot (john.talbot@xtra.co.nz) with a cc to Graham Blow (Graham.Blow@actrix.gen.nz)

Reports Omitted from Previous Circulars

(1306) Scythia • S. Kerr	TYC 6788-00891-1 (Mag 12.3) Glenlee, QLD	2007 July 04 13:18:20 to 13:31:26
2001 KG77 • S. Kerr	UCAC2 23402654 (Mag 11.2) Glenlee, QLD	2007 July 06 10:47:14 to 11:00:00
(1456) Saldanha • S. Kerr	UCAC2 42546521 (Mag 11.9) Glenlee, QLD	2007 September 14 18:58:28 to 19:01:50
(516) Amherstia • S. Kerr	UCAC2 19422596 (Mag 11.9) Glenlee, QLD	2007 September 23 10:10:10 to 10:17:00

<u>Reports from the 2007 last quarter Period</u>







3. H. Pavlov 4. Prediction, 3 Sep.

Discussion: The expected diameter of Hygiea at 407 km is shown in the plot (above left). We can be confident that Stephen Russell was north of the central line of the event using the nearby negative results.

(3772) Piaf

• P. Purcell

TYC 6919-01491-1 (Mag 10.0) 2007 October 05

Chapaman, ACT Longitude: +149° 02' 35.1" Latitude: -35° 21' 30.1" Altitude: 650 m D at 09:36:04.3 R at 09:36:05.3 Duration: 1.0 sec Monitored: 09:34 to 09:38

VISUAL

Comments: The star seemed to be a component of a close double and the event was a 'blink' of possibly 1 sec duration but may possibly have been due to atmospherics although the star was visible continuously up to that point. I had difficulty locating the star initially because of twilight and then cloud about 25 minutes prior to the event. This cleared and I managed to locate the field. All I recorded was a 'blink' so it may well have been simply atmospherics but Dave Herald advised me to report the time anyway.





Key to Plot: 1. P. Purcell; 2. H. Pavlov; 3. D. Gault; 4. A. Brakel; 5. Z. Novak; 6. Prediction 3 Sep.

- H. Pavlov
- D. Gault
- A. Brakel
- Z. Novak

Marsfield, NSW Hawkesbury Heights, NSW Downer, ACT Theodore, ACT

09:34 to 09:41 09:34 to 09:39

09:23 to 09:40

09:34 to 09:40

Discussion: The position and expected 26 km diameter of Piaf is shown in the plot (previous page). With only one chord, which was of short duration, and two nearby negative reports on either side, it is unlikely that this was a real positive.

(3491) Fridolin	TYC 6360-00099-1 (Mag 8.0)	2007 October 20
• H. Pavlov	Marsfield, NSW	14:38 to 14:51
• D. Gault	Hawkesbury Heights, NSW	14:37:13 to 14:49:02
	Tennyson, NSW	14:42 to 14:55
• S. Russell	near Wyee, NSW	14:39 to 14:55
(6740) Goff	TYC 5840-00197-1u	2007 October 20
• B. Loader	Darfield, NZ	13:44:00 to 13:51:45
(51808) 2001OM1	HIP 110853	2007 October 21
• P. Jaquiery	Dunedin, NZ	08:08 to 08:20
(2046) Leningrad	TYC 0277-00636-1 (Mag 9.9)	2007 October 27
• S. Kerr	Glenlee, QLD	15:09:35 to 15:17:14
(4614) Masamura	HIP 700 (Mag 7.1)	2007 October 30
• A. Dallow	Darfield, NZ	D at 11:50:04.51 CCD
	Longitude: +172° 04' 05"	R at 11:50:08.29
	Latitude: -43°2 8' 59"	Duration: 3.78 sec
	Altitude: 205 m	Monitored: 11:49:59 to 11:50:29
Comments: Star was dim in	my telescope. May have some Fi	resnel diffraction.
• L Hussey	Sockburn NZ	11.43 to 11.49
• B. Loader	Glentunnel. NZ	11:45 to 11:57
• P. Loader	Darfield, NZ	11:42 to 12:00
(461 0) Masamura 2007 Oct 30, 7 Geocemic × 2011.6 × 42 0	.0 x 7.0 km, PA 0.0** m	A



Above is Andrew Dallow's drift-scan image, below is the Scanalyser data of the occultation.



Discussion: Masamura has an expected diameter of 7 km. The dip shown in the drift-scan image above is probably noise as Masamura was predicted to have a magnitude of 15.3 and a magnitude drop of 8.6, which would be too dim to show on an image with a 15 cm telescope. The graph also shows a very noisy signal. The other graph (below) shows the observation for track 1 (Pauline Loader), which was close to Andrew Dallow's, and is also noisy. All the observers reported flickering. On balance, it seems likely that Andrew's result was negative.



- D. Gault
- Hawkesbury Heights, NSW 10:20 to 10:25

(1962) Dunant • H. Pavlov	TYC 0017-01136-1 (Mag 9.5) Marsfield, NSW	2007 November 12 10:17:00 to 10:27:42
(25) Phocaea • D. Watson	UCAC2 30682649 (Mag 11.6) Thornton, NZ	2007 November 12 12:36 to 12:54
(1062) Ljuba	TYC 6879-01644-1 (Mag 11.5)	2007 November 16
• H. Pavlov	Marsfield, NSW	11:10 to 11:14
(6619) Kolya	HIP 8375 (Mag 8.7)	2007 November 19
• H. Pavlov	Marsfield, NSW	12:32 to 12:41
(191) Kolga	TYC 0158-00653-1 (Mag 10.5)	2007 December 03
• J. Bradshaw	Samford, QLD	14:00 to 16:10
(82) Alkmene	TYC 0270-00241-1	2007 December 05
• D. Herald	Kambah, ACT	17:20:00 to 17:20:08
(78752) 2002TJ287	TYC 0588-00672-1	2007 December 06
• H. Pavlov	Alison, NSW	17:20:00 to 12:30:30
(70751) 1999VZ24	TYC 6939-00494-1	2007 December 08
• H. Pavlov	Marsfield, NSW	10:03:42 to 10:10:36
(366) Vincentina	UCAC2 40967689	2007 December 21
• S. Kerr	Glenlee, QLD	13:18:45 to 13:27:50
(94) Aurora	UCAC2 28838101 (Mag 11.0)	2007 December 27
• D. Watson	Thornton, NZ	09:16 to 09:30
(246) Asporina	TYC 0116-00302-1 (Mag 10.7)	2007 December 29
• B. Loader	Darfield, NZ	11:10 to 11:20
• D. Watson	Thornton, NZ	11:10 to 11:20
(4975) Dohmoto	TYC 4801-03645-1 (Mag 10.4)	2007 December 30
• D. Watson	Thornton, NZ	14:10 to 14:27
(903) Nealley • D. Gault	UCAC2 34616657 (Mag 11.2) Hawkesbury Heights, NSW Longitude: +150° 38' 27.8" Latitude: -33° 39' 52.0" Altitude: 286 m	2007 December 31 D at 10:41:24.95 VIDEO R at 10:41:27.15 Duration: 2.20 sec Monitored: 10:35 to 10:46 Monitored: 10:35 to 10:46

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Discussion: The graphs (right) are the Limovie light curves of the occultation. With only one result it is not possible to determine whether Dave Gault was north or south of the predicted centre line.



Reports from the 2008 Period

(76) Freia

• B. Allen

TYC 1320-00481-1 (Mag 11.8)2008 January 03Blenheim, NZD at 10:38:13.04Longitude: +173.83927°R at 10:38:22.35

 D at 10:38:13.04
 CCD

 R at 10:38:22.35
 Duration: 9.31 sec

 Monitored: 10:37:44.16 to 10:39

Altitude: 38 mMonitored: 10:37:44.16 to 10:39Comments: The timing tapes were analysed with Goldwave. The images were analysed by JohnBroughton using Scanalyser. Poor observing conditions but the drift scan image was acceptable.Manual synchronisation of Timer Box to KIWI-OSD time to within 0.1 second.

• D. Watson

Thornton, NZ

Latitude: -11.49163°



Bill Allen's CCD drift scan image.

10:32.0 to 10:44.0



Discussion: The expected diameter of Freia is 183 km. With only one result we cannot determine if Bill Allen was north or south of the central line of the event. However, if the updated prediction was close to correct, then Bill's result, which was shorter than expected, might lie 80 km from the central line. (34773) 2001 QL260 • B. Loader

(694) Ekard • D. Gault

(149) Medusa • D. Watson

(227) Philosophia • H. Pavlov

(8355) 1989 RQ1 • B. Loader

(88253) 2001 FV69 • B. Loader

(223) Rosa • J. Bradshaw

(17573) 1994 PJ13 • J. Bradshaw

(2001) XU254 • D. Watson

(45481) 2000 AK733 • B. Loader

(429) Lotis • B. Loader

(3401) Vanphilos • B. Loader

(4700) Carusi • B. Loader

(1796)Riga • D. Herald TYC 0725-00084-1u Darfield, NZ

TYC 6114-00532-1 (Mag 12.4) 2008 January 11 Hawkesbury Heights, NSW 16:55 to 17:05

2008 January 03

2008 January 19

2008 January 21

2008 January 25 17:34:10 to 18:05:51

2008 January 26

2008 January 30

10:59 to 11:06

12:50:58 to 12:56:29

11:08:50 to 11:18:10

13:32:00 to 13:39:30

09:32 to 09:40

TYC 1309-03770-1 (Mag 10.9) 2008 January 14 10:32 to 10:44 Thornton, NZ

TYC 2424-00058-1 (Mag 9.8) 2008 January 15 11:57:00 to 12:04:34 Marsfield, NSW

TYC 0062-00235-1u Darfield, NZ

HIP44176 Darfield, NZ

UCAC2 23396177 Samford, QLD

TYC 1393-00851-1 Samford, QLD

TYC 1373-02131-1 (Mag 10.8) 2008 January 26 12:24 to 12:35 Thornton, NZ

TYC 1313-01654-1u Darfield, NZ

UCAC2 33562382 (Mag 11.3) 2008 January 31 Darfield, NZ 12:47:30 to 12:52:00

HIP 50604 (Mag 8.0) Darfield, NZ

HIP 51067 Darfield, NZ

UCAC2 28726774

Kambah, ACT

Altitude: 580 m

2008 February 06 11:20:30 to 11:27:30

2008 February 05

09:49 to 09:56

2008 February 10 D at 11:25:49.72 Longitude: +149° 03' 49.0" Latitude: -35° 23' 49.3"

Monitored: 11:24:00 to 11:27:00

VIDEO

R at 11:25:52.82 Duration: 3.10 sec

Comments: 16-frame integration (0.64 sec).



Discussion: The circle (above) is plotted at the expected 185 km diameter of Hebe. The observations indicate that Dave Herald's result was north of the central line of the event.

(11) ParthenopeJ. Broughton	UCAC2 24224492 Reedy Creek, QLD	2008 March 02 18:02:53.0 to 18:03:37.2
(15956) 1998 BY24 • B. Loader	TYC 4943-00081-1u Darfield, NZ	2008 March 04 12:10:45 to 12:15:45
 (1712) Angola B. Loader <i>Comments:</i> A "Trans-Tasm visible on the monitor. Ana running averages of 6 field 	UCAC2 20859093 Darfield, NZ Longitude: +172° 06' 24.4" Latitude: -43° 28' 52.9" Altitude: 105 m an Low Magnitude" event. At Ma lysis of captured video using Lim s. Times were also obtained by us	2008 March 06 D at 15:51:53.1 VIDEO R at 15:52:01.2 Duration: 8.1 sec Monitored: 15:45 to 15:58 gnitude 12.1 the star was clearly if faintly ovie was difficult but obtained by using ing a stopwatch on the video playback.
<i>Discussion:</i> With only one south of the central line of correct then the longer than and that the object is not ci	chord it is impossible to determin the event. If we assume that the up a expected chord could suggest the rcular.	e whether Brian Loader was north or pdated prediction was approximately at it lies close to the centre of the asteroid,
(79563) 1998 QD70 • B. Loader	HIP72420 Darfield, NZ	2008 March 06 11:18 to 11:42
(1087) Arabis • S. Kerr	TYC 1965-00974-1 Glenlee, QLD	2008 March 08 13:18:00 to 13:30
(2728) Yatskiv • D. Gault • D. Herald	TYC 1366-02453-1 (Mag 10.1 Hawkesbury Heights, NSW Kambah, ACT	2008 March 08 10:42 to 10:51 10:46 to 10:59
(6344) 1993VM • S. Kerr	TYC 1349-00621-1 Glenlee, QLD	2008 March 08 10:52:00 to 11:02:00
(893) Leopoldina • J. Broughton	TYC 0892-00864-1 (Mag 12.3 Reedy Creek, QLD	2008 March 08 16:48:33.2 to 16:49:33.7
(97) Klotho • H. Pavlov	UCAC2 30546389 Marsfield, NSW Longitude: +151° 06' 11.4" Latitude: -33° 46' 13.5"	2008 March 10D at 13:07:49.1R at 13:07:52.9Duration: 2.8 sec
<i>Comments:</i> I noticed a pose convinced enough that ther event I checked my video a apertures I finally got conv drop was only 0.4 m. Light integration level 6 which co	Altitude: 105 m sible drop visually on the screen. Ye was an occultation but when Da again. After an hour and a half of r inced that the noticeable intensity curves shown over the next page prresponds to 32 frames.	Monitored: 13:02 to 13:10 When I analysed the video I wasn't we Gault reported that he had a 12 sec measurements with different cursor drop is caused by an occultation. The . Camera used: WAT 120N+ with



The light curves above are Hristo Pavlov's observations. The upper light curve (blue), which dips below the 1000 unit mark between the vertical (red) lines, is the target star. The other light curves are comparison stars.



Discussion: The ellipse on the plot (above) is a best fit to the chords observed, and has the same area as a circle with the expected 80 km diameter of Klotho. The path is approximately 180 km west of the predicted line.

(117) Lomia

• S. Kerr

TYC 1948-00414-1 Glenlee, QLD **2008 March 10** 10:46:00 to 10:56:00

(12772) 1994 GM1	TYC 4970-980-1	2008 March 11	
• J. Bradshaw	Samford, QLD	10:20 to 11:05	
(466) Tisiphone	UCAC2 17817515d	2008 March 13	
• H. Pavlov	Marsfield, NSW	15:17 to 15:30	
(1341) Edmee	UCAC2 41711694	2008 March 17	
• D. Herald	Kambah, ACT	14:29.0 to 14:30:30	
(89722) 2001 YY126	TYC 1355-01233-1u	2008 March 20	
• J. Talbot	Waikanae, NZ	08:10 to 08:25	
(283) Emma	UCAC2 20262805	2008 March 24	
• J. Bradshaw	Samford, QLD	16:33 to 16:44	
(1342) Brabantia	TYC 8681-00542-1	2008 March 25	
• S. Kerr	Glenlee, QLD	16:28:00 to 16:39:00	
(90) Antiope	UCAC2 40496606	2008 March 26	
• S. Kerr	Glenlee, QLD	11:40:41 to 11:50:10	
(247) Eukrate	TYC 6717-00695-1 (Mag 11.6)	2008 March 31	
B Loader	Darfield NZ	D at 14.28.41 58	VID

TYC 6/17-00695-1 (Mag 1 Darfield, NZ Longitude: +172° 06' 24.4" Latitude: -43° 28' 52.9" Altitude: 105 m

D at 14:28:41.58 R at 14:28:48.95 Duration: 7.37 sec Monitored: 14:26 to 14:32

VIDEO

Comments: The times are a combination of visual examination of the tape field by field and Limovie graphing. There was a suggestion of flickering just before the disappearance. Limovie and visual examination suggests a possible blink from c 14:28:41.31 to 41:36, that is 3 fields. Quite uncertain, possibly due to seeing.

Discussion: Eukrate has an expected diameter of 134 km. With only one chord it is not possible to determine whether the observation was north or south of the central line of the event.

Co.

(1253) Frisia

• B. Allen

• B. Loader

(3647) Erbisbuhl • J. Bradshaw TYC 6192-01175-1 Blenheim, NZ Darfield, NZ

TYC 5460-01332-1 Samford, QLD **2008 March 31** 17:18:14.697 to 17:18:56.177 17:16 to 17:22

2008 March 31 10:49 to 11:51

(28838) 2000 JA41 • D. Gault	TYC 6161-00029-1 Hawkesbury Heights, NSW	2008 March 31 11:55 to 11:57	
(147) Protogeneia • D. Gault	UCAC2 22768595 Hawkesbury Heights, NSW	2008 April 01 14:45 to 14:48	
(150) Nuwa • H. Pavlov	UCAC2 23473867 Marsfield, NSW	2008 April 03 13:59:00 to 14:16:00	
(1000) Piazzia • J. Bradshaw	UCAC2 12110024 Samford, QLD	2008 April 03 13:00 to 13:45	
(1000) Piazzia • S. Kerr	UCAC2 12110024 Glenlee, QLD	2008 April 03 13:31:20 to 13:44:45	
(510) Mabella This appears to be an occul reporting two events each	TYC 4947-00852-1 tation of a close double star, with	2008 April 05 Ted Dobosz and Hristo Pa	avlov both
• T. Dobosz	Ilford - Wiruna, NSW Longitude: +149° 46' 47.96" Latitude: +33° 0' 48.32" Altitude: 1015 m	D at 15:59:16.06 R at 15:59:21.74 Duration: 5.68 secs Monitored: 15:50:00 to	VIDEO
Comments: At Star Party		11011101 00 . 10.00000	10.00.10
• T. Dobosz	Ilford - Wiruna, NSW Longitude: +149° 46' 47.96" Latitude: +33° 0' 48.32" Altitude: 1015 m	D at 15:59:16.18 R at 15:59:21.62 Duration: 5.44 secs Monitored: 15:50:00 to	VIDEO
Comments: At Star Party	Annual. 1015 III	Wolltored. 15.50.00 to	10.00.15
• H. Pavlov	Ilford, NSW Longitude: +149° 51' 31.2" Latitude: -32° 57' 48.0" Altitude: 825 m	D at 15:59:18.5 R at 15:59:20.98 Duration: 2.48 secs Monitored: 15:49:00 to	VIDEO 16:01:00
<i>Comments:</i> Very humid! Had to wipe off the dew from the Schmidt corrector plate every 5-10 min There is a clearly visible step event at 15:59:20.06 (partial reappearance). May be close double star?			
• H. Pavlov	Ilford, NSW Longitude: +149° 51' 31.2" Latitude: -32° 57' 48.0"	D at 15:59:17.7 R at 15:59:20.06 Duration: 2.36 secs	VIDEO
Comments: This is the occu	Itation event for the secondary st	ar. Conditions were very h	numid.
• P. Purcell	Wiruna, NSW Longitude: +149° 46' 49.1" Latitude: -33° 00' 48.8" Altitude: 1016 m	D at 15:59:16.8 R at 15:59:22.2 Duration: 5.4 secs Monitored: 15:57:00 to	VISUAL 16:01:00
<i>Comments:</i> (1) Ian Mackay 60 mm Televue refractor w first time an asteroid occult	observed the event from the sam ith 7 mm eyepiece but did not rec ation has been observed at the So	e site (within a couple of f ord times. As far as we kn uth Pacific Star Party at W	metres) with a now, this is the Viruna NSW

hosted by the Astronomical Society of NSW. (2) Dave Gault travelled north & recorded a miss. Hristo Pavlov travelled south & recorded a brief disappearance. We infer from this that the occultation path was south of that predicted. (3) The occultation occurred several seconds later than predicted. (4) The duration of the occultation (5.5 secs) as observed at Wiruna was greater than the predicted maximum of 4.6 secs.



Light-curves of the observations (Hristo Pavlov's is on the left, Ted Dobosz's on the right).

• D. Gault

Lake Windamere, Mudgee Rd, 15:56 to 16:04 NSW

• B. Loader Darfield, NZ *Discussion:* This event happily occured during the South Pacific Star Party on April 5. The ellipse (right) is plotted at the fitted dimensions of 95 km by 35 km for Mabella. The locations used by Ted Dobosz, Patrick Purcell, and Margaret Streamer were effectively on the same chord line so they nearly overlap in this plot but help to confirm the timing. The figures below show the light curve data for the occultation and we believe that they are showing a dim secondary star. Hristo Pavlov's curve (left of the two) shows several interesting points: 1) We do not believe there is any case for an occultation between A and B as the light level in that region is consistent with the preceding several seconds. 2) We think there is a possibility of a step event at the first two points at B. The reason is that these two data points are above the subsequent light level, and consistent with the step at C. The three points at the start, and end, of Ted's curve are interesting. They do not have the scatter that is otherwise present in the light curve, and they are generally above the level of the main D part of the curve. So there is a case for interpreting a

15:54:30 to 16:00:30



Key to Plot: 1. B. Loader (miss, off the plot);
2. M. Streamer; 3. P. Purcell; 4. T. Dobosz (secondary star); 5. T. Dobosz (primary star);
6. H. Pavlov (primary); 7. H. Pavlov (secondary);
8. Predicted 7 Mar; 9. D. Gault (miss);
10. I. McKay (saw event from same location as Ted Dobosz but did not record times).

D of a fainter star, starting 0.12 s after, and ending 0.12 s before, the main star.

Note from John Talbot: I have checked the historical observations for Mabella and there are three single observations with chords of 23 km, 59 km and 68 km. With a predicted circular diameter of 57 km for this event (presumably based on magnitude and standard albedo), an ellipse could be from 68 x 49.8 to anything longer and thinner. I have also done a quick search in the latest AsteroidObservations.dat file to see if there were any other reports involving TYC 4947-00852-1 but found none. Of course the probability of same star involved in many occultations is low so this is not surprising. I tried to see if this could have been in the XZ or SAO catalogues as it is near the ecliptic and might already be known in those as a double. I eventually found that XZ equivalent is 35062 and checked to see if there was any hint of double in the XZ catalogue but nothing showed up. In desperation I did a Google search for TYC 4947-00852 and found nine occurrences, all for predictions of this event :-) Finally I looked at the image in Google Sky to see if anything could be seen but this star is way too bright to resolve a secondary at the separation we are looking at.

Summary:

We have four timed chords.

Three were almost on the same path.

The two positives with video observations show possible steps in the light curve, where the best explanation is a possible secondary star.

Fitting with Occult suggests that the separation is only a few milli arcseconds.

Clearly the MP is not elliptical, but we don't have enough chords to determine the actual shape. An alternative explanation is that both observers had near graze, but that seems unlikely.

(524) Fidelio	TYC 7397-00847-1	2008 April 08	
• B. Loader	Darfield, NZ	17:44 to 17:50	
(148) Gallia	UCAC2 33782836	2008 April 08	
• B. Loader	Darfield, NZ	16:48 to 16:54	
(275) Sapientia	UCAC2 32708124	2008 April 08	
• D. Watson	Thornton, NZ near Whakatane	13:37:00 to 13:55:00	
(37) Fides	UCAC2 34362164	2008 April 09	
• D. Gault	Hawkesbury Heights, NSW	16:03 to 16:07	
• B. Loader	Darfield, NZ	16:00 to 16:04:10	
(160) Una	UCAC2 20718790	2008 April 09	
• B. Loader	Darfield, NZ	17:33:20 to 17:39:20	
(623) Chimaera	TYC 7292-01844-1	2008 April 11	
• S. Kerr	Glenlee, QLD	D at 14:39:37.629 VIDEO	
	Longitude: +150° 30' 01.4"	R at 14:39:40.469	
	Latitude: -23° 16' 10.1"	Duration: 2.84 secs	
	Altitude: 50 m	Monitored: 14:37:57 to 14:44:15	
<i>Comments:</i> Video camera integrating with a exposure period of 40 ms. Detailed Limovie analysis from 14:20:20.2 to 14:20:50.7. Days building up on onting during the observation			
nom 14.39.20.3 to 14.39.30.7. Dew building up on optics during the observation.			

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Discussion: The circle (above right) is plotted at the expected 44 km diameter of Chimaera. With only one chord it is not possible to determine whether Steve was north or south of the central line of the event so the circle was arbitrarily placed in the centre of Steve's chord. Assuming the updated prediction was approximately correct would suggest that the chord lies to the north of the centre of the asteroid.

(10369) Sinden • J. Bradshaw	UCAC2 10851729 Samford, QLD	2008 April 12 12:00 to 14:00
(265) Anna	TYC 8769-00637-1	2008 April 13
• B. Allen	Blenheim, NZ	13:46:30 to 13:48:58
(165) LoreleyJ. Bradshaw	UCAC2 17064310 Samford, QLD	2008 April 15 11:14 to 12:00
(119068) 2001KC77	UCAC2 21348151	2008 April 16
• S. Kerr	Glenlee, QLD	18:27:00 to 18:54:00
(1277) Dolores	HIP 53765	2008 April 17
• B. Loader	Darfield, NZ	07:08:20 to 07:12:30
(636) Erika	UCAC2 19506365	2008 April 18
• S. Kerr	Glenlee, QLD	19:06:00 to 19:18:00
(138628) Huya	UCAC2 30865909	2008 April 18
• S. Kerr	Glenlee, QLD	17:52:00 to 18:12:00
(37) Fides	UCAC2 24850210	2008 April 24
• B. Loader	Darfield, NZ	08:19:50 to 08:26:00
(2137) PriscillaD. GaultB. Loader	TYC 6728-00296-1 Hawkesbury Heights, NSW Darfield, NZ	2008 April 28 12:20 to 12:28 12:18:40 to 12:25:00
(47932) 2000GN171 • S. Kerr	UCAC2 26002864 Glenlee, QLD	2008 May 02 15:31:00 to 15:51:00

(1922) Zulu	HIP 98517	2008 May 02
• A. Brakel	Downer, ACT	19:29 to 19:40
• S. Quirk	Frog Rock Obs, Mudgee, NSW	19:33 to 19:35
(399) Persephone	UCAC2 14246232	2008 May 05
• B. Loader	Darfield, NZ	16:04:45 to 16:12:45
(416) Vaticana • S. Kerr	UCAC2 21807658 Glenlee, QLD Longitude: +150° 30' 00.8" Latitude: -23° 16' 09.6" Altitude: 50 m	2008 May 07D at 12:32:23.121VIDEOR at 12:32:27.722Duration: 4.601 secsMonitored: 12:27:00 to 12:38:00

Comments: Video camera integrating with an exposure period of 40 ms. Detailed Limovie analysis from 12:32:00 to 12:33:00 UTC.



Discussion: The circle (above right) is plotted at the expected 86 km diameter of Vaticana. With only one chord, Steve Kerr could be either side of the central line of the event.

(276) Adelheid

• A. Brakel

UCAC2 31676012 Downer, ACT Longitude: +149° 08' 18" Latitude: -35° 14' 27" Altitude: 575 m

Comments: Moderate light pollution. The star could only (just) be seen with averted vision. I think the event was real, but in these marginal conditions I can't be 100 percent certain. Beeper box used for timing.

Discussion: The circle (right) is plotted at the expected 121 km diameter of Adelheid. With only one chord it is not possible to determine whether Albert Brakel was north or south of the central line of the event, or even if the event was real.

Key to Plot: 1. A. Brakel; 2. Prediction 31 Mar.

2008 May 09 D at 09:26:27.5 **VISUAL** R at 09:26:31.3 Duration: 3.8 secs Monitored: 09:22 to 09:28



(2089) Cetacea • S. Kerr	HIP 75756 Glenlee, QLD	2008 May 10 10:45:00 to 10:55:00	
(723) Hammonia • B. Loader	UCAC2 25623452 Darfield, NZ	2008 May 16 12:34:30 to 12:41:30	
(18) Melpomene • H. Pavlov	TYC 0318-00244-1 Sutton Forest, NSW Longitude: +150° 18' 38.8" Latitude: -34° 33' 11.7" Altitude: 666 m	2008 May 18 D at 12:56:32.50 VII R at 12:56:43.12 Duration: 10.62 secs Monitored: 12:47:00 to 12:58:-	DEO 42
Comments: Cold and w	indy, full moon 21 deg from the star		
Comments. Cold and w	may, fun moon 21 deg nom the star		

• D. Gault Silverdale, NSW 12:51 to 13:01

Comments: Watec WAT-120-N Camera. Exposure intergration of 8 images = 0.32 sec duration. Either it was a clean miss or I simply didn't detect the expected 0.4 magnitude drop.

Hawkesbury Heights, NSW • D. Gault 12:56:14 to 12:56:47 *Comments*: prepoint and drift through.



Discussion: The circle (left) is plotted at the expected 140 km diameter of Melpomene. With nearby misses observed by Dave Gault as a constraint we can be confident that Hristo Pavlov was north of the central line of the event.

Key to Plot: 1. D. Gault, Silverdale (miss); 2. D. Gault, Hawkesbury Heights (miss); 3. H. Pavlov; 4. Prediction 13 Apr.

2008 May 18

2008 May 19

2008 May 20

2008 May 24

19:15 to 19:47

08:40:15 to 08:40:55

08:37:30 to 08:43:30

10:34:00 to 10:54:35

16:56:00 to 17:06:35

(2677) Joan

• B. Allen

• B. Loader

(2005) GE187

• S. Kerr

(78) **Diana**

• S. Kerr

(111) Ate

• D. Gault

(266) Aline

• J. Bradshaw

HIP 68524 Blenheim, NZ Darfield, NZ

UCAC2 28385132 Glenlee, OLD

UCAC2 16662066 Glenlee, OLD

UCAC2 28650634 Hawkesbury Heights, NSW

UCAC2 30197143 2008 May 25 Samford, QLD

08:30 to 09:30

(618) Elfriede	TYC 6394-00986-1	2008 May 26	
• J. Bradshaw	Samford, QLD	D at 15:51:48.31	VIDEO
	Longitude: +152° 52' 22.68"	R at 15:51:54.29	
	Latitude: -27' 21 22.80"	Duration: 5.98 secs	
	Altitude: 95 m		
Comments: A perfect event,	, and a nice end to my drought! 20	ms has been subtracted	to account for
camera latency - GSTAR-E	X @ 2x. http://www.youtube.com	/watch?v=NMgT0FOyL	rI
• D. Breadsell	Toowoomba, QLD	D at 15:51:47.5	VISUAL
	Longitude: +151° 55' 37.4"	R at 15:51:53.0	
	Latitude: -27° 35' 58.4"	Duration: 5.5 secs	
	Altitude: 730 m	Monitored: 15:51:00 to	15:52:30
Comments: Event occurred	through very thin broken cloud, v	which caused slight flicke	ring. This led to
a longer PE and a slightly n	nore inaccurate result.		
• P. Anderson	Taylor Range Obs, QLD	D at 15:51:48.6	VISUAL
	Longitude: +152° 56' 01.4580''	R at 15:51:55.1	
	Latitude: -27° 27 47.5562"	Duration: 6.5 secs	
	Altitude: 176 m	Monitored: 15:49:00 to	11:51
Comments: The target stary	was very easily 'held'. The images	were steady. The events	were very
obvious and instantaneous	to the naked eye. Apart from 2 am	in the morning, it was ve	ery satisfactory.
	t •	(618) Elfriede 2008 May 26 Gencentric X -5423 8 ±0.0	142.4 ±0.1 x 90.2 ±0.3 km, P
	. т.		2310.4 20.0 Km
9000		a l	
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	Wine and a war souther and a	Occult 4.0.9.46 100 k	.m
1650 1700 1	750 1800 1850 1900	¹⁹⁵⁰ Key to Plot: 1 Γ) Breadsell [.]
The figure (above) shows J	onathan Bradshaw's Limovie grap	h of 2 I Bradshaw: 3	P Anderson
the light curve of the occult	ation, with nice clean boundaries.	4 Prediction 26	Anr
			1 1 1 C
Discussion: The ellipse (ab	ove) is plotted at the best fit to the	three observations. With	three chords of
very similar length we can	say the the center line of the event	t lies approximately equic	listant between
David Breadsell's and Jonar	than Bradshaw's sites, and roughly	30 km north of the pred	icted path.
(375) Ursula	UCAC2 12060028	2008 Max 27	
(575) Ursula	Deady Creak OLD	D at 16:15:07:00	CCD
• J. Bloughton	Longitudo: $\pm 152^{\circ} 22^{\circ} 52^{\circ}$	D at $10.15.07.00$ D at $16.15.25.40$	CCD
	$ \begin{array}{c} \text{Longnuce.} + 133 & 23 & 32.0 \\ \text{Longnuce.} & 28^{\circ} & 06^{\circ} & 20 & 2^{\circ} \end{array} $	$\frac{10.13.23.47}{\text{Duration: 18.40 coos}}$	
	$\begin{array}{c} \text{Lattude:} -20 00 30.3 \\ \text{Altitude:} 66 m \end{array}$	Monitored: 16:14:42 to	16.15.11
Commonte. This was my At	high_probability astoroid accult	ation in a 21 hour pariad	10.10.44 The other three
were clouded out and this w	as close to suffering the same fat	$= \Delta t = 10 \text{ km from the prod}$	dicted
centerline the probability w	was 98% I measured the magnitude	les of the asteroid and sta	r as 11 77 and
12 53 from an image taken	before the occultation. That repres	sents a magnitude drop of	f = 0.44 or a = 33%
12.00 nom an mage taken	octore me occurtation. That repres	sents a magintude utop 0.	1 0.77 01 a JJ/0

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drop in brightness.

In the analysis, the first problem I encountered was a half-second discrepancy between my manual shutter timing and that calculated from the tape recording. It was eventually established that my stopwatch had correctly been syncronised to UTC before the occultation but after the event when I recorded the 10 MHz shortwave signal on tape for rigorous timing, it had changed from a faint WWVH UTC to a loud chinese UT1 broadcast. To remedy this, I applied a correction appropriate for May 27: UTC=UT1+0.42.

The second problem involved variable attenuation due to the influence of high-altitude haze, making the identification of D rather tricky. As the atmospheric effect is smoothly varying, it should be possible to discriminate the more abrupt real events. Although the low point in the occultation trail coincides with that of other trails, it is deeper and there is a clear indication of reappearance. At first sight of the image, the disappearance appears to occur about mid way along the trail, however the profile in Scanalyzer doesn't show any abrupt 33% drop near there. The earlier location for D I eventually chose does have an abrupt light drop apparent in the raw plot and the results do fit well with the prediction.



The image above shows the light curve as measured by John Broughton's Scanalyser software.

Discussion: The circle (above right) is plotted at the expected 216 km diameter of Ursula. The occultation duration being close to the maximum expected and John Broughton's location being close to the centre of the predicted shadow path suggests that the chord might lie close to the centre of the asteroid.

(747) Winchester TYC 0368-01463-1 2008 May 27 • J. Bradshaw Samford, OLD D at 11:47:44.5 VIDEO Longitude: +152° 52' 22.68" R at 11:47:53.5 Latitude: - 27' 21 22.80" Duration: 9.0 secs Altitude: 95 m Monitored: 10:00 to 12:00 Comments: Shocking conditions and covered by thick high cloud. I cranked the GSTAR-EX camera up to 12x (6 frame) integration, and managed to record the event. I have subtracted 120 ms which is my estimate of the camera lag, but the margin of error may be as high as ± 120 ms. http://www.youtube.com/watch?v=DDUSk0 5FXE • D. Breadsell Toowoomba, QLD D at 11:47:49.6 VISUAL Longitude: +151° 55' 37.4" R at 11:48:00.0

Latitude: -27° 35' 58.4"

Duration: 10.4 secs

Altitude: 730 m Monitored: 11:47:00 to 11:48:30 *Comments:* Perfect conditions. Best possible visual observation.

• P. Anderson Taylor Range Obs, QLD 11:45 to 11:51 *Comments*: The target star was located shortly after 11 hrs. Conditions were such that I used low magnification (98x) so that brighter stars remained in the field for orientation purposes. When it was briefly clear, the star was easily bright enough to monitor. However during the monitoring period the target star was not visible except for the key period between 11:47 and 11:48 when it flickered in and out of visibility. Perhaps there was an event around 11:47:45 because it was not seen for about 15 seconds, but it could just have easily been cloud. Most unsatisfactory!

The figure above shows the light curve observed by Jonathan Bradshaw as analysed by Limovie software. Despite poor conditions he was able to extract good data.

Key to Plot: 1. P. Anderson; 2. D. Breadsell; 3. J. Bradshaw; 4. Prediction 26 Apr.

Discussion: An ellipse with close to the same area as a circle with the expected 171 km diameter of Winchester is shown in the plot (above right). The two chords suggest that the centre line was a little south of all three observers. From the plot it looks as if Peter Anderson may have seen the event but as his times are very uncertain they are not used in the analysis.

(927) Ratisbona B. Loader 	TYC 7857-00861-1 Darfield, NZ	2008 May 28 17:34:00 to 17:40:00
(2321) Luznice	HIP 110012	2008 May 29
• B. Loader	Darfield NZ	17:14:30 to 17:18:50
(24127) 1999 VZ52	TYC 5641-00482-1	2008 May 30
• B. Loader	Darfield NZ	18:09:00 to 18:15:00
(2961) Katsurahama	TYC 5570-00749-1	2008 May 30
• A. Brakel	Nimmitabel. NSW	12:06:00 to 12:13:41
• B. Loader	Darfield, NZ	12:04:40 to 12:11:00
(2321) Luznice	HIP 110012	2008 May 30
• A. Dallow	Darfield, NZ	17:15:56 to 17:16:56

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(715) Transvaalia	TYC 7344-01162-1	2008 June 02
• S. Kerr	Glenlee, QLD	13:20:00 to 13:30:00
(106) Dione • J. Broughton	UCAC2 21161679 Reedy Creek, QLD Longitude: +153° 23' 52.8" Latitude: -28° 06' 30.3" Altitude: 66 m	2008 June 03 D at 19:23:04.46 CCD R at 19:23:05.57 Duration: 1.11 secs Monitored: 19:22:30 to 19:23:31

Comments: A clearly positive result from a magnitude 12.5 occultation. The measured duration of 1.11 sec is remarkably short (9%) compared with the expected maximum duration of 12 seconds. Supporting a grazing occultation scenario where the star passed within 1 km of the edge of Dione is the fact that the event occurred only five seconds later than the prediction. On the other hand, if the occultation was caused by a Dione satellite, then the best guess for its diameter is 17 km, which represents a body 27% longer than the length of this random chord. I should also mention that the apparent second gap in the trail on the right is actually the end of the trail and beginning of another.

Discussion: The circle (right) is plotted at the expected 147 km diameter of Dione. With only one chord we can not tell if John Broughton was north or south of the central line of the event so the circle is arbitrarily placed on the middle of John's chord.

Key to Plot: 1. J. Broughton; 2. Prediction 1 Apr.

(609) Fulvia • B. Loader	UCAC2 25395213 Darfield, NZ	2008 June 04 13:52:30 to 13:58:45
(623) Chimaera • B. Loader	UCAC2 19407192 Darfield, NZ	2008 June 05 07:36 to 07:42:15
(19) Fortuna• A. Brakel	TYC 6277-01188-1 Downer, ACT	2008 June 05 13:06:18 to 13:14

(19) Fortuna	TYC 6277-01188-1	2008 June 05
• S. Quirk	Frog Rock Obs, Mudgee, NSW	13:09:10 to 13:10

(2659) Millis	TYC 4948-00384-1	2008 June 08	
• S. Kerr	Glenlee, QLD	11:03:55 to 11:11:00	
(323) Brucia	TYC 6308-01734-1	2008 June 11	
• B. Loader	Darfield, NZ	14:46:50 to 14:52:50	
	UCAC2 12080706	2008 Lune 12	
• P. Anderson	Taylor Range Obs, QLD Longitude: +152° 56' 01.458" Latitude: -27° 27' 47.5562"	D at 13:05:51.3 VISUAL R at 13:05:55.0 Duration: 3.7 secs	

Comments: I found the star easier to locate than I expected. At my 12.0 in bright moonlight the image could be 'held' but not with ease, to the extent that if there had been a 0.2 second event, it could have been missed. However the event was obvious and I don't think I glimpsed the asteroid during the disappearance. The star just 'went out'. I know this sounds silly, but while you are concentrating on waiting for the reappearance of the star a few seconds later, then if the asteroid is not obvious (i.e. it would require averted vision to see) then you simply you won't see it (the asteroid). This period is one of heightened tension with the comparison star continually being monitored because this references the position of the occulted star.

- J. Bradshaw Samford, QLD D at 13:05:52.14 VIDEO
 Longitude: +152° 52' 22.68" R at 13:05:55.62
 Latitude: 27' 21 22.80" Duration: 3.48 secs
 Altitude: 95 m Monitored: 12:55 to 13:15
 Comments: An unexpected treat! http://www.youtube.com/watch?v=TZPuFKCHXzs
 - J. Broughton
- Reedy Creek, QLD

13:05:23 to 13:06:24

Е

chord of the occultation from Limovie software

 Cocmb 40946
 20 km.

 Key to Plot: 1. J. Broughton;

 2. P. Anderson; 3. J. Bradshaw;

 Prediction 13 May.

(285) Regina 2008 Jun 13 45.0 x 45.0 km, PA 0.0* Geocentric X -1147.0 ±0.4 1763.1 ±0.7 km

Discussion: The circle (above right) is plotted at the expected 45 km diameter of Regina. With two chords we can be reasonably sure that the plot represents a good estimate of the event location.

(2004) OK14 • S. Kerr UCAC2 25438954 Glenlee, QLD **2008 June 14** 11:47:00 to 12:07:00

(286) Iclea	TYC 0398-00907-1	2008 June 15	
• P. Anderson	Taylor Range Obs, QLD	D at 09:41:23.0	VISUAL
	Longitude: +152° 56' 01.458"	R at 09:41:27.8	
	Latitude: -27° 27' 47.5562"	Duration: 4.8 secs	
	Altitude: 176 m	Monitored: 09:39:00 to	09:43:00
Comments: The star was v	ery easy to follow. The event being	g late, I was starting to re	lax, expecting a
miss, so was mentally cau	ght off guard. Nevertheless allowir	ng the extra PE, both stor	watch and tape
and my recollection place	the disappearance within the paran	neters stated. The reappe	arance is easier
to define. In all, and confin	rmed by the tape, the occultation at	t my site was very close t	to 5 seconds.
-		, , , , , , , , , , , , , , , , , , ,	
• J. Bradshaw,	Samford, QLD	D at 09:41:24.08	VIDEO
A. Beck	Longitude: +152° 52' 22.68"	R at 09:41:27.68	
	Latitude: - 27' 21 22.80"	Duration: 3.6 secs	
	Altitude: 95 m	Monitored: 09:30 to 09	:50
Comments: Nice event - M	ly heart sank initially, but 5 second	ls late, it went pop! 20 m	s has been
subtracted to account for c	camera latency - GSTAR-EX @ 2x		
http://www.youtube.com/v	vatch?v=Ym83LKO1cqs		
1 2	1		
• D. Breadsell	Toowoomba, QLD	D at 09:41:26.7	VISUAL
	Longitude: +151° 55' 37.4"	R at 09:41:32.4	
	Latitude: -27° 35' 58.4"	Duration: 5.7 secs	
	Altitude: 730 m	Monitored: 09:41:00 to	09:42:30
Comments: Near perfect c	onditions with very slight flickerin	g. Flickering did not affe	ect observation.
Best possible visual accura	acy.	0 0	
1	5		
• D. Lowe	Mt Mee, QLD	09:39:00 to 09:43:00	
Craph Graph		(286) Iclea 2008 Jun 15 94.0 x Geocentric X -4406 0 +0 91 -3	94.0 km, PA 0.0** 042.5 +0.7 km
	· · · ·		0 12.5 20.1 Kill
	L Hand WH Jakes Hand I		
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2000	11 · 11 · 1	2	

The light-curve above is Jonathon and Alison's limovie anlysis of the occultation.

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Show Image of Clicked point Narrow

50 km,

Discussion: The circle (above right) is plotted at the expected 94 km diameter of Iclea. With three chords we have a high level of confidence that the plot represents the path of the event. This implies the central path was about 75 km south of the predicted path.

FFT

Occult 4.0.9.46

2 3

Diffraction

(1960) Guisan	UCAC2 20871756	2008 June 16	
• J. Bradshaw	Samford, QLD	14:50 to 15:10	
(162) Laurentia	UCAC2 19007480	2008 June 18	
• B. Loader	Darfield, NZ	17:03:30 to 17:09:30	
(132) Aethra • B. Loader	UCAC2 24391049 Darfield, NZ	2008 June 21 09:24:10 to 09:28:30	
(210) Isabella	UCAC2 19957380	2008 June 21	
• S. Kerr	Glenlee, QLD	17:49:00 to 18:00:00	
(134340) Pluto See page 57 for the report	UCAC2 25370733 on this event.	2008 June 22	
(3919) Maryanning	TYC 5776-01621-1u	2008 June 23	
• B. Loader	Darfield, NZ	19:08 to 19:18	
(247) Eukrate • J. Bradshaw	UCAC2 22471788 Samford, QLD Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80" Altitude: 95 m	2008 June 24 D at 12:46:10.14 VII R at 12:46:32.94 Duration: 22.8 secs Monitored: 12:30 to 12:00)EO

Comments: A 13.6 mag event - came out nicely using 12x (6 frame) integration. I have subtracted 120 ms which is my estimate of the camera lag, but the margin of error may be as high as ± 120 ms

The figure above shows the Limovie lightcurve of the occultation.

http://www.youtube.com/watch?v=2VZM9mVqBbA

Discussion: The circle (above right) is plotted at the expected 134 km diameter of Eukrate. Assuming the expected size is approximately correct, the measurement being close to the predicted maximum duration suggests that the chord lies close to the centre of the asteroid.

(773) Irmintraud TYC 8342-00113-1 2008 June 24 This was a well observed event, with two of the participants each managing to measure an occultation from two separate locations. • P. Anderson Taylor Range Obs, QLD D at 09:07:04.4 VISUAL Longitude: +152° 55' 54.04" R at 09:07:11.8 Latitude: -27° 27' 47.96" Duration: 7.4 secs Altitude: 176 m Monitored: 09:04:00 to 09:11:00 Comments: After reappearance the star appeared fainter and flickered until 09:07:30 with futher atmospherics later till 09:10. Though atmospherics are the likely cause it was worthy of note. • J. Bradshaw, Samford, QLD D at 09:07:05.32 VIDEO A. Beck Longitude: +152° 52' 22.68" R at 09:07:12.60 Latitude: - 27' 21 22.80" Duration: 7.28 secs Altitude: 95 m Monitored: 08:55 to 09:15 Comments: Stunning event. 20 ms has been subtracted to account for camera latency - GSTAR-EX @ 2x. http://www.youtube.com/watch?v=iPO4GHFWknU

• J. Broughton	Reedy Creek, QLD	D at 09:07:00.09	CCD
_	Longitude: +153° 23' 52.8"	R at 09:07:07.60	
	Latitude: -28° 06' 30.3"	Duration: 7.51 secs	
	Altitude: 66 m	Monitored: 09:05:58 to 09	9:07:59
	<i><i>a i i i i i i i i i i</i></i>		•

Comments: This was my first unattended drift-scan observation, the telescope having been prepointed on the previous night. The exposure was on a 3-hour delay; Maxim DL can take delayed images of up to 32767 s (9.1 h) and Scantracker supports that. The tape recorder was operated by a powerpoint timer and an alarm went off at 09:09:00 to establish integer second times. Established methods were used to record and derive the sub-second times.

• J. Broughton	Mobile site, QLD	D at 09:06:58.94	VISUAL
	Longitude: +153° 20' 41.8"	R at 09:07:06.50	
	Latitude: -28° 11' 58.0"	Duration: 7.56 secs	
	Altitude: 60 m	Monitored: 09:06:10 to	09:07:25

Comments: This was my first attempt at a mobile sighting of an asteroid occultation, first positive visual, and with a drift scan going on at home, my first double positive. The alt-azimuth SCT was on a round wooden base low to the ground. I used manual alt-azimuth prepointing to set up a drift-through observation. Apart from being a very simple telescope setup and alignment method, there is the advantage of not needing to check the time once the star has entered the field, knowing that the predicted time occurs when the star crosses center. Voice audio and a ticking clock reference was recorded on a digital camera's sound recorder and later calibrated to UTC. That was the backup timing method, after finding the SW signal to be too faint at the site. One minor mistake was to end the observing only 20 s after reappearance.

• S. Kerr	Dingo, QLD Longitude: +149° 20' 07.5" Latitude: -23° 39' 05.4" Altitude: 120 m	D at 09:07:36.31 R at 09:07:43.11 Duration: 6.80 secs Monitored: 09:03:00 to 09:	VIDEO :12:00
• S. Kerr	Duaringa, QLD Longitude: +149° 40' 36.4" Latitude: -23° 44' 21.3"	D at 09:07:36.0 R at 09:07:43.56 Duration: 7.56 secs	VIDEO

Altitude: 117 m Monitored: 09:05:00 to 09:09:00 *Comments:* Video camera integrating at 120 millisecond interval. Time reference failed. Only event duration known with any accuracy.

• D. Breadsell

Toowoomba, QLD

The figure above shows the drift-scan image of the occultation as observed by John Broughton.

The figure above shows the Limovie Plot for Jonathan Bradshaw's observation.

Discussion: The ellipse (above right) is plotted at the best fit to the adjusted chords measured for Irmintraud. With six chords we can have high confidence in the location of the event. It appears that the path was about 40 km north of the prediction. One second was taken off John Broughton's visual times to get the data to align with others. 1.5 secs was taken off Steve Kerr's Duaringa measurements (a Video with audio time signal observation) as Steve noted problems with absolute time but was confident of duration. It looks like David Breadsell was about 10-15 km too far south to see a positive occultation.

09:06:00 to 09:08:00

Key to Plot: 1. J. Bradshaw; 2. P. Anderson; 3. J. Broughton (Visual); 4. J. Broughton (drift-scan); 5. S. Kerr (Duaringa); 6. S. Kerr (Dingo); 7. Prediction 24 May; 8. D. Breadsell

The figures above show the Limovie Plots for Steve Kerr's two observations.

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(488) Kreusa	UCAC2 33228324	2008 July 01
• J. Broughton	Reedy Creek, QLD	10.10.22 to 10.17.22
(297) Caecilia	TYC 7382-01400-1	2008 July 03
• S. Kerr	Glenlee, QLD	10:07:00 to 10:17:00
(51) Nemausa	UCAC2 30099498	2008 July 03
• B. Loader	Darfield, NZ	18:03 to 18:10
(416) Vaticana	UCAC2 19182614	2008 July 04
(416) Vaticana • J. Broughton	UCAC2 19182614 Reedy Creek, QLD	2008 July 04 11:48:00 to 11:49:19
(416) Vaticana• J. Broughton(952) Caia	UCAC2 19182614 Reedy Creek, QLD UCAC2 16432689	2008 July 04 11:48:00 to 11:49:19 2008 July 07
 (416) Vaticana J. Broughton (952) Caia J. Broughton 	UCAC2 19182614 Reedy Creek, QLD UCAC2 16432689 Reedy Creek, QLD	2008 July 04 11:48:00 to 11:49:19 2008 July 07 D at 10:52:02.4 CCD
 (416) Vaticana J. Broughton (952) Caia J. Broughton 	UCAC2 19182614 Reedy Creek, QLD UCAC2 16432689 Reedy Creek, QLD Longitude: +153° 23' 52.8"	2008 July 04 11:48:00 to 11:49:19 2008 July 07 D at 10:52:02.4 CCD R at 10:52:07.7
 (416) Vaticana J. Broughton (952) Caia J. Broughton 	UCAC2 19182614 Reedy Creek, QLD UCAC2 16432689 Reedy Creek, QLD Longitude: +153° 23' 52.8" Latitude: -28° 06' 30.3"	2008 July 04 11:48:00 to 11:49:19 2008 July 07 D at 10:52:02.4 CCD R at 10:52:07.7 Duration: 5.3 secs

Comments: A positive drift-scan observation where preparation paid dividends. For peace of mind whenever a clear sky is not guaranteed, I prefer to align the telescope on a previous night. As it was located in a crowded field, I also imaged the target star, finding its magnitude to be 12.7 and opted to limit the drift-scan exposure to 50 s in avoidance of a left-end trail overlap. The day of the event was raining at times and overcast 95% of the time. Indeed it was overcast at 10:20 UT when I started cooling the CCD camera. However by 10:40, low-level cloud had begun to break up and the observation itself occurred inside the edge of clouds where they were not opaque. Luckily the transparency sufficed to allow a clearly positive result to be recorded. As the trail is fainter in the last 15 seconds where the event is located, I increased the uncertainty from the Scanalyzer result and rounded the D and R times to the nearest tenth. The duration comes out at 5.3 s.

The figure above shows the data as analysed by John's Scanalyser software.

Discussion: The circle (above right) is plotted at the expected 81 km diameter of Caia, and is arbitrarily centred on John Broughton's chord as it could be either to the south or north of the chord. The observed data suggests that the predicted path may have been very close to correct but the predicted time was about 13.5 seconds early.

Discussion: A 12.92 second occultation was recorded by Hristo Pavlov, using a video camera and GPS OSD for timing. The circle (above right) is plotted at the expected 170 km diameter of Hilda. If the asteroid is approximately circular and close to the expected diameter then Steve Quirk's miss suggests that the central path might lie to the south of both observers. Another possibility is that the Hilda is "long and narrow" and may lie close to the predicted path between the observers. Given this uncertainty the plot is shown on the mid point of the observed chord.

(150) Nuwa

• S. Kerr

TYC 6272-00359-1 Glenlee, QLD Longitude: +150° 30' 00.8" Latitude: -23° 16' 09.6" Altitude: 50 m

2008 July 16 D at 11:51:23.88 **VIDEO** R at 11:51:29.92

Duration: 6.04 secs Monitored: 11:44:20 to 11:56:00

Comments: Video camera integrating with a exposure period of 40 ms. Asteroid visible during event.

The figure above shows the lightcurve of the occultation as analysed by Limovie software.

Discussion: A 6.04 second occultation was recorded by Stephen Kerr, using video and GPS OSD timing equipment. The circle (right) is plotted at the expected 151 km diameter of Nuwa. With only the one chord observed, Steve could be on either side of the central line of the event.

Key to Plot: 1. S. Kerr; 2. Prediction 3 July.

(1746) Brouwer • J. Bradshaw	UCAC2 23143082 Samford, QLD	2008 July 17 10:20 to 10:35
(611) Valeria • P. Anderson	TYC 5177-00844-1 Taylor Range Obs, QLD	2008 July 17 19:18:00 to 19:25:00
(93) Minerva • S. Quirk	UCAC2 18203949 Mudgee, NSW Longitude: +149° 39' 45.6" Latitude: -32° 27' 21.3" Altitude: 508 m	2008 July 30D at 08:58:38.50VIDEOR at 08:58:57.46Duration: 18.96 secsMonitored: 08:57:00 to 09:01:00
<i>Discussion</i> : An 18.96 second occultation was recorded by Steve Quirk, using video/OSD. The circle (right) is plotted at the expected 157 km diameter of Minerva. With only one chord it is not possible to determine whether Steve was north or south of the central line of the event.		(93) Minerva 2008 Jul 30 157.0 x 157.0 km, PA 0.0** Geocentric X -769.1 ±13.8 1-18.5 ±38.2 km
Key to Plot: 1. S. Quirk; 2.	Prediction 22 July.	0cruit 4.0.9.46 100 km,

(2617) JiangxiJ. BradshawD. Gault	UCAC2 22824110 Samford, QLD Hawkesbury Heights, NSW	2008 July 31 17:35 to 17:55 17:45 to 17:50
(920) Rogeria • D. Gault	TYC 0571-01349-1 Hawkesbury Heights, NSW	2008 July 31 18:40 to 18:45
(5161) Wightman • D. Gault	TYC 6276-01878-1 Hawkesbury Heights, NSW	2008 July 31 17:10 to 17:16
(40103) 1998QX3 • J. Bradshaw	HIP 78406 Samford, QLD	2008 August 03 13:40 to 14:00
(788) Hohensteina • J. Broughton <i>Comments:</i> Unattended dri involving a 12.7-magnitude	UCAC2 31177691 Reedy Creek, QLD Longitude: +153° 23' 52.8" Latitude: -28° 06' 30.3" Altitude: 66 m ft-scan observation. The trail and e star.	2008 August 04D at 09:18:53.16CCDR at 09:18:57.78Duration: 4.62 secsMonitored: 09:18:37 to 09:19:17occultation is very clear for an event
• J. Broughton Comments: The 13.6-magn	Sleepy Hollow, QLD Longitude: +153° 31' 15.3" Latitude: -28° 25' 22.9" Altitude: 20 m itude asteroid was glimpsed durir	D at 09:18:53.95 VISUAL R at 09:18:59.79 Duration: 5.84 secs Monitored: 09:18:25 to 09:19:40 ag the occultation.
P. AndersonJ. BradshawD. Watson	Taylor Range Obs, QLD Samford, QLD Thornton, NZ	09:18:40 to 09:21:00 09:10 to 09:19:03 09:14:00 to 09:25:00
SCANALYZER - Asteroid Occur 080804 Hohensteine Trail Start Disappearan X 110 76 09:18:36.68 09:18:36.68 09:18:53.11 ±0.09 Duration The figures above show the occultation together with th	Protion Drift-Scan Analyzer 503: 1772 Width: 205 SMOOTH BACK Ce Reappearance Trail End Sign 09:18:57.78 09:19:17.02 3: 0.01 2: 4.62 seconds e drift-scan image of the he data as analysed by John	(768) Hohensteina 2008 Aug 4 107.0 x 99.0 km. PA 89. Geocentric X 3827.1 ±1.7 N-3644.7 ±2.7 km E Cout 409.46 Cout 400.48 Cout 400
occultation together with the Broughton's Scanalyser sol	ne data as analysed by John tware.	6. Prediction 22 July

Discussion: Two occultations were recorded by John Broughton, one using a CCD drift scan with a prepointed telescope and the other visually with a mobile unit. With two chords we can be confident that John's Reedy Creek location was north of the centerline of the event. The ellipse is plotted (previous page) at the best fit to John's observations of Hohensteina with the extra constraint that the ellipse axes have a eccentricity of no more than 0.09 as suggested by published parameters (http://obswww.unige.ch/~behrend/page3cou.html). The misses by the rest of the team are consistent with the positive results.

(620) Drakonia • D. Watson	TYC 7433-00807-1 Thornton, NZ		2008 August 04 08:13:00 to 08:29:00	
(147) Protogeneia • D. Gault	UCAC2 22969892 Hawkesbury Heights	s, NSW	2008 August 04 11:00 to 11:05	
(41838) 2000 WK59 • B. Loader	HIP 93480 Darfield, NZ		2008 August 05 10:41:30 to 10:43:40	
(4937) Lintott • B. Loader	TYC 1120-01518-1 Darfield, NZ		2008 August 06 11:06 to 11:11	
(7593) 1992 WP4 • S. Kerr	TYC 1187-01791-1 Glenlee, QLD		2008 August 07 15:14:00 to 15:24:00	
(1048) Feodosia • S. Kerr	UCAC2 14669141 Glenlee, QLD		2008 August 07 15:56:00 to 16:06:00	
(1184) Gaea • D. Herald	TYC 7357-01060-1 Kambah, ACT Longitude: +149° 03 Latitude: -35° 23' 49 Altitude: 580 m	, 49.0" .3"	2008 August 09 D at 10:24:27.12 R at 10:24:27.62 Duration: 0.50 secs Monitored: 10:20:00 to	VIDEO 10:30:00
• H. Pavlov	Marsfield, NSW Longitude: +151° 06 Latitude: -33° 46' 13 Altitude: 105 m	oʻ 11.5" .6"	D at 10:25:00.79 R at 10:25:01.47 Duration: 0.68 secs Monitored: 10:18:00 to	VIDEO
<i>Comments:</i> Had problems y manual corrections every 3 http://www.hristopavlov.ne	with the scope alignme 0 sec. Camera used: W et/Astronomy/Positives	nt for this r AT 902 H. 5/2008-08-0	near zenith occultation and	l had to make
A. BrakelD. GaultD. Herald	Downer, ACT Hawkesbury Heights Yass, NSW	s, NSW	10:24:10 to 10:26:00 10:24:14 to 10:25:44 10:23:00 to 10:26:00	
The figure (right) shows Hi the occultation as analysed software.	risto's light curve of by Limovie		(1184) Gaea occult 09 Au 09 Au 10:25:01.51	s TYC 7357-01060-1 g 2008

Discussion: Occultations were recorded by Dave Herald and Hristo Pavlov, both using video cameras with GPS OSD timing systems. The ellipse is plotted (right) at the best fit to the two chords of Gaea. This is significantly smaller in area than a circle with the expected diameter of about 20 km. No published shape data has been found. An 11.7×7.9 km ellipse has an area of only 72 sq km compared to a 20 km diameter circle with area of 314 sq km. This suggests that Gaea may have a much higher than normal albedo for a main belt object, or it could be a multi lobed object and this observation only saw a small lobe.

Key to Plot: 1. D. Herald; 2. H. Pavlov; 4. A. Brakel; 5. D. Gault; 6. Prediction 5 July

(412) Elisabetha	UCAC2 20972458	2008 August 09
• B. Loader	Darfield, NZ	09:00 to 09:05
(5409) Saale	TYC 5214-00219-1u	2008 August 10
• B. Loader	Darfield, NZ	11:54 to 11:58
(3176) Paolicchi • D. Gault	TYC 8376-02025-1 Hawkesbury Heights, NSW	2008 August 13 11:06 to 11:15
(32) Pomona	UCAC2 38196247	2008 August 16
• J. Bradshaw	Samford, QLD	D at 16:50:57.07 VIDEO
	Longitude: +152° 52' 22.68"	R at 16:50:58.27
	Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80"	R at 16:50:58.27 Duration: 1.2 secs
	Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80" Altitude: 95 m	R at 16:50:58.27 Duration: 1.2 secs Monitored: 16:40 to 17:00
• J. Bradshaw	Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80" Altitude: 95 m Samford, QLD	R at 16:50:58.27 Duration: 1.2 secs Monitored: 16:40 to 17:00 D at 16:50:59.07 VIDEO
• J. Bradshaw	Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80" Altitude: 95 m Samford, QLD Longitude: +152° 52' 22.68"	R at 16:50:58.27 Duration: 1.2 secs Monitored: 16:40 to 17:00 D at 16:50:59.07 VIDEO R at 16:51:00.27
• J. Bradshaw	Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80" Altitude: 95 m Samford, QLD Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80"	R at 16:50:58.27 Duration: 1.2 secs Monitored: 16:40 to 17:00 D at 16:50:59.07 VIDEO R at 16:51:00.27 Duration: 1.2 secs
• J. Bradshaw	Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80" Altitude: 95 m Samford, QLD Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80" Altitude: 95 m	R at 16:50:58.27 Duration: 1.2 secs Monitored: 16:40 to 17:00 D at 16:50:59.07 VIDEO R at 16:51:00.27 Duration: 1.2 secs Monitored: 16:40 to 17:00

have subtracted 120 ms which is my estimate of the camera lag, but the margin of error may be as high as ± 120 ms. http://www.youtube.com/watch?v=ZctDMdF52hU

The figure above shows the lightcurve of the occultation data as analysed by Limovie software.

Key to Plots: 1. J Bradshaw - 1st event; 2. J Bradshaw - 2nd event; 3. Prediction 10 July

Discussion: Two 1.2 second occultations were recorded by Jonathan Bradshaw from the same location, using Video/GSP equipment. A possible explanation is that the star (UCAC2 38196247) is a double star with a separation of about 0.013". The circles (above left) are plotted at the expected 86 km diameter of Pomona showing how this may be. However the equal duration of the two occultations combined with the geometry of the occultation would require the PA of the components to very closely match the direction of motion of the asteroid. This, together with the equal depth of the occultations, indicates that the double star explanation is unlikely. The most likely explanation is that the asteroid is either binary (including a contact binary), or is a unitary asteroid with a significant concave region on its surface. This is supported by eccentricity data that can be found at the Minor Planet Center. The plot would then look something like the figure on the right. With both chords observed from the same location it is not possible to determine whether Jonathan was north or south of the central line of the event.

(592) Bathseba	TYC 5771-01055-1	2008 August 16
• S. Kerr	Glenlee, QLD	11:03:00 to 11:13:00
(55571) 2002CP82	HIP 5031	2008 August 19
• J. Bradshaw	Samford, QLD	13:20 to 13:30
 (3504) Kholshevnikov • A. Brakel (628) Christine • A. Brakel 	TYC 5820-00740-1 Downer, ACT TYC 6925-01204-1 CAS Observatory, Mt Stromlo, ACT	 2008 August 19 16:10:05 to 16:11:30 2008 August 20 11:20 to 11:29:46
(18) Melpomene • J. Broughton	UCAC2 30028442 Reedy Creek, QLD Longitude: +153° 23' 52.8" Latitude: -28° 06' 30.3" Altitude: 66 m	2008 August 21D at 08:19:46.8CCDR at 08:19:50.7Duration: 3.9 secsMonitored: 08:19:27 to 08:20:08

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Comments: This small 0.36-magnitude drop event was imaged through cloud. To demonstrate what's going on, I compiled an image of 5 aligned trails (see below). In the original image, the top trail was located NW of the occulted trail, the bottom one SE and all trails were scattered in that general direction in the same order as the aligned image. In the aligned image, attenuations caused by cloud move toward the right when 'reading' from top to bottom and those on the right side fade out. The occultation trail (4th from top) bucks the trend near its centre in a way expected for a positive event. The places I measured D and R in that 4th trail are indicated by arrows and result in a 3.9s duration - plausibly 70% of the maximum predicted.

The figure above shows a compound drift-scan image - See comments above.

Discussion: A 3.9 second occultation was recorded by John Broughton, by drift scanning a CCD. The circle (right) is plotted at the expected 140 km diameter of Melpomene. Without any other chords, we can not tell if John was north or south of the central line of the event.

Key to Plot: 1. J Broughton; 2. Prediction 25 July

(626) Notburga

• B. Allen

UCAC2 12572951 Blenheim, NZ Longitude: +173° 50' 21.37" Latitude: -41° 29' 30.05" Altitude: 38 m

 2008 August 22

 D at 13:50:26.3
 CCD

 R at 13:50:34.5
 Duration: 8.2 secs

 Monitored: 13:50:00 to 13:51:06

Comments: Datum NZ1949 (topographical map). Very good observing conditions. Manual synchronisation of Timer Box to KIWI-OSD time to better than 0.1 second.

Discussion: The figure above shows the drift-scan data as analysed by John Broughton's Scanalyser software. The drift trace of the target star was severely affected by a much brighter nearby star, a little to the East. Although there is a small dip close to the expected time of the occultation, it is of similar size to the noise seen on the rest of the trace - so there is no clear evidence of an actual occultation.

Key to Plot: 1. B Allen; 2. Prediction

(81) TerpsichoreP. AndersonJ. Bradshaw	UCAC2 18542358 Taylor Range Obs, QLD Samford, QLD	2008 August 22 14:38:00 to 14:47:00 14:20 to 14:55
(182933) 2002GZ31 • J. Bradshaw	UCAC2 25548482 Samford, QLD	2008 August 24 11:05 to 12:10
(91) Aegina • S. Kerr	UCAC2 39797250 Glenlee, QLD Longitude: +150° 30' 00.8" Latitude: -23° 16' 09.6" Altitude: 50 m	2008 August 25D at 19:18:42.98VIDEOR at 19:18:48.24Duration: 5.26 secsMonitored: 19:14:00 to 19:22:39

Comments: Video camera integrating with a exposure period of 80 ms. Detailed Limovie analysis - 19:18:31 to 19:18:57 UTC. Heavy cloud interference - star monitored in the following periods - 19:14:00 to 19:15:24, 19:15:29 to 19:15:45, 19:15:54 to 19:16:05, 19:16:32 to 19:17:18, 19:17:20 to 19:17:30, 19:17:50 to 19:18:00, 19:18:10 to 19:18:58, 19:21:43 to 19:22:03, 19:22:18 to 19:22:39.

The graph above is Steve Kerr's analysis of the event. The occultation can be clearly seen in the lower (blue) light curve - the other light curves are comparison stars.

Discussion: A 5.26 second occultation was recorded by Stephen Kerr, using video and GPS based timing. The circle (right) is plotted at the expected 109 km diameter of Aegina. Assuming the updated prediction was approximately correct, Steve's chord being a close match

Key to Plot: 1. S Kerr; 2. Prediction 25 July

to the maximum expected chord suggests that his chord might lie close to the centre of the asteroid.

(1132) Hollandia • D. Watson	TYC 7416-00949-1 Thornton, NZ	2008 August 25 10:30:00 to 10:48:00
(42105) 2001 AZ235 • S. Kerr	TYC 7428-00588-1 Glenlee, QLD	2008 August 26 11:12:00 to 11:21:00
(71115) 1999 XW156 • B. Loader	TYC 5725-01910-1u Darfield, NZ	2008 August 28 09:05:30 to 09:11:30
(34529) 2000 SD212 • B. Loader	TYC 0020-00593-1u Darfield, NZ	2008 August 28 12:42:50 to 12:47:50
(9827) 1958 TL1 • B. Loader	TYC 1104-00258-1u Darfield, NZ	2008 August 30 10:25:30 to 10:30:50

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Discussion: A 4.50 second occultation was recorded by Hristo Pavlov, using video with GPS OSD timing. The circle (right) is plotted at the expected 45 km diameter of Reunerta. The constraint provided by Steve Russell's negative observation would suggest that Hristo Pavlov's

Key to Plot: 1. D Watson (off the plot, to the South); 2. D Gault; 3. S Russell; 4. H Pavlov; 5. Prediction, 24 Aug

chord lies to the south of the asteroid's centre. Shape data from the Geneva Observatory (http://obswww.unige.ch/~behrend/page3cou.html) indicates a 0.39 magnitude variation caused by shape. This means it would also be possible to fit it into the gap between Steve's and Hristo's locations. The observation will be archived with Hristo's line being the centre as this gives the least probable error.

Occult 4.0.9.46

(51) NemausaJ. Broughton	UCAC2 27560607 Reedy Creek, QLD	2008 September 09 09:51:02 to 09:53:28	
(224) Oceana • B. Loader	UCAC2 28838410 Darfield, NZ	2008 September 09 13:38:00 to 13:43:00	
(3729) Yangzhou • B. Loader	TYC 7462-00288-1 Darfield, NZ	2008 September 09 13:02:00 to 13:07:00	
(50000) Quaoar • C. Wyatt	UCAC2 26249129 Armidale, NSW	2008 September 10 12:35:00 to 13:15:00	
(21555) Levary • D. Gault	TYC 5631-01210-1 Hawkesbury Heights, NSW	2008 September 14 11:39 to 11:49	
(71063) 1999 XH101 • B. Loader	HIP 111703 Darfield, NZ	2008 September 16 10:17:15 to 10:21:15	
(299) Thora • P. Anderson	TYC 1832-00460-1 Taylor Range Obs, QLD Longitude: +152° 55' 57.9" Latitude:27° 27' 42.3"	2008 September 20 D at 18:51:18.3 R at 18:51:19.2 Duration: 0.9 secs	VISUAL
Altitude: 170 m Monitored: 18:49:30 to 18:53:00 <i>Comments:</i> The immediate field consisted of two stars, a brighter and fainter one. I had expected that the brighter one was the target star. Being in the early morning I was a little fuzzy headed and so taken by surprise when the fainter star blinked out and not the brighter one. I therefore did not trigger the stopwatch but called out. I am about 90% certain that an event occurred.			
<i>Discussion</i> : Double checks the target and that Peter's a brighter star did not dim at	on the latest prediction by John T pparent occultation of the fainter any time, this observation should	Falbot confirmed that the b star was actually a visual be taken as a 'miss'.	orighter star was 'glitch'. As the

(517) Edith • D. Herald	UCAC2 23219251 Kambah, ACT	2008 September 23 10:52:20 to 10:54:20
(62) Erato • D. Herald	UCAC2 22763193 Kambah, ACT Longitude: +149° 03' 49.0" Latitude: -35° 23' 49.3" Altitude: 580 m	2008 September 23D at 11:59:41.08VIDEOR at 11:59:47.48Durations: 6.40 secsMonitored: 11:58:00 to 12:01:00
<i>Discussion</i> : A 6.40 second occultation was recorded by Dave Herald, using Video/GPS equipment. The circle (right) is plotted at the expected 95 km diameter of Erato.		(62) Erato 2008 Sep 23 95.0 x 95.0 km. PA 0.0** Geocentric X 4269.1 ±0.2 №2252.6 ±13.0 km
Key to Plot: 1. D Hera	ld; 2. Prediction, 25 Aug	

Discussion: A 2.97 second occultation was recorded by John Broughton. The circle (right) is plotted at the expected 26 km diameter of Patsayev. The close match to the expected maximum length of the chord would suggest that the chord lies close to the centre of the asteroid. The observation had a low probability of success but shows that it is definitely worth having a go when you are within the one or even two sigma zone and the skies are clear.

Key to Plot: 1. J Broughton; 2. Prediction - Occult special

(127) Johanna TYC 7411-06092-1 2008 September 29 • S. Quirk D at 11:20:29.57 Mudgee, NSW VIDEO Longitude: +149° 39' 45.6" R at 11:20:36.52 Latitude: -32° 27' 21.3" Duration: 6.95 secs Altitude: 508 m Monitored: 11:20:06 to 11:21:36 • C. Wyatt D at 11:19:43.1 Walcha, NSW **VISUAL** Longitude: +151° 33' 13.7" R at 11:19:49.8 Latitude: -31° 00' 23.3" Duration: 6.7 secs

Altitude: 1168 m Monitored: 11:08:00 to 11:24:00 *Comments*: There was a gusty breeze blowing at times, from the SE. The skies were quite clear though, and the observation was good! I'm so happy to have bagged my first! All times are in UT, and times were taken from analysing through "Audacity" software.

• J. Broughton	Reedy Creek, QLD
• J. Broughton	Tyagarah, QLD

Discussion: Two observations were recorded, one visually by Chris Wyatt and the other by Steve Quirk using video. The circle (right) is plotted at the expected 123 km diameter of Johanna. These two chords are displaced by almost a minute. We seem to have either an observation error or a very unusual object. Geneva Observatory (http://translate.google.com/translate?hl=en&sl=fr&u=http:/ /obswww.unige.ch/~behrend/page1cou.html) have measured a light curve with a period of approximately 0.5 days, which could be either the rotational period of a single asteroid or the orbital period of a binary. They have a note for 127 Johanna that says "Binaire à petite éclipse ?", literally translated as 'binary small eclipse?'. So do we in fact have a binary asteroid with each observer having seen one of the two components? Probably not, for two reasons. 1) The speed of the shadow on the Earth's surface is predicted to be about 16 km/sec. A 60 sec

11:20:53 to 11:21:21 11:20:35 to 11:21:08

Key to Plots: 1. S Quirk; 2. C Wyatt; 3. J Broughton, Tyagarah; 4. J Broughton, Reedy Creek;

5. Prediction 17 Sept

offset for binary objects would imply a separation of about 960 km and the similarity of the chord times would imply two fairly equal sized bodies. So assuming a binary object with equal masses, an average separation of 960 km, expected diameters of 123 km and a density of 1100 kg/m³, a back of the envelope calculation gives an orbital period of 6 days - longer than the measured period by one order of magnitude. 2) Both Steve and Chris monitored the star long enough before and after the predicted occultation time that they should have each seen two occultations if the asteroid is a binary (the bar on the top left end of Steve's line indicated when he finished monitoring the star, all the other monitoring start and end times are off the plot). An alternative explanation is a 60 second error in recording the

observation times; the second plot (right) shows the effect of adjusting Chris's observations by one minute - which allows an ellipse with an area similar to the area of a 123 km diameter circle to be fitted to the data.

(927) Ratisbona • S. Kerr	UCAC2 16645875 Glenlee, QLD	2008 September 29 10:15:00 to 10:25:00	
(568) Cheruskia • B. Allen	UCAC2 39243449 Blenheim, NZ Longitude: +173° 50' 21.37"	2008 October 01 D at 11:42:52.54 R at 11:43:08.45	CCD
	Latitude: -41° 29' 30.05"	Duration: 15.91 secs	
	Altitude: 38 m	Monitored: 11:42:42 to 11:43:23	
Comments: Datum N71949	(topographical man) Very good	observing conditions SRIG S	FI 1001F

Comments: Datum NZ1949 (topographical map). Very good observing conditions. SBIG STL 1001E camera used at f15 focus. Timer box synchronised to msltime1.irl.cri.nz with "Beeper Sync" time to better than 0.01 second.

• D. Watson	Thornton, NZ
	Longitude: +176° 51' 48.4"
	Latitude: -37° 55' 30.1"
	Altitude: 3 m

Comments: Timed when shadow completely covered over the star and when star returned to full brightness.

Discussion: An 8.5 second occultation was recorded by Diana Watson visually. The circle (right) is plotted at the expected 87 km diameter of Cheruskia. Past occultation observations have confirmed an oval shape with major axis about 84 km so it is not feasible for both locations to have observed the event. At first Bill Allen's lightcurve seemed to have a signal buried in noise but after taking Diana's clear positive into consideration, I (John Talbot) reached the conclusion that Bill was north of the path and only had noise in his lightcurve. Finally, Diana's longer than expected chord of about 90 km suggests that her chord lies close to the centre of the asteroid. D at 11:42:20.1 VISUAL R at 11:42:28.6 Duration: 8.5 secs Monitored: 11:33:00 to 11:54:00

(712) Boliviana

• S. Kerr

UCAC2 27334118 Glenlee, QLD Longitude: +150° 30' 00.8" Latitude: -23° 16' 09.6" Altitude: 50 m **2008 October 04** D at 12:00:06.318

VIDEO

R at 12:00:11.918 Duration: 5.6 secs

Monitored: 11:55:00 to 12:05:00

Comments: Video camera integrating with a exposure period of 160 ms. Limovie analysis from 11:59:50 to 12:00:20 UTC. Cloud interference 11:57:15 to 11:57:40 UTC.

Discussion: A 5.6 second occultation was recorded by Steve Kerr, using video with a GPS OSD timing system. The circle (right) is plotted at the expected 127 km diameter of Boliviana. Assuming the updated prediction was approximately correct, Steve's chord length being close to expected maximum chord length of about 120 km suggests that his chord lies close to the centre of the asteroid.

Key to Plot: 1. S Kerr; 2. Prediction 24 Sept

(517) Edith	UCAC2 23228414	2008 October 07
• S. Kerr	Glenlee, QLD	10:25:00 to 10:35:00
(539) Pamina	UCAC2 24706401	2008 October 07
• B. Loader	Darfield, NZ	09:57 to 10:02
(1148) Rarahu	TYC 5826-00423-1	2008 October 09
• B Loader	Kaituna Valley Rd	09:53:30 to 09:58:30
D. Downer	Lake Ellesmere, NZ	0.00.00 00 00.000
• P. Loader	Darfield, NZ	09:50:00 to 10:00:00
(1832) Mkros	TYC 7346-00845-1	2008 October 14
(1832) Mkros • D. Lowe	TYC 7346-00845-1 Brisbane, QLD	2008 October 14 D at 10:33:01.105 VIDEO
(1832) Mkros • D. Lowe	TYC 7346-00845-1 Brisbane, QLD Longitude: +153° 6' 50.89"	2008 October 14D at 10:33:01.105VIDEOR at 10:33:01.965
(1832) Mkros • D. Lowe	TYC 7346-00845-1 Brisbane, QLD Longitude: +153° 6' 50.89" Latitude: -27° 30' 29.65"	2008 October 14D at 10:33:01.105VIDEOR at 10:33:01.965Duration: 0.86 secs
(1832) Mkros • D. Lowe	TYC 7346-00845-1 Brisbane, QLD Longitude: +153° 6' 50.89" Latitude: -27° 30' 29.65" Altitude: 27 m	2008 October 14D at 10:33:01.105VIDEOR at 10:33:01.965Duration: 0.86 secsMonitored: 10:00:00 to 10:45:00
(1832) Mkros • D. Lowe <i>Comments:</i> A GTAR-EX ca Other field stars show no fl	TYC 7346-00845-1 Brisbane, QLD Longitude: +153° 6' 50.89" Latitude: -27° 30' 29.65" Altitude: 27 m umera was used with an integration ickering or dimming over the reco	2008 October 14 D at 10:33:01.105 VIDEO R at 10:33:01.965 Duration: 0.86 secs Monitored: 10:00:00 to 10:45:00 n of 32X. This was a low altitude event. orded time of the event. orded time of the event.
 (1832) Mkros D. Lowe <i>Comments:</i> A GTAR-EX can other field stars show no flate the stars of the p. Anderson 	TYC 7346-00845-1 Brisbane, QLD Longitude: +153° 6' 50.89" Latitude: -27° 30' 29.65" Altitude: 27 m umera was used with an integratio ickering or dimming over the reco Taylor Range Obs, QLD	2008 October 14 D at 10:33:01.105 VIDEO R at 10:33:01.965 Duration: 0.86 secs Monitored: 10:00:00 to 10:45:00 n of 32X. This was a low altitude event. orded time of the event. 10:31:00 to 10:35:30
 (1832) Mkros D. Lowe <i>Comments:</i> A GTAR-EX ca Other field stars show no fl P. Anderson J. Bradshaw 	TYC 7346-00845-1 Brisbane, QLD Longitude: +153° 6' 50.89" Latitude: -27° 30' 29.65" Altitude: 27 m umera was used with an integration ickering or dimming over the reco Taylor Range Obs, QLD Samford, QLD	2008 October 14 D at 10:33:01.105 VIDEO R at 10:33:01.965 Duration: 0.86 secs Monitored: 10:00:00 to 10:45:00 n of 32X. This was a low altitude event. orded time of the event. 10:31:00 to 10:35:30 10:15 to 10:40
 (1832) Mkros D. Lowe <i>Comments:</i> A GTAR-EX ca Other field stars show no fl P. Anderson J. Bradshaw 	TYC 7346-00845-1 Brisbane, QLD Longitude: +153° 6' 50.89" Latitude: -27° 30' 29.65" Altitude: 27 m amera was used with an integratio ickering or dimming over the reco Taylor Range Obs, QLD Samford, QLD	2008 October 14 D at 10:33:01.105 VIDEO R at 10:33:01.965 Duration: 0.86 secs Monitored: 10:00:00 to 10:45:00 n of 32X. This was a low altitude event. orded time of the event. 10:31:00 to 10:35:30 10:15 to 10:40

Discussion: A 0.86 second occultation was recorded by Dennis Lowe, using video & GPS OSD. The circle is plotted at the expected 30 km diameter of Mrkos. Assuming the updated prediction was approximately correct and given the constraint of a negative observation by Peter Anderson, the plotted position is probably a good estimate of the path.

Key to Plot: 1. D Lowe; 2. P Anderson; 3. J Bradshaw; 4. Prediction 11 Sep (off the plot)

(1372) Haremari

- B. Loader
- P. Loader
- E. Mason

(4258) Ryazanov

• D. Gault

(3440) Stampfer

• D. Gault

(124) Alkeste

- S. Kerr
- (416) Vaticana
 - J. Bradshaw

(405) Thia

• S. Kerr

(669) Kypria • S. Kerr

(599) Luisa • S. Kerr

(4455) **Ruriko**

• S. Kerr

(346) Hermentaria

- B. Loader
- D. Watson

TYC 6883-00093-1 Glenroy, NZ Darfield, NZ Christchurch, NZ

TYC 1239-00751-1 Hawkesbury Heights, NSW

HIP 101751 Hawkesbury Heights, NSW

UCAC2 23968526 Glenlee, QLD

UCAC2 17580463 Samford, QLD

UCAC2 38729745 Glenlee, QLD

UCAC2 32986965 Glenlee, QLD

UCAC2 15403159 Glenlee, QLD

HIP 112873 Glenlee, QLD

UCAC2 20985020 Darfield, NZ Thornton, NZ **2008 October 14** 10:30 to 10:36 10:30 to 10:36 10:29:00 to 10:35:00

2008 October 18 16:06:40 to 16:10

2008 October 19 12:02:57 to 12:03:53

2008 October 20 10:38:00 to 10:48:00

2008 October 20 10:15 to 10:30

2008 October 22 11:36:00 to 11:46:00

2008 October 24 11:23:00 to 11:32:00

2008 October 24 11:12:00 to 11:20:00

2008 October 24 14:53:00 to 15:03:00

2008 October 27 09:00:55 to 09:04:55 08:56:00 to 09:09:00

(102) Miriam

• J. Bradshaw

UCAC2 34841641 Samford, QLD Longitude: +152° 52' 22.68" Latitude: - 27' 21 22.80" Altitude: 95 m

2008 October 31 D at 17:48:33 55

D at 17:48:33.55 VIDEO R at 17:48:37.39 Duration: 3.84 secs Monitored: 17:35 to 17:55

Comments: A 14.5 mag event - had to push it to using 24x (12 frame) integration. I have subtracted 260 ms which is my estimate of the camera lag, and the margin of error may be as high as \pm 240 ms. http://www.youtube.com/watch?v=7Er 7wZdvAs

The figure above shows the light curve of the occultation as analysed by Johnathon using Limovie software.

Key to Plot: 1. J Bradshaw; 2. Prediction, Occult4

Discussion: A 3.84 second occultation was recorded by Jonathan Bradshaw, using video & GPS OSD. The circle (above right) is plotted at the expected 83 km diameter of Miriam. The predicted path is just visible in lower right corner. Jonathan was actually just outside the one sigma prediction line. Assuming the updated prediction was approximately correct, the close match to the maximum expected chord length would suggest that his chord might lie close to the centre of the asteroid.

(2152) Clementina	UCAC2 30454679	2008 November 03	
• D. Heralu	Kamban, AC I	14:23:30 to 14:23:30	
(19) Fortuna	TYC 6293-02458-1	2008 November 03	
• S. Kerr	Glenlee, QLD	10:49:00 to 10:59:35	
(106) Dione	TYC 6864-01014-1	2008 November 20	
• B. Loader	Darfield, NZ	08:49:30 to 08:53:00	
(120) Flatua	110 100 000 000266564	1000 November 11	
(130) Elektra	UCAC2 222366564	2008 November 22	
(130) Elektra • D. Herald	UCAC2 222366564 Kambah, ACT	2008 November 22 10:23:50 to 10:27:50	
 (130) Elektra D. Herald (776) Berbericia 	UCAC2 222366564 Kambah, ACT UCAC2 41349474	2008 November 22 10:23:50 to 10:27:50 2008 November 29	
 (130) Elektra D. Herald (776) Berbericia D. Gault 	UCAC2 222366564 Kambah, ACT UCAC2 41349474 Hawkesbury Heights, NSW	2008 November 22 10:23:50 to 10:27:50 2008 November 29 D at 15:39:08.6 VIDEO	
 (130) Elektra D. Herald (776) Berbericia D. Gault 	UCAC2 222366564 Kambah, ACT UCAC2 41349474 Hawkesbury Heights, NSW Longitude: +150° 38' 27.8"	2008 November 2210:23:50 to 10:27:502008 November 29D at 15:39:08.6VIDEOR at 15:39:14.0	
 (130) Elektra D. Herald (776) Berbericia D. Gault 	UCAC2 222366564 Kambah, ACT UCAC2 41349474 Hawkesbury Heights, NSW Longitude: +150° 38' 27.8" Latitude: -33° 39' 52.0"	2008 November 22 10:23:50 to 10:27:50 2008 November 29 D at 15:39:08.6 VIDEO R at 15:39:14.0 Duration: 5.4 secs	
 (130) Elektra D. Herald (776) Berbericia D. Gault 	UCAC2 222366564 Kambah, ACT UCAC2 41349474 Hawkesbury Heights, NSW Longitude: +150° 38' 27.8" Latitude: -33° 39' 52.0" Altitude: 286 m	2008 November 22 10:23:50 to 10:27:50 2008 November 29 D at 15:39:08.6 VIDEO R at 15:39:14.0 Duration: 5.4 secs Monitored: 15:35 to 15:43	

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The figure above shows the light curve of the occultation measured by Dave, with the upper light curve being the target star and the lower a nearby comparison star..

Key to Plot: 1. D Gault; 2. C Wyatt; 3. Prediction Nov 13

Discussion: A 5.4 second occultation was recorded by Dave Gault, using video with a GPS OSD timing system. The circle above is plotted at the expected 151 km diameter of Berberica. Chris Wyatt was observing visually and unusually in this event the MP was brighter than the star making the dip of only magnitude 0.46 difficult to observe visually. As we have only the one chord and so can not tell if it was north or south of the asteroid's centre, the circle has been arbitrarily centered on Dave's chord.

(10169) Ogasawara	HIP 29138	2008 December 13
• C. Wyatt	Nowendoc, NSW	16:00:00 to 16:19:00
(3935) Toatenmongakkai	HIP 39191	2008 December 14
• C. Wyatt	Glen Innes, NSW	17:54:00 to 18:10:00
(1628) Strobel	TYC 4861-00933-1	2008 December 21
• J. Palfreyman	Lindisfarne, Hobart, TAS	12:58:00 to 13:01:00
(4236) Lidov	TYC 1220-00593-1	2008 December 22
• H. Pavlov	Marsfield, NSW	11:50 to 12:02
(866) Fatme	UCAC2 27404579	2008 December 26
• B. Loader	Darfield, NZ	10:29:00 to 10:31:10
(218) Bianca • B. Loader	UCAC2 31860955 Darfield, NZ Longitude: +172° 06' 24.4" Latitude: -43° 28' 52.9"	2008 December 28 D at 15:37:07.2 VIDEO R at 15:37:16.5 Duration: 9.3 secs
<i>Comments:</i> Watec camera a drop in magnitude. The rise viewing the video as well a:	Altitude: 210 m t 8 fold integration, i.e. just over uncertain with some wind shake s running it past Limovie. I feel c	Monitored: 15:35:30 to 15:38:30 3 unique images per second. A sharp 0.5 . So a slight doubt remains, but with ertain an event occurred. I have run my

Limovie light curve past Dave Herald and he has some reservations based on that alone. I was 222 km north of the predicted centre line and 12 km outside the one-sigma zone. Probability of an event 8.4%.

Discussion: A 9.3 second occultation was recorded by Brian Loader, using video with GPS OSD timing. The circle (right) is plotted at the expected 60 km diameter of Bianca.

Key to Plot: 1. B Loader; 2. Prediction by Occult

(1264) Letaba

• H Pavlov

UCAC2 232658740 Marsfield, NSW

TYC 0166-02156-1

(16913) 1998 KK9

(44208) 1998 OY6

• B. Loader

• H. Pavlov

HIP 41687 Marsfield, NSW

Darfield, NZ

2008 December 28 14:32 to 14:42

2008 December 29 14:03 to 14:07:20

2008 December 31 15:00:00 to 15:09:00

Total Lunar Occultation Timings Reported to the Section for the Period 2007 October 1 to December 31

Brian Loader

Observer	Place	Disappearance	Reappearance	Total
David Gault	Hawkesbury Heights, NSW	19	1	20
	(TV910)			
Stephen Kerr	Rockhampton, QLD (TV2DA)	7	0	7
Brian Loader	Darfield, NZ (SN286)	24	4	28
Jack O'Kane	Upper Hutt, NZ (SN123)	25	3	28
John Talbot	Waikanae Beach, NZ	9	0	9
Andrew Walker	Te Puke, NZ	2	0	2
	Total (6 observers)	86	8	94

Total Lunar Occultation Timings Reported to the Section for the Period 2008 January 1 to December 31 **Brian Loader**

Observer	Place	Disappearance	Reappearance	Total
Peter Anderson	The Gap, QLD	66	0	66
David Gault	Hawkesbury Heights, NSW	91	16	107

Observer	Place	Disappearance	Reappearance	Total
David Herald	Canberra ACT	186	103	289
Stephen Kerr	Rockhampton, QLD	47	0	47
Brian Loader	Darfield, NZ	71	56	127
Jack O'Kane*	Upper Hutt, NZ	16	13	29
John Talbot	Waikane Beach, NZ	19	0	19
Diana Watson	Whakatane, NZ	11	0	11
	Total (8 observers)	507	188	695

* Jack O'Kane died in July 2008. His last quarterly report was received at the beginning of that month.

<u>Lunar Grazing Occultation Timings Reported to the Section</u> <u>for the Period 2007 October 1 to December 31</u> Brian Loader

Two lunar grazing occultations have been reported for this period, both observed by teams from two separate locations *(See notes in 'A Tale of Two Grazes', below).*

Organiser/ Observer	Location	Date 2007	Star	Mag	%lit	CA	#Sites	#Events
Dave Gault (Dave Herald)	Lithgrow, NSW Yass, NSW	Sep 24	ZC3253	5.5	93%	17	11	38
Observers: A. (O'Neil, M. Nelmes,	J. Blank,	P. Purcell, D.	Herald, S	S. Russel	l, A. Br	akel, G. S	mith,
H. Pavlov, R. N	H. Pavlov, R. Moulder, D. Gault, C. Douglass, D. Corbett, B. McMillan, W. McMillan.							
	+	F	+	 /				L
Dave Gault	Brigelly, NSW	Oct 16	SAO185075	8.3	22%	15S	12	52
(Dave Herald)	Yass, NSW							
Observers: A. I	Observers: A. Brakel, P. Purcell, D. Herald (2 stations), D. Gault, C. Douglass, W. McMillan,							
B. McMillan, F	I. Pavlov, P. Brook	s. T. Dobo	sz. and G. Smi	ith				

A Tale of Two Grazes Dave Gault

Team Occultation observed two grazes during September and October 2007. As often happens, both events were vastly different in terms of event circumstances and lunar geometry. In fact, the only similarities were that both events involved the southern lunar limb, a star, and were observed by two teams of observers located nearly two hundred kilometres apart, yet mere metres apart with respect to the path of the lunar shadow.

24th September Graze of ZC 3253 (aka, 38 Aquarii, SAO 164910)

This event looked fairly easy on paper because it involved a rather bright mag. 5.5 star, grazing 17 degrees from the cusp of a 93% illuminated moon. The only anticipated difficulty was the time of

the event, being 12:16 am on a Tuesday morning.

The Canberra-based team led by Dave Herald decided to observe north of Yass, near the town of Binalong, and the Sydney-based team lead by Dave Gault decided to observe west of Lithgow, near the town of Portland. It was decided early on to interlace observers at both the sites so that the targeted region of the lunar limb was well covered if one team was clouded out. This called for precision GPS siting of the observers to prevent overlap. An early site inspection of the Portland site revealed that a

planned observing site was inaccessible due to it being in a cutting with no safe place to park and observe, so a hasty site re-allocation was arranged via mobile phone communication.

Observing to a deadline is not an easy task and both teams had equipment problems. However this was out-weighed by the overall success of the observation. A total of 38 events were recorded as can be seen in the profile diagram on the cover of this circular.

A feature of this event was brought about by serendipity where two observers (Stephen Russell and Dave Gault) were sited a little too close together. Both observers were 188 km apart on the ground, yet 75 m apart with respect to the path of the lunar shadow. Referring to the inset on the profile diagram, Dave, being slightly deeper into the moon only saw the star disappear (the lower D), yet Stephen observed a sequence of disappearances (D) and reappearances (R). Little can be said about the height of the hills between the D-R events, however the valleys between the R-D events are no deeper than 75 metres otherwise Dave would have observed a flash of the star! Measuring the depth of a valley on the moon from the earth, at a range of 384,000 km, involves an angular resolution of 0.04 arc-seconds! That's pretty cool!

The roll call for both teams is; Canberra: A. O'Neil, M. Nelmes, J. Blank, P. Purcell, D. Herald (2 stations – failed at one), S. Russell (out-of-town interloper), and A. Brakel. Sydney: G. Smith, H. Pavlov, R. Moulder, D. Gault, C. Douglass, D. Corbett, B. McMillan, W. McMillan.

16th October Graze of SAO 185075

This event was a lot more comfortable than the ZC 3253 graze being at 8:15 pm on a Tuesday evening and the moon being only 22% illuminated.

The Canberra based team only had to go as far as south of Yass, near the town of Murrumbateman, and the Sydney based team only had to observe east of Bringelly. The Sydney team were spaced from 300 m south to 1 km north of the profile line, and the Canberra team went southwards 800 m. The Canberra team was buffeted by strong winds, which made observing a challenge.

Most of the Canberra crew observed six events and most of the Sydney crew observed four events. A total of 52 events were observed. The profile diagram can be seen on the cover.

The roll call for both teams was A. Brakel, P. Purcell, D. Herald (2 stations), D. Gault, C. Douglass, W. McMillan, B. McMillan, H. Pavlov, P. Brooks, T. Dobosz, and G. Smith.

Summary

This was a pair of well observed grazes that will be entered into the historical record for eternity. Thank you to all observers, and to all readers, please accept an invitation to join the crews on the graze line somewhere in the not too distant future1. For more information, please contact either of the Daves¹.

Team Occultation

1) Dave Herald DRHerald@bigpond.net.au,Dave Gaultdave4gee@yahoo.com.au

<u>Lunar Grazing Occultation Timings Reported to the Section</u> <u>for the Period 2008 January 1 to December 31</u> Brian Loader

Key to all lunar graze occultation plots: Events '+' = visual observations, circles = instrumental observations, red = disappearances, green = reappearances. Lunar profile = the Watts profile with the corrections of Morrison & Appleby, cyan/continuous = reliable, grey/close dashes = somewhat unreliable, red/spaced dashes = unreliable.

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Observers: D. Herald, S. Russell, D. Wheeler, M. Streamer, C. Douglass, D. Gault

RASNZ Occultation Section Circular CN2007/4 - March 2012

The Occultation by Pluto on 22 June 2008

In the dawn twilight of 23 June (approximately 19h UT on 22 June), Pluto and its satellite Charon were expected to occult the same 12th magnitude star UCAC2 25370733 in Sagittarius. The shadow path was predicted to travel across Antarctica for Pluto and South Africa & Australia for Charon, but given the uncertainty in the prediction and importance of the event (an occultation by Pluto & Charon of the same star, which allows the orbital separation between them to measured, is very rare), it was recommended that all southern hemisphere observers attempt to measure it. The faintness of the star meant 10 inch aperture or larger telescopes would be needed, or an integrating video camera for smaller telescopes. The difficulty was further increased by the star being low in the sky, together with a waning gibbous Moon. Six observers in Australia recorded positive observations for this event, three were clouded out, one had a technical failure and the last observer's CCD exposure durations were too long to be useful . One observer (J. Teng-Chuen-Yu) at Les Makes, La Reunion Island observed an occultation by Charon of the same star. Three observers from South Africa (F. Colas from two locations at the SAAO, and T. Widemann from Springbox) and one from Namibia (C. Gruhn at Hakon) recorded misses.

(134340) Pluto	UCAC2 25370733	2008 June 22
• G. Bolt	Perth, WA	D at 19:08:39 PHOTOELECTRIC
	Longitude: +115° 45' 31.3"	R at 19:08:58
	Latitude: -31° 47' 21.5"	Duration: 19 sec
	Altitude: 45 m	
<i>Comments</i> : This was a	time series photometry session on th	e target star Images had an exposure tin

Comments: This was a time series photometry session on the target star. Images had an exposure time of two seconds, with a download time of four seconds between images. There is a hint of an event around 19:08:27 where the magnitude drop may be around 0.05.

• S. Kerr	Glenlee, QLD	D at 19:06:40	VIDEO
	Longitude: +150° 30' 00.8"	R at 19:07:24	
	Latitude: -23° 16' 09.6"	Duration: 24 sec	
	Altitude: 50 m		

Comments: Video camera integrating with an exposure period of 120 ms. Detailed Limovie analysis from 18:35 to 18:37, 18:43 to 18:45, 18:58 to 19:00, 19:05 to 19:09, 19:13 to 19:15, 19:29 to 19:31 and 19:37 to 19:39 to determine the location on the recording of the occultation.

The two light curves shown above are from Greg Bolt's observations (left) and Steve Kerr's (right). Greg's were smoothed using a one minute sliding average filter, while a three second sliding average was used for Steve's.

• P. Anderson	Taylor Range Obs, QLD	D at 19:06:35	VISUAL
	Longitude: $+152^{\circ}55^{\circ}54$	K missed	
	Latitude: -27° 27' 48"	Duration: ?	
	Altitude: 176 m		
mmonts: Pright moonl	ight and low altitude		

Comments: Bright moonlight and low altitude.

• J. Broughton	Reedy Creek, QLD	D at 19:06:32.1	CCD
	Longitude: +153° 23' 52.8"	R at 19:07:50.3	
	Latitude: -28° 06' 30.3"	Duration: 82.2 sec	
	Altitude: 66 m		

Comments: CCD images were taken at a rate of 20 frames per minute. Each point on the lightcurve represents a stack of three frames. The times were calculated for the half-light level in Pluto's atmosphere and based on an audio recording of shutter events and a time reference calibrated to UTC, just as I do for drift-scan timing.

• D. Gault Hawkesbury Heights, NSW D at 19:06:27.5 **VIDEO** Longitude: +150° 38' 27.8" R at 19:08:26.5 Latitude: -33° 39' 52" Duration: 119 sec Altitude: 286 m

Comments: Camera was a Watec WAT-120N, set at 32 frame integration. Reported time is for the first detection of light drop caused by Pluto's atmosphere.

The two light curves shown above are from John Broughton's observations (left) and Dave Gault's (right). John's were smoothed using a one minute sliding average filter, while a three second sliding average was used for Dave's.

• T. Dobosz

Bankstown, NSW Longitude: +151° 01' 26.9" Latitude: -33° 55' 33.5" Altitude: 25 m D at 19:06:41 R at 19:08:17 Duration: 96 sec VIDEO

Comments: Significant Pollution present. Integrations of 32 frames i.e. 1.28 secs. The disappearence and reappearence times are estimates based on first apparent trend of commencement of dimming and first apparent full re-appearance.

The light curve shown (right) is from Ted Dobosz's observations, which were smoothed using a three second sliding average filter.

the time of the event everything was a blur. The target was only 13 degrees high, and right on my horizon to the west. The video shows nothing, and it is quite possible that I wasn't even pointing at the right place anymore. One to forget!!! • J. Biggs Perth, WA VIDEO Technical failure! • R. Groom Perth, WA Exposures too long.

Comments: It all went horribly wrong! The conditions went from perfect to dreadful overnight, and by

• V. Batista Hobart, TAS & J. Greenhill

Clouded out! Note: Batista is with the Institut d'Astrophysique de Paris, Greenhill with the University of Tasmania.

• D. Herald	Canberra, ACT
Clouded out!	

• B. Lade Clouded out!

• J. Bradshaw

Stockport Obs, SA

Discussion: John Talbot made the following 'first-look' analysis. The plots on this and the next page show three "layers" in Pluto's atmosphere. The outer layer corresponds roughly to the 95% light level of the light curves (shown on the previous page), with the 100% level being the out-of-eclipse light intensity and 0% is the fully occulted light intensity, due solely to Pluto (the flat bottoms on Dave Gault, John Broughton and Ted Dobosz's light curves). The other layers are the 50% and 5% light levels respectively. The middle layer (50% light intensity) is plotted with the expected diameter of 2,306 km and has a good fit to the observed points.

Bruno Sicardy, a professional astronomer who is affiliated to 'Observatoire de Paris', prepared the predictions, worked with all the observers beforehand, collected and analysed the data. Bruno has now published a paper on this event titled "Constraints on Charon's Orbital Elements from the Double Stellar Occultation of 2008 June 22" in 'The Astronomical Journal' (A.J. 141:67 (16pp), 2011 February), listing all of the observers as co-authors. In this paper, Bruno uses the observations to derive the position of Charon relative to Pluto at the moment of the occultation. He then compares this with the predicted position from three different orbital solutions, and is able to rule out one of the solutions.

Quoting from his paper; "the east and north Charon Plutocentric offset in the sky plane (J2000): X = +

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The plot above is made for the five percent light level.

Key to Plots: 1. G. Bolt; 2. S. Kerr; 3. J. Bradshaw (clouded out); 4. P. Anderson;

5. J. Broughton; 6. D. Gault; 7. T. Dobosz

VIDEO

CCD

Samford, OLD

The plots above is made for the fifty percent light level (left) and ninety-five percentage level (right).

 $12,070.5 \pm 4 \text{ km} (+ 546.2 \pm 0.2 \text{ mas}), \text{ Y} = +4,576.3 \pm 24 \text{ km} (+ 207.1 \pm 1.1 \text{ mas})"$ and "orbital radius r = $19,564 \pm 14 \text{ km}$ ". This is a measurement of the orbital radius to an accuracy of 0.07% - to make this measurement directly with a single telescope to that level of accuracy (i.e. to be able to resolve to 1.1 mas) would require an aperture of 120 metres!

Report on the Fifth Trans-Tasman Symposium on Occultations by Steve Kerr <u>TTSO5 - 26-27 May 2011 – Napier, New Zealand</u>

Coordinated amateur occultation observing across New Zealand and Australia has enjoyed a long and productive history under the guidance of the Occultation Section of the RASNZ (Royal Astronomical Society of New Zealand) and its Director Graham Blow. Over the past decade, as occultation observing transitioned from a principally visual process to video and CCD instruments, the Section has actively supported this transition through making video cameras available to observers where commercial options were not available locally. It also became clear that equipment alone was not sufficient and that information and practical hands-on advice was also required. And while on-line mechanisms are vital in this role, a face to face meeting is hard to beat for getting the subtleties across as well as motivating observers and making new contacts. The idea was hatched to hold the First Trans-Tasman Symposium on Occultations with these general aims, which came together as a two day meeting in Auckland in May 2007 in conjunction with the annual RASNZ conference of that year.

The outstanding success of that meeting lead to the establishment of subsequent symposia with a pattern established of holding the event in New Zealand or Australia on alternating years – the New Zealand meeting held in conjunction with that year's RASNZ conference and the Australian meeting in conjunction with NACAA (the National Australian Convention of Amateur Astronomy – a biannual meeting held over the Easter weekend at different locations around the country). The content of the meetings has evolved over that time to cover more than the original educational objectives. Discussions now extend to recent observation results through to emerging new techniques, equipment and software options.

TTSO5 – the fifth symposium - was held in Napier, New Zealand in late May 2011 with Murray Forbes from Lower Hutt putting in an admirable effort as meeting convenor. A healthy contingent of thirty attended including six from Australia. It was particularly pleasing to see so many faces that were new to occultation observing, as well as a few that had been involved in the past and were looking for a refresher in the topic. Scheduled over one and a half days, the agenda covered the full range from basic to cutting edge. Here is a quick summary of the presentations.

A good turn out at TTSO5, Napier 2011.

- After Murray and Graham took care of the administrative details and welcomed everyone to the meeting, Steve Kerr presented a now well recycled talk introducing the astronomical concepts of occultations for beginner observers.
- Well known South Island observer, Bill Allen, gave an overview on his CCD drift scan observing strategies and results, particularly in pursuing occultations by Pluto. Bill offered some different perspectives on how to provide a time base for this observing technique.
- Jacquie Milner from Western Australia introduced the Occultation Video Manual. This has been a project bubbling along in the background for some time, to support beginner observers particularly with respect to the technology aspects of electronic observing. Plenty of discussion followed on what content should be

Bill Allen presenting his CCD drift scan observing strategies at TTSO5.

included and how best to maintain and distribute the document. A broad based collaborative approach would appear to be the best so watch out for your opportunity to contribute.

 On behalf of Dave Gault, Tony Barry, Walt Morgan and Sandy Bumgarner who could not attend the meeting, Steve Russell and Dave Herald rolled out the red carpet for the global launch of the new IOTA VTI – Video Time Inserter – the long awaited successor for the KIWI OSD system that has been the corner stone of video occultation observing. The features and capability of the new device was outlined along with test results and a real live prototype present for everyone to touch and smell. Of course, the dominant question was where do people get them and Steve and Dave got plenty of practice at answering.

The new IOTA GPS based Video Time Inserter.

• After an informal session on assembling video observing equipment on a telescope, North Island observer, Peter Graham, gave a review of his own experience at capturing his first lunar occultation by video – an excellent review of the challenges new observers face.

- Dave Herald from Canberra, Australia, gave a quick overview of the best asteroidal outlines determined by occultation observations over the past two years as reported to IOTA. There were as usual some great examples of what can be achieved with large numbers of well placed observers – something that is difficult to organise in our part of the world.
- John Broughton of Queensland, Australia, has in recent times been catching • many asteroidal occultations using portable telescopes. While he could not attend the meeting, he sent along a very informative video presentation on his design approach to ultra compact, quick setup, large aperture telescopes designed for video occultation observing.
- ٠ At the other end of the scale, South Islander Stu Parker gave a short summary of using small aperture optics based on Scotty Degenhardt's Might Mini concept for multiple site coverage of occultations.
- In what is becoming a regular update for TTSO meetings, Brian Loader from Darfield gave an update on recent measures of double stars using lunar occultations as well as a background description of the technique as an introduction for new observers.
- John Talbot also usually gives an overview of planetary occultations across New Zealand and • Australia but in his absence, Murray Forbes made the presentation. Observation numbers for 2010 were consistent with previous years with a number of good profiles achieved with multiple observers/locations. New Zealand and Australia continue to punch above its weight, with the region contributing 22% of observations reported to IOTA from around the world.
- Steve Kerr closed the first day's proceedings with a short discussion on the observational ٠ aspects of trying to detect shallow planetary occultations. An example including a difficult to interpret light curve was presented.
- Day Two kicked off with a presentation by Hristo Pavlov (who was home in Australia, and connected via Skype) outlining the features of his Tangra software. While primarily aimed at the less experienced observers looking to learn the software, there is always something for the more experienced to gain from the insight of the software's author.

Dave Herald then gave an overview of a process • underway to draw up a new star catalogue to cover stars down to 20th magnitude to support planetary

occultation efforts. While there are many catalogues in play at the moment, it is proposed to take the best of the current data and develop a format compatible with future efforts to improve the quality of data.

- Hristo returned with a second session delivered via Skype on his OccultWatcher software the ٠ gold standard for coordinating planetary occultation observing. Once again, a first rate review of the capabilities for beginner and experienced observers alike.
- Closing the session, Murray Forbes outlined a work in progress to develop a minimal cost

Dave Herald

in action.

mechanism for integrating the widely available "Beeper Box" devices into video observing using basic video insertion electronics.

In closing the meeting, Graham Blow noted the enthusiasm shown and the level of interest by new observers discovering occultations for the first time. Clearly the TTSO concept still fills a valued need for observers around the region and to that ends, planning is well at hand for TTSO6 to be held in conjunction with 2012 NACAA in Brisbane, Queensland, Australia over the Easter weekend. Interested observers are invited to attend and expressions of interest are currently being taken at http://www.nacaa.org.au/2012/interested.

Programme for the 6th Trans-Tasman Symposium on Occultations			
To be held on Monday 9 April 2012 at the University of Queensland, Australia.			
Time	Title	Author/Presenter	
9:00	Introduction and Opening Comments	Graham Blow/	
L		Steve Kerr	
9:15	Planetary Occultations in Aus and NZ in 2011	John Talbot via	
		the Net	
9:35	International Asteroidal Occultation Highlights	Dave Herald	
9:55	IOTA in the Middle East	Mohammad Mirbagheri	
10:15	Morning Tea	L	
10:45	IOTA VTI (Video Time Inserter)	Dave Gault/	
		Tony Barry	
11:05	GPS ABC	Dave Gault/	
		Tony Barry	
11:25	Automating asteroidal occultation observation maybe	Jonathan Bradshaw	
11:45	Baily Beads observing by video – practicalities and value.	Dave Herald	
12:05	Occultation Observers Beginner's Manual	Jacquie Milner	
12:25	Lunch		
1:25	Occultation Clinic	Dave Herald,	
		John Broughton,	
		Jonathan Bradshaw,	
		Steve Kerr,	
		anyone else with an	
		opinion.	
2:45	Afternoon Tea		
3:15	Star Catalogue Developments and Measuring Steller Diameters	Dave Herald	
3:35	High resolution double star observing using lunar occultations	Jonathan Bradshaw	
3:50	Symposium Close	Graham Blow/	
		Steve Kerr	

Occultation Beginner's Manual

Over the past year Jacquie Milner in Perth has been working on an Occultation Beginners Manual. Feedback over the last several years has been that some people have difficulty in making the transition from visual to video or CCD observing, given the complexity and terminology of the systems involved. This manual is intended to make it easy for people to move into using video or CCD, and seeks to set out clearly what's needed and the pros and cons of various techniques. The manual has been through several iterations so far, but the best feedback will always come from those who are going to use it. Jacquie will be leading a discussion on this at the TTSO6 meeting,

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RASNZ Occultation Section Information

The RASNZ Occultation Section is an Observing Section of the Royal Astronomical Society of New Zealand. More information about the section can be obtained from its Director:

Graham Blow, P.O. Box 2241, Wellington, New Zealand E-mail : Graham.Blow@actrix.gen.nz

The URL for the Occultation Section website is: http//www.occultations.org.nz/. The site contains much useful information on coming occultation events, including charts, observing techniques, recent successful observations and much else.

Observation Reports

Observation reports should be sent to coordinators at regular intervals. Addresses and E-mail contacts are shown below.

Minor Planet Occultations and Appulses

Reports of successful observations of Minor Planet occultations should be forwarded to **John Talbot**, with a copy to Graham Blow as soon as possible after the event. Reports of appulses where no event was observed should be sent to **John and Graham** on a regular basis, and certainly at intervals of no greater than 3 months, preferably near the beginning of January, April, July and October in time for publication in the Circular.

John Talbot: john.talbot@xtra.co.nz

If you are reporting by email, observers are particularly encouraged to send their reports to John and Graham immediately after each event using the Excel report form available on the Section's website. Your observation of a 'miss' might link with another observer's successful observation to provide information as to the path and limits of the occultation.

Lunar Occultations

Observations of both total and grazing lunar occultations should be reported on a regular basis, again preferably at the end of each three months. Please send them to:

for New Zealand observers:	for Australian observers:	for all grazes:
Brian Loader	Dave Gault	Mitsura Soma
moonocc@gmail.com	daveg@tpg.com.au	Mitsura.Soma@nao.ac.jp

RASNZ Occultation Section Circular

Occultation Section Circulars are edited by Murray Forbes. The editor is delighted to receive articles about occultations or related fields of astronomy for publication, especially accounts of interesting or unusual observations. Please send contributions (preferably by email) as ASCII text files without formatting, pictures as gif files (or other lossless compression formats) and charts/diagrams/maps preferably as a vector graphic format such as svg (failing that, as a gif file). Contacts for the editor are:

6 Mary Huse Grove Manor Park Lower Hutt 5019, Wellington New Zealand Email: murray_forbes@xtra.co.nz Phone (+64)(4) 5635007

Next Issue

The next circular will appear shortly. Please send any items for publication immediately.

Thanks ...

The editor would like to thank all contributors of observations, articles, diagrams, maps and tables, editing expertise and time.

Graham Blow: Graham.Blow@actrix.gen.nz