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The Astronomer

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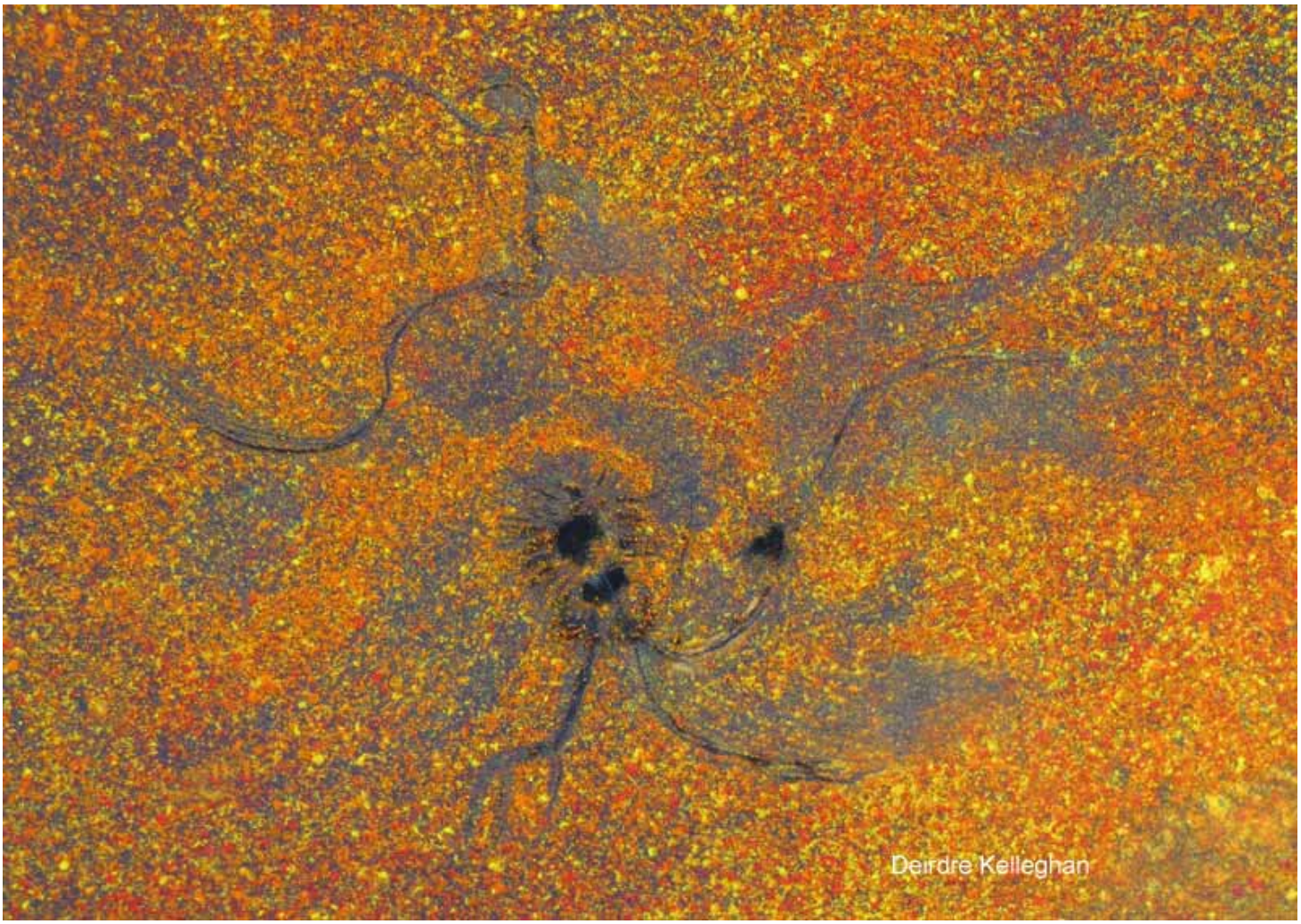
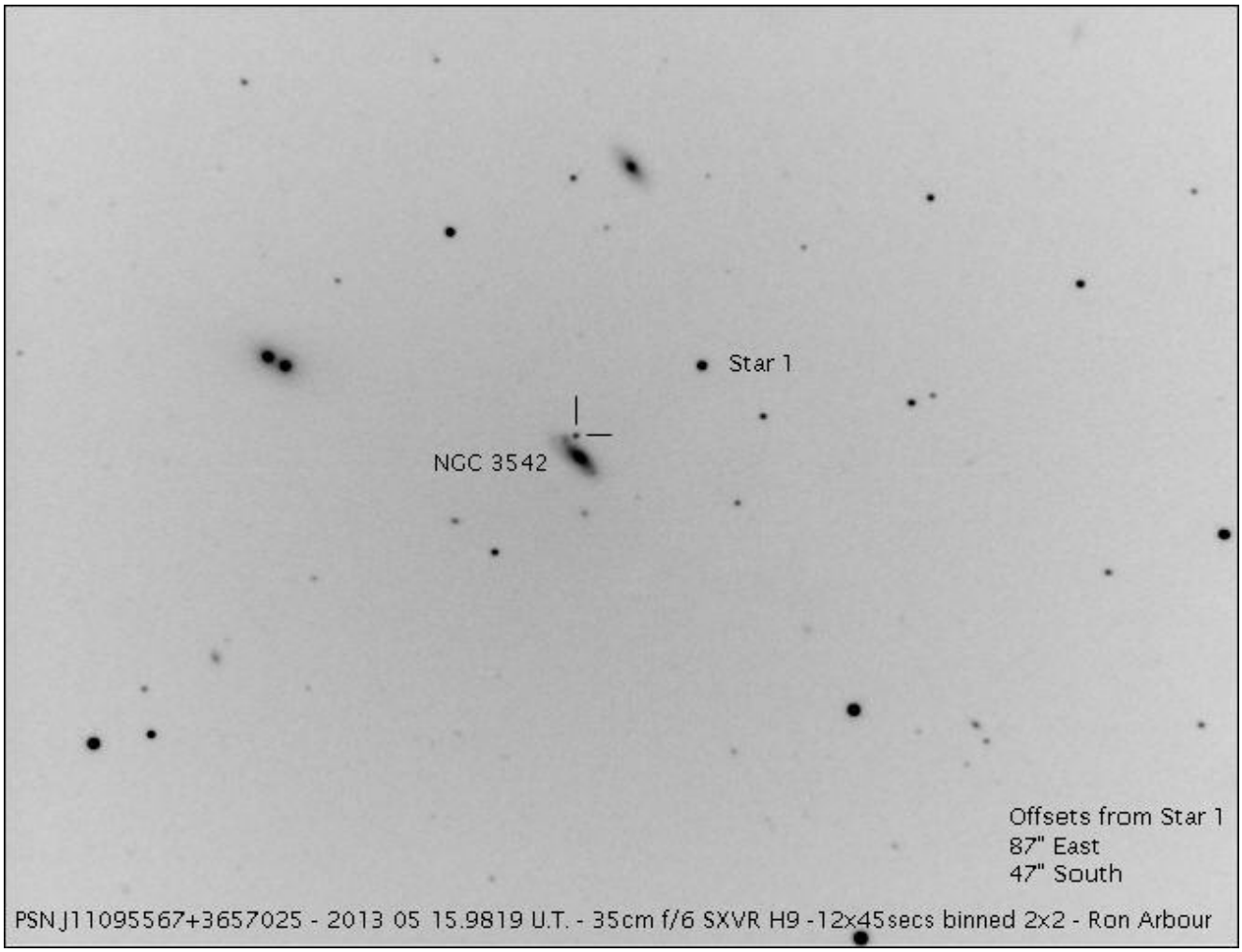
(6411) Tamaga

2013 June Vol. 50 No 590

1) SOLAR: Active Region 1734, 2013 May 6 Deirdre Kelleghan



2)PSN J11095567+3657025 in NGC 3542, DISCOVERY
2013 May 15: Ron Arbour



3) Iridium Flare

2013 May 26

Peter Meadows

Vol 50 No 590 ***THE ASTRONOMER*** ***2013 June***

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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 issued per year. Annual cost £25 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:

Alpha Centauri System and the Ghost exo-planet 'Bb'

Jacob Aron of *New Scientist on-line* reminded us recently that last year we had the astonishing news that a 'close' exo-planet had been found by Xavier Dumusque of the Geneva Observatory in Switzerland and labelled as Alpha Centauri Bb. Once we start discussing an exo-planet just a little over four light years distant the whole issue genuinely seems much closer and less theoretical. Usually in my classes exo-planets are frequently discussed but somehow in a detached way due to such large distances.

The original team looked for changes in the star's light that could be caused by an orbiting planet, whose gravitational tug would induce a slight star wobble. This method, radial velocity, is often successfully used to hunt for exoplanets and indeed was the primary discovery route before the days of **Kepler** and transit detections. Sadly we have recently heard that Kepler's days may have come to an end due to mechanical problems unless engineers can come up with a miracle 'fix'.

Returning to Dumusque's announcement, the difficulty is noise from the star makes it difficult to interpret potential wobble and especially its true cause. They had announced their discovery was based on 450 observations and measures over several years and that they had filtered the data by removing any periodic signals such as dark sunspots and effects of rotation of the star..
.
Now Artie Hatzes, University of Jena, Germany, in a recent preprint, begs to differ. He says, "I don't say it is not there, but I cast serious doubt". Hatzes first removed strongest of any periodic signals, but not necessarily just those tied to the star's rotation, and found only weak evidence for 'Bb'. Also he used short sections of the data curve to look for signs of the planet, and this did not detect a planet. He even inserted a fake signal which showed up the imposter but not 'Bb'.

Dumusque indicates he is now trying other methods of detection so the jury is still out and there is no clear consensus yet as to who is correct and whether the exo-planet exists.

All of this shows how when astronomers are working at the frontier of science and astronomy, just how difficult it is to be sure of an outcome. Even this potential planet, though very close compared with many such discoveries, is really a very long way away.

In the original discovery paper and associated press releases, it mentioned that HARPS radial velocity method revealed a minute star shift. It was stated to be the equivalent to a mere 51cm per second on a 4 year study, the smallest ever detected. A dramatic announcement indeed but is there a warning when making such announcements that we are very prone to error as we grapple at the very limits of detection and measurement?

It will be fascinating to see how this investigation turns out. It may have considerable effects on any exo-planet discoveries based on a single method?

Guy M Hurst (Editor)

THE ASTRONOMER, 2013 ANNUAL MEETING

Since the announcement in the last issue (TA Vol 50 No 589 p3), we have a preliminary list of speakers for September 28 in Northampton:

Paul Abel: "Visual Planetary Astronomy"
Nial Tanvir: "Gamma-ray burst demographics: short, long and ultra-long"
Jeremy Shears: "Harold Knox-Shaw and the Helwan Observatory"
Stan Waterman: "The Cygnus Project- Summary to date and Highlights."
Mark Kidger: "Living the Herschel dream: 4 years of science, 30 years of planning"
Nick Hewitt: "Edge of Darkness", (on the Dark Nebula theme)

We will shortly announce when booking for this event will open.

Circulars Service (continues from the listing in TA Vol 50 No 589 page 3 [2013]):

Date	*Cat*	*Circular*	*Subject*
130501	3	E-Circular 2912	PSN J11343649+5453244 – Possible SN in PGC 213858 (Arbour)
130514	3	E-Circular 2913	SN 2013cf = PSN J11343649+5453244 **(Arbour, 29th supernova)**
130517	3	E-Circular 2914	GRB 130427A
130520	3	E-Circular 2915	Lunar Occultation of ZC 1853, Psi Virginis
130527	3	E-Circular 2916	Comet Astrometry
130527	3	E-Circular 2917	ASASSN-13AK: New cataclysmic variable; SN 2013bd in ESO 583-G5; SN 2013be in IC 3573; SN 2013bf; SN 2013bg
130531	3	E-Circular 2918	Possible supernova in NGC 3542 (Arbour)

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TA DVD: AGM and Celebration of George Alcock's Lifetime

A DVD of the 2012 TA Annual Meeting recorded by Paul Carmody and edited by Nick James is available. The recording covers: Lifetime of George Alcock (Guy Hurst); Awards; BAA Database (Roger Pickard); George Alcock reminiscences (Denis Buczynski); Supernova Ia Progenitors (Professor Boris Gaensicke); 100 years of novae (Professor Nye Evans); Project Alcock (Roger Dymock); Alcock's last comet to Herschel, studying comets from space (Dr. Mark Kidger). Total duration 4h21m. Price £12 post paid. Remittances payable to 'The Astronomer'; orders to Bob Dryden, Secretary, 21 Cross Road, Cholsey, Oxon, OX10 9PE

NEWS NOTES

Disappearance of Supergiant Progenitor of SN 2011dh

Schuyler D. Van Dyk (IPAC/Caltech) et. al. report on The Astronomer's Telegram 4850 that in Hubble Space Telescope (HST) Wide Field Camera 3 (WFC3) observations at F555W and F814W with the UVIS channel, conducted on 2013 March 2 UT they have discovered that the yellow supergiant star, identified by Van Dyk et al. at the position of the Type IIb SN 2011dh in Messier 51, has vanished. From preliminary photometry extracted from the 2013 images the HST flight-system magnitudes of the object seen at the position of the supergiant and SN are F555W = 23.20 +/- 0.02 and F814W = 22.51 +/- 0.02 mag. The brightness of the supergiant in, e.g., Van Dyk et al. (2011) was F555W = 21.86 +/- 0.01 and F814W = 21.22 +/- 0.01 mag. It is therefore evident that the yellow supergiant has disappeared.
A long series of post maximum photometry by Guy Hurst of this star ended on 2012 January 28.545UT (using both BRT and SSON) when the magnitude (unfiltered) was 18.0 but the faintness prevented extension of this run. *(E2898)*

Supernova 2013U in PGC 29001 (R. Gagliano et. al.)

2013U Jan 5.28 10 01 12.00 +00 19 42.3 16.6 2.0"E 4.1"S
An image at: http://www.possdata.com/PSNJ10011200+0019423.jpg
L. Tomasella: spectrum Feb 6 a peculiar type-Ia event a few days before maximum *(E2898)*

Supernova 2013V in UGC 4798 (T. Crowley et. al.)

2013V Jan 6.41 09 08 41.54 +44 48 49.6 17.8 11.5"W 11.1"S An image at: http://www.possdata.com/PSNJ09084154+4448496.jpg L. Tomasella: spectrum Feb 7 type-Ia *(E2898)*

Supernova 2013W in UGC 5448 (R. Gagliano et. al.)

2013W Jan 6.32 10 06 34.02 +14 25 57.8 18.0 11.2"E 3.4"S Image at: http://www.possdata.com/PSNJ10063402+1425578.jpg L. Tomasella: spectrum Feb 7 type-IIn *(E2898)*

Supernova 2013X (ROTSE)

2013X Feb 6.23 12 17 15.19 +46 43 35.9 17.9: 4.9"E 3.8"S
A spectrogram of Feb. 10.51 UT with the 9.2-m Hobby-Eberly Telescope indicates it is a 1991T-like supernova about 10 days after maximum brightness *(E2898)*

Supernova 2013Y (KISS)

2013Y Feb 6.66 12 09 39.70 +16 12 14.3 18.7 1.2"E 2.1"N
F. Taddia: spectrum Feb 11 normal type-Ia around maximum *(E2899)*

Supernova 2013Z (THRU-NAOC Transient Survey)

2013Z Jan 24.90 13 27 54.89 +30 22 29.4 19.0 6 "W 5 "S
C. Inserra: spectrum Feb 10 type-II 2-4 weeks after maximum *(E2899)*

Supernova 2013aa in NGC 5643 (Parker)

2013aa Feb 13.62 14 32 33.88 -44 13 27.8 11.9 74 "W 180 "S
An image has been posted at: http://tinyurl.com/dx7tfrx J. T. Parrent: spectrum Feb 15 type-Ia a few days before maximum *(E2899)*

Supernova 2013ab in NGC 5669 (LOSS)

2013ab Feb 17.54 14 32 44.49 +09 53 12.3 17.6 7.5"E 18.1"S
S. B. Cenko: spectrum Feb 18 are suggestive of a very young type-II supernova *(E2899)*

MASTER OT J212444.87+321738.3 - New very bright variable

N. Tiurina et. al., Moscow State University reports on The Astronomer's Telegram 4888 that MASTER-Amur auto-detection system has recorded an optical transient (OT) source at: RA 21h 24m 44.87s DEC +32d 17m 38.3s

on 2013 March 13.84UT. The OT unfiltered magnitude is 10.7 (limit 16.9m) and recorded on six images. There is no minor planet at this position. The object is close to saturation on the images of Mar 13, so the real magnitude may be yet brighter.
There is nothing at this position in GCVS and AAVSO VSX. No variability was detected by NSVS (ROTSE-I) project. The object is identical to USNO-B1.0 1222-0647260 (21 24 45.007 +32 17 38.09 B1=18.78 R1=14.96 B2=20.88 R2=16.32 I=13.14), 2MASS 21244500+3217377 (J=7.82+/-0.03 H=5.97+/-0.02 K=4.82+/-0.02) and WISE J212444.98+321737.73.440 (W1=3.44+/-0.13 W2=2.21+/-0.10 W3=-0.43+/-0.03 W4=-1.28+/-0.01). The galactic reddening in this direction is A_R=0.55, A_V=0.68 (Schlegel) or A_R=0.45, A_V=0.57 (Schlafly) et al., 2011). Colour-combined (BRIR) finder chart (10'x10') is posted at http://master.sai.msu.ru/static/OT/J212444+321738-BRIR.jpg
Based on the large (J-K) color index of 3.0 they suggest that MASTER OT J212444.87+321738.3 is a new large amplitude variable of C or S spectral type. The discovery images are available at:
http://master.sai.msu.ru/static/OT/212444.87321738.3.png *(E2900)*

The Edgar Wilson Awards 2011 and 2012

Under the rules established in 1998 for the Edgar Wilson Awards for the discovery of comets by amateur astronomers, the Awards for 2011 and 2012 (reckoned with June 11 each year as the annual calendar end date) go to the following individuals: Kaoru Ikeya and Shigeki Murakami for comet P/2010 V1; Leonid Elenin for C/2010 X1 and P/2011 NO_1; Michael Schwartz and Paulo Holvorcem for C/2011 K1; Artyom O. Novichonok and Vladimir V. Gerke for P/2011 R3; Claudine Rinner for P/2011 W2; Terry Lovejoy for C/2011 W3; and Manfred Bruenjes for C/2012 C2. *(E2902)*

Supernova 2013ac (THU-NAOC Transient Survey)

2013ac Feb 15.70 09 45 08.79 +58 40 07.3 18.2 15 "E 2 "S
Offsets are from the galaxy 2MASX J09450774+5840088 Jujia Zhang: spectrum Feb 16 type II-P a few days after maximum and similar to SN 2005cs at +4 days. *(E2902)*

Supernova 2013ad (CSS)

2013ad Feb 15.10 03 38 41.03 +10 18 27.2 17.5 3.9"E 12.6"N
Nothing was visible at this position on a CSS image from Feb. 5.16 UT (limiting mag 19.5)
M. Stritzinger: spectrum Feb 25 type-Ia a few days prior to maximum *(E2902)*

Supernova 2013ae (XINGMING Sky Survey)

2013ae Feb 19.66 02 41 53.16 +43 23 58.8 16.2 1 "W 1 "S
The discovery images from Mt. Nanshan have been posted at:
http://www.xjltp.com/XOSS/XM41ZJ/XM41ZJ.htm
P. Ochner: spectrum Feb 28 type-Ia and similar to 2003du about two weeks after B-band maximum *(E2902)*

Supernova 2013af (THU-NAOC Transient Survey)

2013af Mar 1.50 09 13 55.17 +55 46 56.7 18.9 15 "E 2 "S
Jujia Zhang: spectrum Mar 2 type II-P a few days after maximum and matching SN 2004dj at x17 days *(E2902)*

Supernova 2013ag (ROTSE)

2013ag Mar 2.34 12 51 35.02 +26 37 45.4 16.0 14.9"W 1.1"N
The transient was observed again at similar brightness on Mar. 3.33 UT, with no detection before Feb. 5 down to a limiting magnitude of about 18.5. S Rostopchin: spectrum Mar 3 high-velocity type-Ia 2 days before maximum *(E2902)*

GK Persei

The AAVSO carry news on Special Notice 343 that an outburst of the 1901 nova GK Per appears to be underway. It is known to have dwarf nova outbursts: 2013 March 11.03 UT, 13.0 (John Bortle, Stormville, NY); 12.87, 12.8 (Bill Wilson, Grange over Sands, Cumbria, England); 14.83, 12.7 (Gary Poyner, Birmingham, England); 15.86, 12.4 (Luigi Palazzi, Italy); 16.31, 12.25 (Michael Linnolt, HI, USA); 17.82, 12.3 (Poyner); 17.86, 12.251 CV +/-0.075 (Darlington)
The last observed outburst was in March 2010, when it reached V=9.7 Coverage of GK Per has been sufficiently continuous to deduce that no outburst has been missed since 2010.Coordinates: R.A. 03 31 12.01 Dec. +43 54 15.4 (2000.0) Charts are available from the website catalogue of the BAAVSS. http://www.britastro.org/vss/ *(E2903)*

AURORAL NOTES

Edited by Tom McEwan

Provisional Noctilucent Cloud Reports – 2013 MAY

Observer	Location	Date	Time (UT)	NLC Forms	Max Elev.	Brigh-tness	Comments
I. McEachran	Port Glasgow	22-23	01:15-01:30	NLC		1	Faint, weak, above cloud.
H. Meyerdierks	Edinburgh	22-23	23:30-01:30	I,IV	10 Deg.	1	Images.
J. Fraser	Allness	24-25	23:05-23:40	I,II	15 Deg.	2	Images, movie.
K. Kennedy	Dundee	24-25	22:50-23:40	III,IV	20 Deg.	2	AZI 330-015. Image.
I. McEachran	Port Glasgow	24-25	22:50-23:30	NLC		1	NLC also 01:10-01:55UT
G. Mackie	Strathy Point	24.25	23:00-00:15	II	35 Deg.	2	AZI 000-030
H. Meyerdierks	Edinburgh	24-25	22:15-02:15	I,II,IV	25 Deg.	2	Images.
J. Ronan	Hexham	30-31	21:40-22:00	NLC			Images:
T. McEwan	Glengarnock	30-31	22:00-01:15	I,II,III,IV	35 Deg.	3	Images.
T. Lloyd-Evans	Kinaldy Meadows	30-31	22:10-22:41	II,III	42 Deg.	4	
K. Kennedy	Dundee	30-31	23:00-23:20	II		2	Through cloud.
J. Fraser	Allness	30-31	22:40-01:30	I,II,III,IV	40 Deg.	4	Video. Images
H. Pumphrey	Dunbar	30-31		III,IV		4	Image.
A. C. Tough	Hopeman	30-31	22:15-00:15	I,II,III,IV	80 Deg.	4	Images
D. Gavine	Edinburgh	30-31	22:05-01:00	I,II,III,IV	60 Deg.	4	Through cloud.
A. McBeath	Morpeth	30-31	22:20-02:00	I,II,III,IV	25 Deg.	3	
J. Procee	Aberdeen	30-31	22:30-23:00	III	50 Deg.	3	AZI 315-015.
H. Meyerdierks	Edinburgh	30-31	21:45-02:00	I,II,III,IV	45 Deg.	4	Images.
D. Frydman	London	31-32	02:27-03:13	II	39 Deg.		Images

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

COVER NOTES

1) SOLAR: Active Region 1734, 2013 May 6 Deirdre Kelleghan
09:15UT-11:30UT. Sunspot sketched using 8-inch Dobsonian with 50mm Baadar solar filter , 14mm eyepiece
Rest of sketch built around it using PST 40 mm with 8 mm eyepiece. The white light drawn sunspot kind of merged into the h-alpha sketch. While I figured this approach would give me a better overall sketch , in practice it did not. The 8mm in the Dob was picking up to many aberrations and wobbles that the image I viewed was not stable enough so went for the clearer view with the 14 mm. E-mail: skysketcher@gmail.com

2) PSN J11095567+3657025 in NGC 3542, discovery, 2013 May 15: Ron Arbour
May 15.9819UT. 0.35-m f/6 SXVR H9 12 x 45secs binned 2x2. 3"east, 15"north of galaxy's nucleus.
RA 11h09m55.67s DEC +36 57 02.5 (2000) Mag approx. 17.5, type?.E-mail:ronarbour@swonston.demon.co.uk>

3) Iridium Flare, 2013 May 26: Peter Meadows
22:56:53 to 22:58:01 UT composite 7x10s exposures from using an Imaging Source monochrome DMK AU03 Camera with Opticstar 2.8 to 12.0mm f1.4 Lens. Heavens Above gave maximum magnitude -5. peter@meadows3.demon.co.uk

4) PNV J19150199+0719471(Eruptive in Aquila), 2013 June 1: Martin Mobberley
June 1.332UT. 0.43-m f/6.8 CDK + PL6303E 60 secs. E-mail: martin.mobberley@btinternet.com

5) Comet C/2011 L4 (PanSTARRS), 2013 May 2: James Fraser
01.30UT Camera: Canon 600D Lens: Samyang 85mm F/1.4 44 x 4 second exposures on a fixed tripod (no drive) stacked using Deep Sky Stacker. E-mail: jamesjohnfraser@tiscali.co.uk

6) PNV J19150199+0719471(Eruptive in Aquila), 2013 June 2: Damian Peach
17"CDK with STL-11000M. RVB image. 120s exposure each filter E-mail: dpeach_78@yahoo.co.uk

7) Nova Scorpii 2013, 2013 June 3: Ernesto Guido and Nick Howes
0.50-m f/6.8 astrograph + CCD + f/4.5 focal reducer of ITelescope network, Siding Spring
E-mail: walcom77@gmail.com

ESO's VERY LARGE TELESCOPE CELEBRATES 15 YEARS OF SUCCESS *ESO 1322*

With this new view of a spectacular stellar nursery ESO is celebrating 15 years of the Very Large Telescope — the world's most advanced optical instrument. This picture reveals thick clumps of dust silhouetted against the pink glowing gas cloud known to astronomers as IC 2944. These opaque blobs resemble drops of ink floating in a strawberry cocktail, their whimsical shapes sculpted by powerful radiation coming from the nearby brilliant young stars.

This new picture celebrates an important anniversary for the Very Large Telescope – it is fifteen years since the first light on the first of its four Unit Telescopes, on 25 May 1998. Since then the four original giant telescopes have been joined by the four small Auxiliary Telescopes that form part of the VLT Interferometer (VLTI). The VLT is one of the most powerful and productive ground-based astronomical facilities in existence. In 2012 more than 600 refereed scientific papers based on data from the VLT and VLTI were published..

Interstellar clouds of dust and gas are the nurseries where new stars are born and grow. The new picture shows one of them, **IC 2944**, which appears as the softly glowing pink background [1]. This image is the sharpest view of the object ever taken from the ground [2]. The cloud lies about 6500 light-years away in the southern constellation of Centaurus. This part of the sky is home to many other similar nebulae that are scrutinised by astronomers to study the mechanisms of star formation.

IC 2944

Emission nebulae like IC 2944 are composed mostly of hydrogen gas that glows in a distinctive shade of red, due to the intense radiation from the many brilliant newborn stars. Clearly revealed against this bright backdrop are mysterious dark clots of opaque dust, cold clouds known as Bok globules. They are named after the Dutch-American astronomer Bart Bok, who first drew attention to them in the 1940s as possible sites of star formation. This particular set is nicknamed Thackeray Globules [3].

Larger Bok globules in quieter locations often collapse to form new stars but the ones in this picture are under fierce bombardment from the ultraviolet radiation from nearby hot young stars. They are both being eroded away and also fragmenting, rather like lumps of butter dropped into a hot frying pan. It is likely that Thackeray's Globules will be destroyed before they can collapse and form stars.

Bok globules are not easy to study. As they are opaque to visible light it is difficult for astronomers to observe their inner workings, and so other tools are needed to unveil their secrets — observations in the infrared or in the submillimetre parts of the spectrum, for example, where the dust clouds, only a few degrees over absolute zero, appear bright. Such studies of the Thackeray globules have confirmed that there is no current star formation within them.

This region of sky has also been imaged in the past by the NASA/ESA Hubble Space Telescope. This new view from the FORS instrument on ESO's Very Large Telescope at the Paranal Observatory in northern Chile [4] covers a wider patch of sky than Hubble and shows a broader landscape of star formation.

Notes

[1] The nebula IC 2944 is associated with the bright star cluster **IC 2948** and both of these names are also sometimes associated with the whole region. Many of the bright cluster stars appear in this picture.

[2] The seeing of the blue image in this colour combination was better than 0.5 arcseconds, exceptionally good for a ground-based telescope.

[3] They were discovered from South Africa by the English astronomer A. David Thackeray in 1950.

[4] This picture comes from the ESO Cosmic Gems programme, an outreach initiative to produce images of interesting, intriguing or visually attractive objects using ESO telescopes, for the purposes of education and public outreach. The programme makes use of telescope time that cannot be used for science observations. All data collected may also be suitable for scientific purposes, and are made available to astronomers through ESO's science archive.

COMET NOTES

Edited by Guy Hurst

Contributing Observers:

OBSERVER	*LOCATION*
Alexander Baransky	Kyiv, Ukraine
Peter Birtwhistle	Great Shefford, England
Montse Campas and Ramon Naves	Spain
Roger Dymock	Clanfield, England
John Fletcher	Mount Tuffley Observatory, England
James Fraser	Alness, Scotland
Michael Gainsford	England
Stephen Getliffe	Cambridge, England
Marco Goiato	Brazil
J. J. Gonzalez	Asturias, Spain
Ernesto Guido & Nick Howes	EG: Italy and NH: England
Werner Hasubick	Buchloe, Germany
Kevin Hills	Cheshire, England
Guy Hurst	Basingstoke, England
Andreas Kammerer	St. Leon-Rot, Germany
Carlos Labordena	Spain
Ornulf Midtskogen	Tranby, Norway
Richard Miles	Stourton Caundle, England
Jonathan Shanklln	Cambridge, England
David Spooner	Steyning, England
Dave Storey	Isle of Man
Johan Warell	Sweden
Graham Wolf	Barber Grove, New Zealand

Comet 17P/Holmes

Astrometry: Richard Miles (E10) 2.0-m f/10.0 Ritchey-Chretien + CCD

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2013 04 12.64808 18 00 24.35 -45 28 46.9          18.2 N
2013 04 12.66108 13 57 35.92 -23 44 08.0          17.3 N
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Comet 29P/Schwassmann-Wachmann

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130508.69 C  13.5  UO  40.6 Y  +  9 180  0.4                   Hills
130518.65 C  13.9  UO  40.6 Y  +  9 180  0.4                   Hills
```

Astrometry: Richard Miles (E10 & F65) 2.0-m f/10.0 Ritchey-Chretien + CCD

```
2013 05 28.43347 13 38 48.83 -21 50 49.3          17.5 N      E10
2013 05 28.43629 13 38 48.78 -21 50 48.8          17.5 N      E10
```

Measurements of Faulkes images made using a 10" diameter aperture in the r' band:

```
2013 05 28.43347013 38 48.83 -21 50 49.3          17.3 N      E10
2013 05 31.53590713 38 00.30 -21 42 49.5          15.7 N      E10
```

At the latest epoch, virtually all of the expanding shell of material was contained within the 10" measuring aperture.

Comet 63P/Wild

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130501.96 S  12.2  AU  22   L  +  6 160  1.5   4               Goiato
130512.31 S  11.5  AC  18   L     5 120  1.8   2               Wolf
```

Comet located ~ 40 deg alt, and 1 deg above HIP 49766 (Mv 7.05) near Regulus in Leo.

```
130513.31 S  11.8  AC  18   L     5 120  1.5   2               Wolf
130515.31 S  12.2  AC  18   L     5 120  1.4   2               Wolf
130523.47 C  12.8  UO  40.6 Y  +  9  80  0.5                   Hills
130527.44 C  12.6  UO  40.6 Y  +  9  80  0.4                   Hills
```

Comet 78P/Gehrels

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130514.44 C  18.9  UO  40.6 Y  +  9 240  0.2                   Hills
```

Comet 117P/Helin-Roman-Alu

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130502.68 C  14.1  UO  40.6 Y  +  9 180  0.5                   Hills
130527.62 C  14.5  UO  40.6 Y  +  9 180  0.3                   Hills
```

Astrometry: John Fletcher (J93), 0.25-m f/5.5 Schmidt-Cassegrain + CCD; Dave Storey (987), 0.4m SCT at F/10 ST9-XE

```
2013 05 07.02475 14 24 48.47 -10 07 06.8          15.1 N      987
2013 05 07.02831 14 24 48.34 -10 07 06.4          15.2 N      987
2013 05 11.98986 14 21 22.16 -10 01 21.1          14.8 N      J93
2013 05 11.99832 14 21 21.80 -10 01 20.4          14.8 N      J93
```

Comet 175P/Hergenrother

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130523.45 C  16.2  UO  40.6 Y  +  9 240  0.2                   Hills
```

Comet 246P/NEAT

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130510.83 C  13.9  UO  40.6 Y  +  9 140  0.4                   Hills
```

Comet 256P/LINEAR

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130501.70 C  17.8  UO  40.6 Y  +  9 180  0.2                   Hills
```

Comet 278P/McNaught

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130502.76 C  18.7  UO  40.6 Y  +  9 180  0.1                   Hills
```

Comet C/2006 S3 (LONEOS)

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130501.16 S  11.8  AU  22   L  +  6 160  2     4               Goiato
130502.74 C  12.5  UO  40.6 Y  +  9 120  1.9                   Hills
130503.95 S  10.6  TK  20.3 T  + 10 100  5     2/              Gonzalez
130504.55 S  11.0  AC  18   L     5 120  3.6   2               Wolf
```

Comet located near Saturn in Virgo

```
130510.98 S  10.8  TK  20.3 T  + 10 100  5     2/              Gonzalez
130512.05 S  11.2  TI  23.5 T  + 10  94  1     3               Labordena
```

Astrometry: John Fletcher (J93), 0.25-m f/5.5 Schmidt-Cassegrain + CCD; Dave Storey (987), 0.4m SCT at F/10 ST9-XE

```
2013 05 07.01700 14 06 32.56 -13 30 00.0          14.8 N      987
2013 05 11.96236 14 00 43.53 -13 07 11.9          15.0 N      J93
```

Comet C/2010 R1 (LINEAR)

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130510.63 C  17.0  UO  40.6 Y  +  9 200  0.2                   Hills
```

Comet C/2010 S1 (LINEAR)

Visual/CCD observations reported:

```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130504.11 S  13.3  AQ  20.3 T  + 10 222  0.5   5               Gonzalez
```

```
130511.05 S  12.9  AQ  20.3 T  + 10 133  0.7   5               Gonzalez
```
Astrometry: Dave Storey (987), 0.4m SCT at F/10 ST9-XE
```
2013 05 07.06659 21 17 04.74 +32 04 23.7          14.6 N      987
2013 05 07.07934 21 17 04.53 +32 04 26.0          14.5 N      987
```

Comet C/2011 F1 (LINEAR)

Visual/CCD observations reported:
```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130502.84 C  14.3  UO  40.6 Y  +  9  45  0.2                   Hills
```

Comet C/2011 J2 (LINEAR)

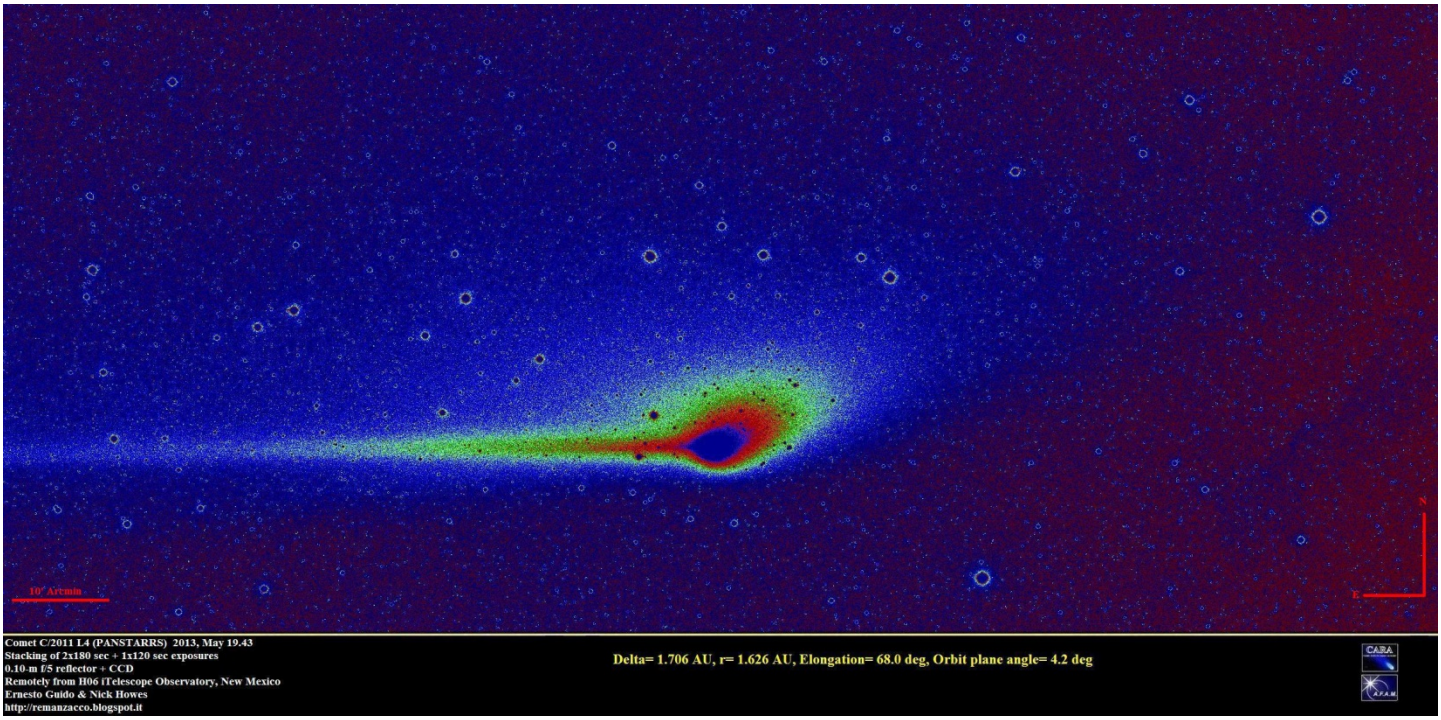
Visual/CCD observations reported:
```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130510.96 S  14.1  AQ  20.3 T  + 10 133  0.7   5               Gonzalez
```
Astrometry: A Baransky (585):
```
2013 05 15.84473 09 00 40.42 +50 17 28.1          15.5 N      585
2013 05 25.92937 08 59 03.00 +50 15 46.3          15.4 N      585
```

Comet C/2011 L4 (PanSTARRS)

Visual/CCD observations reported:
```
Date      MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130501.88 S   8.0  TK   8.0 B  +     11  5     6/  0.7   335   Warell
130501.89 S   7.9  TK   8   B  +     20  4     4               Shanklin
130501.90 S   7.6  TK   8   B        15 13     3               Hurst
Round diffuse glow
130501.91 S   5.8  SC   2.8 R     2   3 22     4               Getliffe
130501.92             10.8 L     4  15  7.5       0.57  334   Getliffe
Tail from 0.11dg ray at PA295 with 0.24 fan to 007, also .08 rays at 349 & 38deg
130502.07 S   7.2  TK   7.0 B        15  4     5   0.3   329   Fraser
130502.89 S   8.1  TK   8   B  +     20  4     4               Shanklin
130502.90 S   7.7  TK   8   B        15  6     4               Hurst
130503.89 S   7.9  TK   8   B  +     20  4     3               Shanklin
130503.10             5.0 B         7 20     3   0.63    2   Getliffe
Coma eccentric by 0.17 deg at PA 70 deg, also 0.61 deg at PA 147 deg
130503.90 S   7.3  TK   5.0 B  +     10  5     4/  0.4   330   Gonzalez
130503.92 S   7.8  TK   8   B        15  8     3               Hurst
130504.08             15.0 L     4  30  5.5   4   0.20  320   Getliffe
Also 0.18 deg at PA 100 deg and 0.12 deg at PA 6 deg
130504.09             15.0 L     4  80            0.02  316   Getliffe
Also 0.02 deg jets at PA 136 and 349 deg
130504.98 V   8.8      10.0              2.2                   Midtskogen
Reduced by Jan Qvam, Norway
130505.11 B   7.6  TI   8   B  +     11  5     5  20   M      Labordena
130505.90 S   8.9: TK   8   B  +     20  4     8               Shanklin
130505.95 S   5.9  HI   2.8 R     2   3 20     3               Getliffe
130506.90 S   8.4  TK   8   B  +     20  4.1   3               Shanklin
130507.09             10.8 L     4  15  7.5       0.40  318   Getliffe
Also 0.17 deg fan spanning to PA 30 deg
130507.91 S   8.4  TK   8   B  +     20  4.1   2               Shanklin
130508.93 S   8.0  SC  25.4 L  +  6  49        3               Gainsford
130508.93 S   8.2  TK   8   B        15  5     2               Hurst
130508.93 S   7.0  HI   5.0 B         7 16     3               Getliffe
130510.91 S   8.6  TK   8.0 B  +     11  4     6   0.4   300   Warell
130511.02 S   7.9  TK   5.0 B  +     10  5     4/  0.6   320   Gonzalez
130511.11 S   7.6  TI   8   B  +     11  5     5  35   M      Labordena
130511.91 S   8.4  TK   8   B        15  9     4               Hurst
130514.95 S   7.8  HV   6.3 B         9  8     3               Kammerer
Rather faint, slightly condensed towards centre; no tail discernible, butt could be that I incorporated it as part of the coma
130515.00             20.3 T    10  50        5   0.15  290   Kammerer
```

Significantly condensed, rather bright coma with false nucleus (11.0 mag at 161x); tail surprisingly easy; morphologically this showed a rather easily visible diffuse glow between PA290 deg and 270 deg, which became quickly difficult for p.a. < 270 deg, but showing a spike-like brightening in p.a. 95 deg, easily discernible with averted vision. Both tail components could be traced to 0.15 deg.

```
130515.02 B   7.6  TK   6.3 B  +      9  7.9   4                Hasubick
130515.90 S   7.9  TK   5.0 B  +     10  6     4   0.4   310    Gonzalez
130515.91 S   8.1  TK  10.0 B  +     25  6     5   0.6   310    Gonzalez
130515.98 B   8.7  TK   8.0 B  +     11  4     5                Warell
130515.93 S   8.4  TK   8.0 B        15 10     4                Hurst
```
Glimpsed to direct vision
```
130516.06               5.0 B         7  9     3   0.59  301    Getliffe
```
Also narrow 0.36 deg at PA 281 deg
```
130516.90 S   8.5  TK   8   B        15  8     2                Hurst
```
Very difficult. Glimpsed to averted vision
```
130518.14 S   8.1  TI   8   B  +     11  5     4  25   M        Labordena
130526.98 S   7.4  TT   5.0 B         7 10     3                Getliffe
130528.92 M   8.5  TK  10.0 B  +     25  4     5   0.6   220    Gonzalez
130531.93 M   8.7  TK  10.0 B  +     25  4     5   0.5   185    Gonzalez
```
Astrometry: Dave Storey (987), 0.4m SCT at F/10 ST9-XE
```
2013 05 06.94759 00 00 28.83 +72 12 15.0                    987
2013 05 07.08520 00 00 09.36 +72 19 02.1                    987
```



Comet C/2011 L4, 2013 May 19: Ernesto Guido and Nick Howes

Comet C/2011 R1 (McNaught)

Visual/CCD observations reported:
```
Date       MM  Mag  ref Aper type  f   x  dia   DC  Tldeg Tlpa  Observer
130504.54 S  11.8  AC  18   L     5 120  2.0   3               Wolf
130507.69 C  12.7  UO  40.6 Y  +  9  90  1.1                   Hills
130512.03 S  12.9  TI  23.5 T  + 10 188  1     2               Labordena
130526.95 C  13.5  NO  28.0 T  +  7 120  0.1   6   1.9   167   Spooner
```
Astrometry: John Fletcher (J93) Dave Storey (987), Alexander Baransky (585):
```
2013 05 07.04825 14 11 42.50 +12 10 24.0          16.7 N      987
2013 05 11.98139 14 03 03.08 +13 49 23.1          16.4 N      J93
2013 05 15.90398 13 56 40.34 +14 58 38.1          16.5 N      585
2013 05 25.99839 13 42 31.12 +17 20 52.7          16.2 N      585
```

Comet P/2012 B1 (PanSTARRS)

Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130501.22	C	15.6	MC	61.0	C	+ 10	90	0.3		49.9s	299	Dymock

Astrometry: Alexander Baransky (595):

```
2013 05 15.92744 11 47 26.22 +06 02 42.3          16.4 N      585
2013 05 15.93726 11 47 26.17 +06 02 41.4          16.3 N      585
```

Comet C/2012 F6 (Lemmon)

Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130504.15	S	6.2	TK	10.0	B	+	25	6	5/			Gonzalez
130505.15	B	6.7	TI	8	B	+	11	7	6			Labordena
130510.35	M	7.0	HD	10	B	+	20	7	6	0.5	250	Goiato
130510.35	S	6.8	HD	5	B	+	7	7	5			Goiato
130511.13	S	6.4	TK	5.0	B	+	10	8	5/	0.8	260	Gonzalez
130511.35	M	6.6	HD	5	B	+	7	8	6			Goiato
130511.35	M	6.8	HD	10	B	+	20	7	6/	0.5	260	Goiato
130512.15	S	6.5	TI	8	B	+	11	7	5	30 M		Labordena
130514.09	M	7.7	TT	10.8	L		4	15	4.5	7	0.08	219 Getliffe
130515.07	B	7.0	TK	6.3	B	+	9		4			Hasubick
130516.10				10.8	L		4	55	1.5		0.07	285 Getliffe

Also 0.06 deg at PA 253 deg in twilight

130516.10	S	6.2	HI	10.8	L		4	15	3.8	7		Getliffe
130519.09				10.8	L		4	27	3.8		0.17	259 Getliffe

Also 0.10 deg at PA 217 deg in twilight

130519.09	S	6.6	TT	10.8	L		4	15	4.8	7	0.19	259 Getliffe
130527.08	S	7.6	TT	10.8	L		4	15	4.0	6		Getliffe

Comet C/2012 K1 (PanSTARRS)

Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130501.44	C	15.3	MC	61.0	C	+ 10	90	0.3		19.2s	160	Dymock
130501.73	C	15.3	UO	40.6	Y	+ 9	180	0.3				Hills
130508.70	C	15.5	UO	40.6	Y	+ 9	180	0.3				Hills
130516.05	S	13.5	HN	20.3	T	+ 10	133	1.0	4			Gonzalez

Astrometry: Dave Storey (987), 0.4m SCT at F/10 ST9-XE

```
2013 05 07.03884 17 09 53.53 +18 59 19.8          15.9 N      987
2013 05 07.06154 17 09 52.43 +18 59 28.7          15.9 N      987
```

Comet C/2012 K6 (McNaught)

Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130520.53	C	14.0	UO	40.6	Y	+ 9	75	0.2				Hills

Comet C/2012 L2 (LINEAR)

Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130503.88	S	8.5:	TK	20.3	T	+ 10	77	7	3			Gonzalez
130504.27	S	9.2	AC	18	L		5	120	3.0	2		Wolf
130505.27	S	9.5	AC	18			5	120	3.2	2		Wolf
130508.27	S	10.0	AC	18	L		5	120	3.0	2		Wolf
130509.27	S	9.8	AC	18	L		5	120	3.6	2		Wolf
130511.93	S	8.7	TK	10	B	+	20	5	3			Goiato
130513.27	S	10.8	AC	18	L		5	120	2.5	2		Wolf
130513.93	S	8.9	TK	10	B	+	20	5	2			Goiato
130514.27	S	10.6	AC	18	L		4	120	2.4	2		Wolf
130520.27	S	10.8	AC	18	L		5	120	1.2	2		Wolf

Comet C/2013 E2 (Iwamoto)
Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130509.74	S	12.0	AC	18	L	5	120	2.0	2			Wolf
130511.33	S	11.7	AU	22	L +	6	160	2	3			Goiato
130514.74	S	12.2	AC	18	L	5	120	1.8	2			Wolf
130515.74	S	12.3	AC	18	L	5	120	1.5	2			Wolf

Comet C/2013 G1 (Kowalski)
Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130514.65	C	17.8	UO	40.6	Y +	9	200	0.2				Hills

Comet C/2013 G6 (Lemmon)
Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130518.66	C	16.0	UO	40.6	Y +	9	40	0.2				Hills

Comet C/2013 G7 (McNaught)
Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130509.66	C	16.9	UO	40.6	Y +	9	120	0.2				Hills

Comet C/2013 H1 (La Sagra)
Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130514.63	C	17.0	UO	40.6	Y +	9	120	0.3				Hills
130518.61	C	15.4	UO	40.6	Y +	9	120	0.2				Hills

Comet C/2013 J3 (McNaught)
Visual/CCD observations reported:

Date	MM	Mag	ref	Aper	type	f	x	dia	DC	Tldeg	Tlpa	Observer
130518.69	C	17.6	UO	40.6	Y +	9	80	0.2				Hills

Comet C/2013 J5 (Boattini)
Astrometry: Peter Birtwhistle (J95):

2013 05 17.03766	15 19 14.65	+15 39 14.5					J95	
2013 05 17.04702	15 19 13.94	+15 39 18.5			20.3	R	J95	

Photometry of various comets: OD 213; OBS Ramon Naves; submitted by Montse Campas

CATALOGO: USNO A2.0 / CMC-14 - BANDA: R

COMETA	UTC	10x10 +/-	20x20 +/-	30x30 +/-	40x40 +/-	50x50 +/-	60x60 +/-	RSR N	FC FWHM	COD CAT
C/2012 S1	08/04/2013 20:09:25	15.89	15.42	15.23	15.08	14.95	14.79	17.3	17.5	213
C/2012 S1	08/04/2013 20:09:25*	0.04	0.07	0.07	0.08	0.09	0.10	4	3.5	CMC
C/2012 X1	08/04/2013 21:13:32	17.23	16.66	16.43	16.29	16.21	16.12	9.3	17.9	213
C/2012 X1	08/04/2013 21:13:32*	0.02	0.04	0.05	0.05	0.08	0.13	4	3.6	CMC
C/2011 L4	09/04/2013 03:15:39	8.43	7.20	6.67	6.35	6.13	5.96	9.1	14.8	213
C/2011 L4	09/04/2013 03:15:39*	0.09	0.18	0.22	0.23	0.24	0.24	5	3.0	CMC
C/2011 J2	08/04/2013 22:43:05	15.61	14.99	14.82	14.79	14.86		13.6	18.1	213
C/2011 J2	08/04/2013 22:43:05*	0.03	0.05	0.05	0.05	0.09		5	3.6	CMC
C/2012 K1	09/04/2013 02:09:13	16.11	15.69	15.68				11.4	18.2	213
C/2012 K1	09/04/2013 02:09:13*	0.06	0.10	0.13				5	3.4	CMC

METEOR and FIREBALL NOTES

Edited by Tony Markham

Strong 2013 Eta Aquarid display

Eta Aquarid activity was unusually high this year. There was some advanced warning that this might happen. A few days before the shower peak, Mikiya Sato published predictions that, during the course of May 6, the Earth would encounter several dust trails ejected 8-11 centuries ago by comet 1P/Halley. Given the age of these filaments it was quite possible that, rather than seeing sharp peaks in activity, observers would see a broad peak of enhanced activity (due to the dust having spread out). Sato's best estimate was that the peak would be around twice its normal level - somewhat similar to that seen for enhancements of the Orionid meteor shower (the Earth's autumn encounter with comet 1P/Halley's dust stream) during the years 2006-2010.

The predictions proved accurate. Alex Pratt, who had never previously imaged any Eta Aquarids, managed to image several Eta Aquarids late in the nights of May 4-5, 5-6 and 6-7 (see his report below). Reports from elsewhere in the world, posted via the *meteorobs* system, confirmed the outburst. For example, Koen Miskotte, observing from the Netherlands (Lat 52 N) reported counting about 8-10 Eta Aquarids during the morning twilight of May 6th compared with his typical rate of 1-2 per hour in previous years. High visual rates were also reported from Canada and the USA. Radio and radar observers also reported higher than usual activity. For the latest visual analysis, see the IMO activity curve at http://imo.net/live/eta-aquariids2013/

Alex Pratt (Leeds)
Summary of Eta Aquarids captured using 3.8mm f/0.8 video system :

Magnitude	-2	-1	0	1	2	Sum	Mean
Eta Aquarids	2	3	3	5	2	15	0.1

The first was captured on May 01/02 and the last on May 12/13. Four were captured on May 04/05, four on May 05/06 and three on May 06/07.

Four of these images are shown below

2013/05/05 03:33:14 UT

2013/05/05 03:40:44 UT

2013/05/06 02:57:37 UT

2013/05/06 03:12:42 UT

Sub Ed: As readers may be aware from previous issues of TA, Alex corresponds with William Stewart, who is based in Cheshire, to carry out triangulation of fireballs and publish their results on the web site www.nemetode.org . William has reported that he also managed to image several Eta Aquarids on the morning of May 6th.

2013 May 8 Fireball

Many people across the Midlands and south of England and south Wales saw a bright fireball heading in a westerly direction at approx 21:47 BST (20:47 UT) on the evening of 2013 May 8th. Many of these witnesses described it as having a short "tail" and being green in colour and with a duration of around 5 seconds.

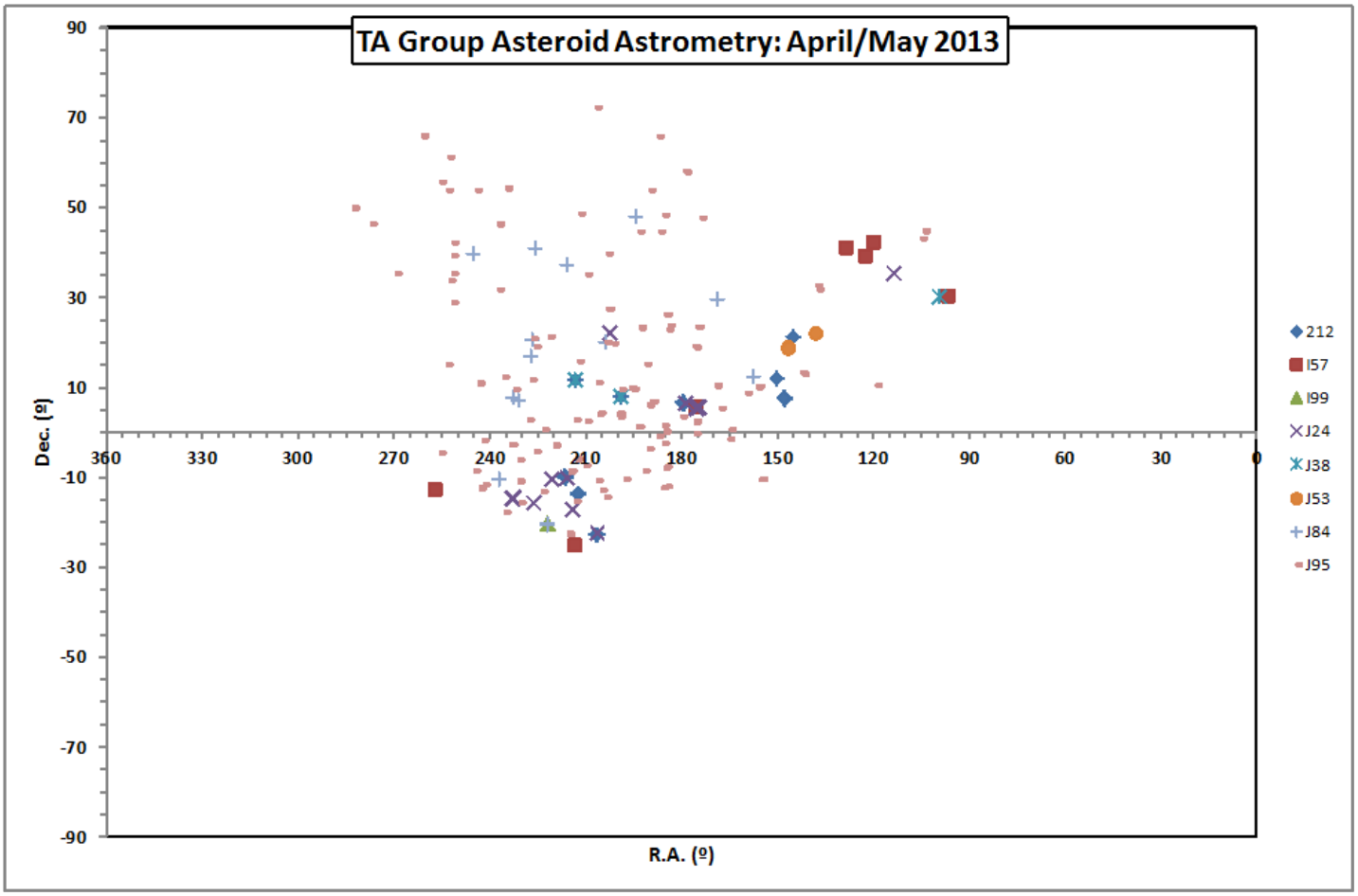
Some of the news reports the following morning claimed that the fireball was debris from comet 1P/Halley. This claim was presumably based on someone looking up a list of meteor showers and seeing that the Eta Aquarid meteor shower is active in early May. However, the Eta Aquarid radiant does not rise until the early hours of the morning and consequently no Eta Aquarid meteors can be seen during the evening hours. Later in the day the BBC removed the incorrect claim from the text of the report on their News web site http://www.bbc.co.uk/news/uk-22460642 , although the claimed link to comet Halley still remains in the video link.

Since the fireball appeared at a time of night when the sky was not yet fully dark, not all automated meteor camera systems were fully active – during the twilight period, these systems will usually often only take short exposures of a few seconds duration, leaving a gap of nearly a minute until the next exposure. However, the cameras of the UK meteor observation network (UKMON) had some success in capturing images of the fireball. Their initial analysis of its atmospheric trajectory, which suggests that the fireball passed over Dorset and Devon, can be found at http://ukmeteornetwork.co.uk/2013/05/full-report-on-meteor-spotted-in-night-sky-in-england-and-wales-8-may-2013-at-2147/ . Bear in mind, however, their caution that none of the cameras captured the whole path and so there is some uncertainty in the calculated trajectory.

PLANETARY NOTES

Edited by Mark Kidger

It has been years since planetary and lunar drawings were a regular feature of TA submissions. This month they dominate the column, with fine drawings of the Moon, Venus and Saturn included, selected from a much wider range of submitted material. There is also a curious tale of how professional and amateur astronomers have alerted that a well-known satellite was wandering off course, causing it to be mistakenly reported as a Near Earth Asteroid.



Peter Birtwhistle (peter@birtwhi.demon.co.uk) reports:

[**April**] Astrometry attached from a continuing awful run of weather, by far the poorest March I've experienced in the last decade. Along with the normal run of near-earth asteroid discoveries picked up by the surveys during the month, one 16th mag fast-moving object that had been given the designation UE2A938 by the Catalina Sky Survey was removed from the NEO Confirmation Page (NEOCP) by the Minor Planet Center with the note "was not a minor planet", their way of indicating that it was an artificial satellite rather than a natural object. It had been picked up from Catalina at 05:36 UT on March 12 and followed for a little under 4 hours. The Bisei Observatory in Japan then picked it up 2 hours later and followed it for another 4 hours before it was removed from the NEOCP.

Using the available astrometry to determine an orbit using Find_Orb I found that it was in a 12.7 day orbit with perigee at 0.5 Lunar Distances (LD) and apogee at 0.7 LD and inclination of 27 degrees. This seemed remarkably similar to a distant artificial satellite IMP-8 (Interplanetary Monitoring Platform 8) that I have kept track of, getting a few positions every 4-5 months since it was picked up and briefly put on the NEOCP ten years ago this February (see the report by Reiner Stoss in TA of 2003 March Vol 39,295 and available online at http://www.birtwhistle.org/GallerySatelliteIMP8Search.htm). I had last observed IMP-8 on 21 July 2012 and at that time it was in a 12.25d period orbit, with a 0.4 LD perigee and 0.8 LD apogee and inclination of 24 degrees.

Considering another 8 months of perturbations it seemed reasonably similar to the current orbit derived for UE2A938, so at first glance I thought that Catalina had managed to pick up IMP-8 again (as an accidental re-discovery, for the first time in those ten years) but attempts at fitting the positions of UE2A938 with IMP-8 failed. Bill Gray, the author of Find_Orb suggested on the Minor Planet Mailing List in message 28292 that the new object is quite likely to be IMP-7, launched in 1972, a year before IMP-8. They were both intended to be put into similar nearly circular 12.5 day period orbits but IMP-8 ended up in a somewhat more eccentric orbit than originally intended. IMP-7 sent data back for 6 years and was turned off in 1978 but IMP-8 worked for 33 years and sent its last data back to Earth in October 2006.

After the set of positions obtained around the time of its appearance on the NEOCP my next chance to try for UE2A938 was in early April. The ephemeris generated with Find_Orb predicted it (assuming asteroidal style magnitude variations dependent on distance from Sun and Earth and phase angle) would have a magnitude around +18 and would be moving at about 50"/min. I started a search for it with my 18' field of view and eventually came across it about 22' ahead of the ephemeris at magnitude +15! It was very lucky for me that it was 3 mags brighter than the prediction because at magnitude +18 it could easily have been missed, but at +15 its movement from one exposure to the next was glaringly obvious. A subsequent set of images taken the next night found it about as bright as the ephemeris predicted, around +18 so by chance it must have had sunlight glinting off a panel the previous night.

The orbit now seems remarkably well constrained, already allowing a good determination of the area-to-mass ratio (AMR) due to the effect of solar radiation pressure on the small spacecraft of 0.0109 m^2/kg. The equivalent for IMP-8 calculated from observations in the last three years is 0.0103 m^2/kg, reassuringly similar for the two identically sized spacecraft!

It has surprised me for many years that IMP-8 has only ever been put on the NEOCP once by accident (in 2003), even though it sometimes is as bright as 16th magnitude and moving at NEO-like speeds against the stars. Now it seems we have another similar example with UE2A938 very likely being identified with IMP-7 and sometimes as bright as 15th magnitude yet only once making it onto the NEOCP in the last decade.

[**May**] Attached is my astrometry for the month, nothing particularly outstanding, other than a triplet of astrometry of Herschel on May 12th while it was on the NEOCP (again!).

[Sub-Ed: Peter's report is "Herschel K2013/05/12.02961 15 24 06.07 -06 12 46.0 J95 = UJ0C202 Found 13.2' E and 1.7' S (13.3') of nominal". On March 15th Herschel fired its thrusters with a 10.51m/s burn to take it out of orbit around L2, in preparation for the large, 115m/s disposal burn on May 13/14th. However, an old orbit file was still being used by the MPC, which led to Herschel being reported as a NEO because it reached a quarter degree out of position before the discrepancy was corrected. Staff working with Herschel at ESA were though deeply impressed that the 20th magnitude Herschel was spotted to be out of position so quickly by observers. As Herschel's helium cryogen was lasting longer than expected, a possible return to L2 was prepared – this would have been a ≈60m/s burn on April 29th – and a new orbit calculated and placed in the JPL Horizons system, assuming this burn would take place finally. Meanwhile intensive work was carried out on the likely helium lifetime that led to the decision that the remaining programme of observing could be carried out with adequate margins on ground station coverage without a return to L2, so the braking manoeuvre was cancelled three days before execution: this decision was vindicated as the helium finally ran out as the burn would have been taking place. However, this meant there being the quite substantial difference between where Herschel was expected to be and where it actually was, which is what was reported by Peter on May 12th. The large disposal burn was then carried out the following day, increasing the discrepancies even more, as Herschel's semi-major axis was boosted to 1.05AU, until a new orbit could be calculated and placed in the Horizons system late on May 14th. This though is not the end of the story. A small, but rather uncertain quantity of fuel remains in the tanks that will finally be burnt off on June 17th, before Herschel is finally made safe and switched-off: this will cause yet another orbit deviation before the final and definitive orbit for the future is calculated and posted on June 18th or 19th.]

Sinus Iridum – Observations during May 2013

Mike Harvey (ipmike@hotmail.co.uk) reports: The instrument used was a 10inch Dobsonian reflector magnification x 316. Drawings made on varying nights in May 2013 to show detail surrounding terrain through varying illuminations of light. The observer has to appreciate that varying detail of surrounding geology can become more apparent through drawings made over several nights.

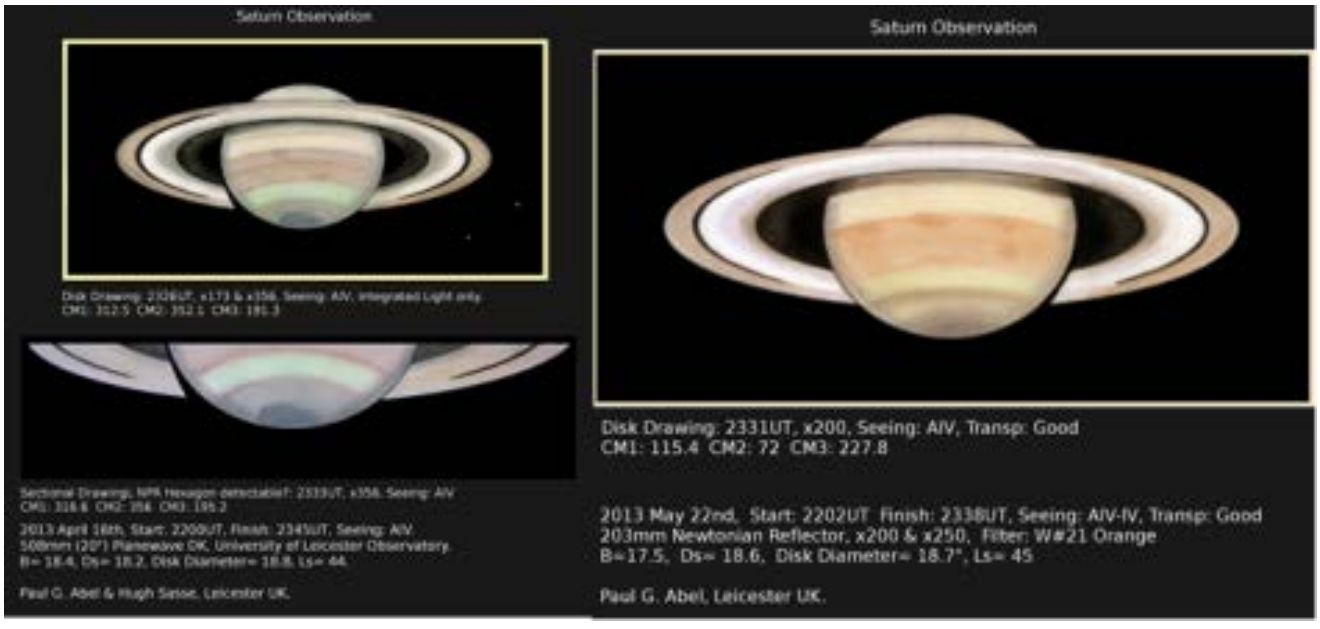
Observation notes: Through most modest sized telescopes fixed on Sinus Iridum (Bay of Rainbows), you become aware of two horn-like outcrops of bay, namely prom Laplace and prom Heraclides in varying illuminations. These outcrops become prominent in most sized telescopes. At bright illumination the promontoriums fade into the surrounding lunar upper topography (Montes Jura). The bay itself, Sinus Iridum, presents from varying angulations as smooth plain but on closer inspection shows small craters which need high magnification to show inner shadows.

Crater Bianchini is nestled into back crop of Montes Jura. This crater has been drawn under varying illuminations and presents shadowing under varying conditions. Again this crater, under higher magnifications, shows reflective spots in its inner circle.

The Montes Jura running full gauntlet of half circumference of Sinus Iridum is an impressive elevation of geology and, looking through the telescope eye piece and distinguishing the finer detail in its geography, has been a time consuming task, requiring varying nights' work to achieve this. Craging and intertwining elevations make the back crop of Montes Jura a challenge for any future astronauts. Exploring this elevation, looking at varying shadows, allows the observer to fully comprehend both height and distances involved in lunar topography. The Sinus Iridum is indeed a jewel in the moons' geology, a prominent feature in upper quadrant of Mare Imbrium, its presence is imposing and impossible to miss. To appreciate its full beauty requires many nights of patient observations and to draw it is to fully comprehend its beauty.

Saturn drawings by Paul Abel

Paul Abel (paul.abel@yahoo.co.uk) reports the following drawings of Saturn made on April 16th and May 22nd.



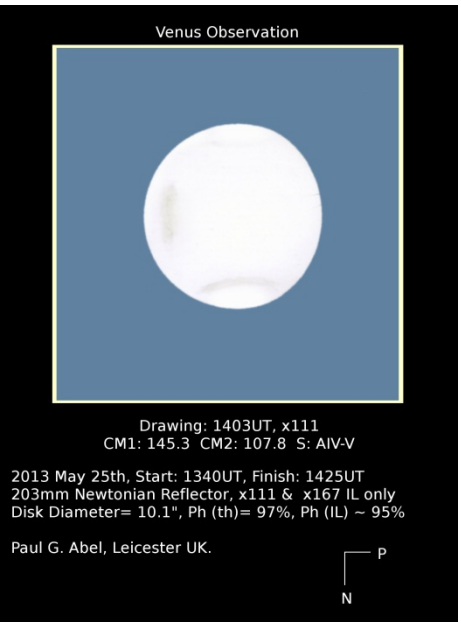
Occultation of ZC1853 (Psi Virginis) by the Moon on 2013 May 21st

Montse Campàs (mont2003_1@hotmail.com) reports observations by Ramón Naves of this rare occultation of a naked eye visible star by the Moon on May 21st. Although the mean magnitude of the star is 4.79 (it is a low amplitude variable) and thus, in theory, an easy naked eye object, despite being a dark limb immersion the contrast with a 10 day old moon made this a tricky occultation to image.

The image left was taken with a rooftop 0.30-m f/10 Schmidt-Cassegrain.

There was considerable interest in this occultation because the star is a binary with an F6V companion at 0″.04 and thus a candidate to show a stepwise disappearance.

The CCD drift scan record of the occultation is shown at the bottom of the image showing the brightness of the star through immersion.



Venus drawing on May 25th 2013 by Paul Abel

Paul Abel also reports the following observation of Venus:
Please find a drawing of Venus I made this afternoon. I used setting circles to find the planet, and this is probably the largest phase I have ever observed the planet (~97%)! Seeing wasn't great, but it was nice to make a start on the current elongation.

Illuminated disk: Seemed to contain some subtle shadings- one darker one near the limb though it is hard to be sure.

Unilluminated Disk: Not seen

Terminator: Geometrically regular

Cusp Caps: NPC seemed to be brighter

Cusp Collars: NP collar seemed to be marginally more prominent, hard to be certain.

SOLAR NOTES

Edited by Peter Meadows

White light Mean Daily Frequencies, 2013 May

Observer	AA North	South	Total	Days	R Total	Days	Q Total	Days
H. Barnes	-	-	6.0	9	88	9	-	-
R. Dryden	2.2	3.2	5.4	13	77	13	-	-
J. Janssens	2.9	3.6	6.5	8	-	-	-	-
P. Meadows	2.9	3.3	6.3	24	89	24	18.0	24
K. Medway	1.7	2.6	4.3	27	-	-	-	-
G. North	1.2	3.0	4.2	5	78	5	-	-
I. Phelps	2.3	4.1	6.4	7	96	7	-	-
G. Schott	2.5	3.0	5.5	22	70	22	-	-
J. Shanklin	2.9	3.3	6.2	24	86	24	-	-
L. Smith	3.2	4.0	7.2	5	104	5	20.0	5
D. Storey	3.0	3.0	6.0	16	-	-	-	-
MEANS	2.5	3.2	5.7	160	84	109	18.3	29

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

White light activity, 2013 May

Activity increased during the month such that both the TA AA and R were at their highest since 2011 November. Peter Meadows reports that AR 1731 at N11/188 was one of five groups seen on the 1st having just passed the central meridian. It was still a complex Eac type group with many small penumbral and other sunspots and a total area of 290 millionths. On the 2nd and 3rd AR 1731 was still of type Eac but it had less sunspots visible on each day such that by the 4th it was of type Cso and a single Hsx sunspot on the 5th. It was not visible on the 6th having rotated around the limb. A larger group seen on the 1st was AR 1734 at S17/152 with an area of 660 millionths – this was of type Dko which consisted two irregular penumbral sunspots with the following sunspot being the smaller but more irregular. As this group rotated towards the central meridian it remained type Dko but it reduced slightly such that when it crossed the meridian on the 5th it had an area of 440 millionth and it had developed several pores within the group. This group then continued to decay so that by the 9th it was just a single irregular Hkx sunspot – it was last seen by Meadows close to the western limb on the 11th. AR 1734 was seen with the protected naked eye by Dave Storey on the 1st, 2nd, 6th and 7th, by Ken Medway on the 6th and by Meadows & Lyn Smith on the 7th.

On the 10th and 11th Meadows reports that ten groups were seen, with six in the north and four in the south. The largest of these was AR 1745 which appeared on the eastern limb as an Hsx sunspot at N13/335 on the 10th. By the 13th it had developed into a Dkc group with an area of 390 millionths – the follower penumbral sunspot was the largest. On subsequent days he adds the leading sunspots decayed so that by the time the group passed the central meridian on the 16th it comprised a single Hkx sunspot at 210 millionths. When next observed by him on the 19th it was a Hax sunspot at 170 millionths – it was last seen on the 22nd as a small Hsx sunspot close to the western limb. Storey observed AR 1745 with the protected naked eye on the 15th, 16th and 17th. By the 25th Meadows reports that the number of groups had reduced to five – the largest being AR 1755 at N10/200 of type Dao and 1756 at S19/212 of type Dac. Both groups were of a similar size of just over 300 millionths. By the 27th AR 1755 had become type Dsi with a reduced size of 60 millionths while AR 1756 had elongated to become type Fai with a reduced size of 150 millionths. By the 31st AR 1755 must have decayed on the disk while AR 1756 was a single Hsx sunspot on the eastern limb. It was one of three groups seen by Meadows on this date.

Hα activity, 2013 May

Ken Medway reports that a striking loop prominence was seen on the NE limb on the 2nd. Peter Meadows reports that on the 3rd between 1450 and 1515 UT a compact flare was seen within AR 1734 (type C1.7). Later the same day two other flares were seen, the first of type M1.3 within AR 1731 from 1715 UT which appeared as several bright ribbons while the second of type M5.7 from 1730 UT was very close to the E limb within AR 1739. The latter flare appeared as a bright region with a nearby bright and active prominence: this changed rapidly over the next 25 minutes with a jet of hydrogen moving away from the limb before breaking up into several blobs of hydrogen which stretched up to an estimated height of 200,000 km. By 1745 UT these blobs had started to disappear before the base of the prominence reduced in height and intensity. With the strength of the flare reducing, the prominence began to disappear. On the 7th Lyn Smith comments that the most notable prominence hearth was on the SW limb consisting of a double loop and a pillar. A smaller loop was on the S limb. Many filaments were present. A curving filament and a hooked filament were just south of AR1734 with an arc just north of the main sunspot. A strong N-S broad filament was north of AR1736 and a strong E-W

filament was south of AR1741. Short filaments were also seen within sunspot groups AR 1738 and 1739. She adds that plage was seen with these two short filaments and within AR1734, the strongest plage being associated with AR1741 just over the SE limb. A noble arch prominence was seen by Medway on the 9th on the SW limb.

Smith reports that five prominence hearths were counted on the 10th but none were notable. A cloud of plasma was seen off the NW limb (0800 UT). A broad filament mass was in the NW quadrant, north of AR 1738 and another E-W filament was south of AR 1739. An N-S aligned filament preceded both these groups with another N-S filament to the W near the limb. Plage was seen with AR 1736 on the SW limb and with AR 1744 just over the SE limb. On the 13th Meadows comments that at 1730 UT a very bright compact loop prominence was seen on the E limb – this had been the site of an X2.8 limb flare which had peaked at 1605 UT before decayed to an M1 flare by the time of the observation. The flare occurred in AR 1748. However a very spectacular prominence was also seen on the almost opposite limb. It comprised a hearth near the limb with several blobs and a broken jet higher above the limb up to an estimated height of 300,000 km. Just 10 minutes later only the hearth and a small jet were all that remained of this very dynamic prominence.

Smith notes that on the 17th most prominences were small except a hearth on the SW limb consisting of two pillars bending towards one another. The northern element was shaped like a claw. Six filaments were counted, none particularly notable. An E-W filament was through the centre of AR1748 with accompanying plage. Plage was also seen with AR1744 and 1746. Also on the 17th Medway observed a double arch was seen on the SW limb. Observing on the 25th Smith notes that five prominence hearths were counted but all were small. Two long spectacular filaments "flowed" from AR1755 like streamers with smaller filaments to the north and south. Three small filaments also accompanied AR1756. Medway observed a very long filament in the NE quadrant on the 29th and in the S on the 31st - it stretched from near the CM to near 40E. Four prominence hearths were counted by Smith on the 31st. A hearth on the SW limb consisted of three small pillars which was mirrored by a smaller hearth on the NE limb. A hearth consisting of a pillar and a mound were seen on the SE limb. A long east-west filament was just north of AR1757 and a long diffuse filament was seen in the NW quadrant. A broad diffuse filament surrounded AR1758 to the south and west of the group. Also a small but obvious filament trailed AR1760. AR1760 also displayed an area of plage.

Prominence Mean Daily Frequencies, 2013 May

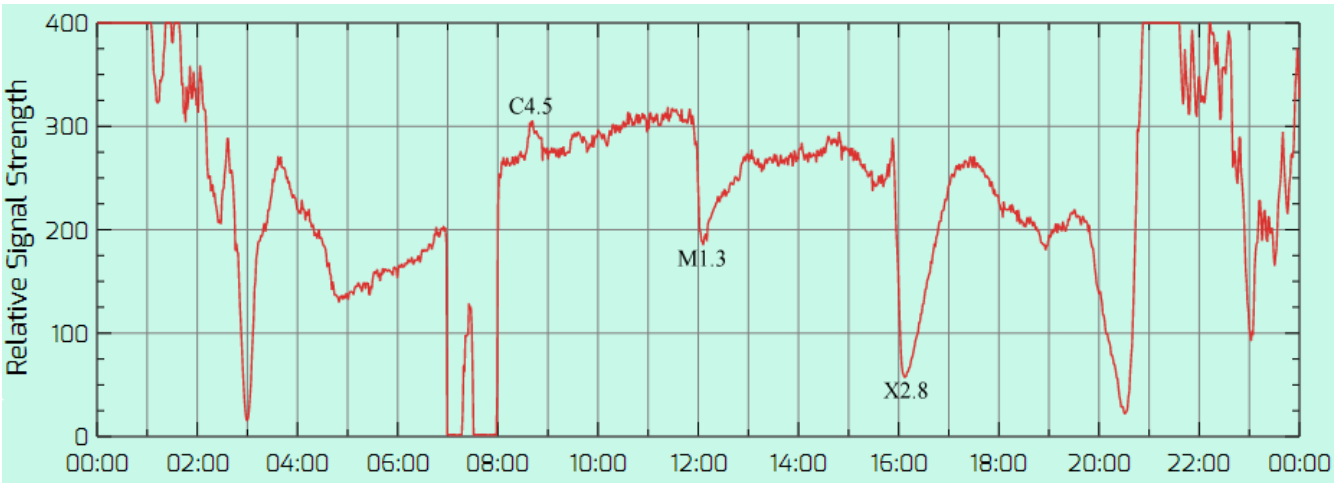
Observer	All Latitudes				0-40°			40-90°		
	North	South	Total	Days	North	South	Total	North	South	Total
R. Dryden			4.6	10						
P. Meadows	2.8	2.8	5.6	12						
K. Medway	2.1	1.7	3.8	21	1.7	1.5	3.1	0.4	0.2	0.6
L. Smith			4.9	7						

Flares, 2013 May

Medway saw many solar flares with 12 were being of the SB category. They were seen on 1st, 2nd, 3rd, 6th, 7th, 10th,16th and 31st and all were of short duration. Also see table & VLF plot below and notes above.

Date	Time UT	Lat.	CMD	Type	Obs.
17	0955	+10	35E	1B	KJM

Date	Time UT	Lat.	CMD	Type	Obs.
26	0953-1002	-16	10W		KJM



VLF 23.4 kHz flare detections. 2003 May 13 (UT). Richard Meadows.

SOME THOUGHTS ON THE PASSING OF PATRICK

James Muirden

"It's Mars night!" Those were the first words I heard Patrick speak. It was September 1956, the time of the perihelic opposition, and I was in his garden at East Grinstead, Sussex.

A year earlier I had come across a little book called *Guide to the Sky* by E. A. Beet, and this introduced me to astronomy. Another early purchase was Patrick's *Guide to the Moon*. Of course I couldn't afford to buy a telescope, although I recall my father taking me to Brunnings' showroom in Holborn, where unattainable brass tubes pointed skywards aboard their polished tripods. The family lived in a four-storey house in Earl's Court, and I would sit up among the chimney pots with an opera glass.

So when my sister Margaret told me that a friend of hers knew the author of Guide to the Moon and (almost as unlikely back then) had a car and could drive us to his house, it had the flavour of a voyage to some briefly-attainable magic kingdom where I would be able to put my eye to a telescope eyepiece before being whisked back to the smoke of Earls Court.

I remember that it was an unpromising evening. No sign of Mars in the sky. So our driver stopped at a phone box and rang ahead. "It's clear!" he cried.

To a 14-year-old, everything about that visit was surreal. I had ambitions of authorship, and here was Authorship writ large. Patrick's presence almost burst the little room apart. It had been his nursery, he said. Now it was a fog of Three Nuns, and a hooded desk lamp bent over his typewriter, awaiting the return of the Scribe. (I remember the model as a Smith Premier, but by other accounts this must be wrong.) French windows opened into the garden and the black, black night. Mars, seen through his 12-inch reflector, was flickering and featureless, for it was the time of the dust-storms. He showed me a few sights with his 6-inch, including Beta Cygni. The background seemed granular with stars, as did the Milky Way itself. I doubt if I had ever seen (or at least noticed) a rural night sky before.

That night was a defining moment.

I had a charming post card a few days later, the words of which have stayed in my memory ("Sorry conditions weren't better for Mars, but I hope you will come back again when the Moon is on view.") It had three characteristic Patrick-isms: Esqre for Esq. (everyone was an esquire then), Set. for Sept., and an acute accent instead of an apostrophe. I think I stayed with Sept. but I certainly adopted Esqre. and from then on used the French accent instead of a ', even though it meant having to press the space bar to move the carriage on. Equally characteristic was his machine-gun response to all correspondence. Somewhere I have the whole precious set of his headed post cards (telephone number East Grinstead 377, I think).

Encouraged by his invitation, I phoned him about another visit. In those days all calls but local ones had to go through the operator. My parents ran a guest house, so they had a payphone, and I would dial 0 and wait with my three pennies ready to clank into the slot when told to. It was wise to take food or at least a cup of tea and a book while waiting to reach an operator. I think the next visit was arranged for a lunar eclipse. I can't remember much about the Moon, but under the bed in the spare room was a mirror disc, I think 22 inches across, that his mentor H. P. Wilkins, who was Director of the Lunar Section of the BAA, was planning to turn into a telescope for lunar studies. In his early books Patrick wrote with much reverence of this remote figure, whom I never met. Wilkins created a huge map of the Moon, 300 inches across, and placed the names of several of his colleagues on it, including Patrick's. But by that time the IAU was beginning to get tough on this sort of thing. I got the impression that Wilkins was the subject of controversy, and he may have resigned in anger over some issue, but Patrick, I am sure, remained loyal to him.

I must have gone down to Glencathara, the name of his house, several times over the next few years. The visit that stands out most was one arranged, coincidentally, for the night of the Lunik II landing on the Moon, on 13 September 1959 (it was launched without warning only the day before). Several reporters were standing around in the darkness hoping for a scoop. Patrick had the 12-inch, which he called Oscar, I had the 6-inch, and his mother and her companion (whose name I think was Miss Denny) were using binoculars. The impact was due at just after 10 o'clock, and we had been told more or less where it would be. Every now and then the phone rang with some message for Patrick, possibly from Jodrell Bank, which was tracking it – if I was ever at the centre of things, I felt I was then! The time came and went. A little while later I heard Patrick say "My God, I think I saw something". He asked the reporters not to publish an observation that could not be confirmed, but in the morning he was furious to learn that one of the newspapers had done so and machine-gunned a protest off to the editor, showing it to me for vetting before dictating it over the phone. I recall

his mother saying to me “Blue flames!” and trying to restrain him with something like “Patrick, you need them for your fox-hunting,” but it was the breaking of a promise, or at least an understanding, that raised him to an incandescent state and got the keys rattling.

Miss Denny had also exclaimed that she thought she saw something through her binoculars, and I remember a reporter asking for her name and not getting it.

It turned out that the impact was indeed late, and very near the time of his “My God!” He said to me afterwards that he was pretty certain he saw something, but dared not publish what might have been mere fancy. I wonder if he ever referred to it again, or what the chances are that the brief dust-cloud could have been visible to someone looking in exactly the right spot with the telescope he was using?

It may have been on this same morning that the New Scientist rang him for an article about the Moon, and he sent me out into the garden to wander around in the sunshine while the sound of embattled typewriter keys came through the French windows. In no time at all he had covered two single-spaced sheets and I was asked to mark the seamless prose, which he then dictated over the same telephone that had absorbed his editorial broadside.

In the late Fifties, if you had not much money and wanted a proper astronomical telescope, you bought two circles of thick plate glass, carborundum powder, pitch and rouge, and ground and polished yourself a mirror, afterwards coating it using silver nitrate and ammonia, chemicals readily available in the High Street. With my father’s help I built myself a 6-inch Newtonian, a rolled zinc tube mounted on a turntable. Patrick never came to our house, but he heard about the telescope, and one evening I had a phone call. “Jimmy, do you feel up to facing a television camera?” He always called me Jimmy, although no one outside the family ever did. Although he had started the Sky at Night soon after we met, we didn’t have a television set and I don’t recall seeing any of the programmes until much later; anyway, he was also doing a programme for children called *Seeing Stars*, and this is what the call was about. A photographer came and took photographs of the telescope (black and white, of course), and the wooden stand around which I had walked for many hours grinding the mirror was taken off to the television studio in Hammersmith they were using then, and I walked around it sliding two glass discs together. I remember I had to wear a pale blue shirt because white dazzled the cameras — I had never owned a pale blue shirt before. The programme was live, and Patrick was much concerned that the studio manager or whoever was signalling to him was not indicating seconds remaining, which is what he was used to, but simply making increasingly frantic throat-slitting signs, so he ran out of time and was furious. I never saw the programme for the simple reason that I was in it, and video recorders didn’t exist, even if there had been any video recordings to load into them.

In the fug-filled study, eating toast at two in the morning (“A strange habit”), the discussion or rather monologue might turn to people rather than planets, and I was introduced to two categories of being that loomed large in his terrestrial life — Nutters and Serpents. Nutters were harmless but invariably amusing cranks. He had joined the recently-formed Flat Earth Society, and persuaded me to as well; apparently he had given a talk to them “disguising my voice” (how on earth could Patrick have disguised that unique verbal cataract?), but had to give up after he started being seen on TV. Another candidate was a Stringologist, who believed that the Universe consisted of string — perhaps he was ahead of his time? Another, in his view, was Velikovsky of Worlds In Collision fame. Patrick at that time was a vulcanologist. In Guide to the Moon he dismissed meteoritic impacts as of minor importance in moulding the lunar surface and attributed the larger craters (he called them Ringed Plains, a name introduced in the previous century, I should say) to the outpouring of lava from a central vent. The rays were caused by final eruptions of ash from a a few particularly active centres. Velikovsky’s ‘catastrophic’ vision of the solar system’s history found few supporters, but in Patrick’s case it also offended his view of an essentially peaceful planetary history. When I started writing on my own account I was quickly taken to task by referees for repeating this outmoded igneous stuff, and eventually, of course, Patrick himself abandoned it too.

Allied to his taste for Nutters was his schoolboy sense of fun. Under various noms de plume he would write letters to newspapers and scientific journals offering absurd theories or observations with the straightest of faces. One alter ego was Dr Eggen Spoonraus; another was L. F. Antyne. Of course this was too rich a vein for me to ignore, and the New Scientist carried a letter about, I think, Martian canals, from a correspondent named D. Seeve, a name that John Larard adopted for our personal correspondence.

Serpents were another matter. They were real and serious people with whom Patrick had crossed swords, or who had somehow offended him. And this introduces a side to his character that was seen only by those on whom the iron door had clanged, who had been banished to the waste land, and for whom there was, as far as I know, no likelihood of redemption. ***(To be continued in the July issue: Editor)***

VARIABLE STAR NOTES

Edited by Gary Poyner

Observations for May 2013

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

Dwarf Novae

RX And: Outburst on May 7.1 at 11.0. fading to 12.8 by May 12.1 & <13.0 by May 14.1 (6) TO
BY Aur: At min. 17.8C (1) XG(C)
SS Aur: Outburst on May 31.9 at 11.0 (25) DR, EV, TO, XG
CR Boo: Rise from 15.1 on May 3.0 to outburst on may 4.9 at 14.0, then 14.1-14.5 through to end of month. (9) XG
HW Boo: At min. 16.6V-17.6V (27) XG(Vis.&V)
Z Cam: Active standstill 11.4-12.3 until May 22.9 when fade to minimum 13.0 before returning to standstill state of 11.7 on May 24.9 and remaining at standstill at mean 11.6 to end of month. (*Is this the first time Z Cam has done this?)* (38) DR, EV, TO, XG **AT Cnc:** April outburst continues – May 1.9 12.7, fading to 15.2 by May 8.9 (5) XG
DE Cnc: At min. 17.4C-19.5C (8) XG(Vis.&C)
SY Cnc: Slow rise to max – May 1.9 13.3 to 11.9 by May 8.9 then 11.0 on May 13.9 (6) XG
YZ Cnc: April outburst continues – May 1.9 13.1, fading to 14.8 by May 4.9 then 14.7-14.8 (6) XG
GO Com: At min. 16.9C-17.3C until outburst on May 8.9 at 15.5C & 15.3 visual, fading to 17.62C by May 12.05 (23) EV, JMS(C), XG **IR Com:** At min. 18.4C (22) JMS(C), XG(Vis.&C)
VW CrB: At 15.8 on May 9.0, otherwise <15.6 (10) XG
TT Crt: Rise from <14.7 on May 13.9 to outburst 13.0 by May 15.9, fading to <13.2 by May 19.9 (8) TO
EM Cyg: Outburst on May 12.1 at 12.4, fading to 12.7 by May 15.0 then 13.5-13.8 (6) DR, EV
EY Cyg: At min 14.8 then rare outburst on May 15.06 at 11.9, fading to 13.7 by May 25.99 (8) EV, XG
SS Cyg: At min. 12.0-12.3 (20) EV, TO **AB Dra:** At min. 14.6-15.2 until outburst on May 11.9 at 13.3 mean, rising to 13.0 by May 13.9 then fade to 14.8 by May 15.9. Outburst on May 25.0 at 12.8, fading to 15.0 by May 31.9 (27) DR, EV, TO, XG **DV Dra:** At min. 18.7C (18) JMS(C), XG
ES Dra: Rise from 16.1 on May 5.0 to 15.5 by May 16.0 (7) XG
EX Dra: At min. 14.6-14.9 until outburst on May 13.97 at 13.7, fading to 14.7 by May 16.0 then 14.8 (9) EV, XG **U Gem:** At min. 14.5-15.1 (21) DR, EV, TO, XG
AH Her: At min. 13.5-14.4 until outburst on May 4.9 at 12.1 mean, fading to 13.7 by May 11.9. Rise from 13.5 on May 19.9 to outburst on May 21.9 at 12.2 & 11.9 on May 22.9, fading to 13.5 by May 31.9 (38) DR, EV, TO, XG

NY Her: Outburst on May 19.14 at 16.57C (1) XG(C) **V478 Her:** At min. 17.2C-17.9C (15) JMS(C), XG
V1227 Her: Rise from 17.9C on May 1.9 to outburst on May 4.9 at 15.56C, rising to 15.29C by May 5./9 then fade to <16.5C by May 24.9 (5) JMS(C) **X Leo:** April outburst continues – May 1.9 13.8 mean fading to 15.3 by May 4.9 & 15.8 mean on May 8.9. Outburst on May 15.9 at 12.7, fading to <13.8 by May 19.9 (20) EV, TO, XG
HM Leo: At min. 16.4C-17.1C (12) XG(Vis.&C)
RZ Leo: At min. 18.34C (21) EV, JMS(C), XG(Vis.&C) **AC LMi:** At min. 18.2C (11) XG(Vis.&C)
RZ LMi: April outburst continues – May 1.9 14.6, fading to <15.5 by May 6.9. Outburst on May 8.9 at 14.4, fading to 15.7 by May 13.9. Outburst on May 22.9 at 14.7 (7) XG
SX LMi: At min. 16.5 (9) XG **GW Lib:** At min. 16.69C (1) XG(C)
EQ Lyn: At min. 18.5C (8) JMS(C) **EZ Lyn:** At min. 17.7C-18.2C (7) JMS(C)
FH Lyn: At min. 18.0C-18.4C (2) JMS(C), XG(C) **AY Lyr:** Outburst on May 8.9 at 14.3, fading to <15.3 by May 11.9 (24) DR, EV, TO, XG **V344 Lyr:** Outburst on May 23.0 at 15.6 (6) XG
V587 Lyr : Outburst on May 23.0 at 14.9 (4) XG **RU Peg:** At min 12.6-12.7 until outburst on May 12.1 at 10.9, rising to 10.2 by May 14.1 then fade to 12.0 by May 27.1 (8) EV, TO
TZ Per: At 13.3-13.5 (3) DR, TO **NY Ser:** Outburst on May 9.0 at 15.3, fading to <15.5 by May 13.9 (9) XG **BC UMa:** At min. 18.2C (12) EV, XG(Vis.&C)
BZ UMa: At min. 16.1C-16.5C (20) CPJ, EV, JMS(C), XG
CH UMa: At min. 14.7-15.1 (10) XG
ER UMa: Fade from April outburst – May 1.9 14.3 to 15.2 by May 3.0. Outburst on May 5.9 at 13.3, fading to 14.9 by May 6.9. Outburst on May 15.97 at 12.8, fading to 13.4 by May 22.9 (10) XG
SU UMa: At min. 14.6-15.2 until rise from 15.0 on May 4.9 to outburst on May 5.9 at 12.95 mean, then fade to 14.9 mean by May 8.9. Outburst on May 11.9 at 13.6, fading to 15.0 mean by May 13.9. Outburst on May 19.9 at 12.8, fading to 14.3 by May 25.9 & Outburst on May 31.9 at 13.2 (25) EV, TO, XG
V355 UMa: Min. 16.9C-17.3C (21) EV, JMS(C), XG
SS UMi: Fading from outburst – May 13.9 15.5 (7) XG **QZ Vir:** At min. 16.0 vis – 16.2C (21) TO, XG
TW Vir: April outburst continues – May 1.9 12.8 fading to 14.1 by May 5.9 then negative. (6) XG

VW Vul: Outburst on May 23.0 at 13.5, fading to <13.7 by May 25.0 (2) EV
HS 1857+7127: Rise from 15.9 on May 5.0 to outburst on May 9.1 at 14.2, fading to <15.8 by May 13.9. Outburst on May 23.0 at 14.9 (8) XG
RXJ1831.7+6511: Outburst on May 9.0 at 14.8, fading to <15.1 by May 16.0 (3) XG
SDSS J090016.53+430118.2: At min. 17.7C-10.0C (16) JMS(C)
SDSS J093249.57+472523.0: Outburst on May 24.93 at 16.4C, otherwise negative <17.7C (18) JMS(C)
SDSS J100515.38+191107.9: At min. 17.1C-18.3C (3) JMS(C)
SDSS J105550.08+095620.4: At min. 16.9C-17.8C (10) JMS(C)
SDSS J114628.80+675909.7: At 17.4C on May 2.91, otherwise <17.7C (13) JMS(C)
SDSS J140429.37+172359.5: At min. 16.6C-17.4C (12) JMS(C)
SDSS J150137.22+550123.4: At min. 18.3C (11) JMS(C)
SDSS J151500.56+191619.6: Fade from 16.3C on May 1.9 to 18.3C by May 5.9 then 17.4V-18.3C (12) JMS(C)

SDSS J103533.02+055158.3: At min. 17.7C (2) XG(C)
SDSS J153817.35+512338.0: At min. 17.9C-19.1C (12) JMS(C), XG(C)
SDSS J162212.45+341147.3: At min. 17.7C (10) JMS(C)
SDSS J163605.01+465204.5: At 16.6C (1) XG
SDSS J170324.09+320953.2: At min. 18.0 (1) JMS(C)
SDSS J173008.38+624754.7: At min. 16.5 (7) XG
Negative Observations: KX Aql, V725 Aql, 1502+09 Boo, TT Boo, UZ Boo, V342 Cam, V391 Cam, AK Cnc, CC Cnc, EG Cnc, GY Cnc, V713 Cep, AL Com, V337 Cyg, V542 Cyg, V632 Cyg, V795 Cyg, V1028 Cyg, V1113 Cyg, V1251 Cyg, V1454 Cyg, V1504 Cyg, V2176 Cyg, CP Dra, KV Dra, AW Gem, PR Her, V589 Her, V592 Her, V660 Her, V844 Her, V1008 Her, V1108 Her, AY Lac, RU LMi, SS LMi, FV Lyn, CY Lyr, DM Lyr, LL Lyr, V358 Lyr, V391 Lyr, V493 Lyr, V585 Lyr, UV Per, QW Ser, QZ Ser, RZ Sge, CI UMa, CY UMa, DI UMa, DV UMa, EL UMa, IY UMa, KS UMa, MR UMa, PU UMa, SW UMa, HV Vir, FBS 1719+834
FBS 1735+825, FSVJ1722+2723, NSV 4838, MASTER OT J174902.10+191331.2 19.139, RXJ1437.0+2342, 1RXS J164103.6+784307
SDSS J073208.11+413008.7, SDSS J074640.62+173412.8, SDSS J075059.97+141150.1, SDSS J080303.90+251627.0, SDSS J080714.26+113812.5, SDSS J080846.19+313106.0, SDSS J081610.84+453010.2, SDSS J082457.15+073702.4, SDSS J083931.35+282824.0, SDSS J091242.18+620940.1, SDSS J092229.26+330743.6, SDSS J095135.21+602939.6, SDSS J112003.40+663632.4, SDSS J113551.09+532246.2, SDSS J115207.00+404947.8, SDSS J115639.48+630907.7, SDSS J120231.01+450349.1, SDSS J130514.73+582856.3, SDSS J153634.42+332851.9, SDSS J155656.92+352336.6, SDSS J155720.75+180720.2, SDSS J160419.02+161548.5, SDSS J160501.35+203056.9, SDSS J165244.84+333925.4,

Novae & Supernovae
SN 2013ab: Fade 15.6C on May 11.1 to 16.5V by May 31.1 (2) HF(C&V)
SN 2013aj: At 16.5V (1) HF(V)
T CrB: At min. Mean 10.4 (45) CPR, DR, EV, HF, MDT, TO, XG
V404 Cyg: At 17.6C (4) JMS(C)
DQ Her: At min. 14.4-14.6 (7) XG
HY Leo: At min. 16.8C-17.4C (12) JMS(C)
RS Oph: At min. 11.3-11.7 (14) TO, XG
HR Del: At min. 12.0-12.1 (3) TO
U Leo: At min. 17.1V-17.4V (14) JMS(V), XG
HR Lyr: At min. 15.6C-16.1C (11) JMS(C), XG
Negative Observations: SN 2013bc, 2013bs, V1330 Cyg, V1819 Cyg, V529 Ori,

Eruptives
GRB 130427A: Fade from 19.1V on May 1.205 to 20.37C by May 2.902 (3) HF(V), PI(CR), RPP(C)
Z And: At 9.8 (2) DR
V1413 Aql: AT 12.2-12.4 (6) XG
OV Boo: At min. 18.4 (11) JMS(C)
BZ Cam: Range 12.3-12.6 (10) XG
DW Cnc: At 15.3-15.5 (5) XG
DE CVn: AT 13.0-13.1 (7) XG
AP CrB: At 16.8V-17.0V (3) XG(V)
EG And: At 7.5 (3) TO
AB Aur: Range 6.8-7.2 (9) MDT, TO
BY Cam: At 15.0-15.2 (5) XG
gamma Cas: Mean 2.1 (15) HF, MDT
LV Cnc: At min. 18.3C (11) JMS(C)
TX CVn: Mean 10.15 (13) DR, TO, XG
BF Cyg: At 9.8 (1) DR
CH Cyg: Slight rise – 8.2 mean to 7.9 mean (37) HF, MDT, SK, TO, XG
CI Cyg: Mean 11.1 (14) DR, TO, XG
V1016 Cyg: Mean 11.2 (11) EV, XG
V1329 Cyg: At 13.8 (1) XG
AG Dra: At 9.8-10.0 (6) DR, MDT
BN Gem: At 6.7 (3) MDT
YY Her: Mean 12.2 (12) EV, XG
V751 Cyg: High state – 14.1 (1) XG
V1057 Cyg: At 12.9-13.0 (6) XG
V1363 Cyg: Range 16.6C-17.4C (8) JMS(C), XG
DO Dra: Range 14.9-15.4 (14) CPJ, EV, XG
AM Her: Low state – 14.9-15.3 (8) EV, XG
V443 Her: Mean 11.4 (11) XG
V884 Her: Fainter – Visual 13.8-14.3, V-band 14.0V-14.3V (15) XG(Vis.&V)

V1117 Her: Fade to low state – 14.2-14.8 (2) XG
ST LMi: Range 16.2V-17.2V (12) XG(V)
WX LMi: Range 16.3V-17.1V & 16.6C (6) JMS(C), XG(V)
FR Lyn: At 16.4C (2) JMS(C)
MV Lyr: High state – 12.4-12.6 (13) EV, XG
V562 Lyr: Range 12.1-12.4 (7) CPJ, XG (10) XG(V)
V2301 Oph: Brightening – range 17.5V-15.4V
AG Peg: At 8.7-8.9 (6) TO
X Per: At 6.2 (1) TO
AX Per: At 12.1 (1) DR
V818 Sco: Range 12.3-12.9 (9) TO
LX Ser: At 15.0-15.3 (9) XG
MR Ser: Low state – 16.7V-17.1V (2) XG(V)
V Sge: Fade 10.7-11.0 (5) EV
EG UMa: At 13.6 (2) HF
EI UMa: At 13.8-14.0 (2) CPJ
EU UMa: High state – 17.7V-17.9V (11) XG(V)
PU Vul: At 11.9-12.1 (4) EV
RXSJ161008+035222: Range 16.5V-17.7V (9) XG(V)
SDSS J074716.81+424849.0: At 17.0C-17.2C (7) JMS(C)
SDSS J075653.11+085831.8: At 17.0C-17.5C (4) JMS(C)
SDSS J075808.81+104345.5: At 17.2C-17.5C (4) JMS(C)
SDSS J080908.39+381406.2: At 15.3C-15.4C (2) JMS(C)
SDSS J091935.66+502825.1: At 17.3C-17.8C (16) JMS(C)
SDSS J122405.58+184102.7: At 15.9C-16.6C (11) JMS(C)
SDSS J123255.11+222209.4: At 16.7C-16.9C (12) JMS(C)
SDSS J151915.86+064529.1: At 16.3C-17.4C (11) JMS(C)
SDSS J154953.41+173939.0: At 17.1C-17.2C (12) JMS(C)
SDSS J161012.52+222110.8: At 16.9C-17.7C (11) JMS(C)
Negative Observations: V654 Aur, PP Boo, HT Cam, MT Com, DP Leo, GG Leo, AN UMa, KV UMa, 1RXS J184543.6+622334, 1RXS J185310.0+594509, 1RXS J194151.4+752621, SSDSS J074716.81+424849.0, DSS J075507.70+143547.6, SDSS J080142.37+210345.8, SDSS J084026.16+220446.6, SDSS J084617.12+245344.1, SDSS J092219.55+421256.7, SDSS J092918.90+622346.2, SDSS J093839.25+534403.8, SDSS J095151.79+471008.7, SDSS J100516.61+694136.5, SDSS J120724.69+223529.8, SDSS J121913.04+204938.3, SDSS J125834.74+640823.1, SDSS J141118.31+481257.6, SDSS J142955.86+414516.8, SDSS J145003.12+584501.9, SDSS J145758.21+514807.9, SDSS J152717.96+543724.9, SDSS J170542.54+313240.8, SDSS J171247.71+604603.3, SDSS J172601.96+543230.7, SDSS J202520.13+762222.4,

AGN

3C 232: At 14.3V (1) FL(V)
3C 273: Range 12.5-12.8 (13) CPJ, TO, XG
3C 279: At 16.0C (13) CPJ, TO, XG(Vis.&C)
3C 351: At 15.5 (1) TO
3C 371: At 15.2-15.3 (9) CPJ, XG
3C 382: At 13.6-13.8 (3) XG
W Com: Remains faint - visual range 15.1-15.7. V-band 15.7V (17) CPJ, TO, XG(Vis.&V)
Markarian 421: Mean 12.3 (29) CPJ, HF, TO, XG
Markarian 501: At 13.7 (1) TO
NGC 4151: Mean 11.5 (9) CPJ, TO, XG
OJ287: Visual range 14.7-15.0. V-band 145V-15.1V (20) CPJ, HF(V), TO, XG(Vis.&V)
PKS 1510-089: At 16,.3V (1) HF(V)
S5 0716+71: Active! Fade from 13.75 mean on May 1.9 to 14.4 by May 6.9, rising to 13.4 by May 31.9 (21) CPJ, TO, XG

RCB's

ES Aql: At max. 11.8-11.9 (4) EV
XX Cam: At max. Mean 7.4 (11) DR, MDT, TO
UV Cas: At max. 10.9 (2) DR
R CrB: Fading – 11.0 mean to 13.5 (35) CPJ, DR, EV, HF(V), TO, XG
V482 Cyg: At max. Mean 11.1 (20) DR, EV, XG
V532 Oph: At max. 11.5V-11.6V (2) XG(V)
SV Sge: At max. Mean 10.7 (25) DR, EV, TO, XG
Z UMi: Fade from 14.9 mean on May 1.9 to 16.0 by May 9.0 thereafter <16.1 (18) CPJ, DR, EV, TO, XG
NSV 11154: At max. Mean 12.0 (9) XG

Miscellaneous

R And: Fade 11.3-12.1 (4) DR, TO
AQ And: At 9.1 (1) TO
BZ And: At 8.2-8.3 (2) TO
RW And: At 10.8 (1) DR
R Aql: Rise 7.2 mean to 6.35 mean (5) DR, TO
V Aql: At 7.7-7.8 (3) TO
OW Aql: At 10.1 (1) EV
V450 Aql: At 6.8-6.9 (3) TO
X Aur: Rise 13.4-10.3 (3) EV
AA Aur: At 14.0 (1) EV
GO Aur: At 12.2 (1) EV
ST Aur: Rise 12.1-11.2 (3) EV
UU Aur: Rise 5.9-5.7 (3) TO
UV Aur: At 8.3 (1) TO
VX Aur: Fade 10.0-10.4 (2) EV
R Boo: Fade 8.2-9.3 (2) TO
U Boo: Fade 10.9 mean to 11.2 mean (5) DR, TO
V Boo: Rise 8.8-8.25 mean (10) DR, MDT, SK, TO
RV Boo: Range 8.2-8.9 (7) MDT, SK, TO
RW Boo: Mean 8.4 (7) MDT, SK, TO
RX Boo: Rise 8.4 to 7.95 mean (20) HF, MDT, SK, TO
UV Boo: Mean 8.4 (12) HF

U Cam: At 8.1-8.2 (3) TO
V Cam: Fade 9.9-10.2 (2) DR
W Cam: At 11.2 (2) EV
X Cam: Rise 10.8 mean to 9.3 (7) DR, TO
RT Cam: At 13.5 (1) EV
ST Cam: Range 6.8-7.6 (6) MDT, SK, TO
ZZ Cam: At 7.4 (1) MDT
T Cnc: At 9.0 (1) TO
W Cnc: At 8.4 (1) EV
X Cnc: Range 5.8-7.1 (8) DR, MDT, SK, TO
RS Cnc: Range 5.7-6.6 (5) MDT, TO
RT Cnc: Mean 7.8 (4) MDT, TO
R CVn: At 8.3 (1) TO
U CVn: At 14.0 (1) DR
V CVn: Mean 7.0 (8) MDT, SK, TO
Y CVn: At 5.3-5.4 (4) MDT, TO
TU CVn: Mean 5.9 (4) MDT, TO
rho Cas: Mean 4.3 (9) HF
T Cas: Rise 9.1-8.6 (5) DR, TO
W Cas: At 9.2 (1) EV
WZ Cas: Range 6.6-7.2 (11) HF, MDT
V377 Cas: Mean 8.0 (9) HF
V391 Cas: Mean 7.5 (10) HF, MDT
V393 Cas: Mean 7.7 (10) HF, MDT
V465 Cas: Mean 7.0 (11) HF, TO
mu Cep: Mean 3.9 (4) MDT, TO
S Cep: At 9.1 (1) EV
T Cep: Fade 6.8 mean to 8.0 6) SK, TO
W Cep: Mean 7.5 (6) MDT, TO
Y Cep: Rise 11.0-10.4 (2) EV
Z Cep: At 12.6 (1) EV
AR Cep: Range 7.1-7.6 (3) MDT
AX Cep: At 13.1 (1) EV
BF Cep: At 14.8-14.9 (2) EV
DM Cep: At 7.3 (1) MDT
FZ Cep: At 7.4 (1) MDT
RW Cep: At 7.1 (4) MDT, TO
SS Cep: AT 7.0-7.1 (5) MDT, TO
R Com: Rise 14.8-14.0 (3) TO
FS Com: At 6.0 (1) TO
S CrB: Fade 13.0-13.4 (5) DR, TO
V CrB: Fade 10.2-10.8 (6) DR, EV, TO
W CrB: Fade 8.8-9.7 mean (5) DR, TO
RR CrB: Mean 7.8 (4) MDT, TO
RS CrB: Rise 8.6-8.4 (3) TO
R Crv: At 10.2 (1) TO
SV Crv: At 7.5 (1) TO
chi Cyg: Maximum. occurring on May 7.0 at mean 3.8, then fade to 4.5 mean by May 27.0 (17) DR, MDT, SK, TO, XG
P Cyg: At 4.7-4.8 (11) HF
R Cyg: Rise 14.1-13.4 (2) DR
S Cyg: Fade 10.0-10.5 (2) DR
T Cyg: Mean 5.2 (8) HF
U Cyg: At 11.7 (1) EV
V Cyg: Mean 12.1 (6) DR, EV, TO
W Cyg: Mean 6.5 (8) DR, MDT, SK, TO
AF Cyg: Rise 8.0 to 7.4 mean (20) HF, MDT, SK, TO
BC Cyg: At 10.4 (1) DR
BI Cyg: At 10.0 (1) DR
FY Cyg: At 12.5 (1) EV
RS Cyg: At 8.1 (1) EV
TT Cyg: Rise 8.4-8.2 (3) TO
WX Cyg: At 10.3 (1) EV
V973 Cyg: At 6.5 (1) MDT
V1339 Cyg: At 6.1 (1) MDT
V1664 Cyg: At 5.0- 5.1 (9) HF
U Del: At 7.4-7.5 (3) TO
EU Del: At 6.4-6.7 (3) TO
T Dra: At 12.7-12.9 (3) DR, EV
AH Dra: Range 7.4-8.1 (6) MDT, TO
AZ Dra: Range 7.3-7.6 (3) MDT, TO
RY Dra: Range 6,.6-7.4 (4) MDT, TO
TX Dra: At 7.6 (4) MDT, TO
UW Dra: At 7.8 (1) MDT
UX Dra: Rise 6.9-6.6 (2) MDT
WZ Dra: At 12.9 (1) EV
ZZ Dra: Rise 14.2-13.9 (2) EV
RR Equ: At 10.9 (1) EV
BP Gem: At 12.2 (1) EV
BU Gem: Range 6,.3-6.8 (8) HF, MDT, TO
LU Gem: At 7.0-7.1 (5) HF
PU Gem: At 5.8-5.9 (5) HF
ST Gem: At 10.8 (1) EV
TU Gem: At 7.5 (2) HF
TV Gem: Mean 6.9 (6) HF, TO
WY Gem: Range 7.7-8.0 (3) HF, TO
g Her: At 5.5-5.6 (3) TO
X Her: Fade 6.2 mean to 6.9 (4) MDT, TO
AC Her: Fade from 7.35 mean on May 2.9 to 8.0 by May 15.9, then rise to 7.4 mean by May 31.9 (23) DR, MDT, SK, TO
NP Her: At 11.4 (1) EV
OP Her: Mean 6.7 (4) MDT, TO
RU Her: At 13.9-14.0 (3) DR, TO
SS Her: Fade 8.5-9.0 (2) XG
ST Her: Mean 8.0 (4) MDT, TO
SX Her: At 8.3-8.4 (4) MDT, TO
UW Her: Range 7.7-8.2 (4) MDT, TO
UZ Her: At 13.1 (1) EV
VY Her: At 12.5 (1) EV
V566 Her: At 7.8 (1) MDT
R Hya: At 8.5-8.6 (2) TO
U Hya: At 5.8 (3) TO
V Hya: At 9.0 (1) TO
W Hya: At 7.2 (1) TO
SU Lac: At 14.6 (1) DR
SX Lac: Fade 8.4-8.7 (3) TO
V416 Lac: At 5.4 (1) MDT
R Leo: Fade 8.1-8.8 (6) MDT, SK, TO
RS Leo: Fade 9.9-10.1 (2) DR
RY Leo: Fade 10.6-11.7 (5) DR, TO
R LMi: At 8.9 (1) TO
U LMi: Mean 11.82 (6) CPJ, DR, TO
FY Lib: At 7.8 (1) TO

T Lyn: At 11.2 (1) EV
X Lyn: At 12.6 (1) DR
CE Lyn: At 7.9-8.0 (2) TO
R Lyr: At 4.8-4.9 (3) TO
T Lyr: At 9.2 (1) TO
XY Lyr: At 6.4-6.5 (3) TO
RV Mon: At 8.1 (1) TO
X Oph: At 8.4 (3) TO
V759 Oph: At 10.8 (1) EV
W Lyn: Rise 14.55 mean to 12.3 (3) DR, TO
Y Lyn: At 7.9-8.1 (4) SK, TO
SV Lyn: Fade 7.1-7.6 (5) MDT, TO
S Lyr: Rise 13.4-12.3 (2) EV
U Lyr: At 10.8 (1) EV
U Mon: At 6.5 (1) TO
SX Mon: At 8.4 (1) TO
RX Oph: Fade 14.9-15.3 (2) EV
U Ori: Discordant – At 6.6-6.7 & <7.3 on May 1/2 (4) HF, MDT, TO
BL Ori: At 6.8 (1) TO
beta Peg: At 2.7 (2) TO
GO Peg: At 7.7 (2) TO
S Per: At 10.5 (2) DR
AQ Sgr: At 7.6 (1) TO
BQ Ori: At 8.4 (1) TO
AN Peg: At 13.8 (1) EV
RZ Peg: At 12.2 (1) EV
RR Per: At 12.3 (1) EV
R Sct: Fade to deep min. May 2.1 5.7 to 8.3 by May 31.9 (5) DR, TO
RT Sex: At 8.8 (1) TO
R Ser: Rise 12.6-11.8 (3) TO
WW Ser: At 11.6 (1) EV
S Sct: At 7.5-7.6 (3) TO
R UMa: At 7.9 (1) TO
T UMa: Fade 8.9-10.1 (5) DR, TO
Z UMa: Rise 8.8-7.3 (15) HF, SK, TO
RY UMa: Mean 7.6 (17) HF, MDT, SK, TO
TV UMa: At 7.2-7.3 (3) TO
VY UMa: At 6.7 (1) MDT
V UMi: Fade 7.8-8.2 (5) MDT, TO
TT UMi: At 7.0 (1) TO
R Vir: At 10.9 (1) TO
BK Vir: At 8.0-8.1 (3) TO
RW Vir: Rise 7.6-7.3 (3) TO
SS Vir: Heavy scatter - range 6.2-7.6 (6) MDT, TO
BD Vul: At 10.4 (1) EV
tau4 Ser: At 6.8-6.9 (3) TO
Z Ser: At 9.5 (1) TO
delta Sco: At 2.3 (1) TO
Y Tau: At 7.5 (1) TO
S UMa: At 8.9 (1) TO
X UMa: Fade 10.0-10.7 (2) EV
RU UMa: At 12.9 (1) EV
ST UMa: Mean 6.7 (6) MDT, TO
VW UMa: At 7.6 (1) MDT
R UMi: At 9.7 (1) TO
Y UMa: At 9.2 (1) TO
TW UMi: At 8.2 (1) TO
RX Vir: At 8.8 (3) TO
RU Vir: At 13.8 (1) EV
SW Vir: At 7.3-7.5 (3) TO
V Vul: Discordant results – mean 8.9 (5) DR, TO
Negative Observations: HT Aur, S Cas, X Com,

Suspects

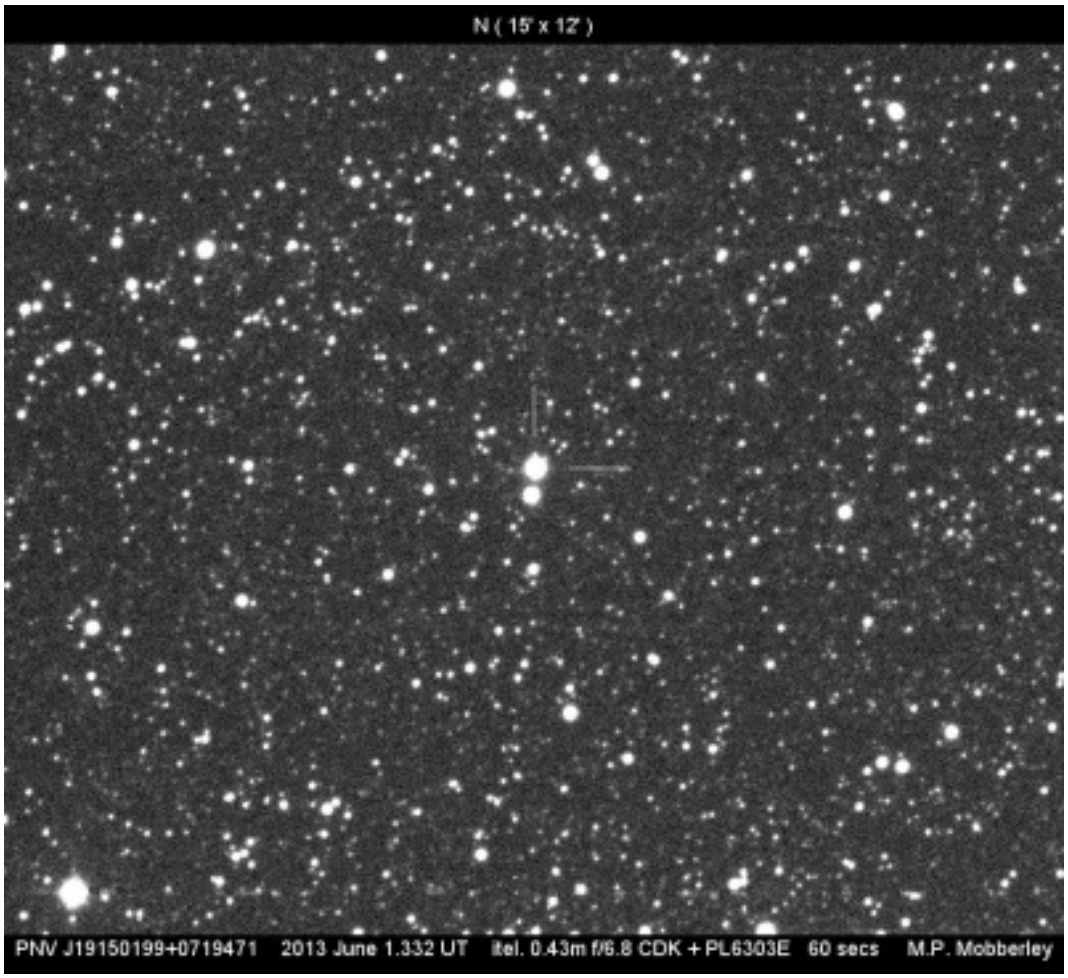
NSV 650: At 7.2-7.3 (9) HF, MDT
NSV 5543: At 18.1C (12) JMS(C)
NSV 7373: At 9.7-9.8 (2) HF
NSV 13857: At 5.5 (1) MDT
NSV 16812: At 6.4 (5) HF
NSV 25966: At 16.5C-16.8C (4) JMS(C)
NSV 5086: Rise 11.1-10.9 (3) HF
NSV 7370: At 9.6-9.7 (2) HF
NSV 7378: Rise 9.4-9.0 (2) HF
NSV 14213: At 5.8 (1) MDT
NSV 16874: At 10.8 (1) CPJ
BD+26 2566: At 8.8-8.9 (4) HF

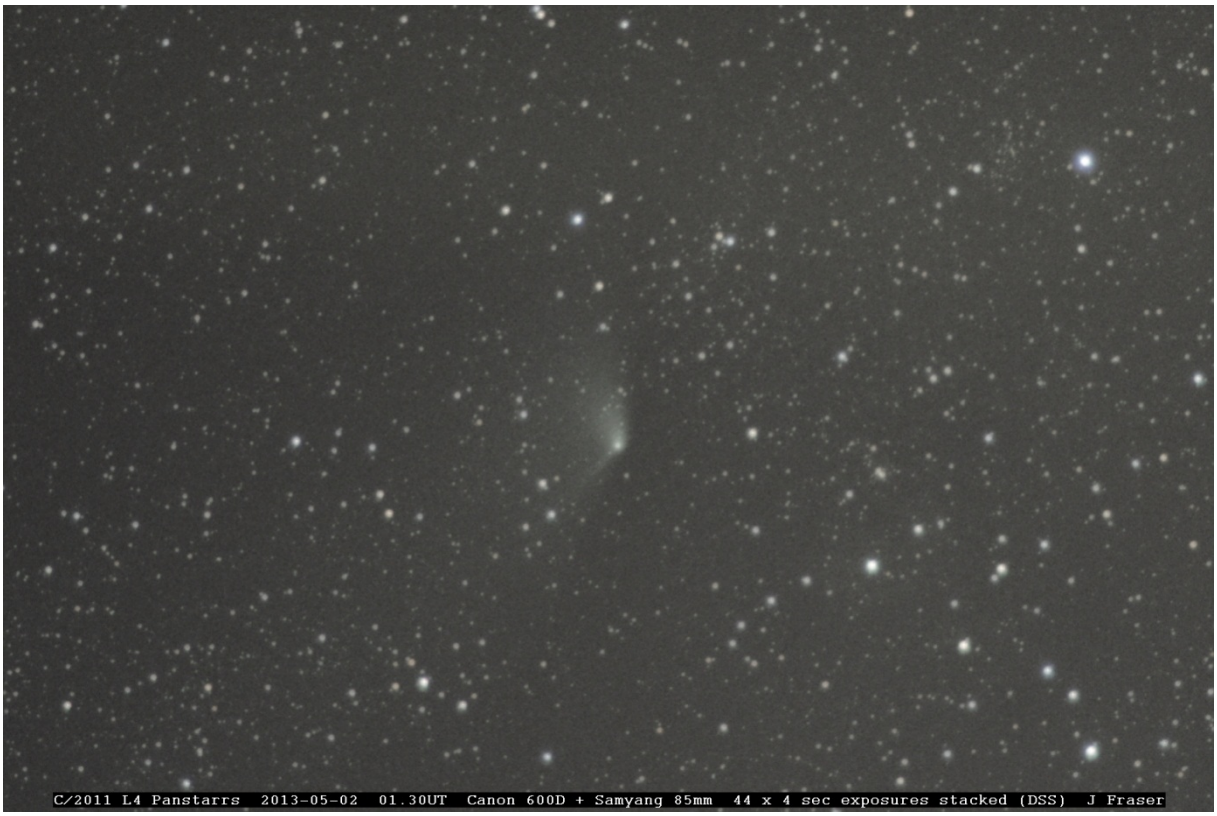
Negative Observations: Q1995_047, TAV J0629+205

No. of observations reported = 3,729

Observers: Bob Dryden DR, Tom Lloyd Evans EV, John Fletcher (V) FL, Guy Hurst (Vis.C&V) HF, Chris Jones CPJ, Roger Pickard (CR), PI, Gary Poyner (Vis, C&V) XG, Philip Russell (C), RPP, Jonathan Shanklin SK, Jeremy Shears (C&V), JMS, Melvyn Taylor MDT, John Toone TO

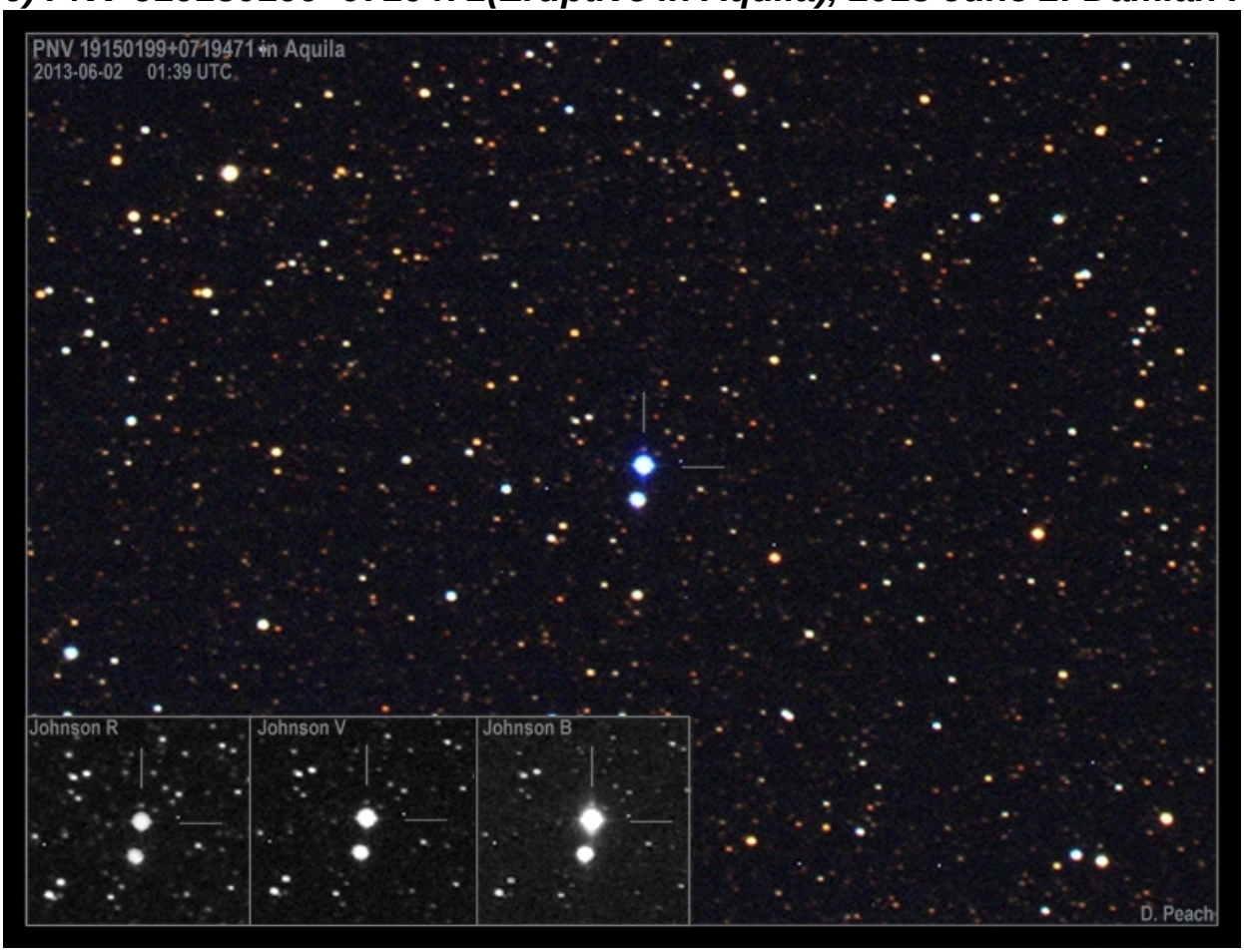
4) PNV J19150199+0719471(Eruptive in Aquila), 2013 June 1: Martin Mobberley

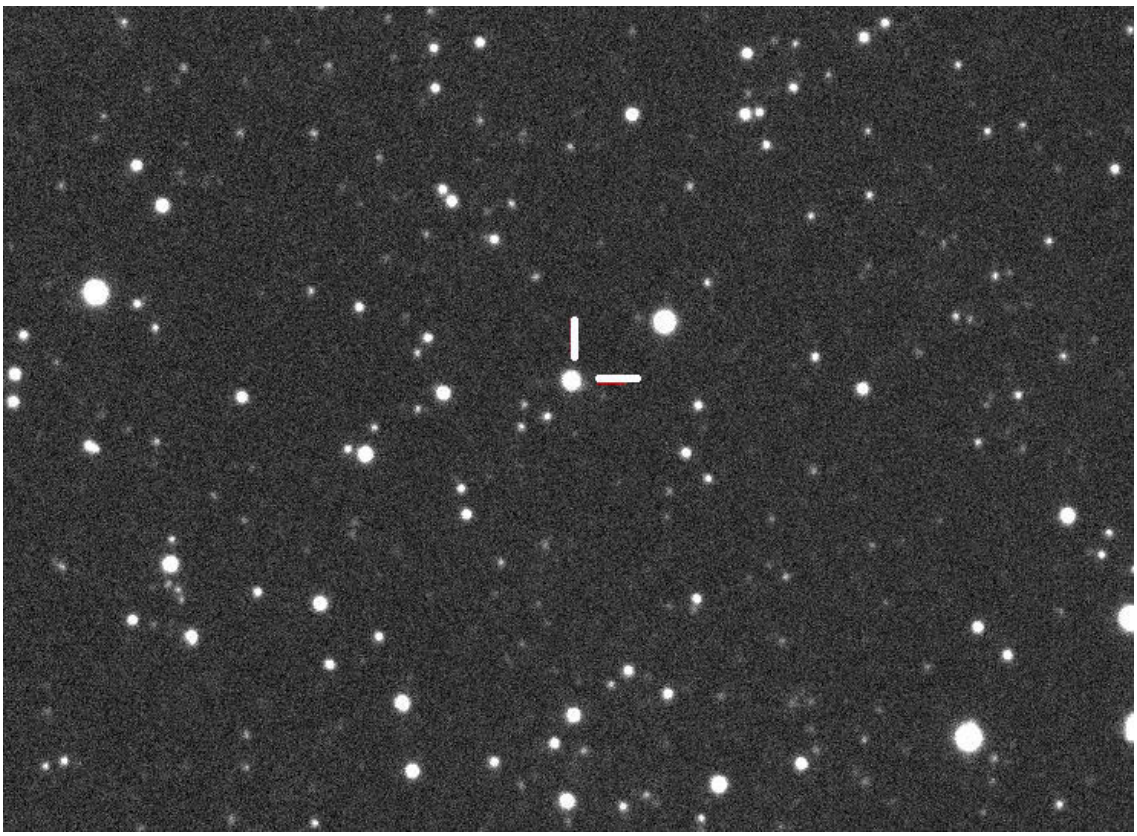




5) Comet C/2011 L4, 2013 May 2: James Fraser

6) PNV J19150199+0719471(Eruptive in Aquila), 2013 June 2: Damian Peach





7) Nova Scorpii 2013, 2013 June 3: Ernesto Guido and Nick Howes