

Southern African Fireball Observations 2005

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Catalogue of Recent Sightings

This article continues the sequential numbering of reported fireball sightings from southern Africa, and covers fireballs observed from January to December 2005. By definition, a fireball is any meteor event with brightness equal to or greater than visual magnitude -3. The following events were reported to the author and details are reproduced as given by the observer. All times were converted to UT, and all coordinates are for epoch J2000.0.

Event 169 – 2002 December 1 – Kempton Park, Gauteng

Observed by Laurie Kaye from the cockpit of a Boeing 747 aircraft during takeoff from Johannesburg International Airport. The event was observed on 2002 December 1 but was only reported recently. Time was around 17h00 (shortly after sunset), about 10 minutes after takeoff from runway 03 and directly ahead with the aircraft heading 310° . The motion was downwards at an altitude of $\sim 8\text{-}14^\circ$. This would put the path of the meteor very approximately from Delphinus through Cygnus. A check on my archives shows no other reports on this evening.

As an interesting aside, Captain Kaye will be remembered as the pilot of the Boeing 747 which flew low over Ellis Park before the start of the 1995 Rugby World Cup final. As I was in the stadium at the time, I observed this event, and I must admit to shedding a tear. Thank you Laurie for both events!

Event 170 - 2005 January 15 – Constantia, Cape

Observed by John Kleyn, Brommersvlei Rd. Constantia at 05h23, full sunshine, no cloud.

First seen at altitude $\sim 35\text{-}40^\circ$, heading $5\text{-}10^\circ$ west of north, burning out at altitude $10\text{-}15^\circ$. Speed fast, colour bright orange. Appeared to grow in size before burning out without any disintegration. Left bright white trail of short duration, no sound.

Event 171 - 2005 January 24 – Bryanston, Gauteng

Observed by Trevor Gould at 20h05, driving on William Nicol highway. $m_v = \sim -6$, colour white, no train, disintegrated into several pieces. The moon was full that evening, however path given very approximately as 13h25, -64° , to 18h45, -70° . The fireball was also reported independently by Charles Biddulph, driving south on the R21 highway from Pretoria.

Event 172 - 2005 March 26 – Northern Cape

Observed by Bruce Saxby and several others, reported via Brian Fraser. Location on the Orange River about 100km inland at $\sim 18h00$, very bright but not as bright as the full moon (which had just risen). Duration about 5 seconds, disintegrating along its path which was roughly from south-west to north-east. The observers reported sparks in front of and trailing the head. Colour was orange red, no trail and no sound.

Event 173 - 2005 April 29 – Alldays, Northern Province

Observed by Magda Streicher at 19h40. $m_v = -6$ or -7 . Path from 07h, $+3^\circ$ to 08h, -9° . Duration 4 seconds, colour blue, with persistent train. Several bursts along its trajectory, broke into two pieces before fading out.

Event 174 - 2005 June 2 – Alldays, Northern Province

Observed by Magda Streicher at 20h40. $m_v = -3$. Speed fast, path from 13h, -3° to 15h, $+3^\circ$. Magnitude -2.5 with terminal burst to -3 at end of path.

Event 175 - 2005 June 15 – North of Harrismith, Free State

Observed by Andrie van der Linde at $\sim 18h00$, travelling south on N3 to Durban. $m_v = -5$ or -6 . Colour green, duration [longer than] 2-3 seconds, no train. Due to driving, the coordinates of start and end points were very approximately given as 18h30, -49° (first came into view) to 22h30, -65° where it disappeared behind some hills.

Event 176 - 2005 July 18 – Johannesburg, Gauteng

Observed by Trevor Gould at 18h20. $m_v = -8$, brighter than nearby moon (89%). Conditions were poor with high thin cloud, but path approximately from 12h48, $+2^\circ$ to 13h48, $+49^\circ$. Duration 3 seconds, colour yellow, no visible train, faded in two stages. Personally I was observing Nova Sagittarii 05#2 at the time and the fireball was behind the roof of my open observatory.

Event 177 - 2005 September 13 – Polokwane, Northern Province

Observed by Magda Streicher at 02h15. $m_v = -3$ to -4 . Very short blue flash crossing gamma Orionis, from direction of Taurus, moving south east.

Event 178 - 2005 September 24 – Ellisras, Northern Province

Observed by Andrie van der Linde during twilight at 16h18 from about 4km south of Hans Strydom dam. $m_v = -5$, slightly brighter than Venus which was visible at the time. Colour white, slow and duration about 5 seconds. From the rough directions described I obtain the following start and end points; 20h15, $+15^\circ$ to 23h50, -30° .

Event 179 - 2005 September 24 – Kaapsehoop, Mpumalanga

Observed by Willie Marais at 16h35, much brighter than Venus, $m_v =$ about -6 . Colour said to be [aqua]green. Broke up into several fragments and left persistent train. Duration given as 9 seconds (!). From the description of the path I obtain the following start and end points; 18h50, $+33^\circ$ to 23h30, $+01^\circ$.

Event 180 - 2005 October 21 – Pretoria, Gauteng

Observed by Andrie and Casper van der Linde and Gerrit Scheffer at 17h45 from the Pretoria Centre's observatory site at CBC. $m_v =$ about -6 . Colour yellow/orange. Path from about 00h13, $+15^\circ$, almost parallel to the horizon to about 20h00, $+24^\circ$. Showed signs of disintegration along its path and persistent train. Duration about 5 seconds.

Event 181 - 2005 October 27 – Alldays, Northern Province

Observed by Magda Streicher at 16h19. $m_v = -4$. Path from 17h40, $+10^\circ$ to approx 16h40, $+30^\circ$. Colour white, no tail or persistent train, more like a bright white ball or coma. Sky conditions slightly hazy.

Event 182 - 2005 November 13 – Vanderbijlpark, Gauteng

Observed by Henk Kruger and his wife from home early morning at about 02h30. Very short duration, faded almost immediately. Followed about 30 seconds later by a loud bang like an explosion. No further details provided.

Event 183 - 2005 December 10 – Cape Town, Western Cape

Reported by Dudley Field. Observed during a SALT open night at the Observatory in Cape Town at about 20h00, $m_v = -6$ or -7 . First seen as a bright meteor but brightened rapidly, duration 2 seconds before being lost behind trees. Brilliant white. Path very approximately from 22h, -14° to 20h, -10° .

Report on CCD activities at the Bronberg Observatory (CBA Pretoria) in 2005

The Bronberg Observatory (25° 54' 32 S, 28° 26 18 E, alt. 1590 m / updated values) is situated 40 km south-east of Pretoria, on plot 39, Rietfontein JR 395, which is located on top of the Bronberg ridge, which stretches from Pretoria to just East of the observatory.

The Observatory, which is run by LAG (Berto) Monard, is also the dedicated African participant in the global CBA (Centre for Backyard Astrophysics) network under the name of CBA Pretoria.

The observatory houses a Meade 12" LX 200, which is permanently mounted on a pier and polar wedge. This telescope is used with a CCD camera, SBIG ST-7XME and a focal reducer that produces an effective f/3.7. A filter wheel with BVRI filters is part of the system.

The main types of observation at the Bronberg Observatory / CBA Pretoria were explained in the 2002 and 2004 reports.

The following observing activities took place in 2005:

1. Time series Photometry (part or full night) on cataclysmic variables (CVs) Most of the time series were done as participation in the CBA around the globe monitoring network and the VSNET campaigns. Some were done simultaneously with satellite observations (Chandra, FUSE...).

The following targets were monitored over four or more nights or part there-of. Observations were unfiltered CCD unless stated differently.

- 2QZ J021927-3045: Jul 3-7, 9-15; 12 nights
- AE Aqr : CCD-V Aug 29-31, Sep 1; 4 nights
- AH Men: Jan 5, 6, 24, 25, 28, 30, Feb 18; 7 nights
- ASAS 160048-4846.2: Jun 9-21, 23, 24, 27-29, Jul 1; 19 nights
- BV Cen: Jun 1-4; 4 nights
- BW Scl: Nov 1, 9, 15, 20, 21, Dec 7; 6 nights
- CP Pup: Apr 9, 11, 18, 20, 21; 5 nights
- CTCV J1300-3052: Aug 13-15, 17; 4 nights
- FL TrA: Jul 27-31, Aug 1, 2, 5; 8 nights
- Ind: Sep 15-21; 7 nights

- N? Pyx: Mar 17-20, 24, 26, 31; 7 nights
- PU CMa: Feb 2, 4-6, 10; 5 nights
- ROTSE J 1009-02: Feb 22, Mar 1, 4, 7; 4 nights
- RXS J1730-05: Jul 3, 6, 7, 9-13; 8 nights
- RZ Gru: Aug 2, 5-8, 13, 17-21, Sep 27-29, Oct 1-4, 7, 18; 20 nights
- V1033 Sco: Mar 7,24, Apr 7, Jun 1; 4 nights
- V1043 Cen: Mar 7-9, 12, 13, Apr 4; 6 nights
- V345 Pav: Jul 19-27; 9 nights
- V3608 Sgr: May 27-30; 4 nights
- V4641 Sgr: May 1, Jun 24-26, 28-30, Jul 1, 2, 5, 13, 14; 12 nights
- V504 Cen: Mar 28, 30, 31, Apr 28, 30, May 2-8, 10, 11; 14 nights
- V803 Cen: May 12-31, Jun 1-15; 35 nights
- VZ Scl: Sep 9-14, 24; 7 nights
- WX Pyx: Dec 11-15; 5 nights

Other targets with time series photometry were done on fewer nights. They include outbursting CVs and some ‘exploration’ CV targets, a fresh nova, two blazars and a minor planet. They are listed alphabetically with the number of observed nights (or part thereof) in brackets:

CTCV J1925-5001 (1), MP Atossa (3), PKS 2005-489 (1), PKS 2155-304 (1), QU Car (3), RX J1039-0507 (3), V1082 Sgr (3), V1186 Sco (1), V1187 Sco (1), V1195 Oph (1), V2839 Sgr (1), V378 Ser (1), V391 Hya (2), V395 Hya (2), V4065 Sgr (1), V422 Car (1), V442 Oph (1), V4743 Sgr (1), V574 Pup (1), V818 Sco (2), V841 Oph (1)

Some of the observations (in most cases with assistance from other observatories) did establish the UGSU nature of the following cataclysmic binaries, measured during a long duration active (superoutburst) stage. Some of those CVs were not known to be dwarf novae:

ROTSE J100932-020155: the alerted detection by the ROTSE team of a bright CV was promptly followed up at the Bronberg Observatory and other observatories.

2QZ J021927-3045: a cv discovered by the 2dF survey, was spotted in outburst at the Bronberg Observatory on July 3. Immediate follow up by means of time series photometry, later assisted with observations from alerted observatories at other time zones allowed to establish the ugsu status of this star.

ASAS 160048-4846.2 was discovered as an active CV during the ASAS3

survey. Prompt follow up on the alert with time series photometry at the Bronberg Observatory and later at other observatories showed the ugsu nature of this star.

N? Pyx was announced as a possible nova. Prompt time series from CBA Pretoria (Bronberg Observatory) showed the presence of a modulation in the light curve, refuting the nova nature of the object. This was reported to the CBA group and observations from different time zones allowed to fill in the details of this ugsu star.

FL TrA was found in outburst by R Stubbings. Follow up observations from several observatories established the nature of this rarely outbursting CV.

The annual (seems to occur like that) V4641 Sgr festival took place in the period June-July. Interesting observations were done from the Bronberg Observatory. This star is unpredictable and global observations are the only way to monitor the build-up to the giant flares of this microquasar.

Time series photometry was done on 1 year old novae to look for periodic signals, incl. the presence of eclipses.

Time series photometry done on certain CVs did show a different nature for the stars concerned. V2839 Sgr and V3608 Sgr (see 2005 report) were found to be RRab stars with periods around 0.5d and not CVs. VZ Gru and the variable found near V1043 Cen are RRab stars too.

For details on all those, see the on-line CV atlas at:
<http://archive.stsci.edu/prepds/cvcat/index.html>

Note: for future reference, observations of time series photometry and related observations of cataclysmic variables, done at the Bronberg Observatory are referred to as done at CBA Pretoria.

2. Snapshot Observations of faint CVs and X ray Transients.

The list of observed targets has further expanded to 210 objects. Due to capacity limits and changing priorities it is expected to be reduced during 2006.

Many observations were done on the active black hole binary V1033 Sco (GRO J1655-40) over the duration of its active state. Light curves in V and R show the optical activity of this LMXB.

3. **Supernova Searching** activities yielded 14 SNe in 2005:

- SN 2005Q in ESO 244-31, Type II, discovered on Jan 28.80 at 17.2CR
- SN 2005ah in anon ACOS 560, Type Ia, discovered on Feb 10.77 at 17.3CR
- SN 2005at in NGC 6744, Type Ic, discovered on Mar 05.14 at 14.3CR
- SN 2005av in NGC 6943, Type IIn, discovered on Mar 24.08 at 15.4CR
- SN 2005bf in MCG+00-27-5, Type Ic/b, discovered on Apr 05.72 at 18.0CR
- SN 2005bq in IC 4367, Type Ic, discovered on Apr 17.04 at 18.3CR
- SN 2005br in IC 5084, Type Ib, discovered on Mar 28.11 at 16.5CR
- SN 2005bs in anon ACO 3667, Type Ia, discovered on Apr 19.07 at 17.4CR
- SN 2005cj in ESO 114-14, Type ?, discovered on Jun 12.12 at 17.9CR
- SN 2005cm in IC 5142, Type ?, discovered on Jun 20.12 at 16.9CR
- SN 2005cu in NGC 6754, Type II, discovered on Jul 10.76 at 16.1CR
- SN 2005db in NGC 214, Type IIn, discovered on Jul 19.14 at 17.3CR
- SN 2005dg in ESO 420-3, Type Ic, discovered on Aug 5.14 at 16.6CR
- SN 2005me in ESO 244-31, Type II, discovered on Dec 23.79 at 17.5CR

Remarkable is the dry spell in the period Aug-Dec, despite the same efforts. For this to happen must be a statistical low probability.

Notes: CR are unfiltered CCD magnitudes traceable to Rc magnitudes.

As predicted in the 2004 report, two type Ia SNe were found in Abell clusters. Four other marks were achieved by the Bronberg Observatory:

First one-letter SN (2005Q)

First code repeat (SN 2002bq / 2005bq)

First galaxy with a second SN find (ESO 244-31, SN 2005Q/me)

First hat-trick (SN 2005bq/br/bs)

More on the above SNe and their notifications in the circulars of the International Astronomical Union can be found at:

- <http://www.rochesterastronomy.org/snimages/>
- <http://cfa-www.harvard.edu/cfa/ps/lists/RecentSupernovae.html>

Lately it has become fashionable to give a specific name to the SN search efforts for each Observatory or group of observatories: LOSS, CROSS, BRASS, TOSS etc.

Perhaps the name BOSS must be forwarded... for the Bronberg Observatory SN Search?

4. Follow-up observations on alerts for Gamma Ray Bursts (GRBs)

Only one GRB afterglow was successfully imaged in 2005:

GRB 050801: positive detection images of a reported counterpart were made 40 minutes after the GRB trigger. The magnitude of the measured afterglow varied over a period of 11 minutes from 17.5 to 18.4CR.

Other attempts to image and detect GRB afterglows gave negative results. The following GRB fields were imaged and reported onto the AAVSO-HEN site. The magnitude limit and time delay between observation time and GRB trigger are given in brackets. The image limit was usually 0.5 to 1.0 CR deeper.

GRB 050318 (17.5, 3.3h), GRB 050326 (17.5, 8.5h), GRB 050331 (20.0, 1.8h), GRB 050408 (19.0, 1.4h), GRB 050418 (16.5, 8.0h), GRB 050709 (19.5, 28.4h).

Although these were negative detections, two of them were of significance. The most interesting of those reports was that of GRB 050331. The Bronberg report was a refutation of published positive detections by the SWIFT UVOT system, which had reported a bright optical counterpart. As soon as the AAVSO report on the Bronberg observations was reported to GCN, the SWIFT people started retracting all previous reports on those positive detections. See GCN 3159 and later.

The other important observation was of GRB 050418. It was the first deepest world-wide non-detection of that GRB that occurred close to the direction of the sun. It was reported in GCN 3292 (GRB 050418).

5. Follow up on X ray sources

Due to the low success rate in the past, no follow up observations on reported X ray activities observed by INTEGRAL were attempted in 2005.

Observations of the active LMXB V1033 Sco were reported above.

6. Other observations

CCD observations were done on request of professional astronomers often to complement observations via satellites at other wavelengths or on exploration targets.

Confirmation images of newly discovered novae were made on request of the discoverer or an organization.

Confirming observations, colour indication and astrometry were made of Nova Sgr 05 (V5115 Sgr), Nova Nor 05 (V382 Nor), and Nova SMC 05.

Observations to detect transits of **exoplanets**:

HD 109749 was observed on several occasions in April by invitation of a professional group. No transits were detected.

HD 76700 was observed on nights in Feb and April (own initiative). No transits were seen.

See amongst others:

http://www.ucolick.org/%7elaugh/HD76700__b.results.html
and the remarks in the 2004 report.

7. Symbiotic stars monitoring project

Observations of the listed stars were made approximately once every month. Interesting info on periodic behaviour (Mira-like or eclipsing) was already picked up during the first year. In other cases the true identity of the star was discovered in variability and the suspect ID rejected. Although no detailed study has been done on the observations so far, it is clear that certain of the findings are not known or shown in the literature.

It is expected that interesting behaviour will be recorded in the years to come.

8. Conclusion for the Bronberg Observatory in 2005

2005 was another successful year for the Bronberg Observatory with 14 SN finds, a productive characterisation of several CVs and the successful start of the symbiotic star observing programme.

9. References/publications to date

Observing data, contributed to campaigns resulted in co-authorship in many publications. They are listed in the Appendix below. IAUCs and GCNs are not included.

Berto Monard for

Bronberg Observatory / CBA Pretoria

Pretoria, 20 January 2006

Appendix: List of relevant publications in 2005

Title: **Discovery of a Promising Candidate of WZ Sge-Type Dwarf Novae, ASAS 160048-4846.2: Evidence for Double-Peaked Humps.**

Authors: Akira Imada, L.A.G. Berto Monard, submitted to *PASJ*.

Title: **The 2003/2004 superoutburst of SDSS J013701.06-091234.9.**

Authors: Akira Imada, Taichi Kato, Kaori Kubota, Makoto Uemura, Ryoko Ishioka, Seiichiro Kiyota, Kenzo Kinugasa, Hiroyuki Maehara, Kazuhiro Nakajima, L.A.G. Berto Monard, Donn R. Starkey, Arto Oksanen, Daisaku Nogami. Accepted for *PASJ*.

Title: **Superhumps in Cataclysmic Binaries. XXV. q_{crit} , $\epsilon(q)$, and Mass-Radius.**

Authors: Joseph Patterson, Jonathan Kemp, David Harvey, Robert Fried, Robert Rea, Berto Monard, Lewis Cook, David Skillman, Tonny Vanmuster, Greg Bolt, Eve Armstrong, Jennie McCormick, Thomas Krajci, Lasse Jensen, Jerry Gunn, Neil Butterworth, Jerry Foote, Marc Bos, Gianluca Masi, Paul Warhurst. *PASP* (2005), **117**:1204.

J.P.U. Title: **The red optical afterglow of GRB 030725.**

Authors: G. Pugliese, P. Møller, J. Gorosabel, B. L. Jensen, Fynbo, J. Hjorth, S.F. Jørgensen, B. Monard, C. Vinter. *Astron.Astrophys* (2005), **439**: 527-532.

Title: **Outburst of a Black Hole X-ray Binary V4641 Sgr in 2004 July**

Authors: Uemura, M.; Mennickent, R.; Stubbings, R.; Bolt, G.; Monard, B.; Cook, L. M.; Williams, P.; Ishioka, R.; Imada, A.; Kato, T.; Nogami, D.; Starkey, D.; Maehara, H.; Nakajima, K.; Meszaros, Sz.; Szekely, P.; Kiss, L. L.; Lindstrom, C.; Griffin, J. *Information Bulletin on Variable Stars*, **5626**: 1

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