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The Astronomer

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(6411) Tamaga

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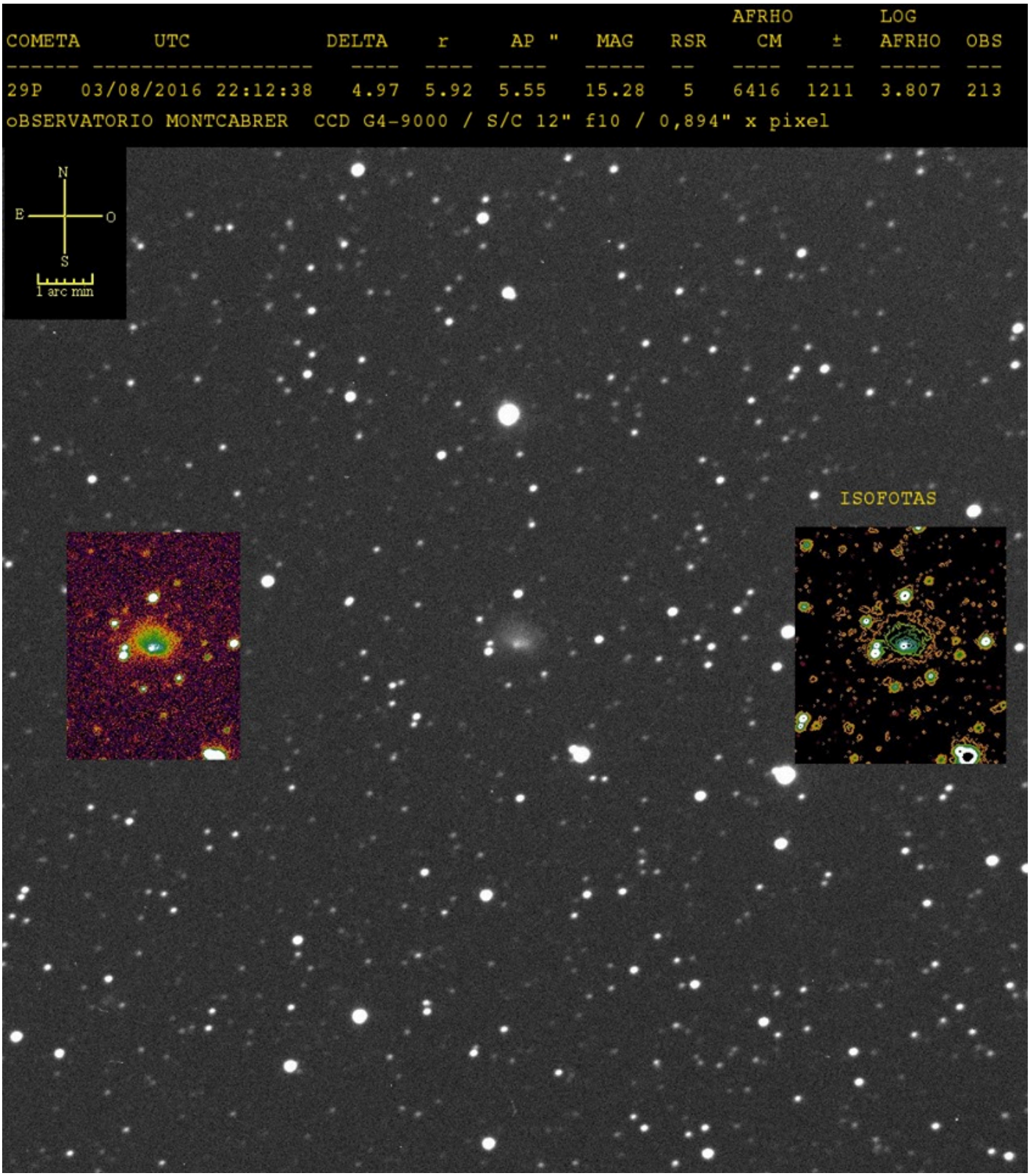
1) Gum 12 Nebula, 2016 May: Gerald Rhemann

Imaged from Namibia

2) Comet 29P, 2016 August 3: Ramon Naves and Montse Campas (Spain)



Vol 53 No 628 ***THE ASTRONOMER*** ***2016 August***

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E-CIRCULARS SUBSCRIPTIONS: The circulars provide the fastest service for discoveries and news of novae, comets, supernovae, asteroids, variables and any other object of interest. Chart information is sometimes included. There are approximately 100 circulars e-mailed per year. Annual cost £20 per year.

DISCOVERIES: can be reported to the Editor on (01256) 471074. If answering machine response only PLEASE LEAVE MESSAGE ON TAPE and in addition, contact Nick James (01245) 354366, Denis Buczynski 01862 871187 or Peter Birtwhistle (01488) 648103 Above numbers are available all night. Please e-mail as attachments, charts or photos to the Editor's number immediately
.
VARIABLE STAR ALERTS to be reported to Gary Poyner, VS editor. Details above.
RESULTS: in TA are preliminary unless otherwise stated. They should also be sent to the body responsible for the ultimate analysis of the object.

EDITORIAL:

Observer Motivation

If we go right back to the earliest memories of why people became fascinated by the night sky or felt the need to try and study it in detail there are clearly big differences compared with motivations in today's efforts including those who contribute to this magazine. There is also some concern in modern times, however, that the number of active observers may be in decline.

Readers will all know that the public at large often confuse our subject and observing with astrology but in those early times astronomy as we know it was not really distinguished from the former. Consequently motivation of studying the sky was entirely different and some regarded the sky as a mirror image of the Earth. Because of this close association it was though that any changes in the heavens might indicate a forthcoming special event.

The Chinese in particular had teams of observers to make sure the whole sky was monitored for changes and so that records could be compared leading to wonderful accuracy of their logs. Any special events such as 'hairy stars' (comets) or 'guest stars' (novae/supernovae) were regarded as especially important indicators of events on Earth. The only difficulty seemed to be that opinions, including those of the current Emperor, left the observer apprehensive. A new object might indicate good news and approval of the 'politics' of the day but at other times they might instead suggest disapproval of the emperor's administration. The latter might have serious repercussions for the observer.

Motivation gradually changed the more the sky was studied. Predictions of the movement of planets along the ecliptic improved as a consequence leading to a form of 'stability'. Eventually more later on observers such as Tycho and Kepler were not content to regard changes as solely linked to the Earth and motivation turned to the quest to understand new objects, why they appeared suddenly and such matters as how far away were they.

By the 1900's the need to understand the heavens in considerable detail became paramount. The observer would feed regularly results to those who analysed measurements. Occasionally the theorist might reverse the trend and ask the observer to check their proposals, much of which happens to this day.

But what of today from an amateur's perspective? The vast majority of the public who step outside to look at the night sky would probably be classed as star gazers. This is still a wonderful theme for our subject. Most might not actually notice any changes but merely recognise a few favourite constellations and be reassured that things in the sky seem very stable compared with some of the uncertain events on Earth! Others may recognise the brighter planets and may even consult books which show predictions of movement.

That leaves a comparatively very small proportion, such as ourselves who are motivated to study of individual stars, deep sky objects, comets and much more. Is this for pure enjoyment or to help professionals investigate more obscure matters and support the pro-am cause? Only the individual observer, motivated to go every clear night knows the answer to that question.

Guy M Hurst, editor

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The Astronomer 2016 Annual Meeting

This is a further reminder that the date for this year's annual meeting of 'The Astronomer' has been set for Saturday **2016 November 19**. The meeting will take place at St. Mary's Church Hall, Goats lane, Basingstoke and will start at 11am.

Preliminary speakers (but subject to change/addition):

1) Annual TA Report and Future Plans: Guy Hurst
2) The Role of the Amateur in the Observation of Occultations: Tim Haymes
3) Euclid: a space mission to map the dark universe: Bruno Altieri
4) OJ287 - a quasar with a case of Schizophrenia? Mark Kidger
5) A technical guide to SLR Astrophotography: John Murphy
6) LEDs Bringing back the star?: Bob Mizon

We will open booking in September and this will include booking forms with an e-circular and on our TA website. In the meantime **please enter this meeting in your diaries** for November 19.

Meteor Notes: September deadline

Due to personal commitments the meteor sub-editor requests contributions for the September issue be sent by Sept 3.

Circulars Service (continues from the listing in TA Volume 53 No 627 page 59 [2016])

:

Date	*Cat*	*Circular*	*Subject*
160708	3	E-Circular 3182	FO Aqr in an extended low state
160711	3	E-Circular 3183	Pluto Occults UCAC4 345-180583 2016 July 14
160715	3	E-Circular 3184	GRB 160625B: Prompt Optical Emission Detection
160718	3	E-Circular 3185	RX Andromedae
160720	3	E-Circular 3186	QSO BZQJ0206-1150: Sudden brightening
160728	3	E-Circular 3187	MASTER OT J204806.68+135423.3 Outburst
160729	3	E-Circular 3188	PNV J00430400+4117079 = M31N 1990-10a

NEWS NOTES

ASASSN-16FV: Nuclear Transient in IC 4705 (=AT 2016cqz)

J. Brimacombe, Coral Towers Observatory et. al. report on ATEL 9123 that during ASAS-SN and using data from the quadruple 14-cm "Cassius" telescope in Cerro Tololo, Chile, they discovered a nuclear transient in the galaxy IC 4705.
It was discovered in images obtained on UT 2016 June 6.28UT at V~15.6 mag. It was also detected in images obtained on 2016 June 07.26 (V~15.2) but not on 2016 May 28.33 and before to mag 17.1.

www.astronomy.ohio-state.edu/~assassin/followup/asassn-16fv.png shows the archival DSS image of the host (left) and the J. Brimacombe confirmation image (right). The red circle has a radius of 5" and is centred on the position of the transient in the J. Brimacombe image.
The position of ASASSN-16fv is approximately 0.6" South and 0.6" East from the centre of IC 4705 (z=0.011972, d=49.7 Mpc, via NED), giving an absolute V-band magnitude of approximately -18.1 (m-M=33.46, A_V=0.272).
Properties:

Object	RA (J2000)	DEC (J2000)	Disc. UT Date	Disc. V mag
ASASSN-16fv	18:28:10.441	-71:41:38.81	2016-06-06.28	15.6

Obs. UT Date	V mag
2016-05-28.33	>17.1
2016-06-06.28	15.6
2016-06-07.26	15.2

(E3175)

Possible Nova in Scorpius PNV J17381927-3725077

According to CBAT "Transient Objects Confirmation Page", Hideo Nishimura, Shizuoka-ken, Japan reports discovery of an eruptive object (PNV J17381927-3725077) on 2016 June 10.63UT at magnitude 12.4 using a 200-m f/3.2 lens + Canon digital camera EOS 5D and CCD.
It is located at: RA 17h 38m 19.27s DEC -37 25' 07.7" (2000)
Nothing was visible at this location on an image of 2016 May 14.71UT, May 18.61UT or June 5.53UT to a limiting magnitude of 13.0.
Two USNO-B1.0 stars (both about 17 mag) are within 1" of the transient's position.
A mag 11.8, pre-discovery image has been found by T. Kojima, Gunma-ken, Japan, on three frames using 135-mm lens + Canon EOS 6D digital camera, who also advise nothing was visible at this location on two patrol frames (Limiting mag.= 13) taken on 2016 June 5.582 UT.

K. Ayani, Bisei Astronomical Observatory (BAO) obtained a low-dispersion spectrogram (resolution 0.5 nm, range 400-800 nm) of this PNV with the BAO 1.01-m telescope. It has a prominent and broad H-alpha emission line (FWHM about 1800 km/s, equivalent width about 23 nm) and a broad H-beta emission line, which shows that the PNV is a nova in early phase. *(E3176)*

MASTER OT J164511.95+275227.2: QSO Flare

P. Balanutse et. al. (Lomonosov MSU) et. al. report on ATEL 9166 the MASTER-IAC auto-detection system discovery of an OT source at: RA 16h 45m 11.95s DEC +27 52' 27.2" on 2016 June 12.014UT.

The OT unfiltered magnitude is 15.8m (limit 19.3m). It is seen in a bright state on three images but 'quiet' as follows:
2016-05-03 01:43:32.17UT 18.8
2016-03-10 00:58:15.98 19.0
2016-02-14 05:45:16.91 19.1

The last outburst was registered at MASTER-Kislovodsk on 2012 July 15 with unfiltered m=16.8.
This OT is 0.6" from the candidate to QSO
(SDSS DR10 catalogue of candidate quasars (Brescia+, 2015))
Spectral observations are required.
The discovery and reference images are available at:
http://master.sai.msu.ru/static/OT/164511.95275227.2.png *(E3177)*

MASTER OT J095958.98-190100.6 Dwarf Nova Outburst

P. Balanutsa et. al. (SAAO) and others report on ATEL #9174 that MASTER-SAAO auto-detection system discovered an OT source at: RA 09h 59m 58.98s DEC -19 01' 00.6" on 2016 June 17.77954UT.

The OT unfiltered magnitude is 13.3m (limit 18.8m). It is seen in three images. There is no minor planet at this place. There is a reference image without the OT on 2016 Apr 12.80183UT with an unfiltered magnitude limit 19.8.
There is an USNO-B1 star with B=20.71, R=20.70 and GALEX source, suggesting a dwarf nova outburst with current amplitude greater than seven magnitudes.
Spectral observations are required.
The discovery and reference images are available at http://master.sai.msu.ru/static/OT/095958.98-190100.6.png
This OT is also present on the ASASSN page (independent detection?)

GRB 160625B: Bright Glow Pre-Trigger

A. Melandri (INAF-OAB), and others report (GCN 19585) on behalf of the Swift-XRT team:
Swift-XRT has performed follow-up observations of the Fermi/LAT-detected burst GRB 160625B in a series of observations tiled on the sky. The total exposure time is 2.7 ks, distributed over 8 tiles; the maximum exposure at a single sky location was 1.1 ks. The data were collected between T0+9.6 ks and T0+10.0 ks, and are entirely in Photon Counting (PC) mode.
An uncatalogued X-ray source is detected and is above the RASS limit, and is therefore likely the GRB afterglow. The position of this source is RA, Dec=308.5969, +6.9196 which is equivalent to:
RA (J2000): 20:34:23.25 Dec(J2000): +06:55:10.5
with an uncertainty of 3.8 arcsec (radius, 90% confidence). This position is 19.7 arcmin from the Fermi/LAT position.
Subsequently on GCN 19615 T. Batsch et. al., (Pi of the Sky Collaboration) relay:

One of four **Pi of the Sky North detectors** located at Arenosillo observatory in Mazagón near Huelva, Spain imaged the region of GRB 160625B, at a position:
RA 20h 34m 23.50s DEC +6 55' 8.1" before, during and after the GRB with 10s exposures (the exposures were taken in white light, IR-cut and UV-cut filters only, to achieve deepest detection limit).

Cameras of the Pi of the Sky North observatory were observing the position of the GRB160625B 48s after Fermi GBM trigger 488587220 time (Jun 25 22:40:16.28 UT) 140 seconds before the LAT 488587408 trigger (Jun 25 22:43:24.82 UT). We observed optical emission at the position given by Swift XRT recording a bright light curve starting -5.9 s before the LAT trigger.
The first 10 s exposure shows initial magnitude of ~9.18 (unfiltered) brightening to ~8.04 on the second exposure, than becoming gradually dimmer.
It is important to note that both cameras, 35 and 39, identified a new object on exposures starting just before the time of the trigger.
Editor: If anyone has by chance images of this area around: Jun 25 22:40:16.28 UT please check for an optical outburst and if detected please send to the editor with caption details. *(E3181)*

FO Aqr in an Extended Low State

Collin Littlefield (Notre Dame) et. al. report on ATEL 9216 that the cataclysmic variable FO Aquarii, the so-called "**king of the intermediate polars**," is presently in an unprecedented and prolonged faint state. Normally brighter than V = 14, FO Aqr is currently at V ~15 and was as faint as V~15.7 at the start of 2016 May. The faint state began at an unknown time between 2015 Dec. 18 (V = 13.71, S. Dvorak, AAVSO) and 2016 May 6 (V ~ 15.6, our measurement).

To investigate this behaviour, they combined photometry from the Catalina Real-Time Sky Survey, the 1.8-m Vatican Advanced Technology Telescope (VATT), and the University of Notre Dame's 80-cm Sarah L. Krizmanich Telescope (SLKT). The VATT and SLKT data were unfiltered with a Johnson V zero point. They also downloaded the AAVSO observations of FO Aqr made after 2015 Oct. 1, all of which were V-filtered CCD observations contributed by Shawn Dvorak. Together, these datasets show a gradual, quasi-linear recovery since early May, with FO Aqr brightening at an average rate of approximately -0.01 mag/day. At the time of writing, FO Aqr had brightened to V ~ 15, still well below its normal brightness. A light curve of the data is available http://www3.nd.edu/~clittlef/fo_aqr.png

Although FO Aqr was recently observed by the K2 mission, the Kepler observations ended before the start of the current low state. Prior to this faint state, FO Aqr had been in an extended bright state, implying a stable rate of mass transfer. A study using the Harvard Plate Collection showed no evidence of faint states between 1923 and 1953. More recently, light curves from the CRTS and the AAVSO show the system to be consistently brighter than V~14, with no indication of prolonged low states. Additionally, the AAVSO's International Variable Star Index lists FO Aqr's variability range as 12.7 (V) -14.2 (V), further underscoring the exceptional nature of the current low state. Indeed, they are unaware of any published measurement of this system in a faint state.

Continued monitoring of this event would provide insight into the ongoing low state as well as the effect of the diminished mass transfer on FO Aqr's magnetic accretion processes. A spectroscopic study would likely prove to be especially fruitful.

AAVSO have a chart and sequence under ‘Pick a Star’ from their Home page.

Location: RA 22h 17m 55s DEC -08 21’04” (2000)

(E3182)

COMET NOTES

Edited by Guy Hurst

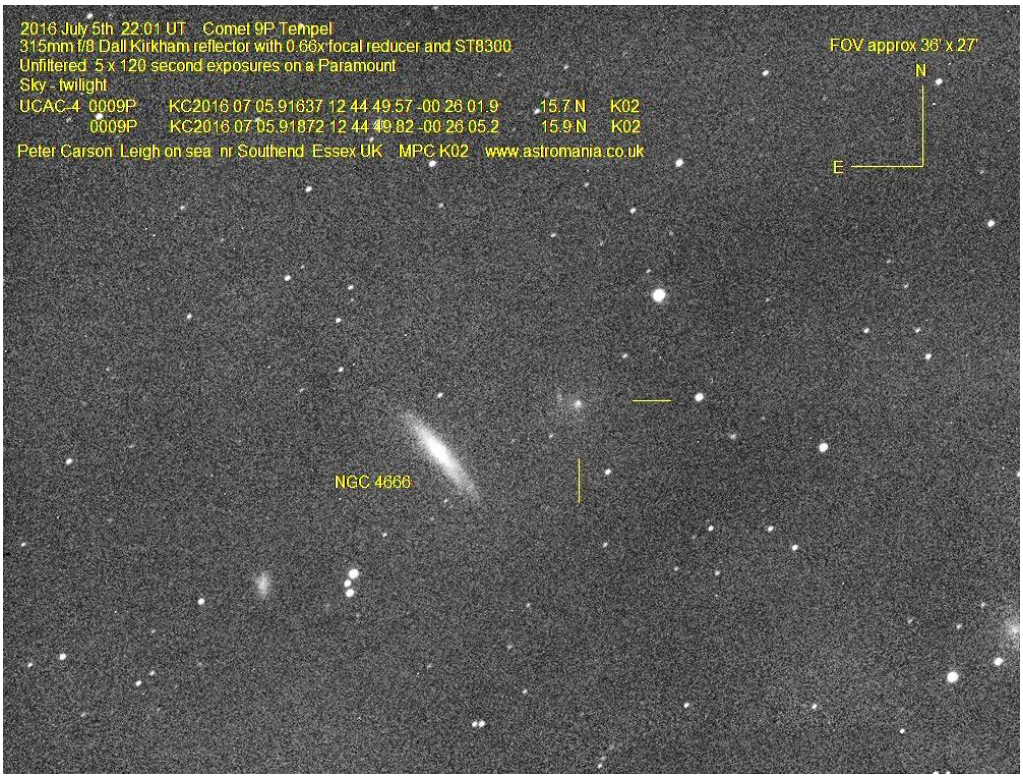
Contributing Observers:

OBSERVER	LOCATION
Alexander Baransky	Kyiv, Ukraine
Peter Birtwhistle	Great Shefford, England
Peter Carson	Leigh on Sea, England
Roger Dymock	Waterlooville, England
Marco Goiato	Brazil
J. J. Gonzalez	Asturias, Spain
Kevin Hills	Cheshire, England
Nick James	Chelmsford, England
Carlos Labordena	Spain
Martin Mobberley	Bury St Edmunds
William C de Souza	Brazil
Graham Wolf	Barber Grove, New Zealand
Chris Wyatt	Walcha, NSW, Australia

Astrometry contributors with stations:

Q65,G68 **Roger Dymock** 0.51-m reflector + CCD; 0.61-m f/10 reflector + CCD
K02 **Peter Carson** TEL 315mm CDK reflector + CCD
J95 **Peter Birtwhistle**, Great Shefford

Comet 9P/Tempel



Comet 9P and NGC 4666

2016 July 5 22h01mUT
0.315-m Dall Kirkham + ST8300
5 x 120 sec exposures

Peter Carson

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
160701.28	S	11.0	AC	12	L	8	150	3.2	2			Wolf

Usual observing site is Fairfield Backyard Observatory (FBO). Co-ords are 45deg 53min 51.54s S, 170deg 24min 06.00sec E, 27.8m amsl.

160701.90	B	11.2	TI	20.0	T	+ 10	80	2	3			Labordena
160702.92	S	10.8	TK	20.3	T	+ 10	77	3.5	2/			Gonzalez
160703.92	S	11.5	AU	22	L	+ 6	60	2.5	3/			Goiato
160705.28	S	10.8	AC	12	L	8	150	2.4	2			Wolf
160707.28	S	10.8	AC	12	L	8	150	2.6	2			Wolf
160708.94	S	10.8	TK	20.3	T	+ 10	77	3	2			Gonzalez
160710.28	S	10.6	AC	12	L	8	150	3.0	2			Wolf
160722.29	S	12.0	AC	12	L	8	150	2.3	3			Wolf
160725.32	S	12.0	AC	12	L	8	150	2.0	3			Wolf
160726.31	S	12.0	AC	12	L	8	150	2.2	3			Wolf
160727.90	S	9.8	TK	20.3	T	+ 10	77	5	2/			Gonzalez
160728.31	S	12.0	AC	12	L	8	150	2.6	4			Wolf
160729.89	B	10.1	TI	20.0	T	+ 10	50	3	2			Labordena
160730.31	S	12.2	AC	12	L	8	150	2.5	3			Wolf
160731.31	S	12.2	AC	12	L	8	150	2.3	3			Wolf
160731.97	S	10.3	TK	22	L	+ 6	60	3	2/			Goiato

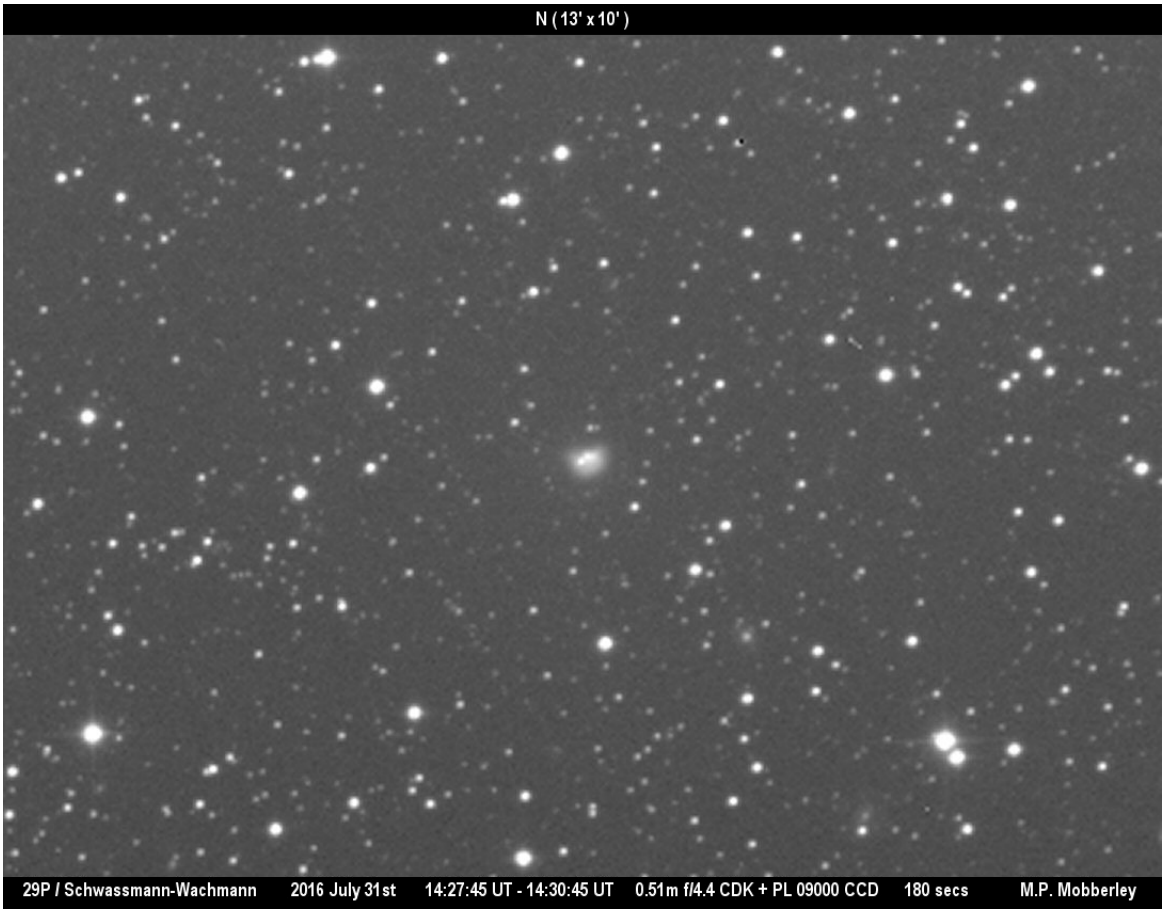
Chris Wyatt at Walcha, NSW, reports the following comet data via Graham Wolf: July 02.39 UT, Mv 12.5, 3 arcmin, DC3. July 25.38 UT, Mv 12.2, 2.6 arcmin, DC 2/3. July 28.38 UT, Mv 12.0, 3.1 arcmin, DC 3:- all with a 25cm f5 Dob at 39x.

Comet 29P/Schwassmann-Wachmann

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
160708.08	C	11.9	MC	50.0	L	+ 3	150	0.3				Hills
160708.63	C	12.8	MC	51.0	C	+ 7	80	0.6				Dymock
160714.07	C	12.2	MC	50.0	L	+ 3	150	0.6				Hills
160727.55	C	13.6	MC	51.0	C	+ 7	100	0.6				Dymock
160729.00	I	12.9	AQ	20.3	T	+ 10	133	0.4	8			Gonzalez

Astrometry:

2016 07 08.62789	19 38 11.98	-25 43 09.1		15.32N		Q65
2016 07 08.63755	19 38 11.66	-25 43 09.4		15.31N		Q65
2016 07 27.54087	19 28 35.89	-25 48 10.7		15.95N		Q65
2016 07 27.54236	19 28 35.86	-25 48 10.5		15.98N		Q65
2016 07 27.55182	19 28 35.66	-25 48 09.8		15.95N		Q65
2016 07 27.55331	19 28 35.64	-25 48 09.9		16.01N		Q65
2016 07 29.49723	19 27 39.26	-25 48 12.8		13.1 N		Q65
2016 07 29.52999	19 27 38.32	-25 48 12.8		13.1 N		Q65



Comet 29P, 2016 July 31, 14h27mUT 0.51-m f4.4 CDK + CCD: Martin Mobberley

Comet 53P/Van Biesbroeck

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
160703.02	S	12.9	AQ	20.3	T	+ 10	133	0.9	3			Gonzalez
160711.18	C	13.0	MC	50.0	L	+ 3	120	0.8				Hills

Astrometry:

2016 07 02.03230	21 16 00.93	-11 14 04.5		15.5	N		K02
2016 07 02.03826	21 16 00.90	-11 14 05.6		15.8	N		K02
2016 07 02.04271	21 16 00.86	-11 14 06.0		15.4	N		K02
2016 07 02.03230	21 16 00.93	-11 14 04.5		15.5	N		K02
2016 07 02.03826	21 16 00.90	-11 14 05.6		15.8	N		K02
2016 07 02.04271	21 16 00.86	-11 14 06.0		15.4	N		K02

Comet 81P/Wild

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
160701.29	S	9.3	AC	12	L	8	150	8.8	2			Wolf
160702.91	S	8.1	TK	20.3	T	+ 10	77	9	2			Gonzalez
160705.29	S	11.0	AC	12	L	8	150	1.7	2			Wolf
160707.29	S	11.2	AC	12	L	8	150	1.5	2			Wolf
160722.31	S	11.2	AC	12	L	8	150	1.8	3			Wolf
160725.32	S	10.8	AC	12	L	8	150	2.4	3			Wolf
160726.34	S	11.0	AC	12	L	8	150	2.0	3			Wolf

```
160728.34 S  11.2  AC  12   L     8 150  3.5   3                Wolf
160730.34 S  11.0  AC  12   L     8 150  3.6   3                Wolf
160731.34 S  11.2  AC  12   L     8 150  3.2   3                Wolf
```

Chris Wyatt at Walcha, NSW, reports the following comet data via Graham Wolf:
July 02.35 UT, Mv 11.2, 2 arcmin, DC3
July 25.35 UT, Mv 10.9, 2.5 arcmin, DC3
July 28.35 UT, Mv 11.2, 3.7 arcmin, DC 2/3:- all with a 25cm f5 Dob at 39x.

Comet 93P/Lovas

```
Date       MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160716.20 C  18.3  MC  50.0 L  +  3 150  0.2                    Hills
```

Comet 174P/Echeclus (60558)

```
Date       MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160704.45 C  17.9  NO  61.0 C  + 10 100  0.4                    Dymock
Astrometry:
2016 07 04.43300 01 20 42.34 +07 01 35.0          18.3 N      G68
2016 07 04.44340 01 20 42.49 +07 01 35.9          18.3 N      G68
2016 07 04.45383 01 20 42.76 +07 01 37.4          18.1 N      G68
2016 07 04.46424 01 20 42.97 +07 01 38.3          18.2 N      G68
```

Comet 188P/LINEAR-Mueller

```
Date       MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160716.21 C  17.7  MC  50.0 L  +  3 120  0.2                    Hills
```

Comet 237P/LINEAR

```
Date       MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160702.93 S  13.1  AQ  20.3 T  + 10 133  0.6   5                Gonzalez
```

Comet C/2011 KP36 (Spacewatch)

```
Date       MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160709.11 S  13.3  AQ  20.3 T  + 10 133  0.8   3                Gonzalez
```

Comet C/2013 V4 (Catalina)

```
Date       MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160714.91 C  15.1  UO  50.0 L  +  3  90  0.2                    Hills
```

Comet C/2013 X1 (PANSTARRS)

```
Date       MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160701.17 S   6.9  TK   5   B  +     7 15     3                Goiato
160701.46 S   7.0  TK   5   B       10 12     5                Wolf
160703.18 S   7.0  TK   7.0 B  +    15 10     3                Souza
160704.05 S   7.2  TK  10.0 R  +  5 25 10     3                Souza
160704.17 S   7.2  TK   5   B  +     7 12     3                Goiato
160704.46 S   7.0  TK   5   B       10 10     6                Wolf
160704.71 S   7.2  TK   5   B       10  9     6                Wolf
160705.26 S   7.4  TK   5   B       10  9     6                Wolf
160706.45 S   7.4  TK   5   B       10  8     5                Wolf
160707.40 S   7.5  TK   5   B       10  8     5                Wolf
```

160708.50	S	7.3	TK	5	B		10	8	5			Wolf
160709.40	S	7.6	TK	5	B		10	7	5			Wolf
160710.27	S	7.6	TK	5	B		10	4	5			Wolf
160710.45	S	7.8	TK	5	B		10	3	5			Wolf
160711.40	S	8.4	TK	5	B		10	2	4			Wolf
160712.53	S	8.4	TK	5	B		10	2	4			Wolf
160713.43	S	8.5	TK	5	B		10	2	4			Wolf
160714.54	S	8.5	TK	5	B		10	3	4			Wolf
160722.28	S	9.3	AC	5	B		10	4	5			Wolf
160724.31	S	9.5	AC	12	L	8	60	4.8	5			Wolf
160725.31	S	9.8	AC	12	L	8	120	4.5	5	0.75	108	Wolf
160726.33	S	10.0	AC	12	L	8	120	4.2	5			Wolf
160727.89	S	8.1	TK	20.3	T	+ 10	77	8	3			Gonzalez
160728.04	S	8.6	TK	10	B	+	20	7	2			Goiato
160728.33	S	10.0	AC	12	L	8	120	3.4	3	0.70	105	Wolf
160729.87	B	8.9	TI	20.0	T	+ 10	50	6	3			Labordena
160730.33	S	10.0	AC	12	L	8	120	3.2	4	0.60	108	Wolf
160731.33	S	10.2	AC	12	L	8	120	3.5	4	0.53	110	Wolf
160731.98	S	8.8	TK	22	L	+ 6	60	6	2			Goiato

Chris Wyatt at Walcha, NSW, reports the following comet data via Graham Wolf:
He used a 7x50B
June 29.47 UT, Mv 7.2, 6.8 arcmin, DC4, 14 arcmin tail in PA 062
July 023.40 UT, Mv 7.5, 17 arcmin, DC5, 22 arcmin tail in PA 072
July 03.47 UT, Mv 7.1, 10.6 arcmin, DC5. Also:-
July 25.40 UT, Mv 9.9, 5.1 arcmin, DC4/5, 50 arcmin tail in PA) and
July 28.41 UT, Mv 10.1, 3.9 arcmin, DC3. Both with a 25cm f5 Dob at 39x.

Comet C/2014 S2 (PANSTARRS)

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
160701.30	S	10.9	AC	12	L	8	150	4.2	2			Wolf
160701.91	B	11.3	TI	20.0	T	+ 10	80	3	3			Labordena
160702.95	S	10.7	TK	20.3	T	+ 10	77	5	2			Gonzalez
160705.30	S	10.7	AC	12	L	8	150	4.5	2			Wolf
160707.30	S	10.6	AC	12	L	8	150	4.0	2			Wolf
160708.93	S	10.7	TK	20.3	T	+ 10	77	5	2/			Gonzalez
160710.30	S	10.8	AC	12	L	8	150	4.6	2			Wolf
160711.28	S	11.0	AC	12	L	8	150	4.0	2			Wolf
160714.29	S	11.6	AC	12	L	8	150	3.4	2			Wolf

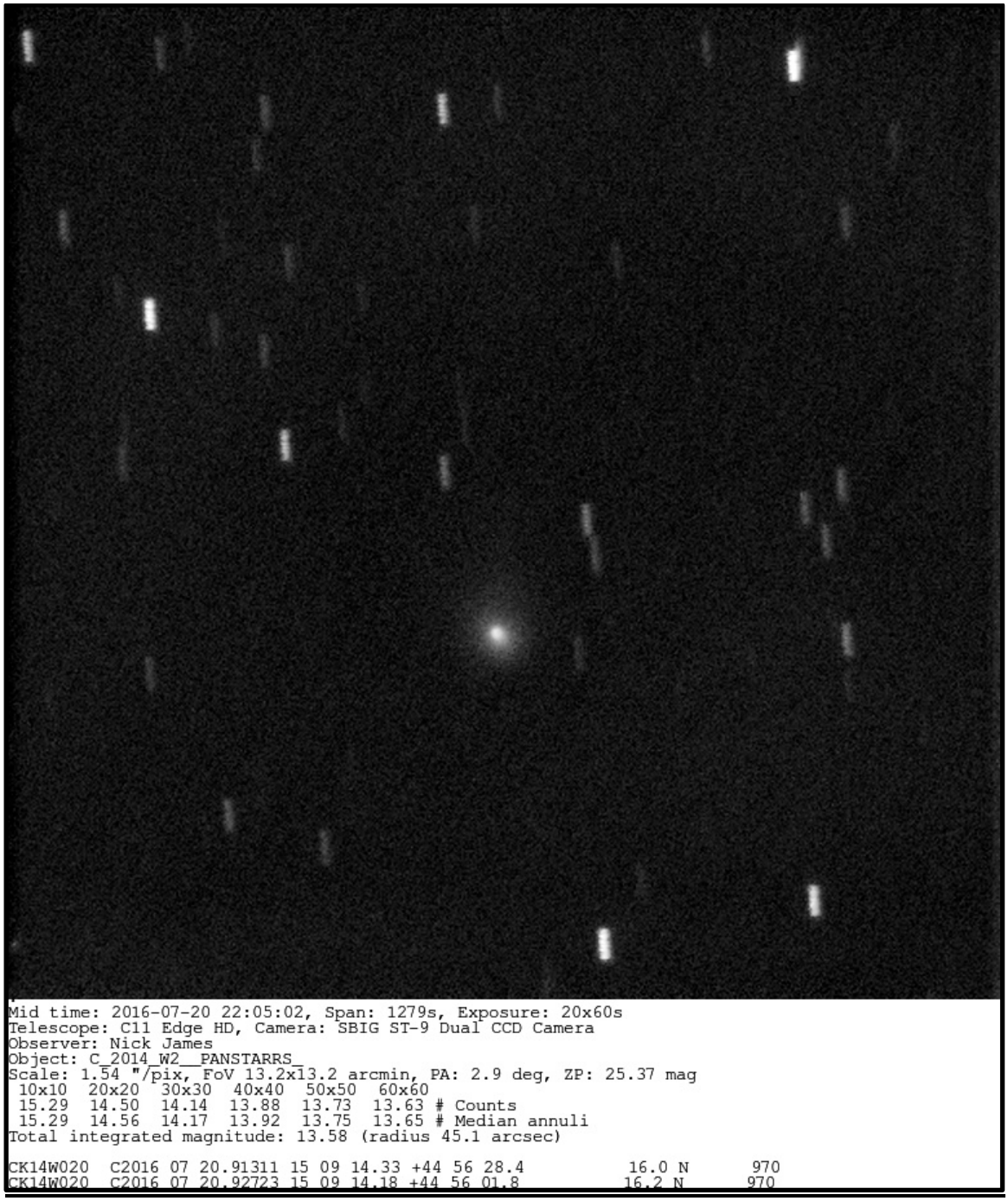
Chris Wyatt at Walcha, NSW, reports the following comet data via Graham Wolf:
July 23.37 UT, Mv 12.9, 1.8 arcmin, DC 2/3; July 25.36 UT, Mv 13.9, 0.7 arcmin, DC2
July 28.36 UT, Mv 13.8, 0.9 arcmin, DC2. All data with a 25cm f5 Dob at 83x.

Comet C/2014 W2 (PANSTARRS)

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
160702.97	S	12.5	AQ	20.3	T	+ 10	77	2.0	5			Gonzalez
160708.99	S	12.5	AQ	20.3	T	+ 10	77	2.0	4			Gonzalez
160727.92	S	12.6	AQ	20.3	T	+ 10	77	1.5	5			Gonzalez

Astrometry:
2016 07 01.97900 15 20 32.88 +55 00 27.2 15.5 N K02

```
2016 07 01.98352 15 20 32.59 +55 00 18.8          15.5 N      K02
2016 07 01.98823 15 20 32.27 +55 00 09.9          15.5 N      K02
```



Comet C/2014 W2, 2016 July 20 22h05mUT 20x60sec exposures; C11 Edge + SBIG ST9 Nick James

Comet C/2015 O1 (PANSTARRS)

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160714.05 C  15.3  MC  50.0 L  +  3 150  0.2                   Hills
```

Comet C/2015 WZ (PANSTARRS)

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160707.06 C  14.9  MC  50.0 L  +  3  40  0.2                   Hills
```

Comet C/2016 A8 (LINEAR)

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
160728.00 I  14.5  HN  20.3 T  + 10 222  0.4   7               Gonzalez
```

Comet C/2016 KA (Catalina)

```
Astrometry:
2016 06 05.95452 18 21 03.14 +57 06 07.9                    J95
2016 06 05.96034 18 21 02.51 +57 06 10.9                    J95
2016 06 05.96590 18 21 01.81 +57 06 13.9          19.8 N    J95
```

Tail at least 13" long in p.a. 171 deg

Comet C/2016 M1 (PANSTARRS)

Richard Wainscoat and Rob Weryk report the discovery of a comet in four i-band exposures obtained with the 1.8-m Pan-STARRS1 telescope at Haleakala on June 22.5 UT in which the comet appears softer than nearby field stars with a hint of possible asymmetry extended toward p.a. approximately 150 degrees (perhaps associated with a faint tail, but only very marginally visible).

```
     2016 UT             R.A. (2000) Decl.       Mag.
     June 22.46678   18 11 33.54   +69 34 30.4   19.7
          22.50562   18 11 30.09   +69 34 26.7   19.9
```

After the object was posted on NEOCP, other astrometrists noted the object's cometary appearance. G. Hug (Scranton, KS, U.S.A.) reports his images taken with a 0.56-m reflector on June 23 show it diffuse. E. Bryssinck, Kruibeke, Belgium, notes that seven stacked 180-s images taken on June 23.3 with a 0.61-m f/6.5 astrograph (+ Bessel I filter) at the Sierra Remote Observatory shows a star-like nuclear condensation with a very faint coma 10"-11" in diameter (red magnitude 18.4-1.8). H. Sato, Tokyo, Japan, relates that twelve stacked 60-s exposures taken with an iTelescope 0.43-m f/6.8 astrograph (+ luminance
filter) at Nerpio, Spain, on June 23.9 show the comet to be strongly condensed with an asymmetrical coma 8" in diameter and no tail; the total w-band magnitude was 18.4 as measured within a circular aperture of radius 5".0.

The available astrometry (spanning June 22-24), the following preliminary parabolic orbital elements by G. V. Williams, and an ephemeris appear on MPEC 2016-M18.

```
     T = 2018 Oct. 26.3330 TT         Peri. = 204.4209
                                      Node  =  81.7478  2000.0
     q = 2.632583 AU                  Incl. =  91.7507          CBET 4286
```

Astrometry (by Peter Carson sent direct to TAHQ):

```
2016 07 14.97179 17 40 35.72 +68 17 57.6          17.9 N    K02
2016 07 14.97772 17 40 35.67 +68 17 56.2          18.2 N    K02
```

The ephemeris has the comet currently 8 AU away but may reach perihelion at 2.632 (q in elements above):

Ephemeris from Minor Planet Center:

```
                  RA         DEC       Earth   Sun      Elong   m1
2016 07 01    17 59 18.2 +69 16 05   8.0197  8.0366    87.3   18.6
2016 07 09    17 48 16.8 +68 47 38   7.9591  7.9802    87.5   18.5
2016 07 24    17 30 11.3 +67 26 51   7.8509  7.8743    87.6   18.4
```

METEOR and FIREBALL NOTES

Edited by Tracie Heywood

2016 June 25th Fireball

Despite appearing well beyond midnight, this fireball, at 02:02:26 UT, was seen visually by a good number of observers and also imaged by several automated video camera systems in the NEMETODE network.

Image by Martin Farmer (Newcastle-under-Lyme)

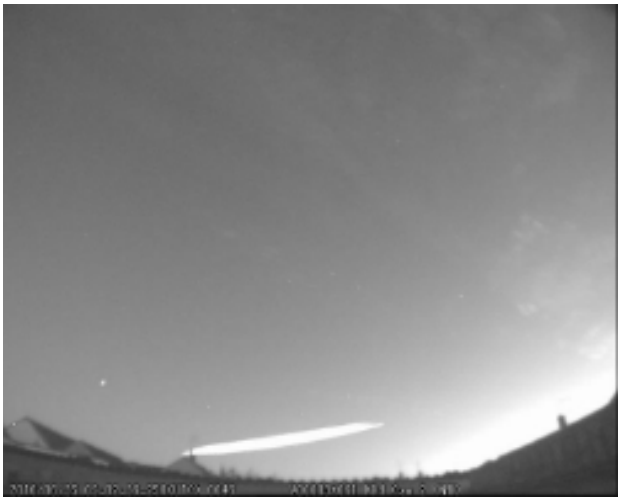
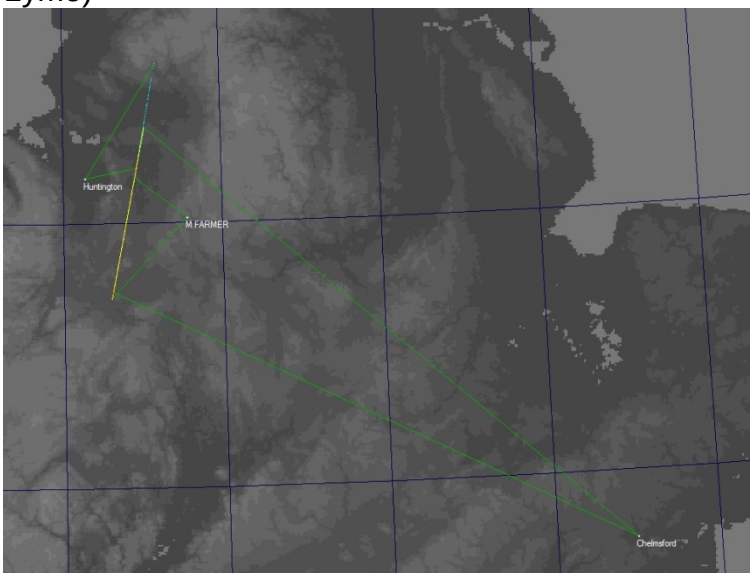


Image by Nick James (Chelmsford)



The analysis of the images indicated that the fireball travelled in a SSW direction, starting over Lancashire and crossing Cheshire and that it was a sporadic with a low Vg of 12.4 km/s, catching up with the Earth as it orbited the Sun.

Further information can be found at http://nemetode.org/index.html

Spectrum of 2016 August 2: Bill Ward (Kilwinning)

Fortune gave me a very bright spectrum at 00:40:48 UT on 2016 August 2. Both good dispersion and good resolution. Many iron lines with a strong sodium line, so very probably a stony iron meteoroid. Effective resolution was 1.9nm/pix fwhm on blue/green iron lines.

AURORALNOTES Edited by Tom McEwan

Provisional Noctilucent Cloud Reports: 2016, July

Observer	Location	Date	UT Start	UT End	Forms	Elevation	Brightness
D. Buczynski	Tarbatness	01-02	00:15	00:50	NLC		1
H. Meyerdierks	Edinburgh	01-02	00:00	02:00	I,II,IV	16	3
Alan C Tough	Elgin	01-02	01:40	02:10	I,II,III	30	3
James Fraser	Alness	01-02	00:05	02:00	I,II,III,I	30	3
James Akrill	Glentham	01-02	01:15	02:30	NLC	10	2
Ken Kennedy	Broughty Ferry	01-02	00:01	02:02	I,II,III	23	3
Kevin Boyle	Stoke-on-Trent	01-02	01:40	02:15	I,II,V	10	1
S. Brantingham	Banff	03-04	23:15	01:30	I,II,III	40	3
James Akrill	Glentham	03-04	01:10	02:30	NLC	16	1
James Fraser	Alness	03-04	00:18	00:26	NLC		2
Kevin Boyle	Stoke-on-Trent	03-04	01:10	02:45	I, II, III	15	4
James Abbott	Rivenhall, Essex	05-06	21:45	22:30	II	3	2
S. Brantingham	Banff	05-06	23:00	02:30	II,III,IV	80	4
T. McEwan	Glengarnock	05-06	23:45	02:00	I,II,III	25	3
D. Buczynski	Tarbatness	05-06	00:15	02:00	NLC		1
Kevin Boyle	Stoke-on-Trent	05-06	01:30	03:00	I,II,III	20	4
James Akrill	Glentham	07-08	22:45	00:30	NLC	4	4
James Fraser	Alness	08-09	23:50	00:01	II	15	3
Ken Kennedy	Broughty Ferry	08-09	22:35	23:15	II	15	2
T. McEwan	Glengarnock	09-10	01:30	01:56	I,II,III	15	3
S. Brantingham	Banff	10-11	01:20	01:30	II	10	2
James Akrill	Glentham	11-12	00:10	01:00	NLC	4	2
Ken Kennedy	Broughty Ferry	11-12	00:00	02:16	II,IV	18	3
S. Brantingham	Banff	12-13	00:00	02:00	I,II,III	20	2
Gordon Mackie	Thurso	12-13	23:10	23:55	I,II,III	50	4
T. McEwan	Glengarnock	12-13	23:50	23:53	NLC		2
Bill Ward	Aldie	12-13	00:15	01:00	NLC	3	2
James Fraser	Alness	12-13	23:35	00:11	NLC		3
James Akrill	Glentham	13-14	01:44	02:12	NLC	6	4
T. McEwan	Glengarnock	13-14	01:30	02:00	I,II	3	3
John Whitener	Labrador Sea	16-17	03:30	04:30	II		4
James Abbott	Rivenhall, Essex	18-19	21:30	22:15	I,II	5	1
H. Meyerdierks	Edinburgh	18-19	01:00	02:45	II,III	40	3
Len Entwisle	Elland	18-19	01:30	02:45	I,II,III	20	2
Ken Kennedy	Broughty Ferry	18-19	01:16	02:16	II,III	25	2
Kevin Boyle	Stoke-on-Trent	18-19	01:30	03:15	I,II,III	30	2
Kevin Boyle	Stoke-on-Trent	18-19	01:30	03:15	I,II,III	30	2
T. McEwan	Glengarnock	20-21	23:05	01:00	II	6	3
James Fraser	Alness	20-21	02:15	02:24	II	5	1
B.H.Granslo	Risløkka, Oslo	20-21	21:50	00:30	I,II,IV	25	4
H. Meyerdierks	Edinburgh	22-23	22:45	03:15	I,II,III,IV	>50	5
James Fraser	Alness	22-23	01:00	03:12	I,II,III,IV	110	4
S. MacIver	Edinburgh	22-23	02.45	03.30	I,II,III	60	2
Kevin Boyle	Stoke-on-Trent	22-23	03:10	03:15	?	<5	3
Ken Kennedy	Broughty Ferry	22-23	00:30	03:00	I,II,III,IV	90	4

NLC Forms: **I = Veil; II = Bands** (horizontal streaks); **III = waves** (ripples); **IV = Whirls** (curved forms)

AR SCORPII: WHITE DWARF LASHES RED DWARF

ESO Science Release 1627

Astronomers using ESO's Very Large Telescope, along with other telescopes on the ground and in space, have discovered a new type of exotic binary star. In the system AR Scorpii a rapidly spinning white dwarf star powers electrons up to almost the speed of light. These high energy particles release blasts of radiation that lash the companion red dwarf star, and cause the entire system to pulse dramatically every 1.97 minutes with radiation ranging from the ultraviolet to radio. The research has been published in Nature of 28 July 2016.

In May 2015, a group of amateur astronomers from Germany, Belgium and the UK came across a star system that was exhibiting behaviour unlike anything they had ever encountered. Follow-up observations led by the University of Warwick and using a multitude of telescopes on the ground and in space[1] have now revealed the true nature of this previously misidentified system.

The star system AR Sco is 380 light-years from Earth. It comprises a rapidly spinning white dwarf [2] the size of Earth but containing 200 000 times more mass, and a cool red dwarf companion one third the mass of the Sun [3], orbiting one another every 3.6 hours in a cosmic dance as regular as clockwork.

In a unique twist, this binary star system is exhibiting some brutal behaviour. Highly magnetic and spinning rapidly, AR Sco's white dwarf accelerates electrons up to almost the speed of light. As these high energy particles whip through space, they release radiation in a lighthouse-like beam which lashes across the face of the cool red dwarf star, causing the entire system to brighten and fade dramatically every 1.97 minutes. These powerful pulses include radiation at radio frequencies, which has never been detected before from a white dwarf system.

Lead researcher Tom Marsh of the University of Warwick's Astrophysics Group commented: "AR Scorpii was discovered over 40 years ago, but its true nature was not suspected until we started observing it in 2015. We realised we were seeing something extraordinary within minutes of starting the observations." The observed properties of AR Sco are unique. They are also mysterious. The radiation across a broad range of frequencies is indicative of emission from electrons accelerated in magnetic fields, which can be explained by AR Sco's spinning white dwarf. The source of the

electrons themselves, however, is a major mystery — it is not clear whether it is associated with the white dwarf itself, or its cooler companion.

AR Scorpii was first observed in the early 1970s and regular fluctuations in brightness every 3.6 hours led it to be incorrectly classified as a lone variable star [4]. The true source of AR Scorpii's varying luminosity was revealed thanks to the combined efforts of amateur and professional astronomers. Similar pulsing behaviour has been observed before, but from neutron stars — some of the densest celestial objects known in the Universe — rather than white dwarfs.
Boris Gänsicke, co-author of the new study, also at the University of Warwick, concludes: "We've known pulsing neutron stars for nearly fifty years, and some theories predicted white dwarfs could show similar behaviour. It is very exciting that we have discovered such a system, and it has been a fantastic example of amateur astronomers and academics working together."

Notes

[1] The observations underlying this research were carried out on: ESO's Very Lagre Telescope (VLT) located at Cerro Paranal, Chile; the William Herschel and Isaac Newton Telescopes of the Isaac Newton Group of Telescopes sited on the Spanish island of La Palma in the Canaries; the Australia Telescope Compact Array at the Paul Wild Observatory, Narrabri, Australia; the NASA.ESA Hubble Space telescope and NASA's Swift Satellite.

[2] White dwarfs form late in the life cycles of stars with masses up to about eight times that of our Sun. After hydrogen fusion in a star's core is exhausted, the internal changes are reflected in a dramatic expansion into a red giant, followed by a contraction accompanied by the star's outer layers being blown off in great clouds of dust and gas. Left behind is a white dwarf, Earth-sized but 200 000 times more dense. A single spoonful of the matter making up a white dwarf would weigh about as much as an elephant here on Earth.

[3] The red dwarf is an M type star. M type stars are the most common class in the Harvard classification system, which uses single letters to group stars according their spectral characteristics. The famously awkward to remember sequence of classes runs: OBAFGKM, and is often remembered using the mnemonic Oh Be A Fine Girl/Guy, Kiss Me.

[4] A variable star is one whose brightness fluctuates as seen from Earth. The fluctuations may be due to the intrinsic properties of the star itself changing. For instance some stars noticeably expand and contract. It could also be due to another object regularly eclipsing the star. AR Scorpii was mistaken for a single variable star as the orbiting of two stars also results in regular fluctuations in observed brightness.

More information

This research was presented in a paper entitled "A radio pulsing white dwarf binary star", by T. Marsh et al., to appear in the journal Nature on 28 July 2016.

Reproduced courtesy of the European Space Observatory

SOLAR NOTES

Edited by Peter Meadows

White light Mean Daily Frequencies, 2016 July

Observer	AA North	South	Total	Days	R Total	Days	Q Total	Days
H. Barnes	-	-	1.3	9	22	9	-	-
R. Dryden	1.2	0.1	1.3	9	20	9	-	-
J. Janssens	1.8	0.6	2.4	5	-	-	-	-
P. Meadows	1.2	0.1	1.3	17	19	17	3.7	17
K. Medway	0.9	0.1	1.0	31	-	-	-	-
G. North	2.0	0.0	2.0	2	42	2	-	-
J. Shanklin	1.2	0.3	1.5	29	19	29	-	-
L. Smith	1.0	0.0	1.0	6	15	6	3.0	6
D. Storey	1.2	0.3	1.5	10	-	-	-	-
MEANS	1.1	0.2	1.3	118	20	72	3.5	23

AA = active areas, R = sunspot number, Q = mean quality estimate (JBAA 98, 6, pp 282-286)

White light activity, 2016 July

Peter Meadows reports that there was an increase in activity compared to the previous month but there were still several spotless days at the beginning and end of the month. Between the 1st and 6th inclusive only one groups was seen on the 3rd only – an Axx sunspot near the centre of the disk at N11/9. His observations on the 25th, 26th and 31st also showed spotless disks. Lyn Smith also reported blank disk observations on the 25th, 26th and 27th while on the 28th a single Axx sunspot was seen over the north east limb, AR2570 N11/316, amid faculae.

Meadows' observation on the 16th showed four groups including two nearby groups AR 2565 and 2567: these were at N05/175 of type Cao & size 170 millionths and at N06/165 of type Dac & size 270 millionths (the other two groups were of type Axx and Bxo). AR 2565 increased in size slightly over subsequent days such that it was 340 millionths on the 19th and still of type Cao. With this group approaching the western limb on the 22nd and 24th it was of type Hax. AR 2567 also increased in size to 340 millionths on the 18th when it was of type Dkc with several pores between the larger leader and a couple of follower penumbral sunspots. It then continued to grow through the leader between the 19th and 20th to 600 millionths – the group was now of type Dkc. The two followers had also merged. Subsequent observations by Meadows showed that AR 2567 reverting back to type Dac and it was seen close to the limb on the 24th. A single Axx sunspot, AR 2566, was seen to the north of AR 2565 on the 18th only.

Smith's first observation of the month on the 19th revealed a large active region in the north west quadrant: AR 2565 and AR 2567. The leading component, AR 2565, consisted of a large symmetrical penumbral sunspot with three umbrae within, type Cho. The following AR 2567 consisted of a large penumbral leader and several smaller penumbral followers, type Dkc. By the 23rd, AR 2565 was very near the north west limb with AR 2567 still following, consisting of three penumbral sunspots all showing the Wilson effect.

One protected naked eye sunspot was seen by Meadows on the 16th (AR 2567) and two on each day between the 17th to 20th (AR 2565 and 2567). Ken Medway also observed a sunspot with the protected naked eye (using a Baader filter) on the 17th, as did Dave Storey on the 18th and 19th.

Hα activity, 2016 July

Ken Medway, based on observations in Hα made on 24 days, comments there was a definite rise in the number of prominences seen during the month. Most of these were small however. Peter Meadows reports that numerous quite long filaments were seen on the 2nd and 3rd all in the northern hemisphere. Lyn Smith observed a large flame prominence with a small arch to the north on the NE limb on the 19th with a low prominence hearth seen on the W limb ahead of the approaching AR 2565. A broad but fairly faint filament was just north of AR 2565 and a long faint filament aligned north/south, trailed AR 2567. Medway reports that a notable prominence was seen on the E limb on the 22nd the shape of which resembled the "Spinnaker" Tower in Portsmouth. On the following day this prominence has assumed an arching shape. On the 23rd, a low hedgerow prominence hearth was seen by Smith just north of the approaching AR 2565 and a long fila-prom was seen on the NE limb with the filament element extending substantially onto the disk through the NE quadrant. A smoking chimney type prominence was further south along the E limb. She adds that on the following day the fila-prom was now solely a filament extending across the NE quadrant. This filament proved to be long-

lived as it persisted on the 26th, 27th and 28th progressing across the disk and extending in length. It did appear fainter on the 28th particularly the westerly section.

Also on the 24th Meadows saw a bright short prominence on the W limb on the 24th – possibly the limb flare reported by Medway in the flare table below. On the 25th Smith observed a nice arch prominence with broad stems at both bases, on the NW limb with several small hearths seen long the E limb particularly the SE limb. A short dark filament was seen well south of the long filament in the NE quadrant which also persisted on the 26th, 27th and 28th. This filament became less pronounced as it progressed but it did lengthen and was quite substantial by the 28th. Medway adds that a long filament was noted in the northern hemisphere during the last week of the month, as did Meadows who reports that a long broken filament was seen, again the northern hemisphere on the 24th, 25th and 31st. Smith continues that on the 26th three filament hearths were spaced along the W limb and a further low hedgerow on the S limb. Prominence activity declined on the following two days with only minor prominences seen.

Meadows notes that plage was seen around combined AR 2565 and 2567 on the 17th, 18th, 19th, 20th, 22nd and 23rd. Plage was also seen at three other locations without sunspots on the 17th and two of these on the 18th. A patch of plage was seen by Smith over the SE limb on the 27th (in a position where the faculae patch seen the day before would have been). Some plage was seen with AR 2570 on the 28th.

Prominence Mean Daily Frequencies, 2016 July

Observer	All Latitudes				0-40°			40-90°		
	North	South	Total	Days	North	South	Total	North	South	Total
R. Dryden			3.3	9						
K. Medway	2.4	1.8	4.1	24	1.9	1.7	3.6	0.5	0.0	0.5
P. Meadows	2.0	1.5	3.5	11						
J. Shears			2.8	4						
L. Smith			3.2	6						

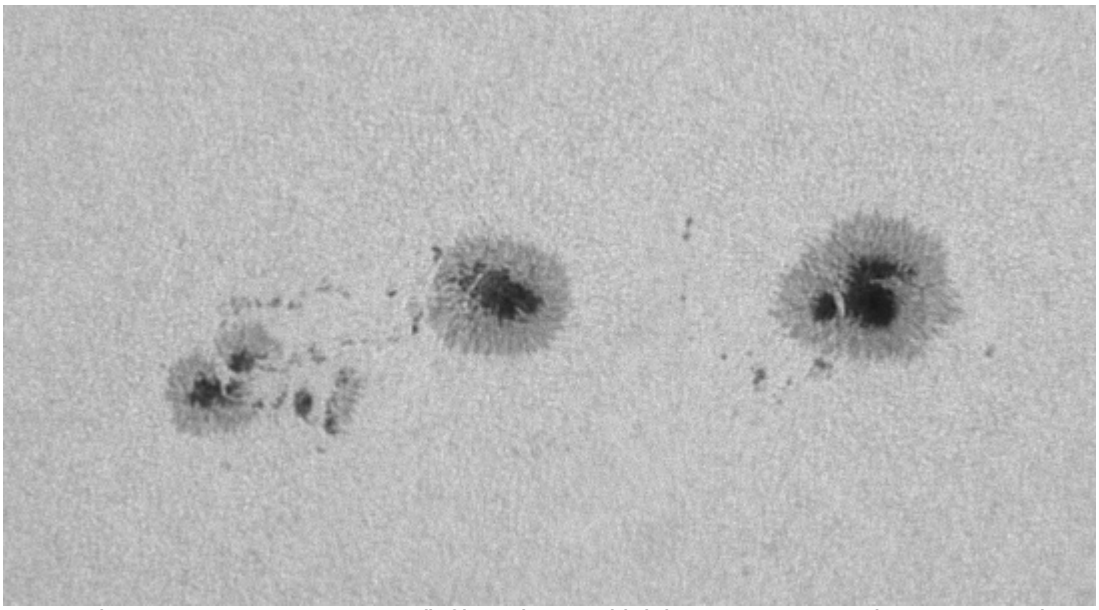
Flares, 2016 July

Date	Time UT	Lat.	CMD	Type	Obs.
13	1212	S10	E05	SF	KJM
16	1444	S03	E27	SF	KJM
17	1650	N04	E03	SF	KJM
19	1132	N05	E17	SF*	KJM

* Ribbon Flare

Date	Time UT	Lat.	CMD	Type	Obs.
19	1328	N05	E17	SB	KJM
22	0738	N04	W60	SF	KJM
24	1031	N04	**	SN	KJM

** Limb Flare

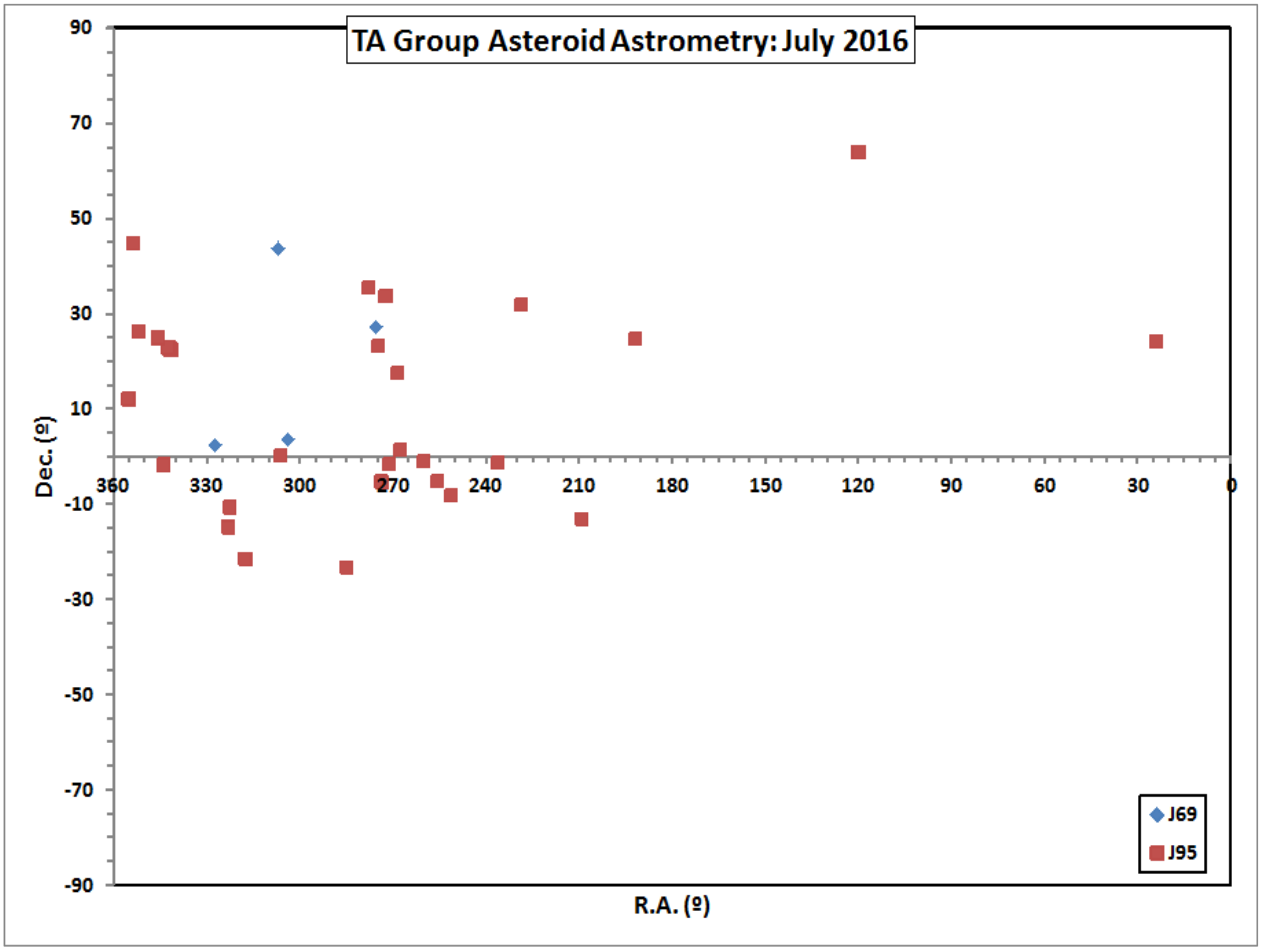


2016 July 17, 15:29 UT. AR 2567 (left) and 2565 (right). 105mm ETX telescope, Baader N3.8 Solar Film and Imaging Source Camera. Peter Meadows.

PLANETARY NOTES

Edited by Mark Kidger

After two months in which the amount of material received has been small due to very poor weather, there has been a significant improvement in July. The highlights: some beautiful Mars images from Malta by Leonard Ellul-Mercer and a successful (and very rare) observation of an occultation of a star by Pluto from Barcelona by Ramón Naves and Montse Campàs.



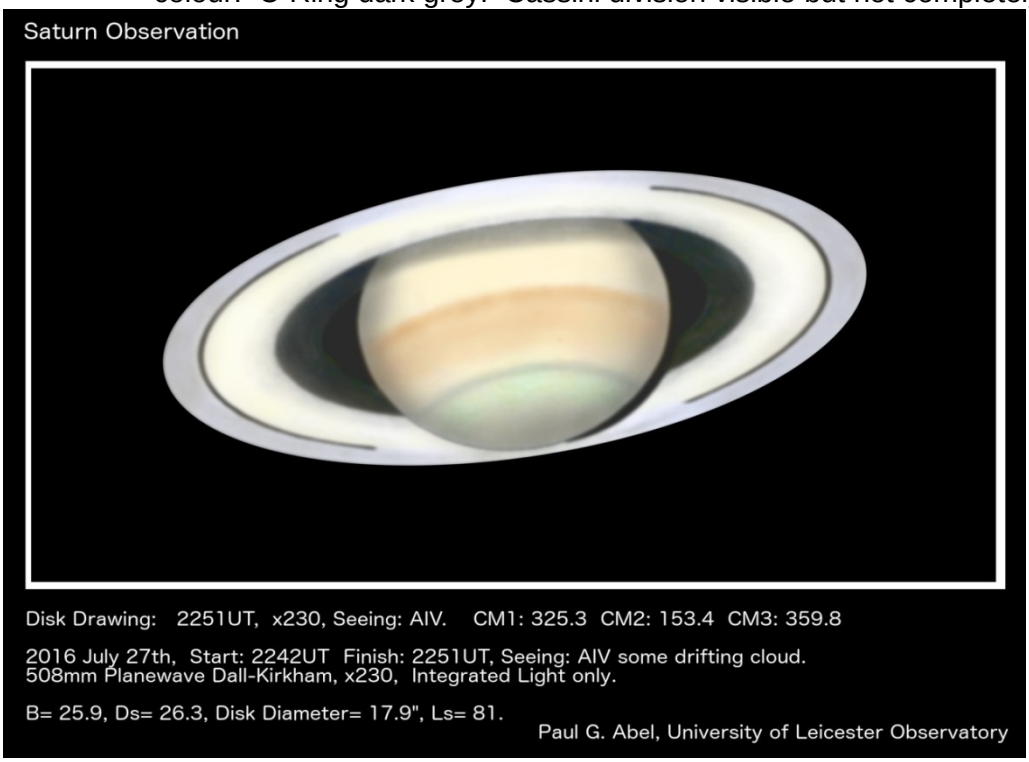
Peter Birtwhistle (peter@birtwhi.demon.co.uk) comments that the only consolation in July was that it was better than June.

Saturn

Paul Abel (paul.abel@yahoo.co.uk) reports: Please find details of an observation of Saturn I made with Dr Hugh Sasse using the 508mm Planewave Dall-Kirkham telescope at the University of Leicester observatory. Seeing was around AIV and we had to contend with some passing clouds. Of course the low altitude meant that the finer features were somewhat obscured, the main points of note are:

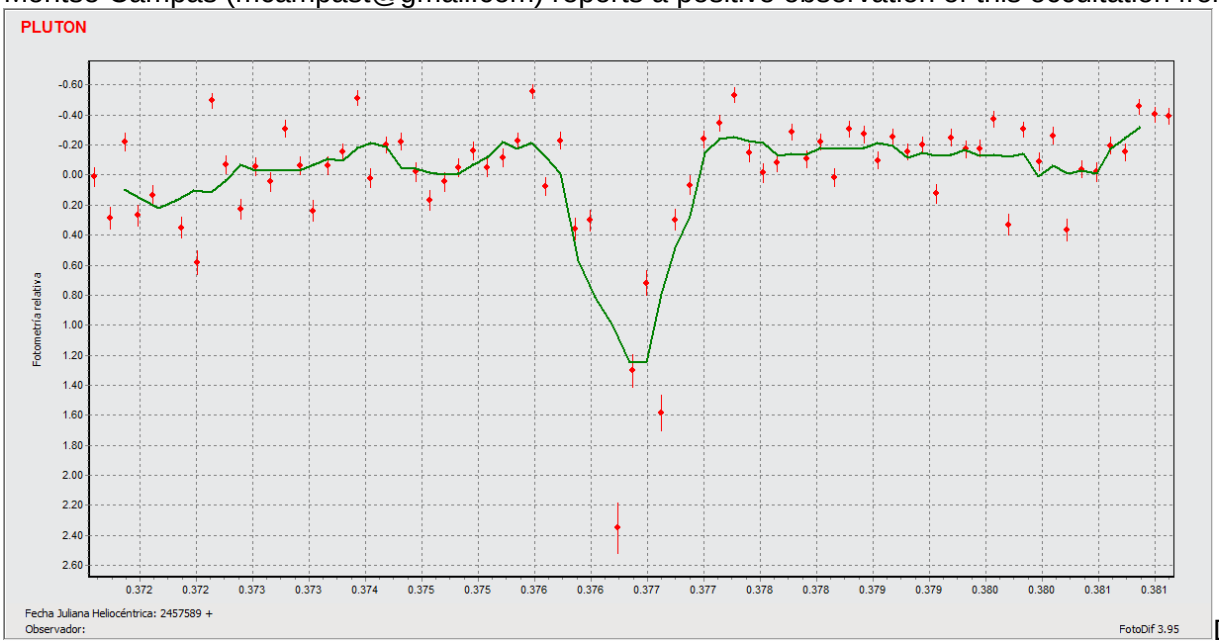
- A broad NEB, the northern edge being the best defined part of the belt. The belt appears to be quite broad and blends into the general hue of the disk further north.
- A dark NTB, thin but well defined and greyish in colour was present.
- Greenish tint present to the NPR. No sign of the polar hexagon. Indeed, I have used this telescope over the last few years at high powers and in better seeing conditions, and although sometimes a dark polar cap can be viewed at x400 it never shows any structure and I have never suspected the polar hexagon feature. I am now satisfied that it is beyond the range of the human visual system.

- A-Ring greyish, and the B ring was bright and had a slight yellowish tint. When the planet was at higher altitudes the B ring is white but when viewed low down seems to take on a yellowish colour. C-Ring dark grey. Cassini division visible but not completely jet black.



Pluto Occults UCAC4 345-180583

Montse Campas (mcampast@gmail.com) reports a positive observation of this occultation from Barcelona.



DATE (YYYY/MM/DD):2016/07/19 STAR: 4UC 345-180315 ASTEROID:PLUTO N°:134340 OBSERVER: Name: Ramon Naves, E-mail:ramonnavesnogues@gmail.com, Address: c/Jaume Balmes nº 24 Cabrils 08348 Spain. Latitude: 41deg 31' 11.3" N; Longitude: 2deg 23' 7.6" E, Altitude: 114m, Datum: WGS84

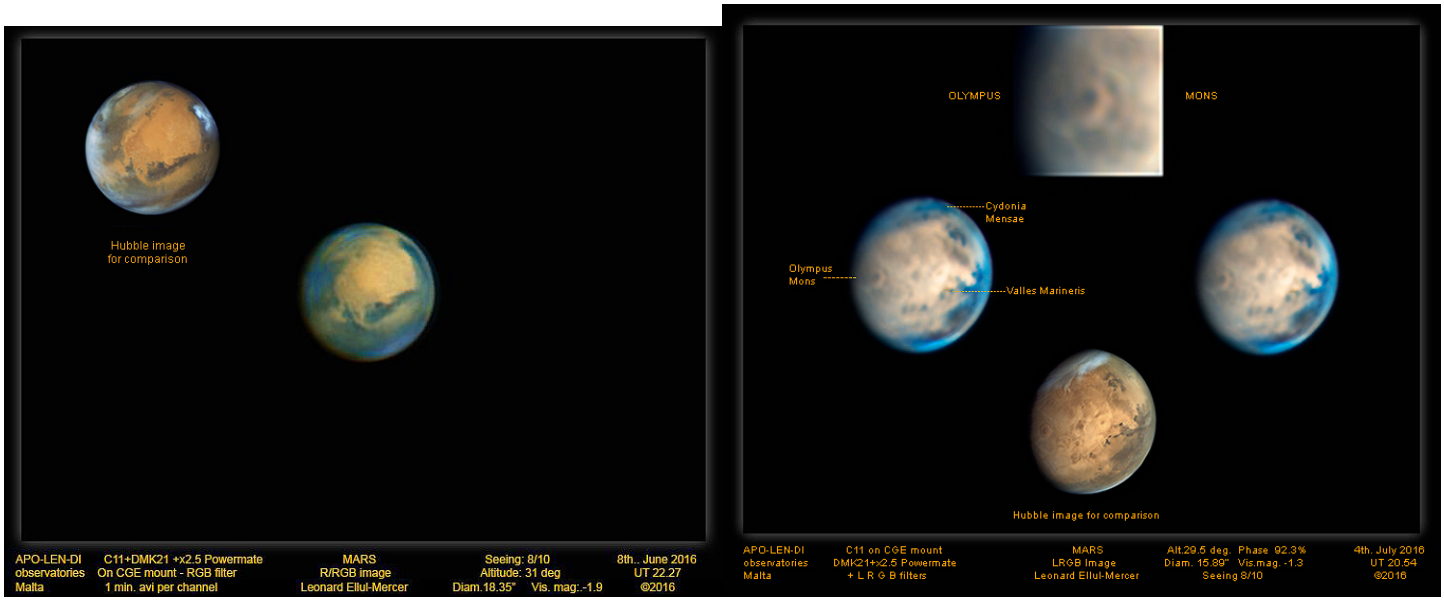
Start observation - 20:46:48.50 ± 5.0s
Disappearance - 20:52:47.50 ± 5.0s

Reappearance - 20:54:22.50 ± 5.0s
End observation - 21:00:3150 ± 5.0s
Duration of occultation: 95.0s
Mid-event: 20:53:35.0UT

TELESCOPE: S/C 30cm. Time source: NTP++. Sensor: CCD Moravian G4-9000. Recording: MAXIM DL

Mars

Leonard Ellul-Mercer (lellulmercer@gmail.com) reports the following images of Mars from Malta. Below are two images taken in July and one taken in June. The last composite which I captured on the 20th. and 22nd. July shows the cloud distribution over the polar caps, especially over the northern cap.



COVER NOTES

1) Gum 12 Nebula and clusters NGC2477 NGC2451 in Puppis, 2016 May Gerald Rhemann

Location: Farm Tivoli Namibia/SW-Africa
Telescope: ASA H8 f 2.9 Astrograph; Camera: FLI PL 16803; Mount: ASA DDM60
Exposure time: Mosaic of 4 panels HALRGB 40/30/40/40/40min. each panel
Internet: gerald.rhemann@gmail.com

2) Comet 29P, 2016 August 3: Montse Campas and Ramon Naves (Spain)

August 3.92544UT; exposure: 328 seconds
0.30-m f/10 Schmidt-Cassegrain + CCD Moravian G4-9000
Station 213, observer Ramon Naves
Internet: mont2003_1@hotmail.com

3) Comet 174P/Echeclus, 2016 July 4: Roger Dymock

10h43mUT 20x10arcmins; 4 x 100sec exposures
SSON OM 0-.61-m f/10 Cassegrain FLI Proline PLO9000 CCD unfiltered
Internet: roger.dymock@ntlworld.com

4) Messier 109, 2016 March 31: Denis Buczynski

03h48mUT0.30-m f/4 Newtonian + Baader MPCC + SBIG ST10XE
Unfiltered 10x60sec exposures
MPC Code I81
Internet: buczynski8166@btinternet.com

5) Antares, Saturn and Mars, 2016 July 12: Peter Meadows

Summer Southern Sky showing Saturn, Scorpius and Mars
21:45UT. 5 seconds exposure. Taken from near Salcombe, Devon.
Canon D550 camera and 50mm f/1.4 lens.
Internet: peter@meadows3.demon.co.uk

6) Saturn in IR, 2016 July 21: Alexei Pace (Malta)

19h29mUT
EdgeHD 14; 2x TV Barlow ; QHY5III224C
IR>742nm Altitude 34deg
Internet: alexei.pace@gmail.com

VARIABLE STAR NOTES

Edited by Gary Poyner

Observations for July 2016

Number of observations in parentheses. Observers initials in alphabetical order. Times are UT Decimal.

Dwarf Novae

DX And: At min. 15.2 (1) XG
RX And: Outburst on Jly 4.0 at 10.8, fading to 12.8 by Jly 12.9. At 13.6-13.7 from Jly 18.1 to 31.1 when rise from 13.6 to outburst on Jly 31.9 at 11.4 (11) TO, XG
V455 And: At min. 16.1 (1) XG
FO Aql: Outburst on Jly 30.9 at 15.1 (5) XG
CR Boo: Rise from 15.4 on Jly 1.9 to 14.9 by Jly 3.9 then negative <14.6 (5) XG
Z Cam: At min. 13.65 mean until outburst on Jly 27.9 at 10.9, fading to 11.6 by Jly 31.9 (18) APGA, TO, XG
HT Cas: At min. 16.4C (4) JMS(C), XG
V452 Cas: Fading from outburst – Jly 30.95 16.1C (2) JMS(C), XG
V630 Cas: At min. 16.4 vis. & 16.5C (2) JMS(C), XG
EY Cyg: Min. 14.5-14.8 vis. & 14.7V (8) HF(V), XG
SS Cyg: Fading from June outburst – Jly 2.0 10.7 to 12.2 by Jly 11.9 then min. 12.08 mean (25) APGA, RPE, TO, XG
V503 Cyg: Outburst on Jly 2.0 at 14.4, fading to <14.9 by Jly 6.0 then negative <16.0 (6) XG
V516 Cyg: Outburst on Jly 2.0 at 13.9, fading to <15.4 by Jly 6.0. Outburst on Jly 30.0 at 13.9 rising to 13.7 by Jly 31.0 (6) XG
V630 Cyg: Superoutburst on Jly 31.0 at 14.9 (5) XG
V1113 Cyg: Superoutburst on Jly 31.0 at 13.8 (6) XG
AB Dra: Atypical behaviour at minimum continues – Slow rise from 14.9 on Jly 1.9 to 13.4 mean by Jly 12.9 then outburst on Jly 17.9 at 12.9, fading to 14.6 mean by Jly 20.9 through to Jly 31.9 (17) TO, XG
ES Dra: Rise 15.5-15.1 (4) XG
EX Dra: At min. 14.3-14.9 until outburst on Jly 17.96 at 12.9, fading to 15.2 in eclipse on Jly 18.962 then return to minimum 15.2 by Jly 24.9 (7) XG
KV Dra: Outburst on Jly 30.9 at 14.9 (3) XG
V416 Dra: Outburst on Jly 17.9 at 14.6, fading to 14.9 by Jly 18.9 then 16.2 on Jly 30.9 (7) XG
AH Her: Fade from June outburst – Jly 01.9 12.5 to 13.6 by Jly 13.9. Outburst on Jly 17.9 at 12.3, rising to 12.0 by Jly 24.9 then fade to 12.7 mean by Jly 31.9 (20) TO, XG
V478 Her: At 16.9C (9) JMS(C), XG
V660 Her: Outburst on Jly 5.9 at 15.3, otherwise negative <157 (10) XG
V844 Her: Rise from <15.0 on Jly 3.9 to superoutburst on Jly 4.9 at 13.1, rising to 12.6 by Jly 7.9 then <15.0 on Jly 17.9 (12) XG
V1227 Her: At min. 17.8C (1) JMS(C)
AY Lyr: Rise from <14.8 on Jly 2.0 to outburst on Jly 4.0 at 14.6 mean, fading to <15.7 by Jly 6.0. Outburst on Jly 30.9 at 13.25 mean and 13.3 on Jly 31.9 (16) TO, XG
CY Lyr: Outburst on Jly 2.0 at 13.5, fading to 16.3 by Jly 6.0. Declining from unreported outburst on Jly 17.9 at 14.7 & <14.8 on Jly 18.9. Outburst on Jly 24.9 at 14.2, fading to <15.9 by Jly 30.9 (10) XG
V344 Lyr: Outburst on Jly 6.0 at 14.8, fading to 15.2 by Jly 7.9 then negative <15.6. Outburst on Jly 30.9 at 15.9 (10) XG
RU Peg: At min. 12.6-12.7 then rise from 12.0 on Jly 23.9 to outburst on Jly 28.9 at 10.2, fading to 10.9 by Jly 31.9 (13) DR, TO, XG
V476 Peg: Outburst on Jly 31.0 at 14.5 (2) XG
V513 Peg: Fading from unreported outburst on Jly 31.0 at 14.8 (1) XG
KT Per: Outburst on Jly 31.1 at 13.3 (1) XG
TZ Per: Fade from 13.4 on Jly 6.0 to 13.8 by Jly 11.9 then rise to outburst on Jly 18.1 at 13.0, fading to 14.4 by Jly 29.9. Outburst on Jly 30.9 at 13.3, rising to 13.1 by Jly 31.9 (8) TO, XG
WZ Sge: At min. 15.1-15.5 vis. & 15.1C (9) JMS(C), RPE, TO, XG
CH UMa: At min. 14.9-15.1 (7) RPE, XG
SU UMa: Outburst on Jly 4.0 at 12.2, fading to 13.4 by Jly 5.9 then <13.4 on Jly 11.9. Outburst on Jly 28.9 at 12.1, fading to 12.9 by Jly 31.9 (7) TO
SW UMa: Outburst on Jly 11.9 at 11.65 mean. No further positive results (6) RPE, TO
VW Vul: At min. 15.1-15.3 then outburst on Jly 25.0 at 14.0 fading to 15.0 by Jly 31.0 (5) XG
CSS 121005:212625+201948: At min. 17.0C (1) JMS(C)

NSV 14581: Outburst on Jly 17.9 at 14.4 & Jly 30.9 at 14.5 (3) XG
RXJ1831.7+6511: Outburst on Jly 30.9 at 14.2 (7) XG
SDSS J151500.56+191619.6: At min. 17.7C (1) JMS(C)
SDSS J173008.38+624754.7: At 15.9 on Jly 5.9 otherwise <15.6 (7) XG

Negative Observations: LL And, PQ And, V402 And, KX Aql, V725 Aql, VY Aqr, SS Aur, HW Boo, TT Boo, UZ Boo, GX Cas, KP Cas, KU Cas, V713 Cep, BT CrB, VW CrB, CY CrB, V337 Cyg, V542 Cyg, V632 Cyg, V1006 Cyg, V1028 Cyg, V1060 Cyg, V1251 Cyg, V1454 Cyg, V1504 Cyg, V2176 Cyg, HO Del, IO Del, DV Dra, PR Her, V589 Her, V592 Her, V1008 Her, V1108 Her, AY Lac, KM Lac, PS Lac, DM Lyr, LL Lyr, V358 Lyr, V493 Lyr, V585 Lyr, V587 Lyr, EF Peg, V368 Peg, V521 Peg, UV Per, UW Per, AS Psc, NY Ser, QW Ser, QZ Ser, AW Sge, RZ Sge, SS UMi, TY Vul, 1RXS J164103.6+784307, ASASSN-13ae, ASASSN-14id, ASASSN-14jv, ASASSN-16fy, DDE 20 Lyr, DDE 21 Lyr, FBS 1719+834, FBS 1735+825, FSVS J1722+2723 RAT J1953+1859, SDSS J145758.21+514807.9, SDSS J150137.22+550123.4, SDSS J150441.76+084752.6, SDSS J153817.35+512338.0, SDSS J155720.75+180720.2, SDSS J160419.02+161548.5, SDSS J160501.35+203056.9, SDSS J165244.84+333925.4,

Novae & Supernovae

SN 2016coj: At 14.8V on Jly 29.2 (1) HF(V)
V603 Aql: At min. 11.9-12.0 (5) XG
V723 Cas: At 15.5-15.8 (2) XG
T CrB: Remains above minimum level – mean 9.74 (34) DR, HF, RPE, TO, XG
Q Cyg: At min. 14.9-15.0 (6) XG
V2659 Cyg: At 15.8 (5) XG
HR Del: At min. 12.2-12.3 (8) TO, XG
V339 Del: Very slow fade continuing. 14.0-14.1 (9) XG
DQ Her: At min. 14.3-14.8 (7) XG
HR Lyr: At min. 16.1-16.2 vis. & 16.1C (7) JMS(C), XG
RS Oph: At min. Range 11.0-11.5 (23) TO, XG
GK Per: At min. 13.1-13.2 (3) TO, XG

Negative Observations: M31N 2008-12a, CI Aql, V404 Cyg, V1330 Cyg, V2491 Cyg, EU Sct, FS Sct,

CV's and Eruptives

Z And: At 9.9 (3) XG
EG And: At mean 7.51 (10) TLH, TO, XG
V1413 Aql: At max. 12.2-12.7 (11) XG
AB Aur: At 7.1 (1) TO
BZ Cam: At 12.6-12.8 (6) XG
gamma Cas: Mean 2.1 (23) HF, KGM
V635 Cas: At 15.2 (2) XG
DE CVn: At 13.1-13.2 (3) XG
TX CVn: Range 10.0-10.2 (7) DR, TO, XG
V730 Cep: At 14.4 (1) XG
BF Cyg: Range 10.1-10.6 (5) RPE
CH Cyg: Slow fade throughout month – 7.8 mean to 8.1 mean (44) HF, RPE, SK, TLH, TO, XG
CI Cyg: Mean 10.94 (19) DR, RPE, TO, XG
V751 Cyg: Rare fade continues 14.5-15.1 during month (8) XG
V1016 Cyg: **At 11.1-11.3 (7) XG**
V1057 Cyg: **At 12.8-13.0 (9) XG**
V1329 Cyg: At 13.3-13.5 (9) XG
V1363 Cyg: Active. Fade from 15.6 vis on Jly 4.0 to 16.9C and 16.2 vis by Jly 31.0 (6) JMS(C), XG
V2492 Cyg: At 16.4V (1) HF(V)
CM Del: Fade 13.8-14.4 (4) XG
AG Dra: **At 9.7-9.9 (4) XG**
AM Her: **Remains in low state 14.7-15.5 (9) XG**
YY Her: Range 12.8-13.1 (11) XG
V443 Her: At 11.5-11.6 (11) XG

V884 Her: At 14.3-14.5 (6) XG
V1117 Her: Fade from 12.9 on Jly 5.9 to 14.3 by Jly 24.9 recovering to 13.5 by Jly 31.9 (8) XG
MV Lyr: High state 12.4-12.6 (12) XG
V562 Lyr: At 11.6-11.7 (11) XG
V2048 Oph: At 4.7-4.8 (3) TLH
AG Peg: Active. Range 8.3-8.8 (25) TLH, TO, XG
X Per: At 6.2-6.6 (3) TLH, TO
AX Per: Fade 11.0-11.2 (2) XG
V818 Sco: Range 12.4-12.7 (4) TO
LX Ser: Range 14.7-15.0 (10) XG
V Sge: Range 10.9-11.3 (amplitude much reduced over last couple of years) (10) RPE, XG
HM Sge: At 12.1-12.2 (4) XG
QW Sge: At 12.7-12.9 (2) RPE
PU Vul: At 12.5-12.8 (9) XG
RZ Vul: Range 12.6-13.0 (8) XG
1RXS J184543.6+622334: At min. 18.1C (1) JMS
IPHAS 1901+1458: At 15.9C (1) JMS(C)
IPHAS 1924+2302: At 16.4C (1) JMS(C)
IPHAS 2136+5108: At 15.8C (1) JMS(C)
KIC J192410.81+445934.9: At 15.6C (1) JMS(C)
SDSS J001856.93+345444.3: At 17.2C (1) JMS(C)
SDSS J151915.86+064529.1: At 17.1C (1) JMS(C)
SDSS J161012.52+222110.8: At 17.0C (1) JMS(C)
SDSS J224303.82+221456.0 At 16.9C (1) JMS(C)

Negative Observations: LS And, OV Boo, PP Boo, FG Sge, 1RXS J194151.4+752621, RX J0131.4+3602, SDSS J012940.05+384210.4, SDSS J141118.31+481257.6, SDSS J142955.86+414516.8, SDSS J145003.12+584501.9, SDSS J152717.96+543724.9, SDSS J154953.41+173939.0, SDSS J170542.54+313240.8, SDSS J171247.71+604603.3, SDSS J172601.96+543230.7, SDSS J173047.59+554518.5, SDSS J202520.13+762222.4, SDSS J223252.35+140353.0, SDSS J233512.11+495416.9

AGN

3C 66A: At 14.9 (1) XG
3C 351: At 15.3 (1) TO
3C 371: At 15.2-15.4 (7) XG
3C 382: At 14.4-14.6 (10) XG
BL Lac: Brightish phase continuing – 13.9 to 14.2 (11) TO, XG
Markarian 421: At 13.013.2 (5) TO
Markarian 509: At 14.3 (1) TO
NGC 4151: AT 11.6-11.7 (2) XG
S5 0716+71: Fade from 13.2 on Jly 1.9 to 14.1 by Jly 24.9, recovering slightly to 13.9 by Jly 30.9 (8) TO, XG

RCB's
U Aqr: At max. **11.4-11.5 (2) XG**
ES Aql: At max. 12.3-12.5 (9) XG
XX Cam: At max. Mean 7.34 (5) TLH, TO
UV Cas: At max. 11.0 (3) DR, XG
R CrB: Gentle rise 13.2 mean to 12.7 (28) RPE, TO, XG
V482 Cyg: At max. 11.03 mean (16) DR, RPE, XG
AO Her: Recovering from deep minimum – Jly 17.9 <15.2 rising to 14.1 by Jly 24.9 then 13.88 mean to end of month (10) RPE, XG
V742 Lyr: At max. Mean 12,62 (13) RPE, XG
DY Per: At max. 11.1-11.3 (4) XG
SV Sge: At max. Mean 10.48 (24) DR, RPE, TO, XG
FH Sct: Slight rise at max. 12.6-12.3 (4) XG
Z UMi: Fade from 13.4 on Jly 1.9 to 14.0 by Jly 11.9, recovering to 13.6 mean by Jly 31.9 (Atypical behaviour for Z UMi *specifically* but not for RCB's in *general*). (18) TO, XG

Miscellaneous

R And: Fade 8.35 mean to 9.8 (5) DR, TLH, TO
W And: Fade 13.0-13.9 (2) TO
AQ And: At 8.6-8.8 (3) TO
BZ And: Fade 8.5-8.9 (3) TO
RS And: At 8.8-8.9 (2) TLH
TZ And: At 8.8-8.9 (2) TLH
R Aql: Fade 8.3-9.3 (7) DR, SK, TLH, TO
V Aql: Rise 7.65 mean to 6.85 mean (14) HF, JMS, TLH, TO
V450 Aql: Mean 6.83 (7) JMS, TLH, TO
V923 Aql: At 5.7-5.8 (4) TLH
V1293 Aql: At 6.8 (3) TLH
V1294 Aql: At 7.0 (2) TLH
T Ari: At 8.9 (1) TO
psi1 Aur: At 5.2 (1) TLH
UU Aur: At 5.7 (1) TO
UV Aur: At 7.9 (1) TO
U Boo: Rise 11.5-10.7 (5) DR, RPE, TO
V Boo: Mean 8.79 (12) DR, RPE, SK, TLH, TO
W Boo: At 5.2 (3) TLH
FG Boo: At 7.9 (2) TLH
RV Boo: Mean 8.43 (12) RPE, SK, TLH, TO
RW Boo: Rise 8.8-8.3 mean (12) RPE, SK, TLH, TO
RX Boo: Rise 8.15 mean to 7.8 (17) HF, RPE, SK, TLH, TO
UV Boo: Mean 8.14 (7) HF, TLH
U Cam: Rise 8.6-8.4 (3) TO
X Cam: Rise 8.7-8.35 mean (4) APGA, TO
ST Cam: Mean 7.34 (7) SK, TLH, TO
UV Cam: At 8.2-8.3 (2) TLH
ZZ Cam: At 7.5 (2) TLH
U CVn: At 11.7 (1) DR
V CVn: Fade 7.05 mean to 7.5 mean (10) SK, TLH, TO
Y CVn: Mean 5.7 (7) TLH, TO
BR CVn: At 6.9-7.0 (3) TLH
TU CVn: Mean 6.2 (7) TLH, TO
RT Cap: At 7.7 (1) TO
alpha Cas: Mean 2.21 (14) KGM
rho Cas: Mean 4.81 (17) HF, TLH
R Cas: At 11.4 (1) TO
S Cas: Fade 14.6-15.1 (2) TO
T Cas: At 10.7-10.9 (4) DR, TO
AA Cas: At 8.5-8.7 (3) TLH, TO
WZ Cas: Mean 7.18 (12) HF, TLH
V377 Cas: Mean 7.85 (6) HF
V391 Cas: Mean 7.53 (12) HF, TLH
V393 Cas: Mean 7.77 (12) HF, TLH
V465 Cas: Mean 6.78 (15) HF, TLH, TO
V770 Cas: At 8.0 (3) TLH
V822 Cas: At 6.9-7.0 (5) TLH
mu Cep: At 4.0-4.1 (5) TLH, TO
T Cep: Fade 7.5-8.65 mean (9) SK, TLH, TO
W Cep: Mean 7.64 (7) TLH, TO
AR Cep: At 7.6 (4) TLH
DM Cep: At 7.9-8.0 (2) TLH
FZ Cep: At 7.9-8.0 (4) TLH
RU Cep: At 8.9 (2) TLH
RW Cep: At 6.9-7.0 (7) TLH, TO
RX Cep: At 7.7 (3) TLH
SS Cep: Range 7.7-8.5 (5) TLH, TO
omicron Cet: At 7.4 on Jly 30.1 (1) TO
T Cet: At 6.2 (1) TO
R Com: Rise 10.1-9.0 (2) TO
S CrB: Rise 10.8-7.95 mean (6) DR, TLH, TO
V CrB: Rise 11.2-10.45 mean (4) DR, TO
W CrB: Rise 9.7-9.2 (5) DR, TO
RR CrB: Mean 8.17 (12) RPE, TLH, TO
RS CrB: Mean 7.94 (8) RPE, TO
SW CrB: At 8.2-8.3 (4) TLH
chi Cyg: Rise 9.55 mean to 8.6 mean (14) DR, SK, TLH, TO, XG
P Cyg: Mean 4.81 (21) HF, RPE, SK, TLH
R Cyg: Fade 12.4-13.1 (4) DR, RPE
T Cyg: Mean 5.07 (10) HF
V Cyg: Fade 12.6-12.8 (4) DR, TO
W Cyg: Slow fade through month 6.4-6.8 (10) DR, SK, TLH, TO
AF Cyg: Mean 7.62 (21) HF, RPE, SK, TLH, TO
BC Cyg: At 10.2 (1) DR
BI Cyg: At 9.8-10.0 (2) SR, RPE
RU Cyg: Fade 8.5-8.8 (3) TLH
RV Cyg: Fade 7.45 mean to 8.2 (5) RPE, TLH
TT Cyg: Mean 8.23 (11) RPE, TLH, TO
V449 Cyg: At 8.2-8.3 (3) TLH
V460 Cyg: At 6.3-6.4 (4) TLH
V832 Cyg: At 4.9 (1) TLH
V973 Cyg: At 6.7-6.8 (4) TLH
V1070 Cyg: At 7.5-7.6 (4) TLH
V1339 Cyg: At 6.7-6.8 (4) TLH
V1598 Cyg: At 14.2V (1) HF(V)
V1624 Cyg: At 5.1-5.2 (11) HF
V1704 Cyg: At 16.6V (1) HF(V)
V2085 Cyg: At 7.3-7.4 (3) TLH
U Del: At 7.1-7.3 (7) TLH, TO
CT Del: At 8.0 (2) TLH
EU Del: Mean 6.36 (7) TLH, TO
S Dra: Fade 8.7-9.1 (3) TLH, TO
AH Dra: Mean 8.22 (6) TLH, TO
AZ Dra: At 7.3 (1) TO
RY Dra: Mean 7.27 (7) TLH, TO
TX Dra: Mean 7.3 (8) RPE, TLH, TO
UW Dra: At 7.3-7.5 (3) TLH
UX Dra: At 7.0-7.1 (3) TLH
VD Dra: At 6.1-6.2 (3) TLH
alpha Her: Mean 2.98 (14) KGM, TLH
g Her: Mean 5.2 (10) JMS, RPE, TLH, TO
S Her: At 7.7 (1) TLH
U Her: Fade 8.0-9.0 (2) TLH
X Her: Rise 7.4 mean to 6.8 (10) RPE, TLH, TO
AC Her: Fade 7.5 mean to 8.75 mean (19) DR, RPE, SK TLH, TO

IQ Her: Range 7.0-7.6 (3) RPE, TLH
OP Her: Mean 6.56 (7) JMS, RPE, TLH, TO
RU Her: Fade 9.8 mean to 10.35 mean (7) DR, RPE, TO
SS Her: Rising to August max. 13.0 on Jly 1.9 to 10.4 by Jly 30.9 (8) APGA, XG
ST Her: Fade 8.3-8.6 (4) TLH, TO
SX Her: Discordant – range 8.3-9.1 with mean 8.59 (7) RPE, TLH, TO
UW Her: At 8.2-8.4 (6) TLH, TO
V566 Her: At 7.8-7.9 (3) JMS, TLH
V939 Her: At 8.2-8.4 (3) TLH
SX Lac: At 8.5-8.6 (5) TLH, TO
FY Lib: At 8.1 (1) TO
Y Lyn: At 8.2 (1) TO
delta2 Lyr: At 4.8-4.9 (2) TLH
R Lyr: Mean 4.65 (6) TLH, TO
T Lyr: At 9.5 (1) TO
XY Lyr: Mean 6.24 (8) JMS, TLH, TO
X Oph: Fade 7.2 mean to 7.7 (8) SK, TLH, TO
beta Peg: Mean 2.87 (6) TLH, TO
GO Peg: Mean 7.77 (6) TLH, TO
rho Per: Mean 3.76 (8) KGM, TLH
AD Per: At 9.1 (1) TLH
PR Per: At 8.4-8.5 (2) TLH
SU Per: At 8.1 (3) TLH
Z Psc: At 7.2-7.3 (3) TO
TV Psc: Sat 5.5 (3) TLH
TX Psc: At 5.7-5.9 (6) TLH, TO
XZ Psc: At 6.1 (1) TO
AQ Sgr: At 7.7 (1) TO
alpha Sco: Mean 1.24 (14) KGM
delta Sco: At 2.2 (14) KGM
R Sct: Rise from 5.65 mean on Jly 1.9 to 5.33 mean by Jly 22.9, fading to 5.57 mean by Jly 31.9 (34) DR, HF, JMS, SK, TLH, TO, XG
S Sct: At 7.9-8.0 (3) TO
tau4 Ser: At 6.9-7.1 (6) TLH, TO
R Ser: Near max. 7.34 mean (9) SK, TLH, TO
MS Ser: At 8.3 (3) HF
BU Tau: Fade 5.4-5.8 (2) RPE, TLH
RV Tau: At 10.4 (1) TO
R Tri: At 11.6 (1) TO
W Tri: At 8.4 (2) TO
R UMa: Rise 10.9-8.2 (2) TO
S UMa: Fade 8.3-10.1 (3) TLH, TO
T UMa: Rise 13.3-12.1 (6) DR, RPE, TO
Y UMa: At 8.8 (1) TO
Z UMa: Discordant. Mean 7.16 with a suggestion of a slight rise in brightness. (17) RPE, SK, TLH, TO
RU UMa: At 12.5 (1) RPE
RY UMa: Mean 7.69 (15) HF, RPE, SK, TLH, TO
ST UMa: Rise 7.4-6.95 mean (9) RPE, TLH, TO
TV UMa: Rise 7.4-6.95 mean (5) RPE, TLJ, TO
R UMi: At 9.8-10.0 (2) TO
V UMi: At 8.0-8.2 (5) TLH, TO
RR UMi: At 4.8-5.0 (4) TLH
TT UMi: At 7.0 (1) TO
TW UMi: T 8.1 (1) TO
VW UMa: Mean 7.88 (5) TLH, TO
VY UMa: At 6.4-6.5 (5) TLH, TO
V Vul: Fade 8.4-8.95 mean (9) DR, SK, TO

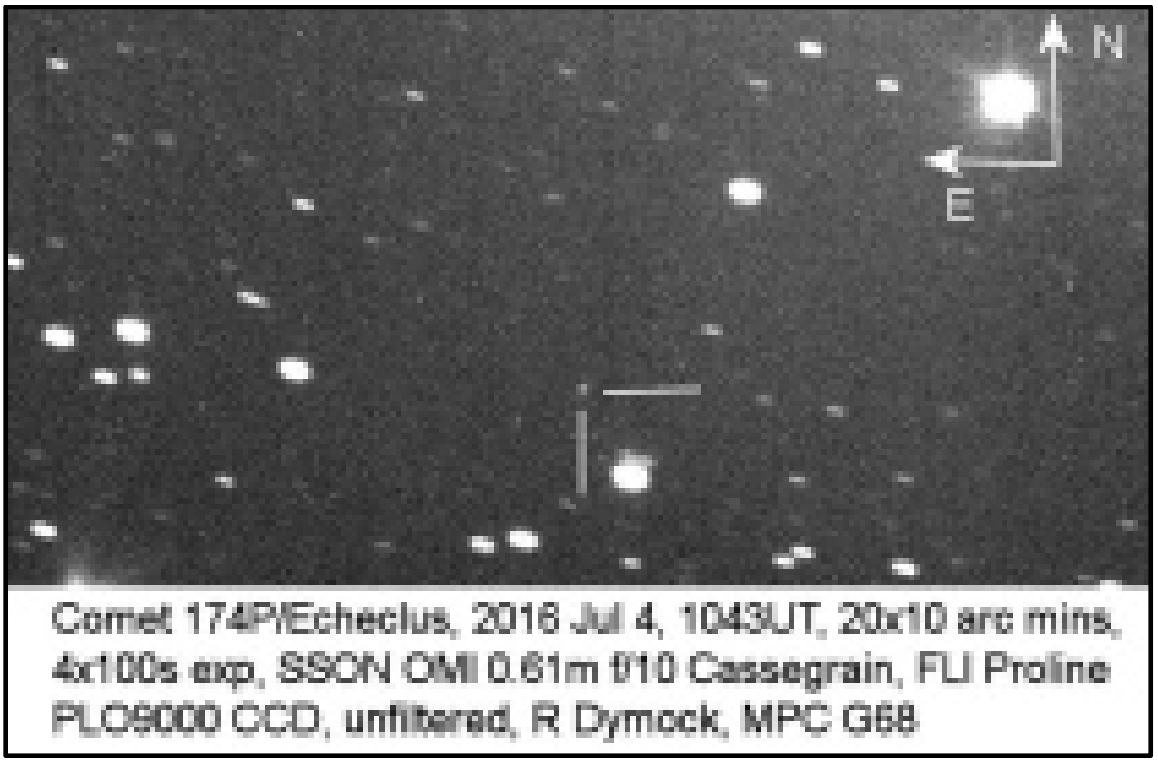
Suspects
NSV 436: At 7.9 (2) TLH
NSV 650: At 7.2 (9) HF
NSV 7370: At 9.6-9.7 (3) HF
NSV 7373: At 9.5-9.7 (3) HF
NSV 7374: Rise 8.7-8.3 (3) HF
NSV 7378: Rise 9.2-8.5 (3) HF
NSV 12439: At 8.1 (2) TLH
NSV 14680: At 8.1-8.2 (4) TLH
NSV 15133: At 10.5 (1) XG
NSV 25966: At 16.3-16.4 vis. & 16.3C (6) JMS(C), XG
GSC2.3 N2GO040899: At 15.0V (1) HF(V)
Var SE EY Cyg: At 14.7V (1) HF(V)

Negative Observations: NSV 25747

No. of observations reported = 2,364

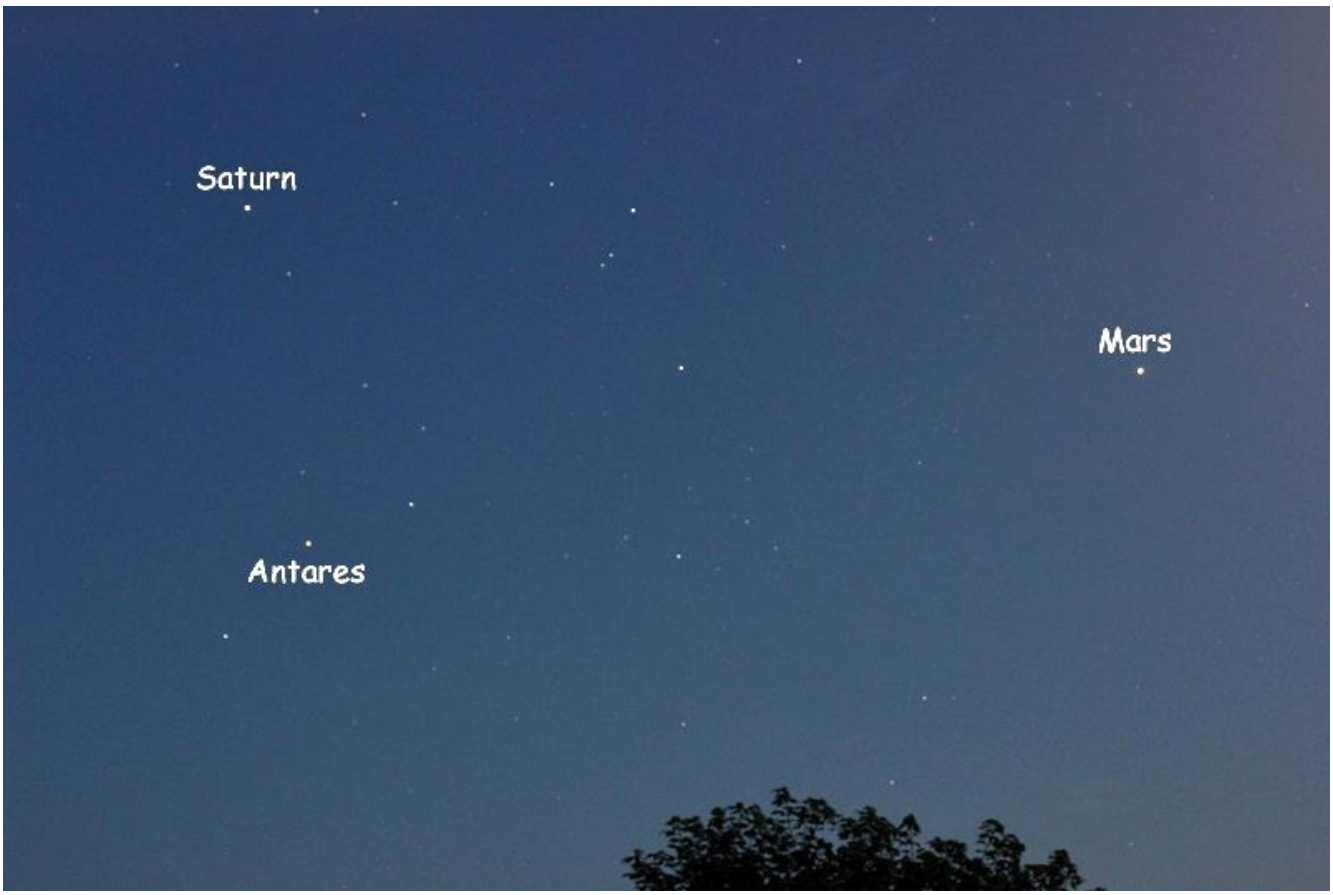
Observers: Paul Abel APGA, Bob Dryden DR, Tracie Heywood TLH, Guy Hurst (Vis.&V) HF, Mark Kidger KGM, Ray Pearce RPE, Gary Poyner XG, Jonathan Shanklin SK, Jeremy Shears (Vis.&C) JMS, John Toone TO

3) Comet 174P/Echeclus, 2016 July 4: Roger Dymock



4) Messier 109, 2016 March 31: Denis Buczynski

5) Antares, Saturn and Mars, 2016 July 12: Peter Meadows



6) Saturn

2016 July 21

Alexei Pace

(Malta)